This Land Is Your Land, This Land Is My Land

Addressing Equity and Fairness in Tolling and Pricing

David Ungemah

National experience has shown that perceived inequity to disadvantaged communities can derail the consideration of proposed toll and pricing projects. Even in areas with existing toll facilities, new proposals are not immune from fairness criticisms. Left unanswered, fairness issues may overwhelm public opinion and potentially elicit legal concerns. Five general types of equity apply to toll and priced facilities: geographic, income, participation, opportunity, and modal equity. The first two issues are generally more important in the planning process. Issues with geographic equity are largely reflected in public opinion, which in turn reflects participation and modal equity. Income equity also incorporates elements of opportunity equity and modal equity. Through the careful and deliberate planning process, issues pertaining to income equity can more easily be mitigated or alleviated than geographic equity, fulfilling the requirements of environmental justice. As toll and pricing policies are developed, planners and policy makers should address key questions designed to identify (*a*) potential income equity concerns and (*b*) ways to mitigate those concerns that may occur. Although no assessment can completely address all potential issues of equity and fairness, the principle of environmental justice requires transportation professionals to evaluate proposed projects with an open eye and an open mind. Ultimately, no project needs to be delayed or tabled because of issues of equity. Rather, correctly identifying concerns and addressing them through deliberate and transparent policy and action can help further the case for tolls in a broad transportation financing and planning context.

Unlike most other issues initially raised with regard to tolling and pricing, such as privacy and the reliability of technology, issues of fairness and equity continue to be raised as an objection to tolling as often today as they were 10 years ago. Left unanswered, equity and fairness concerns can constitute an insurmountable barrier to implementation.

POLICY FOUNDATION OF EQUITY ANALYSIS

The analytical basis of equity and fairness in the transportation infrastructure and services is found in seven policies and directives, which are described in chronological order:

Texas Transportation Institute, 1106 Clayton Lane, Suite 300E, Austin, TX 78723. d-ungemah@tamu.edu.

Transportation Research Record: Journal of the Transportation Research Board, No. 2013, Transportation Research Board of the National Academies, Washington, D.C., 2007, pp. 13–20.
DOI: 10.3141/2013-03

- Title VI of the Civil Rights Act of 1964, which states, "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance" [Title VI, Nondiscrimination in Federally Assisted Programs, Civil Rights Act of 1964, 42 USC 2000(d)–2000(d)(1)].
- National Environmental Policy Act of 1969, which decided in favor of community-oriented analysis of policy making [The National Environmental Policy Act, 42 USC 4321-4347, Public Law 91-190 (1970), Public Law 94-52 (1975), Public Law 94-83 (1975), and Public Law 97-258 (1982)]. For proposed major transportation facilities, an analysis of environmental impacts that went beyond the infrastructure itself to include a broader geographic area became required.
- Federal Aid Highway Act of 1970, which ensured that transportation facilities be approved "in the best overall public interest" with efforts to eliminate or minimize the effects on community cohesion, employment effects, and the displacement of people [Federal-Aid Highway Act of 1970, 23 USC 109(h), 1970].
- Civil Rights Restoration Act of 1987, which identified the extent to which Title VI applied to include all federal-aid recipients, subrecipients, and contractors, regardless of whether the specific activities in question are federally funded or not [Civil Rights Restoration Act, Public Law 100-259 (S. 557), March 1988].
- Executive Order 12898 of 1994, which established the precedent that environmental justice consideration be extended to low-income and minority populations and to avoid "disproportionately high and adverse" effects (*1*).
- Two U.S. Department of Transportation implementation actions, which provided requirements and guidance for transportation agencies and professionals in incorporating environmental justice principles in all transportation activities (*2*, *3*).

The above seven actions combine to provide the fundamental concerns of environmental justice (*4*):

1. To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations;
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations.

Environmental justice may be the basis for issues of equity and fairness in the consideration of the funding and planning process; however, the concepts of equity and fairness are not wholly comprised by environmental justice when they are interpreted literally. For example, if a project has benefits for a low-income population (defined by FHWA to mean a population below the U.S. Department of Health and Human Services' poverty guidelines) yet is detrimental to a community just above the poverty level, does this make the project a fair and equitable project simply because it achieves the literal definition of environmental justice (*5*)? (Order 6640.23 references the eligibility criteria for the Community Services Block Grant Program, found at aspe.os.dhhs.gov/poverty/poverty.htm.) To account for issues similar to these, many practitioners advocate for considering the context, perspective, and time frame of policy decisions on the broader definition of disadvantaged groups. Another related equity issue is the situation of two communities with similar demographics, in which one community has extensive toll facilities and the other community does not.

As articulated by a publication from the Institute for Transportation Studies at the University of California at Berkeley, equity and fairness issues most frequently arise when (*6*)

- Some communities get the benefits of improved accessibility, faster trips, and congestion relief, whereas others experience fewer benefits;
- Some communities suffer disproportionately from transportation programs' negative impacts, such as air pollution;
- Some communities must pay higher transportation taxes or higher fares than others in relation to the services that they receive; or
- Some communities are less represented than others when policy-making bodies debate and decide what should be done with transportation resources.

These four issues are generally identified within the concepts of geographic equity, income equity, and participation equity. However, there are additional measures of equity and fairness.

The Victoria Transport Policy Institute, Victoria, British Columbia, Canada, identifies opportunity equity issues as they pertain to mobility need and accessibility, whereby certain communities may disproportionately benefit from actions taken by the state. In a violation of opportunity equity, the extent of mobility needs may be greater for Population A than Population B, but mobility enhancements are offered disproportionately to Population B (*7*). Put differently, if a toll road serving a high-income community rather than a needed road from a low-income community is implemented solely because of cost recovery, this would violate the concept of opportunity equity.

In a study for the Santa Clara Valley Transportation Authority, San Jose, California, for the specific evaluation of equity for high-occupancy toll (HOT) lane facilities, researchers identified a fifth type of equity consideration, modal equity, which pertains to the perceived attractiveness of commuting by single-occupant vehicles (SOV) in HOT lanes relative to the travel time benefits extended to high-occupancy vehicle (HOV) users under HOV lane operations (*8*). In other words, carpoolers and bus riders may be predisposed against toll roads, as they believe that one should do the right thing to have the travel time benefits that these facilities provide. Such an attitude would be an example of perceived modal equity.

EQUITY ISSUES IN TOLL PROPOSALS

A fair and equitable policy regarding tolls must be viewed in a contemporary context. Eighty years ago, publicly financed roads were perceived as unfair, as an extremely small portion of the population owned an automobile. Tolls were used extensively in the first few centuries of this country's existence and into the first five and a half decades of the 20th century. Eventually, however, fuel taxes won out as the primary tool for financing the development of the modern highway system, as the correlation between road use and fuel was viewed as a sufficient nexus. Today, vehicle ownership is pervasive, and at some point the vast majority of the adult population personally drives a vehicle on a public road [according to the 2000 census (Summary File 3 data), approximately 96% of owner-occupied households and 78% of renter-occupied households throughout the United States have a personal vehicle available]. As a result, public opinion now tends to view roads as a public good. Because of rising fuel efficiencies and fixed taxation levels, fuel tax revenue as a percentage of the transportation need has been declining substantially, and actual tax receipts may soon be in decline (*9, 10*). As governments turn to tolls as a way of shoring up transportation funding, public opinion concerns with equity have also risen with it.

Tolling currently has many applications in the United States. The various applications can be summarized into four general categories, with the understanding that some proposed projects do not fit neatly into these four categories: flat-rate tolls on highways and bridges (traditional toll facilities), variable-rate tolls on highways and bridges (value pricing), variable-rate tolls on exclusive facilities within corridors (express toll lanes), and variable-rate tolls on exclusive HOV facilities (HOT lanes). A fifth category also deserves to be mentioned: vehicular use pricing. Vehicular use pricing includes advanced implementations such as a vehicle-miles-traveled (VMT) toll and a cordon toll. These applications have not been implemented in the United States or Canada; but they have had some limited applications in Great Britain, Singapore, Norway, and Germany.

Although different in their implementation and focus on the five areas of equity outlined above, these categories all face the same test of fairness: the distribution of costs and benefits and the public acceptance of that distribution. Public opposition rather than a technical evaluation of equity has been the overriding factor in tolling projects that have failed to come to implementation. As a result, the review of equity issues in toll projects is largely a study of public opinion.

The concept of tolling is new in many states, and proposed projects have inevitably been controversial to one extent or another everywhere they have been considered. Toll projects have remained controversial for a variety of reasons. As they pertain to equity and fairness, the reasons include concerns for low-income individuals, the geographic distribution of toll benefits and burdens, and fairness to user classes. Addressing concerns of equity and fairness has taken a considerable amount of time to nurture even in states where projects have been implemented, such as California, New York, Minnesota, and Texas. In all states, public opinion generally was lukewarm, at best, to start (*11–13*).

Limited studies on the fairness of new toll facilities have been conducted. Generally, proposed new road or bridge projects with a tolling element have been criticized on the basis of established environmental documentation procedures, even if the principal (unofficial) objection on the part of opinion setters has been the fairness of tolling. Examples can be found with the Jefferson Parkway (W-470) proposed toll corridor in Colorado, the Mid-State Tollway in Alameda and

Contra Costa Counties in California, and the Trans-Texas Corridor in Texas. As a result, separating issues of equity from other facility development issues is difficult in this scenario.

By comparison, a larger amount of data from the study of equity for recent value pricing pilot program projects are available. Extensive evaluation efforts of the State Route 91 (SR-91) express toll lanes (Orange County, California) and Interstate 15 HOT lanes (San Diego, California) have yielded significant data. Additional efforts to investigate and document equity issues have been conducted for I-394 HOT lanes in Minneapolis, Minnesota; I-25 HOT lanes in Denver, Colorado; the Tappan Zee Bridge value pricing in Westchester County, New York; and the Leeway Toll Bridge value pricing in Lee County, Florida. Some of the more conclusive findings from this body of research are reported below:

1. The Center for Transportation Research at the University of Texas conducted a statewide public opinion assessment of new toll roads, new toll lanes, and HOT lanes in various areas of Texas for the Texas Department of Transportation. In general, a majority of respondents throughout Texas indicated that toll roads were unfair (55%), should not be used to finance new roads (51%), and should not be used to finance improvements to existing roads (71%). Negative perceptions of the fairness of toll roads occurred more often for respondents in areas currently without toll roads (such as Lubbock, Corpus Christi, and San Antonio) than in areas with toll roads (such as Houston and Dallas), typically by 10% to 15%. Although the negative responses are strong and indicate a clear public perception issue with the fairness of tolls, it should be noted that Texans favored tolling over fuel taxes in all areas except San Antonio. Finally, although support for tolls on new and existing roads was low, support for HOT lanes was much stronger, with 52% in favor (*14*).
2. The California Polytechnic State University evaluated the user profiles of travelers on SR-91, an express toll lane, immediately following implementation and opening of that facility. The findings from that evaluation, repeated often to counter criticism of the equity and fairness issues related to express toll lanes and HOT lanes, indicated that low-income drivers use the express lanes and that they approve of them as much as higher-income drivers. More than 50% of commuters with annual household incomes of less than $25,000 approved of the express toll lane concept on SR-91, again similar to the opinions of those with higher household incomes (*15*).
3. A Villanova University study of transponder acquisition on the SR-91 express lanes found an inequitable hurdle for low-income drivers to access the facility because of the unavailability of credit cards, checking accounts, or sufficient cash savings to pay for transponder deposits. These barriers become a greater barrier to use of the facility than trip cost when they are modeled for lower-income users (*16*).
4. Research efforts for the I-15 HOT lanes included attitudinal and use studies of the existing I-15 HOT lanes and stated preference surveys for the I-15 managed lane expansion proposal. The results showed that lower-income drivers used the HOT lanes (as toll payers) less than a normalized model would reflect for the facility but expressed opinions favorable to the program and to its fairness (*17*). This attitude was confirmed in an extensive stated preference survey for the proposed managed lane expansion. That survey found that 60% of low-income respondents approved of the HOT lane concept (roughly equivalent to the percentage of higher-income respondents who approved), 78% of low-income respondents believed that the concept of using the lanes for a toll was fair (there was no statistically significant difference in the responses between individuals of different income levels), and 75% of low-income respondents expressed support for the concept of managed lanes in general (a percentage higher than that for the middle-income respondents). The highest stated desired uses of revenue were to improve all San Diego freeways (31%), improve I-15 general-purpose lanes (28%), improve I-15 express lanes (20%), extend I-15 express lanes (15%), and add more general-purpose lanes to I-15 (12%). Overall, the survey found significant evidence that HOT lanes do not negatively affect lower-income communities (*18*).
5. Researchers at San Jose State University and the University of California at Berkeley investigated equity issues regarding HOT lanes in particular for the Santa Clara Valley Transportation Authority. First, they found that income equity was the most frequently cited equity concern. Second, they determined that geographic equity concerns arise when project benefits and costs have strong spatial patterns or when different constituencies are noticeably segregated. For example, the authors specifically cited an example of proposed HOT lanes in Maryland. Residents who lived closer to Washington, D.C., feared that the toll rate for them to use the HOT lanes would be made higher by the volume of travelers commuting from farther out. As a result, they perceived HOT lanes to be inequitable, as the proposed lanes would not benefit them (on a cost-per-use basis) as much as it would residents farther out from the District of Columbia. This is similar to complaints often heard on the city's Metrorail system: the trains are already full by the time they reach the inner stations. Finally, researchers determined that modal equity was a real concern to groups that promote transit, carpools, or other modes. Concerned participants do not believe that it is fair to offer the same travel time savings to those who pay a toll as for those who do the right thing by sharing a ride or riding the bus (*8*).
6. For new toll roads and bridges, the World Bank identified toll roads as a way to positively influence equity by supporting infrastructure networks in areas that are less wealthy than others. To accomplish these objectives, toll revenues must be redistributed with the expressed goal of aiding less developed areas. Additional ways that tolls can be used to benefit equity include the provision of financial support or the charging of lower tolls for targeted communities (*19, 20*). This concept is counter to the conventional wisdom in the United States, where there is a strong bias toward the idea that toll revenues should be used within the corridor or area where they were generated.

EQUITY OF CURRENT FINANCING SYSTEM

Any analysis of the fairness of toll projects needs to consider the fairness of the current system of financing. Policy makers generally consider fuel taxes to be a reasonable proxy for use fees, as the more that one travels on the state highway network, the greater are the taxes that will be paid. Although fuel taxes do correlate use with payment, they are a brute-force tactic that poorly conforms to the actual cost of building, maintaining, and operating facilities at maximum effectiveness. Examining national trends, a Brookings Institution report identified federal, state, and local gas taxes as covering only one-third of total highway investment revenue. Even accounting for other user fees (such as vehicle taxes, vehicle fees, and tolls), less than 60% of all highway revenue is derived from direct user fees (*21*).

In addition to the overall funding of transportation investments, the fuel tax itself is a poor proxy for the actual value of transportation services and resources. As indicated by the Brookings Institution report, the growth in VMT has greatly outpaced the growth in gasoline consumption (*21*). Through the 1970s, VMT growth tracked gasoline

consumption growth nearly one to one. Starting in the 1980s, though, the increasing fuel efficiencies of automobiles and the use of alternative-fuel vehicles widened the gap between VMT and gasoline consumption. To the extent that VMT reflects the actual use of the transportation system, the fuel tax became less of a direct payment for use. According to the California Policy Research Center, Berkeley, in 1999,

> The result is that, as less tax revenue per gallon is generated, Americans drive about twice as many miles per gallon; therefore, fuel tax revenues have plummeted when measured per mile of driving. What is more, congestion is worsening throughout the nation as revenues from user fees level off in current dollars and decline in buying power, and decline even more per vehicle mile traveled. (*22*)

The imbalance between the use of highway facilities and payment for those facilities has been manifest in increasing congestion. Congestion reflects a market-based shortage between capacity (supply) and vehicular volume (demand). Provided that fuel taxes remain a poor proxy for use, the "price" of using any given highway at any given point in time is set too low relative to demand and supply. Travel time delay is the unintended consequence of the inability to meet use with payment through fuel taxes. FHWA estimated that automobile users paid only 70% of the amount needed for their use of highways, with certain classifications of trucks contributing only 40% (*23*). Travel time delay resulting from the inefficient use of pricing not only affects the actual users of highways at the time of use but also nonhighway users (such as transit riders) and consumers (reflected as an indirect cost of goods movement). Altogether, congestion creates an inequitable consequence: nonusers are penalized by the inability to price users correctly.

In the long term, pricing and tolling offer opportunities to address this inequity, best summarized by a separate Brookings Institution paper:

> Some argue that congestion pricing discriminates against the poor. Yet the current system of transportation finance is not at all neutral with respect to income, and a system of direct charges for actual benefits gained from using the system is inherently fairer than a complex system of cross-subsidies. For many trips, the proposed approach would lower trip costs compared with the current means of pricing travel. . . .
>
> As recognized in the 1920s, directly charging users at the time and place of use is the fairest and most efficient way of financing transportation systems. A change over time to electronic user fees could correct other inequities in the current system of user charges. (*22*)

ADDRESSING EQUITY CONCERNS

National experience has shown that equity issues can become a factor in the consideration of proposed toll and pricing projects. However, careful and deliberate planning may help mitigate equity concerns. As states and metropolitan areas in the United States move forward with the consideration of tolls and pricing, planners and policy makers should address key questions designed to identify potential equity concerns and ways to mitigate those that may occur. Some of these questions include the following:

- Are proposed toll facilities located in the areas of highest need?
- Are proposed facilities disproportionately influenced by potential cost recovery?
- Are the distributions of benefits aligned with the principles of environmental justice?
- Are there ways to redistribute revenues to disadvantaged communities?
- Have alternative access options been considered for the facility, such as free use by HOVs or discounted toll rates for low-income households?
- If electronic tolling is included, have issues related to credit cards and account debits been resolved to permit the broadest opportunity to participate as possible?
- Are interest and citizen groups properly involved throughout the process of identifying projects and considering the impacts on their communities?

Although no assessment can completely address all potential issues of equity and fairness, the principle of environmental justice requires transportation professionals to evaluate proposed toll projects with an open eye and an open mind. Ultimately, no project needs to be unnecessarily delayed or tabled because of issues of equity. Rather, the correct identification of concerns and mitigation of those concerns through deliberate action can ensure a win–win solution for project development.

As a point of reference for equity analysis, it may be helpful to refer to the five principal types of equity considerations, which all relate to the distribution of benefits and burden of toll or pricing projects:

- Geographic equity. Are improvements distributed in a logical and rational manner, based on some objective and measurable criteria?
- Income equity. Do improvements negatively affect economically disadvantaged communities? Are improvements with negative consequences necessary for greater state or regional vitality?
- Participation equity. Do disadvantaged communities have a voice in the decision-making process, and is that voice adequately represented relative to the scale of the impact?
- Opportunity equity. Are decision-making criteria, such as cost recovery, influenced by secondary affects, such as income status?
- Modal equity. Do activities conflict with public perception for the encouragement of multimodal transportation?

All five equity and fairness issues can pertain to the consideration of toll and pricing concepts. Furthermore, these five issues are not separate from one another. For example, determining what is fair regarding the geographic distribution of toll projects (geographic equity) invariably involves the public participation process, an element of participation equity. Transportation planners involved with pricing and toll projects have identified the first two areas of equity—geographic equity and income equity—as the two most problematic for public perception. However, by maintaining a consistent and knowable process in selecting toll and pricing projects, it should be possible to minimize the fairness and equity controversy.

Geographic Equity

Geographic equity is guided by public opinion and awareness. Public opinion shapes local policy choices, which are then articulated on the regional level in the pursuit of projects. If a local population believes that its residents are not receiving their fair share from federal and state transportation financing sources, this concern will inevitably be raised with regional, state, and, in some cases, federal policy makers. In the regional and statewide planning processes, geographic equity

is one of the principal considerations for federal and state project selection. Given the desire to apply a consistent project selection process, the existing planning process has a significant role in geographic equity.

Put simply, geographic equity, as manifest in public opinion, addresses two basic types of concerns:

- The geographic impacts of deciding to place a toll on a facility. The public often expresses concerns about (*a*) the fairness of charging a toll on one facility but not another, (*b*) the use of transportation funding freed up because of the use of tolls on a facility, and (*c*) local accessibility burdened by tolls, which are, in turn, addressing regional demand.
- The process of selection of toll projects. The public also expresses concerns regarding the selection of toll facilities and the consistency in the application and the process of selection.

Before it can be understood how the tolling and pricing of transportation facilities may detract or enhance geographic equity, it is necessary to understand the fairness of the current distribution of transportation resources. If the general public does not believe that the current system is fair, then its evaluation of toll concepts will be influenced by this determination. Toll equity cannot be examined in a vacuum independent of the current distribution of resources.

The first step involves defining "fair" in the regional and statewide transportation planning and financing processes. A dictionary definition of "fair" uses descriptors such as "lack of favoritism," "free from preference in judgment," "dictated by reason," and "unbiased." The public may hope for an idealized decision-making process that is applied on the basis of objectively established criteria, but when transportation funding is limited, some form of preference is inevitable. Even an objective process will have criteria measured by subjective weighting: how much preference is given to regional congestion relief, for example, as opposed to local accessibility?

Addressing geographic equity involves the examination of toll proposals that enhance regional mobility but that have the perceived impact of burdening local accessibility (or, potentially, vice versa). In other words, if a new toll project involves improvements to better serve regional trip making, local residents may perceive themselves as carrying the burden of toll payment, as they may have no realistic option to avoid the toll. This is primarily a public opinion challenge. Understanding what is acceptable for local communities is ultimately addressing public education and attitudes, and these will already be influenced by the perceived fairness of the distribution of regional tax dollars for transportation. Invariably, the issue of geographic equity for all transportation improvements is a matter of political choice: when the resources are fewer than the needs, choices must be made.

Three levels of geography relate to transportation improvements: (*a*) statewide, (*b*) regional, and (*c*) local. These geographic levels do not necessarily correspond to the funding source but correspond just to the type of project.

Statewide improvements are those transportation facilities and corridors of significant value to the movement of either people or freight between regions. Obvious facilities include the Interstate and U.S. highway network, as well as less obvious aviation system facilities. Statewide improvements generally fall to investments that ensure efficient and effective travel throughout the state. Although many (if not most) state residents will never directly use the specific improvement corridor, especially if they are outside the Interstate network, the secondary effects of improvements on the movement of goods and people will be realized throughout the regional and local economies.

Regional improvements are related in purpose to statewide improvements, but their benefits are primarily identified within confined areas, and they involve transportation facilities that enhance the movement of people and goods within a prescribed region. Certainly, many regional improvements will benefit residents outside of the region, much as statewide improvements do. However, the intent of regional improvements is to benefit the movement of travelers and freight for trips within the region. These trips will likely extend across multiple jurisdictions but will be contained within the extended regional area.

Local improvements rarely involve the broad mobility enhancements of statewide and regional improvements. Rather, these improvements offer local accessibility to regional and statewide corridors. Wholly contained within one or two jurisdictions, local improvements will provide a service or facility whose benefits are likely tendered to the residents or businesses within a short distance of that facility.

All three types of transportation improvements are important to the public, yet the funding mechanisms for these improvements are relatively discrete. Federal and state funds are generally applied to regional and statewide improvements (with exceptions), and local funds are generally applied to local improvements (again, with exceptions). Generally, the public does not understand these distinctions. For example, a resident may equally desire improvements to local and regional facilities and believes that a decision for both comes from the same "pot" of funding (e.g., "my gas taxes"). Such belief can lead to equity-related questions that may not be appropriate to the scope of the project, leading to inappropriate comparisons, such as "it's not fair that Community X on the opposite side of town has congestion-free arterials when my arterials are clogged daily" (local versus local fairness, viewed under an incorrect regional lens).

As illustrated in the example, the public perception dilemma with fairness is not easily addressed within the context of only one or two of the geographic applications: what may be perceived by the implementing agency as a fair distribution of regional or statewide resources may not be viewed as fair by the residents. However, the existing system of funding transportation improvements requires this geographic separation.

The consideration of toll corridors primarily involves the consideration of regional and statewide improvements. As a result, the context of improvements should address regional and statewide mobility and efficiency.

Altogether, fairness in transportation finance, with a new layer of toll financing, can be simplified to three fundamental categories of questions for application on a geographic scale. These questions remain at the forefront of the planning process and equally involve the consideration of tax-financed or toll-financed projects:

- Current allocation of benefits and burdens. As any decision-making process involves some allocation of preference, is the current system of distribution based on a selection system that is applied in a just and consistent manner with transparent and measurable criteria? Is there an opportunity for input into this selection process?
- Future allocation of new benefits. Is the allocation of new project concepts (in the context of this study, toll corridors) likewise based on a selection system that is applied justly and consistently? Is the selection process compatible with the existing system? Again, is there an opportunity for input into this selection process?
- Future allocation of new burdens. Are there statewide or regional needs that are unjustly ignored or penalized in the consideration of the new project concepts? Are local communities that may

be dependent on regional facilities for local access unjustly financing regional improvements for their access, or is the burden for the regional improvement shared throughout the region? Has the previous distribution of statewide and regional resources for local accessibility potentially offset this concern?

Income Equity

Unlike geographic equity, the analysis of which is primarily in the realm of public opinion and policy setting, the analysis of income equity is based within the principles of environmental justice. After federal and state actions since 1964, fundamental policy-making principles have been articulated for environmental justice (*24*):

1. To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations;
2. To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and
3. To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations.

Earlier, this paper identified key questions pertaining to the potential effects of tolling on lower-income and poverty-stricken communities, consistent with the application of environmental justice. For toll projects, the particular question is whether payment of a toll may be an additional burden. The evaluation needs to consider the net benefit or net burden of the toll itself on these communities, the access to the system because of the ability (or lack thereof) to pay a toll, and available alternatives to paying the toll.

Toll projects are not necessarily punitive to low-income populations. Particular situations in which toll projects avoid negative impacts on low-income populations include the following:

1. When toll projects create a positive spillover effect on adjacent facilities. If demand management through tolling creates net localized or net systemwide benefits to traffic, congestion, and mobility, low-income travelers may benefit from toll facilities even if they never actually paid the toll charges. This scenario typically occurs in capacity enhancement projects, but it can also occur in system management toll applications.
2. When the value of time of lower-income drivers is higher than the prevailing toll charge. As witnessed on SR-91 in California, low-income drivers use and benefit from the toll facilities because the value of their time sometimes exceeds the toll charge. Qualitative research on SR-91 indicated that low-income, working, single parents had a high value of time in the p.m. peak period, when the threat of overtime charges at day care facilities was greater than the prevailing toll charge. In this situation, lower-income travelers still have a net financial benefit from the use of the facility. The situational value of time comes into play more often for lower-income travelers than higher-income travelers, as the willingness to pay may depend on only certain travel situations.
3. When toll projects provide new mobility options, without a loss of existing mobility options. The principles of environmental justice ensure that benefits are not reduced or delayed. In the situation of toll projects that enhance mobility options (such as advancing new regional capacity for travel time savings or extending modal benefits), the net effect is positive regardless of the mechanism of payment, provided the alternative (existing) options are not harmed by the enhancement. HOT lanes are almost always a net enhancement, provided that existing benefits to carpools and vanpools are maintained, accessibility is not made more difficult, and travel times are sustained on the HOT lane facility.

New toll roads may also be net enhancements; however, the key comparison here is the proposed funding and development situation without the use of toll charges. The net present value of the facility with tolls should be compared side by side with the net present value of the facility without tolls constructed at a later date.

Conversely, the following particular applications of tolling hold the prospect of burdensome impacts on lower-income communities:

1. Toll projects that do not ensure accessibility to the facility, independent of the ability to pay. One pervasive concern of income equity in toll projects is the use of electronic tolling. To the extent that electronic tolling completely replaces cash-based transactions, the criteria necessary to obtain an account undergoes scrutiny for disproportionate effects. If mechanisms that minimize hardship (such as the ability to obtain transponders for a minimal cash outlay, without the need for credit cards or checking accounts for validation) are embraced, these concerns become moot.
2. Toll projects on existing capacity. There may be situations in which tolling of the existing capacity or infrastructure is prudent for policy making, such as building revenue for rehabilitation or managing system capacity. However, these situations could lead to burdens on low-income communities when the traveler's cash outlay needed to use a particular facility increases. Even though pricing may improve the overall effectiveness of a system (such as spreading peak periods and reducing congestion) and thereby deliver net economic benefits to society at large, the out-of-pocket cost to low-income travelers may far outweigh their own value of time. Hence, the cost to use the facility is a net burden on the low-income traveler in this scenario.
3. Projects that jump to the head of the priority queue because of toll revenue. Cost recovery from tolls is one of the primary reasons to pursue toll-financed projects. However, it is also the clearest path to disproportionate harm to lower-income communities. To the extent that traffic and revenue models use income as a component of willingness to pay, then it is likely toll projects adjacent to or contained within higher-income communities will show greater cost recovery than those adjacent to or contained within lower-income communities. In these scenarios, projects are chosen not so much for overall need as for their ability to pay to meet improvements. If a project in a low-income community could significantly enhance mobility but is passed by because of cost recovery concerns, a net burden is placed on the low-income community.

The consideration of tolling and pricing in any given region requires an analysis similar to that for transportation infrastructure allocation. By following a similar analysis, the net effect of tolling on lower-income communities must be considered. Do investments enable disadvantaged residents to access opportunities for income advancement more efficiently and effectively? Are existing burdens addressed through the allocation of facilities or revenues? To answer these questions of income equity, the nature of the type of toll proposed must be understood. The impacts for these general

classifications will differ. General guidance by type of project follows:

- New-facility tolls provide a mobility option that does not currently exist. Provided that the facility itself is warranted and meets the criteria of geographic equity analysis, the only question that pertains to mobility is how toll operations affect the community's mobility options and efficiency.
- Truck-only toll (TOT). The concept of a TOT lane is to help reduce traffic and congestion in the general-purpose lanes. This objective is counter to the prevailing wisdom for the use of HOT lane facilities, in which the express lane is viewed as a traffic relief option from the general-purpose lanes. The basis for the TOT lane policy is the perspective that, by consolidating truck and freight operations into a separate facility, vehicular throughput on the general-purpose lanes is benefited to a degree greater than simply the difference in vehicular density. If TOT operations are shown to reduce traffic and congestion in the general-purpose lanes (the users of which will include lower-income travelers) while maintaining or improving the net economic cost to freight movement, then TOT operations are likely to be a net positive action for general-purpose lane users.
- HOT lanes. HOT lanes with free access to HOV users provide a new mobility option for avoiding congestion within a corridor, with little or no effect on general-purpose lane users. Provided that HOT lane operations enhance HOV lane operations, with no net harm to HOV lane users by the increased travel on the facility, then HOT lanes provide a new mobility option without detriment. Furthermore, the extent to which HOT lane revenues can be used to pay for more corridor-based services (such as improved transit services, park-and-ride services, or operational improvements) will only further extend the equity to lower-income communities.
- Express toll lanes (ETLs). ETL concepts involve charging all users for use of the lanes. The principal purpose of ETL is congestion relief and revenue generation. ETL analysis and the net impacts will differ significantly, depending on the specific proposal. For example, if the ETL involves new capacity construction, then the net effects of TOT and new-capacity tolls apply. If an ETL also involves the conversion of an HOV lane, the loss of free use of the HOV lane constitutes a loss of congestion relief for those unwilling to pay the toll. Although capacity enhancement will have occurred in this corridor, the loss of a mobility option today may constitute a burden on lower-income communities. However, as with any toll project, the use of revenue can offset impacts. For example, if ETL revenues advance the construction of new transit facilities or enhance transit services (such as bus rapid transit), then the effects on lower-income communities may be minimized, depending on the nature and the routing of the services.
- System management tolls. System management tolls involve tolling of all users of a facility to reduce congestion and enhance throughput. Like ETL tolling, system management tolls have too many variables to generally classify the concept as a net benefit or burden to lower-income communities. For example, if tolls may be avoided through the use of HOVs with three or more passengers (HOV3+) and transit modes of travels, the net mobility may be improved through a reduction in congestion either as SOV or HOV2 user or as an HOV3+ user with toll avoidance. However, if the value of time for lower-income travelers is significantly less than the prevailing toll charge and there is an economic cost to carpool formation, even HOV3+ use without a toll may still yield a net burden on lower-income communities. As indicated in public research, any application of tolling on existing nontolled, general-purpose lane capacity is extremely controversial and rarely successful.

In addition to the ability to access and use toll facilities, addressed above as a mobility question, system accessibility is an important consideration in income equity. For this purpose, "system accessibility" is defined as the specific methods used for toll payment. For most of the proposed toll corridors, electronic toll collection will be the primary method for toll payment. However, as indicated in the national research, barriers to the acquisition of transponders and toll accounts constitute a burden to lower-income communities. These barriers include the requirement to maintain checking or credit card accounts for automatic debits or even the outlay of a substantial volume of cash if automatic debits are not mandated. To many lower-income households, these barriers are significant.

CONCLUSIONS

Although no assessment can completely address all potential issues or equity and fairness, the principle of environmental justice requires transportation professionals to evaluate proposed projects with an open eye and an open mind. This paper identifies a framework for categorizing and identifying potential issues pertaining to equity and for analyzing those issues in the planning process. However, each project will be different, as will the dynamics of each state and region. The analysis of equity issues requires attention to detail and openness in participation. Ultimately, no project needs to be unnecessarily delayed or tabled because of issues of equity. Rather, correctly identifying concerns and addressing them through deliberate and transparent policy making and action can help further the case for tolls in a broad transportation financing and planning context.

ACKNOWLEDGMENTS

The author acknowledges the Washington State Department of Transportation, the Washington State Transportation Commission, and Cambridge Systematics, Cambridge, Mass., for their sponsorship of and assistance with this research.

REFERENCES

1. Executive Order 12898. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. *Federal Register*, Vol. 59, No. 32, Feb. 16, 1994.
2. *DOT Order on Environmental Justice to Address Environmental Justice in Minority Populations and Low-Income Populations.* DOT Order 5610.2. U.S. Department of Transportation, April 1997.
3. *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* DOT Order 6640.23. U.S. Department of Transportation, Dec. 1998.
4. *Questions and Answers on Environmental Justice and Title VI.* FHWA, U.S. Department of Transportation. www.fhwa.dot.gov/environment/ejustice/facts/index.htm. Accessed July 27, 2007.
5. *FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.* DOT Order 6640.23. U.S. Department of Transportation, Dec. 1998.
6. Cairns, S., J. Greig, and M. Wachs. *Environmental Justice and Transportation: A Citizen's Handbook.* Institute of Transportation Studies, University of California, Berkeley, Jan. 2003.
7. Littman, T. *Evaluating Transportation Equity: Guidance for Incorporating Distributional Impacts in Transportation Planning.* Victoria Transport

Policy Institute, Victoria, British Columbia, Canada, Sept. 2005. www.vtpi.org/equity.pdf. Accessed July 27, 2007.
8. Weinstein, A., and G.-C. Sciara. Assessing the Equity Implications of HOT Lanes. Santa Clara Valley Transportation Authority, San Jose, Calif., Nov. 2004.
9. Frequently Asked Questions. Road User Fee Task Force, Office of Innovative Partnerships and Alternative Funding, Oregon Department of Transportation, Salem, Ore. www.oregon.gov/ODOT/HWY/OIPP/ruftf_faq.shtml. Accessed July 27, 2007.
10. Taylor, B., A. Weinstein, and M. Wachs. *Reforming Highway Finance: California's Policy Options.* University of California Transportation Center, Berkeley, 2001. www.uctc.net/papers/488.pdf. Accessed July 27, 2007.
11. Munnich, L. W., Jr., and J. D. Loveland. Value Pricing and Public Outreach: Minnesota's Lessons Learned. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1932*, Transportation Research Board of the National Academies, Washington, D.C., 2005, pp. 164–168.
12. Ungemah, D., M. Swisher, and C. D. Tighe. Discussing High-Occupancy Toll Lanes with the Denver, Colorado, Public. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1932*, Transportation Research Board of the National Academies, Washington, D.C., 2005, pp. 129–136.
13. Stockton, W. R., C. L. Grant, F. McFarland, N. R. Edmonson, and M. A. Ogden. *Feasibility of Priority Lane Pricing on the Katy HOV Lane: Feasibility Assessment.* Research Report 2701-F. Texas Transportation Institute, Texas A&M University, College Station, June 1997.
14. Podgorski, K., and K. Kockelman. *Public Perceptions of Toll Roads: A Survey of the Texas Perspective.* Center for Transportation Research, University of Texas at Austin, 2005. www.ce.utexas.edu/prof/kockelman/public_html/TRB05PublicResponsetoTRs.pdf. Accessed July 27, 2007.
15. Sullivan, E. *Continuation Study to Evaluate the Impacts of the SR-91 Value-Priced Express Lanes.* Final report. California Polytechnic State University, San Luis Obispo, Dec. 2000. ceenve3.civeng.calpoly.edu/sullivan/SR91/final_rpt/FinalRep2000.pdf. Accessed July 27, 2007.
16. Parkany, E. Environmental Justice Issues Related to Transponder Ownership and Road Pricing. In *Transportation Research Record: Journal of the Transportation Research Board, No. 1932*, Transportation Research Board of the National Academies, Washington, D.C., 2005, pp. 97–108.
17. Supernak, J., D. Brownstone, J. Golob, T. Golob, C. Kaschade, C. Kazimi, E. Schreffler, and D. Steffey. *I-15 Congestion Pricing Project Monitoring and Evaluation Services: Phase II Year Two Overall Report.* San Diego Association of Governments, Calif. May 2000.
18. Redman, D., J. Norman, and F. Wilson. *I-15 Managed Lanes Value Pricing Project Planning Study*, Vol. 2. *Public Outreach.* San Diego Association of Governments, Calif., Feb. 2002.
19. *Review of Recent Toll Road Experience in Selected Countries and Preliminary Tool Kit for Toll Road Development.* Draft final report. Asian Toll Road Development Program, The World Bank, Washington, D.C. May 1999.
20. *Toll Roads and Concessions.* Ongoing Knowledge Base. The World Bank, Washington, D.C. www.worldbank.org/transport/roads/toll_rds.htm. Accessed July 27, 2007.
21. Puentes, R., and R. Prince. *Fueling Transportation Finance: A Primer on the Gas Tax.* Brookings Institution, Washington, D.C., 2003. www.brookings.edu/es/urban/publications/gastax.pdf. Accessed July 27, 2007.
22. Wachs, M. *Improving Efficiency and Equity in Transportation Finance.* Center on Urban and Mobility Policy, Brookings Institution, Washington, D.C., April 2003.
23. March, J. Federal Highway Cost Allocation Study, Federal Highway Administration. *Public Roads*, Vol. 61, No. 4, Jan./Feb. 1998. www.tfhrc.gov/pubrds/janpr/cost.htm. Accessed July 27, 2007.
24. *Questions and Answers on Environmental Justice and Title VI.* FHWA, U.S. Department of Transportation. www.fhwa.dot.gov/environment/ejustice/facts/index.htm.

The Environmental Justice in Transportation Committee sponsored publication of this paper.