

the 20-year period, and only about 10 percent of the funds needed to complete the programmed primary highway projects would be available.

2. Under the most optimistic assumptions of revenues available to MDOT, which includes three or four revenue increases, all projects in the 5-year program can be completed over the 20-year period. However, MDOT would not have the financial capability to initiate any additional major port, aviation, rail, highway, or transit projects within the next 20 years without cutting back on operating services or currently programmed capital projects. Furthermore, because of an anticipated shortfall in federal primary highway funds, about 75 percent of the primary highway funding would have to be provided entirely by the state; i.e., there would be no federal matching funds available for many of the primary highway projects.

3. Under the constant-purchasing-power revenue estimate, MDOT could expect to complete all of the programmed projects plus about \$250 million worth of nonprogrammed primary highway projects. Again, all of the new projects would have to be entirely state funded, because all of the estimated federal aid available would have been used on programmed projects.

Comparing the costs to implement the 1972 system and the system proposed here with the estimates of anticipated revenues led to the following conclusions:

1. The proposed revisions to the primary highway system reduce the total costs to complete the system by \$500 million.

2. All the critical highway needs (i.e., those needs perceived necessary today) under the proposed system could be met by assuming the most optimistic revenue estimate but, under the adopted system, about \$300 million worth of critical needs would remain unmet.

3. Under the constant-purchasing-power revenue estimate, the total costs to implement the proposed primary highway system exceed the revenues that are anticipated to be available. Even assuming that non-Interstate federal aid would double, approximately one-sixth of all primary needs would remain unmet at

the end of the 20-year period. Because of this situation, MDOT is considering access-control policies to preserve the traffic-carrying capacities and functions of the existing primary facilities.

SUMMARY AND CONCLUSION

Criteria for system designation and policies for system development have been proposed that recognize that the funding necessary to bring the entire system to freeway standards will not be available in the foreseeable future. Several estimates of state and federal revenues were developed, and it was concluded that (a) MDOT cannot complete all the primary projects in its approved 5-year program within 20 years without additional revenues and (b) even under the most optimistic estimate of revenues, the total cost to implement the primary highway system exceeds the revenues that are anticipated to be available.

Emphasis, therefore, has been placed on making better use of existing facilities, for example, by adding access controls where practical. In addition, several major freeways that were part of the long-range planned freeway system in Maryland were deleted from the primary highway system.

The proposed criteria for system designation will provide, for the first time, an objective process by which to consider suggested additions to the system. Thus far, only the primary system has been analyzed. As a next step, it is proposed to conduct a similar analysis and develop criteria for inclusion of facilities in the secondary system so that the entire state highway system can be rationalized.

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Transportation Programming in Today's Rapidly Changing Fiscal Environment

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Because of decreasing rates of revenue growth, increasing inflation, and growing maintenance and operating costs, revenues for transportation are insufficient to satisfy public expectations. This paper summarizes a discussion of how several states are altering the programming process to meet changing financial conditions. Maryland is emphasizing smaller, less costly highway projects, designing for current rather than future service needs, and planning more projects than can currently be funded. Texas, on the other hand, has embarked on an \$11.8 billion 20-year highway construction program. Pennsylvania, concerned over abandonment of railroad branch lines, is providing subsidies for commuter rail lines. To allocate limited resources for airport development, Illinois has instituted a systematic project-selection process. At the local level, the New York Metropolitan Transportation Authority is putting heavy reliance on federal-aid funds. Uncertainty in these funds causes a problem in programming. In an effort to hold local subsidies down, capital funds have been used for transit operations.

Almost every major industrial state in the nation is

facing a cost-revenue squeeze. The problem is related to three basic factors:

1. Decreasing rates of revenue growth;
2. Diminishing buying power because of inflation; and
3. Increasing maintenance and operating costs because of the aging of physical facilities, a backlog of maintenance and repair work, and high traffic volumes.

The impacts of this situation can be stated simply: For almost all modes of transportation, revenues are not sufficient to satisfy public expectations for system and service expansion. Furthermore, this cost-revenue squeeze has reduced improvement projects sharply rather than gradually.

This report summarizes a conference session that discussed this topic. Two of the five speakers presented state highway department approaches. One

speaker indicated the problems of planning and programming statewide railroad improvements. Another speaker discussed the programming of airport improvements, and the last speaker discussed mass transportation programming in a large metropolitan area.

MARYLAND STATE HIGHWAY PROGRAMMING

Frederick J. Goettemoeller of the Maryland Highway Department traced the problems in Maryland of construction programming in the 1973-1977 period.

Highway-user tax revenues, which are related to automobile travel, had been increasing rapidly until 1974, when there was an abrupt downturn, which was followed by a leveling in 1975 and an upturn in 1976 and 1977. Programmers who were attempting to make forecasts based on annual revenues were consistently wrong in their projections, thereby creating a credibility gap between highway officials and both citizens and legislators about construction projects to be included in annual programs. Rapidly increasing construction costs during this period compounded the problem of establishing realistic programs.

As a result of the experience, the Maryland Highway Department is now emphasizing smaller, less costly projects. This change was made because cancellation of small projects has less impact on the total construction program than does cancellation of larger, more expensive projects.

Also, Maryland is now programming projects that are needed for current traffic and deferring facilities that will be needed to satisfy future traffic. For example, some projects that require only two lanes now but will require four lanes in the future are being designed and built with two lanes and enough right-of-way to accommodate four lanes.

Furthermore, more projects are now being included in the program than are likely to be funded to be prepared for the possibility of increased travel and therefore more revenue than anticipated. This requires that preconstruction activities be completed on many projects that are not likely to be built during the construction period and also requires special care in explanations to legislators and the driving public.

In summary, an important objective of the Maryland programming process is to keep options open as long as possible. At the same time, extra effort is being made to be candid with the public and elected officials on the need for this flexibility.

TEXAS STATE HIGHWAY PROGRAMMING

Robert L. Lewis of the Highway Design Division of the Texas Department of Highways and Public Transportation explained how they are meeting financial problems.

First, the workforce was reduced from a staff of 18 000 persons in 1974 to 14 000 in 1975. Second, a special task group was organized that led to changes in design standards and project specifications and other changes to improve economy and efficiency.

However, most important was a comprehensive study of the construction program and finances, which found an \$11.8 billion backlog of committed projects and only \$1.9 billion of available state funds to meet these commitments over a 20-year time period.

In January 1977, the results of the study were presented to the Texas legislature in the form of alternative lists of projects based on alternative funding levels. The legislators were given the choice between cutting back the program in line with available funds or increasing the resources to expand the number of projects that could be completed. With close to unanimity, the legislature and governor authorized an immediate \$200 million in catch-up

funds and, at the same time, established \$700 million as the annual statutory base for state highway funds and provided for increasing this annual level based on a highway cost index.

To estimate the highway cost index, a highway fund forecasting model, termed HIFUND, was developed that estimates both highway revenues from all sources and highway costs on an annual basis for a 25-year future period.

RAILROAD PROGRAMMING

Edson L. Tennyson of the Pennsylvania Department of Transportation (PennDOT) explained that the statewide railroad system is largely controlled by the private railroad companies and the federal government. PennDOT is, however, concerned, because abandonment of branch lines may adversely affect Pennsylvania industry and citizens. Federal subsidy for the continuation of service on branch lines is available to the railroads and is related to the benefits of the service.

Because of the popularity of the 15 commuter rail lines in Pennsylvania and because the cost of commuter rail service is more than passenger fares will cover, Pennsylvania uses available federal and state aid to subsidize the railroads for continuation of commuter service.

AIRPORT PROGRAMMING

Harry Wolf of the Illinois Department of Transportation (IDOT) described the three-stage process used to develop their airport capital-improvement program. The types of improvements are (a) airport resurfacing; (b) construction of runways, taxiways, and aprons; (c) land acquisition; (d) automobile parking lot expansion; and (e) new airport construction. The three-stage systematic project-selection process is needed because airport capital needs are three times greater than available improvement resources.

In the first stage, IDOT determines the program objectives and defines what is to be accomplished during the program period.

In the second stage, IDOT establishes the relative priorities of the program objectives. For example, IDOT may choose as its first priority to preserve essential airports by resurfacing and replacing worn-out facilities or equipment. However, program priorities are established to preclude a situation in which the entire program emphasizes either construction or rehabilitation.

The third stage in the process is the development of project-selection standards. These are established to ensure that only those projects that can be implemented and that make the best use of available funds are included in the program. Threshold standards, in terms of aircraft use and other items, are established and used to eliminate low-priority projects.

URBAN MASS TRANSPORTATION PROGRAMMING

John Kaiser of the New York Metropolitan Transportation Authority (MTA) outlined the role of his organization in funding mass transportation service in the New York City metropolitan area. To place the MTA in perspective, Kaiser indicated that the buses, rail transit system, and commuter railroads serving the area carry 31 percent of the nation's total transit riders.

Two issues are of special importance to the programming of mass transportation capital improvements in the New York City area: federal funding options and the mixing of social and mobility objectives.

Federal funding is important because approximately

\$220 million is available for transit construction or rehabilitation and because state and local governments need provide only 20 percent in matching funds to gain the federal support. However, the problem in programming is the uncertainty of the federal funds because, under federal law, these funds can be, and are being, diverted to system operation.

In their attempts to hold down both local subsidy of transit operations and fares, state and local officials have opted to use much of the available capital funds for transit operations. Because New York City has an old rail transit system, this diversion of capital resources and the deferment of capital rehabilitation may cause future problems in the reliability of the subway system.

The other MTA programming problem surrounds the issue of mixing objectives. Mass transportation is evolving into a social benefit for elderly and handicapped persons without added financial resources to cover the additional costs.

An example of a social program that has no special

funding is New York City's half-fare program for the elderly. This program was enacted in 1969 without careful establishment of need. Basic to the enactment of the program was the assumption that twice as many elderly persons would use the system, thereby making the program a break-even financial proposition. However, in reality, the elderly are making only 27 percent more person-trips and, therefore, this program substantially increases the deficit of the system.

Also, new federal regulations require that, in the future, transit vehicles must accommodate wheelchairs (although there has not been a careful study of the needs of handicapped persons). Unless substantial public resources are made available to the MTA to meet this new social role, transit service to New Yorkers will deteriorate.

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State and Federal Issues in Financing Highway Programs

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Current and emerging issues in highway finance are summarized from both a state and a federal perspective. The highway revenue outlook is presented and contrasted with recent historical experience. Inflationary forces, particularly in the highway construction and maintenance sectors, and the projected revenue impacts of the Energy Policy and Conservation Act of 1975 are having a severe effect on the ability of the states to maintain and improve existing highway systems. The increasing constraints on state highway budgets raise several questions concerning future highway finance alternatives and the proper roles of federal and state governments. The problem of the inability of the existing federal-aid highway program to adapt to changes in the highway finance environment and shifting investment priorities is growing. More attention should be given to the link between highway investment policy objectives and the programs designed to implement these objectives.

By past standards, the revenue outlook for state highway departments is austere at best. After nearly two decades of rapid growth in highway programs following the inception of the Interstate system, the states now face the prospect of sharply reduced revenues in the wake of the Energy Policy and Conservation Act (EPCA) of 1975. The recently mandated nationwide 88.5-km/h (55-mph) speed limit and other legislation pending before Congress may also serve to erode state highway revenue bases. Although various forecasts differ somewhat (1,2,3,4), it is generally conceded that recent legislative actions will result in gasoline consumption levels in 1985 that are little or no higher than current levels despite a significant projected growth in vehicle travel (VT). Because gasoline tax receipts have traditionally contributed approximately three-fourths of state and federal highway revenues, the revenue impact of projected automotive fuel-economy improvements is a significant concern of highway officials at all levels of government.

The potential problems associated with projected

decreases in the growth of highway revenues are compounded by inflation and the recent sharp increase in highway maintenance requirements. Inflation in particular has had a severe effect on the costs of construction, maintenance, and highway administration. As one example, the California Highway Commission on Problems of Financing Transportation has reported that, during the 8-year period between 1967 and 1975, the state highway-construction cost index increased by nearly 140 percent in contrast with the increase in the state consumer price index over the same period of only 63 percent. Nationwide, the figures are, if anything, more striking. The 1975 composite federal-aid highway construction index was more than double its 1967 level, although the nationwide consumer price index increased by little more than 50 percent over the 8-year period (5). Inflationary forces have been especially severe since the 1973 oil embargo. Petroleum cutbacks and increased oil-import costs have led to dramatic increases in the prices of the bituminous and asphaltic materials used in construction and maintenance. In fact, since 1973, the yearly increase in highway material costs in many states has been as high as 45 percent (6).

HISTORICAL PERSPECTIVE

Historically, the increase in construction and maintenance costs has not been accompanied by a commensurate increase in highway revenues, and this trend is likely to be exacerbated as new, more fuel-efficient automobiles enter the nation's vehicle fleet. Over the past 8 years, state highway motor-fuel tax revenues have grown by an annual nationwide average rate of 6.6 percent. Federal highway grant authorizations, another major source of revenue to the states, have grown even more slowly, at an annualized rate of only 4.4 percent [see below (7)].