

# Guidebook for State, Regional, and Local Governments on Addressing Potential Equity Impacts of Road Pricing

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## **1.0 PURPOSE AND INTRODUCTION**

### **1.1 Introduction**

Addressing potential equity issues is often vital to obtaining the support needed to implement road pricing projects. In order for road pricing projects to succeed, the implementing State, regional, and local agencies must understand equity issues, develop mitigating measures, and articulate the issues and mitigation strategy to both decisionmakers and the public. These steps are necessary because equity is a paradox: what may appear equitable in one dimension can be construed as inequitable in another.

Much has been learned over the past two decades both from successful projects and those that have not reached implementation but from which best practices can be derived. As a result, an equity guidebook is needed to provide agencies interested in implementing road pricing strategies with tools and methodology to properly address equity issues.

***Early consideration of equity issues is critical to the success of road pricing projects.***

Equity concerns have been raised in the development stages of most proposed road pricing projects in the United States and abroad. Experience from projects that have reached implementation has shown that with proper consideration of equity and associated mitigation measures, road pricing projects can be successful. Most projects currently in operation have found pricing scheme acceptance levels to be similar in low-, mid-, and high-income groups.

Recent projects have illustrated the importance of appropriate and timely consideration of equity in the ultimate success of major pricing projects and programs. As part of Washington State DOT's (WSDOT) Urban Partnership Agreement, the agency proposed to impose variable electronic tolls on all lanes of an existing non-tolled floating bridge on SR-520. The existing bridge was in need of replacement and there was not adequate funding available for the project. Such a strategy – tolling of existing non-tolled infrastructure to raise revenue for its replacement – has been considered for many projects nationwide, as our transportation infrastructure ages. However, no other agencies have succeeded in making the case to the public and decisionmakers to take this controversial step.

The WSDOT designed a strong public process to help build support for roadway pricing. A tolling implementation committee was established in 2010 to gauge and build public support and to provide guidance to the legislature. The committee succeeded in demonstrating the need for replacing the deteriorating existing bridge and the resulting mobility benefits of doing so to all users of all income levels. The WSDOT worked with the regional transit agency to initiate a substantial increase in express bus service within the SR 520 corridor for several months leading up to the start of bridge tolling. This created an expanded transit market and helped to reduce traffic diversion effects. In addition, WSDOT provided traffic mitigation funds to local agencies to assist in dealing with the expected traffic diversion. Toll collection began in December 2011 and has been received favorably by the public.

A key lesson learned from these congestion pricing projects is that equity issues should be addressed at the earliest practical phase in project development because those who perceive inequity are likely to object to the project's implementation.

Road pricing projects of all kinds (tolling, HOT lanes, congestion pricing, parking, and vehicle-miles traveled (VMT) fees) are expected to become more important in the United States over the next decade. The U.S. Federal gas tax and many State gas taxes are not tracked to inflation. As an increasing percentage of the vehicle fleet switches to higher efficiency hybrid, plug-in hybrid, and non-gasoline modes such as electric, the gas tax revenues will continue to decline and will be insufficient to cover operations and maintenance costs. In this financial environment, funding for new infrastructure, needed to keep pace with expansion of vehicle miles traveled in congested cities, is even more scarce. To deal with this lack of funds, States may begin financing transportation projects more heavily from the sales tax, but this is highly regressive by any vertical equity measure. Schweitzer and Taylor stated, “Using sales taxes to fund roadways creates substantial savings to drivers by shifting some of the costs of driving from drivers to consumers at large, and in the process disproportionately favors the more affluent at the expense of the impoverished.”<sup>1</sup> Alternatively, State and local agencies may employ road pricing more extensively, such as current legislative changes being promoted in Oregon, and will thus need to quickly address vertical equity issues.

### ***The need for a road pricing equity guidebook for State and local agencies***

In today’s challenging financial and political environment, State and local transportation agencies need a common reference both to understand and to explain potential road pricing equity issues in common terms and using a consistent set of measurements. This guidebook will greatly help them understand and communicate both the horizontal and vertical equities of their plans or policies to reach a common understanding among key decisionmakers and stakeholders. This is especially true today as policy initiatives for sustainability, the environment, efficiency of provided services and congestion or demand management are key objectives for many transportation organizations. In the wake of the recent economic downturn, the funding and maintenance of our infrastructure will continue to dominate our debate for years in the future. These funding debates could raise further equity concerns.

## **1.2 Purpose of Study**

Many road pricing projects and systems have been successfully implemented, despite experiencing setbacks in the concept development and planning stages with respect to equity concerns and other issues. Often, the perception of equity imbalances has been a significant issue introduced in the environmental review process, however it has been successfully mitigated through careful and thoughtful programs.

In order to assist transportation agencies to better assess and mitigate perceived and potential equity impacts of road pricing projects on local communities, commuters, and system users, the Federal Highway Administration (FHWA) developed a “*Guidebook for State, Regional, and Local Governments on Addressing Potential Equity Impacts of Road Pricing.*” The guidebook:

- Provides comprehensive procedures and guidance to State, regional, and local agencies as well as decisionmakers and concerned citizens to follow when considering road pricing projects to ensure that equity is appropriately and adequately addressed;

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<sup>1</sup>Schweitzer, L. and B. D. Taylor. “Just Pricing: The Distributional Effects of Congestion Pricing and Sales Taxes.” *Transportation*, 35(6). 2008, pp. 797-812.

- Focuses primarily on time-of-day variable pricing as it may be applied to cordon and area-wide pricing, facility pricing (including high occupancy toll (HOT) lanes, express toll lanes, and traditional toll roads), and parking pricing.
- Is built upon:
  - A comprehensive literature review of existing road/congestion pricing equity research and applications;<sup>2</sup>
  - A series of interviews with government staff, academics, private sector representatives, and other subject matter experts knowledgeable about road pricing equity; and
  - A workshop held in Washington, D.C. in October 2011 to review and finalize the guidebook. The workshop was attended by road/congestion pricing and equity experts including government officials, researchers and academics, as well as private sector representatives.<sup>3</sup>
- Includes two road pricing scenarios/case studies identified by FHWA. These include:
  - Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time.
  - Scenario 2: Agencies considering road pricing expansion along their network.

The remainder of the guidebook includes the following:

**Section 2.0: Congestion and Road Pricing Strategies – Illustrative Scenarios** describes two examples of relevant road pricing strategies that will be used throughout the guidebook for illustration purposes.

**Section 3.0: Congestion and Road Pricing Equity – Definition and Factors** provides a comprehensive review of equity concepts that should be considered during congestion pricing discussions.

**Section 4.0: Incorporating Equity in the Transportation Planning Process** describes how agencies should integrate equity indicators in transportation and project planning processes; and how to measure congestion pricing equity impacts both qualitatively and quantitatively.

**Section 5.0: Evaluating Equity at the Project Level** presents a methodology that can be used to measure congestion pricing equity impacts both qualitatively and quantitatively.

**Section 6.0: Strategies to Address and Mitigate the Impacts of Congestion Pricing** provides a comprehensive approach for minimizing the impacts of tolling and parking pricing initiatives on local communities and system users.

**Section 7.0: The Role of Communications in Congestion Pricing Initiatives** presents a summary on communications methods and strategies to address equity when seeking to successfully implement pricing projects.

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<sup>2</sup> The findings from the Literature Review are summarized in a report entitled Development of a Guidebook for State and Local Governments on Evaluating and Mitigating Equity Impacts of Road Pricing, Task 1 - Background Paper.

<sup>3</sup> The findings from the Workshop are summarized in a report entitled Development of a Guidebook for State and Local Governments on Evaluating and Mitigating Equity Impacts of Road Pricing, Task 2 – Summary Report on Workshop Findings.

**Section 8.0: Recommendations and Next Steps**

**Appendix A: Glossary provides a detailed definition of key equity terms, types of equity, mitigation terms, key policy definitions, and other useful terms.**

**Appendix B: Detailed Review of Potential Remediation Strategies for Congestion Pricing Equity Impacts**

**Appendix C: Bibliography**

## 2.0 CONGESTION PRICING STRATEGIES – ILLUSTRATIVE SCENARIOS

As discussed in Section 1.0, two illustrative scenarios were identified during discussions with FHWA staff and discussions with subject matter experts, academics, practitioners, and State and local agencies. These examples were deemed relevant for the purpose of this guidebook and include the following case studies:

- Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time.
- Scenario 2: Agencies considering road pricing expansion along their network.

### **Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time**

In this scenario, it is very important to consider equity at all stages of the project to ensure a successful implementation and lay the groundwork for future road pricing projects in the region. In a region where travelers are unfamiliar with road pricing, communications of the project objectives, needs, and use of the funding are paramount. Equity issues should be analyzed and presented proactively and as early as practical. It can be difficult to gain public support, especially if there are perceived equity issues that are not being adequately considered. Incorporating equity considerations into the earliest stages of the planning process is critical in that equity issues that arise for the first time during later phases tend to delay or block project implementation.

#### **Agency and Region New to Pricing**

For the purposes of this guidebook, we will think in terms of an agency and a region new to pricing as follows: county X has two urban areas separated by a 12 mile long, eight-lane freeway. Ten years ago, the county widened the roadway from three lanes to four lanes (each direction) by adding a High Occupancy Vehicle (HOV) lane alongside the three general purpose lanes. However, the HOV lane has been consistently underutilized, leaving the highly congested general purpose lanes adjacent to the low volume HOV lane. The agency is considering an HOV to HOT conversion, which will allow carpools (HOVs) and buses to continue to use the HOT lane for free but charge a fee to ineligible vehicles to use the lane.

### **Scenario 2: Agencies considering road pricing expansion along their network**

In this scenario, the original facility should be well established and evaluated, and there should be an awareness of the current road pricing conditions in terms of effectiveness, acceptance, and an awareness of pricing. Few equity-related problems are being caused by or perceived within the current HOT lane system. For this scenario, expansion can be considered either by extending the length of the facility, expanding the capacity of the existing facility, expanding into a network of priced roadways, or implementing a cordon pricing scheme.

Expansion can be highly rewarding and very effective in dealing with the growing challenges of congestion and a limited ability to expand freeway capacity due to construction costs, right-of-way constraints, and environmental and societal impacts. This scenario is very much related to the concept of “managed lanes,” defined as “highway facilities or a set of lanes where operational strategies are proactively implemented and managed in response to changing conditions.” In expansion projects, it is

important to consider cooperation across agencies and geographical borders as these projects frequently cross jurisdictional boundaries. Careful planning and project development is key to successful implementation. As the system expands, equity may be a larger issue than when only one road was priced. Other equity considerations, such as rural and urban issues, should be addressed as well as the market and societal equity at either end or either side of the project boundaries.

**Tolling Expansion**

For the purposes of this guidebook, we will think in terms of a city planning to expand tolling along its roadway network as follows: city Y currently accessible from three directions: north, south, and east. The north Interstate currently has an HOT lane while the south Interstate only has general purpose lanes. The east access road is a highway corridor with an adjacent arterial, also un-priced. Due to current budget shortfalls, funding is insufficient to add general purpose lanes to the south Interstate and east highways. Thus, expanding the HOT network to these facilities, utilizing their existing footprints, is now being considered.

### **3.0 CONGESTION PRICING EQUITY - DEFINITION AND FACTORS**

Section 3.0 provides a comprehensive definition of congestion and road pricing equity and describes the elements or factors that should be considered when evaluating the impacts of road pricing projects on communities and transportation system users.

#### **3.1 Definition of Types of Equity**

In simplest terms, equity means treating people of all social groups equally. In order for this definition to be meaningful, a definition of the following characteristics is needed:

- What constitutes equal treatment (called equity type), and
- Which social groupings are being observed (called equity category or unit of analysis).

Because equity is a very broad topic, the scope of equity being discussed should be limited. In addition to equity type and the category or unit of analysis, two further characteristics must be identified: impacts of concern and measures to assess equity impact. Impacts of concern are the aspects of the lives of travelers that are affected by the transportation or pricing project. Typical categories of impacts that are relevant to transportation equity include financial/economic, transportation service, or environmental impacts. Sometimes these impacts of concern are referred to as “social exclusions,” which means the transportation system by either price, area of service, or vehicle category is perceived to be biased against a social class, poor neighborhood, or beyond the financial reach of a percentage of the population; for example, a new highway that does not have an interchange at or near the lower income housing area of the urban center. Another example is an electric vehicle that does not pay any fuel taxes but is priced sufficiently high that only the upper economic classes can afford to buy one. This latter example is a new concern as high efficiency and alternate fuel vehicles start entering the overall vehicle fleet.

In order to compare the equity discussions from one project to another, the impacts must be measured in units that allow comparison across projects of different size, passenger utilization, etc. Such measures may be per capita, per vehicle mile, per trip, etc. In terms of “social inequities,” for example, the measure to assess equity impacts between an electric vehicle and carbon-based fuel vehicle could be translated to the dollar value of tax paid by one versus the other. Alternatively, one could translate it to the amount of lane miles driven per refill to show the social inequity of a plug-in hybrid versus vehicle versus a conventional carbon-based fuel vehicle. In either example, the measures of comparison must be comparative to show the degree of social inequity of one case versus another.

Economists and social theorists have defined several types of equity that can be applied to transportation projects. At the highest level, the categories are horizontal equity and vertical equity. Every system can be defined in terms of horizontal social equity and vertical equity at any point along the horizontal axis. Typically, social inequity is a horizontal measure while social exclusion is a vertical equity argument.

### **Horizontal Equity**

Horizontal equity, also called fairness and egalitarianism, defines equity as the equal distribution of impacts (costs and benefits) between distinct individuals and groups that are considered equal in ability or need. Horizontal equity means that each group of the same class is treated the same. Horizontal equity makes no claim whatsoever about distribution between different classes. Horizontal equity generally falls into two categories: opportunity equity and market equity. Agencies often achieve horizontal equity by applying principals of both.

### ***Opportunity Equity***

Opportunity equity requires that costs and benefits are assigned in proportion to the size of the group without regard to any other group characteristics. In the case of road pricing, opportunity equity means that the costs and benefits of a new transportation project should be divided proportionately among social groups. An example of opportunity equity in road pricing is with respect to geography: each individual pays the same rate regardless of starting point. This means that one-way tolls, such as are used on some bridges in the Northeast, do not exhibit full horizontal equity (though many people using these bridges make round-trips and thus pay an equal toll, there is a small population who do not and thus are exposed to horizontally inequity). Opportunity equity is a type of horizontal equity because it does not consider the resources, socio-economic class, etc., of individuals.

### ***Market Equity***

Market equity in road pricing is achieved when the price charged to each individual or group is in direct proportion to the costs imposed and the benefits received by the individual or group. An example of market equity in road pricing would be setting a congestion charge for a driver entering a congested area at a specific time to correspond precisely to the cost of the induced delay the driver imposed upon other drivers—as the amount of imposed delay would vary by the level of congestion, the price would correspondingly vary. Market equity is a type of horizontal equity because it does not consider the resources, class, etc., of individuals—everyone pays the same market-based rate.

### **Vertical Equity or Outcome Equity**

Vertical or outcome equity refers to the distribution of impacts (costs and benefits) across social groups that differ in ability and/or need. The principle of vertical equity is that individuals with less ability and/or more need should bear less of the cost and/or accrue more of the benefits of a project, and conversely, that individuals with more ability and/or less need should bear more of the cost and/or accrue more of the benefits of the project. The minimum statement of vertical equity is that the worst off should be made no worse off. Social groupings used in vertical equity include income or social class, or with respect to mobility need and ability. In road pricing projects, a type of vertical equity with respect to income is achieved by noting that lower income individuals are more likely to use buses or other forms of public transportation. Thus when a flat road charge is imposed by an agency creating more vertical inequity (because the lower income individuals pay a higher percentage of their income for the charge than higher income individuals), the inequity can be mitigated by increasing public transportation service to, from, and within the area subject to the road charge.

### Additional Types of Equity

- **Spatial Equity** - The extent to which benefits and costs are distributed equally over space.
- **Intergenerational Equity** - The extent to which benefits and losses/costs are distributed to the present or the future.
- **Social Equity** - The extent to which allocation is proportionate to need.
- **Operational Equity** - The extent to which benefits and costs are distributed among system users for different operational strategies. With the greater prevalence of dynamic pricing that varies with congestion, the same facility may have prices that vary from day to day in addition to time of day. Thus, a trip at 7:30 a.m. may be priced differently on Monday than it is on Wednesday or even on Monday of the previous week.

Horizontal, vertical, and spatial equities are often considered in road pricing projects. Spatial equity is often cited as a key reason for expanding a toll network to adjacent regions to allow a larger population to benefit from additional travel options, including priced lanes with faster travel times and/or new transit service. Interregional equity is a priority when an agency is considering long-term lease agreements with private companies and may receive a lump-sum payment now, but toll users will pay far into the future. Market, social, and operational equity are addressed or accounted for less often.

**Table 3-1: Taxonomy of Transportation Equity**

Type	Subtype	Description
Horizontal	Opportunity	Groups/individuals of the same ability/need are given costs/benefits in proportion to their size
	Market	Groups/individuals of the same ability/need are charged a cost in proportion to benefits received
Vertical/Outcome		Groups/individuals of differing ability/need achieve the same result

These different types of equity often overlap and conflict. For example, horizontal equity requires that users bear the costs of their transportation facilities and services, but vertical equity often requires subsidies for disadvantaged people. Transportation planning often involves making tradeoffs between different equity objectives. State and local government officials will want to understand equity considerations so that they can explain the equity issues to the public on a given road pricing project.

### 3.2 Equity Units of Analysis

The primary scope of an equity measurement is its category or unit of analysis, the grouping of individuals for whom equity is analyzed. Typical units of analysis for equity include geographic, stakeholder groups, and individuals. Of these units, stakeholder groups are among the most commonly analyzed in transportation equity literature. This section will provide some examples of different types of stakeholder groups as applied to the above types of equity. The guidebook will be used by state and local governments so the team will highlight state and local governments as a stakeholder group, separately from other groups such as the American Highway Users Alliance or other advocate groups.

For horizontal equity analysis, stakeholder groups may be ethnic groups, groups who primarily use one mode of transportation (transit, passenger vehicle, walk/bike), or other groups. A new type of horizontal equity concerns infrastructure payment by various stakeholder groups. This focuses on equity of each class of user of the mobility network paying their own share for the use of the network infrastructure. Payment for infrastructure has long been based on the ubiquitous use of fuel taxes paid into a dedicated (hypothecated) fund (the Highway Trust Fund). The advance of electric, plug-in hybrids, high-efficiency petroleum, and hydrogen fuel vehicles has created new classes of road users. These new classes are not buying fuel and paying proportionate taxes to support the infrastructure they use. Drivers of fully electric vehicles such as the Tesla Roadster and the Nissan Leaf (which sold out its first year model run of 20,000 vehicles) are paying no fuel tax towards highway infrastructure whatsoever. From the perspective of horizontal equity with respect to infrastructure payment, this situation is not equitable, though it may encourage adoption of the use of lower emissions vehicles.

Vertical equity is commonly measured with respect to stakeholders grouped by income or social class: lower income classes should bear less of the cost and/or accrue more of the benefits than upper income classes. An alternative application of vertical equity is achieved by grouping stakeholders according to mobility need and ability. This application says in essence that those who have greatest need for mobility and/or are least capable of accessing transportation should accrue the most benefits and/or pay the least costs for a transportation project. By grouping stakeholders according to mobility need and ability, equity measures the degree to which the transportation system meets the needs of travelers with special constraints and is frequently invoked to justify paratransit services.

### ***Payment Medium Access Equity***

One significant stakeholder group affected by road pricing projects are “unbanked” people—people who have no bank accounts, by choice or because they lack the financial means. Some agencies require that users have bank accounts in order to obtain the means to pay the fare on a given road pricing project. Yet the number of unbanked people remains as high as 10-20 percent in many places, and denying these people access to priced road projects can significantly harm equity.<sup>4</sup> Those tolling projects require users to have transponders, thus preventing the legal usage of the facility by a significant portion of the population, a situation that would be considered inequitable by both vertical and horizontal measures. Many other facilities also allow users to pay video tolling fees (a camera reads the license plate and the owner is billed by mail), which are slightly higher than the EZ-Pass fees, to account for additional costs of processing. While this arrangement allows unbanked individuals to use the project legally, it requires them to pay more than others, which is also inequitable by standard vertical and horizontal measures. Measures to mitigate this equity issue include providing transponders to drivers using cash, and providing cash “top up” stations (kiosks that allow account holders to pay cash to increase their balance) at supermarkets or gas stations; or simply allowing video tolling for the same price as transponder tolling—a measure sure to substantially increase operating costs due to the inherent inefficiencies in

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<sup>4</sup> Parkany, Emily, “Environmental Justice Issues Related to Transponder Ownership and Road Pricing,” *Transportation Research Record*, a Journal of the Transportation Research Board, No. 1932, 2005, pages 97-108.

video tolling. Maryland's Intercounty Connector is one of several road pricing facilities in the United States that allows payments with an EZ-Pass, which requires users to have either a bank account or to pay by cash.

### 3.3 Definitions of "Impacts of Concern" by Equity Type and Analysis Unit

"Impacts of concern" refer to the changes in the lives of the traveling public (as divided according to the categories or units of analysis) caused by the transportation project for which equity implications will be observed. There are three main groups of impacts of concern that are observed for road pricing projects:

- Financial and economic user costs and benefits: this group of impacts includes the direct financial and economic costs and benefits of the transportation project to both users of the system and those living in the region affected by the system. User financial costs include direct financial costs (charges) and indirect financial costs (transponder rental, banking costs, costs incurred changing routes or times to avoid the charges). Non-user financial costs may include upfront costs for implementing the system (typically taken from general funds). Financial and economic benefits experienced by both users and non-users include overall greater economic productivity and growth due to more efficient use of the transportation system.
- Transportation system impacts: user transportation benefits may include increased service quality, travel time reductions (decrease in congestion or delays), or increase in trip time reliability. These benefits may be experienced not only by road system users but also by transit users in systems where transit receives funding from road revenues or where transit services utilize the road pricing system (e.g., buses through the tolled region). Transportation harms may include extra traffic on areas bordering pricing regions.
- External impacts: this group includes the impacts that the transportation activity has on all individuals external to the transportation transaction. Specific external impacts may include environmental impacts (such as net CO<sub>2</sub> emissions, or emissions of polluting gases such as NO<sub>x</sub>), safety impacts (increases or decreases in road safety), and congestion/delay impacts (road delay or congestion caused by traveling).

Non-users are potentially important in terms of equity impacts. Affected non-users include travelers using adjacent non-priced facilities, residents and business owners along the priced facility, residents and business owners on the adjacent facilities, existing transit riders that may be affected by a larger number of transit riders and improved transit service, etc. User costs and benefits will include pre-pricing-implementation users of the road that benefit from a road pricing project and pre-pricing users that may accrue non-benefits (detrimental costs) from a road-pricing project and thus may not be able to continue to use the road at their preferred times.

### 3.4 Definitions of Measures to Assess Potential Equity Impact

The size, scope, and average daily traffic on pricing facilities vary widely. To allow for comparison between projects or between the present situation and the future situation (after the project is built), the equity impacts must employ measures that account for the size of the project. There are several measures to assess equity impacts that allow for comparisons, including the following:

- Per capita: what are the impacts per person using the pricing project? This can further be refined by specific groups: per adult, per commuter, per household, etc. Per capita measures

treat all passengers equally, whether they are driving single-occupancy vehicles or riding in large transit vehicles.

- **Per vehicle mile:** what are the impacts per vehicle mile traveled by any vehicle in the pricing project? This can further be refined by specifying the type of roadway (per highway mile, per arterial mile) and/or the type of vehicle (per bus mile, per car mile). Per vehicle mile measures treat all vehicles equally, regardless of occupancy.
- **Per trip:** what are the impacts per trip taken? This measure is not the same as per capita, because travelers do not always take the same number of trips per week: some may take 2 per day, while some may take many more. This can be further refined by specifying the purpose or time of the trip: per commute trip, per peak-period trip, etc. Like per capita, per trip measures treat all passengers equally, regardless of their mode or vehicle.
- **Per dollar:** what are the impacts of the program per dollar paid for the charge? This can be further refined by specifying the type of expenditure: dollar of user fee paid, dollar of tax paid.

Table 3-2 summarizes the main possibilities of the four characteristics that define equity.

**Table 3-2: Indicative List of the four Characteristics that Define Equity<sup>5</sup>**

Types of Equity	Categories/ Units of Analysis	Impacts of Concern	Measures to Assess Equity Impact
<b>Horizontal</b> Opportunity Market <b>Vertical/Outcome</b>	Income Geographic (location) Demographic (race, gender, etc.) Ability Mode Vehicle type Trip Type	<b>Financial / Economic</b> Price/Fare structure Economic opportunity & development Other Financial/ Economic <b>Transportation Service</b> Delay Reliability Other service quality metrics <b>External</b> Crash risk Induced congestion Emissions Noise	Per Capita Per Trip Per vehicle mile Per Dollar

<sup>5</sup> Adapted from Litman, T. (2002), "Evaluating Transportation Equity," World Transport Policy & Practice, Volume 8, No. 2, Summer 2002, pp. 50-65. Updated version available at: <http://www.islandnet.com/~litman/equity.pdf>.

### 3.5 State and Local Consideration for Equity Type, Category, Impacts of Concern, and Measures

During the initial phase of project evaluation, agencies should develop a plan to identify the equity factors that should be considered when assessing the impacts of road pricing strategies. As demonstrated in Table 3-2, for each road pricing strategy agencies should answer the following questions:

- What types of potential equity impacts should be evaluated for the proposed road pricing strategy?
- What are the equity categories most likely affected by the proposed pricing strategy?
- What are the likely qualitative and quantitative impacts that would result should the proposed congestion strategy be implemented?
- What measurement units should agencies use to best measure the costs and benefits of the proposed congestion strategy?

The process of incorporating equity analysis into the transportation planning process and the methods to evaluate the impacts of congestion and road pricing strategies are discussed further in Sections 4 and 5.

### 3.6 Classification of Equity in Congestion and Road Pricing Initiatives – Illustrative Examples

As discussed earlier, the two scenarios identified in Section 2.0 are used in the remaining sections of this report to help demonstrate new concepts and guidelines. These scenarios are intended to be illustrative rather than comprehensive. Each scenario will likely need to address multiple types of equity.

#### **Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time**

State, regional, and/or local agencies should consider how groups with different incomes are impacted by high occupancy toll (HOT) lanes. HOT lanes are considered relatively equitable since a free alternative is adjacent to the tolled alternative. As an example of equity classification and evaluation, transportation agencies should evaluate the travel time differences of drivers of all incomes and races between taking the tolled lane vs. the adjacent free lanes. This way they can consider what income proportion is used when paying the toll and for how much travel time savings.

#### **Scenario 2: Agencies considering road pricing expansion along their network**

State, regional, and local agencies considering expanding an existing toll system should account for the entire network effects of expanding their system. Now that multiple roads are under consideration for tolling, potential geographic impacts, market and societal equity come into play. It may be that drivers from certain communities now have fewer un-priced choices. Evaluation may include estimating tolls by minute of travel time savings offset by additional transit service using the faster tolled lanes.

## 4.0 INCORPORATING EQUITY IN THE TRANSPORTATION PLANNING PROCESS

Equity analysis will be most effective if it is incorporated into the development of road pricing projects from the beginning. This is especially true of the design of the pricing structure, where failure to address equity concerns may necessitate a complete reanalysis.

### 4.1 General Guidelines to Consider when Incorporating Equity in the Transportation Planning Process

There are some general guidelines that all public agencies contemplating road pricing projects should follow in order to measure and evaluate equity impacts. It is likely that the same agency or group of agencies that is proposing a project will be responsible for all aspects of the project, including evaluation, implementing potential remediation schemes, and communicating about the project. In theory, the evaluation and its results should be independent from the entity performing the evaluation, be it a State or a local department of transportation, a Metropolitan Planning Organization, or any other planning authority. In practice, these agencies may need to participate in the evaluation as they may control the revenue generated. When this is the case, all of the participating agencies should be involved and the process should be open and transparent. All agencies should try to follow guidelines and procedures consistent with those listed in Table 4-1.

**Table 4-1: Equity Evaluation Guidelines**

Step 1. Consider any potential equity impacts of pricing early in the project—during the planning and design phases.
Step 2. Determine who may potentially be impacted by the project. What kind of equity is important?
Step 3. Evaluate potential equity impacts of the base case or “no build” alternative to compare against the equity impact of the road pricing project.
Step 4. Consider variety of perspectives and impacts.
Step 5. Measure effects (measuring equity impacts is addressed in Section 5).

**1. Consider equity impacts early and throughout the project planning process:** Agencies will benefit from identifying and measuring potential equity impacts early and throughout the process, which should lead to greater awareness and public acceptance and ultimately success of the road pricing project.

**2. Determine users potentially impacted by the proposed project as well as regional equity priorities:** Section 3.0 demonstrated that various categories of users may become impacted by a particular road pricing project. How the impacts are measured may vary with whether the proposed road pricing project impacts low income travelers, particular ethnic groups, particular residents, and/or travelers with less access to alternative travel modes. A socio-economic analysis of an agency’s and a project’s regional boundaries can help identify the various demographic, socioeconomic, industry, and other system user groups potentially affected by the proposed road pricing initiative. Evaluating and measuring the impacts of congestion pricing strategies on system users is discussed in more detail in Section 5.0. The magnitude of road pricing equity impacts will likely influence the choice of an appropriate remediation method (addressed in Section 6).

**3. Evaluate equity impacts of the base case or “no build” alternative as well as the impact of the road pricing project:** A roadway may have a negative impact on low-income travelers or particular residents with less access to alternative modes whether or not the roadway is priced. A limited access roadway (such as a highway) may limit local connectivity and access to shopping and services. There may be

externalities like noise and air pollution. For these reasons and others it is important to consider impacts of the no-build scenario as well as the impact of the road pricing project. Part of the baseline evaluation is that, at a minimum, an agency should “do no additional harm” with a road pricing project.

**4. Consider a variety of perspectives and impacts:** It is likely that all projects will have groups of people that benefit from the project and may have other groups that are negatively affected. Project evaluation should consider impacts on all impacted groups, not just those on lower income people or the residents of one particular neighborhood. It is better to consider multiple origins and destinations and multiple types of potential users.

**5. Measure effects:** Section 5.0 describes several qualitative and quantitative methodologies for measuring equity impacts. Until impacts are quantified and compared against the base, no-build case, it is difficult to fully understand how the project affects different groups.

#### **4.2 An Example of Equity Analysis: Environmental Justice**

Environmental Justice (EJ) is a type of equity in which only environmental impacts are considered. Because equity analysis encompasses more than just an environmental justice analysis, this guidebook recommends that agencies perform a larger equity analysis as they contemplate road pricing projects and implement road pricing. The equity analysis should be performed in addition to any environmental evaluation required by law.

As described in Table 4-2, procedures for an EJ analysis illustrate how equity analysis can be completed. EJ Analysis is a type of equity analysis that focuses on environmental impacts. The guideline provided in Table 4-2 is based on actual analysis performed on Environmental Protection Agency (EPA) projects where 200 draft Environmental Impact statements were reviewed to determine how many EJ analyses were performed as part of the Environmental Impact Statement process. The project analyzed EJ impacts related to project scope, affected project area, sources of exposure, potential for disproportionate effects, and project actions. The emphasis is not just on potential impacts of project alternatives on the affected community, but whether the community participated in project inputs and project meetings.

**Table 4-2: Procedure for Conducting an Environmental Justice Analysis<sup>6</sup>**

**SCOPING**

- Clearly identify the composition of the region of influence and include appropriate criteria and data on the community.
- Analyze the identification of the region of influence using appropriate data on the affected community.
- Ensure that the affected community input during the scoping process includes access to information and meetings.

**AFFECTED AREA AND COMPOSITION OF REGION OF INFLUENCE**

- Define the criteria for recognizing the affected community and do criteria include minority and low-income groups and Indian tribes.
- Analyze the affected community and include information on patterns of subsistence consumption of fish, vegetation, or wildlife.
- Ensure that the community provides input to the identification of the community of concern and has associated access to information and meetings.

**IDENTIFY SOURCES OF EXPOSURE**

- Identify the sources of exposure and likelihood of exposure to the affected community including potential environmental, human health, social, economic, and cultural impacts.
- Analyze potential direct, indirect, multiple, and cumulative impacts to the affected community.
- Ensure that the affected community's input is considered in the identification of the sources of exposure and likelihood of exposure. Also that they receive access to information and meetings.

**POTENTIAL FOR DISPROPORTIONATE EFFECTS**

- Identify the potential or adverse impacts on the community and whether they include potential environmental, human health, social, economic, and cultural impacts.
- Analyze the potential for adverse impacts and evaluate both whether it is disproportionate on the community and whether it includes potential environmental, human health, social, economic, and cultural impacts.
- Ensure that community provides input in the assessment of impacts and potential for disproportionate impacts on the community and has access to information and meetings.

**DETERMINE ACTIONS**

- Identify potential alternatives, mitigation measures, and monitoring to minimize the potential impact on the community.
- Analyze the potential alternatives, mitigation measures, and monitoring to minimize the potential impact to the community.
- Ensure community input to the identification of actions and ensure access to information and meetings.

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<sup>6</sup> Based on Booz Allen project, Analysis of Federal Agency Practices in Implementing E.O. 12898 and Accompanying Presidential Memo, March 2011.

FHWA and the Texas Department of Transportation (TxDOT) compiled detailed how-to guidance in April 2009 for how to perform project-level and network-level environmental justice evaluations of toll roads. In this case, ***this is the equivalent to what can be done for a road pricing equity analysis.*** The document explains that an EJ area may be one where minorities or low-income populations in the traffic analysis zone (TAZ) exceed 50 percent. The general guidance is presented in Table 4-3.

**Table 4-3: Project-Level Evaluation of Toll Roads<sup>7</sup>**

***All projects should document and discuss:***

- Available non-tolled facilities (that can be used as substitutes for the tolled facility).
- Travel time differences between tolled and non-tolled routes.
- Transit vehicle toll policies.
- Toll rates or toll ranges.
- Methods of toll collection and how they may affect access and cost.
- Cost differences between acquiring toll tag with credit card or with cash.
- Location of toll booths, particularly in relation to identified EJ areas.
- EJ-related demographic data by traffic analysis zone (TAZ).
- Potential economic impact to individuals (for example, assuming 250 tolled round trips to work per year) and calculating toll proportion of income.
- Expected use of toll revenues.
- Potential remediation measures.
- Accommodations for Limited English Proficiency and disabled travelers to use the toll facility.
- Potential users of the facility using origin and destination studies identified by decreased travel time with use of the tolled facility.
- Assumptions and limitations of any travel demand models used in the study.

The FHWA/TxDOT source also describes evaluation of a network of toll roads which includes priced managed lanes.<sup>8</sup> In addition to the information highlighted in Table 4-3, the source includes how the network will be tolled over time, an estimation of the cumulative economic impact of the tolls and expanding toll network, and a comparison of the tolled and non-tolled network benefits over time.

### **4.3 Incorporating Equity in the Transportation Planning Process – Illustrative Examples**

To further illustrate how agencies should consider equity in evaluating their projects, each of the scenarios described in Section 2.0 is presented below along with a discussion around how equity should be incorporated in each scenario.

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<sup>7</sup> FHWA and TxDOT, “Joint Guidance for Project and Network Level Environmental Justice, Regional Network Land Use, and Air Quality Analyses for Toll Roads,” April 23, 2009. [Obtained by email between Anita Wilson and Patrick DeCorla-Souza, FHWA.]

<sup>8</sup> Ibid.

**Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time**

County X should consider equity impacts early and often in contemplating their potential pricing project. Transportation planners and decisionmakers should consider users impacted by the proposed tolling strategy. Since they are considering tolling an HOV lane adjacent to non-tolled lanes, then they already have identified a substitutable non-tolled lane. As such, county X's equity analysis should focus primarily on the tolled lane potential users, specifically how the tolled travel time compares to the travel time on the non-tolled lanes and how toll fares are collected.

**Scenario 2: Agencies considering road pricing expansion along their network**

City Y should consider the network effects of their expanding system. And equity issues did not arise before when only one road was tolled, but now that several roads are likely to be tolled and the additional roads do not have existing HOV or HOT lanes, road pricing equity impacts could be substantial. The public often balks at charges for roadways that had previously been un-tolled. If the pricing expansion ensures that all priced lanes also accommodate HOV for free, then the equity impacts may be reduced. Transportation planners and decisionmakers in city Y should identify potential equity impacts early on rather than continue to ignore equity considerations. Without considering equity and user impacts early, there may be concerns about the city's ability to successfully implement its toll expansion initiative.

## 5.0 EVALUATING EQUITY AT THE PROJECT LEVEL

The equity measurement procedures and methods described in Section 5.0 can be used by agencies at all levels of government (State, regional, and local). Proactive agencies consider equity impacts at project initiation and become aware of potential and actual project impacts as part of project planning. In contrast, reactive agencies consider equity impacts after concerns are raised by stakeholders that the project has negative equity impacts and that equity should be addressed. Both proactive and reactive agencies should determine who is affected and measure potential impacts. Both will adopt the same evaluation methodologies to their projects. The illustrative scenarios presented at the end of Section 5.0 provide examples of how an agency approaches equity evaluation proactively or reactively.

### 5.1 Procedure for Evaluating Equity at the Project Level

Agencies may find it helpful to evaluate the equity impacts of pricing projects on an ongoing basis during the design of the project. To evaluate equity impacts of any road pricing project, the first step is to define the specific kinds of equity (Section 3.0) that should be analyzed: the unique combinations of the four characteristics described previously.

The following procedure is a starting point for agencies desiring to assess equity impacts:

- Determine the stakeholder groups that could potentially be affected by a given project.
- Catalog the known concerns of the major stakeholder groups that will be affected, and make best guesses as to which kinds of equity will matter to them. Choose only the top few kinds for each stakeholder group.
- Internally, use modeling to determine impacts on the types of equity chosen for analysis. Modeling techniques may include the following:
  - Transportation modeling
  - Financial modeling
  - Environmental modeling.
- Design mitigation strategies (such as those described in Section 6) to mitigate significant equity impacts.
- Hold stakeholder outreach meetings to explain the project. Explain how the project creates a net social benefit, and explain the mitigation strategies to those who would perceive harm. After the stakeholders understand the system, ask for their remaining concerns about the project. Stakeholders should be engaged early in the process, but not before the first efforts at alleviating equity concerns are incorporated into the project design.
- Based on stakeholder concerns from the meeting, consider whether further mitigation strategies are warranted.
- Continue to work with stakeholder groups throughout project implementation to ensure that no new equity concerns arise.

### 5.2 Evaluating the Impacts of Road Pricing Projects – Qualitative and Quantitative Techniques

There seems to be little consensus among experts on what methodologies to use to measure the cost and benefits of road pricing initiatives. Appropriate evaluation methodologies can vary based upon the specific equity measure desired, data availability, and agency staff expertise in conducting equity analyses for road pricing projects. This guidebook provides instructions to help standardize processes for all State and local agencies to use in evaluating equity.

Evaluation methodologies can be categorized as qualitative or quantitative. Qualitative evaluation methods can be used as an initial step towards quantitative evaluation, but quantitative measures should be used to measure actual impacts. The following text provides brief summaries of several potential evaluation methods.

**Identification of Beneficiaries and Those Potentially Negatively Impacted – Qualitative Evaluation**

Table 5-1 provides example road pricing beneficiaries and those potentially negatively impacted. As shown, an initial catalog of who directly benefits or dis-benefits (i.e., receives harm) from a road pricing project helps to illustrate project impacts. Once these are identified, a quantitative analysis of the size of the benefits and dis-benefits can be made. A general agency goal, beyond “do no additional harm” is that the aggregated benefits of a project outweigh the aggregated dis-benefits.

**Table 5-1: Example Road Pricing Beneficiaries and Those Potentially Negatively Impacted**

Direct Beneficiaries	Potentially Negatively Impacted
<ul style="list-style-type: none"> <li>• Wealthier motorists who value their travel time savings more than their toll costs</li> <li>• Bus and rideshare travelers who enjoy improved service due to reduced congestion and economies of scale</li> <li>• Recipients of toll revenues</li> <li>• Local and regional communities who enjoy a better quality of life, less noise pollution, and emissions</li> </ul>	<ul style="list-style-type: none"> <li>• Lower income motorists who pay the toll because they have no travel alternative, but don't value their time savings more than the toll costs</li> <li>• Motorists who shift to other routes to avoid a toll</li> <li>• Road users on un-tolled roads who experience increased congestion</li> <li>• Motorists who forego trips due to tolls</li> <li>• Motorists who shift to transit and rideshare modes due to tolls (although service improvements due to economies of scale may make some of these net beneficiaries)</li> </ul>

Note: Contents adapted from original.

Source: Gomez-Ibanez, Jose, “The Political Economy of Highway Tolls and Congestion Pricing,” *Journal of Transport Economics and Policy*, Vol. 46, No. 3, July 1992, pp. 343-360. Repeated in Litman, Todd, “Using Road Pricing Revenue: Economic Efficiency and Equity Considerations,” May 2011. Found at <http://www.vtpi.org/revenue.pdf>. Accessed January 18, 2012

**Before and After Road Pricing Equity Impacts**

A simpler way to measure equity impacts is to measure equity impacts before a road pricing scheme is implemented and then to measure the impacts after a scheme is implemented. As with all evaluation, there are advantages to measuring the actual project implementation and impacts, but there may be reasons why we want to predict the impact of projects that are only in the planning stages. For the scientifically rigorous before-and-after and cross-sectional studies to measure the equity implications of evolving financing mechanisms in order to provide a robust basis for future decisionmaking, the report states that the studies should:

- Track short- and long-term behavioral shifts in response to the evolving mechanisms
- Conduct verifiable analyses to ensure the validity and transferability of results
- Avoid preconceived notions and oversimplification.<sup>9</sup>

### ***Direct and Indirect Road Pricing Cost and Benefit Calculations***

Weinstein and Sciara suggest considering both direct and indirect cost and benefit calculations in evaluating the equity of road pricing projects.<sup>10</sup> They suggest that tolls are regressive but that there are many socially acceptable government fees like garbage collection fees, community college tuition, and fees to use public swimming pools. They suggest considering the evidence from existing HOT lanes that some low-income people do use the lanes indicating that they feel the benefits are greater than the cost of the toll. Many priced managed lane users are only occasional users—for certain occasions the toll is a price that most people can afford. They suggest the following indirect benefits—that the reallocation of revenues to enhance transit or match carpools or provide other transportation services may provide all corridor users including lower income travelers with enhanced and faster transportation options. Another benefit suggested earlier in the guidebook is that some HOT lanes have reduced the travel times on the general purpose lanes, providing a benefit to all corridor users. Weinstein and Sciara finally suggest that the benefit and cost calculations also need to consider indirect costs like transponder deposits and acquisition.

### ***GIS Analysis of Who is Affected by a Road Pricing Project***

The FHWA/TxDOT paper referred to in Section 4.0 suggests using Geographical Information Systems (GIS) to determine which residential areas may benefit from the faster travel times of a road pricing project.<sup>11</sup> As described earlier, the travel times from each regional neighborhood to typical destinations using the priced and substitutable unpriced roadways should be calculated to determine the potential benefits and impacts of the priced facility. GIS may also help identify which residential areas are adjacent to a road pricing project and which areas may have increased noise from the faster traveling vehicles on a priced roadway. These noise-related dis-benefits may be offset by the air quality reductions resulting from faster moving vehicles.

### ***Econometric Analysis with Survey Data***

One way to quantitatively assess the impacts of a road pricing project is to obtain both demographic and travel behavior data of potential and actual project users. An econometric analysis can then be performed to determine which variables contribute to the choice of using a priced lane. Econometric analyses may also be used to determine the frequency of using a priced option. Demographics include

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<sup>9</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011).

<http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

<sup>10</sup> Weinstein, A., and G. C. Sciara, Assessing the Equity Implications of HOT Lanes: A Report Prepared for the Santa Clara Valley Transportation Authority (San Jose State University and University of California Berkeley, November 2004). [http://www.vta.org/projects/hot\\_lanes/hot\\_equity.pdf](http://www.vta.org/projects/hot_lanes/hot_equity.pdf). Accessed Sept. 1, 2011.

<sup>11</sup> FHWA and TxDOT, “Joint Guidance for Project and Network Level Environmental Justice, Regional Network Land Use, and Air Quality Analyses for Toll Roads,” April 23, 2009. [Obtained by email between Anita Wilson and Patrick DeCorla-Souza, FHWA.]

income, gender, vehicle ownership rates, and household size. Travel behavior includes origin and destination at a minimum, but may also include attitudes towards pricing and how travel times, travel time reliability, number of signals, and type of roadway impact route choice decisions.

A number of papers in the literature perform econometric analyses related to road pricing, but the ones that specifically address equity are limited. A recent project at the University of Washington used non-project-specific regional data for their analysis including the 2007 American Community Survey, the Washington Population Survey for 2004 and 2006, and the Puget Sound Regional Council's 2006 Household Activities Survey. The paper found that the ACS provided the best demographic data but they needed to integrate the ACS data with the Household Activity survey data for travel routes of poor and non-poor households.<sup>12</sup> The researchers used the data to determine the percentage of income used in paying tolls for two different scenarios: a network of tolled roadways and one priced bridge (SR 520 which initiated tolls in December 2011).

Burris and Hannay performed the more-common analysis of acquiring demographic and travel behavior data from project-specific survey data; in this case, a survey of Houston QuickRide enrollees.<sup>13</sup> The analyses determined that priced roadway usage did not vary significantly by income, occupation, age, or household size. Similarly, frequency of usage did not vary significantly; however, QuickRide enrollees were found to have significantly higher incomes and were significantly younger than drivers on the adjacent general purpose lanes. Burris and Hannay suggest that the ability or interest of low-income individuals to enroll in the program is an equity concern but that as long as the occupants of the QuickRide program valued their time at more than \$3 an hour, the program had a net benefit.

### ***Road Pricing Versus Alternative Non-Tolled Projects and Remediation Strategies***

In addition to the proposed road pricing project, alternative projects should be identified. An understanding of the base conditions without the road pricing project is also needed. After this step, the agency can start measuring the additional benefits or dis-benefits of the road pricing project compared to not implementing the road pricing project. It may be, for example, that certain geographic areas are adversely affected by a roadway whether or not the roadway is tolled.

As the groups that are affected are identified, remediation strategies should be considered for addressing potential equity impacts. Several of these remediation strategies including toll design, toll discounts, and revenue redistribution are presented in Section 6.0.

## **5.3 Evaluating Equity at the Project Level – Illustrative Examples**

For each of the two scenarios described in Section 2.0, an illustrative example of how to evaluate the equity impact of a pricing project is offered below.

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<sup>12</sup> Plotnick, R., J. Romich, and J. Thacker. The Impacts of Tolling on Low-Income Persons in the Puget Sound Region. University of Washington, April 2009. <http://www.wsdot.wa.gov/research/reports/fullreports/721.1.pdf>. Accessed Sept. 1, 2011.

<sup>13</sup> Burris, M., and R. Hannay. "Equity Analysis of the Houston Quickride Project." Transportation Research Board Annual Meeting, March 2003.

**Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time**

<b>Potential Evaluation Method</b>	<ul style="list-style-type: none"> <li>• <b>Direct and Indirect Cost and Benefit Calculation</b></li> </ul>
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**Description**

The tolling agency in county X should attempt to calculate direct and indirect costs and benefits of potential users and non-users in the priced managed lane corridor. Direct costs include the expected tolls to be paid. Indirect costs include transponder acquisition and deposit, obtaining information about travel time differences between the priced and general purpose lanes. Direct benefits include travel time savings for both the priced managed lane users and general purpose lane users. Indirect benefits include not having to travel in a carpool to use the faster lane and improved air quality due to the higher speed of the general purpose lanes.

**Scenario 2: Agencies considering road pricing expansion along their network**

<b>Potential Evaluation Method</b>	<ul style="list-style-type: none"> <li>• <b>Econometric Analysis with Project-Specific Survey</b></li> </ul>
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**Description**

With the experience of priced managed lanes in the region, the tolling agency in city Y can survey users (both priced managed lane users and general purpose lane users) of the corridor and the proposed toll corridors. The survey can result in demographic data including income, household size, occupation, age and gender and travel behavior data of typical origin, typical destination, priced managed lane HOT lane usage frequency, commuting frequency, and attitudes about priced managed lanes and pricing. With this data, the agency can determine what factors impact priced managed lane usage frequency and assess how the expanded tolled roadways may be utilized.

## 6.0 STRATEGIES TO ADDRESS AND MITIGATE THE IMPACTS OF CONGESTION PRICING

Section 6.0 offers transportation planners and decisionmakers procedures and guidelines to help address and mitigate the equity impacts of road pricing strategies.

### 6.1 Congestion Pricing Remediation Strategies in the Literature

Some earlier papers suggest how revenues gained from road pricing projects should be redistributed to make road pricing more politically viable. Goodwin suggests a “Rule of Three” and distributing revenues to tax relief, new roads, and public transportation.<sup>14</sup> Small provides seven recommendations for how revenue should be utilized.<sup>15</sup> But neither of these emphasize that this revenue distribution is to remediate adverse equity impacts; the larger emphasis is road pricing viability. In contrast to these and similar, earlier papers, the emphasis of Section 6.0 is remediation in response to equity impacts.

TRB Special Report 303<sup>16</sup> cautions that there may be limited funding for remediation measures, especially if the road pricing revenues go to further road construction or debt service. Another report suggests that remediation measures should be assessed by whether they treat everyone equally, whether people bear the costs that they impose, whether they are progressive with respect to income, whether they benefit the transportation disadvantaged, and whether they improve basic access.<sup>17</sup> Also, related to Section 7.0 on communications, stakeholders should be involved early in the process to help identify and target remedies.<sup>18</sup>

This section lists many different measures that can be used to remediate negative equity impacts of road pricing projects. There are a number of measures that agencies may employ to mitigate equity effects. These include:

- Use of revenues—judicious use of revenues generated by a pricing project is the single most important way of mitigating equity effects. The European Union’s Coordination of Urban Road User Charging Organizational Issues (CURACAO’s) road pricing fact sheet reads: “Evidence suggests that the judicious use of hypothecated revenues is likely to achieve a greater improvement in equity than simply reducing the overall charge level.” In order to ensure such judicious use, the agency should, foremost, hypothecate or ring-fence revenues from the project for use on transportation. Such uses may include public transportation, but also highway operations and improvements. If the pricing program replaces other taxation sources, the

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<sup>14</sup> Goodwin, P. “The Rule of Three: A Possible Solution to the Political Problem of Competing Objectives for Road Pricing.” *Traffic Engineering and Control*, Vol. 30, No. 10, 1989, pp. 495–97.

<sup>15</sup> Small, K., Using the Revenues from Congestion Pricing. *Transportation*, Vol. 19, No. 4, 1992, pp. 359–381.

<sup>16</sup> Committee on the Equity of Transportation Finance Mechanisms, *Equity of Evolving Transportation Finance Mechanisms*, Transportation Research Board Special Report 303 (August 2011). <http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf> Accessed Sept. 1, 2011.

<sup>17</sup> Litman T., *Evaluating Transportation Equity*, *World Transport Policy & Practice*, Vol. 8, No. 2, Summer 2002, pp. 50–65. Updated version (May 2011) available at <http://www.islandnet.com/~litman/equity.pdf>. Accessed Sept. 1, 2011.

<sup>18</sup> Bonsall, P., and C. Kelly. *Road User Charging and Social Exclusion: The Impact of Congestion Charges on At-Risk Groups*, *Transport Policy*, Vol. 12, No. 5, 2005, pp. 406–18.

pricing program may increase equity by many measures: Taylor and Schweitzer suggest that using road pricing to finance highway construction, maintenance and operations and thus reducing sales tax, increases vertical equity.<sup>19</sup>

- Vary pricing by time of day, type and location of road, vehicle type, etc. – use of pricing that varies by location, road type, time of day, vehicle type, and other characteristics may mitigate some equity impacts of pricing projects.
- Discounts/Exemptions—discounts and exemptions—in essence, varying pricing by person type—are a way of mitigating some demographic equity effects. However, such discounts and exemptions often lead to a greater need for enforcement and high administrative costs, and so should be avoided unless no other means of equity mitigation exists.
- Provide payment means for the unbanked—in order to avoid creating a system where the unbanked are unable to easily participate in a pricing project, the agency should provide a means for them to pay by cash, such as top up terminals in gas stations or grocery stores.

Remediation strategies generally fall under one of three categories listed below:

- Revising existing finance pricing policies;
- Offering exemptions, discounts, subsidies, or rebates to parties adversely affected by the policy; or
- Offering or improving alternative transportation services.<sup>20</sup>

Table 6-1 provides a listing of potential equity impact remediation strategies. Please note that each of the remediation measures or strategies listed in Table 6-1 is described in further detail Appendix B along with example deployment sites, benefactors, why the strategy is used, additional details, and links to more information. Table 6-2 describes some of the state and local financial as well as technology policies and strategies that might offset the benefits of equity impact mitigation measures.

At the end of section 6.0, we offer illustrative examples of potential remediation measures for each of the scenarios identified in Section 2.0.

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<sup>19</sup> Schweitzer, L. and B. D. Taylor. Just Pricing: The Distributional Effects of Congestion Pricing and Sales Taxes. *Transportation*, 35(6). 2008, pp. 797-812.

<sup>20</sup> Committee on the Equity of Transportation Finance Mechanisms, *Equity of Evolving Transportation Finance Mechanisms*, Transportation Research Board Special Report 303 (August 2011) <http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

**Table 6-1: Remediation Measures to Offset Equity Impacts, and Policy Choices that Complicate Remediation Measures**

Method	Brief Description	Deployment site Examples
<i>Revising existing finance policies</i>		
Credit-based congestion pricing <sup>21</sup>	Credit-based system to redistribute revenue to individual drivers	FAST miles <sup>22</sup>
Price Design limitations	Upper limits on road pricing, limits on the number of priced crossings per period for cordon charges, allowances for unlimited use of priced facilities in certain periods (off-peak hours, holidays, weekends, etc.) <sup>23</sup>	Widely implemented
Increased access to transponders	Allow motorists to apply for and receive transponders at public assistance offices and other sites commonly used by low-income populations. This may include customer service centers	Auto Expreso System in Puerto Rico TxTag in Texas <sup>24</sup> SR 520 bridge customer service centers in Washington
Alternative payment options	Offer cash or pay-as-you-go options for motorists who do not have debit/credit cards	Widely implemented (turnpike ticket option, cash for fare card, etc.)
Compensating nonusers	Offering compensation (i.e., toll credits) to drivers choosing to use general-purpose lanes	(Proposed) FAIR lanes <sup>25</sup>
Geographic system design	Purposefully locating cordon boundaries, exits, etc., in order to maximize equity	London and Stockholm cordon boundaries

<sup>21</sup> Kockelman, K. M., and S. Kalmanje, Credit-Based Congestion Pricing: A Policy Proposal and the Public's Response, Transportation Research Part A: Policy and Practice, Vol. 39, No. 7–9, August–November 2005.

<sup>22</sup> DeCorla-Souza, P., Improving Metropolitan Transportation Efficiency with Fast Miles, Journal of Public Transportation, Vol. 9, No. 1, 2006, pp. 45–70.

<sup>23</sup> ICF International, Environmental Justice in Transportation: Emerging Trends and Best Practices. FHWA, 2011. <http://www.fhwa.dot.gov/environment/ejustice/lib/guidebook/index.cfm>. Accessed Sept. 1, 2011.

<sup>24</sup> FHWA, Income-Based Equity Impacts of Congestion Pricing: A Primer (FHWA Office of Transportation Management, 2009).

<sup>25</sup> DeCorla-Souza, P., Fair Highway Networks: A New Approach to Eliminate Congestion on Metropolitan Freeways, Public Works Management and Policy, Vol. 9, No. 3, 2005, pp. 196–205.

Method	Brief Description	Deployment site Examples
Park and ride facilities	Parking adjacent to project or express bus stops to increase carpooling and transit use	I-95 Express Lanes in Broward County, FL I-15 Express Lanes in San Diego, CA
<i>Offering exemptions, discounts, subsidies, or rebates to parties adversely affected by the policy</i>		
Discounts/exemptions	Discounts reduce the congestion charge paid; exemptions exclude certain persons or vehicles from payment. May have cost and enforcement consequences	Most priced managed lane facilities exempt transit and emergency vehicles L.A. Metro – Toll Credit Program for low income users including discount and monthly fee waiver
Subsidies	Use a portion of revenue to subsidize toll costs/costs of low-income commuters	Central Texas toll roads (Texas 130, Loop 1, Texas 45N), <sup>26</sup> Germany, and France allow taxpayers to deduct commuting expenses from their income tax liability <sup>27</sup>
<i>Offering or improving alternative transportation services</i>		
Revenue redistribution	Redistribute revenues through public spending on specific transportation-related improvements (widely implemented strategy on many priced managed lanes)	I-15 in San Diego (funds to support express bus service) <sup>28</sup> Norwegian toll rings (funds to roadway/transit improvement) <sup>29</sup>
Increased access to alternative transit	Transit, vanpools, paratransit, or other options as alternatives in locations not served by transit	Widely implemented

<sup>26</sup> Wear, B., Central Texas toll roads need more state subsidies than expected, The Statesman (July 18, 2011). <http://www.statesman.com/news/local/central-texas-toll-roads-need-more-state-subsidies-1618544.html>. Accessed Sept. 1, 2011

<sup>27</sup> Bork, R., and M. Wrede, Political economy of commuting subsidies, Journal of Urban Economics No. 57, 2005, pp. 478–99.

<sup>28</sup> Toups, D. T., San Diego Association of Governments, “FasTrak Study—Follow-Up Questions,” e-mail to Liisa Ecola, December 18, 2008.

<sup>29</sup> Leromonachou, P., S. Potter, and J. P. Warren, “Norway’s Urban Toll Rings: Evolving Towards Congestion Charging?” Transport Policy, Vol. 13, No. 5, September 2006, pp. 367–78.

The selection of remediation measures depends primarily on project objectives and conditions. A project emphasizing congestion reduction may adopt different remediation measures from a project with a revenue maximization emphasis. Similarly, a project with significant Federal funding may make choices differently than a locally funded project. The Los Angeles Metro project has an explicit Toll Credit Program for low income users to receive a credit at program sign-up and a waiver of monthly account fees. The Stockholm congestion charge has succeeded because special accommodations and mitigating measures were made for certain groups who perceived inequities, including the residents of a specific area (Lidingo Island).

Many recently deployed projects include the enhancement of transit options that take advantage of the faster facility. Use of toll revenues to support improved transit service has been one of the most successful strategies at gaining support from lower income groups as it provides mobility options that best serve these communities. However, Manchester, U.K., did not succeed in implementation of its congestion pricing project in part because automobile drivers perceived that a disproportionate amount of the anticipated revenues would be going to support riders of other modes.

More details are provided in Section 6.3 and in Appendix B.

## 6.2 Post-Implementation Road Pricing Remediation Strategies — Equity Audit Tool

Ecola and Light suggest the use of an “equity audit tool” after implementing a road pricing project. They suggest continuously monitoring the road pricing project and its remediation measures and determining whether the measures successfully address equity differences. If equity concerns are not well enough addressed, then either the road pricing project or the remediation can be modified to better address equity.<sup>30</sup>

## 6.3 Road Pricing Remediation Strategies – Illustrative Examples

In the following, the research team presents a potential remediation approach for each of the three road pricing scenarios identified. It is important to note that examples below are for illustrative purposes only; additional remediation methods likely apply to each of these scenarios.

### Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time

<b>Issue</b>	<ul style="list-style-type: none"> <li>• <b>Lack of Internet Access/Stable Address to Receive Mail</b></li> </ul>
<b>Potential Remediation Method</b>	<ul style="list-style-type: none"> <li>• <b>Increased access to transponders</b></li> </ul>
<b>Description</b>	
<p>County X has an underutilized HOV lane. Converting to a HOT lane gives all drivers the opportunity to take advantage of the fourth lane, but often pricing a lane that was previously untolled is met with resistance. One way to encourage use of the newly converted HOT/Express lane is to make the</p>	

<sup>30</sup> Ecola L. and Light T., Equity and Congestion Pricing A Review of the Evidence (RAND 2009). [http://www.rand.org/pubs/technical\\_reports/TR680.html](http://www.rand.org/pubs/technical_reports/TR680.html). Accessed January 27, 2012.

technology as accessible and visible as possible. Making transponders convenient by selling them at local gas stations, retailers, etc. and providing cash-based purchase options to accommodate the unbanked will encourage drivers to acquire one and then utilize the new HOT/Express lane. This addresses payment medium equity and that some users are not able to utilize accounts that require credit cards or internet access.

**Scenario 2: Agencies considering road pricing expansion along their network**

<b>Issue</b>	<ul style="list-style-type: none"> <li>• <b>Pricing Variations (time of day; miles traveled, etc...)</b></li> </ul>
<b>Potential Remediation Method</b>	<ul style="list-style-type: none"> <li>• <b>Discounts/exemptions</b></li> </ul>
<p><b>Description</b></p> <p>The expansion of the tolled roadway network near city Y may coincide with a more-complicated tolling structure. Instead of charging just one toll to use the HOT/Express lane (regardless of traffic levels), the toll may vary by time of day and by miles traveled. It may also be possible for certain groups of users to apply for transponders that facilitate a discount. A simpler system follows the Los Angeles Metro example and provides a credit at account sign up and monthly fee waiver to low-income households.</p>	

## 7.0 THE ROLE OF COMMUNICATIONS IN CONGESTION PRICING INITIATIVES

Public perception and understanding of equity considerations are critical components for many road pricing initiatives. Much of the literature and our discussions with stakeholders relate to the importance of communications with respect to potential equity impacts on any of these projects. Communications should happen early and often in the project planning process and throughout the process. The literature stresses the importance of perception, acknowledging that road pricing is often perceived as unfair (e.g., the use of the “Lexus Lanes” moniker), and that there are differences in popular and expert perspectives.<sup>31</sup>

Communications may take on several forms including press releases, public meetings, glossy brochures, web sites, and speaking points for customer service representatives and agency staff. Agencies will likely need to use a variety of these methods to reach a large number of potential roadway users and potentially negatively impacted people. With appropriate communications, some of the questions and concerns surrounding the road pricing project may be addressed. With positive communications, users and local groups may be convinced of the roadway’s benefits and less concerned with possible dis-benefits.

Section 7.0, presents a summary of what to communicate (Table 7-1) and also a summary of communications methods (Table 7-2). It also revisits the two illustrative scenarios from Section 2.0 and provides examples of what they should communicate about their projects and examples of how they should communicate it. For each particular project, agencies should review the charts below.

Agencies should carefully consider each of the proposed items in Table 7-1 and whether these apply to their projects and should be incorporated into their communications messages and strategies. Agencies should then review Table 7-2 and determine which of the communications methods can be adopted into their own project communications plans.

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<sup>31</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011). <http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

**Table 7-1: Selecting Equity-Related Messages to Communicate**

What to Communicate	
Description	Example
Determining where and how revenues are used and how revenues will benefit roadway users	
Demonstrating benefits through experimental programs and pilot strategies <sup>a</sup>	Stockholm cordon pricing system <sup>b</sup>
Market research of catchment areas around road pricing projects to characterize users/assess equity. Additional equity evaluation results pre- and post-project implementation	
Information about tolling. For example, provide information to social agencies about tolls and options for avoiding tolls	Puget Sound, <sup>c</sup> San Francisco, SR 520 (Washington State)
Discuss and address “Lexus Lane” Concerns	Minneapolis <sup>d</sup>
Additional travel choice for drivers and educating users on the new transit options that will be available along the corridor	Los Angeles MTA <sup>e</sup>
Special groups’ (ex. Truckers’) concerns over negative effects of proposed pricing changes	New York <sup>f</sup>

<sup>a</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011). <http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

<sup>b</sup> Taylor, B.D. How Fair Is Road Pricing? Evaluating Equity in Transportation Pricing and Finance. UCLA Institute of Transportation Studies, September 2010. <http://www.bipartisanpolicy.org/sites/default/files/BPC%20Pricing%20EquityFIN.pdf>. Accessed Jan. 20, 2012.

<sup>c</sup> Eight-Month Performance Summary of SR 167 High Occupancy Toll (HOT) Lanes Pilot Project (Washington State Department of Transportation, January 2008).

<sup>d</sup> Munnich, Lee W., Jr., and Kenneth 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: Journal of the Transportation Research Board, 2007.

<sup>e</sup> Los Angeles Region Express Lanes Project: AB 1467 Application (Los Angeles County Metropolitan Transportation Authority in partnership with the California Department of Transportation, March 2008).

<sup>f</sup> Report to the Traffic Congestion Mitigation Commission & Recommended Implementation Plan (New York City Traffic Congestion Mitigation Commission, January 2008). The new pricing scheme lifted peak hour prices dramatically but offered a substantial overnight discount on weekdays. While overnight truck traffic rose 2 percent, most truckers and trucking groups felt they had been unfairly targeted and that the special overnight discount was not helpful

**Table 7-2: What Equity-Related Messages to Communicate**

Methods of Communication	
Description	Example
Emphasize communications throughout the entire project from planning to implementation. Develop and use communications plans describing how project information and impacts will be disseminated	<ul style="list-style-type: none"> <li>Numerous meetings and focus groups (Minneapolis)<sup>a</sup></li> </ul>
Foster community dialog and make communications two-sided. If	<ul style="list-style-type: none"> <li>Examples include an advisory task force, HOT lane workshop for Metropolitan Planning Organization (MPO)</li> </ul>

Methods of Communication	
Description	Example
changes can be made to a project based on citizen input then we want to disseminate information about a project and have live blogs and contact centers in order to inform the public and gather input	<p>board members, and a press conference and public meetings early in the project planning. They suggest the need to foster community dialogue<sup>b</sup></p> <ul style="list-style-type: none"> <li>• Numerous policy advisory committees, community organizations, neighborhood groups, and business associations (San Francisco)<sup>c</sup></li> <li>• Value Pricing Outreach Program including focus groups, discussions with community leaders, and board member education to promote the system. (Transportation Corridor Agencies, Southern California)<sup>d</sup></li> </ul>
Provide limited English proficiency (L.E.P.) plans and outreach in multiple languages as needed	<ul style="list-style-type: none"> <li>• Washington State/SR 520</li> </ul>
Use a variety of public outreach and educational tools <sup>e</sup>	<ul style="list-style-type: none"> <li>• Use surveys/focus groups/open houses to help identify designs most acceptable to public, refine strategies, and discuss concerns</li> <li>• Advertise in newspapers, transit stations, online, and through neighborhood/business groups</li> <li>• Social media strategies are emerging (e.g., Twitter, Facebook, YouTube)</li> <li>• Internet, citizen champions, and a mobility coordinator role. (Dallas)<sup>f</sup></li> </ul>
Deploy a phased approach (small-scale [pilot] implementation first) to assess and then react to how users respond	<ul style="list-style-type: none"> <li>• SFpark, Stockholm</li> </ul>
Contact majority with little to moderate outreach; Contact a few with extensive outreach supporting long/incremental planning process	
Customer service centers	<ul style="list-style-type: none"> <li>• SR 520 (Washington State)</li> </ul>
A commercial video prepared to promote use of the facility	<ul style="list-style-type: none"> <li>• SR 91 (Southern California),<sup>g</sup> LA Metro Express Lanes<sup>h</sup></li> </ul>

<sup>a</sup> Munnich, Lee W., Jr., and Kenneth 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: Journal of the Transportation Research Board, 2007.

<sup>b</sup> Weinstein, A., and G. C. Sciara, Assessing the Equity Implications of HOT Lanes: A Report Prepared for the Santa Clara Valley Transportation Authority (San Jose State University and University of California Berkeley, November 2004). [http://www.vta.org/projects/hot\\_lanes/hot\\_equity.pdf](http://www.vta.org/projects/hot_lanes/hot_equity.pdf). Accessed Sept. 1, 2011.

<sup>c</sup> San Francisco Mobility, Access and Pricing Study: Final Report (San Francisco County Transportation Authority, December 2010).

Methods of Communication	
Description	Example
<p><sup>d</sup> Sullivan E., Continuation Study to Evaluate the Impacts of the SR-91 Value-Priced Lanes: Final Report (Cal Poly State University-San Luis Obispo, December 2000). See also Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011). <a href="http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf">http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf</a>. Accessed Sept. 1, 2011.</p> <p><sup>e</sup> Private communication with MacGregor M., Texas Department of Transportation, CDA/Tollway Director, 2009.</p> <p><sup>f</sup> Sullivan E., Continuation Study to Evaluate the Impacts of the SR-91 Value-Priced Lanes: Final Report (Cal Poly State University-San Luis Obispo, December 2000).</p> <p><sup>g</sup> See: <a href="http://www.metro.net/projects/expresslanes/">http://www.metro.net/projects/expresslanes/</a>. Accessed January 27, 2012. An updated video is to be made available in Spring 2012.</p>	

### 7.1 Congestion Pricing Communication Strategies – What and How, Illustrative Examples

For each of the road pricing scenarios described in Section 2.0, we provide examples of what to communicate and how to communicate it to stakeholders as well as interested and concerned parties.

Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time	
<b>What to communicate</b>	<ul style="list-style-type: none"> <li>• Information about tolling</li> <li>• Determining where and how revenues are used and how revenues will benefit roadway users</li> <li>• Discuss and address potential equity concerns</li> </ul>
<b>How to communicate</b>	<ul style="list-style-type: none"> <li>• Emphasize communications throughout the entire project from planning to implementation</li> <li>• Foster community dialog and make communications two-sided. If changes can be made to a project based on citizen input then we want to disseminate information about a project and have live blogs and contact centers in order to inform the public and gather input</li> </ul>
<b>Description</b>	
<p>For regions new to road pricing, much of what they need is information. Why is a pricing strategy being recommended? How much will they be tolled and when and how? If tolling will be facilitated with transponders, then how do they get a transponder? In addition to the logistics, the public should be told where and how revenues will be used and how the revenues will benefit roadway users. For regions where tolled lanes are referred to as “Lexus lanes,” it is best to address that directly and explain that other road pricing projects are utilized by a mix of vehicles and drivers from all income classes. As with all road pricing projects, emphasizing communications to the public throughout the project including during initiation, planning, and implementation is vital. A variety of dissemination methods can be used including newspaper ads, press releases, websites, and community meetings. Ideally, community meetings and websites can be utilized to foster two-way communication. Project changes such as when the toll is charged or when the project opens may be initiated by community dialog.</p>	

<b>Scenario 2: Agencies considering road pricing expansion along their network</b>	
<b>What to communicate</b>	<ul style="list-style-type: none"> <li>• Market research of catchment areas around road pricing projects to characterize users/assess equity</li> <li>• An additional travel choice for drivers and educating users on the new transit options that will be available along the corridor</li> </ul>
<b>How to communicate</b>	<ul style="list-style-type: none"> <li>• Schedule information sessions to educate the public and address concerns</li> <li>• Inform the public about upcoming events and information related to the project through social media sites</li> </ul>
<p><b>Description</b></p> <p>Based upon city Y’s experience with pricing, they will be able to communicate results of evaluations that show how users adjacent to priced roadways utilize the priced roadways. The agency will be able to communicate how groups are positively or negatively impacted by the priced roadway and they can communicate expected impacts of the new tolled roadways. Mature and new Express lane systems can also explain that the priced roadway provides an additional travel choice for drivers. In their communications, they can explain remediation measures like the addition of transit in the corridor. The system can also reach out to specific groups such as truckers and address their concerns explicitly. Similar to how these things can be communicated in county X, city Y can schedule information sessions to educate the public and address concerns. They can also update any project websites and provide information through social media sites including Twitter and Facebook.</p>	

## 8.0 RECOMMENDATIONS AND NEXT STEPS

In order to assist transportation agencies to better assess and mitigate equity impacts of road pricing projects on local communities, commuters, and system users, the FHWA developed this guidebook. This guidebook will help transportation agencies, decision-makers, and other interested parties, including the public, to better understand, address, and mitigate equity impacts of road pricing projects on local communities, commuters, and system users. The guidebook:

- Offers comprehensive procedures and guidance to State, regional, and local agencies, as well as decisionmakers and concerned citizens to follow when considering road pricing projects to ensure that equity issues are appropriately and adequately communicated, evaluated, and addressed to the best extent possible.
- Focuses primarily on time-of-day variable pricing applied to cordon and area-wide pricing, facility pricing (including high occupancy toll (HOT) lanes, express toll lanes, and traditional toll roads), and parking pricing. Was built upon:
  - A comprehensive literature review of existing road/congestion pricing equity research and applications;
  - A series of interviews with government staff, academics, private sector representatives, and other subject matter experts knowledgeable about road pricing equity; and
  - A workshop held in Washington D.C. in October 2011 to review and finalize the guidebook. The workshop was attended by road/congestion pricing and equity experts including government officials, researchers and academics, as well as private sector representatives.
- Includes two road pricing scenarios/case studies identified by FHWA. Two potential scenarios were introduced and used throughout the guidebook to illustrate potential applications of guidebook topics. These included:
  - Scenario 1: Agencies considering implementing roadway congestion pricing strategies for the first time.
  - Scenario 2: Agencies considering road pricing expansion along its network.

It is unlikely that any agency will be able to identify, evaluate, and remediate all potential equity issues resulting from new or ongoing road-pricing strategies and initiatives. There will likely be a degree of inequity in any project whether or not it involves road pricing. The point is to limit equity impacts or to work towards a new and more equitable system. Pricing projects may have positive impacts beyond users. The Miami 95 Express Lanes project reports improved travel times on the general purpose lanes adjacent to the HOT lanes suggesting that the project has improved travel for all in the corridor. By following this guidebook, agencies should be able to identify potential equity impacts, evaluate them, and identify remediation and communications methods that may address any identified equity impacts.

### 8.1 Recommendations

As a starting point, agencies may wish to keep the following guidelines in mind as they consider incorporating road pricing as an option into their planning processes:

- An analyst trained in equity can review the equity implications of all pricing concepts before they are discussed publicly, so that all agency officials are conversant with the major equity concepts in play.

- It may be helpful for agencies to first address the existing system and measure the equity of the existing system that the new policy or system will replace. No system is perfect in terms of equity. Incrementally, the new system should be more equitable than the existing system or policy it is replacing. Therefore, it is important to understand the pluses and minuses of the existing system to adequately address the pros and cons of the new system against the existing system in terms of horizontal and vertical equity.
- Mitigation measures will involve a package of transportation improvements almost inevitably including public transportation improvements. These packages should be developed at least at a high level before the discussion becomes public.
- Agencies may begin equity analysis by determining who is affected by the road pricing project. The agency may wish to provide targeted stakeholder outreach, specifically outreach to stakeholders who are likely to perceive greater equity harms. Agencies should avoid asking the question “What do you think of the new road pricing project?” in isolation, as users will simply perceive it as an additional fee that they will have to pay. Instead, agencies may ask users to envision two futures—one with the road pricing project, and one without it, so that the users can understand the benefits and costs of each approach.
- Agencies can consider equity vs. efficiency tradeoffs present in the project. Broadly speaking the more completely equitable a project is, the less efficient (i.e., greater percentage of revenues needed to cover operating costs) it is.
- Agencies should focus on the net equity outcome. Often in analyzing a project, stakeholders, public officials, media, and members of the public tend to focus primarily on equity concerns that arise due to the project, and fail to recognize the equity problems that the project solves. The agency can demonstrate that net equity outcome is the key measure of effectiveness for the project.

## 8.2 Next Steps

### ***More Research and Analysis is Needed***

The literature review for this guidebook identified gaps related to equity and road pricing. The RAND study listed topics on equity impacts of congestion pricing. This literature review revealed a significant research gap in these topics. These topics include environmental justice impacts, long-term land use impacts of congestion pricing, equity implications of building new roads with congestion pricing revenue, and how adding congestion pricing to existing transportation finance mechanisms would change the equity implications.<sup>32</sup>

The August 2011 Special Report from the Transportation Research Board (TRB) suggests that comprehensive before-and-after studies are needed, as well as a better understanding of travel behavior and its consequences. It also recommends a knowledge base for decision support and a TRB Handbook for equity analyses of transportation finance policies.<sup>33</sup> It is hoped that the Guidebook developed in this project will come close to what TRB contemplates as an American Association of State

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<sup>32</sup> Ecola L., and T. Light, Equity and Congestion Pricing A Review of the Evidence (RAND 2009). [http://www.rand.org/pubs/technical\\_reports/TR680.html](http://www.rand.org/pubs/technical_reports/TR680.html). Accessed Jan 27, 2012.

<sup>33</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011). <http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

Highway and Transportation Officials-funded National Cooperative Highway Research Program project. FHWA may be able to use resources like [www.transportationresearch.gov](http://www.transportationresearch.gov) and the learning portal under development by the Intelligent Transportation Systems Professional Capacity Building program as the decision-support knowledge base that the TRB Committee envisioned.

## APPENDIX A: GLOSSARY

The terms in the glossary have been divided into the following subsections: key equity terms, types of equity, mitigation terms, key policy definitions, and other useful terms.

### Key Equity Terms

*Benefit principle:* The idea that it is equitable for one group to pay higher taxes if its members receive greater benefits.<sup>34</sup>

*Benefits received:* People who use a facility the most pay the most.<sup>35</sup>

*Classifications:* Ways that equity can be categorized in terms of what factors are taken into consideration

*Communications:* Working with the public in order to produce a favorable perspective and understanding of a road pricing project.

*Efficiency:* An allocation of resources is *efficient* if there is no other feasible allocation of resources that can make more people better off without making anyone worse off. In terms of transportation analyses, *efficiency* is measured in terms of a policy's ability to maximize overall total social welfare, regardless of whether some individuals are made worse off.

*Equality:* Distributing costs and benefits in a manner that benefits all people to the same extent. This can refer to *equality of opportunity*, whereby all people have the same chances, or *equality of outcome*, whereby all people end up with the same opportunities.<sup>36</sup>

*Equitable:* Meeting a normative standard of fairness.

*Equity:* A measure of "fairness" in terms of the distribution of costs and benefits among members of society. Such benefits and costs—whether monetary or nonmonetary—can be distributed in ways that people may see as reasonable or unreasonable.

*Equity categories:* The social groupings that are under observation.

*Equity impacts:* Consequences of transportation policy that may affect equity.

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<sup>34</sup> Ecola, L., and T. Light, Equity and Congestion Pricing A Review of the Evidence (RAND 2009). [http://www.rand.org/pubs/technical\\_reports/TR680.html](http://www.rand.org/pubs/technical_reports/TR680.html). Accessed Jan 27, 2012.

<sup>35</sup> Committee on the Equity of Transportation Finance Mechanisms. Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011). <http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

<sup>36</sup> Equality of opportunity and equality of outcome are discussed further in Litman T., Evaluating Transportation Equity, World Transport Policy & Practice, Volume 8, No. 2, Summer 2002, pp. 50-65. Updated version (2011) available at <http://www.islandnet.com/~litman/equity.pdf>. Accessed Sept. 1, 2011.

*Evaluation:* Examining road pricing projects in regard to various factors in order to assess their equity impacts.

*Impacts of concern:* The aspects of travelers' lives that are affected by the transportation or pricing project.

*Indicators:* Measurable variables selected to reflect progress toward planning objectives.

*Measures to assess equity impact:* To allow for comparison between projects or between the present situation and the future situation (after the project is built), the equity impacts must employ measures that account for the size of the project (e.g., per capita, per vehicle mile, per trip).

*Net equity outcome:* The positive and negative equity outcomes of a project—sometimes preferable to considering only negative outcomes.

*Polluter pays principle:* Tolls are considered fair if people pay an amount roughly equal to the costs they impose on others.<sup>37</sup>

*Remediation:* Strategies implemented to reduce inequity.

*Toll roads, bridges, and tunnels:* Individual routes that apply tolls independently. These facilities often collect tolls to repay bonds issued to finance their construction rather than to manage congestion. Tolls can be collected manually at tollbooths or electronically using *transponder* technology.

*Types of equity:* A set of criteria to constitute equal treatment.

*Units of analysis:* How equity is analyzed in regard to a particular group of individuals.

## **Types of Equity**

*Ability Equity:* concerning issues and inequalities effecting physically disabled persons.

*Access to tolled facilities equity:* A term<sup>38</sup> referring to whether barriers to owning a transponder, including requiring a credit cards (20 to 40 percent of U.S. households do not own credit cards) and large deposits, make using the facility too onerous.

*Compensatory equity:* Social problems and inequities addressed by providing transportation access or resources.

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<sup>37</sup> Ecola, L., and T. Light, Equity and Congestion Pricing A Review of the Evidence (RAND 2009). [http://www.rand.org/pubs/technical\\_reports/TR680.html](http://www.rand.org/pubs/technical_reports/TR680.html). Accessed Jan. 27, 2011.

<sup>38</sup> Plotnick R., J. Romich, and J. Thacker, The Impacts of Tolling on Low-Income Persons in the Puget Sound Region (University of Washington, April 2009). <http://www.wsdot.wa.gov/research/reports/fullreports/721.1.pdf>. Accessed Sept. 1, 2011.

*Education equity:* concerning issues and inequalities facing less educated users in comparison to degree holders.

*Environmental/green equity:* Equal protection from environmental hazards for individuals, groups, or communities regardless of race, ethnicity, or economic status

*Gender equity:* A less recognized equity issue concerning the behavior and usage differences between male and female motorists (e.g., one study finds that women value travel-time reliability more than twice as highly as men).<sup>39</sup>

*Generational equity:* A subset of *vertical equity* concerning the burdens placed on future generations from policies made by and for the current generation. For example, borrowing for long-lived facilities is fair because it spreads the cost across generations of users, as opposed to current users paying for future generations.

*Geographic equity:* A subset of *vertical equity* concerning how where people work and live influences the effect transportation investment decisions has upon them (e.g., State versus state, urban versus rural).

*Horizontal equity:* How members of the same group (e.g., drivers or bus riders) fare relative to one another.

*Income equity:* Sometimes called *redistributive equity*. This equity type includes the effects on economically disadvantaged communities and low-income people. (e.g., do improvements negatively impact disadvantaged communities? Are improvements with negative consequences necessary for greater State or regional vitality?)

*Language equity:* concerns and inequalities faced by users not native to the standard language

*Life-stage equity:* concerning issues and inequalities faced by users of various life-stages in comparison to other users such as retirees, people with families, single users, etc.

*Market equity:* A price charged to each individual or group that is directly proportional to the costs imposed and benefits received by that individual or group.

*Modal equity:* Dedicating revenues to the modes where they were generated (e.g., a state requiring that gas tax revenue be spent on roads).

*Modal equity:* The effect on preferred travel behavior (e.g., Do activities conflict with public perceptions for the encouragement of multimodal transportation?).

*Occupancy equity:* concerning inequities and concerns faced by SOV users in comparison to HOV users (and vice versa).

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<sup>39</sup> Lam, T. C., and K. A. Small, The Value of Time and Reliability: Measurement from a Value Pricing Experiment, Transportation Research Part E, Vol. 37, No. 2–3, 2001, pp. 231–51.

*Opportunity equity:* Costs/benefits that are proportional to the size of the receiving group without regard to any other distinguishing characteristics between groups.

*Outcome equity:* See *vertical equity*.

*Participation equity:* Sometimes called *process equity*, the ability to participate in the decision-making related to a project by responding to a public solicitation, attending a public meeting, rallying neighbors to support or oppose a measure, and so on.

*Payment medium access equity:* Concern over a denial of access to priced road projects or reduced equity. A significant portion of the population does not have access to credit cards (20 to 40 percent of the population) or checking accounts (10 percent) that facilitate easier use of a road pricing facility. Others may find the deposits required to obtain a transponder onerous. Some toll roads require transponders.

*Process equity:* See *Participation equity*

*Race/ethnicity equity:* Considering whether different racial and ethnic groups, particularly minorities, are burdened disproportionately, taking into account fees paid, benefits received, and impacts experienced.

*Redistributive equity:* See *Income equity*

*Spatial equity:* A geographic application of the horizontal and vertical equity concepts.

*Vertical equity:* How members of different groups (e.g., low-income groups versus high-income groups, drivers versus non-drivers, or inner-city versus rural residents) fare relative to one another.

## **Mitigation Terms**

*All Electronic Tolling (AET):* Vehicles are automatically charged via transponder and license plate imaging

*Area-license systems:* Drivers may travel in and out of a zone an unlimited number of times for a fixed fee during certain hours. In addition, licensed residents of the zone may receive a discount or exemption.

*Cordon pricing:* Every time a vehicle crosses a boundary (i.e., cordon) into and out of a charged zone, a fee is charged. Generally, the amount of the charge varies between weekdays and weekends and peak and off-peak hours. Trips that begin and finish entirely within the zone are not charged.

*Credit-based congestion pricing:* Revenue-neutral pricing system in which an individual or group receives “credit” to charge toward a certain action such as traveling in congestion lanes during rush hour, or a certain amount of congestion fees to be used each month.

*Disability exemption:* Exemption offered to disabled individuals who may not have reasonable alternatives for transit (e.g., it is challenging or impossible for wheelchair users to use mass transit).

*Discounts:* Reductions in congestion charge offered to certain individuals or groups.

*Distance-based fees:* Vehicle use fees based on how many miles a vehicle is driven.

*Exemptions:* Excluding certain individuals or groups from being charged (e.g., emergency vehicles).

*Express lanes:* A variation on *HOT lanes* which carpools must pay a toll to use, though the toll may be lower than that charged to solo drivers.

*FAIR lanes:* Fast and Intertwined Regular Lanes, a variation on *HOT lanes* whereby drivers in the regular (un-tolled) lanes receive credits that, depending on the structure of the program, can be used to pay for using the fast (tolled) lanes, or for public transit fares or other transportation services.

*Geographic exemptions:* Exempting individuals from paying charges based on their residential/geographic situation (e.g., residents forced to drive through a cordoned zone regardless of their destination).

*HOT lanes:* High-occupancy/toll lanes, a version of high-occupancy vehicle (HOV) lanes. Qualified carpool vehicles can use HOT lanes free or at a discount, while other vehicles having must pay a toll. All vehicles continue to have the option of traveling in free general-purpose lanes.

*Income exemption:* Exempting individuals or groups from charges on the basis of their income level (e.g., household income less than \$X is exempt).

*“Lexus Lanes”:* A term used to describe road pricing projects as inequitable for lower income drivers. The term is effective and popular as a sound bite, but with has negative connotation for many.

*Revenue redistribution:* Redistributing revenues through public spending on specific transportation-related improvements.

*Road space rationing:* Using revenue-neutral credits to ration peak-period roadway capacity.

*Time-, distance-, and/or place-based pricing:* Adjusting road-user charges based on the distance traveled, location, time of day, and vehicle type. Some proposals also adjust the toll based on vehicle fuel efficiency or pollution certification level. These tolls are often collected to both finance maintenance efforts as well as manage congestion.

<b>-Based</b>	<b>Definition/Toll varies by...</b>
Time-	time of day
Distance-	trip length
Place-	Facility type (bridge toll)
Fuel-	Electric vehicle may get a discount
Emissions-	Electric vehicle may get a discount
Vehicle type-	Trucks pay more

*TOT lanes:* Truck only toll lanes, proposed to reduce traffic and congestion in the general purpose lanes by consolidating truck and freight operations into a separate facility

*Transit investment:* The use of transportation revenues to improve transit systems (thereby improving transportation choices for low-income travelers and those who are affected by new charges).

### **Key Policy Definitions**

*Civil Rights Restoration Act of 1987:* Identified the extent to which Title VI applied, to include all Federal-aid recipients, sub-recipients, and contractors, regardless of whether specific activities are federally funded or not.

*Environmental justice:* The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies (U.S. Environmental Protection Agency official definition).

*Executive Order 12898 of 1994:* Established the precedent that environmental justice consideration is extended to low-income populations and to avoid “disproportionately high and adverse” effects.

*Federal Aid Highway Act of 1970:* Ensured that transportation facilities would be approved “in the best overall public interest” with efforts to eliminate or minimize effects on community cohesion, employment effects, and displacement of people.

*National Environmental Policy Act of 1969:* An act requiring that for proposed major transportation facilities, an analysis of environmental impacts go beyond the infrastructure itself to include a broader geographic area.

*Title VI of the Civil Rights Act of 1964:* States that no person in the United States shall, on the ground of race, color, or national origin be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance.<sup>40</sup>

### **Other Useful Terms**

*Ability to Pay:* People who have more money pay more (i.e., a project is financed through a progressive tax that is paid disproportionately by higher income people).<sup>41</sup>

*Cost recovery:* The ratio between costs imposed on users and what they pay in user fees and special taxes.

*Costs imposed:* Users pay for the burden they impose on others (e.g., extra expense required to provide express bus service for suburb-to-city commuters is recovered through fares on this service).<sup>42</sup>

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<sup>40</sup> United States Code. Title VI: Nondiscrimination in Federally Assisted Programs, Civil Rights Act of 1964, 42 USC 2000(d) – 2000(d)(1).

<sup>41</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011).  
<http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

*“Do-Nothing Alternative”*: A solution where no action is taken.

*Equity audit tool*: A systematic approach to monitor and periodically make needed changes to implemented pricing programs to ensure that the tools to promote equitable outcomes are meeting their goals.<sup>43</sup>

*Focus groups*: Small groups of representative people who are questioned about their opinions as part of market research.

*Geographical Information System (GIS) analysis*—Often used to determine the location of groups affected by a project, and related to environmental justice concerns.

*Highway cost allocation*: Analysis of the costs imposed by various types of vehicles and the degree to which they are recovered by user fees.

*Limitation*: Maximum or minimum amount allowed.

*Mobility gap analysis*: An analysis of the difference in motorized travel (automobile, public transit, taxi, etc.) between households with and without automobiles (“zero-vehicle households”).

*Process (or participation)*: Having a voice when the decision was made (e.g., Public outreach regarding proposed new high-occupancy toll lanes provides transparent information and seeks to involve all affected parties in public hearings and workshops).<sup>44</sup>

*Progressive*: Placing a higher burden on those with higher incomes (e.g., the U.S. income tax).

*Regressive*: Placing a higher burden on those with lower incomes (e.g., a uniform tax of \$500 is regressive, since \$500 is a larger proportion of a lower income).

*Return to Source*: “We get back what we put in” (i.e., transit investment in each county is matched to that county’s share of metropolitan tax revenues used for transit).<sup>45</sup>

*Revenue*: The income of a party from all sources, used to pay for the party’s expenses.

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<sup>42</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011).  
<http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

<sup>43</sup> Ecola, L., and T. Light, Equity and Congestion Pricing A Review of the Evidence (RAND 2009).  
[http://www.rand.org/pubs/technical\\_reports/TR680.html](http://www.rand.org/pubs/technical_reports/TR680.html). Accessed Jan. 27, 2012.

<sup>44</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011).  
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<sup>45</sup> Committee on the Equity of Transportation Finance Mechanisms, Equity of Evolving Transportation Finance Mechanisms, Transportation Research Board Special Report 303 (August 2011).  
<http://onlinepubs.trb.org/onlinepubs/sr/sr303.pdf>. Accessed Sept. 1, 2011.

*Revenue-neutral:* Having no effect on overall revenue.

*Subsidy:* A form of financial assistance paid to a business or economic sector.

*Surveys:* Examinations of opinions, behaviors, effects, and so on.

*Transponder:* A wireless communications, monitoring, or control device that picks up and automatically responds to an incoming signal.

*Unbanked:* Lacking access to a bank account either by choice or by circumstance.

*Uniform:* Treating all people equally from a strictly monetary perspective (e.g., a uniform tax would charge each person the same amount, and a uniform redistribution of revenues would provide each person with the same amount of money).

*Welfare:* The overall well-being of people, either as individuals or collectively.

In addition to the specific citations, the following sources were consulted in developing the glossary:

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Ecola L. and Light T., *Equity and Congestion Pricing A Review of the Evidence* (RAND 2009).

[http://www.rand.org/pubs/technical\\_reports/TR680.html](http://www.rand.org/pubs/technical_reports/TR680.html). Accessed January 27, 2012.

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Litman T., *Evaluating Transportation Equity*, *World Transport Policy & Practice*, Volume 8, No. 2, Summer 2002, pp. 50-65. Updated version (2011) available at

<http://www.islandnet.com/~litman/equity.pdf>

Litman T., TDM Encyclopedia, VTPI, <http://www.vtpi.org/tdm/tdm35.htm>

## **APPENDIX B: POTENTIAL REMEDIATION STRATEGIES**

### ***Altering the design of the finance policy***

- Price design limitations
- Increased access to transponders
- Park and ride facilities
- Revenues redistributed directly to collecting city
- Geographic system design
- Credit-based congestion pricing

### ***Giving exemptions, discounts, subsidies, or rebates to parties adversely affected by the policy***

- Discounts/exemptions
- Subsidies

### ***Offering or improving alternative transportation services***

- Revenue redistribution
- Increased access to alternative transit

### ***Policy choices that complicate remediation measures***

- All Electronic Tolling (AET)
- Long-term concession agreements; Public Private Partnerships
- Sales tax increase

## Altering the Design of the Finance Policy

Price Design Limitations	
<b>Brief Description</b>	Identifying a maximum number of crossings that can be charged per time period.
<b>Deployment Sites</b>	New York City, Stockholm, Trondheim (Norway), Singapore
<b>Benefactors</b>	Frequent users
<b>Why this strategy is used</b>	May address spatial equity concerns and adverse impacts to one geographic area including drivers that due to the geography of their residency enter or exit the charged zone multiple times/day.
<b>Additional details</b>	Popular price design limitations include defining both the maximum allowed charge for each crossing and/or the maximum number of crossings that can be charged per period. Allowances may also be implemented allowing for unlimited use of priced facilities during certain periods (ex. holidays, weekends, off-peak hours). Inequities can arise in cordon pricing schemes due where some drivers, due to the geography of their residency, have no choice but to enter/exit the cordoned zone multiple times per day. Exemptions and/or placing a limit on the maximum number of crossings charged per day can address these inequities while still allowing the pricing in place to discourage others from driving in highly congested city centers.
<b>Links to more information</b>	Information about the Trondheim, Norway pricing system: <a href="http://www.progress-project.org/Progress/tron.html">http://www.progress-project.org/Progress/tron.html</a> Information on congestion pricing trials in Stockholm, Sweden: <a href="http://www.stockholmsforsoket.se/templates/page.aspx?id=183">http://www.stockholmsforsoket.se/templates/page.aspx?id=183</a> Paper about Singapore road pricing lessons learned: <a href="http://www.imprint-eu.org/public/Papers/IMPRINT3_chin.pdf">http://www.imprint-eu.org/public/Papers/IMPRINT3_chin.pdf</a> TDM encyclopedia chapter on road pricing: <a href="http://www.vtpi.org/tdm/tdm35.htm">http://www.vtpi.org/tdm/tdm35.htm</a>

Increased Access to Transponders/Stickers	
<b>Brief Description</b>	Motorists can apply for and receive transponders at public assistance offices and other sites frequented by the general population including gas stations, and local retailers.
<b>Deployment Sites</b>	Puerto Rico (Auto Expreso System), Texas (TxTag), Washington (SR 520 bridge customer service centers), Minnesota (MnPASS), E-ZPASS (northeast US), Florida (SunPass), Seattle (Good To Go SR-520)
<b>Benefactors</b>	Low-income users
<b>Why this strategy is used</b>	People who only have access to cash and no stable bank account cannot pay with traditional transponder technology that is linked to a debit or credit card. Drivers need low cash deposit/no credit card necessary payment options.
<b>Additional details</b>	With some transponders, it is possible to reload with cash (i.e., Florida turnpike SunPass and AutoExpreso in Puerto Rico) at kiosks located at facilities and various retailers. This cash reload option allows for toll transponder benefits while still allowing use by the

	<p>unbanked.</p> <p>With an increasing number of toll plazas converting to all electronic tolling, increased access to transponder technology can greatly ease this transition.</p>
<b>Links to more information</b>	<p>Article about the wide availability of Florida SunPass transponders and where/how they can be paid for with cash:  <a href="http://articles.sun-sentinel.com/2010-06-27/news/fl-sunpass-kiosks-20100625_1_sunpass-account-sunpass-mini-transponders">http://articles.sun-sentinel.com/2010-06-27/news/fl-sunpass-kiosks-20100625_1_sunpass-account-sunpass-mini-transponders</a></p> <p>Information about Florida SunPass transponders:  <a href="https://www.sunpass.com/index">https://www.sunpass.com/index</a></p> <p>Short article about SR520 Good-to-Go transponder availability:  <a href="http://blog.seattlepi.com/transportation/2011/02/15/good-to-go-electronic-toll-passes-for-sr-520-now-available/">http://blog.seattlepi.com/transportation/2011/02/15/good-to-go-electronic-toll-passes-for-sr-520-now-available/</a></p> <p>AutoExpreso (Puerto Rico) retail locations for obtaining AutoExpreso toolkit and replenishing toll amounts:  <a href="https://www.autoexpreso.com">https://www.autoexpreso.com</a></p>

<b>Geographic System Design</b>	
<b>Brief Description</b>	Geographic system design applies mostly to cordon pricing. Under this strategy, cordon boundaries, exit points, etc. are purposefully located in ways that will maximize equity.
<b>Deployment Sites</b>	London and Stockholm (cordon boundaries), NYC cordon pricing
<b>Benefactors</b>	All drivers
<b>Why this strategy is used</b>	Maximize equity
<b>Additional details</b>	There may be a conflict between maximizing equity and maximizing revenue. Revenue concerns often trump equity concerns and cordon pricing schemes are likely to be designed with revenue as the top priority.
<b>Links to more information</b>	Income-Based Equity Impacts of Congestion Pricing: A Primer, FHWA: <a href="http://ops.fhwa.dot.gov/publications/fhwahop08040/fhwahop08040.pdf">http://ops.fhwa.dot.gov/publications/fhwahop08040/fhwahop08040.pdf</a>

<b>Credit-based Congestion Pricing</b>	
<b>Brief Description</b>	Drivers receive a monthly allowance of travel “credits” to be used on toll roads. Drivers only pay money “out of pocket” if they exceed their allowance. Drivers who spend less than their allowance can allow the credits to roll over for later use or exchange them for cash. Extra credits may be allotted to those with special, socially desirable, travel needs (ex. welfare-to-work participants, and single parent low-income household heads).
<b>Deployment Sites</b>	Pilot Sites: <ul style="list-style-type: none"> <li>• FAST Miles (tested statewide in Minnesota and in Austin, TX)</li> <li>• HOT/C (HOT Credit) Lanes (tested in Alameda County, CA)</li> </ul>
<b>Benefactors</b>	All drivers
<b>Why this strategy is used</b>	Strategy predicts increased transit use, peak travel to decrease, and total vehicle emissions to decrease. Potential to optimize network use and address equity, welfare, and revenue-distribution.
<b>Additional details</b>	Credit-based systems have not been implemented as of 2011 but feasibility testing has proved promising. Implementation is easier with electronic toll collection.
<b>Links to more information</b>	Academic paper describing credit-based pricing: <a href="http://www.ce.utexas.edu/prof/kockelman/public_html/TR-A-CBCP.pdf">http://www.ce.utexas.edu/prof/kockelman/public_html/TR-A-CBCP.pdf</a> <u>HOT Credit Lanes Feasibility Study-Alameda County, CA, 2005:</u> <a href="http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/pubs_reports/projectreports/hot_credit_lanes.htm">http://ops.fhwa.dot.gov/tolling_pricing/value_pricing/pubs_reports/projectreports/hot_credit_lanes.htm</a>

**Giving Exemptions, Discounts, Subsidies, or Rebates to Parties Adversely Affected by the Policy**

<b>Discounts/Exemptions</b>	
<b>Brief Description</b>	Discounts (reducing the amount of congestion charge paid) and exemptions (excluding certain persons or vehicles from payment) are often offered to certain types of vehicles and motorists with special transportation needs.
<b>Deployment Sites</b>	Widely implemented (most cities exempt transit and emergency vehicles), Milan and other cities also discount low-emission vehicles, London
<b>Benefactors</b>	Persons with special transportation needs and certain types of vehicles (ex. hybrid, emergency, military, law enforcement, etc.)
<b>Why this strategy is used</b>	Allow for unhindered travel of emergency personnel; encourage motorists to drive low-emission vehicles
<b>Additional details</b>	May have cost and enforcement consequences. The Los Angeles Metro Express Lanes have a Toll Credit Program that provides a \$25 credit to low-income households (less than \$35,000, twice the local poverty line) to be used towards either account transponder deposit or pre-paid tolls. Drivers in the Toll Credit Program will also have the \$3 monthly account maintenance fee waived.
<b>Links to more information</b>	<p>Potential Impact of Exempt Vehicles on HOV Lanes, FHWA:  <a href="http://ops.fhwa.dot.gov/publications/exemptvehicleshov/chapter4.htm">http://ops.fhwa.dot.gov/publications/exemptvehicleshov/chapter4.htm</a> Information on Low Emission Zones for Italy &amp; Germany:  <a href="http://www.iema.net/news/envnews?aid=17943">http://www.iema.net/news/envnews?aid=17943</a>                      Solo drivers of low-emission autos fume over fees to use carpool lanes, LA Times:  <a href="http://articles.latimes.com/2011/sep/14/business/la-fi-autos-carpool-20110914">http://articles.latimes.com/2011/sep/14/business/la-fi-autos-carpool-20110914</a>                      Academic paper on lessons learned from road pricing in London:  <a href="http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0327.2006.00159.x/abstract;jsessionid=DCD5887FCE108B1D8E78B0726F6A797D.d03t03">http://onlinelibrary.wiley.com/doi/10.1111/j.1468-0327.2006.00159.x/abstract;jsessionid=DCD5887FCE108B1D8E78B0726F6A797D.d03t03</a>                      Discounts and exemptions for London charging zone:  <a href="http://www.tfl.gov.uk/roadusers/congestioncharging/6713.aspx">http://www.tfl.gov.uk/roadusers/congestioncharging/6713.aspx</a>                      Los Angeles Metro Toll Credit Program  <a href="http://www.metro.net/projects/expresslanes/">http://www.metro.net/projects/expresslanes/</a></p>

<b>Subsidies</b>	
<b>Brief Description</b>	A portion of revenue from the project is used to subsidize the toll cost/costs of low-income commuters or transit.
<b>Deployment Sites</b>	Central Texas toll roads (Texas 130, Loop 1, Texas 45N), Germany and France (taxpayers can deduct commuting expenses from their income tax liability)
<b>Benefactors</b>	Low-income commuters
<b>Why this strategy is used</b>	Encourage use of facilities by low-income population
<b>Additional details</b>	Not widely implemented, it is more likely that low-income commuters will be offered a discount up front rather than receive a subsidy. Toll revenue is also more likely to be diverted to the low-income community through improvements to low-income transit options. Subsidy proposals are often not well received by the general population.
<b>Links to more information</b>	Tolls would subsidize rail line along Route 422, Chester County Daily Local News: <a href="http://www.dailylocal.com/article/20110919/NEWS/309199941/tolls-would-subsidize-rail-line-along-route-422">http://www.dailylocal.com/article/20110919/NEWS/309199941/tolls-would-subsidize-rail-line-along-route-422</a> Using Drivers' Tolls to Subsidize Light Rail across the Columbia River is Wrong, The Columbian-Op/Ed section: <a href="http://www.washingtonpolicy.org/publications/opinion/using-drivers-tolls-subsidize-light-rail-across-columbia-river-wrong">http://www.washingtonpolicy.org/publications/opinion/using-drivers-tolls-subsidize-light-rail-across-columbia-river-wrong</a>

### Offering or Improving Alternative Transportation Services

<b>Revenue Redistribution</b>	
<b>Brief Description</b>	Revenue from facility is redistributed through public spending on specific transportation-related improvements.
<b>Deployment Sites</b>	Widely implemented (common practice among recent pricing projects) I-15 in San Diego (funds support express bus service), Norwegian toll rings (funds support roadway/transit improvement)
<b>Benefactors</b>	All commuters
<b>Why this strategy is used</b>	Revenue is used to make improvements to facilities, roads, etc. to benefit and provide additional travel modes to all corridor users.
<b>Additional details</b>	
<b>Links to more information</b>	

<b>Increased Access to Alternative Transit</b>	
<b>Brief Description</b>	Transit, vanpools, paratransit, or other options as alternatives in locations not served by mass transit. Expand existing facilities to serve more people.
<b>Deployment Sites</b>	Widely implemented, Washington State light rail expansion, Campus carsharing/ridesharing programs (message-boards & social media to connect people to transit) Miami (Dade and Broward Counties), I-95 Express Lanes introduced significant new Bus Rapid Transit service in the corridor in advance of opening of Phase 1. This new service, coupled with dramatic improvement in travel speeds in the managed lanes, resulted in a 145% increase in ridership in the first two years of the project.
<b>Benefactors</b>	Non-drivers, Choice transit riders (those who own cars), All drivers (congestion reduction)
<b>Why this strategy is used</b>	Reduce congestion in urban areas and potentially share/split toll rates.
<b>Additional details</b>	
<b>Links to more information</b>	Information on Puget Sound (Washington) Transit Capital projects: <a href="http://projects.soundtransit.org/">http://projects.soundtransit.org/</a> Virginia Tech alternative transportation information: <a href="http://www.facilities.vt.edu/tcs/alternative/">http://www.facilities.vt.edu/tcs/alternative/</a>

Sales Tax Increase	
Brief Description	Under this strategy, sales tax is increased in order to fund transit and infrastructure rather than relying solely on revenue generated by pricing projects.
Deployment Sites	Massachusetts (2009), Durham County, NC (2011)
Benefactors	Users of public transportation (transit projects receive funding from sales tax more often than roadway projects)
Why this strategy is used	This has been argued as a more equitable as all residents are charged equally based on their purchases. Sales tax is also a fairly reliable source of revenue during uncertain economic periods and can make up for budget shortfalls.
Additional details	
Links to more information	<p>Brief on regions that fund transit with sales tax:  <a href="http://www.tlcmnnesota.org/pdf/Sources%20of%20funding%20for%20public%20transit%202009%20Final%20April%2021.pdf">http://www.tlcmnnesota.org/pdf/Sources%20of%20funding%20for%20public%20transit%202009%20Final%20April%2021.pdf</a></p> <p>Durham voters approve sales tax increase for transit, Triangle Business Journal:  <a href="http://www.bizjournals.com/triangle/news/2011/11/09/durham-voters-approve-sales-tax.html">http://www.bizjournals.com/triangle/news/2011/11/09/durham-voters-approve-sales-tax.html</a></p> <p>Mass. Senate OKs transportation bill that includes sales tax increase, no toll or gas tax increase, Masslive.com article,2009:  <a href="http://www.masslive.com/news/index.ssf/2009/06/mass_senate_oks_transportation.html">http://www.masslive.com/news/index.ssf/2009/06/mass_senate_oks_transportation.html</a></p> <p>Possible Sales Tax Increase to Help Fund Public Transportation:  <a href="http://nwahomepage.com/fulltext-news/?nxd_id=287497">http://nwahomepage.com/fulltext-news/?nxd_id=287497</a></p>

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