Background Paper #1
National Perspective: Uses of Tolling and Related Issues

Tolling Background and History

Tolling has been used for centuries to finance highways. For example, early road building in the United States relied heavily on private, profit-seeking entities, and the historical remnants of these early turnpikes can be seen in the numerous roads with the "turnpike" moniker. The earliest turnpike in the United States was the Philadelphia and Lancaster Turnpike Road, built in 1795. These early turnpikes ultimately failed, as more efficient canals and then railroads were developed in the mid-1800s.

It was not until the popularization of automobiles in the early to mid-20th century that toll-backed financing gained renewed popularity. Starting with the Pennsylvania Turnpike in the 1930s, state after state embarked on building intercity highways using toll revenue bonds. For the most part, these new highways were developed by special purpose authorities and were financed with bonds backed by the anticipated toll collections. This era of turnpike building extended into the 1950s and early 1960s, but was mostly extinguished by the advent of the Interstate Highway System begun in 1956. Though some of these early turnpikes paid off their debt and removed their tolls, most still operate as tolled facilities, since the need to upgrade, expand, and extend could be funded through continuing toll collection on the original facilities.

The late 1970s and 1980s saw another revival of the toll financing concept, this time focusing on urban expressways in a few fast-growing areas, where traditional revenue sources were inadequate to meet growing traffic demands.

In the 1990s and continuing into the early part of the 21st century, toll facility development continued, this time enhanced by the promise of electronic toll collection to reduce or eliminate the delays commonly associated with traditional toll roads. Electronic toll collection also opened the opportunity for new concepts in tolling, such as high-occupancy toll (HOT) lanes, express toll lanes, truck only lanes, cordon tolling, and mileage-based pricing. Innovations are proceeding at a pace, whereby, it soon may be technically feasible to toll a broad spectrum of other roads, using global positioning satellites (GPS) or roadside short-range radio methods. Though the more recent activity has been more widespread than that in the 1970s and 1980s, tolling continues to be a solution primarily being done by a few states with intense traffic needs.

The advent of electronic toll collection has broadened the potential policy rationale for tolling. Whereas, the historical use of tolling has been to fund high-cost projects, it can now be used to manage congestion on a network with limited capacity. Economists have long argued that using flat user charges (the gas tax) does not reflect the true value of highway travel under congested conditions. Using price to manage demand is used in the airline, hotel, and telecommunications industries, to name a few. With electronic tolling, it can now be used in the highway industry, and many regions are starting to move in that direction.

Definition of Key Terms

There are a variety of terms used to describe the different types of tolling projects in use around the country, and everyone using them does not necessarily use the same terminology. As such, we have provided these definitions as they will be used in this report:

- **Tolling –** This involves charging a direct fee to use a highway, bridge, or tunnel (generically referred to as a "highway" or "toll road" for this report).

- **Pricing –** A subset of tolling, pricing focuses on the use of tolls to manage traffic demand, with revenue generation being a secondary objective. Various adjectives are sometimes used to modify the term pricing: variable-, congestion-, and value-. They all essentially mean the same thing: varying the toll charged based upon the time of day, day of week, and/or real-time traffic conditions in order to appropriately manage traffic. Pricing can be applied to traditional toll roads, bridges, tunnels, or designated highway lanes (i.e., managed lanes as defined below).

- **Traditional Toll Road (or Bridge/Tunnel) –** A highway that requires toll collections from all drivers (usually with the exception of emergency vehicles). Typically, those tolls are used to support operations and maintenance, as well as to pay debt service on the bonds issued to finance the toll facility. The toll rate does not vary by time of day or day of week. Tolls may be collected at a flat rate at toll plazas, or based on distance traveled using tickets, electronic transponders, or video recording of license plates. Many existing traditional toll roads are converting to some form of electronic toll collection, and most new toll projects incorporate the option to pay electronically.

- **Managed Lanes –** Any type of highway lane that is set aside for special use. A managed lane could be a traditional high-occupancy vehicle (HOV) lane (i.e., a lane restricted to vehicles that carry 2+ or 3+ passengers), a truck-only lane, or a bus-only lane. More recently, managed lanes also may refer to highway facilities for which tolled lanes are adjacent to free lanes. Drivers have the option to either pay the toll and use the toll lanes (to take advantage of travel time savings), or use the toll-free lanes instead. HOVs, transit buses, and motorcycles often are allowed to use the toll

lanes at no charge. The appropriate toll amount may be determined according to actual real-time traffic volumes.

The method used to select which highway projects may be good candidates for tolling varies widely from region to region. A comprehensive regional tolling plan could be developed, or the selection process could be done on a case-by-case basis.

The revenue generated from tolls may be used in ways that include, but are not limited to, the following:

- Debt service on new stand-alone projects;
- Debt service on toll road extensions and expansions;
- Capital renewal that does not involve new capacity;
- Operating and maintenance expenses; and
- Cross subsidization of other transportation projects and services, including transit.

Current Trends in Tolling Applications

There are several current trends in the planning and development of new tolling projects, as discussed below.

Existing Systems Leveraging New Capacity

Regions with successful and mature toll roads have a significant advantage when trying to develop new toll projects. Historically, many of the nation's toll roads were developed using revenue bonds, which meant that projects needed to generate enough revenue to cover debt service in the early years. However, once they got through these early years (sometimes with the help of general obligation guarantees), they quickly became money makers, and had excess revenue. Depending on the enabling legislation or relevant bond documents, this excess revenue from the existing system often could be used to subsidize extensions or entirely new toll projects. A few recent examples of new toll projects being developed using system financing or guarantees are highlighted below.

In Texas, toll road authorities in both Houston and Dallas have continued to build new facilities backed by revenue streams from existing systems. In Dallas, the Metroplex Toll Financing System (MTFS) allows TxDOT and/or the North Texas Tollway Authority (NTTA) to make toll projects available for investment by other entities that would then receive returns on their investments, as well as benefit through accelerated project development and completion. Candidate MTFS projects would be those toll projects that can reasonably be expected to generate toll revenues beyond the level necessary to pay debt and expenses. These candidates could be designated MTFS projects and represent an

opportunity for local entities to partner in the investment, thereby, sharing in any surplus revenues generated by the toll project. For example, if City A were to contribute 10 percent of the funding for Project X, then that city would receive 10 percent of the surplus revenues from Project X. This surplus revenue could provide an ongoing funding source for the city to use in other transportation projects. In keeping with the premise of regional project support, first choice to invest in a MTFS toll project would belong to those cities and counties directly affected by a project. Contributions are not limited to cash, but include donated right-of-way, design, or other contributions to the value of the total project.

Also in Texas, the **Texas Mobility Fund** is a revolving fund that is designed to back bonds that are pledged towards the construction of highway projects. The proceeds from the sale of these bonds could be used to finance construction on state-maintained highways, publicly owned toll roads, and any other project that is eligible for the State's Highway Fund.

Other examples of using leverage from mature systems include:

- Florida's Turnpike and other agencies in Florida have built extensive systems of toll projects by using established revenue streams from earlier projects;

- In Massachusetts, excess revenues from the Massachusetts Turnpike Authority, obtained from toll increases, have been used to help close the funding gap in the Central Artery/Tunnel project, most of which is untolled; and

- In New York City, the MTA uses toll revenues from its bridge and tunnel crossings to subsidize its transit operations.

Leveraging the revenue of an existing system can create concerns about interregional and intraregional equity. People may not always be willing to have the tolls collected on "their" part of the system used to support projects on a part of the system that they do not use.

Startup Traditional Toll Facilities

Many regions are turning to tolling to enable construction of limited access highway projects (or bridges/tunnels) that are not being funded through general funding mechanisms. When funding highway projects on a pay-as-you-go basis, it can often take years or decades for enough dollars to be available to pay for a project. With tolling, the dedicated future revenue stream can be bonded, enabling the project development to be accelerated. Recent projects are being developed through the public sector, as well as through public-private partnerships.

Public Sector

Historically, toll roads were developed by special purpose public authorities that raised capital either through the sale of non-recourse revenue bonds backed by toll collections. With non-recourse bonds, shortfalls in toll revenue could result in default. This was the case in most of the major eastern toll roads, such as the Massachusetts, Pennsylvania, and New Jersey turnpikes. In some cases, projects mitigated some of the default risk with backup pledges from government, either through general obligation bonds (where state or local governments pledged tax revenues to make up for any revenue shortfalls from tolls), or limited obligations of specific revenue sources (such as gas taxes).

In the mid-1980s, the toll road system in Harris County (Houston), Texas was financed with bonds backed by both toll revenues and a general obligation pledge of the County. Likewise, in the mid-1990s, the E-470 Public Highway Authority developed a startup toll facility in the Denver region with partial support from a regional vehicle registration fee.

In contrast, the Foothill/Eastern and San Joaquin toll roads in Orange County, California were developed by two public authorities (one for each corridor), largely through the use of non-recourse toll-backed debt.

For some projects, a combination of factors led to toll revenue in the early years to be considerably lower than forecast. Both Houston and Orange County toll road systems opened in the midst of severe economic recessions. This resulted in both financial and public relations difficulties. The E-470 project, in some ways, was the most speculative, as it was heavily dependent upon future traffic growth that would result from development spurred by the road itself. However, the risks inherent in the project were mitigated somewhat by both the pledge of the vehicle registration fees and the funding of deeply subordinated loans by the state DOT and local governments.

It is becoming increasingly difficult for new standalone projects to be self-supporting without revenue pledges from other sources (either non-toll or existing, mature toll facilities). This is probably due to the higher cost of road development. The rates on the Harris County system are about $0.08 to $0.14 per mile, while those on the Orange County projects are $0.13 to $0.23 per mile and the Denver project is $0.18 per mile. By comparison, the toll rate on older, established facilities is much lower: the Illinois Tollway charge has been $0.03 per mile until recently, and the toll rate on the New Jersey Turnpike is $0.04 per mile. Rates on these older facilities have not had to keep pace with inflation.

Public-Private Partnerships

The mid-1990s brought greatly increased interest in the role of public-private partnerships (PPP) in the development of toll facilities. The interest in PPPs for this study is limited to situations where the private sector is responsible for contributing some or all of the capital needed to build a project. This may be contrasted with the *governmentally funded* design-build projects. In design-build projects, the private sector takes responsibility for delivering a project for a fixed price and a fixed date, but the funding ultimately comes from public sources, such as taxes (Federal, state, or local grants or tax-supported bonds).

For PPPs, where the private sector contributes capital, the level of private involvement varies considerably from project to project. For example, the Dulles Greenway project in Virginia and the Camino Colombia project in Texas were actually owned by private investors. Other PPPs have made use of 63-20 corporations, where ownership of the project resides in a publicly appointed nonprofit corporation, such as the Greenville Southern Connector in South Carolina and Pocahontas Parkway in Virginia.

All of these toll PPPs have struggled in their early years, with the Greenway project requiring restructuring of its debt, and the Camino Colombia project recently going bankrupt and closing. The Camino Colombia project was recently bought by the Texas Department of Transportation (TxDOT) for less than one-quarter of its construction cost, and has been reopened.

Many other attempts at developing toll roads as PPPs have failed or been derailed, due to adverse public reaction or the changing needs of the public sector. In recent years, potential public-private toll road projects in Minnesota and Arizona were canceled. The Tacoma Narrows Bridge project in Washington started out as a PPP, but was converted to a traditional, publicly financed toll bridge after public protest over the private sector profiting from a public project. In Chesapeake, Virginia, the Chesapeake Expressway went through its development process with the intent of being financed and operated through a 63-20 corporation, but ultimately, the project ended up being developed and owned by the City of Chesapeake, since much of the risk that was to have been transferred to the private sector had been reduced through the project development process.

Developing toll projects as PPPs is still in its infancy in the United States, with techniques and legislation evolving.

■ Recent Innovations in Tolled Managed Lanes

The advent and rapid advancement of electronic toll collection technology allows for tolling to be applied in ways that were not possible a decade ago, making tolling faster and more convenient for both the drivers and the operating agency. In addition to the increased convenience to toll-paying customers, electronic toll collection allows for pricing to be used for traffic management purposes, in addition to, or even instead of, revenue generation.

Some of these new concepts have been implemented, while others are the subject of proposed legislation or policy discussion. The focus of this working paper is on these recent innovations in tolling, which have primarily been new or enhanced tolled managed lane applications. There are several types of such applications, described below.

HOT (High-Occupancy Toll) Lanes

HOT (High-Occupancy Toll) lanes grew out of the recognition that some traditional HOV lanes were underutilized. HOT lanes allow a single-occupancy vehicle (SOV) to pay a toll to use HOV lanes which have excess capacity. Three HOT lane projects were developed in the mid-1990s: SR 91 Express Lanes, I-15 HOT Lanes, and Katy Freeway QuickRide. In May 2005, the first MnPASS lanes on I-394 in Minneapolis opened to traffic, and the I-25 HOT lane is due to open in Denver this fall. Each of these is described below.

SR 91 Express Lanes

This was the first PPP to emerge in California, and involved the construction of four new express lanes (two in each direction) in the median of the heavily congested SR 91 freeway that connected homes in Riverside County to jobs in Orange County. The express lanes were about 10 miles long, and provided only one entry and exit point at each end. Toll rates were set based on historical traffic information to ensure free flow of traffic, and were intended to maximize revenue for the owner/operator, while maintaining a high level of traffic flow. The project combined innovations in PPPs (design-build development, private operations) with innovations in tolling (variable pricing and all-electronic collection).

The California Private Transportation Company operated the project as a business, focusing on customer satisfaction. They provided such a high level of emergency/safety surveillance that some drivers chose to pay to use the toll lanes even during periods when there was no congestion on the adjacent free lanes. The company also frequently surveyed customers to enhance the customer experience.

The project was an unqualified success. The typical customer used the facility once or twice a week (rather than everyday), but felt as if they received value for the money they paid when they needed to avoid congestion on the adjacent free lanes.

Over time, however, the project came under increasing criticism, especially from commuters residing in Riverside County. A clause in the franchise agreement entered into between the company and the California DOT (Caltrans) limited Caltrans' ability to provide capacity enhancements that competed with the HOT lane project (a so-called "non-compete" clause). Ultimately, the project was sold by the private developer to the Orange County Transportation Authority (OCTA) for a profit. OCTA is moving forward with the capacity enhancements, and has modified the tolling policy to increase traffic flow at lower toll prices.

I-15 HOT Lanes

Around the same time, the San Diego Association of Governments (SANDAG) moved forward with a demonstration project funded in part from the Federal Highway Administration's (FHWA) congestion pricing pilot program (now called value pricing). The project involved conversion of the existing reversible HOV lanes to about eight miles

of HOT lanes. Toll prices are set dynamically, meaning that the traffic volume on the HOT lane dictates the toll price, changing every six minutes to keep traffic at free flow in the HOT lane. This project is not a private venture, and the upfront capital costs were not extensive since the lanes already existed. The only costs were for toll collection and enforcement. Excess revenue from the project is used to support improved transit service in the corridor.

Katy Freeway QuickRide

Another variety of HOT lane project was built in Houston, where an existing reversible single-lane HOV lane was modified to increase the number of drivers using the lane. On the Katy Freeway, HOVs were defined as cars with three or more people during certain peak hours. With the QuickRide program, HOVs with two or more could pay to use the HOV lane during those hours. Use of the lane is by subscription only, and the lane has a few hundred paying customers a day. The program was extended to the U.S. 290 reversible HOV lane in 2000 (for the a.m. period only).

I-394 HOT Lane (MnPASS)

The first HOT lane to open for quite awhile just opened recently in Minneapolis, where the existing HOV lane on I-394 was converted to a HOT lane. The project extends for nine miles in one direction (11 in the other), with part of the project a single lane in each direction, and the remainder two lanes reversible. I-394 is different from previous HOT lane projects in these ways:

- Most of it is a single lane in each direction, with only a double-white stripe separating the HOV/Toll traffic from the general purpose traffic.

- There are zones where there are breaks in the striping to allow drivers to enter or exit the facility. This is in contrast to the single on- and off-points on previous projects.

- There are two tolling zones, and prices change dynamically every three minutes, based on traffic density in the HOT lanes. Drivers are shown the price to use either one or both tolling zones at the beginning of their trip, with the price at entry guaranteed, regardless of any price changes by the time they get to the new section.

- Enforcement of the HOV and tolling is done by roving patrol vehicles. Some patrol cars are equipped with enforcement transponders that allow them to query the transponders of vehicles in the toll lane that do not have more than one occupant.

The project is still new, but early indications have found that about 4,000 people per day use the facility, and that the buffer-separated design is generally being heeded by the public. The algorithms that modify the tolls have been found to be very sensitive to short-term variations in traffic density that result from the "platooning" or grouping of vehicles behind slower vehicles (particularly buses); alternative approaches are being studied. A

recent study by a television news team found that the HOT lane saved about an hour of time over the course of a week's worth of commuting at a cost of about $12.00.

The HOT lanes originally ran for 24 hours a day; whereas, the HOV lanes they replaced only operated during peak hours in the peak direction. However, this has now changed, such that the traffic in the non-peak direction is allowed free access to the HOT lanes. This is because traffic conditions in the general purpose lanes were found to worsen with the take away of the previously non-restricted HOV lanes.

Early findings also are that the lanes are not generating enough revenue to cover operations expenses. This may be due to the change in hours of operation described above.

I-25 HOT Lane

The I-25 HOT Lane Project in Colorado is scheduled to open in spring 2006. This project is a conversion of the existing I-25 HOV facility. State law currently maintains free access for HOV2+, motorcycles, Inherently Low-Emission Vehicles (ILEV), and hybrids. Colorado DOT currently is seeking a change in state statutes for the hybrids to become tolled. The important constraints on this project are as follows:

- The full funding grant agreement between the Federal Transit Administration (FTA) and the Regional Transportation District (RTD) specifies that net revenues must go to transit;

- Bus travel times take precedence over all others using the facility, meaning that the addition of SOV traffic should not impact bus operations; and

- Entering and exiting loading constraints for the facility into the downtown Denver grid network mean that the pricing for this facility will be on a published toll schedule to be updated periodically, rather than with dynamic pricing.

The revenue priorities for this project are to cover operations, maintenance, enforcement, and rehabilitation. The project is not anticipated to generate additional net revenue within the first 10 years of operation.

Summary of HOT Lane Experience to Date

HOT lanes are not one-size-fits-all. Each of the three HOT lane projects developed to date has had different policy motives. The SR 91 project grew out of a desire to increase capacity in a heavily congested corridor, and provided a way for a private partner to develop the project motivated by profit. The I-15 project grew out of a desire to utilize spare capacity on the HOV lanes, as well as the desire to cross-subsidize transit service in the corridor. The Katy Freeway QuickRide program was a way to obtain more productivity out of underutilized HOV lanes during the hours when HOV2s were not permitted to use them.

Express Toll Lanes

As with HOT lanes, express toll lanes are situated next to regular highway lanes. The difference from the HOT lane concept is that with an express toll lane, all personal automobiles using them pay a toll – there are no exceptions made for HOV vehicles. However, transit vehicles and/or registered vanpools would usually be allowed to operate for free. While these lanes typically represent added highway capacity, existing toll-free lanes also could be converted to toll lanes. Express toll lanes also could be located adjacent to traditional toll roads, but employ variable pricing (based on time of day and/ or congestion levels) to maintain free-flowing traffic.

The Tampa-Hillsborough County Expressway Authority currently is building three express toll lanes elevated over the existing Lee Roy Selmon Crosstown Expressway (a toll road), and plans to charge premium tolls for the express service. The Miami-Dade Expressway Authority also has been studying a similar project on its SR 836 toll road. Express toll lanes also are being actively studied in Maryland, Georgia, and Minnesota.

Truck-Only Toll (TOT) Lanes

Truck-Only Toll (TOT) lanes have the potential to improve safety and increase productivity in the trucking industry. One concept is dedicated toll truckways for long-haul truck movements. The toll truckways would be built next to existing roadways, but would be barrier-separated from general traffic to improve safety. The toll truckways could potentially be built to withstand greater vehicle weights, thus, enabling a single truck driver to carry several times the payload than currently is permitted in most states. In theory, truckers would, therefore, be attracted to use the TOT lanes, because the toll cost would be offset by the additional safety and productivity. With the TOT lane concept, a single truckway lane would be provided in each freeway direction of travel, with frequent passing lanes and staging yards near cities or major highway junctions. The concept also could involve a rebate of fuel taxes for mileage spent on the toll truckways. Separating truck traffic from auto traffic also has potential safety benefits by separating vehicles with different operating characteristics into separate traffic streams.

TOT lanes have been studied in the Los Angeles region on SR 60 and I-710, both of which are heavily utilized by trucks accessing the Ports of Los Angeles and Long Beach. The preliminary Los Angeles region studies found that urban TOT lane facilities would need to overcome challenges that include truck trips of short lengths, limited travel time savings during off-peak periods, and significant construction costs and geometric constraints related to adding lanes in an urban environment.

Another TOT lane concept involves urban corridors, which do not necessarily allow longer or heavier vehicles. Such a system of TOT lanes has been recently studied in the Atlanta metropolitan areas, with the findings that TOT lanes had a high potential for relieving congestion, potentially even more than HOV or HOT lanes. Some of the scenarios studied involved the conversion of existing and planned HOV lanes to TOT

lanes. Such a policy would be unprecedented, and be politically very difficult to implement. However, the study does point the way towards the potential for TOT lanes in dense urban regions with heavy truck demands.

Tolled Managed Lane Issues

Tolled managed lane facilities in their various forms are an exciting and promising mechanism to generate revenue, manage traffic congestion, and improve operational efficiency. Some members of the public continue to be skeptical with respect to paying tolls, particularly when toll-free alternatives are available. One of the biggest challenges with tolling involves creating a common understanding of what is being proposed, and the policy or strategic basis for the particular proposal. Some of the key issues surrounding tolled managed lane concepts are discussed below.

All Express Toll Lanes Depend on Congestion

Express toll lanes, whether HOV are allowed in for free or not, depend on congestion to be successful. It is congestion that creates the value offered by a lane managed through pricing. If there is no congestion, there is no need for such a facility. This means that express toll lane solutions are best suited in corridors where there is no opportunity to expand capacity, and where the traffic management potential of toll lanes provides a benefit to all travelers at some time when their personal value of time is high enough to warrant paying extra to be somewhere on time.

Traffic Management Benefits of Toll Lanes Depend on Tolls Forever

Traditionally, people expect tolls to be removed once the debt to finance a facility has been paid off. In the case of express toll lanes, the value of the project depends on the tolls staying on. It is the tolls that create the traffic management benefit, and that benefit will be lost if tolls are removed. This leaves the question of what should be done with the money collected by tolls on a managed lanes system.

Revenue Productivity

How much of the capital cost of a highway improvement can a toll lane project generate? Can it produce excess revenue to subsidize other highway or transit projects? There is a tendency to think that tolling projects can be big revenue generators, but in fact there are likely to be very few applications for which tolling could be fully self-supporting, except for projects that simply involve a conversion of existing general purpose lanes to tolling lanes. The success of express toll lanes depends largely on congestion levels in adjacent lanes. In most metropolitan areas, such congestion only lasts for an hour or two during morning and evening rush hours – typically not enough to pay for an expensive infrastructure project. In addition, the sections of highway with the greatest need for capacity expansion are often the ones with the most geometric constraints – meaning that

the upfront design and construction costs will be high. Increasingly, pricing projects are being considered for their potential traffic management capabilities, regardless of their ability to fund new infrastructure construction.

Policy Justification

It is important to clearly articulate the policy rationale for considering a tolling project. One rationale might be to simply provide a supplemental revenue source to enable a project to be built sooner than it would otherwise. Another might be to provide a congestion-free alternative in places where "building your way out of congestion" with conventional freeway lanes is not possible. Whatever the policy objective is for a particular project, it must be clearly articulated and justified for both decision-makers and the public in order for a new tolling project to be approved.

Equity

Equity considerations may emerge in public discussions, including "Lexus Lane" concerns (i.e., providing a highway lane that is only affordable to the wealthy) and geographic concerns (i.e., why travelers must pay a toll for certain parts of the transportation network, while other parts have no tolls). In some cases, the public also has expressed concerns about the private sector being in the business of collecting and setting tolls for a profit. They may not understand why, if the private sector is able to make a profit on such projects, the public sector does not simply develop the project on its own.

Implementation

Implementing new tolled managed lane projects often have particular challenges. For example, how would cars get in and out of the lanes – any time they want, via special ramps, or with merge/weave zones? Would tolling just happen during peak periods or all day? How would safety be affected? What happens if an accident blocks one or more tolled managed general purpose lane(s) for some period of time?

■ Cordon Pricing

Cordon pricing is a relatively new concept; whereby, vehicles are charged a toll to enter a highly congested area. The concept has been in use in Singapore since 1975, and recently enacted in the central business district portion of London. The concept in London involves a flat toll of £5 to enter the cordoned area during normal business hours. The toll has resulted in a significant reduction in congestion, with the revenue being used to subsidize additional transit services. Generally considered a success, the London cordon charge is expected to be expanded to a larger area.

Conclusions: Tolling Opportunities and Constraints

Clearly, the use of tolling in numerous forms is under intense consideration in many regions of the country. Some states and regions have been successful at advancing the idea that tolls can be used to finance desired highway improvements, while others have struggled to advance proposals beyond the discussion phase. This section explores some of the lessons learned from recent toll project development activities, and the opportunities and constraints for such activities in the future.

Underlying Conditions

Leveraging Existing Toll Facilities Provides a Head Start

Regions that have existing toll assets have an advantage over those just starting out, because they have the ability to leverage the revenue stream from the current facilities. The ability to provide system financing (i.e., apply excess revenues from other parts of the toll enterprise) or to provide loans or seed money, provides new projects in such communities a "head start" over other areas. Areas with existing toll facilities also have a head start on the public relations and political battles regarding the use of tolls in the first place.

Heavy Traffic Congestion Breeds a "Last Resort" Mentality

Places with intense traffic congestion have a greater incentive to move to tolling than those that do not. Especially in areas with rapid growth, traditional public funding is often inadequate to keep up with traffic needs. Often, tolling is a way to advance a project that cannot be afforded for 10 or 20 years. Where congestion is not as pressing an issue, communities may make the choice to wait the extra time for the desired highway projects.

Political Champions Needed

It usually takes an elected official to champion a particular toll project. Without the benefit of an elected champion, projects are less likely to advance.

Electronic Toll Collection Removes One Big Objection

Many people still equate toll roads with congestion at toll booths. With electronic toll collection, most new toll projects are able to offer highway-speed toll collection facilities, which eliminate this objection.

Expectations Versus Reality

It is rare for a startup toll project to be able to be fully self supporting without some kind of credit enhancement or financial contribution. The difficulty of startup toll projects has been demonstrated repeatedly around the country. Various factors contribute to this reality:

- Development costs are high, especially in congested urban areas.

- Projects being built in anticipation of (or to accommodate/encourage) future development are inherently risky. Although development costs in these areas may be lower, potential revenue from traffic also is likely to be more speculative. High population and employment growth rates over extended periods of time are no guarantee of future continuation of such trends. Indeed, normal trends in the business cycle might lead to a situation where the high growth that leads to the pent up demand for a startup toll road stalls by the time the road opens, thereby, impacting early year revenues from a project.

- The full and timely payment requirements of traditional municipal bonds set a high bar for feasibility. Credit enhancements that give projects time to mature are likely to be critical for most projects to be acceptable to investors.

Attempts to mitigate these factors also may exacerbate the toll facility's financial problems in later years. For example, the San Joaquin Hills toll road was built in anticipation of a continuation of intense traffic growth in Orange County. The debt service was structured so that early year payments were lower, but later year payments were higher. The financing also assumed toll rate escalation over time. When growth stalled in Orange County at the opening of the toll road in 1997, the agency struggled to make debt service payments. In traditional financings, this early year pressure ultimately would ease, as traffic grew sufficiently to meet a level debt service payment schedule. However, in the case of the San Joaquin Hills toll road, since debt service increases over time, and toll rates increase over time, traffic never really had a chance to catch up.

The growing acknowledgment of traffic uncertainty in the ramp-up period is being reflected in recent initiatives in the various states. The Florida and Texas case studies show that the states are willing to contribute to the development and early year support of new toll projects. Colorado allows state and local support for toll projects up to 10 percent of the cost (and is exploring how it might incorporate Federal assistance).

Recent activities with FAST lanes projects are recognizing that such projects are unlikely to be self supporting. In Minnesota, a PPP program designed to attract private partners initially anticipated 100 percent private funding; however, over time, the financial realities of such lanes have migrated that thinking toward "how much" the public subsidy will need to be.

Outlook

Whether, where, and how to use tolling to fill gaps in funding for expansion of highway infrastructure comes down to how different regions treat the financial, philosophical, and political questions that toll financing entails.

Questions

1. Should funding for building or expanding corridors be paid from general fuel tax revenues (general user fees), or from user fees generated in the corridor (tolls)?

Texas has all, but made the policy decision to fund new limited-access highway capacity at least partially through tolls. A number of states may be creeping towards that idea, and yet others are not ready to embrace such policies. An important consideration in this question has to do with equity between corridors or regions. Should one corridor be expected to pay its own way, while others benefit from traditional DOT revenue streams? When DOTs do provide backstop financing or seed money, how can they ensure equity around their states?

Such issues are not new, and are not limited to toll finance. When projects are funded with general user fees, the same issue of social equity must be dealt with in the intrastate distributions of public funds. With projects that are partially funded by tolls, another equity issue that arises is related to double taxation – if drivers are paying gas taxes, why should they have to pay again with tolls? If they pay tolls, are they entitled to a rebate on gas taxes? The Massachusetts Turnpike, for example, offers rebates on fuel taxes for drivers that provide documentation of using the Turnpike. Ultimately, the answers to these questions are political, but there are potential answers to why tolls may not be double taxation. For instance, most new toll facilities will not be self-supporting from tolls for many, many years, and the fuel taxes cover the costs not paid for through tolls – thereby allowing the project to be built and provide mobility benefits earlier than with tax-only projects.

One key difference between discussions of toll finance today and a decade or two ago revolves around government involvement. Federal policy still prohibits tolling the Interstates (with the exception of a few pilot projects). States are beginning to realize that they need to play an important role in project finance if new projects are to succeed, and are more open to supporting projects financially through a combination of toll and other tax-based revenues. For example, the Chesapeake Expressway in Virginia is a tolled facility, but state policy-makers recognized early on during project development that it could never be self-sustaining. The State contributed public funds to cover 75 percent of the total capital costs.

2. To what extent should projects have to be self-sustaining?

It is much easier to finance a new toll project if there is an existing stream of revenue from a mature project to provide a source of funds for pooled financing. Such cross-subsidies, while financially desirable, can bring out interregional and intraregional concerns

regarding the allocation of scarce dollars. As noted above in the Dallas/Fort Worth region with the Metroplex Toll Financing System, carefully crafted agreements are possible.

3. What role should the private sector play in developing projects?

Public-private partnerships typically bring innovation, risk transfer, and accelerated completion to the project development process. If the project is financed with toll revenue bonds, PPPs can help structure the debt financing so that it avoids state borrowing limitations. They allow states to avoid debt cap limitations. However, the price of private involvement can include a real or perceived loss of public control. The successful SR 91 project in Southern California is an example where the public gave up control over toll setting and improvements to competing routes, with the ultimate result being a perceived need to buy out the private involvement. Washington and Virginia also have backed out of potential PPP deals to some extent motivated by issues of control. Though not a U.S. project, the current lawsuit in the Province of Ontario between the private owners of the Highway 407 ETR in Toronto and the government over who has the right to set toll rates is a telling example of privatization issues.

4. Are toll lanes an appropriate response to traffic congestion in urban areas?

Toll lanes provide an interesting response to a difficult problem. The conventional wisdom is that "you can't build your way out of congestion," and indeed, the increase in new lane miles has not come close to the increase in vehicle miles of travel over the last few decades in the United States. Toll lanes serve a dual purpose – they bring a funding source (tolls and possibly up-front capital from private partners), and the ability to manage demand through variable pricing.

The use of variable pricing to offer improved reliability to those willing to pay is a new concept in highways, but not new in other arenas, such as air travel and hotel pricing. It also has a long history in other public utilities, such as telecommunications and electricity. While the telecommunications industry has moved away from "congestion pricing" in recent years, and has embraced more of a flat-pricing model, this is because of intense competition among providers, and the fact that the telecommunications system now has lots of excess capacity – certainly not the case for highways.

In the constrained capacity environment of urban highways, using tolls to provide a measure of reliability to the public could be a creative compromise. Most people acknowledge that enough capacity cannot be built to ward off congestion problems. However using prices to keep lanes flowing when people really need them is a concept that might gain favor over time. The policy rationale for providing partial public subsidies for such toll lanes is fairly solid as well – when people pay to use the express lanes, they free up capacity in the "free" lanes, thereby, benefiting everyone. And when a particular traveler really needs the uncongested capacity in those cases where their own value of time is high enough to warrant paying the toll, they will be happy the lanes are available.

Express toll lanes are being advanced in several places right now, and time will tell the extent to which they can achieve political acceptance and achieve the objectives intended.

At current and anticipated future levels, the motor fuel tax will be inadequate to satisfy all the highway construction demands in areas where new highways are still needed. In most of the country, toll-revenue financed projects can be expected to be successful at closing some of this revenue gap in a limited number of locations where conditions are most favorable.

Background paper prepared by Cambridge Systematics, Inc., with assistance from PBS&J and Texas Transportation Institute in January 2006.

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