

Impacts of Congestion Pricing on Low-Income Populations

Efforts to Measure and Respond to Income-Equity Concerns



U.S. Department of Transportation
Federal Highway Administration

NOTICE

This document is disseminated under the sponsorship of the U.S. Department of Transportation in the interest of information exchange. The U.S. Government assumes no liability for the use of the information contained in this document. This report does not constitute a standard, specification, or regulation.

The U.S. Government does not endorse products or manufacturers. Trademarks or manufacturers' names appear in this report only because they are considered essential to the objective of the document.

QUALITY ASSURANCE STATEMENT

The Federal Highway Administration (FHWA) provides high-quality information to serve Government, industry, and the public in a manner that promotes public understanding. Standards and policies are used to ensure and maximize the quality, objectivity, utility, and integrity of its information. FHWA periodically reviews quality issues and adjusts its programs and processes to ensure continuous quality improvement.

TABLE OF CONTENTS

I. INTRODUCTION	1
II. BACKGROUND	3
ENVIRONMENTAL JUSTICE REQUIREMENTS.....	4
III. CASE STUDIES	5
LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY EXPRESS LANES.....	5
Framework for Evaluation of Equity Impacts.....	5
Defining “Low Income”.....	6
Estimating Low-Income Populations.....	6
Effects of Express Lanes on Low-Income Drivers.....	7
Toll Policy Recommendations.....	7
Performance Measures Recommendations.....	8
Impact and Outcomes of Los Angeles County Metropolitan Transportation Authority’s Low-Income Policies.....	8
TIME-OF-DAY TOLLING IN AUSTIN, TEXAS.....	9
Estimating Low-Income Populations and Impacts.....	10
Economic Impact to Low-Income Populations.....	10
Mitigating Factors.....	11
Regional Mitigation Policies.....	12
IV. SUMMARY	13
APPROACHES TO ENVIRONMENTAL JUSTICE ANALYSIS.....	13
POTENTIAL IMPACTS OF PRICED-MANAGED LANES ON LOW-INCOME POPULATIONS AND MITIGATION MEASURES.....	14
V. ADDITIONAL RESOURCES	17

LIST OF ACRONYMS AND ABBREVIATIONS

CRD	Congestion Reduction Demonstrations
CTRMA	Central Texas Regional Mobility Authority
FHWA	Federal Highway Administration
HOT	high-occupancy toll
HOV	high-occupancy vehicle
LA Metro	Los Angeles County Metropolitan Transportation Authority
TAP	Transit Access Pass
TAZ	traffic analysis zone
UPA	Urban Partnership Agreements
VPPP	Value Pricing Pilot Program

I. INTRODUCTION

The perception of negative equity impacts associated with pricing implementation has often plagued congestion pricing projects. It has been argued that pricing roadways limits the options available to low-income travelers while simultaneously increasing the number of options available to high-income users. Significant research into the income-equity impacts of congestion pricing projects over the last several years has shown that well-designed pricing schemes can help mitigate such impacts and ensure greater options for all travelers, regardless of their income category. Further, several recent efforts by agencies to measure and respond to impacts on low-income communities affected by pricing implementation provide real-life examples of tools and measures utilized to address these concerns. This white paper documents examples of mitigation strategies implemented by agencies to analyze and measure the impacts of their pricing projects on low-income users of the transportation system.

The following case studies are presented in this white paper:

1. The Central Texas Regional Mobility Authority (CTRMA) analysis of impacts of adopting time-of-day tolling on US 183 in Austin, Texas.
2. The Los Angeles County Metropolitan Transportation Authority (LA Metro) assessment of low-income impacts of the Express Lanes project.

The environmental justice analyses conducted by the agencies sponsoring the projects and proposals included an evaluation of the potential impacts of tolling on low-income populations. The case studies review the tools and approaches used for the analysis of impacts and the results of the analysis. They also document successful strategies used by the agencies to mitigate the projected adverse impacts. This white paper summarizes takeaways from the examples and strategies that future project managers can employ to evaluate and mitigate potential impacts on low-income users of priced-managed roadways.

II. BACKGROUND

The U.S. Department of Transportation's 2016 Value Pricing Pilot Program (VPPP) report to Congress documented results from several congestion pricing programs implemented through the VPPP as well as through follow-on initiatives such as the Congestion Reduction Demonstration (CRD), Urban Partnership Agreement (UPA), and Express Lanes Demonstration Programs. One of the key findings of the report was that equity impacts resulting from the congestion pricing deployments have been minimal, yet remain a concern for the public. Overall, the UPA/CRD projects did not have any negative equity impacts and, instead, succeeded in expanding travel options through transit improvements and by expanding the range of parking pricing and convenience options available to drivers. Nevertheless, the report states surveys at several sites indicate a persistent perception of unfairness related to congestion pricing efforts.

The Federal Highway Administration (FHWA) has several published resources that address equity in congestion pricing, including a white paper ([*Low-Income Equity Concerns of U.S. Road Pricing Initiatives*](#)), a fact sheet on [*Environmental Justice and Tolling: A Review of Tolling and Potential Impacts to Environmental Justice Populations*](#), an [*Environmental Justice Emerging Trends and Best Practices Guidebook*](#), and a one-page brief ([*Congestion Pricing Equity*](#)), along with a compendium of frequently asked questions.¹ According to the one-page brief, well-planned congestion pricing schemes:

- Increase transportation options for all commuters, including low-income commuters, to achieve relatively congestion-free travel on specific occasions.
- Demonstrate wide acceptance and usage of priced-managed facilities by low-income commuters.
- Demonstrate that low-income commuters, many of whom are transit riders, particularly benefit from reduced congestion and transit investments made from pricing revenues.

While these resources are a helpful starting point, each pricing proposal is unique in the geographic and demographic context in which it is situated. Transportation agencies evaluating congestion pricing scenarios are required to consider the potential negative impacts each scheme may have on various populations. Such analysis is important to allay public concerns related to income equity, as well as to meet Federal, State, local, and regional requirements. While the focus of this study is on impacts to low-income populations, the Federal environmental justice requirement, as authorized by Executive Order 12898 (described on page 4), mandates Federal actions to address disproportionately high and adverse impacts on minority populations and low-income populations, which includes an analysis of potential impacts and implementation of measures to alleviate adverse impacts. In addition to Federal requirements, certain States and regions have laws requiring assessment and mitigation of negative impacts on low-income communities. The authorizing legislation to develop and operate high-occupancy toll lanes on I-10 and I-110 in California, State Bill 1422, directed the Los Angeles County Metropolitan

¹ Federal Highway Administration, "Urban Partnership Agreement Low-Income Equity Concerns of U.S. Road Pricing Initiatives" Web page. Available at: <http://ops.fhwa.dot.gov/congestionpricing/resources/lwincequityrpi/index.htm>

Transportation Authority to assess the impacts of the program on low income commuters and to provide mitigation to those impacted commuters. The mitigation measures suggested by the bill included reduced toll charges and toll credits for transit users based on income eligibility.² The North Central Texas Council of Governments' congestion management plans also include consideration of the location of low-income populations in the evaluation of several congestion management strategies as a criterion for project eligibility and selection.³

Despite a number of successful priced-managed lane projects, transportation agencies continue to need tools to measure the potential impacts of pricing when considering pricing implementation. Understanding potential negative impacts up front will allow agencies to address environmental justice requirements while proactively addressing constituents' concerns related to pricing. It would also ultimately lead to the design of a congestion pricing scheme that is equitable to all the transportation users in a region.

ENVIRONMENTAL JUSTICE REQUIREMENTS

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which was issued in 1994, brought attention to environmental and health consequences of government action on minority and low-income communities.⁴ It directed all Federal agencies to make "achieving environmental justice part of its mission by identifying and addressing, as appropriate, any disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." This requirement applies to all projects requiring Federal approval that have minority or low-income populations in their study area.

In response, FHWA's original environmental justice Order 6640.23 was signed by the Administrator in December 1998. The Order was updated in 2012, and the current directive is [FHWA Order 6640.23A](#). The Technical Advisory accompanying this order provides guidance for documenting the potential social, economic, and environmental impacts considered in the selection and implementation of highway projects. The case study locations included in this white paper conducted environmental justice analyses in accordance with this FHWA requirement.

² California Senate Bill Number SB 1422, as amended, "High-occupancy toll (HOT) lanes," February 21, 2008. Available at: ftp://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_1401-1450/sb_1422_bill_20080825_amended_asm_v96.html.

³ North Central Texas Council of Governments, "Nondiscrimination in Transportation Planning" Web page. Available at: <http://www.nctcog.org/trans/ej/>.

⁴ *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, Executive Order 12898, February 11, 1994, Federal Register Volume 59, Number 32. Available at: <https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf>.

III. CASE STUDIES

LOS ANGELES COUNTY METROPOLITAN TRANSPORTATION AUTHORITY EXPRESS LANES

In 2010, as part of the Congestion Reduction Demonstration (CRD) Program, Los Angeles County Metropolitan Transportation Authority (LA Metro) undertook a demonstration project to convert two interstate carpool lanes on I-10 and I-110 to high-occupancy toll (HOT) lanes or “express lanes.” The pilot also represented the first toll projects in Los Angeles. I-10 and I-110 are two of the busiest highways in the LA Metro area, with I-10 being the main east-west highway through downtown Los Angeles, and I-110 extending from central Los Angeles due south to the port. In 2010, mixed-flow lanes on I-10 and I-110 carried approximately 1,400 to 1,500 vehicles per lane, and high-occupancy vehicle (HOV) lanes carried approximately 1,500 to 1600 vehicles per lane during the typical morning rush hour. As such, the facilities were operating at or near capacity at the time of implementation of the demonstration project.

As part of the project, LA Metro, in accordance with State law (SB 1422, 2008) and the Federal Executive Order 12898 requirement, analyzed the impact of the congestion pricing demonstration project on low-income commuters in the area (*Low-Income Assessment*).⁵ The following sections summarize the framework for this evaluation, the key findings of the analysis, and the mitigation measures undertaken by LA Metro.

Framework for Evaluation of Equity Impacts

Taylor and Norton (2010) proposed a framework for equity along three dimensions:⁶

- Individual equity.
- Group equity (among groups of people).
- Geographic equity (among different areas).

In accordance with the authorizing statute, the analysis conducted by LA Metro focused on group equity impacts of the proposed Express Lanes project. The group equity dimension involves ensuring that low-income commuters, as a group, are not disadvantaged by express lane implementation or, if they are, that mitigation is provided. Other relevant considerations included:

- Group equity of opportunity (i.e., not pricing tolled lanes such that low-income drivers must be excluded).
- Individual market equity (i.e., ensuring tolls do not exceed the value of time savings).

⁵ Los Angeles County Metropolitan Transportation Authority, LA Metro Express Lanes project, *Low-Income Assessment*, March 2010.

⁶ B. D. Taylor and A.T. Norton, “Paying for Transportation: What’s a Fair Price?” *Journal of Planning Literature*, 2010.

Using this framework, the study identified groups that would be better off and ones that could be worse off under the Express Lanes project at a high level.

Defining “Low Income”

LA Metro used a couple of guiding principles to define “low income.” Chief among these was the threshold used by the authorizing legislation’s (SB 1422) stipulation for low-income toll credits for certain specified State and local aid programs. This was taken as the lower threshold of the income cut-off (i.e., LA Metro’s level defining low income had to be no lower than that specified in these programs). Programs and thresholds examined for setting the low income threshold for this analysis included:⁷

- Eligibility limits for food stamps and other Los Angeles County assistance programs in light of economic downturn.
- LA Metro’s Rider Relief program for low-income transit users.
- Federal poverty threshold.
- Income stratification in the travel demand model used for the project.
- Income stratification used in several recent surveys.

The ultimate threshold for the definition of “low income” for this analysis was set at an amount higher than most guiding programs and surveys.

Estimating Low-Income Populations

In the absence of a direct methodology to estimate the income levels of the users of the express lanes corridor, LA Metro used four different approaches and data sources. The data sources included census-based data on commuting modes by income group, a commuter survey conducted by Southern California Association of Governments, and income levels indicated on a license-plate survey conducted as part of a CRD project. The final source of data on low-income commuters came from the travel model built for the project. The morning peak trip origins were overlaid with the demographic data on a traffic analysis zone (TAZ) level to determine the potential number of trips originating from TAZs with a high share of low-income populations. The analysis evaluated the benefits and limitations of each of these data sources. For instance, the approach of overlaying the travel model TAZ with income distribution data was determined to suffer from an “ecological fallacy,” which is defined as drawing

LA Metro’s environmental justice analysis used the regional travel demand model to determine overall choices of the region’s commuters. The toll level was analyzed using an economic model. The toll optimization model was set to optimize (i.e., minimize) the cost of travel time in each corridor against maximizing revenue. Using these two models, the behavior of low-income commuters, when faced with the option of paying a toll to use express lanes, was inferred.

⁷ FHWA uses Department of Health and Human Services guidelines to define “low-income.” The guidelines are available at: <https://aspe.hhs.gov/poverty-guidelines>.

conclusions about individuals in an area on the basis of overall characteristics in that area. The estimates from a license plate survey regarding percentage of low-income users of I-10 and I-110 were eventually used as representative of future commuting patterns by that income group.

Effects of Express Lanes on Low-Income Drivers

This analysis found that low-income solo drivers would be unlikely to choose to use the express lanes on a regular basis, but that there might be urgent situations where they would choose to use them. This analysis was based on the premise that a driver will choose to pay the toll on any occasion, based on his or her value of time at that instance. While value-of-time estimates are used for economic analysis, they do not reflect the instantaneous value of time for any person, much less the intrinsic value of any person's time to himself or to others. The report argued that, under specific circumstance (e.g., when running late for work or for pick-up at a day care), a low-income person may exhibit a substantially higher value of time. A combination of higher instantaneous value of time (as low as 120 percent of wage rate) coupled with a toll credit was sufficient to lead low-income drivers to choose to pay the toll in the model.

The analysis also found that low-income households, prevalent in Los Angeles, are less likely to have either a credit card or bank account (i.e., they are “unbanked”)—an essential requirement to have greater transponder penetration. Hence, a successful tolling system in Puerto Rico, which has a large proportion of unbanked residents, was examined as a possible model.

Toll Policy Recommendations

The *Low-Income Assessment Report* made toll policy and performance measure recommendations to accommodate the needs of LA Metro's low-income commuters. The policy recommendations included:

- Implementing the intended policy of crediting the accounts of qualifying low-income households for setup fees.
- Considering requiring lower minimum account balances for accounts that are not linked to a credit card.
- Providing a wide, neighborhood-based network of locations to obtain transponders and replenish accounts.
- Examining the possibility of making arrangements with check-cashing outlets and banks to direct a portion of customer paychecks to Transit Access Pass (TAP) or transponder accounts.
- Considering waiving or reducing any minimum monthly account charges (e.g., low or no activity fees) for low-income account holders.

The report recommended and reported the following measures to help mitigate impacts on low-income commuters:

- Transit Credit for “frequent transit riders” (many of whom would be low income). Commuters riding a minimum of 16 round trips using their TAP or electronic fare card

within 60 days would be eligible for a credit of \$5 every 30 days or a maximum of \$60 for the 1-year demonstration period in transit or toll credit.

- **Toll Credit** or account setup fee waiver for low-income households. A one-time-per-household account setup fee waiver of \$25 (the anticipated value of the transponder), which would be credited to the transponder account. Because each express lane user, whether paying or not, must have a transponder, both general-purpose and HOV lane users could be eligible for this credit.

The report evaluated the potential costs and benefits of two credit schemes, if implemented based on a projection of low-income commuter share. The analysis found that the projected corridor revenues would be sufficient to pay for the potential demand for toll and transit credits, should both measures be implemented. Moreover, when the value of travel time savings is considered, the project has an overall net social benefit.

Performance Measures Recommendations

The report also made recommendations for performance measures to ensure that public policy goals with regard to low-income commuters are met. The performance measures recommended included:

- Number of low-income commuters (including percentage of TAP users) who sign up for a transponder.
- Number of peak-period low-income users of HOT lanes (and percentage of overall HOT lane users).
- Usage of HOT lane credits for low-income drivers (credit redemptions).
- Mode choice of low-income drivers (carpool versus single-occupant vehicle), compared with mode choice before the project is implemented.
- Performance of transit service in the express lanes corridors during the demonstration period.
- General-purpose lane speeds during the demonstration period.
- Account balance problems associated with low-income commuters, compared with non-low-income commuters.
- Share of time savings by low-income express lanes drivers in comparison with the share of tolls and transponder costs they pay.
- Trends in trip distance and trip time by low-income commuters, compared with non-low-income commuters.
- Toll revenue reinvestment.

Impact and Outcomes of Los Angeles County Metropolitan Transportation Authority's Low-Income Policies

LA Metro went on to implement both the transit credit and toll credit programs, as recommended in the *Low Income Assessment Report*. These two programs were rolled out as:

- Low-Income Assistance Plan (toll credit).
- Transit Rewards Program (transit credit).

The LA Metro Express Lanes became the first toll operation in the country to offer a plan for low-income commuters. The analysis of impacts, including the benefit-cost analysis based on projections of usage of the low-income credit schemes, provided a financially sound plan to go ahead with the proposed strategies. Further, these programs were bolstered by efforts to measure the performance of the Low-Income Assistance Plan as part of regular monitoring and management of the HOT lanes program. More information about the plans can be found on the LA Metro website: www.metroexpresslanes.net/.

As predicted by the *Low-Income Assessment Report*, despite the implementation of the Low-Income Assistance Plan, the I-10 and I-110 HOT lanes are a net revenue generator. The HOT lanes continued beyond the demonstration period, and LA Metro initiated a Net Toll Revenue Re-Investment Grant Program funded by the excess toll revenues. The program's goal is to increase mobility options in the region using a multimodal approach. County and city authorities and transit operators can apply for funding to support projects within the I-10 and I-110 corridors that have been identified in the Long Range Transportation Plan and that align with LA Metro's goals for a more sustainable multimodal countywide transportation system.⁸ The objective of the grant program is to increase mobility through a series of integrated strategies (e.g., transit operations, transportation demand management, transportation systems management, active transportation, and capital investments) on the I-10 and I-110 corridors.

Through policies such as the Low-Income Assistance Plan, the Transit Rewards Program, and the Net Toll Revenue Re-Investment Grant Program, LA Metro ensured that the pricing proposal was both equitable and affordable to low-income commuters. Furthermore, excess toll revenues are invested back into the communities, thus improving transportation options across modes. The resulting improved operations, while benefitting the entire community, particularly benefit low-income populations that are disproportionately reliant on the transit system. As such, through a careful analysis and projection of potential equity impacts and implementation of strategies to mitigate potentially negative effects, LA Metro was able to alleviate adverse outcomes for low-income populations while ensuring that accessibility options were enhanced for all commuters across the board.

TIME-OF-DAY TOLLING IN AUSTIN, TEXAS

In July 2015, the Texas Department of Transportation (TxDOT) and Central Texas Regional Mobility Authority (CTRMA) published a *Community Impact Assessment Technical Report* on the proposed 183 North Mobility Project in Travis and Williamson Counties in Austin, Texas. The proposed project would include the construction of two variably priced express toll lanes in each direction from State Highway (SH)45/Ranch-to-Market (RM) 620 south in Williamson County to Loop 1 (MoPac) in Travis County and in the center median of US Highway 183. The proposed express lanes would charge a variable toll to users opting to drive on the facility. Bicycle and pedestrian accommodations are also proposed as part of the project.

⁸ Los Angeles County Metropolitan Transportation Authority, "ExpressLanes Net Toll Revenue Re-Investment Grant Program" Web page. Available at: <https://www.metro.net/projects/expresslanes/projectsprograms/>.

As part of the *Community Impact Assessment Technical Report*, CTRMA undertook a study to satisfy the environmental justice requirement of EO 12989. The report points out that both minority and low-income populations exist within the study area. Block Group 1 in Williamson County contains 60.7 percent minority residents. The median household income for residents in Block Group 3 in the study area portion of Travis County is \$17,386, which is close to the 2009 Federal poverty level. Therefore, the majority in these two block groups are low-income residents. The report included a detailed analysis of low-income population impacts and proposed mitigation measures to alleviate some adverse effects. The report also made a case for how the proposed project would be beneficial to all users regardless of income category.

Estimating Low-Income Populations and Impacts

Populations in the study area, disadvantaged both by income criteria and those belonging to minority groups, were identified based on Department of Health and Human Service guidelines. The populations in question were estimated based on census tract data.

To determine potential impacts of the proposed project, a stated preference survey was administered and model estimation and scenario testing were conducted to understand how motorists would respond to alternative tolling arrangements. The Capital Area Metropolitan Planning Organization (CAMPO) regional travel model was used to conduct the environmental justice analysis. In the CAMPO model, specific TAZs were assigned as environmental justice TAZs based upon the following criteria:

- Low-income TAZs have at least 50 percent of their population living in families earning less than 80 percent of the county median family income or have at least 25 percent of the population with income falling below the 2009 Federal poverty level for a family of three (\$17,373).
- Minority TAZs have less than 50 percent of their population identifying themselves as “White, Non-Hispanic.”

Several data sources were used to identify environmental justice TAZs, including 2005 Bureau of Economic Analysis data, 2008 and 2009 Census Bureau poverty data, and 2005 ethnicity data based on 2000 census data ethnicity ratios applied to 2005 population data.

All trips originating from the environmental justice TAZs were assumed to be by low-income or minority commuters. Simplifying the assumption made it easier to use the model to estimate trips originating in the study area. The model’s Trip Generation step did consider a household’s income level as a factor for trip generation as statistics to account for the fact that higher income households tend to make more trips.

Economic Impact to Low-Income Populations

A sketch-level quantitative analysis was conducted to estimate the potential economic impact of introducing tolls on commuters of various income levels. The premise of the analysis was that the economic impact of choosing to travel on toll roads or lanes may be greater for low-income

individuals because the toll cost is a greater proportion of their income than it is for users with a higher income. The analysis assumed an average of 250 trips per year per household and calculated the annual toll cost as a percentage of median household income in Travis and Williamson Counties. Percentage of poverty-level income at those toll rates was also calculated. A similar analysis was also conducted for trips on both US Highway 183 and directional connector ramps at both ends of the project.

As expected, this analysis reveals that, for the same number of annual trips, a low-income (poverty-level income) household will incur a toll cost that is a greater percentage of its annual income than a median income household.

Mitigating Factors

CTRMA identified several factors that would mitigate tolling impacts on low-income commuters on US 183:

- Regional model results showed that speeds in the non-tolled, general-purpose lanes were projected to increase in the “Build” over the “No-Build” scenario as drivers elect to pay the toll and enter the express lanes, removing their vehicles from traffic in the general-purpose lanes. (Refer to the table below.)

Table. Average Speeds in Project Limits in 2015, Build and No-Build Alternatives.

Peak Travel Period	Average Speed		
	Build Alternative		No-Build Alternative (General Purpose Lanes)
	Express Lanes	General Purpose Lanes	
AM	61 mph	37 mph	29 mph
PM	62 mph	34 mph	27 mph

Source: CDM Smith, 2014.

- Transit-Capital Metro buses would be able to use the express lanes toll-free, enabling more reliable transit along this route.
- Emergency response vehicles would also be able to utilize the express lanes to bypass congestion in the general-purpose lanes when responding to incidents along and off the corridor.
- The study identified changes in traffic movement on parallel routes and local roads as a result of tolling that would benefit the communities living in those areas, including the environmental justice populations identified. This is termed as encroachment alteration effects.

Thus, the study demonstrated that, regardless of race or socioeconomic status, the proposed project would benefit all residents alike within the study area by increasing mobility along the project limits for both drivers and transit users, providing a reliable route for transit, and facilitating reliable emergency response.

Regional Mitigation Policies

CTRMA has instituted the following policies to ensure equitable implementation of tolling across all of its facilities:

- A toll waiver for public transit vehicles and registered car/van pools. The CTRMA policy of waiving transit tolls benefits transit that uses CTRMA facilities. Waiving transit tolls on CTRMA facilities increases transit reliability and decrease travel times at no additional cost to the transit user. This, in turn, benefits the environmental justice populations. According to the Texas Transportation Institute's Toll Road Opinion Survey, minority and low-income travelers are more likely than other populations to use transit.
- A violations policy that allows several opportunities to pay delinquent tolls prior to advancing unpaid tolls to a collection agency and municipal courts, where fees and fines of up to \$250 can be assessed.

The CAMPO Regional Transportation Plan also puts forth policies that minimize negative impacts by considering environmental justice populations, especially low-income travelers, when setting toll rates and collection methods. TxDOT and CTRMA provide multiple options for rate discounts and for payment methods, including pay-by-mail, making it possible for those who do not have a credit card to use the toll roads as well. For example, a traveler does not need a credit card to purchase and maintain a transponder. Further, allowing sufficient time to pay a toll bill before accruing additional costs also benefits those without the means for prompt payment.

CAMPO also provides some guidelines to implementing tolling. For example, the CAMPO 2035 Regional Transportation Plan states that providing the same or more non-toll capacity in the corridor than currently exists ensures viable non-toll alternatives that provide better service to environmental justice populations. Also, limiting the use of surplus toll revenue to the same corridor as the tolled facility allows further improvement to those corridors and provides benefits to corridor residents.

IV. SUMMARY

APPROACHES TO ENVIRONMENTAL JUSTICE ANALYSIS

The case studies described in this white paper provide a best-practices approach to conducting environmental justice analyses as they relate to identifying and addressing adverse impacts on minority and low-income populations. While each project is unique in terms of proposed design and the demographic context, there are some basic components of good analytical approaches that aim to not only satisfy legislative requirements but also the concerns of constituents and other stakeholders with regard to income equity aspects of road pricing proposals. It is important to note here that at the time of writing of this paper, the National Cooperative Highway Research Program (NCHRP) is in the process of conducting research to develop a toolbox that practitioners can use to evaluate and address environmental justice issues that arise when implementing tolls or rate changes. The research effort, entitled “*Environmental Justice Analysis when Considering Toll Implementation or Rate Changes*,” will include:

- Tools to measure the impacts of tolling on mobility, access, and household income.
- Tools to engage low-income and minority populations early and often so decision makers and users can better understand the value of trade-offs when considering travel reliability, costs, and time.
- Tools to offset impacts on low-income and minority populations.

While there can be several approaches to analyze environmental justice impacts based on project needs and legislative requirements, a good analysis should aim to include the following components:

- 1) ***Identification of target populations:*** This would involve estimating both the size of low-income populations and where they are situated geographically. Researchers can estimate low-income populations in the study area using census or recent survey data. Geographic identification using traffic analysis zone (TAZ)-level data underlying the travel model or other Geographic Information System-based information or surveys could help ascertain where target populations live and commute to. In the absence of recent census data, several simplifying assumptions may need to be made to estimate target populations; however, this is a crucial step not just for determining impacts but also for informing appropriate mitigation strategies. Some of the data sources used in the examples explored in this paper include census data, survey data (such as license-plate surveys), origin-destination data by TAZ, and Bureau of Economic Analysis data, among others. This step may also involve analyzing national, regional, and local indicators that define “low income” based on income thresholds.
- 2) ***Analysis of impacts to target populations:*** Depending upon available resources, the type of evaluation approach used could range from a sketch-level analysis of the effects of priced managed lanes on low-income households to detailed modeling aimed at evaluating behavioral responses and travel choice outcomes of various tolling levels on target populations.

- a) *A sketch-level analysis* of the impacts tolling has on low-income households would estimate, for instance, the impact of proposed tolling schemes on an average low-income household's income in percentage terms. It would also involve conducting stated preference surveys. Such an analysis would be high-level and may not be suitable for estimating behavioral responses of low-income commuters or effectively informing mitigation strategies.
 - b) *A detailed analysis* may involve using a travel demand model or a proprietary economic model to test varying values of time for low-income populations. Such a method could also help to estimate response of target populations to specific tolling policies and mitigation measures.
- 3) ***Analysis of other limitations of target populations:*** Surveys or other methods of data collection could be employed to find other limitations of low-income populations, such as lack of access to credit card and banking facilities. These limitations could impact market penetration of transponders and adversely affect low-income populations.
 - 4) ***Proposals for mitigation of adverse impacts on target populations:*** Based on the results of the analysis of impacts, agencies should consider measures for mitigation of any identified adverse impacts of tolling. Some of these measures are described in Section B below. A quantitative evaluation of the impact of the proposed measures can be conducted using the tools described in item 2 above.
 - 5) ***Performance measurement of low-income schemes:*** For any mitigation proposals that may be implemented, performance measures should be put in place to ascertain if they are providing the intended benefits to target populations. These could range from simply tracking low-income subscribers of transponders to detailed data collection of transponder usage by income class. This would enable agencies to evaluate mitigation strategies and make appropriate adjustments in the future.

POTENTIAL IMPACTS OF PRICED-MANAGED LANES ON LOW-INCOME POPULATIONS AND MITIGATION MEASURES

Agencies looking to implement priced-managed lanes need to be cognizant about both the potential for genuine adverse impacts on low-income populations as well as the gap in public education leading to a rejection of road pricing as inherently inequitable. As such, the outreach and public education campaigns should outline the potential benefits of priced-managed lanes to low-income populations and demonstrate an understanding of potential dis-benefits. The following can help inform both a public outreach scheme as well as mitigation strategies in this regard:

- Priced-managed lanes and tolling can benefit all drivers, including low-income drivers, by reducing congestion in general-purpose lanes and by providing an enhanced service alternative to all in exigent situations where reaching the destination on time is critical:

- Providing the same or more non-toll capacity as that existing at the start of the project ensures improvement in service levels for all commuters, regardless of income.
 - In the case of express toll lanes being added to existing capacity, speeds in non-toll lanes are often improved as drivers elect to pay tolls and enter express lanes.
 - Often, when value-of-time estimates are used for economic analysis, they do not reflect the instantaneous value of time for any person. Studies have shown that, under specific circumstances (e.g., when running late for work or for pick-up at a day care), a low-income person may exhibit a substantially higher value of time and, thus, choose to pay a toll and purchase a superior level of service. Priced-managed lanes provide this option.
- Priced-managed lane programs can be designed to reward transit use through toll exemption for transit or programs that provide toll credit incentives for transit use. Toll exemption for transit on express lanes, for instance, enhances the reliability of transit service by enabling operation under less-congested conditions. This, in turn, benefits low-income commuters, who are likely to be a high proportion of transit users. Strategies that reward transit use by giving toll credits can serve the dual purpose of incentivizing transit use and providing much-needed relief to low-income users by reducing out-of-pocket costs on the occasions when they need to use a tolled facility. The Los Angeles County Metropolitan Transportation Authority (LA Metro) toll credit approach provides a good model for such a scheme.
 - Priced-managed lane programs can be designed to be easier for low-income persons to transition to by making toll payment and transponder procurement accessible to those without credit cards or bank accounts. The Central Texas Regional Mobility Authority practice of waiving transponder fees based on income threshold and providing significant time for paying a toll bill without incurring additional fines makes the benefits of tolling more accessible to low-income users.
 - Priced-managed lane programs can be designed such that toll revenues are invested into transportation improvements in impacted communities towards the goal of enhancing multimodal mobility in the study area or region. By investing toll revenues back into the community for public-benefit projects that enhance mobility, several objectives can be achieved: not only does it provide a model for clear and transparent use of toll revenue proceeds, it can also help achieve regional multimodal mobility goals. LA Metro's Net Toll Revenue Reinvestment Grant Program is an example of such an arrangement.
 - Priced-managed lanes can provide enhanced service for public service vehicles (police cars, ambulances, and fire trucks) that benefit all regardless of income category.

V. ADDITIONAL RESOURCES

1. FHWA, Environmental Justice and Tolling: A Review of Tolling and Potential Impacts to Environmental Justice Populations, December, 2016. Available at: https://www.fhwa.dot.gov/environment/environmental_justice/publications/ej_and_tolling/ej_andtolling.pdf
2. FHWA, Guidebook for State, Regional and Local Governments on Addressing Potential Equity Impacts of Road Pricing, April, 2013. Available at: <http://ops.fhwa.dot.gov/publications/fhwahop13033/fhwahop13033.pdf>
3. FHWA, Environmental Justice Emerging Trends and Best Practices Guidebook, Washington, D.C., November, 2011. Available at: http://www.fhwa.dot.gov/environment/environmental_justice/publications/guidebook_2011/
4. FHWA, Frequently Asked Questions (FAQ) on Environmental Justice. Available at: http://www.fhwa.dot.gov/environment/environmental_justice/faq/index.cfm
5. HHS Poverty, U.S. Federal Poverty Guidelines Used to Determine Financial Eligibility for some Federal Programs, January, 2016. Available at: <https://aspe.hhs.gov/poverty-guidelines>
6. FHWA, Urban Partnership Agreement Low-Income Equity Concerns of U.S. Road Pricing Initiatives. Available at: <http://www.ops.fhwa.dot.gov/congestionpricing/resources/lwincequityrpi/>



U.S. Department of Transportation
Federal Highway Administration

U.S. Department of Transportation
Federal Highway Administration
Office of Operations
1200 New Jersey Avenue, SE
Washington, DC 20590
www.ops.fhwa.dot.gov

FHWA-HOP-17-019

March 2017