NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM
SYNTHESIS OF HIGHWAY PRACTICE

117

TOLL HIGHWAY FINANCING

TRANSPORTATION RESEARCH BOARD
National Research Council

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RESEARCH SPONSORED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS IN COOPERATION WITH THE FEDERAL HIGHWAY ADMINISTRATION

TRANSPORTATION RESEARCH BOARD
NATIONAL RESEARCH COUNCIL
WASHINGTON, D.C. DECEMBER 1984

Systematic, well-designed research provides the most effective approach to the solution of many problems facing highway administrators and engineers. Often, highway problems are of local interest and can best be studied by highway departments individually or in cooperation with their state universities and others. However, the accelerating growth of highway transportation develops increasingly complex problems of wide interest to highway authorities. These problems are best studied through a coordinated program of cooperative research.

In recognition of these needs, the highway administrators of the American Association of State Highway and Transportation Officials initiated in 1962 an objective national highway research program employing modern scientific techniques. This program is supported on a continuing basis by funds from participating member states of the Association and it receives the full cooperation and support of the Federal Highway Administration, United States Department of Transportation.

The Transportation Research Board of the National Research Council was requested by the Association to administer the research program because of the Board's recognized objectivity and understanding of modern research practices. The Board is uniquely suited for this purpose as: it maintains an extensive committee structure from which authorities on any highway transportation subject may be drawn; it possesses avenues of communications and cooperation with federal, state, and local governmental agencies, universities, and industry; its relationship to the National Research Council is an assurance of objectivity; it maintains a full-time research correlation staff of specialists in highway transportation matters to bring the findings of research directly to those who are in a position to use them.

The program is developed on the basis of research needs identified by chief administrators of the highway and transportation departments and by committees of AASHTO. Each year, specific areas of research needs to be included in the program are proposed to the National Research Council and the Board by the American Association of State Highway and Transportation Officials. Research projects to fulfill these needs are defined by the Board, and qualified research agencies are selected from those that have submitted proposals. Administration and surveillance of research contracts are the responsibilities of the National Research Council and its Transportation Research Board.

The needs for highway research are many, and the National Cooperative Highway Research Program can make significant contributions to the solution of highway transportation problems of mutual concern to many responsible groups. The program, however, is intended to complement rather than to substitute for or duplicate other highway research programs.

NOTE: The Transportation Research Board, the National Research Council, the Federal Highway Administration, the American Association of State Highway and Transportation Officials, and the individual states participating in the National Cooperative Highway Research Program do not endorse products or manufacturers. Trade or manufacturers' names appear herein solely because they are considered essential to the object of this report.

NCHRP SYNTHESIS 117

Project 20-5 FY 1983 (Topic 15-01)
ISSN 0547-5570
ISBN 0-309-03873-1
Library of Congress Catalog Card No. 84-52854

Price: $7.20

Subject Areas
Administration
Finance

Mode
Highway Transportation

NOTICE

Published reports of the

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

are available from:

Transportation Research Board
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Printed in the United States of America

PREFACE

A vast storehouse of information exists on nearly every subject of concern to highway administrators and engineers. Much of this information has resulted from both research and the successful application of solutions to the problems faced by practitioners in their daily work. Because previously there has been no systematic means for compiling such useful information and making it available to the entire highway community, the American Association of State Highway and Transportation Officials has, through the mechanism of the National Cooperative Highway Research Program, authorized the Transportation Research Board to undertake a continuing project to search out and synthesize useful knowledge from all available sources and to prepare documented reports on current practices in the subject areas of concern.

This synthesis series reports on various practices, making specific recommendations where appropriate but without the detailed directions usually found in handbooks or design manuals. Nonetheless, these documents can serve similar purposes, for each is a compendium of the best knowledge available on those measures found to be the most successful in resolving specific problems. The extent to which these reports are useful will be tempered by the user's knowledge and experience in the particular problem area.

FOREWORD

By Staff
Transportation
Research Board

This synthesis will be of interest to highway financial officers, administrators, and other concerned with financing highway construction, maintenance, and operation. Information is presented on the history, recent trends and developments, and general considerations for financing a highway project through use of tolls.

Administrators, engineers, and researchers are continually faced with highway problems on which much information exists, either in the form of reports or in terms of undocumented experience and practice. Unfortunately, this information often is scattered and unevaluated, and, as a consequence, in seeking solutions, full information on what has been learned about a problem frequently is not assembled. Costly research findings may go unused, valuable experience may be overlooked, and full consideration may not be given to available practices for solving or alleviating the problem. In an effort to correct this situation, a continuing NCHRP project, carried out by the Transportation Research Board as the research agency, has the objective of reporting on common highway problems and synthesizing available information. The synthesis reports from this endeavor constitute an NCHRP publication series in which various forms of relevant information are assembled into single, concise documents pertaining to specific highway problems or sets of closely related problems.

Toll financing has often been used as a supplemental source of revenue to meet highway needs. This report of the Transportation Research Board gives a brief history of toll financing in the United States, presents some recent trends and innovative developments in the use of toll highway financing, and gives some general guidelines on legal and financial requirements.

To develop this synthesis in a comprehensive manner and to ensure inclusion of significant knowledge, the Board analyzed available information assembled from numerous sources, including a large number of state highway and transportation departments. A topic panel of experts in the subject area was established to guide the researcher in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records practices that were acceptable within the limitations of the knowledge available at the time of its preparation. As the processes of advancement continue, new knowledge can be expected to be added to that now at hand.

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ACKNOWLEDGMENTS

This synthesis was completed by the Transportation Research Board under the supervision of Damian J. Kulash, Assistant Director for Special Projects. The principal Investigators responsible for conduct of the synthesis were Thomas L. Copas and Herbert A. Pennock, Special Projects Engineers. This synthesis was edited by Anne S. Brennan.

Special appreciation is expressed to W. A. Rusch, Silver Spring, Maryland, who was responsible for the collection of the data and the preparation of the report.

Valuable assistance in the preparation of this synthesis was provided by the Topic Panel, consisting of Kiran Bhatt, Chevy Chase, Maryland; Edward A. Mueller, Morales and Shumer Engineers, Inc.; R.W. Stevens, Chief, Bureau of Toll Facilities, Florida Department of Transportation; Thomas Teneyck, Manager, Planning Studies Division, Pennsylvania Department of Transportation; John B. Wallace, Director, Delaware Transportation Authority; Norman H. Wuestefeld, Senior Vice President, Wilbur Smith & Associates; and Liaison Members Thomas W. Cooper and Arturo Politano, Transportation Specialists, Office of Highway Planning, Federal Highway Administration.

Kenneth E. Cook, Transportation Economist, Transportation Research Board, assisted the NCHRP Project 20-5 Staff and the Topic Panel.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance were most helpful.

TOLL HIGHWAY FINANCING

SUMMARY

Toll financing has been used as a supplemental source of revenue to meet public needs since ancient times, and in the United States since colonial days. The primary objectives of toll financing have been (a) to obtain funds for urgently needed projects; (b) to shift the burden of capital, operating, and maintenance costs to specific users; and (c) to provide an immediate and direct source of revenue to discharge the obligations created.

The user-pay concept has been utilized to finance and operate highways and other public facilities throughout history. Highway user charges include motor-fuel taxes, tolls, and other service charges and fees. Tolls and motor-fuel taxes are both user fees within the user-pay concept. The objective of both methods is the same—to produce revenue. But tolls are paid only when and if a particular facility is used and the toll paid covers operating and maintenance costs as well as debt retirement. Compared to motor-fuel taxes, which cannot be made to vary with specific routes, times, or vehicles, tolls permit a form of pay-as-you-go financing that involves less cross subsidy among different road users. This fact makes the incidence of tolls more visible and more real to the user than the less apparent and more remote impact of motor-fuel taxes, which are not stated separately as a part of each purchase.

As a nation, the United States has generally followed a policy of financing highway improvements by means of highway-user (tax) revenues. The Federal-Aid Road Act of 1916 and subsequent legislation have generally stipulated that roads constructed with federal aid were to be toll free.

The advantages and disadvantages of toll financing have been debated for many years. The primary advantages attributed to toll financing are a more precise form of pay-as-you-go financing, rapid construction, inclusion of adequate operating and maintenance costs in the toll rates, and ability to use toll rates as a form of congestion pricing. The disadvantages cited most often are: the extra costs of interest payments and toll collection, and the payment of a fuel tax while traveling on a toll facility. These factors and considerations, including all long-term costs and other tangible benefits, are important when weighing the toll option against a tax-supported financial plan.

Toll projects in the United States reflect the fact that each one was designed and financed under different state, local, and sometimes federal laws to meet a particular need. Therefore, they represent a great variety of financial and legal arrangements. It now appears that this variety will become even greater in the future. Traditionally, toll-project financing was based solely on estimates of future toll revenue. Cost increases and high interest rates have placed severe restrictions on this long-standing approach; few projects in recent years have been financed without support or participation from other sources of revenue.

Consequently, traditional concepts of toll financing have changed and are continuing to change in order to meet new conditions and requirements. Revenue require-

ments for tax-supported programs have also produced innovations and departures from past methods and practices, including pledged support of toll projects by tax dollars. In some cases, toll and tax revenues have been utilized in combination and additional proposals for such combined funding are increasing at the state level. Some proposals include recommendations that federal aid be authorized for toll projects and that states be authorized to place tolls on existing highways on the federal-aid system, including portions of Interstate routes.

Existing federal law does not permit the use of federal aid to provide initial funding of toll roads. However, federal-aid funds are available for connections to toll roads subject to a required agreement that tolls be removed when all current outstanding financial obligations are discharged. Federal-aid funds are also available for specified improvements on toll roads on the Interstate system as provided in the Surface Transportation Assistance Act of 1978 subject to the required agreement that tolls be removed when all dept has been discharged. The requirements and conditions for the use of federal aid on toll bridges and tunnels are similar although admininstered under different laws.

Legislation adopted by Congress in recent years and measures introduced for consideration point to greater recognition of the potential of toll financing to meet the individual needs of states and metropolitan areas. This fact, plus the innovative financial plans being utilized and considered at the state and local level, indicate that the long-standing concepts of both toll and tax-supported highway financing have entered a transitional stage. The motor-fuel tax and related user fees will likely continue to serve as the cornerstone of future highway programs. At the same time, it is clear that additional revenues and flexible financial management will be required to meet growing and expanding highway and transportation needs. States or localities that face high-priority needs that cannot be met through existing sources of highway funding may find that expanded use of toll financing methods offer a new revenue structure by which future highway and transportation projects can be financed. To assist states and localities in evaluating the feasibility and desirability of toll financing, this synthesis provides a brief history of toll financing and describes in greater detail many recent applications of this approach, both in the United States and abroad. Although no two applications of this approach are identical, this review of recent experience illustrates the potential variety of toll financing arrangements, and it may help state and local officials to access realistically whether and how toll financing might be applicable to their specific needs.

CHAPTER ONE

INTRODUCTION

BACKGROUND

Toll financing has been used as a supplemental source of revenue to meet public needs since ancient times, and in the United States since colonial days. It is a method of financing that has made it possible to complete a wide variety of highway, bridge, and tunnel improvements that could not have been realized within a reasonable time in any other way.

Toll financing is similar to other bond financing mechanisms except that toll revenues are used to retire the bond indebtedness. In this synthesis, the focus is on the means of highway financing in which toll revenues are used to retire the bonds.

The popularity of toll highway financing has soared and declined from time to time depending on the depth of demonstrated needs in relation to highway revenues available. When transportation and highway needs rise beyond available tax revenues, officials at all levels of government explore possible alternatives to detrmine how such revenues might be increased and costs reduced. Efforts to reduce highway costs, while intense, have not produced large savings so attention is now focused primarily on alternative sources of revenue to meet established and projected needs. Toll financing is one alternative being actively considered as a supplemental source of revenue.

The primary objectives of toll financing are: (a) to obtain funds for urgently needed projects; (b) to shift the burden of capital, operating, and maintenance expenses to specific users; and (c) to provide an immediate and direct source of revenue to discharge the financial obligations created.

The words "toll" and "motor fuel taxes," as terms related to highways, are generally well understood. But although they are both in fact "user fees," the collection of tolls as an alternative source of highway revenue is not as widespread as collection of motor-fuel taxes. This is so for many reasons. Generally, governments have favored broadly based user fees in preference to toll financing. Except for certain periods of great need, paralleled by insufficient revenues, highway user and other funds available at the local, state, and federal levels have been generally adequate to meet most requirements. As a result, toll financing has been undertaken on a project-by-project basis at the state and local level to meet urgent needs rather than as an integral part of a national policy or program. Consequently, toll financing has followed a cyclical pattern. As responsibilities of state and local government, toll projects require special state (and possibly federal) legislation along with legal and financial arrangements. This makes their background rather complex because they are financed and built to meet specific needs under a wide range of financial policies, conditions, and plans.

Toll financing is popular in many developed and developing countries and is being actively applied in Europe, South America, and the Pacific area to build freeways and supporting expressway systems. These programs are wide in scope and objectives. They are financed under a number of different toll-based plans. They are often built to encourage economic development and thus include responsibilities for toll-free roads for better connections between isolated areas. The programs are also different in that nearly all are sponsored by or have the support of national governments in some form as a part of a national policy and program.

As a nation, the United States has, since the beginning of the auto age, followed and encouraged a public policy of financing highway improvements by means of highway user (tax) revenues. Since the start of federal-aid financing of highways in 1916, toll financing generally has been prohibited by federal law when federal-aid funds are involved. At times when public tax revenues were not sufficient to meet a variety of established needs, many state and local governments have financed urgent highway needs by means of borrowed capital to be repaid from tolls. In recent years a combination of rising costs together with stabilized or reduced highway user (tax) revenues has meant that many agencies have needed projects that cannot be funded through existing programs. This situation has focused renewed attention on the potential of toll revenues as a source of fiscal relief.

The fiscal elements and considerations involved are being reviewed in depth by a number of states. Indications are that the broad options being examined are moving away from traditional and historical concepts, which limited and placed highway financing into two rather separate and distinct methods—toll financed or tax financed. These basic concepts will no doubt continue to anchor any variations or new methods of financing highways and transportation projects. However, approaches now under consideration center on the possibilities of combining these methods and available resources in various ways and to different degrees, including tolls and highway user taxes and fees. Modifications and adjustments in federal law would be required before federal-aid funds can be combined with toll revenues to fund highway projects on an unrestricted basis. Only time will tell how these ideas and concepts will fare and how public opinion, legislative philosophy, and governmental policy will develop in response to established needs and the financial problems at hand.

THE USER-PAY CONCEPT

The user-pay concept has been utilized to finance and operate highways and other public facilities for hundreds of years. The user-pay concept is based on the premise that the user of a facility pays for the design, construction, and operation of that facility. The user-pay concept is applied in the form of motor-

fuel taxes, highway tolls, port dockage charges, airport landing fees, canal tolls, transit fares, parking charges, and so on.

Highway user charges include (a) revenue-producing charges, such as motor-fuel taxes, weight-distance taxes, and tolls; and (b) service charges, such as motor vehicle registration fees. The primary purpose of the revenue charges is to provide funds for design, construction, operation, and maintenance of highways, bridges, etc. The service charges and fees cover the costs of administering items such as vehicle registration and driver licensing and also are used for other highway purposes; such charges now provide about 19 percent of total state receipts for highways (*1*).

Highway user revenues currently are made up of a broad network of fees, taxes, and tolls that vary somewhat from state to state. The basic user-pay idea originated in the states and was given impetus by a number of factors including the poor condition of existing roads, the advent of the motor vehicle, and the need for a better and more dependable source of highway revenue. The state of New York was the first to adopt motor vehicle registration fees in 1901 and Oregon passed the first gasoline tax in 1919. By 1929, all states had adopted a motor-fuel tax. The user fee became the cornerstone of national highway policy when the first federal gasoline tax of one cent per gallon was levied in 1932. Since that time the user-fee concept has expanded and evolved on a broad base within the respective states and at the federal level to meet growing needs and changed conditions.

Toll financing returned as an element of national policy late in the 19th century when Congress adopted the Rivers and Harbors Appropriation Act of 1899, which provided that "bridges over waterways the navigable portions of which lie wholly within the limits of a single state" could be built under the authority of that state's legislature as long as the plans for the bridge were approved by the Chief of Engineers and the Secretary of the Army. Public policy with respect to the use of federal funds for highway construction was established in 1916 when Congress passed the first federal-aid road act, which for the first time made federal funds available for road construction. Section I of that act provided: "that all roads constructed under the provisions of this act shall be free from tolls of all kinds." Although there have been adjustments and modifications in language over the years to meet specific problems encountered by states in its blanket application, this dictum remains as a cornerstone of federal law and policy.

The user-pay concept is based on the theory that the highway user is the beneficiary of a highway facility and should therefore carry the costs of construction, maintenance, and operation. However, research has pointed out that there are also peripheral benefits that accrue to property owners, the community or area at large, and non-users as well, including those not owning or operating a motor vehicle. Under these terms benefits derived become a broader consideration in project approval involving factors well beyond the projected basic user fee regardless of whether the project is toll or tax supported.

The user-pay concept of highway and transportation finance has been the focal point for the development of the very successful federal-state cooperative program and system in operation in the United States today. Nevertheless, many projects that are given high priority by state and local agencies are not eligible for federal funding, or insufficient funds are available to finance them.

The 1979 report of the National Transportation Policy Study Commission (*2*) prepared and published before adoption of the Surface Transportation Assistance Act (STAA) of 1982, projected that available revenues would fall short of needs. The Commission in its report recommends as follows:

> Where Federal services are provided, the rule should be to assess taxes that reflect costs attributable to users. Thus, in special cases tolls for new and improved highway facilities, bridges and limited-use facilities could be applied. Such fees could be applied so as to permit a smoother flow of traffic during peak hours, or to permit longer and heavier trucks to operate where *all* incremental costs as well as an appropriate share of common costs are recovered. For example, industrial highways or specialized lanes could be built as toll facilities. The savings from being permitted to operate on these upgraded highways and bridges could out-weigh the expense of user fees (*2*).

In 1982, user revenues (taxes and tolls) provided about 59 percent of total current highway receipts for all units of government (*1*). For state and federal governments, user revenues provided more than 80 percent of receipts for highways. Passage of the 1982 STAA, which produces approximately $4.4 billion for the Highway Trust Fund, and recent increases in state gasoline taxes have increased the percentage of the total funds provided by user revenues.

ADVANTAGES AND DISADVANTAGES

Tolls have several major advantages and disadvantages, as enumerated below. First, tolls, which are levied on specific vehicles or specific routes, provide the most precise form of pay-as-you-go financing. Motor-fuel taxes, by contrast, are very broadly based. They apply to all types of vehicles on all roads. Because of the huge variations in costs and use from one road to another, and from one group of road users to another, financing of roads using motor-fuel taxes necessarily means that some road users will be paying more than their share of costs whereas others pay less. Such cross subsidies can be reduced through toll financing, which can more precisely link costs and revenues.

Second, toll projects are often built sooner than projects financed by user taxes. This is because (a) complete funding is available at the beginning of a project; (b) toll projects do not necessarily have to comply with federal statutes, standards, and regulations; and (c) there is usually no need to go through a review process by federal and state agencies although some states do require a review. However, the ability to complete a toll project rapidly depends on the existence of appropriate legislation to establish the toll authority and sell bonds. Without such legislation, the toll project might not progress as quickly.

Third, toll financing almost always provides adequate funds for inspection, maintenance, and operation. This is because the typical financial agreement for a toll facility requires annual in-depth inspection and maintenance reports to protect users and bondholders. Toll rates are established at a level that provides the necessary funds for the inspection and maintenance.

A final advantage is that toll collection can be used as a method of congestion pricing, encouraging users to make more efficient choices of route or mode most advantageous to them. Because of tolls charged, some commuters may opt for transit

services or group travel arrangements, such as car pools or vanpools.

Among the disadvantages of toll financing, the chief drawback is the interest cost of borrowing funds. This cost will vary depending on the type of financing arrangements, the nature of the bond market at the time, the estimated feasibility of the project, and the credit rating of the agency issuing the bonds.

In addition, the cost of toll collection imposes extra expenses that are not incurred on a tax-supported project. In 1983 the total cost of toll collection averaged about 18 percent of revenues compared to the 1 percent of gross revenues for collection of motor-fuel taxes (*1*). An intangible cost of toll collection is the delays that motorists often encounter at toll plazas, although automatic vehicle identification devices currently being introduced will reduce these delays.

Another disadvantage of toll financing is that motorists who pay a toll are also paying a tax on the fuel consumed while traveling on the toll facility. However, motor-fuel taxes, by their broad and general nature, necessarily involve cross subsidies from one user to another, such as the support of low-volume roads by taxes earned on high-volume facilities. Nevertheless, it is clear that by paying motor-fuel taxes in addition to tolls, the amount of cross subsidization among users is increased and the precise pay-as-you-go advantages of toll financing is diluted.

It is unlikely that there would be a substantial difference between the economic impact of a new toll road and that of a new tax-supported highway, even though studies comparing the relative economic benefits generated by toll facilities and tax-supported projects are scarce. In some cases, the frequency of interchanges on a toll road may be different from on a tax-supported road and this could result in different economic impacts.

Environmental impacts of a toll facility will be similar to those of a tax-supported facility. If a toll project is financed with the support of federal funds, federal regulations and legal requirements must be followed in the planning process and environmental studies. If no federal funds are involved, state and local laws govern procedures. In this area state and local laws vary considerably and toll projects may or may not be so regulated depending on location.

CHAPTER TWO

TOLL FACILITIES U.S.A.

BRIEF HISTORY

Toll facilities of different types are reported from ancient times and remained common through the middle ages. Toll financing in England provides the background and structure for the general pattern followed in the United States today. The word "murage" was used in England in 1189 to describe a toll on those passing through a city wall to provide funds for maintenance of the wall. In a similar way, the word "pavage" was used in 1274 to describe a toll or special tax to improve streets and roads and, by 1286, tolls were levied on the old London Bridge. Kings and prominent individuals were at times granted special privileges to collect tolls on important roads, but these efforts fell far short of needs.

In 1760 Parliament adopted a law that became the basic framework for modern toll financing. Under its provisions special charters were granted that required the removal of tolls when all original costs were recovered. This law became popular and between 1760 and 1774 more than 450 turnpike companies were chartered (Figure 1). However, costs of operation and maintenance were often greater than anticipated and revenues less than expected. As a result, charters were frequently renewed so that tolls could be continued.

Quite naturally, this concept was carried forward to the New World and the first turnpikes in the United States were a direct reflection of those in England. They came into being immediately following the Revolution because neither the new republic nor its individual states had the resources to build the roads necessary to tie the infant nation together. One of the earliest turnpikes was started in 1792 when Pennsylvania authorized incorporation of a company to build and operate a toll road from Lancaster to the Port of Philadelphia. This toll road was an immediate success, prompting the chartering of hundreds of turnpike companies and the construction of more than 8,000 miles of toll roads in the next 40 years.

By the 1830s, competition from canals and interest in railroads, along with the costs of maintaining and operating hastily constructed roadbeds, dampened the toll road movement and toll roads began to deteriorate gradually except for those holding favorable positions.

By the late 1840s it became evident that canals and railroads could not provide all the local transportation services a growing nation required. This fact, together with the decline of the original toll roads, left an obvious void in the transportation system and states began to explore other possible solutions. One of these was an expedient known as plank roads and by 1857 more than $10 million in bonds had been issued for their construction. But the wooden slabs used required constant maintenance and replacement in about 5 years and most plank roads disappeared by the late 1860s.

By comparison, toll bridges and ferries fared better because of the continuing need for crossings. Ferries powered by horses

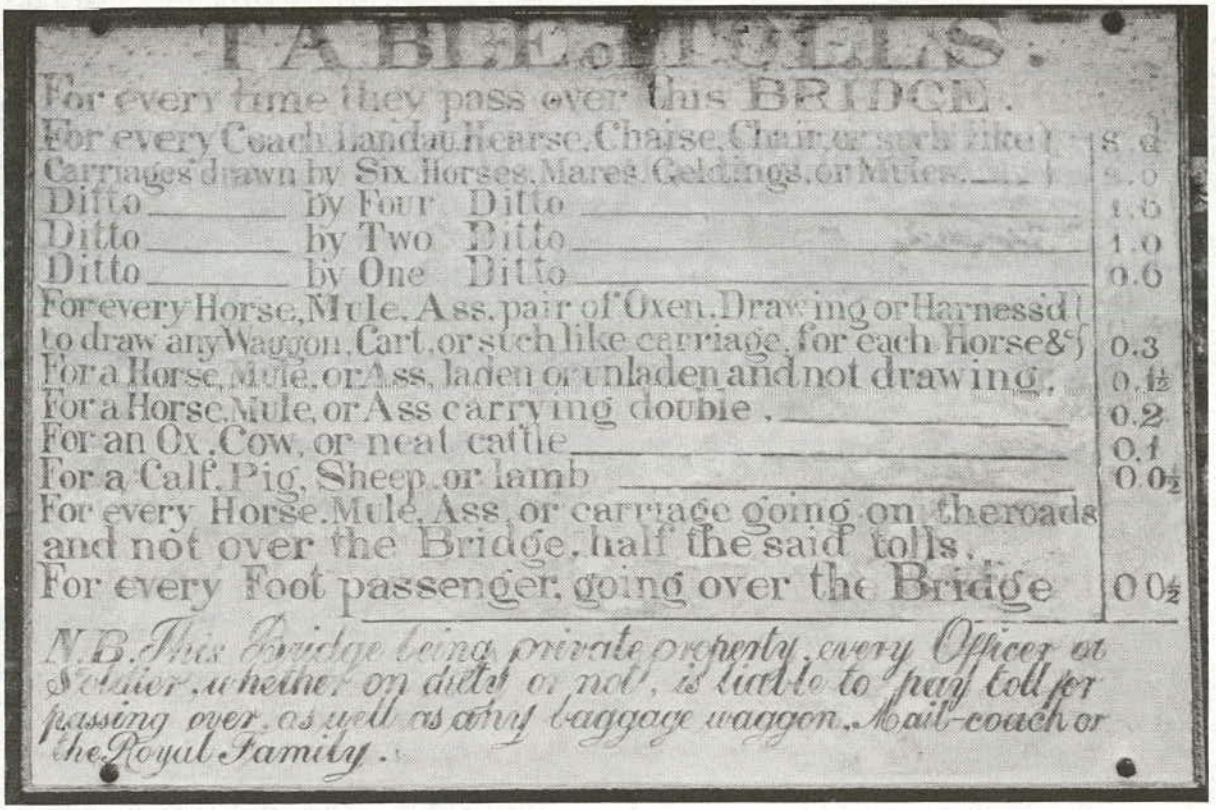

FIGURE 1 Toll charges on Iron Bridge, England (ca. 1779).

or oxen were practical only on short crossings, and as demand grew, individuals and companies were chartered to build and operate toll bridges as private enterprise ventures. The durability of such crossing facilities is exemplified by the toll ferry between Rocky Hill and Glastonbury, Connecticut, still operated seasonally, and in continuous use since 1655.

Gradually rail service became more general and earlier canals still proved to be economical for transporting bulk commodities. The turnpikes still in use found the competition strong and many were abandoned. In 1866 the original Lancaster-Philadelphia Turnpike was divided into sections for the purpose of disposal. Some sections were sold, one section was abandoned, and the last section was made toll free in 1902. Similar actions in other areas reduced turnpike operations to isolated instances and special purpose roadways.

This situation began to reverse itself early in the 1900s. After a slow start, the automobile revolutionized transportation and the methods of financing roads in the new century.

With it came the Federal-Aid Road Act of 1916, which stipulated that all roads constructed under the provisions of the act were to be toll free. This dictum remains in force as a matter of federal law and policy. The 1916 act was the centerpiece of the "good roads" movement that helped to generate the first motor fuel tax in Oregon in 1919 and the first federal gasoline tax in 1932. The state of New York had imposed a vehicle tax as early as 1901.

Toll roads were not popular in the first forty years of the twentieth century, but many toll bridges and tunnels were built in those years. They include such landmarks as the Golden Gate Bridge (Figure 2) and San Francisco-Oakland Bay Bridge in California, the George Washington Bridge and Triborough Bridge in New York City, the Ambassador Bridge connecting Detroit and Windsor, Ontario, and the Benjamin Franklin Bridge in Philadelphia. The toll tunnels built included the Holland Tunnel, the initial two tubes of the Lincoln Tunnel, the Queens-Midtown Tunnel, and the Brooklyn-Battery Tunnel, all in New York City. Further west, the Detroit-Canada Tunnel added another crossing between the two countries.

The Merritt and Wilbur Cross Parkways were the first toll roads of that type completed in 1940. Financing was by a bond issue of $15 million to be repaid from the State Highway Fund, the repository of tolls collected. The first pioneering section of the Pennsylvania Turnpike between Harrisburg and Pittsburgh was opened to traffic in 1940. This section was built almost completely with federal assistance by the Works Progress Administration.

> Thus there was some inconsistency in federal policy toward aid to toll roads during this period; with the Bureau of Public Roads continuing to oppose the use of federal-aid funds on such projects while other agencies were providing assistance. However, assistance by such agencies as Works Progress Administration and Reconstruction Finance Corporation was more likely prompted by the policy of supporting projects that would create a demand for materials and employment during times of economic distress than from any endorsement, per se, of the toll method of financing (*3*).

The immediate success of the Pennsylvania Turnpike inspired a new wave of toll road financing following World War II. It

is interesting to note that the Pennsylvania Turnpike follows the same general corridor as the Lancaster-Philadelphia toll road in the 18th century. The original portion of the turnpike is, in part, constructed over an abandoned railroad right-of-way, illustrating the changes in transportation modes and needs from toll road to railroad back to toll road in this corridor.

Whereas toll roads found little favor before World War II, toll bridges were being built on an "as needed" basis in accordance with applicable federal laws. Traffic demands grew rapidly after 1945 and history began to repeat itself. By 1950 more than 30 states had built, were building, or were planning to build toll roads to help overcome the pent-up demand for better highways; between 1946 and 1965 the total investment in toll facilities was more than $7.7 billion. During the 1940s and early 1950s there were proposals for a national system of limited-access highways; serious consideration was given to using toll financing for the system. However, the passage of the 1956 Federal-Aid Highway Act provided 90% federal financing of a 41,000-mile system of Interstate and Defense highways along with a substantial increase in federal funds for roads on the previously established federal-aid system.

At the time the 1956 act was passed, a number of toll roads had already been built in the heavily traveled corridors and general locations to be designated as part of the Interstate system. There being no logic in depleting available funds in the construction of parallel toll-free roads, toll roads and portions of toll roads located within those corridors and providing the intended service of the planned Interstate highways were designated as official parts of the system.

As official parts of the Interstate system, this designation carried with it the previously stated federal policy that the Interstate system, to be federally funded, was intended to be toll-free and that all toll roads included in this designation were to be made toll free at the earliest practical opportunity. According to the Federal Highway Administration (*4*), as of January 1, 1985 a total of 2,466.6 miles of toll facilities were on the Interstate system, including 2,371 miles of toll roads, 71.3 miles of bridge projects, and 24.3 miles of tunnels.

FIGURE 2 Golden Gate Bridge.

As far as is known, only two states, Missouri and Montana, prohibit toll roads. In seven states, deficit financing and state debt, however secured, is prohibited, giving rise to expedient measures that permit borrowing by specially created agencies under certain conditions, including toll financing. These seven states are Arizona, Arkansas, Indiana, Iowa, Nebraska, South Dakota, and Wyoming. Kentucky has a two-year limit on borrowed funds supported or secured by general revenues without referendum approval.

Recognizing the thrust of federal policy with reference to toll financing and considering the vast complexities and barriers of state laws and constitutions plus the requirements of enabling legislation and bond indentures, the result as far as toll financing and operation is concerned is a complex pattern of individual arrangements involving laws, policies, and financial commitments designed to meet particular needs in a given location.

Beginning with the oil embargo in the mid 1970s, highway costs rose sharply while motor fuel consumption and thus tax revenues decreased. During these revenue-lean years, overall needs expanded and accumulated because the declining revenues were accompanied by rising costs of new construction, general repairs, and maintenance, and increasing needs for rehabilitation of aging highways and bridges. The great share of this burden still falls on the states despite the fact that provision has been made for federal funds to support a considerable part of these needs in the Surface Transportation Assistance Act of 1982.

Contributing to and overlapping this situation was a broad change in governmental philosophy and policy—the move toward departments of transportation at both the federal and state levels. This change centered attention on all modes of transportation and placed all modes and their functioning parts into one administrative, political, and financial unit. It also served to focus more attention on other public needs and services. Thus the new departments of transportation have played an important part, either directly or indirectly, in shaping subsequent programs and financial plans.

Financing toll projects based solely on toll revenues has become difficult in recent years because of the increased costs of interest, construction, and project operation, which would require toll rates considerably above present levels. The increased costs plus the limited highway user funds available to the states have generated new ideas and special legislation, adopted or proposed, at both the state and federal levels to permit the combined use of all available resources, including tolls, to meet critical highway and transportation needs. On the other hand, legislative proposals now pending in Congress would remove the federal tax exemption on bonds issued by state and local agencies. If passed into law, such proposals would increase interest rates and make bonds more difficult to sell.

TOLL ROADS

According to the Federal Highway Administration (*4*), as of January 1, 1985 the aggregate length of toll roads, bridges, and tunnels, including both public and private facilities, was 4,780 miles. Toll roads made up 4,417.7 miles of the total including 31.6 miles of private roads. There were 2,371 miles of toll roads on the Interstate system, 703.1 miles on federal-aid primary and urban systems, and 1,343.6 miles on state and local roads.

Of the major toll roads, 2,262 miles were built before and during 1956, 590 miles were added in 1957, and an additional 368 miles were completed in 1958. From 1959 through 1962 only 18 miles were built, but from 1963 through 1974, 1240 miles were added. In 1975 Oklahoma completed the Cimarron Turnpike, and a little later the extension of the Dallas North Tollway (Figure 3) was authorized. The 12-mile Dulles Toll Road in northern Virginia has recently been opened to traffic. Following retirement of outstanding debt, tolls were removed from 86 miles of toll roads including the Kentucky Turnpike, the Dallas-Fort Worth Turnpike, and the Denver-Boulder Turnpike; these are now operated and maintained by the respective states.

Toll Road Rates

Toll rates on toll roads vary depending on location, traffic volumes, climatic conditions, and many other factors that affect total costs including the financial commitments made. The South Dade Expressway in Florida has the lowest rate for passenger vehicles at 1.3 cents per mile and the highest is 9.0 cents per mile on the Delaware portion of the John F. Kennedy Memorial Highway. The South Dade Expressway is a commuter road and the Delaware toll road is a 12-mile through highway in the heavily traveled Baltimore-New York corridor with a large number of out-of-state movements. Reduced commuter, car pool, and vanpool rates are also used on some facilities, especially in urban areas.

Toll rates are usually contained in an official toll structure listing rates for different classes of vehicles. On short projects, the structure may be very simple and contain perhaps only four or five classifications, whereas a road of considerable length carrying commercial as well as passenger vehicles usually has a toll rate structure with eight or more classifications. Truck and bus rates are usually higher than the rates for passenger cars to reflect higher construction, maintenance, and repair costs caused by the heavier vehicles.

The actual toll structure may vary widely depending on traffic volume and composition, type of collection system and collection technology as well as the basic considerations of fiscal requirements. The average toll rate on toll roads is now about 2.5¢/mile, exclusive of reduced rates for commuters, car pools, and vanpools.

Toll Road Revenues

For many years, toll road revenues generally have covered the obligations created. Rapid increases in traffic and toll revenues during the late 1950s and in the 1960s allowed some toll roads to maintain original toll rates and advance scheduled debt retirement; others were able to make necessary improvements that were not in original plans. In other cases, new programs, such as excursion bus stops, changeable message signs, and night maintenance methods were tested and adopted. Several toll authorities have found that the revenues generated by the higher traffic volumes are sufficient to warrant continuation of toll collection beyond the original bond payoff date to cover costs of maintenance and operation. Others have issued additional bonds to finance facility rehabilitation or expansion with refi-

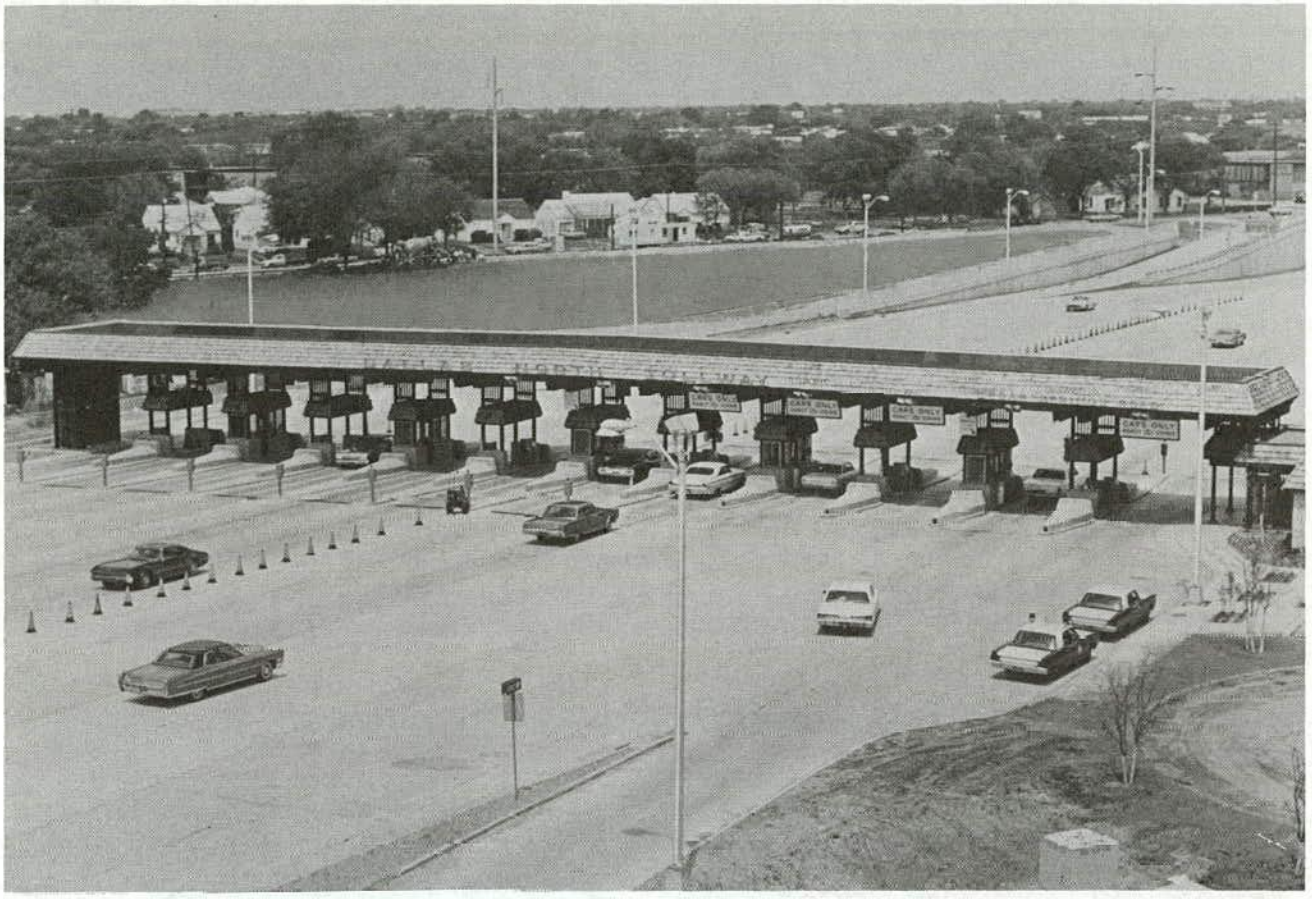

FIGURE 3 Dallas North Tollway.

nancing assured by higher tolls. A few have used the revenue from one toll facility to finance other less successful facilities or other modes of transportation.

In general, toll financing has proven very successful despite the costs of operation, service, and toll collection. However, there are some exceptions in which the revenues, for one reason or another, have not kept pace with costs of operation and the bonded obligations.

TOLL BRIDGES AND TUNNELS

As reported by the Federal Highway Administration (*4*), there were 159 toll bridges and 11 tunnels in operation in January 1985. Of these, 22 toll bridges and 1 tunnel were privately owned and operated. Early toll bridges were almost exclusively private ventures. By the late 1920s many of those original structures had became old and obsolete and needed to be replaced or reconstructed. Some of the companies were able to raise the necessary funds, but during the depression years a great number were not and the move to public ownership became strong. Some were purchased by cities, counties, or states and in other instances special commissions and authorities were created to assume the new responsibilities. This trend has continued to the present time and, except for the Ambassador Bridge between Michigan and Canada, owned and operated by the Detroit International Bridge Company, most bridges now in private ownership are comparatively small facilities.

Construction of new toll bridges, changes in ownership, and removal of tolls appears to be a continuing process over the years. In some instances, tolls have been reinstated after removal. According to the Federal Highway Administration, tolls were removed from 21 bridges between 1976 and 1983.

Nearly all of the larger toll bridges were built before 1970 with one, the Whirlpool Rapids Bridge in New York, dating back to 1877. The most recent addition is the Houston Ship Channel Bridge (Jesse Jones Memorial Bridge) completed by the Texas Turnpike Authority in 1982.

Toll Rates and Revenues—Bridges and Tunnels

Toll rates on bridges and tunnels vary more widely than on toll roads for many different reasons. First, they are relatively short structures, usually located in high-volume corridors where local traffic demand is reasonably predictable on a day-to-day basis. Second, the points of toll collection are limited and precise. Third, some structures are very large and represent a huge investment whereas others are much smaller. In instances where original investments have been discharged, toll rates are sometimes structured to provide funds for maintenance and operation only.

One-way toll collection has helped to expedite traffic and reduce operating costs where geographic features and other considerations permit as in the New York City, Miami, and San Francisco Bay areas. Special commuter rates are quite common and special car pool rates are in effect in a number of places. The Golden Gate Bridge, Highway and Transportation District has a car-pool policy that permits free passage for vehicles with three or more persons and motorcycles on weekdays between the hours of 6:00 a.m. and 9:00 a.m. and between 4:00 p.m. and 6:00 p.m. This agency has also established a rate policy that increases the normal $1.00 one-way toll for passenger cars to $2.00 on Fridays and Saturdays.

At present, the lowest bridge toll on record is $0.10 for passenger cars on the Boulevard Bridge in Richmond, Virginia, built in 1925 and owned and operated by the Richmond Metropolitan Authority. The $0.10 toll is retained to maintain the structure in safe condition for commuter traffic. The highest rate for passenger cars is $9.00 for the 19.7-mile Chesapeake Bay Bridge-Tunnel (Figure 4) in Virginia in order to meet fiscal requirements. Commuter toll rates are utilized widely with discounts in the form of tokens, ticket books, or special permits ranging up to 50% below the standard rate.

These limited examples illustrate the range of different toll rates that were adopted to meet specific objectives within the legal, financial, governmental, and operational climate in which projects exist.

Although information on all toll bridges is not available, data gathered by the International Bridge, Tunnel and Turnpike Association show that toll bridge revenues follow the same general pattern as revenues for toll roads, showing decreases in the 1974–1975 and the 1980–1981 periods. With the exceptions of two major facilities, toll bridge revenues have been well within estimates originally projected. The two exceptions are the Chicago Skyway and the Chesapeake Bay Bridge-Tunnel.

In both instances the effects of factors and developments beyond the control of these projects resulted in a reduction of traffic volumes anticipated and toll revenues received. A reluctance to raise toll rates and a parallel Interstate highway constructed in the same general corridor as the Chicago Skyway siphoned off considerable traffic so that revenues fell below debt service requirements causing the Skyway to go into default.

The Chesapeake Bay Bridge-Tunnel was constructed with the understanding that improvements and connectors to access roads on both the north and south approaches would be carried forward. These improvements were not made and, therefore, the development and growth of traffic that was anticipated was not realized at the rate originally projected. In addition, operations were interrupted for extensive repairs resulting from three

FIGURE 4 Chesapeake Bay Bridge-Tunnel.

separate ship collisions that knocked out parts of the two major spans of the low-level bridge connecting the tunnels. However, general increases in traffic over the years in combination with increased toll rates have improved the situation so that all obligations are being met on the first two (A & B) series of the bonds originally issued and interest payments will become current on the last (C) series in 1985 or 1986.

PUBLIC POLICY, LEGISLATION, AND CONTROL

Beginning with the Federal-Aid Road Act of 1916, basic federal policy has followed a continuing course designed to discourage toll financing. This policy has been restated and broadened a number of times since to include regulation of bridge construction, bridge financing, toll road financing, reconstruction and repair, and regulation of bridge toll rates, all of which are in some form directed toward the ultimate goal of toll removal.

This policy was reconfirmed and modified in the highway act that established the System of Interstate and Defense Highways in 1956. Under the provisions of Section 301, Title 23, United Staes Code, federal-aid funds cannot be used to build or assist in building toll roads. Federal-aid may, however, be utilized to construct bridges and tunnels on the federal-aid system under specified terms and conditions including an agreement that tolls be removed after construction costs are repaid. Federal funds may be utilized for approaches to toll facilities to the point of the last toll-free exit, and Interstate funds may be used for direct approaches to toll roads on the Interstate System; however, the toll agency or state receiving such aid is required to agree that tolls will be eliminated from the Interstate toll route when all outstanding obligations are discharged.

The Surface Transportation Assitance Acts of 1978 and 1982 provide that toll roads on the federal-aid Interstate system are eligible for grants of 4-R funds (resurfacing, restoration, rehabilitation, and reconstruction) under specified terms and conditions including an agreement to remove tolls when outstanding bonds have been liquidated. Toll bridges and tunnels are eligible for federal-aid funds under a series of special acts covering a variety of circumstances and conditions beginning with the Rivers and Harbors Act of 1899 and subsequent acts of Congress. Such laws, adopted over a period of many years to serve different objectives, have become very complicated and have disparate effects. Toll rates for some bridges over navigable waters are regulated whereas others crossing the same body of water are not regulated. Bridges whose toll rates and financial responsibilites are prescribed are regulated under different laws. Operations of tunnels and toll roads constructed and improved without federal aid are not regulated by the federal government. The original purpose of federal bridge legislation was protection of navigation channels from obstruction rather than control of toll rates, financing methods, or operational latitude.

The Rivers and Harbors Act of 1899 required that bridges that crossed "waterways the navigable portions of which be wholly within the limits of a single state" could be built by the authority of the state and without congressional approval provided plans for the bridge were approved by the Chief of Engineers and the Secretary of the Army. No mention is made of toll regulation and the act is still in effect today for the particular bridges constructed under its provisions.

The Bridge Act of 1906 was passed by Congress to establish uniform regulations for the construction and operation of international and interstate bridges not covered by the 1899 act. Individual acts of Congress continued to be required to authorize bridges under this act and an effort was made to adopt and incorporate a uniform standard for setting tolls as follows:

> If tolls shall be charged for the transit over any bridge constructed under the provisions of said sections, . . . such tolls shall be reasonable and just, and the Secretary of War may, at any time, and from time to time, prescribe reasonable rates of tolls for such transit over such bridge, and the rates so prescribed shall be the legal rates and shall be the rates demanded and received for such transit.

In 1926 Congress adopted a new bridge policy under which a private operator would be allowed an opportunity to realize a fair profit and amortize the original investment at the same time allowing the state to acquire the facility. A public owner would be allowed to charge tolls, but only to the point of amortization.

The so-called Oldfield Act of 1927 modified original federal opposition to tolls by providing that federal-aid highway funds could be extended to the construction of any bridge and approaches thereto under certain conditions. These were: (a) that the bridge be owned and operated by states or their political subdivisions and (b) that "all tolls received from the operation thereof, less the actual cost of operation and maintenance, are applied to the repayment to the state or states, or political subdivision thereof, of its or their part of the costs of construction of said bridge and, upon the further condition that when the amount (so contributed) shall have been repaid from the tolls, the collection of tolls for the use of such bridge should thereafter cease, and the same be maintained and operated as a free bridge." This statute was amended in 1956 to include tunnels constructed with federal aid.

The General Bridge Act of 1946 revises and supersedes provisions of the 1906 act with reference to any bridge approval after August 2, 1946. An important objective of this act was to eliminate the need for an act of Congress to authorize each bridge, provided advance approval was obtained from the Secretary of the Army. The provisions of the act apply to both publicly and privately owned toll bridges, the same as the 1906 act. However, the toll regulatory provisions of this act apply only to *interstate* bridges; i.e., bridges connecting two states. Tolls collected on *intrastate* bridges built after 1946 are not regulated by any federal law. At the same time, this act contains more restrictive toll provisions for publicly owned bridges than for those privately owned. Congress has since authorized some exceptions to the original requirements of the 1946 act and has modified some of its restrictive provisions.

The International Bridge Act of 1972 was the last major piece of specific toll bridge legislation. Up to this time, all international bridges were authorized individually in accordance with the 1906 act. The 1972 act granted advance congressional consent subject to specified restrictions governing their construction, operation, and maintenance. Toll rates on publicly owned international bridges built under this act are subject to the "reasonable and just" provisions of the 1906 act, with somewhat different regulations for those privately owned.

Federal statutes adopted through 1927 created a situation where on January 1980, 32 *interstate* and 11 *intrastate* bridges

were subject to the 1906 act. Twenty-one of those covered under this act must meet the requirement that tolls be "reasonable and just." The other 22 are under a more stringent policy permitting tolls to be charged only to cover costs of construction and operation. Of these, 12 are permitted toll rates sufficient to cover the costs of operation and maintenance after the construction costs have been recovered, and 10 bridges are required to become toll free when costs are recovered.

Federal statutes governing bridge tolls empower the Federal Highway Administrator to review tolls on bridges within his or her jurisdiction and the validity of toll increases. Proceedings under the 1906 and 1946 bridge acts are governed by the Federal Highway Administrator's Bridge Toll Procedural Rules. When a single protest is filed with the Federal Highway Administrator, the entire process is set in motion and carried forward until it is resolved, either through ruling of the Administrator or a federal court. This can involve a lengthy and costly procedure.

If the proceeding ends in federal court, both sides, the toll agency and the federal government, will have spent a great deal of time and money to satisfy the requirements. A toll rate case involving the Port Authority of New York and New Jersey requidred almost five years before the United States Court of Appeals ruled that the increase be allowed.

Another case, involving the City of Burlington, Iowa in 1968 extended over a period of five years when the U.S. Court of Appeals upheld the increase. A similar case involving the Delaware River Port Authority spanned a period of more than five years before resolution and included a great number of legal proceedings. The delay during an inflationary period brought about increased costs to that authority in addition to the delay of planned improvements and construction.

This review power over toll rates tends to inhibit plans for capital and safety improvements because there is always the possibility that a required toll increase to finance improvements, however small, will be delayed or possibly denied. If a bond issued is involved, investors cannot be certain that their position will be secure and the agency cannot plan ahead or make improvements on a contingency basis under the uncertain financial climate created by this review procedure. In 1982 and 1984 proposals to repeal the provisions governing bridge toll rates were considered by Congress but were not included in the final legislation adopted.

Other Restrictions and Controls

Enabling legislation provides the powers and authority granted any agency owning and operating a toll project in the United States. While establishing powers, it also creates responsibilities for the toll agency whether it be a special commission or authority, a state agency or department, or a city or county government. Because most projects are local in nature, state legislation is most common. However, where bi-state agencies are created, enabling legislation by both states and Congress are required; in the case of international facilities, the concurrence of both governments is required as well. State constitutions provide the basic legal structure for enabling legislation.

In general, the powers and responsibilities of the agency created include those of a corporation. Enabling legislation may be broad in the sense that is permits the agency created to undertake a wide range of projects or services. Conversely, it may also limit the projects and activities authorized, the financing methods and commitments permitted, the toll rate structure and possibly pledges of tax revenues, and operation of the facilities contemplated. There are wide variations in this regard and a more detailed discussion is included in Chapter 5.

Another part of the control structure is the bond covenant (contract or resolution), which is usually quite specific about the project description, the amount of bonds to be issued, how they are to be sold, the trustee bank to receive and record proceeds and transactions, the reserve funds to be maintained, annual inspection programs, and other requirements. Overall accountability is important because trends in costs and revenues must be measured continually and with precision to ensure success, not only from a financial point of view, but as a public service project that meets original objectives and expectations of the users.

CHAPTER THREE

TRENDS AND DEVELOPMENTS

The history of toll financing in the United States reveals a cyclical pattern. Although early experiences provide interesting background, modern highway and transportation financing has its roots in the 1956 Federal-Aid Highway Act and subsequent legislation. At the time the 1956 act was passed, a number of toll roads had already been built in the same corridors and general locations to be designated as part of the Interstate system. Toll roads and portions of toll roads located within those corridors and providing the intended service of the planned Interstate highways were designated as parts of that system, and all toll roads so included were to be made toll free at the earliest opportunity.

Toll road financing slowed sharply after passage of the 1956 Act. Toll road investment for over 3,220 miles of roadway reached $4.8 billion between 1950 and 1959, but declined to $571 million between 1960 and 1965 because the high volume corridors remaining as potential toll projects were eligible for 90-10 financing. Toll bridge construction retained a steady pace with 22 projects built between 1950 and 1959 and another 12 between 1960 and 1965.

TOLL ROADS ON THE INTERSTATE SYSTEM

The presence of toll roads on the Interstate system caused conflicts with reference to connections between toll and toll-free highways, federal participation in the financing of such connections and interchanges, and related problems. In recognition of this situation, a special subcommittee of the Committee on Public Works, U.S. House of Representatives held protracted hearings in 1966. These hearings served to clarify points of federal law in relation to the legal and financial positions of toll agencies, including their restrictions and operations as a part of the national system.

Subsequently, several studies were commissioned by Congress to determine the practical aspects of federal reimbursement (90-10) to the states for toll roads located on the Interstate system, or the redemption of outstanding toll road bonds so that tolls might be removed. Neither approach was found practical for a variety of reasons and legislation introduced to this general effect from time to time was not enacted.

Six states signed agreements under the provisions of the 1956 Highway Act that allowed use of federal funds for connections and interchanges between toll roads and other roads on the federal-aid system, provided that the toll road in question, or section thereof, would become toll free when all outstanding debt was retired. The states are Indiana (Indiana Toll Road, I-80 and I-90), Illinois (Northern Illinois Tollway, I-90) Ohio (Ohio Turnpike, I-80 and I-90), Maine (Maine Turnpike, I-95), Kentucky (Kentucky Turnpike, I-65), and Virginia (Richmond-Petersburg Turnpike, I-95). Of these, the Kentucky Turnpike is now toll free and is being maintained and operated by the state.

REFUNDS OF FEDERAL AID

Maryland and Delaware used federal funds for planning and designing Interstate 95 between the city of Baltimore and the New Jersey state line. However, it became evident that completion of the project could be realized only in stages over a considerable period of time. It was also ascertained that about 60% of the anticipated traffic would be through traffic originating outside of these states. Consequently a joint decision was made to build the highway as a toll facility and the two states requested permission to return the federal funds received so that construction as a toll facility could proceed. This refund was approved by Congress in July 1960 and the Delaware-Maryland Turnpike (now John F. Kennedy Memorial Highway) was opened to traffic by President Kennedy in November 1963.

In 1968 Congress authorized the return of federal funds previously utilized by New Jersey for building a section of the Garden State Parkway, which was then completed as a toll road. In 1973 Congress also authorized New Hampshire to return federal funds previously allocated to Highway 101 to permit that highway to be financed by tolls. (However, this was never done.) Several years later, Congress authorized federal funds for the completion, reconstruction, and improvement of the West Virginia Turnpike to bring it up to full Interstate standards as a part of that system. West Virginia in turn has agreed to remove tolls when outstanding obligations are discharged.

In a similar way, the Richmond-Petersburg Turnpike was widened and improved through the aid of an additional bond issue with the approval of Congress and the state of Virginia. The Turnpike was very successful from the beginning and bonds were being retired well in advance of the 1995 target date, but traffic volumes had increased to the point where an extensive widening project was necessary. An agreement had been entered into by the state of Virginia on behalf of the Turnpike to provide that the Turnpike would become toll free when the original bonds were retired. This agreement became necessary when federal funds were utilized in constructing connections between the Turnpike and Interstate 64 in Richmond and related improvements. At the request of Turnpike and state officials, Congress included a provision in the Federal-Aid Highway Act of 1970 authorizing the Secretary of Transportation to amend the original agreement in order to permit the continuation of tolls on the Turnpike to finance the two additional traffic lanes required. This provision stipulated that "in no event shall tolls

be collected after date of maturity of those bonds outstanding," meaning 1995.

After several efforts and extended negotiations to proceed with the financing, including controversy concerning the continuation of tolls, a compromise was reached. This compromise allowed the Richmond-Petersburg Turnpike to be widened and also allows the Virginia Department of Highways to build a parallel or alternative expressway to accommodate traffic through the Richmond-Petersburg corridor. This plan gave the Commonwealth of Virginia the option to sell bonds to widen the Turnpike at a lower rate of interest and in this way ensure an earlier payout of bonds. The expressway, when constructed, would be built as Interstate 95 and, on completion, the I-95 designation on the Turnpike would be removed. To implement this plan, the Turnpike Authority was dissolved and its powers, duties, and obligations transferred to the Virginia State Highway Commission. In due course the bonds to widen the Turnpike were sold and the improvement project moved forward to completion in 1981.

The Virginia situation, reported only in brief summary here, illustrates the type of conflicts between the tax-supported and toll-financed systems under current laws. Although some of these situations were resolved, some toll road agencies declined to participate in the required agreement. Agencies operating the Massachusetts Turnpike, the Pennsylvania Turnpike, and the New York Thruway, all designated parts of the Interstate system, were not able to build the connections and improvements planned by the states and the Federal Highway Administration because the additional traffic anticipated was not sufficient to justify estimated expenditures required under terms of their bond obligations. At that same time these agencies declined to participate in an agreement to finance such improvements with the help of federal-aid because this would require them to remove tolls from the road when all bond obligations are discharged. A recent solution to the New York Thruway situation is discussed later in this chapter.

FUEL SHORTAGES AND REVENUE SHORTFALLS

The years between 1965 and the early 1970s saw continued progress in the national highway program under a stable revenue situation and the federal-state cooperative arrangement. But this situation changed rather abruptly beginning with the oil embargo of 1973–74 and intensified by a second fuel shortage in 1979, which raised the price of motor fuel to a level approximately three times the levels of 1972. The immediate result was less highway travel, less vehicle use, and sharply lower fuel-tax revenues. The long-range effect was the production of smaller, more fuel-efficient vehicles, which reduced fuel-tax revenues even further. Further, highway costs rose and inflation continued to reduce effective dollar values. In turn, highway and transportation budgets were cut, needed construction and maintenance programs were deferred, and overall highway service programs were reduced throughout the United States.

States began to take action by increasing gasoline taxes; the average levy was more than 11¢ per gallon in 1984 (*5*). Some adopted the sales tax approach so that the gasoline tax is a percentage of the price of gasoline rather than a flat per gallon rate in an effort to stabilize revenues and sustain programs at a proportional level.

At this point states and toll agencies became acutely aware of the fiscal dilemma created by the cost-revenue gap. Some states began to consider the possibility of toll financing, while others faced the problem of having their toll roads become toll free under previous agreements with the federal government (Indiana, Maine, Ohio). At that point, these roads (without toll revenues) would become a state responsibility including maintenance and operation. The Denver-Boulder Toll Road in Colorado, the Kentucky Turnpike, and the Dallas-Fort Worth Turnpike in Texas had become toll free earlier.

THE 1978 SURFACE TRANSPORTATION ASSISTANCE ACT

With these new financial problems in evidence, the situation received attention from Congress in the 1978 Surface Transportation Assistance Act in which 14 different provisions involved toll facilities either directly or indirectly. Some of the more significant provisions with respect to toll financing are included here.

Toll roads on the Interstate system were made eligible for Interstate 3-R funds (resurfacing, restoration, and rehabilitation) under provisions of the 1978 act, provided that agencies owning and operating the facilities are willing to sign an agreement requiring ultimate toll-free operations. In another provision, service areas on toll roads included in the Interstate system that were constructed before January 1, 1960 would be allowed to remain and continue operation after such toll roads become toll free. (Service areas are not permitted on the Interstate system under provisions of the 1956 Federal-Aid Highway Act.)

Maine Turnpike

The Maine Turnpike, on the Interstate system, was due to retire its bonds in 1981, and if all obligations were then to be discharged, the Turnpike would become toll free. The state would be responsible for its immediate operation and maintenance plus the cost of providing some very necessary improvements to handle peak traffic loads. Maintenance costs were estimated at $5 million annually and the improvements and the cost of modernizing some sections would require about $80 million with the state share about $8 million under the 90-10 formula. In addition, there would be an annual loss of $14 million in revenue if tolls were removed.

Toll removal was required under an agreement signed earlier when federal funds were utilized in building some connecting interchanges between the Main Turnpike and tax-supported highways. After reviewing the situation, Maine requested and received congressional approval to retain tolls on the Turnpike upon repayment of federal-aid previously received. This approval is contained in the 1978 Surface Transportation Assistance Act, which allowed the Maine Turnpike Authority to issue additional bonds to make the necessary improvements. As a part of the total agreement, the Turnpike Authority pledged a minimum annual payment of about $4.7 million to the state to help maintain connecting highways and adjacent roads.

Golden Gate Bridge

As a part of the highway bridge replacement and rehabilitation program, the 1978 act provides, in brief, that any agency that does not have taxing powers and whose functions include operating a federally assisted public transit system subsidized by toll revenues shall be eligible for assistance, with such assistance limited to the amount spent by the agency for capital and operating costs to subsidize the transit system.

This provision qualified the Golden Gate Bridge, Highway and Transportation District of California for federal aid toward the overall cost of replacing the deck of the Golden Gate bridge. This project has been approved and is now in progress. The Golden Gate Bridge, Highway and Transportation District operates a commuter bus system and a ferry system and federal funds have been received for capital expenditures, including the purchase of transit equipment, and for operating subsidies. A special vanpool project was also launched by the District under provisions of the 1978 act and it is estimated that these programs have increased bridge crossing capacity by more than 10,000 passengers daily.

New York Thruway

The 1978 Surface Transportation Assistance Act also authorized the Secretary of Transportation to approve a project on Interstate 90 (New York State Thruway) for the construction of an additional lane in each direction between designated points on the condition that all lanes between exits 24 and 26 be free of tolls for Interstate 88 traffic utilizing the Thruway between those connecting points.

Section 105 of the 1978 Surface Transportation Assistance Act (concerning use of Interstate 3-R funds) enabled the New York Department of Transportation, the New York State Thruway Authority, and the Federal Highway Administration to enter into a tripartite agreement. This agreement provides for the calculation of Interstate 3-R funds using the New York State Thruway mileage covered by the agreement.

A significant part of this agreement is a provision that allows tolls to be retained following the retirement of all outstanding bonds. However, if tolls are retained, and if federal-aid funds have been used to work on the toll facility, the Authority is required to repay the federal funds used.

Indiana Toll Road

An amendment to the Surface Transportation Assistance Act of 1978, approved in November 1979, authorized Indiana to return federal-aid funds previously accepted for construction of additional interchanges and other improvements on the Indiana Toll Road (Interstate 90) and permitted the continuation of tolls. This situation was almost identical to that in Maine. Remaining indebtedness was about to be discharged, and if so, tolls would be removed and the road would become a responsibility of the state. Maintenance costs were about $10 million annually and toll revenues would also have been lost. Additional interchanges and improvements were definitely needed and the continuation of tolls was considered to be the most practical answer. Since then, bonds have been issued to complete the improvements and to make the necessary refund of federal aid previously received. As in the case of Maine, the state highway department supported this plan. Reports indicate that public opinion polls taken during the process showed strong motorist support for the continuation of tolls under the circumstances encountered.

In concert with the above mentioned federal legislation, the General Assembly of Indiana passed legislation dissolving the Indiana Toll Road Commission and transferring its powers and responsibilities to the Indiana Department of Highways. Certain provisions of this act were challenged on the basis that Indiana's constitution prohibits state debt and under circumstances involving current outstanding obligations of the original Toll Road Commission, such obligations would, in effect, represent state debt. As a result that act was declared invalid. Subsequently, the Indiana General Assembly adopted new legislation, effective April 1, 1983, amending the Indiana Code and establishing the Indiana Toll Finance Authority as a separate corporate body responsible for toll roads and toll bridges, removing this responsibility from the Department of Highways. Among the powers granted the newly created authority was the power to lease toll projects to the Department of Highways for the purpose of construction, reconstruction, improvement, repair, maintenance, and operation. The power to borrow and issue bonds is now the responsibility of Indiana Toll Finance Authority, thus removing the state from any direct legal obligation for funds borrowed.

INNOVATIVE FINANCING PLANS

In recent years increased needs for highways and shortages of tax revenues have led several agencies to implement or study various innovative types of financing arrangements.

Ohio Turnpike

Ohio also accepted federal aid for building connections and interchanges on the Ohio Turnpike (Interstate 90) and could be in a position to discharge all bonded indebtedness within a few years. In June 1984, after considering possible alternatives, the Ohio Turnpike Commission authorized the refunding of remaining outstanding bonds and authorized execution of an agreement with the Ohio Department of Transportation defining the repair and rehabilitation program to be completed in six years. The refunding issue for the $4.8 million of original bonds and the new bonds issued will mature and be retired in December 1990. This is to be accomplished under a procedure that couples the applicable provisions of the Turnpike Act and the 1964 tripartite agreement among the Turnpike Commission, the state of Ohio, and the Federal Highway Administration so that there will be no need for action by Congress or the Ohio General Assembly. This program is designed to meet "good condition and repair" requirements of the original 1964 agreement when the road becomes a toll-free segment of the Interstate system in December 1990.

Fort McHenry Tunnel

Another milestone is the financial plan approved for the construction of the new Fort McHenry tunnel in Baltimore as an important link of Interstate 95. This financial plan, as authorized, provides that the tunnel may be constructed as a toll project with 100 percent federal funds and that the toll revenues of Maryland are pledged to repay the amounts in excess of the normal 90 percent federal share. This project, which has an estimated total cost of over $800 million, is the most expensive single project on the Interstate system. Tunnel tolls are to be removed when the state and local share of the cost has been recovered. In effect, the Federal Highway Trust Fund has provided a loan, secured by tolls, to permit the project to proceed.

Special Studies

Interest in the revenues of toll financing is growing as evidenced by the number of special studies scheduled or planned. The Illinois Department of Transportation has been studying the possibility of constructing additional toll roads in the Chicago metropolitan area. The Illinois study suggests a new method of financing a toll project including the possible use of Federal-Aid Interstate funds, state highway revenues, and possible support from business and industry whose operations would benefit as a result. Early in 1984, the Department announced plans for the construction of an additional toll highway in the Chicago metropolitan area. To carry out this plan, the Illinois State Toll Highway Authority is considering the authorization of about $300 million in new revenue bonds and an additional $165 million in revenue bonds to refinance debt of the original system and to remove restrictions of the original bond covenant. The restructured new covenant would be designed to permit use of revenues of existing facilities to support the new road.

Pennsylvania has carried out a study similar to the one in Illinois. The conclusions reached were that needs for new construction and improvements of existing highways were already great and growing and that user fee (tax) revenues anticipated fall far short of modest goals. The study also shows that the increased costs of construction, operation, maintenance, and interest make toll financing secured only by toll revenue impractical. This study recommended that consideration be given to placing tolls on several existing highways in Pennsylvania, including Interstate 80, and that a joint financing approach including state and federal funds along with bond financing secured by tolls be considered.

A toll feasibility study was completed for the state of Wisconsin in August 1983. The purpose of this study was to explore the possibility of imposing tolls on the rural portion of Wisconsin's Interstate routes. This study was undertaken recognizing that under federal law the state might be required to reimburse the federal government for funds previously received for those portions of the Interstate highways in question. Three different concepts were advanced along with a number of variations within those concepts with reference to toll collection systems, toll-free local movements, initial financing, federal requirements, diversion of traffic, toll rates, etc. In view of the availability of federal-aid 4-R funds provided by the Surface Transportation Assistance Act of 1982, Wisconsin has not adopted recommendations contained in this report.

A special study of alternative sources of financing, carried out for the Charleston (South Carolina) Area Transportation Study, reviewed existing highway and bridge needs and possible alternative sources of revenue to support required improvements. These include an increase in the motor vehicle registration fee, an increase in the ad valorem auto (personal property) tax, and two toll systems. In all, 27 different funding possibilities were developed and explored encompassing nine different combinations of the sources of revenue mentioned. The most promising plan considered appears to be a combination of an increase in the local motor vehicle registration fee and implementation of a toll system. Because tolls would be placed on toll-free bridges, special legislation or a modification of existing federal law would be required to carry out this plan of action. The toll projects recommended for construction would also require enabling legislation at the state level.

Recent Developments

For a project to be independently feasible and completely dependent on tolls under present higher interest rates and construction costs, anticipated traffic volumes would have to be much greater than the qualifying levels of the 1960s and 1970s, and toll rates would have to be calculated at much higher rates to reach the level of revenues required. These factors have delayed or prevented toll financing for all but a few projects in recent years. This situation plus the shortage of tax revenues in relation to total present and estimated future needs has led to some of the more creative methods of financing now under intensive study.

These special studies and related activities in many other areas illustrate the fact that with rare exceptions traditional toll financing with complete reliance on toll revenues per se is often not practical under present economic conditions. The extra weight of higher interest rates and increased costs of construction, maintenance, and operation create too great a financial burden without support from other sources of revenue. Nonetheless, three major toll revenue projects have been financed recently. They are the Houston Ship Channel Bridge (Jesse Jones Memorial Bridge, constructed by the Texas Turnpike Authority and completed in 1982) (Figure 5), the 12-mile Dulles Toll Road in suburban Washington, D.C. recently constructed by the Virginia Department of Highways and Transportation, and the $175 million Jacksonville (Florida) bypass expressway project of the Jacksonville Transportation Authority.

Two major toll projects now moving forward are the Hardy and West Belt toll roads in Harris County (Houston) Texas. The original feasibility studies for these projects, prepared for the Texas Turnpike Authority, indicated that the level of interest rates anticipated would increase overall costs to a point where a revenue bond issue would not be practical without support from other sources. It was also evident that tax funds at the state level would not be available in the foreseeable future. After reviewing this situation in depth, officials of Harris County concluded that the county might finance these expressways as toll roads by authorizing an issue of general obligation bonds as a support measure for revenue bonds to be issued, and in this way reduce anticipated interest costs. The citizens of Harris

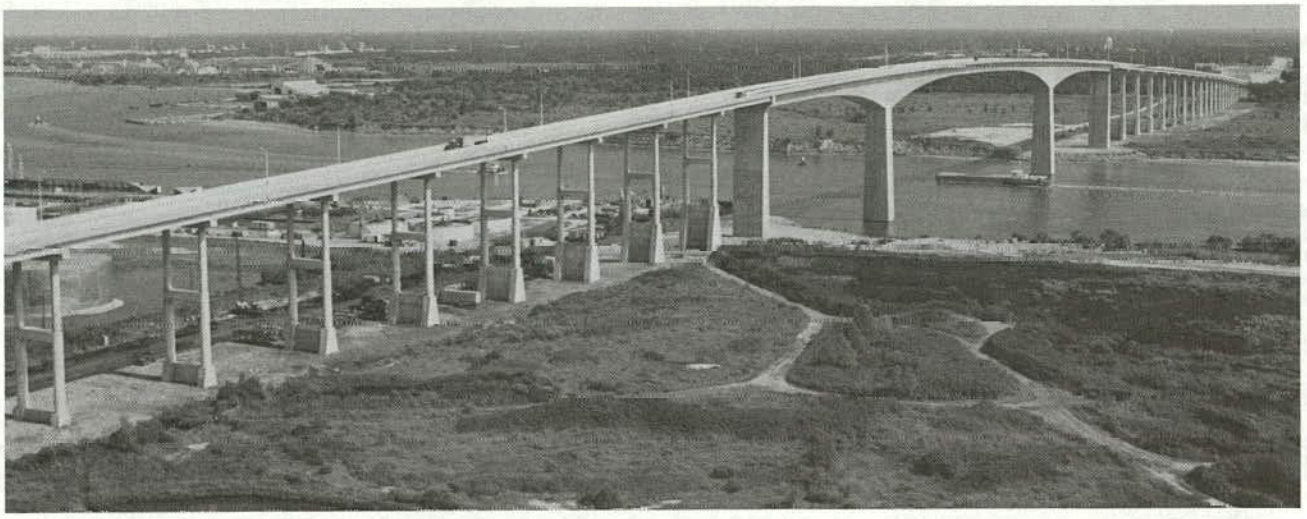

FIGURE 5 Jesse Jones Memorial Bridge (Houston ship channel).

County supported the necessary referendum including the creation of the Harris County Toll Road Authority and plans for constructing the expressways are now in progress.

Construction of the $600 million second span of the Mississippi River Bridge in New Orleans, Louisiana is also under way with completion scheduled for 1987. Original funding for this parallel structure was provided by $400 million in general obligation bonds by the state of Louisiana in 1976 with an additional $200 million in state-backed revenue bonds authorized for the project. The new span includes two transit lanes and a special ramp and connections, which are funded in part by a grant from the Urban Mass Transportation Administration. Tolls were removed from the original span in 1965; when tolls are reinstated upon completion of the second span, they will be collected in only one direction.

There is also evidence that toll projects, especially the well-established and well-grounded organizations, are beginning to attract more and more attention and that efforts will be made in some states to obtain their support for other projects. Such support could take many forms depending on local conditions, enabling legislation, bond indentures, and governmental policies in effect at both the state and federal levels. Collaborative efforts could be very simple or very complex. The considerations involved are closely related to bills introduced in the 97th Congress that would permit joint financing by the combined use of federal-aid, state tax revenues, and toll revenues.

The high level of visibility now accorded established toll agencies is centered around a number of reasons. The most important of these are:

1. These organizations already exist, have legal status and wide recognition.
2. They have established and continuing sources of revenue.
3. They have sound credit ratings that have been established over the years.
4. Their administrative and professional staff are experienced and available.

Support of one toll project by revenues of another or by a group of projects is not new, especially in the early years of operation before projected traffic volumes are fully realized. In the same way, support of other transportation projects by toll revenues has been brought about as a financial necessity, especially in urban areas. For example, in 1983 the Triborough Bridge and Tunnel Authority of New York City transferred a total of $190,754,383 in surplus 1982 tolls plus $13,447,768 in interest on investments, or a total of $204,202,152 to the Metropolitan Transportation Authority to support transit operations under its jurisdiction. The total contributions made to the Metropolitan Transportation Authority since 1968 are in excess of $1.5 billion. Support of bus and ferry operations by the Golden Gate Bridge, Highway and Transportation District falls into this general category as do the operations and responsibilities of the Port Authority of New York and New Jersey and the Delaware River Port Authority.

Other more inclusive concepts are on the horizon. These efforts embrace the broad field of regional economic development in which all modes of transportation are considered to be an important ingredient and highways a key element. A proposal of this nature is under consideration by the Massachusetts legislature, which would authorize a public service development bank. This bank, if approved, would be organized to serve as a depository of all federal-aid and state funds that would normally be allocated to local governments in the form of grants and loans. The bank would have authorization to borrow money, make loans, and, after original funding, develop some of its own resources, including the possible use of toll receipts not needed for debt retirement.

It was also reported that the states of New York and New Jersey are considering a similar approach to serve the regional development potential of the New York City metropolitan area. The Port Authority of New York and New Jersey is expected to spearhead the effort, if approved, and toll revenues, rents, and fees would serve as a part of the initial capital base.

Under legislation adopted in 1984, the state of New Jersey

created a new Transportation Trust Fund Authority to support a planned program of statewide nontoll highway and mass transportation projects over a four-year period. The state will raise approximately $250 million including an annual contribution of $24.5 million from toll roads. These annual contributions consist of $12 million from the New Jersey Turnpike Authority, $10 million from the New Jersey Highway Authority (Garden State Parkway), and $2.5 million from the New Jersey Expressway Authority (Atlantic City Expressway).

A $0.03/gal. increase in the diesel fuel tax and higher truck fees will add about $30 million a year to the trust fund. On November 6, 1984, New Jersey voters approved dedication of 2.5 cents of the state gasoline tax to transportation. This will provide approximately $88 million annually.

The combination of funds raised in this way will be utilized to repay short-term bonds to be issued by the new Authority, which could reach a total of $600 million over the four-year program. By applying a substantial portion of those funds as the state match for federal transportation programs, the state anticipates that an additional $900 million will be available for capital projects in the 1985 fiscal year.

These innovative financial concepts reflect the urgency of the situation and parallel efforts to maximize the public benefits of all available financial resources, whatever their origin. Such concepts transcend piecemeal local development and the fragmentation of transportation expenditures and direct attention toward a more flexible pattern of resource management and a more comprehensive goal.

These are indications that the revenue problem is real and is being recognized and that public policy toward toll financing, as a practical concept, is now more favorable than in the past 20 years. This fact is evidenced by the federal legislation mentioned, legislation being proposed, the innovative fiscal arrangements being planned and positions taken by the Federal Highway Administration.

In a presentation on the federal outlook on toll financing, the Federal Highway Administrator stated in part "it is my feeling, that if we are going to be philosophically consistent in this administration, we must see (to it) that we grant more latitude to the individual states to address their highway needs as they see fit. I strongly believe that this means giving the states more latitude in the area of federal funds as they relate to application on toll roads" (*6*).

In 1981, the Federal Highway Administration recommended that all federal laws and regulations governing bridge tolls be repealed. This recommendation was made because administrative and legal costs of the few case handled were very large, and well beyond any benefits actually realized. These costs fall on both the federal government and the toll agencies involved. This recommendation was included in the first drafts of legislation in 1982 and 1984 but was not incorporated in final legislation adopted.

In August 1983, the National Conference of State Legislatures, by unanimous vote, adopted a resolution endorsing the principle of allowing states to use toll revenues as their matching share for federal highway funds. Only time will tell how these ideas and possibly other concepts will fare and how legislative philosophy and public policy will develop in response to the financial problem at hand.

A policy statement accepted by the AASHTO Policy Committee in 1985 states that tolls should be viewed as a supplement to federal aid and recommends (a) that states be allowed to develop toll highways in conjunction with use of federal funds as they are already permitted to do on bridges and tunnels and (b) that the Secretary of Transportation be authorized to allow tolls of federal-aid highways and bridges under certain circumstances without obligation to repay federal-aid funds (*7*).

At the request of the Senate Committee on Environment and Public Works, the Congressional Budget Office is preparing a report on the financing and condition of toll roads. This report, which will be released in 1985, will also be of interest to any agency considering toll financing of highway facilities. International interest in toll financing may also be building. The Organization for Economic Cooperation and Development is preparing a review of experience with toll financing in serveral nations and this report is scheduled to be available in 1986.

CHAPTER FOUR

ESTABLISHING A TOLL PROJECT

CONSIDERATIONS AND REQUIREMENTS

The process of planning, financing, and constructing public improvements follows a well-worn path. Important projects are first itemized and arranged by general priority. Cost estimates and projected revenues normally become the screening mechanism that determines to a large extent those projects that can be undertaken and those that will be deferred. This procedure is followed regardless of how they are to be financed.

Experience shows that toll financing, as an alternative to tax funding, comes under consideration when urgently needed projects cannot be financed with available tax revenues or without an unacceptable delay. A decision to fund or support a project with toll revenues embraces certain considerations and requirements.

Enabling Legislation

Enabling legislation is the first step in creating a toll project, but that step in itself is purely an authorization to proceed with a series of prescribed actions and requirements. It does not by or in itself produce the plans or the funding necessary to carry a project forward.

Enabling legislation establishes the powers and responsibilities of a toll agency, whether it be a special commission or authority, a state agency or department, or a city or county government. Because most projects are local or intrastate in nature, state enabling legislation is the key. In cases where bi-state agencies are created, enabling legislation by both states and Congress are required, and in the case of international facilities, the concurrence of both national governments as well. In a general way, the powers and responsibilities of the special purpose agency created include those of a corporation.

Enabling legislation may be broad in the sense that it may permit the agency created to undertake a wide range of projects within a state or specially defined district or area. For example, the Texas Turnpike Authority, may, with appropriate advance approval, construct and operate projects throughout the state. Indiana, Kansas, and Ohio authorities have similar powers.

Enabling legislation may also be restrictive. Legislation creating the Maine Turnpike Authority specified that the Authority was empowered to construct, maintain, and operate integral operating units of a turnpike from a point near Kittery to a point at or near Fort Kent in Aroostook County and to issue turnpike revenue bonds payable solely from tolls. The Massachusetts Turnpike was also initially limited to a specific roadway. This legislation was later amended to permit construction of the Boston extension.

By contrast, there are some notable differences in that certain authorities (such as the Port Authority of New York and New Jersey; the Delaware River Port Authority serving Pennsylvania and New Jersey; the Delaware River and Bay Authority, serving Delaware and New Jersey; and the Golden Gate Bridge, Highway and Transportation District) are also authorized to own and operate other transportation facilities such as airports, port facilities, and transit and ferry services. The Richmond (Virginia) Metropolitan Authority operates a toll road, a toll bridge, a parking garage, and a sports stadium.

The Port Authority of New York and New Jersey is an agency of those two states created by bi-state compact approved by Congress in 1921. The authority is a municipal corporate instrumentality of those states. Its established purpose is to develop and operate passenger and freight terminals and transportation and industrial facilities in the bi-state Port District, an area of about 1500 square miles within 25 miles of the Statue of Liberty. This district contains more than 200 municipalities and includes all or parts of seventeen counties in the two states. It was provided that the construction and operation of bridges and tunnels within that area should be unified under the authority.

The authority has the power to borrow money by issuing bonds or other obligations and to make charges for the use of its facilities. The original legislation of 1921 was amended in 1947 to broaden local governmental cooperation within the Port District in the development of marine terminals. In that same year the two states adopted a policy and legislation for the integration and furnishing of proper air terminal facilities within the Port District and authorized the authority to proceed with air terminal development.

In 1962 the two states authorized the Port Authority to acquire, rehabilitate, and operate railroad tunnels under the Hudson River formerly operated by the Hudson and Manhattan Railroad Company. The states also authorized the World Trade Center. These actions followed the original concept that the level of coordination and cooperation required in the metropolitan area could best be accomplished through a common agency.

The revenues of the authority are derived from tolls, fares, landing and dockage fees, rentals, and other charges for the use of its facilities. The authority raises money for construction and acquisition of its facilities by issuing bonds on the basis of its own credit. The bonds issued are not obligations of either state. The bonds are issued by and on behalf of the Authority as a whole and the obligations created and revenues received are included in the annual budget of the authority.

The Delaware River Port Authority, a bi-state agency serving both Pennsylvania and New Jersey, was established in a similar way in 1952. It has broad authority and responsibilities similar to those of the Port Authority of New York and New Jersey. However, its operating procedures and financial requirements are somewhat different. It is also responsible for operating and providing financial support for the Lindenwold Transit Line in Philadelphia and New Jersey.

Enabling legislation for most bridges and tunnels is usually quite specific, but there are wide variations designed to meet a particular situation in a given location. Most of the early enabling legislation for bridges and toll roads was very restrictive.

Engineering Studies

Preliminary engineering studies, preceding or following enabling legislation, are required to bring a proposed toll project into focus by determining its overall practical aspects. These considerations include location, alignment, toll rates, traffic projections, and construction cost estimates along with estimated costs of operation, maintenance, and financing. Funds to perform these preliminary studies are normally advanced by the state or local government, usually in the form of a loan to be capitalized and repaid if and when bonds are issued or discharged in accordance with an advance agreement.

If preliminary studies indicate project feasibility, more detailed and definitive engineering studies are required to produce reliable cost and revenue estimates to supply the basic facts on which bonds may be issued. This series of studies is very important because the data produced are designed to give prospective investors assurance that the project will succeed; i.e., that toll revenues anticipated can be relied on to operate and maintain the project and to make interest and principal payments. The studies will reveal levels of support required to make the project feasible.

The Bond Issue

Generally speaking, bonds are issued for the construction of an entire project because it must function as a complete operational unit to produce the toll revenues required. Completion of a project within a definite schedule becomes an important consideration. If construction should be delayed, interest costs will continue to accumulate from the date bonds were issued. Therefore a contingent item is usually included to help offset this possibility in the event of delays that are not controllable within the power of the agency.

Bonds are issued under a contract between the purchaser of the bonds and the toll agency and, in turn, a bank, acting as trustee on behalf of the bond holder. This contract may be identified as a bond resolution, bond indenture, bond covenant, or bond repurchase agreement.

A designated trustee bank receives all proceeds of the bonds sold and places this money into a construction fund to be expended by order of the toll agency and under the supervision of consulting engineers during the construction phase.

Bringing a project into being requires teamwork and professional competence in a number of areas. Beyond the services of consulting engineers lies the work of traffic engineers, bond attorneys, and legal counsel to ensure that the project meets all legislative and statutory requirements so that the terms of the bond indenture and all contractual arrangements cannot be challenged as to their legality. Investment bankers are responsible for handling the sale of the bonds and the trustee bank, in turn, becomes responsible for the proceeds as mentioned.

Upon completion of the project, attention is directed toward providing a good, safe facility the public will use at a charge that permits repayment of the obligations in force. Admittedly, the short description of the process outlined above is oversimplified, but it is intended to illustrate the overall basic procedure and the checks and balances involved, the records that must be kept, and the built-in safeguards incorporated to protect the integrity of such projects and those responsible for their success or failure.

FINANCING METHODS

Three basic methods have dominated the financing of toll projects over the years. They are revenue bonds, limited revenue bonds, and general obligation bonds. Combinations of these methods have also been used. Federal funds may also enter the picture under the provisions of the 1956 Federal-Aid Highway Act and other legislation referred to earlier. User fees and other tax revenues have been used to support toll projects in some instances and vice versa, and it is entirely possible that such interdependent fiscal arrangements will become more common in the future if established needs cannot be met.

Revenue Bonds

Revenue bonds in the past were commonly secured only by toll revenues on one or more toll projects. This is the so-called classic method of financing originating with the private financing of toll roads, such as the original Lancaster-Philadelphia toll road in colonial times. Although private financing and ownership of early toll projects was largely replaced by public ownership, the question frequently asked was "will it pay for itself?" This question remains and has special validity now in states where constitutions prohibit debt or deficit financing or where long-standing policies against borrowing remain in force.

The modern toll roads financed in the late 1940s and 1950s carried forward a very strict approach to revenue bond issues. Failures of privately owned toll roads before 1900 were a matter of historical record. Consequently, investors and local governments insisted on certain protective provisions under which bonds issued were to be secured solely and completely by toll revenues to be received. The immediate advantage was protection of credit for the state or local government. A toll road, built to expressway standards with controlled access, was still a novelty of sorts and not a popular idea in the early 1950s. No doubt in some cases the interpretation of the toll revenue requirements probably served as a political defense mechanism to minimize the possibility of a toll project being seriously considered or built.

To most investors and a good share of the public, investment in the original section of the Pennsylvania Turnpike was a "crackpot idea," a concept that was sure to fail. As a result,

and as indicated earlier, the Works Project Administration of the federal government provided a grant of some $29 million and the Reconstruction Finance Corporation of the federal government purchased $40.8 million in bonds to launch the first section of that road. Turnpikes constructed later experienced a more favorable financial climate because of the success of the Pennsylvania Turnpike and because of the obvious need for new high-type roads, but some skepticism remained with reference to risk taking in this field.

Enabling legislation and bond indentures of the early 1950s included special restrictions beyond strict revenue bond redemption requirements. These restrictions called for the establishment of a high level of reserve funds—a level much higher than later deemed necessary or practical. These restrictions were designed to help overcome resistance of potential investors and attract interest in the proposed bond sale. Stringent requirements of this kind proved to be a burden in later years when traffic volumes rose rapidly and improvements had to be delayed in order to maintain the precise financial ratios prescribed. The great majority of toll roads built up to 1965 were financed by the "free standing" type of revenue bonds, which are secured only by tolls to be collected and other toll facility revenues, such as fees, rentals, interest on invested funds, and concessions.

Limited Revenue Bonds

Limited revenue bonds, or limited obligation bonds, are secured either wholly or in part by a pledge of support from another established source of revenue, but do not carry any further guarantee of full faith and credit of any government. The use of limited revenue bonds is an advantage in that it tends to reduce the overall borrowing risk and produce lower rates of interest, which, in turn, tends to make a project more feasible in the eyes of potential investors. The exact financial benefits of limited revenue bonds would be difficult to calculate because a great deal depends on the economy and the bond market at a particular time as well as the nature, location, and general economic health and prospects of the area to be served.

The New York State Thruway is an example of where limited revenue bonds secured by tolls and backed by the full faith and credit of the state ($500,000,000) and revenue bonds secured only by the tolls to be collected ($472,000,000) were utilized in combination to build the Thruway system of 559 miles. Although tolls have covered all debt costs, the state pledge behind the bonds improved their marketability and lowered the interest rate. Short-term notes in the amount of $8,000,000 were also issued by the Authority making the total investment $980,000,000. Certain toll-free sections were constructed with the help of federal-aid ($80,000,000).

Combinations of standard toll-secured revenue bonds and limited revenue bonds are popular in toll financing because they are readily compatible from a financial point of view and because a pledge of supporting tax revenues does not actually commit such revenues. The pledge merely places such revenues in readiness for possible use under certain specified conditions when toll revenues available fall short of fiscal requirements. Examples of this type of issue include the procedures followed in Florida, bonds of the Oklahoma Turnpike Authority, and the program followed in Kentucky.

Through a series of legislative acts, most toll projects in Florida have been placed under the Florida Department of Transportation. In turn, the Florida Toll Facilities Division is charged with the responsibility of maintaining and operating the projects (Figure 6) on behalf of the Department under a variety of conditions and circumstances created by state law in accordance with enabling legislation adopted from time to time authorizing such local projects. The general provisions of such enabling legislation are designed to authorize and establish a specific toll authority in a county or counties, which is authorized to finance and construct a particular toll project or projects and to lease such projects to the State Department of Transportation for operation.

Details of all other matters, including composition of such authorities, specific powers, responsibilities, and borrowing abilities, are all included in each legislative act along with the power to set toll rates. These provisions vary in detail depending on the nature of the project, the county in question, and other factors. But there is usually a special and very significant provision that permits the authority, with concurrence of the county, to pledge all or some portion of the county's share of state gasoline tax funds as support for the project in the event such support is required to meet the provisions of the bond indenture. This pledge involves tax funds that normally accrue to the county under state law and established procedures. When the obligations are discharged, the county begins making paymants to the state for operating and maintenance costs that were deferred during the life of the bond issue. Florida's turnpike and the Sunshine Skyway toll bridge were financed by a standard revenue bond issue and are not supported by revenues other than tolls.

The pledge of gasoline tax revenues in Florida comes into consideration when project revenues are not sufficient to discharge financial requirements of the bond contract. In effect, this approach pledges the full faith and credit of the state in the event of an unexpected decline in revenues. The advance pledge of gasoline tax revenues makes bonds more attractive as investments and tends to lower interest rates. This system has been very successful in Florida and more projects are being considered there at the local level to relieve existing and anticipated traffic demands.

A similar approach in making a pledge of state gasoline taxes is found in Oklahoma under provisions of the Oklahoma Turnpike Enabling Act. The Oklahoma Tax Commission is required to calculate an amount equal to the motor fuel taxes computed on 97½% of the total gallonage of all fuels consumed on the six Oklahoma turnpikes. Of the amount so calculated, 97% is apportioned to the Oklahoma Turnpike Authority and 3% to the Oklahoma Tax Commission fund. However, these apportionments as authorized are subject to limitations. The act provides that such apportionments to the Oklahoma Turnpike Authority may not exceed $1,000,000 in any fiscal year. Further, if the level of the Turnpike Trust Fund is equal to three years' interest on all obligations outstanding, or if there is a balance of $4,000,000 in the Turnpike Trust Fund before the issuance of bonds, no apportionment will be made. This pledge of gasoline tax revenue support, in the event of need, is again a stabilizing influence that tends to reduce interest rates and overall project costs.

The Oklahoma turnpikes have always been operated as a single system, except for the Will Rogers Turnpike (the first toll road in Oklahoma), which was financed as a separate entity.

FIGURE 6 Bennett Causeway, one of several toll facilities in Florida.

By action of the state legislature, all six turnpikes have now been consolidated into a single system. This permits the continuation of tolls on those turnpikes where original obligations have been discharged. It also strengthens the financial position of the Authority to make improvements and carry out necessary expansions of service programs.

Kentucky utilizes two different approaches—one for toll roads on the major highway system and another for special roads built to serve coal transport needs (Resource Recovery Roads). Under an enabling act adopted in 1960, the Kentucky Turnpike Authority is authorized to issue revenue bonds secured by tolls, revenues, rentals, and other funds to construct turnpike projects and refund the debt so created. Among other powers it is also granted the privilege of combining two or more turnpikes for financing purposes, and in a special provision, to lease any turnpike project or projects to the Kentucky Department of Transportation under the terms of a written lease.

The provisions of this act have their roots in the 1891 State Constitution, which prevents the Commonwealth of Kentucky or any of its agencies from making financial commitments beyond the revenues provided for each two-year fiscal period of the state except in the case of revenue bonds voted by the people. This has brought into being the "renewable lease" type of financing for toll roads. This method is not limited to toll roads and is also utilized for other public facilities constructed by the state.

The special feature of the Kentucky Turnpike Authority revenue bonds is that they are secured and made payable from lease rentals received by the Authority from the Kentucky Department of Transportation under biennially renewable leases. Under these leases the Department of Transportation is obligated to pay the rentals required during the term of each lease regardless of the level of toll collections. The leases are not automatically renewable. The Department of Transportation has complete authority to operate the toll roads and there is no requirement that the Department collect tolls while the leases are in effect or that it set specific toll rates.

It was recognized from the beginning that the toll roads financed and operated in this way might require support over and above the tolls to be collected, and as a result, all revenues of the Department of Transportation are included in the bond calculations made. The state considers the program to be very successful—providing highways, jobs, and economic opportunity that would otherwise have been delayed many years. Approximately $820 million in toll revenue bonds were issued by the Turnpike Authority between 1960 and 1971.

Under this same enabling act and general procedure, the Kentucky Turnpike Authority has undertaken the construction of "coalpikes"—Resource Recovery Roads. Tolls are collected in the form of a prescribed tonnage levy (severance tax) at the mine for coal transport vehicles with any remaining support required provided by tolls and other sources in accordance with enabling legislation and terms of the lease agreement. Each project financed in this way is a part of the highway system of

Kentucky and such highways are open to public use subject to the collection of tolls. These roads are financed by a series of revenue bond issues beginning in 1977 and consolidated by an issue of $350,560,000 of Resource Recovery Refunding Bonds in 1981 to extend the system and integrate financial responsibilities.

The John F. Kennedy Memorial Highway (Maryland-Delaware Turnpike) was dedicated and opened to traffic in November 1963. Revenue bonds for the Delaware portion of this project were originally issued by the Delaware Turnpike Authority. Subsequently, responsibility for this project was transferred to a division of the Delaware Department of Transportation.

Following this change, the state of Delaware became dissatisfied with the funding covenants of the Delaware Turnpike Trust Agreement, which required that all surplus funds be retained by the trustee in a sinking fund to buy back its own bonds. By enacting new enabling legislation for advance refunding of existing bonds, refinancing the indebtedness, and adopting a new trust agreement, the state:

a. created a "Transportation Authority" within the state DOT to manage all transportation programs except the state highway system (the Authority is empowered to issue revenue bonds that do not carry the full faith and credit of the state);
b. terminated and restructured the old Trust Agreement concurrent with refinancing, thereby eliminating restrictive covenants and providing greater financial flexibility;
c. provided a flow of funds whereby all state motor fuel taxes and special truck permit fees flow through Transportation Authority accounts to provide better coverage for revenue bonds and enhance their ratings;
d. allowed excess revenues of the Authority (Turnpike) to be used as subsidy for other transportation programs (transit, rail, air) and excesses beyond that to flow to a Road Improvement Fund to support feeder roads in the vicinity of the Turnpike;
e. created a mechanism for the issuance of new revenue bonds as future needs arise, such as turnpike widening, resurfacing, etc; and
f. created a mechanism for the issuance of motor fuel tax revenue bonds to be issued to provide state matching funds to support federal-aid road projects within the state.

The flexibility created by this approach allows Delaware to organize its total transportation resources to full advantage so that benefits may be distributed on a broad statewide pattern rather than individually financed programs that are narrowly restricted.

General Obligation Bonds

General obligation bonds are guaranteed by the full faith and credit of a state or other government. Because of this guarantee, interest rates are somewhat lower than for revenue bonds. They are most often employed on projects that do not produce income, such as schools, hospitals, and libraries. They also have been issued in combination with revenue bonds for airports, sports arenas, parking projects, and, in some cases, toll facilities.

The Richmond Metropolitan Authority utilized a combination of general obligation bonds and revenue bonds to finance its projects and activities including a toll road, a parking garage, and the operation and maintenance of a toll bridge built in 1925.

The Authority operates under an agreement involving the participation of the city of Richmond and the Virginia Department of Highways and Transportation. In brief, the city of Richmond advanced support in the form of a general obligation bond issue to purchase the highway right-of-way required for the Powhite Parkway. The Authority issued the revenue bonds to finance construction and entered into an agreement with the Virginia Department of Highways and Transportation for maintenance and highway patrol services. State maintenance does not include toll plazas. It is the declared intent of the Authority to begin repayment of the bonds issued by the city of Richmond as soon as revenues reach anticipated levels.

The city of Richmond provided the original bond reserve fund and, if revenues are insufficient to cover current bond obligations, the Authority is authorized to reduce the reserve fund in accordance with requirements. The city then replaces the amount withdrawn from the reserve fund. The city of Richmond also has the option to retain tolls after all revenue bond obligations have been retired so that funds originally invested can be recovered. This is an example of how different levels of government cooperated to construct facilities that could not have been built, operated, and maintained solely from tax revenues or on the basis of toll revenue alone for a number of years.

Combinations of general obligation bonds and revenue bonds have not been popular in toll project financing in the past. Interest on general obligation bonds becomes an immediate drain on available general tax revenues. In addition, most state and local governments prefer to preserve their general borrowing power and credit rating for other non-revenue-producing projects. This situation could change in the future as more ways to produce and control revenues are explored.

Efforts in this direction are evident in the studies carried out for the city of Charleston, South Carolina, and the states of Pennsylvania, Illinois, and Wisconsin. A study of the possibilities of toll financing has been authorized by Arizona and other states are also contemplating similar investigations. It is apparent that combinations of revenues, including tolls, are being given serious consideration as a new and expanded base for highway and transportation financing. The Harris County (Texas) general obligation bond issue, approved by referendum to support revenue bond funding for the Hardy and West Belt toll projects in Houston, is the first in this category in recent years.

Recently, in a similar action, the voters of Chesterfield County, Virginia approved a proposal for the issuance of $22 million in general obligation bonds as that county's share of financing a 13-mile, $100 million extension of the Powhite Parkway in the Richmond metropolitan area. As mentioned earlier, the Richmond Metropolitan Authority, in cooperation with the city of Richmond, constructed the original section of the Parkway within the city. The major portion of the funding of approximately $70 million will come from revenue bonds backed by the state of Virginia. Construction is scheduled to start in 1986.

The latitude for toll financing is dependent on the terms and conditions of enabling legislation, bond covenants, contractual relationships, and local and federal law and policy. This tends to make each toll project different from every other toll project in some respects because each one is planned, constructed, and financed to meet certain well-defined local needs and objectives, some of which may be remote from the toll project itself. The pattern of toll projects and their operations is of such great

variety it is doubtful there is a single toll operation that can be identified as the duplicate of another.

This synthesis contains only a few examples, some of which are typical of conventional toll financing based on toll revenues only, whereas the support of others is more innovative. There is also the new trend toward toll financing by a combination of revenues, which is beginning to receive serious consideration at various levels of government in the United States. Toll financing in other countries provides an entire new array of methods and possibilities, most of which reflect substantially different national attitudes and policies from those found in the United States.

Although it is not possible to predict specific events or precise changes in toll financing methods and philosophies, it is entirely safe to assume that toll financing, secured by a combination of revenues and possibly other selective sources of support, will gain in popularity in general proportion to the index of unmet needs and in relation to the availability of highway user revenues.

CHAPTER FIVE

TOLL FINANCING IN OTHER COUNTRIES

EUROPE

Highway and transportation needs in Europe paralleled those in the United States and North America. Following World War II countries in Europe were in desperate need of new and improved highways. But they were also in need of vast repairs to their rail systems and airports, not to mention all the human needs for housing, health care, and education that had suffered during the war. Governments recognized the need for good highways to help speed economic recovery and that the huge investment required would deplete available resources very quickly.

Facing this situation, several countries, notably France, Italy, and Spain, reached the decision that, where possible, the cost of highway construction and operation should be a direct responsibility of users through the payment of tolls. Because of existing budgetary obligations and problems of debt service, the concession method (quasi-public corporation) was determined to be the most practical way of financing the construction of nearly all of the major highways in Western Europe. This approach has been used to finance the equivalent of the Interstate system in western Europe.

France

France authorized its first public authorities for toll roads in 1956. Before 1970, the French financing plan was based on private enterprise capital and each project was insured by a 35% repayable advance provided by the government with the remainder consisting of loans from banks and a National Autoroute Fund. This system was provided financial protection by the government, which also provides technical assistance at the design, construction, and operational levels. There are six such "mixed economy companies," which operate more than 2800 km (1740 miles) of toll highways in France.

An additional group of four agencies holding competitively awarded private concessions was organized in about 1970. It is financed by loans and risk capital in the approximate amount of 25% with the remaining 75% in loans secured by a government guarantee. Concessions are granted by the national government for a stated period (30 to 50 years) with a provision permitting government repurchase after a specified period. Express highways in urban areas are built with tax revenues. In 1982 there were 4170 km (2600 miles) of toll roads in France.

Toll rates in France are approximately two times the U.S. rates, with some higher or lower depending on location and other factors. (The average price of gasoline in Europe is about $3.00 per gallon.) As in the United States, toll-road construction in France has slowed in recent years because most of the major corridors are now served and because the rising costs of construction and increasing costs of interest have made toll financing more difficult. Toll roads in France have been successful with traffic and revenue above estimates for the system.

Italy

The first toll road in Italy was built in 1924 and by the 1950s approximately 500 miles were completed. Today, Italy has more than 5000 km (3100 miles) of toll roads in operation, all of which were created and are now managed under the concession system. The first concessions received a government grant calculated to offset the projected difference between toll revenues and the actual costs of financing, construction, operation, and maintenance of toll facilities. Later grants were reduced to a fixed amount of estimated capital costs with total adjustments authorized to absorb differences. Still later, the Autostrade Company was awarded a concession for some 700 km (435 miles) of new toll motorways without a government grant with the venture capital secured by toll revenues of toll roads already operated by that company. The objective of this program was

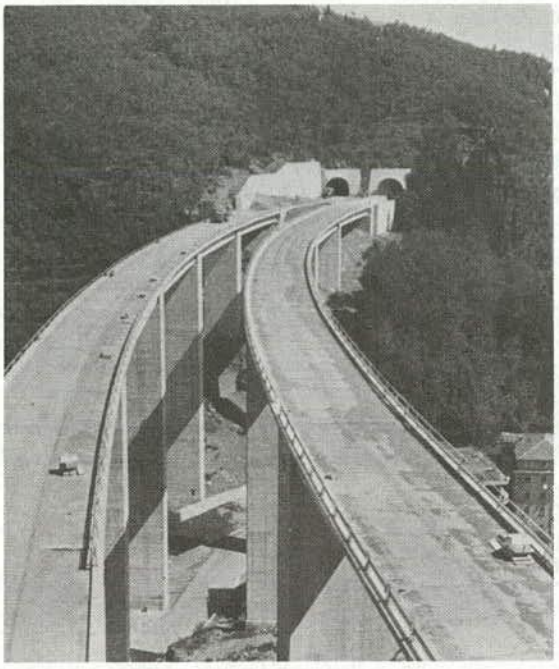

FIGURE 7 Italian autostrada.

economic development—the provision of roads where highways and access were inadequate.

Under the most recent concessions granted in Italy, the government receives the "net profit" from tolls under the concession contract and distributes dividends at a set rate on the capital investment of the corporation. All toll motorways in Italy are under the supervision of the national highway agency, which approves and grants concessions and controls toll rates.

Construction of toll motorways in Italy has been very costly because of mountainous terrain requiring major sections of roadway to be built as tunnels and bridges (Figure 7). Toll rates, as in France, are approximately two to two and a half times greater than in the United States. The Italian motorway system has been very successful in meeting the two-fold objective of providing a system of excellent major highways and promoting economic development. Work is continuing to move forward toward completion of a system beyond the original planned total of 6,000 km (3700 miles).

Spain

Toll highways in Spain were first authorized under a special law in 1960, which was later revised to its present status in 1972. The concessions are granted for specified periods of time varying from 25 to 50 years, at the conclusion of which the roads revert to the government without cost. Concessions are awarded private organizations in an open competitive bidding system. Concessionaries must provide basic capital in an amount equal to not less than 10% of construction cost and at least 45% must be provided by foreign capital. This 45% is secured by a 75% government guarantee. The remainder is financed through private channels. Toll rates, again approximately two times those in the United States, are under the control of the government with specific guidelines for toll increases. Construction of toll highways is limited to principal roads between cities. Urban highways are financed with tax revenues.

Thirteen separate toll road concessions were granted in Spain through 1976. A total of 1634 km (1020 miles) was constructed by 1980. Construction of toll roads in Spain, as in other countries, has slowed in recent years because of the oil embargo and unfavorable economic conditions. Between 1965 and 1975, toll traffic increased at an annual rate of 17% and between 1975 and 1980 at about half that rate. Direct connections between the French, Italian, and Spanish toll roads provide motorists complete, nonstop routes from northwestern France to Rome and Naples in Italy and to Barcelona in Spain.

Austria

Austria has financed a portion of its motorways by the toll method, especially the very expensive sections through mountainous terrain. Such financing is accomplished through government-sponsored shareholding companies in which the government holds a majority ownership. The remaining interest is held by the provinces in which the projects are located. As the major shareholder, the government is also guarantor of deficits and subsidies if required. Austria has four projects in operation: three toll roads and a toll tunnel.

Other Countries

Portugal and Yugoslavia are also in the process of constructing toll roads through a formal government-supported program. Both programs are oriented toward economic and industrial development objectives as well as basic traffic service. Greece is also planning to utilize tolls to meet its future needs.

SOUTH AMERICA

Argentina, Brazil, and Venezuela are South American countries actively constructing toll roads to serve traffic needs and to promote industrial development. Toll agencies in these countries reflect the European concessionaire approach using private capital to supplement limited governmental resources. Brazil has four toll roads in operation and an extensive program is underway in Venezuela.

ASIA

Japan

The rapidly expanding economy of the Pacific region has created a strong demand for highway transportation. Japan was the first country to undertake toll road programs under an amended law adopted in 1956. It established the Japan Highway Public Corporation, which was created to construct a system of toll highways because available revenues were not sufficient to meet rapidly expanding needs. The roads on this system are classified as national expressways, urban expressways, the Honshu-Shikoku Bridge, and ordinary toll roads.

The national expressways are high-type, high-speed roadways that make up an arterial network similar to the Interstate system. The urban expressways are designed to serve metropolitan areas. The bridge designation is a special traffic relief project between the respective islands, and ordinary toll roads consist of national and local (prefecture, city, and village) roads. In 1981 Japan had 2860 km (1780 miles) of national expressways, 264 km (164 miles) of urban expressways, 7 km (4 miles) on the bridge project, and 2413 km (1500 miles) of ordinary toll roads, or a total of 5544 km (3445 miles). An additional 107 projects totalling 3485 km (2165 miles) were under construction at that time.

Japanese toll roads are financed on a triangular base with a capital fund made up of investment money, grants-in-aid or subsidies by the government or other public agencies, and borrowed funds. The original investment is provided by the government and is subject to repayment from tolls collected, the same as borrowed funds. Subsidies and grants-in-aid are not subject to repayment by tolls.

Toll rates on national expressways are calculated to recover investment and operating expenses. Toll rates on ordinary expressways are on the basis of a benefit principle. In short, the benefits of time, transport and travel expenses, distant saved, and related factors are calculated and are basic ingredients of the toll rates adopted.

Japanese toll roads are scheduled to become toll free when all expenses are recovered, usually within 30 years. Up to 1981, 48 toll roads (290 km) had been made toll free. All national and urban expressways are operated on a pool system, which permits a more coordinated program for the benefit of the collective system. Ordinary toll roads are not included in the pool system and each project is treated separately.

Other Countries

Another area of activity in the Pacific is Indonesia where a toll road program is moving forward rapidly to construct a regional system centered on the city of Jakarta and its metropolitan area. The program is being carried out by the Indonesian Highway Corporation and basic financing is provided through government investment or grants and borrowed funds. The program is in its early stages and is being carried forward at a rapid pace. Malaysia is also moving forward with several toll highway projects.

There are many other examples of toll operations in the Pacific area including more than 900 miles of toll roads in South Korea, which were built to provide farm-to-market and industrial highways to improve the economy. These roads have been very successful and results have surpassed original estimates. The Philippines have built a toll road system through a private development corporation that designs, finances, constructs, and operates toll projects with government support.

The Cross-Harbour Tunnel in Hong Kong was constructed by a private stock company in 1970–1972. Since that time traffic volumes have increased to a point where a second tunnel project is now underway. On Taiwan there are toll projects built and operated by the Republic of China that have been in place for a number of years serving the needs of the island's bustling economy.

CANADA

Canada's Province of Quebec has had a long and successful experience with toll roads. The Laurentian Autoroute was the first toll road opened in 1959 and since that time three additional roads have been placed in operation for a total of 181.2 miles. Over recent years original low toll rates were maintained and commuters were given special consideration, and any deficits encountered were covered by the Province. With the incidence of the oil embargo, rising prices, and the economic downturn, tolls were essentially doubled in 1982 to help counterbalance the cost-revenue gap. Originally the autoroutes were planned and financed through the Quebec Autoroute Authority. This agency has been dissolved and the Autoroutes are now administered by the Ministry of Transport of the Province of Quebec.

CLOSING

There are many other toll projects and potential developments not mentioned here. Those included, however, illustrate the wide range of policies, financial arrangements, and objectives of a number of countries, including the methods used to finance, build, and operate toll highway projects to meet their particular needs.

REFERENCES

1. "Highway Statistics 1983." Federal Highway Administration, Washington, D.C. (1984) 181 pp.
2. "National Transportation Policies through the Year 2000." Executive Summary, National Transportation Policy Study Commission (June 1979).
3. "A Review of Federal Statutes and Policies on Highway Toll Facilities." U.S. Department of Commerce, Bureau of Public Roads (1980).
4. "Toll Facilities in the United States—Bridges—Roads—Tunnels—Ferries." Federal Highway Administration, Washington, D.C. (April 1985) 16 pp.
5. Fifteen States Increase Highway-User Charges." ARTBA Newsletter (October 10, 1984).
6. Barnhart, R. A., "Federal Outlook on Toll Financing." Presented at the 62nd Annual Meeting of the Transportation Research Board, National Research Council, Washington, D.C. (January 1983).
7. "A New Focus for America's Highways—Recommendations on the Federal-Aid Highway Program." American Association of State Highway and Transportation Officials, Policy Committee (February 22, 1985).

BIBLIOGRAPHY

American Transportation Advisory Council, *Transportation Needs During The Next Decade* (1978–1987) (May, 1977).

Blackwell, F. H., *The Rickmond-Petersburg Turnpike.* Special Report (June, 1982).

Ceron, J. L., "Toll Highways in Spain and an Approach to the Future." Address, 49th Annual Meeting, International Bridge, Tunnel and Turnpike Association (1981).

Committee on Public Works, U.S. House of Representatives, Report of Hearings Before Special Subcommittee on the Federal-Aid Highway Program, "Relationship of Toll Facilities to the Federal-Aid Highway Program," (1966).

Cope, E. M., "The Pricing of Highways." Address, Western Association of State Highway Officials Planning Conference (May, 1968).

Delaware River Port Authority, Statement before Subcommittee on Surface Transportation, Committee on Public Works and Transportation, U.S. House of Representatives (May, 1977).

ENO Foundation, Report on Joint Conference, Transportation Financing, Board of Directors, Oct. 12 and 13, 1983, *Transportation Quarterly* (April, 1984).

Federal Highway Administration, U.S. Department of Transportation, *Bonded Indebtedness of Toll Roads Study* (August, 1980).

FHWA, *Highway Finance—The Evolution of the Highway User Charge Principle.* State Highway Finance Trends, Federal Highway Administration, U.S. Department of Transportation, Washington, D.C. (April, 1983).

Cooper, T. W., *The State of Highway Finance Outlook.* Federal Highway Administration, U.S. Department of Transportation, Office of Program and Policy Planning, Washington, D.C. (August, 1978).

FHWA, *Federal Laws and Material Relating to the Federal Highway Administration.* Federal Highway Administration, U.S. Department of Transportation, Washington, D.C. (1980).

FHWA, *Our Nation's Highway—Selected Facts and Figures.* Federal Highway Administration, U.S. Department of Transportation, Washington, D.C. (1981).

Fischer, J. M. "Toll Financing in Europe." Address, 38th Annual Meeting, International Bridge, Tunnel & Turnpike Association (Montreal, 1970).

Foote, R. S. "Prospects for Non-Stop Toll Collecting Using Automatic Vehicle Identification." *Traffic Quarterly,* ENO Foundation, Vol. 35, No. 3 (July 1981).

Goldberg, A. H., "Toll Rate Increases." Address, International Bridge, Tunnel and Turnpike Association (1974).

Golden Gate Bridge Highway and Transportation District *Annual Report,* 1980–81.

Governor's Toll Road Task Force, *Pennsylvania Toll Roads Feasibility Study* Final Report (December, 1983).

Greenbaum, D. W., "The Pennsylvania Toll Road Study, An Example of the New Look in Toll Road Financing." Address, International Bridge, Tunnel and Turnpike Association (April, 1983).

Halsey, Stuart & Company, Inc., *The Energy Crisis and the Turnpike Authority of Kentucky Toll Road Revenue Bonds.* Special Report (January 1974).

Highway Research Board, *Special Report 83: Law of Turnpikes*

and Toll Bridges, An Analysis, National Academy of Sciences, National Research Council, Washington, D.C. (1963).

Indiana Toll Road Commission, *Annual Report* (1982).

International Bridge, Tunnel and Turnpike Association, "Work Begins on Ft. McHenry Tunnel—New Maryland Facility." *TOLLWAYS* (July 1980).

International Bridge, Tunnel and Turnpike Association, "Triborough Declares 1982 Surplus," *TOLLWAYS* (May–June, 1983).

International Bridge, Tunnel and Turnpike Association, "New York New Jersey Governors Create Port Authority Game Plan," *TOLLWAYS* (July, 1983).

International Bridge, Tunnel and Turnpike Association, *Toll Rates Survey—Bridges and Tunnels,* U.S. and Canada (January, 1983).

International Bridge, Tunnel and Turnpike Association, *Comparative Traffic Statistics,* 1980–81 and 1981–82, (annual).

International Bridge, Tunnel and Turnpike Association, *The Need for Eliminating the Federal Government's Statutory Review Power over Bridge Tolls* (April, 1982).

International Road Federation, "The Crisis in Highway Financing," *World Highways,* Vol. 23, No. 9 (Nov. 1982).

Jancu, P., "Financing Toll Facilities in the Uncertain Markets Ahead." Address, Annual Meeting, International Bridge, Tunnel and Turnpike Association (1981).

Joint Economic Committee, U.S. Congress. "State and Local Public Facility Needs and Financing." *Public Facility Needs* Vol. I (1966).

Kansas Turnpike Authority, *Annual Report* (1982).

Kendrick, B., *Florida Trails To Turnpikes.* 1914–1964, pp. 139–153.

Kolapaking, J., "A Toll Road System in Indonesia." Address, Annual Meeting, International Bridge Tunnel and Turnpike Association (1981).

Lamm, L. P., "The Federal Government and Toll Facilities." Address, Technical Workshop, International Bridge, Tunnel and Turnpike Association (1983).

Legislative Research Commission, Commonwealth of Kentucky, *Toll Roads: Economic Impact.* Research Report No. 60 (September, 1971).

McKevoy, G. I., Jr., "History Does Repeat Itself in Toll Road Construction," *Quarterly Review.* American Bridge, Tunnel and Turnpike Association. 1955 Annual Meeting Issue and April 1956 Issue (Name change to International effective 1965).

Murazio, S., "New Horizons in Italian Highways." Address, Annual Meeting, International Bridge, Tunnel and Turnpike Association (1981).

New Jersey Turnpike Authority, *Annual Report* (1982).

New York State Thruway Authority, *Annual Report* (1982).

Ohio Turnpike Commission, *Annual Report* (1982).

Oklahoma Statutes, *Oklahoma Turnpike Enabling Act,* Title 69, as amended.

Orski, K., Address, Annual Meeting, International Bridge, Tunnel and Turnpike Commission (1982).

Pearson, K. C., Address, Special Meeting, Indonesian Highway Corporation (1983).

Pellegrini, G., "Toll Motorways," *Review of Economic Conditions in Italy.* Banco Di Roma, Vol. XIII, No. 2 (March, 1969).

Pershing, J., "The Principles of Toll Road Financing in the United States." Address, International Road Federation Meeting (September, 1966).

The Port Authority of New York and New Jersey, Tunnels and Bridges Division, *Automatic Bus Identification,* Urban Corridor Demonstration Program. (Federal Highway Administration, Urban Mass Transit Administration and U.S. Department of Transportation) (June, 1974).

Public Service Institute, Kentucky State University, *Economic Impact of Kentucky's Toll Roads* (July, 1976).

Rickard, C., "Evaluation of the French Toll Road Network and New Directions of Government Policy with Regard to Concessions." Address, 49th Annual Meeting, International Bridge, Tunnel and Turnpike Association, Honolulu (1981).

Richmond Metropolitan Authority, *"A Resolution Creating and Establishing an Issue of Revenue Bonds of the Richmond Metropolitan Authority"* (December, 1970).

Secretariat Europe'en des Concessionares I'Autoroutes A'Peage, *Annual Report* (May 1983).

Shuster, B., Member, U.S. House of Representatives. Address, Annual Meeting, International Bridge, Tunnel and Turnpike Association (1982).

Smith, Wilbur and Associates, *Toll Financing. A Supplemental Resource for Transportation Needs* (April, 1977).

Smith, Wilbur and Associates, in association with Howard, Needles, Tammen and Bergendoff, *Feasibility of Converting Wisconsin's Interstate to a Toll Road.* Summary Report (August, 1983).

Smith, Wilbur and Associates, *Alternative Financing Sources Study.* Charleston (S. Carolina) Area and Transportation Study (November, 1983).

Smith, W. S. and N. H. Wuestefeld, "Current Trends in Toll Financing." Address, 62nd Annual Meeting, Transportation Research Board (January, 1983).

Takahashi, H., "An Outline of the Toll Road System in Japan." Address, Annual Meeting, International Bridge, Tunnel and Turnpike Association (1981).

Transportation Policy Associates, *Transportation in America,* first edition (March 1982).

The Turnpike Authority of Kentucky and the Kentucky Department of Transportation, *Toll Road Agreement and Toll Road Lease* (September, 1981).

The Turnpike Authority of Kentucky, *Trust Indenture to Liberty National Bank and Trust Company* (July, 1966).

The Turnpike Authority of Kentucky, *Resource Recovery Road Agreement and Resource Recovery Road Lease* (Sept. 1981).

Wuestefeld, N. H. and E. J. Regan, III, "Toll Rate Impacts." *Traffic Quarterly.* ENO Foundation for Transportation (Oct. 1981).

Wuestefeld, N. H., "Beyond the Nickel" *Transportation Quarterly.* ENO Foundation for Transportation (Oct. 1983).

Tyndall, G. R., "Transportation Management in the 1980s. Strategic Issues and Opportunites." Address Annual Meeting, International Bridge, Tunnel and Turnpike Association (1982).

Yucel, N. C., "Toll Financing of Highways: Economic and Financial Considerations." Staff working paper, International Bank for Reconstruction and Development (World Bank), Washington, D.C. (1974) 44 pp.

APPENDIX

FINANCING METHODS USED BY SELECTED AGENCIES[a]

Toll Facility	General Obligation Bonds	Revenue Bonds	Lease Arrangements	Gasoline Tax Pledge	Federal Aid	Privately Financed
California						
Golden Gate Bridge, Highway and Transportation District		X			X	
San Francisco - Oakland Bay Bridge		X			X	
Connecticut						
Connecticut Turnpike	X			X		
Delaware						
Delaware Transportation Auth.		X		X		
Florida						
Various county toll roads			X	X		
Florida Turnpike		X				
Sunshine Skyway	X	X			X	
Illinois						
Illinois Tollway		X				
Indiana						
Indiana Toll Road		X	X			
Kansas						
Kansas Turnpike		X				
Kentucky						
Kentucky Turnpike			X			
Louisiana						
Various toll facilities	X	X				
Maine						
Maine Turnpike		X				
Maryland						
Ft. McHenry Tunnel		X			X	
Michigan						
Ambassador Bridge						X
New Hampshire						
New Hampshire Turnpike	X					
New York						
Port Authority of New York and New Jersey toll facilities		X				
New York State Thruway		X			X	
New Jersey						
Delaware River Port Authority toll facilities		X				
New Jersey Turnpike		X				
Garden State Parkway		X			X	
Ohio						
Ohio Turnpike		X			X	
Oklahoma						
Oklahoma Turnpike System		X		X		
Pennsylvania						
Pennsylvania Turnpike		X				
Texas						
Dallas North Tollway		X				
Hardy and West Belt toll roads	X	X				
Virginia						
City of Richmond urban tollways	X	X				
Richmond-Petersburg Turnpike		X			X	
Chesapeake Bay Bridge-Tunnel		X				
Norfolk-Virginia Beach Toll Road		X				
West Virginia						
West Virginia Turnpike		X			X	

[a] Adapted from data supplied by Wilbur Smith and Associates, February 27, 1984.

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