

Advancing Congestion Pricing in the Metropolitan Transportation Planning Process: Four Case Studies

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16. Abstract Road pricing often has come about separate from the traditional metropolitan planning process through pilot projects and demonstrations. As pricing demonstration projects have shown road pricing to be an effective tool, there is a growing need to incorporate road pricing into long-range plans. This study examined how road pricing was incorporated into long-range planning at four metropolitan planning organizations (MPOs) to provide examples that could support other regions seeking to do the same. The study summarized the experience in the Dallas/Fort Worth region, the Puget Sound region, the Minneapolis/St. Paul region, and the San Francisco Bay area, and identified common themes and differences amongst the approaches used and the outcomes.			
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Foreword

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SI* (MODERN METRIC) CONVERSION FACTORS

APPROXIMATE CONVERSIONS TO SI UNITS

Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
in	inches	25.4	millimeters	mm
ft	feet	0.305	meters	m
yd	yards	0.914	meters	m
mi	miles	1.61	kilometers	km
AREA				
in ²	square inches	645.2	square millimeters	mm ²
ft ²	square feet	0.093	square meters	m ²
yd ²	square yard	0.836	square meters	m ²
ac	acres	0.405	hectares	ha
mi ²	square miles	2.59	square kilometers	km ²
VOLUME				
fl oz	fluid ounces	29.57	milliliters	mL
gal	gallons	3.785	liters	L
ft ³	cubic feet	0.028	cubic meters	m ³
yd ³	cubic yards	0.765	cubic meters	m ³
NOTE: volumes greater than 1000 L shall be shown in m ³				
MASS				
oz	ounces	28.35	grams	g
lb	pounds	0.454	kilograms	kg
T	short tons (2000 lb)	0.907	megagrams (or "metric ton")	Mg (or "t")
TEMPERATURE (exact degrees)				
°F	Fahrenheit	5 (F-32)/9 or (F-32)/1.8	Celsius	°C
ILLUMINATION				
fc	foot-candles	10.76	lux	lx
fl	foot-Lamberts	3.426	candela/m ²	cd/m ²
FORCE and PRESSURE or STRESS				
lbf	poundforce	4.45	newtons	N
lbf/in ²	poundforce per square inch	6.89	kilopascals	kPa
APPROXIMATE CONVERSIONS FROM SI UNITS				
Symbol	When You Know	Multiply By	To Find	Symbol
LENGTH				
mm	millimeters	0.039	inches	in
m	meters	3.28	feet	ft
m	meters	1.09	yards	yd
km	kilometers	0.621	miles	mi
AREA				
mm ²	square millimeters	0.0016	square inches	in ²
m ²	square meters	10.764	square feet	ft ²
m ²	square meters	1.195	square yards	yd ²
ha	hectares	2.47	acres	ac
km ²	square kilometers	0.386	square miles	mi ²
VOLUME				
mL	milliliters	0.034	fluid ounces	fl oz
L	liters	0.264	gallons	gal
m ³	cubic meters	35.314	cubic feet	ft ³
m ³	cubic meters	1.307	cubic yards	yd ³
MASS				
g	grams	0.035	ounces	oz
kg	kilograms	2.202	pounds	lb
Mg (or "t")	megagrams (or "metric ton")	1.103	short tons (2000 lb)	T
TEMPERATURE (exact degrees)				
°C	Celsius	1.8C+32	Fahrenheit	°F
ILLUMINATION				
lx	lux	0.0929	foot-candles	fc
cd/m ²	candela/m ²	0.2919	foot-Lamberts	fl
FORCE and PRESSURE or STRESS				
N	newtons	0.225	poundforce	lbf
kPa	kilopascals	0.145	poundforce per square inch	lbf/in ²

*SI is the symbol for the International System of Units. Appropriate rounding should be made to comply with Section 4 of ASTM E380.
(Revised March 2003)

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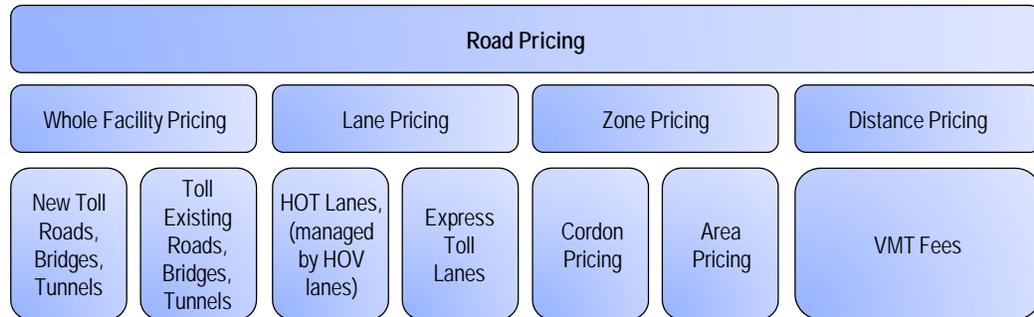
Figure 1.1 Types of Road Pricing 1

1.0 Summary and Findings

1.1 BACKGROUND AND PURPOSE

Road pricing is being considered by more and more regions as a reaction to the dual challenges of declining revenues and increasing congestion. Road pricing is more than simply tolling a new highway with flat tolls, it involves charging a fee to use a lane, road, area, or regional network for purposes of generating revenue, managing traffic congestion, or both (see Figure 1.1).

Figure 1.1 Types of Road Pricing



Note: Any of these can use “congestion pricing” or “variable pricing” to achieve policy objectives.

Road pricing is called “congestion pricing” when prices are tailored to manage congestion by using a fixed time-of-day schedule or a dynamic algorithm based on congestion levels. In any case, some forms of road pricing can generate revenues in support of roads and/or auto alternatives, and can help achieve environmental objectives, such as reducing air pollution or greenhouse gas emissions.

Road pricing in the United States is new and not well understood by the general public and elected officials. The most common form of road pricing in the United States has been high-occupancy toll (HOT) lanes, where high-occupancy vehicle (HOV) lanes are opened to use by vehicles with lower occupancy for a fee, or express toll lanes where new lanes are built adjacent to existing freeways and use of these new lanes is subject to a toll.

Road pricing experiments in Europe and Asia have involved zone pricing, where drivers are charged a fee to enter into and/or drive within a specified high-congestion location. Zone pricing may or may not have a time-of-day component.

As states and regions consider ways to address declining revenues from the motor fuel tax, the concept of distance pricing - charging drivers for each mile they drive on the highway system - is being discussed more and more. This is

often referred to as vehicle miles traveled (VMT) fees, or mileage-based user fees. These are typically seen as a revenue mechanism, but could also incorporate a congestion-pricing component.

What Is Congestion Pricing?

Congestion pricing – sometimes called value pricing – is a way of harnessing the power of the market to reduce the waste associated with traffic congestion. Congestion pricing works by shifting purely discretionary rush hour highway travel to other transportation modes or to off-peak periods, taking advantage of the fact that the majority of rush hour drivers on a typical urban highway are not commuters. By removing a fraction (even as small as five percent) of the vehicles from a congested roadway, pricing enables the system to flow much more efficiently, allowing more cars to move through the same physical space. Similar variable charges have been successfully utilized in other industries – for example, airline tickets, cell phone rates, and electricity rates. There is a consensus among economists that congestion pricing represents the single most viable and sustainable approach to reducing traffic congestion.

Source: *Congestion Pricing, A Primer*, FHWA, 2006.

Road pricing often has come about separate from the traditional metropolitan planning process through pilot projects and demonstrations. As pricing demonstration projects have shown road pricing to be an effective tool, there is a growing need to incorporate road pricing into long-range plans. This study examined how road pricing was incorporated into long-range planning at four metropolitan planning organizations (MPOs) to provide examples that could support other regions seeking to do the same.

1.2 THE CASE STUDY REGIONS

The four case study regions were selected by the Federal Highway Administration (FHWA) based on a previous study, *A Domestic Scan of Congestion Pricing and Managed Lanes*.¹ The case studies represent places where road pricing was successfully included in long-range plans – examples from places where road pricing has not been included in long-range plans are not covered. The key themes used to guide the case studies were based upon findings from the initial literature review provided in Appendix B. The team reviewed the relevant studies and planning documents from each region, and then conducted

¹ *A Domestic Scan of Congestion Pricing and Managed Lanes*, prepared for the Federal Highway Administration, U.S. Department of Transportation by DKS Associates, with PBSJ and Jack Faucett Associates, February 2009.

interviews with staff from the responsible regional planning organizations. The Interview Guide is in Appendix C.

Dallas/Fort Worth Region, Texas

The Dallas/Fort Worth region has had road pricing in the form of toll roads for decades. The region has aggressively pursued innovative partnerships, both public and private, to advance roadway projects through pricing. Examples include recent public-private partnerships to build the North Tarrant Express (IH 35W/IH 820/SH 183) and LBJ Freeway (IH 635) managed lanes. A high-growth area, the region is still planning to build new lane-miles of highway, and has a policy to consider any new capacity as tolled capacity. The result was a long-range plan that includes numerous new toll roads and new tolled managed lanes (where HOV and transit are free), and new priced express lanes (where all vehicles pay). Beyond the project lists, there are explicit policies that govern issues such as rate setting and use of revenues.

Puget Sound Region, Washington

The last tolls came off a bridge in the Puget Sound region of Washington State in 1979, but when a new bridge was needed across the Tacoma Narrows, it was built as a toll bridge. Though it is a high-growth area, there are few new highways planned in the region. Realizing that traffic demand will far outstrip the capacity of available and planned facilities, the region has been serious about how road pricing could be used to manage transportation demand while at the same time providing a revenue source for high-priority improvements. The SR 167 HOV lane was converted to a HOT lane several years ago and several other HOT lane projects are under consideration. With the SR 520 bridge across Lake Washington in need of replacement due to seismic concerns, a consortium of agencies is advancing a project to toll the existing crossing using congestion-pricing techniques and using the revenue to partially pay for the construction costs of a new bridge. As the region started to update its long-range plan, some level of road pricing was included in every plan alternative, and pricing became a key component of the plan.

Minneapolis/St. Paul Region, Minnesota

The Twin Cities built two HOT lane projects over the last few years: I-394 and I-35W. These projects were the result of more than a decade of proposals to address congestion in these corridors. On I-394, an underutilized HOV lane was converted to a HOT lane. On I-35W, existing shoulders that already had allowed bus use were converted to travel lanes, and the existing inside lane was converted to a HOT lane. Looking beyond these individual projects, the region has been trying to address how to consider new opportunities for HOT lanes when it plans new expansion projects. Like Seattle, new highways are not being planned, but expansions of existing highways might be accommodated as HOT lanes.

San Francisco Bay Area, California

Several counties and congestion management agencies have been studying new HOT lanes as a way to improve the efficiency of existing highways. The Alameda County Congestion Management Agency is moving forward with HOT lanes on I-680 and I-580, and has studied HOT lanes in other corridors. Santa Clara County did a countywide assessment of HOT lanes and is moving forward with projects on the SR 237/I-880 Connector, and Route 85 and U.S. 101. Marin and Solano counties also have explored HOT lanes. Concerned about a variety of projects following a variety of standards, the Metropolitan Transportation Commission carried out several studies aimed to bring consistency to the development of these lanes. An extensive network of priced lanes became a centerpiece of the region's transportation plan update, including design standards and rules for use of revenue. In addition, congestion pricing of the Bay Bridge was recently implemented, and the City and County of San Francisco has been studying cordon/area pricing.

1.3 LESSONS LEARNED

Our scan of these four regions where road pricing was successfully incorporated into long-range transportation plans revealed that every region is unique. Each region brings a history of attitudes, jurisdictional negotiations, and politics that influences how pricing is perceived.

Regional Road Pricing Policy Grew from Individual Projects

None of the regions began with a broad concept of road pricing as an integral part of their long-range transportation vision. Rather, in all regions, individual project proposals introduced the metropolitan area to pricing.

In the Puget Sound region, tolling the Tacoma Narrows Bridge helped bring attention and support to tolling for financial support. Later, the Route 167 HOT lane project in another part of the region introduced the idea of congestion pricing.

The Dallas/Fort Worth region had a long history of toll roads. The region's expected high-growth rate was expected to create intense traffic demands. With extensive highway needs and limited revenues, Texas had a policy to consider pricing for all new highway projects around the State.

In the San Francisco Bay Area, early proposals to congestion-price the Bay Bridge were defeated, but after the success of HOT lanes around the United States and with the encouragement of the FHWA's Value Pricing Pilot Program (VPPP), the counties in the Bay Area started planning HOT lanes. Variable pricing of the Bay Bridge was recently implemented, aided by the need to raise tolls to pay for a vital seismic retrofit.

Soon after the success of the SR 91 and I-15 managed lanes projects in southern California, the Minnesota Department of Transportation (Mn/DOT) tried to convert an underutilized HOV lane on I-394 to a HOT lane. Early efforts to introduce pricing in Minnesota were unsuccessful, but persistence paid off as the I-394 HOT lane came to fruition almost 10 years later and a second HOT lane has recently opened on I-35W, enabled by the success and acceptance of I-394.

Once individual projects were committed or underway and gaining favorable response, regional and state governments adopted them into long-range plans and developed supportive policies. The push to include policies on pricing in long-range plans grew out of a need for consistency in the application of pricing around a region and ways to allocate revenues. As regions looked beyond their initial pricing projects, consistency of development and revenue allocation policy became important. Also of concern were consistent design and technology policies.

The Dallas/Fort Worth region developed policies that defined toll rates and how revenues would be used, among others. The Puget Sound region went through years of study both at the state level and in the region to define how or whether road pricing would form an important part of the transportation landscape. In the end, the Puget Sound Regional Council (PSRC) came up with a 30-year vision to allow pricing to evolve as technology allowed, with pricing integral to support broad goals for the region both for revenue and as a way to manage demand.

In the San Francisco Bay Area, individual counties and congestion management agencies were proceeding with development of HOT lane projects. In response, the Metropolitan Transportation Commission (MTC) took on a study of a HOT lane network and a long-term vision for pricing that defined how road pricing revenues would be spent. The Twin Cities experience was more understated. Though Mn/DOT and the Metropolitan Council studied systems of HOT lanes, these agencies were not in a position to move forward boldly. The Metropolitan Council's long-range plan reflects an understanding that there is more pricing in the future in conjunction with transit expansion, but is not specific about how such pricing would be accomplished.

Developing the Right Tools for the Job

All regions struggle with developing the right tools to provide the analysis to support difficult public policy decisions surrounding pricing. Basic four-step travel demand models are not well suited to the complex societal changes that extensive road pricing can bring about. The different visions of road pricing in each region has shaped how the emphasis on the tools that were developed.

In the Twin Cities, the main emphasis was on HOT lanes, which give travelers a choice of one lane or another in one corridor. The questions revolved around whether these lanes would improve speeds and throughput in the corridor. From a regional perspective, the main question to be answered was “how many people would choose to use the managed lane at what price.” This resulted in

relatively simple modifications to the traffic assignment routines that did not try to account for more complicated changes in travel patterns such as changes to trip distribution patterns, trip-making volume, or housing/job location decisions.

In the San Francisco Bay Area, MTC is moving from a trip- to activity-based model to give more precision to pricing analysis. The model also has been modified to do better mode choice prediction since mode shift is an important impact of pricing. Perhaps most important, MTC planners and analysts use latest travel survey data from The Bay Area Transportation Survey to get accurate elasticities for modeling. MTC also uses benefit/cost analysis to explain the benefits of pricing and equity assessments that explain impacts and benefits on different income groups.

In the Dallas/Fort Worth region, the emphasis was on toll roads and HOT lanes, and thus the North Central Texas Council of Governments (NCTCOG) model development focused on assignment-path decisions rather than more extensive modeling of travel pattern changes. NCTCOG was concerned, however, about whether road pricing impacted poor people more than other parts of the population and developed techniques to understand which populations would be paying tolls. Moving forward, however, NCTCOG has plans to improve their analytical tools using before-and-after studies on the SH 161 toll road now under construction to capture eight different behavior changes, such as route, mode, destination, and housing location.

The Puget Sound region has the most extensive plans for pricing – with VMT fees in its long-range vision. As a result, the policy boards tasked with developing the long-range plan demanded better answers relating to changes in driver behavior as well as development patterns and economic impacts. PSRC spent several years developing new travel demand modeling and benefit/cost analysis techniques. The Traffic Choices study funded in part by the VPPP provided a wealth of data on travel behavior changes under priced conditions that found its way into the travel demand model. One byproduct of these sophisticated tools was the need to develop new approaches to communicate the findings to lay audiences.

Communication of Road Pricing Concepts Is a Challenge Everywhere

Communication of road pricing concepts and consensus-building can be difficult, especially when those concepts are unknown and untested. In the Dallas/Fort Worth region, road pricing is a logical outgrowth of toll road development that had been going on for decades. This incremental approach aided public and stakeholder acceptance. Engagement is continuous to maintain support and visibility for tolling and pricing.

In the San Francisco Bay Area, MTC endured failure of Bay Bridge pricing proposals over several years, but now has gained acceptance of a HOT network in its long-range plan and recently implemented time-of-day pricing on the Bay Bridge. The HOT lane network benefited from successful HOT lane projects in

other parts of California, but the region's acceptance of the HOT lane network also sprang from the idea of expediting development of the HOV network over and above what regular funding would allow, rather than congestion pricing per se. Despite the experience elsewhere, MTC works hard to explain how HOT lanes would work, how HOT lanes benefit transit users, and how the "Lexus lane" concept is misguided.

Both Mn/DOT and the Metropolitan Council in the Twin Cities have been undertaking public communications efforts surrounding road pricing (in particular HOT lanes) for 10 years in the aftermath of a failed HOT lane proposal. In particular, the Humphrey Institute of the University of Minnesota has been active (both locally and at the national level) in trying to understand people's attitudes and crafting messages that address lingering concerns. Through engagement of influential decision-makers and a policy of "leaving no question unanswered" when it comes to the HOT lanes projects, Mn/DOT has finally brought about two successful HOT lane projects and, with the Council, continues to plan for more pricing in the future.

PSRC had the most extensive need for communication, because it was exploring the most extensive use of pricing in its plan. Pricing had been discussed for years in the region, including support by the Secretary of Transportation. A key element of the approach was to emphasize that pricing was one element of a larger plan. Recognizing early the challenges they would face, PSRC formed a Pricing Task Force that could get educated on the more complicated points of road pricing, and then carry that message back to their constituents. PSRC also had a well-respected champion that could speak to elected officials and gain their support.

Pricing Is One Element of a Cohesive Transportation Plan

All four regions found that making road pricing one element among many of a cohesive transportation plan was effective at gaining acceptance for the concepts. This meant integrating project lists, road pricing concepts, and decisions about how to handle potential revenue, showing that these pieces all worked together.

In the Puget Sound region, especially, pricing was a cornerstone of the plan, with the revenue to be generated by large-scale pricing of the existing highway system a key element of the financial plan as well as a key mechanism to move towards achieving greenhouse gas emission reduction goals. The same was true in the Dallas/Fort Worth region, where pricing, in the form of tolled highways and lanes was an important revenue source for highway expansion. In the San Francisco Bay Area, HOT lanes were a way to increase highway capacity through more effective use of existing and planned HOV lanes, and contribute a revenue source to accomplish that. In the Twin Cities region, HOT lanes were part of a mix of strategies, including bus-only shoulder lanes, priced dynamic shoulder lanes, and other elements of the long-range plan.

2.0 Case Studies

2.1 DALLAS/FORT WORTH CASE STUDY

Road Pricing Policies Grew out of the Planning Process

The Dallas Fort Worth region was an early player when it came to road pricing, when the Dallas/Fort Worth Turnpike opened in the late 1950s, built by the Texas Turnpike Authority (TTA). The bonds for those toll roads were paid off in 1977, after which toll collection ceased. Around that same time, the TTA developed other toll projects, such as the Dallas North Tollway and Mountain Creek Lake Bridge, which were the first projects of a growing tollway system in the region. Over the decades, the TTA (later reconstituted as the North Texas Tollway Authority or NTTA) developed extensions to the Dallas North Tollway, as well as two new toll roads, the President George Bush Turnpike (PGBT) and Sam Rayburn Tollway (SH 121). Recent efforts include public-private partnerships to construct managed lanes on North Tarrant Express (IH 35W/IH 820/SH 183) and LBJ Freeway (IH 635). In addition, the proposed managed lane system has been included in the FHWA Value Pricing Pilot Program.

The financial constraint requirements of the Intermodal Surface Transportation Efficiency Act (ISTEA) in the 1990s led the NCTCOG to look much more aggressively at tolling as a means to finance its extensive highway expansion needs, and the result was a policy to consider whether corridor improvements could “support” pricing. NCTCOG started by assuming that all new capacity can be priced and then approached the financial component by looking at the priced and nonpriced transportation system as a whole. Each project does not necessarily have to support itself. Toll revenue becomes one of many revenue sources, with the aim of reducing public expenditure. As a result, NCTCOG has a policy that all new limited access highways should be evaluated for toll potential and all reconstructions should include priced express lanes as appropriate.

NCTCOG sees pricing as a tool to achieve objectives such as supporting economic vitality, increasing safety, increasing accessibility and mobility, and environmental protection and enhancement. Air quality was another strong motivation of NCTCOG’s plan, since the region is in nonattainment status. When considering plan options, NCTCOG realized that pricing by itself will not change behavior, but can work with other elements of the plan to achieve transportation and other objectives. The current plan does not address climate change, but the plan update that is now in process will.

The NCTCOG policies that are in *Mobility 2030: The Metropolitan Transportation Plan for the Dallas/Fort Worth Area, 2009 Amendment*, are the result of years of evolution of individual projects until the need for consistent policy relating to toll

setting and use of revenue became clear. These policies are described in the sections below.

The Dallas/Fort Worth Region Considers a Wide Range of Pricing Options

There are three types of priced facilities being considered in the region: traditional toll roads, managed HOV lanes (called HOT lanes in other places), and stand-alone express managed lanes which may or may not have HOV priority (see Table 2.1). Over time, all three types should have a managed component to them, i.e., price differentials by time of day, vehicle type, occupancy, technology. For now, the traditional toll roads do not have this aspect, but the regional policy points to move in that direction over time.

Table 2.1 Road Pricing Projects in the Dallas/Fort Worth Region

Existing	Committed	Planned
Toll Roads, Bridges, and Tunnels		
Dallas North Tollway	SH 161, Traditional toll road, under construction	Trinity Parkway (new toll road)
President George Bush Turnpike (PGBT)	SH 121 (Sam Rayburn Tollway), part open, part still under construction	Southwest Parkway (new toll road)
Sam Rayburn Tollway (SH 121)		President George Bush Turnpike Extension, toll road
Addison Airport Toll Tunnel		SH 360 Extension, toll road
Mountain Creek Lake Toll Bridge		Add main lanes on SH 170, toll road
Lewisville Lake Toll Bridge		Loop 9 between I-20 and SH 287, toll road
Managed HOV Lanes		
	I-30 managed HOV lane, new lanes	
	I-635 (LBJ Freeway) and I-35E managed HOV lanes, new lanes	
	North Tarrant Express, managed HOV lanes, covering routes 183, 820, 35W	
Express Managed Lanes		
		DFW connector, which includes four miles of express managed lanes

Source: North Central Texas Council of Governments, via interview.

Innovative Strategies for Use of Road Pricing Revenue

The excess revenue from priced facilities is available to fund projects on the entire transportation system including other toll facilities, nontoll facilities, and transit-related projects. Excess revenue over and above construction and maintenance/operations expenses is split along the concept of “near neighbor,

near timeframe.” This is in Regional Transportation Council (RTC)² policy, defined as follows:

- Near neighbor:
 - Seventy-five percent stays in the county where the revenue is collected; and
 - Twenty-five percent goes to the rest of the region based on the distribution of home locations of toll tag users in January of that year.
- Near timeframe:
 - Seventy-five percent up front; and
 - Twenty-five percent over time.

One exception is the NTTA concession for SH 121, which was paid 100 percent up front. There is a disagreement over whether the concession payments on SH 121 go to the state highway trust fund called Fund 6, or to the region.

Policies for use of the money are established in advance of each transaction, under the general guidelines described above. NCTCOG developed a set of business terms for tollways and managed lane projects in the region covering topics such as: specific toll rates for peak and off-peak periods, treatment of transit vehicles, toll increase provisions, use of comprehensive development agreements, and disposition of excess revenue.

Evaluation Tools Designed to Meet the Challenge of Analyzing Pricing

NCTCOG’s travel demand model treats toll roads as an assignment-path decision that does not loop back through mode choice or land use. NCTCOG validated the models to observed volumes on toll facilities, and have generally found that tolling would produce about 40 percent diversion.³ NCTCOG plans to improve their data and analytical tools through a full before-and-after study in the SH 161 corridor in which they hope to capture eight different behavior changes in this study (e.g., route, mode, destination, housing location).

Environmental justice (EJ) also has been a significant issue, and NCTCOG has worked extensively with FHWA, Texas Department of Transportation (TxDOT), and others to address this. NCTCOG has an environmental justice tool that

² The Regional Transportation Council is the independent transportation policy body of the metropolitan planning organization.

³ Note that this comment was made without considering toll rates or the specifics of available alternative routes. However, the toll rates, by policy, are consistent through the region; and there is a consistently dense network of parallel arterials, implying that some consistency of outcome appears reasonable.

addresses trip distribution effects by feeding back through the path decision. The tool looks at whether people living in EJ communities that use toll facilities have access to free facilities. NCTCOG does extensive EJ analysis as part of project studies.

An emerging view on the environmental justice topic is the importance to evaluate not just who is paying tolls, but how the money is spent. In the case of the NCTCOG region, excess revenues are spent entirely on nontoll projects such as other highways or transit. This spending offsets potential environmental justice concerns. Also, NCTCOG has found that people of low income sometimes have high values of time because of inflexible job and childcare schedules.

Communications and Consensus-Building Takes a Lot of Work

NCTCOG uses a full array of communication tools, including press releases, web presence, and presentations. However, even though NCTCOG and TxDOT have been talking about the concept of pricing and tolling for years, they find that the public and policy-makers still have difficulty understanding the nuances. Once projects open however, these agencies found that the complaints stop. For example, when SH 121 opened, NCTCOG did not get many complaints; rather, the feedback was positive since people had the new highway alternative.

The region struggles with the concept of how many toll roads is the right balance. People have understood for years that there is not adequate traditional revenue to build the highways and highway lanes that need to be built, so there has been acceptance of tolling for new highways and pricing for highway expansion. The fact that the policy is applied consistently throughout the entire region also is helpful.

One challenge has been the complaint of double taxation. NCTCOG tried to address this complaint by emphasizing the system benefits of the use of the toll revenue, but they do not know what the reaction will be when the managed lanes projects start to open. With managed lanes, there will always be a free option, so NCTCOG expects that will help public acceptance.

NCTCOG staff believed that these considerations have contributed to their success so far:

- Consistent staff at NCTCOG working on these issues for 20 years. If the staff had changed over more frequently, the job would have been more difficult;
- Strong analytical foundation through improving modeling tools;
- Consistent message with respect to the benefits of pricing;
- Policy coordination with elected officials; and
- Desire to create a sustainable transportation system and acknowledgment that there is not enough money.

Despite these successes, the region has had to face public and elected-official backlash that emerged out of the aggressive pursuit of public-private partnerships a few years ago. In 2007, the Texas legislature imposed a two-year moratorium on new partnerships (called Comprehensive Development Agreements, or CDA) that impacted further toll development. Many CDA that were underway were grandfathered and not impacted by the moratorium, but the legislation still created uncertainty. There also were controversies surrounding the award of a CDA for SH 121, which had originally been awarded to a private concessionaire, but later given to the North Texas Tollway Authority.

Prepared for the Unexpected

The State and region have built in a variety of backstops to guard against the unexpected.

Revenue Shortfalls

One of the biggest concerns has to do with toll revenues being lower than expected. In the case of managed lanes, the region has tried to shift as much revenue risk as possible to the private sector. However, the traditional toll roads to be built will be public projects meaning that there is no risk transfer.

The region has consistent toll setting policy, and NCTCOG believes that its toll rates are set conservatively low, at about half the revenue-maximizing rate. This gives them the ability to raise tolls if needed.

An element under discussion in the current Southwest Parkway and SH 161 negotiations with NTTA and TxDOT is for the NCTCOG and TxDOT to guarantee debt service repayment in the event of lower than expected revenue collections in early years of a facility. This additional backstop is because NTTA's system revenues are needed for current construction commitments, which normally would otherwise be cross-pledged to new projects.

NCTCOG may put aside some programming authority from SH 121 revenues (state dollars, kept in the state treasury for assignment to projects by NCTCOG) to use as a form of debt service reserve and thus allow NTTA to issue debt with higher bond ratings and more money available for project funding.

NTTA would own the roads in question like any other of their properties. The difference would be that debt issued to finance these two roads also would have a financial commitment from NCTCOG and TxDOT to offset revenue shortfalls. These advanced funds would then be repaid with future revenues.

Revenue Leakage

With modern open-road tolling applications, there is an increased temptation for drivers to try to get away without paying tolls. In response to this, the region is developing administrative courts to deal with toll violators, to avoid clogging up the regular courts.

Operations

Managed lanes have now been tested in several markets around the United States, and there is a reasonable understanding of how to optimize flow and avoid congested premium lanes. However, each region is unique, and this risk is being managed by setting toll rates by time of day, as opposed to dynamically based on traffic levels. Once there is a history of the demand profile, dynamic pricing will be tried.

Summary of Dallas/Fort Worth Experience

An early adopter of tolling, the Dallas/Fort Worth region has continued to pursue aggressively road user fees as a means to fund its extensive backlog of transportation projects. In recent years, the region has embraced new notions of managed lanes as a means of achieving highway expansion. With the region's citizens already familiar with tolling, it has been relatively easy to advance new toll projects, since those toll projects bring with them new transportation options. Acceptance grows once the projects open. The jump to managed lanes is not without its controversies, but given the experience with tolling in the region, not as difficult as it may be in areas without a prior history of tolling.

As the region moved from individual project development to more widespread use of tolling and managed lanes for all highway expansion, the region moved to incorporate a consistent set of rules in its regional transportation plan. The region has had to address issues such as how to spend excess revenue and whether road pricing projects unfairly impacts environmental justice populations, and has developed policies and evaluation tools in response. What sets this region apart from the other case study regions is the extent to which new highways and new capacity are a part of the transportation landscape. The other case study regions are more focused on traffic management than new capacity.

2.2 PUGET SOUND REGION CASE STUDY

Road Pricing in the Seattle Region Grew from Individual Projects into a Comprehensive Long-Range Vision

In the mid-1990s, Washington State was among the first to look seriously at public-private partnerships (PPP) to advance high-cost/high-need projects, and one project emerged from the process – construction of a second span of the Tacoma Narrows Bridge, to be supported by toll revenues. Although the project evolved from being a concession-style public-private partnership to a more common design-build approach, the result was a new toll bridge in an existing toll-free corridor. While tolls had been commonly used in Washington to finance bridges in the past, there had been no tolls in the State since tolls were removed from the Evergreen Point Floating Bridge (SR 520) in 1979. The Tacoma Narrows Bridge project also was notable in that it was the first time a toll had ever been added to an existing toll-free corridor (although the new toll was technically only

on the new bridge, which served the southbound direction). The next individual project to emerge was a four-year HOT lane demonstration on SR 167, which opened in 2008, supported by the Value Pricing Pilot Program.

At the same time, the Washington State Department of Transportation (WSDOT) continued to look at options for replacing the SR 520 floating bridge – a multibillion-dollar project with a substantial shortfall in funding. Tolling, potentially with time-of-day pricing was under study as a possible solution. When the U.S. Department of Transportation (U.S. DOT) announced its Urban Partnership Agreement (UPA) grant program, a collaboration of the region, state, and King County applied for a grant that would allow time-of-day tolling on the existing SR 520 Bridge in advance of construction of a new bridge, in addition to active traffic management and other complementary actions. That project is expected to open in the spring of 2011.

While these projects were being studied, designed, and built, the State Legislature became curious as to whether or how tolling and road pricing might fit into the future of transportation in Washington State. Some of the groundwork for this had been laid by the Department of Transportation secretary who was a passionate believer in the potential for congestion pricing to allow highways to operate at maximum capacity. The result was a Comprehensive Tolling Study that considered a broad range of policy motivations and applications, evaluated institutional and technical considerations, considered a variety of case studies, and resulted in eight policy recommendations that were mostly adopted by the legislature.

Also in parallel, the PSRC received a VPPP grant to conduct a pilot project to see how travelers change their travel behavior (number, mode, route, and time of vehicle trips) in response to time-of-day variable charges for road use (variable or congestion-based tolling). The project, called the Traffic Choices Study, placed Global Positioning System (GPS) tolling meters in the vehicles of about 275 volunteer households. The project involved observation of driving patterns before and after experimental tolls were charged for driving on any of the major freeways and arterials in the Seattle metropolitan area. The Traffic Choices Study received a lot of public attention, and provided valuable behavioral information to feed the PSRC's travel demand model for better analysis of road pricing.

These prior experiences and history of discussion laid the groundwork for further discussion of pricing in the PSRC's long-range plan update called Transportation 2040. As it began Transportation 2040, PSRC created a Pricing Task Force. This was the first task force created in the plan update, in recognition of the potential role that pricing might play in the long-range plan, and that pricing deserved a hard look. Both the need for nontax financial resources and the desire to use price to modify travel behavior were driving forces behind tolling and road pricing in the plan.

As Transportation 2040 evolved, all of the plan alternatives had a pricing component. According to PSRC, *Transportation 2040 promotes transportation financing*

methods, such as user fees and tolls that will sustain maintenance, preservation, and operation of facilities and reflect the costs imposed by users.

- The plan recommends a phased financial strategy based on transitioning away from current gas taxes and other traditional transportation revenue sources. The Transportation 2040 financial strategy calls for moving toward the implementation of new user fees, including tolls. The region also will explore a fuel tax replacement, such as vehicle-miles traveled (VMT) charges, and other pricing approaches to fund and manage the transportation system. The financial strategy assumes a nexus between the tax, fee, or toll and the use of the revenues.
- It is assumed the strategy of implementing tolls will start with developing high-occupancy toll (HOT) lanes, and tolling individual highway and bridge facilities in their entirety as they are implemented. The plan also gave guidance for the strategy to remain flexible and accelerate the implementation of tolls earlier than 2020 wherever feasible.⁴

The PSRC General Assembly adopted the Transportation 2040 plan in May 2010, with 98 percent of the vote in favor. Although pricing is a key feature in the plan, considerably more work is needed to implement a pricing policy, including state legislation. In the meantime, the following road pricing projects are in the pipeline:

- Nearing Commitment:
 - I-405 HOT lane corridor, as an extension of SR 167 HOT lane as a one-to-two-lane HOT system with likely approval in 2011.
- Proposals:
 - SR 509 Extension as a toll road;
 - SR 167 Extension as a toll road; and
 - Alaskan Way Viaduct replacement as a toll road.

Greenhouse Gas Emissions A Big Concern

Air quality conformity was not an issue in the PSRC region, but greenhouse gas emissions were a big concern. A desire to be serious about greenhouse gas emission reductions, spurred on by a legislative mandate for significant reductions in greenhouse gas emissions over the next several decades turned out to be a big incentive for many stakeholders to consider pricing.

Although air quality conformity was not a concern, financial conformity was an issue when it came to defining sources of revenue for the financially constrained plan. Since the plan alternatives (and the preferred alternative) all relied on

⁴ Puget Sound Regional Council, Transportation 2040 Frequently Asked Questions, at <http://psrc.org/assets/3175/FAQs.pdf>, accessed on August 4, 2010.

pricing – a new, untested source – to generate revenue, some questioned the stability of the financial resources to pay for transportation system improvements. PSRC staff believed there would be the same level of skepticism with proposals to increase existing sources, which may have been as much as, or even more of a political struggle to achieve.

Transportation 2040s Investment Plan Is Sized to Expected Revenue from Road Pricing and Other Sources

As plan alternatives were developed, PSRC sized the extent of transportation improvement plans to the amount of revenue expected. Alternatives were purposely structured to test different toll philosophies, whether tolling existing facilities or added capacity. In this way, decision-makers could see the nexus between the ability to undertake investments and pricing.

Rules on the Use of Pricing Revenue

Transportation 2040 assumes that over time there is an evolution of rules related to the use of revenue from road pricing. In the beginning, the plan makes some connection between road pricing revenues and the improvement projects, but later, with a tolled network, revenues may be generated without specific investments. This is still a controversial point.

There is a clear policy to balance revenue with investments. PSRC expects that over time, pricing revenue would be offset by reductions or eliminations of other revenue sources. According to PSRC staff, there was a “general understanding” that a certain portion of toll revenues would go to transit, but the details of this policy have to be worked out in the future.

Washington State has a constitutional restriction on the use of motor fuel taxes for anything other than the highway system (called the 18th amendment). This restriction does not affect toll revenue, but current legislative policy does limit toll revenue to be spent in the corridor in which it was raised, with some flexibility for the Legislature to decide on a case-by-case basis to include nonhighway expenditures such as local arterials or transit programs in the definition of the highway corridor.

Significant Changes to Analytical Procedures

In order to accommodate the groundbreaking policy choices being studied, including road pricing, PSRC undertook an extensive effort to update their travel demand and related models. Their model underwent an extensive peer review. Some examples of the improvements include:

- The land use model is now parcel-based, representing individual households. PSRC then develops synthetic population estimates from the households. The results of the land use model feed the travel demand model, so travel model socioeconomics are no longer static, allowing estimates of changes to land use patterns due to transportation system changes.

- An activity generator replaced the trip generator. As a result, activity patterns can change due to downstream changes in the transportation system (including pricing).
- Off-model tools and techniques for toll rate setting, called the Toll Optimization Model (TOM). The TOM uses Ramsey price rules for partial tolling of networks, recognizing the increasing costs on nontolled roads due to diversion, and optimized the performance of the entire system, not just the tolled highway.
- A benefit/cost analysis procedure disaggregated to a fine level of detail, including vehicle class and origin-destination pairs.
- Emissions factors came from the new Motor Vehicle Emissions Simulator (MOVES) model (PSRC is a beta test site).

Despite the significant enhancements, PSRC staff still see some shortcomings in their revised modeling approaches. These include:

- Income classes across all mode choices are not as granular as desired as part of the multiyear effort to develop an activity-based model.
- Pedestrian and bicycle options are not adequately handled. Some stakeholders wanted to see complete health impact analysis. An element of the mode choice model showing how walking and biking could be beneficial to health could be useful. But there are tradeoffs in terms of what you can afford to pursue.
- There is a need for better representation of potential impacts of system management on networks, with all modes.
- Vanpools and parking management strategies are at a coarse scale. The data needs to fix this are “mind-boggling.”

PSRC staff continues to monitor industry developments to be able to apply the latest techniques, including:

- NCHRP HR 08-57: Improved Framework and Tools for Highway Pricing Decisions;
- SHRP2-C04: Improving Our Understanding of Highway Users and the Factors Affecting Travel Demand (Emphasis on pricing and congestion);
- SHRP2 C10: Partnership to Develop an Integrated Advanced Travel Demand Model and a Fine-Grained, Time-Sensitive Network; and
- SHRP2 L04: Incorporating Reliability Performance Measures in Planning and Operations Modeling Tools.

Bringing the level of detail and techniques on the supply side and the demand side together is the difficult part. As PSRC staff moves forward with the improvements, they have the goal of looking at benefit/cost at a disaggregate scale, yielding an analysis of who wins and who loses with different concepts.

Effective Communication to Aid Informed Decision-Making

Treating tolling and pricing as integral to plan development was important to the success of PSRC's process. PSRC realized that they could not fund transportation in the same ways as in the past, so were more open to ideas such as VMT fees and tolling. Once the public understood how the current system was broken, there was more openness to pricing and tolling alternatives. The decision to create the Pricing Task Force was a foot in the door to discuss pricing issues, and allowed other conversations about pricing to move forward.

The message that was difficult to communicate was how pricing would contribute to congestion reduction. PSRC introduced new methods of measuring the value of different investments during the plan update (not just for road pricing). These new methods were difficult for people to understand, and there was particular difficulty with the concept of monetizing benefit/cost. Ultimately, however, these measures were successful at getting participants in the planning process to understand the value of different packages. In particular, the new benefit/cost measures highlighted the fact that congestion had a cost, which encouraged those involved in the planning process to take a fresh look at transportation problems, solutions, and costs.

Individual projects (SR 520, Tacoma Narrows Bridge, and SR 167) already were in progress and had a lot of traction. PSRC was able to point out that the region already was using pricing, thereby defusing many arguments against the idea. Tolling individual projects did not seem to be a big issue, but tolling the whole network was more difficult for those involved in the process to grasp and accept.

With 15 years of pricing debate, the professionals knew that pricing could be an effective way to achieve their goals, but PSRC was worried that "leading with pricing" would be dangerous, giving the appearance that they already had made decisions. A clear champion for pricing was a former chair of the Washington State Transportation Commission, who was well respected by decision-makers. His support allowed pricing to be taken seriously, and not treated as a fringe theory.

There was only one example of problematic communications that PSRC staff could recall. PSRC experienced problems communicating the concept of parking pricing because the public, stakeholders, and policy-makers did not understand it. The parking pricing idea was supposed to be a surcharge applied at the regional level to dampen demand and raise substantial revenue, but audiences pushed back because they were concerned that these measures would be difficult to apply at a regional level and would require more detailed analysis than was possible in this plan update. PSRC pulled back substantially on this concept. There was concern that the model was not adequately reflecting reduced demand to shopping locations.

Although PSRC did not encounter any communications "brick walls" to speak of, communicating full system pricing was a challenge. Also, there were quite a few single-issue stakeholders: those that believed that pricing was "the answer" did

not seem to care about economic development, while others focused more on transportation system effectiveness and economics.

The concept of “equity” was challenging because it was difficult to define and difficult for people to understand. Equity was a concern, though, and dictated how plan alternatives were analyzed and presented. PSRC examined equity in four ways: 1) the geographic distribution of benefits and adverse impacts by county and county subarea, 2) the distribution of benefits and adverse impacts by income groups, 3) the distribution of benefits to freight and passenger vehicles, and 4) an accounting and comparison of benefits of investments to minority and low-income residents.

PSRC developed new evaluation tools, well beyond what had existed before, either in the region or elsewhere. But the additional capabilities caused participants in the planning process to be even more critical of the analytical shortcomings of the new system – there was just too much to absorb, and there were many subtleties that were difficult to comprehend. In the end, PSRC staff reminded policy-makers that data is meant to aid decisions and that they should use their best judgment when it came to making choices.

Counting on Extensive Use of Road Pricing to Fund the Long-Range Plan Is a Big Risk

In reviewing the Transportation 2040 financial plan, FHWA was concerned that road pricing was an untested new revenue source that had not yet been authorized by the State and would require additional Federal approvals. As such, road pricing might not be a “reasonably foreseeable” revenue source. PSRC staff reasoned, on the other hand, that even though other revenue sources such as increased gas taxes had a history, there was little inclination to increase them to the amounts needed to fund needed highway expansion. Therefore, any increase in revenue, whether from a new source or an existing source, would be equally risky.

Summary of Puget Sound Region Experience

Road pricing in the Puget Sound region incubated over the course of almost two decades, starting with a few individual projects, and culminating with a long-range transportation plan that calls for the most extensive application of road pricing for both revenue and traffic management in the United States. The process was not without its setbacks, but a combination of leadership by high-profile elected officials and appointees, plus the willingness to expend the resources to develop and apply state-of-the-art analytical tools provided a strong base from which to advance. The analysts also took the time and effort to communicate the findings and work with stakeholders over the course of years. This contributed to increased public understanding of the implications of both action and inaction with respect to the transportation system.

2.3 MINNEAPOLIS/ST. PAUL REGION CASE STUDY

Two Decades of Interest in Pricing

Pricing policy began to be mentioned in 1992 to 1993 in Metropolitan Council⁵ planning documents as an option for consideration following a directive from the State Legislature directing the Mn/DOT and the Metropolitan Council to study and implement, where appropriate, congestion pricing, toll roads, and a mileage-based tax. The State recognized the potential public acceptance hurdles around road pricing and encouraged a public outreach process to begin discussion of the concept. At the direction of the legislature in 1995, Mn/DOT and the Metropolitan Council undertook the Minnesota Road Pricing Study that included a comprehensive public outreach process using such techniques as a citizens' jury, focus groups, opinion leaders survey, personal interviews, and a telephone survey. The process was designed to uncover acceptability issues and frame acceptable pricing options. The results indicated some support for road pricing depending on how the collected revenues are used and what those revenues replace or supplement.

According to Metropolitan Council planners, study of road pricing in the 1990s and support for study in planning documents was inspired in good measure by the successful implementation of the California SR 91 express toll lanes project. However, stronger and more specific road pricing policies came with the advent of the I-394 MnPASS lanes project, which was largely the responsibility of Mn/DOT working with the State Legislature.

A Decade of Trial and Error

Advocates at Mn/DOT first proposed I-394 HOT lanes as a demonstration project in 1997. However, lack of sufficient consensus especially among legislative and local decision-makers, and more importantly, lack of public support, led to failure of the proposal. In 1995-1996 Mn/DOT launched the TransMart Public-Private Partnership (P3) Toll Road Initiative. The TH 212 corridor was selected for development of the region's first toll road under a P3 agreement. The proposal was killed by a provision in state law (Minnesota Statute 160.85) that allowed any community in the path of a toll road to have veto power, which one of the communities exercised.

A Value Pricing Advisory Task Force was formed in 2000/2001, aided by the University of Minnesota Humphrey Institute. The task force included state legislators and city officials, and consensus formed around testing pricing on the underutilized HOV lane on this facility. The influence of this Task Force recommendations, and the recognition that pricing should be tested in the Twin

⁵ The Metropolitan Council is the regional planning agency serving the Twin Cities seven-county metropolitan area.

Region, led directly to the introduction of legislation authorizing conversion of HOV lanes to HOT lanes. With that authorization, and with support of both the Governor and Legislature, Mn/DOT launched the I-394 MnPASS HOV lane conversion to HOT.

The Federal Value Pricing Pilot Program supported the demonstration project on I-394. The I-394 express lanes opened in May 2005 and involved conversion of existing underutilized HOV lanes from Highway 101 to I-94 in the Minneapolis area – a distance of about 9 miles in one direction and 12 in the other. The lanes are dynamically priced during peak hours in the peak direction and remain free to buses, 2+ HOVs, and motorcyclists. The lanes are free to all users during off-peak periods (and in the nonpeak direction during the peak periods). The I-394 project goals are to maintain traffic flow and alleviate congestion in the corridor. Fifty percent of net revenues after payment of capital and operating costs are to be dedicated to transit.

While the I-394 MnPASS lanes were being implemented, Mn/DOT undertook the MnPASS System Study, which looked at the potential for a system of toll lanes without HOV priority to relieve congestion. The study also considered potential financial outcomes and engaged a group of opinion leaders and stakeholders. The result was a memorandum of understanding between Mn/DOT and the Metropolitan Council (the region's MPO) to consider tolled express lanes in all expansions of the highway system.

In September 2009, building on public support of I-394, the I-35W express lane opened, with 2+ carpools free and dynamic pricing in the peak periods. A portion of the 16-mile-long facility uses a converted shoulder lane available at most congested times. Potential express lanes are being investigated on other corridors.

Pricing Experience Influences Long-Range Plans

The Metropolitan Council's 2030 Transportation Policy Plan (the Plan) adopted in 2004 and updated in 2009 encourages pricing in tandem with a mix of strategies, including HOT lanes, bus-only shoulder lanes, priced dynamic shoulder lanes to mitigate congestion (Strategies 9b and 9c of the Plan). Pricing options also appear under optimizing Highway Performance (Strategy 11d), Pricing (11f), Multimodal Investment (2e), Multimodal System (9b), and Optimizing Trunk Highways (9c).

Pricing is one of the five “key components” of the Plan to cope with “limited resources” and pricing is cast as fully complementary with transit and HOV strategies described in the other four strategies. Having a fiscally constrained plan forced a closer look at regional resources and at the aging transportation system, which enabled pricing to come up in discussions. However, road-pricing revenues are a secondary motivation – the primary motivation is efficiency, mobility, and congestion management. Thus, the main justifications for pricing derive from the Congestion Management Plan.

The Plan projects needs and capabilities of the highway system 50 years into the future. Within this context, pricing and managed lanes are important components. The Transportation Finance section of the Plan also references pricing as among priority strategies for “Federal funding” of multimodal investments.

In late 2009, the Metropolitan Council and Mn/DOT began collaboration on two related efforts aimed at creating short- and long-term visions for the highway system in the Twin Cities region, with the intent of informing another Plan update. The goal of the first study, the Metropolitan Highway System Investment Study (MHSIS) was to identify methods and improvements to achieve the greatest efficiency out of the region’s highway system and manage congestion from a systemwide perspective. Rather than focusing on building capacity alone, the new strategy will focus on improvements that build on existing management strategies and provide relief to identified problem areas throughout the system.

A second study, the MnPASS System Study Phase 2 (MnPASS 2) was intended to analyze and make recommendations for the next generation of MnPASS managed lane projects. Whereas the MHSIS focused on the long-term perspective, MnPASS 2 focused on short-term implementation opportunities (2-10 years).

Based on the analysis performed in the MHSIS and MnPASS 2 studies, a managed lane system long-term vision was developed and has been included in a Plan update anticipated to be adopted in November 2010. The draft Plan update calls for developing managed lane corridors either within the existing right-of-way, or with minimal additional right-of-way. It is also the intent to implement these projects in accordance with existing design standards, to the greatest extent possible. In some instances, however, some design flexibility may be necessary to reduce costs and make it possible to implement the project within existing funding constraints. The managed lane vision includes almost 102 miles of managed lanes, but these are not funded. The fiscally constrained plan calls for funding of the 3.9-mile I-35E MnPASS lane, and for another \$35 to \$70 million for other, unspecified MnPASS projects.

Road Pricing Revenues Are Limited to Operations, Maintenance, and Transit Service in the Priced Corridor

On the I-394 HOT lane, Minnesota Statute 160.93 specifies that excess revenues (after capital, and operations and maintenance costs) are to be devoted to capital improvements in the corridor and to transit enhancements in the priced corridor on a 50/50 basis. On the I-35W UPA project, revenue also is dedicated to improved transit in the corridor and capital improvements in the corridor by formula.

Roles of Agencies

Mn/DOT has had a sustained interest in congestion pricing and has consistently devoted staff resources to the topic. Mn/DOT staff working on intelligent

transportation systems (ITS) introduced the idea of road pricing, conducted studies, and worked with the Humphrey Institute over several years – waiting for the right opportunity to propose pricing. Legislation passed in 2003 allowed charging tolls on I-394. Support from state legislators brought the Governor on-board and allowed Mn/DOT to quickly identify and implement the project.

Mn/DOT has had a sustained interest in congestion pricing and has consistently devoted staff resources to the topic. Mn/DOT staff working in planning, research, and project development introduced the idea of road pricing, conducted studies, and worked with the Humphrey Institute over several years – waiting for the right opportunity to propose pricing. Legislation passed in 2003 allowed for conversion of HOV lanes to HOT lanes. Support from state legislators and the Governor allowed Mn/DOT to quickly identify and implement the I-394 MnPASS HOT lane project.

The Metropolitan Council has worked together with Mn/DOT over the years in the planning for toll lanes. Generally, strategies planned for implementation in a corridor or subarea must be accepted by Mn/DOT and adopted by the Council as consistent with the policy plan, according to Strategy 9h in the Plan. As the region's transit operator, the Metropolitan Council also is a stakeholder with respect to transit operations in priced corridors.

In terms of the Federal role, the VPPP provided pivotal support for the I-394 HOT lane project, and the Federal UPA grant supported the I-35W project. The Federal UPA grant also encouraged increased collaboration between state and local agencies as a condition of the grant.

Metropolitan Council Is Using the Four-Step Model for Analyzing Road Pricing

The Metropolitan Council updated its four-step travel demand model several years ago to be able to accommodate evaluation of HOT lanes. The model evaluates traffic in both the main lanes and HOT lanes, and calculates a toll that would keep the HOT lane free-flowing. The model is not sensitive to income levels, and assumes that all drivers have the same value of time, which was a simplifying assumption. Model modifications were made for a recent study of opportunities for new tolled express lanes that would not allow HOV to travel free.

Council planners believe modeling must be based on good information about specific travelers in the affected area and anticipated users of the priced facility. For example, an up-to-date traveler survey for I-394 was useful to assign travelers to the lane, alternative modes, and routes.

In 2010, Mn/DOT conducted an update of the MnPASS System Study to consider MnPASS opportunities that might be built without significant widening or right-of-way takes. Since the business rules for new MnPASS lanes would be different from the existing lanes (e.g., HOV would not be allowed free use, and the

lanes would be open all day), the model needed to be updated to accommodate these changes.

Communications and Consensus-Building

The guiding communication philosophy with respect to road pricing in Minnesota is to leave “no question unanswered” in all interactions. Also, and very importantly, Mn/DOT acknowledged that it is impossible to anticipate all possible outcomes of a demonstration. Assurance was given that if the project worsened conditions, adjustments would be made. In fact, that was necessary in the early weeks of operation on I-394 MnPASS.

Communications also have been geared toward anticipating interests of key affected parties. For example, for the I-35W project, Metro Transit conveyed the transit benefits in workshops for transit riders. When drivers are the audience, travel-time reliability and free-flow conditions are the main concerns.

Communications have deemphasized revenue generation in favor of improved congestion management and improved travel options, and have stayed away from any hint at pricing of existing lanes. When the issue of income equity arose, project proponents were able to reference findings from other projects (e.g., I-15 in San Diego) that showed little in the way of income equity concerns.

Communications around the entire new Policy Plan also attempts to gear subjects to appropriate stakeholder groups i.e., technical, local government, other regions, and public. The Council public relations office maintains lists for opt-in registration to receive e-mail updates and meeting notices, and invites specific professional, civic, and community organizations to participate in plan development.

Early on in the consideration of road pricing in Minnesota (in the mid-1990s), the Humphrey Institute convened a Citizens’ Jury to opine on the potential uses of tolling in the State. There have been extensive consensus-building and stakeholder involvement activities throughout the consideration of road pricing in the Twin Cities metro area. An I-394 MnPASS HOT Lane Community Implementation Task Force was formed in 2004 to guide the department through project implementation. Representatives from the community included six city councils, citizen representatives, American Automobile Association (AAA), trucking association, transit-oriented groups, and state legislators. The Task Force met monthly and visited California’s SR 91 and I-15 projects to guide project design.

The Humphrey Institute (part of the University of Minnesota) brought neutrality and objectivity to pricing discussions and worked to educate stakeholders. For example, the Humphrey Institute and Mn/DOT sponsored public roundtables on “Rethinking Transportation Finance,” organized legislative seminars on road pricing, and held stakeholder workshops twice a year. An important feature of consensus-building first for I-394 and continuing thereafter involved a “grasstops approach.” The approach reached out to elected officials and community leaders who then can communicate with their constituents to get support first of elected

officials before the public. Another communication tactic was keeping the media informed.

Mn/DOT also has been diligent about assessing public reaction along the way. For example, survey work to evaluate I-394 showed that the MnPASS lanes were benefiting transit vehicles and there was not much effect on carpools. Surveys also showed support from 75 percent of the population.

Managing Risks through Incremental Development

The Twin Cities region has been successful at developing pricing projects and policies in a methodical way, demonstrating concepts, and then moving on. This has allowed the region to test, evaluate, and incrementally develop HOT lanes in the region and gradually address enforcement, technology, and merge/weave operational risks. There also have been lower profile technical studies, to test concepts such as mileage-based user fees.

Summary of Twin Cities Experience

Road pricing has been a topic of interest in the Twin Cities since the mid-1990s. Despite early defeats on project proposals, continued persistence by agencies and public officials has led to two projects moving forward, and recognition of pricing as an element of the long-range transportation plan. The 2030 Policy Plan encourages pricing in the form of HOT lanes and priced dynamic shoulder lanes to mitigate congestion. The Metropolitan Council has collaborated with Mn/DOT in the investigation of an expansion of the MnPASS system that might be accomplished in the short term. Lead agencies in forwarding pricing have demonstrated the importance of incremental steps and decision-maker involvement to gaining successful projects. The agencies also have demonstrated the importance of an open and responsive planning and communication process attentive to concerns of affected parties.

2.4 SAN FRANCISCO BAY AREA CASE STUDY

Road Pricing in the San Francisco Bay Area Is Emerging from Years of Planning

Road pricing in the Bay Area was first considered in the early 1990s when the MTC convened the Bay Area Congestion Pricing Task Force to consider time-of-day pricing on the Bay Bridge. The task force was composed of business and environmental group stakeholders and secured one of the earliest grants from the FHWA congestion pricing pilot program. That initial effort did not move forward, but the success of HOT lanes in other parts of the country led to interest in the Bay Area to try this approach. These early efforts reflected a general philosophy at the MTC to encourage pricing whenever possible as well as land use planning that is oriented towards transit.

The next serious foray into congestion pricing was led by the Alameda County Congestion Management Agency (ACCMA), which developed a plan for a HOT lane on I-680 through the Sunol Pass that links the Tri-Valley area to Fremont and Santa Clara County. The ACCMA has been evaluating improvement alternatives in the I-680 corridor since 1990. With the help of a Value Pricing Pilot Program grant received in 2002, the southbound-only HOT lane is expected to open September 2010.

As familiarity and acceptance grew around the potential of HOT lanes, other HOT lane studies and plans followed, including I-580 Tri Valley area, and SR 85 and U.S. 101 in Santa Clara County. These projects are expected to open in the coming years. Studies have also been conducted of HOT lanes in other parts of the Bay Area, including Sonoma and Marin Counties on U.S. 101.

Bay Area Express Lane Network

With growing interest in HOT lanes around the Bay Area, MTC realized the need for a coordinated approach to HOT lanes in the region. In 2006, the agency planned a network of HOT lanes sharing design, finance, and operational characteristics. MTC included an 800-mile network of HOT lanes in the regional long-range transportation plan for the first time in the Transportation 2030 Plan, adopted in 2005.

The HOT network follows the layout of the 2002 update of the Regional HOV Master Plan, and assumed a regional express bus system operating on the network. The Bay Area's carpool lane system is incomplete because of funding shortfalls. With the express lane network, existing carpool lanes would be converted to express toll lanes and the revenue would be used to finance completion of the carpool/express lane system as well as other important transportation projects and transit operations in the express lane corridors.

As MTC and its partner agencies move into implementation of the network, they hope to accelerate delivery of some portions of the express lane network and reduce costs through a "Rapid Delivery Design" approach that fits express lanes within existing right-of-way.

Pricing is a headline element in MTC's Transportation 2035 Plan for the San Francisco Bay Area adopted in April 2009. The next step to HOT lane development will be corridor studies for each part of network to specify exact configurations, costs and revenues, and operations.

MTC's Transportation 2035 Plan

The Transportation 2035 Plan evaluated the HOT lanes network with express bus enhancements as both a general strategy, compared to regional freeway operational improvements and regional rail expansion, and as a specific investment. The evaluation applied performance measures used by MTC to evaluate all project candidates in the planning process. Performance measures included benefit/cost ratio; collision reduction; delay reduction; reduction of carbon

dioxide and particulate matter emissions; reduction of vehicle miles traveled; and affordability of housing and transportation for low-income households. MTC also developed a legislative framework for the express lane network that addresses issues such as the roles and responsibilities of the key players, use of revenue and project development processes.

Congestion Pricing on the Bay Bridge

In July 2010, the Bay Area implemented variable pricing of the Bay Bridge. The 1989 Loma Prieta earthquake brought down a part of the upper deck onto the lower and vividly demonstrated the vulnerability of the bridge to earthquakes. Since then, rising concerns about the earthquake susceptibility of all aging bridges in the Bay Area, especially the heavily traveled Bay Bridge, combined with waning state funding for needed upgrades, has turned the tide. Most active and influential interest groups came to support raising tolls if revenues were devoted to seismic retrofit and operations/maintenance for bridges.

MTC was able to piggyback successfully on the need for a toll increase in 2009 by proposing peak pricing as both logical and familiar in terms of paying more when demand is greatest, and in terms of dampening congestion. MTC also addressed concerns revenues might not be devoted to Bay Area projects as the State owns the Bay Bridges and might decide to channel revenues to other purposes. Under California law, while Caltrans is responsible for the day-to-day operations, maintenance, and toll collection, the Bay Area Toll Authority (BATA) sets tolls and administers toll revenues. BATA is empowered specifically with toll setting and revenue allocation powers and is governed by MTC, thus subject to local control. Under existing BATA policy, bridge toll revenues are dedicated to bridge operations and maintenance with excess revenues devoted to bridge transit. While some commuters raised objections, major stakeholder support held and the new peak toll schedule went into effect on July 1, 2010.

Congestion Pricing in the City and County of San Francisco

In addition to regional initiatives, the San Francisco County Transportation Authority (SFCTA) has been studying congestion pricing for the downtown area of San Francisco since 2004 when an areawide system was explored in the Countywide Transportation Plan of that year. Detailed examination began in 2007 under a Value Pricing grant. The plans being considered involve charging a fee to cross or travel within a downtown zone or cross major portals leading into San Francisco. So far, proposals have been controversial. There is considerable opposition especially from the business community who contend economic impacts in San Francisco may be unlike those in London and Stockholm where areawide schemes exist like the one proposed for the city. So far, this proposal is not included in the Regional Transportation Plan.

Adoption of the HOT Lane Network Required Extensive Consensus-Building

Successful adoption of the new HOT network required building consensus among several stakeholders. Consensus focused on principles adopted with the network plan for revenues collected in a corridor to be returned to the same area for HOT development and operations. Other principles included maximum use of existing right-of-way, use of best technology, and a common system of marketing and branding. Much of the consensus-building occurred as MTC and regional partners developed proposed enabling legislation (AB 744). Though the legislation ultimately failed to progress, MTC is pursuing authority to implement the network under existing state law that allows for additional HOT lanes in northern California. MTC expects the principles developed through hard won consensus will endure.

Revenue allocation was a major consideration. The counties with more remunerative express lane corridors expressed concern that net revenues would be diverted build HOT lanes with less revenue potential. The legislation addressed the concern by specifying that 95 percent of revenues would return to where collected and 5 percent would be a “backstop” for areas where net revenues are insufficient.

Gaining consensus took time and effort. A special HOT Lanes Executive Committee was formed that included representatives from Caltrans, county congestion management agencies, BATA, and California Highway Patrol. Although automobile, truck, environmental, business interests, and cities were not formally represented on the committee, they were active through standing advisory committees for development of the Transportation 2035 Plan.

Environmental groups raised concerns about the HOT network as “new highways in sheep’s clothing” contributing to more travel and emissions. Environmental concerns are one of several reasons AB 744 failed to progress. Other reasons included efforts by the state professional engineers’ union to seek guarantees of all work (which goes beyond current law), and a need to update revenue projections based on current economic trends.

Another important negotiating point was between Caltrans and MTC on design issues of merging, ingress, and egress. Caltrans preferred separate acceleration and deceleration lanes with no mixing in general purpose lanes, increasing the freeway footprint. MTC desired less expansion. Final details of design were not settled and will be worked out as corridor plans develop.

Income equity was raised in early planning for the I-680 HOT lane, but devoting significant revenues to transit patronized by lower-income groups has blunted criticism, as has independent analysis by academics at San Jose State.

Air Quality Conformity Was Not a Significant Issue

When reviewing the air quality impacts of the HOT lane network compared to regular HOV lane network, MTC estimated that CO emissions would be reduced by 10 million tons over 40 years because HOT provides higher speeds for more vehicles. There also would be expected CO₂ and NO_x benefits. However, specific new HOT lanes will require Environmental Impact Report (EIR) analysis.

MTC Is Modifying Its Models to Address Road Pricing Analytical Needs

The analysis of HOT lanes for the regional plan was done with the existing four-step model. Future demand by vehicle class, income quartile and trip purpose was passed to a separate sketch-level toll optimization model to estimate traffic and revenue in the HOT lanes. Although the procedure allows for iterating between forecast with the regional travel demand model and the toll optimization model, this was not done for the HOT lane system study because of resource constraints.

In large part due to increased attention to road pricing in the region, MTC is moving from trip- to activity-based modeling to give more precision to pricing analysis. The micro-simulation framework in which the activity-based model is applied allows MTC to assign a value of time for each synthetic person in the region, allowing each “traveler” to decide whether paying a toll is “worth it.” With representations of the number of household passengers in each part of a trip, representation of carpooling behavior is also improved, which is important for analysis of HOT lanes. Activity-based models also identify income categories to each household, which is useful in equity analysis.

The model also has been modified to do better mode choice prediction since mode shift is an important impact of pricing. Both highway and transit path choice models are embedded in the trip mode choice model. The highway path-choice models allow travelers to select the best “free” or “pay” path.

Perhaps most important, MTC planners and analysts use the latest travel survey data from the Bay Area Transportation Survey to get accurate elasticities for modeling. Benefit/cost analysis is considered important for explaining the benefits of pricing and equity assessments by income group.

Communications

With respect to the HOT lane network, MTC framed communications (web site, press releases, etc.) to emphasize expediting development of HOV network over and above what regular funding would allow, with tolls from HOV contributing needed revenue. MTC also emphasized the return of revenue to the corridors where that revenue was generated and calling HOT lanes “express lanes,” emphasized the concept of speeding travel.

The MTC web site references FHWA's Value Pricing Pilot Program and a Reason Foundation paper on HOT networks. MTC's frequently asked questions section of the web site explains the HOT concept, rationale, and timeline; and indicates that it is a well-tested concept. The web site emphasizes the attractiveness to expanding HOV and transit use, and addresses the oft-used moniker of HOT lanes as "Lexus lanes." The web site also has links to other HOT projects in the United States.

The HOT lane network plan stresses the collaborative effort needed to arrive at the plan, including agencies, business groups, and local governments. The plan also indicates that HOT principles would result in more throughput and reduced delays; benefits would be commensurate with revenues collected in a particular corridor; existing highway right-of-way would be used; designs would be tailored to each corridor, but there would be consistent geometrics and signage. Communication also pointed out the benefits for the economy through congestion management; health and safety; equitable mobility options.

Summary of San Francisco Bay Area Experience

After early attempts to implement/introduce congestion-pricing on the Bay Bridge, the Bay Area began looking at HOT lanes as other regions successfully implemented road pricing projects. The impetus began at the county level, but as several counties initiated studies, the Metropolitan Planning Commission, which functions as the region's MPO, undertook comprehensive studies on a system of toll lanes that would have consistent operating characteristics and standards.

Through extensive analytical studies, outreach, and consensus-building, MTC included a network of approximately 800 miles. The network promised to accelerate development of the long planned HOV network by adding the HOT component.

Aside from the regional HOT lane system, the Bay Area Toll Authority recently adopted time-of-day tolls designed to spread demand and alleviate congestion, and the San Francisco County Transportation Authority is studying a cordon pricing concept similar to that enacted in London several years ago.

A. Acronyms Used in This Report

AAA	American Automobile Association
ABAG	Association of Bay Area Governments (San Francisco Area)
ACCMA	Alameda County Congestion Management Agency
BATA	Bay Area Toll Authority
BRT	Bus Rapid Transit
CDA	Comprehensive Development Agreement
CMA	Congestion Management Agency
CMP	Congestion Management Plan
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
EIR	Environmental Impact Report
EJ	Environmental Justice
FHWA	Federal Highway Administration
GPS	Global Positioning System
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
Mn/DOT	Minnesota Department of Transportation
MnPASS	Managed Express Lanes in Minnesota
MOVES	Motor Vehicle Emissions Simulator Model
MPO	Metropolitan Planning Organization
MTC	Metropolitan Transportation Commission (San Francisco Bay Area)
MTP	Metropolitan Transportation Plan
NCTCOG	North Central Texas Council of Governments (Dallas/Fort Worth Area)
NEPA	National Environmental Policy Act
NO _x	Nitrogen Oxide
NTTA	North Texas Tollway Authority

PGBT	President George Bush Turnpike
PPP	Public Private Partnership
PSRC	Puget Sound Regional Council (Seattle Region)
RTC	Regional Transportation Council
SFCTA	San Francisco County Transportation Authority
SH	State Highway
SR	State Route
TIP	Transportation Improvement Program
TOM	Toll Optimization Model
TTA	Texas Turnpike Authority
TxDOT	Texas Department of Transportation
UPA	Urban Partnership Agreement
U.S. DOT	U.S. Department of Transportation
VMT	Vehicle-Miles Traveled
VPPP	Value Pricing Pilot Program
WSDOT	Washington State Department of Transportation

B. References

B.1 Dallas/Fort Worth Region Case Study

Mobility 2030, 2009 Amendment, especially Sections 1 and 17. <http://www.nctcog.org/trans/mtp/2030/2009Amendment.asp>.

Managed Lanes Implementation in Dallas/Fort Worth, Presentation to Tarrant Regional Transportation Coalition, March 4, 2009, by Maribel Chavez, P.E., TxDOT and Michael Morris, P.E., NCTCOG. http://www.nctcog.org/trans/presentations/TRTC_ManagedLanes_030409.pdf.

2005 Regional Value Pricing Corridor Evaluation and Feasibility Study, prepared by URS, for NCTCOG. <http://www.nctcog.dst.tx.us/trans/mtp/valuepricing/index.asp>.

RTC tolling policies. <http://www.nctcog.dst.tx.us/trans/committees/rtc/index.asp>.

Developing Procedures for the Determination of Mobile Source Air Toxics (MSAT) and EJ Impacts, presentation by Dan Lamers, NCTCOG to IBTTA Facilities Management Workshop, April 28, 2008.

B.2 Puget Sound Region Case Study

The PSRC web site has considerable information about the plan and the analytical details on its web site. In particular:

- Transportation 2040. <http://psrc.org/transportation/t2040/t2040-pubs/final-draft-transportation-2040>; and
- Transportation 2040: Draft Environmental Impact Statement. <http://www.psrc.org/transportation/t2040/t2040-pubs/trans2040-deis/>.

These appendices in particular shed light on analytical techniques:

- Appendix E: Technical Description of the Modeling Framework;
- Appendix K: Data Analysis and Forecasting at the PSRC: New Tools Within and Integrated Modeling Framework; and
- Benefit/Cost Analysis web page, with several helpful references: <http://www.psrc.org/data/models/benefit/costanalysis/>.

B.3 Minneapolis/St. Paul Region Case Study

2010 Transportation Policy Plan, Adopted 2009, Amended 2010, Metropolitan Council. <http://www.metrocouncil.org/planning/transportation/TPP/2008/index.htm>.

Minnesota Department of Transportation I-394 MnPASS Technical Evaluation, Final Report. Prepared by Cambridge Systematics, Inc. November 2006. http://www.mnpass.org/pdfs/394mnpass_tech_eval.pdf.

Buckeye, K.R., and L.W. Munnich, Jr. Value Pricing Education and Outreach Model: I-394 MnPASS Community Task Force. In Transportation Research Record No. 1960, Transportation Research Board, National Research Council. Washington, D.C. 2006.

Munnich, L.W., Jr., and K.R. Buckeye. I-394 MnPASS High-Occupancy Toll Lanes: Planning and Operational Issues and Outcomes (Lessons Learned in Year 1). Transportation Research Record No. 1996, Transportation Research Board, National Research Council. Washington, D.C. 2007.

MnPASS System Study, Prepared by Cambridge Systematics, Inc., 2005. http://www.mnpass.org/systemstudy_archive.html.

Rebecca Kalaskas, Brian D. Taylor, and Hiroyuki Isek. Motivations Behind Electronic Road Pricing. What is the Driving Force Behind the Worldwide Rise in Tolling? A Review of Innovative Road Pricing from Across the Globe, UCB-ITS-PRR-2009-16, California PATH Research Report, page 2. <http://www.path.berkeley.edu/PATH/Publications/PDF/PRR/2009/PRR-2009-16.pdf>.

Kenneth Buckeye and Adeel Lari. Measuring Perceptions of Road Pricing Alternatives: Minnesota Public Outreach Effort, Transportation Research Record: Journal of the Transportation Research Board, Transportation Research Board of the National Academies, ISSN0361-1981, Volume 1558/1996. <http://trb.metapress.com/content/e628t42847624478/>.

Fact sheet. <http://www.dot.state.mn.us/upa/documents/legfactsheet0309.pdf>.

Overall information, reference to other cities. <http://www.dot.state.mn.us/upa/>.

Publicity video. http://www.hhh.umn.edu/centers/slp/vp/vp_org/about/videos.html.

I-35 customer information, MnPASS outreach events, survey results, operations. <http://www.mnpass.org/outreach.html>.

Minnesota Statutes 160.84 through 160.93, available at: https://www.revisor.mn.gov/revisor/pages/statute/statute_chapter_toc.php?year=2006&chapter=160.

B.4 San Francisco Bay Area Case Study

2030 Plan. http://www.mtc.ca.gov/planning/2035_plan/index.htm.

HOT Principles. http://www.mtc.ca.gov/planning/hov/Res3868_Att_B-HOT_Network_Principles.pdf.

HOT Lane Analysis. http://www.mtc.ca.gov/planning/hov/HOT_Phase_3_report/2_HOT_Lanes_Final_Report.pdf.

FAQ. <http://www.mtc.ca.gov/planning/hov/faq.htm>.

Bay Bridge Pricing proposal. http://www.mtc.ca.gov/news/info/toll_increase.htm.

Bay Bridge Pricing Proposal Power Point. http://www.mtc.ca.gov/news/info/2009/Toll_Increase_Recommendation_12-9-09.pdf.

Bay Bridge Pricing Analysis Power Point. http://apps.mtc.ca.gov/meeting_packet_documents/agenda_1367/3_TollIncreaseRecommendationFinal.pdf.

C. Literature Review

The team conducted a literature review of both planning process reports and congestion pricing reports to identify important themes and trends that would form the foundation for the case study interviews.

Decision-Making Framework for Pricing Decisions

“Improved Framework and Tools for Highway Pricing Decisions, Draft Final Report Volume I: Decision-Making Framework for Highway Pricing Decisions,” Project NCHRP HR 08-57, Prepared by Parsons Brinckerhoff, Inc., July 2008.

In a review of planning for road pricing projects, Parsons Brinckerhoff, Inc. (PB) recommends four phases in the planning of road pricing projects: from 1) exploration to; 2) option development; 3) feasibility assessment; and 4) investment or finance study. PB indicates the phases follow traditional transportation planning. However, some findings and recommendations of relevance to integrating road pricing into planning:

- **Finance Phase of Planning** – PB indicates the investment and finance phase of study for road pricing, while common to many transportation planning activities, entails unique tasks. For projects financed by debt backed proceeds for future tolls, an “Investment Grade Study” is needed to finalize funding arrangements in a “Financial Plan,” the formal document that details a project’s cost estimate, revenue structure, and financial resources. Projects not relying upon debt finance based on future tolls do not require this step but still require detailed finance analysis.
- **Planning by Project or Comprehensively** – PB suggest “two broad approaches may be used to initiate and assess tolling and pricing, including a comprehensive approach going through the four phases identified or a project approach focusing on a specific corridor or area.” As PB notes, both approaches “are valid” and, “this research effort demonstrates that a flexible decision-making framework is likely to incorporate both approaches, capitalizing on their respective strengths” and tailored to reflect “regional transportation needs, institutional arrangements, and politics.” Examples of comprehensive approaches are cited in the SF Bay Area, Washington State, Colorado, Atlanta, and Texas.
- **From Projects to Regional Assessments** – PB finds, “Many regions begin their experience with pricing as a result of low-hanging fruit situations where there is a clear logic behind the use of tolls on a new or existing facility. If pricing is implemented successfully ... a region may consider embarking on a comprehensive assessment of pricing in other settings, with subsequent projects moving forward for further assessment as a result.”

- **Matching Pricing to Goals and Contexts** – PB proposes road pricing planning should match up types of pricing options with appropriate goals and contexts. PB suggests HOT conversions, existing tollways, new facilities, and other concepts are best suited to varying goals and conditions and a planning approach needs to select concepts accordingly. Likewise, the exact form of pricing needs to match the congestion problem. Thus, integrating road pricing in to planning depends on how pricing strategies fit with local, regional, and state goals and priorities around congestion, finance, and the environment.
- **Environmental Review and Road Pricing** – PB notes environmental reviews as part of road pricing planning vary with state law and custom suggesting integration of road pricing into planning will vary by location. They note, “In certain cases, the consideration of tolling and pricing may be introduced while the environmental process is underway or even after it has been completed.” At a minimum, this change would require a reevaluation of the analyses completed. The level of detail of the reevaluation depends on the circumstances surrounding the particular project. In situations where the introduction of tolling and pricing is determined to be “significant,” a supplemental environmental impact statement must be prepared.
- **Modeling and Road Pricing** – PB finds planning for road pricing is an “intense endeavor” given “behavioral models must consider both tolled and nontolled alternatives, as well as multiple tolling scenarios. Standards can be particularly high when private sector investment is involved (to meet bonding requirements).”
- **Legal and Legislative Matters** – PB notes an important stepping stone in the planning process is assessing legal and legislative requirements. Planning will vary depending in large measure on Federal aid to facilities. PB notes, “State and local jurisdictions have the greatest flexibility to implement tolling and pricing on local roads and highways that have been, or will be built without Federal funding. Greater restrictions apply when tolling and pricing are used on the Federal Aid Highway System, or on HOV lanes or busways funded with transit monies. As a result of these restrictions, the vast majority of tolling and pricing projects implemented over the past 50 years have involved either new state or county toll roads or the expansion of preexisting toll facilities that have been incorporated into the Interstate Highway System.” Likewise, “Various state and local authorities also are needed to implement tolling and pricing projects. Local legal requirements are dictated by state and local statutes and regulations, as well as pricing and toll collection policies and mechanisms used to raise financing. Policy-makers interested in pursuing tolling and pricing projects should consult with legal experts to identify the specific requirements that would apply in their regions.”

- **Screening Criteria** – PB enumerates several planning screening criteria important to consider as road pricing is integrated into planning:
 - Congestion relief potential;
 - Consistency with state and regional plan goals;
 - Ability to improve the efficiency of the regional transportation network;
 - Public acceptance;
 - Institutional feasibility;
 - Safety impacts;
 - Order-of-magnitude construction cost;
 - Revenue generation potential; and
 - Financial viability.

Domestic Scan of Congestion Pricing and Managed Lanes

A Domestic Scan of Congestion Pricing and Managed Lanes, prepared for the Federal Highway Administration, U.S. DOT, DKS Associates, with PBSJ and Jack Faucett Associates, February 2009.

This recent survey by DKS Associates of selected MPOs and state DOTs in 10 metropolitan areas examined how they are planning for congestion pricing and managed lanes. Important findings for integrating road pricing into planning include:

- **From Projects to Plans** – The study found initiation of congestion pricing in eight metropolitan areas with pricing projects “has started with individual projects,” versus deriving from within regional plans themselves. Specifically, “In most cases, the desirability of a congestion pricing or managed lanes project did not emerge directly from a congestion management plan (CMP) assessment of options,” and “most congestion pricing or managed lanes projects are ... initiated and advocated for by agencies within the metropolitan area and are incorporated into the Metropolitan Transportation Plan (MTP) and the Transportation Improvement Plan (TIP) by the MPO as updates of these documents occur.” One example is how HOT lanes gradually developed into the regional plan as a network approach within the San Francisco Bay Area. There, “the initiative for the HOT lane projects came first from the ACCMA and the Santa Clara County CMA (the Santa Clara Valley Transportation Authority).” Thereafter, “The MPO (MTC) took the lead to develop the regional plan for a HOT lane network.” Nor did state agencies generally derive congestion pricing projects from within broad or systematic planning efforts but instead came from site-specific studies. Specifically, “The state DOT was often the initiator but survey respondents generally did not indicate that the projects proposed were part of the statewide planning effort.”

However, the report also finds as interest has moved from individual projects to regional approaches, “integration into the metropolitan planning process also has increased.” Specifically, MPOs are making “a greater effort to provide an appropriate interagency collaborative process for identifying the need for the projects, identifying the options and alternatives to be considered, formulating an appropriate evaluation process, seeking public and stakeholder input, and identifying a preferred approach.”

- **Exemplary Approaches** – The report identifies some “exemplary approaches” to planning useful for consideration in integrating road pricing into planning. The report points to the Seattle area where PSRC has updated its CMP to:
“... identify the location where congestion is greatest and potential future locations for possible application of congestion pricing; specify pricing, demand management and system management strategies as specific options; establish a specific evaluation method (in this case, benefit/cost analysis model) as well as other more traditional performance measures such as safety, reliability, access as well as delay; coordinate with Washington DOT long-range transportation plan, to insure it incorporates outcomes of the MTP update.”
- **Revenues** – Another important finding relevant to integrating road pricing into regional and state planning has to do with revenues. The report finds in Minnesota, a policy position has evolved in the MTP pertaining to road pricing revenues. Policy indicates “revenue generated from the managed lanes will be used for the cost of implementation and maintenance. The net revenue from the I-394 MnPASS project has not been sufficiently large to warrant consideration of these revenues in the MTP financial constraint.” Likewise in Virginia with the adoption of the I-95/I-395 HOT lane project into the 2007 MTP, policy sets out how revenue obtained will be used to cover the costs of each project, and excess revenue will be used to fund transit improvements.
- **Air Quality** – The report notes the importance of road pricing plans meeting air quality requirements, suggesting integration of road pricing into planning must take into account air quality requirements and assessment processes. The study found all HOT land projects reviewed involved assessing air quality impacts and attending to mitigation to meet National Environmental Policy Act (NEPA) and/or CEQA requirements. One MPO in Kansas City, MARC, is attempting to make environmental review and analysis integral to regional planning rather than analysis done after projects are identified. The initiative is entitled Linking Environmental and Transportation Planning.
- **Models/Analysis** – Integration of road pricing into planning depends on good modeling and analysis. The analysis of congestion pricing among the metropolitan areas surveyed relied on the regional travel model for analysis. The model often is supplemented by other tools with added sensitivity to pricing and/or for analysis of costs and benefits. Microsimulation models

have been used to assess the travel time and level of service associated with alternative pricing scenarios, level of service, traffic impacts on local streets and general purpose lanes, as well as the impacts to lower-income travelers. Other common performance measures include vehicle-miles traveled, emission volumes, vehicles-hours traveled, and individual and network delays savings. Proprietary toll revenue models have been used for analyses in some areas.

D. Interview Guide

1. Road Pricing Projects and Programs in your region:
 - a. Let's start by confirming what has been proposed in the past 10 years by your agency or others in your area of jurisdiction?
 - b. What is committed to in the sense of pending implementation?
 - c. What has moved forward into implemented project, if any?
2. What (if any) road pricing strategies currently are being considered in the MTP, Constrained Long-Range Plan, TIP, or other relevant agency plans?
 - a. To what extent did the road pricing proposals emerge from the regional planning process via vision, goals, criteria, deficiencies, and finance assumptions, versus coming from outside the planning process (such as individual project proposals)?
 - b. If proposals originated outside the regional plan process via vision, goals, criteria, deficiencies, and finance assumptions, were they later incorporated into the plan, and if so, how?
3. To what extent did the role of conformity, or other air quality planning, figure in the pricing proposals now in agency plans?
 - a. If air quality did play a role in planning, what was the significance of climate change or other specific air quality issues?
 - b. Did air quality provide an incentive or a hindrance to pricing planning and implementation, or some combination?
4. To what (if any) extent did financial considerations influence congestion pricing proposals in your region?
5. To what extent if any is road pricing combined in a package with other transportation improvements or initiatives?
 - a. Transit?
 - b. Other?
6. What plans have been outlined for distribution/use of potential excess revenue from the pricing strategy?
 - a. Were there any legal or constitutional restrictions to consider?
 - b. To what extent were any such requirements a factor in developing the plans?

7. Agency Roles. The role Federal, state, or local regulations and guidelines play in spurring or hindering current road pricing plans.
 - a. Role of Federal programs, such as: Urban Partnerships; Value Pricing Pilot; Express Lanes Demonstration (ELD); Congestion Reduction Demonstration (CRD); Section 166 HOV to HOT; Interstate tolling restrictions;
 - b. Role of state DOT;
 - c. Role of MPO;
 - d. Role of other regional agencies (such as congestion management agencies if they exist, or transit agencies); and
 - e. Role of municipalities or counties.
8. Analytical methods and issues.
 - a. Analytical approaches used to evaluate pricing proposals now in plans. Use of models in analysis, including which models were used, strengths and weaknesses, any modifications; interface with regional transportation and air quality models; foreseeable improvements, changes in response to issues that were identified. Particular topics:
 - i. Transportation effects (e.g., volumes, VMT, transit ridership, trip reduction, elimination, diversion);
 - ii. Transportation effects (e.g., congestion levels, level of service, corridor speed, system speed, transit ridership);
 - iii. Revenues;
 - iv. Costs/benefits;
 - v. Equity; and
 - vi. Other?
9. Communications and consensus-building.
 - a. How road pricing strategies are framed and objectives communicated;
 - b. If/how views of stakeholders, interest groups, key decision-makers for and against were assessed and taken into account toward acceptable compromises; if/how nurturing of champions and allies was done;
 - c. If/how packaged with transit;
 - d. Revenue distribution plan;
 - e. Treatment of “stick point” issues, e.g., equity, effectiveness, economy impacts, revenue redistribution;
 - f. Samples of perceived successful or problematic communication methods or approaches (flyers, newsletters, press releases, public hearing materials, brochures, web information, opinion/attitudinal surveys); and
 - g. For ongoing programs, customer information materials (e.g., newsletters, mailings, and web information). Pros/cons of each.

10. Contingencies for potential negative impacts, e.g., technology or operations glitches, enforcement problems, lower than expected revenues, etc.
11. References.
 - a. Analytic, modeling experts;
 - b. Personnel in public relations or elsewhere directly responsible for relevant communications; and
 - c. Relevant reports, meeting minutes, in-house documents, consultant studies, web sites.



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