

prepared and published a number of comprehensive reports designed for informational purposes. These are often published exclusively for the use of the legislature in dealing in a more enlightened manner with proposed legislation pertaining to the furtherance of a system of highways adapted to the needs of today and foreseeing those of tomorrow.

USES OF HIGHWAY SURVEY PLANNING DATA IN HIGHWAY FINANCE AND TAXATION

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The mere collection and tabulation of highway survey planning data serves no useful purpose unless the information is analyzed and put to work on the primary problem of planning, designing, and constructing highway systems as elements of transportation, that such systems may inject new vitality into the economic and social life of America. Transportation is the new dynamic factor in modern American life.

The past thirty years have witnessed the rapid and magical development of the motor vehicle to a state of near perfection and a corresponding expansion from a standing start of a system of highways of national extent to such effect that the economy of the United States is irrevocably bound up with motor transport.

Early in the development of the motor age, highway planning was comparatively simple, for the need to connect centers of population with passable roads through rural areas was obvious, and instinctive engineering judgment was adequate to meet and promote the development of the motor car. That this task was well done is attested by the great highway network which stretches from the Atlantic to the Pacific, and from the Mexican border to Canada, and which is a tribute to American engineering.

But as motor transport integrated itself with American life and industry, the problem became more complex until today the instinctive approach will no longer suffice and more analytical methods are required in order that the highway transportation system will pace the tempo of industrial and social development. Thus it is vital that the continued development and expansion of this system should be wisely, carefully, and scientifically planned, utilizing all available data. Highway

planning surveys as presently organized under the able guidance and leadership of Public Roads Administration collect much of the data required to plan and design modern highway transportation facilities. But these data must be analyzed and applied to the practical problems associated with planning, designing, and financing highways.

The New Jersey State Highway Department has recognized the necessity and has recently organized a division of planning and economics headed by a director and deputy and composed of two principal bureaus: (1) the bureau of planning and economics, and (2) the bureau of planning survey. The latter bureau gathers highway planning (traffic) data in the field and collates it, while the former analyzes the information and applies it to practical highway planning problems having due regard for the principles of economics.

One of the important duties of a planning and economics division is to assist in the field of finance and taxation as applied to the highway transportation system. This problem is particularly acute in the state of New Jersey where public sentiment, in view of critical unemployment distress and believing that sufficient highways had already been constructed to adequately fulfill transportation needs, sanctioned by referendum vote of the people the diversion of motor vehicle revenues to other than highway uses. The total diversion amounted to the sum of \$159,000,000 over the past 16 years. This diversion sentiment came largely from the cities and urban areas where a large portion of motor vehicle revenues were collected and where land tax distress developed during the depression years. The people of the urban areas felt that motor vehicle revenues collected from them were being used largely in rural areas and that they were deriving little benefit from such taxes. Therefore an equitable balance between highway expenditures in rural and urban areas is essential. It is interesting to note that in the three-year period from 1940-1942 inclusive, 12 percent of the total motor vehicle revenue in the sum of \$615,000,000 was diverted from highway uses in the United States.

Consequently it is necessary to take stock of highway construction and maintenance needs and to relate those needs to anticipated revenues in order to determine whether such revenues will be sufficient to meet requirements as rapidly as required by expanding traffic, or if additional motor vehicle taxes or possibly a bond issue is necessary.

In order to determine scope in financial planning, the first broad objective contemplates the blueprinting of an overall statewide highway transportation system which will be required by the state to assure its economic vigor, health, and continuous progressive development, looking forward a

reasonable period in the future. In the state of New Jersey the system is being developed on a 30-year basis. To accomplish this task it is necessary to gather data from national, state, and local agencies in order to integrate the development plans of these groups into the highway net. It is necessary to learn the trend of industrial and agricultural development, to ascertain where water power and water supply reservoirs, airfields, canals, railways, recreation areas, state and national forests, and military installations are planned in order that the highway system will serve these facilities effectively and not conflict with them. It is then necessary to relate these data to predicted traffic volume and trends.

In the planning and determination of the amount and location of highway facilities it is advisable to cut cross-sections across traffic sheds and compare the present traffic volume with the number of traffic lanes presently available thus establishing whether there is a current deficiency or adequacy of traffic capacity. The traffic volumes may then be projected ahead 30 years and the number of traffic lanes needed at the end of that period determined. With this data, suitable future routes are laid out. In the development of a statewide 30-year plan, consideration should also be given to opening up undeveloped areas for growth and recreation.

It is estimated that the state highway portion of the 30-year system, which should be constructed in New Jersey in order to meet transportation needs so that the state may retain and advance its economic vigor and prosperity, will cost in excess of one billion dollars.

Upon the completion of the long-range 30-year plan conceived on a realistic basis of actual state needs, a definite goal of accomplishment is established, based on a thoughtful reasoned analysis of all the factual data available. Actual construction can then proceed with the assurance that each project forms a part of the ultimate master plan. This results in overall economy, avoidance of duplication and costly scrapping of expensive highway facilities.

With the ultimate goal blueprinted, it is then necessary to establish priorities for the actual construction based on factual data and having due regard for anticipated available funds. In order to utilize engineering personnel effectively to perform the field surveys, prepare plans, specifications, and to plan construction operations properly, it is the purpose of the New Jersey highway department to establish these priorities five years in advance. In this way planning for actual construction can be kept continuously five years ahead and schedules (time tables) can be worked up so that the program may be executed smoothly.

In a state where traffic has continued to grow apace in

spite of curtailed highway construction, there is inescapably a tremendous backlog of new highway construction virtually in an emergency category due to acute strangulation of highway transportation. This ten-year backlog of emergency projects in New Jersey amounts to more than \$200,000,000 at the present time. That this has reached alarming proportions is indicated by the condition of one highway which has a satisfactory maximum capacity of 35,000 vehicles per day and which now carries an average daily traffic of 66,000 vehicles. This route has carried 102,000 vehicles per day. The economic loss due to congestion and delay is enormous. In the traffic shed served by this route there is a roadway deficiency of over 95,000 vehicles per day at the present time. This is big business in the economic field and in view of the intimate relationship such facilities have on the welfare of the state, it is essential that priorities for construction and financing be based on a careful and intelligent use of traffic and economic data gathered by the highway planning survey. The establishment of these priorities is difficult, however, because of the tremendous backlog of urgently needed highway improvements. Consequently, it will be necessary in New Jersey to use the yardstick of traffic congestion as a measure of urgency in establishing priorities for construction. Because the heaviest concentration of excessive and sustained congestion is confined to one section of the state and in fairness to the state as a whole, it is proposed to divide the state into zones and establish relative priorities within the zones. Since the anticipated future motor vehicle revenues will not be sufficient to provide all the highway facilities needed to bring the state abreast of traffic needs at once, it is considered equitable to establish construction priorities within these zones in order that relief may be afforded throughout the state rather than be entirely concentrated in one area alone.

Inasmuch as the work of the highway department is carried forward on a fiscal year basis it is necessary to prepare a yearly budgetary statement for consideration by the state budget commissioner, approval by the Governor, and submission to the legislature for final approval and action. The projects included in the budget for state highway construction can be selected in the order of priority from the five year highway priority list within each zone.

A necessary fiscal responsibility is to set up an annual program for the replacement of worn out pavements and other physical units of the highway structure and to establish a fiscal program for the rectification of traffic hazards on a priority basis. The use of highway planning data is fundamental in developing these programs.

Another important use of highway planning survey data in the field of finance and taxation is the determination of an equitable distribution of motor vehicle taxes over all classes of vehicles. In conjunction with this work a study may be made of maximum desirable vehicle size and weight with the objective of submitting model drafts of legislation for the consideration of the legislature and the Governor.

It is considered that this is a most important assignment, for the role of the motor truck is so interwoven with the economic and industrial welfare of the state, not to mention the dependence of vast populations on the truck for the delivery of food, that any adverse unbalance in the economy of truck haulage would have an immediate and unfavorable effect on the people and business interests of the state.

During the last session of the New Jersey legislature, a bill was introduced increasing the motor vehicle license fee for the heavier trucks. Before it was put to a vote, advice was requested of the highway department as to whether the new rates were equitable in relation to the additional original highway construction cost and the wear and tear caused by heavy trucks on the highway.

The department did not have any answers ready nor was it in a position to produce realistic answers in time to be of assistance. After considerable calculation the best that could be done was to advise that heavy trucks would require an increase of about two inches in the thickness of concrete pavement, some increase in bridge costs, some additional maintenance costs on pavement and shoulders, and that in some cases costs had been increased due to constructing lower rates of grades for trucks. It was concluded that trucks did not cause any increase in cost for right-of-way, width of pavement lane and total number of lanes of pavement, grading (except as influenced by lower rates of grades), width of bridges, width of shoulders, and traffic interchanges. No data were available to indicate the ratios of these various costs as related to truck weights and classes and in turn related to the proper share of motor vehicle taxes that should be borne by passenger cars and the various truck classes.

It was evident that the department needed to develop more information in order to advise on equitable rates of taxation. This information can be obtained by proper utilization of data derived from highway planning surveys.

It is essential, therefore, that a sound fiscal policy be formulated based on highway transportation needs as determined by traffic data and met by annual motor vehicle revenues equitably adjusted in differential rate among all the various classes of vehicles and set at a level that will yield sufficient revenue to meet the needs of motor transportation adequately,

but such rate structure must not exceed ability and willingness to pay. A policy contemplating motor vehicle tax rates above ability to pay will result in diminishing returns, and more serious still, will have a tremendously adverse effect on the economy and social welfare of the state.

The American motorist and the trucking industry have shown an extraordinary willingness to pay motor vehicle taxes but it cannot be expected that they will continue in this mood if the monies collected from them are diverted away from highway construction and maintenance or if a hit or miss or inequitable fiscal program is adopted. Highway planning surveys provide the data and furnish the key to the establishment of a sound fiscal policy based on the use factor. In the establishment of a policy, care must be exercised in avoiding blind acceptance of traffic volume density as the sole criteria. There should be a recognition of the necessity to open up undeveloped areas in a state and to "subsidize" such areas with an adequate road system to stimulate development in order to effect an increase in land tax ratables on a state-wide basis, to spread out industry and population and to open up recreation areas. Such a policy must be carefully balanced against the highway transportation needs of presently developed areas, otherwise industry, population and business will be sucked away from these areas resulting in blighting them with subsequent loss in land tax ratables and a staggering loss in physical investment in schools, hospitals, playgrounds, parks, water supply, sewerage, and street systems as well as other public utilities. The cost of government in these fully developed areas does not decline when there is a loss in land ratables, but rather increases. Consequently, communities with declining ratables face almost certain bankruptcy.

A fertile field where economic analysis based on highway planning survey data will yield large dividends in state-wide prosperity is in developing an equitable fiscal policy establishing the ratio of available motor vehicle funds that should be spent on the main state highway and urban system to that spent on the secondary or feeder system. It is clear that the purely land service road provides access to property and is almost entirely of direct benefit to the abutting owners, while the trunk highway is an element of transportation and is of large benefit to the region, the state, and in many cases to the national economy. This is a large and pressing problem since state legislators are constantly subjected to pressure from rural areas for a larger "cut" of state motor vehicle revenues to be spent on local land service roads. It is difficult for the landowner bogged in the mud in an isolated rural area to understand benefits accruing to him by the

expenditure of millions on express highway facilities in highly developed urban areas. It is essential that there be a fundamental clarification of what land service roads should be supported entirely by land taxes collected from local land owners, what land service roads should be supported partly by the land owner and by motor vehicle revenues, and an equitable ratio set up. Where there is state participation in local road construction and maintenance using motor vehicle revenues, a determination should be made by the state as to which roads should be improved on the basis of the service to be rendered by such roads to the state-wide feeder system of highways. This indicates the necessity of developing a state-wide feeder system of highways properly integrated with the main system. It may be of interest to note that of the 3,000,000 miles of highways in the United States, approximately 80 percent carry an average daily traffic of 22 vehicles or less. Assuming the improvement of such a low traffic road at a cost of \$8,000 per mile and assuming the investment is charged off in one year, the cost is at the rate of \$1.00 per vehicle mile, while an express route carrying 60,000 vehicles per day and costing \$2,000,000 per mile could be charged off in one year at the cost of ten cents per vehicle mile. In 1921 nearly three-fourths of all money spent for highways was derived from local land taxes, while in 1941 only one-quarter was furnished locally. It is noted that an "at grade" local access main state highway is still a land service and the adjacent property reaps a great benefit when the highway is improved and traffic increases. It would appear equitable therefore that such specifically benefitted land owners bear a share in the cost of such roads. The same reasoning applies to express highway facilities constructed to relieve traffic congestion in urban territory. In New Jersey where limited access express highways are involved, the thinking to date has tended to the opinion that the loss in land tax ratables due to destruction of buildings and the withdrawal from the tax books of the land occupied by the new highway constitutes a sufficient local contribution to the cost of the express facility. Often, even this contribution involves small fully built up communities in a serious financial problem particularly during the period required to effect an increase in ratables on the remaining properties in the town induced by the expansive effect on such properties by reason of the construction of the express facility. This thinking may be untenable in states not as heavily urbanized and industrialized as New Jersey.

It is the opinion of the writer that the surface has only been scratched in utilizing the tools made available by highway planning surveys. This is particularly true in the field of finance and taxation and it is hoped that the scientific

reasoned approach to these problems will be given definiteness of direction and be pressed with vigor. The stakes are high, for the economic and the social welfare of the United States is dependent on an adequate highway transportation system developed on a sound fiscal policy.

PROGRAM AND PROJECT PLANNING

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Discussion of Program and Project Planning will be limited to some aspects of Connecticut's highway planning which it is believed are somewhat different in character from planning survey activities in most other states.

Program Planning. A \$99,000,000 five-year state highway construction program has been planned and there is only \$31,000,000 in sight to accomplish it.

The first year of the five-year program ended on June 30, 1946. The second year is the fiscal year ending June 30, 1947. The third, fourth, and fifth years will be the fiscal years of 1948, 1949, and 1950. If the \$99,000,000 program is carried out according to plan, it would mean that all projects contemplated would be completed or under way by July 1, 1950.

The biggest "program" job at the moment in Connecticut is to present the five-year program of \$99,000,000 and the latter program, involving another \$200,000,000, in a manner that will assure that its importance and urgency are recognized by the legislature whose responsibility it is to establish the basis for financing Connecticut's road program. It is important to make clear the character of the major improvements being planned in and adjacent to cities, to indicate the value these improvements will have in the relief of congestion and reduction of hazard, and, above all, to establish a recognition that the program is a fact and not a proposal. Whether construction proceeds rapidly or slowly, whether there are \$31,000,000 or \$99,000,000 available in five years, the characteristics of the individual projects will be unchanged because they are based on the traffic to be served and not fitted to potential revenue. This must be made clear. *There is no uncertainty about a soundly planned program except the rate at which it will be undertaken.* The Connecticut highway planning unit has just completed and is now distributing a program report. Some of the illustrations from this report will show how the state