

PROGRAM DEVELOPMENT
COUNTY AND RURAL SECONDARY ROADS

by

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Commissioner Tinder, Mr. Sabel, Mr. Chairman, and members of the 1966 Highway Conference, the subject for this next period on the county and rural secondary roads section has been entitled, Program Development. I suppose many books have been written on various aspects of program development as it relates to the planning, design, construction and maintenance of highways. However, without prior knowledge of why this topic was selected, I have taken the privilege of using this time to discuss with you certain aspects of program development in the Kentucky Department of Highways.

First, in the way of introduction, let's take a look at some of the facts relating to highways in the United States, and also narrow it down to Kentucky's highway system. In the United States today, there are 90 million drivers operating approximately 90 million motor vehicles on three and one-half million miles of roads and streets. Each year, the public travels approximately 750 billion miles. It is estimated that in 15 years from this date, around 1980, there will be 113 million motor vehicles being driven over 1.2 trillion miles per year. The use of the trillion almost defies my imagination. It has been stated that if all the vehicles today were placed on our roads and streets, simultaneously, they would be spaced approximately 500 feet apart. It has been further estimated that in 1975 if all cars were spaced on the proposed roads, they would be spaced some 350 feet apart.

Kentucky has approximately 70,000 miles of all types of roads and streets, including both rural and urban. Some 21,000 miles of these roads and 5,000 miles of bridges are presently maintained by the Kentucky Department of Highways. You might be interested in some of the neighboring states. Tennessee has some 75,206 miles, Ohio has 104,500 miles, Indiana 102,000, West Virginia 36,000, and Virginia 56,000. There are 26 states with more road mileage than Kentucky and 24 states with less total mileage. The most essential step in the development of an effective highway program for the state of Kentucky is securing a basic understanding of the responsibilities of the Federal, State, County and City for the construction and maintenance of highways. I have always felt that the Highway Conference, if it receives maximum participation from local communities, is the place where this better understanding between agencies could be effected.

By law, the Department of Highways has been given the responsibility to establish, construct and maintain a state system of highways. In studying the existing State-responsible road network, it is apparent that for the past 45 years there has been a lack of a clear pattern of highway development in Kentucky. There is one exception - in the case of the Interstate and Toll Road

System where there has been a definite pattern followed in the location and construction of these facilities.

It is also apparent that the Department has committed itself to a system of highways which far exceeds the limits of its financial capabilities, without having a clear-cut definition of systems and priorities for improvement of these miles. This creates an illusion that tax monies can continue to be spent for the construction of new roads without regard to what it is costing to own what we already have. It is interesting to note that in 1930 the total mileage in the state was 61,500 miles, and the state-maintained system was approximately 4,000 miles. As of January 1, 1966, the total mileage of public roads in the state was 69,893 miles, and the state-maintained system was 21,690 miles. Although the total mileage in the state has increased by only 15%, the number of miles on which the state has accepted the responsibility for maintenance has increased 500%. The pronounced effect this increase in state responsible mileage has had on the road fund is evident in the Department's annual maintenance expenditure which has risen from approximately 7% of the total road fund tax revenues in 1930 to approximately 33% in fiscal year 1966.

With this trend, it is estimated that annual maintenance expenditures will increase to approximately 57.5 million in 1980, or an average annual amount of \$43 million for the next 20 years. You may be interested in knowing how Kentucky compares with other states in road expenditures. Kentucky exceeds the national average in percentage of total road expenditures by all units of government that are devoted to state highways. A large portion of the total represents expenditures made entirely by the state.

Kentucky also exceeds the national average in expenditure of state highway revenues for rural roads. In Kentucky, 13.85% is spent on local rural roads as compared to the national average of 9.63%.

I believe from the above statement you can see that the first step in developing an effective program for Kentucky is to provide a basis for establishing and maintaining a state responsible network of highways so that determinations for future improvements and proper allocations of money for these improvements can be made annually.

By law, Section 177.020 of the Kentucky Revised Statutes states that the Department of Highways is charged with the responsibility of establishing, constructing and maintaining a state responsible system. Some three and a half years ago, extensive studies were initiated by the Department to classify highways and to fit certain facilities into logical systems based on the type of traffic service which these facilities provide. A complete, functional classification study was made to determine whether a facility was providing an arterial type of service (long distance trips), a collector type service (shorter trips which feed the main arterial facilities), or strictly a land service which

provides access to otherwise inaccessible areas. For this study, the Interstate System and the present Parkway System were considered as complete. The resulting traffic reorientation from the construction of these full-controlled access facilities was considered and those facilities which are presently performing as arterials will, by necessity, become collectors with the completion of the Interstate and Parkway Systems.

Some interesting statistical information has resulted from this study. Upon completion of the Interstate and Parkways in 1972, there will be approximately 71,000 miles of public highways in Kentucky. Our studies have shown that a selected network of state responsible highways of approximately 21,500 miles will provide 84% of the vehicular traffic service in the state. The remaining 50,000 miles which represents approximately 70% of the total mileage in Kentucky will provide traffic service to only 16% of the traffic desires. This 21,500 mile state responsible system is made up of the following: 734 miles - Interstate, 405 miles - Parkway, 3,600 miles - State Primary, 7,300 miles - Secondary, and 9,500 miles on the Rural Secondary system. Of this 21,500 miles, approximately 20,700 miles are in the rural areas of the state, and our studies indicate that this mileage will serve 91% of all the rural traffic in the state. There are approximately 750 miles in the urban areas which will serve approximately 67% of the traffic in the urban areas.

The total Interstate and Parkway systems comprise 1,139.69 miles. This mileage is approximately 1.6% of the total mileage in Kentucky, and upon completion, these miles will serve 27% of the traffic. In other words, these fully-controlled access facilities, when completed, will serve 25% of the state's traffic with less than 2% of the total road mileage in the state.

The most important step in developing an effective highway program in Kentucky has been accomplished with the completion of these studies, and I am happy to say for the first time in the history of the Kentucky Highway Department, Kentucky has established a state-responsible network of highways. This responsible-system of highways will form the basis for estimating the present and future needs. I believe you can understand that until this step was taken by the Kentucky Department of Highways, it was practically impossible to develop a highway program. Until this was done, it was not possible for the Department to determine its present or future needs - not knowing what would be the financial responsibilities - one year, two years, or three years from the present dates. In establishing a state-responsible system of highways, procedures have also been formulated for changes which are expected to occur due to land use and socio-economic revisions.

With the completion of our studies on the functional classification systems and the establishment of the responsible system of highways, the Department is now in a position to move to the next step of developing an effective highway program. In this paper, all reference to highway program relates to a total highway program, including all systems and all monies, both Federal and State. The following programs are administered by the Kentucky Department of Highways:

Interstate Program which consists of approximately 735 miles in Kentucky, and if Congress does not extend the completion date, is expected to be completed in 1972. Kentucky's Interstate System is expected to cost over \$600 million. Funds for this program are on a 90/10 Federal-State share. Interstate in Kentucky has opened approximately 50% of its Interstate System to traffic.

The proposed and existing Parkway System is comprised of approximately 405 miles, is supported by the sale of bonds to cover the cost of constructing each parkway, operating under the jurisdiction of the Turnpike Authority, the Highway Department constructs these parkways and has the responsibility for maintenance.

The regular Federal-aid program for the Federal-aid Primary, Secondary, and Urban Systems, provides approximately \$16 million Federal dollars each year for the improvement of these roads. These Federal funds are matched on a 50/50 ratio with State money, making a total program annually of approximately \$32 million. Under our recently established state responsible system of highways, this \$32 million annually will be used for construction improvement projects on approximately 11,000 miles of roads.

With the passage of the Appalachian Development Act of 1965, an Appalachian Development System of Highways in 49 counties in Kentucky was developed. Kentucky now has 413 miles approved as eligible for Appalachian construction monies. Kentucky has been apportioned for the next five years, \$183,911,000 to implement this program. This program, being a five-year program, is scheduled for completion in 1971, and the funding is on a 70/30, Federal-State ratio on all two-lane sections. On all four-lane sections, which are constructed initially, the funding ratio is 50/50.

The Highway Beautification Act of 1965 provides for the control of outdoor advertising and for control of junkyards on the Federal-aid Interstate, Primary highway systems, and for the scenic development and road beautification of all Federal-aid highway systems and provision of roadside rest areas. During fiscal year 1966, a little more than one million dollars in Federal funds was available to Kentucky to carry out work approved under the Beautification Act.

In addition to the Federal programs which are administered by the Highway Department, programs involving the expenditure of 100% State funds have been of considerable magnitude. These are improvement projects which are financed with 100% State funds from our road revenues.

As you are aware, two programs administered by the Kentucky Department of Highways are for the improvement and maintenance of principal secondary and rural roads in each county. Taxes paid by the people of the entire state go into the road fund to support these programs.

The county road aid program is made possible by an appropriation of \$10 million for the maintenance and improvement of county roads. The rural secondary program is financed by 2¢ of the 7¢ gasoline tax. This fund goes for the construction, reconstruction and maintenance of a system of secondary roads. Both county road aid program and rural secondary program are funded from funds distributed under a formula approved by the General Assembly. This formula guarantees that a specific amount of each fund is available each year for these road purposes in each county. Under the formula, 2/5 of the total is distributed on the basis of rural area of the county, 1/5 is based on the rural population, 1/5 on the mileage of the roads and 1/5 is distributed equally among all 120 counties. For the 1966-67 fiscal year, approximately \$33 million will be expended on the secondary and county road aid programs.

Under the state law, the Department of Highways is responsible for the administration of both the above programs. The law directs the Department to seek the recommendation of the fiscal court for the system to be approved and the projects within the system. It is the purpose of the Department of Highways to work with local officials and other interested people in the county to produce the best possible expenditure of these funds.

A very sizeable program involving the expenditure of over \$20 million of State funds is under way in Kentucky to provide for needed improvements which cannot be financed with Federal funds. This includes work done by contract and State forces as well. The Department's resurfacing program for this year involves the resurfacing of more than 1100 miles at a cost of approximately \$11 million.

From the capsule version of each of the above programs, you can see that the total highway program for Kentucky covers a variety of activities and a wide range of planning considerations. It would be difficult to single out any one program and say, "this is the most important", or "this one has more complex problems", as they are all important to the total highway program, and each in its own way has its peculiar problems.

With the establishment of a State-responsible network of highways, the next step towards determining needs is an inventory of the existing roadway system. The Department has, for some years now, been completing sufficiency ratings of our Federal-aid systems which includes the inventorying of roadways to determine the adequacy of the existing road to accommodate its present traffic. However, until this time, we have not been able to do an effective job of inventorying the rural secondary facilities.

If the money available for roads were unlimited, we, of course, would not have any problem in determining priorities; however, with the limited financial capabilities under each program, it is important that the Highway Department determine those projects which should receive improvement, first. At the present time, the Highway Department works with a 20-year planning period. Improvement projects are made on the basis of 20-year projected traffic. It is

possible to evaluate the State-responsible network on a 20-year projection period and determine the need in 20 years. However, it is more important at the present time to determine those highways on the State-responsible system which are below tolerable standards. You can recognize, of course, that working with a 21,500-mile classified system that the determination of 20-year needs, 15-year needs, 10-year needs and present-day needs is a most time-consuming process. It is, therefore, imperative that the Highway Department utilize computers in these studies so that budgetary limitations can be assessed. For example, it would be desirable for all highways on the State-responsible system of highways to be improved to a level that would accommodate an average travel speed of 50 m.p.h., and have lane widths of 12 feet. However, this is not possible because these high standards cannot be financed with the present funds available. It is, therefore, necessary to determine standards where a proper balance between the adequacy and the economy can be made. If the standards are set too high, the resulting needs are impractical as well as impossible to obtain.

The Department, at the present time, is studying methods used in other highway departments in this field, and are hopeful that we might benefit from their work. We are presently in the process of establishing sections on the State-responsible network so that inventories can be made for each specific section. These inventories will show the capacity volume ratio, the amount of lane width deficiency, the amount of shoulder width deficiency, the structural ability of the pavement, inches of surfacing, and other inventory of data. After the completion of this inventory data, utilizing the computer, we will be in a position to secure, very quickly, individual sections accumulated with the following totals printed out:

1. Number of miles inventoried
2. Number of miles of two-lane roads with deficiencies
3. Number of miles of three-lane roads with deficiencies
4. Number of miles of roads with four lanes or more having deficiencies
5. Number of miles which have capacity deficiencies
6. Number of miles which have a deficient lane width
7. Number of miles which have a deficient shoulder width
8. Number of miles which have an insufficient remaining pavement life (structurally)
9. Estimated cost for eliminating capacity deficiencies, only
10. Estimated cost of eliminating all needs
11. Total vehicle miles traveled on the route
12. Number of miles of resurfacing required, average thickness and estimated cost.
13. Number of miles requiring relocation or reconstruction
14. Number of miles that need to be widened to four lanes
15. Number of miles on which pavement needs to be widened to 24 feet.

Each of the above 15 items can be tabulated for each functional classification of highways. For example, this information could be determined for the rural secondary system, the state primary system and state secondary system.

The North Carolina Highway Program utilizes 2600 roadway sections, and they are able to get the above 15 tabulations with about 30 minutes of computer time which costs less than \$50. Utilization of this kind of computer program also give you the opportunity to secure print-outs, system-by-system, which can be analyzed, and this summary can be made, requiring approximately 10 minutes of computer time at a cost of approximately \$20. The greatest advantage of this kind of analysis is the practical approach which is provided to fit the needs with the financial capabilities available on each system and on the total system. It also has the advantages of providing information for management which forms the basis for good, logical decision-making. For instance, if the Department wanted to know how much it would cost to raise the State-responsible system of highways to a level of traffic service approximately five miles per hour over the existing average operating speed, one pass on the computer would give an approximate estimate of the cost. This kind of data will indicate the effect of raising or lowering traffic speeds by 5 m.p.h. on each or all of the functional systems. The kinds of questions which we need to ask in the Highway Department are as follows:

1. Which roads presently require improvement
2. Which roads will require improvement in the next five, 10, 15 and 20 years
3. What will be the needs if the future traffic is 10% more than estimated.
4. What would be needed if we have 10% less than that estimated
5. What are the needs if the Department chooses to maintain the minimum acceptable operating speeds.
6. What are the needs if AASHO design standards are used to evaluate the system.

The Department is not presently able to answer these kinds of questions, but having completed the giant step of establishing a State-responsible network of highways, we are now ready to take the next step of establishing techniques and methods within the Department so answers to the above questions can be made.

It is vitally important that the Department be aware of its present and future needs. It is the Legislature which shapes the character of the highway program by defining road and street responsibilities of the various levels of government, by establishing equitable financing for each road and street system, and by setting long-range objectives for each system developed. The responsibility to advise the Legislature of the needs of Kentucky on a State-responsible system is that of the Highway Department. The method which Kentucky is presently following is a rational and systematic analysis of data by functional classes on a statewide basis which will produce an array of deficient sections of highways which can be ranked in order of urgency. The array, thus formed, give management the basic data needed for the first steps in program formulation. It should be re-emphasized that programming and the development of a program is a continuous operation. Its effect is far-reaching and involves all elements of highway organization, yet the procedure must be flexible enough to cope with unforeseen circumstances.

To be sure, there are other considerations which affect the timing or positioning of individual deficient sections in the overall program. Among these are economic aspects, agreements, commitments, continuity of route development, stage construction, advance right-of-way acquisition and traffic control. Although these latter considerations may advance or retard timing of an individual project, they generally have little affect on the overall program over a long period of time.

The end result of a continuous, effective programming operation is a sound short-range program of approximately three to five years, an intermediate-range program of five to ten years, and a long-range program of ten to twenty years.

In my remarks today, I have not tried to raise many of the questions which could be raised in regard to program development, nor have I tried to come up with answers for all situations that arise in our Highway Department. But, if I have managed to raise some questions in your own minds, and if I have been able to indicate the problems and workload presently facing our Highway Department, then I believe my talk, in some respects, has been worthwhile.

Thank you for your kind attention.

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