

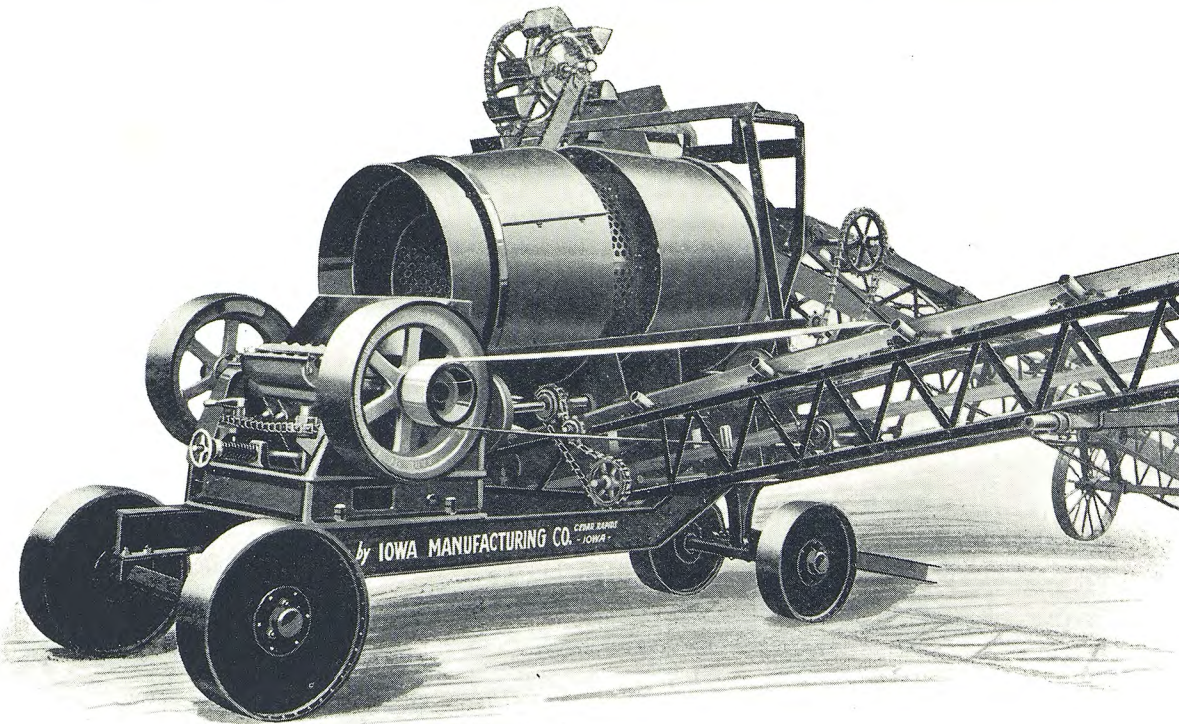


Arizona Highways

VOL. 1

1925

NO. 1



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ARIZONA HIGHWAYS

CIVILIZATION FOLLOWS THE IMPROVED HIGHWAY

VOLUME 1

APRIL, 1925

NUMBER 1

TO THE PUBLIC

WITH this issue, ARIZONA HIGHWAYS makes its bow to its public. In its decision to issue a magazine devoted to the interest of good roads, the Arizona Highway Department is following the example of 22 other state highway departments, the American Association of State Highway Officials and the United States Bureau of Public Roads, in disseminating information in regard to its activities and those of the nation.

Although, during a previous administration, a pamphlet dealing with highways in Arizona was issued at intervals, the inauguration of ARIZONA HIGHWAYS is the first big step forward to tell the people of Arizona and other states of the work being done by the Arizona Highway Department.

The necessity of such an organ for the Highway Department has become apparent through the scores of letters received from persons in this and other states inquiring into its activities or seeking information in regard to Arizona's highways.

ARIZONA HIGHWAYS will be published each month by the Arizona Highway Department. It will contain in each issue many interesting and well illustrated articles by authorities on roads and allied subjects, furnishing authentic information of value to all who use Arizona's highways for business or pleasure.

For the information of motorists of Arizona and tourists from east and west, each issue will contain a travelogue of one of the 18 main routes in the state. The travelogue will tell the route of the particular highway, illustrated by a map of the highway, pointing out the conditions of the road along the route, the towns visited, historic points of interest and a description of the scenery.

The first travelogue, contained in this issue, is of the Yuma-Phoenix highway, from the California State Line to the Arizona Capital City. It provides valuable information to all who traverse this well traveled highway.

A comprehensive program has been outlined for ARIZONA HIGHWAYS and it will grow bigger and better with each issue. Suggestions containing constructive criticism are solicited and will be given careful consideration. Those who favor good roads will boost ARIZONA HIGHWAYS.

Good Roads An Investment, Not An Expense to the People

NO QUESTION, it seems, can so quickly arouse prejudice and hostility as the question of taxes. In fact, it is not necessary for one to be a taxpayer to feel "righteously" indignant and aggrieved and therefore to feel called upon to denounce a tax levy, even where the tax levy is necessary and proper. In many instances the hardest fighters and loudest talkers against public improvements are persons who have never paid a dollar in direct taxes.

This is no less true in the case of automobile taxes. In every state in the Union and in every community in the states, men are to be found shouting against motor car taxes. In regard to the three cent gasoline tax, which is the tax in vogue or proposed in the great majority of the 48 states, men who are not automobile owners and who undoubtedly never will own one, are the most severe critics of the tax. By the same token, non-owners of automobiles bitterly complain against the cost of trunk highways and improvements, when they contribute not one cent toward the cost of construction and maintenance.

As a matter of fact, good roads cost nothing to the persons who use them, for the money paid to build good highways is an investment that brings large and direct returns. All automobile owners know the cost of rack and tear from rough roads, the wear on tires and the increase in gasoline consumption. All who drive horse drawn vehicles know the wear and tear on such vehicles produced by rough roads and the wear and tear upon horses and harness. Likewise, they know that larger loads can be hauled over good roads with far less damage to vehicles and harness. Plus all this, there should be added in favor of good roads the pleasure and comfort experienced.

BRING LARGE RETURNS

When all these items are taken into consideration, it is readily seen that good roads are an investment—not a tax—and brings in large returns.

Civilization follows the improved highways and nothing contributes to prosperity in such measure as does road building. This is shown in the example set by California. During the panic that swept the country in the so-called "deflation" period which followed the closing of the great war, California alone experienced no financial depression, for the Golden

State took time by the forelock and prepared for peace in time of war. Its good road building program furnished employment for its citizens, thus avoiding the hard times experienced by other states.

The Seventh Legislature failed to enact a Highway Bill for the fiscal years of 1925-1926 and 1926-1927, adjourning sine die two days after the expiration of the sixty day period. The last 48 hours was a period of storms and calms which ended finally with the passage of the general appropriations bill. When Substitute House Bill No. 188 came up in the Senate after recommendations for passage by the committee of that body in its majority report, a filibuster was started by supporters of the minority report. The House, worn out and discouraged, sent a message to the Senate that it would refuse to consider any legislation other than the general appropriations bill.

SENATE HIGHWAY BILL

Substitute House Bill No. 188, or the Senate Highway Bill, included a ten cent tax levy and a change in the distribution of the gasoline tax, giving 75 per cent to the state for road building purposes and 25 per cent to the counties. Here was the question of taxation and the allocation of tax monies. Though the majority of the members of the house and senate expressed themselves in favor of good roads, the Highway Bill that provides for good roads was not passed.

The trouble seems to be that good roads are built by taxes. There is something about the very word taxes that makes everyone "see red." War taxes came in for more than their share of criticism. Perhaps it is the mere fact that taxes are an enactment of the government. Certainly it is not the amount of money involved, for every taxpayer will cheerfully contribute many times the amount of his taxes for other things,—many of which are useless, if not harmful,—without a word of protest or complaint.

Oil companies, for instance, can boost the price of gas as much as they will, but the motor car driver pays the price with little, or no complaint, regardless of the fact that he gets absolutely nothing for the additional cost of the product. But when the state imposes a tax of three cents per gallon on gas, proposing that the income shall be used to

build and improve highways so as further to reduce the cost of operation of motor vehicles, there is nothing to be heard but imprecations.

EMBRACES 2,000 MILES

It is not to be denied that the operation of the state highway system is open to criticism in many things. Neither is it to be denied that this is inevitable when one stops to remember that the system has been in operation for only a few years and that it embraces about 2,000 miles of roads. Also it must be taken into consideration that fallible man frequently sets himself up as infallible. Particularly are the critics of the operation of the Arizona Highway Department infallible.

Yet it must be remembered that the Creator of the Universe has many objectors in each community as to the manner in which He rules that same universe. With the highways, as with the government, those who stand on the sidelines, free from responsibility, know more about how highway matters should be carried on than the trained men actually and earnestly engaged in their operation.

The fact that perfection in the management of the Arizona Highway Department has not been attained, offers no reason for seeking to cripple the department by denying it a reasonable fund for carrying out the great program of improvements and betterments contemplated by the state engineer. The mistakes of yesterday will be remedied today, specially if intelligent and constructive criticism is offered, instead of the present attitude of "I do not approve; therefore it is no good."

CONFUSING WITNESSES.

Jenks: "What's the grand idea having your car painted yellow on one side and blue on the other?"

Bangs: "It's great, I'm telling you. You should hear how confused the witnesses are and how they contradict each other in court when I have a damage case on."—Detroit News.

REGRET.

"Madam," said the leader of the brigands, "we'll have to hold you until your husband ransoms you."

"Alas" replied the woman. "I wish I'd treated him a little better."—Pearson's Weekly (London).

Who Pays for the Highways?

By W. W. LANE, Chief Engineer

"WHO pays for the highways?" is very seldom asked as a direct question, but discussions of the subject are numerous, and invariably end with a question. Most of us cannot conceive of receipts and expenditures extending into hundreds of thousands and millions of dollars, and a discussion of such amounts, without the tabulated figures, usually leaves our minds in a whirl of figures, too difficult of dissemination just for the sake of discussion.

Arizona is yet an infant in his highway development and highway expenditures as compared to the majority of the other states, and yet it may well be proud of its progress in highway construction and maintenance since its inauguration of the State and County Highway departments.

BEGINNING CONSTRUCTION ACTIVITY.

While the State Highway Department was created in 1909, or three years before statehood, the appropriations for the work were \$250,000.00 annum, \$60,000.00 per annum for the working of convicts, and an occasional small special appropriation until 1917—which sums permitted very little permanent construction.

The motor vehicle fee was in existence prior to 1915 but was a small factor, as the amount raised in 1915 from this source was only \$45,579.00, and amounts for the preceding years were less.

The County Highway Departments were practically all created after 1915 and required a year or two to become established and really function.

The Federal Aid Highway Act was passed in 1916 making a small initial appropriation, but as this was a new idea and required the establishment of the Bureau of Public Roads and adjustments on the part of the States, no money was received from this source by Arizona until early in 1918.

The gasoline tax of one cent on each gallon was initiated in 1921, and was increased in 1923 to three cents per gallon.

Also the results from the county road bond issues, with a few exceptions, came into evidence after 1918. Therefore the greater portion of our highways are products of the last decade, and this discussion will include the period from 1915 to date.

The 75 per cent apportionment of the state road tax fund is treated herein as

State funds, which it is, and is included in the State tax levy, although by law it must be expended within the County from which it is levied, and the County Boards of Supervisors have certain joint administrative jurisdiction over these funds.

The County Bond funds are considered as to the amount expended for highway construction only and exclusive of the interest, and is not included in the tax rates herein given. These tax rates are for annual highway expenditures only. It must therefore be remembered when future highway finances are considered that the taxable property of the state still has the greater part of the amortization of the road bonded indebtedness inclusive of interest yet to levy for.

AMOUNTS EXPENDED FOR HIGHWAYS.

There has been received and expended for highways in Arizona since 1915, \$44,970,295.80 from the following sources:

State Tax Levies	\$ 8,192,966.02
County Tax Levies	9,194,229.48
County Bond Issues	18,501,000.00
Motor Vehicle Tax	1,967,803.16
Gas Tax	1,477,103.15
Motor Bus and Truck Tax	32,278.10
Federal Aid Received	5,604,915.89
Total	\$44,970,295.80

The \$8,192,966.02 raised by the State tax levies, or an average of \$819,296.60 per annum for the past ten years, has required an average tax rate of thirteen and six-tenths cents for each \$100.00 assessed valuation per annum, the maximum tax rate for any one year being sixteen and six-tenths cents levied in 1921. In that year \$1,383,315.91 was raised by a direct tax levy.

The \$9,194,229.48 raised by County tax levies, exclusive of bond redemption and interest, or an average of \$919,422.95 per annum, has required an average tax rate of fourteen and ninety-six hundredths cents for each \$100.00 of assessed valuation per annum. This, together with the average state tax levy, makes a total average tax rate for State and County taxes on property of twenty-eight and fifty-six hundred cents on each \$100.00 of assessed valuation for highway purposes exclusive of bond redemption and interest. It may be added here that all funds appropriated by the Government to Arizona for expenditure for forest roads are not considered herein, as they

are expended by the Government, but the amount has been considerable.

WHO HAS PAID TO DATE?

Generally in discussions on this question, and particularly since the initiation of the "Gas Tax," statements are prevalent that the automobile owner pays the bills. A study of the above tabulation does not reflect that he has paid the bills in the past, many years will pass before he will pay an appreciable ratio to the present development.

In percentage, the property taxpayers have paid and obligated to pay 79.81 per cent of the highway development to date of Arizona; the Federal Government has paid 12.46 per cent. The automobile owners through the motor vehicle and gas tax, 7.66 per cent, and the motor bus and commercial truck line owners for special taxes, 0.07 per cent. From this it is evident that the real and personal property of the State is by far the largest contributor to the past highway development; the Federal Government second, and to date the total of all special automobile taxes is a very small third. This also indicates the relative value of Federal aid to this State.

WHO PAID IN 1924.

The receipts for highway construction in the State for 1924, exclusive of bond issues and balances on hand were as follows:

State Tax Levy	\$ 652,293.30
County Tax Levies	752,883.70
Motor Vehicle Fees	339,721.50
Gas Tax	730,294.31
Motor Bus and Truck Tax ..	21,000.00
Federal Aid	1,053,003.56
Total	\$3,549,196.37

Of this amount the total tax levies for highways, exclusive of levies for the redemption of principal and interest of the road bonds now in existence, was—39.59 per cent of the total; the motor vehicle fees, gas tax and motor bus and truck tax combined, 30.74 per cent, and the Federal aid, 29.67 per cent. Combined figures of the necessary levies for 1924 for the County road bond issues are not readily available, but \$18,501,000.00 of bonds at an interest rate of about five per cent per annum, most of which are serial bonds requiring a redemption that will probably approximate the interest amount, it is evident that this amount exceeded the \$1,405,177.00 raised by State and County tax levies for

1924, and which must also be credited to taxes for highway purposes upon real and personal property.

RECEIPTS AND EXPENDITURES BY STATE HIGHWAY DEPARTMENT

The records of the Highway Department show that since 1915 \$20,202,670.09 in cash has been received and disbursed by that department. The receipts were from the following sources: : :
 State Tax Levies\$ 8,192,966.02
 Motor Buss and Truck Tax 32,278.10
 Motor Vehicle Fee 1,967,803.16
 Gas Tax 813,699.66
 County Bond Funds (cash receipts) 3,046,454.06
 Federal Aid Received 5,604,915.89
 Receipts from Rentals, etc. 544,553.20

Total\$20,202,670.09

Of this amount \$18,380,520.11 has been received and expended from 1919 to date, within a period of approximately six years, or at an average of \$3,063,420.02 per annum. In addition to the \$3,046,454.06 as shown received from County bond funds there has been approximately \$2,000,000.00 additional County bond and other funds expended directly by the counties upon Federal aid projects without passing through the books of the State Highway Department, hence the department records do not show the receipts and disbursements of this amount. This additional item makes the County aid toward State highway construction total approximately \$5,000,000.00, or an amount sufficient to have matched the entire Federal aid funds—\$5,604,915.89 earned to date by this State. With the addition of the approximate \$2,000,000.00 expended upon State highways within the past six years brings the average annual expenditure upon State highways for this period to approximately \$3,500,000.00 per annum.

WHY ADDITIONAL HIGHWAY IMPROVEMENT.

Why State highways? This has been very ably answered by the Highway Advisory Committee of California in a report recently made by it to the Governor of that State, and is quoted elsewhere in this issue of the Arizona Highways.

In 1900 the population of Arizona was 122,931; in 1910 it was 204,354, and in 1920 it was 334,162. What will it be in 1930? The motor vehicle registration shows that in 1915 there were 7,320 cars registered in this State; 34,601 in 1920 and 57,828 cars in 1924. What will be the total automobile registration in 1930? The traffic counts taken upon the Arizona State highways today indicate that between 25 per cent and 30 per cent of all cars upon these highways are carrying a foreign state license.

With the extensive highway improvement being rapidly prosecuted in the other states, the construction of highways to National Parks and other points of interest, and the increasing comfort and economy in touring, resulting from this activity, touring is rapidly gaining in popularity. Will tourist traffic increase upon our highways? The tourists more than pay their way while in the state.

The coming of the motor has extended our community boundary line, as it were, to the State boundaries, to National boundaries. The Government has long since recognized this, as evidenced by Federal aid, and in connection with this cooperation with the states it is outlining and building a connected national highway system. Should there not be a system for the State, which would be a part of the national system, or connecting with it and acting as a trunk line system for the State and for the County highway systems to connect with or radiate from? How can the construction and operation of such a State highway system be accomplished except through a State Highway Department?

HIGHWAY NOT A SUBSIDY.

It is folly to say that necessary and properly constructed highways are a subsidy, because every added facility for the transportation of commerce helps to build up the State. It means State wealth and State welfare. Every property owner upon, or adjacent to, a good highway knows that he has been financially benefitted many times more than the improvement has cost him. Every automobile driver knows that the "Bad Road Tax" is many times the tax he actually pays for better highways. If he has forgotten the roads of yesterday, there are many of such remaining upon which a comparison may be made. How often has the statement that the "road is bad" kept you from going to some place that you desired or needed to go? And if you did go over such roads, you paid a tax for wear and tear upon your car, and used a greater amount of fuel oil for the mileage traveled. Which is the subsidy?

FEDERAL AID

Federal co-operation in highway construction has been of great assistance to Arizona in many ways. We will only consider the financial assistance, however, at this time. There has been allotted to Arizona \$7,495,701.00 of Federal aid funds, with an additional allotment of \$1,056,171.00 becoming available July 1st, of this year, making a total of \$8,551,872.00. Of this amount there has been received to date, or March 15th of this year, \$5,604,915.89, or an amount

equal to almost double the total of all special automobile and gas tax receipts since 1915; \$729,916.31 now under agreement or requested for agreement for particular projects and \$2,217,039.80 yet to be matched with State funds. It is probable, through not an assured fact, that Congress will continue to make appropriations for Federal aid on approximately the same scale as for this fiscal year, or of approximately \$1,050,000.00 per annum to Arizona.

These funds are appropriated by Congress to the States for a period of two years after the end of the fiscal year for which they are appropriated. In order for the States to avail themselves of these funds they must be matched with the State funds at the ratio of participation for each State, as determined from the Federal Aid Acts and within the time limit prescribed, or the funds revert to the Government for distribution to the other States. The participation by the Government in Arizona is now 72.34 per cent. In addition to the time limitations included in the acts, other requirements must be met by the States, one of which is Paragraph 5 of the Amended Federal Aid Act approved November 9, 1921, which reads as follows:

"Section 24 of the Act entitled 'An Act to amend the act entitled 'An Act to provide that the United States shall aid the States in the construction of rural post roads, and for other purposes,' approved November 9, 1921, is amended to read as follows: 'That in any State where the existing constitution or laws will not permit the State to provide revenues for the construction, reconstruction, or maintenance of highways, the Secretary of Agriculture shall continue to approve projects for said State until five years after November 9, 1921, if he shall find that said State has complied with the provisions of this Act in so far as its existing constitution and laws will permit.'"

ESTIMATE FOR COMPLETION OF STATE SYSTEM.

It is not possible to estimate the actual cost of completing the state highway system, particularly, when in Arizona, we might rightfully ask "when is a State highway?" There is no legal limit to the possible extensions to the State system at this time, and it may be that some sections of what is now on the so called State system may be discarded at a future date as not being of State-wide necessity. The mileage included in the seven per cent Federal aid system is 1498, while the total present State sys-

(Continued on page 21)

Total License and Gas Revenues from Motor Vehicles, 1924

State	Number of Automobiles and Trucks	Rank	Revenue from Motor Vehicles	Rank	Average Motor License per Vehicle	Rank	Revenue from Gas Tax	Average Gas Receipts per Motor Vehicle	Average Motor and Gas Receipts per Motor Vehicle	Rank
Alabama	158,019	32	\$1,853,289	33	\$11.72	30	\$1,510,572	\$9.55	\$21.27	18
Arizona	57,828	44	339,721	48	5.87	47	730,846	12.63	18.50	25
Arkansas	142,978	33	2,333,033	29	16.31	14	2,643,535	18.48	34.79	3
California	1,329,394	2	7,011,112	12	5.27	49	12,126,145	9.11	14.38	38
Colorado	213,247	23	1,249,480	38	5.85	48	1,740,152	8.16	14.01	39
Connecticut	215,721	22	5,058,908	14	23.45	2	962,479	4.46	27.91	7
Delaware	35,136	47	604,354	43	17.20	8	302,143	8.59	25.79	10
Florida	210,000	24	2,500,000	28	11.94	29	3,658,677	17.42	29.36	4
Georgia	208,168	25	2,532,147	27	12.16	27	3,361,400	16.09	28.25	6
Idaho	69,305	41	1,287,388	37	18.57	7	545,672	7.85	26.42	8
Illinois	1,132,641	5	11,513,957	4	10.16	35	.....	.....	*10.16	46
Indiana	658,796	9	4,126,058	18	6.17	46	5,537,610	8.40	14.57	37
Iowa	614,347	10	8,995,118	7	14.64	18	.....	.....	*14.64	36
Kansas	410,891	15	3,412,355	22	8.30	41	.....	.....	*8.30	48
Kentucky	231,784	21	3,281,535	23	14.15	21	1,660,937	7.16	21.31	17
Louisiana	178,000	30	2,844,979	25	15.97	15	1,455,541	8.17	23.14	14
Maine	129,000	36	1,934,360	32	14.99	17	522,298	4.04	19.03	23
Maryland	195,581	28	2,135,311	31	10.91	33	1,042,332	5.32	16.23	34
Massachusetts	672,315	8	8,122,166	10	12.08	28	.....	.....	*12.08	43
Michigan	877,222	6	11,261,282	5	12.85	24	.....	.....	*12.85	41
Minnesota	508,000	14	8,559,130	9	16.84	11	.....	.....	*16.84	33
Mississippi	134,547	35	1,160,730	39	8.62	40	1,385,060	10.29	18.91	24
Missouri	545,155	11	4,525,914	16	8.30	41	.....	.....	*8.30	48
Montana	80,674	39	776,320	42	9.62	37	632,700	7.84	17.46	29
Nebraska	308,715	17	3,594,437	21	11.64	31	.....	.....	*11.64	44
Nevada	18,327	49	181,961	49	9.92	36	154,415	4.82	18.34	26
New Hampshire	73,633	40	1,522,186	35	20.67	6	587,845	7.98	28.65	5
New Jersey	516,964	13	8,854,808	8	17.12	9	.....	.....	*17.12	30
New Mexico	41,750	46	392,929	47	9.41	38	182,856	4.37	13.78	40
New York	1,420,000	1	24,089,241	1	17.04	12	.....	.....	*17.04	31
North Carolina	305,756	19	7,150,061	11	23.38	3	3,979,855	13.01	36.39	2
North Dakota	117,050	37	816,871	41	6.98	45	442,967	3.78	10.76	45
Ohio	1,256,000	3	11,721,041	3	9.34	39	.....	.....	*9.34	47
Oklahoma	337,740	16	3,692,898	20	10.93	32	3,174,900	9.40	20.33	22
Oregon	192,615	29	4,766,070	15	24.74	1	2,562,500	13.30	38.40	1
Pennsylvania	1,228,586	4	20,051,021	2	16.32	13	9,089,539	7.39	24.71	12
Rhode Island	95,407	38	1,618,773	34	16.96	10	.....	.....	*16.96	32
South Carolina	163,382	31	1,151,983	40	7.05	44	2,186,136	13.37	20.42	21
South Dakota	142,396	34	2,142,446	30	15.05	16	1,106,634	7.77	22.82	15
Tennessee	204,580	26	2,597,567	26	12.69	25	1,727,604	8.44	21.13	19
Texas	806,000	7	10,474,558	6	12.99	23	3,892,725	4.82	17.81	27
Utah	68,316	42	487,110	45	7.13	43	725,967	10.62	17.75	28
Vermont	61,179	43	1,323,376	36	21.63	5	230,865	3.77	25.40	11
Virginia	262,677	20	3,715,049	19	14.14	22	3,163,999	12.04	26.18	9
Washington	306,002	18	4,475,197	17	14.62	19	2,635,410	8.61	23.23	13
West Virginia	197,746	27	2,874,587	24	14.53	20	1,259,099	6.36	20.89	20
Wisconsin	540,000	12	6,712,637	13	12.45	26	.....	.....	*12.45	42
Wyoming	43,639	45	448,664	46	10.28	34	200,319	4.59	14.87	35
Hawaii	25,449	48	568,515	44	22.33	4	.....	.....	*22.33	16
Total	17,984,830	....	\$222,842,641	....	A.13.29	....	\$77,121,734	† 8.80	‡19.65	....

*No Gas Tax. †Average of 35 states having a Gas Tax. ‡This average also includes states which do not have a Gas Tax.

ARIZONA HIGHWAYS

Published in the Interest of Good Roads by The
ARIZONA HIGHWAY DEPARTMENT

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Vincent J. Keating.....Editor

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OUR COVER PICTURE

THE cover picture for the first issue of ARIZONA HIGHWAYS shows some of the scenery along the Prescott-White Spar Forest Project, which connects with the White Spar-Congress Junction Highway, or Federal Aid Project No. 72. It is a government project rapidly nearing completion and will be ready for traffic probably in August.

It is one of the prettiest scenic roads in the State, traveling through the pines in the Prescott National Forest, forming a link of the Prescott-Phoenix Highway. Beginning at Prescott, the road goes through the mountains in a south-westerly direction for 15.5 miles, to the forest boundary. There it connects with the White Spar-Congress Junction Highway.

With the completion of the Prescott-White Spar Project and Section B. of the White Spar-Congress Junction Highway, or Federal Aid Project No. 72-B., upon which the contract, calling for completion by October 15, 1924, has been awarded, there will be furnished to motorists the best and fastest road between Prescott and the State Capital.

GOOD ROADS IN ECONOMICS

(Minneapolis Tribune)

THE average impression about a paved road is that it is a luxury that is paid for as a matter of convenience, comfort and pleasure. Particularly is that the average impression of those who do not own and finance the upkeep of automobiles. Many of those who own cars have this constricted, unthinking view, but experience is reduced the number of these.

The fact is that where traffic is heavy, a paved road, far from being a luxury, is an economic necessity. Commissioner Babcock has been trying to drive that idea home to the minds of Minnesotans, but he is not a lone missionary bearing this message. All over the country there are competent witnesses to corroborate his testimony.

Among these witnesses is the American Automobile association, from whose headquarters comes the statement that American motorists cash in yearly a dividend of 10 per cent on the capital invested in improved highways—that is, in roads that are equal to traffic demands. Says the president of that organization with reference to the results of studies of road economy:

"If the average motorist is not conscious of how much he pays for bad roads, it is only because the loss does not occur in one grand smashup. The loss occurs in dribbles among millions of users of motor vehicles. It oozes away in little amounts here and there—a little gas today, a little abnormal tire wear tomorrow, a little strain on a vehicle for a few hours and a burnt-out bearing, making a gigantic leakage in cost of operation. The cost of good roads is insignificant compared with the dividend that they yield."

It isn't possible either for an individual or a state to make all investments, off the reel, that he or it knows to be sound and profitable, but the collective body of Minnesota motor car owners will be paying into its own pocket if it is called upon to make the state roads fit for the kind of traffic they must bear. What it pays out in license fees, or gas charges, or in other sound financing of good roads construction will revert to it with the interest in the form of various kinds of saving—in reduced gasoline consumption, n upkeep bills on mechanism, in road maintenance expense and facilitation of travel.

The trouble is that despite the numerous proprietorship of motor vehicles, there is still a proneness to think of paved roads in terms of carriage and horses, or wagon and team. Nothing could be more fallacious. Careful surveys in Kentucky and Iowa have yielded almost identical conclusions—that the improved road enables a saving of 2½ cents a mile in the cost of operation. Iowa State college, the Iowa highway commission and the bureau of public roads found that the gasoline consumption on a paved road is only approximately one-half the gasoline consumed on a dirt road per unit of traffic, and that the saving of gasoline can be taken as an index of similar saving as to tires and general wear and tear on machines.

From Yuma to Phoenix Over Good Roads

THE tourist, upon entering Arizona from California, crosses the Colorado River on a steel truss bridge, constructed by the United States Government, and enters Yuma, a city of five thousand population. This city is the largest in the Yuma irrigation project, on the Arizona side.

This project includes lands to the south and west of Yuma along the east bank of the Colorado River. The water for irrigation is supplied by a diversion dam across the Colorado at a point approximately 12 miles north and east of Yuma. This dam "The Laguna Dam"—was built by the United States Reclamation Service.

The water is diverted into a canal on the California side of the river and is syphoned across the Colorado at Yuma, then diverted to lands in the Yuma Irrigation Project.

The project has been enlarged to include the mesa lands south of Yuma. They have proven valuable for growing citrus fruits, being entirely free from frost.

Unfortunately for the motorist coming

into Arizona from California, the first acreage planted is south and east of Somerton, a town 12 miles southwest of Yuma. The average tourist does not visit this area and hence has no idea of its development.

CITRUS GROVES ALONG ROAD

There are several acres of citrus fruits along the state highway south of Yuma, but these are not typical of the district, due to the fact that they were planted years ago and are watered by private pumping plants. Congress has just appropriated funds for the development of this area, so that within a few years the sandy mesa should be covered with orange and grapefruit groves.

In Yuma the tourist can find first class hotel accommodations and garages.

The county has built a network of paved highways through the irrigated district and the motorist will find it both pleasing and profitable to remain in Yuma for a day to inspect this area.

From Yuma to Wellton, a distance of approximately 40 miles, the state highway parallels the Southern Pacific railroad tracks. The first 17 miles are gravel

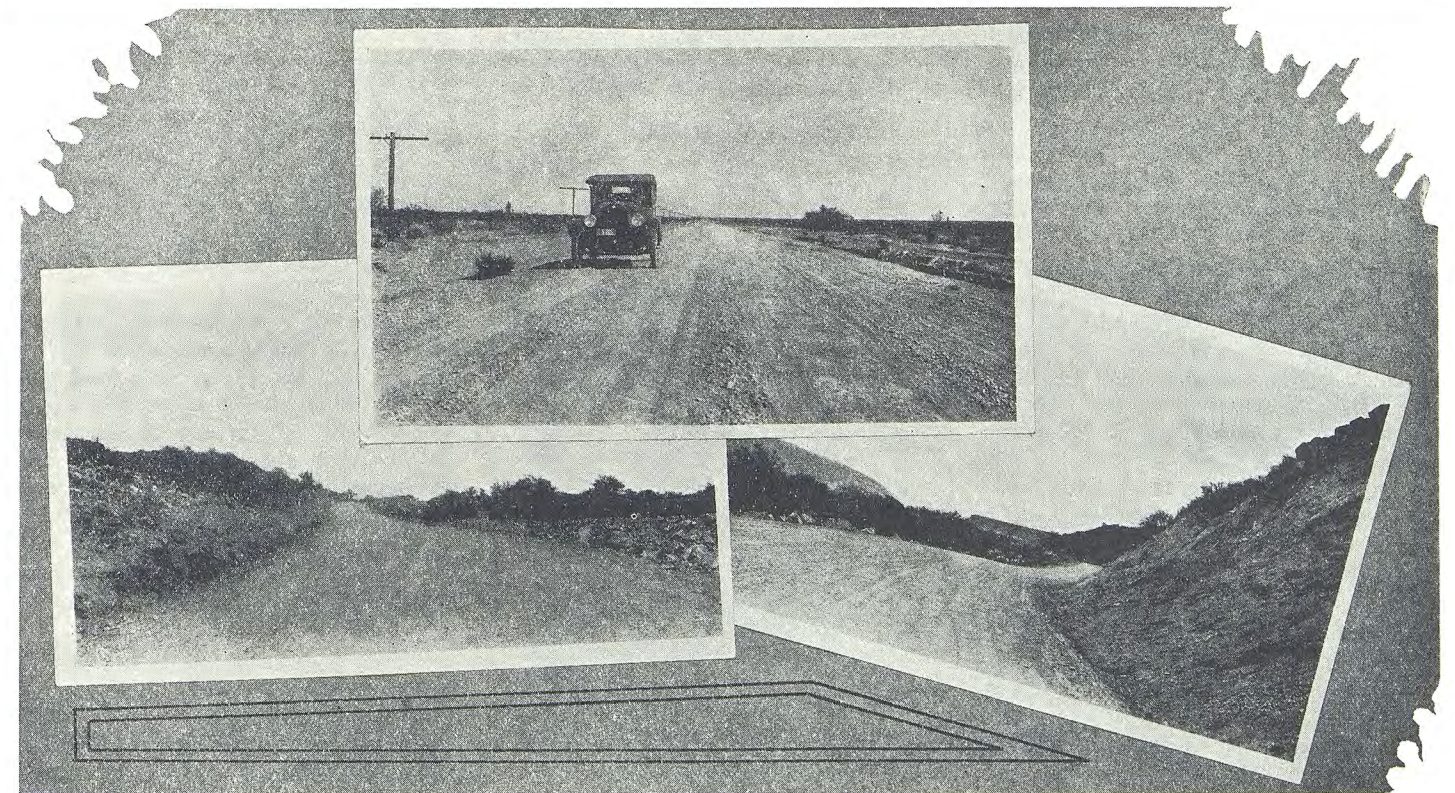
surface and of standard width, running across a sandy mesa. Due to continued dry weather, this section is rather rough. The next 13 mile stretch is a narrow gravel surfaced road that utilizes an abandoned Southern Pacific roadbed. The last 10 miles is a standard gravel road in fair condition.

The Arizona Highway Department is contemplating considerable construction between these points, the most notable of which is the construction of a road through Telegraph Pass, which will eliminate the 13 miles of narrow road and will shorten the distance from Yuma to Wellton by approximately 13 miles. Wellton is the center of a proposed irrigation district, which contemplates obtaining its water from wells. The electric power for pumping is brought in from South Central California.

THROUGH DESERT COUNTRY

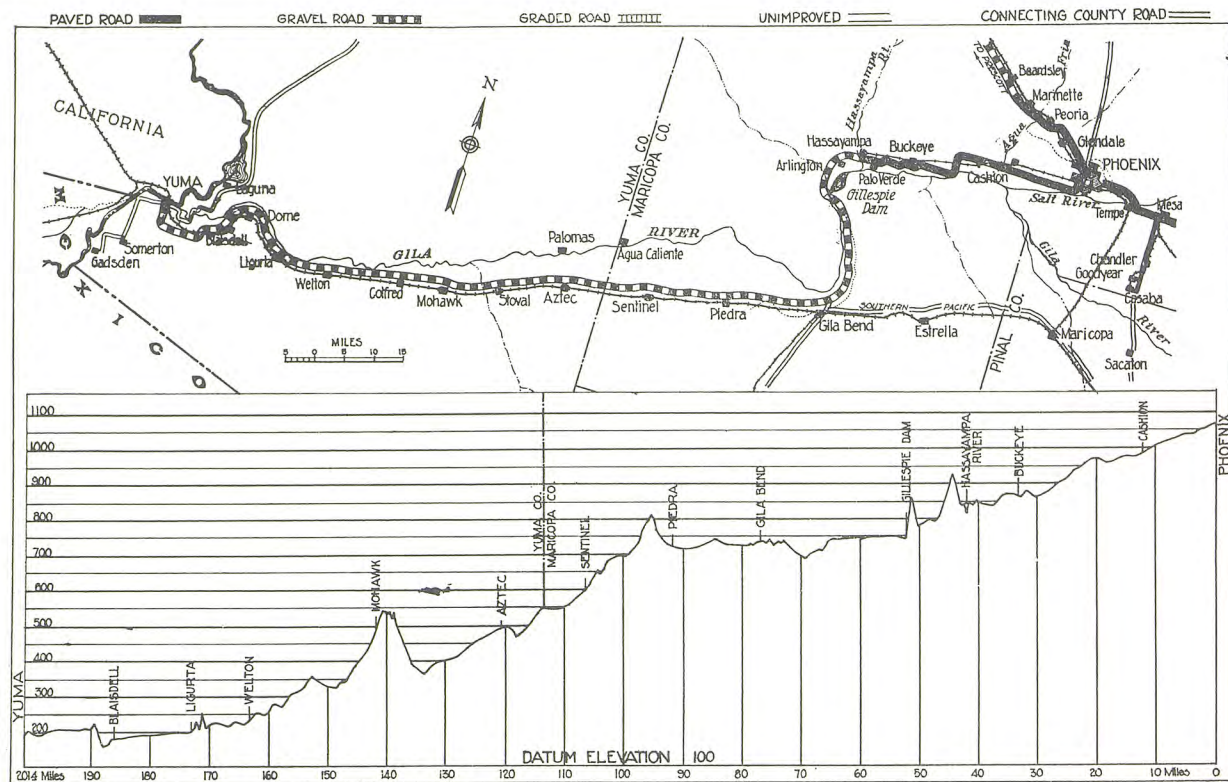
From Wellton to Aztec the state highway parallels the Southern Pacific railroad tracks, across a typical southwestern desert country, traveling through a mountain pass at Mohawk, situated about half way between the two points. The

BETWEEN YUMA AND THE HASSAYAMPA RIVER



The center picture shows a stretch of gravel surfaced highway near Sentinel. It is an example of a road through the desert country, that makes traveling easy for the tourist. The left and right pictures are scenes near Gillespie Dam.

ROUTE FROM YUMA TO PHOENIX



The lower half of the map shows a profile of a greatly distorted scale. This profile is for the purpose of showing the elevations along the route and for comparisons of elevations with other routes. The elevation datum being mean sea level. The profiles that are shown in the solid lines are from actual surveys and are therefore correct. Those shown in the dotted lines are sections where actual surveys were not available, but considerable care has been taken, and all available data utilized to determine the general profile of the route as accurately as possible.

highway is a high type of gravel surfaced road, built of material that is very suitable for the extreme droughts of Southwestern Arizona. At Aztec there is a store, garage and hotel. The accommodations for tourists are good.

From Aztec to Sentinel the highway continues parallel to the tracks of the Southern Pacific. The country and the type of road are similar to the section west of Aztec. Sentinel has a tourist hotel and garage. It is the railroad junction point for Agua Caliente, 15 miles north of Sentinel, whose hot springs have been famous for their medicinal properties since their discovery a few years ago. Tourists from Arizona and surrounding states visit the Agua Caliente Hot Springs throughout the winter months.

From Sentinel to Gila Bend the country changes somewhat. The desert is left behind and the highway, a standard surfaced road in excellent condition, passes through an undulating country, to a point about 10 miles west of Gila Bend. Here is the beginning of an irrigation project that embraces 80,000 acres, 10,000

Log of Road

Log	Section	Miles
0.00	California-Arizona State Line at Yuma	204.56
16.94	Blaisdell	187.62
29.94	Ligurta	174.62
39.67	Wellton	164.90
82.24	Aztec	122.32
96.56	Sentinel	108.00
111.06	Piedra	93.50
126.03	Gila Bend	78.53
149.59	Gillespie Dam	55.27
160.88	Hassayampa	43.75
170.09	Buckeye	34.47
188.45	Coldwater	16.11
190.85	Cashion	13.71
204.56	Center of Phoenix	0.00

NOTE—Mileage through Yuma 1.3 miles.
Mileage through Phoenix 1.9 miles.

of which are now under cultivation. The water is obtained from the Gillespie Diversion Dam, on the Gila River, about 23 miles north of Gila Bend.

BRANCH FOR AJO

Gila Bend has a tourist hotel and several garages. It is the junction point of

the Southern Pacific railroad and a branch line which runs to Ajo, 45 miles to the south. Ajo is one of the largest copper mining camps in Arizona. The camp differs from other Arizona copper mining camps in that the ore is very low grade and is mined with steam shovels.

At Gila Bend the highway leaves the railroad and swings north along the east bank of the Gila River. The road is an excellent gravel surfaced one of standard width. At a point about 23 miles north of Gila Bend, the road crosses the river on the concrete apron of the Gillespie dam. This crossing is open to traffic virtually the entire year. However, when the water is too high to ford the State Highway Department places a specially built truck at the dam. The truck is so constructed that automobiles may be ferried across the river.

Soundings are now being made for the foundations of a bridge just south of the dam, with the idea that construction may start in the near future. The waters of the Gila furnish excellent sport for fishermen.

From Gillespie Dam north for about a mile the highway is very narrow and rough. This condition will be remedied when the bridge location is finally selected. The next stretch of 11 miles into Hassayampa is a well graded, gravel road in good condition. It passes through a rolling country, skirting the west end of the irrigated Arlington district, the entire distance to Hassayampa. Hassayampa has several stores and garages, and rooming houses where the tourist may spend the night.

PAVED SECTION REACHED

About one-tenth of a mile east of Hassayampa, the highway crosses the Hassayampa River on a combination temporary and permanent bridge. At this point the desert is left behind and tourists come upon a high class 18 foot pavement through the Buckeye Irrigation District. Meadows, seed alfalfa and cotton are the principal crops. The rich soil is watered by a canal system of a very efficient type. This water supply is obtained from the Gila River some miles up stream, where a brush dam diverts water from the river channel to the canal system. A striking feature of this district is the large amount of alfalfa seed threshed each year.

Stores, service stations, schools and churches are well distributed through the district. Buckeye, the principal town in the district, is on the highway 9.2 miles from the Hassayampa River. Auto camp grounds, hotels and other tourist accommodations can be had here. Telegraphic connection is provided by telephone from Buckeye to Phoenix.

Leaving Buckeye the paved highway continues toward Phoenix through the irrigated district for a distance of about nine miles to the Buckeye canal. From this point the traveler passes through several miles of typical Arizona desert, the work of man being very little in evidence, except for the beautifully constructed pavement which stretches endlessly ahead. About seventeen miles from Buckeye a paved road, heading north from the highway, furnishes a four mile side trip to Litchfield, a cotton producing territory, owned and operated by the Goodyear Rubber Company.

CAMPING SPACE GOOD

Arriving at Coldwater 18.4 miles from Buckeye, tourists are able to obtain excellent water for all purposes. Good camping space is available and groceries may be purchased at the store. Coldwater is on the west bank of the Agua Fria River. The highway across the river bottom is graded and the channel is bridged, the distance from bank to bank being about one mile. The pavement continues eastward from the east bank of the river.

LIST OF TRAVELOGUES

Each Issue of ARIZONA HIGHWAYS will contain a Travelogue, showing the condition of the highway, points of interest and hotel and garage accommodations, and other valuable information for the tourist, of the 18 main routes in the State. When completed, the Travelogues, which will be illustrated by maps and scenes along the highways, will cover all the main arteries of travel in the State, from California and Nevada on the West to New Mexico on the East and from Utah on the North to Old Mexico on the South. The list of Travelogues and the issues in which they are to appear, follows:

Highway	Issue
1—Yuma-Phoenix	April 1925
2—Phoenix-Globe-Rice	May 1925
3—Rice-Safford-Duncan-New-Mexico Line	June 1925
4—Florence Junction-Tucson	July 1925
5—Tucson-Benson-Bisbee	August 1925
6—Bisbee-Douglas-Rodeo	September 1925
7—Tucson-Nogales	October 1925
8—Nogales-Fairbanks-Tombstone	November 1925
9—Phoenix-Wickenburg-Prescott-Ash Fork	December 1925
10—Prescott-Jerome	January 1926
11—Topock-Kingman-Ash Fork	February 1926
12—Ash Fork-Flagstaff-Winslow-Holbrook	March 1926
13—Holbrook-Lupton	April 1926
14—Holbrook-Springerville-State Line	May 1926
15—Rice-White River-Springerville	June 1926
16—Clifton-Mule Creek	July 1926
17—Douglas-Pearce	August 1926
18—Mesa-Chandler-Casa Grande	September 1926

distant the highway passes through Cashion, a farming community with a store and garage. Here is the entrance to the wonderful Salt River Valley which is irrigated from the great Roosevelt Dam and lake at the edge of the historic Tonto Basin, about 100 miles eastward. Cashion is 13.7 miles west of Phoenix. Traveling from Cashion to Phoenix the tourist passes scientifically irrigated and drained ranches which produce wonderful crops from the fertile soil.

Gasoline stations are plentiful along this part of the highway.

The tourist enters Phoenix at Eighteenth avenue and passes the State Capitol.

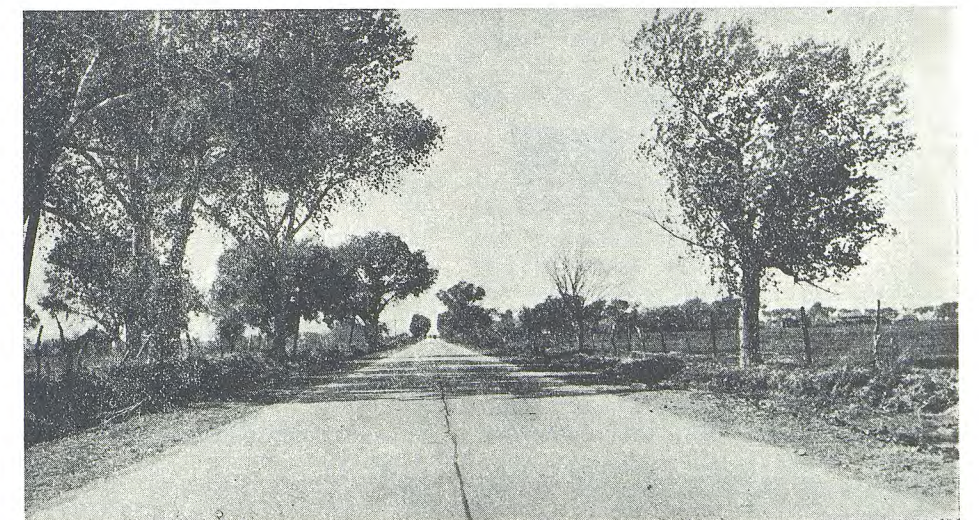
The gardens of the Capitol contain all of the various kinds of cactus plant, some of the rarest and oldest palms in Arizona, and a rare profusion of flowers. Continuing eastward the tourist reaches the center of the city, passing through the downtown business section. From Phoenix, a thoroughly modern city, many side trips may be taken over the state and county highways.

ROADS PLEASE GOVERNOR.

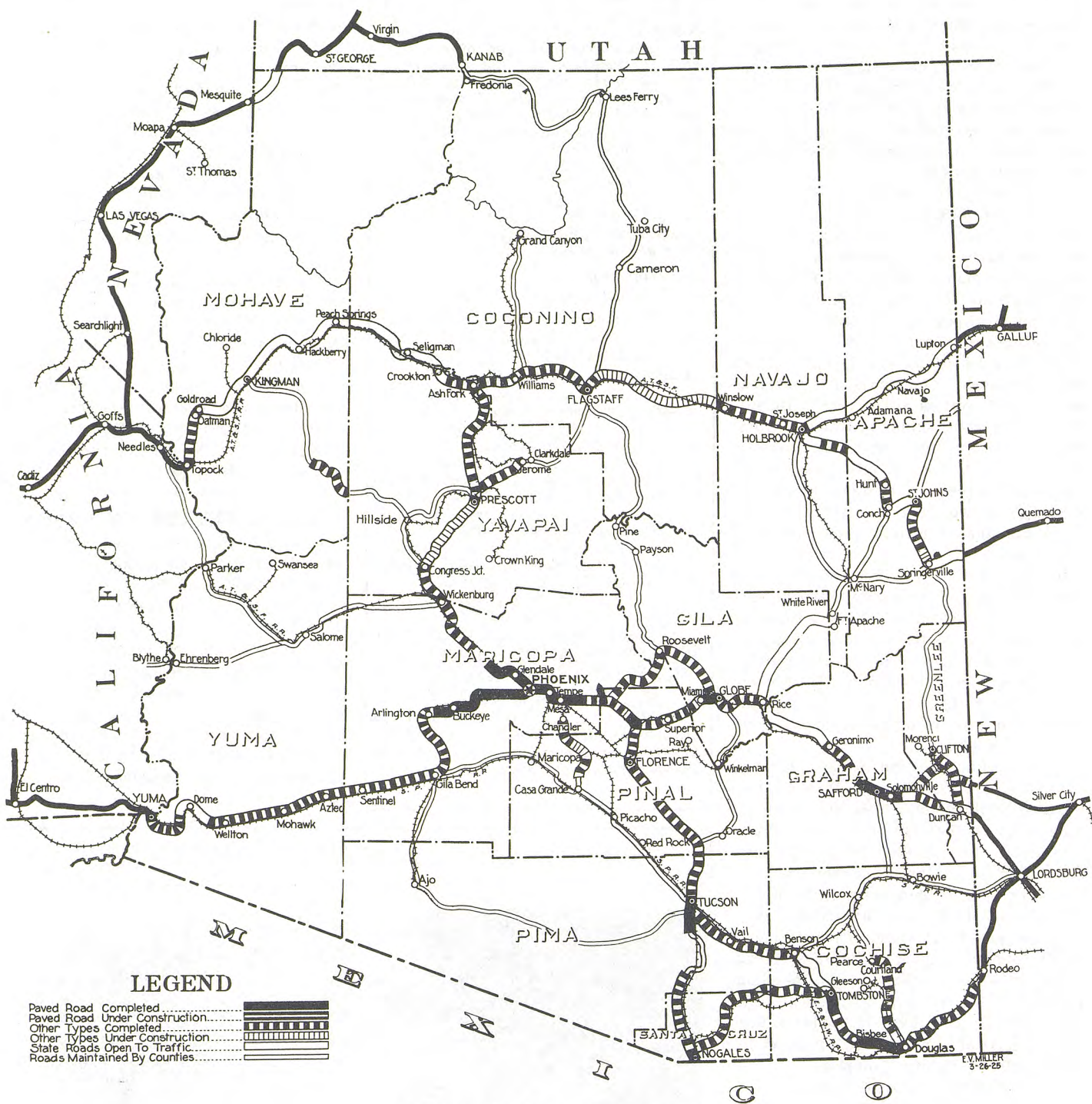
Governor Hunt expressed satisfaction of the excellent condition of the road between Globe and Rice following a recent inspection trip over the entire road from here to Safford. With the exception of a few stretches of the road in the San Carlos Indian reservation, the entire road is good, the governor stated.

This stretch of road has never been constructed or maintained to federal aid standard and it will be built to those requirements on a relocation, the governor said.

IN THE BUCKEYE IRRIGATION DISTRICT



Section on paved highway five miles west of Buckeye, Maricopa County, showing the longitudinal paving joint. An example of the "Arizona" type of paving.



ARIZONA HIGHWAY DEPARTMENT
 CONDITION MAP
 OF
 STATE HIGHWAY SYSTEM

Scale
 0 10 20 30 40 50 Miles

Condition of Roads

On Arizona State Highway System

YUMA-PHOENIX HIGHWAY

Length of route from Arizona-California state line at Yuma to center of Phoenix 204.56 miles. Leaving paved streets of Yuma to town of Blaisdell, a distance of 16.94 miles, road fair, slightly rough in places. From Blaisdell to Ligurta, the road is narrow and not up to standard, being a section of abandoned Southern Pacific railroad grade. This section is being maintained in fair condition pending construction of new route between these points. Leaving Ligurta for a distance of six miles toward Wellton, road fair. From this point passing through Aztec, Sentinel, Piedra, Gila Bend and on to Gillespie Dam the road is in excellent condition. A comfortable speed of thirty-five miles an hour may be maintained. At Gillespie Dam the crossing is made on the concrete apron of the dam. The construction of a bridge at this point is being contemplated. From Gillespie Dam to the Hassayampa River, 11.52 miles of excellent highway, excepting a half mile after crossing the dam which is in fair condition and will be relocated and built to standard upon construction of the bridge. Crossing the Hassayampa River concrete paving begins. The road from this point to Phoenix, 43.68 miles, is an excellent highway.

ASHFORK-NEW MEXICO LINE VIA ST. JOHNS AND SPRINGVILLE

Ashfork to city of Flagstaff through towns of Williams and Maine, surfaced, excellent condition. City of Flagstaff streets are paved. Flagstaff to Winslow, road fair. Two sections under construction, open for traffic. Winslow-Holbrook, condition good. Bridge under construction on this section. Holbrook-St. Johns very good. St. Johns-Springerville good. Section under construction not open for traffic. Old road good. Springerville to New Mexico state line, condition good. To New Mexico state line via Adamana, Holbrook to Lupton-New Mexico state line, old road fair.

CHANDLER-CASA GRANDE HIGHWAY

Chandler to Gila River at Sacaton, diversion dam under construction. Sections open to traffic, detours fair. Bridge at dam under construction. Old Gila River crossing at Sacaton, good. Old desert road connecting with new road, fair. New road completed from 1 mile south of Gila River to Casa Grande, condition very good.

ROOSEVELT-GLOBE-APACHE TRAIL

From Apache Trail Junction to Fish Creek Hill, condition good. Fish Creek Hill to mile post 8½ west of Roosevelt, excellent shape. From mile post 8½ to Roosevelt narrow road, sharp curves, very dangerous, condition fair.

(Note: New road from this point to Roosevelt is under construction.)

Roosevelt to Globe, first 8 miles, condition good, remainder to Globe excellent. Length from Junction to Globe 76.3 miles.

PHOENIX-PRESCOTT-ASHFORK

Present Route

From Phoenix, passing through Glendale, Peoria and Marinette, a paved highway extends for 20.15 miles. From end of pavement to Nada is newly graded road in good condition. Nada to Hot Springs Junction graveled surfaced, excellent. Through Hot Springs Junction to Wickenburg, excellent surfaced highway. Wickenburg streets rough. Wickenburg to Congress Junction, surfaced, good. New route, not open to traffic. Congress Junction to Yarnell, to be under construction in April. Yarnell to White Spar under construction. White Spar to Prescott under construction. Prescott route via Hillside. From Congress Junction to Prescott not on Arizona State Highway System. Condition rough. New route will shorten distance from Phoenix to Prescott 26.54 miles. Through city of Prescott, streets very good, partly paved. Prescott to Ashfork gravel surfaced highway, excellent condition. Length of present route Phoenix to Ashfork 193.96 miles. Over new route 167.418 miles.

PHOENIX-DUNCAN-STATE LINE

Leaving Phoenix, paved highway on through Tempe, Mesa and to Desert Wells, 24.75 miles, excellent. Desert Wells to Apache Trail Junction, very good graveled surfaced. Apache Trail Junction to FlorenceSuperior Junction, good. This section is a gravel surfaced highway with a section of five miles of asphalt paving. From Florence-Superior Junction to town of Superior, condition good. Through Superior paved. Excellent gravel surfaced road from Superior to Miami, 20.15 miles. Miami to Globe, paved 7.8 miles. Globe to Rice, fair; rough in places. Rice to Geronimo, 40.05 miles, good. Geronimo through Central to Safford, excellent. 13.6 miles

of pavement on this section. Safford to Solomonville paved. Solomonville to Junction of Clifton Highway, 2 miles paved, 6 miles of fair dirt road. Junction Clifton Highway to Greenlee County line 12.09 miles under construction, but not open to traffic. Traffic east leaves highway about a mile from end of pavement, using old road to Duncan, which is very rough. Duncan to state line, 3.5 miles, unimproved road. Length of route 227.46 miles.

PHOENIX-TUCSON-NOGALES

Phoenix to Desert Wells, a paved highway passing through Tempe and Mesa, excellent. From Desert Wells to Florence, gravel surfaced with five miles of asphalt pavement, very good. Through city of Florence graded streets, fair. Florence to Tucson, very good. Through Tucson on towards Continental, a distance of 11.85 miles paved, excellent. From end of pavement, south of Tucson to beginning of pavement north of Nogales, gravel surfaced, very good. Nogales city streets fair. Length of route from Phoenix to Arizona-Mexico line at Nogales 205.8 miles.

ASHFORK TO TOPOCK

Ashfork to Seligma, surfaced, very good. Seligma to east boundary of Hualpai Indian reservation, good. Across Reservation through town of Peach Springs, good. Peach Springs to Kingman, good. Kingman to Goldroad, condition fair. Goldroad to Oatman, fair. Oatman to three miles south, very rough. From this point to Arizona-California state line fair. Distance from Ashfork to Topock 169.8.

TUCSON-RODEO HIGHWAY

Tucson to Benson, gravel surfaced, very good. Benson to Tombstone, surfaced, good. Tombstone to Bisbee, 26.3 miles, 10 miles of asphalt paving, excellent condition; balance fair. Bisbee to Douglas, paved, very good. Douglas to New Mexico state line near Rodeo, gravel surfaced highway, condition good. Length Tucson-Rodeo 180.44.

NOGALES-TOMBSTONE HIGHWAY

Nogales to Patagonia, construction recently finished, condition good. Patagonia to Tombstone through Sonoita and Fairbank surfaced, very good. Length of this route 68.8 miles.

(Continued on page 19)

California's Highways of the Future

Recommendations of the Advisory Committee Appointed to Study Golden State's Highway System.

RECOMMENDATION that a rate of progress should be adopted which will provide for the completion of construction on the present California state highway system within a period of 12 to 14 years, which will require revenues in the amount of \$10,000,000 in 1926 and increasing annually thereafter, are contained in the report of the Highway Advisory Committee of California to Governor Friend W. Richardson.

The committee was appointed by Governor Richardson February 2, 1924, in compliance with a law passed by the California legislature in 1923, creating the committee and providing for a comprehensive study of the California state highway system for the purpose of making recommendations for the extension or reduction of the state highway system and for its future.

REPORT IN BOOK FORM

The report of the committee has been compiled in book form and sent to Governor Richardson. The report says in part:

The duties of the committee, as set forth by law, include the following:

1—Making a complete study of the whole highway system situation.

2—Investigation of the general location of each of the several units of the state highway system, whether constructed or unconstructed.

3—Investigation as to whether the various highways in the system should be paved or otherwise improved.

4—Investigation as to the necessity of adding any roads to the present system.

6—Recommendation as to the best methods of outlining a proper system of state highways.

7—Investigation of methods of obtaining revenues for construction and recommendation of a plan.

8—Recommendation as to the rate at which the state highway system can be constructed and the time which will be required to bring it to a state of completion.

9—Recommendation as to such other matters as may be incidental to the work outlined.

NINE MEMBERS ON BOARD

Under authority vested by the law, Governor Friend W. Richardson appointed the Highway Advisory Committee, consisting of seven citizens of the state

WHY STATE HIGHWAYS?

WE HAVE given much serious thought to the question as to why the State should interest itself financially in highway construction. Also, if it is proper for the State to interest itself in highway construction, is there a limit to its interest?

There is only one major reason why the State should interest itself in highway construction located in the various counties. That is, in order to accomplish, for the benefit of the people of the whole state, a purpose which the counties, functioning separately, can not so well accomplish.

The tremendous development of motor transportation in the United States, and particularly in California, has brought to the people incalculable gains. Where means of rapid transportation of men and freight already existed, it supplemented them by providing feeders and connections, by offering for freight alternative and more flexible service, and for men, what is often a more pleasant, faster, or cheaper method of travel than was already available. The development of motor transportation has been one of the outstanding factors of American life of the last two decades, and it is impossible to overestimate the contribution it has made to our social and economic welfare.

Due to the rapidly increasing facilities for travel, a public necessity has developed for continuity and uniformity in construction and maintenance of our main lines of travel. There has also developed a desire for highways reaching into the outlying and undeveloped sections and into the vast recreational areas of the State.

For each county to do its part in the construction of primary roads is not within the ability of the counties through which these primary roads are logically located. Many of the counties do not possess the resources to finance such work.

The only practical way in which roads desired universally by the people of the State can be built is to set up a State Highway Department, provide funds and proceed to construct highways which the business of the people of the State requires.

In selecting the roads for a State highway system, only those should be included which are of state-wide necessity and use.

—From the report of a study of the State Highway System by the Highway Advisory Committee.

to act in conjunction with a member of California Highway Commission and the State Highway Engineer. Following is a list of the members of the committee as appointed, showing their respective places of residence, calling and official connections:

Arthur H. Breed, Piedmont, member of the Senate of the State of California, real estate.

Elmer P. Bromley, Los Angeles, member of the Assembly of the State of California, attorney.

George G. Radcliff, Sacramento, president of the State Board of Control, newspaperman.

Louis Everding, Arcata, member of the California Highway Commission, lumberman.

Robert M. Morton, Sacramento, State Highway Engineer.

E. E. East, Los Angeles, chief engineer of the Automobile Club of Southern California.

Arthur E. Loder, San Francisco, chief engineer, California State Automobile Association.

J. B. Gill, San Bernardino, banker and former county road commissioner.

J. H. Newman, Dinuba, farmer and former chairman, county board of supervisors.

COMMITTEE ORGANIZES

The committee met at Sacramento, March 6, 1924, and organized by electing Arthur H. Breed chairman. W. F. Mixon, secretary of the California Highway Commission, was selected as secretary by the committee.

The members devoted the larger portion of their time for one year to the work of the committee. The committee, as a whole, traveled by automobile over the entire state highway system, and over many of the additional roads advocated by various organizations for addition to the system. A complete study of the whole state highway system was made both in the field and in the offices of the California Highway Commission, and many public meetings were held in all parts of the state. Conferences were held with the county boards of supervisors and various civic organizations.

In the absence of any appropriation for salaries or expenses, the work was carried on by the members of the committee

with employment of any outside technical or clerical assistants.

Special studies in the engineering, economic and financial features of the problems were made by the engineers of the committee, and at their request considerable data and many reports were prepared by the engineering organization of the California Highway Commission.

Recommendations of the committee follow:

SUMMARY OF RECOMMENDATIONS

1. We recommend that the present revenue acts providing funds for reconstruction be so amended as to give the Highway Commission authority to relocate and realign constructed roads.

2. We recommend that maintenance be extended by law to all unconstructed state highways open to travel; this for the reason that many years will elapse prior to construction of all the state highways, and the best possible road service should in the interim be furnished.

3. We recommend that the reconstruction work now being carried on by the state should be continued as rapidly as funds can be made available, to the end that previous investments in light types of construction may be saved and present dangerous conditions eliminated.

4. We recommend that on account of the requirements for maintenance and the urgency of reconstruction needs, due to traffic conditions, the existing revenues for maintenance and reconstruction purposes be not reduced in amount or rate of revenue.

5. We recommend that no highway should be improved in excess of its earning capacity, and that the program for state highway development should contemplate stage construction.

6. We recommend that the policy of the state should be to assume all future costs of construction on both minor and major structures on the state highway system, accepting such donations as may be offered.

RIGHTS-OF-WAY

7. We recommend that the State Highway Commission should more freely exercise its rights of condemnation and not permit important projects to be postponed on account of delay in acquiring rights-of-way, and that it should be the policy of the Highway Commission to assume all future costs of rights-of-way, accepting such donations as may be offered.

8. We recommend that a rate of progress should be adopted which will provide for the completion of construction on the present state highway system within a period of twelve to fourteen years, which will require revenues to the amount of \$10,000,000 in 1926, increasing annually thereafter.

9. We recommend a classification of the roads in the present highway system into two general systems hereafter designated as primary system and secondary system. Classification has been made in accordance with the importance of the various highways based on their functional use.

The primary system to consist of: CLASS "A".

1. Intercity highways.
 2. Major interstate connections.
- CLASS "B".
3. County seat laterals.
 4. Other important lateral connections.
 5. Major recreational highways.

The secondary system to consist of: CLASS "C".

6. Minor interstate connections.
7. Minor recreational highways.
8. Local development highways.

PRIMARY SYSTEM

10. We recommend that the primary system consist of the roads outlined in red and that the secondary system consist of the roads outlined in green upon the maps hereto attached and made part hereof, which classification is listed in detail on the tabulation herewith.

11. We recommend that not less than 75 per cent of construction funds be devoted annually to the construction of the Primary Class A and Class B road system until completed.

12. We recommend that the following ten roads be made state highways, and classified as a portion of the primary system:

CLASS A PRIMARY.

1. Crescent City to the Oregon line, near Chetco, Coast route, 19 miles.
3. Needles to Arizona line near Topock, 16 miles.
4. Blythe to Arizona line near Ehrenberg, 4 miles.
5. Shavers Wells to Route 26 near Coachella, 18 miles.
6. San Rafael to Point San Quentin, 3 miles.
7. San Diego to Tia Juana, 7 miles.

CLASS B PRIMARY

8. Oxnard to the main coast highway, 2 miles.
9. Alturas to the Oregon line near New Pine Creek, 44 miles.
10. Route 23 near Coleville to the Nevada State line, 12 miles.

13. We recommend that no other additions be made to the primary system, and that any additional roads which, in the opinion of the legislature, should be included in the state highway system prior to the completion of the primary system, be classified into the secondary system.

14. We recommend as a procedure for adding roads to the system, that any dis-

trict or county asking for the inclusion of additional roads to the highway system should make survey, plans and estimates of the cost of same in proper form and submit to the California Highway Commission, which, in turn, should submit the same to the first succeeding session of the legislature, with its recommendations as to importance and classification.

PAY-AS-YOU-GO METHOD

15. We recommend that the financing of state highway construction be changed from the expensive long-term bond method to the "pay-as-you-go" method as rapidly as it can be effected.

16. We recommend the immediate refinancing of state highway construction by one or more methods which will insure a revenue of approximately \$10,000,000 for the year 1926 with annual amounts increasing each year thereafter at the same rate as the increase in motor vehicle registration, such revenue to be in addition to such construction revenue as may be made available from federal aid or supplementary bond issues.

17. We recommend that the revenue for this construction program be derived from increased taxes upon the users of motor vehicles, either by increasing the plate tax, by a graduated weight tax, or by an increased tax on gasoline, or a combination of these forms of tax.

18. We recommend the selection of that form of taxation on motor vehicles which will be the most equitable and the most acceptable to those who pay the tax.

19. We recommend that increases in motor vehicle revenue be made available entirely to the state for highway construction.

20. We recommend that steps be taken by the legislature, preliminary to placing before the voters at the next general election, a bond issue of \$25,000,000 in short term bonds, all proceeds of which shall be used on the primary road system for the construction of major bridges and to defray the state's portion of the cost of the elimination of railroad grade crossings, in co-operation with railroads, the division of expense to be fixed by the California Railroad Commission for each grade crossing elimination project.

PRIMARY SYSTEM FAVORED

21. We recommend that future state highway construction expenditures, in so far as possible, be concentrated on the primary trunk system, and that construction be prosecuted by the State Highway Commission on the primary system at equal rates of annually completed highway mileage in each section of the state.

(Continued on page 19)

The Engineer's Log

DISTRICT NO. 1
B. M. Atwood
District Engineer

FEDERAL AID PROJECTS

UNDER CONSTRUCTION

Federal Aid Project No. 36-B underpass on Prescott-Jerome Highway—State construction completed. Railroad share of structure under construction.

Federal Aid Project No. 40 Reo. Holbrook-Winslow Highway. Bridge and surfacing 95 per cent complete. Construction of entire project complete within ten days. Length under construction 2.811.3 miles.

Federal Aid Project No. 68-B St. Johns-Springerville Highway. Gravel surfaced highway under construction. Length 9.6496 miles. Percentage complete 10 per cent.

Federal Aid Project No. 74—Winslow-Flagstaff Highway. Gravel surfaced, under construction. Length 20.35 miles, 85 per cent complete.

Flagstaff-Angel Highway. Forest road on state system. Gravel surfaced. Length 23.43 miles. Eighty-one per cent complete.

DISTRICT NO. 2
George B. Shaffer
District Engineer

FEDERAL AID PROJECTS

UNDER CONSTRUCTION

Federal Aid Project No. 72-A, Prescott-Phoenix. White Spar to Yarnell section gravel surfaced highway with one four-girder concrete bridge and one two-span concrete bridge. Ninety-two per cent complete. Length of this section 18.84 miles.

Prescott-Phoenix Prescott-White Spar section. Forest road on State system, graded and drained under construction, 73 per cent complete. Length of project 15.58 miles.

ARIZONA STATE ROADS

UNDER CONSTRUCTION

The Chandler-Casa Grande Project, 22.7 miles in length, with 5.3 miles in Maricopa county and 17.4 miles in Pinal county, is under construction in Pinal county with state forces. Eleven and seven-tenths miles of grade and 4.5 miles of surfacing has been completed. The

remainder of the completed grade is self-surfacing.

The new main line of the Southern Pacific Railroad, now under construction, parallels the state highway location from stations 430 plus 00 to 810 plus 00. The original highway location encroached on the older railroad right-of-way, which necessitated a new location of about six miles. The new location follows between the railroad and the San Tan cana to the U. S. I. S. bridge across the Gila river, which is now under construction. The piers have been poured and the superstructure will be completed by June 30.

For the past six months the camp has employed from 50 to 60 men, but due to lack of funds, the camp now has been reduced to 15 men. Work in Pinal county closed March 31 pending the appropriation of additional funds.

The camp was moved to Maricopa county to begin grading on a 2.3 miles section of the same project. The remainder of the grade has been built for some time and other than work on a few drainage structures, only needs reshaping preparatory to surfacing.

J. R. VAN HORN,
Resident Engineer.

DISTRICT NO. 3
T. S. O'Connell
District Engineer

FEDERAL AID PROJECTS

UNDER CONSTRUCTION

Federal Aid Project No. 77, Solomonville-Duncan Highway, surfaced. Under construction 12.09 miles, 94 per cent of work completed.

ARIZONA STATE ROADS

UNDER CONSTRUCTION

Non Federal Aid State roads. Apache Trail (Horse Mesa Section) under construction. Length 8½ miles, 10 per cent complete.

PERSONALS

Harry Hatcher contributes the following:

"We would like to announce in the 'Lost Column,' that somewhere between here and Ashfork, B. M. Atwood lost a very fine mustache and goatee."

D. L. Bundy, resident engineer, with headquarters at Winslow, is taking a keen interest in ARIZONA HIGHWAYS,

and will be a frequent contributor of news notes.

James Parker, caretaker of the Patagonia end of the Patagonia-Nogales Highway, has become a contributor to ARIZONA HIGHWAYS.

Stanley E. Watkins, concrete inspector on F. A. Project No. 74, was married February 21, 1925 to Miss Margaret Leinhard in Los Angeles, California. Mr. Watkins returned from his honeymoon and resumed his duties March 4, 1925. Miss Leinhard was a resident of Winslow.

L. C. Lashmet, "The Bridge Builder of the Southwest," will finish his contract on a three-span concrete bridge at Joseph City this month. This is one of the finest bridges in the northern part of the state. James G. Wray is the inspector for the state.

Winslow-Flagstaff Project—F. A. No. 74—is nearing completion. The grading is practically completed, only some rock cuts at Burro Canon and Canon Diablo being unfinished. The concrete paving at the underpass, Burro Canon Bridge and a few small structures are under construction. The surfacing of the first 3.3 miles of F. A. Project No. 74 is about 60 per cent complete. This surfacing is one of the best in the state. The binder is of lime and alumina and stood a very high cementation test. The material "setting up" dry, and, under traffic compaction and moisture, resembles a hard surfaced highway.

F. A. Project No. 40-Reopened is being resurfaced with practically the same material as Project F. A. No. 74, from the Winslow city limits east to the Little Colorado bridge, about 2.3 miles. When completed, this will make the best piece of surfacing between Holbrook and Winslow. The project is about 65 per cent completed and will be finished this month.

L. C. Rockett of the Bureau of Public Roads, made the April inspection of Projects Nos. 40-Reopened and 74, April 3, 1925. This is Mr. Rockett's first trip through this section in two and one-half years and he seems well pleased with the work in progress and with the improvements made by the Arizona Highway Department in this time.

From the Patagonia-Nogales Highway section comes the following:

H. H. McCutcheon, an employe of the Patagonia-Nogales section of the state highway system, is again settled in his own home, which was rebuilt following

destruction by fire.

Gov. G. W. P. Hunt was a visitor February 28 at the road camps in this highway. We are always glad to welcome the governor, who is an enthusiastic booster for good roads.

Local residents are anxious to see the beginning of work on the highway link between Sonoita and the Vail highway, which, when constructed, will make good roads the rule in Santa Cruz and Pima counties, besides inducing more tourist traffic to pass this way.

James Parker, caretaker of the Patagonia end of the new state highway here, celebrated his thirty-ninth birthday anniversary April 3. He has devoted the last ten years to county road work and highway construction in Santa Cruz county.

Howard Keener, who has been furnishing the state highway department with chopped feed, delivered the last two tons last week. The grain was raised on his San Rafael Valley ranch, the chops being a mixture of Indian corn, milo maize, feterita and kaffir corn. It is the best feed we have had and the most economical, cost and results considered.

R. L. Mitchell and family, of Sentinel, and Mr. and Mrs. C. Carpenter attended a dance and supper at the ranch of Mr. Stroud in the Sentinel district.

Miss Bessie Carpenter, daughter of Mr. and Mrs. C. Carpenter, was married March 18 to James Nichols of Winslow, employe of the Arizona Highway Department.

The Sentinel correspondent announces that R. L. Mitchell is very proud of his new truck.

Condition of Roads

(Continued from page 15)

PRESCOTT-JEROME HIGHWAY

Length of route 33.3 miles, gravel surfaced, condition excellent.

HILLSIDE-KINGMAN HIGHWAY

This road recently completed as a connecting link between county highways, condition good. County roads on either side very poor and rough. Distance Hillside to Kingman 123 miles.

DOUGLAS-PEARCE HIGHWAY

Construction completed on 30 miles, very good, remainder fair to good.

RICE-SPRINGVILLE HIGHWAY

Fair mountain road.

SOLOMONVILLE-DUNCAN-CLIFTON
Solomonville to Clifton, surfaced mountain road, condition good. Clifton

to Duncan and Arizona-New Mexico state line, condition very good.

CLIFTON-MULE CREEK HIGHWAY

From Junction with Clifton-Duncan Highway to New Mexico state line, length 17.5 miles, condition good.

California's Highways

(Continued from page 17)

22. We recommend that the convict labor camps be expanded or increased in number, to utilize at least 1000 prisoners on highways, the cost to be payable from any moneys in the highway construction funds, and that the savings in prison maintenance expense be paid from general state funds to the highway fund, from which operation of convict camps is defrayed.

23. We recommend that statutes be enacted to require approval of the State Highway Commission before filing with the county clerk of any subdivision plat of land fronting on state highway.

ARTHUR H. BREEN, Chairman.
ELMER P. BROMLEY,
LOUIS EVERDING,
R. M. MORTON,
GEORGE G. RADCLIFF,
*ARTHUR E. LODER,
J. H. NEWMAN.
W. F. MIXON, Secretary,
February 20, 1925.

*My approval of these recommendations is as an individual, and reflects no policy of the organization with which I am officially connected.

ARTHUR E. LODER.

District Engineer Seriously Hurt In Automobile Crash

With his neck broken in four places as the result of an automobile accident, E. M. Whitworth, district engineer in charge of highway districts three and four, comprising the Southern, Southeastern and Southwestern counties, is in a Los Angeles hospital. Mr. Whitworth was taken to Los Angeles March 29, in the hope that an operation might help him.

Mr. Whitworth was injured March 7 while driving his car 15 miles south of Florence on the Florence-Tucson highway, when the right front wheel collapsed, throwing the car into a ditch alongside the road. The car turned over twice sideways and then end over end, hurling the driver on his head in the middle of the road.

A passing motorist discovered Whit-

worth lying unconscious in the middle of the road and took him into his car. Later he was taken to St. Mary's hospital in Tucson. Recovering somewhat from the shock of the accident, Whitworth was able to sit up but the swelling of his neck showed no signs of decreasing.

An X-ray picture showed four distinct fractures of the vertebrae and the case was so baffling in nature that he was taken to the Good Samaritan hospital in Los Angeles. His neck was placed in a plaster cast immediately following the accident. Mrs. Whitworth accompanied her husband to Los Angeles.

W. R. Hutchins, former district engineer for the eastern district, has been assigned by State Engineer W. C. Lefebvre to District No. 4 until Mr. Whitworth's return.

Mr. Whitworth is reported as being in slightly better condition.

NOTICE TO CONTRACTORS

Sealed bids marked upon outside of envelope "State Highway Contract, Federal Aid Project No. 86-A", and addressed to W. C. Lefebvre, State Engineer, Phoenix, Arizona, will be received at 2 P. M., May 4, 1925, upon the Tucson-Nogales Highway, Federal Aid Project No. 86-A.

The work consists of approximately 8000 Cu. Yds. Roadway Excavation; 66,000 Cu. Yds. Roadway Borrow; 3000 Cu. Yds. Structural Excavation; 1000 Cu. Yds. Ditches and Dykes; 28,000 Cu. Yds. Roadway Surfacing; 70,000 Yard Miles Surfacing Overhaul; 3800 Cu. Yds. Concrete; 440 Lin. Ft. Corrugated Metal Pipe; 105,000 Lbs. Reinforcing Steel, and other incidental items.

All bids shall be accompanied by an unendorsed, certified or cashier's check for 5% of the gross amount of the bid, payable to the State Treasurer of Arizona.

The State Engineer reserves the right to reject any and all bids.

Copies of the plans and specifications may be seen at the office of the State Engineer, Phoenix, Arizona, and at the County Engineer's Office, Tucson, Arizona, or may be obtained at either place upon payment of Five (\$5.00) Dollars to W. C. Lefebvre, State Engineer.

Satisfactory bonds will be required of the contractor to whom the award is made.

All proposals shall be made on blanks furnished for that purpose.

W. C. LEFEBVRE,
State Engineer.

Phoenix, Arizona,
April 8, 1925.

ARTHUR L. FERRY

Surveying, Engineering, Mining and
Nautical Instruments
1001 So. Hill St. Los Angeles

Expansion Joints---Their Use In Arizona

By **GEORGE B. SHAFFER**, District Engineer

(This is the first of a series of articles on pavements by one of the foremost paving experts of Arizona.—Editor.)

OWING to the fact that concrete pavements predominate in Arizona, a great field of observation has been provided for the study of slab movement and behavior of the expansion joints under such movement. Many breaks causing damage to the pavement have occurred at the expansion joints in the nature of longitudinal and bias cracks and chipping of the surface adjacent to the joint.

Many theories are advanced regarding the cause of this action. Agencies from different sources no doubt contribute in part certain forces and conditions which result in damage to the pavement, but at this time only type and workmanship will be considered as causes of failures.

To properly set an expansion joint is a very tedious and difficult operation, and owing to the fact that time is a very important factor so far as the contractor's financial success is concerned, the expansion joint becomes a dreaded bugbear for both contractor and inspector.

FACTORS OF WEAKNESS

Expansion joints at their best are factors of weakness, and for this reason should be placed with utmost care. The joints which appear to prove best as ex-

pansion areas are those of a width great enough to be workable, or a joint sufficiently wide so that when it becomes replaced with non-elastic material, the joint can be entirely removed by simple methods and a fresh joint put in place of the old.

The wider joint enables the maintenance crew to do this at the proper time. A joint of any width will allow material to enter which immediately goes into a position that puts it under compression. In Arizona this material is of a mineral composition, and if maintenance is not kept up to the minute, will accumulate under the wheel ways to the extent of a solid. These solids are more or less concentrated as the average driver does not distribute traffic evenly over the entire width of an eighteen foot pavement.

At the time of expansion these so called solids, if in a reasonably narrow joint, immediately go under compression, which subjects the adjoining slabs to shear and tensile resistance, causing chipping and longitudinal cracking respectively. This appears obviously as a rule rather than an exception, especially where the width of the expansion joint was estimated to equal the expansion movement in the slabs.

The intention here is to estimate a width, regardless of the length of interval, which will enable a quick removal of the old joint material, thereby removing the accumulations which form concentrated solids that are apparently the causes of chipping at the joint, a great many longitudinal cracks and the greater part of the bias cracks.

It is not the intention to convey the idea that all damage to pavements due, apparently to expansion joint arrangement, is caused by material entering and solidifying in the expansion area. The most formidable obstruction to free expansion movement is the contact or actual joining of the slabs at the time of construction. This may happen in more than one way; two of which are most common, first by the concrete of one slab uniting with that of its neighbors by passing between the abutting ends or around the extreme ends of the expansion joint material, and second, by uniting under the expansion joint material. This is a difficulty particularly true in the use of the disappearing type of joint and as this type of joint is tentatively adopted by the Arizona Highway Department, great efforts are being made to overcome it.

CONTRACT AWARDED

Contract for the construction of Federal Aid Project No. 72-B on the Phoenix-Prescott Highway, comprising the nine miles of road between Congress Junction and Yarnell, was awarded April 7 to Schmidt and Hitchcock of Phoenix, the lowest of five bidders. The bids were opened April 6. Following are the bids of the contractors:

Schmidt and Hitchcock, \$177,135.01; Twohy Brothers, Los Angeles, \$200,517.71; Phoenix-Tempe Stone Company, \$262,208.61; Henry Galbraith, Prescott, \$207,007.13; Lee Moor Construction Company, El Paso, \$201,844.51.

The specifications call for the work to be completed by October 15, 1925.

NOTICE TO CONTRACTORS

Sealed bids marked upon outside of envelope "State Highway Contract, Tombstone-Bisbee Highway", addressed to W. G. Lefebvre, State Engineer, Phoenix, Arizona, will be received at 2 P. M., April 20, 1925, upon the Benson-Douglas Highway, Federal Aid Project No. 79-A.

The work consists of approximately 105,600 Sq. Yds. of Asphaltic Flush Coat on old paving.

All bids shall be accompanied by an unendorsed, certified or cashier's check for 5% of the gross amount of the bid payable to the State Treasurer of

Arizona.

The State Engineer reserves the right to reject any or all bids.

Copies of the plans and specifications may be seen at the office of the State Engineer, Phoenix, Arizona, or may be obtained upon payment of Five (\$5.00) Dollars to W. C. Lefebvre, State Engineer.

Satisfactory bonds will be required of the contractor to whom the award is made.

All proposals shall be made on blanks furnished for that purpose.

W. C. LEFEBVRE,
State Engineer.

Phoenix, Arizona,
April 1, 1925.

NOTICE TO CONTRACTORS

Sealed bids marked upon outside of envelope "State Highway Contract, Federal Aid Project No. 79-A", and addressed to W. C. Lefebvre, State Engineer, Phoenix, Arizona, will be received at 2 P. M., April 20, 1925, upon the Benson-Douglas Highway, Federal Aid Project No. 79-A.

The work consists of approximately 900 Cu. Yds. Roadway Excavation; 10,000 Cu. Yds. Roadway Borrow; 5,000 Sta. Yds. Earthwork Overhaul; 58,000 Sq. Yds. Asphaltic Concrete Paving; 120 Cu. Yds. Class "B" Concrete; 136 feet of

Corrugated Metal Pipe Culvert, and other incidental items.

All bids shall be accompanied by an unendorsed, certified or cashier's check for 5% of the gross amount of the bid payable to the State Treasurer of Arizona.

The State Engineer reserves the right to reject any or all bids.

Copies of the plans and specifications may be seen at the office of the State Engineer, Phoenix, Arizona, or may be obtained upon payment of Five (\$5.00) Dollars to W. C. Lefebvre, State Engineer.

Satisfactory bonds will be required of the contractor to whom the award is made.

All proposals shall be made on blanks furnished for that purpose.

W. C. LEFEBVRE,
State Engineer.

Phoenix, Arizona,
April 1, 1925.

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Who Pays for the Highways?

(Continued from page 8)

tem, including the seven per cent system, is 1990 miles, or practically 2000 miles.

Of the approximate 2000 miles of highways 181 miles are now paved; 1250 miles are completed as to grading and structures and with variable classes of surfacing, some of which now need to be paved, and much more will require paving within a very few years as the traffic increases; and other sections will require surface renewals. One hundred and fifty miles are completed as to grading and drainage, but requires either paving or lower type of surfacing. The remainder has had minor improvements or are just trails.

A review of the State system shows it less than 35 per cent complete to the standards that the development of the State and the increasing traffic for the next ten year period will unquestionably require, and considering that in excess of \$20,000,000.00 has been expended to date it is evident that at least \$35,000,000.00 will be required. This means an average of at least \$3,500,000.00 annually for the construction. This amount added to the annual requirements for maintenance and general operating expense of the Highway Department, means a minimum average total annual expenditure of \$4,500,000.00.

It is a fact often overlooked that the cost of highway construction has increased since the war, just as the cost of all other commodities and wages have increased. The average of commodity increase between 1912 and 1924 has been about 80 per cent. The wages of labor in Arizona average 100 per cent increase over that year. Almost all highway cost can be analyzed back to labor cost. This means that the same highway which could be built in 1912 for \$10,000.00 per mile will now cost from \$18,000.00 to \$20,000.00 per mile. In addition to this the development of traffic and the great need for more efficient road improvements has required the highway builders through the nation—and Arizona is no exception—very materially to increase their standards, and thereby further increasing the cost.

STATE HIGHWAY RESOURCES.

For the year of 1924 the Arizona Highway Department received from all sources provided by law for financing the construction and maintenance of the State highway system, and to match the Federal aid allotment, as follows:

Ten mill State Tax Levy ...	\$ 652,293.30
Motor Vehicle Fee	339,721.50
One-half Gas Tax	365,147.15
Motor Bus and Truck Tax..	21,000.00

Total\$1,378,161.95

On the same basis it is estimated that for the fiscal year of 1925-1926 it will be as follows:

Ten Mill State Tax Levy ...	\$ 650,000.00
Motor Vehicle Fee	360,000.00
One-half Gas Tax	420,000.00
Motor Bus and Truck Tax..	22,000.00

Total\$1,452,000.00

Upon the basis of the present statutes, 75 per cent of the 10 mill tax levy must be expended where determined jointly by the several Boards of Supervisors and the State Engineer, and it is only natural that the Boards of Supervisors are more interested in purely local needs than in the sections of the state system within their County, of State wide necessity and urgency. The motor vehicle receipts are by law only to be expended for maintenance; 50 per cent of the one-half of the gas tax is administered with the same restrictions as the 10 mill tax levy. The motor bus and truck tax is for general State highway purposes, as is 25 per cent of the 10 mill tax levy and 50 per cent of the one-half of the gas tax.

The maintenance requirements of the State highway system are approximately \$700,000.00 per annum at the present time and they are increasing. If the State continues a program of construction, which it must do for its own welfare, and which is necessary to avail itself of the Federal aid accruing to the State, the overhead or general operating expenses and equipment renewals will amount to approximately \$300,000.00 per annum, or a total of \$1,000,000.00 per annum for these two items.

This leaves an estimated balance for

construction of approximately \$450,000.00 for the coming fiscal year. As there is much needed work to be done on the State system not included in the Federal seven per cent system, and as all of the available construction funds for the coming year are under the joint jurisdiction of the Boards of Supervisors and the State Engineer, and therefore must be bartered between the local needs and that of State necessity, together with the small amounts available for expenditure in many of the counties, it is anticipated that less than \$200,000.00 will be available for matching Federal aid.

FEDERAL AID AVAILABLE.

It has been stated previously herein that there is now \$2,217,039.80 of Federal aid available to Arizona that has yet to be matched. It is expected that this amount will be reduced to about \$2,100,000.00 by July first, of this year,

NOTICE TO CONTRACTORS

Sealed bids marked upon outside of envelope "State Highway Contract, Federal Aid Project No. 79-B", and addressed to W. C. Lefebvre, State Engineer, Phoenix, Arizona, will be received at 2 P. M., April 20, 1925, upon the Benson-Douglas Highway, Federal Aid Project No. 79-B.

The work consists of approximately 4,800 Cu. Yds. Roadway Excavation; 5,000 Cu. Yds. Roadway Borrow; 3,200 Sta. Yds. Earthwork Overhaul; 42 Cu. Yds. Class "B" Concrete; 118 Lin. Ft. of Corrugated Metal Pipe, and other incidental items.

All bids shall be accompanied by an unendorsed, certified or cashier's check for 5% of the gross amount of the bid payable to the State Treasurer of Arizona.

The State Engineer reserves the right to reject any or all bids.

Copies of the plans and specifications may be seen at the office of the State Engineer, Phoenix, Arizona, or may be obtained upon payment of Five (\$5.00) Dollars to W. C. Lefebvre, State Engineer.

Satisfactory bonds will be required of the contractor to whom the award is made.

All proposals shall be made on blanks furnished for that purpose.

W. C. LEFEBVRE,
State Engineer.

Phoenix, Arizona,
April 1, 1925.

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or equal to two full years of Federal aid allotment to Arizona.

Although the ratio of participation of Federal aid is now 72.34 per cent to Arizona's 27.66 per cent, this participation is based on certain features of the cost only. All surveys, plans, estimates and all work necessary to be done prior to construction, and to comply with the rules and regulations of the Federal Aid Act and the Bureau of Public Roads, are not participating features on the part of the Government, nor is any expenditure for rights-of-way. This reduces the percentage to Arizona to an average of 65 per cent on the part of the Government.

Therefore the probable \$200,000.00 for the coming fiscal year will match approximately \$375,000.00 of the now available Federal aid unmatched funds, or about one-third of one year's allotment to Arizona on the present basis. Unless the revenues for the State highways are augmented from some source the conditions will certainly not be better for the fiscal year of 1926-27, and in which event it is probable that some of the 1924 Federal aid allotment will revert to the Government July 1, 1927. The additional revenues for matching Federal aid in the past—the County bond monies—are now exhausted so there can be no relief from that source.

In addition to the apparent lack of available funds for matching the Federal aid that is now available, from this review of the sources of the revenue provided by law for the construction, reconstruction and maintenance of State highways, it is also very doubtful if Arizona has complied with all of the requirements of the Federal Aid Road Act, particularly with regard to the amendment to Section 24 thereof, as previously quoted herein. If not, the time for so doing expires November 9, 1926, and the penalty is the withdrawal of Federal aid from the State.

MOTOR VEHICLE FEE AND GAS TAX.

The motor vehicle and gas tax are means of taxing the road users for their portion of the benefits derived. The motor vehicle fee was the first of such taxes to come in to use, and consists of several different methods: the flat rate, per horse power, by weight, upon factory price of car, or combinations of two or more of these methods. Arizona uses the method of a flat rate upon all cars

within certain limits of horse power, or \$5.00 per car of all cars not exceeding 25 horse power; \$10.00 for cars having a rating between 25 and 40 horse power, and \$15.00 for cars rated over 40 horse power. Trucks are taxed by rated capacity, \$25.00 being the maximum any size pays under the present basis. Arizona's method is fundamentally wrong, as is evidenced from the fact that the minimum rate for any passenger car is \$5.00, the minimum for any truck is \$10.00, and the average per car including trucks collected in 1924 was \$5.87 per car.

Most of the states have adopted a weight basis for the motor vehicle tax, or a combination including weight. It is generally conceded that the damage done to the roads is nearer in proportion to the weight of the vehicle than any other factor that may be considered. Such tax is largely based upon so much per hundredweight for the gross weight of the car. The tax upon trucks is generally based upon the tonnage capacity, as in Arizona, but the rates are much higher.

Very few of the states have a maximum rate for the largest trucks less than \$100.00 per annum; many around \$300.00 per annum; and range to a maximum per annum truck tax of 1125.00 for a seven ton truck in the State of Georgia. A license for such a truck in Arizona would be \$25.00 per annum.

Arizona ranks forty-seventh among the 48 states, in its motor vehicle fee per car. Even the Territory of Hawaii ranks higher. California is the only State below Arizona. It has a flat rate of \$3.00 for all passenger cars, but a much higher rate on trucks.

TABULATION INCLUDED.

Included with this article there is a tabulation of the total license and gas revenues from motor vehicles for 1924, giving the automobile registration, revenues from the motor vehicle fees and gas tax averages and ranks of all of the States including Hawaii.

The gas tax is a recent method of taxing the road user, and is the fairest and yet the easiest method, as it serves as a meter upon the user. The burden is not felt as in other taxes as the payments are so small and over the entire year. This tax has become a very popular tax and in 1924 it had been adopted by 35 States.

It is predicted that the number of States having the gas tax will probably exceed 40 after all the legislatures have adjourned. Some of the States that have had low gas tax rates have increase them this year. Of the 35 States that had the gas tax in 1924—eight States have a one-cent tax; 10 States a two-cent tax; two States a two and one-half cent tax; nine States a three-cent tax and one state a four cent gas tax.

The inclination seems to be to increase this tax rather than reduce it. The California legislature is now considering raising the present tax of two cents to three and probably to four cents per gallon. The gas tax is the only form of tax by which outside of State or foreign cars pay a portion of the highway cost of the State over which they travel, and it is well worth it to them as it affords them better roads, thereby reducing their road expenses more than the sum they pay in taxes.

BUS AND COMMERCIAL TRUCK TAX.

Arizona now has a bus and commercial truck tax, but it is ridiculously low. The stage and truck lines are becoming very much in evidence in this State. The modern stage of today, many of which may be seen upon our highways, are large heavy buses, capable of high speed, and due to the absence of proper enforcement of speed regulations they usually travel at a high rate of speed.

These stages and trucks make regular trips, heavily loaded, which together with their speed, cause considerable damage to the highways. They are in direct competition with the railroads, who buy their own right-of-way, who construct and maintain their own road bed, and who pay a tax on right-of-way and road bed to the State and Counties.

A part of this tax is used to build and maintain a road bed for their competitors, the stages and truck lines. All the taxpayers and automobile owners of the State contribute to this road bed and pay their full fare when they patronize the stage companies. In fact the taxpayers build and maintain the highways, and these bus and truck line companies are now capitalizing these investments and forcing the taxpayers to contribute much more heavily for maintaining the highways, due to their heavy usage. They, themselves, are contributing but very little more than the other taxpayers who

use the highways only occasionally and then largely for pleasure.

The transportation companies are essential, and should not be excluded from the highways, but an equitable tax commensurate with such use of the highways certainly should be levied upon them.

WHO BENEFITS?

If State highways are to be constructed and maintained they must sooner or later be paid for mostly by the people of the State. Taxpayers have never been enthusiastic over paying any form of taxes, but notwithstanding, they are insistent upon having the highways. Therefore, it becomes a case of selecting from the various methods of taxation that method which will prove to be the most equitable and the nearest to being popular with the several classifications of the people who pay.

The earlier forms of taxation used the principle of "ability to pay" and "accessibility for collection," and this still is mainly the method upon which Arizona's State highway taxes are based. The principles that are now generally being adopted are being based upon the benefits derived, and efforts are being made to make equitable distribution of the taxes among those who benefit.

The building of all highways of general motor use will produce either direct or indirect benefits, which are generally classified as follows:

- (a) Benefits to organized society in general.
- (b) Benefits to definite groups, such as labor, agriculture and various industries.
- (c) Benefits to property.
- (d) Benefits to the road user.

It is impossible to determine accurately the relative amount of benefits derived by each of these classifications or groups.

Every individual benefits indirectly through each, but his direct benefits can usually be found predominantly in one. The direct benefits to groups, as well as individuals, becomes apparent with increasing certainty and increasing amount as we proceed down the list from the "a" to the "d" classification. Therefore, in taxation for roads, the benefits should be and are becoming to be assessed to the general public, to property, and to the road user.

LEGISLATION NEEDED.

It is obvious that Arizona is in dire

need of more adequate financing legislation for State highways, and that serious and detailed consideration should be given such legislation.

In the past few years the legislatures have attempted to provide the necessary finances for such purposes, mainly by the passage of Omnibus Bills, or appropriation bills, either of which are simply resorting to the famous "pork barrel" method. This method places the highways in the position of being the principle object of trade for all classes of legislation.

This is accomplished by trading a section of road desired by some member, and including it in the appropriation bill, for his support of this or some other piece of legislation. It is very often the case that such a highway is purely local in its character, and will not remain in the system after its construction. Often only a portion of the amount actually required is included, hoping to obligate the State to make additional appropriations later.

This method retards rather than advances the completion of the State system. Although such legislation may temporarily provide a large amount to be expended by the State Highway Department, much of it is thereby diverted to non-essential sections, consequently detracting from the amount which should be used for the essential sections.

It is very evident that such uncertainty in the financial provisions for highway progress cannot permit of an economic construction policy, and must and does result in a material loss financially and in serious delays in the completion of much needed improvements. Therefore, it is apparent that if the State highway development is to progress economically, even in a measure comparable to the progress of its requirements, continuing finances must be provided in such a manner that may be estimated for from one to three years in advance in order that a continuity of construction, reconstruction and maintenance may be planned and assured.

METHOD OF FINANCE

Method of possible financial sources may be classed as follows:

1. Direct legislative appropriations.
2. Tax upon all property.
3. Motor vehicle license fees, including plate, chauffeur and regulating tax.

4. Bus and commercial truck tax.
5. Gasoline tax.
6. State bond issues.

Direct legislative appropriations as a general method are economically unsound for reasons previously given herein, and should only be used in special instances, if at all.

A tax upon all property within certain limits is just and equitable, and should be included, within those limits, in any financing program that may be adopted. From the statistics given herein, it would appear that property is now carrying all of the burden that should be imposed upon it, particularly so when the present obligated indebtedness is considered in conjunction with the tax levies for current funds, and it seems proper that it should be so considered.

The motor vehicle fee, the bus and commercial truck tax, and the gas tax have been previously discussed. The first named should be materially increased, particularly as they pertain to trucks, the inclusion of tractors and trailers which are not now taxed at all, and the bus and commercial truck tax. Such revisions, properly adjusted, would be equitable and would result in a marked increased revenue, and would increase

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annually with the increased motor registration.

The gas tax is as near popular a tax as is possible for a tax to be popular, and if it is determined that the users of the roads are not paying their pro-rata of the cost, an increase may be considered.

These special automobile taxes are rapidly increasing, due to the great increase in automobiles in Arizona and the use of Arizona highways by tourists. Revenues from these sources may be fairly accurately estimated for several years in advance, by curves plotted from the past records. This procedure is common for many purposes, and has been successfully used upon like taxes in other states for bond purposes. The results to date have invariably been below the amounts actually raised.

BONDS

Bonds are not the most desirable means of securing finances for any purpose, and for highways are no more than a mortgage upon any asset for improvements, as the privilege for the advanced use of the money must be paid for. But it is often desirable and profitable, beyond the interest cost, to make the necessary improvements which may apply to the State highway as it does to corporations and individuals. However,

the price ultimately paid depends entirely upon the duration of the loan.

The tax on property, together with the equitable and properly adjusted increases in the taxes upon the road users, or the special automobile taxes, in all probability will not furnish sufficient revenue to meet the present state highway requirements. But the susceptibility of reasonably accurate estimation of the future receipts of the rapidly increasing revenues from the revised special automobile taxes, lends itself to the possibility of anticipation by short term bonds to supply the annual balance needed, until increased receipts from all tax sources meet the requirements. After this is attained the additional amounts should apply upon the retirements of the bonds.

In formulating such a plan an annual total expenditure should be found to control the annual bond issues, and insure the amortization of the bonds when they become due. It is not advocated here that any of such bonds should exceed ten years in duration, and it is believed that the revenues from the sources mentioned will be adequate for the economic State highway requirements, including the amortization of the short term bonds within less than a ten year period.

CONCLUSION.

It is generally conceded that there is much improvement now needed on the State highway system by those who are familiar with its present physical condition. This is very forcibly demonstrated by the frequent and insistent demands for such improvements to be made immediately.

From the statistics and deductions given here it is evident that if these improvements are made, and if Arizona is to have a State highway system, and avail itself of the Federal aid appropriations, that it must pay its proportion of the cost, and that the revenues as now provided are entirely inadequate.

The State is now face to face with an issue upon which procrastination can only result in economic waste and added financial burdens for the future. Other States have and are facing and meeting just such conditions. This cannot be done by hurriedly assembled legislation to be used as a medium of barter in the legislatures. Such finances can and must be provided, but serious consideration must be given and a careful analysis of all possible sources must be made if suitable provisions are inaugurated which will be practical, equitable and just. Is not this problem worthy of serious consideration and effort?

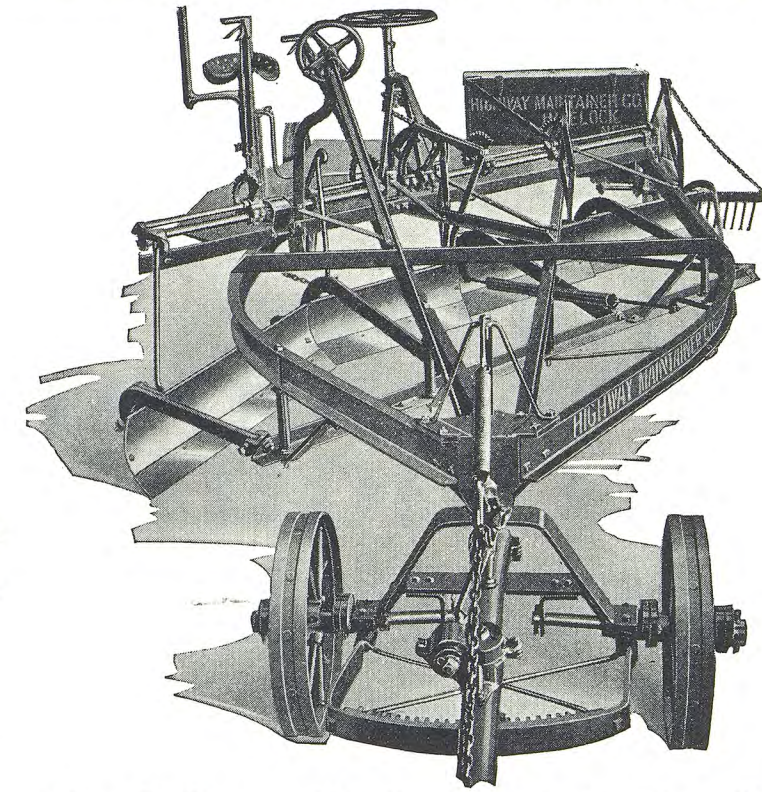
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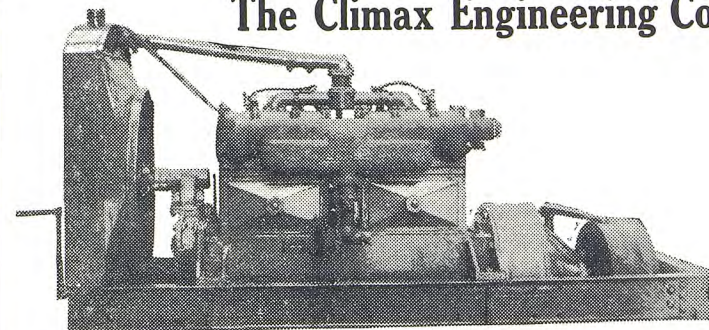
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