1926

# Highway financing in Massachusetts

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by

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Thesis submitted for the degree of

Master of Science

Massachusetts Agricultural College

Amherst, Massachusetts

May 1926

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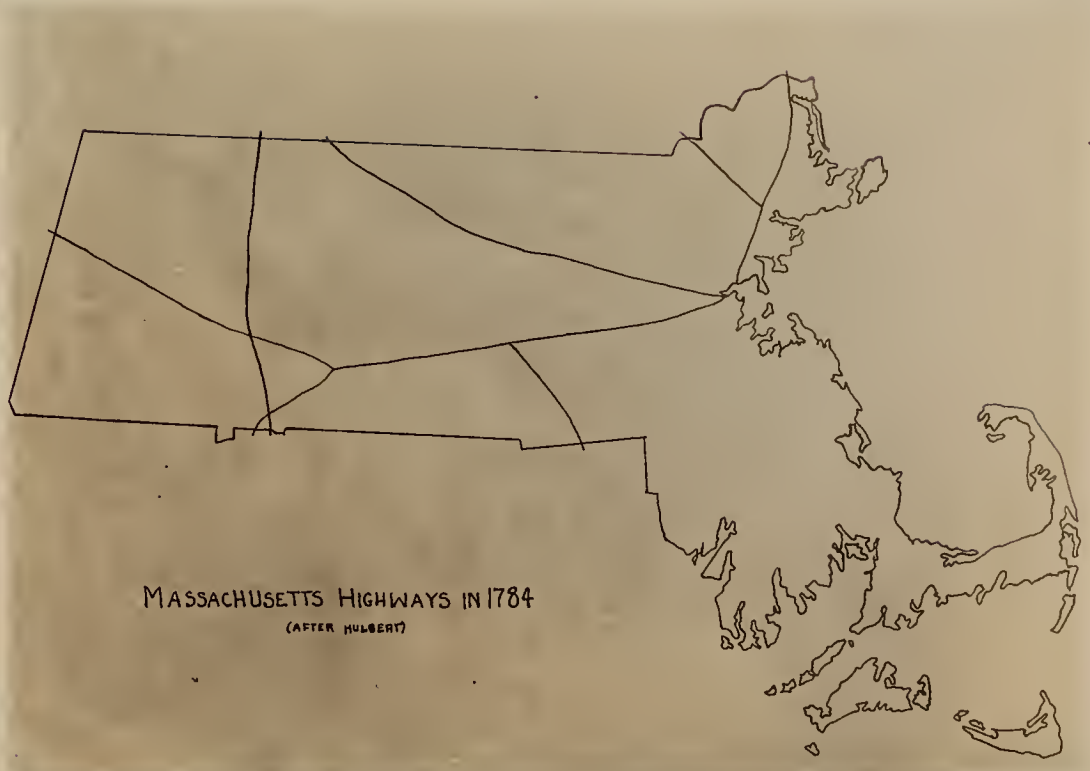
I. HISTORICAL SKETCH.

An expenditure as large as the annual highway expenditure in Massachusetts presents a real financing problem to the people of the state. Our highway costs have increased steadily since 1909, largely because improved roads, of the type now constructed, are built at great expense for substantial foundations and for a surface thick enough to carry the automobile traffic which a modern highway is forced to bear. Automobile traffic, however, has only been important since 1900, while roads have been used for almost three centuries in many parts of the state. These roads had to be paid for, and it is the purpose of this historical sketch to indicate what methods were used in highway financing at different times in the development of our highway system.

The Colonial Period, which extended roughly from 1625 to 1800, was characterized by the laying out of the first highways, most of which were planned to follow the Indian trails which had been used before the settlement of either the Plymouth or the Massachusetts Bay colonies. Some of these trails or "traces" were so frequented that they were actually sunk below the level of the adjoining ground;(1) and it is these trails that are followed by roads today; - the Mohawk Trail, the "Coast Path" from Boston to Plymouth, the Bay Road, and the old Connecticut Path (through Wayland, Marlboro, Worcester, Oxford and Springfield).

It was essential that the early settlers should be able to move about with some degree of ease. They wanted to be able to help each other in case of Indian troubles or other domestic matters, such as meagerness of the food supply, and to communicate with each other



MASSACHUSETTS HIGHWAYS IN 1784

(AFTER HULBERT)

socially. Hence we find that very early, the movement of people in and from colony to colony was fairly constant. Some of the colonies began to provide for somewhat better transportation facilities by simple means. Plymouth, for example, ordered all creeks to be bridged by felling trees across them.(2)

The first enactment of highway legislation in what is now the United States took place in 1627, when the Plymouth Colony provided "that the old pathways be still allowed and that every man be allowed a convenient way to the water whereseever the lot fall".(3) Road making, as referred to in colonial literature, meant planning the course of the new road, removing brush, rocks and fallen timber, notching the trees, and sometimes laying logs "over all the marshy, swampy and difficult dirty places".(3a) These logs were then covered by a two or three inch layer of dirt. Very few of the roads were built in the last mentioned fashion, because the cost of labor was too great. Labor was the only outlay for roads at this time, however. No foundations were made for the roads, no surfacing materials were used on them, and no expensive machinery was required. Because labor was the main outlay, the custom of "working out" road taxes grew up, and all the citizens were required to actually work on the roads. This is the cheapest method of keeping up a road system, and it is also the poorest; for it has been said that the masculine equivalent of gossip over a cup of tea is gossiping while working out the road taxes. This system was not abolished completely until 1871 in Massachusetts. (Acts and Resolves 1871, Chapter 298).

In 1636, a group of settlers from Newtown (Cambridge) spent two weeks in making the journey over the Connecticut Path to the

present site of Springfield.[4] Since this route was in as good condition as the other roads throughout the state, the general condition of the roads must have been wretched. Other migrations at this time, stimulating an improvement of some inter-town ways, were the settlements of Dover and Exeter, New Hampshire, Providence, Rhode Island, and New Haven, Milford and Guilford, Connecticut. It would be wrong to suppose that much freight or produce was carried over the roads of this period. As Hadley puts it[5] "Long distance freight moving was absolutely impossible. The charge for hauling a cord of wood twenty miles was three dollars, for hauling a barrel of flour one hundred and fifty miles was five dollars. Either of these charges was sufficient to double the cost of the article and set a practical limit to its conveyance. Salt, which cost one cent a pound at the store, would sometimes cost six cents a pound three hundred miles inland, the difference representing the bare cost of transportation. It was on these cheap articles of daily use that the charge bore most heavily. It forced every community to live within itself."

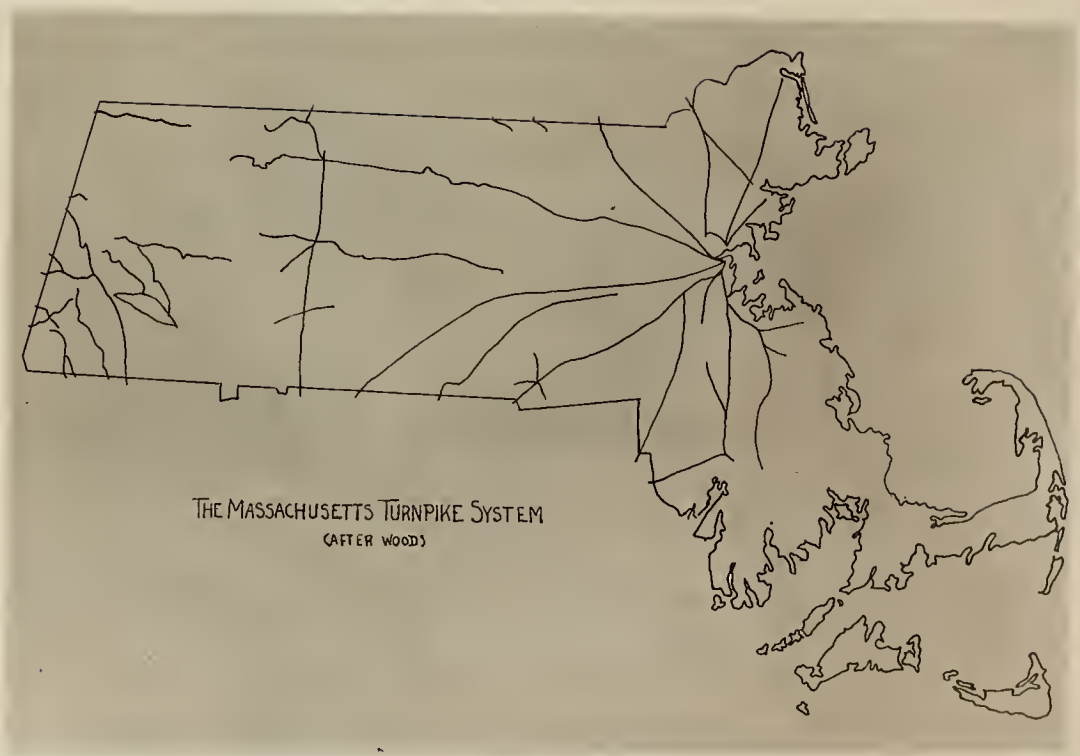
Since England did not encourage inter-colonial trade, there was little progress in road building in Massachusetts until after the Revolutionary period. On June 25, 1772, the first regular land connection was established between Boston and New York. Another evidence of the wretched condition of the ways is the fact that as late as 1768 there were only twenty-two privately-owned wheeled vehicles in Boston.[6] During the Revolution, some roads in the eastern part of the state were improved to facilitate military operations; but as late as Washington's first administration, the tri-weekly post riders from Boston to New York took six days in summer, and nine days in winter for the trip.

After the Revolution, we find a different situation. Massachusetts was beginning her period of industrial supremacy, and good

transportation was necessary for success. The voting population was not predominantly industrial by any means; and even had industrial interests controlled the state, it is doubtful whether many miles of road could have been constructed, for Massachusetts was impoverished both from the loyal support she had extended to the Continental cause, and from the unfavorable commercial competition with England after the war.

Yet they needed roads, although the public funds were inadequate to provide them; and this fact caused the development of a new period in road construction - the Turnpike Era (1795-1825).(7) The turnpike companies were groups of investors who hoped to be able to realize an adequate return by financing the construction of turnpikes in certain parts of the state, shown in map II. The state granted charters to these companies, allowing them to derive revenue from the collection of tolls, in return for a contractual agreement to keep the turnpikes open at all times to individuals who paid the required toll, and "to provide for their comfort and security" by maintaining the roads in proper repair.

The legislature authorized each turnpike by a special act, and until 1805 each act was long and detailed. After the passage of the general corporation law (which applied at first only to turnpikes), the route of each proposed turnpike was investigated by five disinterested freeholders, appointed by the county in which the road was to be built. Upon a favorable report, the charter was granted. After the road was built, it was viewed again by a committee which approved the location of the toll gates, generally placed ten miles apart. If a road were losing money, it was customary to move the gates nearer together,- the toll itself was seldom changed. There were many different rates of



THE MASSACHUSETTS TURNPIKE SYSTEM
(AFTER WOOD)

toll, varying usually with the cost of building the road, and the relative density of the area through which it ran. Usually a charge of twenty-five cents was made for every four wheeled carriage drawn by two horses, ten cents for a vehicle drawn by one horse, four cents for every man and horse, three cents a dozen for sheep and swine; the other fees were proportionate. There were certain exemptions from toll such as

> "Any person who shall be passing with his horse or carriage to or from public worship, or with his horse or team to or from any mill, or with his horse, team or cattle to or from his ordinary labor on his farm, or on the common or ordinary business of family concerns within the same towns; or any person passing on military duty."

Each company was required to file a statement of the cost of its roads, together with an annual account of receipts and expenditures. Inasmuch as no penalty was attached to the non-fulfillment of this obligation, only eight corporations made conscientious efforts to obey the law. We know, however, that there were ninety-seven turnpike companies organized within twenty years, their operations spreading over the state, as indicated by the map. The first charter was granted June 11, 1796, for the Palmer-Western (Warren) Turnpike. In 1803, sixteen companies were chartered, followed by several every year until 1814. The average cost per mile of constructing the turnpikes averaged between $600 and $1000;(8) but Albert Gallatin,(7) in a report made April 4, 1808 to the United States Senate, made the following reference to Massachusetts roads:

"No particular account has been received of the roads in the other eastern states, but it is known that besides some of a similar description with those of Connecticut, several of a more expensive kind

have been completed, particularly in Massachusetts. The cost has varied from $3000 to $14,000 a mile, and amongst artificial roads of the first grade may be mentioned those from Boston to Providence, to Salem, and to Newburyport. These are all finished with an artificial stratum of gravel or pounded stones, and finished in the most substantial manner. Great expense has also been incurred, in order to shorten the distance without exceeding the angle of ascent, which is fixed at five degrees, and it is stated that the road to Newburyport, thirty-two miles in length, and in which marshes and rocks presented considerable obstacles, has cost $400,000 or at the rate of $12,500 a mile."

These roads, however, were the exception rather than the rule; usually the natural soil of the region through which they passed was the only surfacing material. The work in building a turnpike was principally the clearing away of stones and trees, building bridges and culverts, and digging ditches on either side of the road. The middle of the road was slightly raised by throwing upon it the soil from the gullies along the roadside, for the purpose of securing drainage.

The financing of these roads was an individual matter with each company; but as Bidwell phrases it "The townsfolk restored the medieval principle of laying the burden of an expense which was or should have been incurred for the benefit of the whole community, upon those individuals in the community who most benefited by it".(9) This mode of financing was pleasing in practice to neither townsfolk nor turnpike company. The townspeople objected to the frequent halts necessitated by the toll gates; the companies to the small returns which they were able to make on their investments (the average being less than 3% for all turnpikes constructed). One by one the companies allowed their charters to lapse; by 1840 or thereabouts the turnpike was a thing of

the past.

The third period, which may be termed the period of Town Control, overlaps somewhat the preceding or turnpike period. The approximate dates for this town period are 1825 to 1893; the former date marking the appointment of county highway commissioners, and the latter the creation of the State Highway Commission. In 1827, the form of county authority was transferred to the county commissioners, who were also given authority in other town matters. A growing co-ordination in highway construction and maintenance was instituted at this time which culminated in 1893.

The actual care of the highways was in the hands of the town selectmen, and was carried on by the highway surveyors who had been first appointed in 1786. Each surveyor was in charge of one highway district, and had the right to call upon the townspeople to work on the roads, or to furnish horses and implements when they were needed. This "working out" of road taxes was very unsatisfactory. The United States Commissioner of Agriculture in 1866 described this system in his annual report:

> "No one who has once witnessed the process of 'mending roads' in a small New England town needs any argument to convince him that a system more ingeniously devised to accomplish nothing was ever invented..... Often some citizen who lives on a road out of repair seeks the office (of highway surveyor) and is elected, and takes the opportunity to expend most of the tax (labor) for the year on his own road, leaving the rest of the district to be attended to later..... The time appointed for 'working out the highway tax',as it is termed, arrives, and at eight o'clock a. m. a motley assemblage gathers, of decrepit old men, each with a garden hoe on his shoulder; of pale thin

mechanics from their shoe shops, armed with worn-out shovels; half grown boys, sent by their mothers who are widows; with perhaps the doctor, the lawyer, and even the minister, all of whom understand that 'working on the road' does not mean hard labor, even for soft hands....."

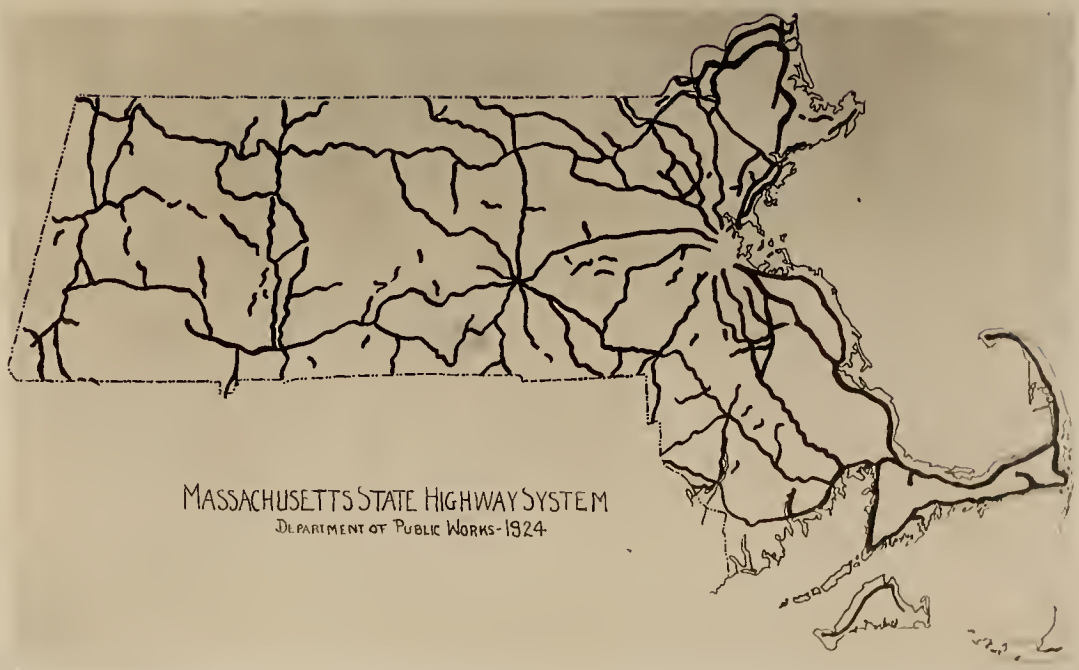
The actual dollars and cents cost of roads in this period of town and county authority was not large, but the social costs,if we may so designate them, were quite otherwise. This was the period when poor roads cut off certain hill towns from social contacts which might have been their means of warding off stagnation; it was also the period when costly distribution, largely because of insufficient transportation facilities, kept the prices of many goods obtained 'off the hilltop' out of the reach of the small town dwellers.

About 1885, interests in the industries of the state began to think about the advantages of better roads; and from 1887 until 1892, at least one proposal was made each year to the Legislature for an integrated highway system. The difficulty of keeping up a system of through roads between large centers of population is obvious. The towns were quite unable financially to maintain adequate highways. Many of the towns were still predominantly agricultural; they had neither the means nor the inclination to maintain roads for the benefit of their industrial neighbors.

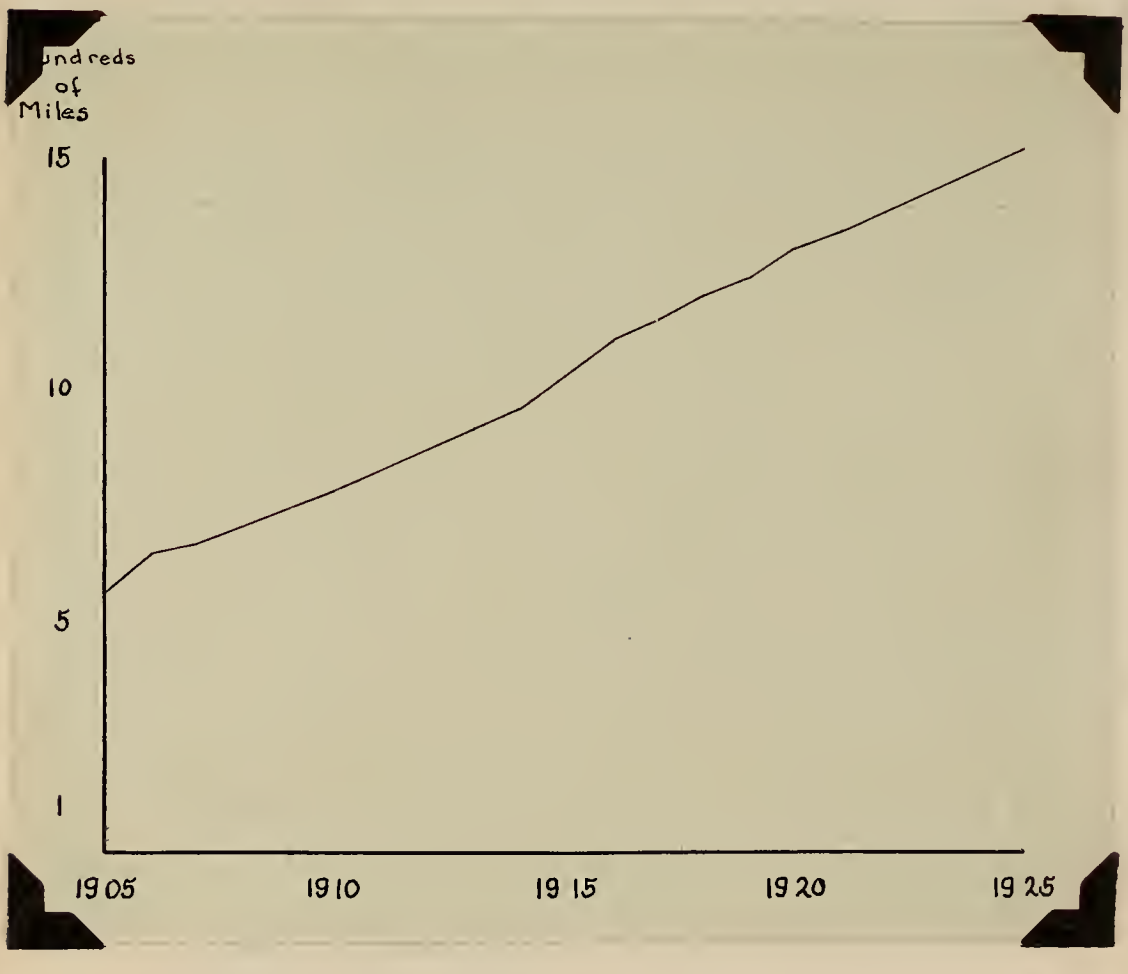
In 1892 a commission was appointed to inquire into the entire matter of the highway facilities of the Commonwealth. Their report, made in 1893 to the Legislature, may be said to have inaugurated the period of the state's interest in highway affairs, which has extended up to the present. The report stated that investigation had shown "the importance and necessity of legislation providing for a more uniform

system of road construction and maintenance under scientific supervision".(10) The law enacted on the recommendation of this commission (Acts and Resolves 1893, chapter 471) provided for a continuous commission of three men which was empowered not only to compile road statistics, make investigations and recommendations regarding city, town and county roads, but also to cause new roads to be constructed, or existing roads to be regraded, rebuilt or altered upon petition of the town, city or county authorities. These roads upon being accepted by the State Highway Commission become part of the "State Highway System". Although New Jersey created a state highway commission in 1892, Massachusetts established the first system of state highways, constructed and maintained by the state. The act was amended in 1894 (Acts and Resolves 1894, chapter 497), and a state highway loan and sinking fund provided for. For work done on state highways, the state pays the entire cost of the construction from the state highway loan fund, but counties must repay (within six years) twenty-five per cent of the cost, with three per cent interest, for all roads constructed within their boundaries. The county in turn may assess this back to the town as part of the county tax. There are about fifteen hundred miles in the State Highway System, (the growth of which is shown in the accompanying chart), or seven per cent of the total road mileage of the state.(11) The improved mileage is twenty-eight per cent of the total; which leaves about sixty/five per cent of the roads of the state unimproved, and many actually in decidedly poor condition.

The state, however, does aid roads which are not within the state system, through the medium of the Small Towns Act, the Western Counties Act (taken up in detail in another place), and through chapter 90, section 32 (General Laws of Massachusetts 1921) which governs


MASSACHUSETTS STATE HIGHWAY SYSTEM
DEPARTMENT OF PUBLIC WORKS - 1924

GROWTH OF THE MASSACHUSETTS STATE HIGHWAY SYSTEM, 1905-1925.




Reference: W.F.Williams, Chief of the Division of Highways.

the disposal of motor vehicle fees, some of which are expended on roads which are not state highways. Besides these general acts, about one hundred fifty miles of roadway has also been constructed since 1900 by appropriations from special acts which care for roads otherwise neglected, or to care for very costly stretches of a through road which could not be otherwise financed. Such, for example, is the Revere-Lynn Boulevard.

The following figures,(taken from the annual auditor's reports and the state publication "Municipal Finances"), show how highway expenditures have increased in the fifteen year period from 1909 to 1923.

Expenditures of the State Highway Department

1909 - $1,043,571.75

1923 - 8,001,939.42 (excluding Federal Grants)

9,251,939.43 (including Federal Grants)

Total Highway Expenditures for Massachusetts (excluding cities and including Federal Grants)

1909 - $4,434,450.60

1923 - 24,121,622.37

Total Highway Expenditures for Massachusetts (including cities and Federal Grants)

1909 - $12,684,585.95

1923 - 48,713,685.48

These figures indicate how much of the total highway expense is paid outside the state department. Since only seven and a half per cent of the total mileage of Massachusetts is included within the State Highway System, it is not strange that the bulk of the expenditure should be cared for locally. This local financing, much of which is for neighborhood roads, i..e., roads which are not parts of a through route, but may be either feeders to through routes, or crossroads of relatively little importance, (11) will be analyzed more fully in a later discussion. The Federal Aid Roads, of which there have been about three hundred thirty

miles built since 1917, will also be discussed more fully later.

Although there has been no attempt to make this more than an outline of the highway policies which have determined highway financing in Massachusetts, it is hoped that enough has been said to indicate the trend of the development of the last thirty years. This has paralleled the increased use of the automobile; in 1904 there were 4,889 automobiles registered in Massachusetts; in 1925 there were 764,338. It is not difficult to understand why road expenditures are so much greater. The surfaced roads of the state, built on well-drained, adequate foundations, with careful grades and safe bridges to care for this increased traffic, are a far cry from the turnpikes of a century ago.

II. LEGAL ASPECTS OF HIGHWAY DEVELOPMENT IN MASSACHUSETTS.

The development of any governmental service or function is accompanied by a legal development which is as many sided as the function itself. Although many of the laws passed regarding highways in the colonial and provincial periods of Massachusetts legislative history contradict each other, and hence are difficult to classify, the later laws contain many technical, many financial and economic, and many social aspects which may be traced back over a period of years.

The early laws of the Plymouth and Massachusetts Bay Colonies were primarily to insure adequate highways. During this period the authority for all the road construction and maintenance within its borders was vested in the colony. As early as 1635, the Plymouth colony in its general court worked out a system which was used for two centuries. The selectmen of each town were placed in direct charge of the roads, and they, in turn, appointed surveyors who were responsible for repairing the roads with the assistance of the able bodied men of the town.(12) Should the townsfolk disagree as to the location of a projected road, a jury, appointed by the colony, was to "lay out such way as in conscience they find most beneficiale to the Commonweale." This was actually done in Scituate as early as 1636.(13) All the other laws (except one passed in 1668 which provided that every road should be forty feet wide)(14) were for the purpose of making it impossible to avoid working on the road. In the Massachusetts Bay Colony the office of highway surveyor was created in 1635,(15) with rights and duties similar to those of the highway surveyor in the Plymouth Colony. In 1648, however, the Massachusetts Bay Colony made towns liable to a fine of £100 for every life lost by a defect in the roads or bridges of the towns.(16) This is the legal progenitor of our present laws instituting equitable damages for injuries sustained on account

of the negligence of the town. In 1679, some of the towns complained to the General Court that their neighboring towns would not cooperate in providing inter-town roads; so legislative provision was made for appointment, by the County Court, of an impartial committee which should view the proposed site of the road, and report back to the Court the necessity of creating the highway. The Court was also given authority to force the towns to cooperate in constructing a road so investigated and approved. After 1692 when both colonies were united to form the Massachusetts Bay Province, the town highway surveyor was given increased authority to lay out roads, control private ways, and compel able bodied men to work on the roads. The office was made elective, and, since there were frequently two or more surveyors, each was given charge of a 'road district', a form of political sub-division still found in some small towns in the state.(17) The purpose of these early laws was entirely technical. They are the laws of a group engaged in overcoming many obstacles in order to provide some means of making contacts with each other.

After this time it is sufficient to trace the legislation in three sections. The first and most important of these is the growth of restrictions on municipal finance especially as it relates to highway finance; the second, the technical aspects of highway development as reflected in the laws; and last, the evolution of state highway policing.

State Restrictions on Municipal Expenditures.

Each of the colonies which later made the Province of Massachusetts Bay, as well as the province itself, had some legal provisions relating to taxation, although for each of them the wording of the tax law was decidedly vague and put no restrictions on the taxing power of the individual town. As has been noted, few taxes were raised for roads since the custom of letting people pay a fee for exemption from road work did not develop until early in the nineteenth century. One curious way of financing roads did exist, however; in the Acts and Resolves of the Province of Massachusetts Bay, Vol. XXI for 1779-1780, a record is found of a petition granted to a group of men in Berkshire and Hampshire Counties to form a lottery for the purpose of mending and repairing the highway through the 'Green Woods' as part of the 'Great Road' from Boston to Albany. The stretch of road referred to is that from Westfield to Great Barrington; it had not been cared for adequately and, realizing the need of a good through road, the citizens chose this unique method of raising the money for it.

As the town gave way to the city, however, it became apparent that the existing vague laws were inadequate to cope with the new situation. The municipal debt of the state increased from $19,852,109.21 to $80,427,245.00 /in currency in the ten year period from 1865 to 1875 - an increase of over three hundred per cent. The legislature, accordingly, passed the first municipal indebtedness statute of the state (Acts and Resolves, 1875, chapter 209). This statute limited the amount of funded debt which a municipality might incur to three per cent of its last valuation, and provided certain methods by which the existing debt might be paid off if it exceeded this amount. It also attempted to limit the purposes for which a town might go into debt; and it specifically stated that no debts other

than temporary debts (in anticipation of revenue) should be incurred except debts for public improvements, among which we find highways. Even for debts which were approved, however, there was a definite limit.

Theoretically the law was sound, practically it was a failure, because any municipality could get special authorization for loans exceeding the debt limit. Among the evils which developed was the abuse of trust funds; in 1910 the total of trust funds appropriated to uses other than those for which they were given amounted to a million dollars.(17a) It is said that part of this money was misappropriated to making payments on highway construction.

To remedy the conditions, a new law was passed (Statute 1913, chapter 719) which repealed the authority of the town or city to institute sinking funds, and established serial payments for debt. This law provided that notes for a one-year period in anticipation of revenue were not renewable; further, that trust funds must be used only for the purposes for which they were given. This law is still in force. It provides that towns may issue serial bonds for a ten-year period for the original construction of public ways, or for constructing stone, block, brick, or other permanent pavement; and for a five-year period for macadam pavement or other road material under specifications approved by the state highway department.

This put highway expenditures on a firm basis, and, since the state director of accounts must authorize each transaction in which the town borrows money, there is little possibility for the towns to misappropriate funds.

The first legal provision for a special highway assessment on abutters was made in 1693, applying only to the town of Boston. Although the privilege was extended by special acts to include some other towns, it was not until 1871 (Acts and Resolves 1871, chapter 382) that pro-

vision was definitely made for special assessments, not to exceed one half of the total expense in any case, to be laid on estates receiving special benefits from highway improvement. This assessment was divided into thirds, and added to the taxes for the following three years. In 1884, (Acts and Resolves 1884, chapter 226) a provision was added to the law providing that if the owner should release the municipality from all claims for damages arising out of the construction of streets or highways, the town or city in return would assume the payments for betterments assessed upon the remainder of his land.

Since the institution of the State Department of Highways in 1893 (St. 1894, chapter 497, section 5) there have been some other methods used to finance roads besides those mentioned above. The construction of state highways is financed by the state, although twenty-five per cent of the cost is repaid by the county. The state also provides for maintenance of state highways, filing annually with the state treasurer an account of the amount of money expended in each town during the preceding year. (General Laws 1921, chapter 81). Half the maintenance expenditures are then charged back to the towns as part of the state tax, on the following basis:

In towns with a valuation of less than $1,000,000; not exceeding $50 a mile.
" " " " " " $1,000,000-$2,000,000; " " $100 " "
" " " " " " $2,000,000-$5,000,000; " " $200 " "
" " " " " " over $5,000,000 ; " " $500 " "

Besides this assistance in maintaining roads, the Division of Highways (the form of state organization was changed in 1921 - General Laws 1921, chapter 81, section 23) is also charged to spend annually five per cent of the total appropriation for state highways, for roads which are not actually part of the State Highway System, in towns having a valuation

of less than one million dollars. The towns make no return for this. Another five per cent is distributed on the same basis to towns which agree to expend sums equal in amount to the expenditure of the state; and another five per cent is expended in towns having a valuation exceeding one million dollars if the towns agree to expend a like amount. The towns maintain these roads.

The "Small Towns Act" (General Laws 1921, chapter 81, section 26-29) also supplies money to towns for highways, provided that the road mileage valuation (town's valuation divided by town road mileage) is not in excess of fifty dollars a mile, and that the town contributes an amount varying from twelve dollars and fifty cents to one hundred twenty-five dollars per mile, (depending on the road mileage valuation). The "Western Highways Act" of 1915 (Acts and Resolves 1915, chapter 221) authorized the State Highway Commission to construct between 1915 and 1918 seventeen specially designated roads, situated in the five Western Counties. The total amount available for this was $3,000,000,($2,000,000 in 1916; $1,000,000 in 1920) and the time for expending the money was extended to 1924. The motor vehicle fees and fines (General Laws 1921, chapter 90) are also expended to improve and maintain the highways of the state. Twenty per cent of the amount available for roads, as explained in the discussion of state financing of highways, is spent on town or county highways which are on through routes, and the balance for maintaining state highways. The Federal Aid to highway construction is the newest source of funds for highway financing.

Legal Restrictions on Road Construction - Practical.

The first general law of the state (Acts and Resolves 1786, chapter 67) on the subject of highways is entitled "An Act directing the method for laying out highways" - evidence that the actual construction of roads was most important to the people then, as now. Originally, roads were laid out by the selectmen of the town, or by the court of sessions if the selectmen were negligent. In 1825, the appointment of the Highway Commissioners in every county transferred the roadmaking authority from the court to the commissioners, although the records were still kept by the court of sessions. In 1827, (Acts and Resolves 1827, chapter 77) the appointment of county commissioners made them the ultimate highway authority by transferring to them the rights previously held by the highway commissioners. In 1846, (Acts and Resolves 1846, chapter 222) the county commissioners were authorized to make needed repairs to the highways in any town in which they were neglected by the selectmen, and charge the costs back to the town. In 1871, (Acts 1871, chapter 158) an act was passed authorizing towns to elect road commissioners, if they desired to, who were intrusted with the duties of the selectmen and the highway surveyors. There was a general acceptance of this act. In 1894, the State Highway Commission was also granted authority to lay out certain roads; and in 1907 (Acts 1907, chapter 191) provision was made for the appointment, in cities, of boards of survey to control the laying out of roads by individuals and corporations. This act referred to the division of large areas into house lots with the consequent necessity for laying out roads.

Legislative Provisions Regarding Highway Maintenance in Massachusetts.

In 1786, a law was passed entitled "An Act for the Repair and Amendment of Highways". The highway surveyors were named as the officials responsible for maintaining the roads.(18) They were given authority to compel the able bodied to work on the roads. In 1818,(Acts 1818, chapter 121) towns having more than eight hundred inhabitants were authorized to raise taxes for road maintenance in the same manner as they raised it to meet any other obligation. In 1871, (Acts 1871, chapter 298) the "working out of taxes" was abolished for all towns.

Mention has been made of the action of the Massachusetts Bay Colony in 1648 in imposing a fine of £100 or $500 on any town in which defects in the roads caused a death. In 1818, this was raised to $1,000, and provision was made for equitable damages for other injuries resulting from the same cause. In 1877, (Acts 1877, chapter 234) the limit for such indemnity was placed at $4,000.

State Control of Inter-town Ways.

The foundation of government, as well as its ultimate resource, is the physical force of the whole body of citizens organized for their protection from any unsocial or anti-social element within the group. Because of the exigencies arising from an unpopular prohibition period, it was necessary in 1865 to create some type of police officer with inter-town authority. To meet this need, a state constable was appointed (Acts 1865, chapter 249) with thirty-four deputies - twenty in Boston, and one in each county. These constables had ordinary police authority with state-wide jurisdiction. In 1871, (Acts 1871, chapter 394) three state commissioners were appointed with seventy deputy constables. The people resented the state constabulary, however; the officers themselves were not above sus-

picion; the town police would not cooperate with them; and the whole force was disbanded in 1874 (Acts 1874, chapter 405). Although the state constabulary themselves were so unpopular, their services were apparently necessary, and there followed a state detective force (Acts 1875, chapter 15) which lasted until 1879, and then was abolished by Governor Talbot who said in his inaugural address "It is impolitic to the last degree....to usurp the functions of local officers under the sanction of a higher authority than the county or town". He did, however, sanction the establishment of the District Police (Acts 1879, chapter 305) on a somewhat different basis, for they were a carefully chosen, heavily bonded group. They were more successful than their predecessors for they were not disbanded until 1919. The Department of Safety, created in 1919, as a step toward economical concentration of state functions, has a group of one hundred forty state police under its jurisdiction (Revised Laws 1919, chapter 350, section 99) who are strongly coordinated and provided with swift transportation. They are necessary to make the highways safe and also for the safety of the rural population from the marauders whom the highways bring to their doors.

## III. THE COSTS OF VARIOUS TYPES OF HIGHWAY CONSTRUCTION IN MASSACHUSETTS.

As we have noted, the construction of the first highways in Massachusetts cost very little, except the labor of the townsfolk who lived along the way. The turnpikes also were comparatively inexpensive, the average turnpike probably costing not more than $600 to $1000 a mile. This inexpensive construction is no longer possible, however; the construction of surfaced roads is not only costly, but also very far from being a "one outlay" expense, for besides construction costs, we must include costs for maintenance, interest on the investment, and depreciation. These cost factors may be analyzed as follows:

1. Construction costs are those costs directly incurred in building a road; they include expenditures for excavating, draining, putting in artificial foundations, culvert and bridge construction, and surfacing.

2. Maintenance expenditures may be divided into those expenditures which are constantly required to preserve the road from deterioration, and those which are necessary only occasionally when the road is partially destroyed. The resurfacing of roads is also included with maintenance expenditures in Massachusetts.

3. Depreciation costs are those arising from the lack of permanance of the roads. Even with good maintenance, few roads have lasted more than twenty years in this state; in figuring the cost of the roads, allowance must be made for this fact.

Table number I shows the various types of improved roads in Massachusetts. It should be said that the existence of fewer miles of surfaced highway in 1921 than in 1904 is due to the fact that many surfaced roads, especially gravel roads, have not been maintained sufficiently well by the towns to keep them in the "surfaced road" class, that in constructing new roads along the route of previously surfaced roads,

## MILEAGE OF SURFACED ROADS IN MASSACHUSETTS

| | 1904 | 1914 | 1921 |
|---|---|---|---|
| Total Mileage | 17,092 | 18,681.4 | 18,868 |
| Total Surfaced Mileage | 7,833.27 | 8,505.89 | 6,575 |
| Sand Clay | | | 8 |
| Gravel | 6,621.14 | 6,289.57 | 3,103 |
| Stone | 1,212.13 | | |
| Macadam | | 834.30 | 1,684 |
| Bituminous Macadam | | 1,337.33 | 1,269 |
| Bituminous Concrete | | | 280 |
| Portland Cement Concrete | | | 129 |
| Various | | 44.69 | 102 |

many cut offs have been made to straighten the roads by removing curves (this is shown by the new highway between Palmer and Springfield); and that the towns prefer to build a hard surfaced road where it is needed, paying for it in many cases by retrenching on other highway expenditures.

Before discussing the costs of various types of highway, with the object of making the highway finance problem more specific, it is probably worth while to differentiate the various types of "improved roads" (19) found in this state.

1.Gravel roads - A road surfaced with a mixture of pebbles, sand, loam or clay; i.e., materials found in the vicinity largely. The most desirable mixture has many varying sizes of pebbles, not larger than one to one and one half inches in diameter. The surface layer may be spread over the subgrade, and allowed to compact through the weight of traffic, or it may be spread in courses and compacted with a roller. A gravel road is not satisfactory when the daily traffic exceeds six hundred automobiles. Constant rutting of the gravel indicates the need of a new type of surface.

2. Water-bound macadam surfaces are made of crushed rock, usually built in two layers and compacted by rolling. Three sizes of rocks are used. The first practice was to use the coarse material for the base, and the intermediate size for the top layer, filling in the spaces with the finest material. Now the finest material is used for the base because it completely covers the subgrade and prevents "frost boils"from forming in the spring. The road is held together by the cementing properties of wet rock dust. Since the wind blows away rock dust, constant replacements have to be made. When most of the traffic was horse drawn, the horse's shoes and the steel tired wheels wore off enough dust particles to keep the supply replenished. The effect of rubber tired motor vehicles is different; the rear wheels have enough force to dislodge the

surface stones, the rapidity of movement sets up currents which blow away the dust, and no replacements are made because of the frictionless rubber tires. For this reason water-bound macadam is not suitable for automobile traffic. Sometimes this type of road built before the strictly rubber tire period is given prolonged usefulness by spreading tar or asphalt over it to prevent removal of the binding material.

3. Bituminous macadam roads are ordinary macadam roads with a different surface treatment. Hot tar or asphalt is applied to the surface in sufficient quantities to coat each stone. The wearing course is covered with a light layer of stone chips and rolled; and then another layer of bituminous material is applied, upon which more stone chips are rolled, and then covered with the tar or asphalt. The top layer of stone chips is thoroughly rolled. This is a common type of surfaced road because it stands a large volume of automobile traffic with little wear; but it does not stand heavy motor truck traffic.

4. Bituminous concrete roads are those made from mixtures of asphalt with crushed stone or sand graded to include a range of sizes. The main differences between bituminous macadam and bitmuninous concrete are that the latter has the sand or stone particles carefully graded to include various percentages of all sizes. Theoretically, those particles when compacted form a dense mass with a minimum of voids or spaces. Another difference is that the asphaltic cement and the graded stone are mixed, hot, before they are spread on the road. After being spread, they are compacted into a two-inch surface layer, which is weather-proof and capable of supporting heavy loads if on an adequate foundation.

5. Portland cement concrete, often called 'concrete',is used both for the base and the surface of roads. Concrete is a mixture of crushed stone or gravel, sand, Portland cement and water. Mixed wet, the cement changes chemically in drying, forming a hard strong surface. The

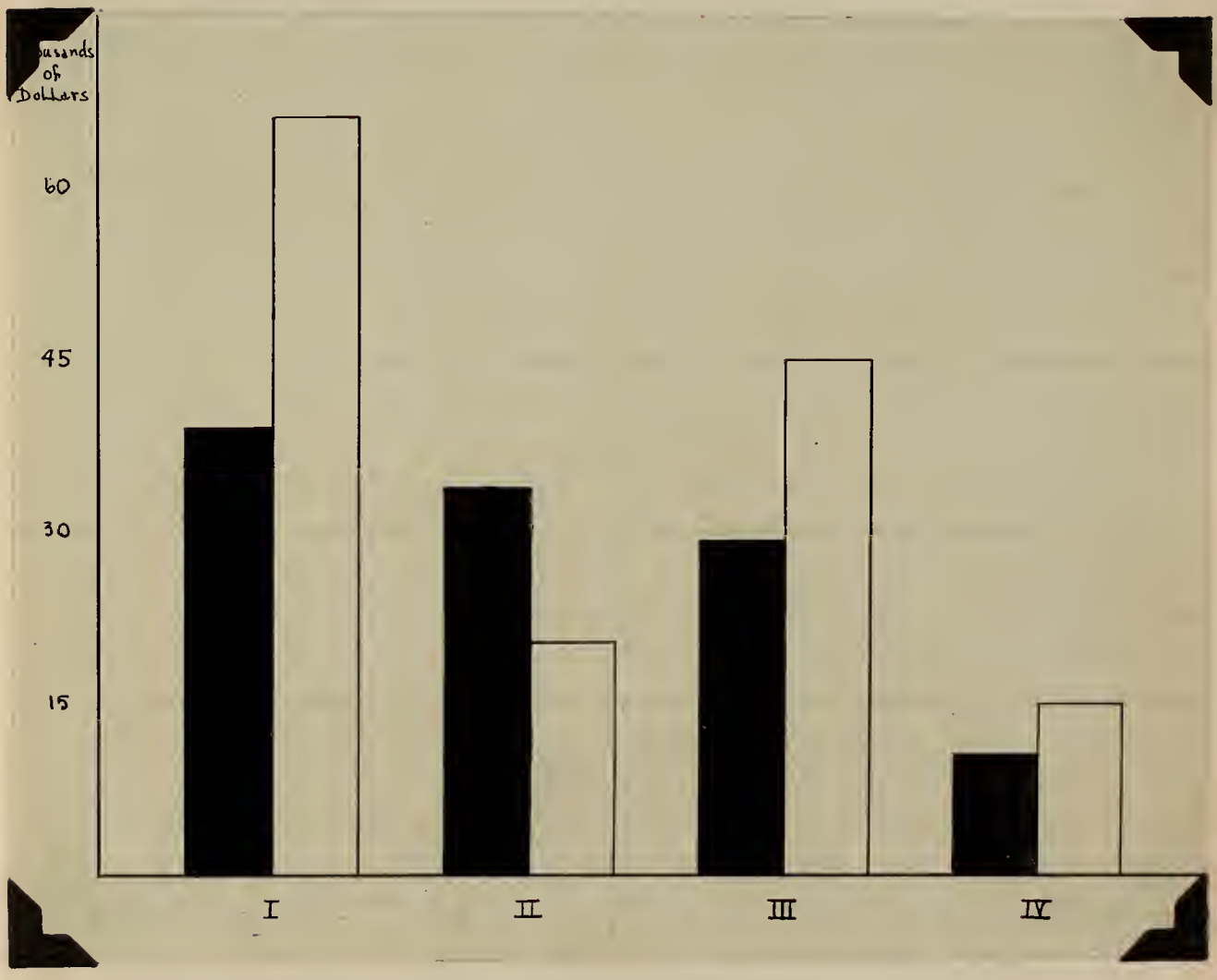
concrete is spread from the mixer over the subgrade, between the side forms of wood or metal, which hold in the wet concrete until it hardens or sets, after which it is smoothed to the required shape by mechanical concrete road finishers. These roads will bear the heaviest traffic if they are on adequate foundations. In Massachusetts it is the custom to reinforce Portland concrete roads having a minimum thickness of eight inches with ten pounds of steel rods to the square yard. When this is done, the road is called "reinforced concrete".

The Bureau of Public Roads has found that although it is possible to work out an average cost for constructing a mile of various types of roads, the average cost for the United States is not more than an approximation. Some of the circumstances which affect the cost of roads are the amount of grading required, the kind of foundation which is necessary, the width and thickness of the surface, the wages of labor, and the time of year in which the road is constructed. With these limitations, the following costs are representative of the thirty-five thousand miles of road constructed throughout the country with federal funds, as compared with similar figures from the Massachusetts Highway Engineer's office. (20) (21)

Comparative Costs of Construction Per Mile - 1925

| Type of Road | United States | Massachusetts |
|---|---|---|
| Portland Cement Concrete | $38,300 | $65,000 |
| Bituminous Concrete | 33,500 | 20,000 |
| Bituminous Macadam | 29,100 | 45,000 |
| Gravel | 9,900 | 15,000 |

## COST PER MILE OF VARIOUS TYPES OF ROAD CONSTRUCTION




Reference: U.S.D.A. Bureau of Public Roads,
Massachusetts State Highway Department.

■ Federal Aid System, U.S. Average Cost.
□ Massachusetts Highway Cost.

I. Portland Cement Concrete.
II. Bituminous Concrete.
III. Bituminous Macadam.
IV. Gravel.

The reasons for the differences in cost (shown graphically in diagram No. 1) are as follows:

1. The Portland cement roads built in Massachusetts have been reinforced highways for carrying heavy truck traffic. The surfaces alone, excluding the cost of excavation, draining and foundation, cost from $30,000 to $40,000 a mile, according to the availability of sand and stone. The uneven topography of the state and the severe frost action make necessary a large amount of excavating, under-drainage and culvert construction.

2. Bituminous concrete roads cost less than similar roads throughout the country, because most of our roads of this type have been built on Cape Cod where the material for making the roads is available. Seventy-five per cent of the material in the surface of these Cape Cod roads consists of sand which is obtained at points alongside the road under construction. In other parts of the country the cost of procuring sand adds decidedly to the total road cost.

3. For both bituminous macadam and gravel roads, the explanation of a higher cost in Massachusetts lies in the natural factors of uneven topography and severe frost action which make an artificial and costly stone foundation necessary; in the heavy traffic which necessitates a thicker surface layer; and in a high labor cost.

The difference in costs of construction for the same types of road at different periods is also great. In 1915 the average cost per mile of road constructed was from $12,000 to $16,000; the roads mainly were water-bound macadam, gravel and bituminous macadam. It is not possible to quote accurate construction figures for various types of road at this time, although it is probable that the water-bound macadam cost about $13,000 a mile, while the Portland cement

concrete cost $22,000 a mile. In 1905, the average cost was $6,000 a mile for building water-bound macadam and gravel roads fifteen feet wide without foundations.(22)

Maintenance costs are increasing in like manner. There can be no good highway system without proper maintenance, and it has always been the object of the Department of Highways to keep up the roads properly. Although there is no such thing as a "permanent highway" properly speaking, there is no excuse for increasing the total highway bill by false economy in failing to maintain the roads, which only makes the bill larger in the end by causing expensive reconstruction or re-surfacing. Not more than half a dozen surfaced roads in this state have lasted twenty years, largely because they were not built for heavy automobile traffic, but also in many cases because they were not properly maintained. (This latter is true only for roads outside the state highway system, however.) It is difficult to approximate any satisfactory figure for maintenance expenditures per mile of various kinds of roads, but the cost of the repair and maintenance under the control of the State Department averaged $105 a mile in 1905(23) and $642 in 1910.(24) The following data are the latest available on maintenance charges.

Surface Maintenance Costs in 1925 for Whole State of Massachusetts.

| Type of road | Average Maintenance Cost per mile |
|---|---|
| Cement Concrete | $140.77 |
| Bituminous Macadam | 400. (Range from $234-$629) |
| Bituminous Concrete | 588.30 (Range from $245-$1076) |
| Water-bound Macadam | 748.87 |
| Gravel | 807.96 |

The average maintenance costs on all Federal Aid roads, the accounting for which is done separately, averaged $560 a mile in the period from 1917-1924. This figure is probably lower than that for other roads of the same general types, because the Federal Aid roads are so well built.

The annual cost of a mile of Portland cement concrete road costing $65,000 a mile approximates this:

| | |
|---|---|
| Interest on $65,000 at 4% | - $2600. |
| Maintenance | - 140. |
| Depreciation at 5% | - 3250. |
| | $5990. |

The depreciation estimate is based on a twenty year average length of use for cement roads, since bond issues are usually issued on expectation of twenty year service.

In "Public Roads" for November 1919, Mr. W. D. Solier, former chairman of the Massachusetts Highway Commission, estimated the annual cost of part of the Newburyport turnpike, at that time of bituminous macadam construction

| | |
|---|---|
| Interest on $40,000 at 2½% | - $1000. |
| Depreciation at 5% | - 2000. |
| Maintenance | - 100. |
| | $3100. |

This figure seems too low; but he was the first to put any emphasis on annual costs of highways per mile. Because these costs are so large, we have a financing problem in Massachusetts. The accompanying tables show data for the state (excluding Federal funds), illustrating just how large it is.

IV.HIGHWAY FINANCING IN MASSACHUSETTS.

With the origin and importance of the highway financing policy of Massachusetts in mind, the problem of the ways in which Massachusetts pays for her highways must now be analyzed. The most important single agent in spending the highway appropriations in this state is the Division of Highways, and it is the purpose of the following discussion to indicate the sources of income for the Massachusetts State Highway System.

The Massachusetts Highway Department, or Division of Highways as it is now called, spends about one-third of the total annual Massachusetts expenditure for highways. An analysis was made of the income of the Division for the years 1904, 1909, 1914, 1919, and 1924. The state expenditure for highways and the annual amount set aside to meet it do not check, for no effort is made by the Division of Highways or the State Auditor to make receipts and expenditures balance in any year. Frequently the accounts do not check within a million dollars. This is largely due to the classification of motor vehicle fees as a restricted revenue. The annual appropriations are made on the basis of an estimated receipt from motor vehicle fees, and since no expenditure may exceed the appropriation for it, a balance of unexpended money was carried over from one year to the next. A balance of Federal Aid money was carried over from year to year after 1918, until certain selected roads were built.

Table number II. shows the actual receipts of money from various sources, and the same information is shown graphically in diagram 2. These seem to point out the following facts about the highway finance policy adopted in the last twenty years by the state.

1. The total highway expenditure has increased consistently, especially since 1919.

## HIGHWAY EXPENDITURES IN MASSACHUSETTS

| Year | Total State[1] Expenditure | % of Change (over 1909) | Expenditure of State Highway Department[2] | % of Change (over 1909) | % of Total |
|---|---|---|---|---|---|
| 1909 | $ 4,434,450.60 | | $ 1,043,571.75 | | 23.53 |
| 1910 | 6,022,493.78 | 35.81 | 2,007,463.84 | 92.36 | 33.33 |
| 1911 | 6,190,979.61 | 39.60 | 2,114,529.92 | 102.62 | 34.15 |
| 1912 | 7,937,555.09 | 78.99 | 2,709,773.00 | 159.66 | 34.13 |
| 1913 | 9,146,369.44 | 106.25 | 3,387,692.44 | 224.62 | 37.03 |
| 1914 | 9,881,784.42 | 122.83 | 3,937,598196 | 277.32 | 39.84 |
| 1915 | 9,062,389.06 | 104.35 | 2,910,493.08 | 178.89 | 32.11 |
| 1916 | 9,915,040.09 | 123.58 | 3,300,825.94 | 216.30 | 33.29 |
| 1917 | 11,748,819.33 | 164.93 | 4,827,609.44 | 362.60 | 41.09 |
| 1918 | 10,241,687.35 | 130.95 | 4,008,926.37 | 284.15 | 39.14 |
| 1919 | 12,312,127.43 | 177.64 | 3,787,245.51 | 262.91 | 30.76 |
| 1920 | 17,974,416.39 | 305.32 | 5,696,725.20 | 445.88 | 31.69 |
| 1921 | 23,003,144.77 | 418.72 | 7,563,855.38 | 624.80 | 32.88 |
| 1922 | 21,823,498.94 | 392.12 | 7,882,076.68 | 655.29 | 36.11 |
| 1923 | 24,121,622.37 | 443.94 | 9,251.959.43 | 786.56 | 38.35 |

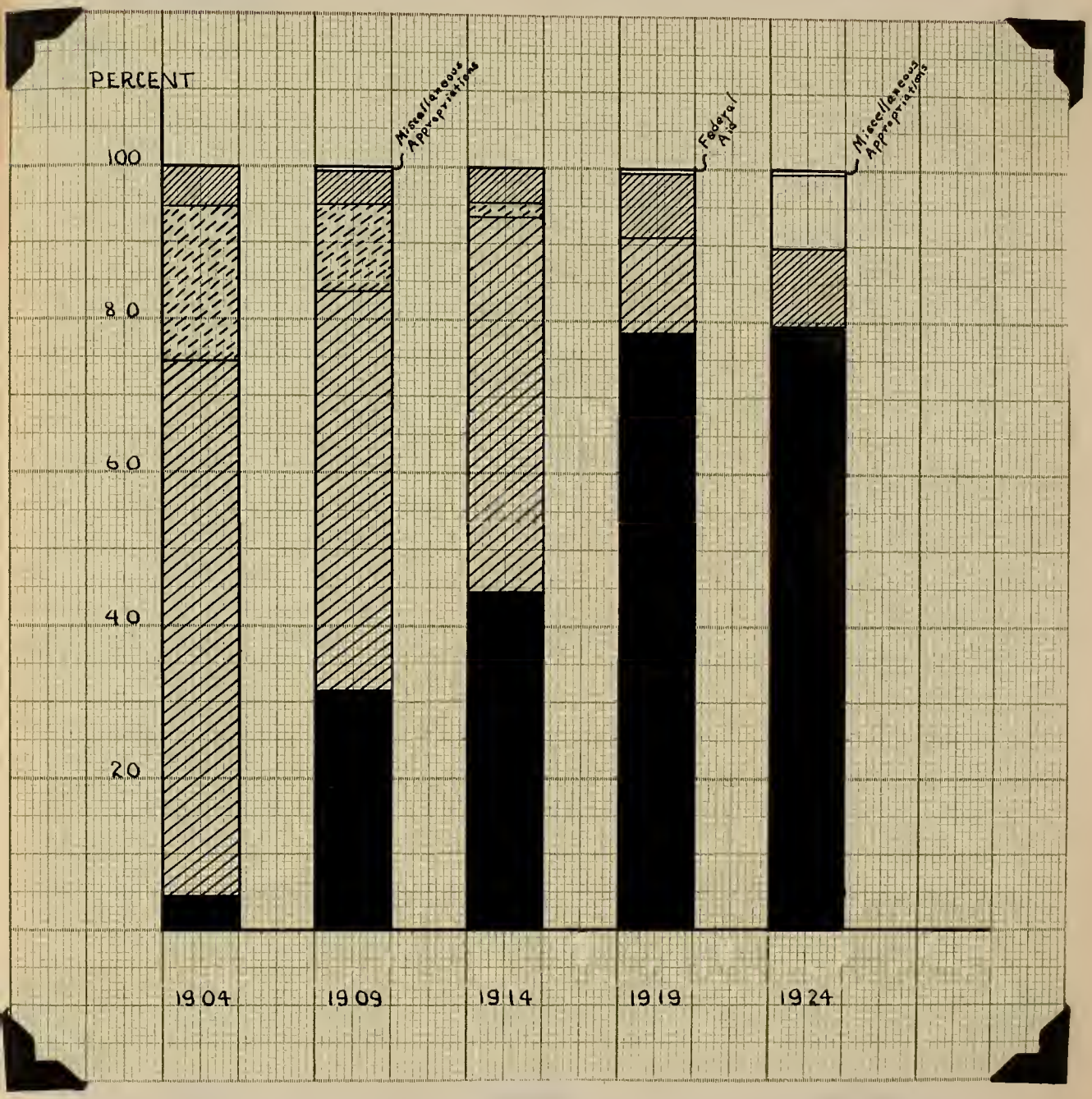
1. Excluding city expenditures for streets, etc.
2. Including Federal Aid, since 1918.

SOURCES OF FUNDS OF THE MASSACHUSETTS DIVISION OF HIGHWAYS

| Year | State Appropriations | Bond Issues[1] | Motor Vehicle Revenues | Special Assessments[2] | Federal Aid[3] | Miscellaneous Appropriations |
|---|---|---|---|---|---|---|
| 1904 | $89,300.00 | $ 300,000.00 | $ 17,684.00 | $ 18,923.11 | --- | --- |
| 1909 | 84,553.00 | 380,000.00 | 229,217.01 | 34,596.72 | --- | 214.64 |
| 1914 | 39,823.00 | 1,070,000.00 | 965,873.14 | 102,548.62 | --- | --- |
| 1919 | --- | 500,000.00[4] | 3,236,885.15 | 360,024.01 | $ 8,043.63 | --- |
| 1924 | --- | --- | 8,470,891.38 | 1,118,740.41 | 1,044,229.41 | 35,324.84 |

1. Figure given refers to bonds authorized.
2. Includes a few 'gifts and grants' from towns.
3. Refers only to Federal Aid actually expended.
4. 'Western Counties' Serial Bonds.

PER CENT OF TOTAL HIGHWAY FUNDS OF THE MASSACHUSETTS DIVISION OF HIGHWAYS RECEIVED FROM VARIOUS SOURCES, 1909 - 1924.




Motor Vehicle Revenues.
Bond Issues.
State Appropriations.
Special Assessments.
Federal Aid.

2. The amount appropriated by the state from general revenue has declined.

3. Fewer bonds are being issued.

4. The revenue from motor vehicle fees has increased tremendously and is now bearing most of the state highway burden.

5. The Federal Aid expended in Massachusetts is as yet too small to be relatively important as a source of income for highways.

The importance of motor vehicle revenues in the financing policy of the state is obvious. Not only do these revenues pay for maintaining the present highways and constructing the new ones, but they are also paid into the sinking fund to retire bonds issued for roads built in the past. The tremendous increase in the motor vehicle revenues is largely responsible for their increased share in highway financing, the figures for which are taken from the Annual Report of the Highway Department. It is possible to gain some idea of this increase from the following table:

Increase in Motor Vehicle Revenues.

| Year | Number Motor Vehicles Registered | Motor Vehicle Revenues |
|---|---|---|
| 1904 | 3,743 | $17,684.00 |
| 1909 | 23,971 | 229,217.07 |
| 1914 | 22,246 | 965,873.14 |
| 1919 | 247,182 | 3,236,885.15 |
| 1924 | 672,315 | 8,470,891.38 |

The motor vehicle revenues are also used for roads other than state roads as provided by chapter 112, section 34 of the General Laws, which was amended by section 1, chapter 112 of the Acts of 1921. This provides

1. That all administrative expenses relating to the licensing of motor vehicles are to be paid from the motor vehicle fees fund.

2. That the balance is to be expended

a. To maintain, repair, improve and construct town and county highways which are not parts of the state highway system.

b. To maintain and construct state highways.

c. To meet the Commonwealth's share of the expenses for maintaining boulevards in the metropolitan parks district.

Massachusetts is by no means the only state which is putting the increasing burden of a coordinated highway system upon the people who own motor vehicles. The Bureau of Public Roads reports that in 1914, 5.1% of the total highway income came from motor vehicle revenues, and that in 1923, 19.5% was collected from the same source throughout the country at large. It seems, however, that it might be easy to carry this policy too far. The theory of a tax has come to be that it should be paid by the people who can best afford to pay it; and it is probably true that, as a group, automobile owners can afford to pay taxes for the upkeep of roads more easily than any similar group in the state. They have been willing to pay for good roads, because they realized that the costs of operation and maintenance for automobiles were much less when highways were kept in good condition. It is hardly more reasonable, however, that they should pay the whole costs of a highway system than that the vessels which sail the high seas should bear their prorata cost for the services performed by governments in removing wrecks, patrolling iceberg areas, dredging channels and otherwise providing for the traffic of the sea. The governments have undertaken these functions because they are felt to be a service to the whole people; and the whole people pay for them through taxes. Perilous ocean routes and dangerous sea lanes are reflected in higher carrying rates, which increase the cost of goods; poor roads are

also paid for by the consumer as increased distribution costs. Good roads are essential to the functioning of an efficient police service for all the people of the state; why should the people who are in possession of some type of motor vehicle pay to provide this service for all? It seems only reasonable, therefore, that some of the costs of main or through highways should be borne by the people of the state. Probably they should pay for the construction of the so-called 'permanent roads', which are built to last thirty years. They represent a large investment which should not decline appreciably in value if well maintained. At any rate, there is a real problem as to how much of the burden it is fair to place on the motor vehicle owner.

Another angle of this same matter is the levy of advalorem rates on automobiles as personal property under the general property tax. This is really not a special tax on motor vehicles, so is not regarded as falling within the problem of this study; yet there is danger of a multiplication of taxes which places an unfair handicap on a selected portion of the population.

## Bonds.

There are only two ways of expending the money which it is decided to invest in roads. The first is to meet all obligations as they are due, and the other is to defer the payment by means of bonds. The latter method must be used in every case when current revenues are insufficient to care for road improvement, but there should be a sharp distinction as to the uses to which money borrowed by issuing bonds may be put. It is justifiable to pay for the construction of long-time improvements with money raised from bond issues; but it is unwise to maintain roads with borrowed money. In one case, the money produces a semi-permanent durable good; in the other, it pays a current upkeep

STATE HIGHWAY BOND ISSUES IN MASSACHUSETTS

| Year | Total Highway Bond Issues Outstanding | Per Cent of Direct Debt of State | Sinking Fund Bonds | Serial Bonds | Latest Date of Maturity | Bonds Issued During Year |
|---|---|---|---|---|---|---|
| 1909 | $ 6,199,500 | 23.71 | $ 4,525,000 | $ 1,594,500 | 1939 | $ 380,000 |
| 1910 | 6,409,000 | 21.80 | 4,525,000 | 1,884,000 | 1940 | 285,000 |
| 1911 | 6,663,500 | 21.97 | 4,525,000 | 2,108,500 | 1940 | 310,000 |
| 1912 | 6,925,000 | 21.65 | 4,525,000 | 2,440,000 | 1940 | 430,000 |
| 1913 | 7,890,500 | 21.59 | 4,525,000 | 3,365,500 | 1940 | 1,110,000 |
| 1914 | 8,699,500 | 20.82 | 4,525,000 | 4,174,500 | 1940 | 1,070,000 |
| 1915 | 9,093,500 | 20.24 | 4,525,000 | 4,568,500 | 1940 | 710,000 |
| 1916 | 9,376,500 | 20.63 | 4,525,000 | 4,851,500 | 1940 | 642,000 |
| 1917 | 11,842,500 | 25.69 | 4,525,000 | 7,317,500 | 1941 | 895,000 |
| 1918 | 10,657,500 | 22.41 | 4,525,000 | 6,132,500 | 1941 | ------- |
| 1919 | 10,565,500 | 17.15 | 4,525,00 | 6,040,500 | 1941 | 500,000 |
| 1920 | 8,680,000 | 17.44 | 3,225,000 | 5,455,000 | 1941 | ------- |
| 1921 | 8,097,500 | 18.84 | 3,225,000 | 4,872,500 | 1941 | ------- |
| 1922 | 7,516,500 | 20.38 | 3,225,000 | 4,291,500 | 1941 | ------- |
| 1923 | 6,957,500 | 20.38 | 3,225,000 | 3,732,500 | 1941 | ------- |
| 1924 | 6,417,000 | 18.59 | 3,225,000 | 3,192,000 | 1941 | ------- |

charge, for a good which is constantly decreasing in value.

Actually, bonds are certificates of indebtedness, by means of which the repayment of borrowed money may be spread over several years. They are usually guaranteed by a lien on the property which they represent, although road bonds are really secured by the credit of the state or municipality which they represent. The state of Massachusetts has issued two types of bonds, - sinking fund bonds, and serial bonds.

Sinking fund bonds were the earliest kind used in this state, although none have been issued since 1909. They are paid as a whole at the end of their term, interest being paid annually. The name "sinking fund" arises because a certain proportion of the debt is put aside and invested annually so that at the end of the period it will amount to the face value of the bond. Frequently, however, there is some time lost between collection of the amount appropriated from general revenue for investment, and the actual investment of it. This means that a discrepancy exists between the amount of the interest on the sinking fund investment, and that of the bonds; a discrepancy which has to be made up by the borrower.

The sinking fund which must be raised each year to pay off a debt is given by the formula (25)

$$\text{Sinking fund} = \frac{i}{(1+i)^n - 1} \cdot p$$

in which

p = debt

n = payments, number of

i = per cent of interest on fund when it is invested to pay off debt.

For example, suppose the debt is $10,000, the average rate that can be expected from the sinking fund four per cent, and the time five years. Substituting

$$S = \frac{.04}{(1 + .04)^5 - 1} \cdot \$10,000$$

Solving

$$\text{Log} \quad (1 + .04)^5 = 5 \times .017033$$

$$= .085165$$

Taking the anti-log

$$(1 + .04)^5 = 1.21665$$

and $$(1 + .05)^5 = 0.21665$$

$$S = \frac{.04 \times \$10,000}{0.21665} = \$1846.27$$

The following tabular statement shows the growth of the sinking funds.

| Year | Sinking fund at beginning of year | Interest during year | Annual payments into sinking fund | Total sinking fund at end of year |
|---|---|---|---|---|
| 1 | 0 | 0 | $1846.27 | $1846.27 |
| 2 | $1846.27 | $ 73.85 | 1846.27 | 3766.39 |
| 3 | 3766.39 | 150.66 | 1846.27 | 5763.32 |
| 4 | 5763.32 | 230.53 | 1846.27 | 7840.12 |
| 5 | 7840.12 | 313.61 | 1846.27 | 10,000.00 |

It is unnecessary to solve the equasion to find the annual payment. Annuity tables similar to the one given in the bullotin of the United States Department of Agriculture Number 136 give in tabular form the annual payments required for different rates of interest. The difficulty with using a table

of this sort is illustrated in the following example in which a $50,000 debt at four per cent is to be retired in ten years. The annuity which will amount to one dollar in ten years at four per cent is .0832909 which, multiplied by $50,000, gives $4,164.55 as the annual payment.

| Year | Sinking fund at beginning of year | Interest during year | Annual payments into sinking fund | Total sinking fund at end of year |
|---|---|---|---|---|
| 1 | 0 | 0 | $4,164.55 | $4,164.55 |
| 2 | $4,164.55 | $264.58 | 4,164.55 | 8,593.68 |
| 3 | 8,593.68 | 343.75 | 4,164.55 | 13,101.98 |
| 4 | 13,101.98 | 524.08 | 4,164.55 | 17,790.61 |
| 5 | 17,790.61 | 711.62 | 4,164.55 | 22,666.78 |
| 6 | 22,666.78 | 906.67 | 4,164.55 | 27,738.00 |
| 7 | 27,738.00 | 1109.52 | 4,164.55 | 33,012.07 |
| 8 | 33,012.07 | 1320.48 | 4,164.55 | 38.497.10 |
| 9 | 38,497.10 | 1539.88 | 4,164.55 | 44,201.53 |
| 10 | 44,201.53 | 1768.06 | 4,164.55 | 50,134.14 |

This illustrates the big difficulty with a sinking fund bond; it is very difficult to figure an annuity to a cent, so that invariably there is a balance over the sum required, or a deficit. If a balance resulted, the municipal officers felt free to use it as they saw fit, and because of frequent changes in personnel, many towns were hopelessly confused in their accounting when this was done. The use of this kind of bond was prohibited for municipalities in 1913, not only for this reason, but also because of the misuse of the annual appropriation for the sinking fund. Frequently the appropriations were not invested promptly, or were invested unwisely. Sometimes the town officials actually used the sinking fund for some other purpose than investment, but the result was much the same in any case - the

town had too large a burden when the date for paying up the bonds arrived.

Serial bonds are bonds which have a fixed amount of the principal retireable at definite periods (usually annually), plus the interest on the unpaid portion up to that date. This type of bond is increasing in importance in this state, both for the state and for the municipalities. There are many formulae for retiring this type of bond, of which the following is probably the simplest:(26)

Annual payment for the $K^{th}$ year; p = principal; $\frac{1}{n}$ = amount to be retired annually.

$$\text{Annual payment} = p\left(\frac{1}{n} + i\left(1 + \frac{1-k}{n}\right)\right)$$

$$\text{Interest for the year} = pi\left(1 + \frac{1-k}{n}\right)$$

The amortization of serial bonds for highways is shown in the following table, which shows how a debt of $20,000 bearing five per cent interest would be paid by five annual payments.

| Year | Principal at beginning of year | Interest for year | Principal repaid at end of year | Total annual payment |
|---|---|---|---|---|
| 1 | $20,000 | $1,000 | $4,000 | $5,000 |
| 2 | 16,000 | 800 | 4,000 | 4,800 |
| 3 | 12,000 | 600 | 4,000 | 4,600 |
| 4 | 8,000 | 400 | 4,000 | 4,400 |
| 5 | 4,000 | 200 | 4,000 | 4,200 |
| | Totals | $3,000 | $20,000 | $23,000 |

The serial bonds are easier to handle, as well as less costly, than the sinking fund bonds, as is shown by the following table:(27)

Total cost of a $100,000 loan for twenty years, interest compounded annually.

| Annual Interest | Sinking fund compounded annually at | | | Serial |
|---|---|---|---|---|
| | 3% | 3½ % | 4% | |
| 4% | $154,431 | $150,722 | $147,163 | $142,000 |
| 4½ | 164,431 | 160,722 | 157,163 | 147,250 |
| 5 | 174,431 | 170,722 | 167,163 | 152,500 |
| 5½ | 184,431 | 180,722 | 177,163 | 157,750 |
| 6 | 194,431 | 190,722 | 187,163 | 163,000 |

Federal Aid to Massachusetts Roads.

The Constitution of the United States, in article 1, section 8, contains the following phrases:

"1.- - provide for the common defense and general welfare of the United States.

3.- - to regulate commerce with foreign nations and among the several states - -.

7.- - to establish post offices and post roads."

These are held to be constitutional authority for road building by the United States government, and have always been so construed. The earliest

federal highway was the Cumberland Road, which was authorized in 1802 to connect the Ohio River County with the eastern seaboard. The road was to have extended to Jefferson City, Missouri, but the superiority of the railroad for long distance traffic became apparent before its completion, with the result that the "National Pike" was discontinued. (28)

About 1880, the bicycling craze swept the county, culminating in the organization of a national league, the "Association of American Wheelmen" in 1887. (29) The outstanding purpose of this group was to encourage the building of good roads, and in 1893 their agitation caused the creation of the "Office of Public Roads Inquiry" in the United States Department of Agriculture. The purpose of this office was to supply speakers to "good road" conferences, answer inquiries, and collect highway data; but it had no authority to do any actual highway work.

In 1913, popular agitation for the improvement of roads reached its highest point, and forty measures were introduced into the 1912-1913 session of Congress, each providing for some form of Federal Aid. A compromise measure was finally passed which was approved by President Wilson on July 11, 1916. (Public Law #156, 64th Congress). The administration of this act was controlled by the Bureau of Public Roads in the Department of Agriculture.

This act made $5,000,000 immediately available for roads out of a fund of $75,000,000 which was to be put aside for roads during the following five years. This money was distributed to each state in an amount apportioned on the following bases:

a. 1/3 in the ratio which the area of the state bears to the area of the United States.

b. 1/3 in the ratio which the population of the state bears to the population of the United States.

c. 1/3 in the ratio which the mileage of rural delivery and

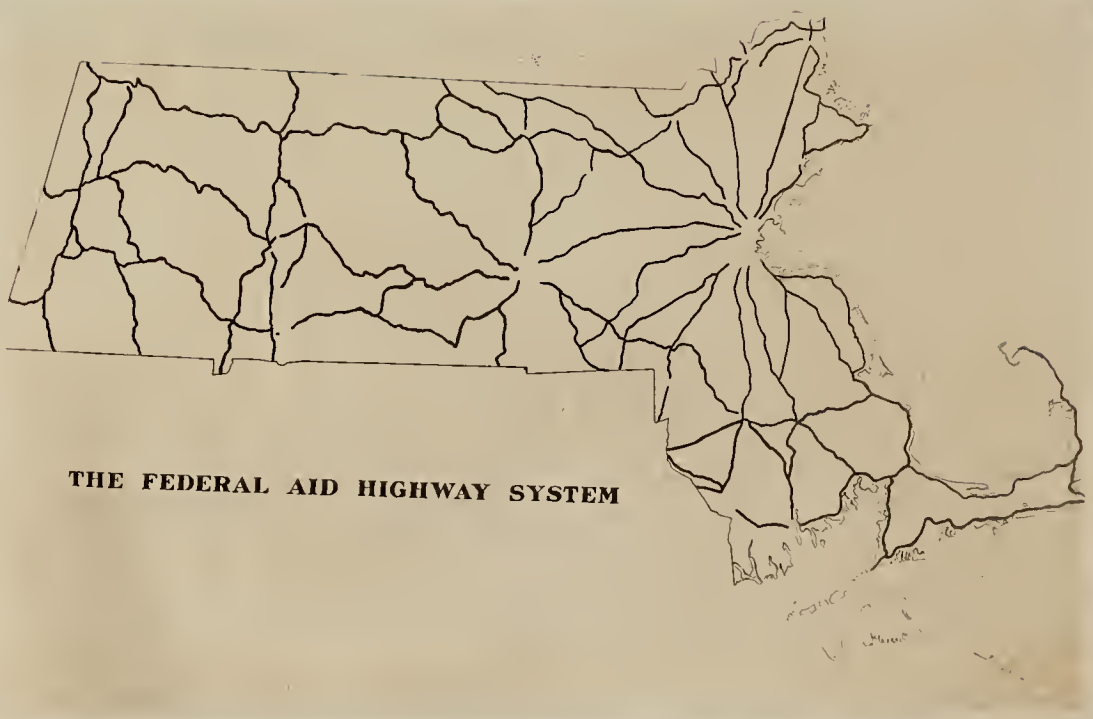
star routes in the state bears to the total mileage in all the states.

There were other provisions in the law also which were for the purpose of making the division of funds fair to all the states. One regulated the proportion which the United States might pay on any road to fifty per cent of the cost of construction; another required that all expenditures of federal money in the states should be made through a state highway department; another provided that federal money should be used to build highways only when the distance between the dwellings along the side of the highway averaged more than two hundred feet.

In 1919, a $200,000,000 increase was made in the federal appropriation. In 1921, the Federal Highway Act (See appendix) was passed which provided that each state should designate a system of highways not to exceed seven per cent of the total highway mileage of the state, upon which all federal Aid money should be expended. The Massachusetts Federal Aid System, comprising 1308 miles, is shown in Map 4. In every state four-sevenths of this system consists of inter-county highways; the remaining three-sevenths of inter-state or primary highways. Not more than sixty per cent of the federal allotment may be spent on the primary highways. When a state has completely constructed its original seven per cent of federal highways, the remainder of the federal money may be allotted to construct any other roads which the state highway department may designate, and the Bureau of Public Roads approve (as agents for the Secretary of Agriculture.) This act made available $50,000,000 in 1923, $65,000,000 in 1924, and $75,000,000 in 1925.

The total amount which Massachusetts has received from the federal government is as follows:

(30)



THE FEDERAL AID HIGHWAY SYSTEM

| | | |
|---|---|---|
| For fiscal year ending June 30, | 1917 | $73,850.95 |
| " " " " " " | 1918 | 147,701.90 |
| " " " " " " | 1919 | 958,145.15 |
| " " " " " " | 1920 | 1,400,078.27 |
| " " " " " " | 1921 | 1,472,788.83 |
| " " " " " " | 1922 | 1,096,176.04 |
| " " " " " " | 1923 | 730,784.03 |
| " " " " " " | 1924 | 950,448.62 |
| " " " " " " | 1925 | 1,089,806.22 |
| | TOTAL | $7,919,780.01 |

The amount expended annually differs materially from this figure, for a large balance of Federal Aid money is usually carried from year to year. This is explained by the fact that although the federal government had assented to projects totalling 359.9 miles on November 30, 1924 (the latest available figure), the constructed mileage was actually 329 miles,(31) so that the appropriations for the other thirty miles of road are carried as a balance.

The total mileage included to November 30, 1924 in the Federal Aid projects in Massachusetts is by counties:

| | |
|---|---|
| Barnstable | 39.41 miles |
| Berkshire | 93.42 " |
| Bristol | 55.44 " |
| Dukes | 10.58 " |
| Essex | 49.89 " |
| Franklin | 68.79 " |
| Hampden | 22.54 " |
| Hampshire | 19.30 " |

| | | |
|---|---|---|
| Middlesex | 38.80 | miles |
| Norfolk | 29.51 | " |
| Plymouth | 25.86 | " |
| Worcester | 51.61 | " |
| Total | 359.98 | miles |

As the road mileage of Massachusetts is 18,868 miles, this Federal Aid mileage represents about two per cent of the total road mileage, and about five per cent of the improved road mileage of the state. Fourteen and three-tenths per cent of the Federal Aid mileage approved is in Worcester County, 29 per cent is west of Worcester County, and 56.7 per cent is east of Worcester.

Many people fail to realize that a federal grant of money for any purpose must come from the federal taxes collected as internal revenue.

Inasmuch as good roads have been made necessary by the automobile, it is interesting to compare the amounts collected by the excise tax on automobiles and accessories from this state with the amounts returned by the federal government for road construction. The first provision for an excise tax on automobiles was contained in the Tax Bill of 1917 (under War Excise Taxes, Title VI), and consisted of a three per cent tax on the selling price of automobiles and motorcycles. This was amended by the Revenue Act of 1921, section 900, which raised the tax on automobiles (excluding trucks and accessories) to five per cent. In March 1926, this was reduced to three per cent. Under the terms of this law, Massachusetts has paid the following taxes and received the following grants:

| Year | Total Mass. Internal Revenue Contribution | Automobile Excise | | Federal Aid to Mass. Highways | |
|---|---|---|---|---|---|
| | | Amount | % of total | Amount | % of Excise |
| 1916 | $16,059,024.68 | | | | |
| 1917 | 29,796,108.38 | | | $ 73,850.95 | |
| 1918 | 191,814,297.99 | $ 134,654.17 # | .007 | 147,701.90 | 109.68 |
| 1919 | 245,731,169.39 | 427,663.68 | .0017 | 958,145.15 | 224.04 |
| 1920 | 352,022,233.29 | 3,381,315.13 | .0096 | 1,400,078.27 | 41.41 |
| 1921 | 259,865,213.85 | 2,307,023.51 | .0088 | 1,472,788.83 | 63.83 |
| 1922 | 169,813,493.51 | 2,483,140.23 | .01462 | 1,096,176.04 | 47.51 |
| 1923 | 139,093,670.44 | 2,405,440.40 | .01729 | 730,784.03 | 30.38 |
| 1924 | 138,681,654.73 | 2,466,174.89 | .01778 | 950,448.62 | 38.53 |
| 1925 | 118,909,084.22 | 1,936,550.92 | .1628 | 1,089,806.22 | 56.27 |

# Three months

The federal government has returned 50.8 per cent of the excise tax on automobiles and accessories in the form of Federal Aid to Massachusetts highways; but when we consider the total contribution of this state to the revenue of the United States, the return made is indeed small. According to figures prepared by Senator David A. Reed of Pennsylvania, Massachusetts paid (32) five per cent (.046) of the total federal revenue in 1925, and received 1.39 per cent of the total federal grants to states. This is surpassed only by New York, which received about one per cent (.0087) of the amount paid into the federal treasury. New Mexico, on the other hand, received 353.69 per cent of her contribution, while Nevada realized 319.15 per cent.

County Highway Financing.

A second agent, although a relatively unimportant one, in constructing and maintaining roads in Massachusetts is the county. The following table shows the amounts spent for highways by the counties of this state. The county reports are not available in detail, however, so these figures are doubtless less accurate than either the state or the town figures used. The method of computing the amounts spent for construction and maintenance also offers opportunity for error. The amounts contributed to the state department of highways by the counties for road construction is designated as a construction expenditure; the rest is included in maintenance because, strictly speaking, there are no county built roads. Obviously this is a rough classification, but it seems the most logical under the circumstances. The figures are taken from the annual state publication "Statistics of County Finances" 1909-1923, while the amounts repaid by the counties to the state for highway construction are taken each year from the Auditor's report until 1921, and the Comptroller's report in 1922 and 1923.

These figures, although inaccurate, point out the importance of maintenance expenditures in Massachusetts. This places Massachusetts with the group of states which have completed the major part of their improved highway systems, and are forced primarily to maintain rather than construct roads.

The counties raise their money from county taxes, which are contributed by the towns. The county commissioners budget the county expenses each year, and then assess each town in the county for its share of the county tax. This county tax is levied at the state rate ($27.71 in 1925), and is appropriated each year at the annual town meetings.

The counties may issue bonds for any county purpose (General Laws 1921, chapter 34), such as highways, bridges and county buildings.

COUNTY EXPENDITURES FOR HIGHWAYS IN MASSACHUSETTS

| Year | Total Expenditure | Expenditure for Construction | Expenditure for Maintenance |
|---|---|---|---|
| 1909 | $ 421,741.20 | $ 190,329.28 | $ 231,411.92 |
| 1910 | 383,063.36 | 162,687.42 | 220,375.94 |
| 1911 | 368,595.77 | 148,288.57 | 220,307.20 |
| 1912 | 532,881.68 | 261,205.44 | 271,676.24 |
| 1913 | 600,838.08 | 143,259.89 | 457,578.19 |
| 1914 | 705,407.73 | 347,731.93 | 357,675.80 |
| 1915 | 68 ,659.26 | 402,196.64 | 278,462.62 |
| 1916 | 840,856.76 | 323,615.75 | 517,241.01 |
| 1917 | 898,937.08 | 331,989.79 | 566,947.29 |
| 1918 | 903,616.00 | 300,731.68 | 602,884.32 |
| 1919 | 929,189.72 | 201,408.78 | 727,780.94 |
| 1920 | 1,885,598.80 | 165,314.30 | 1,720,283.50 |
| 1921 | 4,758,564.83 | 302,229.75 | 4,456,335.08 |
| 1922 | 3,693,449.11 | 728,423.71 | 2,965,025.40 |
| 1923 | 3,095,443.81 | 584,241.01 | 2,511,202.80 |

There is no limit by statute on their bonding capacity. All the bonds issued are grouped together in the reports, however. There is no method of getting the total of highway bonds separately. The county commissioners may also pay for highways by issuing one year notes in anticipation of revenue or special assessments. Again it is impossible to find out which of those notes were issued for highway purposes, because of the lack of adequate records.

## Town Financing.

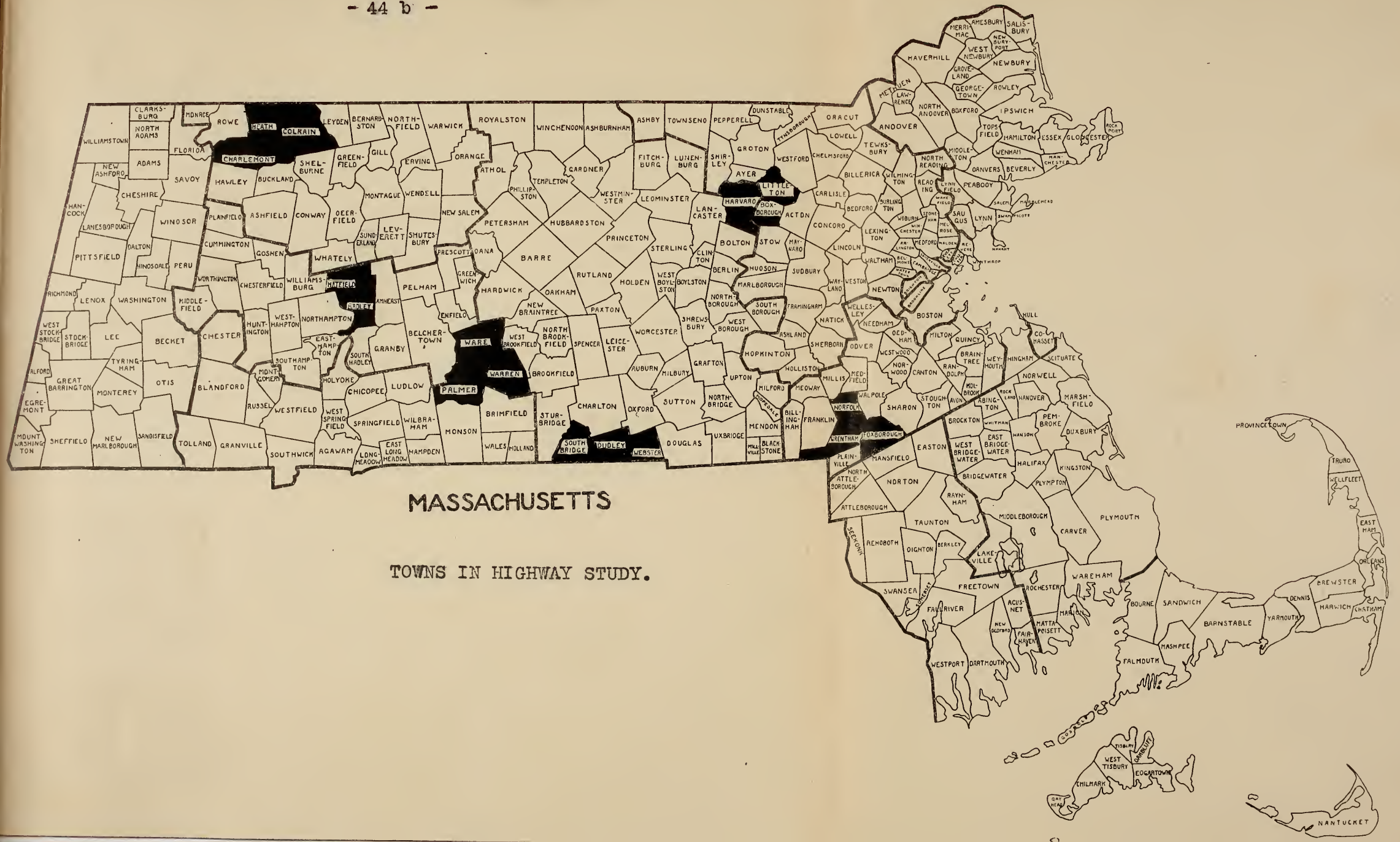
For the average Massachusetts town, the amount of money spent for highways is only exceeded by that spent for schools. The following table shows the amount of money spent annually for constructing and maintaining roads by the towns in this state. A large expenditure for maintenance is again noticeable; another indication that most of the town roads are already constructed, and that the present problem is one of maintenance.

To make the problem of highway financing specific, six groups, each comprising three towns, were selected because they were felt to be typical of particular sections of the state. The locations of the towns are shown on the following map; their populations and areas are indicated in table 12 . Four of the groups are mainly agricultural in their interests. The other two groups were chosen because they were industrial towns, and hence might present interesting comparisons. The agricultural towns are Hadley, Hatfield and Sunderland; Charlemont, Heath and Colrain; Littleton, Boxboro and Harvard; Foxborough, Brentham and Norfolk. The industrial groups comprise Palmer, Ware and Warren; Southbridge, Dudley and Webster.

The finances of these towns were studied in some detail, the results being shown in the following tables. The figures in each case were taken from the annual state report on "Statistics of Municipal Finances" published by the Division of Accounts of the Department of Corporations and Taxation. The total expenditures for each town were recorded, together with the expenditures for general administration, protection of persons and property, education, and highways. These were then combined into groups corresponding to the groups mentioned above. Index numbers were then computed with the 1909 figure as a base. The resulting comparisons are shown on the following charts.

TOWN EXPENDITURES FOR HIGHWAYS IN MASSACHUSETTS

| Year | Total Expenditure | Expenditure for Construction | Expenditure for Maintenance |
|---|---|---|---|
| 1909 | $ 3,159,466.93 | $ 840,676.37 | $ 2,318,790.56 |
| 1910 | 3,794,654.00 | 1,254,870.87 | 2,539,783.13 |
| 1911 | 3,856,142.49 | 1,280,155.52 | 2,575,986.97 |
| 1912 | 4,956,105,85 | 1,883,075.34 | 3,073,030.51 |
| 1913 | 5,301,098.81 | 2,011,866.43 | 3,289,232.38 |
| 1914 | 5,586,509.66 | 2,088,097.34 | 3,498,412.32 |
| 1915 | 5,873,433.36 | 2,165,946.34 | 3,707,487.02 |
| 1916 | 6,096,973.14 | 2,111,058.17 | 3,985,914.97 |
| 1917 | 6,354,262.60 | 2,135,292.94 | 4,218,969.66 |
| 1918 | 5,629,876.66 | 1,427,139.22 | 4,202,737.44 |
| 1919 | 7,797,100.98 | 2,595,862.29 | 5,201,238.69 |
| 1920 | 10,557,407.74 | 3,525,424.99 | 7,031,982.75 |
| 1921 | 10,952,954.31 | 4,078,895.02 | 6,874,052.29 |
| 1922 | 10,976,396.86 | 4,111,755.23 | 6,864,641.63 |
| 1923 | 12,358,480.08 | 4,601,921.61 | 7,756,558.47 |


MASSACHUSETTS
TOWNS IN HIGHWAY STUDY.

## TOWNS IN HIGHWAY STUDY

| | Area Square Miles | Population 1910 | 1915 | 1920 |
|---|---|---|---|---|
| Boxboro | 10.4 | 317 | 336 | 298 |
| Charlemont | 26. | 1,001 | 977 | 808 |
| Colrain | 43.2 | 1,741 | 1,829 | 1,607 |
| Dudley | 21.1 | 4,267 | 4,373 | 3,701 |
| Foxborough | 19.8 | 3,863 | 5,755 | 4,136 |
| Hadley | 23.1 | 1,999 | 2,666 | 2,734 |
| Harvard | 26.4 | 1,054 | 1,104 | 2,546 |
| Hatfield | 16.2 | 1,986 | 2,630 | 2,651 |
| Heath | 24.9 | 346 | 383 | 325 |
| Littleton | 16.5 | 1,229 | 1,223 | 1,277 |
| Norfolk | 15.1 | 960 | 1,268 | 1,159 |
| Palmer | 31.5 | 8,610 | 9,468 | 9,896 |
| Southbridge | 20.4 | 12,598 | 14,217 | 14,245 |
| Sunderland | 14.4 | 1,047 | 1,278 | 1,289 |
| Ware | 28.5 | 8,774 | 9,346 | 8,525 |
| Warren | 27.5 | 4,1[illegible] | 4,268 | 3,467 |
| Webster | 12.5 | 11,509 | 12,565 | 13,258 |
| Wrentham | 22. | 1,743 | 2,414 | 2,[illegible]08 |

## SUMMARY OF TOTAL EXPENDITURES

## HADLEY -- SUNDERLAND -- HATFIELD

| Year | Total Expenditure | % of Change | Per Capita | % of Change | % of Total | General Administration | % of Change | Per Capita | % of Change | % of Total | Protection | % of Change | Per Capita | % of Change | % of Total | Highways | % of Change | Per Capita | % of Change | % of Total | Schools | % of Change | Per Capita | % of Change | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | $65,993.33 | 100 | $ 13.11 | 100 | 100 | $ 4,473.73 | 100 | $ .89 | 100 | 6.78 | $ 2,072.81 | 100 | $ .41 | 100 | 3.14 | $ 15,620.10 | 100 | $ 3.10 | 100 | 23.67 | $26,398.80 | 100 | $ 5.24 | 100 | 40 |
| 1910 | 62,441.72 | 94.62 | 12.91 | 94.66 | 100 | 4,436.84 | 99.1 | .88 | 98.8 | 7.10 | 2,668.40 | 128.3 | .53 | 129.2 | 4.27 | 17,419.67 | 111.5 | 3.46 | 111.6 | 27.9 | 27,057.97 | 102.5 | 5.36 | 102.2 | 43.33 |
| 1911 | 70,573.05 | 106.94 | 14.02 | 106.94 | 100 | 4,863.69 | 108.7 | .96 | 107.8 | 6.89 | 1,140.65 | 55. | .23 | 56.1 | 1.62 | 21,953.44 | 140.5 | 4.36 | 140.6 | 31.11 | 29,423.13 | 111.4 | 5.85 | 111.6 | 41.69 |
| 1912 | 79,771.99 | 120.88 | 15.85 | 120.9 | 100 | 6,161.88 | 137.7 | 1.22 | 137.1 | 7.72 | 1,552.99 | 74.8 | .31 | 75.6 | 1.95 | 25,354.59 | 162.3 | 5.04 | 162.6 | 31.78 | 34,182.25 | 129.5 | 6.79 | 129.6 | 42.85 |
| 1913 | 116,705.90 | 176.84 | 23.19 | 176.88 | 100 | 3,895.36 | 86.9 | .77 | 86.5 | 3.34 | 2,048.82 | 98.9 | .40 | 97.6 | 1.75 | 56,963.24 | 364.6 | 11.31 | 364.8 | 48.81 | 29,266.13 | 110.8 | 5.81 | 110.8 | 25.08 |
| 1914 | 149,949.11 | 227.27 | 29.80 | 227.3 | 100 | 4,765.55 | 106.4 | .95 | 106.7 | 3.18 | 2,894.01 | 139.4 | .57 | 139. | 1.93 | 55,050.20 | 352.4 | 10.94 | 353. | 36.71 | 72,389.97 | 274.2 | 14.36 | 274. | 48.27 |
| 1915 | 117,520.35 | 178.09 | 17.87 | 136.3 | 100 | 5,798.39 | 129.4 | .88 | 98.8 | 4.93 | 3,044.12 | 146.6 | .46 | 112.2 | 2.59 | 34,848.42 | 223.1 | 5.30 | 171. | 29.65 | 55,338.99 | 209.6 | 8.42 | 160.7 | 47.09 |
| 1916 | 114,358.01 | 173.29 | 17.39 | 132.64 | 100 | 6,506.56 | 145.3 | .99 | 111.2 | 5.69 | 3,049.55 | 146.7 | .46 | 112.2 | 2.67 | 42,575.96 | 272.6 | 6.47 | 208.7 | 37.23 | 43,810.87 | 166. | 6.66 | 127.1 | 38.31 |
| 1917 | 115,627.80 | 175.21 | 17.59 | 134.17 | 100 | 6,381.54 | 142.6 | .97 | 109. | 5.52 | 2,544.05 | 122.5 | .39 | 95.1 | 2.2 | 42,411.33 | 271.5 | 6.45 | 208.1 | 36.68 | 48,627.48 | 184.2 | 7.40 | 141.2 | 42.05 |
| 1918 | 123,765.79 | 187.54 | 18.83 | 143.63 | 100 | 6,188.77 | 138.1 | .94 | 105.6 | 4.99 | 1,979.25 | 95.5 | .30 | 73.2 | 1.6 | 44,824.71 | 286.9 | 6.82 | 220. | 36.22 | 50,582,96 | 191.6 | 7.69 | 146.7 | 40.87 |
| 1919 | 135,465.80 | 205.26 | 20.60 | 157.13 | 100 | 6,725.29 | 150.2 | 1.02 | 114.6 | 4.96 | 1,696.46 | 82. | .26 | 63.4 | 1.25 | 36,999.63 | 236.8 | 5.62 | 181.3 | 27.31 | 70,365.53 | 266.6 | 10.70 | 204.2 | 51.95 |
| 1920 | 195,944.10 | 296.91 | 29.19 | 222.65 | 100 | 7,772.39 | 173.7 | 1.16 | 130.3 | 3.97 | 2,547.10 | 123. | .38 | 92.7 | 1.3 | 78,883.49 | 504.9 | 11.73 | 378.4 | 40.26 | 82,218.07 | 311.4 | 12.23 | 233.4 | 41.96 |
| 1921 | 269,547.74 | 408.44 | 40.09 | 305.79 | 100 | 8,294.48 | 185.3 | 1.23 | 138.2 | 3.08 | 4,004.42 | 192.9 | .59 | 144. | 1.49 | 73,546.93 | 470.8 | 10.94 | 353. | 27.28 | 158,126.19 | 599. | 23.52 | 448.8 | 58.66 |
| 1922 | 237,012.94 | 434.9 | 42.68 | 325.55 | 100 | 7,958.58 | 177.9 | 1.18 | 132.6 | 2.77 | 4,793.39 | 231.1 | .71 | 173.2 | 1.67 | 57,379.01 | 367.3 | 8.53 | 275.16 | 19.99 | 174,966.35 | 662.8 | 26.02 | 496.5 | 60.96 |
| 1923 | 216,256.09 | 327.69 | 32.16 | 245.31 | 100 | 10,071.87 | 225.1 | 1.50 | 168.5 | 4.65 | 4,890.43 | 236. | .73 | 178. | 2.26 | 46,296.81 | 296.4 | 6.88 | 221.9 | 21.41 | 120,463.51 | 456.3 | 17.91 | 341.8 | 55.7 |

## SUMMARY OF TOTAL EXPENDITURES

## BOXBORO -- LITTLETON -- HARVARD

| Year | Total Expenditure | % of Change | Per Capita | % of Change | % of Total | General Administration | % of Change | Per Capita | % of Change | % of Total | Protection | % of Change | Per Capita | % of Change | % of Total | Highways | % of Change | Per Capita | % of Change | % of Total | Schools | % of Change | Per Capita | % of Change | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | $ 49,223.38 | 100 | $ 19.08 | 100 | 100 | $ 5,073.54 | 100 | $ 1.97 | 100 | 10.3 | $ 3,824.51 | 100 | $ 1.48 | 100 | 7.76 | $ 6,780.44 | 100 | $ 2.62 | 100 | 13.77 | $ 18,965.51 | 100 | $ 7.34 | 100 | 38.52 |
| 1910 | 51,390.62 | 104.4 | 19.92 | 104.4 | 100 | 4,577.36 | 90.22 | 1.77 | 89.8 | 8.9 | 4,863.51 | 127.15 | 1.88 | 127. | 9.46 | 5,617.29 | 82.84 | 2.17 | 82.8 | 10.93 | 10,039.70 | 105.66 | 7.76 | 105.7 | 38.99 |
| 1911 | 91,197.50 | 185.27 | 35.35 | 185.27 | 100 | 3,764.66 | 74.20 | 1.45 | 73.6 | 4.12 | 4,628.11 | 121.01 | 1.79 | 120.9 | 5.07 | 7,183.05 | 105.92 | 2.78 | 106.1 | 7.87 | 19,753.91 | 104.15 | 7.65 | 104.2 | 21.65 |
| 1912 | 95,616.17 | 194.25 | 37.06 | 194.23 | 100 | 4,310.64 | 84.95 | 1.67 | 84.7 | 4.5 | 9,190.35 | 240.29 | 3.56 | 240.5 | 9.61 | 9,652.13 | 142.35 | 3.74 | 142.7 | 10.09 | 21,195.23 | 111.75 | 8.2 | 111.7 | 22.16 |
| 1913 | 76,967.48 | 156.36 | 29.83 | 156.34 | 100 | 5,261.01 | 103.7 | 2.03 | 103. | 6.83 | 7,652.04 | 200.01 | 2.96 | 200 | 9.94 | 15,032.64 | 221.69 | 5.82 | 222.1 | 19.53 | 21,396.21 | 112.81 | 8.29 | 112.9 | 27.79 |
| 1914 | 72,608.02 | 147.51 | 28.14 | 147.48 | 100 | 4,616.73 | 90.98 | 1.78 | 90.3 | 6.35 | 6,994.07 | 182.87 | 2.7 | 182.4 | 9.63 | 12,045.88 | 177.64 | 4.66 | 177.9 | 16.58 | 18,152.66 | 95.71 | 7.03 | 95.8 | 24.99 |
| 1915 | 83,503.75 | 169.64 | 31.42 | 164.67 | 100 | 5,199.26 | 102.47 | 1.95 | 98.9 | 6.22 | 7,052.59 | 184.38 | 2.65 | 179. | 8.44 | 23,194.31 | 342.06 | 8.72 | 332.8 | 27.77 | 22,715.66 | 119.77 | 7.13 | 97.1 | 27.2 |
| 1916 | 85,144.63 | 172,97 | 32.03 | 167.87 | 100 | 5,970.61 | 117.67 | 2.25 | 114.2 | 7.01 | 6,734.94 | 176.07 | 2.53 | 170.9 | 7.9 | 26,044.19 | 384.10 | 9.8 | 374.1 | 30.58 | 23,967.16 | 126.37 | 9.01 | 122.7 | 28.14 |
| 1917 | 90,049.53 | 182.94 | 33.88 | 177.56 | 100 | 4,778.69 | 94.17 | 1.8 | 91.4 | 5.3 | 6,193.55 | 161.94 | 2.33 | 157.4 | 6.87 | 23,941.22 | 353.08 | 9.01 | 344. | 26.58 | 24,643.06 | 129.94 | 9.27 | 126.3 | 27.36 |
| 1918 | 90,803.47 | 184.47 | 34.16 | 179.03 | 100 | 5,204.80 | 102.57 | 1.95 | 98.9 | 5.73 | 7,706.72 | 201.49 | 2.9 | 196. | 8.48 | 25,212.76 | 311.82 | 9.48 | 361.8 | 27.76 | 24,436.48 | 128.84 | 9.19 | 125.2 | 26.91 |
| 1919 | 100,404.07 | 203.97 | 37.77 | 197.95 | 100 | 6,882.56 | 135.64 | 2.59 | 131.5 | 6.85 | 6,860.11 | 179.37 | 2.58 | 174.3 | 6.83 | 21,745.37 | 320.70 | 8.18 | 312.2 | 21.65 | 29,182.91 | 153.87 | 10.97 | 149.4 | 29.06 |
| 1920 | 153,434.68 | 311.71 | 37.23 | 195.12 | 100 | 7,258.99 | 143 .07 | 1.75 | 88.8 | 4.73 | 9,791.02 | 256. | 2.39 | 160.1 | 6.38 | 52,586.52 | 775.54 | 12.75 | 486.6 | 34.27 | 40,072.34 | 211.29 | 9.72 | 132.4 | 26.11 |
| 1921 | 161,277.27 | 327.64 | 39.13 | 205.08 | 100 | 7,615.48 | 150.09 | 1.84 | 93.4 | 4.72 | 10,521.68 | 275.09 | 2.55 | 172.3 | 6.52 | 57,990.22 | 855.24 | 14.07 | 537. | 35.95 | 44,351.84 | 233.85 | 10.76 | 146.6 | 27.49 |
| 1922 | 196,611.85 | 399.43 | 47.71 | 250.05 | 100 | 7,692.13 | 151.61 | 1.86 | 94.4 | 3.91 | 15,580.56 | 407.37 | 3.78 | 255.4 | 7.92 | 49,068.49 | 723.65 | 11.9 | 454.2 | 24.95 | 77,538.57 | 408.83 | 18.81 | 256.2 | 39.43 |
| 1923 | 196,338.60 | 398.87 | 47.64 | 249.68 | 100 | 8,733.97 | 172.15 | 2.11 | 107.1 | 4.44 | 15,972.92 | 417.61 | 3.87 | 261.4 | 8.13 | 58,484.38 | 862.52 | 14.19 | 541.6 | 29.78 | 72,297.35 | 381.2 | 17.54 | 238.9 | 36.82 |

SUMMARY OF TOTAL EXPENDITURES

CHARLEMONT -- HEATH -- COLRAIN

| Year | Total Expenditure | % of Change | Per Capita | % of Change | % of Total | General Administration | % of Change | Per Capita | % of Change | % of Total | Protection | % of Change | Per Capita | % of Change | % of Total | Highways | % of Change | Per Capita | % of Change | % of Total | Schools | % of Change | Per Capita | % of Change | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | $ 34,938.00 | 100 | $ 11.31 | 100 | 100 | $ 2,750.61 | 100 | $ .89 | 100 | 7.87 | $ 115.75 | 100 | $ .04 | 100 | .33 | $ 6,950.75 | 100 | $ 2.25 | 100 | 19.89 | $ 19,502.99 | 100 | $ 6.31 | 100 | 55.81 |
| 1910 | 35,485.40 | 101.56 | 11.49 | 101.49 | 100 | 2,230.40 | 81.1 | .72 | 80.9 | 6.28 | 262.97 | 227.2 | .09 | 225 | .74 | 7,436.81 | 107 | 2.41 | 107.1 | 20.95 | 20,039.24 | 102.7 | 6.49 | 102.8 | 56.47 |
| 1911 | 40,678.95 | 116.43 | 13.17 | 116.44 | 100 | 2,752.72 | 100.01 | .89 | 100 | 6.76 | 242.60 | 209.6 | .08 | 200 | .59 | 12,475.81 | 179.5 | 4.04 | 179.5 | 30.67 | 18,869.44 | 96.7 | 6.11 | 96.8 | 46.39 |
| 1912 | 40,303.27 | 115.36 | 13.05 | 115.38 | 100 | 2,417.01 | 87.87 | .78 | 87.6 | 5.99 | 346.74 | 299.6 | .11 | 275. | .86 | 12,092.09 | 174 | 3.92 | 174.2 | 30 | 20,287.83 | 104 | 6.57 | 104.1 | 50.34 |
| 1913 | 48,894.48 | 139.94 | 15.83 | 139.96 | 100 | 3,170.18 | 115.24 | 1.03 | 115.7 | 6.48 | 278.09 | 240.3 | .09 | 225 | .57 | 19,926.09 | 286.7 | 6.45 | 286.7 | 40.75 | 20,281.28 | 104 | 6.56 | 103.9 | 41.48 |
| 1914 | 48,140.23 | 137.79 | 15.59 | 137.84 | 100 | 2,618.26 | 95.2 | .85 | 95.5 | 5.44 | 940.44 | 812.5 | .30 | 750 | 1.95 | 19,579.00 | 281.7 | 6.33 | 281.3 | 40.67 | 20,047.73 | 102.8 | 6.49 | 102.8 | 41.64 |
| 1915 | 69,168.87 | 197.97 | 21.69 | 191.77 | 100 | 3,024.88 | 110. | .95 | 106.7 | 4.37 | 597.10 | 515.8 | .18 | 450 | .86 | 35,285.88 | 507.7 | 11.06 | 491.5 | 51.01 | 23,953.10 | 122.8 | 7.51 | 119. | 34.63 |
| 1916 | 80,790.73 | 231.24 | 25.33 | 223.96 | 100 | 2,782.63 | 101.1 | .87 | 97.7 | 3.44 | 657.35 | 567.9 | .21 | 525 | .81 | 47,169.67 | 678.6 | 14.79 | 657.3 | 58.38 | 23,638.07 | 121.2 | 7.41 | 117.4 | 29.25 |
| 1917 | 79,429.26 | 227.34 | 24.90 | 220.16 | 100 | 2,807.63 | 102. | .88 | 98.8 | 3.53 | 409.82 | 354.1 | .13 | 325 | .51 | 44,541.52 | 640.17 | 13.97 | 620.9 | 56.07 | 24,588.46 | 126.1 | 7.71 | 122.2 | 30.95 |
| 1918 | 84,088.29 | 240.68 | 26.36 | 233.07 | 100 | 3,241.29 | 117.8 | 1.02 | 114.6 | 3.85 | 297.19 | 256.7 | .09 | 225 | .35 | 46,063.91 | 662.6 | 14.44 | 641.8 | 54.78 | 26,798.86 | 137.4 | 8.40 | 133.1 | 31.86 |
| 1919 | 64,731.98 | 185.27 | 20.30 | 179.48 | 100 | 3,323.10 | 120.8 | 1.04 | 116.8 | 5.13 | 229.96 | 198.6 | .07 | 175 | .35 | 19,343.51 | 278.2 | 6.06 | 269.3 | 29.88 | 33,568.63 | 172.1 | 10.53 | 166.9 | 51.85 |
| 1920 | 86,142.36 | 246.56 | 31.44 | 277.98 | 100 | 4,888.74 | 177.7 | 1.78 | 200 | 5.67 | 214.01 | 184.9 | .08 | 200 | .26 | 28,896.89 | 415.7 | 10.54 | 468.4 | 33.54 | 43,559.87 | 223.3 | 15.90 | 251.9 | 50.56 |
| 1921 | 87,009.13 | 249.04 | 31.75 | 280.72 | 100 | 4,377.64 | 159.1 | 1.60 | 179.7 | 5.03 | 461.26 | 398.5 | .17 | 425 | .53 | 26,742.30 | 384.7 | 9,76 | 433.8 | 30.73 | 47,764.69 | 244.9 | 17.43 | 276.2 | 54.89 |
| 1922 | 97,583.38 | 279.30 | 35.61 | 314.85 | 100 | 4,166.11 | 151.4 | 1.52 | 170.7 | 4.27 | 325.14 | 280.9 | .12 | 300 | .33 | 31,346.52 | 453.7 | 11.44 | 508.4 | 32.12 | 51,978.13 | 266.5 | 18,97 | 300.6 | 53.26 |
| 1923 | 104,535.26 | 299.20 | 38.15 | 337.31 | 100 | 5,548.54 | 201.7 | 2.03 | 228. | 5.30 | 1,775.05 | 1533.5 | .65 | 1525 | 1.69 | 35,720.75 | 513.9 | 13.04 | 579.5 | 34.17 | 52,841.79 | 270.9 | 19.28 | 305.5 | 50.54 |

## SUMMARY OF TOTAL EXPENDITURES

## FOXBOROUGH -- NORFOLK -- WRENTHAM

| Year | Total Expenditure | % of Change | Per Capita | % of Change | % of Total | General Administration | % of Change | Per Capita | % of Change | % of Total | Protection | % of Change | Per Capita | % of Change | % of Total | Highways | % of Change | Per Capita | % of Change | % of Total | Schools | % of Change | Per Capita | % of Change | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | $ 92,123.83 | 100 | $ 14.03 | 100 | 100 | $ 6,112.05 | 100 | $ .93 | 100 | 6.63 | $ 8,654.25 | 100 | $ 1.31 | 100 | 9.39 | $ 16,288.58 | 100 | $ 2.48 | 100 | 17.68 | $ 32,169.63 | 100 | $ 4.90 | 100 | 34.92 |
| 1910 | 103,038.06 | 111.84 | 15.69 | 111.83 | 100 | 7,218.21 | 118.1 | 1.10 | 118.3 | 7. | 12,744.51 | 147.2 | 1.94 | 148.1 | 12.37 | 18,026.94 | 110.7 | 2.75 | 110.9 | 17.49 | 38,459.19 | 119.6 | 5.86 | 119.6 | 37.32 |
| 1911 | 96,862.27 | 105.14 | 14.75 | 105.13 | 100 | 6,999.36 | 114.5 | 1.07 | 115. | 7.22 | 8,258.12 | 95.4 | 1.26 | 96.2 | 8.52 | 12,638.59 | 77. 6 | 1.92 | 77.4 | 13.04 | 34,462.02 | 107.1 | 5.26 | 107.2 | 35.57 |
| 1912 | 107,244.90 | 116.41 | 16.33 | 116.39 | 100 | 7,756.33 | 126.9 | 1.18 | 126.9 | 7.23 | 11,865.60 | 137. | 1.81 | 138.2 | 11.06 | 16,539.25 | 101.5 | 2.52 | 101.6 | 15.42 | 39,565.60 | 123. | 6.03 | 123. | 36.89 |
| 1913 | 105,989.88 | 115.05 | 16.13 | 114.97 | 100 | 8,207.89 | 134.3 | 1.25 | 134.4 | 7.74 | 10,912.65 | 126. | 1.66 | 126.7 | 10.29 | 17,194.03 | 105.5 | 2.62 | 105.6 | 16.22 | 39,859.52 | 123.9 | 6.07 | 123.8 | 37.60 |
| 1914 | 104,076.09 | 112.97 | 15.85 | 112.97 | 100 | 7,483.75 | 122.4 | 1.14 | 122.6 | 7.18 | 13,076.64 | 151.1 | 1.99 | 152. | 12.56 | 19,093.44 | 117.2 | 2.91 | 117.3 | 18.34 | 38,830.42 | 120.7 | 5.91 | 120.6 | 37.31 |
| 1915 | 119,767.89 | 130.00 | 18.60 | 132.57 | 100 | 9,016.73 | 147.5 | 1.40 | 150.5 | 7.52 | 13,185.39 | 152.4 | 2.09 | 155.7 | 11 | 21,395.53 | 131.4 | 3.32 | 133.9 | 17.86 | 42,409.84 | 131.8 | 6.59 | 134.5 | 35.40 |
| 1916 | 124,832.54 | 135.50 | 19.39 | 138.20 | 100 | 9,257.70 | 151.5 | 1.44 | 154.8 | 7.41 | 16,073.14 | 185.7 | 2.50 | 190.8 | 12.87 | 25,368.50 | 155.8 | 3.94 | 158.9 | 20.32 | 44,944.20 | 139.7 | 6.98 | 142.4 | 36. |
| 1917 | 131,138.96 | 142.35 | 20.37 | 145.19 | 100 | 8,764.45 | 143.4 | 1.36 | 146.2 | 6.68 | 18,613.12 | 215. | 2.89 | 220.6 | 14.19 | 21,487.72 | 131.9 | 3.39 | 136.7 | 16.38 | 50,566.8 6 | 157.2 | 7.86 | 160.4 | 38.55 |
| 1918 | 138,645.10 | 150.50 | 21.54 | 153.53 | 100 | 8,280.12 | 135.5 | 1.29 | 138.7 | 5.97 | 19,355.12 | 223.7 | 3.00 | 229. | 13.95 | 22,856.95 | 140.3 | 3.55 | 143.1 | 16.48 | 50,495.18 | 157. | 7.85 | 160.2 | 36.42 |
| 1919 | 172,809.04 | 187.58 | 26.84 | 191.30 | 100 | 9,657.37 | 158.2 | 1.50 | 161.3 | 5.59 | 20,962.12 | 242.2 | 3.26 | 248.8 | 12.13 | 44,316.75 | 272.1 | 6.86 | 276.6 | 25.64 | 56,558.52 | 175.8 | 8.79 | 179.4 | 32.72 |
| 1920 | 191,786.88 | 208.18 | 23.67 | 168.70 | 100 | 9,332.05 | 152.6 | 1.15 | 123.6 | 4.86 | 27,391.18 | 316.5 | 3.38 | 258. | 14.28 | 47,809.03 | 293.5 | 5.90 | 237.9 | 24.92 | 66,136.49 | 205.6 | 8.16 | 166.5 | 34.48 |
| 1921 | 237,935.10 | 258.27 | 29.36 | 209.26 | 100 | 12,008.33 | 196.5 | 1.48 | 159.1 | 5.04 | 34,001.64 | 392.9 | 4.20 | 320.6 | 14.29 | 58,610.26 | 359.8 | 7.23 | 291.5 | 24.63 | 86,619.32 | 269.2 | 10.69 | 218.2 | 36.40 |
| 1922 | 279,248.27 | 303.12 | 34.46 | 245.61 | 100 | 12,783,10 | 209.1 | 1.58 | 169,9 | 4.57 | 25,749.01 | 297.5 | 3.18 | 242.7 | 9.22 | 100,071.69 | 614.3 | 12.35 | 498. | 35.83 | 97,531.30 | 303.2 | 12.04 | 245.7 | 34.92 |
| 1923 | 268,991.01 | 291.98 | 23.20 | 165.36 | 100 | 14,098.81 | 230.7 | 1.74 | 187.1 | 5.24 | 26,844.05 | 310.1 | 3.31 | 252.6 | 9.97 | 80,502.22 | 494.2 | 9,93 | 400.4 | 29,92 | 98,262.57 | 305.4 | 12.13 | 247.5 | 36.52 |

## SUMMARY OF TOTAL EXPENDITURES

## DUDLEY -- SOUTHBRIDGE -- WEBSTER

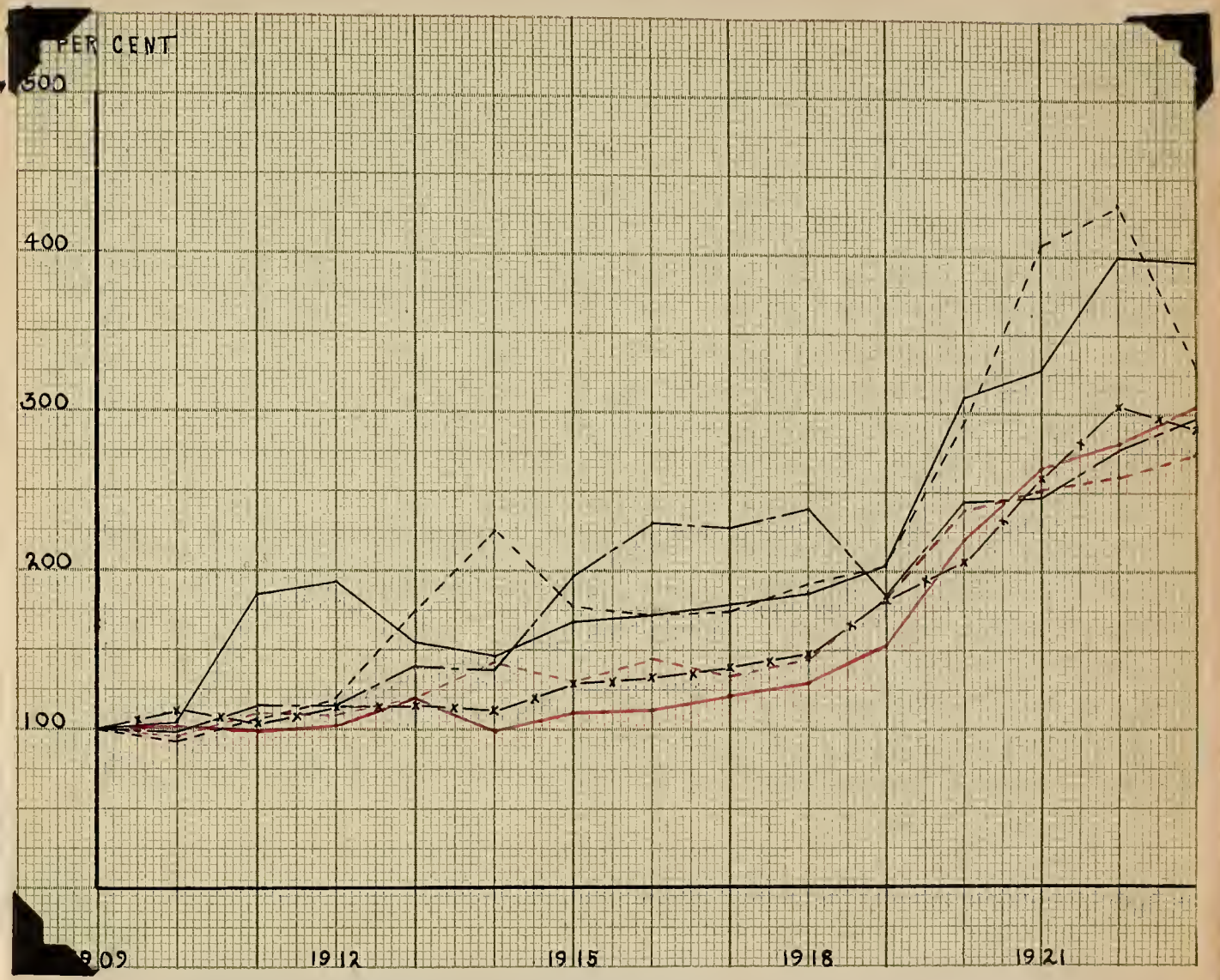
| Year | Total Expenditure | % of Change | Per Capita | % of Change | % of Total | General Administration | % of Change | Per Capita | % of Change | % of Total | Protection | % of Change | Per Capita | % of Change | % of Total | Highways | % of Change | Per Capita | % of Change | % of Total | Schools | % of Change | Per Capita | % of Change | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | $ 357,687.57 | 100 | $ 12.56 | 100 | 100 | $ 18,851.50 | 100 | $ .66 | 100 | 5.27 | $ 39,943.63 | 100 | $ 1.19 | 100 | 9.49 | $ 64,058.72 | 100 | $ 2.26 | 100 | 17.91 | $ 73,015.20 | 100 | $ 2.57 | 100 | 20.41 |
| 1910 | 336,905.27 | 94.19 | 11.83 | 94.19 | 100 | 25,278.42 | 134.1 | .89 | 134.8 | 7.50 | 40,498.74 | 119.3 | 1.43 | 120.2 | 12.02 | 84,155.58 | 131.4 | 2.97 | 131.4 | 24.98 | 75,244.25 | 103 | 2.65 | 103.1 | 22.33 |
| 1911 | 403,380.95 | 112.77 | 14.17 | 112.08 | 100 | 23,704.81 | 125.7 | .84 | 127.2 | 5.88 | 43,329.26 | 127.6 | 1.53 | 128.6 | 10.74 | 112,881.06 | 176.2 | 3.98 | 176. | 27.98 | 76,700.59 | 105. | 2.70 | 105.1 | 19.01 |
| 1912 | 410,701.78 | 114.82 | 14.43 | 114.89 | 100 | 27,037.43 | 143.4 | .95 | 143.9 | 6.58 | 43,498.48 | 128.1 | 1.53 | 128.6 | 10.59 | 122,491.32 | 191.2 | 4.32 | 191.1 | 29.82 | 100,203.54 | 137.2 | 3.53 | 137.4 | 24.40 |
| 1913 | 432,326.27 | 120.87 | 15.19 | 120.94 | 100 | 24,872.02 | 131.9 | .88 | 133.3 | 5.75 | 46,678.84 | 137.5 | 1.65 | 138.6 | 10.80 | 104,656.30 | 163.4 | 3.69 | 163.2 | 24.21 | 126,577.10 | 173.4 | 4.46 | 173.5 | 29.28 |
| 1914 | 514,936.74 | 143.96 | 18.09 | 144.03 | 100 | 27,972.65 | 148.4 | .99 | 149.9 | 5.43 | 55,259.94 | 162.8 | 1.95 | 163.8 | 10.73 | 135,569.11 | 211.6 | 4.78 | 211.5 | 26.33 | 99,644.24 | 136.5 | 3.51 | 136.6 | 19.35 |
| 1915 | 473,610.10 | 132.41 | 15.20 | 121.02 | 100 | 30,813.23 | 163.4 | .99 | 149.9 | 6.51 | 58,299.10 | 171.7 | 1.87 | 157.1 | 12.20 | 113,296.21 | 176.9 | 3.64 | 161. | 23.92 | 116,632.97 | 159.7 | 3.74 | 145.5 | 24.63 |
| 1916 | 521,076.36 | 145.68 | 16.72 | 133.12 | 100 | 31,439.61 | 166.7 | 1.01 | 153. | 6.03 | 58,731.83 | 173. | 1.89 | 158.1 | 11.27 | 121,329.83 | 189.4 | 3.89 | 172. | 23.28 | 159,832.53 | 218.9 | 5.13 | 199.6 | 30.67 |
| 1917 | 484,604.86 | 135.48 | 15.55 | 123.80 | 100 | 31,248,54 | 165.7 | 1.00 | 151.5 | 6.45 | 50,071.73 | 147.5 | 1.61 | 135.3 | 10.33 | 95,775.39 | 149.5 | 3.07 | 135.8 | 19.76 | 163,176.40 | 223.5 | 5.24 | 203.8 | 33.67 |
| 1918 | 516,482.45 | 144.39 | 16.58 | 132. | 100 | 31,122.00 | 165. | 1.00 | 151.5 | 6.02 | 68,653.75 | 202.2 | 2.20 | 184.9 | 13.29 | 99,799.73 | 155.8 | 3.20 | 141.6 | 19.32 | 154,914.77 | 212.2 | 4.97 | 193.4 | 29.99 |
| 1919 | 657,774.45 | 183.89 | 21.11 | 168.07 | 100 | 33,256.93 | 176.4 | 1.07 | 162.1 | 5.06 | 62,431.98 | 183.9 | 2.00 | 168.1 | 9.49 | 157,962.24 | 246.6 | 5.07 | 224.3 | 24.01 | 224,907.86 | 308. | 7.22 | 280.9 | 34.19 |
| 1920 | 862,139.64 | 241.03 | 27.63 | 219.98 | 100 | 42,866.20 | 227.4 | 1.37 | 207.6 | 4.97 | 89,571.24 | 263.9 | 2.87 | 241.2 | 10.39 | 233,640.09 | 364.7 | 7.49 | 331.4 | 27.10 | 255,895.37 | 350.5 | 8.20 | 319.1 | 29.68 |
| 1921 | 901,142.06 | 251.93 | 28.88 | 229.94 | 100 | 43,541.93 | 230.9 | 1.39 | 210.6 | 4.83 | 85,698.16 | 252.5 | 2.75 | 231.1 | 9.51 | 161,767.32 | 252.5 | 5.18 | 229.1 | 17.95 | 299,953.13 | 410.8 | 9.61 | 374. | 33.28 |
| 1922 | 937,976.54 | 262.23 | 30.06 | 239.33 | 100 | 47,593.34 | 252.4 | 1.52 | 236.3 | 5.07 | 94,930.54 | 279.6 | 3.04 | 255.5 | 10.12 | 133,975.14 | 209.1 | 4.29 | 189.8 | 14.28 | 391,606.99 | 536.3 | 12.55 | 488. | 41.75 |
| 1923 | 983,623.04 | 274.99 | 31.52 | 250.95 | 100 | 45,346.42 | 240.5 | 1.45 | 219.7 | 4.61 | 128,446.42 | 378.4 | 4.12 | 346.2 | 13.16 | 173,058.36 | 270.1 | 5.55 | 245.6 | 17.59 | 379,536.04 | 519,8 | 12.16 | 473.1 | 38.58 |

## Summary of Total Expenditures

PALMER --WARE -- WARREN

| Year | Total Expenditure | % of Change | Per Capita | % of Change | % of Total | General Administration | % of Change | Per Capita | % of Change | % of Total | Protection | % of Change | Per Capita | % of Change | % of Total | Highways | % of Change | Per Capita | % of Change | % of Total | Schools | % of Change | Per Capita | % of Change | % of Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1909 | $ 273,286.48 | 100 | $ 12.66 | 100 | 100 | $ 11,355.78 | 100 | $ .52 | 100 | 4.15 | $ 9,554.50 | 100 | $ .44 | 100 | 3.49 | $ 63,578.35 | 100 | $ 2.95 | 100 | 23.26 | $104,636.05 | 100 | $ 4.85 | 100 | 38.29 |
| 1910 | 281,658.82 | 103.06 | 13.06 | 103.16 | 100 | 12,083.35 | 109. | .59 | 113.5 | 4.29 | 10,732.31 | 112.3 | .50 | 113.6 | 3.81 | 84,895.89 | 133.5 | 3.94 | 133.5 | 30.14 | 89,714.25 | 85.7 | 4.16 | 85.7 | 31.85 |
| 1911 | 274,657.26 | 100.49 | 12.73 | 100.55 | 100 | 11,635.22 | 103 | .54 | 104. | 4.25 | 14,874.69 | 155.6 | .69 | 156.8 | 5.42 | 51,912.32 | 81.6 | 2.41 | 81.7 | 18.90 | 94,979,64 | 90.7 | 4.40 | 90.7 | 34.58 |
| 1912 | 282,299.62 | 103.3 | 13.08 | 103.32 | 100 | 15,362.80 | 135. | .71 | 136.5 | 5.44 | 19,813147 | 207.3 | .92 | 209.1 | 7.02 | 65,527.11 | 103. | 3.04 | 103 | 23.21 | 99,641.80 | 95.2 | 4.62 | 95.3 | 35.30 |
| 1913 | 326,280.13 | 119.39 | 15.12 | 119.43 | 100 | 19,838.96 | 174.7 | .92 | 177. | 6.08 | 23,398.49 | 245. | 1.08 | 245.5 | 7.17 | 92,719.49 | 145.8 | 4.30 | 145.8 | 28.42 | 112,953.04 | 107.9 | 5.24 | 108.1 | 34.62 |
| 1914 | 271,206.21 | 99.24 | 12.57 | 99.29 | 100 | 17,730.91 | 156.1 | .82 | 157.7 | 6.54 | 15,746.16 | 164.8 | .73 | 166. | 5.80 | 57,227.43 | 90. | 2.65 | 89.8 | 21.10 | 106,524.82 | 101.8 | 4.94 | 101.9 | 39.28 |
| 1915 | 308,243.24 | 112.79 | 13.35 | 105.45 | 100 | 18,999.64 | 167.3 | .82 | 157.7 | 6.16 | 18,462.30 | 193. | .80 | 181.8 | 5.99 | 73,167.68 | 115. | 3.17 | 107.5 | 23.74 | 116,485.64 | 111.3 | 5.05 | 104.1 | 37.79 |
| 1916 | 311,629.66 | 114.03 | 13.50 | 106.63 | 100 | 20,112.23 | 177. | .87 | 167.3 | 6.45 | 17,254.31 | 180.5 | .75 | 170.5 | 5.54 | 65,289.84 | 102.7 | 2.83 | 95.9 | 20.95 | 119,610.73 | 114.3 | 5.18 | 106.8 | 38.38 |
| 1917 | 334,398.94 | 122.36 | 14.49 | 114.45 | 100 | 20,728.48 | 182.5 | .90 | 173.. | 6.20 | 17,889.36 | 187.3 | .86 | 172.7 | 5.35 | 74,203.56 | 116.7 | 3.21 | 108.8 | 22.19 | 134,708.82 | 128.7 | 5.84 | 120.4 | 40.28 |
| 1918 | 354,173.09 | 129.60 | 15.34 | 121.17 | 100 | 22,247.20 | 196. | .96 | 184.6 | 6.28 | 18,767.14 | 195.4 | .81 | 184. | 5.30 | 64,120.68 | 100.8 | 2.78 | 94.2 | 18.10 | 155,906.25 | 149 | 6.75 | 139.1 | 44.02 |
| 1919 | 419,148.00 | 153.37 | 18.16 | 143.44 | 100 | 23,715.52 | 208.9 | 1.03 | 198 | 5.66 | 19,383.77 | 202.8 | .84 | 191. | 4.62 | 98,379.79 | 155.5 | 4.28 | 145.1 | 23.59 | 177,977.69 | 170.1 | 7.71 | 159. | 42.46 |
| 1920 | 611,353.58 | 223.70 | 27.93 | 220.61 | 100 | 29,242.67 | 257.5 | 1.34 | 253.8 | 4.78 | 23,403.24 | 245. | 1.07 | 243. | 3.83 | 162,801.06 | 256. | 7.44 | 252.2 | 26.63 | 268,165.71 | 256.3 | 12.25 | 252.6 | 43.86 |
| 1921 | 726,699.81 | 265.90 | 33.20 | 262.24 | 100 | 30,608.28 | 269.5 | 1.40 | 269.2 | 4.21 | 25,647.81 | 268.5 | 1.17 | 266. | 3.53 | 210,584.87 | 331.2 | 9.62 | 326.1 | 28.98 | 317,404.04 | 303.3 | 14.50 | 298.9 | 43.68 |
| 1922 | 763,095.13 | 279.22 | 34.86 | 275.35 | 100 | 38,334.77 | 337.5 | 1.75 | 336.5 | 5.02 | 45,499.81 | 476.2 | 2.08 | 473. | 5.96 | 127,521.88 | 200.5 | 5.83 | 197.6 | 16.71 | 428,322.82 | 409.3 | 19.57 | 403.5 | 56.13 |
| 1923 | 822,618.89 | 301. | 37.58 | 296.84 | 100 | 36,306.08 | 319.7 | 1.66 | 319.2 | 4.41 | 28,699.83 | 300.4 | 1.31 | 298. | 3.49 | 131,402.20 | 206.7 | 6. | 203.4 | 15.97 | 458,420.67 | 438.1 | 20.94 | 432. | 55.72 |

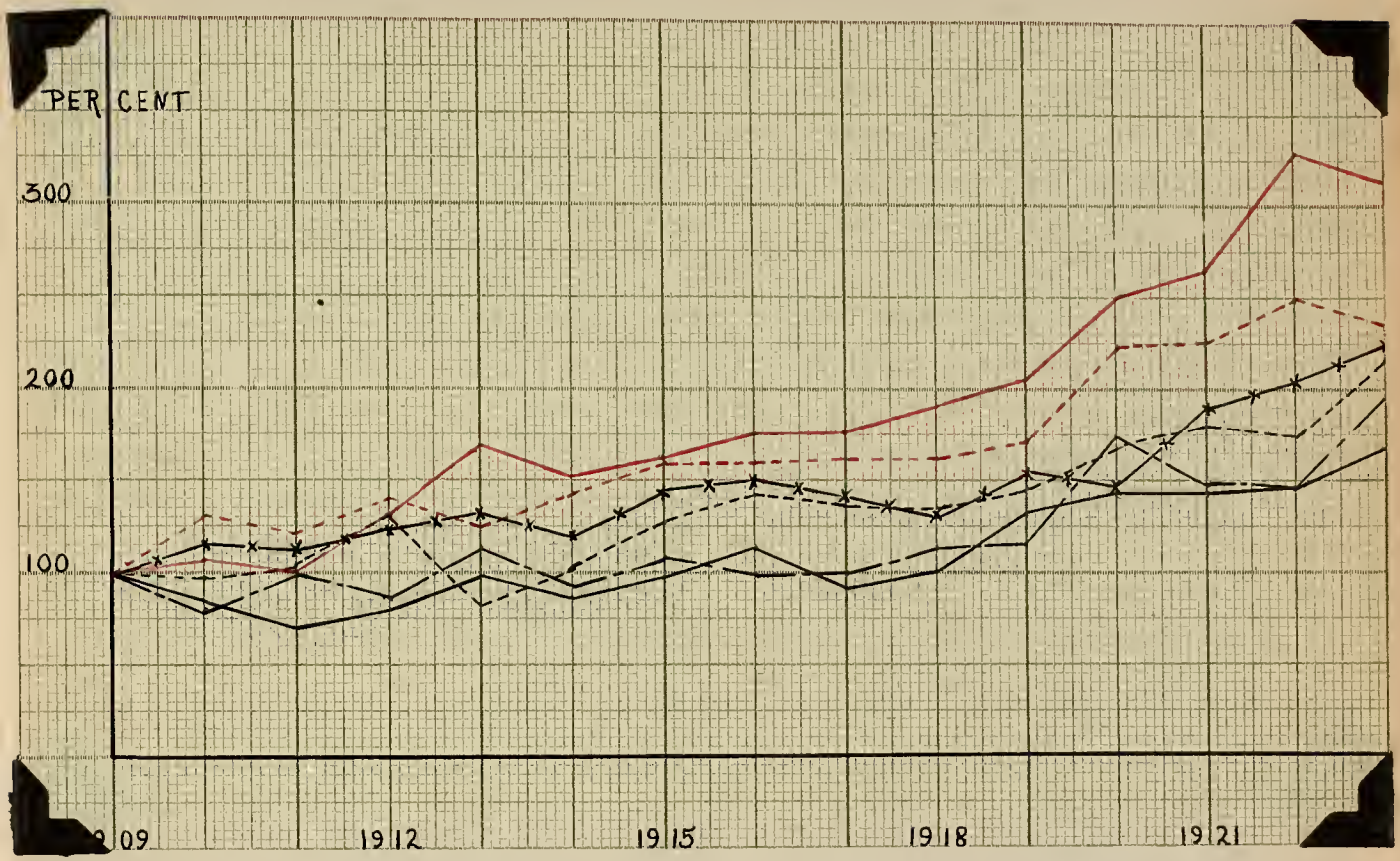
PERCENTUAL CHANGES IN TOTAL EXPENDITURES
IN EIGHTEEN SELECTED MASSACHUSETTS TOWNS, 1909 -- 1923.
1909 = 100%




——— Harvard, Boxboro and Littleton.
- - - - Hadley, Sunderland, and Hatfield.
—·— Charlemont, Heath and Colrain.
——x—— Foxborough, Norfolk and Wrentham.
——— Palmer, Ware and Warren.
- - - - - Southbridge, Dudley and Webster.

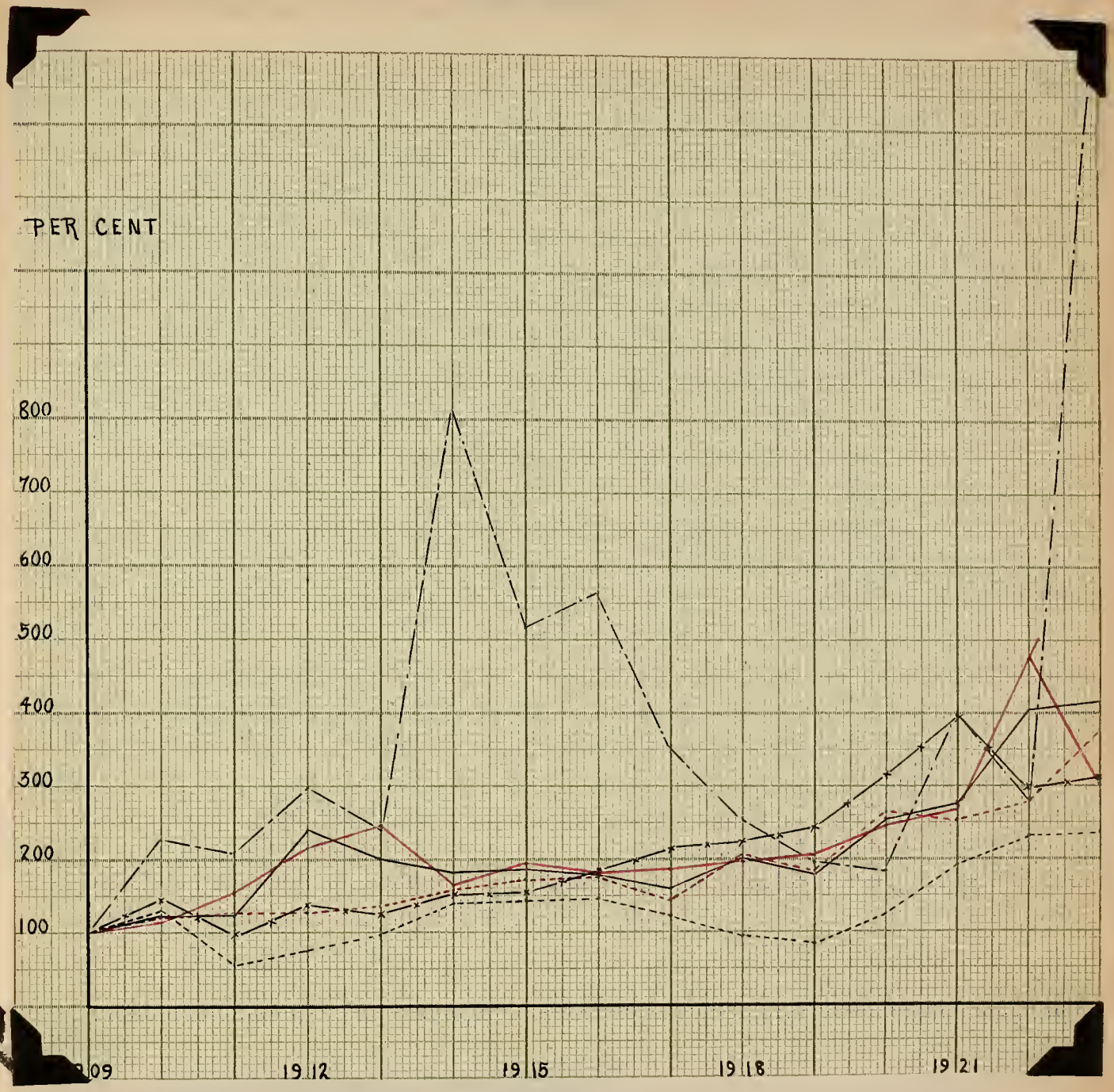
PERCENTUAL CHANGES IN EXPENDITURES FOR GENERAL ADMINISTRATION IN EIGHTEEN SELECTED MASSACHUSETTS TOWNS, 1909 -- 1923.

1909 = 100%



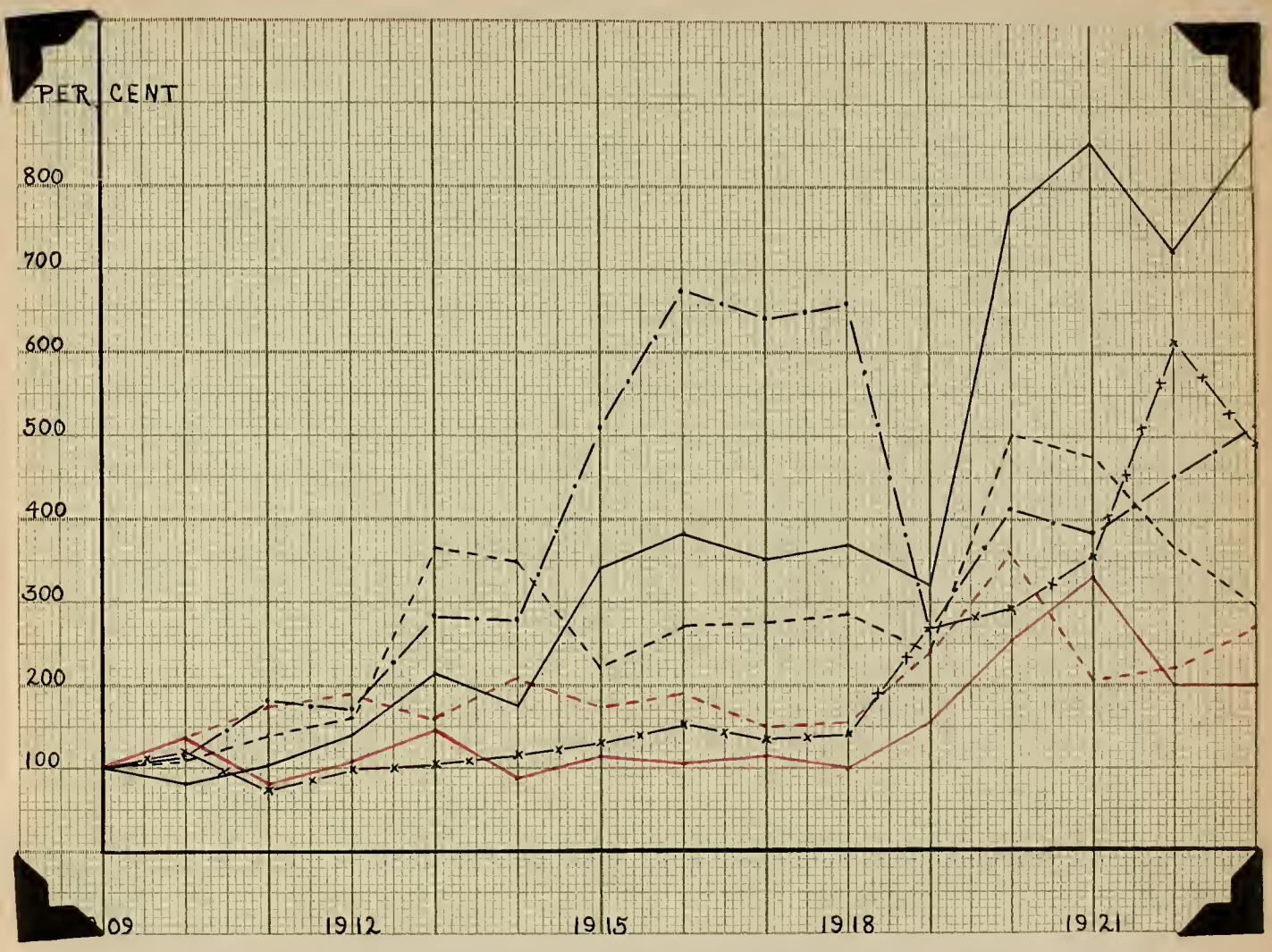

——— Harvard, Boxboro and Littleton.
- - - - - Hadley, Sunderland and Hatfield.
—·— Charlemont, Heath and Colrain.
—x— Foxborough, Norfolk and Wrentham.
——— Palmer, Ware and Warren.
——— Southbridge, Dudley and Webster.

PERCENTUAL CHANGES IN EXPENDITURES FOR PROTECTION OF PERSONS AND PROPERTY IN EIGHTEEN SELECTED MASSACHUSETTS TOWNS, 1909 - 1923.
1909 = 100%



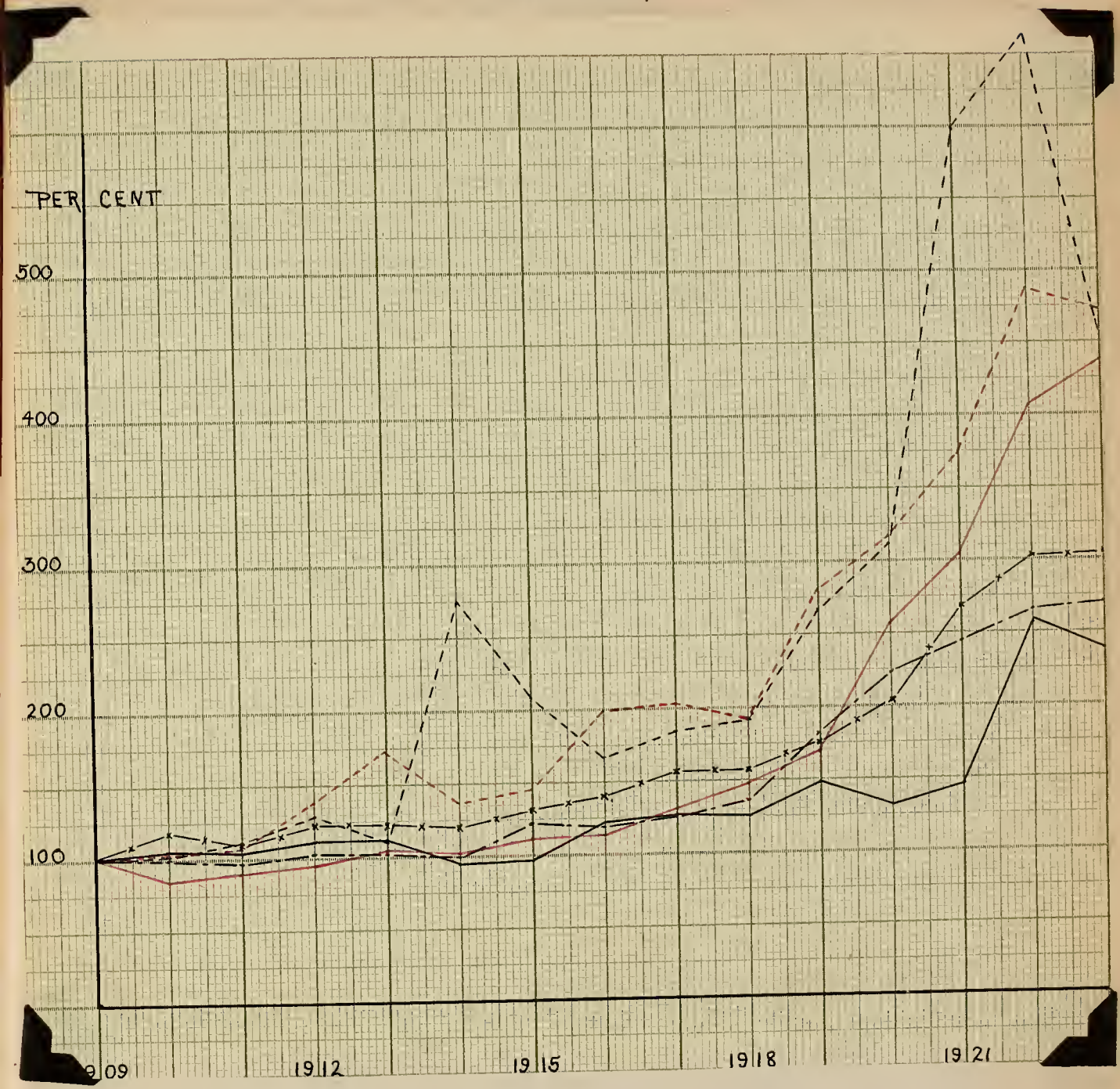

———Harvard, Boxboro and Littleton.
– – – – –Hadley, Sunderland and Hatfield.
——·—— Charlemont, Heath and Colrain.
——x——Foxborough, Norfolk and Wrentham.
———Palmer, Ware and Warren.
– – – – –Southbridge, Dudley and Webster.

PERCENTUAL CHANGES IN EXPENDITURES FOR HIGHWAYS
IN EIGHTEEN SELECTED MASSACHUSETTS TOWNS, 1909-1923.
1909 = 100%




———Harvard, Boxboro and Littleton.
- - - - - -Hadley, Sunderland and Hatfield.
— · —Charlemont, Heath and Colrain.
— x —Foxborough, Norfolk and Wrentham.
———Palmer, Ware and Warren.
— — — —Southbridge, Dudley and Webster.

PERCENTUAL CHANGES IN EXPENDITURES FOR PUBLIC EDUCATION IN EIGHTEEN SELECTED MASSACHUSETTS TOWNS, 1909 -- 1923.
1909 = 100%




———Harvard, Boxboro and Littleton.
- - - - - Hadley, Sunderland and Hatfield.
——·——Charlemont, Heath and Colrain.
——x——Foxborough, Norfolk and Wrentham.
——— Palmer, Ware and Warren.
----- Southbridge, Dudley and Webster.

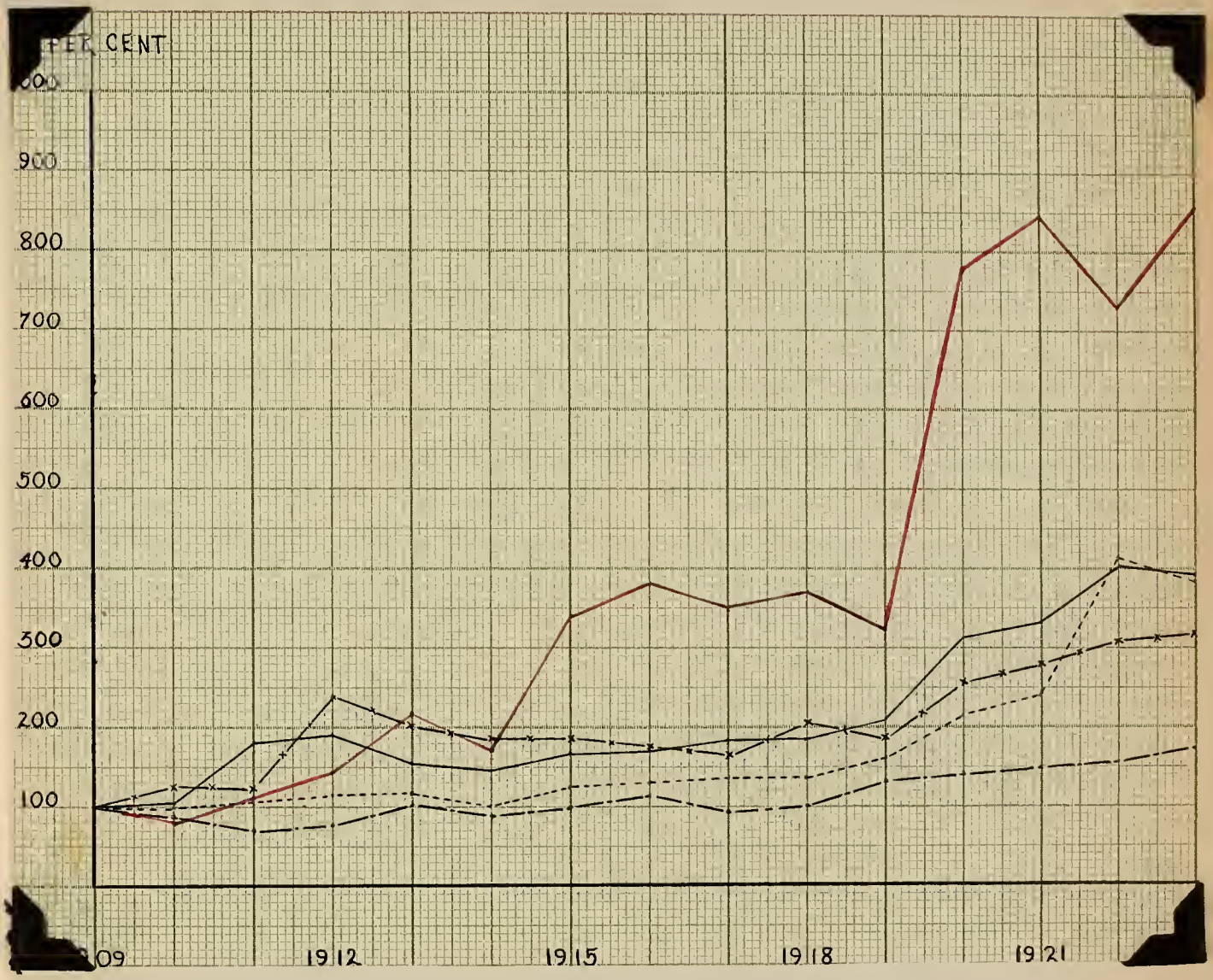
# PERCENTUAL CHANGES IN EXPENDITURES FOR VARIOUS ITEMS IN HADLEY - SUNDERLAND - HATFIELD

1909 - 1923.


——— Total Expenditure.
—·— Expenditure for General Administration.
—‹— Expenditure for Protection of Persons and Property.
——— Expenditure for Highways.
----- Expenditure for Public Education.

PERCENTUAL CHANGES IN EXPENDITURES FOR VARIOUS ITEMS IN
HARVARD - LITTLETON - BOXBORO

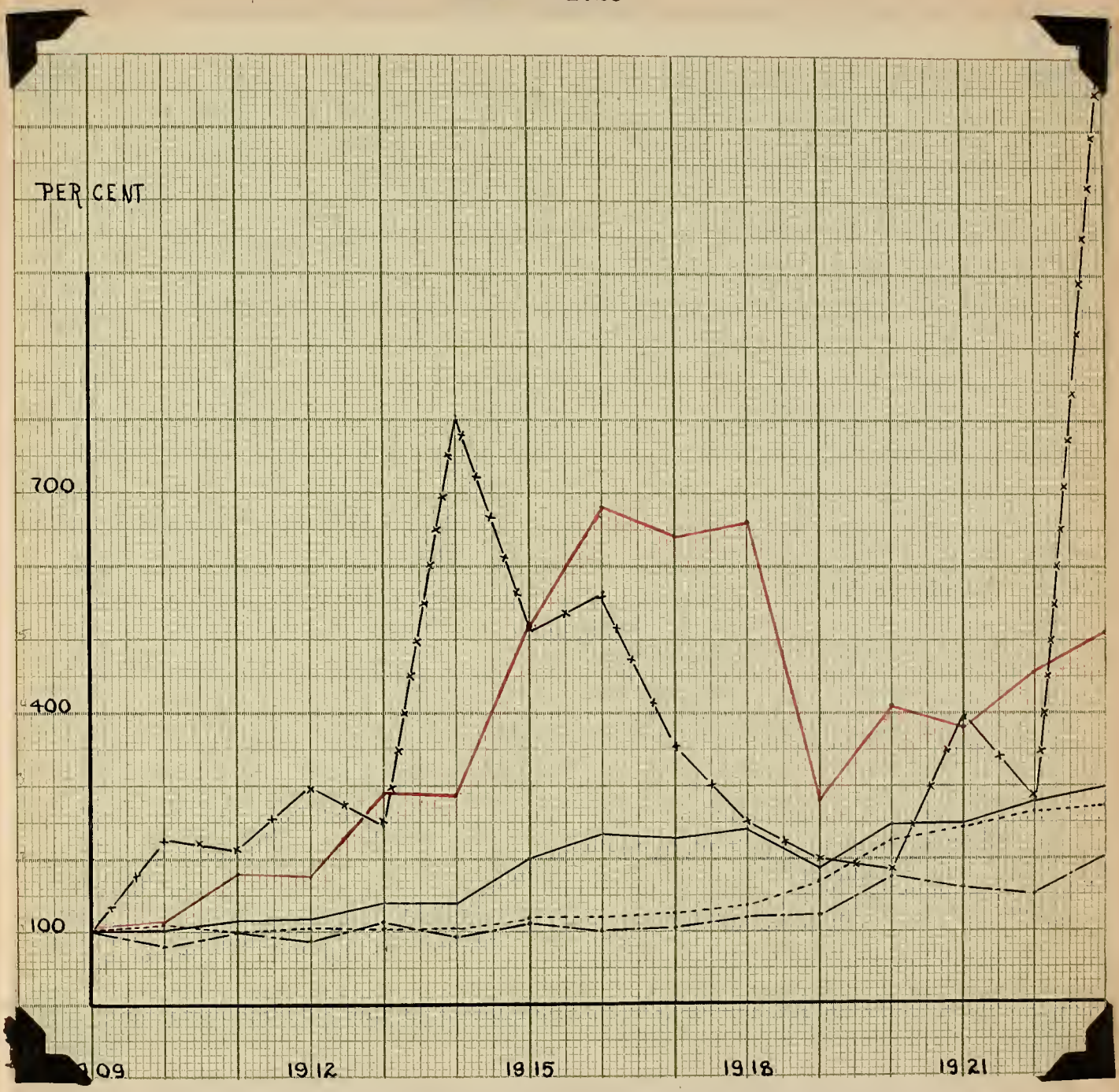
1909 - 1923




———Total Expenditure.
—·—Expenditure for General Administration.
—×—Expenditure for Protection of Persons and Property.
———Expenditure for Highways.
------Expenditure for Public Education.

PERCENTUAL CHANGES IN EXPENDITURES FOR VARIOUS ITEMS IN CHARLEMONT - HEATH - COLRAIN

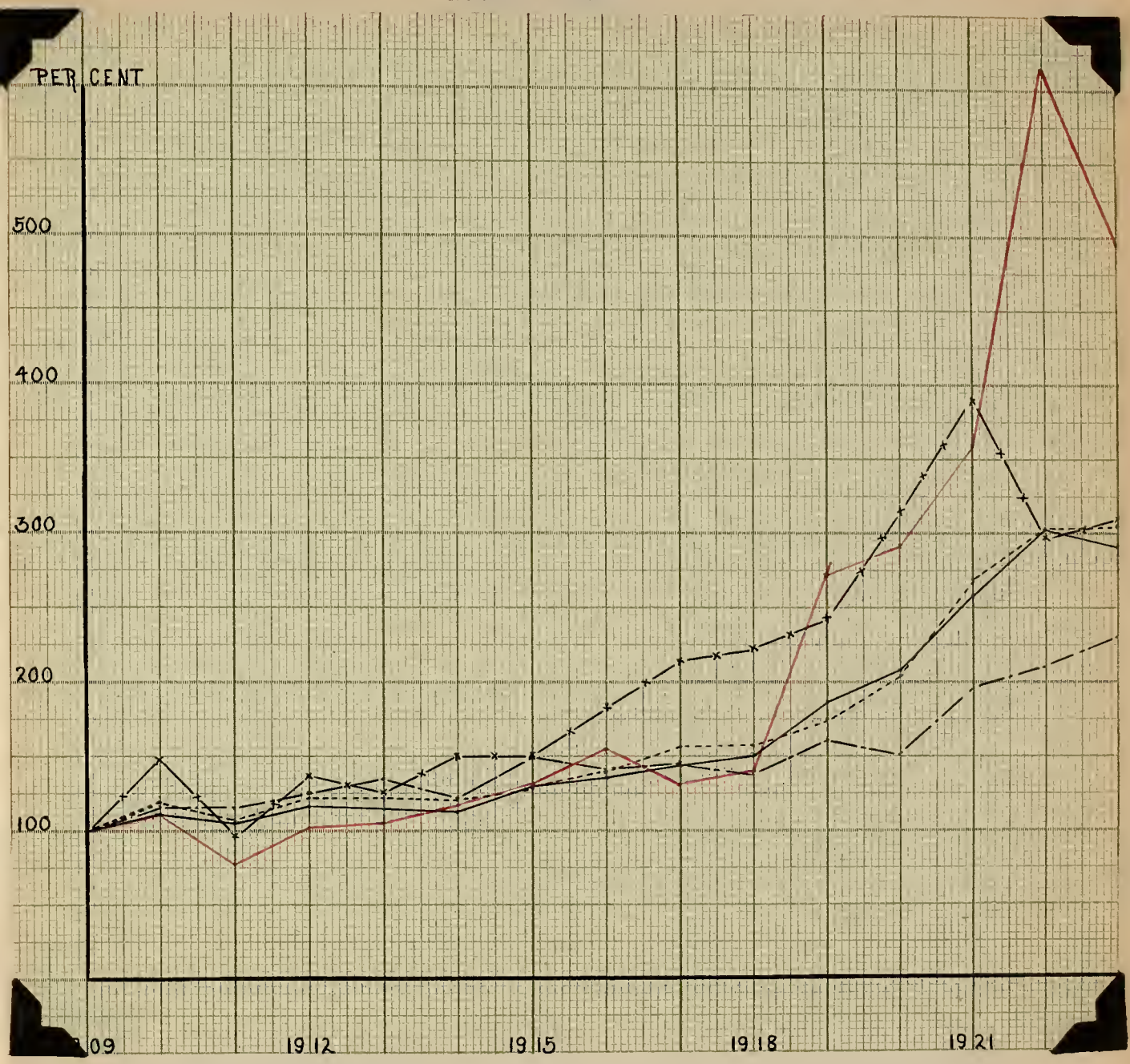
1909 - 1923




———Total Expenditure.
—·—Expenditure for General Administration.
—×—Expenditure for Protection of Persons and Property.
———Expenditure for Highways.
------Expenditure for Public Education.

PERCENTUAL CHANGES IN EXPENDITURES FOR VARIOUS ITEMS IN
FOXBOROUGH - NORFOLK - WRENTHAM

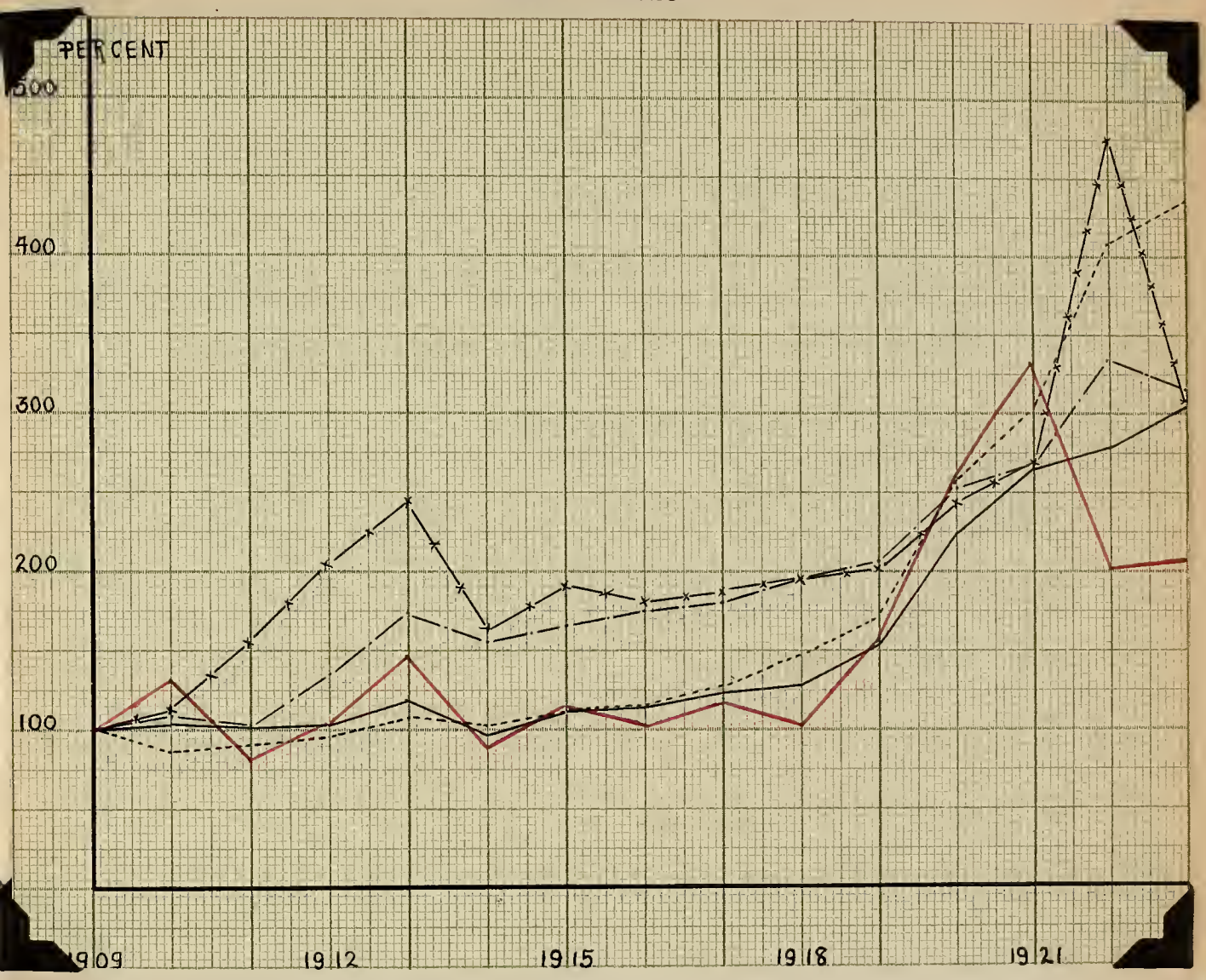
1909 - 1923




——Total Expenditure.
—·—Expenditure for General Administration.
—×—Expenditure for Protection of Persons and Property.
——Expenditure for Highways.
-----Expenditure for Public Education.

PERCENTUAL CHANGES IN EXPENDITURES FOR VARIOUS ITEMS IN PALMER - WARE - WARREN

1909 - 1923




———Total Expenditure.
—·—Expenditure for General Administration.
—×—Expenditure for Protection of Persons and Property.
———Expenditure for Highways.
- - - - -Expenditure for Public Education.

# PERCENTUAL CHANGES IN EXPENDITURES FOR VARIOUS ITEMS IN DUDLEY - SOUTHBRIDGE - WEBSTER

1909 - 1923


——— Total Expenditure.
—·— Expenditure for General Administration.
—x— Expenditure for Protection of Persons and Property.
——— Expenditure for Highways.
----- Expenditure for Public Education.

The purpose of these comparisons is to indicate the growth of the highway expenditures in the towns of the state, and to show how important the road financing problem may become, especially in the smaller towns.

An inquiry was sent to the town treasurer of each of the eighteen towns, to find out how the town had actually financed its roads for each year since 1909. A reply was received for every town except Palmer, which is therefore excluded from the totals. The amount of money received by each town from the state was ascertained from the annual report of the Division of Highways, since in most cases the town officers merely indicated the source of the state funds, as chapter 81, chapter 90, etc. The bond issues or notes were in every case given exactly by the town treasurer. The expenditures with their corresponding receipts have been kept separately for each group of towns, and have also been grouped together in table 19. The resulting figures are believed to be a fair sample of the towns of the state because of the many areas which they represent.

One obvious comparison is the difference in financing methods used by the agricultural and industrial towns. The two agricultural groups having the lowest valuations; namely, Heath, Charlemont and Colrain; and Foxborough, Wrentham and Norfolk, did not issue any deferred payment instruments throughout this fifteen-year period. The other two agricultural groups used notes or bonds only seven times; while the industrial towns issued bonds or notes every year except three. In many cases the per capita expenditures for highways are actually larger in the smaller groups which did not issue any notes or bonds than in the industrial towns; hence the reason why the latter issue these credit instruments cannot be entirely the size of the highway expenditure. Several reasons

SUMMARY OF METHODS OF HIGHWAY FINANCING FOR EIGHTEEN SELECTED MASSACHUSETTS TOWNS, 1909-1923.

| Year | Total Highway Expenditures | Amount of State Aid | % of Total | Amount raised by Taxation | % of Total | Amount from Other Sources | % of Total |
|---|---|---|---|---|---|---|---|
| 1909 | $ 144,485.39 | $ 9,892.50 | 6.84 | $ 113,593.39 | 78.62 | $ 21,000 | 14.53 |
| 1910 | 177,101.77 | 17,039.57 | 9.62 | 148,862.20 | 84.06 | 11,200 | 6.32 |
| 1911 | 201,023.86 | 11,350.92 | 5.65 | 154,302.94 | 76.76 | 36,000 | 17.91 |
| 1912 | 227,091.36 | 13,270.93 | 5.84 | 198,320.43 | 87.33 | 15,500 | 6.82 |
| 1913 | 252,267.98 | 13,642.43 | 5.41 | 203,798.55 | 80.78 | 36,500 | 14.47 |
| 1914 | 271,361.97 | 20,498.54 | 7.55 | 24.,063.42 | 89.20 | 8,800 | 3.24 |
| 1915 | 267,415.22 | 39,207.61 | 14.66 | 199,807.61 | 74.72 | 28,400 | 10.62 |
| 1916 | 298,088.72 | 41,327.77 | 13.86 | 226,660.95 | 76.04 | 30,1 | 10.10 |
| 1917 | 270,860.53 | 64,925.98 | 23.97 | 196,934.55 | 72.71 | 9,000 | 3.32 |
| 1918 | 274,152.63 | 62,966.34 | 22.97 | 203,186.29 | 74.11 | 8,000 | 2.92 |
| 1919 | 342,557.00 | 45,565.89 | 13.30 | 284,991.16 | 83.19 | 12,000 | 3.50 |
| 1920 | 515,397.32 | 85,464.43 | 16.58 | 348,342.89 | 67.60 | 80,500 | 15.81 |
| 1921 | 491,350.56 | 6 ,624.69 | 12.95 | 363,625.87 | 74.00 | 64,100 | 13.04 |
| 1922 | 444,497.50 | 59,466.50 | 13.3 | 380,031.00 | 85.49 | 5,000 | 1.12 |
| 1923 | 463,751.40 | 53,044.41 | 11.31 | 395,706.99 | 84.41 | 20,000 | 4.27 |

I

HADLEY - SUNDERLAND - HATFIELD

| Year | Total Highway Expenditures | Amount of State Aid | Amount raised by Taxation | Amount from All Other Sources |
|---|---|---|---|---|
| 1909 | $ 15,620.10 | $ 965.52 | $ 14,654.58 | |
| 1910 | 17,419.67 | 4,466.83 | 12,952.84 | |
| 1911 | 21,953.44 | 3,016.12 | 18,937.32 | |
| 1912 | 25,354.59 | 3,336.33 | 22,018.26 | |
| 1913 | 56,963.24 | 3,750.00 | 53,186.24 | |
| 1914 | 55,050.20 | 8,277.70 | 46,772.50 | |
| 1915 | 34,848.42 | 11,561.66 | 23,286.76 | |
| 1916 | 42,575.96 | 8,142.84 | 30,433.12 | [1] $4,000 Serial Bonds |
| 1917 | 42,411.33 | 12,833.06 | 25,578.27 | [1] 4,000 " " |
| 1918 | 44,824.71 | 15,072.76 | 23,751.95 | [1] 6,000 " " |
| 1919 | 36,999.63 | 3,198.67 | 33,800.96 | |
| 1920 | 78,883.49 | 8,920.80 | 69,962.69 | |
| 1921 | 73,546.93 | 24,174.58 | 37,372.35 | [2] 12,000 Serial Bonds |
| 1922 | 57,379.01 | 6,598.20 | 50,780.81 | |
| 1923 | 46,296.81 | 3,295.64 | 43,001.17 | |

1. Sunderland
2. Hadley

II

COLRAIN - CHARLEMONT - HEATH

| Year | Total Highway Expenditures | Amount of State Aid | Amount raised by Taxation | Amount from All Other Sources |
|---|---|---|---|---|
| 1909 | $ 6,950.75 | $ 2,077.93 | $ 4,872.82 | |
| 1910 | 7,436.81 | 979.68 | 6,457.13 | |
| 1911 | 12,475.81 | 2,574.98 | 9,900.83 | |
| 1912 | 12,092.09 | 2,209.15 | 9,882.94 | |
| 1913 | 19,926.09 | 4,550.00 | 15,376.09 | |
| 1914 | 19,579.00 | 3,749.98 | 15,829.02 | |
| 1915 | 35,285.88 | 7,079.28 | 28,206.60 | |
| 1916 | 47,169.67 | 7,309.04 | 39,860.63 | |
| 1917 | 44,541.52 | 4,424.11 | 40,117.41 | |
| 1918 | 46,063.91 | 4,003.10 | 42,060.81 | |
| 1919 | 19,343.51 | 10,587.80 | 8,755.71 | |
| 1920 | 28,896.89 | 7,655.22 | 21,241.67 | |
| 1921 | 26,742.30 | 10,683.91 | 16,058.39 | |
| 1922 | 31,346.52 | 11,448.87 | 19,897.65 | |
| 1923 | 35,720.75 | 16,804.90 | 18,915.85 | |

III

HARVARD - LITTLETON - BOXBORO

| Year | Total Highway Expenditures | Amount of State Aid | Amount raised by Taxation | Amount from All Other Sources |
|---|---|---|---|---|
| 1909 | $ 6,780.44 | $ 2,553.13 | $ 4,227.31 | |
| 1910 | 6,617.29 | 1,367.26 | 5,250.03 | |
| 1911 | 7,183.05 | 1,114.34 | 6,698.71 | |
| 1912 | 9,652.13 | 1,707.94 | 7,944.19 | |
| 1913 | 15,032.64 | 825.00 | 14,207.64 | |
| 1914 | 12,045.88 | 1,364.60 | 10,681.28 | |
| 1915 | 23,194.31 | 4,789.20 | 18,405.11 | |
| 1916 | 26,044.19 | 8,990.02 | 17,054.17 | |
| 1917 | 23,941.22 | 7,980.86 | 15,960.36 | |
| 1918 | 25,212.76 | 14,081.26 | 11,131.50 | |
| 1919 | 21,745.37 | 10,802.03 | 10,943.34 | |
| 1920 | 52,586.52 | 10,590.71 | 40,495.81 | $1,500 One Year Note[1] |
| 1921 | 57,990.22 | 7,847.18 | 45,143.04 | 5,000 Serial Bonds[2] |
| 1922 | 49,068.49 | 18,827.13 | 28,241.36 | 2,000 One Year Note[3] |
| 1923 | 58,484.38 | 16,406.59 | 42,077.79 | |

1 - Harvard
2 - "
3 - "

IV

FOXBOROUGH - NORFOLK - WRENTHAM

| Year | Total Highway Expenditures | Amount of State Aid | Amount raised by Taxation | Amount from All Other Sources |
|---|---|---|---|---|
| 1909 | $ 16,288.58 | $ 2,310.04 | $ 13,978.54 | |
| 1910 | 18,026.94 | 3,476.41 | 14,550.53 | |
| 1911 | 12,638.59 | 2,025.89 | 10,612.70 | |
| 1912 | 16,539.25 | 1,561.49 | 14,977.76 | |
| 1913 | 17,194.03 | 1,750.00 | 17,144.03 | |
| 1914 | 19,093.44 | 2,848.59 | 16,244.84 | |
| 1915 | 21,395.53 | 3,712.68 | 17,682.85 | |
| 1916 | 25,368.50 | 5,136.13 | 20,232.37 | |
| 1917 | 21,487.72 | 3,034.02 | 18,453.70 | |
| 1918 | 22,856.95 | 3,405.67 | 19,451.28 | |
| 1919 | 44,316.75 | 5,937.11 | 38,379.64 | |
| 1920 | 47,809.03 | 2,861.51 | 44,947.52 | |
| 1921 | 58,610.26 | 2,691.82 | 55,918.44 | |
| 1922 | 100,071.69 | 20,969.55 | 79,102.14 | |
| 1923 | 80,502.22 | 15,307.74 | 65,194.48 | |

V

DUDLEY - SOUTHBRIDGE - WEBSTER

| Year | Total Highway Expenditure | Amount of State Aid | Amount raised by Taxation | Amount from All Other Sources |
|---|---|---|---|---|
| 1909 | $ 64,058.72 | $ 658.84 | $ 52,399.88 | $ 11,000 Serial Bonds |
| 1910 | 84,155.58 | 791.21 | 83,364.37 | |
| 1911 | 112,881.06 | 673.25 | 81,207.81 | 31,000 |
| 1912 | 122,491.32 | 3,851.01 | 113,640.31 | 5,000 |
| 1913 | 104,656.30 | 2,767.43 | 76,888.87 | 25,000 |
| 1914 | 135,569.11 | 3,341.79 | 123,427.32 | 8,800 |
| 1915 | 113,296.21 | 7,757.15 | 85,139.06 | 20,400 |
| 1916 | 121,329.83 | 6,025.12 | 91,204.71 | 24,100 |
| 1917 | 95,775.39 | 5,458.90 | 90,316.49 | |
| 1918 | 99,799.73 | 6,973.41 | 90,826.32 | 2,000 |
| 1919 | 157,962.24 | 12,662.62 | 145,299.67 | |
| 1920 | 233,640.09 | 55,316.05 | 118,324.04 | 60,000 |
| 1921 | 161,767.32 | 13,227.20 | 116,440.12 | 27,100 |
| 1922 | 133,975.14 | 1,224.19 | 129,750.95 | 3,000 |
| 1923 | 173,058.36 | 861.78 | 152,196.58 | 20,000 |

1. The town of Webster pays all highway expenses from current revenue.

VI

KANE - WARREN No re ort from FULTON

| Year | Total Highway Expenditure | Amount of State Aid | Amount raised by Taxation | Amount From All Other Sources |
|---|---|---|---|---|
| 1909 | $ 34,786.80 | $ 1,327.04 | $ 23,459.76 | $ 10,000 Bonds |
| 1910 | 43,445.48 | 5,958.18 | 26,287.30 | 11,200 " |
| 1911 | 33,891.91 | 1,946.34 | 26,945.57 | 5,000 |
| 1912 | 40,961.98 | 605.01 | 29,856.97 | 10,500 |
| 1913 | 38,495.68 | | 26,995.68 | 11,500 |
| 1914 | 30,024.34 | 915.88 | 29,108.46 | |
| 1915 | 39,394.37 | 4,307.64 | 27,087.33 | 8,000 |
| 1916 | 35,600.57 | 5,7 .62 | 27,875.95 | 2,000 |
| 1917 | 42,703.35 | 31,195.03 | 6,508.32 | 5,000 |
| 1918 | 35,394.57 | 19,430.14 | 15,964.43 | |
| 1919 | 62,189.50 | 2,377.66 | 47,811.84 | 12,000 |
| 1920 | 73,491.30 | 1 .0.14 | 53,371.16 | 20,000 |
| 1921 | 112,693.53 | | 92,693.53 | 20,000 |
| 1922 | 72,656.65 | 398.56 | 72,258.09 | |
| 1923 | 74,6 8.88 | 36 .16 | 74,320.72 | |

may be suggested as an explanation of this. In the first place, the smaller towns have not had so much experience in bonding as have the industrial towns, where business is commonly carried on by credit. Another possible reason is the short length of time which these bonds may run - a five-year period for general highway construction. It seems probable that this is too short a period to make the use of bonds really effective. Further, the law stipulates that any bonds or notes issued by towns must be sold at par; and frequently the poor towns experience difficulty in selling their bonds under these conditions. The last reason is the New England conservatism which makes borrowing money for improvements highly unpopular.

The importance of the general property tax in Massachusetts is clearly shown in these figures. About four-fifths of the support of the town roads is derived from the annual general tax collection. This suggests that any increase in highway expenditures, such as that caused by an outlay for an improved road, will be reflected in the tax rate. There are many other factors which enter into a comparison of this kind, however, which prevent a close correlation between any single expenditure and the tax rate; i.e., a new schoolhouse, town hall or road would have the same general effect. However, the highway expenditures of the town of Heath, a town which did not resort to any other method than the "pay-as-you-go", as the town treasurer expressed it, are presented with the annual tax rate.(32) It is obvious that for this town, at least, the change in highway expenditures has had no great significance in changing the tax rate.

Highway Expenditures and Tax Rate of Heath, Massachusetts.

| Year | Highway Expenditure | Tax Rate |
|---|---|---|
| 1909 | $1865.45 | $15.50 |
| 1910 | 1368.05 | 17.00 |
| 1911 | 1364.90 | 16.00 |
| 1912 | 1989.87 | 17.50 |
| 1913 | 2178.02 | 17.00 |
| 1914 | 2248.42 | 20.50 |
| 1915 | 2388.82 | 20.00 |
| 1916 | 2533.30 | 21.00 |
| 1917 | 3777.44 | 20.00 |
| 1918 | 4371.99 | 19.00 |
| 1919 | 3756.76 | 19.50 |
| 1920 | 5812.15 | 25.50 |
| 1921 | 5335.66 | 21.50 |
| 1922 | 4659.32 | 25.75 |
| 1923 | 7814.76 | 24.70 |

The town of Harvard issued notes to meet part of the highway bill for two different years. These notes are in anticipation of revenue, are issued to run one year, and must be authorized by the Director of Accounts. The use of demand notes is prohibited in this state.

From this investigation, it seems that Massachusetts towns are following the financing plan approved by the United States Bureau of Public Roads, which advocates the financing of maintenance expenditures from current revenue. It also appears, however, that the provisions of the

Municipal Finance Act of 1913, which allows towns to incur debt up to the limit of indebtedness for a definite period, as

"1. For the construction of stone, brick or other permanent pavement of similar lasting character, ten years.

2. For macadam pavement or other road material under specifications approved by the Massachusetts Highway Commission, five years."

are inadequate to meet the needs of a long-time highway policy which contains special expensive projects. With the increasing knowledge of road building, the period which a road may be expected to last has become much longer. For this reason, a longer period for paying for the improvement should also be made possible for those towns which wish to avail themselves of the opportunity to build good roads without putting too heavy a burden on the taxpayers in any one year.

The following principles of highway finance are quoted because they are the consensus of opinion of the leading highway authorities of the country:

PRINCIPLES OF HIGHWAY FINANCING

(As agreed upon by representatives from U. S. Bureau of Public Roads, and Committees from American Association of State Highway Officials, the Investment Bankers Association of America and the National Automobile Chamber of Commerce.)

The wide variance in the present status of highway development in the several states prevents the adoption of uniform policies for securing the funds necessary to the annual budget. Generally speaking, however, these principles may be set forth:

(a) States in the initial stage of highway development should issue bonds to defer that portion of the annual charge for construction which would over-burden either property or the road user.

(b) States where original construction programs are well under way can, in the main, finance normal new construction from current funds, utilizing bond issue funds to defer the cost of special projects.

(c) States where original construction is largely completed are concerned chiefly with maintenance and reconstruction, and should depend on current funds save in cases of emergency.

(d) The maintenance of interstate and state highways should be a charge against the road user.

(e) Roads serving a purely local purpose will generally require only light upkeep and should properly be a charge against the adjacent property, which in these cases, is the first and often the only beneficiary.

(f) No road should ever be improved to an extent in excess of its earning capacity. The return to the public in the form of economic traffic is the sole measure of such improvements.

## V. SUMMARY AND CONCLUSIONS.

1. Massachusetts has a very old highway system, and the state is now in a position in which maintenance financing is more important than the financing of new construction.

2. The legal restrictions regarding highways have been very complicated and, in many cases, even contradictory. Since the creation of a unified Department of Highways in 1893, however, the laws have become more adequate.

3. The cost of constructing and maintaining highways has increased tremendously in the last twenty years. This has caused a highway finance problem which has been solved in different ways by different agencies.

4. The state highway finance policy has been completely changed since 1904; the burden of the state highway system is now laid almost entirely on the people who own motor vehicles.

5. The State of Massachusetts no longer issues bonds for highways.

6. The counties are not important road building or road maintaining agencies in Massachusetts, although they are very important in other states.

7. The towns in Massachusetts finance their highways largely from current revenue. Although this indicates that most of the construction work is completed, some arrangement should be made to care for special projects by means of a long-time plan.

## VI. References.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2. Dunbar, S. J.
   A History of Travel in America - Page 26.

3. Magison and Bouve
   Statute Law of Municipal Corporations in Massachusetts - Page 577.

3a. Dunbar, S. J. ab. cit. Page 26.

4. Dunbar, ab. cit. - Page 34.

5. Hadley, "Railroad Transportation" - Page 13.

6. Dunbar, ab. cit. - Page 205.

7. The discussion of the Turnpike Era follows Wood, "The Turnpikes of New England".

8. Bidwell, P. W.
   Rural Economy in New England at the Beginning of the Nineteenth Century. - Page 317.

9. Bidwell, P. W., ab. cit. - Page 315.

10. U.S.D.A. Yearbook 1894 - Page 505.

11. U.S.D.A. Bulletin No. 136 - Page 5.

12. Magison and Bouve, ab. cit. - Page 577.

13. Weedon, "Economic and Social History of New England, Volume 1, Page 208.

14. Magison and Bouve, ab. cit. - Page 577.

15. Dunbar, ab. cit. - Page 26.

16. Magison and Bouve - Page 580.

17. Garland, "Massachusetts Town Law" - Page 64.

17a. Magison and Bouve, ab. cit. - Page 171.

18. Magison and Bouve, ab. cit. - Page 590.

19. McDonald, T. F.
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20. U.S.D.A. Yearbook 1924 - Page 113.

21. Letter from A. W. Dean, Massachusetts State Highway Engineer 1/15/'26.

22. Letter from A. W. Dean, Massachusetts State Highway Engineer 4/27/'26.

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28. Johnson and Van Metre,"Principles of Highway Transportation" - Page 15.

29. Chatburn, ab. cit. - Page 129.

30. Annual Report of the Department of Public Works 1924 - Pages 19 & 20.

31. Letter from H. M. Trumkower, Economist, Bureau of Public Roads.

32. Letter from Senator D. A. Reed of Pennsylvania, January 16, 1926.

33. Aggregates of Polls, Property, Taxes, etc. - Massachusetts 1909-1923.

## VII. Excerpts from the Federal Aid Highway System.

(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 July 11, 1916, as amended and supplemented, and for other purposes.)

Sec. 6. That in approving projects to receive Federal aid under the provisions of this Act 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.

Before any projects are approved in any State, such State, through its State highway department, shall select or designate a system of highways not to exceed 7 per centum of the total highway mileage of such State as shown by the records of the State highway department at the time of the passage of this Act.

Upon this system all Federal-aid apportionments shall be expended.

Highways which may receive Federal aid shall be divided into two classes, one of which shall be known as primary or interstate highways, and shall not exceed three-sevenths of the total mileage which may receive Federal aid, and the other which shall connect or correlate therewith and be known as secondary or intercounty highways, and shall consist of the remainder of the mileage which may receive Federal aid.

The Secretary of Agriculture shall have authority to approve in whole or in part the systems as designated or to require modifications or revisions thereof; Provided, That the States shall submit to the Secretary of Agriculture for his approval any proposed revisions of the designated systems of highways above provided for.

Nor more than 60 per centum of all Federal aid allotted to any State shall be expended upon the primary or interstate highways until provision has been made for the improvement of the entire system of such highways: Provided, That with the approval of any State highway department the Secretary of Agriculture may approve the expenditure of more than 60 per centum of the Federal aid apportioned to such State upon the primary or interstate highways in such State.

.....

Whenever provision has been made by any State for the completion and maintenance of a system of primary or interstate and secondary or intercounty highways equal to 7 per centum of the total mileage of such State, as required by this Act, said State, through its State highway department, by and with the approval of the Secretary of Agriculture, is hereby authorized to add to the mileage of primary or interstate and secondary or intercounty systems as funds become available for the construction and maintenance of such additional mileage.

Sec. 7. That before any project shall be approved by the Secretary of Agriculture for any State such State shall make provisions for State funds required each year of such States by this Act for construction, reconstruction, and maintenance of Federal-aid highways within the State, which funds shall be under the direct control of the State highway department.

Sec. 8. That only such durable types of surface and kinds of materials shall be adopted for the construction and reconstruction of any highway which is a part of the primary or interstate and secondary or intercounty systems as will adequately meet the existing and probable future traffic needs and conditions thereon. The Secretary of Agriculture shall approve the types and width of construction and reconstruction and the character of improvement, repair, and maintenance of each case, consideration being 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.

Sec. 21. .....

The Secretary of Agriculture, after making the deduction authorized by this section, shall apportion the remainder of the appropriation made for expenditure under the provision of the Act for the fiscal year among the several States in the following manner: 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 at the close of the next preceding fiscal year, as shown by certificate of the Postmaster General, which he is directed to make and furnish annually to the Secretary of Agriculture; Provided, That no State shall receive less than one-half of 1 per centum of each year's allotment. All moneys herein or hereafter appropriated for expenditure under the provisions of this Act shall be available until the close of the second succeeding fiscal year for which apportionment was made; Provided further, That any sums apportioned to any State under the provisions of 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 July 11, 1916, and all Acts amendatory thereof and supplemental thereto, shall be available for expenditure in that State for the purpose set forth in such Acts until two years after the close of the respective fiscal years for which any such sums become available, and any amount so apportioned remaining unexpended at the end of the period during which it is available for expenditure under the terms of such Acts shall be reapportioned according to the provisions of 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 July 11, 1916: And provided further, That any amount apportioned under the provisions of this Act unexpended at the end of the period during which it is available for expenditure under the terms of this section shall be reapportioned within sixty days thereafter to all the States in the same manner and on the same basis, and certified to the Secretary of the Treasury and the State highway departments in the same way as if it were being apportioned under this Act for the first time.

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Acknowledgements.

The writer wishes to express her indebtedness to the members of the Department of Agricultural Economics, all of whom have been most helpful in giving their time and critical advice when it was most needed. Especial thanks are due to Dr. Alexander E. Cance for his encouragement and suggestions. To Mr. Hubert W. Yount for his criticism of the manuscript, and to Miss Margaret E. Nagle for her work in typing the statistical material, thanks are also extended.