

Supplemental Material Agenda Item No. 36

Board of Directors Meeting

November 6, 2013
10:30 am

Location:
San Bernardino Associated Government
Santa Fe Depot – SANBAG Lobby 1st Floor
1170 W. 3rd Street
San Bernardino, CA

DISCUSSION CALENDAR

Project Delivery

36. I-10 and I-15 Corridor Improvement Projects – Update

1. Receive the I-10 and I-15 Corridor Improvement Projects Equity Study final report.
2. Receive other information on the I-10 and I-15 Corridor Improvement Projects.
Garry Cohoe

The Equity Assessment Report for I-10 and I-15 in San Bernardino County is being provided as Supplemental Material for Agenda Item No. 32.

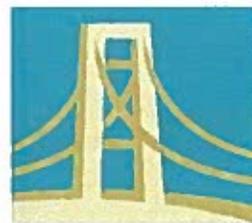
Equity Assessment Report for I-10 and I-15 in San Bernardino County

Prepared for:

San Bernardino Associated Governments (SANBAG)
1170 W. 3rd Street, 2nd Floor
San Bernardino, CA 92410

Prepared by:

Network Public Affairs, LLC
444 West Ocean Blvd., Suite 800
Long Beach, CA 90802



Network Public Affairs

FINAL November 5, 2013

Acknowledgments

The work presented in this report would not have been possible without the collaboration and contributions of the following project team members: Garry Cohoe and Chad Costello, SANBAG; David Speirs, John Meier, Neal Denno, Sean Noonan, and Phil Armstrong, Parsons; Cissy Kulakowski, CDM Smith; Julie Vandermost, VCS Environmental; Jason Lombard and Annette Cortez, Lee Andrews Group; Craig Hoshijima, Public Financial Management. Members of the East Valley, High Desert, and West Valley Corridor Advisory Groups also provided valuable comments.

The work was also improved through the comments of several local and regional stakeholders who agreed to be informally interviewed for this assessment. They are identified in Section III of the report.

I am also grateful to the following peer reviewers, who provided comments on an earlier draft of this report: Norm King (formerly with SANBAG); Ty Schuiling (formerly with SANBAG); Robert Poole, Reason Foundation; Martin Wachs, RAND and UCLA.

Contents

Executive Summary	5
I. Introduction and Background.....	7
II. Literature Review	8
III. Equity Assessment Methodology	9
a. Stakeholder and Expert Interviews.....	10
Stakeholders Interviewed.....	10
Experts Interviewed	10
IV. Equity Assessment.....	11
a. Who Is Affected: Poverty Data for San Bernardino County.....	12
b. Who Makes Direct Payments?.....	18
c. Benefits and Impacts for Low-Income Travelers.....	20
Congestion Relief.....	20
Option to Use Express Lanes.....	23
Transit and Travel Alternatives.....	27
Transponder Issues.....	30
V. Synthesis and Conclusions	31
Synthesis	34
VI. Recommendations	34
a. Definition of “Low-income”	35
b. Suggested Performance Measures.....	35
Appendix A. Literature Review Results.....	37

List of Tables

Table 1. Concepts of Equity – reproduced from TRB Special Report 303, 2011.....11

Table 2. Summary Comparison of Corridor Travel Time and Speed in I-10 General Purpose Lanes with and without Express Lanes and HOV*22

Table 3. Summary Comparison of Corridor Travel Time and Speed in I-15 General Purpose Lanes with and without Express Lanes**23

Table 4. Projected Toll Levels and Implied Value of Time Savings for I-10 Corridor.....25

Table 5. Projected Toll Levels and Implied Value of Time Savings for I-15 Corridor.....25

List of Figures

Figure 1. Levels of Poverty in San Bernardino County by Transportation Analysis Zone 12

Figure 2. Levels of Poverty in the I-15 Corridor, San Bernardino County, by Transportation Analysis Zone 13

Figure 3. Levels of Poverty in the I-10 Corridor, San Bernardino County, by Transportation Analysis Zone 14

Figure 4. Income Distribution Chart 15

Figure 5. Median Household Income in the I-10 Corridor by Transportation Analysis Zone..... 15

Figure 6. Median Household Income in the I-15 Corridor by Transportation Analysis Zone..... 16

Figure 7. Income Distribution of Stated Preference Survey Respondents by Trip Type 17

Figure 8. Major Sources of Construction Funding for I-10 Express Lanes Project..... 19

Figure 9. Major Sources of Construction Funding for I-15 Express Lanes Project.....20

Figure 10. Planned Bus Rapid Transit Corridors in San Bernardino County28

Executive Summary

The San Bernardino Associated Governments (SANBAG), in its role as the County Transportation Commission for San Bernardino County, is considering the implementation of express lanes, also known as high-occupancy/toll (HOT) lanes, on the I-10 and I-15 corridors in the County, primarily through the addition of new capacity. Express lanes allow solo drivers to pay a toll to access the carpool lanes, while qualifying carpools continue to use the lanes for free. As with many proposals for new roadway pricing, concerns have been expressed that the express lanes may be unfair for low-income travelers.

This equity assessment is intended to address that question. Its goals are to determine if the proposed I-10 and I-15 express lanes would benefit or adversely affect low-income travelers, and, if the impacts are adverse, to recommend measures to SANBAG to address those impacts.

The structure of the equity assessment was guided by a comprehensive report published in 2011 by the Transportation Research Board (TRB) entitled “Equity of Evolving Transportation Finance Mechanisms.” This report includes a set of questions that policy makers should ask when considering a new transportation finance policy such as express lanes. In brief form, these questions are:

- Who is affected by the project?
- Who makes direct payments, and how are revenues spent?
- What are the benefits and impacts of the project (for low-income drivers)?
- What travel alternatives are available (if needed)?

Network Public Affairs (NPA) used several sources of information to conduct the assessment. Published literature and studies on the equity of express (HOT) lanes and other tolling schemes were reviewed. NPA reviewed data on poverty levels and household income for the affected areas, and examined the project finance plans to identify what portion of the funds would come from tolls and taxes. NPA compared travel modeling data on speeds and travel times in the general purpose lanes for different project alternatives. Projected toll amounts were compared with the value of time savings that might be expected for a low-income person to see if a low-income driver might find the lanes attractive to use. NPA also consulted six nationally recognized experts on tolling and equity and interviewed thirteen local stakeholders to help guide the analysis.

Overall, the assessment found that the express lanes are projected to have several benefits for low-income drivers. Notably, the travel modeling indicated that travel times in the general purpose lanes will be faster on both I-10 and I-15 if express lanes are implemented, as compared with other project alternatives. Put another way, drivers using the free lanes would be better off if the express lanes were implemented than if they were not. Also, the express lanes provide a new travel option for low-income (and other) drivers, which they do not enjoy today. Analysis of potential toll levels indicated that there could be times when a low-income driver would find the express lane time savings attractive.

Low-income drivers might find toll account requirements burdensome, particularly account maintenance fees that can drain an account even if the driver uses the express lane infrequently (as is likely for a low-income person). If SANBAG were to implement video license plate recognition as a toll collection method, this could provide an alternative to transponders. Other policies could be adopted to mitigate concerns that low-income people could lack credit cards or checking accounts.

The express lanes may not improve mobility for low-income drivers who may have limitations on driving. There are limited transit alternatives to the Express Lane corridors, including Metrolink along I-10 (but not along I-15), a limited amount of planned express bus service, and local bus service; and a subsidized vanpool program now limited to the Victor Valley area.

Equity concerns also relate to who pays for the facility as compared with who benefits, and how toll revenues will be used. A key research study on SR-91 found that tolls, which are paid by users for the direct benefit of an uncongested trip, are even more equitable than sales taxes, which have found broad support in San Bernardino County. The I-10 and I-15 projects will be funded by a combination of toll revenues, sales tax revenues, and gas tax revenues. Eventually, toll revenues could become the primary source of project funding, meaning that the project funding would become more equitable over time.

Based on these findings, the assessment concludes with a series of five recommendations, as follows:

- 1) Consider adopting a policy to waive account maintenance fees for low-income households. This would assure that even if a low-income driver were an infrequent user of the Express Lanes, he would not see his account balance dwindle to zero with no actual benefit.
- 2) Consider adopting policies that allow the use of cash to open and replenish toll accounts. This would address the difficulties of low-income drivers who could lack either a credit card or a bank account.
- 3) Investigate implementation of video license plate recognition as an alternative toll-collection technology. This option could eliminate the need for a low-income household to pay a transponder deposit.
- 4) Consider presenting the proposed I-10 and I-15 Express Lanes as an element of a package of mobility options that also includes plans to enhance vanpool service and explore the provision of additional parallel transit services via express bus, BRT, or rail, including the potential for express bus service within the Express Lanes.
- 5) Continue to conduct outreach activities targeted to low-income residents during the planning, design, and implementation process for these corridors, regardless of which alternative is chosen.

I. Introduction and Background

The San Bernardino Associated Governments (SANBAG), in its role as the County Transportation Commission for San Bernardino County, is considering the implementation of high-occupancy/toll (HOT) lanes on the I-10 and I-15 corridors in the County. HOT lanes, also known as express lanes, allow solo drivers to pay a toll to access the carpool lanes, while qualifying carpools continue to use the lanes for free. Many transportation agencies across the nation and the globe are considering or implementing roadway charging, which can help manage travel demand and provide a new source of funding. This is becoming especially important as traditional sources of highway funding, including gas taxes and sales taxes, fail to keep pace with demand for capacity and infrastructure.

The San Bernardino Express Lane project would add new lanes on both corridors and convert an existing 8-mile carpool lane at the western end of I-10 for a total of two express lanes along most of the length of each corridor. If implemented, these would be the first tolled lanes in San Bernardino County. When new roadway charges are imposed, the public and elected representatives are often concerned about the potential impacts on low-income residents. These concerns have been expressed with regard to the project proposed by SANBAG, which retained Network Public Affairs to conduct an equity assessment of the project's impact on low-income travelers.

NPA used a combination of methods to assess this question. The first step was a review of current literature on roadway tolling in general and express (HOT) lanes in particular. Much of the current research and thinking on this topic was collated and synthesized in a 2011 report by the Transportation Research Board (TRB), known as Special Report 303. This report contains a set of questions that policy makers should ask about the equity of roadway pricing proposals, and it was this set of questions that guided the SANBAG equity assessment.

In brief, the questions are these:

- Who is affected by the project?
- Who makes direct payments, and how are revenues spent?
- What are the benefits and impacts of the project (for low-income drivers)?
- What travel alternatives are available (if needed)?

To answer these questions, NPA examined project-specific data, such as travel demand modeling results that projected whether drivers in the non-tolled lanes would experience less congestion as other drivers chose to use the express lanes. NPA also looked at the value of time, an economic concept that helps to indicate whether drivers would choose to use a tolled lane. In addition, NPA conducted targeted interviews with stakeholders and leaders in San Bernardino County, as well as with nationally recognized experts on tolling and roadway charging. These interviews helped guide the assessment so that it could respond to local concerns using a credible approach.

II. Literature Review

Because the field of equity in tolling is relatively new and developing quickly, NPA reviewed published literature on the subject. This was done to ensure that the SANBAG equity assessment would be based on the latest scholarship and thinking. Express (HOT) lanes have been implemented primarily within the U.S., although NPA extended the literature search internationally to ensure that a broad range of issues relevant to equity were identified.

This section gives an overview of the most relevant papers and reports relating to the equity of express lanes. More extensive summaries of these papers and reports are provided in Appendix A.

Express (or HOT) lanes are the most commonly implemented form of roadway pricing in the United States. Even so, the equity implications of express lane implementations have been inconsistently studied. Moreover, some projects have added to capacity while others have converted existing high-occupancy (carpool) lanes, a distinction that is not always accounted for when assessing actual impacts on congestion or on groups of users or non-users.

The literature – whether theoretical or based on evaluations of actual experience – indicates that, compared to other types of roadway pricing, express lanes generate fewer equity concerns. This is generally because the lanes are optional – drivers, regardless of income level, still have the choice to use untolled lanes. However, the express lanes give them an option they did not have before, which may lead to the finding that supporters and users of these lanes come from all income groups from low to high. Still, high-income drivers are more likely to choose the express lanes, while low-income drivers are more likely to remain in general-purpose lanes.

The literature indicates that projects that increase travel choices are generally beneficial to low-income residents. Surveys of express lane implementation also tend to find that early equity concerns diminish with actual experience. This may be because users generally see that congestion in general-purpose (untolled) lanes is reduced once the express lanes are implemented.

The use of revenues is a critical question in the literature on express lanes. If revenues are spent in ways that benefit low-income travelers, this would reduce equity concerns compared to use of the funds in a way that could benefit all drivers equally. Key papers also examine the regressivity of various kinds of transportation finance methods and find that tolls, as a user fee, are more equitable (if still potentially regressive) than gasoline or sales taxes, which are the primary current sources of roadway funding in the U.S.

On the matter of political acceptability, research on actual and attempted road charging implementations indicates that it is best to study questions of equity early in the planning process. Moreover, clear explanation of the proposed charging plan is important to ensure good public understanding, and can help to build support.

Overall, express lanes are not a “strong” pricing mechanism and do not generate a great deal of revenue compared to other methods. However, there is some evidence that they provide effective

congestion relief with relatively low social cost. One paper concludes that express lanes meet the “Do No Harm” criterion, which can be important to a finding of equity.¹

III. Equity Assessment Methodology

TRB Special Report 303, “Equity of Evolving Transportation Finance Mechanisms,” was published in 2011 and overseen by a committee composed of a dozen noted nationwide experts on the topic. The publisher, the Transportation Research Board, is the premier transportation research body in the United States and is part of the National Academies of Sciences and Engineering and the Institutes of Medicine. The report includes an extensive section on equity assessment in the context of other factors that policy makers may consider, such as efficiency. The section concludes with a list of important questions for decision makers to ask concerning any new transportation finance policy, such as charging tolls for express lane access. It is these questions (which were presented in condensed form in Section I, Introduction) that formed the basis for the methodology of the SANBAG equity assessment. The full list of questions as they appeared in Special Report 303 is given in Appendix A under the report summary.

The methodology for the equity assessment included the following steps:

- Review published literature and reports on equity of HOT lanes and similar priced roadways to ensure that relevant issues were identified and addressed.
- Obtain, map, and summarize detailed information on income and poverty levels in San Bernardino County and the two project corridors, I-10 and I-15.
- Review the potential definition of “low-income” and make a recommendation for use by policy makers.
- Review project finance plans to understand who will be expected to pay for the use of the new lanes and how revenues will be dedicated.
- Examine travel demand modeling results to compare projected travel conditions in the untolled (general purpose) lanes between the scenarios with no new construction, with HOV (free) lanes, and with express lanes.
- Estimate the value of time (an economic concept used in tolling studies) for low-income drivers and compare it with projected toll rates.
- Explore travel alternatives or choices available to low-income travelers in the I-10 and I-15 corridors.

The information gained from each of these steps was used to formulate answers to the key questions summarized in the Introduction.

¹ Altshuler, A., Equity, Pricing, and Surface Transportation Politics, 2010. Paper prepared for the Committee on the Equity Implications of Evolving Transportation Finance Mechanisms, Transportation Research Board.

a. Stakeholder and Expert Interviews

To provide context and guidance for this methodology, two groups of interviews were conducted. Local stakeholders were interviewed, including business leaders, elected officials, academics and planners, to identify relevant issues and help guide the analysis. In addition, NPA consulted nationally recognized experts to ensure that the methodology was sound and to request a peer review for the work. A list of these interviews is provided below.

Stakeholders Interviewed

The following San Bernardino County-based stakeholders were interviewed by Network Public Affairs for this assessment. These interviewees were selected on the basis of recommendations by SANBAG, NPA, and other interviewees. They were not intended to be exhaustive or representative, but instead to provide local insight into issues of possible concern from an equity standpoint.

Carole Beswick	Inland Action
Paul Granillo	Executive Director, Inland Empire Economic Partnership
John Husing	Consultant, Economics & Politics, Inc.
Norm King	Former Executive Director, SANBAG
Rich Macias	Director of Transportation Planning, SCAG; former planning commissioner, Rancho Cucamonga
Gloria Macias Harrison	San Bernardino Community College District Board of Trustees
Gary Madden	Director, 2-1-1 San Bernardino
Vici Nagel	Academy GO (Grassroots Organizations)
Deborah Robertson	Mayor, City of Rialto; SANBAG Board member; SCAG Regional Council member
Arnold San Miguel	Regional Affairs Officer for Inland Empire, SCAG
Ty Schuiling	Former Director of Planning, SANBAG
Acquanetta Warren	Mayor, City of Fontana
Denny Zane	Executive Director, Move LA (former Colton resident)

These stakeholders were asked questions including what equity concerns they thought were raised by the proposed express lanes; what effect the express lanes could have on business; and what measures they would recommend to address any negative impacts they identified.

Experts Interviewed

The following academic and consultant experts on equity and roadway pricing were consulted in regard to this study:

Jim Moore	USC Price School of Public Policy
Jack Opiola	D'Artagnan Consulting LLP
Robert Poole	Reason Foundation

Ken Small	University of California, Irvine
Brian Taylor	UCLA
Martin Wachs	RAND Corp. and UCLA

IV. Equity Assessment

Equity, or fairness, can be defined in different ways. TRB Special Report 303 offers a useful summary of concepts of equity related to transportation provision (see Table 1).

Table 1. Concepts of Equity – reproduced from TRB Special Report 303, 2011

Type of Equity	Simple Definition	Transportation Example
Benefits received	I get what I pay for.	People who use a facility the most pay the most.
Ability to pay	I pay more because I have more money.	A project is financed through a progressive tax that is disproportionately paid by higher income people.
Return to source	We get back what we put in.	Transit investment in each county is matched to that county's share of metropolitan tax revenues used for transit.
Costs imposed	I pay for the burden I impose on others.	Extra expense required to provide express bus service for suburb-to-city commuters is recovered through fares on this service.
Process (or participation)	I had a voice when the decision was made.	Public outreach regarding proposed new high-occupancy toll lanes provides transparent information and seeks to involve all affected parties in public hearings and workshops.

Source: TRB Special Report 303, Equity of Evolving Transportation Finance Mechanisms, 2011, Table 3-1.

Given the concerns expressed by SANBAG, the focus of this equity assessment was to explore benefits that may be received by low-income drivers (i.e., the first entry in Table 1), as well as ways in which they could be worse off with implementation of the proposed express lanes. Accordingly, the sections below describe the analysis and findings resulting from each of the following elements of the equity assessment:

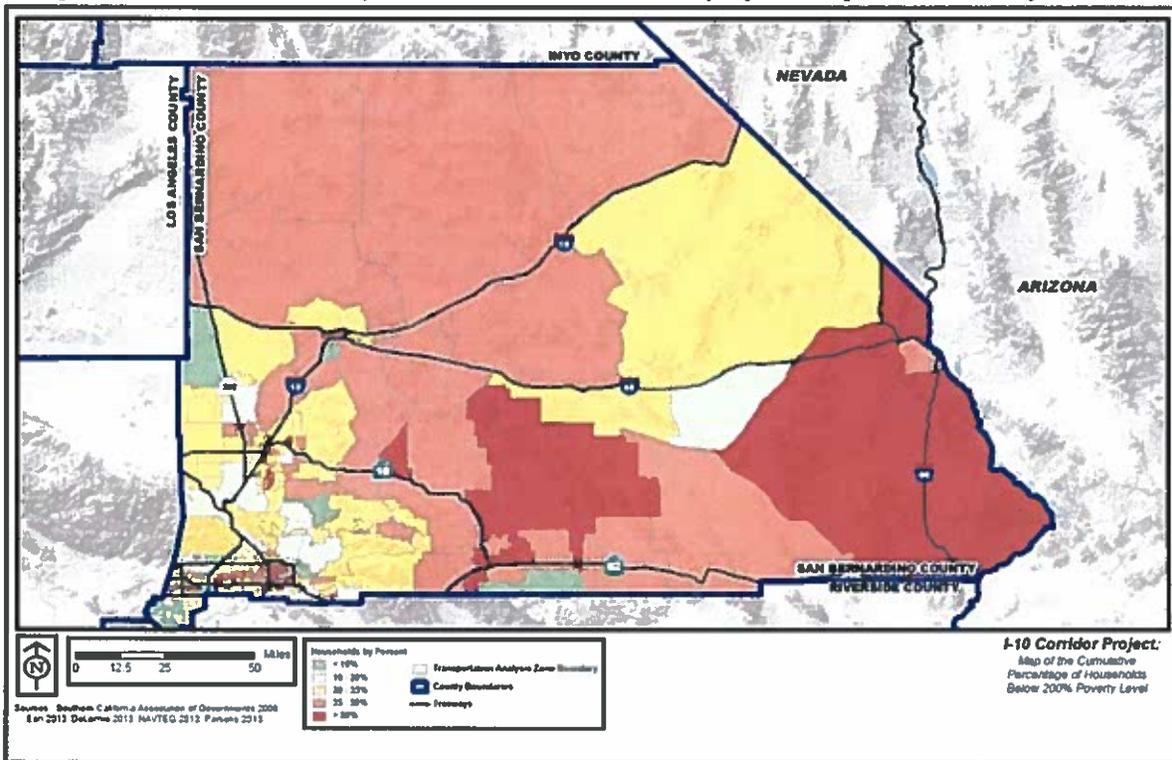
- Poverty data summary
- Project finance plans
- Value of time
- Time savings in general purpose lanes
- Transponder issues
- Travel alternatives (transit service).

a. Who Is Affected: Poverty Data for San Bernardino County

The Southern California Association of Governments (SCAG), the regional transportation planning agency, develops a detailed demographic data set for each four-year regional planning cycle. In particular, SCAG develops household income data by quintile (fifth) and data for poverty levels (relative to the federal poverty threshold) for Transportation Analysis Zones (TAZ). These geographic units are similar to census tracts, though not identical. NPA obtained this data set for San Bernardino County for 2008, and worked with Parsons to map the data for the full county, as well as for the I-10 and I-15 corridors.

In keeping with the equity assessment scope, NPA focused on identifying the low-income populations in San Bernardino County as well as along the I-10 and I-15 corridors (see Figures 1, 2, and 3). For each corridor, a study area was determined in collaboration with the project team so that demographics could be compared. The study areas for each corridor are as indicated by the map extent in Figures 2 (I-15 corridor) and 3 (I-10 corridor).

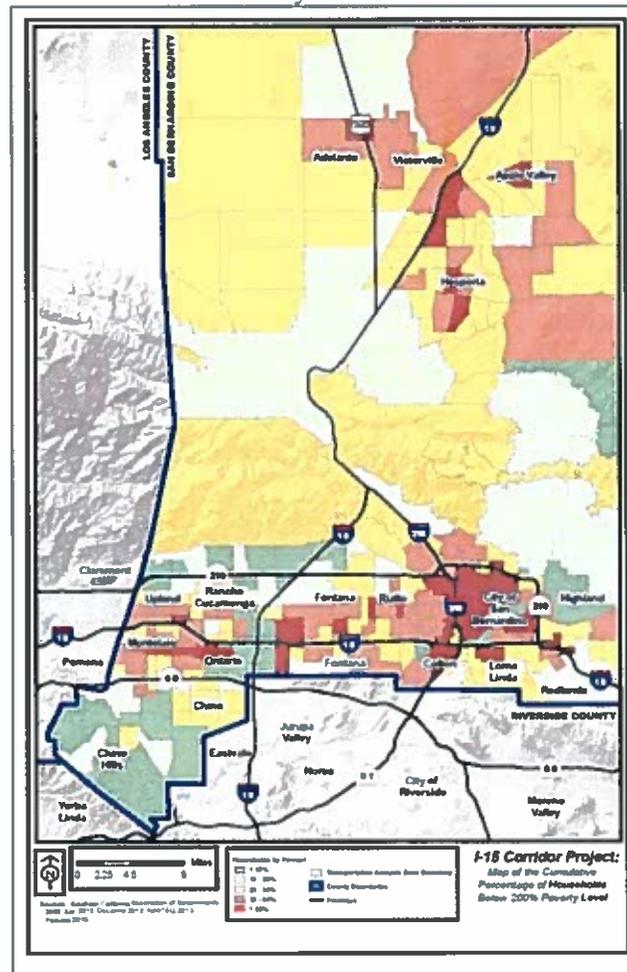
Figure 1. Levels of Poverty in San Bernardino County by Transportation Analysis Zone



The criterion mapped in Figures 1, 2, and 3 is the percentage of households in each TAZ with household income below 200% of the federal poverty level. This threshold is sometimes used in equity and environmental justice analyses in recognition of the relatively high cost of living (especially housing and transportation) in Southern California.

The figures show that there is great diversity in levels of poverty throughout the County and the I-10 and I-15 corridors. The southwest areas of the County are generally the most prosperous; the high desert has a concentration of poorer residents; and along the I-10 corridor, there are many areas of relatively high poverty including the western portion, the center, and the San Bernardino area. Percentages of households below 200% of poverty level range as high as 78% (San Bernardino City area). Several TAZ's are in the 60%-70% range, and many of those are in and near the City of San Bernardino. Another TAZ with nearly 64% of households in poverty is located in Adelanto.² In all, seven TAZ's exceeding 50% are located in the High Desert.

Figure 2. Levels of Poverty in the I-15 Corridor, San Bernardino County, by Transportation Analysis Zone

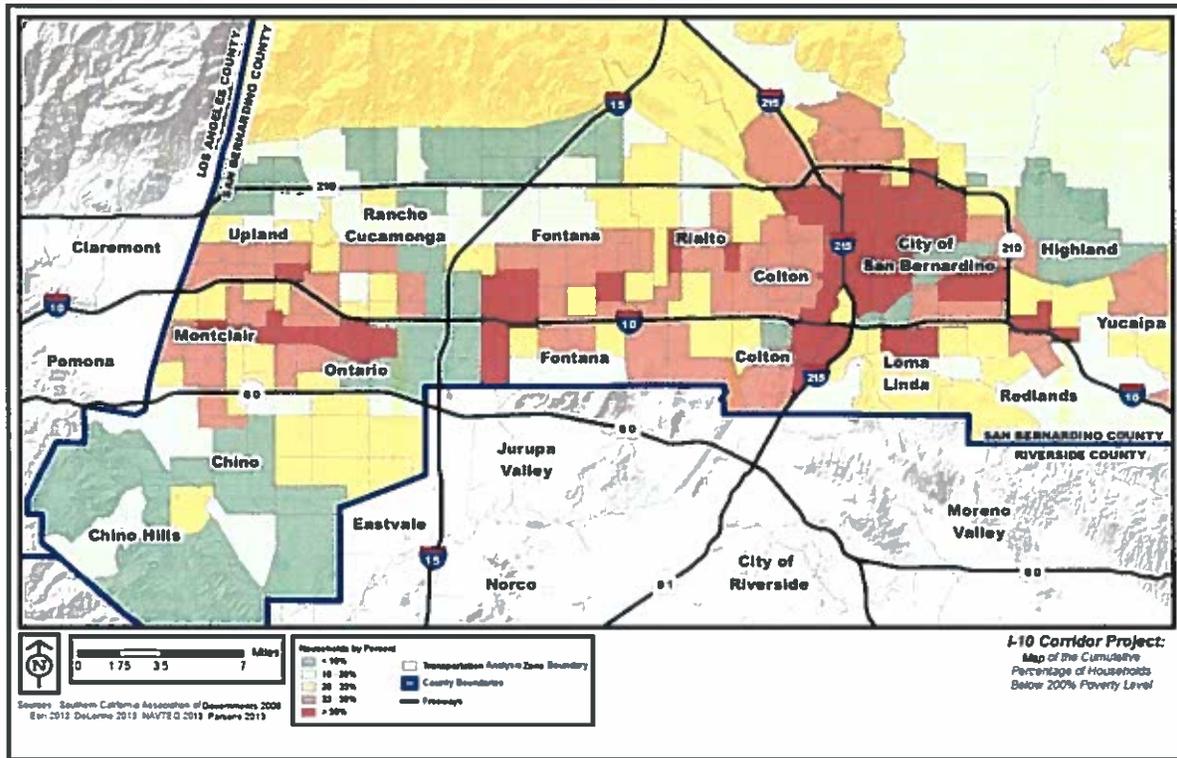


Another measure of relative levels of poverty is the income distribution of households by quintiles (fifths). SCAG's data set includes this measure, which NPA summarized for the County and the two project corridors (see Figure 4). The income distribution for the County as a whole is slightly

² Three TAZ's have higher rates of poverty, up to 100% in some cases, but they have fewer than 20 households.

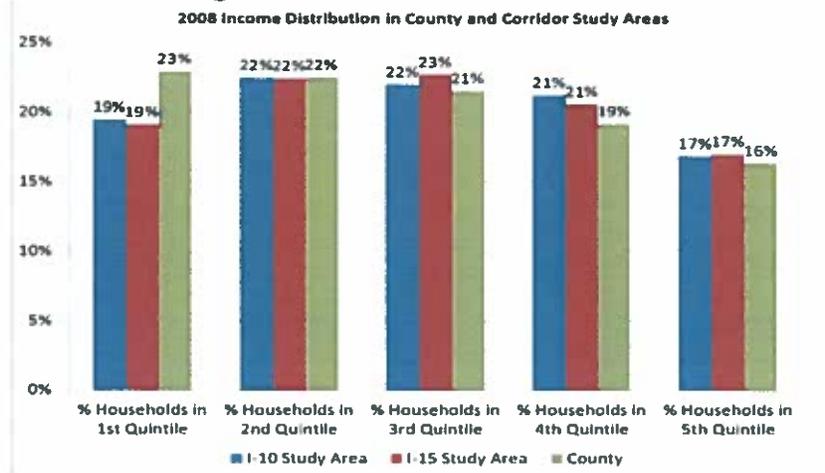
more skewed towards the lower income categories (quintiles 1 and 2) than the distribution for either of the two project corridors. The income distributions are very similar between the two corridors.

Figure 3. Levels of Poverty in the I-10 Corridor, San Bernardino County, by Transportation Analysis Zone



NPA also obtained and worked with Parsons to map median household income data for 2008 provided by SCAG (see Figures 5 and 6 for the I-10 and I-15 corridor areas, respectively). Median household income for TAZ in the study area ranges from a low of \$12,978 (for a zone in the City of San Bernardino) to a high of \$113,254 (for a zone in the Rancho Cucamonga area). This range highlights the demographic and economic diversity of San Bernardino County residents.

Figure 4. Income Distribution Chart



Source: Southern California Association of Governments 2012; data summarized by NPA.

Figure 5. Median Household Income in the I-10 Corridor by Transportation Analysis Zone

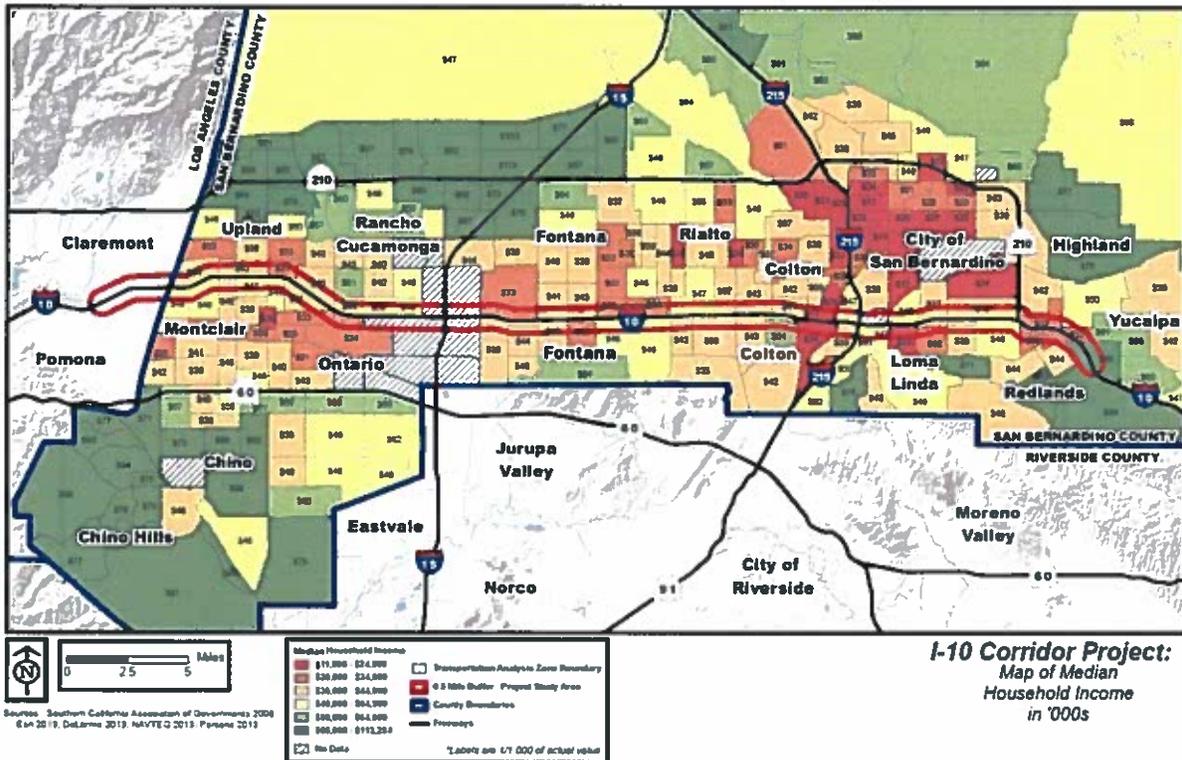
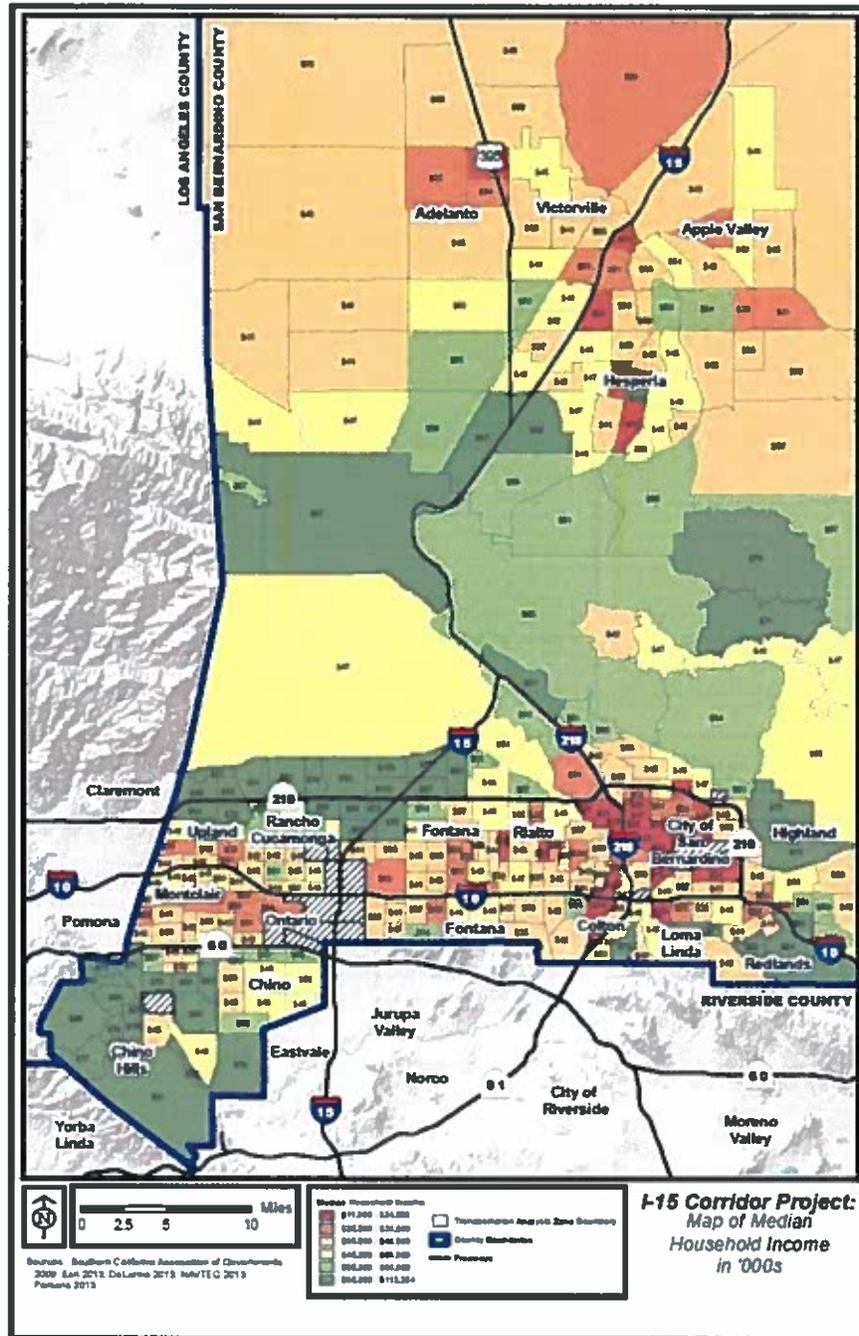


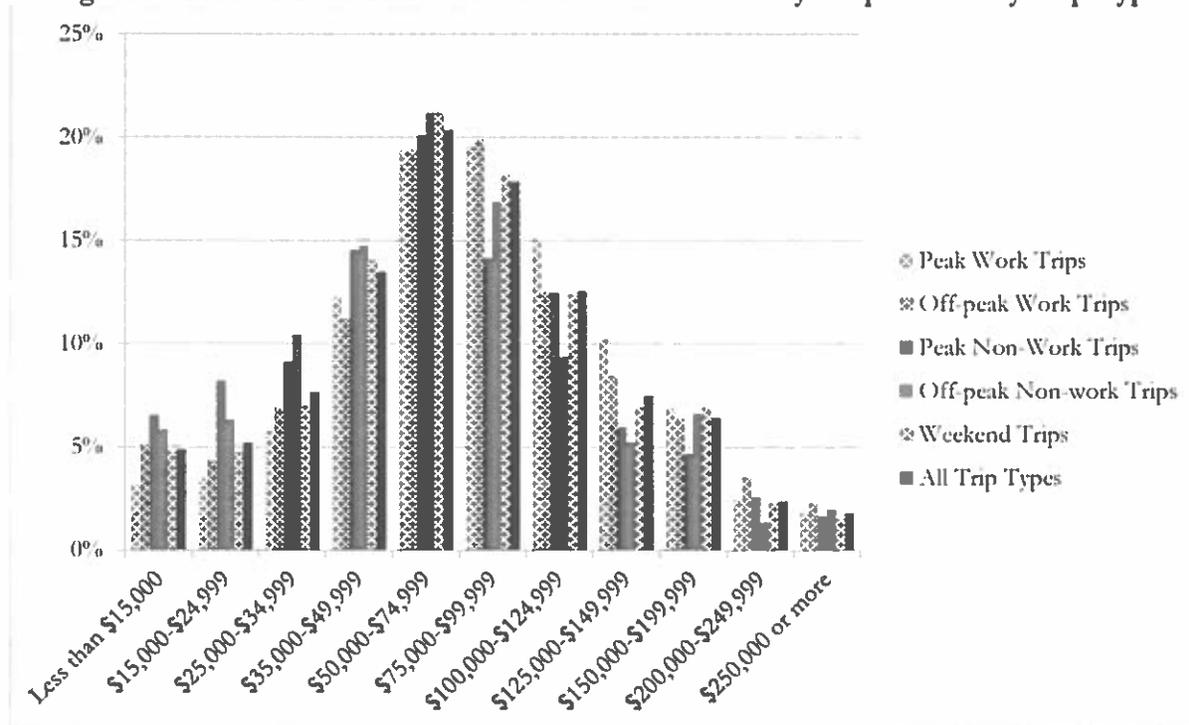
Figure 6. Median Household Income in the I-15 Corridor by Transportation Analysis Zone



It is important to note that the demographic profile of corridor residents likely differs from the profile of those who travel on the corridors or those who might use the Express Lanes. Many residents of the corridor areas may not often use the Interstates, while residents who commute to jobs tend to have higher incomes.

The stated preference survey conducted by Resource Systems Group (RSG), Inc., in 2012 reached over 3,400 users of the I-10 and I-15 corridors by a variety of methods.³ The results showed that, as might be expected, the household income for those making work trips is skewed more towards the higher income categories than incomes for those making non-work trips (see Figure 7). The median income for those making work-related trips, whether peak or off-peak, falls within the range of \$75,000-\$99,999, while the median income for all others, including non-work and weekend trips, falls within the range of \$50,000-\$74,999, according to these data.

Figure 7. Income Distribution of Stated Preference Survey Respondents by Trip Type



Source: Data from SANBAG I-10/I-15 Express Lanes Travel Study Report, RSG, Inc., October 2012, Appendix B; charted by NPA.

If SANBAG were to adopt an equity policy or program similar to that adopted by the Los Angeles County MTA for its LA County express lanes,⁴ the qualifying income threshold would be closest to the stated preference survey’s \$35,000 category boundary. For all trip types on the two corridors, 18% of households would fall below \$35,000 in household income. For peak work trips, the percentage would be smallest (12%) and for peak non-work trips it would be the largest (24%).

³ SANBAG I-10/I-15 Express Lanes Travel Study Report, RSG, Inc., prepared for CDM Smith, October 2012.

⁴ Los Angeles County Metropolitan Transportation Authority, Metro ExpressLanes Equity Plan, https://www.metroexpresslanes.net/en/about/ExpressLanes_Factsheet_Toll_Credit_Program.pdf.

b. Who Makes Direct Payments?

One of the research papers that is most relevant to the question of express lane equity examined financing on State Route 91 in Orange County, California.⁵ This paper, whose short title is “Just pricing,” makes the point that when considering whether charging for road use is fair, policy makers should ask, compared to what alternatives? The paper points out that most of the options for funding roadway infrastructure, including tolls and taxes, are regressive: they take a greater share of income from a low-income person or household than from a high-income person or household. “Thus, the relevant question is not whether congestion pricing is regressive in the abstract, but whether pricing methods are more or less regressive than other means of paying for transport infrastructure and maintenance.”

The paper examined a hypothetical situation in which sales tax revenues would be used instead of toll revenues to cover one year’s worth of operating and debt service expenses for SR-91 (about \$34 million). The study concluded that the effect would be to transfer over \$3 million from the lowest income category (median \$7,126) to three middle income categories (medians \$22,221, \$40,902, and \$67,427, respectively), and also to transfer over \$4 million from the highest income category (median \$180,830) to those same middle-income categories. The study found that infrequent users, and non-users, of the express lanes would stand to lose the most in this hypothetical switch from toll financing to sales tax financing.

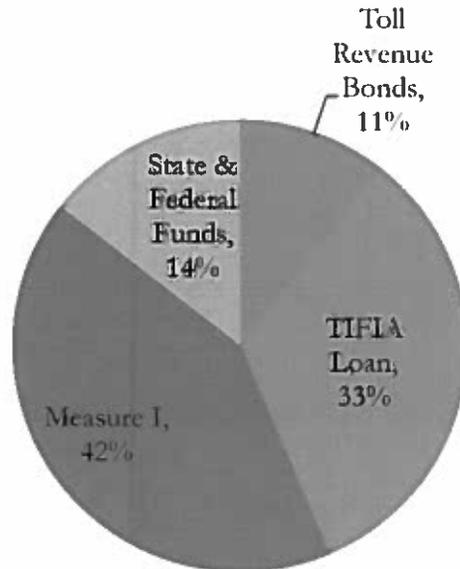
The key message of this exercise is that relative to a sales tax, a toll can be considered a more equitable method of roadway finance in that the user pays directly for a benefit received: namely, an uncongested trip. A sales tax, by contrast, may be paid by non-users who never receive such a benefit. Gasoline taxes also may be paid by drivers who never use the tolled lanes, although those who pay the tax are using some road infrastructure that their contribution helped to put in place. In this sense, gasoline taxes can be seen as a user fee.

In order to determine who will ultimately pay for the proposed new lanes on I-10 and I-15, NPA referred to the project financing plan developed in 2013 by Public Financial Management (PFM), Inc.⁶ For the purposes of equity assessment, NPA looked at the major proposed sources of project funding in order to draw general conclusions (see Figures 8 and 9).

⁵ Just pricing: the distributional effects of congestion pricing and sales taxes, L. Schweitzer and B. D. Taylor, Transportation, DOI 10.1007/s11116-008-9165-9, 2008.

⁶ San Bernardino Associated Governments, I-10/I-15 Revised Base Case, P3, and Sensitivity Analysis, September 10, 2013; by Public Financial Management.

Figure 8. Major Sources of Construction Funding for I-10 Express Lanes Project



I-10: Total \$1.851 billion*

Source: PFM, I-10/I-15 Revised Base Case, P3, and Sensitivity Analysis, September 2013.

* Exclusive of operations & maintenance, which will be funded through toll revenues.

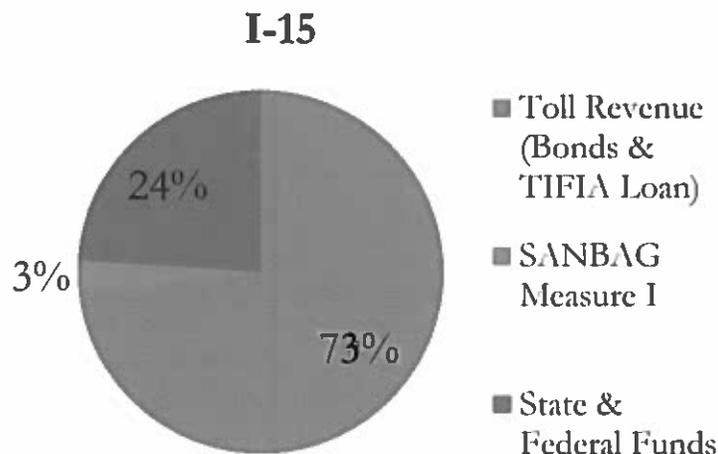
In the case of the I-10 project, two funding sources – toll revenue bonds (of two different types) and TIFIA loans – would be financed using toll revenues. These would total 44 percent of the initially planned project funding. A nearly like amount, 42 percent, is planned to come from Measure I, which is, of course, sales tax. The remaining 14 percent would be the federal and state share, which is funded by fuel taxes.

The relative shares of funding for each project were determined on the basis of how much of the costs could be financed based on the expected toll revenues and the ability to use TIFIA loans. Non-toll revenues, including Measure I and the federal and state funds, were then used to fill the remaining needs. As a result of these estimates, a larger share of the I-15 project cost would be funded by toll revenues than for I-10.

It should be noted that these charts represent the funding at the time the bonds are sold. The relative shares of funding could change over time depending on the actual toll revenues realized.

There is no goal or standard for what the relative amounts should be from different funding sources in order to be considered equitable. This summary is provided for use in answering questions about who will be paying for the projects, by what means, and what benefits they can expect to receive, which are discussed in the following sections. As discussed at the start of Section IV, Equity Assessment, this approach reflects the concerns expressed by SANBAG relative to whether low-income drivers could be left worse off by the implementation of the express lanes.

Figure 9. Major Sources of Construction Funding for I-15 Express Lanes Project



I-15 Total: \$1.872 billion*

Source: PFM, I-10/I-15 Revised Base Case, P3, and Sensitivity Analysis, September 2013.

* Exclusive of operations & maintenance, which will be funded through toll revenues.

A related question is how the toll revenues will be spent. According to PFM’s projected flow of funds, it appears that SANBAG could begin to realize surplus toll revenue within a few years of beginning revenue service. SANBAG could decide to use this revenue to reimburse sales tax contributions to the project. This choice would effectively reduce the funding contribution from sales tax and replace it with a more equitable method. Alternatively, SANBAG could choose to invest the excess toll revenue in additional projects within the corridors, which could also be an equitable use of the funds, particularly if the investments specifically benefit low-income travelers or residents. However the excess toll revenues are spent, the projections by PFM indicate that the projects will be increasingly toll-funded over time, which is a positive finding for equity.

c. Benefits and Impacts for Low-Income Travelers

Congestion Relief

One of the key reasons for roadway pricing is management of travel demand so that the throughput of the express lanes is maximized. As a result of this strategy, general purpose (untolled) lanes may also experience a decrease in congestion as paying drivers are attracted into the express lanes with the promise of an uncongested trip.

Actual operating experience with HOT lane conversion projects on I-15 in Salt Lake City, UT (beginning in 2006), and on I-95 in Miami, FL (beginning in 2008), bears out these expectations. After conversion of the HOV to express lanes in Utah on I-15, average general purpose lane speeds increased about three miles per hour, from 51 to 54 mph, and a larger percentage increase was seen

in general purpose lane speeds than was seen in Express Lane speeds.⁷ In Florida, dramatic increases were seen in untolled lane speeds: “Drivers travelling via the general purpose lanes (GPL) have also experienced a significant peak period increase in average travel speed since implementation of 95 Express – from an average of approximately 15 mph (southbound) and 20 mph (northbound) to a monthly average of 51 mph and 41 mph, respectively.”⁸

Closer to home, experience with the LA County ExpressLanes demonstration projects on I-110 and I-10 has not been so clear-cut, with media reports sometimes focusing on continued congestion in the untolled lanes.⁹ A preliminary ExpressLanes performance update report to the MTA board dated July 19, 2013, indicated that average general purpose lane speeds on I-110 were essentially unchanged from the prior year, and that average general purpose lane speeds on I-10, reported as 51.6 mph, had not yet been compared with speeds for the prior year, which were still being evaluated.¹⁰ The experience to date with the LA County lanes is confined to a period of less than a year, which could be regarded as transitional or “ramp-up” period, rather than reflective of longer-term experience.

For the proposed SANBAG express lanes, the likely effects on the general purpose lanes were examined using travel demand modeling results from the traffic and revenue study being concurrently conducted by CDM Smith. NPA was provided with model-projected corridor travel time and speed data for 2030 and 2046 for both corridors and for afternoon and evening peak hours of travel.

The results of this analysis show that drivers in the general purpose lanes are likely to experience substantial improvements in travel time and speed once the express lanes are implemented (see Tables 2 and 3 for results projected for 2030). This is an important finding for equity, since low-income drivers are more likely to remain in the untolled lanes. This finding holds true for both corridors in both 2030 and 2046, in both congested and uncongested directions of travel.

As an example, a driver in 2030 making the full through trip on I-10 general purpose lanes westbound in the morning (congested direction) could expect a 46-minute trip for the nearly 33 miles of the corridor if the express lanes are in place, vs. 110 minutes under the no-project alternative and 62 minutes if a free HOV lane were constructed. On I-15, a full through trip of about 32 miles in general purpose lanes northbound in the afternoon in 2030 is projected to take 67 minutes if the express lanes are built, but 168 minutes if they are not.

⁷ The I-15 Express Lanes Evaluation, Final Report, UTL-1106-89 (v9). P.T. Martin, I. Vladisavljevic, D. Yusufzyanova, University of Utah. November 26, 2007.

⁸ 95 Express Annual Report Covering July 1, 2009 through June 30, 2010; Project Status for Urban Partnership Agreement, Florida Department of Transportation, January 21, 2011.

⁹ “I-10 and I-110 freeway pay lanes: a tale of two commuters,” S. Scauzillo, San Gabriel Valley Tribune, July 25, 2013, <http://www.sgvtribune.com/general/news/20130726-10-and-110-freeway-pay-lanes-a-tale-of-two-commuters>; “Freeway Toll Lanes Slow Free Lanes,” KTLA Channel 5 News, April 10, 2013.

¹⁰ ExpressLanes Performance Update-Preliminary Report to Los Angeles County MTA Board from A. Leahy & S. Wiggins, July 19, 2013.

Travel demand modeling is, of course, an approximation of reality based on assumptions about demand, travel choices, land use and much more. Relevant model assumptions include that the volume of traffic demand is the same for express lane, HOV lane, and no-project alternatives. The results shown here are probably best regarded not as definitive, but as representing the relative magnitudes of general-purpose lane travel time between alternatives: that is, express lane < HOV < no-project.

Table 2. Summary Comparison of Corridor Travel Time and Speed in I-10 General Purpose Lanes with and without Express Lanes and HOV*

	General Purpose Lane Comparison - Express Lane vs No Build					
	Travel Time (min.) - 2030					
	AM Peak Hour			PM Peak Hour		
	GP Lane w/ Express Lanes	GP Lane under No Build	Travel Time Savings	GP Lane w/ Express Lanes	GP Lane under No Build	Travel Time Savings
Westbound Through Trip, total 32.82 miles	46	110	64	41	92	51
Eastbound Through Trip, total 32.95 miles	36	58	22	53	166	114
	Average Speed Difference - 2030					
Westbound Through Trip	25			27		
Eastbound Through Trip	20			26		
	General Purpose Lane Comparison - Express Lane vs HOV Lane					
	Travel Time (min.) - 2030					
	AM Peak Hour			PM Peak Hour		
	GP Lane w/ Express Lanes	GP Lane w/ HOV Lanes	Travel Time Savings	GP Lane w/ Express Lanes	GP Lane w/ HOV Lanes	Travel Time Savings
Westbound Through Trip, total 32.82 miles	46	62	16	41	52	11
Eastbound Through Trip, total 32.95 miles	36	46	10	53	82	29
	Average Speed Difference - 2030					
Westbound Through Trip	11			10		
Eastbound Through Trip	11			13		

Travel time and speed data provided by CDM Smith; summarized by Network Public Affairs

* Based on assumption of traffic maximization.

Table 3. Summary Comparison of Corridor Travel Time and Speed in I-15 General Purpose Lanes with and without Express Lanes**

	General Purpose Lane Comparison - Express Lane vs No Build					
	Travel Time (min.) - 2030					
	AM Peak Hour			PM Peak Hour		
	GP Lane w/ Express Lanes	GP Lane under No Build	Travel Time Savings	GP Lane w/ Express Lanes	GP Lane under No Build	Travel Time Savings
Northbound Through Trip, total 32.40 mi	34	49	15	67	168	101
Southbound Through Trip, total 33.22 mi	39	104	65	34	53	19
	Average Speed Difference - 2030					
Northbound Through Trip	18			17		
Southbound Through Trip	32			21		

Travel time and speed data provided by CDM Smith; summarized by Network Public Affairs

** Based on assumption of traffic maximization.

Option to Use Express Lanes

One of the objections to pricing lanes is that low-income drivers will not be able to afford to use them. To examine this possibility, NPA looked at the value of time savings, also called simply value of time (VOT), to see whether low-income drivers might sometimes find it advantageous to choose the express lanes.

Literature on tolling suggests that travel time for business purposes can be valued as a function of wage rate. Thus by definition, a high-income (high-wage) driver's time will be worth more than a low-income (low-wage) driver's time. Personal travel time, which includes time spent commuting, is less valuable than travel time for commercial reasons, such as by trucks delivering goods or services.¹¹

Research done by NPA in previous equity studies indicates that the value of time for a low-income commuter can be estimated at roughly \$10/hour.¹² This value is in line with, though slightly lower than, values of time found by RSG, Inc. for low-income corridor users in conducting the stated preference survey referred to earlier in this section.¹³

Toll level estimates for the I-10 and I-15 express lanes were provided by CDM Smith for 2030 and 2046 from the traffic & revenue study mentioned earlier. NPA used these results to compute an implied value of time for each time period and direction of travel, based on the expected time savings (see results projected for 2030 in Table 4 for I-10 and Table 5 for I-15). The estimates of

¹¹ "Revised Departmental Guidance on Valuation of Travel Time in Economic Analysis," U.S. Department of Transportation Memorandum dated September 28, 2011, http://www.dot.gov/sites/dot.dev/files/docs/vot_guidance_092811c.pdf.

¹² ExpressLanes Final Low-Income Assessment, March 2010, prepared by NPA for Los Angeles County MTA, http://www.metro.net/projects/studies/expresslanes/images/low_income_draft_final_report.pdf.

¹³ RSG assumed the following values of time in \$/hr for the lowest income category (midpoint \$10,000): Peak work trips \$11.75, Peak non-work trips \$10.74, Off-peak work trips \$11.69, Off-peak non-work trips \$11.63, Weekend trips \$10.86. SANBAG I-10/I-15 Express Lanes Travel Study Report, RSG, Inc., October 2012, p. 31, Table 5.2.

implied VOT for most peak hours typically exceed \$10/hour, ranging to more than \$23/hour for a full-corridor trip on I-10 in 2030 and over \$35/hour for a full-corridor trip on I-15 in 2030.¹⁴

However, there are a number of time periods, notably in the early and late peak traffic hours, where the VOT is below \$10/hour. These periods are highlighted in green in the tables. For example, the implied VOT for the 6:30-7:30 hour eastbound on I-10 in 2030 is under \$8/hour, while for the 7:30 p.m. hour it is under \$6/hour. At these and similar times, in theory a low-income person could choose to use the express lanes. If low-income VOT were a bit higher as estimated by RSG, there could be even more occasions where a low-income person might use the express lanes during peak periods.

The estimates in this section are based on an assumption that tolls are set to maximize traffic throughput, rather than to maximize revenue. Results for the assumption of revenue maximization were examined and did not differ greatly from those shown here.¹⁵ The main difference is that in the case of revenue maximization, the projected time savings in general purpose lanes on I-10 are very similar between the HOV alternative and the express lanes alternative. However, the conclusions regarding equity would be the same regardless of whether traffic or revenue was maximized.

¹⁴ Estimated toll amounts were provided to NPA for three AM peak period hours and five PM peak period hours, but time savings in minutes were provided only for a single AM peak and PM peak hour. The implied values of time were computed for each hour of the AM and PM peak periods using the respective time savings for the peak hour.

¹⁵ The scenario evaluated assumed revenue maximization on all segments except Segment 4 of I-15, which would be operated for traffic maximization.

Table 4. Projected Toll Levels and Implied Value of Time Savings for I-10 Corridor

I-10 Express Lanes - 2030								
	AM1	AM2	AM3	PM1	PM2	PM3	PM4	PM5
	6:30	7:30	8:30	15:30	16:30	17:30	18:30	19:30
	7:30	8:30	9:30	16:30	17:30	18:30	19:30	21:00
Westbound through trip toll, 32.82 mi	\$5.60	\$5.34	\$3.04	\$4.37	\$5.03	\$4.11	\$2.32	\$2.32
Implied Value of Time, \$/hr	\$18.11	\$17.27	\$9.89	\$18.84	\$21.68	\$17.72	\$10.00	\$10.00
Eastbound through trip toll, 32.95 mi	\$2.15	\$2.15	\$2.15	\$7.48	\$9.41	\$8.07	\$3.12	\$2.15
Implied Value of Time, \$/hr	\$13.76	\$13.76	\$13.76	\$18.74	\$23.57	\$20.22	\$7.82	\$5.39

NOTES/ASSUMPTIONS:

1. Assumes I-10 Express Lanes are two lanes per direction from LA County Line to Alabama Street; assumes I-10 Express Lanes are one lane per direction from Alabama Street to Ford Street.
2. Assumes HOV-2 traffic is toll-free from 2021 through 2023 and tolled beginning in 2024. HOV-3+ traffic is free at all times.
3. Speeds and travel times shown assume a traffic maximization pricing regime in the express lanes. Under a traffic maximization pricing regime, toll rates will be kept as low as possible to maintain a maximum of 1,650 vehicles per lane per hour in the express lanes after minimum tolls are taken into consideration.
4. All tolls shown in 2012 dollars.
5. Implied values of time are based on projected time savings in minutes for the peak AM hour (for AM periods) and for the peak PM hour (for PM periods).

Data provided by CDM Smith and summarized by NPA.

Green highlights indicate hours where implied VOT is less than low-income VOT (\$10.00).

Table 5. Projected Toll Levels and Implied Value of Time Savings for I-15 Corridor

I-15 Express Lanes -2030								
	AM1	AM2	AM3	PM1	PM2	PM3	PM4	PM5
	6:30	7:30	8:30	15:30	16:30	17:30	18:30	19:30
	7:30	8:30	9:30	16:30	17:30	18:30	19:30	21:00
Northbound through trip toll, 32.40 mi	\$2.44	\$2.44	\$2.44	\$9.51	\$12.97	\$9.32	\$2.91	\$2.44
Implied Value of Time, \$/hr	\$17.82	\$17.82	\$17.82	\$14.82	\$20.22	\$14.53	\$4.54	\$3.80
Southbound through trip toll, 33.22 mi	\$6.63	\$3.08	\$2.29	\$2.29	\$2.29	\$2.29	\$2.29	\$2.29
Implied Value of Time, \$/hr	\$35.12	\$16.31	\$12.13	\$16.79	\$16.79	\$16.79	\$16.79	\$16.79

NOTES/ASSUMPTIONS:

1. Assumes I-15 Express Lanes are two lanes per direction from Cantu-Galleano to Sierra Avenue and from I-215 to US 395; assumes I-15 Express Lanes are one lane per direction from Sierra Avenue to I-215.
2. Assumes HOV-2 traffic is tolled; HOV-3+ traffic is free at all times.
3. Speeds and travel times shown assume a traffic maximization pricing regime in the express lanes. Under a traffic maximization pricing regime, toll rates will be kept as low as possible to maintain a maximum of 1,650 vehicles per lane per hour in the express lanes after minimum tolls are taken into consideration.
4. All tolls shown in 2012 dollars.
5. Implied values of time are based on projected time savings in minutes for the peak AM hour (for AM periods) and for the peak PM hour (for PM periods).

Data provided by CDM Smith and summarized by NPA.

Green highlights indicate hours where implied VOT is less than low-income VOT (\$10.00).

It is also important to note that the value of time for any person, low-income or not, is highly variable. At any given time, under specific circumstances, a low-income person might exhibit a substantially higher value of time – for example, when running late for work, or for other reasons. A toll might be less expensive than per-minute late fees at a day care center. The VOT estimates used for economic analysis are just for that purpose and do not reflect the value of a specific trip for any person, much less the intrinsic value of any person’s time to himself or to others.

According to the Victoria Transport Policy Institute, “disadvantaged people may benefit from policies that help them drive, but they can benefit even more overall from policies and programs that increase total travel options.”¹⁶ Adding express lanes would provide all drivers, including low-income drivers, with an option they do not have today. In this way, implementing express lanes would leave low-income drivers better off.

Recent studies cast more doubt on the “Lexus lanes” label that is sometimes applied to tolled lanes. The Washington State Department of Transportation (WSDOT) implemented HOT lanes on State Route 167 in the Puget Sound area beginning as a pilot project in 2008. Currently, in year 5 of operation, toll revenue exceeds operating costs. In 2010, WSDOT surveyed drivers in the HOT lanes and found that only 2 percent of drivers were actually in a Lexus, while the top three makes (in order) were Ford (19 percent), Chevy/GMC (18 percent), and Toyota (12 percent). Luxury brands including BMW, Mercedes, and Lexus together accounted for 5 percent of the users. WSDOT’s annual survey of HOT lane users also indicates that they come from all income brackets, including some with household incomes below \$20,000.¹⁷

A recent Stanford study cited survey findings from the 91 Express Lanes in Orange County that users come from all income categories; those with household incomes below \$50,000 used the lanes on average 7.4 times per month, compared with 7.7 for those earning \$200,000 or more and 9.1 for those in the \$100,000 - \$149,000 category. Those with a high school education or less showed a higher average frequency of use (9.0 times per month) than those in any other education category (ranging from 7.0 to 7.9).¹⁸ Notably, opinions of the potential San Bernardino express lanes found in the RSG stated preference survey were nearly the same for the three income groups studied, with favorable opinions at 33 percent for incomes below \$25,000 and 35 percent for incomes over \$100,000.¹⁹

Studies of toll roads are now also beginning to explore the value of reliability – the fact that express lane users can leave less “buffer time” for their trips because they can expect less variation in trip

¹⁶ Litman, T. 2007. Evaluating Transportation Equity: Guidance for Incorporating Distributional Impacts in Transportation Planning. Victoria Transport Policy Institute, Victoria, BC, Canada. <http://www.vtpi.org/equity.pdf>

¹⁷ Perceptions and Reality: Equity and Managed Lanes in Washington State. Powerpoint presentation given June 21, 2013 via webinar by C. Gants and J. Strausz-Clark, PRR.

¹⁸ Monk, Ashby H. B. and Levitt, Raymond E. and Garvin, Michael and South, Andrew and Carollo, George, Public-Private Partnerships for Infrastructure Delivery (September 19, 2012). Available at SSRN: <http://ssrn.com/abstract=2149313> or <http://dx.doi.org/10.2139/ssrn.2149313>

¹⁹ Resource Systems Group, Inc., SANBAG I-10/I-15 Express Lanes Stated Preference Travel Survey, Powerpoint prepared for San Bernardino Associated Governments, July 26, 2012.

duration. The Texas Transportation Institute has begun reporting a Planning Time Index alongside the better-known Travel Time Index in its annual Mobility Report, which quantifies the cost of congestion to the economy.²⁰ The value of reliability may be more subjective than value of time, and since research on this topic is at an early stage, it was not further studied.

Transit and Travel Alternatives

One of the relevant questions when examining equity in transportation policy is whether low-income travelers have alternatives to the tolled facility. In the case of the proposed express lanes on I-10 and I-15, an untolled alternative, namely the general purpose lanes, will continue to be available. However, freeway lanes by themselves do not provide flexibility or choice for those who may find driving too expensive or may have other limitations on driving. Such concerns may be more acute for low-income residents or for retirees who may have a fixed income.

Potential alternatives to driving alone in the freeway lanes include public transit, ridesharing, and vanpools.

Transit

The need for more comprehensive transit service in the County was noted by several of the stakeholders interviewed by NPA. They pointed out that low-income people may often have less reliable vehicles, and may need to access educational institutions, health care services, or work locations that could be far from home.

For these reasons, parallel transit service options are of interest. Metrolink rail service offers over twenty trains per day along a parallel route to I-10. The one-way regular fare from San Bernardino to Los Angeles Union Station is \$13.25 (round trip \$26.50), with discounts available, including 50 percent off one-way and round trip tickets for seniors, disabled, and Medicare recipients, and other discounts for children, active military, and students. No comparable rail service is available to the east of San Bernardino (City) or along the I-15 corridor.

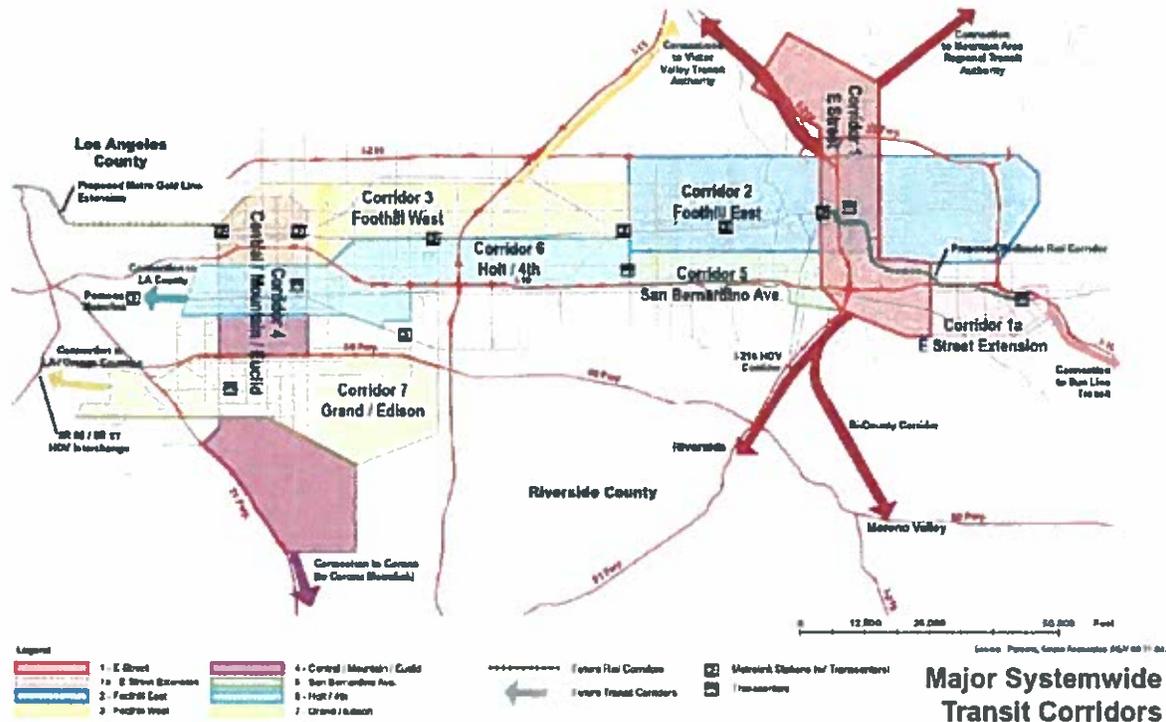
The SANBAG Long-Range Transit Plan (LRTP), developed in 2009, calls for the development of new bus rapid transit (BRT) service along several corridors in the County (see Figure 10).²¹ The first line in the service would serve the north-south E Street Corridor in the City of San Bernardino, and is expected to open in Spring of 2014. Given its location near the I-215 freeway, this new BRT service would not be an alternative for north-south travel on I-15, and in any case will not extend nearly as far north as the planned I-15 express lanes. Additional BRT corridors are planned for routes that run parallel to I-10, including Foothill and Holt. However, according to SANBAG staff, no funding sources have been identified for additional BRT routes beyond the E Street corridor, and further planning for these routes has been deferred for the next few years.

²⁰ 2012 Urban Mobility Report, Texas A&M Transportation Institute, December 2012.
http://d2d15mipr0h.cloudfront.net/tti.tamu.edu/documents/mobility_report_2012.pdf

²¹ San Bernardino County Long Range Transit Plan, Interim Draft Report, PARSONS et al., October 2009.

Aside from BRT service, the planned Redlands Rail Line could be an alternative, but it also would not parallel the express lane routes. Otherwise, local bus service would be the only other option for travelers on the I-10 and I-15 corridors. Omnitrans Line 61, for instance, parallels much of the I-10 corridor along Holt, but takes a little longer than an hour and a half to make the trip between Pomona and Fontana. Although fares might be low, this would not be a reasonable alternative to express lanes in terms of travel time or convenience.

Figure 10. Planned Bus Rapid Transit Corridors in San Bernardino County



Source: San Bernardino County Long Range Transit Plan, Interim Draft Report, PARSONS et al., October 2009, Figure 5-5; sourced to Gruen Associates 2004.

Ridesharing

SANBAG partners with neighboring Riverside County to provide Inland Empire “511” ridesharing services for residents through participating employers. Employees who sign up are offered incentives in the form of gift cards and discount coupons, and are guaranteed a no-cost ride home in emergency situations. The service provider, Inland Empire Commuter Services, provides ride-matching information to employees and administers the program.²² Ridesharing can provide a lower-cost alternative to driving alone for low-income residents.

²² San Bernardino Associated Governments Commuter Benefits Program Employer Partnership Agreement FY 12/13.

Vanpools

In September 2012, SANBAG launched a vanpool program in collaboration with the Victor Valley Transit Authority (VVTa). Startup of the program, under which trips must either originate or terminate in the Victor Valley, was funded through a three-year Federal Transit Administration (FTA) livability grant (under Section 5309), along with SANBAG match and other funds for a total of about \$2.2 million.

As of September 2013, 142 vehicles had been leased for vanpool use by a total of 1,134 commuters to or from the Victor Valley. Under the federal program, the vanpools must be open to the public; passenger miles and other data are reported to the FTA and the public agency is reimbursed on the basis of vanpool usage. In this way, the vanpool program becomes self-sustaining for the public agency. The program requires a minimum 30-mile per day roundtrip; this scale of travel is comparable to the I-10 and I-15 Express Lanes, each of which would cover a little more than 30 miles.

The vanpool option could be attractive for low-income residents who commute regularly, especially for those who have a regular work schedule. Vanpool lessees receive (under this program) a subsidy of up to \$400 a month to offset the cost of the vanpool lease, reducing the burden on them and their riders.²³ According to VVTa's vanpool program brochure, "A 70-mile roundtrip commute driving alone can cost as much as \$750 per month in car ownership, fuel, and maintenance costs. The same vanpool trip is about \$224 per person, per month," and less with the vanpool subsidy.²⁴ Large employers may operate private vanpools, but would not be eligible for the VVTa/SANBAG monthly subsidy. The agency-subsidized vanpools through this leasing model could be flexible and affordable for workers heading to jobs with smaller employers, while creating a positive return on the agency's investment.

According to SANBAG staff, the current year's work plan will include an assessment of the potential to expand this federally subsidized vanpool program countywide.

Overall, equity concerns provide one reason for SANBAG to consider presenting the express lanes as part of a planned package of investments in multiple modes of transportation. Expanded vanpool service, parallel express or expedited bus service could be an affordable, effective alternative for low-income travelers. It could also be helpful, given equity concerns among other factors, if funding for the envisioned BRT service were identified and planning could move forward rather than being deferred.

It is important to note that the express lanes, if implemented, could make it possible to provide express bus service in the corridors that is not possible under current (or future) congested conditions, although there is currently no plan to do so. Low-income travelers could particularly benefit from the implementation of parallel express bus service.

²³ Personal communication with SANBAG staff and consultant (MK Consulting), October 2013.

²⁴ Quote from VVTa vanpool program brochure, <http://www.vvta.org/vanpool/media/VanpoolBrochureEnglish.pdf>.

Transponder Issues

The low-income commuter assessment conducted by NPA for the Los Angeles County ExpressLanes found that the use of transponders for toll collection can pose challenges for low-income commuters.²⁵ The I-10 and I-110 ExpressLanes require the use of transponders even for non-tolled (carpool) trips. This means that even if a low-income person was carpooling and would not expect to pay tolls, they still might have to obtain a transponder and open an account.

Potential concerns of low-income drivers with transponders and toll accounts include:

- *Account opening requirements.* Low-income households are more likely to lack a credit card. Research done for Los Angeles County MTA's ExpressLanes low-income assessment found that, as of 2004, less than 50 percent of households with incomes below \$25,000 had a credit card. Some low-income households are "unbanked," lacking a transaction account of any kind. A policy to waive the transponder deposit only for credit-card holders could actually place a burden on low-income account holders or discourage them from opening an account. Balance replenishment may also be a concern, particularly for those who lack a card or account to which the account can be linked, whether for manual or automatic replenishment.
- *Minimum balance requirements.* Tolling policies may require users to maintain a minimum account balance, and impose fees or penalties for dropping below the minimum. Low-income drivers might be more likely than higher-income drivers to maintain a minimal balance, thus running a greater risk of incurring these fees or penalties.
- *Account maintenance fees.* Some toll operators charge a monthly fee if the account holder does not use the express lane more than a few times a month. Since a low-income driver is less likely to use the lanes on a regular basis than a higher-income driver, they are more likely to incur this monthly fee, which could drain their account while they receive no benefit at all. Some systems charge a maintenance fee that is independent of usage, which poses similar concerns for a low-income account holder.
- *Transponder distribution.* If transponders are available only through government offices that are open during weekday business hours, this could pose a challenge for low-income (and other) drivers wishing to open an account.

SANBAG's consideration of the use of video license plate recognition as an optional toll collection method could be positive for low-income commuters. This toll payment option would eliminate some of the concerns listed above. However, without a transponder, a driver would not be able to indicate qualifying carpool status and could thus pay for a trip that should otherwise be free. Account balance, replenishment, and opening requirements, as well as maintenance fees, could still be of concern to low-income drivers.

²⁵ ExpressLanes Final Low-Income Assessment, March 2010, prepared by NPA for Los Angeles County MTA, http://www.metro.net/projects/studies/expresslanes/images/low_income_draft_final_report.pdf.

SANBAG may also wish to examine Puerto Rico's AutoExpreso tolling system as an example implemented in a region where many residents have a low income and many are without credit cards or bank accounts. The following description was provided in the 2010 NPA express lanes low-income assessment for Los Angeles County:

“An example of a tolling system used in an area where 42% of residents do not have checking accounts can be found in Puerto Rico's AutoExpreso electronic tolling system. (This is a hybrid system that currently also accepts cash toll payments.) Transponders are sold at about 210 retail and gas station locations in a country with a population just under 4 million and a land area not much bigger than Rhode Island or Delaware. They are also sold in lanes at the toll plazas.²⁶ In addition to a transponder, each customer receives a corresponding card with a magnetic stripe, which is used as the means of account replenishment.²⁷ Accounts can be reloaded at nearly all the retail locations and in the toll lanes using cash, debit cards, or common credit cards. Accounts are opened for \$20 including a transponder and \$10 in prepaid tolls. The minimum account balance requiring replenishment is \$5 for manually replenished accounts and \$30 for automatic replenishment.²⁸”

In designing toll policies, SANBAG can consider a wide range of strategies for alleviating impacts to low-income account holders, including ideas such as employer incentives, programs to “bundle” tolls with transit fares, or targeted discounts, among others. The Equity Plan adopted by Los Angeles County MTA could serve as a model or starting point for consideration.

V. Synthesis and Conclusions

In order to draw conclusions regarding the equity of the proposed San Bernardino express lanes, let us revisit the key questions asked by this assessment.

- Who is affected by the project?

A review of the household income data for San Bernardino County and the two project corridors indicates that there are many low-income residents who might be affected by the Express Lane projects. Relatively high levels of poverty – in terms of the percentage of households below 200 percent of the federal poverty threshold – can be found in the High Desert, in and around the City of San Bernardino, and along the I-10 corridor all the way to the Los Angeles County line.

²⁶ <https://www.autoexpreso.com/static/web/Web1.aq.html>.

²⁷ AutoExpreso Introductory Booklet, https://www.autoexpreso.com/static/web/Booklet_English_WLB_Version.pdf, accessed August 21, 2009.

²⁸ Puerto Rico Highway Transportation Authority Prepaid Toll Program Account Application, https://www.autoexpreso.com/static/web/Application01ormv31_Final.pdf, accessed August 21, 2009.

The stated preference survey conducted in 2012 for the Express Lanes projects describes the demographics of corridor users, which likely differ from those of residents. The survey indicates that the peak-period commuters have a higher-income profile than non-work or weekend travelers. These residents (or travelers from elsewhere) are more likely to be directly affected by, i.e., to benefit from, the Express Lanes. However, value of time (VOT) analysis indicates that there may be hours during the peak periods when low-income drivers might choose to use the Express Lanes. Of course, drivers of all income levels will continue to use the un-tolled lanes, and low-income drivers are more likely to choose these lanes at any time of travel.

Low-income residents will also be affected through the payment of gasoline tax and Measure I sales tax, each of which will ultimately fund a portion of the construction cost of the projects.

- Who makes direct payments, and how are revenues spent?

The most direct payments will be made by users of the Express Lanes, in the form of variable tolls for an uncongested trip. As discussed above, these users are more likely to be higher-income residents of San Bernardino County (or travelers from other counties), but low-income drivers (resident or non-resident) may also occasionally use the Express Lanes. Indirect payments will be made by drivers paying federal and state gas tax and consumers paying Measure I sales taxes, since a portion of each project will be funded using federal highway funds and a portion by Measure I tax revenues. Some of these drivers and consumers will come from outside San Bernardino County.

Toll revenues, according to the project financing plans, will be dedicated to paying operations and maintenance, as well as interest on two types of toll revenue bonds and repaying TIFIA loans, all of which will be used to finance project construction. Over time, a growing share of project costs will be covered by toll revenues, which is a positive trend for equity. Excess toll revenues (i.e., those not dedicated to one of these purposes) could be used to repay sales tax (Measure I) funds used in construction, or could be used to fund additional projects within the I-10 and I-15 corridors. Either of these choices could also be positive from the standpoint of equity.

- What are the benefits and impacts of the project (for low-income drivers)?

The greatest benefit of the proposed I-10 and I-15 express lanes for low-income drivers is the time savings projected by modeling for the general purpose (untolled) lanes. In each case – morning and evening, congested and uncongested directions of travel, both corridors, and both analysis years (2035 and 2046) – drivers in the untolled lanes are projected to save time if the express lanes are implemented versus if they are not implemented. On I-10,

general purpose lane users are projected to save more time with express lanes than if free HOV lanes are implemented.²⁹

Addition of an express lane option, where there is none today, is also a benefit to all drivers, including low-income drivers. Value-of-time analysis, as mentioned above, indicates that there could be hours during peak periods when the cost of using the express lane would, in theory, be attractive to a low-income driver. Even if a low-income driver's value of time saved were such that he or she would theoretically never choose to use the lanes, there may be situations in reality where anyone, at any income level, would gladly pay a few dollars for an uncongested and predictable trip. Surveys on other Southern California express lanes, such as those on SR-91 in Orange County, indicate comparable rates of usage across all income categories.

The key difficulties posed by express lanes for low-income drivers have to do with transponders and accounts. If SANBAG were to require drivers to obtain a transponder before using the lanes, this could impose a financial burden on a low-income household. If SANBAG were to implement video license plate recognition as a toll collection technology, this would eliminate that financial concern. Low-income drivers might still have concerns with the ability to open an account, since they may lack credit cards or a bank account. Low-income account holders could have concerns with account maintenance fees or minimum balance requirements to a greater extent than higher-income account holders.

- What travel alternatives are available (if needed)?

While untolled general purpose lanes would remain available alongside the proposed express lanes, low-income residents may have limitations on driving. This suggests that SANBAG may wish to consider whether vanpools or parallel transit services can serve as alternatives for low-income travelers. Metrolink rail service parallels the I-10 corridor; prices are relatively high, and discounts are available for travelers including seniors, the disabled, and students, but not for low-income people generally. No comparable service is available along I-15, while commuter bus service in that corridor has been discontinued due to a lack of funding and low ridership. Local bus service is available and inexpensive, but takes too long to be a reasonable alternative to express lanes.

SANBAG now works with the Victor Valley Transit Authority to run an FTA-funded vanpool program to and from the Victor Valley. The program serves over 1,100 commuters each traveling more than 30 miles roundtrip. It provides subsidies to those leasing vanpool vehicles and returns FTA funds to the agency based on reported vanpool usage, so the

²⁹ This finding is based on an assumption of traffic maximization. In the case of revenue maximization, the projected time savings in the general purpose are very similar between the HOV alternative and the express lanes alternative.

program is self-sustaining. SANBAG staff will explore options for expanding this federally-funded public vanpool service countywide.

Synthesis

Overall, this assessment has shown that low-income residents could be better off in several ways if SANBAG elected to implement Express Lanes on I-10 and I-15 as envisioned. The most important benefit is projected time savings in the general purpose lanes under the express lanes alternative, as compared to the HOV alternative (on I-10) or no-build (on either corridor). Low-income residents would also benefit, as would other travelers, from having an option to use the express lanes that they do not have now. An analysis of projected toll levels showed there would be certain peak period hours when low-income drivers might choose to use the lanes.

Low-income residents would not necessarily be made worse off by the implementation of Express Lanes. To the extent that the projects are financed by sales taxes and gasoline taxes, low-income residents may be among non-users, or infrequent users, who nonetheless are contributing to the construction and operation of the express lanes. Over time the financing of the projects and their operation is projected to shift more towards toll revenues. This shift would enhance the equity (fairness) of the funding scheme by placing more of the cost burden on users of the express lanes, who receive direct benefits.

Low-income drivers could find it financially burdensome to obtain a transponder, if they were required to do so, and if they open a tolling account, they may have concerns with account opening (if a credit card or checking account is required), account maintenance fees, and minimum balance requirements. In Los Angeles County, similar concerns have been addressed through an Equity Program adopted by MTA, for which 3,400 households have signed up.

Given these findings, the proposed Express Lanes do not appear likely to create an equity problem for low-income residents. The proposed projects might be more favorably received if residents saw that additional alternatives to the Express Lanes were being actively studied: not only the untolled freeway lanes, but also alternatives to driving such as vanpool and new express-type or limited-stop transit service. Such a package of mobility improvements might help to alleviate any continuing equity concerns within the County.

VI. Recommendations

Since the equity assessment indicates that low-income travelers would not, in general, be adversely affected by the proposed express lanes on I-10 and I-15, the recommendations are limited to the following:

- 1) Consider adopting a policy to waive account maintenance fees for low-income households. This would assure that even if a low-income driver were an infrequent user of the Express Lanes, he would not see his account balance dwindle to zero with no actual benefit.

- 2) Consider adopting policies that allow the use of cash to open and replenish toll accounts. This would address the difficulties of low-income drivers who could lack either a credit card or a bank account.
- 3) Investigate implementation of video license plate recognition as an alternative toll-collection technology. This option could eliminate the need for a low-income household to pay a transponder deposit.
- 4) Consider presenting the proposed I-10 and I-15 Express Lanes as an element of a package of mobility options that also includes plans to enhance vanpool service and explore the provision of additional parallel transit services via express bus, BRT, or rail, including the potential for express bus service within the Express Lanes.
- 5) Continue to conduct outreach activities targeted to low-income residents during the planning, design, and implementation process for these corridors, regardless of which alternative is chosen.

a. Definition of “Low-income”

Should SANBAG decide to implement equity policies or programs based on household income, NPA would recommend using a threshold definition of “low-income” that is the same as the threshold used by Los Angeles County MTA. This level is set at 200 percent of the federal poverty level, depending on household size; for example, it is \$39,060 for a family of three, which is close to the regional average household size for the SCAG region. This level reflects the high combined cost of transportation and housing in Southern California and Los Angeles County, and was also based on a review of other qualification thresholds in state law for benefits like food stamps and CalWorks, as directed by the state implementing legislation for the ExpressLanes.

This level is recommended for SANBAG in part so that equity policies between counties will be consistent. At this time, only Los Angeles County has an equity program; San Bernardino would be the second to adopt such a program, if it so chooses. The percentages of households with incomes up to 200 percent of federal poverty level are very similar between San Bernardino County and Los Angeles County (35.0 percent below twice the poverty level for San Bernardino and 34.9 percent below for Los Angeles). Median household income in the two counties is also similar: \$52,280 for Los Angeles County and \$51,247 for San Bernardino.³⁰

Alternatively, for administrative convenience, SANBAG may want to use a threshold for low-income that is already in use by other social service agencies.

b. Suggested Performance Measures

Any program or policy can be better designed and supported if decision makers have information about its actual effects. For this reason, the following performance metrics are suggested for SANBAG’s consideration if the express lane option is implemented. Note that some metrics could require collection of data in advance of project implementation.

³⁰ Personal communication with John Husing, Economics & Politics, Inc., August 2013.

- Number of low-income households that open an account, and low-income as a percentage of all accounts.
- Number of peak-period low-income users of express lanes (and percentage of overall express lane users).
- Methods selected to open accounts (credit card, cash, check) by low-income and other users.
- Mode choice of low-income drivers (carpool vs. single-occupant vehicle), compared with mode choice before the project is implemented.
- General-purpose lane speeds before and after implementation.
- Account balance problems of low-income users, compared with other users.
- Share of time savings by low-income express lane 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.
- Annual share of project costs covered by toll revenues vs. other sources.
- Toll revenue reinvestment.

Some of these performance measures are based on recommendations from the NPA low-income assessment for Los Angeles County's ExpressLanes.³¹ Additional detail can be found in Section VII of that report.

³¹ ExpressLanes Final Low-Income Assessment, March 2010, prepared by NPA for Los Angeles County MTA, http://www.metro.net/projects/studies/expresslanes/images/low_income_draft_final_report.pdf.

Appendix A. Literature Review Results

Summaries are provided below for several of the most relevant studies and reports reviewed on the equity of express (HOT) lanes and related tolling policies.

- **Just Pricing: the distributional effects of congestion pricing and sales taxes** (L. Schweitzer, University of Southern California, and B.D. Taylor, University of California, Los Angeles, 2008)

In response to the often-voiced concerns that roadway tolls are unfair to low-income drivers, this paper points out that it is important to compare the equity effects of tolling with those of traditional means of financing transportation infrastructure. The paper compares the cost burden of State Route 91 in Orange County, CA, which includes priced high-occupancy lanes, with its cost burden under the County's transportation sales tax measure. The analysis finds that the sales tax redistributes about \$3 million in revenues from less affluent residents to more affluent residents, just for State Route 91. "The sales tax, because it is paid by virtually everyone, spreads the costs of infrastructure across a broad base of consumers. It costs each family comparatively little, but these burdens are regressively distributed. In comparison to higher-income groups, low-income households pay the highest proportion of their income on sales taxes; we find in our geographically constrained estimation that households in the lowest income group would contribute over \$3 million out of the \$34 million in SR91 revenues were these monies to come from sales taxes rather than tolls." (Conclusions, paragraph 3)

A toll, by contrast, is a user fee that is paid directly by the recipient of the benefit, in this case an uncongested driving trip. "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. Others have shown such transfers to be inefficient; we argue it is inequitable as well." (Conclusions, last paragraph)

- **Equity of Evolving Transportation Finance Mechanisms** (Transportation Research Board, 2011)

This report provides a comprehensive overview of equity concerns in transportation finance methods, including tolling. It provides guidance to policy makers and analysts based on the best current understanding of the key issues that can be raised by various means of paying for road infrastructure. For example, it is important to consider new mechanisms (like tolls or HOT lanes) in comparison with traditional or existing means of project funding, such as sales taxes and gas taxes. Four commissioned scholarly papers by noted academics underpin this report.

The report includes a concise yet powerful list of questions that policy makers should consider in an equity analysis for a transportation project or a transportation finance policy. These questions have been used to guide and structure the I-5 North equity assessment since they are based on the best current research:

- Who makes direct payments?
 - Who receives direct benefits, including time and reliability savings?
 - Who is most likely to change behavior to avoid a new or increased tax or toll? Are there social implications beyond the individual burden of changing travel behavior, such as loss of an industry or isolation of the elderly?
 - Are there viable alternatives that satisfy the travel needs of those who reduce their automotive travel in response to new or increased taxes or tolls?
 - What businesses are likely to be affected and how?
 - How will the revenues be spent, and who is likely to benefit from these expenditures?
 - How will the costs and benefits be distributed over time (generations)?
 - Are land prices likely to shift in response to changes in transportation costs? If so, will the burdens of the policy shift to different groups? How will location patterns (e.g., gentrification, areas of job growth, retail development) respond to shifts in land prices?
- (p. 63)

The report points out the following:

- “People tend to favor the status quo strongly, and sometimes even irrationally, over potential alternatives” to traditional road project finance methods, such as tolled express lanes. (p. 132)
- “Empirical evidence about the effectiveness of strategies for remedying inequities resulting from transportation finance policies is very limited.” (p. 134)
- “Suitable models for predicting...shifts [in behavior in response to a new toll, e.g.] are not widely available, so logical reasoning may well be needed to develop a qualitative picture of the redistribution of the burden of a new policy.” (p. 136)

The report recommends that policy makers take the following steps:

- Assess likely impacts of finance strategies.
- Use lessons learned elsewhere to inform discussions.
- Develop outreach programs and educational materials.
- Explore possible remedies for inequities.

- **Traffic Congestion: Road Pricing Can Help Reduce Congestion, but Equity Concerns May Grow** (U.S. Government Accountability Office [GAO], 2012)

As of January 2012, this report identified 12 HOT lane projects in operation around the U.S. Four HOT lane projects have been evaluated for equity concerns (p. 21): SR-91 in Orange County, CA, I-394 in Minneapolis, SR 167 in Seattle, and I-15 in San Diego. I-95 HOT lanes in Miami-Ft. Lauderdale were evaluated, but not for equity concerns. Evaluations of the first three of these HOT lane projects found that “high-income drivers used them more often than low-income drivers” (with varying definitions of high- and low-income). For all four of these facilities, drivers “liked having the option of using the HOT lanes and thus were supportive of them” – independent of income level.

The report states that “[b]oth travel time and travel speed improved on at least some sections of all five HOT lane projects that were evaluated.” However, evaluations used inconsistent performance measures, so it is difficult to draw clear conclusions about whether drivers in parallel unpriced lanes – who are more likely to include low-income drivers or commuters – will benefit from the implementation of a priced Express Lane. Such effects were found in Miami on I-95 and on SR 167 in Seattle. Some HOT lane projects involved adding new capacity while others involved only HOV lane conversion, but in the evaluations, the effects of adding capacity were not distinguished from the effects of implementing pricing.

- **Road Pricing: Public Perceptions and Program Development** (Transportation Research Board, National Cooperative Highway Research Program, 2011)

This detailed planning guide compiles lessons learned from road pricing (RP) projects implemented around the United States. It observes that “[t]he most popular and widespread RP concept to date has been conversion of high-occupancy vehicle (HOV) lanes to high-occupancy toll (HOT) lanes and new-capacity HOT lane projects. These projects have shown initial success in managing traffic more effectively, raising revenue for system investment, advancing greater travel reliability for roadway users, and creating new travel options.” (Foreword)

In a summary table on HOT lane conversion (Exhibit 20, p. 44), the report observes that:

“[I]ncome equity has not been a major issue; usage surveys of I-15 lanes in San Diego and I-394 lanes in Minneapolis showed high support for HOT lanes across all income groups, with lowest and highest income groups expressing about equal support.”

“HOT lanes are likely to be used by all income groups...; no disadvantage caused to transit and carpool users.”

“...optional nature of HOT lanes reduces concerns about some travelers being worse off than before.”

“Requirement of an electronic tolling account...can be a concern for low-income or other groups without credit cards or access to checking accounts.”

- **Equity, Pricing, and Surface Transportation Politics** (A. Altshuler, John F. Kennedy School of Government, Harvard University, 2011)

This report provides a brief summary of the history of HOT Lanes, giving a brief description of the ten sets of HOT Lanes in operation as of spring 2010. Concerns about income-based equity have frequently arisen in connection with HOT lane proposals, and were a major factor in the failure of a 1997 effort to implement HOT lanes on I-394 in Minneapolis. Over time, however, they have declined in significance during the reinvigoration of HOT lane progress since 2004, largely because advocates have perfected their brief, emphasizing that HOT lane users include representatives of all income groups and that users of the parallel general purpose lanes benefit as well (if less) than those who pay the tolls.

The HOT lane concept is a small step in the direction of strong congestion pricing since the users who pay are a minority even in the HOT lanes, let alone the entire freeway. The great question, however, is whether HOT lanes will be an important step along the path toward more general acceptance in the U.S. of congestion pricing. This could be a possibility if traffic demand continues to grow and public resistance remains intense both to new taxes and highway construction in new corridors.

Regardless of how impactful HOT lanes are to congestion prices, they are gaining momentum primarily for four reasons. They have helped to reinvigorate a traffic engineering concept, HOV lanes, that had become increasingly controversial for “wasting” valuable road capacity. They are very low cost relative to other means of expanding expressway capacity. They benefit a subset of motorists. And they are unique among the options for ameliorating congestion in satisfying the Do No Harm criterion of equity.

- **Remediating Inequity in Transportation Finance** (D. King, Columbia University, 2011)

If the revenues from congestion pricing are not distributed and the only benefit is less congestion, then high-income groups gain and low-income groups will lose. Consequently, at least some of the revenue should be used to promote fairness and compensate those who are made worse off. This report explores how inequity is resolved through revenue recycling and dedicated programs using transportation finance.

The report also provides a survey of United States' HOT Lane projects. It states that the perceived fairness of toll facilities minimizes concerns about equity and access to tolled roads. None of the projects makes any mention of actions meant to remediate inequities. Instead, they all argue that HOT lanes are perfectly equitable and that there is no point in offering compensation. The claims of enhanced choices and the voluntary nature of the toll facilities are usually coupled with claims about improvements resulting from lower levels of congestion and from new transit investment using some of the toll revenues. According to the I-95 Express website, tolls help transit run more smoothly and more reliably and are not mentioned as compensation or an intentional outcome. Rather, transit improvements seem to be viewed as a pleasant side effect of the HOT lanes.

Examples of partial solutions to remediating inequity include transit investment, geographic exemptions, income and disability exemptions, fare policy, and credit-based transportation allowances. The existing financing projects reviewed in the report suggest few proven ways to remediate inequity, but also bring into question whether equity is as important a political issue as theorized in the literature. For example, the inequity of HOT Lanes projects are not really perceived as being an impediment to new financing mechanisms, making this issue less of a priority for officials. All of the HOT lane projects referenced in the report describe equity concerns on their websites and other public materials, but argue that no serious inequities are created. As a result of minimal inequities, the projects produce limited revenues and are of limited value for general transportation finance. In order to support more transportation investment, road pricing will have to expand beyond HOT lanes. Once this expansion occurs, dismissing equity concerns because people have a free option may not be possible.

- **The Empirical Research on the Social Equity of Gas Taxes, Emissions Fees, and Congestion Charges** (L. Schweitzer, University of Southern California, 2011)

This report summarizes the empirical research on the effects of transport user charges and taxes on low-income households. The first section of the report describes how finance fits into social exclusion and environmental justice, which inform why researchers should be concerned with finance and pricing beyond basic tax fairness principles from public finance.

The report also summarizes the findings from recent studies on HOT Lanes, congestion charges, and cordon tolls. The following are conclusions from these studies:

- “Although tolls and HOT lanes have a reputation for being regressive, low-income motorists appear to pay very little for priced links, largely because most schemes only apply to selected links under HOT lane proposals.” (p. 8)

- The analysis compared HOT lanes with more comprehensive tolling methods and found that HOT lanes “provided almost as much congestion relief at a much lower social cost than the more comprehensive tolling schemes.”(p. 8)
- “A panel survey of SR91 users showed that low-income individuals paid very little, because the SR91 serves fairly affluent areas.” (p.9)

The major takeaway points are as follows:

- “Estimates here fall at about 0.5 percent of income for households under \$25,000 for gas taxes, emissions fees, and some limited implementation HOT lane proposals. For fairly comprehensive, high-cost tolls, the estimates go as high as 2 percent for low-income drivers. While the effects of specific implementations vary by context, as I will discuss later on, the major choice among policy instruments—the gas tax, emission taxes, or facility pricing— concerns the tax base across which system costs are spread. “ (p. 20)
 - “Outcomes for low-income urban residents further depend on geography and policy context. Urban geography determines the baseline conditions for the availability of substitute modes and destinations and the spatial distribution of different social groups. The political geography matters as well. The review of the research shows that total, un-shifted tax burdens for low-income households range from low burdens—about five percent of income—to very high burdens, at 17 percent.” (p. 20)
- **The Incidence of Public Finance Schemes** (S. West, Macalester College, 2011)

This report explains the equity implications of adopting a public finance policy, such as imposing a tax.

Most discussion assumes that the people on whom a tax or fee is levied are the people who end up bearing the burden of the policy. In reality, however, behavioral responses are critical to determining the equity of a public finance scheme. The more substitutes that are available to consumers or producers, the more each group can avoid a tax or fee. As the number of substitutes increase over time, these groups tend to respond more elastically in the long-run than in the short-run, thereby shifting more of the burden.

The main conclusions of the report are as follows:

- “Despite the fact that consumers become more responsive to increases in gasoline prices in the long run, competition among suppliers implies that consumers bear the great majority of the burden of a gasoline tax.” (p. 14)

- “Tax incidence estimates obtained using lifetime income or consumption, which are better indicators of well-being, are usually less regressive than those employing the same data and elasticity assumptions, but using annual income.” (p. 14)
 - “Carefully designed revenue rebate programs can render a once regressive scheme progressive, and in many cases can make poor households better off than before the policy is implemented.” (p. 14)
 - “The more individuals know about a policy, the more likely they are to be able to avoid its burdens or exploit its benefits. Making a policy transparent, especially to poor households, can reduce its regressivity.” (p. 14)
- **Income-Based Equity Impacts of Congestion Pricing, A Primer** (U.S. Department of Transportation, Federal Highway Administration, December 2008)

This equity primer was produced to examine the impacts of congestion pricing on low-income groups, public opinion as expressed by various income groups, and ways to mitigate the equity impacts of congestion pricing.

“A well-designed value-pricing plan can be less burdensome to low-income citizens than current systems that are based on regressive taxes, such as car-registration fees, sales taxes, and the gas tax. They therefore must purchase more fuel per mile driven and consequently pay higher fuel taxes for each mile driven than do those who own newer fuel-efficient models.” (p. 6)

The use of congestion-priced lanes by both high- and low-income users seems to be selective. A paper by the Rand Corporation and Volpe National Transportation Systems Center (2007) indicated that household surveys suggest that rush-hour travelers who travel in the busier direction—and thus are more likely to pay congestion charges—are the most affluent group within the larger category of street and highway users. (p.7)

Data from the various cities that have implemented projects or have projects underway are discussed below. Most of the data are from projects involving “partial” pricing on one or more lanes of a freeway facility. Equity impacts relating to income have not been evaluated for “full facility” pricing projects. “The perception that congestion pricing is an inequitable way of responding to the problem of traffic congestion does not appear to be borne out by experience.” (p. 10)

The following is the experience from “partial” pricing projects:

- “The I-15 HOT lanes in San Diego, CA was the first project to demonstrate that implementing tolls as a demand management measure can play a major role in paying for

transit and reducing the negative impact of this strategy on low-income individuals.” (p. 10)

- “For the I-25/US-36 HOT lanes in Denver, CO, public outreach leading to implementation of HOT lanes did not uncover critical concerns regarding equity or other social impacts, nor have such concerns arisen since implementation.” (p. 11)
- “For the I-10 and US-290 HOT lanes in Houston, TX, there also have been no equity concerns raised during operations. It should be noted, however, that these HOT lanes are somewhat different from other examples, that is, single-occupant vehicles are not permitted in the HOT lanes—tolls are used to manage two-person carpool demand. Burris et al. found that even in the lowest income group, over two-thirds of respondents were interested in paying to use the HOT lanes.” (p. 12)
- “An evaluation of the SR-91 express lanes [in Orange County, CA] found a ‘moderate’ income effect, with the percentage of trips on the express lanes for the lowest and highest income groups (20 percent and 50 percent) staying the same over the 3-year evaluation period. Low-income and moderate-income travelers appeared to be more selective and used the tolled route for less than half of their trips. When prices rose, people in the lowest income group did not reduce their travel, but people of moderate income did. This suggests that people with lower incomes have less flexibility in the time they travel, or that low-income individuals have very high values for reliable travel when they need it.” (p. 13)

- **Public Acceptability of Road User Charging: The Case of Edinburgh and the 2005 Referendum** (M. Gaunt, T. Rye and S. Allen, *Transport Reviews*, Vol. 27, No. 1, 85-102, January 2007)

The objective was to assess the importance of a range of factors that might have influenced the residents of Edinburgh to reject congestion charging by a large majority in the referendum. The factors examined were residents’ habitual choice and frequency of use of transport mode, their understanding of the details of the scheme, and their attitudes towards congestion and the City of Edinburgh Council.

Some results of the study were as follows:

- “Car owners were overwhelmingly opposed to the proposal, whereas non-car owners registered net support.” (p. 91)
- “Car users, whether drivers or passengers, were very strongly opposed to the congestion charging scheme. Apparently, only a very small minority perceived the potential benefits of the scheme to outweigh the £2 daily charge.” (p. 92)
- “Perhaps the greatest individual misconception uncovered by Figure 3 is the belief held by 18.2% of respondents that the maximum daily charge was dependent on whether a charging area was entered more than once. This suggests they perceived

the charge to be applicable an unlimited number of times per day. In the light of this misconception, it is unsurprising that these residents opposed the scheme by a ratio of 3.5:1.” (p. 94)

- “A common criticism of the scheme was that many drivers would simply have altered their route, in order to avoid crossing the inner cordon, the effect being merely to displace rather than reduce congestion.” (p. 98)
- “The present study suggests some lessons for other cities considering the introduction of RUC as a means to solve the problem of traffic congestion. First, the design of schemes should avoid unnecessary complexity: they should be simple, especially at first. The findings of this study clearly show that in the Edinburgh case the strength of the negative vote was enhanced by residents’ misunderstanding of the scheme, causing a substantial number to believe that the daily charge would be both higher, and applied more frequently, than in reality. These individuals might conceivably have voted for the scheme if they had understood the details clearly.” (p.100)

- **Just Who Should Pay for What? Vertical Equity, Transit Subsidy, and Road Pricing: The Case of New York City** (Peters, J., Kramer, J., 2012)

In this report, equity and cross-subsidization issues associated with the congestion pricing scheme proposed as part of New York City’s PlaNYC are examined, as are initial usage patterns, user income distribution, and revenue distribution.

The two most important factors that determine equity impacts are how revenues will be used and initial travel patterns; the people making the most trips will be the ones affected by change.

The proposed congestion pricing design for NYC was similar to the London Congestion Charging Scheme launched in 2003. One of the cornerstones of NYC’s congestion pricing proposal was a daily fee (\$8 in the case of NYC) for autos traveling into Manhattan (south of 86th Street) on weekdays between 6 a.m. and 6 p.m. Unlike London, drivers would be given credits for tolls paid on bridges and tunnels in the city.

New Jersey commuters would pay little or nothing in congestion fees (due to the toll offsets), while commuters from Queens, Brooklyn, and the Bronx who use the free bridges would pay the full \$8 fee. (p. 123)

Even before considering the use of the revenue, congestion pricing will create net benefits for drivers whose time saved is worth more than the tolls they pay and people who already use transit and will not pay tolls but will travel faster.

However, congestion pricing creates net losses for drivers whose time saved is worth less

than the tolls they pay, drivers who switch to a less convenient route to avoid the tolls, and people on non-tolled routes whose traffic increases when toll drivers from switch to their roads. (p. 124)

“The data support the contention that revenue would be raised largely from NYC residents of moderate income. Without a detailed plan and commitment for revenue allocation, it is unclear whether the plan would ultimately be progressive, regressive, or neutral.” (p. 132)

- **A Quantitative Study of Attitudes Toward I-15 Express Lanes, FasTrak, Carpools and Vanpools, and Premium Bus Service** (prepared for San Diego Association of Governments (SANDAG) by Lawrence Research and Frank Wilson and Associates, November-December 2011)

In this survey, 608 users of I-15 in San Diego County were interviewed by telephone using a random selection process from 25 zip codes “deemed the most logical ones to contain residents that would use the I-15.” The survey results were used to identify seven “audiences of interest,” with capsule descriptions as follows: Road Warriors (commute every workday for more than 20 min); Competitors (those who enjoy passing others more than saving time or money); Time & Money People (those who prefer precision and predictability); Social Media Users (most likely to get information about commuting from Facebook and Twitter); Social Solos (use social media and always use the general purpose lanes); College Commuters (4% of sample, too small to profile); and Hometown Travelers (non-commuters that use the I-15 at least twice a week).

The survey asked questions about usage, perceptions, awareness, and motivations for using FasTrak, carpools and vanpools, and bus service. The survey did not ask directly about attitudes toward fairness. Nonetheless, the report discusses fairness and offers the following observations:

“By a 51-26 margin [presumably percent], non-FasTrak users feel that the tolls are reasonable... if fairness were a biting issue among the commuting public, the percentage of people stating that the fares are very unreasonable would be considerably higher than 9%.” (p. 33)

Answers to questions about whether the I-15 Express Lanes were effective in reducing congestion in the general purpose lanes led to the following observation: “If the traveling public really had strong feelings about the lanes being unfair to the lower socio-economic stratum, more of them would disparage the lanes as ineffective. As it is, only one in ten, again, fall into that category.” (p. 33)

“Further, if fairness were an issue, one would expect it to appear most prominently among

those with the lowest incomes. But in reality, those making less than \$60K are no more likely to give the ‘not at all’ answer [regarding whether the express lanes reduce congestion in general purpose lanes] than the average person.” (p. 34)

The report concludes, “the overall results seem to indicate that concern about fairness is overblown and can be placed in a third or fourth tier of importance.” (p. 34)

- **Equity and Congestion Pricing: A Review of the Evidence** (L. Picola and T. Light, RAND TR680, 2009)

This report summarized published work on equity issues associated with congestion pricing, supplementing the research with communication with practitioners. The authors looked both at evaluations of existing pricing implementations, and at models of proposed or hypothetical charging schemes.

The report finds that the answer to whether a particular pricing policy is equitable depends on how equity is defined and even how groups of people are defined, as well as what policies congestion pricing is compared to. Some key observations from the report summary follow:

“If regions spend revenues in ways that benefit low-income individuals, congestion pricing is more likely to be progressive. However, if regions use revenues in a way that benefits all individuals equally, congestion pricing may be, overall, regressive. This is the strongest finding in the economic literature.” (p. x)

“For all forms of congestion pricing (but more for some than for others), the distribution of residents and job opportunities (not to mention shopping, schools, places of worship, and other important destinations) has a large impact on the equity implications.” (p. x)

“High-occupancy toll (HOT) lanes, the most common form of congestion pricing in the United States, tend to raise fewer equity concerns among motorists, since they provide drivers with an additional choice of using a set of priced lanes while allowing them to continue using parallel, free lanes if they prefer. While high-income drivers use HOT lanes more often than other drivers, there is little evidence that low-income drivers are made worse off. However, the equity implications of HOT lanes are affected by the location of residents, the costs of participation, and the way in which revenues are utilized. Some analysts have raised concerns that, if HOT lane revenues are used to expand the road network, they will harm the environment and equity by inducing more traffic growth and sprawl.” (p. xi)

The authors found a “dearth of research on the environmental-justice impacts, [and] very little work on the long-term land-use impacts of congestion pricing, the equity implications

of building new roads with congestion pricing revenue, and how adding congestion pricing to existing transportation-finance mechanisms (as opposed to replacing them) would change the equity implications overall.” (p. xi)

“Congestion pricing proposals can selectively exclude or discount certain individuals (e.g., disabled persons), vehicles, or types of trips to make congestion pricing less expensive. However, the trade-off is a higher number of unpaid or discounted trips, which will reduce incentives that seek to discourage driving on congested roads.” (p. xi)

“A region seeking to implement congestion pricing should look at measuring and assessing equity early in the planning process.” (p. xi)

- **The Acceptability of Road Pricing** (J. Walker, Royal Automobile Club Foundation, May 2011)

This British overview report describes political acceptability of roadway pricing in the United Kingdom and surveys experience from implementation in several European and Asian countries as well as the United States. The report also describes the future of road pricing in the UK and makes recommendations for further research.

The report includes a section discussing equity. “One argument against road pricing is that less-well-off motorists may be priced off the roads, or at least financially disadvantaged.” (p.20)

The report points out how dramatically car ownership has grown since about 1950 as motoring became more affordable. More than half of low-income households (lowest two income quintiles) own a car, and many have more than one. The report observes that “if [road pricing] measures are revenue-neutral...there will on balance be no financial inequity, [though] there may be individual winners and losers.” (p. 21)

“A lot depends on how the revenue is spent, especially if some of it is [dedicated to] transport improvements, especially public transport.” (p. 21)

“A transparent payment mechanism is a good payment mechanism. People who use scarce public resources, including road space, should pay for what they use, and should know why.” (p. 23)

“Studies of HOT lanes...show that there is in fact a fairly even social mix, and that most drivers use the HOT lanes only occasionally.” (p. 23)

“So road pricing in reality would appear to be less unfair than is generally assumed, and

should not be opposed on grounds of equity. And in one sense we would all be winners because congestion and pollution would be reduced.” (p. 23)