

Arizona Highways



Five Cars Passing Abreast on New Tempe Bridge

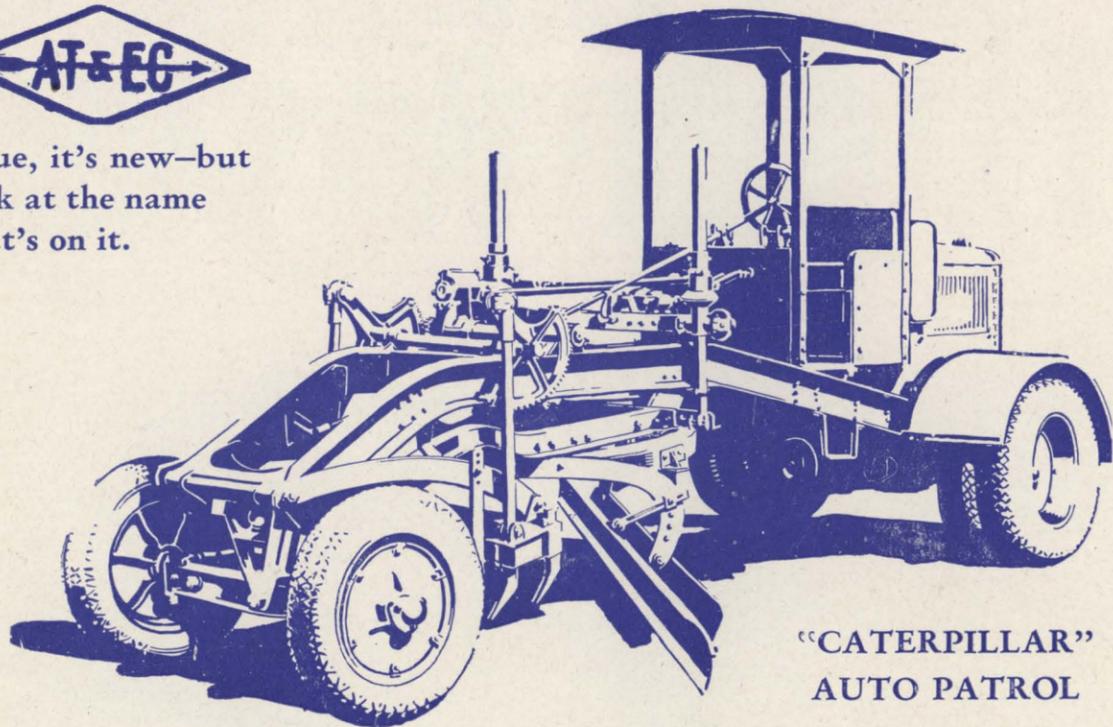
**Volume 7
Number 6**

June

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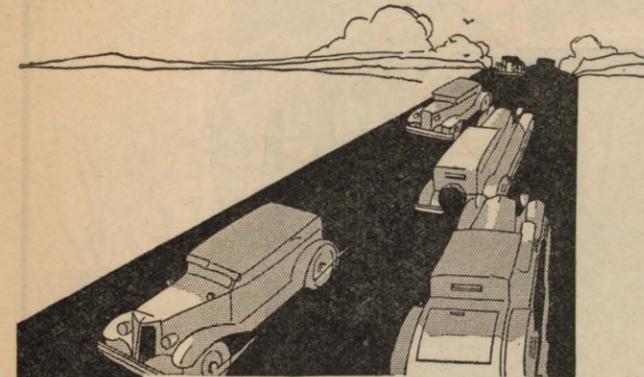
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Arizona Highways

June, 1931



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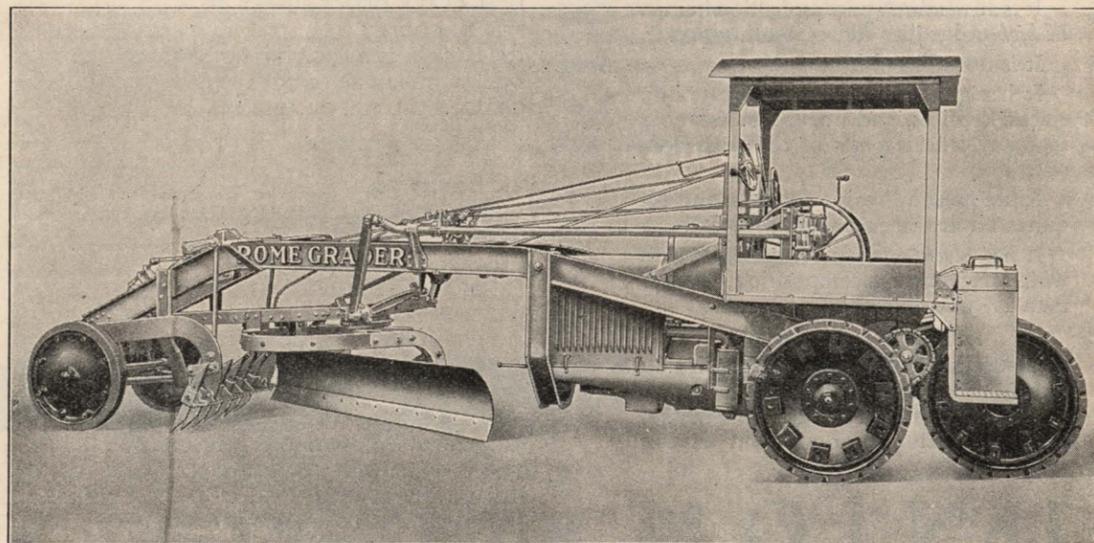
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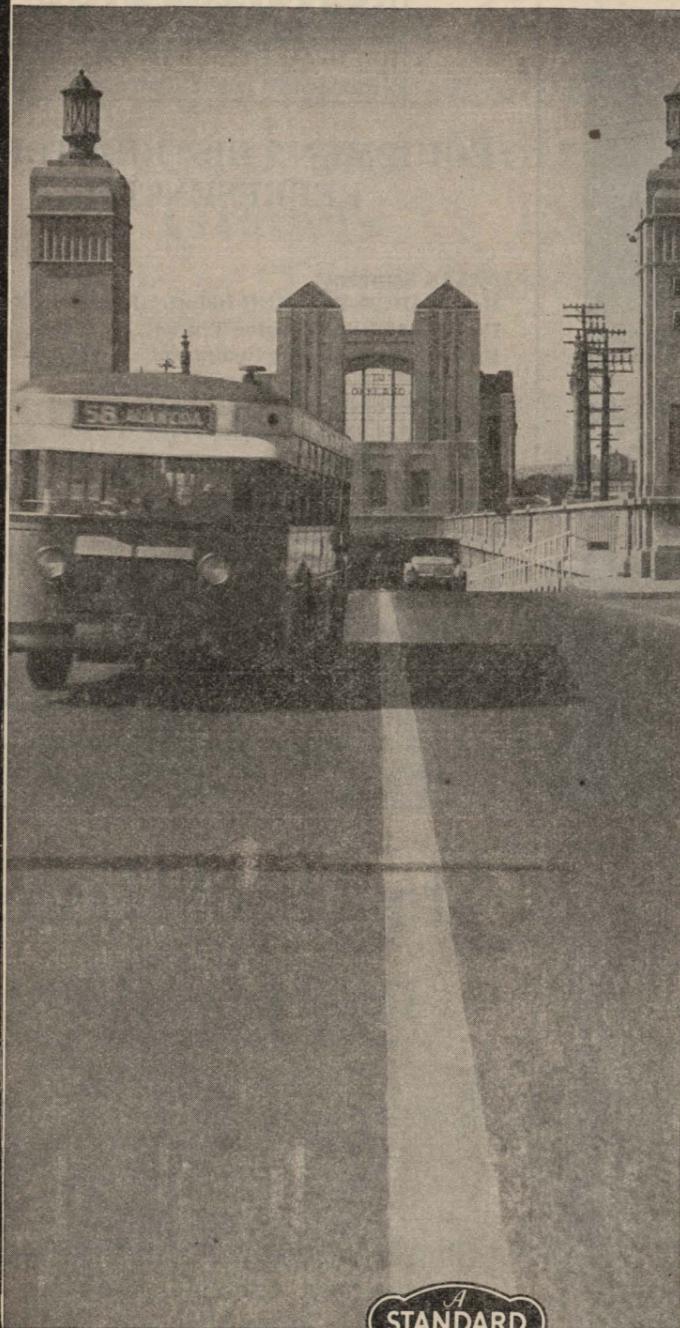
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ARIZONA HIGHWAYS

CIVILIZATION FOLLOWS THE IMPROVED HIGHWAY

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Volume VII.

June, 1931

Number 6

Tempe Bridge Soon To Be Ready For Traffic

By RALPH HOFFMAN, Bridge Engineer.

The completion of the new Tempe Bridge, Arizona's largest and most magnificent causeway, adds another triumph of engineering skill and closes another chapter in the history of Arizona highway construction.

Many readers will recall the dedication of that spectacular structure, the Grand Canyon Bridge, and now just two years later plans are being carried forward for the dedication on July 4th, 1931, of the Tempe Bridge.

This new structure, although not so spectacular as the former, is the largest bridge ever built in the state of Arizona, both in length and width of roadway. The total length is 1577 feet; the width of the roadway is thirty-six feet between curbs and provides room for four lanes of traffic. In addition a five-foot sidewalk is provided on each side, making a total width, inside the concrete handrails, of forty-six feet.

Comparing the above dimensions with those of the old bridge,—an 18-foot roadway and no sidewalks,—those who have driven over it in periods of heavy traffic will realize the easy comfort of driving on the new structure.

The old bridge, designed for the traf-

fic of 20 years ago, has been replaced with a modern structure in which the engineers have attempted to visualize the future needs of this highway.

Within City Limits

The bridge is located at the south end of Mill Avenue within the city limits of Tempe, and carries the traffic of three main U. S. Highways, namely: U. S. Route 89, the only north and south highway through Arizona; U. S. Route 80, a transcontinental highway, and U. S. Route 60, the new transcontinental route recently established through Arizona. Thus it will be seen that, with the completion of Route 60, a large percentage of the tourist traffic must pass over this bridge in addition to the ever increasing local traffic.

The recent traffic counts show a total of about 8,000 vehicles each 24 hours traversing this section of the highway; and this total has been increasing rapidly. If the old bridge carried this traffic it is safe to say that the new one will handle three or more times this total on account of the width of roadway and the increased speed made possible by that width.

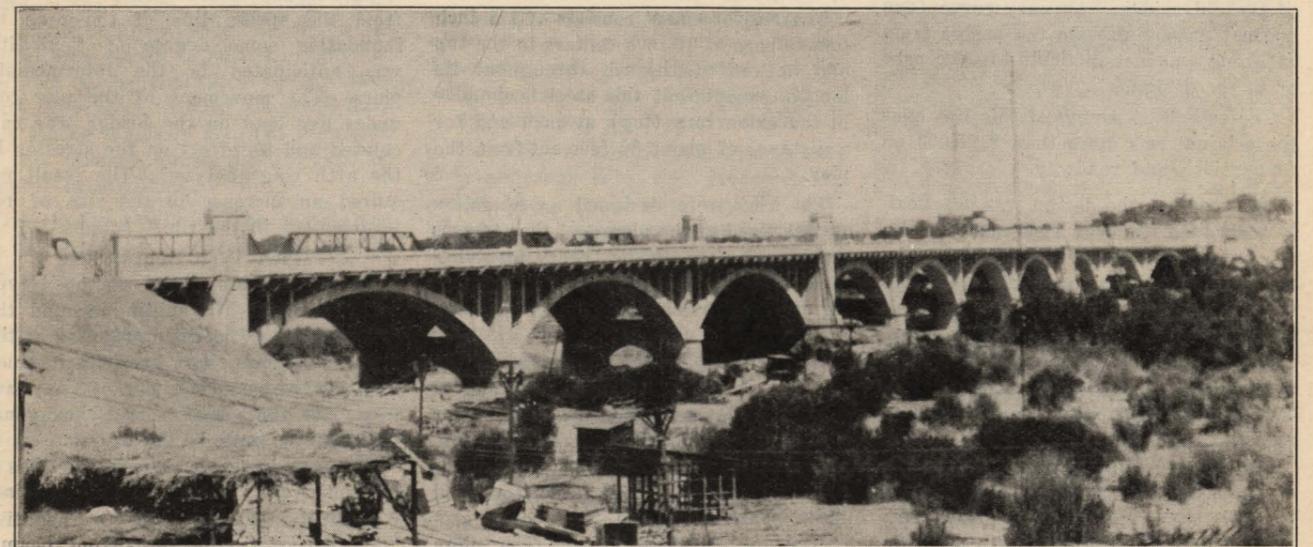
The extension of Mill Avenue was the

only logical location, as it maintains the present line of travel through the main part of town and eliminates two right angle turns in the town of Tempe.

A survey was made first extending the center line of Mill Avenue straight across the river and re-entering the present highway with a long curve on the north side of the river, and a contract was let for foundation borings. The results of these borings were at first very discouraging. The data obtained showed shallow rock foundation for less than half the length of the bridge and the remaining portion a soft caliche. The rock apparently dipped abruptly and was not encountered at depths up to 75 feet beyond the center of the channel.

Side Found Unfavorable

The experience with the railroad bridge only 300 feet up stream, on which two steel spans were lost by the failure of a pier, was sufficient evidence that the caliche material was not adequate for foundations except at a depth which would preclude all possibilities of scour under the footings. This depth was considered to be 40 to 45 feet below low



View of new Tempe Bridge looking down stream, showing arch construction. Each arch has a span of 140 feet.

water elevation, which meant only one type of design—long steel spans.

In addition to the deep foundations this site required extensive bank protection and a long, high fill at the north end of the bridge and the loss of considerable length of the existing paved highway on that side.

The profile plotted from the test borings did, however, show a high point in the rock formation toward the center of the channel. In studying this profile on the ground it was discovered that the high point lined with an outcrop of rock on the north bank under the old bridge and a ridge extending out from the Tempe Butte.

This discovery indicated the possibility of a rock ridge or dyke extending across the river diagonally across our line. The indication of the existence of such a formation was so strong that our own drilling force was moved on the job to prove our theory.

Located Diagonal Ridge

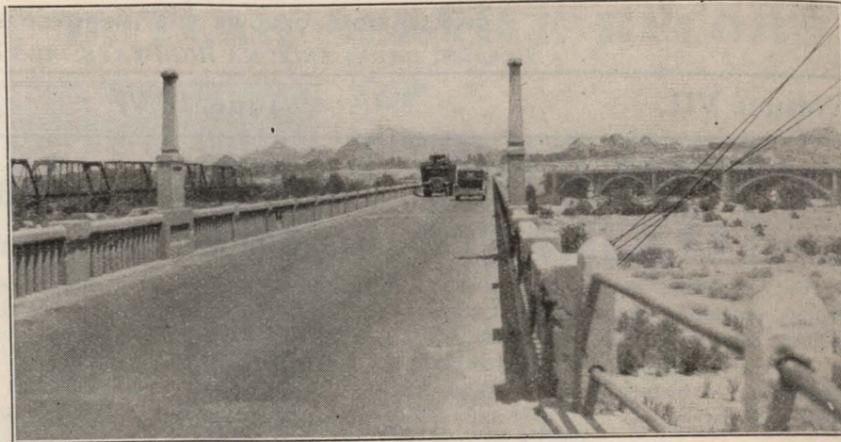
An extensive drilling program was laid out and the ridge located as expected. Contours of this formation under the bed of the river were plotted and a paper location for the new center line laid out.

This location, by spanning a small underground channel in the rock near the north bank, made possible a fairly shallow rock foundation for the entire length of the bridge and also made possible the adoption of the concrete arch design. The line extends from a point on Mill Avenue on the south bank diagonally across the river to an intersection with the present highway at the north end of the old bridge. An easy curve (one degree) extending onto the bridge from each end was not difficult to take care of in the design.

The estimated saving of this line over the original was more than \$100,000 on foundations and roadway.

For economy the design was practically limited to the deck type structure on account of the width of roadway to be provided. It was also desirable to keep the roadway on as low a level as possible, which limited the span length on account of available head room. For these reasons only two types were considered: the concrete arch and the steel plate girders.

The limit of the span length for the concrete arches was about 140 feet and for the steel girders about 100 feet; the problem resolved itself into the comparison of relative merits of two designs on this basis.



The old Tempe Bridge, which the new structure, to be seen at the right, will soon supplant. It was a close squeeze for a truck and auto to pass on this old bridge. On the new bridge 5 cars can pass, as shown on cover scene.

Prevailing steel prices at that time and the additional piers required for the steel design resulted in a slightly lower cost for the concrete arch type. The concrete structure was to be preferred on account of the inherent architectural effects to be secured without additional cost and probably would have been the accepted design even at a slightly higher cost.

Ten Spans in Bridge

Final plans were worked up for the arch bridge consisting of ten spans, 140 feet each. The spans were of the two rib open spandrel type, with the concrete roadway supported on beam and webbed columns above the two ribs.

Each rib is two feet nine inches in thickness by nine feet wide at the crown, seven feet thick in the vertical plane at the piers.

The reinforcement consists of 1¼ inch square bars at 12 inch centers in the top and bottom of the rib throughout its length, except that this steel is doubled in the extractors (top) at each end for a distance of about 30 feet out from the pier.

The ribs were designed as hingeless arches fixed at the piers and the stresses analyzed by the elastic theory involving long, tedious calculations and a mass of figures which have no place in this article.

Two types of piers were used in the design. It was considered advisable to provide at least two abutment piers for convenience and safety in construction. With this in view the spans were divided into three groups of three, four and three spans each and the groups separated by abutment piers. The piers are of the same general design below the top of the arch except in size, the

abutment pier being 15 feet in girth at the spring line of the arch while the intermediate piers are only 7½ feet. These are constructed with two separate shafts on separate footings and the shafts are tied together with an arched tie strut, built integral with the pier cap at the junction with the arch rings.

Above the arch the intermediate piers carry a typical column construction, while the abutment piers are surmounted by a sand box extending the entire length of the piers, to give additional weight. The ends of these boxes are carried up above the roadway in a hexagonal tower effect, terminating in a canopy over a retreat bay in the pier end. These piers are capable of resisting the full deal load thrust of the arches from one side only.

On account of the height of 32 feet from the spring line of the arch to foundation some degree of flexibility was anticipated in the intermediate piers. The movement of the pier top under live load on the bridge was calculated and its effect on the stresses in the arch ring analyzed. The result required an increase in the size of reinforcement in the rib.

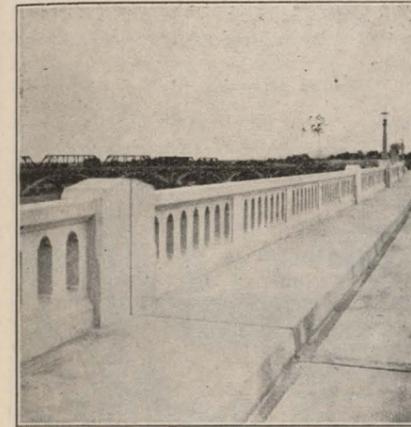
Open Type Abutments

The abutments are of the open type with the earth fill spilling around the end columns. The same effect as at the abutment piers has been maintained with a tower on each side of the roadway with the addition of a hexagonal pylon at the ends of the railing.

The roadway slab is reinforced as a continuous slab between expansion joints with bent steel providing for negative movement over the supporting beams. Four expansion joints are provided to each span at about the third points of

the span and at each pier. A feature of the design is the elimination of all sliding joints by supporting all ends on separate columns.

The handrail details were worked out after a careful study of those built in other cities and a design arrived at



The hand rail and sidewalk on the new bridge adds beauty to the bridge, and safety for pedestrians.

which is sturdy as well as distinctive and in keeping with the rest of the structure.

The lighting fixtures and poles were selected to harmonize with the rest of the handrail structure. Mounted upon handrail block over each intermediate pier is a spun concrete pole surmounted by a standard street lighting unit. At the towers these units are supported on heavy bronze brackets mounted on each side of the tower.

In all there are thirty-four of these units on the bridge. The bracket lights on the towers are specified to be arranged in a circuit to burn all night and the rest to be controlled by an automatic time clock, so that they will burn only during the early hours of the night. In this manner ample lighting will be assured at all times.

The lighting will not be maintained by the state but is placed there for the use of the city of Tempe, as the bridge is within the city limits.

The sections of the members throughout the bridge were designed to a minimum required for the stress and practically no concrete was added for mass effect or architectural treatment except in the work above the deck,—handrails and towers.

The contract was awarded January 22, 1930, to the Lynch-Cannon Engineering Co. of Los Angeles, the low bidder on

the job. This company began work under their contract in March, 1930.

Anchored In Solid Rock

The first work was that of excavating for the piers and abutments. Cofferdams of heavy steel sheet piling were driven to rock and the sand and gravel taken out with a crane. The design required the concrete footings to be anchored three feet into the solid rock, which required blasting the rock out to the footing lines.

While the excavation of the first hole was in progress a central mixing plant was erected adjacent to a commercial gravel plant, which was to furnish the sand and gravel for the entire job. Belt conveyors transported the material from the plant to large storage bins above the mixer. From these bins the sand and gravel were weighed in a batcher and dumped into the mixer. The cement was supplied from an adjacent storage shed by means of a skip which dumped directly into the hopper.

From the mixer the concrete was hauled on an industrial railroad to the job. Here the batch boxes were lifted from the cars and dumped into the forms. For the footings and piers the gasoline operated crawler crane was used in depositing the concrete.

In concreting the arch rings and deck it was necessary to have a machine which could reach the entire height and width of the structure so that concrete could be deposited at any desired point with a minimum of moving. For this purpose a traveling gantry crane was constructed, consisting of a four heavy post frame mounted on four flanged wheels. Supported on top of this frame at deck level was a boom derrick, operated by a gasoline hoisting engine. Two steel rails laid parallel to the bridge permitted this crane to be shifted to any span in a short space of time.

Each rib was poured in five main sections and four keys, each five feet six inches long, which were omitted until the other sections of concrete had taken shrinkage. Two of these keys were near the crown and two at the haunches and were placed at the lap in the reinforcing steel. The purpose of the keys was to eliminate as much of the initial stress in the ring as possible.

Fooled by Big Boulder

The sections of rib were poured symmetrically about the center of the span to balance the load and the timber false work and prevent distortion.

The two abutments were completed first, as specified, in order to allow a

contract to be let for approach fills. Then the piers were completed in order, beginning at the Tempe end.

When pier number 9 was reached in the process of construction, rock foundation was found at plans elevation on the upstream side and extending over about one-half the area of the pier. Original tests for rock made at this pier showed rock at the same elevation at both ends, but developments showed that the drill had struck a large boulder at one end and the crew, confident in the discovery of bed rock, had moved on without the usual check.

Steel rails were at once driven on the perimeter of the pier and a profile of the solid rock plotted to determine its actual location and slope. On the low side the rock was found at an elevation about 30 feet below the high side.

The construction here called for special treatment. The work on this pier was the most difficult encountered on the entire job and required very careful preparations. In order not to delay the rest of the construction the work on this hole was carried on in three eight-



One of the eight rest stations on the new bridge.

hour shifts until the pier was finished. More than 3,000 cubic yards of material were excavated from the hole, of which about 25 per cent was solid rock.

The last concrete was poured in the bridge, a small dado in the handrail, was poured on Wednesday, June 3, 1931—just fifteen months after starting the work.

Throughout the entire job is reflected

(Continued on page 23)

Arizona Is Nation's Largest Vacationland

Arizona has more to offer those of her children who are not too indifferent to seek her wonders and scenic beauties than any other state in the Union.

We hear constantly the Arizonan of long residence confessing his ignorance of his state and admitting that he has never even seen the Grand Canyon. He knows that visitors from every part of the globe come to marvel over this greatest of all natural wonders, and, of course, he plans that some day, on his yearly junket to or from the expensive inconveniences of some grimy beach, he will stop off and take a look.

It remained for a noted English traveler who visited Arizona some years ago to voice his appreciation of the state by saying, "You've seen nothing,—absolutely nothing, until you've seen Arizona!" And this from a man whose travels were world-wide.

Arizona is a peculiar state in that it possesses every variety of climate and scenery to be found in the west. Except for salt water beaches Arizona has everything any reasonable person could wish in the way of scenery, diversion, accommodations, sports or what have you.

Prescott Offers Much

Prescott, in its setting of pine-clad hills, offers many delightful trips to the vacationist. Within fifty-four miles, over excellent highways, is Montezuma's Castle, its history shrouded in the mist of centuries, the best preserved of the cliff-dwellings in the state. High in the niche of a gray cliff an unleashed imagination pictures some householder of the Stone Age, in the twilight of his civilization, scanning the country for his enemies, from the sycamores on Beaver Creek at the foot of the cliff to the long range of the Black Hills in the dim southwest. Time was when the Verde Valley in which the Castle is located was the home of an abounding aboriginal population. How long ago no man may say, for even the Apache Indians have no legends concerning them.

Montezuma's Well is another of the Prescott side trips well worth taking. A cup-shaped lake formed by a constant and uniform flow of subterranean water of which there is no recorded depth. You are paddled across this mystic lake and escorted through caverns lined with cliff dwellings and your fancy furnishes the former inhabitants.

Oak Creek Canyon, a short distance



Typical mountain highway in Northern Arizona showing bank elevation and guard rail on curves.

from Prescott, has been described by a certain traveler as "The Grand Canyon brought to the surface." Wooded dells, brooklets rushing through rocky gorges, a maze of color in rock formation that dazzles the eye, these give one but a slight conception of the beauty held in Oak Creek Canyon. Here is a primitive wilderness untouched by the artificialities of man such as you might have encountered had you live when the world was young; and here you may camp and fish beneath the maples, oaks or sycamores, yew trees or alders, as your fancy urges.

For the golfer visiting Prescott the Hassayampa offers a unique and sporty golf course, with a well appointed club house where good entertainment in the way of food and dancing, showers and lounging rooms may be found.

Coronado Trail

A great state, Arizona, and one teeming with romance. Youngest and oldest in the Union, for it had a civilization of its own when Hannibal led the soldiers of Carthage against the hordes of Rome, before the centuries had run to an end and a new order ensued. And even under the new order its first European settlements antedate the Thirteen Colonies.

Three hundred and ninety-one years

ago the new order blazed a trail searching for gold and the Seven Cities of Cibolla; and today the Coronado Trail rivals the tourist trips of Switzerland, Norway, Sweden, Scotland and other far-famed and world famous beauty spots.

Starting at Clifton, one of the oldest copper camps of the state (three miles long and several hundred feet wide) this trip to the top of the state winds through an ever changing vista of loveliness; timber, wooded canyons, peaceful meadows and mountain peaks, past bubbling brooks and mountain streams. The forest primeval inviting the weary traveler to rest and peace.

And then to Springerville, gateway to the White Mountains and the Mecca of the hunter and fisherman.

Many visitors to the White Mountains prefer to make Springerville their headquarters, but there are many lodges and camps through the White and Blue ranges where one may rusticate in comfort, not to say luxury.

The writer has the memory of a delightful week spent at the hospitable Butler Lodge at Greer in the White Mountains; of the excellent food and a kindly hostess never too busy to organize a fishing party along the pine

(Continued on page 23)

Constant Maintenance Needed On Oil Surfacing

By GEO. B. SHAFFER, District Engineer.

The maintenance of oil surfaced roads is so extremely variable that it is difficult, if not impossible, to explain the different operations so that they can be readily understood by those not familiar with this type of road maintenance.

An effort will be made here to touch upon some failures and remedies. Prospective oil road maintenance men should at every opportunity visit and study the construction of oil roads. Construction difficulties as well as advantages are reflected into the finished job when it is subjected to traffic and a keen observer can take advantage of this.

Failures vary in characteristics and the maintenance man usually has to treat them separately. Rolling of the oil cake is not always traced to the same cause. Too much oil is a common cause for rolling, but quite frequently it is caused either by moisture imprisoned in the oil cake or existing in the subgrade during construction, or attracted to the base of the oil cake under traffic. Either condition will cause rolling or wrinkling of the oil cake.

In the case of too much oil the cake should be scarified, dry selected material added, re-mixed and laid down in its original form. If properly done the rolling will not re-occur.

Moisture in Subgrade

When rolling is caused from the presence of moisture in the subgrade during construction, the cake should be scarified and moved from one side of the road to the other until the subgrade is thoroughly dry. If the cake has been neatly taken up and re-spread during the process of driving out the subgrade, it will make a good job, but ordinarily the disturbed area should be seal coated. Should the reconditioned area appear dry it should by all means be seal coated.

If moisture has been attracted to the subgrade by capillary attraction or gravity, the trouble is a more serious one. Complete drainage is necessary in the case of gravity moisture. Moisture caused by capillary attraction is usually eliminated by removing the oil cake and stabilizer placed on the subgrade. This is rather expensive but in most cases costs less than extensive drainage. In cases of repairs where moisture has been attracted to the subgrade the oil cake must be taken up and relaid as described in the above paragraph.

It is true that several of our oil roads

were constructed of a poor grade of material. Some were constructed of good material but unfortunately placed on inferior subgrade, and in some cases the drainage was neglected. We have to maintain them all regardless of quality; so with apologies to the well-constructed sections, the writer is endeavoring to show causes and remedies for failures.

Raveling Is Common Failure

Raveling is a common failure and is usually caused from insufficient oil, poor quality of aggregate or poorly graded aggregate. Insufficient oil will cause raveling regardless of quality of aggregate.

If oil is lacking the cake should be scarified, more oil added, re-mixed and re-laid as described above. If the aggregate is inferior or poorly graded, a seal coat will help and might have to be repeated from time to time until reconstruction is deemed necessary.

Local raveling is often effectively checked by applying road oil or emulsified asphalt with a covering of coarse sand. Incipient ravels must be detected and repaired at once in the above manner; but if allowed to develop into ruts or pot-holes new oil mixed material should be added, and when compacted they should be seal-coated and covered with coarse sand. All ruts and pot-holes should be cleaned out thoroughly and the sides and bottoms of the pot-holes should be painted with oil or emulsified asphalt before the oil mixed material is added.

The edges of the oil cake are naturally the weakest areas and on heavily traveled roads cause the maintenance man the most of his troubles. The oil cake is not rigid and of course cannot stand up under the impact of heavy traffic. Raveling is pronounced at the edges and will invade the entire width of the road if let alone. The edges should be watched constantly and repaired by adding new stock or sealed with road oil or emulsified asphalt.

Separation of Oil Cake

Separation of the oil cake from the subgrade is caused by the presence of a shifting material between the oil cake and the subgrade. This condition is most noticeable where oil cake is allowed to be put down on uneven subgrade or on a sand subgrade which has not been thoroughly confined and is quite apparent in the line of heavy traffic. The oil cake separates from the

subgrade and shoves ahead in line and in the direction of the heavily loaded traffic. A good remedy for this is, in the case of hard subgrade, to scarify slightly below the oil cake, re-mix and add oil if necessary, re-lay and seal-coat. If the separation is on sand subgrade, remove the oil cake, stabilize the shifting area, replace oil material and seal coat.

The above comments are based on satisfactory results following many unsuccessful attempts of various descriptions. Good oil road maintenance is the direct result of study and experience.

New Gas Station Reduces Fire Danger in Shop Yard

By C. E. SCHNURE, Shop Foreman.

Replacing the shed that stood between the administration building and the warehouse in the Phoenix yards, a new gasoline and oil station has been installed near the main gates. Here the department's cars may be serviced from three sides of the station at the same time, without interfering with each other or with traffic in the yards.

Two gasoline pumps were installed in the station and an oil pump rack that handles six different grades of oil.

The station was moved from its former site so as to lessen the fire hazard and insurance rates on the main building and the warehouse. The old shed has been removed, thereby giving more roadway into the shops and between the buildings.

One of the newest successes turned out by the Phoenix shops is a loader that has been put to work. A Barber Greene Loader No. 1 was brought into the shops for a general overhaul. While the machine was being repaired, workmen in the shop constructed a rotary screen, which they attached to the loader. This screen is of the telescope type, consisting of a series of screens, one inside of the other, ranging in size from one-half inch down to twelve mesh. Now the loader can be put in a creek bed and serve as a complete unit, digging the material, segregating the different sizes and loading it all in the one operation.

Roads might well be classified according to the traffic, "class A, 1,000 to 5,000 vehicles a day; class B, 500 to 1,000; and class C, less than 500.

ARIZONA HIGHWAYS

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THERE ARE ROADS AND MORE ROADS

Since the time when man first discovered he could make the dumb animals of the world transport him and his goods over the earth by means of wheeled vehicles there has been a demand for roads. Xerxes, the great Persian King, 450 years before Christ was born, built a great system of graded roads connecting the far flung portions of his empire, from the Bosphorus to the Persian Gulf, that his tax collectors might levy their duties and transport them back to Persia. Alexander The Great a hundred years later used the same highways to conquer the Persian people.

The Romans early recognized if they were to tie their empire solidly together, they must have roads over which they could quickly transport their legions to subdue rebellions, and their great national highway system outlived their empire many centuries.

We Americans, with a vast undeveloped domain, early recognized our development lay in roads of transportation. First they connected our rivers, then came the iron horse, the steam engine, and the race began between individuals and communities to grid the nation with steel rails and wherever

the railroads went, development, growth and prosperity followed.

The present century brought a new means of transportation, the motor vehicle. The American people immediately grasped the possibilities of this new mode of travel and transportation. In three decades we have literally become a nation on wheels, and to take advantage of this means of transportation we early recognized we must have roads.

For the last twenty years, the cry has been roads and more roads. Billions have been spent building roads. Sleepy Hollow woke up and cried for roads, got them and promptly became a tourist center. The average communities today are more interested in trunkline highways than in trunkline railroads. Schemes are constantly brewing for the diversion of traffic from one section to another. Likewise, the demand has broadened. The modern trucks with their great capacities have opened new freight transportation problems, routes and highway construction. The urge today for roads and more roads is as great as it was a decade ago when our highway system of today was in its infancy. The problem of where and how to build them to satisfy the demands best is just as perplexing.

SPEEDING THE DEPRESSION

It's an old saying that, "Charity begins at home," but when you can practice it and still get better return in hard dollars and cents it is the rankest kind of foolishness to help those who will give you no return.

Arizonans are in exactly that position in the consideration of their vacation plans this year.

This state, like every state in the Union, has felt the pangs of the depression of the last two years. There will not be as many persons in a position to enjoy a vacation this year as in most former seasons and those that are will, most probably, not be able to spend as much. Nevertheless, a large portion of the people of this state will in some degree have a vacation. They have saved their spare nickels, dimes and dollars to that end. They deserve their holidays even more than they did in more prosperous times. We are for them having it, and that leads to the "meat in the coconut."

Arizona is the greatest vacationland in the nation. No other state can offer such wonderful and varied vacation opportunities. Many of the sections that offer the finest vacation attractions are the ones that have felt the depression most. Help them, help yourself. Keep the Arizona dollars working in Arizona. Spend your vacation in Arizona.

Cement Is Tested For All Road Structures

By J. W. POWERS, Engineer of Materials.

The preceding articles have all dealt with material for the riding surface of the highway up to either a good sub-grade for a higher type or a good natural surfacing. Let us turn aside for the time and see what materials we use to take care of the streams and drainage which cross the highway.

The most used material for this purpose is concrete, one ingredient of which is Portland cement. "Portland cement is the product obtained by finely pulverizing clinker produced by calcining to incipient fusion an intimate and properly proportioned mixture of argillaceous and calcareous materials, with no additions subsequent to calcination excepting water and calcined uncalcined gypsum."

While the above definition is a scientific one boiled down to a few words, it means that clay and limestone ground to a fine dust have been burned to a clinker and reground, to which regrind has been added gypsum to retard the setting time. With this background we will proceed to the several tests set up by the American Society for Testing Materials, Specification C 9-30 covering it, namely:

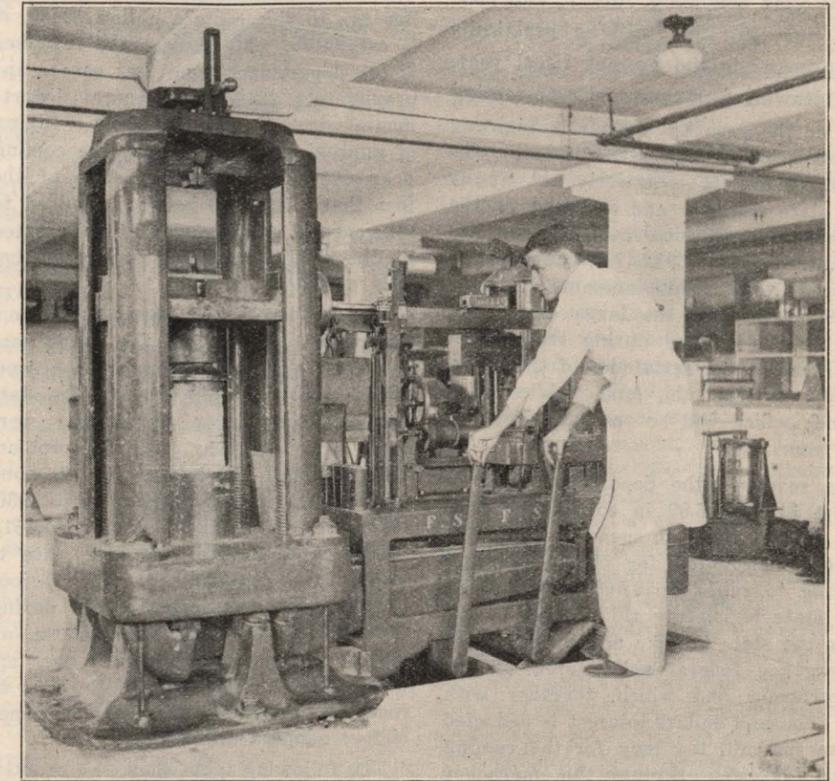
1, Fineness; 2, Soundness; 3, Time of Set; 4, Strength.

FINENESS is determined by screening over a 200-mesh sieve (approximately 40,000 openings per square inch). The usual cements of today do not often exceed 10% retained, with a maximum of 22% allowed. On the fineness depends the rapidity of hardening.

SOUNDNESS is determined by placing in a steam bath for five hours a 24-hour old cement pat (cement and water). No cracking, checking or disintegrating shall result.

TIME OF SET. The minimum time is forty-five minutes and maximum ten hours. There are two methods, the Vicat and Gillmore, but both depend on the penetration of a needle into a neat cement pat for the result. They give slightly different results in time of set but it is not of consequence. Time of set has to be regulated to allow time for placing and finishing.

STRENGTH is determined with a standard sand (Ottawa sand—a pure silica (white) sand graded between the 20 and 30 mesh sieves.) The mix is one part cement and three parts sand. On strength depends the ability of a structure to stand the loads imposed



Universal testing machine used in laboratories in testing strength of cement and steel. It will exert a pressure of 200,000 lbs.

upon it. The minimum strength in tension is 275 pounds at 7 days and 350 pounds at 28 days. All the above tests are physical and in addition to them a chemical analysis is required to determine particularly the sulphate and magnesium content. These two are considered as having detrimental qualities.

Cement is expensive. For this and other reasons it is not used straight. The other ingredients are sand, gravel and water, but they each have their separate determinations and we will treat of them later.

WOMEN DRIVERS TAKE A BOW!

Again feminine motorists are credited as being better drivers than men. According to records recently compiled in Pennsylvania one-fourth of the operators of motor cars in that state were women, but the number of men involved in fatal accidents is nine times greater than the number of women.

A good woman driver is a better oper-

ator than a good man motorist, according to the findings of the Pennsylvania motor vehicle department. The worst drivers on the road are men, it is claimed, and in this "worst driving" category first place is credited to those who cannot leave their business troubles at home or to those whose wives are back-seat drivers and interfere with operation of the vehicle.

And speaking of those back-seat drivers, motorists who have suffered from that particular form of pest will find legal solace in the refusal of the Supreme Court of the United States to review a decision of the lower courts, holding that it is the duty of passengers in an automobile "to sit still and say nothing."

He Must Be in Love

Cop: You say the judge is absent-minded?

Clerk: Well, in court today he dismissed the prisoner, sentenced the jury, scratched his desk and hit himself on the head with the gavel.

Tentative Budget Is Ready For Adoption

Arizona's highway program for the fiscal year beginning July 1, and ending June 30, 1932, will be practically as large as in the present fiscal year, now drawing to a close and representing one of the greatest periods in highway construction in the state's history. The total budget as tentatively set up by the state engineer and accepted by the highway commission calls for an expenditure of \$8,593,541.07 during the coming year. This amount is made possible through the large carry over of projects started during the present year and to the remainder of the emergency federal aid, and Oddie-Colton money which will be spent in the coming year.

In revenues the department will be short \$1,068,426.89 in comparison with the amount it had to spend in 1930-1931. This is accounted for chiefly through having to repay \$650,000 advanced by the state legislature this spring to enable the state to take advantage of the emergency federal aid offered by the government and which, together with ten thousand dollars interest is deducted from the mill tax levy for the coming year. Likewise, through the emergency federal aid, the department has during the present year matched all of the regular federal aid available which will reduce this contingent fund over one million dollars during the year 1931-32. The depression has also lopped \$150,000 off the estimated revenues derived from registration fees.

This reduction in funds was partly overcome by the increase of the gasoline tax to five cents a gallon which, it is estimated, will increase the revenues of the department from that source approximately \$310,000. General departmental expenditures also show a saving of approximately \$6,000 for the coming year over the present in spite of the fact that \$74,510.00 had to be added to take care of the Highway Patrol created by the Tenth legislature and which begins operation on July 1.

Due to the heavy carry over from this year's budget and the funds that had been obligated through the accepting of emergency aid projects, the state highway commission found they were confronted this year with the problem that, although the budget for the coming year was nearly as large as in 1930-1931, they in reality had only \$1,151,111.13 to distribute over the state to satisfy the demands of the various counties for new construction during the coming year, as that amount was all that remained after funds had been apportioned for completion of projects already started or set up in the emergency budget adopted this spring.

The following table shows by counties as well as totals just where the funds, as set up in the tentative budget, for the coming year will be spent.

Sixteen per cent of the motor vehicles made in the United States in 1930 were exported, according to the Automobile Club of Southern California.

Survey Shows How Tourist Dollars Affect Business

Automobile tourists now are recognized as an important factor in business in all sections of the country, so much so in fact, the United States Department of Commerce has been making a study of the new industry and has issued the following percentages as being their findings as to how the tourist's dollar is divided while he is on the road:

Retailer	25 per cent
Restaurant	20 per cent
Hotel or Camp.....	17 per cent
Garage and Filling Station.....	12 per cent
Transportation	10 per cent
Theatres and Amusements.....	10 per cent
Confectionery	6 per cent

Total.....100 per cent

An analysis of the above listings will show the entire business structure is affected by this industry. The merchant who does not profit directly from them is getting his share from the earnings of the employes of the filling station, garage, hotels and restaurants into whose hands the dollars directly fall. Good roads and accommodations bring these dollars to a community.

Motor vehicle registration on farms in the United States now totals 5,700,000.

Arizona To Have Highway Patrol Force July First

By E. M. WHITWORTH, Vehicle Superintendent.

The Highway Patrol authorized by the Tenth Legislature will be provided with funds to organize and function after July 1st. The force is limited to one patrolman to each eight thousand registered vehicles for the calendar year next preceding the appointments. The authorized force in addition to the superintendent and necessary clerical assistants will consist of fourteen patrolmen.

It is the intention to school the force both in respect to provisions of the Motor Vehicle Code and the office operation of the Motor Vehicle Division, so they may be equipped to cope with the many and varied problems with which they will be confronted in field operation.

The development of the patrol and its effective operation will mark a long step forward in the progress of the state in respect to legal operation of vehicles upon our highways and will effect a material increase in revenues accruing to the credit of the general fund of the highway department.

Prevention of bootlegging of motor vehicle fuels into the state is one of the major and serious problems that will confront the patrol at the outset. The correction of this violation in the past has been prevented due to lack of authority and force in the field. That one may be advised the extent to which motor vehicle fuels are imported into the state by means of highway transportation, it might be well to state that with but one exception the major distributors of vehicle fuels are importing their commodity by the agency of truck transportation.

That data may be available when the patrol is organized, a twenty-four hour traffic survey is being maintained at various points of entry on our borders. This will assure the patrol of detailed and authentic information as to the legitimate and suspected outlaw operator. The bootlegging of one shipment of motor vehicle fuel which may be transported by means of a truck and trailer represents a loss of revenue to the Highway Department in fuel tax of approximately \$300. One can readily see that it would not require many outlaws in operation to seriously affect the properly estimated budget receipt from this source.

In connection with this traffic survey, inspection is being made of all commer-

Any Good Surveyor Knows!

That a loose tripod leg has caused a lot of errors.

That oil and dust makes a grinding compound in instrument joints.

That the more ties he takes to the line the easier it is to retrace and

That the Boss says, "In the old days they had wooden line rods and iron men and now they have iron line rods."

cial vehicles in interstate operation to determine the capacity of the fuel tanks of each and of auxiliary tanks, if any. It is and has been in the past, the practice of interstate carriers to equip their vehicles with auxiliary tanks of sufficient capacity to make a round trip, thus losing to Arizona the tax that is properly due her from motor vehicle fuels consumed within the state.

To correct this evasion legislation was passed prohibiting the use of tanks in excess of the manufacturers' stock specifications in respect to capacity. The carrier of motor vehicle fuels is not classified as a common carrier, but as a private or contract carrier and is not required to pay a tax for his use of the highway as is the common carrier. As before stated the movement of this type of operator is becoming tremendous and in the absence of any but license plate fees to the state, it is certainly proper he should pay tax upon all fuel he burns on our highways.

Governor's Message On Purchases in Line With Department's Policies

By W. C. JOYNER, Purchasing Agent.

The general depression in all lines of business was the incentive recently for a form letter from Governor George W. P. Hunt to the heads of all state departments, requesting them to purchase all supplies from Arizona producers, dealers and jobbers whenever it is possible to do so.

I quote part of the subject matter

contained in the Governor's message: "**** No legislation has been enacted giving preference to Arizona manufacturers, producers and business institutions in furnishing supplies to the state and its subdivisions. Yet it is Arizona industry that provides employment for Arizona labor.

"Every legitimate and reasonable preference should be given Arizona institutions in purchasing supplies for public purposes. These people pay taxes in our state and assist in the maintenance of our state government and public institutions. They employ local labor and thus help in alleviating the problem of unemployment, which is very acute at this time. For these reasons I trust that all departments of our state government and of the subdivisions of the state will adopt an active policy of giving preference to Arizona producers, manufacturers and business men in the purchase of supplies, when conditions are equal, or nearly so. Unless Arizona producers and business men obtain orders for their products, they cannot give employment to Arizona labor.

"Complaints have reached my office that branches of departments of the state government have placed orders outside the state for products which could have been obtained on a competitive basis within the state, and that in some instances local dealers were not even invited to bid or quote prices on the supplies desired. This is a condition that should not exist, and certainly should not continue.

"I trust that all officials in Arizona, charged with the authority and duty of purchasing materials and supplies for public purposes, will cooperate in giving reasonable and legitimate preference to Arizona business men and Arizona products, and thus materially aid in promoting employment for our citizens and prosperity for our people."

The Purchasing Department of the Arizona Highway Department is confronted daily with the problem of just where the line of demarcation is between the dealer, long established in business, who handles products other than those produced in the state, and the resident agent who handles out-of-state products.

In certain lines, of course, it is absolutely necessary that we deal with manufacturers in eastern states, one of

(Continued on page 16)

BUDGET, 1931 - 1932

BALANCE 1930 - 1931 BUDGET

County:	Maintenance 7%	Maintenance Non 7%	Total Maintenance	Betterment	Construction 7%	Construction Non 7%	Construction Spec. Appr.	Total Construction	Construction 7%	Construction Non 7%	Grand Total
Apache	\$ 71,885.44	\$ 14,280.00	\$ 86,165.44	\$ 30,350.00	\$ 102,461.62	\$ 12,000.00		\$ 144,811.62	\$ 39,026.91		\$ 270,003.97
Cochise	57,640.68	60,378.86	118,019.54	25,500.00	262,354.02			287,854.02	175,312.36		581,185.92
Cocconino	122,334.91		122,334.91	9,000.00	211,111.66			220,111.66	708,570.04		1,051,016.61
Gila	16,479.72	44,474.74	60,954.46	10,000.00	479,355.75			489,355.75	436,521.95		986,832.16
Graham	38,260.82	18,540.13	56,800.95		96,728.32			96,728.32	187,656.56		341,185.83
Greenlee	8,400.79	30,210.16	38,610.95	30,000.00		13,500.00		43,500.00	52,680.58	4,500.00	139,291.53
Maricopa	98,466.43	37,138.23	135,604.66	54,000.00	246,489.24			300,489.24	203,153.14	4,250.00	643,497.04
Mohave	62,221.58		62,221.58	15,000.00	70,000.00	20,000.00		105,000.00	44,824.32		212,045.90
Navajo	32,902.46	39,411.07	72,313.53	11,500.00	94,205.91	20,000.00	20,000.00	145,705.91	210,789.54		428,808.98
Pima	47,619.51	18,544.49	66,164.00	5,000.00	100,951.55	30,000.00		135,951.55	111,783.24		313,898.79
Pinal	65,315.14	65,237.28	130,552.42	12,500.00	193,079.28	40,000.00		245,579.28	368,694.01	59,250.00	804,075.71
Santa Cruz	12,104.21	22,845.86	34,950.07		67,661.09			67,661.09	123,801.55		226,412.71
Yavapai	107,452.49		107,452.49	22,500.00	317,102.29		65,000.00	404,602.29	239,310.14		751,364.92
Yuma	63,000.00		63,000.00	14,000.00	735,733.90			749,733.90	199,787.83		1,012,521.73
Emerg. Maint.			54,000.00								54,000.00
Grand Totals	\$804,084.18	\$351,060.82	\$1,209,145.00	\$239,350.00	\$2,977,234.63	\$135,500.00	\$85,000.00	\$3,437,084.63	\$3,101,912.17	\$68,000.00	\$7,816,141.80
General Supervision, Departmental Acct., Public Service Acct., Motor Vehicle, Highway and Capital Account											\$ 777,399.27
BUDGET TOTAL											\$8,593,541.07

Many Delegations Appear Before Commissioners

The Arizona State Highway Commission met in regular session in their offices in the Highway Building at 10:00 A. M., May 8, 1931, all members present.

A delegation from Apache County appeared before the Commission requesting that 5½ miles from St. Johns to Concho on U. S. 70 be set up as a Federal Aid Project.

A delegation from Navajo County appeared before the Commission with reference to Senate Bill No. 11 providing for flood protection on the Little Colorado River. The delegation urged the Commission to take immediate action.

The Navajo delegation presented petitions signed by citizens and tax-payers in the vicinity of Showlow and Taylor, requesting the Commission to construct a new alignment on Highway 77 by the way of Shumway involving six or seven miles of new construction.

A delegation from the Southern part of Cochise County appeared before the Commission and requested the Commission to rescind its action of April 24th designating the road from Stein's Pass to Benson a State Route. A Northern Cochise County delegation appeared before the Commission requesting the action of the Commission be not rescinded.

On the motion of Commissioner Mansfield and the second of Commissioner Trengove, it was unanimously carried that the action of commission in designating the road from Stein's Pass to Benson a State Route be rescinded.

A delegation from Florence filed a petition requesting funds be set up in the ensuing budget for the improvement and oil surfacing of U. S. 80 from Florence to Tucson.

A delegation from Mohave county appeared before the commission in the afternoon with reference to oil surfacing U. S. 66 from Kingman to Oatman.

A delegation from Maricopa county requested a proposed road from Perryville to Wintersburg. As the proposed road is not part of the Highway System, no action could be taken.

Delegations from Tempe and Mesa requested and opposed the changing of U. S. Highway 80 through Tempe.

A delegation from East Van Buren street, Phoenix, urged the commission to set up sufficient funds in the ensuing budget for the widening of East Van Buren street with a hard surface from 16th street to the junction of U. S. 80 and Washington boulevard.

Contract on the Solomonville-Duncan Highway, F. A. P. No. 77, Reo., was awarded to the lowest responsible bidder, Skeels and Graham for the amount of \$71,017.14.

The contract on the Wickenburg-Hot Springs Junction Highway, F. A. P. No. 59, 1st Reo., was awarded to the low bidder, Geo. H. Oswald, in the amount of \$70,249.83.

Contract on the Mesa-Casa Grande Highway and Florence-Tucson Highway, F. A. P. Nos. 97-B and C, and 94-B, was awarded to the low bidder on the Alternate, Skeels and Graham Company in the amount of \$127,916.04.

Contract on the Blythe-Wickenburg Highway, F. L. H. P. 1-A, was awarded to the low bidder, V. R. Dennis Construction company, in the amount of \$215,974.95.

Contract on the Blythe-Wickenburg Highway, F. A. P. No. 98-B, was awarded to the low bidder, Canion and Francis, in the amount of \$23,443.33.

The commission recessed at 5:00 P. M., May 8, 1931, to reconvene at 10:00 A. M., May 9, 1931.

Meeting May 9th

The commission reconvened at 10:00 A. M., May 9th, 1931, all members present.

The secretary of the commission was instructed to write the City of Phoenix extending a vote of thanks from the Highway commission for the city's hearty cooperation in directing the chief of police to issue citations to operators of all motor vehicles bearing foreign licenses who have not secured non-resident permits.

Vice-Chairman Hart was instructed to investigate a request made by C. L. Suggs, President of the Southwestern Manufacturing and Construction Co. of Douglas for a permit to construct a spur track crossing U. S. Highway 80 just east of Douglas and also a claim of \$1,100.00 damages caused by the removal of their plant from one side of the road to another.

It was unanimously carried by the commission that the contractors on state highway work be required to start work on the time as specified in the contract.

The contract on the Ash Fork-Flagstaff Highway, F. A. P. No. 89-E, was awarded to the low bidder, Packard and Tanner, in the amount of \$111,682.30.

Contract on the Ash Fork-Flagstaff Highway, F. A. P. No. 89-D, was award-

ed to the low bidder, O. F. Fisher, in the amount of \$103,553.55.

The State Engineer was instructed to erect the proper safety signs at the dangerous intersection on Grand avenue at the junction of U. S. Highway 89 and Grand Canal.

The Commission recessed at 12 o'clock, noon to reconvene at 10:00 A. M., May 11, 1931.

Meeting May 11th

The Commission reconvened at 10:00 A. M., May 11, 1931, all members present.

A letter was read from W. W. Lane, former State Engineer, requesting a vacation of thirty days. It was unanimously carried that W. W. Lane be allowed thirty days' vacation commencing May 1, 1931.

It was unanimously carried by the commission that it was the sense of the commission to require contractors to employ all Arizona citizens.

The State Engineer was instructed to erect signs on all large bridges of the state designating the weight the bridge can carry.

It was unanimously carried that the obsolete Fordson Tractors located in the Phoenix yard be turned over to the Boys' Industrial School at Fort Grant for the consideration of a bill of sale for \$1.00.

Mr. E. M. Whitworth was called in by the Commission to explain what class of road machinery exemptions are made and due diligence was requested in allowing refunds on motor vehicle fuel.

Vice-Chairman Hart was asked to take the chair. It was moved by Commissioner Addams, seconded by Commissioner Barth that the office of the secretary of the commission be declared vacant as of May 16, 1931. The motion carried by the vote of Commissioners Barth, Trengove, Acting Chairman Hart, Commissioner Addams voting "yes." Commissioner Mansfield voting "no."

It was unanimously carried that Geo. W. Comparet be appointed secretary of the highway commission effective May 16, 1931. Mr. Comparet to continue as editor of the magazine and handle the employment department.

The commission adjourned at 12 o'clock, noon, to reconvene at 10:00 A. M., May 20, 1931.

May 20, 1931

The commission met in regular session in their offices in the Highway

Building at 10:00 A. M., May 20, 1931, all members present.

A delegation from Mohave County requested that provision be made in the 1931-32 budget for the oiling of the Highway from Kingman to Oatman and the survey of the road from Kingman to Boulder Canyon Dam.

A delegation from Gila county requested the commission to widen two bridges on Highway 180 within the City Limits of Globe and one bridge east of Miami. Members of the committee testified six fatalities had resulted on these bridges through accidents caused by the narrowness of the bridges.

Mrs. E. R. Keen, State Historian, requested the commission to authorize the placing of signs designating the historic and scenic spots of the state by Highway Department crews.

A Greenlee County delegation requested the commission to provide in the 1931-32 budget for the making of the road from Duncan to Clifton a State Highway and the spending of \$100,000.00 on the Coronado Trail.

A delegation representing the Brotherhood of Carpenters and Joiners requested that the minimum wage agreement with the contractors be changed to include a minimum scale of \$1.00 per hour for all skilled building mechanics on the State Highway work.

It was unanimously carried by the commission that the State Engineer be instructed to enter into negotiations with Mr. C. L. Suggs for the settlement of the claim filed by him for the Southwestern Manufacturing and Construction Company in the matter of the removal of their and the construction of a spur track across the highway East of Douglas.

The contract on the Benson-Vail Highway, F. A. No. 18-A, was awarded to the low bidder, R. H. Martin, in the amount of \$54,129.31.

The contract on two carloads of Grader Blades was awarded to the low bidder, O. S. Stapley Company of Phoenix, in the amount of \$7,443.60.

A contract was awarded to the low bidder, the O'Malley Lumber Company, on the contract on timbers in the amount of \$4,339.34.

A delegation from Maricopa and Gila counties requested that a survey from Showlow to Springerville be made and this section included in the 7 per cent System. The delegation was informed the survey requested already was under way.

A delegation from Santa Cruz county

requested the state to participate with the City of Nogales in the paving of the highway from the Banks Bridge in the city of Nogales to the end of the present paving and desired to have this project included in the coming budget. It was unanimously carried that this project be considered in the tentative budget.

Cochise county delegation requested that three projects of benefit to the Southern counties be included in the coming budget, namely, the oiling of the Casa Grande-Gila Bend Highway, the improvement of the Bisbee Hill and the Nogales paving requested by Santa Cruz county.

The commission adjourned at 4:30 P. M., to reconvene at 9:30 A. M., May 21, 1931.

Consider Tentative Budget

The commission reconvened May 21, 1931, all members present, at 9:35 A. M.

The commission went into executive session to consider the tentative budget.

In the afternoon, the commission awarded the contract on the Blythe-Wickenburg Highway, F. L. H. P. No. 1-C, to the low bidder, Lee Moor Contracting Company, in the amount of \$152,653.51.

The commission then went into executive session to consider the budget.

The commission adjourned at 5:45 P. M., to reconvene at 9:30 A. M., May 22, 1931.

The meeting was called to order at 9:40 A. M., May 22, all members present. The commission continued consideration of the tentative budget in executive session.

The commission adjourned at 5:15 P. M., May 22, 1931, to reconvene at 10:00 A. M., May 26, 1931.

May 26, 1931

The commission met in special session at 10:05 A. M., May 26, 1931, all members present.

A delegation representing the City of Tempe and Phoenix Chapter of the American Society of Engineers stated plans were being perfected for the dedication ceremonies of the Tempe bridge, the date being tentatively set as July 4th. The committee was informed there were no funds available in the Highway Department to assist in the celebration.

A delegation representing Pinal, Pima, Santa Cruz and Cochise counties requested the commission to include in the tentative budget sufficient money for the oiling of the highway between Casa Grande and Gila Bend and presented a petition signed by the citizens of those counties forming the delegation.

Maricopa delegation urged the commission not to complete the Casa Grande Highway at the expense of the Wickenburg-Ehrenberg road.

Bids for the printing of Arizona Highways were presented by the secretary with the recommendation that a new call be issued. It was unanimously carried that the secretary be instructed to issue a new call for bids for the printing of the Arizona Highway magazine.

It was unanimously carried that the Highway Department rent a truck for a nominal rental of \$1.00 per month to the State Fair commission until funds became available to that commission for the purchase of a truck in the new fiscal year.

Contract on the Globe-Showlow Highway, F. A. No. 99-B, was awarded to the low bidder, Chas. Willis and Son, Inc., in the amount of \$274,023.57.

A delegation from Superior urged the commission to investigate the betterment work being carried on between Superior and Miami and the State Engineer was instructed to investigate the condition of the work and the employment on this project.

Upon the recommendation of the State Engineer, it was unanimously carried that the State Engineer be given authority to sign agreement with the City of Holbrook relative to making certain streets within the City of Holbrook a part of the State Highway.

A delegation from Navajo county appeared before the commission and urged the oiling of the highway between Holbrook and Winslow at an early date.

It was regularly moved by Commissioner Barth, seconded by Commissioner Trengove that the commission accept the tentative budget as furnished by the State Engineer in accordance with the provisions of the law. A roll call was demanded. Commissioners Barth, Trengove and Chairman Addams voting "yes." Commissioners Hart and Mansfield voting "no."

The commission adjourned at 3:00 P. M., May 26, 1931, to reconvene in regular session at 10:00 A. M., June 1, 1931.

CONSIDERATION FOR ANIMALS

Consideration and care for animal life on the highways might well be taken as a test of a driver's fitness to operate an automobile. Since kindness and general watchfulness are recognized characteristics of a good operator, the person who is not as careful to protect dogs, cats, and other animals as he is of human beings can be classed as an incautious driver.

Detour Signs Are Bad Signs on Road or in The Warehouse

By A. H. LIND, Warehouse Sup't.

Detour signs nearly always cause unfavorable remarks by the motorists when they block the highways. They often mean slow going and sometimes rough road, but to the warehouse they mean a lot of bookkeeping for which this department gets no actual credit for the work involved in seeing they are sent out for the public's protection and that they are returned or charged to the contractor.

With the large number of projects under construction at the present time it is a difficult task to keep track of the many kinds of signs required to guide the public. All of these signs are handled through the Phoenix warehouse and an enormous amount of detail work is required in the handling of them, as it seems next to impossible to keep them straight on the jobs.

I have in mind one contracting firm who, during 1930-1931, received from the Phoenix warehouse 151 signs and returned a total of 158 signs, yet in checking over their account it was found that they still had 46 of the original signs delivered to them, as 53 of the signs returned were turned over to them by the resident engineer, a transaction of which this office had no record.

These contractors were naturally held responsible for the 46 signs they still held, and were not given credit for the signs they returned, which they had received from the resident engineer. Furthermore, some of the signs returned were in bad order and unfit for use, so the contractors were required to pay for the damaged signs.

Contractors are required to post a check, in the full amount, of the value of signs delivered to them, and if all signs are returned, their check is returned to them, if not they are required to pay for missing or damaged signs before their deposit check is returned. It is also necessary that they return the same kind of signs they receive, as our records are kept to cover each kind of sign.

A certain contractor turned over a portion of his signs to another contractor, sending us a check from the second contractor as deposit for same, but failed to furnish us with an itemized list of the signs he gave the second contractor. In this case we are holding both contractors' checks, as we cannot tell which

signs are involved in the transfer and can only straighten this matter out when we receive the itemized list.

All of the above matters require detailed accounting, correspondence, etc., as it is our desire and intention to keep the sign records of all contractors absolutely correct at all times, and to cooperate with the contractor to the end that they get the signs they need, and we expect the contractors and resident engineers to co-operate with us that our records may be correctly kept.

Resident engineers should not furnish signs to contractors without the proper authority and contractors should not exchange signs between each other without notifying this office that the proper transfer of deposit checks may be made.

Penn State Has Moved 'House In Middle of Road'

Harrisburg, Pa.—"The House in the Middle of the Road," in Moosic Borough, famous since 1925, midway between Scranton and Pittston, will no longer call for comments of consternation or wonder from travelers over U. S. Route 309. The house has been moved to another location, and the completed pavement opened to traffic on May 10.

When this section of the route was constructed in 1925, the borough officials had reached the limit of their bonded indebtedness, were unable to provide the money necessary to pay for the removal of the house occupied by the Garvey family. The center line of the road, which had been relocated to eliminate two dangerous grade crossings and two right angle curves, passed through it. The Garveys refused to move, so the house had been by-passed by an unsightly and unsatisfactory detour thru an alley since that time.

John Garvey, a son, became a football star at Yale a few years ago, and while at the height of his glory a New York newspaper published an article headed "Johnny Garvey holds down line at Yale while his Mother holds down the line in the House in the Middle of the Road."

Recently the Lackawanna County Commissioners, under authority vested in them by an act of Legislature passed in 1929, came to the aid of the borough officials and provided the necessary damage funds and the house was moved.

In 1925 the highway was paved up to the cellar wall at the rear of the house and to the property line in front, leav-

ing a gap approximately 67 feet, occupied by the building.

The situation created by the house remaining in the middle of the road had been the wonder of motorists and brought about many unfavorable and caustic comments from the traveling public and newspapers.

GOVERNOR'S MESSAGE ON PURCHASES IN LINE WITH DEPARTMENT'S POLICIES

(Continued from page 13)

the most outstanding of these being the supplies required in the laboratory.

Many chemicals and articles of a more or less scientific nature are required in this department and we buy goods from California and eastern states, getting competitive bids by mail from dealers in such chemicals.

However, since the governor's instructions reached this office we have endeavored to be more careful than before, if possible, in giving the business of the department to Arizona citizens.

The purchases for the fiscal year 1929-1930 reached the enormous sum of \$803,000 in round numbers. Any thinking citizen will realize that this amount of money expended with Arizona business men would be a Godsend, particularly during times of deep depression such as we have experienced for the past year and a half.

The reader may rest assured that we are doing everything possible to assist the merchant or manufacturer, who is assisting by the payment of taxes in carrying on the business of the state.

TIRE IMPROVEMENT

Instead of buying tires every week or so as motorists did a few years ago, less than one set of tires a year is now the average, according to the manufacturers' report to the census bureau. This showed that the average value of a tire last year was \$8.30 and the average value of a tube \$1.21. Each motorist uses an average of 3.04 tires and 3.09 tubes per year.

It is also shown in these reports that the prices of automobile tires today are lower than they have been since 1924.

During the past few years tires have become more standardized and instead of 43 sizes of baloon tires there are now but 17 sizes. Not only are the tires more durable but their life is extended by the improved roads that are being developed the country over.

Highway Engineers Who Installed Armco Culverts Twenty Years Ago Are Using Them Extensively in New Construction



These Armco culverts were installed in 1930. Their choice was based on their notable strength and durability. Armco Iron Culverts, after serving for twenty years or more both under shallow covers and high fills, are in good condition today, structurally and materially. That's why the earliest users prefer Armco.

Whatever your need, specify Armco Corrugated Culverts. **THEY ARE CHEAPLY AND QUICKLY TRANSPORTED AND INSTALLED, and THEY ARE STRONG AND DURABLE IN SERVICE.**

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Texas.

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Projects Under Construction In Arizona

DISTRICT No. 1.

Geo. B. Shaffer, District Engineer.

Martter & Bock have the grading and draining of 4½ miles (F.A.P. 80 E.) which begins two miles west of Hackberry and extends 2 miles east of Hackberry 67 per cent complete, James A. Parker, Resident Engineer.

Schmidt & Hitchcock have the oil surfacing of 17.8 miles beginning at the Coconino-Yavapai county line and extending west, F. A. P. 57, 80-C, 89-B and 4.3 miles Ashfork south, F. A. P. 62-A 25 per cent complete.

Martter & Bock have the grading, draining and sub-grade stabilizer on 9 miles, beginning at Crookton and extends west to Seligman, F. A. P. 80-B, 1 per cent complete, Floyd J. Beeghly, Resident Engineer.

Canion & Francis have the grading, draining and placing of subgrade stabilizer of 5.7 miles of the Wickenburg-Blythe road (F. A. 98-B, which begins at 1¼ miles east of Aguila and extends toward Wickenburg) 1 per cent complete. Barney R. Hodgkin, Resident Engineer.

V. R. Dennis Construction Co. have started construction on grading, draining and placing of subgrade stabilizer, mineral aggregate and oil surfacing, 14½ miles which begins 1½ miles east of Quartzite and extends east toward Salome, F. L. H. P. 1-A, Percy Jones, Resident Engineer.

Lee Moor Construction Co. has been awarded a contract for the construction of 7.2 miles grading, draining, surfacing and oil processing F. L. H. P. 1-C, beginning near Gonzales Well and extending towards Quartzite, Percy Jones, Resident Engineer.

Ralph Pleasant had been awarded Sections E and F of F. A. 98, 24 miles grading and draining, beginning 16 miles east of Quartzite and extending east, Barney Hodgins, Resident Engineer.

Geo. H. Oswald has the construction of F. A. 59-1 Reo., which consists of grading, draining and placing of sub-grade stabilizer and oil processing 10.3 miles, 1 per cent complete, Geo. Lang, Resident Engineer.

DISTRICT No. 2.

F. N. Grant, District Engineer.

Everly & Allison have the oil processing of 22½ miles (F. A. 83-A) Sanders

to Lupton, 16 per cent complete, H. Pinney, Resident Engineer.

H. L. Royden has the construction of 5½ miles on U. S. Route 70, beginning at Holbrook and extending east (F. A. No. 78-F) 38 per cent complete, J. P. Flynn, Resident Engineer.

O. F. Fisher has the grading, draining and surfacing of 7.8 miles (begins 1 mile east of Williams and extends east to Pitman Valley, F. A. 89-D) 1 per cent complete, W. T. Halloran, Resident Engineer.

McGinty Construction Co. has the paving of Winslow streets 63 per cent complete, J. P. Flynn, Resident Engineer.

Packard, Tanner and Morse have the grading, draining and surfacing of 9 miles (beginning at Pitman Valley and extending toward Flagstaff, F. A. 89-E) 8 per cent complete, R. C. Bond, Resident Engineer.

Veater & Davis have the construction of F. A. 95-B (Cameron to Ridge, 40 miles on U. S. Route 89) 32 per cent complete, H. D. Alexander, Resident Engineer.

DISTRICT No. 3.

R. C. Perkins, District Engineer.

Lynch Canon Engineering Co. has the construction of the Tempe Bridge 100 per cent complete, Gus Rath, Resident Engineer.

R. H. Martin has the construction of the approaches to the Tempe Bridge F. A. Project 2-B, 70 per cent complete, Gus Rath, Resident Engineer.

Western Gunito Co. has the surfacing and oiling of 30 miles (F. A. 23 A. & B. and 23-C, D & F.) from Florence to Superior, 15 per cent complete, A. W. Newhall, Resident Engineer.

Martin Bros. Trucking Co. has practically completed the oil surfacing of F. A. 87-B, 30 miles from Coolidge Dam east, M. Kisselburg, Resident Engineer.

Lee Moor Construction Co. has the grading, draining and placing of sub-grade stabilizer on 5 miles beginning at Geronimo and extending west F. A. 15-D, 85 per cent complete, L. C. Bolles, Resident Engineer.

Skeels & Graham are nearing completion on the surfacing and oiling of 11.6 miles, beginning at Duncan and extending west (F. A. 88-B 1st Reo.), Daniel Thompson, Resident Engineer.

O. F. Fisher has the construction of ¾ mile, Coolidge Dam west (F. A. 87-4)

56 per cent complete, M. Kisselburg, Resident Engineer.

Skeels & Graham have started surfacing and oiling of 14.6 miles beginning east of Solomonville and extending east, F. A. 77-Reo., D. M. Thompson, Resident Engineer.

Lee Moor Contracting Co. is nearing completion on the grading, draining and surfacing from Duncan to the state line, F. A. 88-C, H. B. Wright, Resident Engineer.

Chas. Willis & Sons, Inc., have been awarded a contract for the construction of 10.8 miles of the Globe-Showlow Road, beginning ½ mile east of Globe and extending N. E. (F. A. 99-B), Carl Brannen, Resident Engineer.

Lee Moor Contracting Co. has the grading, draining and sub-surfacing of 11½ miles of the Globe-Showlow road, beginning at the Salt River and extending south, F. A. 99-A, E. A. Bickley, Resident Engineer.

DISTRICT No. 4.

W. R. Hutchins, District Engineer.

N. G. Hill & Co. has the construction of a bridge and approaches, an overpass and the grading, draining and surfacing of 4 miles, beginning just west of Benson and extending west, 90 per cent complete, W. J. Tavennor, Resident Engineer.

William Peper has the construction of 10 miles, which begins approximately 22½ miles south of Tucson, and extends south to the county line, approximately 75 per cent complete, J. R. Van Horn, Resident Engineer.

Packard & Tanner have the construction of 7.6 miles (beginning 1 mile east of St. David and extending east, F. A. Project 79-E) 75 per cent complete, W. J. Tavennor, Resident Engineer.

Hodgman & McVicar are nearing completion on the oil processing of 21 miles on the Tucson-Benson Highway, F. A. 90-A. C. S. Benson, Resident Engineer.

Heitsch & Bitten have the oil surfacing of approximately 17 miles (beginning at the end of the pavement three miles north of Nogales and extending north F. A. 86-C, 86-E. Non 25-A and 66) 57 per cent complete, C. S. Benson, Resident Engineer.

Hodgman and McVicar have the grading, draining and surfacing of 10 miles (beginning at Florence and extending to Coolidge) F. A. 94-B, 40 per cent complete, Joe de Arozana, Resident Engineer.

Farm Population Greater Along Surfaced Highways

By E. E. DUFFY.

Somewhere between one-fourth and one-half of the farmers in the United States are served by highways surfaced with sand clay, gravel or better materials, investigation shows, based on census and highway reports.

At present the United States has approximately 700,000 miles of surfaced roads. The total number of farms is nearly 6,298,000 and the complete 1930 farm population is 27,222,000, an average of 4.3 persons per farm. If all the farm residents were spread evenly along the 3,000,000 miles of roads in this country, there would be an average of nine persons per mile. On that basis nearly a fourth of the farmers live along surfaced highways.

However, surveys in various states show that more farmers per mile live along surfaced highways than along dirt roads. In some quarters it has been estimated that nearly half of all farmers live along highways that have been surfaced. There is also to be considered the countless farmers who live but a mile or two from surfaced roads.

But much of the 700,000 miles of sur-

facied highways, which serve in excess of three-quarters of all travel in rural areas, are in need of more lasting surfaces. Probably 125,000 miles constitutes the mileage of pavements that serve motorists and taxpayers with any great degree of efficiency.

All in all, the procedure of state highway departments in first improving the most used roads has been vindicated. By doing that the greatest traffic flows have been given facilities that would not accrue under haphazard planning and construction. The work of paving the main highways between centers of population, and the work of replacing uneconomical surface, is going on steadily—hard surfaced rural pavements are being provided at the rate of about ten thousand miles yearly.

GOOD CAMPING ADVICE

A good sportsman, camper, or tourist, when going out into a national forest follows these rules:

He obtains a campfire permit; carries a shovel and ax; smokes only in camp; puts his fire dead out with water; leaves a clean and sanitary camp; observes the state fish and game laws; cooperates with the forest rangers in reporting and suppressing fires; and preaches what he practices.

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Bureau Of Public Roads Projects In Arizona

UNDER CONSTRUCTION

C. G. Willis & Sons have the grading of Forest Highway- Oak Creek Hill Section 7-C. The project begins at the top of the Oak Creek Canyon—13 miles south of Flagstaff—and extends to the bottom of the hill, a length of 2.8 miles. Estimated cost of construction is \$186,000 and project is now 40 per cent complete. E. J. McCracken, Resident Engineer.

Lord & Bishop have the contract for oil surfacing 18.5 miles of the Grand View-Desert View Section of the Grand Canyon National Park, Route 1, beginning at Grapevine Canyon, 10 miles east of Grand Canyon Village, extending 15.2 miles east to Desert View and including 3.3 miles of spurs. Estimated cost of this project is \$144,000 and is now 95 per cent completed. V. G. Watson, Resident Engineer.

Jasper Stacy Company has the contract for grading the 8.4 miles of Section B, Houserock Canyon National Forest Highway, Kaibab National Forest, Coconino County, Arizona, at an estimated cost of \$162,000. W. J. Nelson, Resident Engineer.

Lord & Bishop have the contract for oil surfacing 26 miles of the Grand Canyon Route 3 from Bright Angel point to Cape Royal, at an estimated cost of \$285,000. This project is located on the North Rim of the Grand Canyon National Park and in Coconino County. Project when closed down October 29th for the winter was 40 per cent complete. Work will probably be resumed this month. Rudolph Thirion, Resident Engineer.

Portions of Section "A" and "C" of the Payson-Holbrook Forest Highway Route 11 are under Betterment and Improvement work by day labor. Portions

to be so improved total ten miles in length and will cost approximately \$12,000. L. C. Chadwick, Resident Engineer.

Swift Trail Section I Improvement, a portion of the Major Forest Development Road System, is being done by day labor and Station contract. The project is 4 miles in length beginning at a junction with State Route 81, seven miles south of Safford and extending in a southwesterly direction to the foot of the Graham Mountains. Estimated cost is \$15,000 and project is now 95 per cent complete. E. V. Aldrich, Resident Engineer.

Henry Galbraith has the contract for the grading of Project 7-D, Upper Canyon Section of the Oak Creek Forest Highway. The project begins at the foot of the Oak Creek Hill, adjoining the Willis contract, and extends down the Canyon to the "Call of the Canyon" resort. The length of the project is 2.9 miles and the total estimate of cost is \$73,000. Project is 31 per cent completed. E. J. McCracken, Resident Engineer.

Harry Hagen has the contract for the grading of 4.3 miles of Section 2-D, Swift Trail Major Forest Development Road, in Crook National Forest, Graham County. The total estimated cost is \$57,000 and L. G. Watters is the Resident Engineer. Contract time started April 20th and project is now 30 per cent completed.

W. M. Tenney, Jr., had the contract for grading and draining of 1 mile of the Heber Hill section of the Payson-Holbrook Forest Highway, a portion of Project 11-A, in the Sitgreaves National Forest, Navajo County. Cost of construction was \$2,800. Project was completed May 26, 1931. L. C. Chadwick, Resident Engineer.

Jack Casson has the contract for the surfacing by the plant mix method of 28 miles, Section "A" and "B", of the Grand Canyon-South Approach Road in Coconino County. Total estimated cost of construction is \$160,000. V. G. Watson, Resident Engineer. To date no work has been done under contract.

Bids were opened June 2 for the grading and draining of 16 miles through Petrified Forest National Monument in Apache and Navajo Counties. Estimated cost of construction is \$115,000. Everly and Allison of Des Moines, New Mexico were low bidders. Award of the contract has been recommended.

Bids were opened June 2 for the Construction of the Rio Puerco and Dry Creek Bridges in the Petrified Forest National Monument. Estimated cost of construction is \$155,000. Award of the contract to W. E. Callahan Construction Co. of Dallas, Texas, has been recommended.

SURVEYS

Chiricahua National Monument Survey, Forest Highway Route 32, in Cochise County. Estimated length 12 miles Survey began February 23. F. H. Horton, Locating Engineer.

Payson-Indian Garden-Colcord Survey, Forest Highway Route 11, beginning at Payson and extending eastward for an approximate distance of 40 miles, to a connection with the Young-Holbrook Highway near the Gila-Coconino County Line. Survey began March 15th. J. H. Brannan, Locating Engineer.

Clear and Beaver Creek Bridges, Forest Highway Route 9. Approximately 12 miles in length, a portion of the Clarkdale - Globe Highway including

(Continued on page 24)

S. H. VEATER

LAMAR DAVIS

Veater & Davis

EL PASO, TEXAS

General Contractors



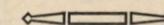
At present constructing Arizona F. A. P. 604-95B, which consists of grading and drainage of forty miles of U. S. Highway 89. Beginning at the suspension bridge across the Little Colorado River at Cameron and extending northward toward the Lee's Ferry Bridge on the Flagstaff-Fredonia Highway.

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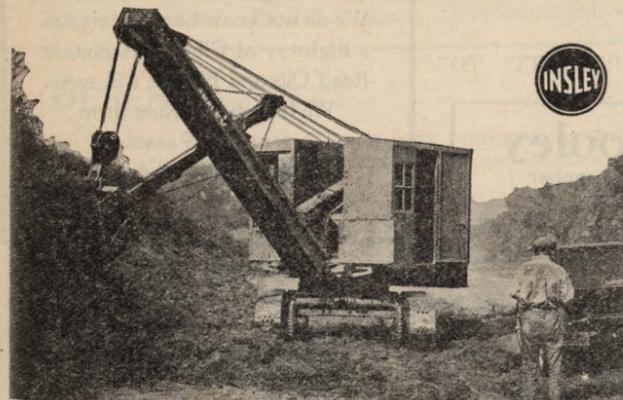
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ASH FORK, ARIZONA

Road Conditions, Arizona State Highway System

These conditions were reported as of June 10th. Changes will occur on roads under construction according to progress of the work.—Editor's note.

River to McNary, other unimproved. Fair condition.

STATE ROUTE 71, CLIFTON JCT. TO SPRINGVILLE — 157 miles. Gravel and partly surfaced. Condition good Clifton Jct. to 40 miles north of Clifton; Cherry Lodge to Hannigan good except when raining. Alpine to Nutrioso good. Nutrioso to Springerville good excepting caution by 7.3 miles under construction near Springerville.

U. S. ROUTE 80, YUMA TO RODEO— 518 Miles. All paved, oil surfaced or graveled. Condition good excepting 21 miles being oil surfaced Tucson to Vail Junction; 4 miles under construction west of Benson nearing completion; 7.6 miles under construction east of St. David. Two detours, condition good.

U. S. ROUTE 66, TOPOCK TO LUP- TON—396 miles. Gravel surface, oiled or paved. Condition good excepting 4½ miles under construction at Hackberry. Nine miles under construction east from Seligman; 15 miles Ash Fork, west, under oil processing construction. No detours; use care in driving. Sixteen miles under construction east of Williams. Paving ¾ mile of Winslow streets and 22½ miles from Sanders to Lupton is being oil surfaced. No detours.

U. S. ROUTE 180, FLORENCE JCT. TO STATE LINE — 183 miles. Condition good. 13 miles under construction, east of Geronimo, 4½ mile detour, fair; 8 miles of oil surfacing, Solomonville to Duncan, ¼ mile detour.

U. S. ROUTE 89, NOGALES TO FRE- DONIA—660 miles. Gravel, oil or paved surface to Flagstaff; graded and drained to Cameron; unimproved Cameron to Jacob's Lake; 40 miles under construction north of Cameron; gravel Jacob's Lake to Fredonia. Condition good excepting 26 miles under construction between Nogales and Tucson. Use precaution. Oil surfacing Hot Springs Junction to Wickenburg; and 4.3 miles of oil surfacing south from Ash Fork.

U. S. ROUTE 70, HOLBROOK TO STATE LINE—109 miles. Gravel surfaced. Condition good to excellent excepting 5 miles east from Holbrook, under construction. 2 short detours. Good.

STATE ROUTE 88, APACHE JCT. TO GLOBE—83 miles. Gravel surface. Condition good.

STATE ROUTE 79, PRESCOTT TO

STATE ROUTE 73, CUTTER TO MC- NARY—104 miles. Gravel surface Cutter to Rice and White

FLAGSTAFF—91 miles. Gravel or oil surfaced to Sedonia, graded and drained Sedonia to Flagstaff. Condition good excepting for



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construction in Oak Creek canyon. Sedonia to Flagstaff slow in wet weather.

STATE ROUTE 74, WICKENBURG TO EHRENBURG—74 miles. Surface, low type improved. Condition good, Wickenburg to Aguilla and Quartzsite to Ehrenberg, balance fair.

STATE ROUTE 81, DOUGLAS TO SAFFORD—128 miles. Gravel surfaced. Condition good.

STATE ROUTE 187, SACATON DAM TO CASA GRANDE—13 miles. Gravel surfaced. Condition good.

STATE ROUTE 83, VAIL TO SONOITA—28 miles. Gravel surfaced. Good.

STATE ROUTE 82, NOGALES TO TOMBSTONE JCT. 70 miles. Gravel surfaced. Good.

STATE ROUTE 84, TUCSON TO GILA BEND—124 miles. Gravel surfaced. Condition good excepting Tucson to Rillito being oil surfaced, 1 mile detour near Rillito; ten mile detour between Rillito and Red Rock. Detour fair. Observe caution in driving.

STATE ROUTE 87, MESA TO PICA- CHO—60 miles. Paved oiled or gravel surfaced. Condition good.

NEW TEMPE BRIDGE SOON TO BE READY FOR TRAFFIC (Continued from page 7)

a careful and excellent workmanship which is a credit to the engineers and contractors. A full measure of credit should be given to the engineering force under the direction of A. F. Rath and to the general foreman, E. C. Moore and his men for the pride they have taken in a piece of work well done.

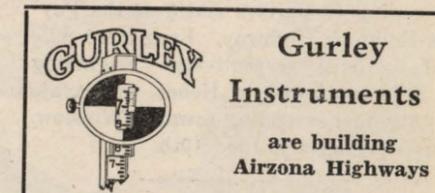
The Lynch-Cannon firm was represented by F. L. Holser, general manager of the company, who by frequent contacts with the work made it his duty to promote harmony and give the state a finished product in which there could be no fault.

ARIZONA IS NATION'S LARGEST VACATIONLAND (Continued from page 8)

and vine shaded streams. And after a blissful day, home to dinner, where even the most inexpert, with never a trout to his credit, shared bountifully in the day's catch.

These are but a few of the vacation spots in Arizona. Flagstaff has many points of interest and wonders. No one should fail to see Sunset Peak, weird and unique. A cone-shaped mountain of gray volcanic cinder until within a short distance of the tip of the cone, where the red cinder begins, giving the peak the appearance of being heated red-hot. Meteor Mountain, caused by the impact of some wanderer of the skies, who collided with Mother Earth by some miscalculation in his schedule.

And then there are the many beautiful lakes, Mary's, Stoneman's Lake, Mormon Lake, all offering entertainment, boating and fishing and both camping and lodging facilities. Not to speak of such sights as the Petrified Forest and the Painted Desert, to be seen only in our own state, time and space forbidding a fuller description but which any Arizonan should feel shame at having failed to see.



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Flagstaff Winslow Holbrook Prescott
Williams Kingman Grand Canyon

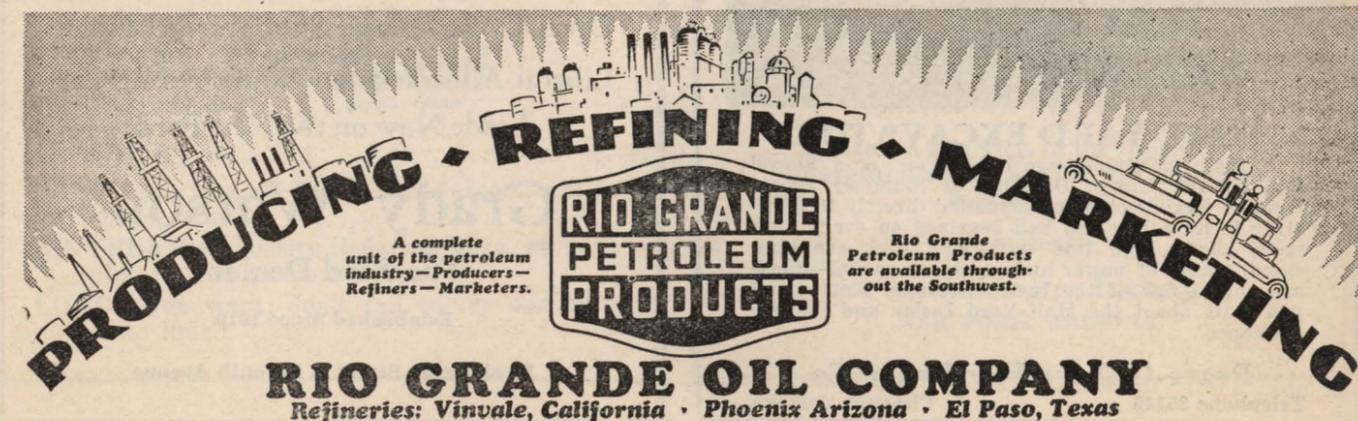
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BUREAU OF PUBLIC ROADS PROJECTS IN ARIZONA

(Continued from page 20)
bridge sites. Survey began May 2. J. H. Brannan, Locatng Engineer.

ADVERTISED FOR CONSTRUCTION

Grading of 20 miles of the Pine-Winslow Forest Highway beginning approximately seven miles north of Clint's Well and extending to the North Forest Boundary 30 miles southwest of Winslow. Bids will be opened June 16th.

Grading of Units 2 and 3 of the Payson-Holbrook Highway. Length 0.8 mile and 0.4 mile respectively. Beginning 1/2 mile southwest of Heber, in Navajo County, and extending towards Winslow. Bids were opened June 10th.

NOTICE TO CONTRACTORS

HOLBROOK-WINSLOW HIGHWAY
E. F. A. 40-B & C

Bids to be opened June 17th, 1931.

Sealed bids for Oil Processing the above named highway will be received until 2:00 P. M. on the above date, and then publicly opened and read at the office of the Arizona State Highway Commission, Phoenix, Arizona. No bids will be received after the time specified.

All bids must be marked upon the outside of the envelope "State Highway Contract, Holbrook-Winslow Highway, E. F. A. 40-B & C," and **MUST CLEARLY SHOW THE NAME OF THE BIDDER ON THE OUTSIDE OF THE ENVELOPE.**

The work, which begins approximately eleven (11) miles east of Winslow and is to extend west to the east city limits of Winslow, consists of Oil Processing the entire length by the Road Mix Method, and is to be completed on or before August 31st, 1931.

APPROXIMATE QUANTITIES

126,500 Sq. Yds. Preparation of Sub-grade

10,570 C. Y. Mineral Aggregate
106,000 C. Y. Mi. Haul of Mineral Aggregate

284,600 Gals. Oil Applied to Roadway
10,781 Miles Mix, Lay & Finish
2,640 C. Y. Shoulder Material
26,500 C. Y. Mi. Haul of Shoulder Material

1,000 C. Y. Mi. Overhaul of Oil Mix to be Stockpiled

No contractor shall be eligible to submit a bid until his attested statements, made on forms supplied by the Arizona Highway Department, of financial resources and construction experience and equipment have been approved. Bids will be made only upon the bidding form contained in the Pamphlet and supplied by the Department, and which form will be supplied only to contractors whose statements show sufficient financial resources and construction experience and equipment to properly construct the work.

All bids shall be accompanied by an unendorsed, certified, or cashier's check only, of not less than five (5%) per cent of the gross amount of the bid payable to the State Treasurer of Arizona.

The right is reserved as the interest of the State Highway Commission may require, to reject any and all bids, to waive any informalities in bids received, and to accept or reject any items of any bid unless such bid is qualified by specific limitations.

STANDARD SPECIFICATIONS—Copies of the Standard Specifications issue of October, 1930, may be purchased for Three (\$3.00) Dollars the copy. Checks should be made payable to T. S. O'Connell, State Highway Engineer.

PLANS & PAMPHLET (For Bidders only)—Copies of the Plans and Pamphlet may be issued to qualified contractors having a copy of the Standard Specifications of above issue, and upon deposit of Ten (\$10.00) Dollars. Deposit

will be refunded should Plans and Pamphlet be returned within ten (10) days after opening of bids.

PLANS & SPECIAL PROVISIONS (For Non-Bidders)—Copies of the Plans and Special Provisions, without Bidding Schedule, may be obtained upon deposit of Ten (\$10.00) Dollars. Deposit will be refunded should Plans and Special Provisions be returned within ten (10) days after opening of bids.

The Standard Specifications of the issue of October, 1930, shall be used.

The bidder will be required to comply with the provisions of the Specifications and Contract in bidding and the award and execution of the Contract.

T. S. O'CONNEL,
State Highway Engineer.

Phoenix, Arizona,
June 3rd, 1931.

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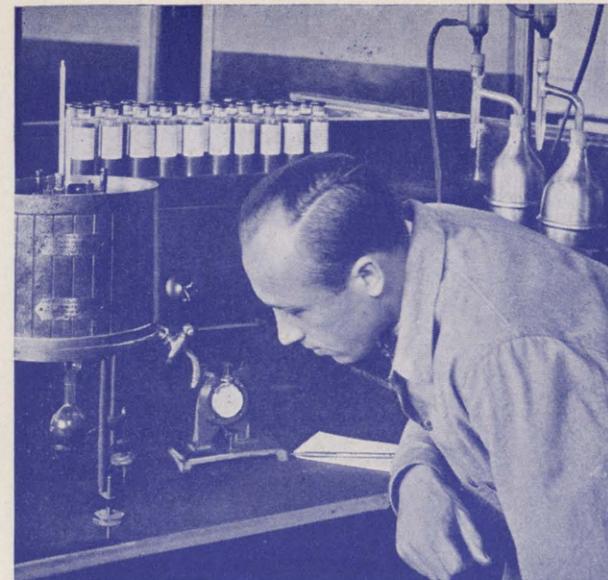
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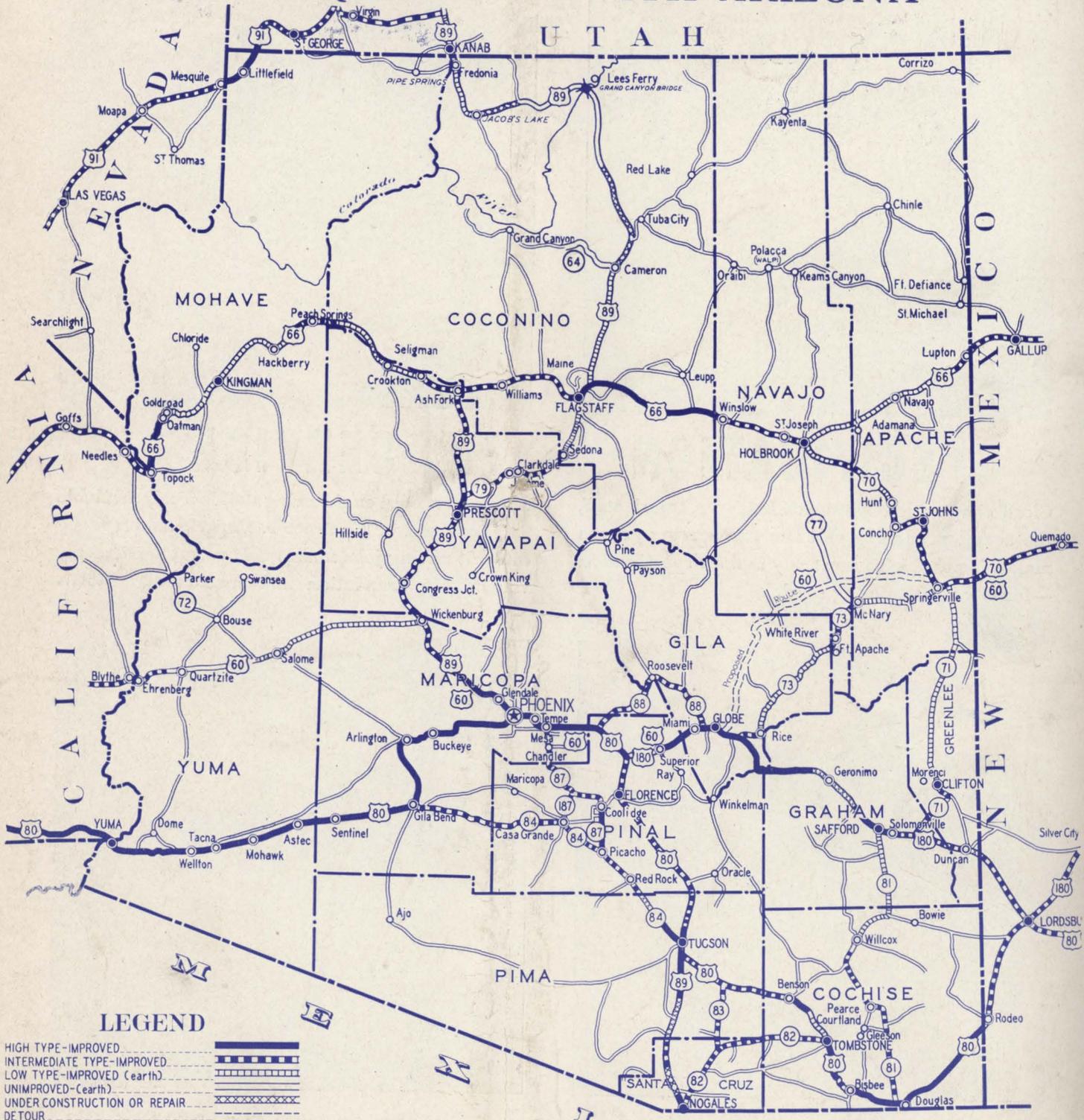
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LEGEND

- HIGH TYPE-IMPROVED
- INTERMEDIATE TYPE-IMPROVED
- LOW TYPE-IMPROVED (earth)
- UNIMPROVED-(earth)
- UNDER CONSTRUCTION OR REPAIR
- DE TOUR
- COUNTY ROADS (conditions not shown)

- U. S. ROUTE No.
- STATE ROUTE No.



STATE ROUTE MARKER

ARIZONA HIGHWAY DEPARTMENT CONDITION MAP OF STATE HIGHWAY SYSTEM

Scale: 0 10 20 30 40 50 Miles

State Historian,
 State Capitol



FEDERAL ROUTE MARKER