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## OBJECTS AND METHODS OF THE STATE-WIDE HIGHWAY PLANNING SURVEYS

A little over a year ago the first State-wide highway planning survey was begun. Similar surveys are now under way in 40 States. In some of these, the first phase of field investigation is drawing to a close; and the study and assimilation of the facts discovered have begun.

A year ago, we of the Bureau of Public Roads, looked forward hopefully to the possibility that a few of the State highway departments would take advantage of the 1-1/2 percent provision of the Hayden-Cartwright Act, to gather what we conceived to be much needed factual information, as a basis for future highway planning. Within the year we have seen those hopes far exceeded, as State after State has joined in the proposed studies; has quickly and efficiently organized the new forces and facilities necessary for the purpose; and vigorously and intelligently pursued the common course of investigation suggested by the Bureau. In a year when activities of government have been subjected to particularly searching scrutiny and criticism we have been gratified by a public endorsement of the purposes of the highway planning surveys, in which there has been scarcely a dissenting note.

Meeting today as partners in this joint effort, well begun, it is desirable that we re-examine our objectives and the methods by which we are seeking to attain them; and, by the test of experience and more seasoned thought, determine whether the objectives are good and the methods effective.

From the beginning it was made clear that the planning surveys were not to be simple traffic surveys, such as had been conducted previously in a number of States. They were not to deal only with the State highway systems, to which practically all organized study had previously been confined; but were to include in their scope the whole rural highway system and its principal urban connections. They were not to be limited to the counting of traffic; but were to consist of a variety of related investigations, including a physical inventory of the existing highway facilities and a close study of highway finances, so planned as to supply all of the facts needed for intelligent highway planning.

They were not to concern themselves solely with the highways as a problem of construction, or of public administration, or of finance; but with highways as the facilities of highway transportation; and with highway transportation as a department of a larger transportation system.

They were not to establish the facts of the present only, though such facts were the first and most urgent need; but were to seek further to trace out the trends that would permit a reasonable

estimate to be formed of the ways and the degrees in which these facts may be altered by new economic and social forces now at work upon them.

Why were these investigations thought to be needed? Because it was recognized that we stand at a critical juncture in the development of highways and highway transportation in the United States.

Our position is somewhat like that of the sculptor who, hacking away with rough but well-directed blows at what was originally a formless mass of stone, approaches the lines of the figure he is fashioning. At such a point the sculptor will change his tools and his methods. Calculated caution will replace confident rough hewing. And we in our similar situation must do likewise.

We began building a highway system for a small but rapidly increasing traffic of motor vehicles. We could not perceive the ultimate extent to which that traffic would grow, the precise forms it would take or the exact nature of its final contribution to the economic and social structure of the nation. We only knew that it was rapidly growing and that it needed and demanded better roads than those that existed, and so we began our road building.

We did not then know, we do not yet know exactly the extent of our whole inherited road system. We did not then know; we still do not know what part of that tremendous network we can or should improve. But we soon found that there was a relatively small part

of it that would serve the needs of the greater portion of the manifest movement; that part, the relatively small mileage that would form the most direct connections between the larger and more important cities. And so we come early to our first and most important highway policy -- the policy of the restriction of principal effort to limited intercity systems, that is expressed in the selection of the State highway systems and the Federal-aid highway system.

From the moment of selection of these limited systems there was at once a demand and a growing need for the improvement of every part of them -- a demand that State and Federal agencies have been working ever since to satisfy. The rate at which they have worked has been determined by the tax revenues annually available, accelerated in some measure by the issuance of bonds.

To attain their appointed end two ways were open to the State and Federal agencies. With the funds annually available to them they could either build each year a relatively small portion of the selected systems to a standard foreseen as ultimately desirable, if indeed, such a standard could be foreseen. Or they could build a larger portion to a lower standard consistent with the accommodation of immediate needs, and so more quickly spread a degree of improvement over the whole mileage of the selected systems, returning as funds became available to lift to higher standards sections previously improved upon which growing needs required further improvement.

The latter course, recognized as the stage-construction policy, was the way that was chosen. It was the second great principle of our past highway planning. By it we have come by now to the point where, with unimportant exceptions, the wholly unimproved gaps in the selected main highway systems have been closed. By no other course could we so quickly have reached this closure that permits a traveler to go from end to end of the country continuously upon roads to some degree improved.

But the task of improving the main roads is by no means finished. In many parts and in many ways the existing degree of improvement is vastly inadequate -- made so in large measure by recent unpredictable changes in the design of motor vehicles. The nature of such changes -- affecting principally the speed of the vehicles -- determines the character of the roads' deficiency, which lies to a greater extent in their grades and alignment and in their width than in the strength of their surfaces. And, because the most heavily traveled routes were for that reason first improved, we have quite generally the paradox that these most important routes are today least adequate to meet the modern needs. But, though we know that much remains to be done to complete the improvement of the selected main system, we do not clearly know all the places at which this further improvement is needed.

While State and Federal governments have been following the course described to bring the selected primary highway system to its present state, three thousand county governments and a larger number of lesser agencies have been working upon the far larger mileage of other roads outside of the selected system.

Little has been known with accuracy of this vast mileage of other roads. Even their total extent has been in nearly every State unknown and to this day -- a few States again excepted -- no reasonably accurate maps exist upon which they all may be seen.

Upon this vast uncounted, uncharted mileage, thousands of generally short-termed, relatively untrained local officials, each within his own narrow territorial limits, and largely without conscious continuing plan or coordination, have been carrying on an effort toward improvement. In some cases the degree of improvement effected is as great as any within the selected primary system. In some cases such a degree of improvement is merited, for, by the accident and error of selection, it is known that there remain without the selected primary system sections of road of importance equal to any in the system. In other cases a high degree of improvement has probably been given to relatively unimportant roads. In still other instances, improvement has possibly been withheld where it has been merited.

There is reason to believe that the improved portions of this "other" mileage are generally the more useful portions. A large but unknown portion remains wholly unimproved. Whether or not

and to what extent additional improvement is needed or justified no man today can say with any certainty, because of the chaotic state of local government records and the virtually complete lack of dependable information of the relative usage of the roads. Nevertheless, there is a public demand for continued extension of improvement "to get the farmer out of the mud," and it is a demand that cannot be denied or properly complied with in the absence of an adequate knowledge of the condition and utility of the remaining unimproved roads. In passing, it may be said that the justice of the demand in this connection may have to be decided upon grounds of social welfare and broad national economy rather than upon the narrower economic grounds of more familiar judgment.

If, from this brief record of the progress toward the present state of improvement of the selected main highways and the other roads, we turn to a consideration of the financial means by which this progress has been made possible, we find that it was begun with funds derived in large part from taxes on property. By an early decision the motor vehicle license fees in most States were dedicated to the selected State highway systems. As the motor fees grew with increase in their rates and in the numbers of vehicles taxed the property taxes levied for the support of the selected roads were reduced. Gasoline taxes were imposed to raise further revenue and steadily increased in rate, and when these with the license fees became sufficient for purposes of the main roads, the remaining property taxes levied for such roads were abolished in most States.

Continued growth of motor vehicle registration and further increase in the rates of the two taxes, especially those on gasoline, brought in larger and larger sums, seemingly without limit, and at first small then larger amounts were taken in many States away from the main roads and used, first for the local rural roads and then in some States for city streets, replacing for these purposes the property taxes from which they had earlier had their sole support.

With the approach of the depression the burden of property taxes was felt with increasing oppressiveness, and a revolt against them reached, in several States, the objective of complete abandonment for rural road purposes, thus throwing the whole cost of all roads upon the support of motor vehicle taxes. In all States the yield of property taxes greatly declined and local road revenues suffered accordingly.

As the depression deepened the need of revenue for other than highway purposes -- a further result of the diminishing yield of property taxes -- inspired a raid upon the special motor vehicle revenues to obtain funds for a variety of purposes, and the serious depletion of essential highway revenue was prevented, after some losses had been sustained, only by the threat of the Hayden-Cartwright Act.

But, if the depression was responsible for this first serious assault upon the principal source of highway revenue, it also brought to the highways an unexpected increase of support from



Federal tax sources, an increase that has probably at least compensated and, perhaps, more than offset the losses of withdrawn property taxes and diverted motor vehicle revenue.

Motivated by employment necessities, these Federal emergency funds have gone in ample amounts to the primary highways, and -- a new thing under the sun -- to the secondary and feeder roads or, as some prefer to call them, the farm-to-market roads. With a practicable measure of reasoned control they have gone through the Bureau of Public Roads and the State highway departments to a considerable mileage of secondary and feeder roads. With a freer hand they have been dispensed by the Federal relief agencies to a larger, but less carefully selected mileage. In both ways they have sustained an activity of local road improvement the burden of which has not been directly felt by the immediate beneficiaries, and, so doing, they have unquestionably stimulated the demand for a wider and accelerated improvement of such roads.

To the States that had completely suspended the collection of property taxes for road purposes, the increased Federal contributions came as the salvation of what would otherwise have been a most difficult, if not impossible situation.

At this moment the question of future support of the road program is involved in serious doubt.

Property taxes once gone will be difficult to get back.

Motor vehicle license fees and gasoline taxes are again increasing. From these sources, however, there is to be expected nothing approaching the rapid increase that characterized them during the twenties. Already, there is evidence of a gathering of serious opposition to further increase in the rates of such taxes, especially of gasoline taxes. And, in this connection, we must not lose sight of the fact that throughout the period of rapid increase in gasoline tax rates a declining price level of the commodity has thus far rendered the taxpayer insensible to the pain of his payment; a fact that probably goes far to explain the remarkable stability of gasoline tax yields during the depression. In looking to the tax as a source of future revenue this fact must receive serious consideration, in connection with the possibility of a reversal of the price trend.

Of the Federal contributions also, though they still continue at higher than past normal levels, it must also be assumed that there is much doubt in the absence of a more definite commitment of policy than any at present recorded. In this case the doubt is raised only by indecision as to the propriety and need of the Federal participation.

We have now traced the main lines of progression toward the present status of both the physical condition of the roads and the revenues that have been depended upon for road purposes, and have come in each case to unanswered questions, to questions that can properly be answered only in the light of a better understanding than we now possess of the facts of the situation.

In other respects also there has been a similar emergence from a past of relative certainty upon a present and future of doubt.

The partitionment of administrative responsibility between the Federal, State and local governments, long regarded as fixed, has been thrown into question by recent trends. At one end we have seen the local responsibility in several States yielded in its entirety to the State government, and everywhere questioned as to its sufficiency to meet the modern test. At the other we have seen the Federal government in emergency taking on the local burdens. To what extent are these the evidences of lasting changes; to what extent will they prove to be mere temporary adjustments to a passing condition?

We hear with increasing frequency the suggestion of Federal assumption of outright responsibility for a Federal system of highways; and in the extension of certain parkways we see a practical accomplishment of a similar fact in embryo. How far is it wise to go along that line?

In the regulation and taxation of road use we have come upon questions also -- stubborn questions; questions warmly debated, yet unanswered; and unanswered mainly because of a lack of dependable factual information. A highway traffic, decreasingly limited by State borders, is hampered in its proper flow by irrationally variable State regulatory laws, the products of uncoordinated past legislative response to problems, dimly understood at the time and

since materially altered. In a traffic at first largely personal there has developed an increasing volume of goods movement. Into a movement of vehicles carrying only the persons and goods of their owners has come a growing element of common carriers and contract carriers for hire. The altered relations of road to vehicle and of highway transport to other forms of transport that these changes have produced, have been and continue to be the subject of spirited controversy which will be decided in the end only upon the basis of facts not now available. Motor trucks are spoken of and taxed in terms of tonnage capacity ratings that are known to bear no definite relation to the loads actually carried. Various sizes and classes of vehicles are taxed according to schedules that have no rational basis of any sort; and the effort to find an agreed and reasonable basis is again defeated by lack of essential factual knowledge, as to the effects of the various sizes upon the highways and their consequent responsibility for road cost, and as to a variety of other circumstances and conditions of their several uses.

Questions; unanswered questions, concerning the conditions of use of the highways; questions on this score that, in the absence of a more perfect knowledge of fact, are as unanswerable as the questions previously alluded to, that concern the further need of highway improvement, the essential and proper financial support for the highways, and the division of administrative control over them.

And now, to these categories of questions, let me add and briefly define one other. This last is a form of question of which, in the past, we may have been but dimly aware. It is a form of question that may in the future transcend many others as a matter for our concern. It has to do with the broadest social and economic implications of our highways and our system of highway transportation.

In all that we, as road builders, have done in the past we have been laboring to supply highways for the use of a people and an industry distributed according to an existing pattern. The pattern of that distribution was made before our time. It was made largely by the forces of unsupplemented railroad transportation and steam power, which is to say - coal power. These were highly concentrative forces and they made a country in their own likeness. It was a country tied closely to rails. It had cities that were crowded as nearly as possible about the railroad station and the freight yard. Even its agriculture was strung on a thread of rail. Who does not remember that the value of farm land was gaged first by its distance from the railroad and only second by its fertility?

I say it was a country made largely by these two concentrative forces, but not entirely by them. In it there were still the residual effects of other forces, some waning, some long since dead. There were still hamlets clustering about dilapidated brookside mills. There were riverside towns that slumbered by their rotting wharves, dreaming of steamboat days, long past. There were pioneer settlements

remaining where they were formed at places, for one reason or another, relatively secure from attack by wild Indians. And there were backwaters of humanity up mountain hollows, on coastal sandbars and at other remote places that existed in an economic and social world of their own, as different from our present world as was that of the past from which their progenitors departed.

While we have been building roads to fit this existing pattern, the motor vehicles by which our roads are traveled have been pressing with a new kind of force upon that pattern, with tendency to change it greatly. The force that these vehicles generate is unlike that of the railroads; a diffusive, not a concentrative, force. What the railroads have tended to draw together, the motor vehicles now work to scatter apart.

And, more recently, this scatter force of the motor vehicles has been joined by another that works in the same direction - the force of electric power, widely distributed. Unquestionably, the merging of these two diffusive forces has reversed the resultant trend of our economic and social movement. Most emphatically it raises new questions for the highway planner and builder that must have most careful study.

Recognizing the lines along which such changes are tending to occur, intelligent highway planning can move with and facilitate them. Planless following of past routines is more likely to oppose and finally be overcome by them, with heavy loss by economic friction.

We hear daily of resettlement projects, revised land uses. It behooves us to recognize in these the evidences of the altered trend and shape our highway plans to aid, rather than resist the irresistible movement. We do not want to build roads where future reservoirs will be. We would not knowingly build a road toward a section soon to be depopulated. Yet there are immediate possibilities that we will do exactly these things unless we take heed of the direction of the new forces now busily at work.

Thus far in this discussion, we have traced each of five strands of the web of highway circumstance: the strand of highway condition; the strand of highway finance; those of highway administration and use; and finally the strand of highway relation to general economic and social trends. We have traced each from the central beginning to the present periphery. At the end of each we encounter questions -- questions of great import, upon the answers to which will depend the further course of each of these five strands and the future shape of the whole highway fabric.

It is these questions that the State-wide highway planning surveys have set out to answer: to answer upon a basis of uncontested and absolute fact, rather than upon a compromise of conflicting and approximate opinion.

In the inventory, which is the first stage of the studies, we are for the first time determining by actual measurement the true extent of our highway facilities, their extent and, in detail,

their present condition. On the main roads (meaning those distinguishable as mains by the character and volume of their traffic) we are locating and recording, in addition to the facts of surface condition, ascertained on all roads, the existing inadequate conditions of sight distance, curvature and grade that limit the service value of these roads. As an important detail, we are determining the exact physical condition existing at every railroad-highway grade crossing in rural territory, the angles and grades of highway approach and the visible distance along the railway from points on the highway. To these physical grade-crossing facts will be added by the traffic surveys the density of highway traffic at each crossing, and later, by agreement already reached with the Association of American Railroads, a record to be supplied by the railroad companies of the number, character, and time of train passages over each crossing, and of the number of collisions, injuries and fatalities that have occurred, and the amount of damage claims paid, at each during the last 5-year period.

In the inventory we are also determining the location in rural territory of all farm houses and homes, all churches, schools, hotels, stores, public institutions, mills, mines, and places of all kinds whatsoever that are the present origins and destinations of highway traffic. We are discovering what roads are used for the carriage of the mails, for the transportation of children to school, and as the routes of common carrier busses and trucks. We are also



determining, for mapping purposes, the location of all railroads, the prescribed routes of all regular air lines, the courses and extents of all navigable and all actually navigated streams, and as to each respectively the location of their stations, ports, and wharves.

All these determined facts of the inventory will be classified in numerous significant statistical tables, and will also be charted on large-scale maps, the first with such wealth of economic detail ever to be attempted. As a basis of future highway planning these maps will be invaluable, and not for highway planning only but for every other public planning purpose as well.

To the results of the inventory, showing the location and present condition of all existing rural roads, and the amount and character of human settlement and industry upon them, there will be joined the outcome of the traffic counts, which will present a composite picture of the flow of traffic over the whole system, and will show the relative present traffic use of each and every section. This will be the simplest of the many results of that complex, but thoughtfully planned series of related studies that comprise the traffic phase of the surveys.

Others will indicate the weight of the vehicles found on all parts of the highway system, with bearing upon problems of road design and the taxation and regulation of vehicles and traffic. Distinguished from these studies of what may be described as the flow of weight over the highway system, there will be other

precise measurements of the weight and related dimensions of vehicles, that are being obtained, generally at permanent pit-scales, for the purpose of establishing, beyond doubt and cavil, the actual characteristics of various kinds and sizes of vehicles, employed for all kinds of purposes. These determinations will have a direct bearing upon questions of taxation and regulation of vehicles.

By one type of origin-and-destination study, conducted generally, we aim to settle questions of the prevailing range of movement, whether relatively local or more far reaching, over various classes of highways -- the primary or main highways, the secondary or feeder highways, the tertiary or land access roads. By these general origin-and-destination studies we shall also have one means of approach to an answer to questions of relative interest in the various classes of highways of city and country dwellers, and the varying degrees to which the traffic on each class of highways and each particular route is composed of a city-to-city movement, of a movement from country to city and vice versa, and of a movement between country points. All of these determinations, having bearing mainly upon taxation questions, will be reinforced and, we hope, verified by information obtained in the so-called road-use studies of the financial phase of the surveys -- studies which approach the same problem by another method.

By other and more specific origin-and-destination studies, at favorable locations where the traffic is presented with alternate free and toll facilities, we shall seek, by noting the conditions of

choice of the shorter and more expensive toll route over the longer or more tedious free route, to measure the value that highway users of various classes put upon savings of time, distance, and vexatious delay.

And, by still other, and still more specific origin-and-destination studies we shall seek to indicate proper answers to recognized problems of highway routing, as local as questions of city by-passing and as broad as the question of eventual substitution of direct, inter-regional routes for the present meandering routes that are the consequence of intercity and intertown growth.

By studies of the commodities carried by trucks and of the origins and destinations and trip-distances of trucks and busses, and private passenger cars, we shall throw light on questions of the competition existing between the highway carriers, both private and public, and railroad and other transportation facilities.

By studies of the speed of highway traffic and of particular classes of vehicles, especially trucks, under various highway conditions, we shall attempt to single out causes of highway congestion in order that they may be corrected by future design of the road system and of the vehicles. These studies are not yet begun. And another type of investigation that should be everywhere conducted, but which thus far has been started in only a few States and in some of these under unsatisfactory conditions, is the careful and intimate analysis of highway accidents in relation to the time,

place, and other conditions of their occurrence. These analyses, so important to a determination of accident-preventive measures, including revision of highway facilities, must await, in the interest of reliability, the legal prescription of compulsory accident reporting. It is to be hoped that each of the State legislatures soon to convene will be urged to add such a requirement to the traffic code.

To the inventory and traffic studies the group of financial investigations adds the third major department of the planning surveys. Although they are indispensable to the attainment of the most important and significant objects of the surveys, it has been a little difficult to obtain an appreciation of that fact by a few of the State highway departments. Although, together, the various parts of these financial studies make up a coordinated whole, we have found in a few States a keen interest in one part and none whatever in another. Believing firmly in the great importance of these parts of the surveys, the Bureau will endeavor to convince all of the cooperating highway departments of their usefulness.

Their most important objective is the estimation of the probable future gross financial resources of the State and all its parts, available for the sustaining of a maximum highway investment. It is a vital objective. It cannot be achieved from any but an all inclusive view of every available highway tax resource, National, State, and local, including those of the municipalities for streets.

It cannot be achieved with a knowledge of the burden of highway and street taxes only, but requires also a general knowledge of the whole tax burden supported by all people for all public purposes. For our people through their taxes pay for many functions of government; and they will not pay excessively for one function at the expense of another; but when they pay for streets and roads they have the right to expect to get not good State roads only (in the narrow legal sense), or city streets, or local roads, but all these together without regard to arbitrary classifications, and limited only by sound economic considerations.

Unfortunately it is not possible to obtain this comprehensive view of the taxes paid by our people from any single informational source. Hence it is necessary that the data be assembled from many sources. Unfortunately it is not possible, because of lax accounting and reporting, to obtain a thoroughly correct view; but it is possible to approximate such a view; and the very effort to array the essential facts and the difficulties encountered in doing so, should have wholesome effect by revealing the weaknesses and deficiencies of the public business administration.

And what is true of the search for revenue is also true of the analysis of the purposes of outgo. Both must be viewed comprehensively, because the highway transportation system in its ultimate state must be a unit, and the more nearly we approach that state the more imperative does it become that we view it and treat it as a unit of closely coordinated parts.

All too readily our people are prone to believe that the money they pay now for highways is for the building of new highways. All too generally they still expect that some fine day all the desired highways will be built, and then there can be a relief from taxes. Of such beliefs and such expectations are born the occasional demand for a highway holiday and the more frequent reckless proposals for diversion of needed highway revenue.

The profound facts with which they must be made familiar are that the cost of a highway system is a perpetual one; that the limit of new highway building is reached not when we have built as many miles as we might be willing to pay to build, but when we have built as many as we are willing to pay indefinitely to keep. Through the discovery of the limit of this latter willingness or ability, which is the prime object of the financial studies of the planning surveys, we hope to set a reasonable limit upon the gross size of the sustainable improved highway system; within this limit to choose, upon the basis of revealed relative importance and usefulness, those coordinated sections of roads and streets which, without regard to their present arbitrary classification, should comprise the ultimate improved system.

To the estimation of the eventual annual costs of our road system, which is essential to the final analysis here outlined, determinations of the economic life expectancy of various types of road surfaces and other parts of the highway structure are also necessary. These, too, are essential parts of the planning surveys, and

finally, the so-called road-use and motor vehicle allocation studies have their definite place, as means of determining an equitable distribution of the ultimate costs of the highways in proportion to the benefits conferred.

I must pass over, with bare reference, the investigation of general economic and social trends which have an important place in the scheme of coordinated study. At Washington we are formulating suggestions indicative of the lines of such studies and the informational sources from which data may be drawn. These final suggestions have not yet been conveyed to the cooperating States. Bearing upon the last of the five strands of circumstance to which I have referred, these studies also are of deep importance if we are really to align our day-to-day operations with the ground swell of national growth on which they must float.

Too lengthily, I fear, I have tried to describe, with some degree of coherence, the many-sided objects of the highway planning surveys and the various and coordinated means by which we seek to achieve those objects.

The eagerness and intelligent interest with which the problems have been attacked by the forces created in 40 States within the last year, give promise of substantial and extremely useful results to be obtained. The progress made has been remarkable.

The work is not finished. Even the basic studies are not concluded and will not be shortly. What has this year been begun should not be thought of as a single venture into scientific study of the

highway problem. It should not be regarded as the subject matter of a single published report, or of any number of reports, however voluminous. It should rather be regarded as the launching of a continuing planning function within each State highway department, a function to discover and revise, perfect and keep current the many precise facts of all sorts that will be continuously the essential guides of a wise and efficient highway administration in the future. Suspend that active function now, and in a year or two the value of the work now done will be lost.

The 3-1/2 percent provision has been retained in the Federal law for the fiscal years 1938 and 1939. It should remain as a permanent fixture in the law, possibly with some enlargement; and no State should forego the opportunity it affords for intelligent planning of its highway improvement functions.



Objects and Methods  
of the  
State-wide Highway Planning Survey  
by  
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Forty States are now cooperating with the Bureau of Public Roads in State-wide highway planning surveys which cover the whole rural highway system and its urban connections. They include a road inventory, traffic surveys, and a financial study, coordinated to supply all the facts needed for intelligent planning of all the highways as essential parts of the transportation system of the whole country.

In our early highway planning we limited the State highway systems and the Federal Aid system to direct connections between important cities, which was sufficient to serve the greater portion of the motor vehicle traffic; and we adopted the "stage-construction" policy, which meant building or improving all of the selected system to a standard suitable for immediate needs, and as funds became more plentiful, raising these standards where necessary.

We have now practically completed the selected main highway systems, but largely because of the high speed of modern traffic many parts of the system are inadequate in grades, alignment, and width. Moreover there is a vast mileage of other roads which require improvement, but to what extent we do not know.

Originally highways were built with funds from property taxes, but in recent years motor vehicle license fees and gasoline taxes have relieved property owners of that burden almost entirely. In fact, the need of revenue for other purposes during the depression inspired such raids on motor vehicle funds that a serious depletion of highway revenues was halted only by the Hayden-Cartwright Act.

Highway administration shows a new trend. Local authorities are yielding responsibility to State governments and the Federal government. Shall the Federal government assume full responsibility for a Federal system of highways?

The regulation and taxation of road use are problems. Interstate traffic is hampered by variable State laws. Commercial use of the roads is increasing. The altered relations of road to vehicle and of highway transport to other forms of transport arouse spirited controversies. Truck taxes have no definite relation to the loads carried, and other vehicle taxes have no rational basis.

Our people and our industries are located where they are largely because of the concentrative forces of railroads and steam power. Industry needed transportation, and needed coal to supply steam power, so cities were located on railroads. Farms, which depended on railroads and cities for markets, were valued according to their proximity to railroads. Highway transportation and widely distributed electric power, on the other hand, are diffusive. They are reversing the whole social and economic trend.

All these problems of highway planning must be solved on a basis of absolute facts. The objective of these surveys is to obtain such facts.

The inventory will reveal the actual mileage of our highways and the condition of their surfaces; sight distances, curvature and grades on main roads; and conditions at all railroad-highway grade crossings in rural territory. From the railroads and our traffic survey parties we shall obtain data on highway and rail traffic densities, accidents, and damage claims at each grade crossing.

The inventory will show the location in rural territory of dwellings, buildings, and places of all kinds that are the origin and destination of highway traffic; roads used as mail routes; routes of school busses, common carrier busses and trucks; all railroads, routes of air lines, courses of navigable streams; and stations, ports, and wharves.

All these data will be classified in statistical tables and charted on large-scale maps.

The traffic surveys will show the flow of traffic over all the rural highways. Precise measurements of the weight and dimensions of various kinds and sizes of vehicles are being obtained, generally at pit scales, to provide data for use in solving problems of road design, taxation and regulation of vehicles.

One type of origin-and-destination study will show the range of movement over all roads, and the relative interest in the highways of city and country dwellers. Another, at locations where there are both free and toll facilities, will help us to measure the value that drivers put upon savings of time and distance. Still another will be made of highway routing.

Studies of commodities carried by trucks, and of the origins and destinations and trip-distances of trucks will throw light on the competition between highway carriers and railroads and other transportation facilities.

By studying the speed of vehicles under various day and night conditions, we shall soon attempt to single out causes of highway congestion. An analysis of highway accidents as to time, place and other conditions, must wait until State laws compel the reporting of accidents. It is hoped that State legislatures soon to convene will be urged to add such a requirement to the State motor vehicle laws.

The financial studies are an indispensable part of the surveys. By analyzing both the revenues and the purposes of expenditures of the State and all its parts, we hope to estimate the future ability of the State to sustain a maximum highway investment. That investment will not be limited merely by the number of miles the State can build and pay for, but the number which it can continue to pay for indefinitely after they are built. Within that limit we hope to choose the most important coordinated sections of roads and streets which should comprise the ultimate improved system.

The road use and motor vehicle allocation studies will show us how to distribute the costs of the highways in proportion to their use. Another study will determine the economic life expectancy of road surfaces.

The investigation of general economic and social trends is now in the formative stage.

The work is not finished. Each State should consider the planning survey as a continuing function. Suspend it now, and the value of the work now done will soon be lost. The  $1\frac{1}{2}$  percent provision has been retained in the Federal law for the fiscal years 1938 and 1939. It should remain permanently, and possibly be enlarged; and no State should forego the opportunity it affords for intelligent highway planning.