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The Financing of Highways

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PRINCIPLES and concepts pertaining to the public welfare formulate slowly, change more or less constantly and move slowly across the pages of history. There are at any time in more or less common use both principles that will endure and those that are temporary and will be abandoned. Examined in retrospect, the financing of highways through legislation presents a most interesting parallel to the social fabric of the time, with this modification that seems to be common to the Anglo-Saxon methods in governmental affairs: certain concepts persist in the laws long after their real abandonment by the public for the reason they no longer serve. Sound principles of legislation have an unceasing conflict with political expediency. For more than three hundred years the English people have been trying to solve this question of highway finance always facing this conflict, always retaining much legislation that is bad along with the good, and always failing in their laws to reach far enough to overtake the needs and demands of the public. Perhaps this will always be.

Certainly just now the subject demands the most serious attention. The facts are presented as they now exist with sufficient comparison to point present tendencies. Some are good, some most discouraging. It ought to be apparent, if in seventeen years we have added new highways to the extent of more than three times the mileage of highways surfaced in the same period, that as a nation we are "tilting with wind mills" unless we classify the tremendous mileage, 2,941,000 miles, in accord with its relative service and select for the better classes of improvement only a limited percentage which serves the greatest number. This is the basic principle of the Federal Highway Act which limits the Federal aid highway system to 7 per cent of the total road mileage. It is the basic principle of many state laws which define and limit the state systems. This concept of nation-wide and state-wide highways lifts the main traffic lines out of the realm of the local authority. They are the responsibility of the state and of the nation, and one of the worst types of financing now existing is the use of local funds for improving these main arteries. Counties and improvement districts have impoverished themselves to improve roads which ought to be improved from state and Federal funds.

The Roads That Serve the Traffic

From another angle, by and large, traffic concentrates on a relatively small percentage of our public highways. Outside the area of the week-end traffic around the large centers of population, this relatively small percentage will carry, when improved with a suitable type of surfacing, the flow of traffic satisfactorily. They answer all purposes. They are the main market roads. They serve the tourist. They are trans-state and trans-nation. They may be called motor highways. Ten per cent of the highways of any fully developed state will include the most important, and 20 per cent will reach about all that will, for a long period, have any claim upon the title

of motor highway. Because tributary roads have a few motor vehicles operated over them from the few farms served to the main road, they are not motor highways. They are not traffic flow lines. These roads serve the land, not the traffic, and this class of highways at this time aggregates probably 80 per cent of the total mileage.

If, as the evidence plainly points, the tendency is to make the road user pay progressively increasing charges in license fees and gas taxes for road improvement, then certainly such revenues ought to be concentrated upon those roads which can be properly classed as motor highways. Further, with the great demands for improved roads of more than 15,000,000 motor vehicles *now* operating, all of the revenues from the motor vehicle ought to be used for highway purposes. Both of these principles are being violated in numerous states.

Perhaps one other major principle ought to be recorded here. While there have been large additions made annually to the mileage of surfaced roads and other betterments in the way of widening narrow roads, improving alignment, eliminating grade crossings and such, the factor that probably has contributed the most to the satisfactory use of large mileages of highways is the maintenance programs of the state highway departments. Common consent will concur that the greatest loss in the past has come from a failure to maintain. With few exceptions the state highway departments that have been entrusted with the responsibility are cautiously conserving the investment they are making by careful maintenance.

HIGHWAY FUNDS AND THEIR ADMINISTRATION

Yet as is pointed out, about 60 per cent of the total highway expenditures are still under control of the local organizations, mainly the counties, and it is this expenditure that is drawn largely from property taxes. At a time when great complaint is heard over land taxes, the fact should not be overlooked that so much of these taxes as are used for roads are levied and expended in the main by local boards for local road purposes. This is not a criticism. These roads are to a large extent land service roads and are properly a charge upon the whole community, urban and rural, but there is great need for better administration of these funds.

The proper financing and administration of the vast mileage of secondary roads under local authority is today progressing toward satisfactory solution slowly and uncertainly. An extension of supervision by the trained organizations of the state highway departments would accomplish much progress to better this situation.

THE COUNTRY'S SURFACED ROADS

The Bureau of Public Roads makes an investigation at five-year intervals to obtain complete data relating to the total highway mileage of the several states, the number of miles which are surfaced and the types of surfacing, and expenditures and revenues for highway purposes. The latest figures compiled are for the year 1921. At the end of that year there were 2,941,294 miles of highways in the United States, not including city streets and streets within incorporated municipalities. Of this total mileage 387,760 miles, or 13.2 per cent, were improved with some type of surfacing; 2,553,534 miles, or 86.8 per cent, were known as ordinary earth or dirt roads. During the year 1921, 41,171 miles were added to mileage of surfaced roads, and during 1922 it was estimated that about 35,000 miles were surfaced. This does not mean that the mileage of earth roads was

decreased in each of these respective years by this addition of surfaced road mileage, because in many cases roads which had a gravel surface, for example, were improved by applying a higher type of surface such as macadam or concrete.

In the following table are set forth by divisions of states the total mileages of all types of roads, the number of miles of surfaced roads and the mileages of earth roads and their percentage relationship as reported for January 1, 1922.

The highest percentage of surfaced mileage is found in the East North Central states, where 30.1 per cent of

DIVISION	TOTAL MILEAGE OF ALL TYPES	SURFACED MILEAGE		EARTH ROAD MILEAGE	
		Miles	Per Cent of Total	Miles	Per Cent of Total
New England	83,295	17,725	21.3	65,570	78.7
Middle Atlantic	186,935	38,946	20.8	147,989	79.2
East No. Central	412,753	124,298	30.1	288,455	69.9
West No. Central	750,820	30,223	3.9	720,597	96.1
South Atlantic	365,567	61,178	16.8	304,389	83.2
East So. Central	242,745	41,478	17.1	201,267	82.9
West So. Central	416,617	23,986	5.8	392,631	94.2
Mountain	306,382	15,539	5.1	290,843	94.9
Pacific	167,180	34,337	20.6	132,793	79.4
Total	2,941,294	387,760	13.2	2,553,534	86.8

the total highway mileage has been improved with some type of surfacing and only 69.9 per cent of the highways are earth roads. In the West North Central section, on the other hand, the relatively smallest surfaced road mileage is found; only 3.9 per cent of the roads are surfaced and 96.1 per cent are earth roads. In this connection it should be borne in mind that this section of states contains approximately 25 per cent of the country's total highway mileage.

The country's surfaced mileage of 387,760 miles is composed of the following types:

	MILES	PER CENT
Sand-clay	63,339	16.3
Gravel	199,899	51.5
Macadam	87,609	22.6
Concrete	15,611	4.0
Bituminous Concrete	4,978	.3
Brick	3,333	.9
Miscellaneous	12,991	3.4
Total	387,760	100.0

PROGRESS IN HIGHWAY IMPROVEMENT

Since the advent of the use of the motor vehicle great progress has been made in highway improvement. In 1904, the first year for which highway data were obtained by the Bureau, the total mileage of our rural roads amounted to 2,151,379 miles, of which only 153,530 miles, or 7.1 per cent, were improved with some form of surfacing. Thus, while 789,915 miles had been added to our total highway system during the 17 years from 1904 to 1922, only 234,230 miles had been added to our surfaced mileage during the same period. In other words, the mileage added to our highways was 3½ times

as great as the mileage added to our surfaced roads. The actual amount of highway improvement which was accomplished during these years, however, is much greater than the above figures would seem to indicate. A large mileage of low-type roads has been replaced with types more suitable to the present traffic requirements. Light and narrow bridges have been replaced with wider and more substantial structures. Old narrow roads have been widened and straightened. In 1904 the highest type of surfacing found on our rural roads was water-bound macadam. At the beginning of 1922 a total of more than 25,000 miles of our rural roads were improved with high-type pavements.

But even when full account is taken of all these improvements and betterments it is still clearly evident that our highway improvements have not kept pace with the increase of the traffic on our highways. In 1904 our highway traffic was almost entirely horse-drawn. Prior to 1904 not more than 40,000 motor cars had been manufactured in the United States. A single factory now produces more cars in a single week. On July 1, 1924, the total motor car registration of the country amounted to 15,552,077 as compared with a registration of 13,002,427 twelve months previous.

MAINTENANCE OF RURAL HIGHWAYS

The construction and maintenance of our rural public roads is carried on by many varied and independent units, such as the states, counties, towns, townships and road districts. The total disbursements during 1921 by all of these governmental units for all highway purposes, including interest and payments on highway bonds, amounted to $1,036,587,772. This amount spent on our highways in a year was substantially the same amount the railroads of the country were entitled to earn as profits under the Transportation Act according to the Interstate Commerce Commission. Of this total amount paid out for highways $626,965,373, or 60.5 per cent, was expended for work classed as construction; $248,593,169, or 24 per cent, for work classed as maintenance; $36,031,353, or 3.5 per cent, for administration and engineering; $89,280,946, or 8.6 per cent, for the payment of principal and interest on highway bonds, and $35,716,931, or 3.4 per cent, for the purchase and repair of machinery, equipment, the purchase of quarries, gravel pits, and for all other items or parts of items not properly chargeable to construction, maintenance or administration.

Of the grand total disbursements of $1,036,587,772 for 1921 there was expended $413,241,662 by or under the supervision of the respective state highway departments; $623,346,110 was paid out by the various local counties, towns, townships and districts without any supervision by the respective state highway departments. These expenditures are set forth in detail in the tabulation on the following page.

It is a noteworthy fact that approximately 60 per cent of the money spent on the rural highways of the country was spent by local communities and upon highway work which was not under the supervision of state highway departments.

The gross total of the funds actually made available for all rural highway purposes during the year 1921 amounted to $1,149,437,896. Of this total, $438,109,273, or 38.1 per cent, was secured from the sale of bonds; $415,680,010, or 36.2 per cent, from general taxes; $122,626,166, or 10.6 per cent, from motor vehicle fees and gasoline taxes; $79,333,226, or 6.9 per cent, from Federal aid payments received by the various states; and $93,689,221, or

LOCAL HIGHWAY EXPENDITURES, WITHOUT STATE SUPERVISION

Construction, roads and bridges	$316,225,470	
Unclassified construction (probably largely maintenance)	18,766,090	
Maintenance, roads and bridges	174,066,423	
Engineering and administration	17,149,498	
All other items	97,138,629	
Total		$623,346,110

HIGHWAY EXPENDITURES BY OR UNDER SUPERVISION OF STATE HIGHWAY DEPARTMENTS

Construction, roads and bridges	$291,973,813	
Maintenance, roads and bridges	74,526,746	
Engineering and administration	18,881,855	
All other items	27,859,248	
Total		413,241,662
Grand total		$1,036,587,772

8.2 per cent, from various other sources, the chief of which was from appropriations or allotments from general funds originating from two or more sources. It is estimated that approximately one-half of this unclassified income originally came from general property taxes.

METHODS OF FINANCING THE HIGHWAYS

In every state except North Dakota a part of the funds expended on roads was obtained from the sale of bonds. Arkansas, West Virginia and Louisiana obtained respectively 70.2 per cent, 69.1 per cent, and 68.1 per cent of their total road income from bonds while, on the other hand, New Hampshire and Connecticut secured only 2.8 per cent and 3 per cent of their total highway revenues from bonds. Certain groups of states relied largely on bonds for their highway funds. Thus, the four states of Arkansas, Louisiana, Oklahoma and Texas, comprising the West South Central group of states, secured 59.3 per cent of their total highway funds from this source. At the other extreme we find the six states, forming the New England group, which received only 12.7 per cent of their total highway funds from the sale of bonds.

At the end of 1921 the total amount of highway bonds outstanding was $1,222,312,300. Of the whole issue 72 per cent are represented by local bonds, the obligations of counties, townships, and districts; 28 per cent are the obligations of state governments. Twenty-seven of the states have no state highway bonds outstanding. In those states, with the exception of Vermont and North Dakota, the outstanding highway bonds were all issued by local governmental units. The United States Census Bureau reported the total amount of bonds issued for all purposes by states, counties, and all other subdivisions to have been $8,695,906,000 at the end of 1922. Comparing this with the outstanding highway bonds at the close of 1921 we find that but 14 per cent of the total indebtedness of the states, counties and other political subdivisions was represented by local and state highway bonds.

General property taxes contributed $415,680,010 to the year's total highway income. As has already been indicated, $93,689,221 was derived from miscellaneous sources, a large part of which was traceable to taxes although

appropriated from general funds in state treasuries. For our present purposes we may consider both of these items as having been payments made by the general public and may, therefore, be regarded as taxes, although a small portion was derived from other sources which could not be clearly segregated. The sum of these two items, $509,369,231, or 44.4 per cent of the total highway income for 1921, may be regarded as the direct contribution of the public through taxes towards the cost of highway construction and maintenance and towards the principal and interest payments of the bonds outstanding. The per capita tax burden for highway purposes was for that year $4.83. The total taxes, fees, etc., in 1921, amounted to $38.80 for the country as a whole. Therefore, the highway tax burden was about 12 per cent of the total per capita tax burden.

FEDERAL AID FOR HIGHWAY CONSTRUCTION

Federal aid legislation for highway construction in co-operation with the several states had its beginning in 1916 when an appropriation of $75,000,000 was made for this purpose by Congress. The law provides that such Federal aid funds be apportioned among the states in the following manner: one-third in the ratio which the area of each state bears to the total area of all the states; one-third in the ratio which the population of each state bears to the total population of all the states, as shown by the latest available Federal census; one-third in the ratio which the mileage of rural delivery routes and star routes in each state bears to the total mileage of rural delivery and star routes in all the states. In approving projects to receive Federal aid under the provisions of the Act, preference is to be given to such projects as will expedite the completion of an adequate and connected system of highways, interstate in character. The amount paid as Federal aid to any state on account of a definite project of highway construction must not exceed 50 per cent of the total estimated cost thereof, except in case of any state containing unappropriated public lands exceeding 5 per cent of the total area of all lands in the state, when the Federal aid payment on such projects shall not exceed 50 per cent of the total estimated cost thereof, plus a percentage of such estimated cost equal to one-half of the percentage which the area of the unappropriated public lands in such state bears to the total area of such state. This provision was written into the law to make it easier for those states to finance their share of highway construction costs in which the Federal Government owned large areas of public lands. The maximum amount which the Federal Government can contribute in ordinary cases is limited to $15,000 a mile. Before any aid can be obtained the Federal Government's approval must be secured as to the type of road and width of construction of the proposed project. Consideration is given to the type and character which shall be best suited for each locality and to the probable character and extent of the future traffic. One of the most important sections of the Act provides that before any project shall be approved for any state, such state must make provisions for the construction and maintenance of Federal aid highways by or under the supervision of a state highway department. Unified and responsible control is thereby insured.

For the period ending June 30, 1924, the Federal Government expended as aid for highway construction $353,082,098. While it is not possible to trace an individual dollar's passage through the Federal treasury, it may be pointed out in this connection that the internal

revenue collected as taxes on the sales of motor vehicles and accessories and on passenger cars for hire amounted to a total of $749,040,569 up to June 30, 1924. The users of motor vehicles, therefore, contributed more than twice the amount that the Federal Government paid out in aid toward highway construction. The Federal aid payments and the Federal motor vehicle taxes are shown by years in the following tabulation:

YEAR ENDED JUNE 30	AMOUNT OF FEDERAL AID AND FOREST FUNDS EXPENDED	INTERNAL REVENUES COLLECTED FROM MOTOR VEHICLES, ETC.
1917	$49,279	.....
1918	837,176	$23,981,268
1919	3,995,102	49,341,990
1920	25,168,794	145,963,034
1921	63,533,861	117,322,741
1922	93,924,885	106,219,381
1923	77,173,116	146,183,607
1924	88,399,885	160,028,548
Total	$353,082,098	$749,040,569

SOURCES OF HIGHWAY FUNDS COMPARED

That there is a marked tendency to collect a larger proportion of highway funds from the owners and users of motor vehicles is noted in analyzing the various sources of these highway funds and comparing them with similar sources in previous years. A survey of highway revenues and expenditures for 1914 showed that, out of a total highway income of $240,262,784, the collections from motor vehicles amounted to $12,382,031, or 5.1 per cent of the total. In 1921, seven years later, the motor vehicle owners and operators paid $118,942,706 in motor vehicle fees and $3,685,460 in gasoline taxes, a total of $122,626,166, or 10.6 per cent of the total income for highway purposes. A similar compilation of the payments made by owners and operators of motor vehicles for licenses and permits in 1923 shows a total contribution on their part of $188,970,992. In the same year the taxes upon the sale of gasoline levied by 35 states amounted to $36,813,939. The motor vehicles, accordingly, contributed a total of $225,784,931 during this last year when complete data were available.

It is estimated that the highway income and expenditures for 1923, based upon information thus far obtained, were substantially the same as for 1921. Construction and maintenance programs proceeded at about the same pace. Upon this assumption, therefore, it appears that in 1923 the contribution of the motor vehicle towards the total highway income was about 19.5 per cent. This shows a very substantial increase in the relationship of motor vehicle revenues to the total highway income, as compared with 1914, when it was only 5.1 per cent. Between 1921 and 1923, it is observed, the ratio almost doubled. This increase in the contribution made by the motor vehicle is accounted for by the increase in the total number of vehicles registered and in the payment per vehicle, which rose from $11.70 in 1921 to $15 per vehicle in 1923.

As long as the emphasis in licensing automobiles was placed upon the state's police power a flat charge of a certain amount upon the registration of the car was deemed sufficient. The fee in most cases was nominal and was not regarded as a revenue-producing measure. When, however, the licensing of motor vehicles and the collection of registration fees began to be related to the problem of highway construction and maintenance, the revenue aspect was brought into prominence, and as the rate was advanced, classification systems were introduced which would

take into account both the extent of the damage to the road resulting from the operation of a heavy and high-powered car over the highways and the owner's ability to pay. In 19 states passenger automobiles are licensed and fees charged on the basis of rated horse power; in 7 states the weight of the vehicle determines how much of a fee is collected; in the rest of the states combinations of these two methods are followed or other schemes of classification have been devised which are intended to produce similar results. In making charges for the licensing of motor trucks most of the states base the fees upon capacity and gross weight.

In 1923, of the $188,613,074 collected by the states as motor vehicle license revenues ($357,918 collected by the District of Columbia not included) $153,226,636, or 81 per cent, was used by highways by and under the direction and supervision of state highway departments. In only 13 states were any substantial amounts apportioned among the counties. The 19 per cent which was not used by the state highway departments includes, in addition to the funds turned over to local units, the expenses of registering cars and the issuing of licenses and other administrative expenses of similar character.

At about the time when most of the states had succeeded in abolishing the old turnpikes and toll roads, by purchasing them at agreed prices or through condemnation proceedings, and had declared them "free" highways, a movement started which in essence was an extension of the toll principle to all highways of a state brought about through the enactment of laws providing for a tax upon the sale of gasoline. This year, 1924, there are 35 states and the District of Columbia which are collecting this kind of a tax; these states have a rural road mileage of 1,954,886 miles comprising 66.5 per cent of the total rural highway mileage of the country. The rates range from 1 cent to 4 cents a gallon; 8 states charge a 1-cent tax; 15 states a 2-cent tax; 2 states a 2½-cent tax; 9 states a 3-cent tax; and 1 state a 4-cent tax. The total gasoline taxes collected in the six months ending June 30, 1924, amounted to $32,430,410. It is estimated that for the whole year of 1924 close to $75,000,000 will be derived from this source. The disposition of the gasoline tax differs from that of the motor vehicle license fees. In 1923 only 58.5 per cent of the total gross gasoline tax receipts was applicable to highway work by or under the supervision of state highway departments. There was a greater tendency for the states to share these newly discovered revenues with the counties and to divert them for other purposes than in case of the motor vehicle license fees.

HIGHWAY COSTS

The cost of highway construction may be divided into (a) cost of enduring features and (b) cost of perishable features. When roads are built with accepted standards of grade, alignment, drainage structures, and foundations, the cost of such elements may be charged for enduring features. It is manifestly poor policy to build an expensive surface or a relatively long-lived surface on defective grades with poor alignment, or where the drainage features are short-lived and temporary. Construction should be so adjusted to the service needed that its purpose is accomplished without waste. Highways constructed with borrowed money should be strictly maintained. This is no less true for all improved roads. Maintenance is necessary in order to insure to the community the maximum economic service by the road and also

to preserve the investment. In many cases it has not been customary for officials to face frankly the cost of maintenance and repair on bond-built highways at the time when the bonds are issued and before construction begins. Provision for meeting the interest payments and for retiring the bonds as they become due is often the maximum consideration given to roads constructed with bond issues. This is perhaps the gravest defect in the project of building highways by issuing bonds. This repair and maintenance charge is inevitable, and since the earning power of a road in reducing transport costs tends to increase with the degree of the maintenance, it is sound business to face the repair and maintenance costs in the beginning.