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RESUME OF COOPERATIVE ROAD IMPROVEMENT  
AND FUTURE POLICIES

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Again we meet in conference to measure critically our efforts of the year, and to plan more thoroughly, more understandingly, I trust, our future work together. With the deepest conviction I record my faith in the principles set forth in the Federal highway legislation founded on the certainty of the progress that is being made, and that will, in a larger way result from the new legislation.

That which has been accomplished through the cooperative efforts of the States and the Bureau, though it is of large consequence, in a comparative sense becomes but the background against which the new, the larger picture, of the future accomplishments, is projected.

Highway Construction Has not Kept Pace with  
Increase in Motor Vehicles.

We comprehend now as we have not understood in the past, the influence exerted upon our national life by transportation. It is the factor we find now interposed between supply and demand, between the starving thousands and food supplies, between producer and consumer. It is the factor whose absence separates, and whose presence ties together communities, States, and the nation as a whole. To supply adequate and increased transportation facilities is the motive which has influenced the American people to increase the number of motor vehicles in use since 1910 more than 1800 per cent. To provide the

complement of the motor vehicle, the improved highway, is the underlying reason why the larger funds have been made available from State and Federal sources. The proper combination of these two to serve a definite purpose in the nation's economy - this is highway transportation in the making.

More enlightening than any statistical quotation is the graphic picture of motor vehicle registration and highway funds. The widespread opposition to State programs of highway building during the years from 1910 to 1915 when motor vehicles were pyramiding at an unforeseen rate, the increased funds made available following the Federal Aid Act of 1916, the stagnation of actual expenditures during 1917 and 1918, the competition of industry of 1919 for materials, labor, and even more important, for rail transportation, - all these have played a major part in producing the wide difference between the improved highways demanded by 9,300,000 motor vehicles and the actual new mileage constructed.

The record for 1920 and 1921 is better, but let each State highway department make plain to the people of its State that for less than three years of the past five since large funds became available, have conditions permitted highway construction on an increasing scale. The facts which are true of construction are true also of maintenance.

The charted figures of expenditures are not exact, yet such error as exists lies principally in those funds which are raised and used locally and which do not reach the principal highways or result in more than haphazard repairs of local roads. For several years, since every State has had a highway department, the figures are substantially correct as to all funds which are a factor in this discussion.

The conclusions are self-evident:

1. During the period 1910-1921, the potential number of motor vehicles demanding highway service increased more than 1800 per cent; our actual expenditures for construction and maintenance increased about 400 per cent.
2. During the period 1910-1918, motor vehicles increased more than 1100 per cent, highway expenditures about 140 per cent.
3. During the period 1918-1921, motor vehicles increased about 700 per cent, and highway expenditures about 260 per cent of the 1910 figures.

But even these figures do not truly represent the differential between the demands for highway service and our actual production. Without attempting impossible refinements, if the cost index of 1918 be taken at two and that of 1910 at one, the actual increase in production of 1918 over 1910 was only 20 per cent, and if the index for 1921 is taken at  $1\frac{1}{2}$ , the actual increase in production of 1921 is only about 233 per cent over the 1910 figure. That is, taken as a national aggregate, the number of motor vehicles, all at least potential users of the highways in some degree, has increased in eleven years since 1910 more than eighteen times. Our greatest annual production of serviceable highways measured by the construction and maintenance expenditures has been not more than two and one third times the production of 1910, and it has been only within the past three years that the production has gone forward at a rate approximating the maximum.

It seems to me a duty as well as a very great privilege to bring before you this viewpoint, clearly defined against the background of

fact, of our progress in the development of highway transportation and of the relationship of the highway organizations, State and Federal, to this development.

Those who are a part of these organizations have the good fortune to be engaged in their chosen field when the greatest development that can ever come is taking place. The first two or three years of something more than a decade of major road building have passed. What has gone before has been largely preparatory - a period of organization. What will come after, - perhaps ten perhaps fifteen years later, - must by then be largely standardized, largely routine. The highway organizations that come after will not have such opportunities to render good, or, equally true, bad service, or be able to progress so far in a limited time in advancing highway engineering and administration, and in combining the motor vehicle and improved highways into scientific highway transportation.

This body of individuals and their associates will determine the efficiency of the highway systems of the future. Are you accepting the responsibility? Do you say to yourself, seriously and thoughtfully, "Upon my efforts in a large degree depend the future service the highways will render? If I yield to political pressure, to selfish interests, to some stubborn opposition, and fail to plan and to build the highways the people of my State ought to have, not only the present but succeeding generations must suffer."

This organization must awaken to the responsibility of placing before the public at large the real facts concerning highways and their relationship to highway transportation service. It must speak with

authority and emphasis. It must take upon itself the serious responsibility of leadership in directing public thought and education, not by the arrogant methods of the demagogue, but by the intelligent dissemination of facts and principles founded upon knowledge and experience. Nothing as big as the highway improvement program now actually under way is safe from attack through selfish, short-sighted or ignorant motives. Nothing will carry on the spirit and interest of the public through the long period ahead except an appreciation of, and a belief in, the integrity and usefulness of the results accomplished.

I do not wish to fail in showing my belief and enthusiasm in the possibilities and opportunities that lie ahead of the highway organizations. But I wish less to fail to place upon the conscience of each individual, regardless of the rank he holds, his responsibility. I want to see this organization accept the fact that the success of the future highway program is dependent upon the character and ideals maintained by the component forces, and that the failure of any one of these, Federal or State, reacts adversely upon the whole.

It is not possible to define for a definite period of time the exact progress made for the United States as a whole, for there is no fixed point common to all the States. Yet, from the standpoint of highway service, I list our outstanding progress for the past two years in this order.

1. The increased highway service made possible through the establishment of proper methods and the expenditure of more adequate funds for maintenance.
2. The increased highway service resulting from new construction.

3. The adoption and enforcement of better engineering standards.
4. The improvement in the administration of highways as a public utility.

Although the new construction has been very large, the mileage of highways of all types that have been brought to a serviceable condition or restored after a period of inadequate repair, is still greater. The outstanding results secured from the distribution of the large quantities of war surplus materials and equipment are found in the better and more extensive highway maintenance made possible. The Bureau of Public Roads estimates that by the end of the year war surplus to the amount of approximately \$150,000,000 in value will have been distributed for use in highway improvement.

Without the detail by states, as a national program the following shows the progress by years in placing new road work under way.

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Federal Aid Projects Under Construction &  
Completed by Calendar Years.

Calendar years:	Estimated Cost		Federal Aid		Miles	
	For Year	Accumulated	For Year	Accumulated	For Yr.	Accum.
Previous to & inc. 1918	\$ 18,088,000	\$ 18,088,000	\$ 7,568,250	\$ 7,568,250	1706	1706
1919	119,746,270	137,834,270	52,210,105	59,778,355	8071	9777
1920	212,292,815	350,127,085	89,904,752	149,683,107	11754	21531
To Dec. 1 1921	141,362,865	491,489,950	59,900,615	209,583,722	6986	28517

On November 1, 1921, our records showed the following mileage and costs of roads completed and under agreement. --

Mileage and Types Completed and Under Agreement  
November 1, 1921.

Type	Cost		Mileage
	Total	Federal Aid	
Graded & Drained	\$ 55,704,253	\$ 24,721,021	6,864
Sand Clay	22,226,362	10,495,172	2,696
Gravel	104,614,067	47,192,895	10,044
W.B. Macadam	22,452,779	9,729,201	1,291
Bituminous Macadam	41,412,557	18,646,066	1,323
Bit. Concrete	23,445,375	9,299,864	772
Concrete	180,021,245	75,600,279	4,654
Brick	22,039,845	6,925,483	444
Bridges	20,235,200	8,525,395	47*
Totals	456,151,663	211,135,376	28,135

\*Includes approaches.

The distribution of costs and types on a percentage basis for the projects summarized are as follows:

As of Nov. 1, 1921.

Percentages of Types - Projects Completed & Under Agreement.

Type	% Est. Tot. Cost	% Federal Aid	% Tot. Mileage
Graded & Drained	11.2	11.7	24.4
Sand Clay	4.5	5.0	9.6
Gravel	21.2	22.4	35.7
W.B. Macadam	4.5	4.6	4.6
Bit. Macadam	8.3	8.8	4.7
Bit. Concrete	4.7	4.4	2.7
P. C. Concrete	37.1	35.8	16.9
Brick	4.4	3.3	1.6
Bridges	4.1	4.0	0.2
	100.	100.	100.

In detail by States the mileages and costs by types are as follows: --

As of November 30 the records of the Bureau of Public Roads show that of the total allotments to the States under the two first appropriations totalling, \$266,750,000, there has been placed under agreement with the States Federal-aid funds in the sum of \$214,649,269, for 25,601 miles of highways. Of this mileage there has been completed the equivalent of 23,000 miles. You will note, therefore, that there now remains the balance of \$52,100,000 to be placed under agreement from the old appropriation. From the new Post road appropriation of November 9, there has been apportioned to the States \$24,375,000, available now, and \$48,750,000 available January 1, 1922.

As a foundation for the consideration of future policies under the new legislation, the Secretary of Agriculture has authorized and requested me to express clearly and without reservation his position that in the formulation of the new rules and regulations required, and in the administration of the law, the Department will request the counsel of this Association through its proper committee. The Secretary is greatly impressed with the possibilities and responsibilities of the new Act, and the truly cooperative spirit which must underlie the functioning of both the State and Federal organizations to make the greatest and surest progress.

The Act itself is remarkably comprehensive in defining and demanding a systematic plan, rational in its extent, for future highway development. None of us has had, or is ever likely to have a more serious responsibility than the one imposed of selecting the Federal-aid system to be composed of the most important highways, articulating not only within the States, but with the systems of the contiguous States. Here is an opportunity to do a big, basic work, such as comes to few in the



course of a life-time. The individual who fails to vision the importance of the task has no moral right to hold a position of authority in its performance. From a conception of highways as a purely local institution, a viewpoint we held for over a half century of our national life, we progressed to an acceptance of their importance to the State. This attitude persisted for another quarter of a century, until through the universal use of the motor vehicle, the transportation crises of a great war, the repeated threats of extensive railroad tie-ups, and the results already secured with Federal aid, we have, in the short period of five years, visioned our more important highways extended and interconnected to form a vast network, serving local, State and national traffic, only limited by the confines of the United States. This is the conception which has been written into the law, and which, because of the projected effect of that which is done now into the future, lifts the importance of this requirement, that is, the selection of the Federal-aid system, above any other principle or duty therein announced.

This work must not be hurriedly done, but because of the unemployment situation urgently demanding every possible relief that may be obtained through the highway program, projects will be approved without delay for the building of roads which the States and the district engineers of the bureau agree will lie upon the Federal-aid system. Each district engineer is fully informed as to the procedure for "interim" projects, which is so simplified that if important projects are chosen in good faith there will be no delay in securing favorable action.

The Department will do everything possible to expedite projects that can bring any relief from the unemployment crisis now, or that will

shorten the winter season of inactivity in road building in the northern States. The revised regulations will not be issued until they have been considered in detail with the representatives of the Association.

There can be no doubt as to the clear intent of the law to provide for a system of roads which shall include those which are now and which after improvement are to become the major traffic lines. The different stages of improvement to which the States have progressed, and all the variations between them of topography, of population distribution, of industries, of development of natural resources, must necessarily be reflected in the laying out of the system. These details must be worked out between the States themselves and between the States and the Bureau of Public Roads. Because of these wide variations, it is only possible to suggest some of the major considerations. We do not minimize the importance of the local traffic. To care for this class properly will, in general, always be the first objective of highway improvement. Our conception is rather that a choice of highways shall be made which, regardless of the order of improvement, will eventually join into a well conceived network crossing both county and State boundaries. Thus, while the immediate needs of a State or a district may determine priority of construction, each new link brings nearer the completion of the system as a whole.

In the western States the major lines will be largely fixed by topography, but by the same token, because long routes will be determined by single strategic points such as a mountain pass, it is the earnest hope of the bureau that the States affected will reach an agreement based on the future service that is to be rendered, not only to the local,

but also to the interstate and national traffic.

In the same spirit as that in which the United States by a courageous and generous policy has made possible definite progress in the limitation of armaments, to be followed by a consequent decrease of national expenditures for potential destruction, it is my sincere belief that the highway organizations will make possible through mutual agreement the consummation of a splendid national system of highways. This comparison is not lightly made, for the program ahead involves hundreds of millions of dollars, but with this essential difference, that this huge expenditure will be for a constructive, nation-building purpose. In the great agricultural districts where the major road development is still ahead, and where the connecting up of continuous routes will at the same time serve the local traffic equally with other projects, it is hoped that the States will recognize the duty imposed upon the Department, as expressed in the language of the law, "The Secretary of Agriculture shall give preference to such projects as will expedite the completion of an adequate and connected system of highways, interstate in character."

In the eastern States, some of them with a large mileage of improved roads, it might appear that the selection of a system is not so important, yet it seems to me that it is here that our greatest traffic problems lie. It will be a comparatively short time, because of new construction and better maintenance, until the trans-continental tourist will be provided with roads that are entirely serviceable throughout the seasons of the year when other conditions favor such travel. The really serious traffic problems lie around and between large centers of population. It must be remembered that for roads built previously many

engineering details such as alignments, widths and types were planned prior to the advent of the motor traffic, and for use of the slower, lighter, horse-drawn vehicles. The considerations of weight, speed, safety, and numbers, which now must govern design, had not yet become the controlling factors. The traffic lines are from town to town, and in general follow through the most congested parts of population centers. As some of the principles which we must properly work out, the following are suggested.

1. The development of parallel lines to divide heavy traffic through thickly populated districts.
2. The development of direct, short-mileage routes, although on these routes there may now be a less amount of improved roads than on routes now followed.
3. The building of inner or outer belt lines around congested centers.
4. The reconstruction of weak sections for heavy truck traffic.
5. The widening of main routes near the largest cities or between cities where the distance is short enough to carry uniform traffic.
6. Proper connections with the routes of adjoining States.

Possibly there are many questions as to the future surfacing policies. The changes in types and specifications which will be sought from time to time by the bureau will be based upon the more accurate knowledge which is being obtained rapidly through research and through the detailed studies of the behavior of modern designs under traffic. The requirement of the 18-foot surfacing is construed to mean that this is fixed as the minimum two-way road, where the construction is to be considered complete as first put down. This requirement will not preclude

the building of a narrower pavement in those districts where the traffic does not yet justify the two-way width. I am yet to be convinced that we may not properly build now in many sparsely populated districts one-half of the final width of pavement in order to complete mileage between points, if all the other work is done to provide for the full-width construction later.

To insure maintenance, the strongest possible requirements have been written into the law. The Department may not slight its responsibility, and the attitude of the whole national administration demands the utmost fidelity in the continuous upkeep of the highways built. The position taken by the President in his published addresses is well known. His statements to the Executive Committee of this Association, who counseled with him while the present legislation was under consideration, the statements of the Secretary of Agriculture in presenting the completed legislation to the President for his signature, all leave no possible doubt as to the position which must be taken by the bureau in enforcing the provisions as to maintenance.

We are not left in doubt as to the meaning of the word "maintenance". The law itself states, "the term maintenance means the constant making of needed repairs to preserve a smooth surfaced highway." Further, "such State shall make provision for State funds required each year \* \* \* for construction, reconstruction and maintenance of all Federal-aid highways \* \* \* which funds shall be under direct control of the State highway department."

The bureau earnestly hopes that it will not be required to take over a single mile of highway for maintenance, but the responsibility is imposed, and this provision of the law will be enforced to the letter. It

is a well established principle that proper maintenance will result only if some form of patrol is organized that placed direct and continuous responsibility upon someone for the condition of each mile of road, and the bureau will not consider that the States are properly living up to the requirements of this Act until such a system is established. I do not use "patrol" in the technical sense to distinguish it from the so-called "gang" system, but rather to designate the proper combination of patrol and gang systems to meet the particular conditions of each State. If there is one word to be accented more than any other, it is the term "constant", and to this should be added "automatic".

Personally, I am more than delighted that the sliding scale has been established to gauge the cooperation required in the public land States. I do not regard the establishment of this scale as a concession to the West. It seems to me to be only a proper and just recognition of the responsibility which the United States as a whole must shoulder - that of improving those highways necessary through the public lands whose future utility is problematic.

It is not necessary to touch upon all the points of the law. I have endeavored to accent the establishment of the system of Federal-aid roads as beyond all other principles, the most important written into this law. Of only slightly less importance is the requirement as to maintenance. While our thoughts may run to large construction programs, and the details of types and materials to be used, let it be remembered that we are providing highway service, and that the degree of service rendered is determined by the lay-out of the system, and by the condition in which every mile of road within that system is maintained constantly. Every

State which has established a State system of highways has found those highways almost immediately abandoned by the counties or other local subdivisions. I trust that each State in which highways are taken into the Federal-aid system, which have not up to this time been established as State highways, but have been under the jurisdiction of the local boards, will recognize this principle and make immediate plans under which all parts of the system will come under the jurisdiction and maintenance of the State without waiting for their construction.

The Bureau of Public Roads will proceed under the provisions of this Act on the assumption that each State will recognize the mutual responsibilities imposed upon the State and upon the Federal organizations, and will bring its operations at once into harmony with all the provisions. Also, that each State will in fairness recognize the greater responsibilities, restrictions and requirements imposed upon the Federal bureau. The bureau does not seek initiative. It does not seek to direct the States but to cooperate with them. There is now a plan of action for the guidance of both organizations that is so clear and so explicit that neither can escape the responsibilities imposed. The Federal requirements are fairly defined and will be sincerely and faithfully enforced. Among all of the 48 States, I know of no cases where it is not possible to cooperate fully -- certainly no physical or financial difficulties are insurmountable, - and if difficulties develop in the administration of this law, they will come from a wrong attitude of mind on the part of one or both of the organizations. We can and will eliminate any possibility of such only through a mutual consideration and respect each for the viewpoints and obligations of the other.

Referring once more briefly to the diagram, it is evident that a great misconception exists in the public mind as to the service which is being rendered by the highways. During the very long period that construction and maintenance were lagging far behind the increase in traffic, it is not to be wondered at that our highways showed a material depreciation. Through the war period, with the greatly increased use of heavy traffic units, particularly at just the seasons of the year when the road surfaces are carried on weakened subgrades, some roads did break up seriously. But this depreciation in general has not continued, and more than this, the effect of the lag in maintenance has been practically obliterated by the increased maintenance during the past three years, and by the reconstruction of the weaker sections, until our roads are in a far better condition today, than they have ever been in our history. This fact in itself controverts successfully any general accusations against our modern highways, of failure to carry the loads imposed. Think of the conditions in your own State. Are not the roads far better than they have ever been? And yet perhaps many of you feel that in some other States the roads have been and are depreciating rapidly. I have been unable to find such evidence. Roads that during the war, because of unusually heavy traffic and lack of maintenance, were seriously depreciated, have since been brought back into a state of better repair than ever. Cheaply constructed roads, -- roads that were built before there was any consideration of present-day traffic, -- are being held up through adequate maintenance on some of the heaviest traffic lines in the country.

The whole purpose of highway building is to make possible highway transportation, and the cost of the transportation must be reduced as low



as possible. Therefore, restrictive legislation which limits too greatly the loads to be hauled on the highways should not be tolerated, as it is against a proper public policy. Legislation regulatory of the traffic on the highways should take into account that there are many factors which govern the traffic depreciation of our highways. Laws which blindly fix some maximum weight to be moved on the highways may prohibit the really profitable traffic and allow less economical and more destructive vehicles to operate practically unchecked. Both weight and speed are major factors in their destructive effects upon the highways, but the distribution of the load, the relation of the sprung and unsprung weights, the tire equipment, -- all have an important effect. From the research of the past two or three years, and from the practical experience of the highway organizations, we are accumulating sufficient knowledge to engage understandingly on a determination of the character of legislation which will result in a sound public policy. The solution of highway transportation lies in the proper adjustment, no less of the motor vehicle to the road than of the road to the motor vehicle. I hope to see no conflict develop between the States in the determination of traffic regulations. Such would destroy in a large measure the utility of a Federal-aid system of primary highways. Rather, because the system will for a long time be non-uniform in its carrying capacity, much discretion should be allowed the State highway departments in determining the loads which are to operate upon specific sections of highways, and further, much discretion should be allowed the departments in the making of seasonal restrictions where climatic conditions are such that there are periods when the roads, normally fully capable of carrying heavy loads, are for a short time carried on uncertain subgrades. Here is an opportunity for the highway builder and the motor truck manufacturer to cooperate to serve

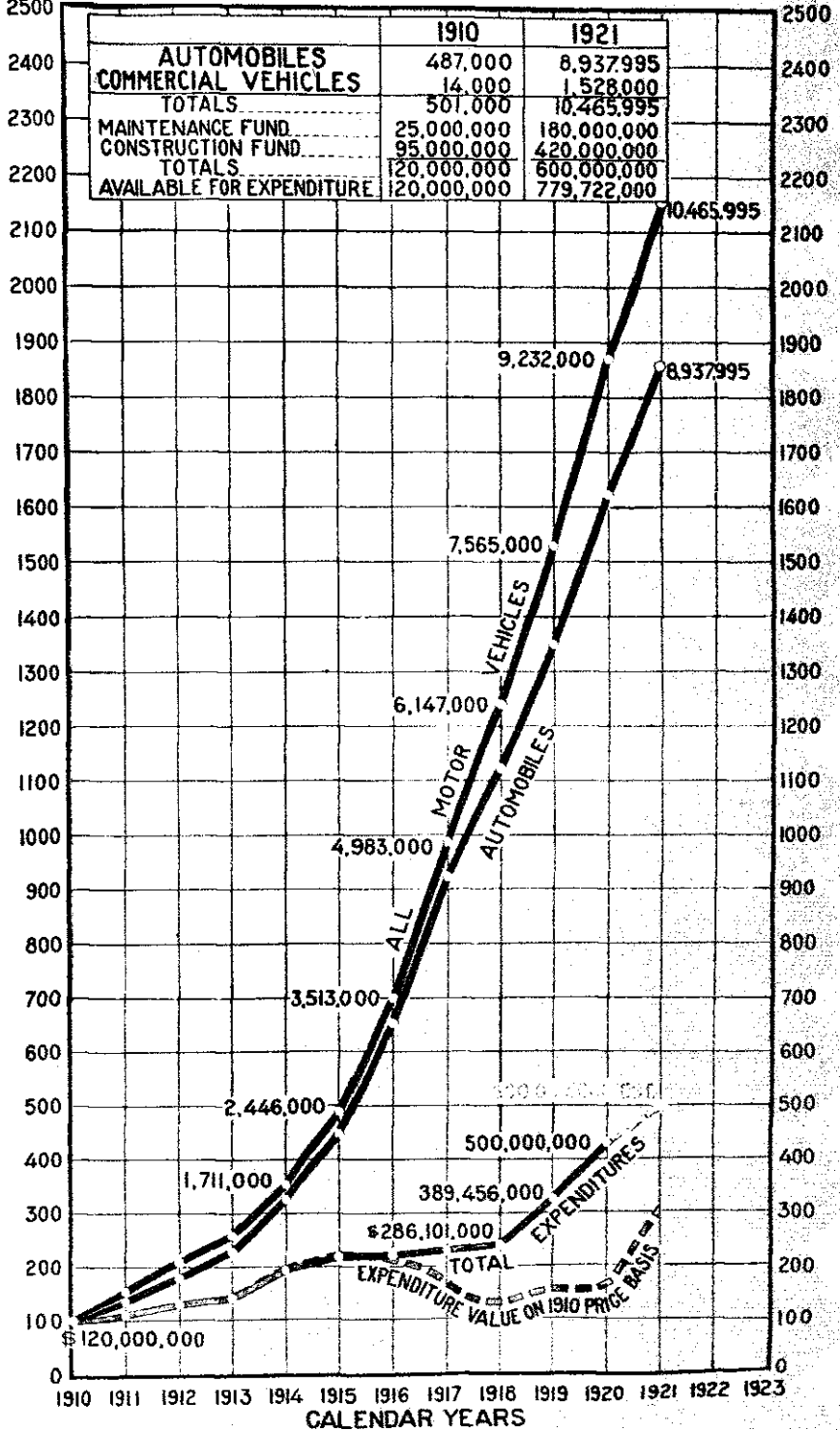
the public's interest.

One other point is causing the public much concern. It is often stated that highways have gone to pieces and must be re-built. Engineers have been prompt to develop methods of improvement which are salvaging practically the full value that was originally invested in the highways. For example, some of the older macadam roads in New York State, lightly built, which are now heavy traffic lines, have been widened by concrete roadways on each side, preserving a strip of macadam, say 6 feet wide in the center, thus giving a 24-foot usable surface by the addition of 18 feet of new construction. The remainder of the madadam width is scarified and the material spread to form a better base under the new construction. This is only one example. There are so many successful operations of like reconstruction that it may be taken as a principle that if roads are well maintained they may be reconstructed, when traffic becomes so heavy as to require it, in such a way as to preserve the major part of the investment and build it into the new highway as an integral part. It is my judgment that our heaviest traffic lines of the future will be developed in this manner, for we must recognize the principle that at the present time the big task is to get a mileage of surfaces that can be maintained under the traffic. Perhaps the principle that we should remember is to do the fundamental work right. Road surfaces are built for use and we must expect them to wear out. The one thing that we must do is to furnish highway service, for this is an essential factor of highway transportation, and we must rely on highway transportation to pay the major portion of the costs of the whole construction and maintenance program ahead.

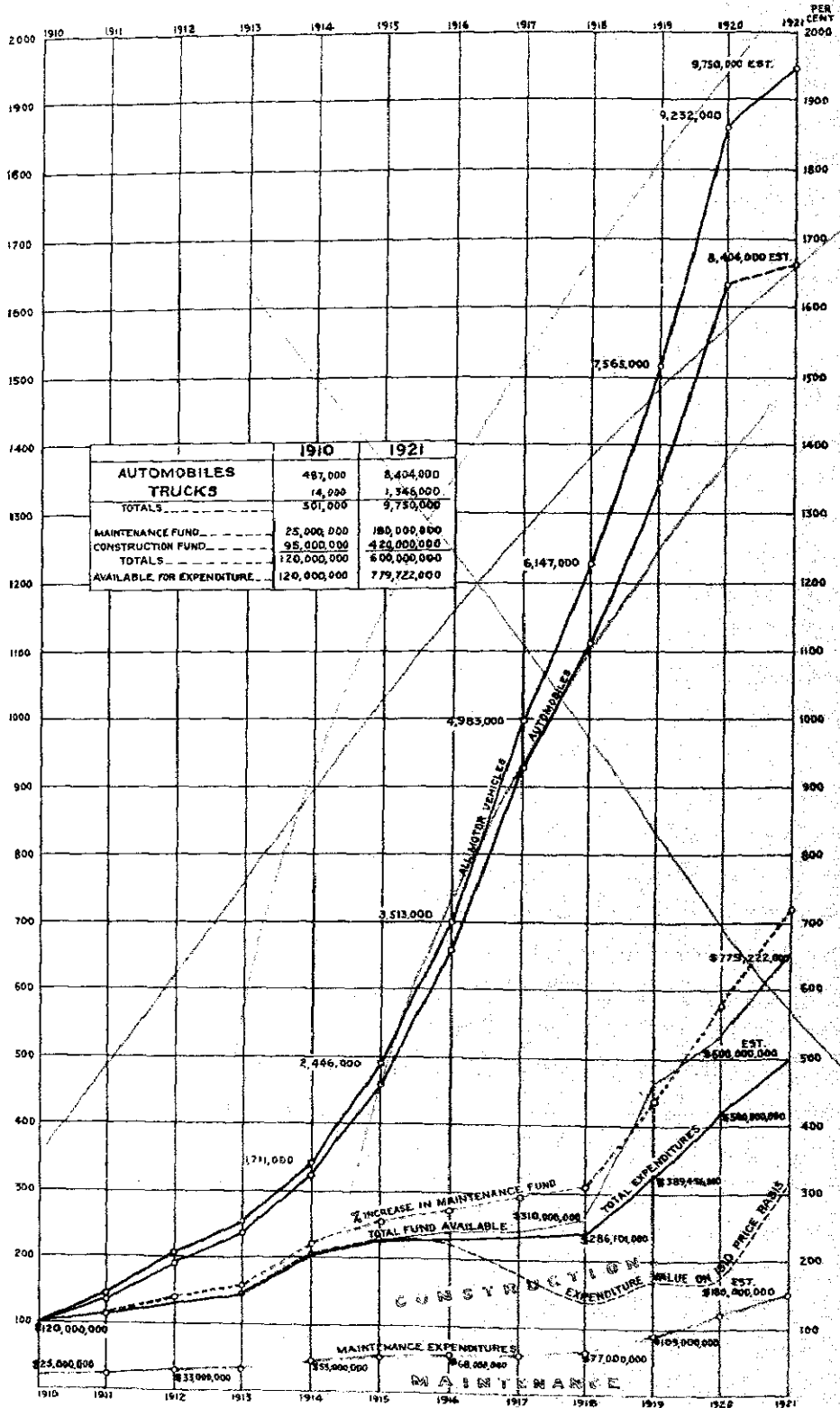
# MOTOR VEHICLE REGISTRATION AND HIGHWAY FUNDS

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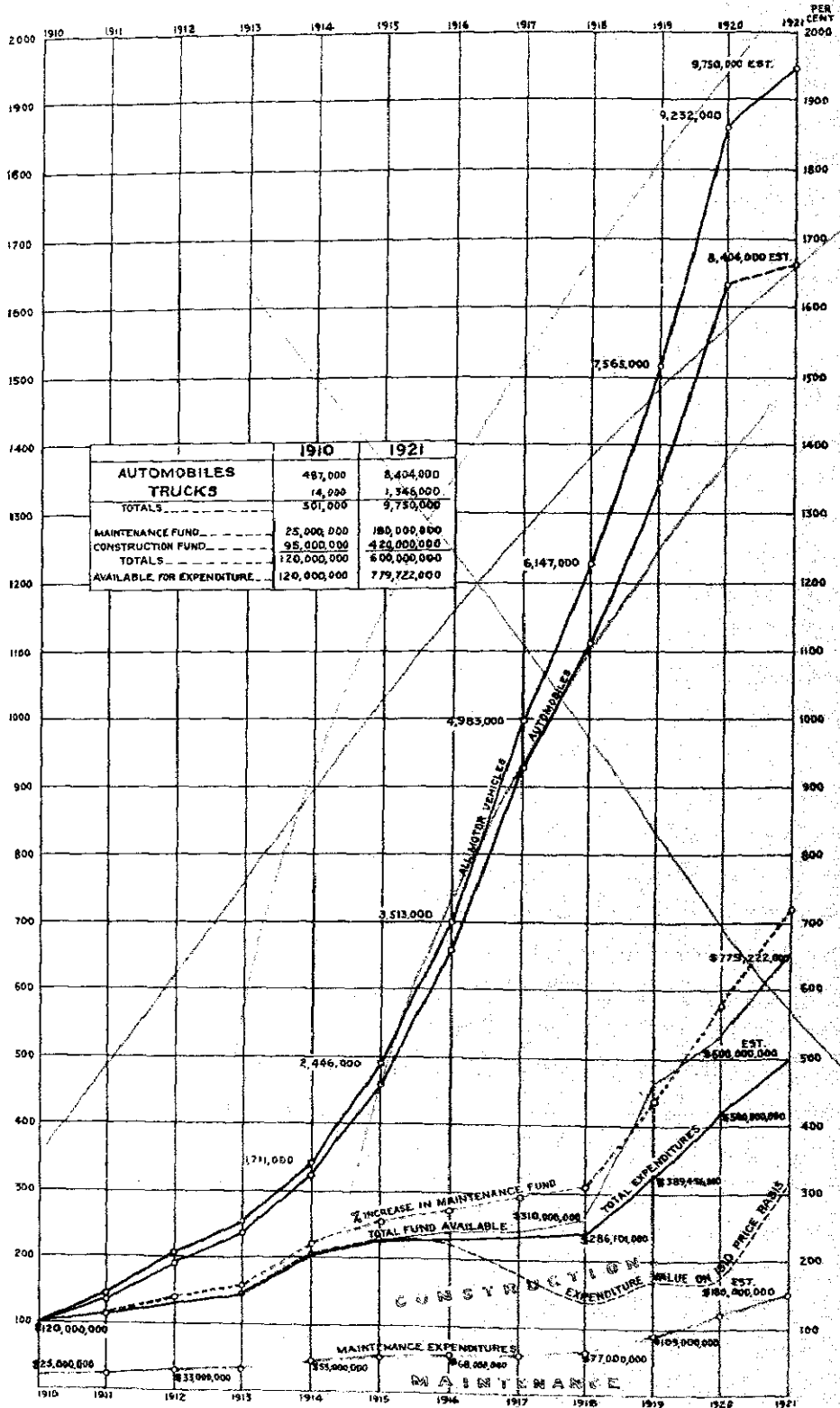
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# MOTOR VEHICLE REGISTRATION AND HIGHWAY FUNDS



	1910	1921
<b>AUTOMOBILES</b>	487,000	8,404,000
<b>TRUCKS</b>	14,000	1,346,000
<b>TOTALS</b> .....	501,000	9,750,000
MAINTENANCE FUND .....	25,000,000	180,000,000
CONSTRUCTION FUND .....	95,000,000	420,000,000
<b>TOTALS</b> .....	120,000,000	600,000,000
AVAILABLE FOR EXPENDITURE .....	120,000,000	779,722,000



States	20 - DEPOSED & DEATED			21 - SAUD OILS			20 - OILS			40 to 45 - MACHIN ( S. S. )			45 to 49 - MACHIN ( S. S. )		
	Net. Cost	Federal Aid	Mileage	Net. Cost	Federal Aid	Mileage	Net. Cost	Federal Aid	Mileage	Net. Cost	Federal Aid	Mileage	Net. Cost	Federal Aid	Mileage
ALABAMA	44,457.86	23,413.68	5.2	1,414,128.00	928,674.49	207.9	3,893,746.40	1,443,622.85	379.0	161,942.64	90,977.20	20.8	2,156,177.81	1,064,002.78	69.6
ALASKA	587,014.30	389,659.13	65.2				3,309,321.49	1,753,164.98	218.0						
ARIZONA							4,059,779.15	1,731,444.61	939.5	1,426,619.88	429,891.80	102.0			
CALIFORNIA	5,069,145.24	1,404,719.78	147.3				1,232,511.06	611,259.84	136.5				656,225.61	317,112.80	23.6
COLORADO	1,716,816.54	824,856.06	229.1	440,415.18	242,942.79	81.5	1,923,251.44	513,119.54	141.1				301,470.23	142,386.23	27.1
CONNECTICUT															
DELAWARE															
FLORIDA	177,289.96	89,249.98	12.2	272,424.52	136,164.41	34.1							126,342.14	64,171.60	25.1
GEORGIA	278,643.14	136,906.71	21.1	8,236,431.54	2,903,866.90	704.9	1,320,281.66	526,664.99	83.3	298,666.13	126,062.99	21.0	1,677,662.90	724,282.06	16.1
IDaho	5,007,649.81	563,259.64	100.6	136,475.45	99,644.22	18.6	1,820,232.69	1,496,217.49	257.6						
ILLINOIS	3,631,163.79	718,883.24	136.4										114,450.45	67,311.01	6.5
INDIANA	701,856.76	360,631.37	53.7												
IOWA	3,369,866.98	1,246,656.82	1,304.0				1,213,956.61	712,777.27	211.0						
KANSAS	2,704,250.70	161,180.96	124.8				2,604,787.66	1,602,697.31	113.1	164,250.68	62,276.18	6.4	1,266,829.91	661,199.61	50.6
KENTUCKY	1,169,170.17	1,073,089.04	146.2				331,640.64	169,120.46	21.9	1,622,219.47	776,603.77	59.6	2,640,264.97	1,118,976.36	67.0
Louisiana	23,454.24	11,224.46	7.2	126,119.11	51,704.11	2.9	6,242,251.62	2,471,333.44	471.1	129,147.22	52,170.11	3.2			
MAINE							856,337.25	177,677.23	16.0				2,468,129.13	1,271,721.12	79.4
MASSACHUSETTS							1,172,721.67	133,333.33	11.7				1,927.00		0.1
MICHIGAN													170,260.68	66,216.29	4.0
MINNESOTA	1,659,234.14	629,425.16	128.2				2,131,701.89	1,163,901.11	173.1	258,255.45	117,916.22	16.6			
MISSISSIPPI							1,626,222.09	2,463,851.46	469.6						
MONTANA	636,324.67	316,411.81	76.6				4,236,147.36	2,602,612.76	406.9	126,120.13	61,360.55	11.3	174,850.09	79,321.07	16.0
NEBRASKA	1,414,676.99	711,275.30	128.1				8,642,217.08	1,317,666.40	277.2	443,444.63	214,232.23	28.6	1,206,897.68	640,264.16	77.6
NEVADA	1,648,274.16	809,771.21	130.0				4,927,732.11	2,197,194.71	476.0						
NEW HAMPSHIRE	3,879,406.62	2,276,877.71	1,327.0	699,291.20	324,111.31	69.4	2,176,174.39	1,200,619.19	70.1						
NEW JERSEY	1,376,124.74	479,022.41	100.6				1,463,648.66	778,958.39	149.0				267,844.74	121,809.09	16.0
NEW MEXICO							1,131,473.13	161,626.87	41.7	247,844.74	121,809.09	16.0	277,841.18	131,709.09	16.0
NEW YORK	477,262.89	459,667.21	246.1				3,662,761.40	1,971,176.65	479.6				32,265.69	18,027.26	1.1
NORTH CAROLINA	231,432.19	262,170.61	45.4	6,426,036.54	3,112,244.22	223.8	211,745.06	974,344.23	136.6	420,980.31	112,134.46	13.2	8,460,363.41	3,647,936.60	210.2
NORTH DAKOTA	3,859,308.03	1,734,419.60	862.2	10,908.26	9,396.22	0.2	572,223.24	438,447.14	126.0						
OHIO	446,400.00	166,293.30	24.4				109,299.90	69,359.93	6.2	2,612,264.14	1,179,793.98	106.0	5,181,081.35	2,146,428.66	124.0
OKLAHOMA				40,664.47	20,662.70	1.6	2,678,271.61	1,142,761.12	154.2						
OREGON	1,248,441.40	1,072,146.72	161.2				4,272,812.35	2,131,460.37	257.3	360,155.43	172,966.98	26.6			
PENNSYLVANIA													414,611.00	240,343.90	20.7
RHODE ISLAND															
SOUTH CAROLINA	141,132.12	57,417.03	8.6	3,394,214.99	1,742,333.66	299.4	316,976.40	147,524.27	40.4						
SOUTH DAKOTA	921,871.38	461,939.47	132.3				2,229,436.65	1,070,642.74	133.3	116,464.28	56,217.46	10.7			
TENNESSEE	36,262.92	44,141.46	20.6				659,644.75	347,301.94	42.7	3,004,414.69	1,509,217.93	104.6	4,224,921.45	1,460,411.66	104.2
TEXAS	1,448,262.10	483,867.64	193.7	734,626.01	338,616.54	112.7	10,980,244.20	6,179,241.20	126.9	6,262,121.60	1,571,227.65	203.6			
UTAH	1,069,217.67	684,523.62	100.0				869,317.66	426,114.77	79.6	61,260.44	30,672.22	7.2	306,921.66	123,142.00	7.0
VERMONT							1,200,619.22	620,800.79	49.2				20,131.66	14,398.60	1.9
VIRGINIA	27,831.47	13,915.73	5.7	765,222.52	378,364.39	126.0	514,366.29	264,337.66	46.0	1,438,900.02	64,243.20	131.2	1,509,640.17	976,933.23	62.9
WASHINGTON	666,006.61	364,846.96	17.0				3,202,240.42	1,560,344.71	234.1						
WEST VIRGINIA	1,715,231.51	205,766.85	129.7				124,465.30	83,970.70	11.5	276,436.00	181,862.98	17.4	1,370,422.41	644,431.88	47.7
WISCONSIN	2,879,049.66	668,633.61	243.9	434,626.23	179,538.15	28.3	3,663,433.23	1,499,411.24	201.0	79,136.68	37,364.89	12.7	264,368.93	170,299.70	13.0
WYOMING	3,614,127.12	1,737,397.57	43.4	229,575.01	114,289.99	22.5	764,691.92	370,238.52	114.8	33,464.43	17,827.23	2.1			

TOTAL	20 - DEPOSED & DEATED	21 - SAUD OILS	20 - OILS	40 to 45 - MACHIN ( S. S. )	45 to 49 - MACHIN ( S. S. )
Net. Cost	57,749,243.78	24,721,037.92	1,396.9	1,149,872.46	1,041,171.20
Federal Aid	11.7	11.7	1.9	212	810
Mileage	8,144	3,690	8,200	3,080	4,171

