National Cooperative Highway Research Program

NCHRP Synthesis 262

Tolling Practices for Highway Facilities

A Synthesis of Highway Practice

Transportation Research Board
National Research Council

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Tolling Practices for Highway Facilities

LINDA M. SPOCK
Larchmont, New York

Topic Panel

SUSAN A. BUSE, *Texas Turnpike Authority*
RALPH ERICKSON, *Federal Highway Administration*
WENDY FRANKLIN, *Lehman Brothers, Inc.*
NEIL GRAY, *International Bridge, Tunnel & Turnpike Association*
THOMAS KEANE, *Federal Highway Administration*
WALTER D. KREUTZEN, *Transportation Corridor Agency*
MICHAEL C. PIETRZYK, P.E., *ITS Program Director*
JON WILLIAMS, *Transportation Research Board*
MICHAEL ZIMMERMAN, *New York State Thruway Authority*

Transportation Research Board
National Research Council

Research Sponsored by the American Association of State Highway and Transportation Officials in Cooperation with the Federal Highway Administration

NATIONAL ACADEMY PRESS
Washington, D.C. 1998

Subject Areas
Planning and Administration

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM

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NCHRP SYNTHESIS 262

Project 20-5 FY 1996 (Topic 28-11)
ISSN 0547-5570
ISBN 0-309-06816-9
Library of Congress Catalog Card No. 98-67629

Price $23.00

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

and can be ordered through the Internet at:

http://www.nas.edu/trb/index.html

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 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 administrative and financial officials of toll authorities, as well as members of the governing boards of these agencies. It will also be of interest to state departments of transportation and to legislators who are exploring innovative methods for financing major highway facilities. This synthesis also provides useful information for bonding and other financial institutions. It presents information on the current tolling policies and practices employed by highway, bridge, and tunnel tolling authorities throughout the United States.

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.

This report of the Transportation Research Board presents a profile of the traditions, pricing practices, and operational aspects of the tolling industry. Based on information derived from survey responses from 41 toll organizations, representing over 90 percent of annual U.S. toll transactions, the research for the synthesis indicates that the tolling industry employs a wide range of policies and practices, including many innovative approaches, used in response to the need to provide improved highway facilities. Case

studies of several selected innovative tolling practices are discussed: variable/congestion pricing; high-occupancy toll, or "HOT" lanes; public-private partnerships; interagency partnerships; and others such as state infrastructure banks (SIBs), shared resource agreements, and transportation utility fees. Detailed information on the experience of states with privatization of highway facilities is also presented. A unique summary of the future issues to be addressed in the tolling industry as gleaned from the survey concludes the document.

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 research in organizing and evaluating the collected data, and to review the final synthesis report.

This synthesis is an immediately useful document that records the 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

Linda M. Spock, Larchmont, New York, was responsible for collection of the data and preparation of the report.

Valuable assistance in the preparation of this synthesis was provided by the Topic Panel, consisting of Susan A. Buse, Treasurer, Texas Turnpike Authority; Ralph Erickson, Economist, Federal Highway Authority; Wendy Franklin, Senior Vice-President, Lehman Brothers, Inc.; Neil Gray, Director of Government Affairs, International Bridge, Tunnel & Turnpike Association; Thomas Keane, Economist, Federal Highway Administration; Walter D. Kreutzen, Chief Operating Officer, Transportation Corridor Agency; Michael C. Pietrzyk, P.E., ITS Program Director, Center for Urban Transportation Research, University of South Florida; Jon Williams, Senior Program Officer, Transportation Research Board; and Michael Zimmerman, Director of Administrative Services/E-Z Pass, Group Policy Chair, New York State Thruway Authority.

This study was managed by Sally D. Liff, Senior Program Officer, who worked with the consultant, the Topic Panel, and the Project 20-5 Committee in the development and review of the report. Assistance in Topic Panel selection and project scope development was provided by Stephen F. Maher, P.E., Senior Program Officer. Linda S. Mason was responsible for editing and production.

Crawford F. Jencks, Manager, National Cooperative Highway Research Program, assisted the NCHRP 20-5 staff and the Topic Panel.

Information on current practice was provided by many highway and transportation agencies. Their cooperation and assistance are appreciated.

TOLLING PRACTICES FOR HIGHWAY FACILITIES

SUMMARY

The toll industry is characterized by diverse institutional arrangements and a variety of pricing structures, toll collection procedures, and operational policies. Rather than universal or standard practices, there is a range of actual industry policies and procedures related to tolling. This range is documented by responses to a detailed toll agency survey to which 41 organizations responded in early 1997, representing more than 90 percent of annual U.S. toll transactions. Survey data were supplemented by an extensive literature review and in-depth case studies on several recent innovative developments within the industry. Due to the dynamic nature of the toll industry, readers are cautioned that the material contained in this report is generally accurate as of mid-1997, the end of the research phase of this project. Of particular note, the uncertain status of pending legislation to reauthorize the Intermodal Surface Transportation Efficiency Act (ISTEA) precluded discussion within the report of this significant influence on tolling practices.

As one example of the industry's diversity, there is no single institutional model that fits all toll organizations. In practice, organizational structures include "traditional" single-purpose public toll authorities; toll operations within or contracted to a state Department of Transportation; multi-functional organizations combining toll operations with everything from mass transit to an arts center; private corporations; and public-private partnerships in various forms.

Technological developments and changes in federal and state policy over the past decade have ushered in an era of innovation within the toll industry in a number of areas. Variable pricing is being implemented, or at least tested, after decades of theoretical discussion within the transportation community now that electronic toll collection has made it more operationally feasible. Encouraged by legislation at the federal and state levels, public-private partnerships have been advanced at varying speeds, in various forms, and with varying degrees of success. The Transportation Corridor Agencies and State Route 91 Express Lanes in California offer examples of public-private facilities that enjoy higher levels of public acceptance than, for example, the Dulles Greenway in Virginia where the projected rate of economic development along the Dulles corridor has not yet occurred and the new facility competes with a relatively uncongested free route at some times of the day.

The road to innovation via use of public-private toll facilities is not always smooth. Case studies of the experience of four states—Arizona, Minnesota, South Carolina, and Washington—offer the sobering perspective, in this era of increased governmental encouragement of tolls, that public acceptance of the toll concept and specific toll projects can still be very difficult to achieve. Perceptions of tolls as double taxation and fears of being singled out to pay tolls in freeway-dominated areas are common challenges encountered in implementing tolls. An effective public education and community involvement strategy may be the single most important factor in achieving success on these projects.

Encouraged by greater flexibility in federal policy, blending of Federal-aid and state funds with toll revenue has stimulated partnerships within the public sector as well as between the public and private sectors. The President George Bush Turnpike in Texas offers an example of public-public partnership that leveraged federal dollars and accelerated project construction, two key objectives of the ISTEA and post-ISTEA policy initiatives.

Financing innovations, such as state infrastructure banks are emerging to complement other highway financing mechanisms. As with public-private partnerships, it will take time and the experience of pioneering states in this area to translate the concept of state infrastructure banks into a range of actual industry practices.

Toll collection operations vary significantly. Twenty percent of the survey respondents operate ticket system toll roads for which drivers are issued tickets on entry and tolls are typically collected at the end of a trip based on the distance traveled by the vehicle; 63 percent operate toll roads using a barrier toll system where tolls are collected at toll plazas stationed at various intervals along the mainline roadway; and 51 percent operate bridges and/or tunnels. Many toll organizations have multiple types of toll facilities, so these numbers total more than 100 percent.

Over the years, the benefits of one-way toll collection—improved traffic flow in the non-toll direction, reduced air and noise pollution, and lower administrative costs—have made this system increasingly common. Currently, based on the survey results, 37 percent of toll organizations feature one-way toll collection at one or more of their toll facilities.

The industry's use of electronic toll collection (ETC) has also grown in recent years to the point that it is a more common method of payment than tokens and is almost as common as ticket books (including commuter books, scrip, etc.). ETC greatly enhances toll lane throughput. A traditional staffed toll lane typically processes 300-350 vehicles per hour while ETC lanes can handle over 1,000 vehicles per hour within a conventional toll plaza and up to 1,800 vehicles per hour in an open highway or bypass lane.

Most toll agencies have automated toll collection in some way. More than two-thirds of the survey respondents operate automatic coin/token machine (ACM) lanes. About one-third of the survey respondents operate dedicated ETC lanes within a conventional toll plaza with vehicle operating speeds ranging from 15 miles per hour (24 kph) to as high as 65 miles per hour (97.5 kph) when operated as bypass lanes. Cash continues to be the only universally accepted method of payment, accounting for more than three-fourths of toll transactions across all survey respondents.

Toll pricing varies within the toll industry in a number of ways. For example, while the value of the average toll transaction among survey respondents was $1.52, the average toll transaction ranged from a low of 33 cents to a high of over $12 per vehicle. Commercial (truck) tolls on average are four times higher than auto tolls. Higher tolls for commercial vehicles reflect the literally higher "toll" they take on roads in terms of wear and tear.

Toll structures within the industry are both varied and complex. The number of axles is the most commonly used variable but vehicle type is also widely used. Nearly a fourth of the survey respondents use miles or distance traveled as a variable in their toll structure. Vehicle weight is rarely used. Most toll authorities use a combination of variables. Based on a sample of 14 toll organizations, the average number of vehicle classifications within a toll schedule is 10.

The frequency and magnitude of toll increases also vary tremendously within the industry. Almost 20 percent of the survey respondents have never had a toll increase. Between 1980 and 1996, those agencies that have increased tolls did so, on average, a little more than twice, or about every 7.5 years. As with toll rates, however, these average figures mask a wide range of actual practice. New York City's MTA Bridges and Tunnels, for example, whose toll revenues subsidize mass transit operations, implemented seven toll increases over the 1980 to 1996 timeframe, roughly every 2.5 years. As far as magnitude of toll increases, the industry average from 1980 through 1996 was 40 percent, with the most common rate of increase being 20 to 25 percent. Actual increases ranged from a low of five percent to a high of 160 percent.

Discounts are offered to varying degrees within the toll industry. Commercial vehicle discounts are the single most frequently offered program, but several commuter-type discount programs and high-occupancy vehicle discounts are also common practice. Prepaid

and postpaid accounts are very common, but premium tolls, i.e., charges above the cash rate, are featured at only one toll facility among the survey respondents, as part of its ETC program.

The primary determinant of initial toll rates is debt service requirements associated with an organization's original bond issue. Subsequent toll increases are often driven by bond covenant requirements. Other factors of primary importance in toll increases include the need for facility or system expansion and forecast capital expenditures (which may trigger additional bond issuance and, therefore, affect debt service requirements). Operating and maintenance expenses are slightly less important, while impact on performance levels and political considerations are tied at third in relative importance as factors driving toll increases. Historically, policy considerations, such as the desire to encourage use of mass transit by raising auto tolls, have not been a significant factor in toll increases for a majority of the toll industry.

Control over toll authorities varies. One aspect of control is often built into the enabling legislation, in the form of sunset or reauthorization provisions that require tolls to be removed at some future time. To date, however, sunset provisions have not resulted in widespread removal of tolls because, typically, such provisions are linked to the retirement of all debt. Few toll organizations have reached that milestone, particularly given the ongoing debt issuance to support toll facility capital programs, including system rehabilitation and expansion.

Although toll organizations may refer to themselves as independent toll authorities, some form of external oversight or approval of toll increases is required for approximately two-thirds of them, based on survey responses. Public hearing requirements are not as common, with only 41 percent of the survey respondents reporting such requirements.

While many toll authorities rely exclusively on tolls and revenue bonds as funding sources, a significant minority also report having used federal and state funds. Based on the survey results, the cost of toll collection averages 21 percent of an agency's annual operating expenses.

Finally, toll organizations are literally as well as figuratively "all over the map." Only 12 states have no toll facilities in operation or planning. Most of these are clustered in the West and Midwest, including Idaho, Nevada, New Mexico, Montana, Wyoming, South Dakota, North Dakota, and Wisconsin. Other states without tolls are Mississippi, Connecticut, Tennessee, and Hawaii. Several other states have only small or privately operated toll facilities, including Alabama, Minnesota, Nebraska, and Vermont.

The toll industry of the future will be shaped by its past and by ongoing developments in technology, funding, innovative institutional arrangements, and federal and state policies. As the industry approaches the end of the 20th century, toll financing appears to be experiencing a resurgence in activity somewhat reminiscent of the significant role it played in building the nation's roadways in the pre-Interstate era. Now, as before 1956, highway expansion initiatives are being undertaken at the state and local levels as a response to the gap between public demand for roadway capacity and available resources. Federal programs are playing an active supporting role in these efforts.

Continued evolution in financing and institutional arrangements in parallel with an increased public understanding of the value of tolls in building supply and managing demand are likely to increase the importance of tolling as a strategy to meet the nation's transportation needs well into the next century.

CHAPTER ONE

INTRODUCTION

OVERVIEW

Today, tolls and toll facilities play a statistically small but significant role in this country's transportation system. Their use within this century represents both the most traditional and the most innovative financing approach for building new roadway capacity. The current generation of toll facilities reflects this dichotomy: within California alone, toll bridges built 50 years ago operate in parallel with fully automated highways opened within the last 2 years.

The traditional toll concept has changed very little; tolls retain their function as a user charge from the customer's perspective, as a security and repayment mechanism from the bondholder's perspective, and as a dedicated revenue stream to fund ongoing operations and maintenance needs from a facility operator's perspective. A traditional public toll authority established in the 1940s and a new public-private partnership enabled in the 1990s both had to address a number of common issues associated with the setting of toll rates and collection of tolls from their customers. How much should be charged for use of the toll facility? Should toll rates vary by vehicle type? How many vehicle classifications should the facility's toll schedule include? Should the toll system be a ticket (distance-based) or barrier (fixed toll rate at each toll collection site) operation? Should tolls be collected in both directions of travel or do travel patterns allow consideration of one-way toll collection? Should discount programs be available and, if so, to which customer segments? Should methods of payment other than cash be accepted or encouraged? What types of toll lanes and toll collection technology should be installed? If a toll increase is necessary, what approval process must be followed?

While the toll concept has not changed and many current tolling issues are decades old, other aspects of tolling practices are new. For example, technological advances have resulted in new electronic methods of toll collection replacing the more traditional manual methods. The parallel forces of technological change and increasing traffic congestion are causing transportation agencies to view and use tolling in new ways. At the beginning of this century, toll operators' pricing decisions were driven by the need to ensure sufficient traffic levels on their new facilities. The objective was to set tolls at the lowest level that would ensure that demand for their facilities met their revenue coverage needs. Expressed in basic economic terms, the supplier of the road set the toll (price) such that the demand (quantity of vehicles) for the road at that price generated sufficient revenue (price times quantity) to cover an agency's debt service and operating costs. Today, traffic congestion and growing resource constraints are driving toll organizations to consider toll pricing as much as a tool to manage demand as a mechanism to ensure a sufficient revenue stream. This shift in perspective makes tolls not just a simple financial calculation but a potentially powerful instrument of public policy. New toll strategies such as variable pricing, i.e. varying tolls by time of day, are both more technically feasible and more operationally imperative in managing customer demand for scarce roadway capacity.

Toll operations, traditionally viewed as similar to a public utility, are associated today with organizational structures ranging from fully public to fully private with various models of public-private partnerships falling between those extremes. Blending of Federal-aid dollars and tax revenues, long prohibited by government policy, has been encouraged by a series of federal policy changes over the last decade. Partnerships within and between the public and private sectors have evolved as a new organizational and financial response to the challenges faced by toll entities. States have also advanced such partnerships as new approaches to providing needed transportation facilities.

As in other areas of this society, the public is faced with the need to accept a redefined role for government in transportation and to adjust its expectations to reflect that "There are no free roads," the trademarked slogan of the International Bridge, Tunnel and Turnpike Association. As the transportation community approaches the end of the 20th century and the reauthorization of ISTEA, it is clear from the states' experience over the last decade and the federal government's policy direction for the next decade, into the next century, that tolls will play an increasing role in meeting the nation's transportation needs.

Given this growing importance of tolls, current toll industry practices and policies can be a useful frame of reference for organizations and states contemplating or implementing tolls on transportation facilities. This synthesis documents those practices and policies based on a detailed toll agency survey and literature review. It provides in-depth case studies on the financing, organizational, pricing, and technological innovations implemented over the last decade. Lessons learned from unsuccessful attempts at innovation are also included. The scope of the study is restricted to tolling in the United States with a primary focus on the last decade.

Chapter 2 provides a historical perspective on the development of toll facilities, particularly as influenced by federal government transportation policies. Chapter 3 reports the results of a toll agency survey to which 41 organizations responded in early 1997, reflecting over 90 percent of annual toll transactions in the United States. Chapter 3 includes:

- A profile of today's toll industry in terms of organizational structure, functions, and authorization/enabling processes,
- Toll industry experience with sunsetting, reauthorization and removal of tolls,

- Data on the sources and uses of funds,
- A description of toll pricing practices including how initial toll rates are set, what variables are used in developing a toll structure or schedule, toll discount programs, and how frequently toll rates are adjusted,
- An overview of factors that drive toll increases,
- Toll agency policies and procedural requirements for increasing toll rates,
- Operational practices including one-way toll collection, methods of payment, and types of toll lanes,
- Toll industry experience with contracting out of major functions and services,
- Use of electronic toll collection,
- Impact of technology, and
- Toll changes studied or under study.

Chapter 4 supplements the toll agency survey data with case studies that focus on specific, innovative tolling practices and current industry issues. Case studies are featured on:

- Variable/congestion pricing,
- "HOT" lanes,
- New toll facilities operated by public-private partnerships,
- Public-public partnership approach to leveraging federal funds, and
- Innovative financing approaches.

Chapter 5 provides a "lessons learned" perspective on attempts to establish private or public-private toll roads based on ongoing initiatives in four states: Arizona, Minnesota, South Carolina, and Washington. Chapter 6 contains conclusions and an overview of emerging and future issues that will shape the toll industry of the 21st century. These span a range of topics, including technology, funding, partnerships, human factors, legislative issues, cost concerns, congestion/variable pricing, environmental issues, roadway conditions, and other developments within and beyond the toll industry.

CHAPTER TWO

BACKGROUND

THE TRADITIONAL TOLL CONCEPT

A toll is a user fee charged for a driver's use of a particular facility. The revenue derived from tolls is used to repay indebtedness (most typically associated with revenue bonds) incurred to design and build a road, bridge, or tunnel; to cover operating and maintenance costs; and to provide the basis for subsequent bond issues to finance facility improvements and expansions.

Tolls, then, fulfill several functions. From the customer's perspective, they represent a user fee. For bondholders, tolls represent the means by which their investment will be repaid. For facility operators, tolls are a dedicated revenue stream that can be used to cover the costs of operating and maintaining the facility and to leverage additional funds that may be required to improve or expand it.

Using tolls to finance roadway projects has a number of benefits. Charging tolls assures that the costs of building and operating a particular facility are paid by the facility's beneficiaries. Bonds issued on the basis of projected toll revenues can accelerate the availability of funds required for construction, thereby expediting project implementation. The revenue stream provided by tolls assures a source of funding for ongoing operation, maintenance, and repairs, which often translates to a higher level of service on toll roads than on other roadways. Traditionally, use of tolls ensured that only financially feasible roads were built; if projected traffic and revenues were insufficient to cover a project's debt service requirements and operating costs, the project was not undertaken. Finally, tolls can be viewed as a pricing mechanism, introducing the potential to use tolls to influence driver behavior as a means of managing demand for the limited facility capacity (supply). Using tolls for demand management could include attempts to change the time, mode, or route of travel for particular trips or even to eliminate a trip altogether.

HISTORY

The history of toll roads in this country actually predates the automobile. Shortly following independence, interstate commerce and associated traffic increased and public demand for well-maintained roads strained the resources of the debt-burdened state governments. The states tried to attract private capital to fund new roads by chartering private turnpike companies to build roads for which tolls could be collected from the public for their use. While Virginia was the first state to charter a turnpike, Pennsylvania's Philadelphia-to-Lancaster turnpike proved to be the greatest early success, providing a model for other states to follow. The charter for this early toll road, granted in 1792, served as a prototype for all others, with the state legislature granting a regulated transportation monopoly to the private company, specifying the general route and minimum engineering standards for the road, and granting the right of eminent domain and authority to collect tolls as originally specified in the charter and periodically renegotiated. Following the Lancaster turnpike example, states adopted toll financing for development of new roadways and toll roads spread rapidly. By 1808, 770 miles of road were completed by 50 chartered private turnpike companies in Connecticut and more than 3,000 miles of roadway and 21 toll bridges were under development in New York. By 1828, Pennsylvania was operating more than 3,000 miles of toll roads. Toll roads expanded beyond the eastern seaboard to facilitate westward development. The net result of this first chapter of toll road development was that hundreds of companies were operating thousands of miles of roads by the mid-1800s.

The decline of these early turnpikes was precipitated by the rapid growth of railroads in the United States, which put the horse transportation companies, i.e., the turnpikes' principal customers, out of business. For the balance of the 1800s, traffic and toll revenue declined as the nation's railroad system expanded, to the point that toll operations were not profitable. Companies abandoned roadways segment by segment and eventually dissolved. The abandoned roadways were returned to public control in the process with local authorities assuming the responsibility for maintenance. Lacking sufficient resources, many roads fell into a state of disrepair (*1*).

State and local responsibility for roads was universally accepted until the 1890s when the bicycle became popular, generating demands for road improvements. Federal aid for such improvements was first proposed in 1902. The concept was not embraced initially by members of congress who questioned the constitutional authority and financial wherewithal of the federal government to be involved in projects affecting interstate commerce. Between 1905 and 1912, public and political support mounted for an increased federal role in road improvements. The resulting active congressional debate and a 1907 Supreme Court ruling eventually produced the Federal-Aid Road Act of 1916, which established a foundation for federal-state cooperation in road projects in parallel with the advent of the automobile era (*2*).

Since the advent of the automobile era, the history of toll roads in this country can be divided into three distinct phases. To a large extent, these phases have reflected different federal government policies. The first phase was prior to the 1956 enactment of the Federal-Aid Highway Act. Although previous policies, including the Federal-Aid Road Act of 1916 and the Federal Highway Act of 1921, discouraged toll financing and required that all roads and bridges built with federal funds be toll-free, the country's rapid economic growth and demand for more and better roadways after World War

II fueled construction of toll facilities at the state and local levels. There was even serious consideration of developing a nationwide network of limited access toll roads (*3*). Many toll roads were built before the establishment of the Interstate highway system.

With the enactment of the Federal-Aid Highway Act in 1956, interest in developing new toll roads declined. The Act provided the states with 90 percent of the funding required to build up to 41,000 miles of highways as part of the Interstate system and created the Highway Trust Fund to provide for its ongoing funding. Numerous toll road proposals were abandoned with this infusion of federal funding which, in effect, preempted toll road development on many major travel corridors. Many previously built toll roads were incorporated into the Interstate system. Toll roads were seen as an impediment to interstate commerce (*4*). Federal law continued to explicitly prohibit toll charges on roads built with Federal-aid highway funds. Although congress has authorized exceptions to this policy over the years, there was generally a firm line between tax-financed and toll-financed roadways.

As the nation's Interstate system was built, commercial and residential development decisions were made in part on the basis of access to transportation facilities. The freeway was experienced not only as an improved road that permitted freer movement of traffic but also as, literally, a "free" road.

This second phase lasted for three decades, until the enactment of the Surface Transportation and Uniform Relocation Assistance Act (P.L. 100-17) in 1987, which began to blur the lines between tax-financed and toll-financed facilities. The Act authorized a Toll Facilities Pilot Program in nine states (California, Colorado, Delaware, Florida, Georgia, Pennsylvania, South Carolina, Texas, and West Virginia) (*5*). These states could receive up to 35 percent of the funds needed for new construction or reconstruction projects outside the Interstate system that would provide new transportation capacity. Toll revenues and other funding sources were required to cover the remaining 65 percent of project costs. The pilot program allowed states to issue tax-exempt bonds for financing these projects and use toll revenues for debt service, debt retirement, and operating and maintenance costs. Ultimately, projects were implemented in several states under this pilot program, including Georgia, Delaware, and Pennsylvania, which are operating toll facilities today. A General Accounting Office evaluation of the Pilot Program, published in 1991, reported the following (*5*):

- While there was significant opposition to tolls in Delaware, other states met with limited opposition to tolls per se. However, there was opposition to projects on other grounds, including community impact and environmental concerns. Some industry groups oppose tolls in general while some public groups tend to support them on Federal-aid highways because tolls increase funding options for roads.
- Although not a financing panacea, tolls can help states increase the amount of funding available for roadway projects and begin construction on those projects sooner.
- New electronic toll collection technology can reduce congestion associated with toll collection at toll plazas and minimize or eliminate the need for toll plaza expansion.

ISTEA reflected even greater encouragement of tolls as a highway financing mechanism because it authorized states and the private sector to use federal aid in combination with toll financing for transportation improvement projects, thus removing many of the long-standing legislative barriers to commingling of federal funds with toll revenues. Section 1012 of ISTEA, which superseded the 1987 Surface Transportation and Uniform Relocation Assistance Act, dramatically altered the federal government's posture toward funding highway facilities from one of discouraging toll facility development to one of encouraging toll facilities as an alternative funding mechanism. The overall objective has been to use limited federal dollars to leverage additional investment, particularly from the private sector. This significant policy shift reflected, in large part, a growing shortage of funding required to meet the needs of the nation's transportation system at a time when the Interstate system, largely built three to four decades ago, was reaching a point of needing major rehabilitation and repair. In addition, congestion was an increasing problem on many of the nation's roadways, fueling the need for capacity expansion. Funds were becoming increasingly limited at the state level, reflecting political and public pressures to reduce taxes.

ISTEA provisions encouraging the public and private sectors to work as partners in the development of toll road projects stimulated legislation in a number of states to authorize, or enable, fully private or public-private toll facilities to be built. Beginning in the mid-1980s with California and Virginia, legislation has now been enacted in 13 states to authorize public-private partnership involvement in some form in highway financing and development (see Appendix B). Statutory and regulatory barriers have been resolved and an administrative process developed in many states to advance public-private partnerships as an approach to financing, constructing, and operating new roadway capacity and efforts to develop a statewide process are underway in many other states. Tolls have been an integral part of public-private partnerships, which have been advanced because they provide the revenue necessary to back bonds issued for construction, pay for debt service and operating and maintenance costs, and offer the potential to generate some return on a private partner's investment.

ISTEA is generally credited with giving state DOTs greater flexibility and control in how they can make use of their limited federal funds. The states receive apportionment's of Highway Trust Funds generated by federal fuel taxes. These apportionment's are treated as reimbursement to the states for fuel taxes collected from their respective residents based on allocation formulas that reflect such factors as land area, population, and road mileage. Policy changes under ISTEA provided further opportunity and incentive for DOTs and toll agencies to work together in advancing critical transportation projects. Transferability of funds within state budgets and a shift in responsibility for planning to Metropolitan Planning Organizations provided greater flexibility for undertaking projects.

Two other policy developments at the federal level followed ISTEA and expanded further the flexibility of states to pursue innovative financing approaches for toll facilities: the

Test and Evaluation-045 (TE-045) initiative launched by the Federal Highway Administration (FHWA) in March, 1994 and the National Highway System Designation Act (NHS) enacted by Congress in 1995. TE-045 was designed to provide further inducement to the states to pursue innovative financing opportunities available under ISTEA. Under the provisions of TE-045, FHWA can grant waivers on federally funded projects to provide accelerated availability of federal funds, extended repayment schedules and favorable interest rates for loans, and other operational waivers (*6*). The NHS expanded further the states' flexibility in use of federal funding through such mechanisms as state infrastructure banks. It raised the maximum federal share of non-Interstate toll projects to 80 percent (from 35 percent) and broadened the definitions of matching funds and reimbursable costs (*7*). It also gave states the authority to determine whether a toll facility "is to become free when debt is retired or at some other future point in time or whether tolls are to be continued indefinitely" (*8*).

The shift to more supportive federal policies on toll facilities coincided with technological developments that made the collection of tolls more operationally efficient for both toll agencies and customers. Electronic toll collection allowed expedited traffic movement through toll lanes, thereby decreasing traffic congestion and providing an effective increase in facility capacity. From the customer's perspective, ETC provided a much more convenient method of toll payment. ETC also makes innovative pricing schemes, including congestion or variable pricing (now referred to broadly as "value pricing"), more technically and operationally feasible.

Against a backdrop of growing transportation needs and declining resources, the net result of the policy and technological developments over the past decade is an increasing public and political acceptance of toll financing of roads, bridges, and tunnels. More than half of the states have existing toll facilities. Another nine have toll facilities under construction or active consideration. Today's toll industry is increasingly diverse. Historically concentrated in the East, toll facilities today are in operation or planning stages in all but 12 states. Organizationally, toll facility operations are associated with a number of points along a continuum of fully private to fully public entities. Although toll facilities still represent a small portion of the nation's highways and highway user charges, they are likely to play an increasingly important role in the transportation systems of the next century.

CHAPTER THREE

PROFILE OF TOLL INDUSTRY AND TOLLING PRACTICES

This chapter includes a profile of the toll industry in the United States and current tolling practices based primarily on the results of a survey of the toll agency membership of the International Bridge, Tunnel, and Turnpike Association (IBTTA) and state departments of transportation (DOT). The overall survey response rate was 70 percent in terms of the number of toll agencies. However, based on IBTTA statistics, these agencies collectively represent over 90 percent of annual U.S. toll traffic. Appendix A includes the survey instrument and a list of survey respondents.

TOLL INDUSTRY PROFILE

Toll Industry Overview

Statistics collected on an annual basis by IBTTA indicate that in 1996, there were 58 major toll agencies in the United States. Collectively, these 58 agencies operated 58 toll bridges, 10 toll tunnels, and 57 toll roads comprising almost 5,000 miles of roadway. Aggregate annual traffic volume in 1995 was almost three-quarters of a million vehicles for toll bridges; over 300,000 vehicles for toll tunnels, and over 2.5 billion vehicles for toll roads (*9*).

Annual toll revenue in 1995 was approximately $4.7 billion industrywide (*10*). Toll revenue volume varies considerably among toll agencies. Figure 1 is a breakdown of the 40 organizations for which toll revenue data are available from the toll agency survey conducted for this report. For these toll organizations, the average annual toll revenue is approximately $110 million; the median toll revenue is approximately $48 million.

The toll industry is growing, by a number of measures. Existing toll organizations have some 350 miles of roadway under construction and approximately the same number of miles in planning, representing a 15 percent increase in miles operated (*9*). Beyond expansion by existing toll agencies, a number of states are actively considering or planning new toll facilities. The survey and other information indicated the following:

- Alabama is exploring the possibility of tolls on an upgrade to U.S.-280 in Birmingham (*11*).
- Alaska has the Juneau Access Road under study as a potential new toll facility. If advanced, such a toll facility would improve access to Juneau, which is currently accessible only by plane or boat.
- Arizona is considering two proposals for private toll roads. Arizona's experience with private toll roads is reported in one of the case studies in chapter 5 of this report.
- California continues to advance toll roads in several locations, building on its successful experience on other projects, such as the Transportation Corridor Agencies and State Route 91 express lanes.
- Delaware is evaluating proposals for a public-private partnership approach to completing State Route 1 as a toll road.

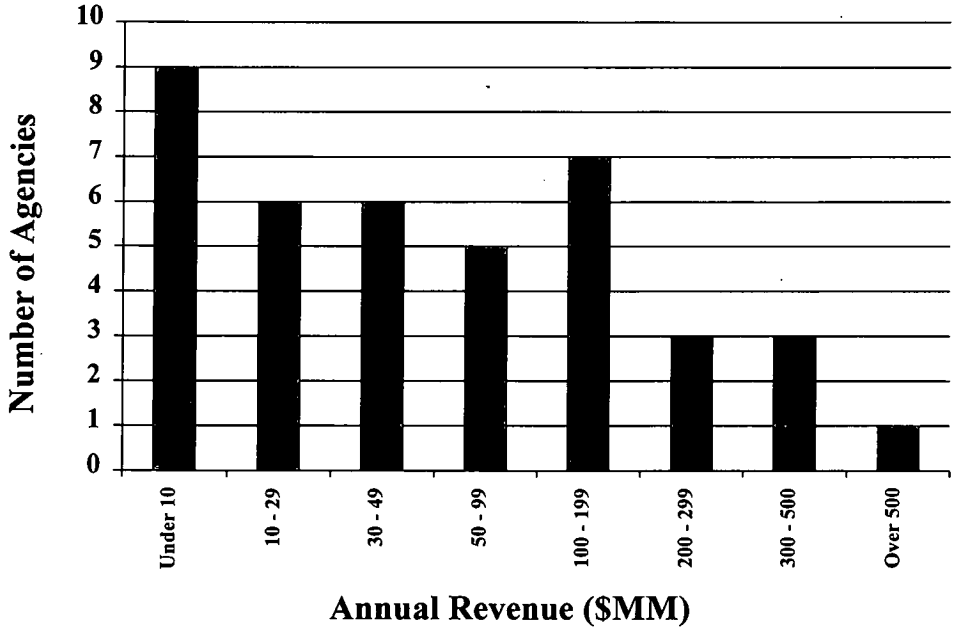

FIGURE 1 Revenue distribution—survey respondents.

• Minnesota established the Office of Alternative Transportation Financing in 1994 to respond to legislative mandates to study congestion pricing and to implement a process for developing toll roads. An early initiative of that office, Highway 212, is one of the case studies in chapter 5 of this report.

• North Carolina established the North Carolina Bridge Authority in 1995 to construct a new toll bridge in the Outer Banks area beginning in January 2001.

• Ohio has made loans from its newly established State Infrastructure Bank to support a bond issue for a new toll road in Butler County (*12*).

• Oregon passed legislation in 1995 to enable the state DOT to explore the possibility of toll roads and to enter into agreements to construct and operate tollways in two specific locations. Oregon DOT is currently evaluating the feasibility of two toll projects and developing an administrative process for identifying and selecting other tollway opportunities. The state does not expect to operate toll facilities until after the year 2000.

• Rhode Island indicates that potential legislation in 1997 could allow its DOT to collect tolls.

• South Carolina opens its first toll road in the Hilton Head Island area in late 1997. The state has several other toll projects under development, as described in chapter 5.

• Utah is currently evaluating a new toll highway in West Davis County. The state legislature passed a new enabling law (HB266) on March 3, 1997, for private toll roads to be built and has appropriated money to support a new tolled northbound connection to Interstate 84 in Ogden (*13*).

• Washington is currently evaluating public-private partnerships, which most likely will involve toll collection. Washington's experience with public-private partnerships to date is one of the case studies in chapter 5 of this report.

IBTTA statistics indicate that, for the United States as a whole, 2,343 miles of toll facility projects, representing over half the mileage of existing toll facilities, are proposed at an estimated cost of $39.7 billion (*14*).

Organizational Structure and Functions

Toll facilities are associated with a variety of organizational structures. Traditionally, the most common structure has been the independent toll authority (or commission) typically established as a public benefit corporation by state legislation prior to construction of a toll facility. The independent toll authority is established as a legal entity for purposes of issuing bonds to finance construction and remains responsible for the ongoing operation and maintenance of the toll facility or facilities upon completion. While the majority of independent toll authorities operate within a single state, some are bi-state organizations (e.g., The Port Authority of New York and New Jersey, The Delaware River Port Authority), and some are bi-national (e.g., Buffalo and Fort Erie Public Bridge Authority).

Toll facilities are also operated by state DOTs. In some cases, toll operations fall within the formal DOT organizational structure. For example, Caltrans owns and operates nine toll bridges in California. The Delaware Turnpike was merged into Delaware DOT in 1996. Florida's Turnpike System is one of eight District Offices within the Florida Department of Transportation. The Louisiana Department of Transportation and Development includes the Crescent City Connection Division, which operates the Crescent City Connection Bridge in New Orleans. New Hampshire DOT has a Bureau of Turnpikes that currently operates three turnpikes in the state and plans three new toll facilities to be in operation in 2000. Virginia DOT owns and operates three toll facilities in the Commonwealth of Virginia.

Some toll authorities contract with a DOT to operate their toll facilities. However, the toll authority remains a separate legal entity, an arrangement that allows for bond issues, revenue, and expenses associated with toll facilities to be isolated from overall DOT operations. The Indiana East-West Toll Road and Kentucky's four active toll parkways are examples of this type of institutional arrangement. Georgia State Tollway Authority is a separate legal entity but has an operating agreement with Georgia DOT that allows the agency to use DOT forces for management of the authority's toll operations, with the balance of the toll agency's operations being contracted out directly to other private contractors.

Still other toll agencies are required by the terms of their enabling legislation to have commissions or boards with the Secretary or Commissioner of the state DOT as a member. Examples of this type of arrangement include the Kansas Turnpike Authority, Maryland Transportation Authority, Pennsylvania Turnpike Commission, the West Virginia Parkways, Economic Development and Tourism Authority, and the Texas Turnpike Authority.

A few toll facilities are operated or are under construction by private entities. For example, Grosse Ile Bridge Company owns and operates the Grosse Ile Bridge in Michigan. The Ambassador Bridge is a privately operated toll facility in Detroit, Michigan. The Burlington Northern/Santa Fe Railroad owns and operates a vehicular toll bridge that crosses the Mississippi River as part of Iowa Highway 103 and a bank owns and operates a private toll bridge that crosses the Missouri River between Iowa and Plattsmouth, Nebraska (*George Sisson, Iowa Department of Transportation, personal communication, February 21, 1997*). The Lake of the Ozarks Community Bridge Corporation expects completion of its bridge in Camden County, Missouri in early 1998 (*Joseph Jaeger, Lake of the Ozarks Community Bridge Corporation, personal communication, February 11, 1997*). Alabama DOT reports that Alabama has "private toll bridges . . . operated primarily for one community or subdivision" (*Larry Lockett, Alabama Department of Transportation, personal communication, March 4, 1997*). Federal Highway Administration statistics list several other toll facilities under private ownership, including three in Minnesota, one in New Hampshire, three in New Jersey, one in Pennsylvania, three in Vermont, and one in West Virginia (*15*).

There are also a number of city- or county-operated toll facilities. For example, in Texas, the cities of El Paso and Laredo, along with three other cities, operate toll bridges. Also in Texas, Galveston, Starr, and Cameron Counties each operate a

toll bridge. County or city-operated toll bridges can also be found in California, Colorado, Florida, Illinois, Missouri, New Jersey, Virginia, and West Virginia (*10*).

A new institutional arrangement has emerged recently in the toll industry. While the details vary among states and projects, they can be referred to generally as public-private partnerships. For example, in Florida, the Osceola Parkway is owned and operated by Osceola County but private developers donated land for the roadway and contribute funds on an ongoing basis for the debt service on county-issued bonds used to finance the facility. (*Richard Diez, Osceola County, personal communication, June 10, 1997*) The emergence of these partnerships was discussed in chapter 2 of this report. A few other examples of the most advanced of these initiatives are included as case studies in chapter 4 of this report.

Most toll authorities operate only toll facilities. Within the survey respondents, for example, 31 organizations (76 percent of the 41 respondents) indicated they operate toll facilities (including rest and maintenance areas associated with toll facility operations) exclusively. However, 10 organizations (24 percent of the survey respondents) were multiple-function organizations involved in a variety of non-toll businesses. For example airports, office buildings, transit lines, and port facilities are operated by three organizations of the 10; bus parking/terminal facilities are operated by two of the 10. Other non-toll activities include an arts center, baseball stadium, canal system, ferries, parking decks, and economic development projects.

There are three basic types of toll operations. The first is a "closed" or ticket system road or turnpike on which the distance traveled, as measured at controlled vehicle entry and exit points, varies with a resulting variation in toll paid by vehicles using the road. The second is an "open" system roadway, which uses a barrier toll system, wherein all vehicles pay tolls at toll plazas stationed at various intervals along the mainline roadway. The third is a bridge or tunnel for which tolls are collected at one or both ends of the facility. Of the responding 31 organizations that operate only toll facilities, 12 operate more than one type of toll facility, while 29 operate either a ticket system road, barrier system road, or bridge/tunnel. Of all survey respondents, eight organizations (20 percent) operate toll roads using tickets; 26 organizations or 63 percent operate toll roads using barriers; and 21 organizations or 51 percent operate bridges and/or tunnels. (Note that these percentages total more than 100 percent because some agencies operate more than one type of toll facility.)

Authorizing/Enabling Process

Of the survey respondents, The Port Authority of New York and New Jersey was the first to begin operating toll facilities with its takeover of operational responsibility for the Holland Tunnel in 1930. The Holland Tunnel had been opened jointly by the New York State Bridge and Tunnel Commission and the New Jersey Holland Tunnel Commission in 1927. In 1931, New York and New Jersey agreed that the construction, maintenance, operation, and control of all bridges and tunnels authorized by the two states would be unified under the-then Port Of New York Authority. The Pennsylvania Turnpike Commission was the first statewide toll authority, created in 1937. In each decade, toll authorities have been established: nine were established in the 1930s; six in the 1940s; 14 in the 1950s; four in the 1960s; three in the 1970s; three in the 1980s; and five to date in the 1990s, including three toll authorities that have not commenced facility operations.

For toll authorities operating within a single state, that state typically passes enabling legislation to establish an independent toll authority or commission which is granted broad authority over the financing, construction, operation, maintenance, and expansion of a particular toll facility or, in some cases, over any toll facilities deemed to be needed by the newly established authority. Although each agency's enabling act is unique in some way, the following provisions are common:

- Creation of an authority or commission, including the legal name and nature of the newly created entity,
- Scope, purpose, and function of the new entity,
- Definition of terms,
- Delineation of district within which the entity operates,
- Details about the entity's governing board, including the number, composition, selection or appointment process, compensation, and term of members; voting/procedural rules for governing board action; and meeting requirements,
- The legal powers of the commission/authority, including the ability to establish rules and regulations, hire employees, sue and be sued, enter into contracts, construct facilities, acquire property, use the power of eminent domain, and impose fees,
- The authority to issue and refund bonds and use tolls and revenues in associated trust indentures,
- The authority to set and revise tolls and any applicable guidelines or formulas,
- The ability to invest bond proceeds,
- Administrative requirements, which may include periodic audits, competitive bidding, annual reports, public notice and/or hearing requirements,
- Any constraints or rules on the use of funds,
- The rights and remedies of bondholders,
- Tax-exempt status of authority property and bonds,
- The venue and jurisdiction of legal actions against the authority/commission,
- Police powers,
- Operating, maintenance, and repair obligations, and
- Relationship to other entities, e.g. for oversight, reporting, etc.

In addition to these typical provisions, an enabling act may have non-competition sections, which guarantee to the new entity that no directly competing facility will be authorized by the state. The Massachusetts Port Authority (Massport) and the Chesapeake Bay Bridge and Tunnel Authority have such a provision in their enabling legislation. Many enabling acts have requirements for the future elimination of tolls. These provisions, often referred to as "sunset" provisions, are described in more detail in the next section.

In Florida, toll authorities can be formed by special act of the legislature or, since 1990, under the auspices of the Florida Expressway Authority Act (Chapter 348, Part I of the Florida Statutes). Under this legislation, "any county, or two or more contiguous counties located within a single district of the [Florida DOT] may, by resolution adopted by the board of county commissioners, form an expressway authority" (*16*). The Act further provides that an authority can enter into a lease-purchase agreement with Florida DOT. Florida DOT performs certain operational functions on the facility under lease from the authority; upon completion of the lease agreement, title to the facility is transferred to the state. To date, Dade County Expressway Authority in the Miami area is the only authority governed by the terms of Chapter 348, Part I, but future toll authorities will be subject to its provisions. Most of Florida's existing toll authorities were created before the 1990 enactment of this legislation.

Similar in concept to these Florida provisions, joint power authorities were authorized in California by state legislation in 1984 and 1985. Joint power authorities are given the right to collect tolls and development impact fees (*17*). The Transportation Corridor Agencies, discussed in detail in chapter 4 of this report, are one example of a joint power authority.

Bi-state organizations require United States congressional consent in addition to legislative approval of both states in which their facilities operate. Similarly, parallel legislation is required to establish an authority operating toll facilities that connect two countries; one example is the Buffalo and Fort Erie Public Bridge Authority, which has enabling legislation in both New York and Canada.

Some toll organizations have undergone organizational changes over time, each of which requires legislative action. For example, the West Virginia Turnpike Commission (established in 1947) was dissolved and succeeded by the West Virginia Parkways, Economic Development and Tourism Authority in 1989. The New Jersey Expressway Authority, established in 1962, was merged with the Atlantic City County Transportation Authority to form the South Jersey Transportation Authority, a new entity, in 1991. The Delaware River Port Authority was originally the Delaware River Joint Commission. These changes have expanded the mission and scope of agencies beyond simply operating toll facilities.

Some organizational changes have created new organizational models. For example, on September 1, 1997, the Texas Turnpike Authority (TTA) was abolished and two successor agencies were created: the North Texas Tollway Authority (NTTA) and the Texas Turnpike Authority Division of Texas DOT (TTA Division). All TTA assets in four north Texas counties, including two toll facilities in operation and two projects under construction, were transferred to the new Authority pursuant to legislative changes in the Texas Transportation Code (*18*). The TTA Division has statewide responsibility for new toll facilities except in the geographical areas under the jurisdiction of the NTTA or any other pre-existing toll authority.

Some toll facilities have been operated by more than one entity. For example, the nine toll facilities operated in New York City by today's MTA Bridges and Tunnels (also known by its legal name, Triborough Bridge and Tunnel Authority) had been operated at some point by five separate agencies. Ultimately, through a series of agency mergers from 1933 to 1968, these nine facilities all became part of the Metropolitan Transportation Authority. The Tobin Bridge in Boston, Massachusetts, now operated by the Massachusetts Port Authority, was originally the Mystic River Bridge operated by the Mystic River Bridge Commission. Louisiana Department of Transportation and Development took over what is now the Crescent City Connection Bridge in New Orleans from the Mississippi River Bridge Authority, which had been established in 1952. The Mount Hope Bridge in Portsmouth, Rhode Island was transferred to the Rhode Island Turnpike and Bridge Authority in 1964.

There are a few instances of county- or state-operated highway facilities being taken over by toll authorities. For example, the Torras Causeway on St. Simon's Island in Georgia was deeded to Georgia DOT by the county in 1981 and is now operated by the Georgia State Tollway Authority which also operates Georgia 400 in Atlanta (*David Burgess, State Tollway Authority, personal communication, April 3, 1997*). The New York State Thruway Authority has operating responsibility for two non-toll roads, the New York portions of Interstate 84 (which connects to the Thruway at Newburgh) and Interstate 287, also known as the Cross Westchester Expressway, which links the mainline Thruway with the agency's New England section (Interstate 95). Both roadways were operated by New York State DOT prior to acquisition by the Thruway Authority in 1991. The acquisition of the two roadways was prompted by New York state legislative action in the face of inadequate state "financial resources to maintain the highway[s] at high standards due to the thousands of miles of roads and bridges statewide that also must be maintained by the state" (*19*). Formal agreements between the Thruway and New York State DOT clarified that while the Thruway was being assigned operation and maintenance responsibilities, New York State DOT remains responsible for all capital improvement projects on the roads. Thruway bonds were issued to finance the acquisition and future operating costs backed by revenues from tolls and service areas along the Thruway. Use of these revenues for non-tolled facilities was justified by the fact that both acquired roads are feeders to the Thruway system and, thus, are part of a single integrated transportation system. A similar rationale underlies the New Jersey Turnpike Authority's assumption of operating responsibility for a 4.4 mile section of Interstate 95 connecting its eastern spur and the George Washington Bridge. Under New Jersey Senate Bill 3549, New Jersey Turnpike is reimbursed by New Jersey DOT for capital improvements on this roadway (*20*).

For the newer public-private partnerships involved in toll facilities, authorization is a multi-step process. For example, in California, Assembly Bill 680 (enacted in July 1989 and frequently referred to as AB-680) authorizes Caltrans to enter into up to four agreements with private entities to develop new toll roads. Under that broad authorization, separate franchise agreements are executed for each toll project. "Ownership of each facility will be held by the franchisee during construction and turned over to the state upon completion. The state is

empowered to lease each facility to developers for up to 35 years. During the lease period [all operating] costs will be paid by the private sector franchisee [and] operators can set and collect tolls and retain revenues, net of ongoing debt and expenses sufficient to produce a 'reasonable return on investment'" (*21*). The return on investment is negotiated up front as part of the franchise agreement. This "build-transfer-operate" approach is used so that the state, rather than the private sector. has the liability risk. Exclusive franchise agreements as authorized by AB-680 have been executed by Caltrans with California Transportation Ventures, Inc. for San Diego Expressway (SR-125) and with California Private Transportation Company, L.P. for the SR-91 express lanes in Orange County. SR-91 is already in operation (see chapter 4) and final environmental approval for the SR-125 project is expected by early 1998. Two other AB-680 projects (an extension of State Route 57 in Orange County over the Santa Ana River channel and the Mid-State Tollway in the San Francisco area) are currently on hold. (*Roy Nagy, Caltrans Office of Public-Private Partnerships, personal communication, September 19, 1997*)

Under a separate but similar law (Chapter 5, Division 7, Title 1 of the Government Code) joint powers agencies are authorized to finance and construct roads and collect tolls and development impact fees within Orange County, California. The Transportation Corridor Agencies (TCA) have been established under this authority. Case studies of SR-91 and TCA are included in chapter 4 of this report.

Sunset, Reauthorization, or Removal of Tolls

In some cases, enabling legislation includes provisions for "sunset" or reauthorization of an organization's ability to continue collecting tolls. Removal or reduction of tolls may be mandated legislatively when all bonds are paid off, at some particular date (year) in the future, or no later than some specific number of years after the toll facility begins operation. Historically, sunset/reauthorization provisions have been part of the enabling legislation for a significant number of toll authorities in this country. Seventeen organizations or 41 percent of the survey respondents report having sunset provisions. Most of these provisions link toll removal to the payment of all debt. In Colorado, E-470 sunset provisions also call for establishment of a perpetual maintenance fund before tolls are removed. Five of the 17 organizations for which tolls are required to be eliminated upon payment of all debt provide specifically for the road system to be taken over by a state DOT. Since new debt is still being issued for facility improvements or system expansions, many agencies with sunset provisions indicate that such provisions are unlikely to apply, at least in the near future.

For several agencies, sunset provisions include specific timeframes for toll elimination or reauthorization. The International Bridge Authority is scheduled to be dissolved in the year 2000 at which point bonds are anticipated to be paid off. Tolls at the Crescent City Connection Bridge were to expire June 30, 1994. Legislation was passed to extend the toll to June 30, 1999 and it is anticipated that legislation will be introduced in 1997 to extend tolls to 2012. The City of Rock Island, Illinois has authority to collect tolls at the Rock Island Centennial Bridge between Illinois and Iowa until the year 2007. At that time, the City intends to either turn the bridge over to the two states or to some other entity, or close the bridge.

Some organizations have reached the point of requiring legislative reauthorization to continue operating as toll authorities. For example, the New York State Thruway Authority was scheduled to retire its bonds in 1996 which, under the terms of a 1982 tripartite agreement between the Thruway Authority, the New York State Department of Transportation and the Federal Highway Administration, meant that the Thruway would have to remove tolls on the Thruway system or repay federal resurfacing, restoration, rehabilitation, and reconstruction (known as 4R) funds received and used to rebuild portions of the Thruway system. In 1989, the New York State Legislature created the New York State Thruway Authority Transition Advisory Council and directed it to assess the implications of the tripartite agreement and to, "study the cost of converting the system to toll-free operation; the impact of toll removal on the Thruway Authority's employees; and the effect of a toll-free Thruway on the 'overall future' of state highway funding." Following 15 months of extensive public meetings, forums, and hearings and detailed consulting engineering and financial analyses, the Advisory Council evaluated five alternatives for future operation of the Thruway. In October, 1991, the Council issued a series of recommendations, including the continuation of tolls, the Thruway Authority's role as operator, and the ability to incur new bonded debt (*22*).

From December, 1990 through October, 1996, the Ohio Turnpike Commission went through a series of steps with the Ohio state legislature and in negotiations with FHWA and Ohio Department of Transportation to permit tolls to continue on the Ohio Turnpike without repayment of certain federal funds it had received via Ohio DOT. Although collection of tolls has been permitted to continue, a few of the conditions are noteworthy. These include the reestablishment of an oversight committee; a public hearing requirement; and prohibition from using toll revenue generated by one turnpike project to pay for any part of the cost of another project (*23*).

In 1980, the Maine State Legislature voted to retain tolls on the Maine Turnpike rather than let them expire. The decision was based on the legislature's determination that costs of operating and maintaining the road "could more fairly be borne by Turnpike travelers" than by the gas tax (*24*).

Some toll agencies had sunset provisions in their original enabling legislation but legislative action since then has eliminated them or prevented them from taking effect. A few examples of this situation are the Delaware River Port Authority and the Maryland Transportation Authority. Following a review performed in 1987 pursuant to a Pennsylvania sunset law applicable to most state agencies, the General Assembly recommended continuation of the Pennsylvania Turnpike Commission (PTC). This recommendation followed Act 61 enacted in 1985, which included a list of capital projects totaling some $4 billion to be undertaken by the agency and required issuance of new debt. PTC's original enabling act

provided for removal of tolls and reversion of PTC facilities to the state DOT when all bonded indebtedness was paid off. With the issuance of new debt following Act 61, PTC's current outstanding debt is $1.2 billion, making it unlikely that sunset provisions will come into play any time in the near future. (*Kevin Longenbach, Pennsylvania Turnpike Commission, personal communication, May 30, 1997*).

Though not necessarily mandated from the outset of an organization's existence, tolls have been eliminated at some facilities. In some cases, tolls have been removed temporarily. For example, the Hampton Ramp Toll Plaza operated by the New Hampshire Bureau of Turnpikes was not tolled from August 23, 1979 until July 1, 1981. The Carquinez Bridge, which links San Francisco and the Sacramento valley, was toll-free from August, 1945 to November, 1958. Tolls were reinstated at that point to pay for new debt issued to construct a new $44 million parallel three-lane northbound crossing with the original structure being used for southbound traffic (*25*). With the opening of the second Crescent City Connection structure in New Orleans, Louisiana on January 4, 1989, tolls were reimposed after having been suspended since 1964.

In Florida, tolls were reduced from January through December 1996 as part of a response to public concerns about truck safety on Interstate 95, a parallel free route to the Florida Turnpike in four heavily congested counties in the southeast Florida area. It was hoped that the temporary toll reduction on the Turnpike would attract truck traffic away from I-95. A detailed evaluation of the one-year toll reduction determined that:

- Truckers who [were] most likely to use the Florida Turnpike rather than I-95 [were] probably already doing so; and
- Convenience, best defined as the shortest route (distance) between the points of origin and destination, [was] the major routing consideration, along with other key factors such as the number of, and accessibility to, entrances and exits, and traffic conditions and tolls.
- The cost per mile of operation for trucks may range from $1.50 to over $3.00 per mile so any diversion is likely to increase costs by more than the toll savings. A five-axle truck, for example, would save $5.25 from the toll reduction in place in 1996, a savings that would be eliminated if the driver had to divert as few as two miles to use the tolled turnpike instead of the toll-free interstate (*26*).

In other cases, tolls have been removed and not reinstated:

- Arkansas removed tolls on the Helena Bridge in July 1973.
- Idaho stopped collecting tolls on U.S. Route 93 in 1940.
- The state of Kentucky has eliminated tolls from 432 miles of parkway or bridge facilities.
- Mississippi collected its last toll in 1969.
- New York discontinued tolls on two Westchester County parkways in November 1994.
- Virginia discontinued tolls on the Norfolk-Virginia Beach Toll Road following legislation enacted in the 1995 Session of the General Assembly.
- The state of Washington discontinued toll operations in the 1980s.

Over the years, tolls have been removed from several other facilities, including the Dallas-Fort Worth Turnpike, the Denver-Boulder Turnpike, and all toll roads and bridges in the state of Connecticut (*27*). Toll removal may be a function of bonds being paid off but may also result from political factors, e.g., in Connecticut as described in more detail later in this report.

Sources and Uses of Funds

Toll organizations use a variety of funding sources, although the two most common are tolls and revenue bonds. These funding sources are closely linked, in that future toll revenues are typically pledged as the security for bonds issued to construct, maintain, expand, or operate the associated toll facility(ies) and are used to make bond principal and interest payments. Of the survey respondents, all (obviously) used tolls as a funding source and all but two of the 41 responding organizations reported use of revenue bonds. These other two organizations were 1) Georgia State Tollway Authority, which used state-guaranteed revenue bonds pledging both the future revenue stream of the toll facility and state motor fuel taxes to secure the bonds, and 2) Osceola County Toll Authority, which used Transportation Improvement Bonds issued by the county but secured by developer fees in addition to toll revenues.

Other types of bonds are utilized, albeit less extensively, by toll organizations. These include general obligation bonds (used by nine (22 percent) of the responding agencies); oil franchise tax revenue bonds (used by the Pennsylvania Turnpike Commission); subordinate bonds from a local government unit (used by Richmond Metropolitan Authority); and Transportation Facilities Bonds (used by Virginia DOT).

Table 1 summarizes available data on toll agency bond issues on an annual basis for 1992 through 1996. Data indicate an aggregate outstanding debt of $10.7 billion for toll agencies rated by Moody's Investor Service.

Bonds may be issued by toll agencies on a facility-specific or system-wide basis. Agencies with existing roadways can use their established revenue base to leverage additional funds for new roadways or expansions of existing facilities. Oklahoma Turnpike is one example of this system financing approach. Four new turnpikes were opened in the early 1990s, funded by bonds backed by the revenue-generating capacity of six established toll roads in the state. Under state law, Oklahoma Turnpike Authority can charge tolls on any of its roadways until all bonds are repaid. Florida Turnpike has used a similar system financing approach, leveraging revenue from the existing Florida Turnpike segments for construction of new toll road projects throughout the state (*27*).

Next to tolls and bonds, federal and state funds are used most often as a funding source. Sixteen organizations (39 percent) report having used federal funding; 15 organizations (37 percent) report receiving state funds. Types of state funds used

TABLE 1
BOND ISSUES FOR TOLL ROADS (1992–1996)

Year	Issuing Agencies	Total Bond Issues	Total Bond Proceeds ($ billions)
1992	8	9[1]	2.7
1993	8	9[2]	3.8
1994	5	9	1.1
1995	6	10[3]	2.9
1996	5	5[4]	1.8

[1]Four of these nine issues, collectively representing $1.25 billion, included both new money and funds for refunding prior bond issues.
[2]Five of these nine issues, collectively representing $2.3 billion, included both new money and funds for refunding prior bond issues.
[3]One of these ten issues for $238 million, included both new money and funds for refunding prior bond issues.
[4]One of these five issues, for $1.075 billion, included both new money and funds for refunding prior bond issues.

Source: Securities Data Company

by toll agencies include reimbursement for roadway maintenance from state DOT highway account funds; matching state funds as required by ISTEA; loans, right-of-way grants, DOT loans, and, in California, State and Local Transportation Partnership Program and State Transportation Improvement Program funds. Funds from local government units are used much less frequently, by only five organizations (12 percent) of the survey respondents.

Fuel taxes have been used by seven (17 percent) of the responding toll agencies. Fees are another less-frequently used source of funding. Four agencies (10 percent) report using registration fees. E-470 in Colorado, for example, uses vehicle registration fees. As allowed by its enabling legislation and approved by voters within the tri-county area served by the road, E-470 receives $10 per registered car per year, which is collected by the three counties on E-470's behalf. E-470, along with the Transportation Corridor Agencies (TCA) in California, also uses developer fees. E-470 refers to its developer fees as highway expansion fees. These fees are imposed on new construction at the time a building permit is issued, based on proximity to interchanges and the roadway and the type of development (residential vs. commercial). (*Pam Bailey, E-470, personal communication, September 16, 1997*). TCA's development impact fees are described in detail in chapter 4. Caltrans is the only agency reporting use of utility fees.

Other sources of funds include concessions, investment interest, property leases, rental income, miscellaneous user charges and fees, and—for multi-functional organizations—income from non-toll operations.

Funds generated by toll organizations are used to cover a variety of toll facility costs, including debt service, cost of toll collection, other operating and maintenance expenditures, administration, construction of new facilities, and expansions or extensions of existing facilities. Multi-functional agencies may also use funds generated by toll operations for their other businesses. For example, there are several cases in which revenue from toll facilities is used to support mass transit operations within the same agency or region. Portions of the toll revenues on Caltrans' seven toll bridges in the San Francisco Bay area are redistributed by the Metropolitan Transportation Commission to local transit operators (*28*). Net income from Delaware River Port Authority's four toll bridges offsets operating losses from its high-speed transit system (*29*). Since 1968, when the Triborough Bridge Authority became part of the Metropolitan Transportation Authority (MTA), toll revenue from the nine MTA Bridges and Tunnels facilities has been used to subsidize subway, bus, and commuter rail operations in the New York City metropolitan area. The agency reported that this subsidy, for example, in 1995 was $274 million as compared to $197 million in bridge and tunnel operating expenses. Revenues from the Port Authority of New York and New Jersey's six tunnels and bridges, along with revenues from that agency's non-toll businesses, are used to offset the agency's deficit mass transit operations, including the Port Authority Trans-Hudson (PATH) rail line, the Port Authority Bus Terminal, and the George Washington Bridge Bus Station (*30*). The theory behind using toll revenues to subsidize mass transit is that roadways and mass transit form an integrated transportation system in which tollpayers benefit from the reduction in roadway traffic made possible by the availability of mass transit.

Toll organizations vary widely in their cost accounting and reporting practices, making it difficult to compile or compare cost breakdowns given by survey respondents. However, 24 survey respondents did provide data from which to calculate what percentage of an agency's annual operating expenses are represented by the cost of toll collection. Toll agencies vary widely on this measure but across the 24 organizations for which data were available, the cost of toll collection averages 21 percent of an agency's annual operating expenses or annual operating budget.

TOLL PRICING PRACTICES

Setting Initial Toll Rates

Typically, initial rates for toll facilities are set such that projected traffic volumes over some period of time (e.g., 20-30 years) will cover the forecast debt service and operating and

maintenance costs associated with the facility. Essentially, agencies perform a break-even financial calculation to assure that their forecast toll revenue matches costs over some period of time, typically the term of the bonds issued for initial construction of the facility. Generically, these studies are referred to as traffic and revenue studies within the industry. Such studies are conducted carefully and require outside review to assess accurately the feasibility of a proposed toll facility, including the economic feasibility, political risk, construction risk and project risk factors (*31*).

Some other factors that may be considered in setting toll rates include toll rates of other agencies already operating in the same region or on comparable facilities in adjacent states; toll sensitivity analysis, market research survey results; value of time savings associated with use of a new facility as compared to alternate "free" routes; and compatibility with rates on other transportation modes (e.g. ferries) that serve as alternatives to or that predated a toll facility. For the newer public-private partnerships, a reasonable rate of return on investment is also taken into consideration in setting or approving toll rates.

Although it appears to be an exception to the rule, it is noteworthy that in the case of Georgia 400, tolls were predetermined on the basis of an outside consultant's recommendation to be 50 cents. This predetermined toll rate was then used to calculate the amount of debt that could be supported by forecast traffic and revenue. (*David Burgess, Georgia State Tollway Authority, personal communication, May 30, 1997*). In the case of Georgia 400, tolls were not the only source of debt service, since funding was also available for the project through the Toll Facilities Pilot Program described in chapter 2.

Toll Structure/Schedule

Toll organizations may use a number of variables as the basis for their toll rate structure or schedule. For example, tolls may vary with the type of vehicle (passenger car versus commercial truck versus bus), number of axles, weight, and/or the distance or miles traveled. Typically, a toll agency has multiple vehicle classifications, each of which is associated with a different toll rate. The number of vehicle classifications and complexity of the toll schedule vary considerably among toll agencies. Based on the detailed toll schedules included by 14 toll organizations in their survey responses, toll agencies have, on average, 10 vehicle classifications as part of their toll rate structure.

An agency's toll structure may also incorporate special discount programs for commuters, commercial vehicles, electronic toll collection customers, carpools, and specific resident groups. Special programs are discussed in the next section.

The number of axles is the most frequently used basis for toll rates. The number of axles is used alone or in combination with other variables by 93 percent of the toll agency survey respondents. Vehicle type is also a frequently used determinant of toll rates, used alone or in combination with other variables by 54 percent of the toll agency survey respondents. Miles or distance (e.g., number of segments on a barrier toll road) traveled is used alone or in combination with other variables by 24 percent of the toll agency survey respondents as a basis for toll rates. Vehicle weight is currently used as part of the toll structure by only three (seven percent) of the responding agencies: the Pennsylvania and Ohio Turnpike Commissions and the Buffalo and Fort Erie Public Bridge Authority.

Overall, 15 percent of responding toll organizations have toll schedules based on a combination of three variables, with the most common combination being vehicle type, number of axles, and distance traveled. Fifty-four percent use some combination of two variables in their toll structure, with the most common combination being vehicle type and number of axles. About one-third of toll organizations have toll structures based strictly on the number of axles.

Toll Discounts and Special Programs

Toll agencies offer a variety of special programs for their customers, most of which provide discounted tolls and added customer convenience. From the toll agency's perspective, such programs provide for positive customer relations and expedited transaction time as compared to a cash transaction. Special programs currently offered by toll authorities include tokens, commuter ticket books or monthly passes that provide discounts from the cash toll rate; discounts available through use of tickets or scrip for commercial vehicles; volume discounts for commercial vehicles; carpool or high-occupancy vehicle (HOV) discounts; discounts or premiums for ETC customers; postpaid or charge account programs for commercial vehicles; special resident discount programs; annual passes; and even one senior citizen discount program (offered by Delaware River Port Authority). Table 2 shows the extent to which special programs are offered by toll agencies.

Toll Rates and Adjustments

The actual toll collected from each vehicle varies significantly among authorities. Note that the data provided by survey respondents are not the same as toll rates, but rather, the actual toll collected per vehicle as affected by such factors as discounts, distance traveled in a trip, etc. Based on the survey respondents, the average toll collected per vehicle ranges from a low of 33 cents (at Richmond Metropolitan Authority) to a high of $12.07 (at the Chesapeake Bay Bridge and Tunnel). The average value of a toll transaction across all responding agencies is $1.52.

Commercial vehicle tolls are consistently higher than passenger car tolls. Passenger car tolls average $1.36; commercial vehicle average tolls are $5.81, more than four times auto tolls. Higher commercial vehicle tolls reflect the higher toll (in the form of wear and tear) these vehicles take on roadways. For example, a Heavy Vehicle Cost Responsibility Study concluded that "most pavement costs are directly related to heavy vehicles" (*32*). Further studies have determined that damage increases exponentially with axle weight, for example,

TABLE 2

SPECIAL PROGRAMS OFFERED BY TOLL AGENCIES

Type of Program	Number of Agencies Offering	Percent of Survey Sample
Commuter discounts offering unlimited trips	10	24
Commuter discounts with limited or maximum number of trips	8	20
Discounts for buses/mass transit	10	24
High occupancy vehicle discounts	9	22
Commercial vehicle discounts	11	27
Discounts for electronic toll collection customers	8	20
Premiums (above cass toll rate) for electronic toll collection customers	1	2
Prepaid accounts	18	44
Postpaid accounts*	16	39
Other types of special programs**	8	20

*Most of the postpaid account programs are charge account programs for commercial vehicles or available only to government vehicles.

**This category includes tokens (sold at discounts by four agencies); special resident discounts (offered by MTA Bridges & Tunnels, Massachusetts Turnpike, and the New York State Thruway Authority); and one senior discount program (offered by Delaware River Port Authority).

Source: Responses to Tolling Practices for Highway Facilities Survey

30,000 pounds in axle weight causes eight times more pavement damage than 18,000 pounds in axle weight (*33*).

The frequency and magnitude of toll increases vary significantly within the toll industry. Toll agencies that did increase tolls between 1980 and 1996 did so, on average, 2.28 times or approximately once every seven and a half years. However, this average masks a wide range of actual practice. For example, seven agencies in the survey report never having had a toll increase. While over half of these (E-470, Osceola Parkway, Georgia 400, and Virginia DOT) operate fairly new toll facilities, the remaining three (Kentucky Toll Roads, Rhode Island Bridge and Turnpike Authority, and South Jersey Transportation Authority) represent toll facilities that have been in operation for three to five decades. On the opposite end of the spectrum, MTA Bridges and Tunnels has implemented seven toll increases since 1980, representing an increase approximately every 2.5 years.

Agencies with foreign traffic sometimes make toll adjustments to reflect currency differentials. For example, Canadian currency is discounted 15 percent by Michigan's International Bridge Authority.

Data provided by 25 toll agencies allowed calculation of the magnitude of each toll increase implemented since 1980. These increases include across-the-board increases for all vehicles, as well as variable increases by vehicle type. Where rates increased by different relative amounts for commercial and passenger vehicles, the majority of cases had larger toll rate increases for commercial than passenger vehicles. Based on a sample of 83 toll increases, the average toll increase was 40 percent. Approximately half of the reported increases were under 30 percent and the most common rate of increase was 20 to 25 percent. Figure 2 includes a breakdown of the magnitude of toll increases reported by toll agencies since 1980.

Although not reflected in the analysis of changes in cash toll rates in Figure 2, discounts available under an agency's special programs may also be modified as part of toll rate increases. In 1995, for example, the International Bridge Authority raised commuter fares from 50 percent to 60 percent of full fare, thus decreasing the discount from 50 percent to 40 percent. A more complex example of modification to toll discount programs is the Port Authority of New York and New Jersey's 1991 toll increase. Before 1991, commuter discount ticket books available to customers at all six toll facilities offered the same 33 percent discount off the cash toll rate. The 1991 toll increase established three different discount rates to reflect the "peculiar traffic and transportation characteristics . . . of each individual facility" (*34*). A 10 percent discount was offered to commuters at the agency's two tunnels that connect New Jersey with the heavily congested areas of lower and midtown Manhattan and have a wide variety of transit and park-and-ride alternatives to auto travel. A 25 percent discount was available for George Washington Bridge commuters traveling from New Jersey to upper Manhattan who have more limited mass transit alternatives available. At the Port Authority's three Staten Island bridges, commuter discount ticket prices remained unchanged in recognition of the less convenient alternatives available to those commuters. Thus, the 1991 toll increase affected different user segments very differently. Cash auto toll-payers experienced a 33 percent increase in tolls, from $3 to $4. Commuter discount ticket users experienced an effective 80 percent increase at the tunnels; 50 percent increase at the George Washington Bridge; and no increase at the three Staten Island Bridges.

Oklahoma Turnpike Authority had a scheduled toll increase that coincided with the introduction of a new special program. Oklahoma Turnpike Authority offered no increase in toll rates to customers who signed up for the agency's new Pike Pass electronic toll collection program at the same time the authority increased the cash toll rate by 30 percent on January 1,1991. Thus the avoidance of a significant toll increase functioned as an effective financial incentive for enrolling in Pike Pass.

A few agencies reported toll decreases that were not included in the analysis above. Harris County Toll Road Authority decreased tolls on the Hardy Toll Road by 25 percent, but has since increased that reduced toll rate by 33

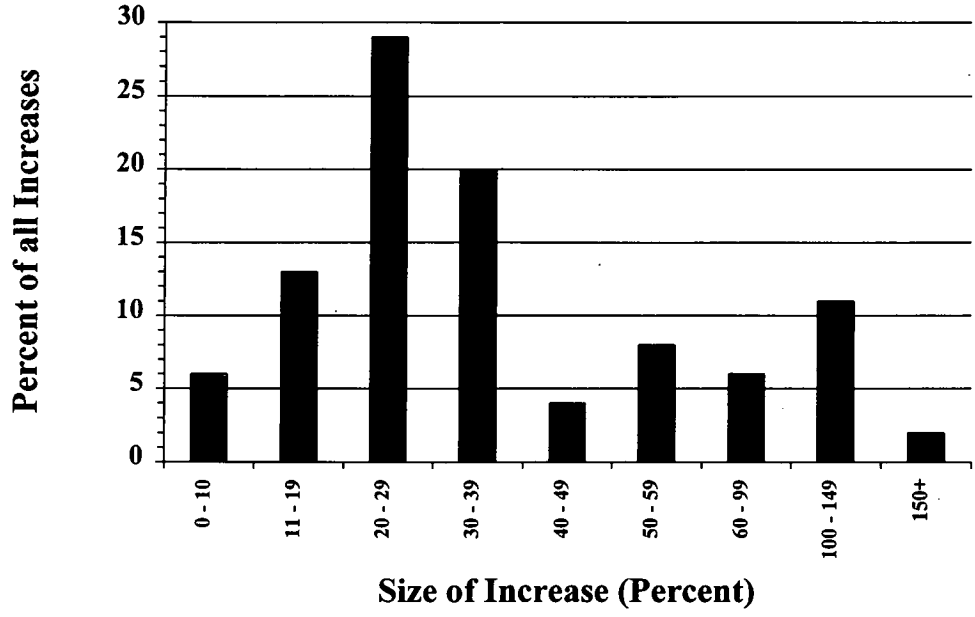

FIGURE 2 Magnitude of toll increases 1980–1996.

percent. New Hampshire Bureau of Turnpikes decreased tolls at the Hampton Main toll plaza and ramp in October, 1987, but only for a 2-month period. The New York State Bridge Authority reduced tolls three times, in 1935, 1937, and 1945, before increasing them in 1989. Orlando-Orange County Expressway Authority (Florida) decreased tolls by 33 percent at four outlying toll plazas in 1992, following the opening of new downtown toll plazas, which effectively doubled a driver's commuting cost on the expressway. Begun as a 6-month experiment, the toll reduction was permanently implemented in 1993 because the traffic increase at the new downtown plazas minimized the revenue impact of lowering tolls at the outlying plazas (*Steve Pestelnyk, Orlando-Orange County Expressway Authority, personal communication, September 1997*).

Factors Affecting Toll Adjustments

A number of considerations play into an agency's decision to propose toll adjustments, including the need for facility or system expansion, forecast capital expenditures, operating and maintenance expenses, bond covenant requirements, political considerations, impact on performance measures (e.g., attempt to improve or maintain service levels), and policy considerations (such as relationship to mass transit pricing or attempted congestion reduction).

While most toll adjustments are increases, toll agencies may also implement toll reductions or removals in response to some of the same factors driving toll increases. A noteworthy example of the influence of political factors in this regard was the removal of tolls on Connecticut toll roads and bridges in the late 1980s. State legislative bills were introduced almost annually for more than a decade to force toll removal. Legislation was finally passed to abolish tolls when "[a] series of commercial vehicle accidents resulting in fatalities at toll plazas, combined with citizen group opposition in an election year, tipped the balance" (*27*).

Toll agencies were surveyed on the relative importance of various factors in toll increase proposals and were asked to assign a ranking for any item they considered as important and to list any other factors considered. The results can be analyzed in several ways. First, it may be useful to know what percentage of the sample assigned any ranking at all to each factor. Using this approach, the need for facility or system expansion, forecast capital expenditures, and bond covenant requirements were all of equal and primary importance with each being assigned a ranking by 82 percent of the survey respondents. Operating and maintenance expenses were slightly less important, ranked by 76 percent of the survey respondents. Impact on performance levels and political considerations tied as the third most important factor. Policy considerations were the least frequently ranked, by only 42 percent of the responding agencies. The write-in candidates for "other factors" of importance included currency value adjustment, long-range projections of agency needs and funding requirements, the need to limit financial support required from non-toll revenue sources within a multi-functional agency, and the need for seismic retrofit of bridges in California.

Further insight into the relative importance of factors in toll increase proposals can be gained by analyzing the numerical rankings assigned by those agencies that considered them important enough to rank. Table 3 presents this analysis for each factor. An average priority ranking can be calculated on the basis of the data presented in Table 3. This approach results in the following average order of importance (listed in descending order, i.e., from relatively most to relatively least important): forecast capital expenditures, bond covenant requirements, operating and maintenance expenses, need for facility or system expansion, impact on performance levels, political considerations, and policy considerations. Note that

TABLE 3
RANKINGS OF FACTORS IN TOLL INCREASES

	Factors (%)			
	Facility/System Expansion Needs	Forecast Capital Expenses	Operating and Maintenance Expenses	Policy Considerations
% citing as factor	82	82	76	42
If cited as factor				
% citing as #1	32	42	34	13
% citing as #2	23	29	34	19
% citing as #3	29	13	21	–
% citing as #4	6	13	3	25
% citing as #5	6	–	7	13
% citing as #6	3	3	–	13
% citing as #7	–	–	–	19
% citing as #8	–	–	–	–
	Factors (%)			
	Impact on Performance Level	Bond Covenant Requirements	Political Factors	Other Factors
% citing as factor	50	82	50	16
If cited as factor				
% citing as #1	–	59	16	60
% citing as #2	42	13	16	20
% citing as #3	11	6	11	–
% citing as #4	21	13	16	–
% citing as #5	16	–	21	–
% citing as #6	11	6	5	–
% citing as #7	–	3	16	–
% citing as #8	–	–	–	20

Source: Responses to Tolling Practices for Highway Facilities Survey

since "other factors" included several different considerations, an average ranking assigned by agencies to these factors was not presented. However, if these rankings had been included, survey results indicate that "other factors" collectively are less important than forecast capital expenditures, bond covenant requirements, operating and maintenance expenses, and the need for facility or system expansion, but more important than impact on performance levels, political considerations, and policy considerations.

Finally, it should be noted (as it was by one survey respondent operating multiple toll facilities) that the relative importance of factors in toll increase proposals may vary by facility. Similarly, over time, different factors may be more or less important considerations in specific toll increase proposals.

Agency Policies and Requirements for Toll Adjustments

Generally, the need for toll increases is determined by an agency's governing board and by the bond covenant/trust indenture requirements associated with bond issues. For example, the Illinois State Toll Highway Authority's indenture resolution requires that toll rates reflect the lowest cost per mile that supports operating, maintenance, and debt service expenses. Illinois State Toll Highway Authority reports that its traffic engineering department reviews this issue on an annual basis. Toll road revenue bonds require a rate covenant or required debt coverage ratio "which states that net revenues must exceed annual debt service by a specified amount. A typical toll road rate covenant states that net revenues must equal at least 1.25 times annual debt service [which] protects bondholders in the event of a temporary decline in net toll revenues" (*35*). When projected traffic and revenue volumes indicate that required rate covenants may not be satisfied under the existing toll structure, toll rate increases are considered.

For approximately two-thirds of toll agencies (26 of the 40 agencies responding on this matter), toll increases are subject to oversight, control, or approval of external entities beyond their own governing board or commission. For example, toll increases or board actions on toll increases are subject to the Governor's approval or veto for seven organizations (18 percent). Toll increases and the process for proposing and implementing them must conform with a state's administrative code or requirements in the case of five organizations (13 percent). Toll increases fall within the purview of state legislatures for three organizations (eight percent). Two organizations must obtain the state DOT's formal approval for any toll changes. Toll increases for eight organizations (20 percent) require involvement of other external entities. Examples of such external entities include a Turnpike Oversight Committee (Ohio Turnpike Commission); a Local Government Advisory Committee and the Secretary of State (Massachusetts Port Authority); State Treasurer (New Jersey Turnpike Authority); Executive Council (New Hampshire Bureau of Turnpikes); City Council (Rock Island Centennial Bridge Commission);

Commonwealth Transportation Board (Virginia DOT); Metropolitan Transportation Commission (Caltrans); and the agency's parent organization board (MTA Bridges and Tunnels). In the case of Caltrans, the Metropolitan Transportation Commission does not simply approve recommended increases but rather "has the authority to set the toll within the maximum rate allowed by the state legislature" (*36*).

Public hearings on proposed toll increases are required by 17 organizations (41 percent of the survey respondents). In some cases, very specific details about advance publication of public hearings, number and location of public hearings, and other matters regarding conduct of a hearing are outlined in an authority's enabling legislation, in rules and regulations adopted by the authority, or in state administrative code requirements with which an authority must comply. A few other agencies conduct public hearings as a matter of practice or policy but are not required to do so. Even where public hearings are not conducted, there may be an opportunity for public input. For example, a board action proposing a toll increase that is part of a public board meeting affords some chance for unsolicited public comments. At a minimum, toll agencies give advance public notice of any changes in toll rates, generally from 45 to 90 days before the proposed effective date.

Newer toll operations may have programmed toll increases as part of their initial bond indenture to assure potential bondholders that revenues will be adequate to cover debt service and other operating and maintenance costs. Osceola Parkway in Florida, for example, has periodic toll increases scheduled, with the first increase tied to the beginning of debt retirement in 2000.

Another approach to toll increases is represented by the Ohio Turnpike Commission's phase-in of toll increases over a 3-year period. "Increases of 10 percent on July 1, 1995, 15 percent on January 1, 1996, and 20 percent on January 1, 1997, have already been implemented. Additional increases are scheduled for January 1, 1998 (10 percent) and July 1, 1998 (approximately 10 percent)" (*23*).

OPERATIONAL ISSUES

One-Way Toll Collection

Of the 41 survey respondents, 15 agencies (37 percent) currently feature one-way toll collection at one or more of their toll facilities. Federal Highway Administration statistics indicate another six agencies operate one-way toll collection: Delaware River and Bay Authority (operator of the Delaware Memorial Bridge); the Delaware River Joint Toll Bridge Commission (operator of seven bridges connecting New Jersey and Pennsylvania); Burlington County Bridge Commission (operator of two bridges in the Philadelphia area); the Mid-Bay Bridge which crosses the Choctawhatchee Bay in Florida; two bridges operated by Lee County, Florida in the Fort Myers area; and the Grosse Ile Bridge in Michigan (*15*).

The earliest conversions from two-way to one-way toll collection were in 1969 on five of the nine toll bridges operated by Caltrans. (The remaining four Caltrans bridges have all been converted since then to one-way toll collection.) Another early implementation of one-way tolls was on August 12, 1970, when the New York State Bridge Authority, New York State Thruway Authority, and the-then Port of New York Authority instituted one-way tolls at 12 bridges and tunnels along a 130-mile stretch of the Hudson River. At the time of the conversion, "[t]he result [was] a definite speedup of traffic, with no delay in the morning for eastbound traffic paying the double toll" (*37*).

Some toll facilities have featured one-way tolls from the outset, including the Torras Causeway in Georgia, Antioch New Bridge in California, Crescent City Connection Bridge in New Orleans, Louisiana; the George P. Coleman Bridge in Virginia; the Ted Williams Tunnel in Boston, Massachusetts; and the Sanibel Island Bridge in Lee County, Florida.

The most frequently cited benefits of one-way toll collection are reduced staffing requirements and associated cost savings; improved traffic flow; and reduced noise and air pollution levels. Estimated savings from the 1970 implementation of one-way tolls across the Hudson River were approximately 40 percent (*37*). Some negative impacts have also been cited. For example, MTA Bridges and Tunnels estimates that one-way toll collection at the Verrazano-Narrows Bridge results in a $13 million loss of toll revenue annually as a result of drivers diverting up to 14.5 kilometers (9 miles) to take a toll-free trip in the eastbound direction across the Verrazano and a toll-free return trip in the westbound direction through the Port Authority of New York & New Jersey's Holland Tunnel. As noted in a later section, potential conversion to one-way tolls is under review by two agencies at the present time and has been studied but not implemented by several other agencies.

Methods of Payment

Most toll agencies accept a variety of payment methods for tolls. Cash is the only universally accepted method of payment; all toll agency survey respondents accept cash and cash represents an average of 76 percent of toll transaction volume for those respondents. Ticket books are the second-most common method of payment, offered by 16 (39 percent) of the agencies in the survey respondents. Tickets average 11 percent of toll transactions at agencies offering tickets to their customers. Currently, ETC is almost as common a method of toll payment as tickets; 15 (37 percent) of the responding toll agencies offer ETC. Five of those 15 agencies offer postpaid ETC accounts as well as prepaid accounts. Generally, the postpaid accounts are offered only to commercial customers. Where it is offered, ETC represents a significant share of agency transaction volume, an average of 28 percent of toll transactions. Tokens are accepted at only nine (22 percent) of the agencies in the survey respondents but at those agencies, they average 30 percent of the transaction volume.

Other methods of payment are accepted by almost half the responding agencies. The most widely accepted other method of payment is charge accounts or charge cards, available to commercial customers at a number of agencies. At least one facility, Georgia 400, offers an annual pass to customers,

accounting for five percent of that facility's toll transactions. Delaware River Port Authority's current commuter discount program features a decal (purchased monthly and affixed to the vehicle), which then allows commuters to pay a significantly reduced cash toll on each trip.

Types of Toll Lanes

Because cash is universally accepted as a method of payment, all toll agencies must operate at least some staffed toll lanes. For responding agencies that could provide toll transaction breakdowns by type of lane, staffed lanes accounted for 69 percent of toll transactions. Automatic coin/token machines (ACM's) are also common within the toll industry, in operation at 68 percent of the toll agencies responding to the survey and representing 37 percent of transaction volume at agencies operating them. Dedicated ETC lanes within a conventional toll plaza are increasingly common, operated by 14 (34 percent) of the agencies responding to the survey and accounting for almost one-third of the toll transactions at those agencies' facilities. Eight agencies provided data on vehicle speed in dedicated ETC lanes within a conventional toll plaza as follows: Illinois State Toll Highway Authority and Louisiana DOTD report average speeds of 15 miles per hour; Orlando-Orange County Expressway Authority and Transportation Corridor Agencies indicate vehicle speeds averaging 25 mph; Oklahoma Turnpike Authority experiences 30 mph on average; The Port Authority of New York and New Jersey's exclusive bus lane is operated as a dedicated ETC lane during morning rush hours at the Lincoln Tunnel and reports average vehicle speeds of 35 mph; Harris County Toll Road Authority reports a maximum vehicle speed of 35 mph; and Georgia State Tollway Authority and the Transportation Corridor Agencies have high-speed dedicated ETC lanes in their toll plazas that allow vehicles to travel at an average of 60 and 65 mph, respectively. ETC lanes in an open highway configuration are operated by two of the survey respondents (E-470 and Oklahoma Turnpike Authority).

Many agencies operate dual-mode lanes, combining two different types of toll collection mechanisms in the same lane. Based on the toll agency survey responses, ETC in combination with staffed operation and ETC in combination with ACM operation are almost equally common, with the former dual mode operated by 11 (27 percent) of the responding organizations and the latter by 10 (24 percent) of the survey respondents. More rarely, staffed and ACM modes exist in a single lane. For example, the Dallas North Tollway has lanes with toll attendants who can give change to a customer for a dollar bill and deposit the toll in the automated coin basket. Customers with exact change may deposit directly into the basket. Some toll agencies with ticket system roadways also operate unstaffed entry toll lanes with automatic ticket issuing machines.

Contracting Out

More than three-fourths of the toll agency survey respondents report contracting out, or outsourcing, major operational and maintenance functions or services. The single function that is most frequently contracted out is toll equipment maintenance; 16 agencies (39 percent) report outsourcing this service. Other aspects of maintenance are also frequently contracted out, including maintenance of roadways, equipment, physical plant, and motor vehicles. A number of ETC functions are outsourced, including overall ETC operations, customer service center/account management functions, and in-lane equipment maintenance. Toll operations are contracted out by some agencies, including E-470, Georgia 400, Orlando-Orange County Expressway Authority, and the Transportation Corridor Agencies. Sandblasting, painting, annual bridge inspections, pavement marking, consulting engineering, legal services, money counting, armored car services, roadside towing, service area restaurants and gas stations, toll collection hardware and software, sweeping, litter pick-up, and grass cutting were among the other services specifically mentioned as being contracted out by toll agencies.

While most agencies perform some services in-house and contract other functions out, a few agencies operate exclusively one way or the other. Three agencies (E-470, Osceola Parkway, and Transportation Corridor Agencies) report contracting out all operating and maintenance functions; a fourth (Orlando-Orange Country Expressway Authority) contracts out everything except its ETC customer service center. Florida DOT reports contracting out all maintenance and over 90 percent of its toll operations functions. Georgia State Tollway Authority contracts with Georgia DOT for management functions related to its toll operations.

At the opposite end of the spectrum, the following nine agencies report that they currently outsource none of their major toll operation and maintenance functions: Buffalo and Fort Erie Public Bridge Authority, Caltrans, Kentucky Toll Roads, Kansas Turnpike Authority, Rock Island Centennial Bridge, West Virginia Parkways, Maryland Transportation Authority, New Jersey Turnpike Authority, and South Jersey Transportation Authority. These latter three agencies will contract out ETC operations or account management as ETC is implemented over the next several years.

Use of Electronic Toll Collection

Other than as reflected in the survey results reported above, this synthesis does not attempt to present a comprehensive description of the toll industry's use of electronic toll collection. Toll industry experience with ETC was covered in detail in *NCHRP Synthesis of Highway Practice 194: Electronic Toll and Traffic Management (ETTM) Systems.* IBTTA compiles an Annual ETTM System Survey that reports a wealth of data on each ETC program in operation and in planning. Based on the latest survey information available, installations of ETC in the United States have grown from six agencies in 1992 to 17 in 1997. Tags in circulation have increased from under 200,000 to 1.7 million over the same timeframe. Daily ETC transactions were approximately 126,000 in 1992; in 1997, they were almost one million (*38*).

Agencies generally cite one or more of three major motivations for implementing ETC: customer satisfaction, operational benefits (e.g., cost savings), and congestion management. As reflected in the latest IBTTA ETTM survey, customer satisfaction is the most dominant motivation, cited by 82 percent of the survey respondents. Congestion management was a close second, cited by 71 percent of the responding agencies. Operational savings were mentioned as a motivation by 53 percent of the survey respondents (*39*).

Now that ETC technology is in common use, three major issues confront the toll industry. First, as discussed in Chapter 6, proposed ETC standards are under development. Current ETC installations have used off-the-shelf technology or featured regional standards such as those adopted by Caltrans and the E-ZPass Interagency Group. Nationwide interoperability of ETC systems will not be possible without the adoption of a standard technology. A second somewhat related issue is the need for ETC account reciprocity, which would allow customers desiring to use toll facilities of multiple agencies (and possibly even tags of different vendors) to avoid having to set up separate accounts for each agency. Rather, as with automatic bank cards, there would be reciprocal arrangements to transfer funds from an agency with which a customer has an established account to another agency. For example, account reciprocity arrangements have been established by the New York State Thruway Authority, MTA Bridges and Tunnels, and The Port Authority of New York and New Jersey in New York; between Osceola Parkway and Orlando/Orange County Expressway Authority in Florida; and between the Transportation Corridor Agencies and SR-91 in California to maximize customer convenience in ETC markets with substantial customer overlap.

A third ETC issue for toll authorities is integration of ETC technologies with ancillary technologies for video enforcement and automatic vehicle classification. These technologies are essential components of fully automated ETC operations that protect toll agencies from potential revenue loss associated with unauthorized use of an ETC lane (e.g. untagged vehicle evading a toll) or ETC tag (e.g., truck using an ETC tag encoded for use by a car).

Impact of Technology

When surveyed about the impact of technology, toll agencies most frequently cited ETC. A variety of impacts were noted, including positive impact on operations and customers. For example, ETC can reduce toll plaza expansion requirements, thus avoiding capital costs. It can reduce the need for reversible toll lanes. ETC significantly improves toll lane efficiency by allowing greater vehicle throughput per toll lane. A traditional staffed toll lane typically processes 300 to 350 vehicles per hour while ETC lanes can handle from 1,000 vehicles per hour (in a dedicated lane within a conventional toll plaza) to 1,800 vehicles per hour in an open highway or bypass lane configuration. It can also reduce the cost of toll collection, primarily by reducing labor requirements. ETC allowed a few toll agencies to introduce toll discounts. ETC required one agency to revise its toll structure to reflect number of axles instead of number of wheels. While not yet fully exploited, agencies note that ETC offers the possibility of more innovative pricing (e.g., time-of-day pricing) without the negative operational impact associated with non-electronic means of toll collection and the ability to use ETC to stimulate use of toll facilities in under-capacity times and seasons.

Automatic coin machines were also noted as improving toll lane throughput. More broadly, the computerization of toll collection and information systems is credited by agencies with improving accountability, funds security, and recordkeeping.

TOLL CHANGES STUDIED AND UNDER STUDY

Currently, a number of agencies are evaluating modifications to their toll structures or operations. Some form of time-of-day pricing (including congestion pricing, peak/off-peak pricing) is under study by MTA Bridges and Tunnels (jointly with the Port Authority of New York and New Jersey), New Jersey Turnpike Authority, New York State Thruway Authority, and Orlando-Orange County Expressway Authority in Florida. As described in chapter 4, Lee County, Florida is currently planning the implementation of variable pricing on several toll facilities in the Fort Myers area. In the past, several other agencies have tested or evaluated some form of time-of-day pricing, including Harris County Toll Road Authority, the Maine Turnpike Authority, the New Jersey Highway Authority, The Port Authority of New York & New Jersey, Transportation Corridor Agencies, and Caltrans. Reasons for not implementing such changes on an ongoing basis include revenue loss, logistical issues, and the need to take a broader regional view of traffic impacts. Chapter 4 provides a more in-depth analysis of several congestion/variable pricing initiatives.

Ongoing evaluations of issues associated with implementation of new technology are being conducted by the following agencies:

- The Buffalo and Fort Erie Public Bridge Authority is considering using automatic vehicle classification for commercial vehicles based on axle count.
- Delaware River Port Authority, Delaware DOT, and South Jersey Transportation Authority (in the Atlantic City area) are evaluating pricing issues related to their pending introductions of ETC.

Ongoing evaluations of changes in toll structures or pricing are being conducted by the following agencies:

- Orlando-Orange County Expressway Authority (Florida) is considering toll reductions for ETC patrons who carpool.
- New Jersey Turnpike Authority is evaluating volume discounts for commercial vehicles.
- Caltrans is studying the possibility of a temporary toll surcharge for seismic retrofit of its toll bridges.

Changes in toll operations currently under study include:

- The Mackinac Bridge Authority (Michigan) is studying the impacts and costs of a potential conversion to one-way tolls.

- The Massachusetts Turnpike Authority is considering one-way tolls on the barrier system of its Boston Extension.
- The Transportation Corridor Agencies (California) must add tolled HOV lanes by 2010 to comply with their agreements with local agencies.

Several agencies have evaluated but not implemented one-way tolls, including Delaware DOT and the New Jersey Highway Authority.

Fundamental changes in toll structure have been evaluated by some agencies. The West Virginia Parkways, for example, studied and proceeded to implement a conversion from ticket system to barrier operations in 1981. The New Jersey Highway Authority has studied but, to date, rejected the opposite conversion, from barrier to ticket operations and has also studied alternate barrier tolls. The Maine Turnpike Authority is in the final stages of converting from a ticket system to a flat fee operation in conjunction with its implementation of ETC.

CHAPTER FOUR

CASE STUDIES: SELECTED INNOVATIVE TOLLING PRACTICES

INTRODUCTION

This chapter highlights selected innovative tolling practices, principally by use of case studies. Five areas are included: variable/congestion pricing, "HOT" lanes, privatization/public-private partnerships, public-public/interagency partnerships, and innovative financing approaches.

VARIABLE/CONGESTION PRICING

Congestion Pricing Concept

"Congestion pricing" is one of a number of terms used to describe the application of market-based pricing principles to transportation facilities. Although the concepts vary somewhat, other terms include road pricing, variable pricing, differential pricing, time-of-day pricing, peak period pricing, congestion-relief pricing, incentive pricing, full-cost pricing, market pricing, and value pricing. All share the basic principle of attempting to charge users more fully for the cost of their use of a road. Just as utilities and airlines, among others, charge higher prices during peak or high-demand periods, proponents of congestion pricing argue that prices for use of roads should vary in order to increase the efficiency of the roadway system. Higher prices during peak periods provide an incentive for drivers to make more efficient trip decisions. Drivers may choose an alternative (less congested) route, a different time to travel, or an alternative travel mode (e.g., public transit). Drivers making marginal or discretionary trips may not travel at all. The net result will be improved traffic conditions for those still willing to pay more to use the roadway and, overall, a more efficient utilization of scarce roadway capacity.

The congestion pricing concept has a long history in the United States, beginning with William Vickrey, who suggested the use of road charges as a mechanism to ration scarce roadway capacity as early as 1959 (*40*). For many years, the concept was difficult to implement operationally, but the emergence of ETC technology has made variable pricing more feasible. While political difficulties remain, a number of other factors have contributed to increased interest in congestion pricing in recent years, including passage of the Clean Air Act Amendments in 1990, the Intermodal Surface Transportation Efficiency Act in 1991, and the need for transportation agencies to consider such strategies as innovative pricing in the face of constraints on physical expansion of roadway capacity and the need to find new revenue sources.

The literature on the theory of congestion pricing is as extensive as the debate within public policy and transportation circles as to whether and how the theory will work in practice. A number of surveys and other types of market research on the topic have been undertaken in recent years. Some agencies have developed detailed econometric models to assist in evaluating alternative variable pricing scenarios and planning for implementation. (See, for example, "Incentive Tolls for Congestion Management: A Planning Tool for the Port Authority of New York & New Jersey," L.B. Doxsey, presented at TRB Annual Meeting, Washington, DC, January 12–16, 1997). However, within the United States, there is limited experience with actual implementation of congestion/variable pricing strategies. This experience is highlighted in the next section.

To encourage efforts to advance implementation of congestion pricing, ISTEA established a congestion pricing pilot program to provide funding and technical advice toward the planning, design, implementation, and evaluation of selected projects. The balance of this section reviews briefly the current status of the congestion pricing pilot program and highlights a number of actual or pending trials of variable/congestion pricing in the United States. Several of the highlighted cases are part of the pilot program, several others are not.

Overview of FHWA Congestion Pricing Pilot Program

FHWA's Congestion Pricing Pilot Program was established under ISTEA in 1991 to encourage testing and evaluation of congestion pricing projects. The program was authorized to fund up to five such projects, three of which could involve tolls on Interstate highways. Ten projects have been funded by the program, including three actual implementations of congestion pricing (in San Diego, California; Houston, Texas; and Lee County, Florida), one for monitoring and evaluation of variable pricing on the SR-91 express lanes in Orange County, California, and the remaining six for pre-project feasibility studies in Portland, Oregon; Los Angeles and San Francisco, California; Boulder, Colorado; Minneapolis/St. Paul, Minnesota; and Westchester County, New York. Two of these projects involve imposition of variable tolls on an existing toll bridge, the San Francisco-Oakland Bay Bridge and two bridges in Lee County, Florida. A congestion pricing scheme has yet to be approved in San Francisco and the issue of seismic retrofitting of California's bridges has complicated further the state's evaluation of changes in toll structure. The New York State Thruway Authority is studying the feasibility of variable tolls on the Tappan Zee Bridge. It also implemented an incentive pricing pilot program that features peak period tolls for commercial vehicles in the Tappan Zee Bridge corridor, north of New York City, in July 1997. Lee County, Florida will implement an off-peak variable pricing pilot

program in the spring of 1998 at two bridges in the Fort Myers area. Several congestion pricing pilot program projects involve variations on the HOV buy-in concept, which allows drivers in autos not qualifying as HOVs to pay a fee or toll to use a dedicated traffic facility that parallels a free route.

With the enactment of the National Highway System Designation Act of 1995, pilot program funding was withdrawn through the end of 1997. Preliminary provisions of legislation to succeed ISTEA include a proposed Value Pricing Pilot Program.

Hardy Toll Road Off-Peak Pricing Trial

Much of the toll industry's current interest in congestion pricing centers on the potential for increased tolls to reduce congestion in peak traffic periods. The Hardy Toll Road Reduced Rate program, which occurred before ISTEA was even enacted, featured variable toll rates in an attempt, instead, to increase traffic in underutilized off-peak periods. Off-peak discounts were tested for a 3-month period on the Hardy toll road in the Houston, Texas area by the Harris County Toll Road Authority. The test program, from mid-January to mid-April 1990, offered a 50 percent discount to two-axle vehicles from 10 am to 2 p.m. The result was some increase in off-peak traffic (by 20 to 40 percent) (*41*) but those increases fell almost 40 percent short of the incremental traffic volumes needed to offset the revenue loss associated with the 50 percent discount (*42*). The test program was not continued as a result of the revenue loss.

Maine Turnpike Congestion Pricing Field Trials

The 1991 Sensible Transportation Act resulted from a referendum vote in the state of Maine regarding the Maine Turnpike Authority's proposed widening of its southern section from four to six lanes. The widening had been proposed to address seasonal congestion problems during summer weekends south of Portland. The Act prohibited the widening project and required that the Maine Turnpike Authority assess alternatives to roadway expansion.

In 1995, the Authority proposed to study one alternative to roadway expansion: imposing peak hour tolls on Fridays and Sundays through the month of August and Labor Day weekend combined with off-peak toll discounts from July 4th through Labor Day. This combination of incentives was designed to encourage users to shift their travel times from the more congested to less congested periods of time. However, primarily in response to intense lobbying from the state's tourism industry, the Maine Legislature prohibited the turnpike from imposing peak hour surcharges. The Turnpike Authority decided to continue the study using only the off-peak discounts. These discounts were available to drivers with coupons that were distributed on the turnpike and in newspapers. During specified off-peak hours on Fridays and Sundays (3 hours on either side of the peak) over five weekends ending with Labor Day, travel was free with the coupons between York (the southernmost end of the turnpike) and South Portland. The results showed that some people did respond to the price incentives by changing their time of travel. However, "the effects were not consistent across all times and days. Tests of statistical significance using regression analysis showed that only some results were significant" (*24*). Moreover, peak period travel was not significantly reduced on Fridays or Sundays on four of the five weekends of the study period.

In 1996, the Maine Turnpike Authority conducted a second study of discounted tolls by targeting off-peak discounts for frequent travelers over a longer trial period, 10 weeks, including Friday, Saturday, and Sunday. Instead of discount coupons, drivers received a magnetic card pass called a SmartPass, which entitled them to discounts when presented at toll booths along the southern portion of the turnpike during designated off-peak hours (shortened to two hours before and after peak periods). The magnitude of the discount was the same as with the discount coupons, i.e., up to $1.60 per trip or 100 percent of the toll if less than $1.60. SmartPass use was relatively low; only 60 percent of SmartPass holders actually used their passes. Despite the longer trial period, total transactions were significantly lower than those associated with the previous summer's discount coupon program. Of those who did use their SmartPasses, one-third had changed their travel time in order to obtain the discounted toll rates with travel tending to shift earlier rather than later. As in 1995, while there were increases in off-peak travel due to use of SmartPass, there were no significant impacts on weekend peak hour traffic levels.

The conclusion of the two summers of field trials was that using off-peak discounts alone will not be effective in managing peak period traffic on the Maine Turnpike. While the impact of using peak period premium tolls is an open question, they may be used as a means of financing any turnpike capacity expansion ultimately undertaken. Such a strategy "could both allow those who will receive the greatest benefit from a wider road to pay their share of the costs and help manage traffic in the future" (*24*).

Pending Congestion Pricing Pilot Projects

The New York State Thruway Authority recently implemented the Tappan Zee Corridor Congestion Relief Initiative, where it is studying the feasibility of variable tolling on the Tappan Zee Bridge. In a separate but related effort, the Thruway Authority implemented an incentive pricing pilot program for commercial vehicles. This commercial vehicle pilot, begun in July 1997, is designed to encourage commercial vehicle use of alternative routes, particularly during the morning peak in the southbound direction and the evening peak in the northbound direction, and to promote commercial vehicle participation in the E-ZPass program. Specifically, all commercial vehicle tolls doubled at the Tappan Zee Bridge in the morning peak to the same approximate level as on the nearby George Washington Bridge. Truck tolls at Spring Valley, a toll barrier located north of the Tappan Zee Bridge, also doubled in the

evening peak. For non-E-ZPass commercial vehicles, the doubled toll rate is also charged in off-peak hours. No evaluation has been performed to date of this pilot program's results.

Toll rates for noncommercial vehicles have also been modified as part of an overall congestion relief plan in the Spring Valley-Tappan Zee Bridge corridor. Auto tolls were eliminated at the Spring Valley toll barrier. To promote mass transit use, mass transit bus tolls were eliminated through Spring Valley and over the Tappan Zee Bridge. To meet bond covenant requirements, the congestion-relief initiative was designed to be revenue-neutral. To offset any potential negative revenue impact associated with the commercial vehicle incentive pricing program, cash auto toll rates were raised by 50 cents or 20 percent over the previous $2.50 toll. Commuter discount toll rates remain available through enrollment in E-ZPass.

As part of an overall congestion relief plan, physical improvements have been made. The Thruway Authority has reconfigured the Spring Valley toll plaza to provide for higher speed electronic toll collection for commercial vehicles and one-way northbound toll collection.

Longer term, the Thruway Authority is evaluating a more comprehensive incentive pricing program that would cover passenger as well as commercial vehicles. A study already underway includes performing a variety of surveys, focus groups, interviews, and data collection in order to develop a computer simulation model to evaluate alternative incentive pricing schemes. The study is scheduled to be complete by mid–1998 (*43*).

In Florida, the Lee County Department of Transportation will begin implementation of a variable pricing pilot program following the opening of the second of two toll bridges operating within 7 kilometers of each other and the introduction of electronic toll collection in the fall of 1997. Although current congestion levels are not severe, Lee County is interested in using time-of-day pricing to maximize operating efficiency of the two-bridge transportation network and preempt (or at least postpone) the need to invest in additional physical expansion. The county plans to use variable pricing on both the existing Cape Coral Bridge and the new Midpoint Bridge (so named for its location halfway between Cape Coral and two non-tolled bridges) (*44*) to encourage travel in the shoulder hours of the morning and evening peak periods by offering discounts in those shoulder hours equivalent to half the cash or already discounted commuter toll rate. The pilot program will be conducted for 2 years, beginning in April 1998.

A noteworthy feature of this FHWA-funded project is a revenue reserve fund that will draw from FHWA funds to compensate Lee County DOT for any revenue lost through use of off-peak discounts. The revenue reserve fund concept was added to the Congestion Pricing Pilot Program in 1995 to encourage experimentation with variable tolls by existing toll authorities (*45*).

Observations on Potential Toll Authority Use of Congestion/Variable Pricing

A study conducted by Wilbur Smith Associates (WSA) in concert with the Batelle Institute for FHWA in 1995 examined the "Potential for Variable Pricing of Toll Facilities." Some of that study's findings, particularly the anonymous responses received from a survey of toll facility operators, are useful in assessing the prospects for increased use of variable pricing within the toll industry.

The WSA survey indicates that, based on current operating conditions, there is the potential for significant use of congestion pricing by toll authorities; 93 percent of the survey respondents report experiencing some type of peak period congestion (due to heavy commuter traffic volume, weekend use, or seasonal fluctuations). However, no current toll operator reported any actual use of congestion pricing at the time of the 1995 survey. Forty percent indicated that they had considered a congestion pricing toll policy; 60 percent reported they had not. Of the survey respondents within the United States, 45 percent indicated that meeting U.S. Clean Air requirements for Non-Attainment Districts would not dictate consideration of a congestion pricing strategy for their toll facility in the future. Only 18 percent indicated that meeting clean air requirements would dictate consideration of congestion pricing and the remaining 37 percent were not sure.

The WSA survey asked toll agencies to identify obstacles or concerns they associated with implementation of variable tolls on their facilities. Responses fell into five general categories: operational issues, policy considerations, bond provisions, political factors, and other. Table 4 lists the specific responses within each of these categories.

When asked what actions an agency would have to take in order to implement congestion/variable pricing, about half the respondents indicated there could be problems meeting existing stipulations of their Trust Agreements which could require any of a number of steps to resolve, including approval of the agency's Board; approval by the State Legislature; State Transportation Board, State Treasurer, or Governor; a public review and hearing process; bondholder approval; revenue certification by the agency's Traffic Engineer; or banker approval (if revenues would be reduced).

Agencies expressed other concerns associated with implementing congestion/variable pricing, including the need for local political consensus; potential applicability of state environmental requirements; and the impact of politicians and the media.

When asked to rank different variable tolling schemes in terms of their perceived effectiveness, survey respondents indicated that they perceived weekday peak period toll surcharges as being most effective, followed by weekday peak pricing, weekday off-peak toll discounts, and seasonal pricing. Vehicle occupancy discounts were ranked as being perceived as least effective.

The WSA study points out that, since many toll facilities offer discounts to high-occupancy vehicles, such discounts can be considered a type of congestion pricing that provides an incentive to carpool. However, with the exception of a few toll bridges in California that allow HOVs toll-free travel, HOV discount programs have historically experienced low usage levels and therefore provide only a very limited example of variable pricing.

Any application of variable pricing that requires drivers to pay premium tolls to use a facility in peak travel periods may

TABLE 4
TOLL OPERATOR CONCERNS WITH VARIABLE PRICING*

Toll Operations Issues
- Audit/programming of toll collection system/limitations of existing systems
- Collection/control of off-peak period discount, in terms of time
- Public relations/acceptance
- Vehicle operating behavior, e.g., waiting for toll changes
- Administration
- Objective of variable tolls might not be met
- Decrease in toll revenue
- Obtaining reliable traffic data (peak/off-peak)
- Signing
- Needing to tag all vehicles in using ETC to implement

Policy Considerations
- Capacity guidelines for adopting congestion pricing/impact on facility's capacity
- How to handle when pricing times change
- Determining most equitable policy
- Legality
- Ability to quantify expected outcome
- Confidence in the benefits of variable tolls
- Type of vehicles to have variable tolls imposed
- Need for revenue-neutral policy
- Traffic diversions

Bond Provisions
- Trust Agreement stipulations relating to reduced tolls for commuters only, no surcharges within a vehicle class, uniformity of tolls, tolls not being allowed below a certain point
- Bonds detailed future rate increases (ETC versus other lanes)
- Compact requires volume discount pricing for specified time period
- Discount rate may reduce debt coverage and trigger review by rating agencies

Political Factors
- Legislative involvement/reluctance
- Political "backlash" or rejection
- Public hostility
- Opposition by affected communities
- Bi-state agency requires approval by both governors

Other Responses
- ETC is an alternative means of increasing system capacity
- Transportation decision-making already complex and leaves little room for consideration of new ideas
- Variable pricing lacks a constituency
- Motorists divert when toll roads become inconvenient
- New tickets/tokens would be needed for use during off-peak hours
- Need to study impact on toll revenue
- Difficult to implement due to existing discount policy

*Within each category, issues are listed in descending order of frequency cited by survey respondents.

Source: Adapted from "Potential for Variable Pricing of Toll Facilities," FHWA Contract DTFH61-93-C-00055, Wilbur Smith Associates in Association with Battelle Institute, November 1995.

run counter to the existing practice by a number of toll authorities of offering frequent commuters a discount toll program. Eliminating toll discounts, once established, has proven to be difficult. Congestion pricing may be even more so.

Another challenge in implementing congestion/variable pricing is that interagency and interjurisdictional coordination will be required to develop a region-wide approach. Perhaps the proven success of interagency cooperation in ETC implementation can serve as a model for advancing regional variable pricing strategies.

Finally, the way in which electronic toll technology was introduced by the toll industry may complicate any future efforts to implement variable pricing. ETC technology represented a higher level of service for which drivers could have been required to pay premium tolls. Instead, only one toll agency (the Dallas North Tollway) has offered ETC at premium rates; most others have introduced discounts or replicated discounts available through other payment media to ensure high levels of ETC enrollment. Such a strategy may make it difficult for toll agencies to gain customer acceptance of

variable pricing structures that include higher toll rates at these same facilities.

Observations on Public Acceptance of Congestion/Variable Pricing

Various public opinion polls have been conducted, indicating varying degrees of public acceptance. A synthesis of public opinion polls conducted between 1993 and 1996 suggests the following conclusions (*48*):

- If congestion pricing is described simply as a means of reducing congestion, public support is low. Support is higher, however when congestion pricing scenarios include potential use of new capacity (e.g., HOV buy-in for SOV drivers, as described in the next section of this chapter); target only the most heavily used facilities; provide preferential pricing for carpoolers; or remove an unpopular feature of current transportation choices (e.g., removal of highway ramp meters). In other words, congestion pricing must be packaged effectively to ensure market acceptance.
- The proposed use of revenues generated by congestion/variable pricing influences the level of public acceptance. The greatest public support is associated with scenarios where revenues are used for specific vs. general transportation purposes, including the maintenance of the priced facility/facilities or public transit improvements within the priced transportation corridor. Tax reductions or rebates may also be an accepted use of revenues.
- Equity considerations have important but not consistent impacts on the levels of public support for congestion pricing. Traditional equity issues, such as income, may be less important than perceived inequities for such groups as people with long commutes and people requiring daytime use of their vehicles. Some studies have found income levels as unrelated to support for congestion pricing; one poll found, unexpectedly, greater support among lower income respondents.
- Support for congestion pricing appears to be lower than for such alternative means of financing highway maintenance and improvements as tolls and gas taxes.

"HOT" LANES

"HOT" Lane Concept

As its name suggests, High Occupancy/Toll (HOT) lanes combine two concepts: high-occupancy vehicle (HOV) lanes and congestion pricing. Basically, an SOV driver can buy his/her way into using a priority lane designed for free use by high-occupancy vehicles. A distinguishing feature of HOT lanes is that they offer a tolled alternative to a parallel "free" route. HOT lanes may also be referred to as priority lanes. Two areas are advancing this concept as a means to improve usage of existing underused HOV lanes: San Diego, California on I-15 and Houston, Texas on the Katy Freeway (I-10). Both projects received funding under the FHWA congestion pricing pilot program. A third project, the SR-91 express lanes, has not converted an existing HOV lane to a HOT lane but, rather, features newly constructed tolled express lanes. This project is described in this set of case studies because it was the country's first HOT lane and it operates in a similar fashion to other HOT lanes in several ways, including allowing HOV-3s to use the tolled express lanes for free. HOT lanes are also included in the MetroRoad proposal in the Phoenix area, described in the discussion of ongoing state efforts to develop private toll roads in chapter 5.

Enforcement is a challenge for HOT lane operations. The state of the art is evolving with various technologies being used or evaluated to detect the number of occupants in a vehicle. Currently, video methods are more commercially available. Infrared technologies, which base the number of occupants on heat measurements, appear to be very expensive and have problems operating through glass and at high speeds. (*Jeff Woodson, Transformation Systems and Sal D'Agostino, Computer Recognition Systems, Inc., personal communication, September 1997*).

San Diego I-15 "Express Pass"

Using interstate funds, two HOV lanes were built in 1988 along an 8-mile stretch of Interstate 15 north of downtown San Diego. The lanes are operated southbound in the morning and northbound in the evening. The initial impetus for applying congestion pricing to use excess capacity in these lanes in the form of an HOV buy-in came from regional air quality control measures adopted in April 1991. Traffic conditions in the regular traffic lanes along I-15 were highly congested. A grant for a project feasibility study was awarded by the Federal Transit Administration in October 1992. FTA's involvement resulted from the proposed use of revenues generated from selling access to the HOV lanes to help fund transit improvements in the I-15 corridor. Later, FHWA funding was provided for implementation as a congestion pricing demonstration project.

Implementation began with an interim operational scheme using a manual system. Marketed as the I-15 Express Pass, monthly permits (paper tags) were first issued to single-occupant vehicles to use the HOV lanes on I-15 in November 1996. Initially, 500 permits were issued on a first-come, first-served basis at a price of $50 per month. The number of permits issued was based on ensuring only a moderate level of congestion in the HOV lanes during peak hours. The permits were sold out in a single day and 600 more drivers were put on a waiting list (*47*). After 3 months, the number of permits was increased to 700 and the price to $70 per month (*48*). Carpool vehicles (HOVs) continue to use the lanes free. The California Highway Patrol performs enforcement on the lane with the violation fine of $271.

In a second phase of the Express Pass demonstration, targeted to begin in early 1998, fully automated transponders will replace the permit system. Instead of paying a flat monthly fee, drivers will pay a variable per trip fee. Video enforcement will be used. The test will run for 2 years, during which time improved

transit service will be implemented. A consultant study will evaluate possible use of the HOV lanes by trucks (*47*).

Katy Freeway Priority Lane Pricing

The Katy Freeway, part of Interstate 10, in the western part of Houston, Texas, features a single reversible HOV lane approximately 21 kilometers in length. Initially, when the lane opened in 1984, it could be used by vehicles carrying two or more occupants (HOV2+), but this scheme resulted in utilization levels near capacity and, consequently, a lower level of service than what was required to provide an effective incentive for carpooling. Therefore, in 1988, minimum occupancy was raised from two to three persons in the morning peak and by 1990, the evening peak also had to be restricted to HOV3+. However, excess capacity has resulted from this HOV3+ restriction. As traffic congestion on the regular traffic lanes of I-10 worsened, the Metropolitan Transit Authority of Harris County (METRO) and Texas DOT began considering the use of pricing to make more effective use of the HOV lane by allowing a controlled number of HOV2s to pay a fee or toll to use the HOV lane even during the restricted HOV3+ time period. It was estimated that up to 1,200 vehicles (600 in the morning peak hour and 600 in the evening peak hour) could be removed from the regular Katy Freeway traffic lanes without adversely affecting levels of service in the HOV lanes, thereby providing travel time savings for drivers in the HOV lanes and the regular traffic lanes.

A feasibility study of priority lane pricing, specifically of allowing HOV2 vehicles to buy into the HOV3 lane, was conducted by METRO, Texas DOT, and the Texas Transportation Institute using funding from FHWA. The feasibility study included analysis of legal authority, operational feasibility, public acceptance, marketing plan, and pricing strategy (*52*). Based on the results of the study, the priority lane pricing project is scheduled to proceed. All necessary agreements among the three parties involved (Texas DOT, METRO, and FHWA) have been completed with project implementation expected in January, 1998. (*Lloyd Smith, METRO, personal communication, December 16, 1997*).

Although a user benefit analysis concluded that a sufficient market existed to reach the desired HOV lane traffic levels at a per-trip price of $3.50, the test will require a toll of only $2 per trip for two-occupant vehicles to use the HOV lane during peak hours, a price selected as being roughly comparable with toll levels on local toll roads and likely to generate sufficient demand for the buy-in program. The program will be marketed as "QuickRide" and require participants to use a visual identification "hang tag" and an electronic transponder. The per-trip fee will be deducted from a prepaid customer account as in electronic toll collection.

State Route 91 (SR-91) Express Lanes

Although SR-91 is cited as a model of innovative financing, public-private partnerships, and fully automated operations, it is included in this synthesis as a case study on HOT lanes. It was the country's first HOT lane facility, implemented as a privately financed, fully automated 10-mile, four-lane new roadway built in the median of the Riverside Freeway in Orange County, California. The express lanes give motorists on a highly congested roadway the option to pay to use dedicated lanes that are guaranteed to provide a faster trip. Under the terms of the franchise agreement between California Private Transportation Company (a California limited partnership) and Caltrans as authorized by AB-680, CPTC planned, financed, and built the express lanes; transferred their ownership to the State of California; and now operate the facility under lease to Caltrans for a 35-year term. CPTC is allowed to set and adjust toll rates but any net revenues in excess of a negotiated maximum return on investment are used to accelerate repayment of debt issued for the project or deposited into the State Highway Account. The franchise agreement requires free HOV3 travel during the first 2 years of operation.

The SR-91 express lanes opened on December 27, 1995. Through the end of 1996, the variable toll structure included five toll levels, ranging from 25 cents during off-peak periods to $2.50 during peak periods. Although the facility was designed with the technical capability to use dynamic road pricing (where toll rates would be adjusted on a real-time basis in response to changing traffic congestion levels), pre-implementation market research indicated that multiple toll levels that are fixed for specific periods during each day of the week were preferred by customers who could adjust their driving behavior (time of travel, choosing to use vs. not use the express lanes on a particular trip) based on a known level of tolls. A preliminary evaluation of usage patterns indicates that most customers do not, in fact, use the express lanes every day. Only one-third of commuters use the express lanes on a daily basis; another one-third use them on a less than weekly basis (*50*).

To ensure that the express lanes continued to provide the promised superior level of service to customers and in response to growing demand, toll schedule modifications implemented in January 1997 increased tolls by 25 cents at certain times of day (such that the maximum rate was $2.75 in peak periods). Concurrent with the toll rate increase, CPTC introduced the 91 Express Club, targeted at frequent commuters. Drivers may choose the Express Club account option and pay a flat $15 monthly membership fee which then entitles them to a 50 cent per-trip discount.

Project evaluations performed to date caution that a long period of adjustment is required before any conclusions can be reached about the long-term impact of the express lanes. Funding under FHWA's Congestion Pricing Pilot Program was provided for a detailed and comprehensive analysis of various impacts based on a full year of operating performance. When the pricing changes noted above were implemented at the beginning of 1997, the FHWA extended the timeframe for evaluation to encompass a full year of results following those changes so no definitive conclusions will be reached until early in 1998. Nevertheless, "preliminary" results from the facility's first full year of operation have been generally positive. The additional capacity provided by the express lanes has

provided a higher level of service for express lane users, as expected, but it has also resulted in dramatically improved traffic conditions for the free lanes; Caltrans officials report that traffic is running more smoothly than at any time since 1980, improving to bumper-to-bumper traffic for only three vs. four hours of the peak period (*51*). Travel times and queues have improved significantly throughout the corridor. Some of these dramatic improvements in congestion have eroded since the early months of operation but conditions on both the free and tolled lanes remain superior to those experienced before the opening of the tolled express lanes.

Public acceptance has been high—an opinion survey conducted by California Polytechnic Institute at San Luis Obispo indicated that 65 percent of paying express lane customers, 62 percent of free HOV3+ express lane users, and 53 percent of drivers in the adjacent freeway lanes view the project favorably. Many credit the program's success to an effective marketing campaign which, among other elements, featured the slogan "The lane change that could change your life" and emphasized the lanes as "fast, safe, and reliable" (*52*). A very comprehensive public awareness campaign was also conducted.

SR-91's financial results have been noteworthy for a start-up operation. Within the first 3 months, the project covered its operating costs. By 1998, CPTC projects it will cover operating costs and debt service (*51*).

Beyond the longer operating period, SR-91 differs from the other HOT lane projects highlighted here in that the facility was not converted from an existing HOV facility. Rather, it was designed from the beginning to function as tolled express lanes. The facility includes such features as overhead variable message signs to display the toll rate in effect before drivers make the decision to use the express lanes on a particular trip. Another significant difference is that this project added new capacity to a roadway corridor, whereas other projects have had the challenge of improving utilization of existing capacity.

PUBLIC-PRIVATE PARTNERSHIPS

As noted in chapter 2, public-private partnerships are a recent development in the toll industry, established in response to federal and state legislative changes and as a primary alternative to traditional funding sources for highway construction. This section includes case studies on two public-private partnerships that have progressed beyond operational start-up: Transportation Corridor Agencies in California and the Dulles Greenway in Virginia. Ongoing public-private partnership initiatives in four other states (Arizona, Minnesota, South Carolina, and Washington) are reviewed in chapter 5 of this report.

Transportation Corridor Agencies (TCA)

On the continuum of fully public to fully private toll roads, Transportation Corridor Agencies (hereinafter referred to as TCA) provide a model of a "mostly public" toll project (*21*). While administered by one staff, TCA is actually two separate and independent joint power agencies established under the authority of California State law (Chapter 5, Division 7, Title 1 of the Government Code) to finance and develop three different toll road projects in Orange County: the San Joaquin Hills Transportation Corridor, the Foothill Transportation Corridor, and the Eastern Transportation Corridor, with the latter two projects falling under the Foothill/Eastern TCA. "The San Joaquin and Foothill/Eastern TCAs have identical organizational structures, powers, and staff, and they are involved in similar financing arrangements. They are separate agencies with separate books because they cover different geographic areas and hence have different areas on which they can levy development [impact] fees. The debt issued by the agencies is separate" (*4*).

TCA projects have used a variety of funding sources. For the two agencies combined, non-recourse toll revenue bonds accounted for 77 percent of project financing as of June 30, 1996 (*53*).

A second source of TCA funding is development impact fees; this innovative funding mechanism accounted for seven percent of total project funding as of June 30, 1996 (*53*) but project sponsors expect this share to increase in the future. Development impact fees are one-time fees imposed on both residential and nonresidential building permits issued by TCA if the project falls within a defined area of benefit. Altogether, these defined areas of benefit cover 60 percent of Orange County. A traffic model is used to delineate two different fee zones, which are distinguished by the number of trips on TCA roadways that each development is projected to generate. The "A" zones are defined as areas in which eight percent or more of a project's traffic will use TCA roadways. Developers in an "A" zone pay a higher fee than those in a "B" zone. Only four to eight percent of traffic in a "B" zone is projected to use TCA roadways (*54*). Development impact fees also vary by type of development, e.g., for commercial projects, fees are based on square footage.

Development impact fees are based on the concept "that future development within a prescribed area which will benefit from the construction of the corridor should contribute to paying for its construction in proportion to projected corridor traffic demand attributable to the development." Such fees are calculated using rates established and adjusted over time by the TCA Boards of Directors, based on the California Construction Cost Index. Projected development is based on the Orange County-adopted Modified Orange County Projections (*55*).

Residential development impact fees are higher for single-family than multi-family units (*4*). The resulting TCA development impact fee schedule for the Foothill/Eastern Transportation Corridor for the period July 1, 1996 through June 30, 1997 is:

	"A" Zone ($)	*"B" Zone ($)*
Commercial	4.99 per square foot	2.90 per square foot
Single-family housing	3,594 per dwelling unit	2,566 per dwelling unit
Multi-family housing	2,098 per dwelling unit	1,487 per dwelling unit

Development impact fees have been important to TCA projects in contributing up-front money for the traditionally risky pre-construction phase during which raising capital from the bond market can be costly or impossible. Revenue collected from development impact fees was used to fund preliminary engineering, design, and environmental work on the projects. In addition, the concept of development impact fees demonstrated local political support for TCA projects, generated private sector support, and enhanced the marketability of bond issues by providing a revenue source other than tolls that can be used for debt service. As of January 1997, $178 million in development impact fees had been collected by TCA (*54*).

Over time, the financial market's view of TCA use of development impact fees has evolved. In 1993, when $1.2 billion in bonds were issued by San Joaquin TCA, development impact fees were included in the general toll revenue pledge. However, they were considered as a potential cushion of excess revenue subject to real estate market risks and therefore not viable for scheduled debt service payments. By 1995, when Foothills/Eastern TCA marketed $1.5 billion in bonds, financial markets accepted development impact fees as a new financing revenue stream that could be pledged exclusively to amortize $250 million in variable rate debt secured by a bank letter of credit over 14 years. Banks were willing to accept the real estate risk associated with the fees and not declare an event of default if TCA did not meet an established target amortization schedule. "Foothill marked the first time a [bond] issuer received measurable credit for development impact fees" (*56*).

Another innovative funding mechanism used by TCA was a federal line of credit. This mechanism was developed to protect investors and the project from the risk of traffic not materializing as, or as fast as, projected. Caltrans administers these funds, which are available from FHWA. Two $120 million lines of credit were made available to TCA that allow each agency to draw up to $12 million annually on a "use it or lose it basis" for 10 years after construction is completed to pay for capital expenditures, debt service, and operating and maintenance costs. No federal funds would be required unless toll revenues were insufficient to pay debt service after all operating reserves were expended, or the need for extraordinary repairs arose (e.g., earthquake damage or compliance with unanticipated federal or state environmental restrictions). The repayment terms vary depending on the nature of the costs covered by the line of credit. For operating and maintenance costs, repayment is required to begin within 3 years at 48 basis points above a 3-year Treasury rate, whereas for debt service, repayment must be made within 30 years at 48 basis points above the 30-year Treasury rate at the time the draw is made (*57*). Based on an actuarial type analysis as to the likelihood of TCAs actually having to tap these lines of credit, only $17 million in direct federal budget allocations were required. The lines of credit enhanced the marketability of TCA revenue bonds and, by TCA calculations, allowed the two agencies to leverage $157 in private capital for every $1 in federal funds (*53*). As of mid–1997, TCA had not drawn on the federal lines of credit.

TCA has opened roadway segments as they are completed. Like SR-91, ownership of TCA facilities is transferred to the state of California once they are open to traffic. Unlike SR-91, operational responsibility for the roadways is split between TCA and Caltrans. Caltrans assumes responsibility for all operations and maintenance functions except toll collection. TCA has responsibility for toll collection and the authority to collect tolls to cover toll operating and agency administrative costs and debt service until the debt is retired (40 years). Under state law provisions, when the debt is retired, the TCA toll roads will become free facilities and the agencies will cease to exist.

As of mid–1997, the entire 15-mile length of San Joaquin Hills Transportation Corridor from Newport Beach to San Juan Capistrano was in operation and a 7.5-mile segment of the Foothill Transportation Corridor was open to traffic. The balance of the Eastern Transportation Corridor roadways will open in phases in 1999 with the last segment of the Foothill Corridor scheduled to be completed by the year 2003 (*58*).

TCA has been cited for innovative practices other than the use of development impact fees and lines of credit as financing mechanisms. For example, TCA roadways include provision for future potential HOV/transitway operation and offer electronic toll collection as one method of payment for customers. TCA has used a fixed contract price on 85 percent of the overall project cost (*59*). Damage clauses for failure to meet contract milestones and financial incentives (70 percent of net toll revenues from any portion of the project open early (*60*)) were also established for TCA projects. Incentives for early completion in the design-build contract for the roadways in the case of San Joaquin Hills Transportation Corridor (*66*) have made it possible to open ahead of schedule.

Dulles Greenway

Dulles Greenway is at the "mostly private" end of the public-private partnership spectrum. It is a build-operate-transfer facility, which means that the private developer(s) rather than the state own the facility for the franchise term granted by the state. Public sector involvement in this toll road project in northern Virginia just outside Washington, D.C. has been limited to certain approvals prior to construction and regulation by Virginia's State Corporation Commission of toll rates to comply with the 18 percent cap on rate of return set by the terms of the 42.5-year franchise agreement (*4*). Dulles Greenway is a 20-kilometer (14.1-mile) extension of the state-built and operated Dulles Toll Road. The Greenway has been financed entirely by a private sector group of investors, the Toll Road Investors Partnership II (TRIP II), as authorized by Virginia's Highway Corporation Act of 1988, which enabled development of private toll roads. Like their counterparts in California and the four states whose privatization efforts are profiled in chapter 5, Virginia's state legislature was responding to the state's shortage of public funds relative to roadway construction needs (*61*).

TRIP II consists of three equity partners: Magalen Bryant (60 percent share), Autostrade (30 percent) and Brown &

Root, Inc. (10 percent) (*62*). Magalen Bryant is a local resident; Autostrade, an Italian company that operates the Italian toll road system, operates the road; and Brown & Root, Inc., a Houston-based construction company, built the road. These three partners contributed $40 million to the project and obtained $310 million in private financing, representing a combination of long-term fixed rate notes provided by a group of 10 institutional investors and $40 million in revolving credit provided by three banks (*4*).

Construction of the Dulles Greenway was planned to take 30 months but was completed in only 2 years, 6 months ahead of schedule. The facility opened to traffic on September 29, 1995 (*61*). Initially toll rates were $1.75 each way. When traffic did not develop as projected, tolls were reduced to $1.00 (*4*). Within 2 months of this 43 percent reduction in toll rates, daily traffic had increased by 80 percent (*63*). Even with the resulting increase in toll revenue, the roadway was still losing money and investors missed quarterly interest payments, forcing negotiations with creditors to forestall foreclosure (*4*).

Virginia's enabling legislation prohibits the state from bailing out private toll road projects but the state legislature did authorize the speed limit to increase from 55 miles per hour to 65 miles per hour in an attempt to attract more traffic (*4*). The state has also agreed to provide improved signage on feeder and parallel routes to ensure that motorists can find the Greenway. The convenience of interoperable electronic toll collection systems on the Dulles Toll Road and the Greenway (which connect at a single toll plaza where motorists pay one toll to be divided between the two facility operators) may provide some additional incentive for motorists to use the Greenway (*4*).

As Dulles Greenway still lags in traffic relative to initial projections, it is assessing the possibility of using time-of-day pricing or a pro-rated toll structure that would impose variable tolls depending on distance traveled. However, these pricing changes would require costly modification of the road's toll collection system. Recently, the Greenway increased weekday tolls by $.15 and indicated it is evaluating toll discounts for ETC customers as a means of attracting more traffic. Meanwhile, a 6-month "standstill" negotiated with creditors in the summer of 1997 will be used to renegotiate the project's debt (*64*).

Clearly, initial traffic forecasts appear to have been overly optimistic. Development to date in Loudoun County along the Greenway corridor has not occurred at the rates projected. In addition, "[d]emand studies failed to consider that many regular commuters might balk at paying an additional $1.75 on top of an 85-cent toll on the connecting Dulles Toll Road. No marketing surveys were conducted among Loudoun County residents to determine whether enough commuters would be prepared to pay an extra $3.50 a day to save at most 10-15 minutes each way" (*65*).

Compounding the Dulles Greenway's financial difficulties, the widening of Route 7, a competing free alternative roadway, is now to be completed one full year ahead of schedule (*64*). There appears to be some short-term positive impact from traffic diversion to the Greenway resulting from the recently started Route 7 construction, but in the longer term, the improved traffic flow made possible by the Route 7 widening will not help in attracting more traffic to the Greenway.

Studies by financial organizations provide some insight into the start-up difficulties experienced by the Dulles Greenway. Standard & Poors analyzed "the six U.S. public toll facilities—out of a total of 200—that have failed to make timely debt payments [and] found they suffered most from the presence of a free-flowing alternative route nearby" (*66*). Given that development has not progressed as anticipated, Route 7 still offers a relatively uncongested alternative route to Dulles Greenway most of the time (*65*). J.P. Morgan Securities compared actual revenue performance of 14 urban toll roads financed over a 12-year period with original revenue forecasts for those facilities. In only two cases (the Illinois North/South Tollway near Chicago and Georgia 400 in Atlanta) did actual results exceed projections during the first 4 years of operation. For 10 of the projects, "revenues on average missed projections by anywhere from 20% to 75% in the initial years after opening" (*67*). The J.P. Morgan study further found that the "[r]isk of [forecasting] failure clearly goes up the more the road is dependent upon development" (*67*). Ultimately, the Dulles Greenway's financial performance will be driven by the economic development of Loudoun County, leading "most observers [to] think that the long-term prospects for the Dulles Greenway are still excellent" (*65*).

A recently reported statement by TRIP II's Chief Executive Officer may provide the best conclusion on the Dulles Greenway project. "We wouldn't do it as a totally private infrastructure project, if we had to do it again. These projects are only successful as public-private partnerships" (*65*).

INTERAGENCY PARTNERSHIPS

Interagency partnerships include cooperative or coordinated activities among transportation agencies within the same region or among levels of government. These partnerships may be motivated by the desire to pool resources toward a common goal or program (e.g., centralizing traffic management activities); the necessity of interagency coordination to assure success of a particular program (e.g., regional introduction of electronic toll collection); or the attraction of blending federal, state, and local funding on selected projects. One case study, the President George Bush Turnpike in North Texas, is included here as a model interagency partnership that represents aspects of all three motivations.

President George Bush Turnpike

Texas DOT proposals dating back to the late 1960s for an outer loop freeway in the Dallas metropolitan area had gone through various stages of planning and design but the roadway (most recently designated as State Highway 190) had never been built because of funding shortfalls. Recent changes at the federal and state levels allowed Texas DOT (TxDOT) and Texas Turnpike Authority (which already operates the Dallas North Tollway) to forge a new partnership, formalized

in December 1995, to tap federal funding available under Section 1012 of ISTEA using provisions of the subsequent Test and Evaluation-045 initiative (referred to as TE-045). This initiative empowered FHWA to waive ISTEA requirements, thereby extending, in effect, the innovative financing opportunities under ISTEA (*6*). This partnership has developed a plan and obtained financing to accelerate construction of SH-190, now named the President George Bush Turnpike, 15 years ahead of schedule. The project blends funds available from state and federal levels with Texas Turnpike Authority's (TTA) toll revenues and bond issuing capacity to leverage the additional financing required for this $800 million project on the basis of $135 million in federal funds (*68*). The project cost is being financed by a combination of the federal funding, $446 million from bonds issued by TTA, $20 million in contributions from Dallas North Tollway operations, and $225 million in committed construction dollars from TxDOT.

Organizationally, the partnership structure is outlined in two different interagency legal agreements. The first agreement is a three-party agreement among TTA, TxDOT, and FHWA, which covers the terms of the $135 million loan of ISTEA funds flowing through TxDOT, including such provisions as annual audit requirements. The second is a two-party agreement between TTA and TxDOT. This agreement covers detailed provisions in four major areas: 1) disbursement, repayment schedules and other terms applicable to the ISTEA loan; 2) transfer of certain TxDOT assets related to the project to TTA, including rights-of-way already obtained, design work, service roads, interchanges, utility reconstruction contracts, engineering surveys; 3) continuing obligations of the parties regarding turnpike construction, operations, and maintenance and 4) unequivocal TxDOT support for TTA financing, design, construction, maintenance, and operation of the project (*6*). A noteworthy aspect of the ISTEA loan is that it is subordinate to all current and future Dallas North Tollway debt.

Significant FHWA waivers included advancing the loan amount up-front, rather than on the usual reimbursement basis after funds were expended; deferral of loan repayments for 8 years to allow for completion of the project; and a low (4.2 percent) interest rate.

The project required the involvement of seven cities and three counties through which the proposed roadway passes. All had to agree on alignment and request that the project be built as a toll facility (*69*). All have adopted resolutions supporting the turnpike project. The cities are donating an estimated $27.8 million in right-of-way for the turnpike (*68*).

The financial package structured the project as part of the existing Dallas North Tollway system. This system financing approach provided a lower level of risk to bondholders because toll revenues from the existing TTA facilities could be used to provide financial support for the new project during construction and start-up phases. The net result was a lower cost of financing than would have been required to issue bonds for the President George Bush Turnpike as a stand-alone project. Given that the new bonds doubled the Dallas North Tollway debt and were being issued for a new start-up facility, there was concern that there be no negative impact on TTA bond ratings. In order to assure an investment-grade rating and prevent any negative impact on TTA bond ratings as a result of issuing debt for a new facility, a 1:3 debt service ratio was recommended by TTA's investment bankers (*70*). TTA also had to issue $129 million Forward Delivery of Dallas North Tollway Revenue Refunding Bonds (*6*) to assure that, through the construction years, when net revenue available for debt service would be reduced, the debt service ratio of 1:3 would still be met (*6*). This advance refunding also provided an economic benefit to TTA estimated at $6.8 million present value savings. Financing for four different segments of the project was done at the same time to take advantage of low interest rates.

The ISTEA loan is estimated to have saved the TTA more than $180 million in borrowing and debt service costs over the life of the loan (*6*). In addition, as TTA repays the ISTEA loan to TxDOT over a 5-year period following full project completion, these funds will be available for TxDOT loans to other qualified transportation projects in the state. At the 4.2 percent interest rate on the ISTEA loan to TTA, loan repayments to TxDOT will generate almost $187 million to be loaned again for other projects (*6*). In effect, the loan repayments are being used to capitalize a revolving loan fund, similar in concept to state infrastructure banks, which are described later in this chapter. In the meantime, the additional TxDOT funds that would have been required to complete State Highway 190 can be spent on other needed projects.

As with TCA toll roads in California, the President George Bush Turnpike project will be open to traffic as segments of the road are completed. A first segment of the road is projected to open to traffic in early 1998 and the fourth and final segment is scheduled to be in revenue service in 2004. The proposed toll schedule is compatible with toll rates in effect on the Dallas North Tollway ($.50 per mainline plaza) (*68*), which represents 7.6 cents per mile. Project sponsors indicate that other recent start-up toll roads have tolls of 10 cents per mile. Projected annual toll revenues are $47.6 million in 2005, the first full year of operation of the entire 26-mile roadway, and will increase to $89.6 million by 2020 (*68*).

Traffic projections for the new turnpike reflect the continuation of "rapid development and growth for many years [including] residential development, business expansion and relocation, and further commercial development" (*6*) in the economically advantaged areas where the project is located. It appears that market research does demonstrate public acceptance of toll roads, particularly if they provide travel time savings as expected (*71*). TTA experience on the Dallas North Tollway also demonstrates area drivers' willingness to pay for a higher level of service; Dallas North Tollway achieved substantial market penetration with its ETC program, despite a required 5-cent per transaction premium and $2.00 monthly service charge. Finally, there is no free-flowing alternative route to the President George Bush Turnpike.

The FHWA-TxDOT-TTA interagency partnership was created in Texas to address the same basic need as in other states, i.e., a shortfall of funding to support highway construction projects. Other states have pursued a strategy of public-private partnerships to fill the gap between resources and

needs and accelerate delivery of new roadway capacity. The President George Bush Turnpike project represents another innovative model for development of transportation facilities. FHWA has indicated that it will use the tripartite agreement for this project as a model for future ISTEA loans. TTA and TxDOT are already pursuing another similar interagency partnership to propose an international toll bridge in the Laredo, Texas area (*6*).

INNOVATIVE FINANCING APPROACHES

Innovative approaches to financing toll facilities are being actively encouraged by the federal government and pursued by state DOTs, individual toll agencies, and partnerships between and within the public and private sectors. The President George Bush Turnpike case study, for example, noted the use of loans under ISTEA Section 1012. This section, in combination with subsequent provisions of FHWAs TE-045, allows states to lend federal funds to public or private facilities with revenue-generating potential. These loans can be subordinate to other project debt and repaid over an extended period of time. In practice, these loans are most useful as a tool for sharing the risk of a project in its early phases. Standby federal lines of credit have been used as a similar risk-sharing mechanism, as in the TCA projects profiled above.

Another innovative financing approach for new toll facilities that has been proposed to support or generate economic development is to capture, at least in part, the enhanced value of property as a result of the improved transportation access to be provided by the new facility. TCA and E-470 use developer fees as a mechanism to accomplish this; TCA's development impact fees have been a notable part of its overall financing package, as described above.

At least one state (Arizona) is using Grant Anticipation Notes (GANs) as a short-term financing technique to accelerate projects. GANs enable a state to pay the federal share of an awarded grant in advance of actual funding availability. If short-term interest rates are low, this interim or bridge financing can be cost effective. Grant revenues, once received, are used to pay off the GANs (*72*).

Another financing mechanism that FHWA is exploring is development risk insurance. In concept, this type of insurance would be designed to provide at least partial recovery of development expenses (e.g., for environmental studies) incurred by a project in a pre-construction phase (*73*). Development risk insurance is included along with other federal credit enhancement programs in a recently introduced House bill. (*David Seltzer, FHWA, personal communication, September 22, 1997*).

Three other categories of innovative financing approaches are described in more detail below: state infrastructure banks, shared resource agreements, and transportation utility fees.

State Infrastructure Banks

As part of the National Highway System Designation Act of 1995, Congress authorized a State Infrastructure Bank (SIB) Pilot Program for up to 10 states. Designed to complement traditional funding programs, SIBs allow states the flexibility to customize financial assistance to meet the needs of specific transportation projects by choosing from a range of financing techniques including various loan and credit options. A SIB is a self-sustaining, revolving loan fund initially capitalized by federal and/or state seed money. As loan or bond repayments are made from project-based revenues (e.g., tolls) or general revenues (dedicated taxes), funds can be recycled as loans for other projects. The concept is patterned after state wastewater revolving funds.

Selected states under the SIB pilot program could provide the initial capital required to establish a SIB, in part, by depositing up to 10 percent of most of their federal highway funds for fiscal years 1996 and 1997. Fifteen states applied for the initial 10 slots and the selected states included Arizona, California, Florida, Missouri, Oklahoma, Ohio, Oregon, South Carolina, Texas, and Virginia. An incremental $150 million of US DOT funding was appropriated for fiscal year 1997 to be allocated among the first 10 pilot states. By mid-1997, two states (Ohio and Missouri) had made SIB loans and five or six other states expected to have SIB projects started by the end of the year. Based on the success of the 2-year SIB pilot program, another 29 states were approved for participation in the program in June 1997 (*74*).

Though attractive to many states, the viability of SIBs will depend on a number of factors, including availability of federal funds to provide initial capitalization; a state's ability to identify a sufficient number of revenue-generating projects; the ability to attract increased private investment in transportation projects; and successful resolution of state legal or constitutional issues associated with establishing a SIB or using SIB financing options involving private sector project participants (*75*).

Just as it took individual states time and, in many cases, enabling legislation to pursue the public-partnership concept encouraged under ISTEA, so too will it take time for states to translate the SIB concept into actual practice. A recent General Accounting Office review of each infrastructure bank established under the SIB pilot program concluded that "[b]ecause of its newness, the pilot program will need time to develop and mature, and a comprehensive assessment of SIB's impact on meeting transportation needs can probably be [made] over the long term" (*75*).

Shared Resource Agreements

Several states and transportation agencies have entered into agreements with telecommunications firms to install infrastructure (fiber optics, etc.) along their rights-of-way in exchange for cash or in-kind compensation to the state or agency. Such agreements can be referred to generally as shared resource agreements and represent a new revenue source being exploited by toll agencies (*76*). As an example, the New York State Thruway Authority entered into an agreement that provides for the design, construction, maintenance, operation, and marketing of a six-duct fiber optics infrastructure along its

right-of-way. The authority benefits by receiving its own dedicated fiber optics network at no cost and avoiding significant telecommunications costs in the future. In addition, the authority will share in the revenues generated from the sublease of the ducts and fibers that it does not use. Another shared resource revenue-generating mechanism in use by the New York State Thruway Authority is granting site access to wireless companies. These companies will pay monthly permit fees for site occupancy to install antennas on existing authority-owned towers, buildings, sign posts, bridges and undeveloped right-of-way. (*Anthony Chillemi, New York State Thruway Authority, personal communication, June 13, 1997*).

The Port Authority of New York and New Jersey also earns revenue from shared resource agreements. The agency has rental agreements with various telecommunications companies to use excess duct capacity at four of its six interstate crossings. In 1997, these duct rentals are projected to generate between $650,000 and $700,000 for the agency (*77*).

The New Jersey Regional Electronic Toll Collection Consortium has selected the MFS/Chase Manhattan Bank team to provide systems integration and customer service center functions for its member agencies. The New Jersey Turnpike Authority is the lead agency and other Consortium members are the New Jersey Highway Authority, South Jersey Transportation Authority, The Port Authority of New York and New Jersey, and Delaware DOT. The Consortium is in the process of finalizing contract terms after having accepted an innovative partnership arrangement that will fund the member agencies' ETC programs. One component of the partnership is to generate proceeds from the excess capacity available in the fiber optic cable installed to support ETC communication requirements. The fiber proceeds, along with administrative fees collected for violation enforcement, interest on prepaid customer accounts, and proceeds from new business ventures that build on the E-ZPass customer base, customer service center (CSC) facilities, and/or technical infrastructure, will be used to pay off the capital construction costs over a term of 8 to 9 years and to cover approximately 7 years of CSC operations costs. Beyond the term of the ETC and CSC contract, fiber proceeds (over a 20-year term) and proceeds from the new business ventures will continue to be shared between the contractor and the Consortium. (*Paul Carris, New Jersey Turnpike Authority, personal communication, June 5, 1997*).

Transportation Utility Fees

Transportation utility fees (TUFs) are another innovative financing approach and, in effect, an alternative to the traditional toll mechanism. The basic concept is to treat a road as a public utility and charge developed properties (residential and nonresidential) on the road or within a designated jurisdiction for use just as businesses are charged for use of water, trash collection, and other public services. Funds generated from the transportation utility fees are used to cover operating expenses and improvement projects. Use of these fees requires local legislative action and may be increasingly attractive to municipalities seeking to fund budget shortfalls without major service cutbacks.

Local jurisdictions using TUFs as of the beginning of 1992 were: Fort Collins, Colorado; Medford, LaGrande, Ashland, and Tualatin, Oregon; Austin and Beaumont, Texas; and Soap Lake, Washington. Fees vary—some are a simple flat fee per month per residential and nonresidential unit, while others are more complicated, reflecting trip generation (based, for example, on standard rates provided by the Institute for Transportation Engineers for different land use categories), footage of road frontage, or number of parking spaces (*78*).

Although there may be public and political resistance (and even legal challenges) to TUFs if they are perceived as taxes or special assessments, the municipalities using them have been successful in introducing such fees as user fees "reasonably related to use of public facilities or services." In a case involving Port Orange, Florida, however, a state supreme court ruling held that TUFs proposed there were a hidden tax.

Dedicating TUF-generated funds to road-related purposes has been critical to public acceptance. TUF billing may be combined with other utilities in a unified utility bill. This practice may permit cutting off other public utility services as an enforcement mechanism for payment of TUFs.

There has been little increase in the use of TUFs since 1992. However, TUFs may be a useful road financing mechanism, particularly where statutory authority is granted in advance at the state level. At a minimum, they are noteworthy as one of the growing number of alternative road financing mechanisms available for public and political consideration.

CHAPTER FIVE

LESSONS LEARNED FROM SELECTED STATE PRIVATIZATION EFFORTS

INTRODUCTION

A number of states have enacted enabling legislation and actively pursued a strategy of involving the private sector in building new toll facilities. Some states have succeeded in advancing public-private partnerships through the implementation stage; TCA and SR-91 in California and Dulles Greenway in Virginia are examples of those successes. Other states' efforts are still underway. In an effort to share the experience of states that have yet to see their visions realized, this section summarizes the history, current status, and lessons learned to date from privatization efforts in four states: Arizona, Minnesota, South Carolina, and Washington.

ARIZONA

Arizona's privatization efforts were motivated by the gap between escalating costs to build a 231-mile regional freeway system (RFS) in the Phoenix area and the revenues generated by a one-half cent sales tax approved by voters of Maricopa County in 1985 to provide RFS funding. The sales tax, approved for a period of 20 years, did not generate sufficient revenues because of slower than anticipated local economic growth and escalating construction costs. In 1994, voters rejected raising the sales tax. In response to this funding gap, the state has gone through several rounds of attempts to use "toll roads as a financing mechanism to accelerate highway construction and fund unmet needs" (*79*) and establish partnerships with the private sector in developing needed transportation projects.

Experience with 1991 Privatization Legislation

In 1991, the Arizona State Legislature approved a bill with two articles, Article 1 providing for project proposals solicited by the state and patterned after legislation in California and Article 2 allowing for unsolicited proposals from the private sector, modeled on Virginia legislation. The bill allowed Arizona Department of Transportation (ADOT) "to enter into agreements with private entities for up to four pilot transportation projects. ADOT's original schedule was to begin soliciting proposals in early 1992 with a goal of executing franchise agreements by the end of [that] year" (*80*). To that end, ADOT held a workshop in September of 1991 to review the intent of the privatization legislation and solicit comments and concerns about the program to be followed in establishing the agreements authorized by the legislation. The main concerns expressed by workshop attendees were that the process be expeditious and that it impose a minimal cost on proposers. The workshop was followed by solicitation of statements of interest and a formal Request for Proposal (RFP) process. During the RFP process, a workshop session held with potential proposers kept the process as user friendly as possible. Responses to the RFP included 10 projects from seven different proposers, nine of which were within the Phoenix area. The 10 projects were evaluated and narrowed down to three for further consideration by ADOT. The three projects included $200 million to construct a 4-mile segment of the Squaw Peak Parkway in north central Phoenix 5 years earlier than ADOT's schedule; a $280 million project to complete construction of the final 16-mile north-south leg of the Pima Freeway as much as 10 years earlier than ADOT's schedule; and a smaller ($55 million) project in the western part of the state involving construction of a 30-mile parkway along the Colorado River connecting I-40 in California with State Route 95 to Bullhead City, Arizona and Laughlin, Nevada.

The three selected proposal teams proceeded to prepare in-depth project proposals and initiate a program of community acceptance and support. Lack of public and political support for the Squaw Peak and Colorado River Parkway projects resulted in their being dropped by ADOT. In the Squaw Peak case, the public perceived that they had already paid for this road (through payment of the one-half cent sales tax surcharge approved in 1985) and did not accept the concept that ADOT funds already programmed for Squaw Peak would be freed up for other projects by having Squaw Peak construction assumed by a franchisee under the privatization legislation. The Colorado River Parkway project would have paralleled existing State Route 95. Local residents believed that ADOT had promised that funding would be available to upgrade this existing route and local businesses along SR-95 feared that the new route would divert traffic (and business) from the existing roadway.

The Pima Freeway project enjoyed greater public support as a result of public frustration with ADOT's schedule delays and a desire to see the project opened to traffic from 6 to 10 years earlier than the existing ADOT schedule, as promised by the project's sponsors. The Salt River Maricopa Indian community, however, objected to a toll road being constructed on their community land, so the project was not advanced.

Refining the Privatization Process: 1993 and 1995 Amendments

Building on its experience with this first round of privatization efforts, ADOT realized the importance of a general public awareness program on a community-wide basis in order to gain community acceptance. The Department also introduced new legislation in 1993 that better defined the role of the State Transportation Board in the privatization processes.

About the same time, a private sector consortium, including HDR Engineering, Inc., Snell and Wilmer, and Coopers and Lybrand International, advanced a Valley Urban Expressway 2000 initiative, which proposed tolling all 231 miles of the regional freeway system. This ambitious proposal was not embraced by the public in part because ADOT's freeway construction programs were proceeding relatively well at that time and tolls were not viewed as necessary.

In July 1995, House Bill 2129 became effective, which amended the 1993 privatization legislation. Key amendments included provisions for leasing right-of-way or property by the state, prohibition of state financial participation in event of a private developer's default, an expanded role for public involvement, and a requirement for solicitation of competitive proposals even for unsolicited project proposals. Although the process differs for a solicited versus unsolicited proposal, both types of projects require involvement of the State Transportation Board, in operation since 1973; formal public hearings on proposed agreements; and an advertised public review period prior to State Transportation Board approval or rejection of final agreements. One criterion for Board approval applicable to both types of project proposals is that a reasonable free alternate route must exist. This provision ensures that the driving public, in effect, will always have the choice to pay or not pay tolls. In addition, for both Article 1 and Article 2 projects, the user may "apply for a refund or credit from the state for motor vehicle fuel license taxes, user fuel taxes, or motor carrier taxes paid while operating the motor vehicle on such transportation facility. The [ADOT] director shall establish, by rule, the procedures for granting the refunds or credits" (*81*).

Key differences between Article 1 and Article 2 projects include: (*82*)

- *How the procedure begins*—Under Article 1, ADOT requests proposals. Under Article 2, a private entity may initiate the process. ADOT then seeks competitive proposals.
- *Community involvement*—Under Article 1, ADOT conducts public hearings. Under Article 2, the private entity initiates a public involvement process and obtains local agreements. Public hearings are conducted after these steps are complete.
- *Ownership of facility*—Under Article 1, the facility is state-owned or leased to a private operator. Under Article 2, ownership is by state or private entity, as mutually agreed upon.
- *Type of facility*—Any transportation facility may be considered under Article 1 but Article 2 projects are restricted to highways only.
- *Liability*—The State has liability as with any state-owned property under Article 1 or if state ownership is agreed to for an Article 2 project. If an Article 2 facility is owned by a private entity, the private entity provides liability insurance.
- *Law enforcement*—Under Article 1, the State is reimbursed for services provided. Under Article 2, if the facility is owned by the private entity, the private entity contracts with the state Department of Public Safety and appropriate local authorities.
- *Inspection*—Under Article 1, inspections are performed as required for all state facilities. Under Article 2, ADOT must be given access for periodic inspections.
- *Excess toll revenue*—Article 1 does not specify a particular purpose or fund for excess toll revenue. Excess toll revenue from Article 2 projects must go to a fund for improving roads affected by the facility.

Current Project Status

Under the provisions of the 1993 privatization act, as amended in 1995, ADOT has made significant progress in advancing two toll road proposals, one under Article 2 (unsolicited) and one solicited under Article 1. The current status of each project is described in the next sections.

MetroRoad Proposal

The unsolicited proposal, submitted to ADOT in July 1996 by a team led by HDR Engineering, is referred to as MetroRoad. Estimated costs for this project are $649 million and involve five freeways east of I-10 in the Phoenix area. MetroRoad accelerates construction of a 20-mile segment of the San Tan Freeway as a toll road and adds tolled express lanes on the Superstition and Price Freeways and sections of the Pima, Red Mountain, and San Tan Freeways. Tolls will be collected electronically. Express lanes will be free for buses, motorcycles, and high-occupancy vehicles with three or more occupants, but other passenger cars will pay a monthly express lane access fee of approximately $50 per month, which will also allow unlimited travel on the San Tan Toll Road. For motorists using only the San Tan Toll Road, monthly electronic passes will be available for $10 to $15 a month. Commercial tolls will be approximately double those for passenger cars.

Tolls on all MetroRoad components are designed to be temporary, with the project sponsor estimating that express lane tolls will be removed in 2015 and guaranteeing that the San Tan Highway tolls will be eliminated by December 2008 (*83*). As stated in the MetroRoad proposal, "When the debt incurred to finance, build and operate the new roads is retired, the roads will be turned over to the State debt-free, to be utilized as free roads by everyone. Arizona state law requires this, and the termination of user fees levied by the private sector will be part of the contract with ADOT. Arizona statutes do not permit tolling by the State" (*84*).

The MetroRoad proposal also includes ADOT funding to be spent on "complementary" expenditures on the San Tan Freeway. Under Arizona law, the state cannot pay for toll roads but can build such complementary improvements as traffic interchanges, bridges, and roadway ramps. "Working together, the State and the private sector can complete the freeway many years sooner than the State could accomplish alone" (*84*).

As required by the 1995 amendments to the privatization law, ADOT solicited competing applications in response to the unsolicited MetroRoad proposal in the fall of 1996. The RFP

allowed proposers to submit proposals for all or only selected components of the project as proposed by MetroRoad. No responses were received. Following this RFP process and a legal evaluation and 5 months of preliminary engineering and financial review of the MetroRoad proposal, ADOT recommended and received conditional approval from the State Transportation Board in April 1997 to proceed with the MetroRoad proposal. Under the process established by the state's privatization law, as amended in 1995, conditional approval allows ADOT to proceed with negotiations and public participation to advance the project. Negotiations are now underway, including discussion of legal, operational, financial, social, and engineering issues identified by a Technical Review Committee. A public involvement process, to be initiated by the private sector proposer, will follow completion of a draft franchise agreement, business plan, and marketing plan. Project sponsors indicate that an initial 30 lane miles of the proposed express lanes could be open as early as 1999 with the balance in operation by 2004. An initial segment of the San Tan Toll Road could be in operation by 2002 and the entire roadway by 2004 (*85*).

South Mountain Corridor Project

A second toll road proposal currently under ADOT consideration is for a new 23-mile road in the South Mountain Corridor, west of I-10 in the Phoenix area. Tolls are estimated at 10 cents a mile. In February 1996, ADOT issued an RFP for this project and is proceeding with a proposal submitted by a nonprofit private consortium, the South Mountain Corridor Highway Association, led by Interwest. Estimated costs are $380 million, although an interim version that could be expanded as traffic increases over time is estimated at only $250-$280 million. The South Mountain Corridor project is not as advanced as the MetroRoad project. There has been debate over the precise location of the new road. Homeowners located along the previously approved Pecos Road alignment formed a group to protest the proposal, called South Mountain Alternatives to Regional Transportation (SMART). The Gila River Indian Community indicated a willingness to consider an alternative alignment further south, with 15 miles of the proposed toll road within the Community's boundaries, which would support its economic development plans. However, the financial feasibility of this alternative alignment remains to be determined. ADOT is currently in negotiations with Interwest regarding financial feasibility issues.

The approval process differs between a solicited proposal like the one for South Mountain and an unsolicited proposal like the one for MetroRoad. While ADOT was required to seek conditional approval from the State Transportation Board for the unsolicited MetroRoad proposal prior to contract negotiations and public involvement, it is not required to seek Transportation Board approval for a project associated with a solicited proposal until after negotiating the contract and initiating the public involvement process. ADOT indicates that the earliest date for seeking Transportation Board approval of the South Mountain Corridor toll road project is late 1997.

Current Prospects for Private Toll Roads in Arizona

ADOT is hopeful that both the MetroRoad and South Mountain Corridor toll road projects will become a reality by the beginning of the 21st century. Both projects are being promoted as serving future growth needs in Arizona, and particularly in the Phoenix area, by completing the long-anticipated Regional Freeway System, reducing congestion, improving mobility, increasing driver safety, providing transportation efficiency, and improving air quality. ADOT has been successful in resolving many issues raised by the two projects. Recent public opinion is supportive of temporary toll roads as a means to bring new highway capacity on line faster. ADOT is currently conducting a survey to quantify the level of public support.

A recent local newspaper editorial presents what appears to be an emerging consensus on the introduction of toll roads in Arizona: "Toll roads haven't made much sense here in the past, thanks to federal largesse and the half-cent freeway tax passed by Valley voters in 1985. And everything else being equal, nobody would favor toll roads over freeways. But everything is not equal, and it's now apparent that some major Valley freeway links won't be finished for 10 to 12 years unless a new source of revenue is found. And while polls show the public is not against extending the freeway tax when it expires in 2005, voters object to higher or new taxes to get the job done . . . More than 8 of 10 people surveyed supported temporary tolls if the only option was raising the gas tax . . . . The real question is: What's the downside of building [suburban freeway links] now with user fees that would expire by the time they would have been built with sales tax revenues anyway? . . . As long as the contracts contained air-tight assurances the tolls would be eliminated by the specified deadlines, there really is no good reason not to build the roads now" (*86*). Clearly, some of the support for tolls is simply a preference over other means of funding such as sales or gas taxes. Promised elimination of tolls in the future also appears to have been critical to gaining public acceptance of tolls as a temporary phenomenon. Other arguments in support of advancing the private toll road concept include the ability to turn more attention (and presumably funding) to mass transit (*87*).

However, there are still challenges to overcome to ensure the success of toll roads in Arizona. One is a deeply rooted feeling of some residents, not just limited to Arizona, that toll roads are "fine for those city slickers back east, but let us drive for free in our wide open spaces" (*86*). Some members of the public and state legislature still feel strongly that they've already paid for some of the proposed roadway projects with the one-half cent sales tax. A sense of unfairness and disappointment has resulted from the failure of the sales tax to finance roadway expansion. After 12 years of paying the sales tax, some residents are understandably cynical or skeptical about the prospects for success with other financing mechansims. Still other opposition reflects anti-growth sentiment. The founder of one opposition group, called NotLA, criticizes the roads as mindless growth. Some Phoenix area residents, notably in the East Valley, are concerned that tolls will be

imposed selectively rather than metro-wide. They fear being singled out to pay tolls or serve as guinea pigs, particularly after feeling shortchanged by previous freeway construction projects, which have been concentrated in Maricopa County and the West Valley areas (*88*). In response, ADOT has begun to evaluate the feasibility of HOT lanes regionwide. Finally, the large retired senior citizen population in the Phoenix area is generally not supportive of any proposal that would impose any additional fees or taxes.

Beyond the opposition to the concept of toll roads or to the individual projects, some concerns have been raised about the specific proposers involved in the two toll road projects currently under consideration. Both proposers have stressed the participation of local firms in the projects in an effort to allay the business community's fear that large out-of-state firms would benefit at local businesses' expense. There may also be some public distrust of the private sector's involvement in highway construction and concern that toll road privatization will allow private companies to use public money for their own good.

On balance, the forces supporting toll road development appear to outweigh the opposition. ADOT is confident that both projects currently under negotiation have strong engineering feasibility and proposer teams with the financial wherewithal to deliver. ADOT recognizes that a third factor, public education and marketing, is perhaps the most critical in its efforts to advance toll road operations in the state. (*Bill Hayden, Privatization/Alternative Financing Office, ADOT, personal communication, June 16, 1997*). Only time will tell if efforts in this area can succeed, however, as ADOT advances its toll road privatization program through the crucial stages of contract negotiation and public involvement. In parallel, Arizona is pursuing other innovative financing strategies to complement its privatization efforts. One of those strategies, a state infrastructure bank, was discussed in the last section of chapter 4.

MINNESOTA

Like Arizona, Minnesota has pursued a strategy of involving the private sector in new toll road development as one solution to the growing gap between the availability of transportation funds and project needs. As of mid–1996, Minnesota DOT (Mn/DOT) had identified almost $5 billion in planned, but unfunded, road projects (*36*). Motor fuel taxes, which together with motor vehicle registration fees account for 79 percent of highway funding in the state, have not been increased since 1988 and are not indexed for inflationary increases. More fuel-efficient vehicles have exacerbated further the state's highway funding shortages (*36*). In 1993, responding to these funding shortages, the Minnesota state legislature authorized Mn/DOT to solicit private sector proposals for the development and operation of toll facilities. The state legislature reinforced its commitment to developing new funding mechanisms with a bill in 1994 requiring a road pricing study and a bill in 1995 requiring Mn/DOT to consider the feasibility of alternative financing in the form of congestion pricing, tolls, or mileage-based taxes to fund any highway project over $10 million. The Office of Alternative Transportation Financing was established within Mn/DOT to respond to these legislative mandates and to implement a process for developing toll roads in the state. This office has undertaken a number of activities over the past several years. For example, it conducted a multi-faceted program of public awareness and market research in 1995 to gauge and gain public acceptance of the toll road concept (*89*). The focus in the rest of this section is on its efforts to advance Highway 212 as a new toll road.

Highway 212, known as Trunk Highway or TH 212, is an existing road which, in combination with other roadways, serves as a critical corridor for commuters between suburban communities and I-494 and longer distance trips between western Minnesota and the Minneapolis-St. Paul metro area. Development along the corridor has resulted in increasing traffic congestion (e.g., in 1989 an environmental impact study (EIS) found that 6 of 11 intersections were highly congested during the evening peak hour). Grade and site distance conditions along the existing roadway have contributed to an accident rate higher than on other similar roads. A new alignment of TH 212 has been under study for many years and an EIS was approved in 1992. The selected alignment intersects with Highway 5, another road along the corridor, and would work in combination with improvements on that road to meet projected growth. The Metropolitan Council's (the region's metropolitan planning organization) transportation plan through 2015 includes no funding for the Highway 212 project, although the coterminous portions of TH 212 and Highway 5 are in the plan. As a toll road developed under a design-build contract, Mn/DOT had projected that Highway 212 could be completed at least 15 years earlier than would be possible with federal and state funding.

Highway 212 has progressed through several stages of project development. The first was a feasibility study of operating the road as a tollway, performed in response to an RFP issued by the Southwest Transportation Coalition, which comprised representatives of Mn/DOT, the three affected cities (Chaska, Chanhassen, and Eden Prairie), and the two counties of Carver and Hennepin. In July 1995, Mn/DOT issued an RFP to solicit proposals for and possibly implement private toll roads throughout the state. A proposal for Highway 212 (TH 212) was one of five proposals received in response to this statewide RFP and the only project selected by Mn/DOT for negotiation based on its technical and financial merit and identified community support. The other four proposals did not progress beyond the point in the process at which documentation of community support (a required submission from all proposers) is evaluated (*36*). By 1996, Mn/DOT had negotiated a development agreement with Interwest/DLR Group Infrastructure and the 212 Community Highway Association. The 35-year term of the development agreement contemplated ownership by the 212 Community Highway Association as a not-for-profit entity under a 1963 ruling of the Internal Revenue Service (63-20) to act on the state's behalf in developing a project and issuing associated project revenue bonds (*90*). As a not-for-profit entity, the Association would be able to issue tax-exempt bonds, thus lowering the cost of financing the

project. The Association would be authorized by the state to acquire land on its behalf and to use the acquired property to construct and operate TH 212 improvements and impose tolls until all debt incurred for the project was retired. The Interwest team was to be responsible for construction and initial management of the project. Mn/DOT was to provide project oversight and quality control during design and construction, and maintenance and policing during operation (*91*).

As provided by the state's 1993 enabling legislation, a 30-day veto period follows the Commissioner of Transportation's approval of a proposed development agreement. During this time, any community through which the proposed facility passes has the authority to veto the project. The proposed TH 212 alignment, as approved in 1993 pursuant to an environmental impact study, gave Carver County and the cities of Eden Prairie, Chanhassen, and Chaska that veto authority. All except Eden Prairie voted to support the TH 212 development agreement. Eden Prairie, however, vetoed the project on September 3, 1996 (*92*). Leading up to the vote, there were indications of community opposition. "Specific opposition was raised by residents of Eden Prairie who recently bought homes near the corridor with the belief that no road would be constructed for at least twenty years . . . Participation at the Eden Prairie town meetings [to discuss the project] surpassed 250 residents, with a majority of the attendees voicing opposition" (*36*). In the aftermath of the Eden Prairie veto, which appeared to reflect a Not In My Backyard (NIMBY) attitude, Minnesota is in the process of "re-examin[ing] its position, policy, and approach to administration of toll road legislation" (*93*). As part of this reassessment, Mn/DOT sponsored a one-day workshop in November 1996 attended by decision makers, community leaders, and industry representatives to help establish the future direction for toll roads and identify any needed modifications to the state's laws, policies, and plans. Mn/DOT drew five major conclusions from this workshop, which are quoted below directly from the workshop summary (*94*):

- Although there is no consensus on the premise that tolling is a preferred approach to financing transportation infrastructure, most believe that tolls should remain as a financing tool.
- There is a need for a statewide and metrowide policy or plan regarding tolls, with emphasis on development of selection criteria.
- There is a need for better education regarding the total transportation funding picture.
- It is not appropriate that one community be able to completely stop a project of regional importance. It is imperative that an appeal process be added to the existing toll road legislation if the toll road process is to work under the public-private partnership scenario.
- Tolls need to be considered in context of overall land use policies, transit, and travel behavior.

Several factors other than NIMBY sentiments lead to Eden Prairie's veto. As in Arizona, some opposition to toll roads reflects anti-development preference. A Chaska, Minnesota resident was quoted in the local newspaper as follows: "To me the issue is not what kind of road to make 212, rather it is the necessity of another road at all. People like me move to areas like Chaska to get out of the city, have a little space to call their own and try to capture a sense of community. The trouble is, the city follows" (*95*). Other opponents appear to distrust Mn/DOT's methods and/or motives in developing toll roads and resent use of any of their tax dollars on toll roads that they do not want. As identified at Mn/DOT's workshop, there is not a clear public understanding of how different funding mechanisms are being used and this confusion creates fear of double-taxation. Some project critics fault the state legislature for giving local governments veto authority on projects with broader regional or statewide impact. One week before the veto, the Eden Prairie Sun-Current stated that "granting us [local governments] the power to redirect state transportation policy is neither a good example of the type of control we have been seeking nor a proper exercise of legislative authority" (*96*). Finally, there was concern about the state's lack of an overall strategy for using tolls: "The process is such that Mn/DOT is not looking at the big picture. We wanted a clear strategy of what the future process [of tolls] would be and they have not done that" (*97*).

Mn/DOT remains confident that toll roads as a public venture or a public-private partnership are part of the solution to its transportation challenges. The 1997 State Legislature has reaffirmed its desire to see Mn/DOT pursue tolls and/or congestion pricing as possible funding alternatives. Mn/DOT continues to refine the process for toll road development based on the lessons learned from its experience with TH 212. Specifically, Mn/DOT is undertaking a process to develop a metrowide toll policy and plan. In addition, a congestion pricing demonstration in the Twin Cities metropolitan area is being developed.

SOUTH CAROLINA

The state of South Carolina has four toll road projects under various stages of development. The most advanced project, the Cross Island Parkway on Hilton Head Island, was scheduled to open in late 1997 and is designed as a 5.6-mile toll road alternative to an existing congested 9-mile roadway skirting the Hilton Head beach area. The new parkway will feature both manual and ETC. The approved toll rates ($1 each way for cash-paying drivers and $.50 each way for ETC customers) will provide an incentive for ETC enrollment. Although there is some public hesitation about paying tolls, project sponsors hope that the benefits and travel time savings of the new road will overcome that hesitation.

The Cross Island Parkway has been developed as a turnkey project featuring South Carolina DOT (SCDOT) ownership of the facility and a 10-year contract awarded to Lockheed Martin IMS for design, equipment, and operation of the toll collection facility. Under the terms of the contract, Lockheed Martin IMS will be paid a flat fee per year but that fee would be reevaluated if traffic exceeds certain threshold levels. (*William McIlwain, SCDOT, personal communication, September 1997*).

South Carolina has advanced three other projects as public-private partnerships. The earliest of the three was a Conway bypass, which was originally proposed as a 28.5-mile roadway to meet the needs of the growing tourist area of Myrtle Beach. SCDOT estimated the project would cost $500 million and secured all necessary environmental permits to proceed. However, because state funds were insufficient to finance the project, SCDOT issued a Request for Proposals for private sector design, financing, construction, and (possibly) operation of the project. Three proposals were received and evaluated and presented in a public meeting of the state's Transportation Commission without identification of the specific proposers involved. Based on an objective evaluation of the merits of each proposal, Fluor-Daniels was selected and a guaranteed maximum cost design/build contract was negotiated for $436 million.

Fluor-Daniels proposed that the Conway bypass be financed with a one-cent local option sales tax. This sales tax was projected to cover the Conway bypass project cost and generate an incremental $800 million in revenues that could be used to fund other roads in the state. An important feature of the sales tax proposal was that 80 percent of the revenues generated would be paid by tourists from outside the local area. Imposition of the tax required approval by county referendum. The referendum failed, a result SCDOT attributes to a combination of local residents' unwillingness to accept a tax increase, their disbelief that tourists would pay such a large share of the cost, and a lack of realization of the need to fund the road in this manner rather than the traditional ways.

After the referendum failed to approve the sales tax financing approach, the Governor set up a local committee to develop alternatives. The committee, known as the RIDE committee, downscaled the original project proposal and recommended that the redefined project be financed with a county-imposed 1.5 percent hospitality tax collected by hotels, golf courses, and other tourist venues. The RIDE committee was successful in building a consensus that reconciled the diverse interests within Horry County, including those of the tourist economy of Myrtle Beach, the agricultural area located west of Myrtle Beach, and the environmental community. Additional funding for the Conway bypass project is anticipated from South Carolina's state infrastructure bank, established in 1997. SCDOT may proceed to negotiate a design-build contract for the RIDE alternative with Fluor-Daniels once financing is in place.

The Southern Connector project in Greenville is another public-private partnership initiative in South Carolina. Public acceptance of this project is high with initial Southern Connector proposals dating back to the 1970s. Private financing was proposed by SCDOT to provide funding in the absence of sufficient state and federal funds for the project. Following an RFP process similar to that used for the Conway bypass project, SCDOT selected the Interwest management team from among three proposals.

In May 1996, SCDOT and Interwest entered into an agreement to perform a jointly funded feasibility study. The study included an investment-grade toll study because part of the project was proposed to be a new toll road that would connect to an upgraded interchange with Interstate 85 via a state-financed widening of State Highway 153. The proposed project featured SCDOT ownership of the toll and non-toll portions of the project with a franchise agreement awarded to Connector 2000, a community nonprofit association established under the 63-20 ruling of the Internal Revenue Service. Connector 2000 would issue toll revenue bonds, operate the tolled portion of the project, and be authorized to collect tolls until all project debt was retired. The feasibility study determined that the Southern Connector project was feasible from both financial and engineering perspectives.

Legal challenges to the Southern Connector project were raised by residents with property along the project right-of-way who contended that the project must be approved in a county referendum pursuant to South Carolina's 1995 referendum law. That law established a $150 million threshold for requiring a referendum among county voters, but the law was ruled unconstitutional in early 1997 by the state Supreme Court. In essence, the Supreme Court determined that a county could not override the state's authority. While the state's authority to proceed with the project without county approval was affirmed by this ruling, allegations regarding Interwest's performance on other contracts caused further delays. SCDOT is evaluating those allegations and continues its negotiation of a final development agreement with Interwest.

A final public-private partnership project under development in South Carolina is for an extension to Interstate 526 (the Mark Clark Expressway), proposed as a toll road in the Charleston area to improve mobility and access to the rapidly developing Sea Islands area. This project is in the very early stages of development with a detailed feasibility study and environmental assessments still to be performed. Having overcome the legal challenges to the Southern Connector project (which could also have applied to the Mark Clark Expressway extension project), SCDOT is negotiating with the sole proposer responding to the agency's RFP to progress the project as a privately financed facility.

South Carolina's experience confirms the critical role of public involvement in transportation projects. It also demonstrates the potential for legal challenges to a state's efforts to advance such projects using new institutional models. While SCDOT anticipates further challenges as it advances public-private partnerships, it views them as "hurdles, not walls" (*Larry Duke, SCDOT, personal communication, September 1997*).

WASHINGTON

The state of Washington formally established its Public-Private Initiatives in Transportation program (PPI Program) in 1993 when legislation unanimously approved by the state legislature "allowed the Washington State Department of Transportation (WSDOT) to enter into agreements with private entities to develop transportation projects and to recover some or all of the costs through tolls or other user fees" (*36*). The law explicitly allowed the private sector to make a profit from such projects by giving private partners the flexibility to set toll rates up to a negotiated maximum rate of return. Like

their counterparts in Arizona and Minnesota, the state legislators took action in response to the growing gap between funding resources and transportation needs. The new law gave the state's Secretary of Transportation the authority to select up to six projects for implementation.

The state legislature continued to support the PPI Program by authorizing a $25 million bond issue in 1994 to provide loans and grants for potential projects. Prior to solicitation of project proposals, WSDOT conducted extensive surveys and public outreach, which indicated support for the concepts of private sector involvement in transportation projects and toll/user fees. In 1994, the PPI moved forward with WSDOT's solicitation of conceptual proposals for transportation improvements. In August 1994, six projects (all in the Seattle area collectively representing $2.4 billion) were approved by the State Transportation Commission (WSDOT's governing body) to proceed to negotiate franchise agreements. Subsequently, one project (for improvements in the SR 18 corridor) was dropped.

Citizen opposition developed late in 1994 only after the individual projects were identified. Local opponents expressed NIMBY sentiments and feared they would be singled out to pay tolls while drivers in other corridors enjoyed "free" roads. Other public concerns arose from WSDOT's protection of proprietary information contained in the private companies' proposals. WSDOT's attempt to protect the integrity and confidentiality of a competitive selection process resulted in the public feeling left out of important details about the projects and in suspicions that behind-the-scenes deals were being made with private developers.

In parallel to the emerging public concerns about PPI projects, a statewide anti-tax climate resulted in a dramatic shift after the November 1994 elections. The state's house of representatives ended a decade of Democratic control as Republicans were elected to a majority of the seats. Republicans also held a one-vote majority in the state senate. The newly constituted legislature reacted to the public opposition to PPI projects in a second special legislative session in 1995 by amending the 1993 law to expand the role of public involvement in PPI projects. Specifically, the 1995 amendment requires an advisory vote on privately financed projects by people living in the "affected area" (determined on the basis of the geographic profile of individual users of the facility as well as the communities in which a proposed project is located) (*36*) as a formal demonstration of public support. This new provision is similar in concept to the veto authority granted to local communities by Minnesota, as described above. WSDOT's legal counsel interpreted the amendment requiring an advisory vote on PPI projects to mean that a truly binding vote would have to be on a statewide basis because the projects concern a statewide interest. Resolving who is entitled to participate in advisory votes is one of the many issues WSDOT must address as it attempts to develop public-private transportation projects. Another step required to move the PPI Program forward is a program and financial audit, as required by the 1995 amendment.

The net result of the public opposition and resulting legislative action in Washington is that only two of the original PPI projects are still being advanced. One is for a potential toll road project and involves a proposed franchise agreement with United Infrastructure Company (which already operates SR-91 express lanes in California) to develop a congestion mitigation strategy for the Tacoma Narrows Bridge. Options to be evaluated on this project include a new or expanded bridge and variable pricing. Despite the general controversy over public-private transportation projects, the Tacoma Narrows project has gained political support because it is a critical, and highly congested, component of the Puget Sound regional transportation system. A Washington State Senate Bill (SB 6753) enacted in 1996 "makes it state policy to select a preferred alternative for certain projects before advisory votes are taken among affected citizens." Funding for the environmental and financial feasibility studies needed to present a specific project and toll rate to voters [for the Tacoma Narrows project] will be drawn from a $25 million bond issue authorized in 1994 to support the public-private initiative projects selected by WSDOT (*98*). This new law attempts to strike a balance between local resident concerns and regional and statewide transportation needs. By providing funding during the preconstruction phase, the state is sharing the development risk with private partners on toll road projects. Thus, the state legislature is demonstrating increased support for the PPI program, which the Director of Economic Partnerships for WSDOT attributes to "a better understanding among new legislators of the state's transportation funding alternatives" (*98*). Political opponents of two other toll road projects that were included among the original six selected PPI program projects were successful in getting all state funds for related studies withdrawn so "[t]hose projects are in suspended animation until their private sponsors can build political support for funding in the legislature" (*98*).

The state legislature has directed WSDOT to use a public involvement process to identify future projects but WSDOT also has the option to solicit private proposals. However, legislation in 1995 requires the removal of tolls once the private debt is paid off on any PPI project. As a result, WSDOT has no immediate plans to solicit private proposals that could leave it with the future responsibility for maintaining toll-free facilities built as a PPI project. The state hopes that the Tacoma Narrows Bridge project will continue to be advanced as a public-private partnership that can demonstrate a successful sharing of risks on transportation projects. This project could also lead to greater public acceptance of reevaluating other potential toll road projects in the state.

CONCLUSIONS ON SELECTED STATE PRIVATIZATION EFFORTS

Each of the four states highlighted provides a different model for how to involve the private sector or public-private partnerships in building new toll roads. Each state has faced somewhat unique challenges. Washington suffered from the shift in power in the state legislature at a critical juncture in the state's privatization program. Arizona has the "baggage" of a sales tax surcharge that failed to provide sufficient funding for a long-promised regional freeway system. Minnesota

has enjoyed strong ongoing legislative support but may have suffered from granting too much local control in its project approval process at the expense of statewide transportation policy concerns. South Carolina has experienced, and appears to have overcome, public and legal challenges to its efforts to build new roads. In the final analysis, however, a statement about Washington's experience probably applies to all four states discussed here: "The setbacks largely reflected a gap between the public's expectation for new transportation facilities and its willingness to pay for these facilities through direct user charges . . . " (*36*). Residents in all four states are accustomed to "free" roads and the notion of user fees, i.e. tolls, represents a paradigm shift that is difficult to make. The experience of these four states can be instructive for other states attempting to develop private or public-private toll roads and suggests that the critical success factors are the following (listed in no particular order):

- Clear and consistent support from the state legislature.
- Effective and constructive public involvement program that provides an appropriate structure and level of local input from affected residents and communities.
- Willingness to refine the process based on experience to ensure continued progress or enhance legislative/community support.
- Finding the right balance between an incremental approach and long-term, comprehensive statewide plan for use of public-private partnerships and toll financing in providing new transportation projects.
- Public acceptance of the premise that traditional funding sources are no longer sufficient for critical transportation projects and that, in that context, tolls are a preferred financing mechanism over other funding or "do nothing" alternatives.
- Realistic expectations, persistence, and patience in attempts to overcome deeply rooted resistance to tolls in general as well as public opposition and legal challenges to specific projects.

CHAPTER SIX

CONCLUSIONS

The previous chapters of this report focused on the past and present of the toll industry. This chapter focuses on the future. As a starting point, toll agencies and state DOTs were surveyed on what they saw as the key issues or factors affecting the toll industry of the future. A total of 170 responses were received. These individual responses were consolidated into 11 broad issue categories, which are presented below in descending order of frequency mentioned by survey respondents. This survey perspective is supplemented by information from a literature review and by observations from the Topic Panel that guided the work of this report. A final section presents some broad conclusions on emerging issues that are likely to shape the toll industry of the future.

Technology was the topic of almost half of the individual survey responses. Primary among technology issues affecting the toll industry of the 21st century is standardization of electronic toll collection methods. While interoperability of ETC systems was noted most frequently as a reason for standards, it was also noted that resulting cost reductions may make ETC cost-effective for smaller toll agencies. One agency raised a concern about the impact such standards would have on investments in existing ETC systems.

Independent of standards, ETC will influence the toll industry of the future in a number of other ways. These other influences include, for example, the use of ETC technology for such non-toll applications as traffic and incident management; technological advancement of ETC systems including smart card technology; emergence of clearinghouse arrangements for customers using multiple ETC systems; and ETC system cost issues, including cost overruns on installation and operation.

Technologies that can be considered as ancillary to ETC were noted as important to the toll industry. For example, the development of enforcement systems, including video enforcement systems, and vehicle classification systems is considered essential. Finally, intelligent transportation systems (ITS) and traffic management technologies were cited by toll agencies as being key developments in the industry's future.

Financial issues figured second-most prominently in survey respondents' view of key issues they face. Survey respondents expressed concern with funding generally, with funding developments at both federal and state levels, and with factors having an indirect impact on available funding, such as fuel prices and public resistance to increases in gas taxes. Agencies noted the importance of flexibility and innovation in their ability to tap various funding sources, including increasing revenue from non-toll sources, such as real estate, air rights, or value-added services.

Clearly, the public's acceptance of toll increases will also affect the toll industry's financial outlook. Recent years have seen an increase in the public's demand for accountability in general and this phenomenon may result in greater scrutiny of toll agencies' use of toll revenues, especially in cases where toll revenues may be used, in part, for non-toll facilities.

State infrastructure banks (SIBs) are an important new funding source for the toll industry. Since states need revenue-generating projects to sustain their SIBs, toll facilities are likely candidates for SIB funds. The development of SIBs as an innovative financing mechanism will parallel the toll industry's experience with public-private partnerships in the 1980s and 1990s. Enabling legislation will be required in many states and administrative processes and procedures will be established. Different states will pursue slightly different models for SIBs and their collective experience will be a basis for refining approaches to meet the particular needs and institutional infrastructure within each state.

Another financial development may be the entry of state DOTs into the bond market as they struggle to establish new sources of funding in an era of budget constraints.

Partnerships, broadly defined, were as frequently cited by survey respondents as financial issues. Agencies see the toll industry of the future being shaped by continuation of recent trends in increased privatization and outsourcing of toll operations, public-private partnerships, interagency coordination, and cooperation among federal, state, and local levels of government. As illustrated by the case studies in chapters 4 and 5 of this report, partnerships are viewed within the transportation community as a critical tool in meeting the challenge of building new transportation facilities in the context of public funding shortages and the increasingly obvious inadequacy of traditional funding sources.

A number of *consumer issues* emerged from the toll agency survey as having a major impact on the industry's future. Chief among these is the public's attitude toward tolls—will it be acceptance, support, or opposition? Other issues noted as important include: integration of human behavior with technology; pricing to impact driver behavior; and public opposition to use of high-occupancy vehicles or transit resulting from a reluctance to give up the freedom associated with single-occupant automobile travel.

From the case studies included in this report, it is clear that consumer awareness and involvement are increasingly important factors in successful transportation initiatives. Public awareness campaigns, early and often, are critical in gaining consumer support for projects.

Other consumer issues may affect transportation demand. Employer action, for example, in providing flexible work hours or telecommuting options, may affect driving behavior. Value pricing, as described in chapter 4, will also play a role in shaping consumer behavior in using transportation facilities.

Legislative influences in the toll industry overlap somewhat with financial issues. For example, reauthorization of ISTEA clearly will have an impact on future funding available

to the toll industry. Other legislative developments, at federal and state levels, will continue to be important influences on the industry as it continues to grapple with how to deliver needed projects in the face of resource constraints.

Cost constraints, most particularly rising operating costs for labor and maintenance, are areas of specific concern to toll agencies. The capital cost for rehabilitation projects, particularly for those that will not create new traffic revenues, is also an issue the toll industry will continue to face in the future.

While technology has been touted as cost saving, the ultimate cost impact of technology implementations is unclear. Hopefully, well-documented cost-benefit analyses will emerge as the industry's experience with new technology increases.

Variable or value pricing may become a major tool used by toll agencies to manage traffic demand in the future. Use of value pricing marks a transition from tolls being primarily a simple financial calculation related to a facility's capital and operating costs to tolls becoming a complex instrument of social policy for balancing the increasing public demand for roadway capacity and available scarce resources to provide that capacity.

In the toll industry of the 21st century, variable/value pricing may be expected to go from being a concept to being a reality. As illustrated by the case studies in chapter 4, the earliest and easiest implementations of these pricing concepts have been associated with underutilized HOV lane capacity. New facilities are likely to be able to implement value pricing more easily than existing mixed-use (non-HOV) facilities. Gaining public acceptance of dramatic changes in pricing structure on existing facilities will be a greater challenge due, in large part, to programs such as commuter discounts to which drivers feel entitled.

Environmental issues generally were noted as important by a number of respondents, although no agency cited a single specific environmental issue. The provisions of the Clean Air Act will figure prominently in the toll industry's future. Some urban areas may need to consider the role of toll roads in their overall regional planning and operation of the transportation system, particularly in areas that are not in attainment of Clean Air Act (CAA) standards. In addition, the effects of new toll facilities in meeting the conformity requirements of the CAA within the overall regional transportation and air quality plans will be important. Toll roads that can be shown to reduce vehicular air pollutant emissions in conjunction with congestion management plans may be considered more favorably in the conformity review.

Maintenance issues will continue to be a focus because toll agencies view one of their major missions as providing a safe and sound transportation system for both their customers and employees. Thus, the safety, structural integrity, and general condition of their own facilities and that of connecting roadways will always be a key issue they face, particularly as their infrastructure ages and requires repair, rehabilitation, and replacement.

Several developments within the toll industry will be important in shaping its future. These issues include HOT lanes, integration of toll roads with other transportation systems, and more flexible bond indentures to address changes in the toll industry.

Some factors that will influence the future of the toll industry relate to developments external to the industry itself. Nevertheless, they may have some indirect but significant impact on the toll business. For example, macroeconomic conditions can affect traffic levels, particularly those associated with commercial and tourism activity. Changes in automobile, bus, and truck design may build ETC capability into the vehicle, obviating the need for customers to acquire tags from individual toll agencies. Such a development could provide full interoperability among ETC systems if the hard-wired ETC capability reflects a single technology or national standard. Labor force developments may affect the ability of the toll industry to recruit and retain qualified personnel. Tax code changes may affect financing mechanisms. Finally, the availability of new transportation corridors to support toll facilities may be important given the difficulty of converting existing "free" routes.

The toll agency perspectives mentioned probably provide as good a crystal ball as any other basis for predicting the future. A few emerging issues bear emphasis as key influences on the tolling practices of the 21st century.

Clearly, the end of the 20th century has seen the states looking more and more at tolls as a source of revenues. Their use of tolls as a financing mechanism for new roadway capacity has evolved over the past decade and is likely to continue. Public acceptance has not always been easy to establish but tolls have become more of an accepted economic fact of life in the context of continuing declines in traditional funding sources.

Technology will continue to play a major role in toll road operations, perhaps increasingly so as ETC standards emerge and variable pricing strategies are implemented. Partnerships will play a continuing but evolving role in toll road projects. Public and private sector roles will be refined based on the experience of successful and failed partnership initiatives.

Looking back over the last decade, technology and partnerships appear to have been the two greatest influences in the toll industry. More revolutionary developments in the toll industry may lie ahead. Over the next decade, evaluation of expanding the use of tolling is likely to generate an intense public and political debate, reinforcing the realization that "There are no free roads" (IBTTA's slogan). The debate will highlight the pros and cons of traditional and innovative financing approaches, including public-private partnerships, gas tax or sales tax financing, development or expansion of toll roads, and development impact or transportation utility fees. In the process, new financing mechanisms may emerge. Ultimately, there will be a greater public understanding of the various alternative means of financing road capacity. As one of those financing alternatives, tolls will most likely be an important part of the nation's strategy for ensuring that it can meet the transportation needs of the 21st century.

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GLOSSARY OF TERMS AND ABBREVIATIONS

ACM—Automatic coin/token machines, used in toll lanes to collect tolls from drivers without staffing lanes with toll attendants

B.O.T—Build-operate-transfer facility, one model of project development which features private contractor development, operation, and ownership for negotiated franchise term after which facility ownership is transferred to state or other entity

B.T.O.—Build-transfer-operate facility, one model of project development which features private contractor development, after which facility ownership is transferred to state or other entity with operational responsibility then transferred back to private contractor for a negotiated franchise term. This model is used to transfer liability risk from private contractor to state or other public entity.

CSC—Customer service center generally used to provide back-office accounting and customer service functions for a toll agency's electronic toll collection program

DOT—Department of Transportation

ETC—Electronic toll collection

ETTM—Electronic toll and traffic management, used to refer to a broader range of applications of ETC technology

FHWA—Federal Highway Administration

GAN—Grant Anticipation Notes, a short-term financing technique used by states already awarded federal government grants in advance of actual receipt of funds

HOT Lanes—High-occupancy/toll lanes which typically offer toll-free travel for high-occupancy vehicles and access for non-HOV's for a toll/fee

HOV—High-occupancy vehicle, which can be defined as 2 or more, 3 or more, or 4 or more occupants per vehicle

IBTTA—International Bridge, Tunnel and Turnpike Association, the trade association representing the toll industry worldwide

ISTEA—Intermodal Surface Transportation Efficiency Act of 1991

NIMBY—Not-in-my-backyard, typically used in connection with community opposition to proposed projects based on local impacts

NHS—National Highway System Designation Act of 1995

PPI—Public-Private Initiatives Program, established by state of Washington in 1993

RFP—Request For Proposals

SIB—State Infrastructure Bank

TE-045—Test and Evaluation initiative introduced by FHWA in March 1994

APPENDIX A

Survey Respondents

Buffalo & Fort Erie Public Bridge Authority
Caltrans
Chesapeake Bay Bridge & Tunnel District
Delaware River Port Authority
Delaware Turnpike
E-470 Public Highway Authority
Florida DOT/Turnpike
GA 400
Harris County Toll Authority
Illinois State Toll Highway Authority
Indiana DOT Toll Road Division
International Bridge Authority of Michigan
Kansas Turnpike Authority
Kentucky Toll Roads
Louisiana DOTD/Crescent City Connection Division
Mackinac Bridge Authority
Maryland Transportation Authority
Massachusetts Port Authority
MTA Bridges and Tunnels
New Hampshire Bureau of Turnpikes
New Jersey Highway Authority
New Jersey Turnpike Authority
New York State Bridge Authority
New York State Thruway Authority
Ohio Turnpike Commission
Oklahoma Turnpike Authority
Orlando-Orange Co. Expressway Authority
Osceola Parkway
Pennsylvania Turnpike Commission
Port Authority of New York & New Jersey
Puerto Rico Highway and Transportation Authority
Rhode Island Turnpike/Bridge Authority
Richmond Metropolitan Authority
Rock Island Centennial Bridge Commission
South Jersey Transportation Authority
Texas Turnpike Authority
Thousand Islands Bridge Authority
Transportation Corridor Agencies
Virginia DOT
West Virginia Turnpikes, Economic Development and Tourism

National Cooperative Highway Research Project 20-5, Synthesis Topic 28-11

TOLLING PRACTICES FOR HIGHWAY FACILITIES

SURVEY

PURPOSE OF THIS SURVEY

Recent policy changes, growing resource constraints, and technological developments have increased the attractiveness of using tolls to fund, operate, and maintain highway facilities throughout the United States. This survey will help the U.S. transportation community to understand better the decision-making processes, funding sources and traditional industry practices associated with operating toll facilities. It will also provide a historical perspective on tolls in this country and identify emerging innovations and issues that will shape the toll industry of the future.

Please complete this survey form as directed with typed or printed handwritten responses. You may attach extra pages if necessary, identifying the question number to which any additional pages are applicable.

Please contact Linda Spock or Sally Liff with any questions about the survey.

Linda Spock		Sally Liff	
Phone:	(914) 833-3828	Phone:	(202) 334-3244
Fax:	(914) 834- 7021	Fax:	(202) 334-2527
email:	teslms@ix.netcom.com		

PLEASE RETURN THE SURVEY BY: **February 28, 1997**

TO: Linda M. Spock Consulting
43 Stoneyside Drive
Larchmont, NY 10538

THANK YOU FOR YOUR VALUABLE ASSISTANCE ON THIS PROJECT!

BASIC INFORMATION ABOUT SURVEY RESPONDENT

1. Please provide a contact name, phone number, and fax number for follow-up or clarification on responses included in this survey:

Organization name: _____

Contact name: _____

Phone number: _____

Fax number: _____

2. How and when were you established as an entity/organization? Please indicate and attach, for example, any enabling legislation associated with your organization.

_____
_____
_____

3. Please place a check to the left of the type(s) of facilities operated by your organization

___ Road or turnpike, ticket system
___ Road or turnpike, barrier system
___ Bridge or tunnel
___ Other facility or facilities, please describe:

_____
_____

5. Please provide 1995 data on the following items:

Annual traffic (number of vehicles): _____
Annual toll transactions: _____
Annual toll revenue (in dollars): _____
Miles of roadway operated: _____
(please specify lane miles or system miles)
Number of toll facilities operated: _____

INFORMATION ABOUT SOURCES AND USES OF FUNDS

5. Please check which one(s) of the following sources of funds your organization has used at any point in its history:

___ Tolls
___ Revenue bonds
___ General obligation bonds
___ Other bonds, please specify
_____
___ Motor fuel taxes
___ Property taxes
___ Registration fees
___ Developer fees
___ Utility fees
___ Tax increment financing
___ Federal funds, e.g. grants
___ State funds, please describe: _____
___ Local funds, please describe: _____
___ Other funding sources, please describe _____
_____

6. Please provide any breakdown available (e.g. dollars expended in 1995; percentage of total uses of funds) regarding uses/distribution of all funding and revenues received, particularly for the following purposes:

Debt service (interest on bonds)
Retirement of debt
Cost of toll collection
Other operating and maintenance expenditures
Construction of new facilities
Expansions or extensions of existing facilities
Other transportation purposes
Other businesses or ventures

QUESTIONS ON TOLLING PRACTICES AND POLICIES

7. Has your organization always charged tolls on its facilities from their inception?

____ Yes

____ No

IF NO, please explain briefly, e.g conversion of previously untolled facility:

_____
_____
_____

8. When and how was it determined that your organization's facilities would be tolled?

_____

9. What process was used to establish the initial toll rates on your facilities?

_____
_____
_____

10. Were there any sunset or reauthorization provisions/requirements applicable to your organization's collection of tolls?

___ No

___ Yes

IF YES, please describe, including whether tolls were removed or reduced as a result of such provisions:

_____
_____
_____

11. Please **indicate the relative importance of factors considered** in toll increase proposals. Note that the number "1" should represent the most important factor and you should use as many numbers as needed to reflect all factors considered by your organization.

___ Need for facility or system expansion
___ Forecast capital expenditures
___ Operating and maintenance expenses
___ Policy considerations, please specify (e.g. relationship to mass transit pricing, attempt to reduce congestion, etc.)

_____
_____

___ Impact on performance measures, please specify (e.g. attempt to improve or maintain service levels)

_____
_____

___ Bond covenant requirements
___ Political considerations
___ Other, please list and number as many other considerations as applicable

_____
_____

12. What, if any, legal, regulatory, or legislative oversight or control applies to your organization's setting/raising tolls?

_____
_____
_____
_____

13. What are your organization's practices/statutory requirements with regard to public notices and/or public hearings for proposed tolls/toll increases?

_____
_____
_____
_____

14. What was the average toll collected per vehicle in 1995?

Overall _____
Commercial traffic _____
Passenger vehicle traffic _____

15. On what basis does your organization charge tolls? (alternatively, attach toll rate schedule)

___ Number of axles
___ Vehicle type
___ Weight of vehicle
___ Number of occupants in vehicle
___ Time of day
___ Day of week
___ Number of miles traveled
___ Combination of variables, please specify_____
_____
___ Other, please specify:_____

16. Does your organization charge one-way tolls at any of its facilities?

___ No, tolls are charged in both directions

___ Yes

IF YES, please describe, including how long one-way tolls have been in effect and what impact they have had:

_____
_____

17. Please check which , if any, of the following toll programs/features your organization offers. Please provide or attach a brief description of any such programs.

___ Commuter discounts (monthly pass, unlimited trips)
___ Commuter discounts(fixed/maximum number of trips per month at discounted rate)
___ Bus/mass transit discounts
___ Carpool/high occupancy vehicle (HOV) discounts
___ Commercial vehicle discounts
___ Discounts for electronic toll collection customers
___ Premium (above cash) toll rates for electronic toll collection customers
___ Prepaid/paid-in-advance accounts
___ Postpaid/charge accounts

____ Other, please specify:

_____

_____

18. Please describe any variations in toll rates considered, studied, or tested by your organization but not currently in practice, including the reason(s) any such toll changes were rejected or not implemented beyond a test period. If tested, please describe the impact(s). Please also note any studies underway or planned for variable toll rates. (Attach any relevant reports if available.)

_____

_____

_____

_____

19. Please note and describe your organization's last five toll increases. For example, please indicate the vehicle or customer types for which tolls were increased. Do not include toll increases prior to 1980.

_____

_____

_____

_____

_____

20. Please describe what, if any, impact new technology has had on your organization's toll policies and procedures or on its toll schedule.

_____

_____

QUESTIONS ABOUT METHODS OF TOLL COLLECTION, PAYMENT AND OPERATIONS

21. Please check which one(s) of the following methods of toll payment is/are accepted by your organization and approximately what share of all toll transactions and revenue each represents (on a daily or annual basis).

Check if used:		Percent of transactions	Percent of revenues
____	Cash	____	____
____	Token	____	____
____	Tickets/ticket books	____	____
____	Electronic toll collection, prepaid account	____	____
____	Electronic toll collection, postpaid account	____	____
____	Other, please specify _____	____	____

22. Please check which one(s) of the following types of toll lanes your organization uses and indicate what percentage of transactions are represented by each (on a daily or annual basis):

Check if used:		Percent of transactions
_____	Staffed toll lane	_____
_____	Automatic coin/token machine (ACM)	_____
_____	Dedicated electronic toll collection (ETC) lane in conventional toll plaza, (please specify average or maximum vehicle speed: ___MPH)	_____
_____	Dedicated ETC lane, open highway speeds	_____
_____	Mixed mode ETC/staffed lane	_____
_____	Mixed mode ETC/ACM lane	_____
_____	High occupancy toll lane	_____
_____	Other, please specify_____	_____

23. Please list any major operational and maintenance functions/services contracted out by your organization, e.g. roadway maintenance; electronic toll collection account management; equipment maintenance, etc.

_____

_____

_____

_____

QUESTIONS ABOUT FUNDING VIA BONDS

24. Please list all new-money bond sales directly related to toll facility purposes since 1980, including the year, type, purpose, and dollar amount or each bond issue. Please do not include bond refundings.

_____

_____

_____

_____

_____

BRIDGE TO THE 21ST CENTURY QUESTION

25. Please list up to five influences or issues which you see as having the most impact on the U.S. toll industry over the next decade. These may include such areas as emergence of ETC standards, technological advances (e.g. ETC products; classification or enforcement systems; smart card technology); growth of variable pricing; non-toll applications of ETC technology (e.g. traffic management); legislative or funding developments at either the Federal or state level (e.g. reauthorization of ISTEA); increased interagency cooperation (e.g. to provide for clearinghouse arrangements for customers using multiple ETC systems); or any other issue which affects your organization's toll policies and practices.

THANK YOU FOR YOUR RESPONSES

PLEASE RETURN THE SURVEY TO:

Linda M. Spock Consulting
43 Stoneyside Drive
Larchmont, NY 10538

APPENDIX B

States with Public-Private Partnership Legislation

State	*Year(s) in Which Enacted or Revised*
Arizona	1991, 1993, 1995
California	1989
Colorado	1987
Delaware	1995
Florida	1991
Minnesota	1993
Missouri	1990
Oregon	1995
Puerto Rico	1990
South Carolina	1995
Texas	1991
Virginia	1988, 1995
Washington	1993, 1995

Source: "New Road Ahead: The Development of Public-Private Partnerships in the United States", Paper Presented by Ralph C. Erickson, US DOT, FHWA at the Roads, Transport, and the Economic Session of the 1997 XIIIth IRF World Meeting, Toronto, Ontario, Canada.

THE TRANSPORTATION RESEARCH BOARD is a unit of the National Research Council, a private, nonprofit institution that provides independent advice on scientific and technical issues under a congressional charter. The Research Council is the principal operating arm of the National Academy of Sciences and the National Academy of Engineering.

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The National Academy of Sciences is a nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. Upon the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Bruce Alberts is president of the National Academy of Sciences.

The National Academy of Engineering was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encouraging education and research, and recognizes the superior achievements of engineers. Dr. William A.Wulf is president of the National Academy of Engineering.

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The National Research Council was organized by the National Academy of Sciences in 1916 to associate the broad community of science and technology with the Academy's purposes of furthering knowledge and advising the federal government. Functioning in accordance with general policies determined by the Academy, the Council has become the principal operating agency of both the National Academy of Sciences and the National Academy of Engineering in providing services to the government, the public, and the scientific and engineering communities. The Council is administered jointly by both Academies and the Institute of Medicine. Dr. Bruce Alberts and Dr. William A. Wulf are chairman and vice chairman, respectively, of the National Research Council.

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

ADDRESS CORRECTION REQUESTED