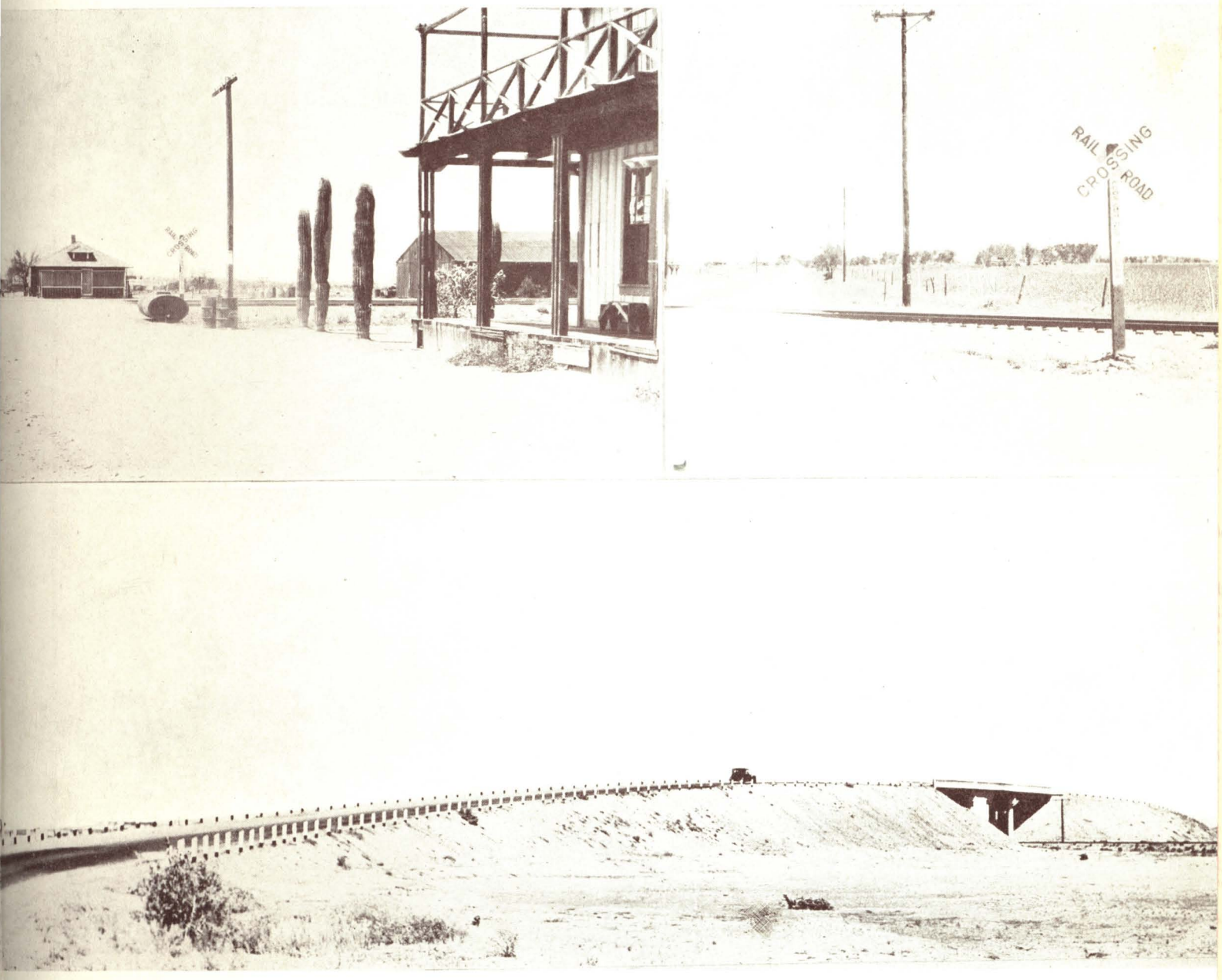
Arizona Highways



The Old and the New Method of Crossing Railroad at Castle Hot Springs Junction

Volume 7
Number 5

May

Copy Ten Cents
Yearly One Dollar

Arizona Highways

May, 1931

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ARIZONA HIGHWAYS

CIVILIZATION FOLLOWS THE IMPROVED HIGHWAY

Volume VII. **May, 1931** **Number 5**

National Monuments Of State Lure Vacationists

THAT Arizona is the most favored state in the Union from the standpoint of national parks and monuments is shown in the fact that eleven, or over one-fifth of the national parks and monuments administered by the federal government, are located in this state. Ten of these are national monuments and the eleventh is Grand Canyon park, the greatest natural show place and playground in the world.

Your plans for a vacation this summer should include some, if not all of these national monuments and the Grand Canyon park. In doing so you will see most of the state of Arizona and you will be able to add an educational, scenic and inspirational touch to your recreational period that millions of persons will never have the opportunity to enjoy in a life time.

Of course the greatest, the most spectacular and inspiring of these nationally preserved wonders in the state is the grand Canyon, yet to many persons some of the lesser monuments will be of greater interest because of their historic rather than natural interest. However, if one had the whole world to choose from, they could do no better than to decide on the Grand Canyon park for a vacation.

Marvel of Erosion

The park is divided into three distinct parts, the South Rim, the first section to be made available to tourist travel; the bottom of the canyon itself, reached only by muleback or on foot from the rims; and the North Rim, where very fine accommodations for tourists have recently been installed by the Union Pacific railroad. The South Rim and the Canyon are the sections that may easily be visited throughout the year. The North Rim, rising 1,000 feet above the South Rim, and reached through the still higher Kaibab Forest, is practically snowbound during the winter months. A year ago, however, snow-plows kept the roads to the north open all winter, so that supplies and equipment might be brought in and construction on the new lodge continued.

Within the park the Canyon varies in width from about four to eighteen miles. El Tovar, the famous hotel on the South Rim, is about ten miles in an air-line from the new Grand Canyon Lodge, located on Bright Angel Point on the North Rim. Between these two points the Canyon is a marvel of erosion. The Colorado River, looking insignificant in the distance, is the instrument through which the gorge was carved, aided by winds and rains at the surface. From the rim the river looks like a narrow band of ribbon, with a slight movement at places that indicates cascades and rapids. Upon closer view it is seen to be a turbulent, swiftly-moving brown stream. Its color proves that the river is still engaged in its chiseling work, and each day the Canyon is deepened or widened by the removal of the silt that colors the water. When one realizes that this gorge, nearly a mile deep, has been carved through seemingly endless ages by just this constant wearing away of the rocks by the river, some idea of the magnitude of nature's task may be grasped.

Riot of Colornig

The overwhelming beauty of the Grand Canyon lies in three characteristics: its stupendous size, its exceptional erosional forms and its gorgeous coloring. From any point on either rim a magnificent panorama spreads out against the opposite wall. Widest at the top, the Canyon narrows rapidly in terraced effects, until the wide Tonto Plateau, slightly more than half way down, is reached. From here down it is much narrower, for now the river has to cut through the hard Archean strata, the earliest known rock formation—a much more difficult task than carving and chiseling the softer limes and sandstones at the top. From the upper sloping walls, from the Tonto Plateau, and from the Canyon floor itself rise innumerable buttes, mesas and terraces, resembling fluted spires, temples and varicolored mountains. No straight, uncompromising lines mar the beauty of the Canyon; on all sides are graceful, flowing curves, with here a long cape extending far out into the sea of space at the top of the Canyon, and there a broad, shallow inlet or narrow bay carved into the rim wall.

Each stratum of limestone, sandstone or shale has its own distinctive tint, which bands the walls and temples in a color combination that is the despair of artists. At the top of the high north wall is the Kaibab limestone, white or buff in color. Below the buff the riot of colors starts, with bands of different shades of red, purple, gray and green. Lowest of all is the so-called granite gorge or Archean strata which seen from the top looks grey in tone, but on closer approach shows many colors. Just above this is the Algonkian stratum, showing from the top as a dark, purplish streak. Scientists say this stratum was laid down during that long ago period when primitive life first appeared on this part of the earth, and the fossil remains of many early life forms are found here.

The Grand Canyon is one of the most accessible of our national parks. Transcontinental travelers may take through sleepers from Chicago to Los Angeles that make a side trip to the Canyon and take one within a very short walk of the hotel on the South Rim. Motorists also find it exceedingly easy of access as the highways in this region are being constantly improved. Rail travelers to the North Rim usually visit this area in connection with a motor "circle trip" from the railroad terminus at Cedar City, Utah, which includes Zion and Bryce Parks and other scenic spots in southern Utah.

Marvelous Trails

But from whichever rim the visitor views the Grand Canyon, he should also take a trip down into its depths. Views from the half-way plateau are different from those obtained at the top, while a view from the floor of the Canyon up the massive walls is totally unlike that obtained from any other point in the park. A trip to the river, or to Phantom Ranch on the canyon floor north of the river, is a unique and worthwhile experience.

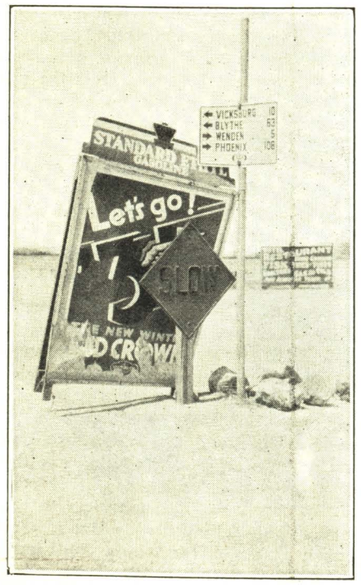
To facilitate the trip into the Canyon, and also to make easier trans-canyon trips by muleback, the new Kaibab Trail has been built by the Government during the past few years. Descending the south wall from Yakai Point, it crosses the new steel suspension bridge, passes Phantom Ranch, and ascends the north wall to the rim. It is constructed through-

(Continued on page 18)

Do You Believe In Signs?

By M. G. HOLT, Sign Foreman

You may not be superstitious and you may not know anything about the Zodiac, or you may think the old-timer who squints at the sky and predicts the kind of weather we are going to have is off his base, but when you see a sign on the highway that says CAUTION, SHARP



Abuse of Signs: Condition existing in the town of Salome, Arizona. These two signs are on Route U. S. 60.

One sign, the property of the State, a C-5 Slow, at the approach of Quarantine Station. Advertising board interfers with view, creates confusion, disrepect and unfavorable comment.

CURVE, or any of the other many things which highway signs say, you had better believe in them or you are liable to find yourself in a jail or hospital.

Signs have played a vital part in every successful venture undertaken. The Highway Department is well aware of this fact and an enormous amount of this work has been and is being done daily throughout the state.

The primary use of a sign is to convey information and to eliminate confusion. The signs upon the highwayss of Arizona are patterned after the standardized signs and markers adopted by the American Association of State Highway officials. A traveler familiar with the shape and color combinations of the signs in any state can be safely guided and informed throughout the entire system of state and federal highways.

Placement of Signs

The placement and erection of highway department signs also is controlled by a standard and the signs are placed as near to this standard as conditions will permit.

A sign may often defeat its purpose if not properly placed, erected or angled, and much thought must be given each location requiring a sign. Therefore, the erection of a sign is not always a purely manual job.

Some idea of the work required in the placing of signs at locations daily encountered may be had from the following description:

Driving down the highway we come upon an S curve, let us suppose the first bend of this curve is to the right and the angle sharp.

How dangerous is this curve? Our decision is based upon the condition of the highway on either side of the curve. If there have been many curves and rather rough going encountered which would be conducive to a slow or reduced speed, the curve is not so dangerous and does not require more warning than that contained in the regular C-4-R or *Right* S *Curve* sign.

However, let us suppose that on either side of this sharp right S curve the highway is in splendid condition, perhaps paved and for miles on either side is straight. With these conditions this curve is dangerous and requires a sign which must give its warning both day and night, as traffic upon this type of road will be fast. Therefore we choose the C-4-R.T.R. sign, a *Right* S *Curve*, with reflectors. How far from the point of curve should this sign be placed?

The standard calls for 400 feet and is carried out as close as conditions of right-of-way, obstructions, etc., will permit.

Time for Reducing Speed

This scale is flexible to a certain extent and the exact distance must be determined at the spot, and the sign location is chosen with the object of giving traffic ample time to see and read the sign in time to reduce speed easily to a safe rate to make the curve without danger to themselves or others.

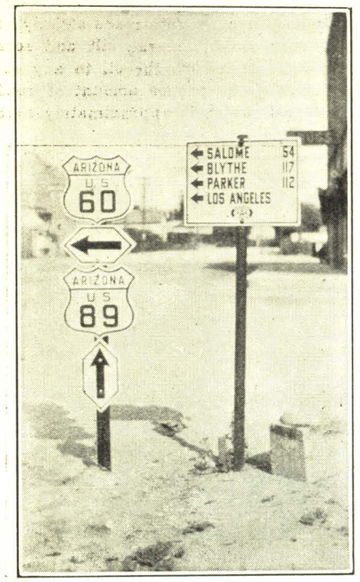
We have decided upon our location in respect to the condition of the road and general speed of traffic and the exact

Sign Foreman has just completed repainting of R-4, Speed Limit and 4-11, City Limit signs, Routes U. S. 60 and U. S. 89.

distance of our location from point of curve may be 450 or even 500 feet.

We are now ready for the manual part of the erection of our sign.

The Standard Steel Sign Post adopted by the department is 7½′ long, a flanged U shaped post known as A-5



Signs used in town of Wickenburg. U. S. 60 turns west. U. S. 89 continues north.

strong, yet light in weight and compact when handled. These posts are usuallly driven into the ground with a sledge hammer, a driving cap being placed over the end of the post to prevent smashing it. The post must be placed so that when the sign is in place the edge of the sign towards the highway will be twelve inches from the edge of the shoulder of the grade.

The top of the sign should be approximately 5½ feet above the center of the highway; for plain or regular signs the post must be angled so that the signs face slightly away from the road. This prevents a return glare to the motorist's eyes at night.

Angled to Reflect Lamps

However, with our C-4-R.T.R. and other button type reflector signs, the post must angle slightly toward the highway in order to catch the rays from the headlights and attract the motorists' eyes to the sign. These signs are fastened to the posts with galvanized bolts. The location chosen always is on the right side of the highway and facing approaching traffic.

What has the cost of this one sign erection been in dollars and cents? The post cost $1.08, two bolts complete at eight cents, labor seventy-five cents or a dollar and the C-4-R.T.R. $10.50, and total of $12.74. It requires two such signs at the curve described, that is $25.48.

These two signs may save many lives.

Resurrection can not be accomplished with dollars and cents and while the first cost and constant maintenance of highway department signs runs high, it can not be compared to the value received in preventing accidents, loss of life and in giving reliable information to the traveling public.

Abuse of Signs

In order to bring up the subject of abuse of signs I must first answer that unspoken question in your mind, To whom do these signs belong?

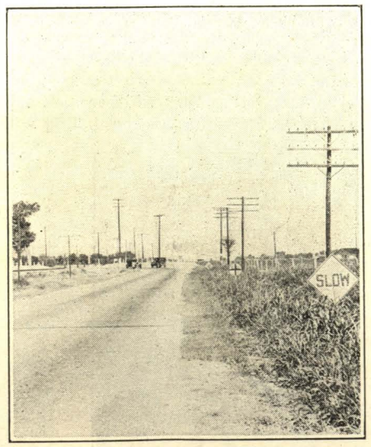
They are yours; they are mine; they are the property of the tax payers of Arizona. I will avoid painful detail regarding the abuse of signs and cite only the most common forms encountered.

Shooting up signs comes first. Some people take an unholy delight in exercising their revolvers, rifles and shot guns on our signs. A sign full of holes cannot be maintained; it must be replaced. If those who destroy our signs are citizens they are certainly destructive and costly ones.

Scratching names, bending, writing upon or otherwise defacing and damaging signs creates an additional cost in maintenance and the eventual replacement of signs.

The law provides a penalty for those who destroy the property of the people, but it is not as strong as it should be in regard to highway department signs.

When signs are damaged or destroyed the department knows it, and as soon as possible they are repainted or replaced. It is to your interest to report to the highway department any persons found destroying highway markers.



Growing grass from canal will soon obscure these signs, endangering traffic at sharp turn and railroad crossing.

U. S. 80 Citizens Send Motorcade to Phoenix

Celebrating the completion of the oil surfacing of the Phoenix to Yuma highway San Diego, Imperial Valley and Yuma merchants and residents participated in a motorcade from the coast city to Phoenix on April 28. Several hundred persons made the trip in 65 cars. Registration of those participating showed citizens from San Diego, Escondido, Calif., Brawley, El Centro, Holtville, Calif., and Yuma.

Besides being entertained by the Phoenix Chamber of Commerce and meeting the business men of Phoenix, one of the features of the motorcade's visit was a luncheon given by the Phoenix Kiwanis club in the Adams hotel. W. W. Lane, state engineer, was chairman of the day at the luncheon and T. S. O'Connell, incoming state engineer, was an honor guest.

Speakers from all the cities along U. S. Route 80, between Phoenix and San Diego, spoke of the wonderful advance Arizona had made in the completing of this route to the coast and expressed its tremendous value to the state from both a tourist and commercial standpoint. It is an easy trip to now drive from Phoenix to San Diego, a distance of 385 miles, in approximately nine hours.

In recalling this trip as recently as three or four years ago, when the old "board walk" road lead through the sand dunes on the edge of Imperial valley it was sometimes impossible to make the trip in less than two days without great discomfit.

IMPROVING CITY STREETS

Stage construction of unimproved city streets is advocated by a committee of the American Road Builders' Association. Under this procedure the dirt streets are graded so that the surface is at or below subgrade elevation for a pavement. Any material placed on the dirt street to make it firm may then be incorporated in the subbase of the pavement when built.

Oil Surfacing As Practiced In Arizona

By GEO. B. SHAFFER, District Engineer.

It has been explained that a completely stabilized subgrade is necessary for a pavement designed to carry heavy traffic, and it is particularly necessary thoroughly to stabilize the subgrade if oil surfacing is to be placed upon it.

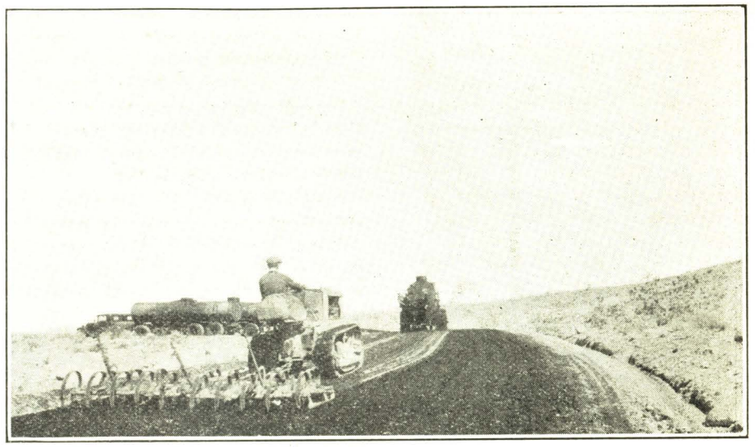
At the time a roadbed is constructed originally little thought is given to the character of the material encountered so far as a finished roadway is concerned. In fact, the work of nature is well explained by the many soil changes which are exposed in the construction of highway. Some soils are stable and some are unstable.

When oil surfacnig is proposed for improving a road where many soil changes exist, it is necessary to place subgrade stabilizer on the sections in question before the mineral aggregate for oil surfacing is placed thereon. There is an important difference between subgrade stabilizer and mineral aggregate which to the layman are one and the same thing.

Content of Stabilizer

Subgrade stabilizer is found in many forms, but just one will be described here. A material so incorporated and mixed as to contain from 20 to 30 per cent fo rocks and 70 to 80 per cent of sand and dust, is a good subgrade stabilizer. The rock should all pass a 1-inch screen and be retained on a ¼-inch screen. The sand and dust should all pass a ¼-inch screen and should grade uniformly from ¼ inch to very fine dust. The dust must carry a high cementation value and of such character so as not to become soft with moisture after it is once set up. A material of this kind makes a good subgrade for all kinds of permanent or semi-permanent surfacing and is thought of as foundation material.

Oil surfacing is made up in a general way of two materials—mineral aggregate and asphaltic road oil. The mineral aggregate which constitutes the main body of the oil surfacing should bear out its name by being strictly mineral in character. The entire mass should pass through a 1-inch circular screen and grade uniformlly to dust, with about five per cent to ten per cent of the material passing a 200 mesh screen. The fine material in the mineral aggregate should have a low cementation value. Most materials which have high cementation values are apt to emulsify with moisture or they might be of such character that will absorb the road oil to the extent that they will become hard and brittle. Ravelling and pot-holing will likely follow and the road will be destroyed under heavy traffic, unless ample money is spent in repairs and maintenance. An aggregate made strictly of hard rock, sand, mineral, silt and rock dust will not absorb the oil to any extent, and if the proper amount of road oil is used, which is approximately four to five per cent of the mass of weight, the oil cake will not become hard and dry nor will it blend or roll if watched carefully when being proportioned.



Spreading and Blotting Oil in close cooperation.

Raveling of oil cake of too high cementation.

Compacts Under Traffic

When the oil cake is constructed of carefully selected materials and oil construction features are properly inspected during the progress of construction, it will compact well under traffic and will remain pliable enough so that it can be reshaped if found neecessary.

The foregoing facts are but an indication of what really should be carried out when the component parts of an oil road are to be decided upon; but it is hoped that they will enable the readers to visualize some of the steps in oil road construction. With this information at hand regarding soil conditions, material for subgrade stabilizer and material for mineral aggregate, the greater part of the battle is won. The road oil is of a crude or some refined product containnig between 65 and 70 per cent of asphalt and is easily obtained from many companies.

We now are ready to prepare the oil surfacing. Assuming that the subgrade has been thoroughly stabilized the mineral aggregate is now distributed evenly on the surface to the depth and width required. We figure on a three-inch oil cake when compacted and we estimate that it requires approximately four and a half inches of loose mineral aggregate to make a finished three-inch oil cake, when thoroughly compacted under traffic.

O l road made of properly graded mineral aggregate after ultimate compaction.

Traffic Benefits Surfacing

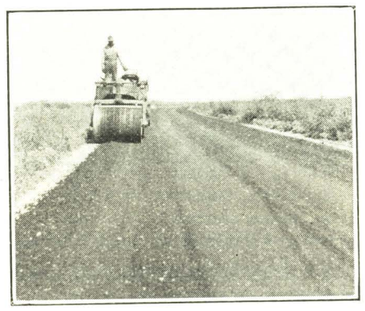
After the mineral aggregate has been distributed as described above the road oil is distributed and mixed into it. It is applied at the rate of about one and a half gallons per square yard. The spreading of the oil is followed very closely by disc and spring-tooth harrows so as to blot out any free oil, so that traffic vehicles can pass through the partially prepared oil cake without undue inconvenience or damage. It might be stated here that traffic passing through the oil material while it is being prepared is a benefit to the final job.

When the required amount of oil has been applied for a distance, the actual mixing begins. This is done by means of blading in windrows from one side of the road to the other, until it is thoroughly mixed and has reached a satisfactory and uniform color.

The oil material now is ready to be spread or laid down. It is spread with a blade to the required width of the finished roadway. The lay down now is complete, but careful finishing is necessary if an easy riding surface is to result.

Final Touches

This final finish is best obtained by carefully blading or dragging a small amount of the fine oil material back and forth across the surface until the oil cake has become compacted. In order that the entire width of the road becomes evenly compacted, it is required that the edges be rolled. The oil road is completed and strange to say we do not state that it is now ready to be thrown open to traffic for the reason that traffic never has been excluded from it during construction.

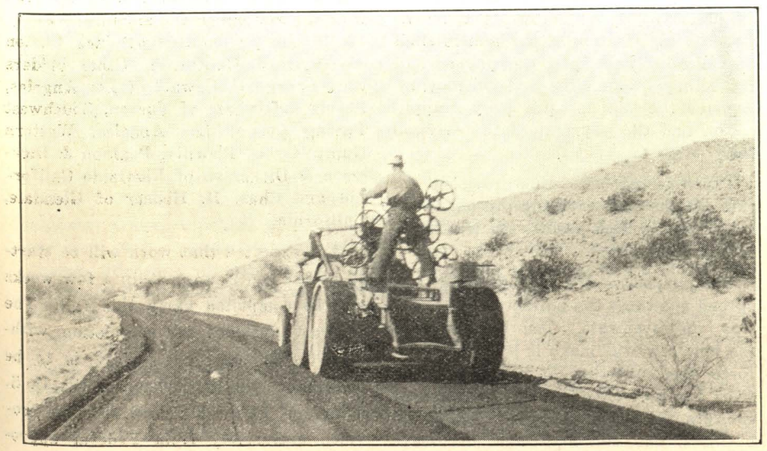


Rolling Edges.

To describe all the thnigs that can happen to an oil road during its construction would cover many pages. This description is given on the assumption that construction conditions, especially the weather, have been ideal.

The maintenance of an oil road begins the day that it is finished. No matter how good or how poor the job may be, maintenance will help it.

Comments on maintenance of oil roads will follow later.



Finishing touches. Final Blading.

Purchasing Agent Attends Buyers, Sellers Meeting

By W. C. JOYNER
Purchasing Agent

Buyers and sellers of Arizona enjoyed a get-together conference at Tucson on April 16, 17 and 18 under the auspices of the Arizona Industrial Congress, that did much to promote the patronizing of Arizona Indusrty and merchants. Unable, because of the press of business, to attend all of the meetings, I managed to be present on April 17 and spoke before the conference on the subject of "Buying for State Institutions."

The meeting was largely attended by wholesalers from all parts of the state, and numerous enlightening speeches were made relative to the importance of buying Arizona-made products. This was in line with the practice of the highway department in buying exclusively from Arizona producers, whenever possible. However, this does not alter the fact that we are compelled to buy a great many articles outside of Arizona because of our inability to obtain the same here. This inability to obtain such articles has caused us to adopt a policy of buying through established firms who order the necessary supplies from dealers in other states. We feel that the merchant who pays taxes to assist in maintaining our state government, through collection of taxes, is entitled to every possible dollar's worth of business we can give them.

A paper was read before the meeting showing the wide range of purchases made for the use of the highway department, the methods of buying, the highly competitive prices bid by the department, and the annual purchases, which for the last fiscal year amounted in round numbers to $803,000.

I believe that considerable good resulted from this meeting with the producers, merchants and agents of the state.

New Laws Give Power To Enforce Highway Code

By E. M. WHITWORTH, Motor Vehicle Superintendent.

THE Tenth Arizona Legislature in regular session, passed two most constructive legislative measures affecting motor vehicle operation. The bills are identified as S. B. 83 and S. B. 97. The former creates a highway patrol, which patrol is made a division of the state highway department, and the latter corrected such faults as had been found in the operation of the highway code.

The patrol will be vested with the power of peace officers to enforce the provisions of the Motor Vehicle Code. The organization will be headed by a superintendent. The force will be restricted to one patrolman to each 8000 registered vehicles. On the basis of this apportionment the force will, by present vehicle registration, consist of one Superintendent, fourteen patrolmen and necessary clerical help. The patrol is charged with the responsibility of patroling the highways both day and night.

Arizona's highway code is patterned after the Uniform Traffic Code. Faults found in the application of the original law passed in 1927 were noted and the highway commission drafted S. B. 97, which bill was drawn to correct these faults and put teeth in the patrol.

Penalties Provided

A general penalty clause was added to existing statute, specific penalties were provided for some offenses. The creation of the patrol should materially improve traffic hazards. It will correct the present objectionable glaring headlights as official testing stations for headlights and brakes will be designated throughout the state and their operation will be supervised by the patrol. The bill provides a four month visitor's privilege in place of the present six months.

Commercial vehicles from foreign states must take immediate registration. This provision was made to prevent the practice that has been followed under the present law which grants a 30 day privilege, of foreign trucks coming into the state and moving out entire crops within the 30 day period to the detriment of the Arizona truck owner.

The patrol should materially increase revenue. Many bona fide residents of Arizona have made a practice of registering their vehicles in a foreign state to evade the payment of the personal property tax that is required at time of registration in Arizona. The motor vehicle division has been powerless in the past to stop this practice, due to its lack of police powers and field force. Should individuals persist in this practice the car will be seized and stored until such time as Arizona registration is effected.

Stops Gas Bootlegging

Some inter-state truck carriers have built large auxiliary storage tanks on their trucks and have traveled our highways without making purchase of gasoline in Arizona. The new legislation prohibits the operator of a truck from importing motor vehicle fuel in his fuel tanks in excess of the amount of the manufacturer's stock specifications in respect to fuel tanks.

A foreign vehicle before receiving Arizona registration must stand a physical inspection by an authorized agent of the division. This is to eliminate the possiblity of stolen vehicles securing registration, many of which have altered motor numbers. The altering of a motor number is declared a felony.

The registration card covering a vehicle must be carried on the vehicle exposed to the inspection of any peace officer. Previously the card could be upon the person of the operator.

Possible To Collect Tax

The division in the past has been unable to enforce the payment of the common carrier tax. This should be a material revenue for the highway department. Upon the failure of an operator to make proper fee return to the division the registration of the vehicle shall be cancelled and upon the payment of the delinquent fees the division may reregister the vehicle upon proper application and the payment of the original fee.

The enforcement of this provision will rule off the highways the present "wild cat" operator and protect the legitimate franchise operator.

The purpose of the Arizona laws is to spread equitably the burden of her highway improvements. The operation of the new law will make it possible to enforce the collection of revenues alike from her own citizens and the transient carriers that come into Arizona to do business, use her highways and leave without contributing anything toward the upkeep of the highways they have used.

The highway commission has been studying the operation of the highway patrols in other states where such state forces exist and has not yet definitely decided how the operation of this law will be put into effect. They will probably act on this the latter part of the present month.

Grand Canyon Approach Road Being Oil Surfaced

Work is now progressing on the paving by the so-called plant mix oil processing method of 27.97 miles of the south park approach road of the Grand Canyon. This road, 57.5 miles in length extends from park headquarters at Grand Canyon to a connection with Highway 66 at a point some 2.5 miles east of Williams. The last section of this road was graded late in December, 1930. It now has a surfacing of gravel and crushed rock for its entire length, making it a standard highway open the year round.

The five mile stretch within the park is already paved, and it is the plan of National Park Service officials to extend the paving all the way to Highway 66. It is expected that a contract will be let during the coming fall or winter for oiling the balance of the road not covered by the project on which bids were recently opened.

A total of seven bids were received with the low bid in the amount of $134,145.10 being submitted by Jack Casson of Hayward, California. Other bidders were George H. Oswald of Los Angeles, Skeels & Graham of Tucson, Southwest Paving Co. of Los Angeles, Western Gunite Co. of Phoenix, Pearson & Dickerson & Dickerson of Riverside California and Chas. H. Heuser of Glendale, California.

It is expected that work will be started by the contractor within a few weeks and be completed early this fall. The contract provides for completion within 200 calendar days. Work is to be done under the supervision of the U. S. Bureau of Public Roads, with funds provided exclusively from Federal appropriations for National Park Roads.

T. S. O'Connell Assumes Post As State Engineer

Culminating a service in the Arizona Highway department that began in November, 1913, T. S. O'Connell was named state highway engineer by the Arizona highway commission, succeeding W. W. Lane, who resigned the post on May 1, to look after his personal affairs, after four years service as state engineer. Mr. O'Connell's appointment became effective April 1 in order to give him an opportunity to familiarize himself with his duties before the retirement of Mr. Lane.

From point of service with the department Mr. O'Connell is one of the oldest engineers in the state's service, having entered the highway department in 1913, serving as assistant engineer in location and construction work until May, 1917, when he left the department to enter the officers training camp of the army. After service over seas with the 91st Division in the World war, he returned to the department in May, 1919, as location and construction engineer, serving in that capacity until March, 1924, when he was named one of the four district engineers of the highway department, in which capacity he has served until his present appointment.

Pioneer Resident

While Mr. O'Connell was born in San Francisco he has been a resident of Arizona for 39 years, with Tucson as his home. He received his engineering education at the University of Arizona and the United States Military Academy at West Point. His first practical experience in his profession was with the Southern Pacific of Mexico on construction work from 1909 to 1912. In 1912 and 1913 he served as instrumentman and assistant engineer in maintenance work at Tucson, and Bakersfield, California, leaving the Southern Pacific company to enter the highway department. Since then he has helped to change Arizona's desert trails into the fine highway system which he now heads. At the time of his appointment he was in charge of the southern district, comprised of Pima, Santa Cruz and Cochise counties.

Mr. O'Connell is a registered professional engineer of the State of Arizona, Associate member, American Society of Engineers and a member of American Society, Civil Engineers.

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

Inter-American Highway Survey Is Nearing Finish

Washington, D. C.—Five-sixths of the Inter-American Highway lying between the Texas-Mexican border and the Panama Canal have been covered by preliminary reconnaissance surveys, and approximately 2,300 miles of a total of 3,200 is possible for traffic during the dry season, according to a delayed cable from Pyke Johnson, secretary of the Highway Education Board, from Panama City.

With Thomas H. MacDonald, chief of the United States Bureau of Public Roads and chairman of the Board, Mr. Johnson went to Panama to attend a conference of delegates from Mexico and the Central American republics to consider the progress made in realization of the dream of seven nations of a continuous highway that will link the sovereign countries of the North American continent.

The conferees formally organized the Inter-American Highway Commission. The meeting was called by the government of Panama. Mr. Johnson's cable follows::

"Substantial progress has been made toward the development of the Inter-American Highway since the Congress in Panama seventeen months ago, according to report adopted at the closing sessions of the Inter-American Highway Commission.

"'Individually and in cooperation with engineers of the Bureau of Public Roads of the United States,' the report says, 'the countries interested in the Highway have now made preliminary reconnaissance surveys over all but approximately 550 miles of a total mileage about 3,200.' The least known links are those in Costa Rica and Nicaragua. A study of these probalby will be undertaken within a month by Bureau engineers, who have been asked by the presidents of the respective countries to cooperate with national engineers.

"The report says: 'As work has progressed surmise has given place to fact. It now is definitely known that no insurmountable obstacles bar the way, although certain sections will be of more than average cost.

"'Construction is progressing steadily. Panama is now finishing the major part of her project to the Costa Rican boundary, and within a short time the new road will open and rich agricultural areas. Delegates to the conference spent two days inspecting highways in the interior of Panama and were very favorably impressed with the progress being made.

"'So sustained have highway earnings been that returns are paying both maintenance costs and providing funds for further construction. Mexico is making a great effort to open the road to Mexico City this year. It certainly will be ready in 1932. Part of the road from Mexico City to Guatemala is improved and the rest surveyed. South of Panama great progress is reported.'"

CROSSING DEATHS LOWER

Although motor vehicle fatalities in general are mounting year by year, deaths in grade crossing accidents are being decreased, according to an announcement by the Interstate Commerce Commission. Fewer deaths resulted from grade crossing accidents in 1930 than in any other year since 1922, or nearly ten years. The commission reported 2,020 deaths at grade crossings in 1930, which was a reduction of 465 over 1929.

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THE LABOR PROBLEM

The Arizona Highway Department has been doing everything in its power to help the labor situation in Arizona. For months it has been working with the aim always in sight of keeping as much highway construction work under way as there would be money available to pay for it when the work was completed.

Far in advance of the appropriation by the federal government of the emergency aid for highway work, the Arizona department had surveyed and completed plans so that it could take immediate advantage of the government's offer when it came. The result of that is, that Arizona will use all of its quota of this money and will be able to use more if it is available.

But the department has labored under many handicaps. The worst of them in the fore part of the present year was that it could not force the contractors to use Arizona citizens on federal aid projects, with the result that many contractors on construction work in the state were using "floaters" who would work for any wage and who kept Arizona citizens from getting work that the department had planned would be available for them. The concession of the government in permitting Arizona to write a citizen clause in all contracts and enforce a minimum wage of four dollars per day has corrected that evil and highway department inspectors are seeing that no one is employed on highway work in the state except citizens of at least one year's residence.

Applications have been received by the department's labor bureau from all that desired to apply, until today they have over 13,000 applicants for work in all vocations. These applications have been filed and indexed according to their qualifications and the labor department furnishes the contractors on highway work lists of applicants qualified to do whatever class of work is needed.

The state is doing all that it can to help Arizona citizens to get work. If private citizens, corporations and industries would give the same kind of cooperation the labor situation in Arizona could be greatly relieved, but as long as the private employers continue to hire other than Arizonans to do their work little real progress can be accomplished.

THE HIGHWAY PATROL

Near the middle of June the new law creating a state Highway Patrol goes into effect. Through this measure the state will have a force of officers to enforce the motor vehicle laws of the state. These new officers will not be just speed cops, although that feature of the motor laws also comes under their jurisdiction, but they will have the power to enforce all the laws pertaining to the operation of motor vehicles on the highways.

Evaders of license fees, faulty registration, common carreir fees and licenses, drivers' permits and everything pertaining to the operation of an automobile will be within their province.

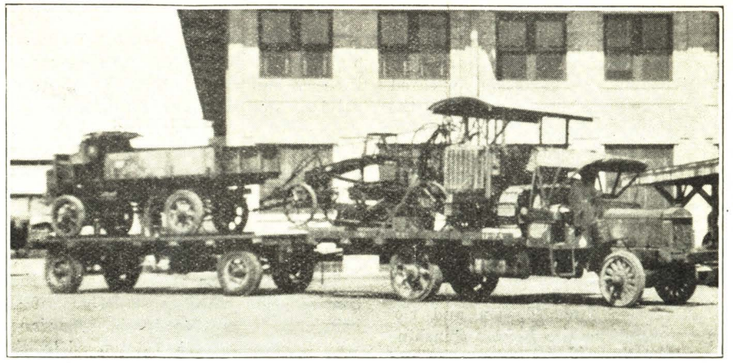
It has been declared there are 5,000 cars running around the state of Arizona with improper or foreign licenses that should be registered in this state. The owners of these cars have but 30 days in which to change their ways, because added penalties will fall to them if the highway patrolmen pick them up. Drivers of vehicles without proper drivers' licenses had better take warning and get them.

Arizona's motor vehicle laws have not been taken seriously. Many of the local authorities have been too busy to enforce them. The motor vehicle department has not had enough inspectors to cover the field. That is going to change. The legislature wants the motor laws of Arizona enforced and the state patrol will be out to do it. It might be a good thing to study up on Arizona's motor laws, some of the things you have gotten into the bad habit of doing may need changing. It is better to do it yourselves than to have a highway patrolman pointing out the errors in your driving.

Department Spends Thirteen Millions In Three Fiscal Years

Arizona's state highway department from July 1, 1928, to March 31, 1931, has averaged over four and one-quarter million dollars each fiscal year in construction and maintenance of state roads, or the total sum for that period of $13,211,473.80.

Below is given a table of highway expenditures for that period divided into counties, showing the amount of money spent each year, in each county, the population of those counties and the per capita expenditure of the department in each county. It is interesting to note that Mohave county with the smallest population of any county in the state has a per capita expenditure of $140,176 on state roads by the highway department. Maricopa county, the most populous, while receiving the largest sum expended in any one county, still had the low per capita expenditure of $14,442 and Pima county the second largest in the state, from a population standpoint, had the lowest expenditure of only $12,592 per person.



Sending a truck, grader and caterpillar tractor to maintenance crew from Phoenix shops all in one operation.

This table shows one of the difficulties which Arizona faces in financing of her state roads. In building up her state system it is necessary to spend large sums in the less populous districts in order to complete the system of East and West and North and South interstate highways.

County	Population 1930	1928-29 Expenditure	1929-30 Expenditure	July 1, 1930 to March 31, 1931	Total	Per Capita Expenditure
Apache	17,766	$ 87,532.27	$ 256,687.24	$ 333,549.58	$ 677,769.09	38.149
Cochise	40,997	429,921.72	580,108.80	428 570.99	1,438,601.61	55.090
Coconino	14,052	481,472.27	216,657.22	487,909.10	1,186,038.59	84.403
Gila	31,010	203,342.38	337,238.57	113,551.91	654,132.86	21.094
Graham	10,061	634,259.42	197.654.77	94,219.70	926,133.89	92.051
Greenlee	9,891	55,184.20	52,140.44	96,464.39	203,789.03	20,603
Maricopa	150,870	402,287.40	875,481.77	901,126.08	2,178,895.25	14.442
Mohave	5,572	130,741.01	446,982.13	203 342.64	781,065.78	140.176
Navajo	21,190	262,619.69	294,778.06	161,600.50	718,998.25	33.931
Pima	55,123	197,654.41	142,942.12	353,513.65	694,110.18	12.592
Pinal	23,321	501,481.26	643,058.39	370,629.58	1,515,169.23	64.970
Santa Cruz	9,652	69,844.93	149,202.00	142,707.88	361,754.81	37.479
Yavapai	28,511	355,482.97	223,223.22	251,686.30	830,392.49	29.125
Yuma	17,817	423,726.08	293,345.11	327,551.55	1,044,622.74	58.630
TOTAL		$4,235,550.01	$4,709,499.94	$4,266,423.85	$13,211,473.80	

Gasoline Tax Revenues Break All U. S. Records

The gasoline tax yielded a net revenue of $494,683,410 in 1930 and nearly fifteen billion gallons of gasoline were used by the motor vehicles of the United States, according to reports received by the Bureau of Public Roads of the U. S. Department of Agriculture from State agencies.

As compared with 1929, the tax revenue increased 14.6 per cent and the consumption of gasoline increased 3½ per cent in spite of the fact that there was no increase in the total number of motor vehicles. The average consumption per vehicle was 556 gallons in 1930 as compared with 538 gallons in 1929.

A gasoline tax was imposed in all the States, the rate ranging from 2 to 6 cents per gallon. The average rate was 3.35 cents per gallon. The net revenue of $494,683,410 was allocated as follows: $1,102,187 for collection expenses; $338,927,564 for State highways; $96,225,637 for local roads; $20,869,901 for State highway bond payments; $10,179,135 for local road bond payments, $11,842,930 for city streets; $13,404,200 for schools, and $2,131,856 for miscellaneous expenditures.

The average of the annual registration fees is $13.41 and this added to the average gasoline tax of $18,62 made a total direct tax on the motorist of $32.03. These two taxes formed the largest item of revenue for highway purposes.

An analysis by the bureau shows that the average consumption of gasoline per motor vehicle was 452 gallons in 1925 and there has been an increase each year to 556 gallons in 1930. This increase is thought to be the result, in part, of the increased percentage of trucks and other commercial vehicles, but it has also been influenced by increased use of the average vehicle.

CHINA NEEDS ROADS

With more than four hundred million people living in an area somewhat larger than the United States, China has only 35,000 miles of road, with only about 2,000 miles paved. In the whole country there is less than 8,000 miles of raliroad and only 30,000 motor vehicles.

Commission Awards Many Highway Contracts

By M. C. HANKINS, Secretary.

The Arizona State Highway Commission met in special session on April 10th and 11th, 1931. A delegation appeared before the Commission representing the Central Highway association requesting that the primary system, as formerly approved by the highway commission, be not changed and had particular reference to the Globe-Springreville route from near Showlow to near Springerville, connecting with U. S. Highway No. 70.

A delegation from Tucson and Nogales representing the Border Sunshine way appeared before the commission and submitted a tentative setup on proposed construction for improvement in the southern part of the state to be included in the ensuing budget.

The Commission awarded the contract on the Florence-Tucson Highway, F. A. P. No. 94-B to the low bidder, Hodgman and MacVicar, in the amount of $64,-850.25.

A board of appraisers was appointed to prepare a list of all obsolete equipment, materials, and supplies, properly segregating them into lots for the purpose of advertising for bids for sale.

The state engineer was authorized, through the superintendent of the Motor Vehicle department, to secure information from other states as to the general operation and administration of the highway patrol for the purpose of setting up the administration of the new Patrol Bill, recently passed by the Tenth legislature.

Citizens Being Employed

Contractors' reports on employees were submitted to the commission on the employment of Arizona labor on all state highway contracts. The reports disclosed that the percentage of Arizona citizens being employed was gradually on the increase and that all contracts awarded since the Arizona citizen clause had been added to the contracts were being lived up to by the contractors in fulfilling the requirements of hiring Arizona citizens.

The Globe-Showlow Highway, F. A. P. No. 99A and B, was brought up for discussion. The Indian agencies are temporarily holding up the right of way until definite actino is taken either by the state or county to maintain the old Rice-McNary highway.

The commission awarded the contract on the Ashfork-Kingman highway, F. A. P. Nos. 57 and80-C, Ashfork-Flagstaff highway, F. A. P. No. 89-B, Ashfork-Prescott highway, F. A. P. No. 62-A, involving approximately 22 miles of oil processing by the Road Mix method, to Schmidt and Hitchcock, low bidder, in the amount of $132,555.14.

Consider Verde Bridge

The commission met in special session on April 18, 1931.

The commission took up for further consideration the construction of a bridge at Camp Verde, in accordance with Senate Bill No. 147 passed by the Tenth legislature, in which a delegation from Yavapai and Gila counties were present. The commission instructed the state engineer to proceed with plans, specifications, and estimate for the construction of the bridge. Yavapai county through the board of supervisors is to put up the difference, not to exceed ten or fifteen thousand dollars, if the cost of the construction should exceed the amount of $65,000 as provided for in Senate Bill No. 147.

The commission awarded the contract on the Tucson-Nogales highway, F. A. P. Nos. 25-B and 86-D to the low bidder, Stanley Jaicks company of Tucson, in the amount of $113,156.51.

The commission awarded a contract on the Globe-Safford highway, F. A. P. No. 87-D to the low bidder, O. F. Fisher, Phoenix, in the amount of $21,201.88.

The commission awarded the contract on the Florence-Superior highway, F. A. P. No. 23-C, 4 and F, to the low bidder, Western Gunite company in the amount of $54,954.43. The work consists of Oil Surfacing approximately 16 miles from Florence Junction to Superior.

The commission awarded the contract on the Florence-Superior highway, F. A. P. No. 23-A and B to the low bidder, Western Gunite company, in the amount of $77,761.87. The work consists of three miles of construction from the Florence Bridge north and the Oil Processing of the entire section from Florence Bridge to Florence Junction, 15 miles.

Request New State Route

A delegation from Willcox, Bowie, San Simon and Dragoon, appeared before the commission requesting that the route from Benson by way of Dragoon, Willcox, Bowie, San Simon and the New Mexico State line be taken over as a State Route or a State Highway. The matter taken under advisement.

The controversy on the right of way through the Indian reservations on the Globe-Showlow road was brought up. The state engineer explained that a conference was held the night before between a representative of the Indian service, Senator Hayden, Mr. Lane and others, and he believed that the controversy had been settled satisfactorily and he did not anticipate any further trouble.

The routing of the Globe-Showlow highway through Springerville was brought up and the commission instructed the state engineer to make a survey from Showlow direct to Springerville and also a survey by the way of Concho to St. Johns.

The commission met in special session on April 24, 1931.

A delegation from Williams appeared before the commission with reference to the routing of U. S. Highway 66 through Williams. The delegation was informed that there was no contemplated change on the routing of U. S. Highway 66, as now established on Bill Williams Avenue, and that a grade separation over the Santa Fe Tracks would be constructed just east of Williams. The delegation was further advised that by July 4th, five or six projects would be under construction on U. S. 66.

The commission awarded the contract on the Florence-Tucson highway, F. A. P. No. 94-E, to the low bidder, Ralph Pleasant of Phoenix, in the amount of $49,531.99. The work begins at the Pima-Pinal county line and extends 8.3 miles toward Tucson.

Mr. William Coxon appeared before the commission with further reference to the Willcox road. The commission designated the road from Benson by the way of Dragoon, Willcox, Bowie, San Simon and the New Mexico State Line a State Route.

Discuss License Violators

A resolution from the board of supervisors of Maricopa county was presented with reference to residents of Maricopa county carrying foreign registration on their automobiles. Chairman Addams stated that on a check made in the vicinity of Phoenix, one man working for six hours counted 610 cars carrying California license plates, 28 of which had 1930 plates. He further estimated that there were five thousand cars in Arizona not paying the license fee and taxes on cars operated in Arizona and owned by Arizona residents. The matter is to be taken up through the various boards of supervisors with a view of reaching an agreement of cooperation between the various counties for the enforcement of this flagrant violation of the Motor Vehicle code.

The commission awarded the contract on the Holbrook-Lupton highway, F. A. P. No. 83-A to the low bidder, Everley and Allison, in the amount of $96,946.55. The work consists of Oil Processing approximately 22½ miles from Sanders to the New Mexico State line.

The commission awarded the contract on the Ashfork-Kingman highway, F. A. P. No. 80-B to the low bidder, Martter and Bock in the amount of $101,709.44. The work consists of grading, draining and surfacing of nine miles of roadway from Crookton to Seligman.

Natural Surfacing Needs Selected Material Types

By J. W. POWERS
Engineer of Materials

In selecting the types of material for use as natural surfacing for highways built by this department, it is necessary that they have certain characteristics. For natural surfacing it is necessary to have a high cementation, a low shrinkage and a proper grading analysis. The tests by which these characteristics are determined are as follows::

CEMENTATION — That portion of the material that passes a quarter inch screen is ground in a ball mill, for a definite length of time, to a stiff mud. This mud is then molded by pressure into small briquettes (approximately one inch in diameter and one inch high). After being formed and allowed to dry, they then are baked to remove all traces of moisture. When thoroughly dehydrated, they are placed on a small anvil and tested for binding power by repeated pounding action. If the material has good cementation qualities it will withstand 1200 blows without breaking. Low cementations range from practically nothing to three or four hundred. Low cementations make loose dusty roads.

LINEAL SHRINKAGE — The lineal shrinkage is made on that portion of material passing a 10-mesh sieve. It is mixed with water to a point at which when slightly compacted it will not readily absorb any further moisture. This condition is known as the moisture equivalent percentage of a material. The wet material is then molded into a 1"x1"x12" briquette and allowed to dry out. The difference in length between the wet state and the dry state is computed to a percentage basis and is reported as percent shrinkage.

Prevents Troubles

We have found that only those soils which have a shrinkage of less than three per cent make satisfactory surfacings. By this I mean that material that has a shrinkage in excess of this three per cent may make satisfactory natural surfacing but in case any other type of surfacing is placed over it, trouble is likely to result.

Screen analyses of these materials are of value in determining the stability of the material. We have found that for natural material the maximum percentage of rock is 40 per cent, and it should preferably be 30 per cent. This gives ample rock and leaves enough binder to set readily and well.

The above determinations constitute the more important tests on the ordinary surfacing materials. However, a material may have good characteristics as measured by the above, yet have a low specific gravity. The heavier a material, the more it resists being displaced by traffic. For this reason we watch the specific gravity, particularly in the northern part of Arizona where cinders (low gravity material) are prevalent.

Shops Are Making Junk Heaps Pay Big Dividends

By C. E. SCHNURE,
Shop Foreman

Making the junk heap pay $50,000 a year dividends is one of the tasks the Phoenix shops of the highway department has recently set about doing in the installation of a reclaim department for automobile parts. On making a survey of F W D and Liberty trucks that were stored in the highway department yards in Phoenix, and which were found to be worn beyond repair, it was decided that it would pay to install a reclaim department. This department could dismantle these old trucks and reclaim the parts in them that were not worn out and were usable as replacements in equipment now in use.

Bins and two sections of racks were installed in the west end of the south sheds for that purpose, the total cost of this installation amounting to approximately $500. These bins and racks are numbered with the parts numbers and as the trucks are dismantled the parts that are usable are placed in these bins and racks, which have now become a stock room for FWD and Liberty truck parts. As the parts are reclaimed a perpetual inventory card system is started on them so that an accurate accounting of all parts is always on hand.

When parts are issued from this stock for replacements in trucks now in use they are charged out at 50 per cent of their list value as a new part. The system has barely gotten underway, but from all indications to date a saving of at least $50,000 will be effected during the coming year by this improvement, a saving that otherwise would have been practically wasted in junking the old trucks as they were not usable.

Inventory Card System Checks Warehouse Stock

By A. H. LIND
Warehouse Superintendent

In the General Warehouse of the Arizona Highway Department at Phoenix a perpetual inventory card system is maintained covering all of the warehouse stocks at Phoenix.

This system is a visable card index, which at all times indicates the quantities of stocks on hand, the unit price of same, and the past disbursements, the files contain some ten thousand index cards, each covering a separate article.

A constant check is kept on the stock, as each item of stock is inventoried and the card is checked whenever it is necessary to reorder, in this manner when it is necessary to reorder any article for stock, an actual physical inventory on that item is made and the inventory is checked with the card, and if any discrepancy is found a further check is made of past disbursements, outstanding requisitions, etc., until the differences are located and the discrepancy eliminated.

Thus it will be seen that the Warehouse stock balances are kept correct at all times, as far as it is possible for us to do so. This department is operated as any private business and attention to all details are always given that a correct and proper accounting can be made for all supplies received and disbursed.

Engineer (disgustedly): "You've got to speed up on this job, Mr. Contractor. You're always behind time. Did you ever do anything on time?"

Mr. Contractor: "Yep; once. Bought a steam shovel and six dump wagons."

Bureau Of Public Roads Projects In Arizona

UNDER CONSTRUCTION

C. G. Willis & Sons have the grading of Forest Highway-Oak Creek Hill Sec-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 25 per cent complete. E. J. McCracken, Resident Engineer.

Skousen Brothers have the grading of the Picnic Mesa-Springerville Section 19-I of the Clifton-Springerville Forest Highway. The project is 4.5 miles in length, beginning at Picnic Mesa and extending north to a connection with U. S. Route 70 at a point ½ mile east of Springerville. Estimated cost of this project is $27,000 and is now 95 per cent complete. C. R. Dalton, Resident Engineer.

O. F. Fisher completed on April 8, the contract for subgrade reinforcement on Forest Highway 19-G2, H1, two sections of the Clifton-Springerville road, 11.3 miles in length extending from a point one mile north of Nutrioso to Picnic Mesa.

Lord & Bishop have the contract for oil surfacing 18.5 miles of the Grand View-Desert View Section of the 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 was 60 per cent completed when closed down in November for the winter season. Work was resumed April 20th and should be completed about June 1st. V. G. Watson, Resident Engineer.

Jasper-Stacey Company has the contract for grading Houserock Canyon Section of the Houserock Canyon National Forest Highway, Project 28-A, Kaibab National Forest, Coconino County, at an estimated cost of $275,000. Work on this project was begun in August, 1930, and is now approximately 85 per cent complete. W. J. Nelson, Resident Engineer.

Jasper Stacy Company has the contract for grading the 8.4 miles of Section B. Houserock Canyon Natinoal 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 in May or June. Rudolph Thirion, Resident Engineer.

Portions of Sections "A" and "C" of the Payson-Holbrook Forest Highway Route 11 are under Betterment and Improvement work by day labor. Portions to be improved total ten miles in length and will cost approximately $12,000. L. C. Chadwick, Resident Engineer.

Swift Trail Section 1 Improvement, a portion of the Major Forest Development Road System, is being done by day labor and station contract. This project is 4 miles in length beginning at a junction with State Route 81, seven miles south of Safford and extending into a southwesterly direction to the foot of the Graham mountains. Estimated cost is $12,000 and project is now 70 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 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 9 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 Rorest Development Road, in Crook National Forest, Graham County. The total estimated cost is $57,000 and E. F. Strickler is the resident engineer. Contract time started April 20th and project is now 4 per cent completed.

W. M. Tenney, Jr., has the contract for grading and draining 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. Estimated cost of construction is $2,800. Project is now 20 per cent complete. 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 $160,000, V. G. Watson, Resident Engineer. To date only preliminary work incident to plant installation has been done.

SURVEYS

Chiricahua National Monument Survey, Forest Highway Route 32, in Cochise county. Estimated length 12 miles. Survey began February 23. F. H. Norton, 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 Highway near the Gila-Coconino county line. Survey began March 15th. J. H. Brannan, Locating Engineer.

ADVERTISED FOR CONSTRUCTION

Grading 12.8 miles, Section "C" of the Pine-Winslow Forest Highway beginning at Moqui Ranch and extending northeast to the North Forest Boundary 30 miles southwest of Winslow. Bids opened by 19th.

Grading of 13.7 miles, Section "B" of the Pine-Winslow Forest Highway beginning at Clint's Well (60 miles south of Flagstaff) and extending to Moqui Ranch. Bids opened May 21.

Grading of 13 miles of the Three Lakes Section of the Fredonia-Grand Canyon Forest Highway in the Kaibab National Forest, Coconino county. Bids to be opened in San Francisco last week in May.

California Leads States In Automobile Registrations

California finally has passed New York in the number of automobiles, and now leads all states in the nation with 1,941,969, it is noted by the Automobile Club of Southern California. The state, however, has not yet passed New York in total registration, as the Empire State has 347,054 trucks, compared with 147,919 for California. This allows New York to maintain its leadership in total registration with 2,347,011, compared with 2,099,293 for this state.

California still retains by a good margin its leadership in motor vehicle registration compared to population. According to the 1930 census, the state has a population of 5,677,251, which means that there is now a motor vehicle registered for each 2.8 persons.

California's registration for 1931 presented an increase of approximately 67,000 over the preceding year.

Road Conditions, Arizona State Highway System

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. Detour good; 7.6 miles under construction east of St. David. Two detours, condition good.

U. S. ROUTE 66, TOPOCK TO LUPTON—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. 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. Observe caution in driving, 30 miles being oiled Coolidge Dam to Geronimo; 5 miles detour; condition fair; 13 miles under construction east of Geronimo, 6 mile detour, fair; 8 miles of oil surfacing, Solomonville to Duncan, caution. Duncan to State Line under construction, detour via Virden.

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

STATE ROUTE 73, CUTTER TO MCNARY—104 miles. Gravel surface Cutter to Rice and White River to McNary, other unimproved. Condition good when open. Should enquire Globe Chamber of Commerce before making trip at this time of year as road is often closed because of snow.

STATE ROUTE 71, CLIFTON JCT. TO SPRINGERVILLE — 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 Springervillle.

U. S. ROUTE 89, NOGALES TO FREDONIA—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 exception 23 miles under construction between Nogales and Tucson, caution. 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. No detour.

STATE ROUTE 79, PRESCOTT TO FLAGSTAFF—91 miles. Gravel or oil surfaced to Sedonia, graded and drained Sedonia to Flagstaff. Condition good excepting for construction in Oak Creek canyon. Sedonia to Flagstaff slow in wet weather.

STATE ROUTE 74, WICKENBURG TO EHRENBERG—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. Bridge under construction 8 miles north of Nogales.

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 Rillitio and Red Rock. Detour fair. Observe caution in driving.

STATE ROUTE 87, MESA TO PICACHO—60 miles. Paved oiled or gravel surfaced. Condition good excepting 1800 ft. detour around overpass construction near Picacho.

PERSONALS

R. C. Bond, locating engineer, has been changed from Nogales to the Wickenburg to Blythe road, with headquarters in Wenden.

L. W. Burdwell, foreman on the Apach Trail betterment, has moved to Roosevelt dam.

Robert D. Canfield has been made sub-resident engineer on Project 8908 on the Tucson to Nogales highway with headquarters at Amado.

H. C. Foster has taken charge of the 21 miles of oil surfacing beginning 5 miles south of Ash Fork and extending westward from Ash Fork.

Albert Freitag, locating engineer, has changed from the Holbrook to Lupton project to 1806 out of Superior.

W. J. Halloran has been named resident engnieer on 6601, the new project east of Williams.

Geo. E. Lang, resident engineer, has changed from Wellton to Project 8902, Wickenburg to Castle Hot Springs Junction, with headquarters in Wickenburg.

Leroy Middleton has assumed charge of the Ash Fork shop and yard as foreman.

W. B. Matlock, foreman, has moved his force from the Seligman-Kingman project to 8402 from Casa Grande to Picacho.

H. O. Norville, resident engineer on the Topock to Oatman oil processing job, is now located at Casa Grande in charge of Project 8402.

PENN STATE LEADS

Pennsylvania leads all the states in highway department expenditures in 1930 with $81,833,000, followed by New York with $57,100,000. Louisiana will have more than $30,000,000 increase this year. Only a comparatively few states show a decrease for 1931.

Projects Under Construction In Arizona

DISTRICT No. 1

Geo. B. Shaffer, District Engineer.

Gribble & Bunce have completed the oil surfacing of 16.5 miles of oil surfacing Topock to Oatman. H. O. Norville, Resident Engineer.

Martler & Bock have grading and draining of 4½ miles (F.A. Project 80-E) which begins 2 miles west of Hackberry and extends 2 miles east of Hackberry 36 per cent complete. Jas. H. Parker, Resident Engineer.

Schmidt & Hitchcock have been awarded a contract for oil surfacing 17.8 miles beginning at the Coconino-Yavapai county line and extending west, F.A. Projects 57, 80-C and 89-B, and 4.3 miles Ashfork south, F.A. Project 62-A started construction on 80-C on April 4th. H. C. Foster, Resident Engineer.

Martler & Brock have been awarded a contract for grading, draining and subgrade stabilizer on approximately 9 miles which begins at Crookton and extends west to Seligman, F.A. Project 80-B. Floyd Bughly, Resident Engineer.

DISTRICT No. 2

F. N. Grant District Engineer

Ben Pearce Construction Co. has the gravel surfacing of 22½ miles from Sanders to Lupton 89 per cent complete (F.A. Project 83-A). H. Pinney, Resident Engineer.

H. L. Rayden has the construction of 5½ miles beginning at Holbrook and extending east (F.A. Project 78-F) 8 per cent complete. J. P. Flynn, Resident Engineer.

McGinty Construction Co. has the construction of Winslow streets (F.A. Projects 20 and Non F.A. 40) 25 per cent complete. J. P. Flynn, Resident Engineer.

Veater & Davis have the construction of F.A. 95-B (Cameron to Ridge, 40 miles) 18 per cent complete. H. D. Alexander, Resident Engineer.

Everly and Allison have been awarded a contract for the oil surfacing of 22½ miles from Sanders to Lupton, F. A. Project 83-A. J. P. Flynn, Resident Engineer.

DISTRICT No. 3

R. C. Perkins, District Engineer.

Lynch Canon Engineering Co. has the construction of the Tempe Bridge (F. A. Project 2-B) 94 per cent complete. Gus Rath, Res. Engr.

R. H. Martin has the construction of the approaches to the Tempe Bridge 24 per cent complete. Gus Rath, Res. Engr.

Martin Bros. Trucking Co. has the oil processing of 30 miles from the Cooldige Dam east 68 per cent complete (F.A. 87-B Sch. 1 and2). M. Kisselburg, Res. Engr.

Lee Moore Contracting Co. has the grading draining and placing of subgrade stabilizer on five miles beginning at Geronimo and extending west, (F.A. 15-D) 66 per cent complete. L. C. Bolles, Res. Engr.

Lee Moore Construction Co. has grading, draining and surfacing of 6.9 miles beginning at Duncan and extendig to the New Mexico-Arizoa state line (F. A. 88-C, 67 per cent complete. H. B. Wright, Res. Engr.

Robert E. McKee has the grading and draining of 13.7 miles beginning at Ge-

ronimo and extending east (F.A. 87-E) 29 per cent complete. L. C. Bolles, Res. Engr.

Skeels & Graham have the surfacing and oiling of 11.6 miles, beginning at Duncan and extending west (F.A. Project 88-B 1st Reo), 42 per cent complete. Daniel Thompson, Res. Engr.

Skeels & Graham have the surfacing and oiling of 8 miles, beginning at the end of the pavement east of Solomonville and extending east, F.A. Project 88-A 1 Reo. Dan Thompson, Res. Engr.

Stanley Jaicks has practically completed the Paving of Florence streets F.A. 94-A and 1 Reo. Joe De Arozena, Res. Engr.

O. F. Fisher has been awarded a contract of approximately ¾ miles just west of Coolidge Dam. F. A. Project 87-D.

Western Gunite Co. have started construction on 15 miles of surfacing and oiling, beginning at the Florence Bridge and extending north F. A. Project 23-A and B and have the contract for surfacing and oiling approximately 16 miles from Florence Junction to Superir F.A. 23-C, D and F.A.—A.W. Newhall, Res. Engr.

Bids were opened May 1st on surfacing and oiling 14.6 miles, beginning approximately 10 miles east of Solmonville and extending east.

DISTRICT No. 4

W. R. Hutchins, District Engineer.

Hoggan & Farmer have the overpass between Rillito and Tucson 94 per cent complete (F.A. 94-G). J. R. Van Horn, Res. Engr.

Stanley Jaicks Co. has the contsruction of 8.3 miles, beginning at Rillito and extending west, F.A. Project 94-E, 94 per cent complete. J. R. Van Horn, Res. Engr.

N. G. Hill & Co. has the construction of a bridge and approaches, an overpass, also grade, drain and surface 4 miles west of Benson approximately 65 per cent complete. W. J. Tavenor, Res. Engr.

The Imperial Trucking Co. has the oil surfacing of 15½ miles which begins 1 mile west of Rillito and extends to the pavement north of Tucson, 96 per cent complete. F.A. Project 94-F. J. R. Van Horn, Res. Engr.

William Peper has the construction of 10 miles which begins approximately 22½ miles south of Tucson and extends south to the county line, approximately 65 per cent complete. J. R. Van Horn, Res. Engr.

Packard & Tanner have the construction of 7.6 miles (beginning 1 mile east of St. David and extending east) (F.A. Project 79-E) 34 per cent complete. W. J. Tavenor, Res. Engr.

Stanley Jaicks has completed the overpass Picacho (F.A. Project) (94-C Sch. 2 and 3). J. R. Van Horn, Res. Engr.

Hodgman & McVicar have the oil surfacing of 21 miles, (beginning 1 mi. east of Tucson and extending to Vail Jct.) F. A. 90-A, 1st Reo. 63 per cent complete. C. S. Benson, Res. Engr.

Heitsch & Bitten have the oil surfacing of approximately 17 miles (beginning at the end of the pavement 3 miles north of Nogales and extending north, F.A. 86-C, 86-E, Non 25-A and 66), 14 per cent complete. C. E. Benson, Res. Engr.

Hodgman & McVicar have started construction on grading, draining and placing of subgrade stabilizer on F.A. Project 94-B, whcih extends from Florence to Coolidge. Joe De Arozena, Res. Engr.

Stanley Jaicks Co. has started construction on 9.2 miles (F.A. 25-B Reo and 86-D) begins at the Pima-Santa Cruz county line and extends south. R. D. Canfield, Res. Engr.

Ralph Pleasant has started construction on the oil processing of F. A. 94-E. beginning at the Pima-Pinal county line and extending south 8.3 miles toward Tucson. C. S. Benson, Res. Engr.

National Monuments of State Lure Vacationists

(Continued from page 3)

out on a standard five-foot width, with parapets at the points of steepest incline. It is a marvel of engineering work, and one of the most spectacular mountain trails in existence. Other interesting trails from the South Rim are the Bright Angel and the Hermit.

The Grand Canyon is ever changing, ever fascinating. Every hour in the day brings different coloring, with the changing shadows apparently altering the very forms of the buttes and temples. And every change in the weather brings its own particular canyon view. An intimate knowledge of its many moods can be gained only through long acquaintance.

In connection with a visit to the North Rim of the Grand Canyon a visit is often made to Pipe Spring National Monument, located up near the Utah border. The main feature here is a ruined old stone fort, a relic of pioneer days. In the early 60's the Mormons had a cattle ranch in the vicinity, and the fort was erected as a protection against marauding Indians. It originally consisted of two houses of two stories each, built facing each other across a courtyard which was closed at both ends by heavy double gates. In the courtyard is Pipe Spring, a spring of cold, pure water, which overflows and waters the ground around, so that cottonwoods thrive and furnish abundant shade, making a charming oasis in the desert.

Tumacacori Monument

Tumacacori National Monument, near the State's southern border, is also interesting historically. Upon it is located a very old Spanish mission ruin, believed to date from the latter part of the Seventeenth Century. It was built by Jesuit missionaries from Spain and operated by them for nearly a hundred years. According to the most authentic information available it was founded about 1691 by Father Eusebio Francisco Kino, missionary and explorer. Sometime after 1769 the Franciscan Fathers took charge of the ancient mission and repaired its crumbling walls. For another sixty years it ministered to the Indians of the region, until Apache Indians attacked it, drove away the priests and disbanded the peaceable Papago Indians residing in the vicinity. When found by Americans about 1869 the mission was in a ruined condition, but much has been done to repair it.

The other national monuments in Arizona under the supervision of the Park Service may be divided into two classes, prehistoric and scientific.

Among those reserved because of their priceless value to the Nation as relics of the prehistoric people who lived in the Southwest are the Casa Grande and Montezuma Castle National Monuments. The main feature of the former is the Casa Grande or "Great House," a burnt-out, dismantled group of solid adobe walls which are the ruins of a great building which at one time was four stories in height. The standing walls are six feet thick at their base. The first recorded visit of a white man to Casa Grande was made in 1694 by Father Kino, founder of San Xavier Mission. From his description of the ruins they must have been in much their present condition for a couple of centuries before he viewed them. In addition to the great main ruin there are many ruins of other prehistoric dwellings. Taken together they indicate a remarkable record of advancement in the architecture of the Casa Grande peoples up to the time of the settlement.

(Continued on page 20)

(Continued from page 18)

Montezuma Castle

Montezuma Castle is an excellent example of an entirely different type of prehistoric architecture—the cliff dwelling—at its highest. The building, situated in a cavity in the face of a vertical cliff eighty feet above its base, is about forty feet from bottom to top and has been kept in an unusually good state of preservation by the overhang of the cave, which extends at least thirty feet. It must be very old for the Apache Indians who occupied the surrounding valley at the advent of the white man, have no traditions concerning its origin. Around the castle are many smaller structures of from one to five rooms, and it is estimated that 200 or 300 persons may have had their homes in the settlement. From their pottery and other artifacts the ancient inhabitants were in a rather well advanced stage of the Stone Age. A study of the Castle itself shows at least three different stages of building, and various methods of construction were used in the different rooms.

The Navajo National Monument, in the northeastern portion of the State, is within the Navajo Indian Reservation. It consists of three separate tracts, each of which contains cliff-dweller or pueblo ruins in a good state of preservation. One of them, Inscription House, gets its name from the inscription, "S-hapeiro ano Dom 1661," carved on its wall by some early Spanish explorer or missionary. So far as known it was not visited again by white men until 1909. Betatakin and Kitsil, the other two groups, are both located in great caves. The latter is the largest of the cave pueblos, and yields broken pottery of the finest type produced by the cliff dwellers.

Wupatki Pueblo

The ruins contained in the Wupatki National Monument are of pueblo type and are mostly indicated by low mounds. Excavation of the mounds show that the prehistoric dwellings were constructed of red sandstone and lava, and that those made of sandstone weathered far better than the lava. Altogether there are thirty-five ruins in the monument. It is evident that the buildings were originally one, two or three stories in height, and some of them contained twenty or more rooms. It is believed that the Wupatki ruins were occupied by the ancestors of the present Hopi Indians, one of the most picturesque tribes of Indians existing today. They apparently were constructed by the Snake clan of the Hopi in their migrations from the Grand Canyon of the Colorado, where according to Indian mythology their ancestors came upward from the Underworld.

Our remaining Arizona monuments, the Petrified Forest and Sunset Crater, were established because of their scientific interest. In the Petrified Forest are a great number of petrified tree trunks, more or less fractured, lying on the ground or in it. Every tree is stripped of its branches and many of their bark. Judging by the strata of the earth's surface in which these trees are found, scientists estimate that the live forests grew several million years ago, at a spot some distance from where the trees are now found. It is evident that the trunks were carried along by some stream, became waterlogged and sank in ponds or bayous, and were rapidly buried by a thick deposit of clay. Later the region was submerged by the sea and petrification of the logs started. Ages afterwards an upheaval of the earth turned the old sea bottom with its embedded logs into a high plateau, so that now the Petrified Forest lies at an altitude of about a mile above sea level. The monument contains three main sections called tht First, Second and Third Forests. Geologically they belong to the same layer, but erosion has produced different results in the three areas, so that the tree trunks of the First Forest are of brightly colored agate and carnelian. Those of the Second Forest are of a dull, yellowish-gray color. The Third Forest surpasses the other two in size, number of logs and brilliancy of coloring. Many of the trunks here now exceed 100 feet in length, and it is believed they at one time grew to a height of 200 feet or more. In this group, called the Rainbow Forest, cross-sections of the tree trunks show every tint of the rainbow. Here the ground is covered with chips of agate, onyx, carnelian and jasper.

Until recently Arizona's scenic monuments included Papago Sahuaro park, consisting of nearly 2,000 acres of virgin, desert land in the Salt River valley. This monument is now, however, divided among several agencies that will retain the area in its natural state for public uses.

Though Papago-Sahuaro park has been lost to Arizona as a national monument, the Federal government has created another national monument in the Sunset Mountains, ten miles northeast of Flagstaff. This monument, the Sunset Crater National Monument, comprises the land about Sunset Mountains, with its lava beds and ice caves.

HIGHWAY EXPORTS INCREASE

The export of highway materials and machinery to foreign countries where road programs are just beginning on a large scale will be a valuable addition to business.

NOTICE TO CONTRACTORS

GLOBE-SHOWLOW HIGHWAY,
F. A. P. 99-A

Bids to be opened May 19th, 1931.

Sealed bids for the construction of the above named project 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, Globe-Showlow Highway, F. A. P. 99-A," and MUST CLEARLY SHOW THE NAME OF THE BIDDER ON THE OUTSIDE OF THE ENVELOPE.

The work, which begins about thirty (30) miles northeast of Globe, extends approximately eleven and one-half (11½) miles to the Salt River, consists of the Grading, Draining and Placing of Subgrade Stabilizer, and is to be completed on or before July 31st, 1932.

APPROXIMATE QUANTITIES

Roadway

560 Squares Clearing & Grubbing
378,900 C. Y. Roadway Excavation
5,000 C. Y. Drainage Excavation
21,300 C. Y. Slides & Overbreak
4,150 C. Y. Structural Excavation
43,100 C. Y. Borrow Excavation
49,400 Sta. Yd. Overhaul Earthwork
15,600 C. Y. Subgrade Stabilizer
59,500 C. Y. Mi. " " Haul
710 C. Y. Concrete
26,900 Lbs. Reinforcing Steel.
1,876 Lin. Ft. 24" C. M. P.
520 Lin. Ft. 30" C. M. P.
1,374 Lin. Ft. 36" C. M. P.
3,100 C. Y. Cement Rubble Masonry
20,600 Lin. Ft. Road Guard
3,200 Lin. Ft. Line Fence
3 Cattle Guards

Bridges

225 C. Y. Excavation
160 C. Y. Concrete
17,400 Lbs. Reinforcing Steel.

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 has 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 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 for all Projects until July 1931, or until notificatin that a new issue is ready for distribution.

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'CONNELL,
State Engineer.

Phoenix, Arizona,
May 7th, 1931.

NOTICE TO CONTRATORS
BENSON-VAIL HIGHWAY
E. F. A. 18-A, Reo.

Bids to be opened May 18th, 1931.

Sealed bids for the construction of the above named project 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, Benson-Vail Highway, E. F. A. 18-A, Reo," and MUST CLEARLY SHOW THE NAME OF THE BIDDER ON THE OUTSIDE OF THE ENVELOPE.

The work is to begin at the end of the Oil Surfacing on 90-A, about twenty-two (22) miles southeast of Tucson, and extend easterly about two and three-fourths (2¾) miles toward Benson, consists of the Grading, Draining, Placing of Subgrade Stabilizer and Mineral Aggregate and the Oil Processing by the Road Mix Method, and is to be completed onor before August 31st, 1931.

APPROXIMATE QUANTITIES
ROADWAY

42,000 C. Y. Roadway Excavation
2,000 C. Y. Drainage Excavation
800 C. Y. Slides and Overbreakage
550 C. Y. Structural Excavation
4,000 C. Y. Borrow Excavation
32,500 Sta. Yd. Earhtwork Overhaul
200 C. Y. Subgrade Stabilizer
90 C. Y. Mi. " " Haul

300 C. Y. Concrete
26,600 Lbs. Reinforcing Steel
550 Lin. Ft. 24" C. M. P.
464 Lin. Ft. 36" C. M. P.
140 C. Y. Plain Riprap
3,600 Lin. Ft. Road Guard
38 C. Y. Stockpiling Shoulder Mat. at Pit
34,000 Sq. Yd. Prep. of Subgrade
4,200 C. Y. Mineral Aggregate
67,600 Gals. Oil
2.881 Mi. Mix, Lay & Finish
16 C. Y. Mi. Haul of Shoulder Mat.
5.746 Mi. Form & Shape Shoulders
1,000 C. Y. Mi. Overhaul of Oil Mix

Bridges
360 C. Y. Drainage Excavation
250 C. Y. Structural Excavation
230 C. Y. Concrete.
22,200 Lbs. Reinforcing Steel.

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 for all Projects until July 1931, or until notification that a new issue is ready for distribution.

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,
May 2nd, 1931.

NOTICE TO CONTRACTORS
BLYTHE-WICKENBURG HIGHWAY
F. L. H. P. No. 1-C

Bids to be opened May 20th, 1931.

Sealed bids for the construction of the above named project 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, Blythe-Wickenburg Highway, F. L. H. P. No. 1-C," and MUST CLEARLY SHOW THE NAME OF THE BIDDER ON THE OUTSIDE OF THE ENVELOPE.

The work, which begins near Gonzales Well extends easterly seven and two-tenths (7.2) miles towards Quartzite (Gonzales well is about nine and eight-tenths (9.8) miles east of Ehrenburg), consists of the Grading, Draining and Oil Processing (Road Mix) the entire project, and is to be completed on or before February 29th, 1932.

APPROXIMATE QUANTITIES
ROADWAY

54,250 C. Y. Roadway Excavation
3,000 C. Y. Drainage Excavation

2,200 C. Y. Slides & Overbreak
1,100 C. Y. Structural Excavation
57,500 C. Y. Borrow Excavation
1,100 Sta. Yd. Earthwork Overhaul
12,800 C. Y. Subgrade Stabilizer
24,100 C. Y. Mi. " " Haul
750 C. Y. Concrete
46,500 Lbs. Reinforcing Steel
968 Lin. Ft. 24" C. M. P.
176 Lin. Ft. 30" C. M. P.
552 Lin. Ft. 36" C. M. P.
210 C. Y. Riprap
9,200 Lin. Ft. Cable Road Guard
84,200 Sq. Yd. Preparation Subgrade
10,500 C. Y. Mineral Aggregate
10,100 C. Y. Mi. " " Haul
189,400 Gals. Oil
7.2 Mi. Mix, Lay & Finish
14.3 Mi. Form & Shape Shoulders
2,300 C. Y. Shoulder Matl. to be stock-piled at pit
4,450 C. Y. Mi. Stock-piled Shoulder Matl. Haul

BRIDGES

660 C. Y. Drainage Excavation
1,360 C. Y. Structural Excavation
970 C. Y. Concrete
88,400 Lbs. Reinforcing Steel
16 Rocker Bridge Seats
16 Fixed Bridge Seats.

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 bene 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.

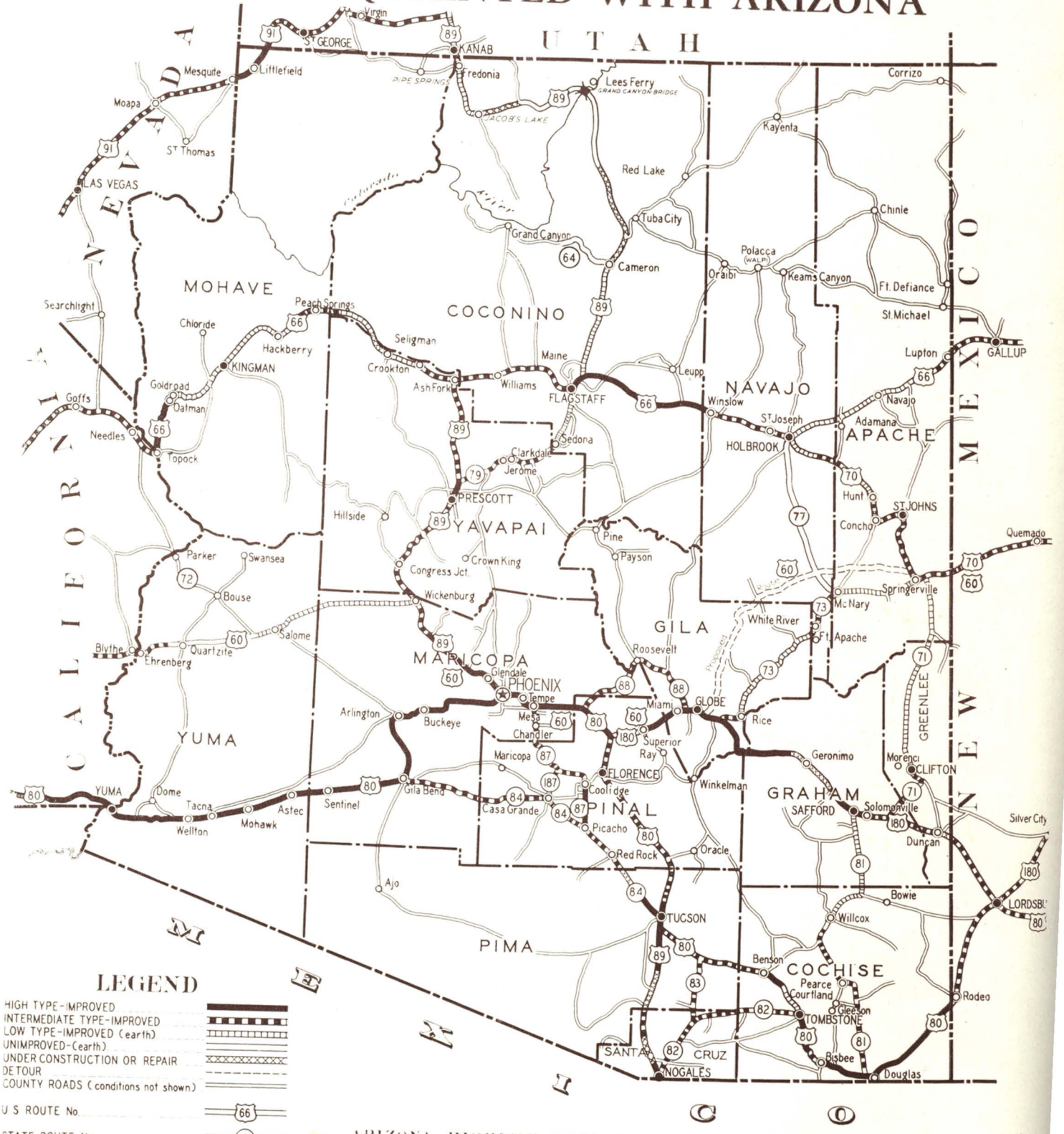
The Standard Specifications of the Issue of October, 1930, shall be used for all Projects.

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,
May 6th, 1931.

GET ACQUAINTED WITH ARIZONA



LEGEND

- HIGH TYPE-IMPROVED
- INTERMEDIATE TYPE-IMPROVED
- LOW TYPE-IMPROVED (earth)
- UNIMPROVED-(earth)
- UNDER CONSTRUCTION OR REPAIR
- DETOUR
- COUNTY ROADS (conditions not shown)
- U S ROUTE No. 66
- STATE ROUTE No. 88

STATE ROUTE 66

STATE ROUTE MARKER

ARIZONA HIGHWAY DEPARTMENT

CONDITION MAP

OF

STATE HIGHWAY SYSTEM

ARIZONA US 80

FEDERAL ROUTE MARKER

A. E. TAYLOR PRINTING CO., PHOENIX, ARIZ.