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Guidebook for Identifying, Measuring and Mitigating Environmental Justice Impacts of Toll Roads

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Tolling of Existing Non-Toll and Toll Roads*

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Introduction

Highway funding constraints in recent years have resulted in the financing of new roads and the modernization of existing roads through investments that will be recovered by toll charges. In Texas, toll equity and Regional Mobility Authorities (RMAs) are voter-approved financial tools to leverage limited state transportation funds. Potential benefits for the Texas Department of Transportation (TxDOT) include savings as RMAs take responsibility for developing infrastructure projects, reduced maintenance expenditures associated with reduced traffic on department facilities, and additional revenue sources (TxDOT, Regional Mobility Authorities: Proposed Preamble). On December 16, 2003, the Texas Transportation Commission thus unanimously approved a policy that directed the TxDOT, RMAs, private developers, counties, and regional toll authorities to evaluate the feasibility of tolling all controlled-access mobility projects in any phase of development or construction (TxDOT, 2004). This directive applied to the following: new facilities, increased capacity (for example, adding frontage roads to existing main lanes), the conversion of existing non-toll roads to toll roads, and the conversion of planned non-toll roads to toll roads. This action fulfills the requirements of Texas House Bill 3588 passed during the 78th Legislature in May of 2003 (see text box) (Krusee, 2003), but it

Texas House Bill 3588

Texas House Bill 3588 addresses the transportation funding shortfall in the State of Texas and expanded the ability of RMAs to construct, maintain, and operate various transportation projects. It also gave TxDOT, RMAs and counties flexibility in deciding whether to develop a non-toll highway as a tolled facility.



has also raised some questions about environmental justice (EJ) and how that relates to tolling.

Toll roads aiming at ensuring mobility, accessibility, and increased travel times may have unintended consequences. Inherently, transportation investments almost always create a disparate impact in that benefits are not equally distributed to all communities impacted by the investments. EJ becomes an issue when minority or low-income communities (referred to as EJ communities) receive fewer benefits and either are or may be disproportionately burdened by transportation investments. The burdens may be the result of negative social, economic, or environmental impacts imposed on those living in the impacted toll project area. But toll road projects could also have additional benefits for EJ communities compared to non-toll road projects. The objective of this guidebook is to present an approach for the identification, measurement, and mitigation of disproportionately high or adverse impacts imposed on minority and low-income (EJ) communities by toll roads relative to non-toll roads.

BACKGROUND

EJ is *“fundamentally about fairness toward the disadvantaged and often addresses the exclusion of racial and ethnic minorities from decision-making”* (Cairns, Greig, and Wachs, 2003). In essence, the goal is thus to ensure that the benefits and burdens (i.e., air pollution, noise, injuries, fatalities, division of communities) are distributed in a manner that will promote a just and equitable society (Cairns, Greig, and Wachs, 2003).

Environmental Justice: A Legal Requirement and Administrative Directive

On February 11, 1994, President Bill Clinton signed Executive Order (EO) 12898 entitled “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations.” EO 12898 requires federal agencies to achieve EJ by identifying and addressing disproportionately high and adverse human health and environmental impacts on minority and low-income populations caused by proposed federal actions¹. Specifically, the EO pointed agencies to the existing regulations contained in the National Environmental Policy Act (NEPA) of 1969, Title VI of the Civil Rights Act of 1964, and the laws that require public input and access to information (Hicks & Company and Rust Environment and Infrastructure, 1997). EO 12898 thus did not create new legal rights. It is not enforceable in a court of law, but an administrative procedure exists to ensure compliance.

EO 12898

(1994) requires federal agencies to achieve EJ by identifying and addressing disproportionately high and adverse human health and environmental impacts on minority and low-income populations caused by proposed federal actions

NEPA

(1969) sets policy goals for the protection, maintenance, and enhancement of the environment

Title VI of the Civil Rights Act

(1964) prohibits discrimination on the basis of race, color, or national origin in participating in, or being denied benefits under any programs or activities that receive federal funding

In response to EO 12898, the U.S. DOT² and the Federal Highway Administration (FHWA)³ issued their own EJ directives. The FHWA policy defined the EJ population groups (summarized in the following table).

¹ Executive Order 12898. 1994. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 Fed. Reg 7629 (section 1-101) (1994), 3 C.F.R. S 859, reprinted in 42 U.S.C. S4321. Available at <http://www.epa.gov/fedsite/eo12898.htm>.

² DOT Order 5610.2 entitled "Department of Transportation Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (February 3, 1997).

³ FHWA Order 6640.23 entitled "FHWA Actions to Address Environmental Justice in Minority Populations and Low-Income Populations" (December 2, 1998).

Minority	Black, Hispanic, Asian American, American Indian or Alaskan Native person
Minority Populations	Any readily identifiable group of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient person (such as migrant workers or Native Americans)
Low-Income Person	An individual with a household income at or below the Department of Health and Human Services poverty guidelines
Low-Income Population	Any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who would be similarly affected by a proposed FHWA program, policy, or activity.

According to the FHWA, the two terms *minority* and *low-income* populations “should not be presumptively combined” when conducting EJ analysis. There are minority populations of all income levels, and low-income populations may be minority, non-minority, or a mix in a given area (Cambridge Systematics, Inc., 2002).

EJ thus requires that a transportation agency determine whether a program, policy, project, or activity will impact minority or low-income populations disproportionately and that these communities are:

- afforded an opportunity under Title VI to participate in the planning process to ensure a non-discriminatory process,
- involved in the identification of impacts associated with the project in an effort to determine if the effects suffered by these populations are disproportionately high, and
- involved in identifying mitigation and enhancement measures associated with a particular project (Novak and Joseph, 1996).

These requirements apply to projects that receive federal funding or require a type of federal permit.

Environmental Justice: Concerns Pertinent to Transportation Projects

EJ is a concern when:

- some communities benefit from improved access, faster trips, and congestion relief, while minority or low-income communities receive fewer benefits,
- minority or low-income communities are disproportionately impacted by transportation projects in terms of social, economic, and environmental burdens, or
- minority or low-income communities are less represented in decisions (Cairns, Greig, and Wachs, 2003).

When conducting EJ analysis, the environment includes the ecological, economic, and social impacts of transportation policies, programs, and projects, as well as the equitable distribution of both benefits and burdens across income and racial population groups.

EJ concerns will often be identified as the affected community evaluates the impacts of transportation

policies, programs, and projects. These concerns can, however, generally be categorized as follows:

Physical Environment Effects	Air, noise, and water pollution, and soil contamination; destruction or disruption of natural resources
Health Effects	Bodily impairment, infirmity, illness or death
Mobility and Safety Effects	Increased traffic congestion, decreased transportation choices, and reduced pedestrian safety
Social and Economic Effects	Destruction or disruption of community cohesion or community's economic vitality; destruction or reduction of aesthetic values; adverse employment effects; displacement of households and businesses; and significant delay in the receipt of benefits from DOT programs

Toll Road Scenarios

Transportation pricing strategies irrespective of the objectives—whether it is to reduce traffic congestion, protect the natural environment, increase transportation revenues, or facilitate the adding of capacity—generally raise equity concerns. It is generally argued that:

- toll roads have a disproportionate impact on lower-income commuters if their workplaces are not accessible by transit,
- the poor bear an unfair burden if they have to shift to congested roads to avoid the toll, and
- low-income drivers may be priced out of discretionary trips (e.g., shopping trips and recreational trips) or be forced to use less attractive modes (e.g., transit, bicycling, or walking) to satisfy their transportation needs when charged a toll (Litman, 2005).

Whether a toll has a disproportionate impact on EJ communities, however, is a function of how many lower-income drivers use the toll facility, how many are discouraged or prevented from using the toll facility, the quality of available alternative transportation options, and how toll revenues are used (Litman, 2005; Litman, 1996; Giuliano, 1994). The EJ analysis of toll roads is complex, as is evident from Table 1, which summarizes the relevant features of a toll road that may potentially impact EJ outcomes.

Table 1: Toll Road Features Relevant for EJ Analysis

Features	Examples
Type of facility	Toll roads with adjacent frontage roads as “free” alternatives
Demographic characteristics of the commuter population	High percentage of low-income/minority travelers and low percentage of high-income travelers
Demographic characteristics of the neighborhood adjacent to the facility	Facility to divide low-income African American neighborhood
Corridor alternatives, including non-auto mode	No non-toll road available Non-toll roads available as “frontage roads” Low frequency of public transit service
Access control	Limited access to local minority neighborhoods Improved access to sensitive places (i.e., hospitals)
Toll pricing structure	Flat rate Dynamic rate Differential rate (e.g., low-income commuters pay less than high-income commuters)

Different ecological, social, and economic impacts may result depending on the features of the toll road. For example, the conversion of an existing non-toll road into a toll road is more likely to have a disproportionate impact on a low-income community living adjacent to the road, especially if residents commute to work by car, rather than a new location facility. Four toll road scenarios (see Table 2) were conceptualized considering the tolling policy adopted on December 16, 2003 by the Texas Transportation Commission. The Commission’s tolling policy applies to new location facilities (Scenario 3), capacity enhancements, for example, additional main lanes or frontage roads to existing facilities (Scenario 3), the conversion of existing non-toll roads into toll roads (Scenario 1), and the conversion of planned non-toll roads to toll roads upon completion (Scenario 2). The pricing structure for all four scenarios assumed a flat rate (i.e., constant toll irrespective of the day of week, time of day, level of congestion, or number of passengers in

the vehicle).

Table 2: Toll Road Scenario Characteristics

Scenario Characteristics	Scenario 1	Scenario 2
Funding	Federal funding	Federal funding
Location	Existing location (existing road)	New location (new road)
Alternative non-toll road within the same right-of-way	No	Not applicable
Planned/Constructed	As a non-toll road	As a toll road
Operated	Initially operated as a non-toll road. Non-toll road converted into a toll road after a period of time.	As a toll road
Scenario Characteristics	Scenario 3	Scenario 4
Funding	Federal funding	Federal funding
Location	New location (new road)	Existing location (existing road)
Alternative non-toll road within the same right-of-way	Not applicable	Yes (frontage roads)
Planned/Constructed	As a non-toll road	As a non-toll road
Operated	As a toll road	Initially operated as a non-toll road. After a period of time, (a) existing lanes are tolled, and adjacent frontage roads are added as non-toll alternatives or (b) the new lanes built in the grass median are tolled and the existing lanes are kept as non-toll alternatives. In both cases, the new capacity is provided within the same right-of-way.

Texas law dictates that the Texas Transportation Commission cannot convert a non-toll road segment into a toll road unless the public has “a reasonable alternative non-tolled route” (Texas Transportation Code Ann. § 370.035(2), Vernon 1999 & Supp. 2004). Because it is still unclear what this provision entails, scenario 1 was conceptualized with no non-toll road alternatives within the same right-of-way (ROW). Scenario 4 assumes adjacent frontage roads as the non-toll alternative within the same ROW. Finally, this provision does not apply to scenarios 2 and 3 as these represent new facilities.

Methodology for Assessing EJ Impacts of Toll Roads

In general, an EJ analysis is required when one of the following two conditions exists:

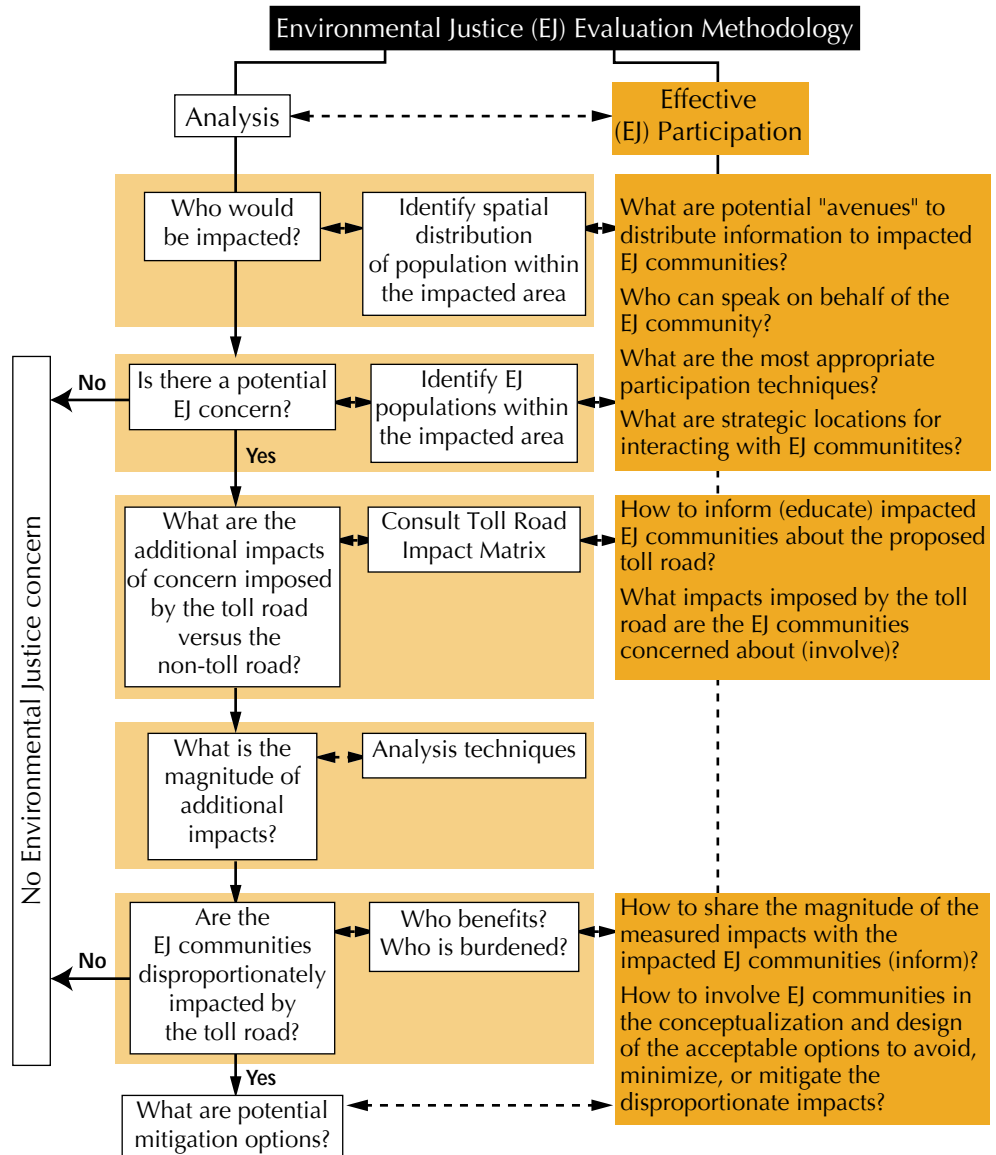
1. there is an EJ community in the impacted area, or
2. the adverse impacts caused by a transportation project could impact the EJ community disproportionately.

Given one of these two conditions, the scoping part of the NEPA process has to be expanded to ensure that low-income and minority populations participate in project decisions and that opportunities are provided for them to become informed, and to voice their concerns. This guidebook describes an EJ evaluation methodology (EJEM) to identify, measure, and mitigate EJ concerns associated with four defined toll road scenarios relative to non-toll roads. The methodology has two equally important components: an analysis/quantitative and an effective EJ participation component (see Figure 1). The analysis component requires the analyst to:

1. identify the demographic profile and the spatial distribution of population groups within the impacted area,
2. identify the spatial concentrations of EJ communities in the impacted area,
3. identify the additional impacts of concern associated with the toll road relative to the non-toll road,
4. calculate the additional impacts,
5. determine whether zones with higher concentrations of EJ populations are disproportionately impacted by the toll road, and finally

6. identify and formulate mitigation options if it is found that the impacts imposed on zones with higher concentrations of EJ populations are considerably more severe than the impacts imposed on zones with lower concentrations of EJ populations.

Figure 1: Environmental Justice Flowchart for Toll-Road Projects



A key component of any EJ analysis is the inclusion of low-income and minority populations in the planning process, providing input and data, project design, identifying the benefits and burdens of proposed facilities, and identifying mitigation measures. The second component of the EJEM, EJ participation, thus aims to ensure that EJ communities are given the opportunity for meaningful participation. EJ community outreach efforts are foreseen during various steps of the analysis to ensure that all the adverse impacts are known and that effective mitigation options are designed to lessen or offset the disproportionately high impacts.

Analysis/Quantitative Component

Who Would Be Impacted?

The first step is the identification of the population potentially impacted by the proposed toll road. The U.S. Census Data and GIS-based techniques are very useful when developing demographic profiles by allowing for analyses at very disaggregate levels of geographic detail (e.g., census block, grids). Also, the analyst is referred to the EnviroMapper tool developed by the Environmental Protection Agency to assist with EJ analysis (see <http://www.epa.gov/compliance/wherelive/ejtool.html>).

Forkenbrock and Sheeley (2004) recommended the following scale of geographic analysis when using U.S. Census Data:

- states, counties, and census tracts for the initial assessment of corridor studies and when the scale of impacts are assumed to be uniform over the affected area, and
- block, block group, and TAZs for detailed corridor-level and project-level assessment and when the impacts require a high degree of demographic resolution.

When identifying impacted population groups at the project level the scale of geographic analysis selected is very important, because the geographic scale selected when identifying EJ communities (i.e., census tract, block, block group, and TAZs) could potentially affect the demographic profiles of the impacted area.

The identification of EJ communities using the conventional

Threshold Approach

When identifying EJ communities using the threshold approach, the demographics of the impacted area is compared with the demographics of a more general area (referred to as the community of comparison or COC).

approach, which classifies communities into target (EJ) and non-target (non-EJ) populations using threshold values, is

influenced by the geographic scale of analysis used. Figure 2 illustrates that the classification of target and non-target minority/low-income populations in the study area changed when the scale of geographic analysis (i.e., tracts, block groups, blocks, and TAZs) changed. The figure shows that the coarse scale of TAZs used in travel demand modeling might overlook smaller minority/low-income population groups and prevent the calculation of local impacts (e.g., calculate access to sensitive sites). A more complete classification of the EJ communities was obtained at the block level and it is therefore considered more appropriate to assess EJ concerns of toll-road projects when (a) the impacts are not uniformly distributed over the impacted area, (b) there is a possibility that smaller low-income and minority communities might be overlooked at more aggregate levels of geographic analysis, and (c) the proposed toll project is perceived to be highly controversial.

Figure 2: Spatial Distribution of Minority Populations Given Different Geographic Scales

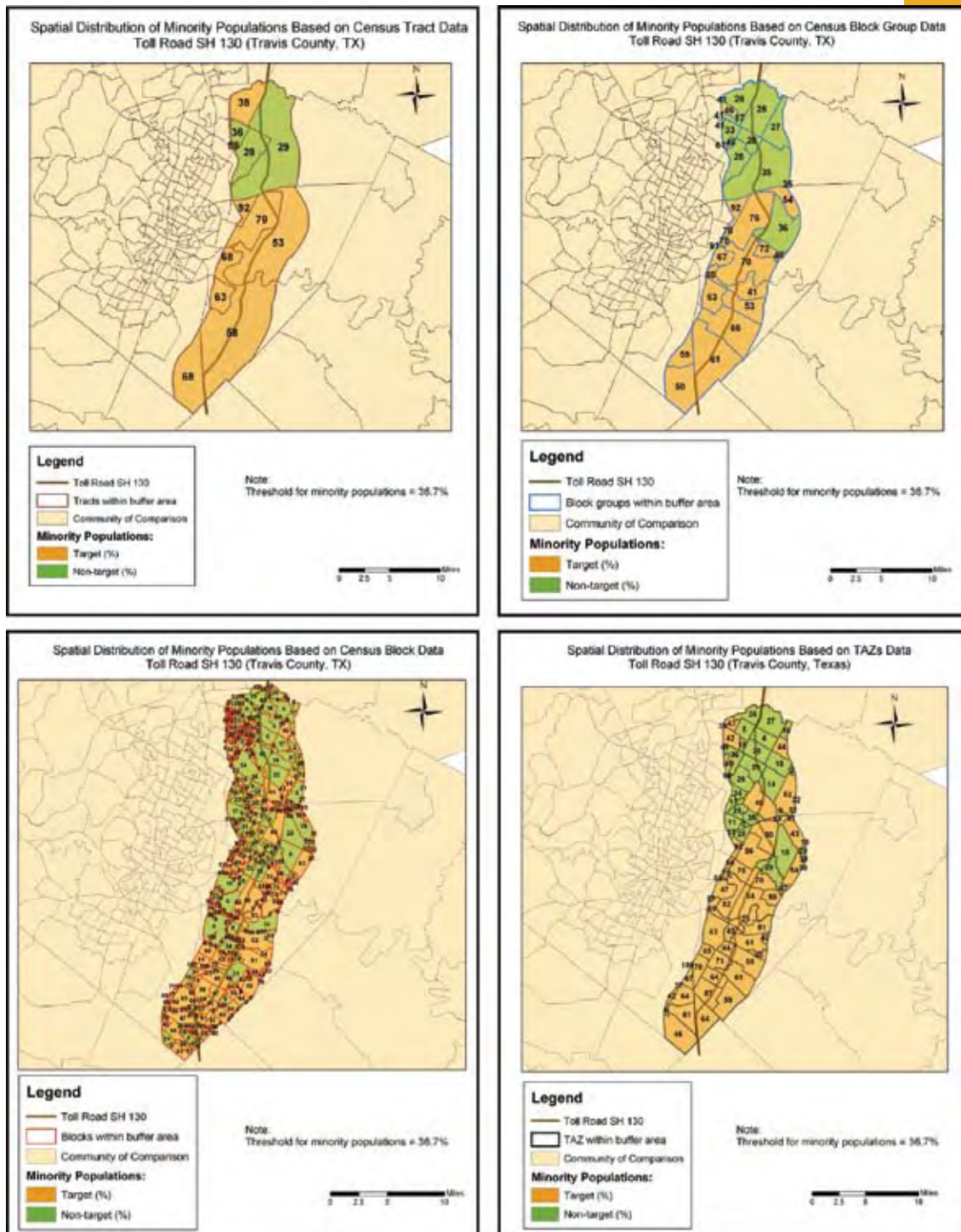


Table 3 summarizes the geographic scales of EJ data captured in the 2000 census products. For additional information on the variables and geographic scales of census products that can be used for the identification of EJ populations, the reader is referred to TxDOT Technical Report 0-5208-R2 entitled “Identifying, Measuring, and Mitigating Environmental Justice Impacts of Toll Roads.” From Table 3, it is evident that income data is not available at the Census block level.

Table 3: Race and Income Data Captured by the 2000 Census Products

Geographic Scale	Environmental Justice Data		Census Data Products
	Race	Income	
Census Block	Yes	No	Census 2000 Redistricting Data File (PL-94-171)* Summary File 1 (SF 1)
Census Block Group	Yes	Yes	Summary File 3 (SF3)
Census Tracts	Yes	Yes	Summary File 3 (SF 3)
TAZ	Yes	Yes	Census Transportation Planning Package 2000 (CTPP 2000)

*A TAZ field included in the redistricting file allows users to aggregate blocks into TAZ summaries.

From Table 3, it is clear that income data is not available at the census block level. As part of TxDOT Project 0-5208, an income model-

Block-Low-Income Model

The block-low-income model was estimated using housing characteristics that are highly correlated with household-income. The model was built at the block group level, using available U.S. Census Data, to estimate low-income populations at the block level. This is possible because block groups are made up of blocks.

the block-low-income model-
was estimated to address
this gap when conducting EJ
analyses of toll-road projects
that require a high degree of
demographic resolution.

Is There an EJ Concern?

Step 2 identifies the EJ communities in the area impacted by the toll road. The Council on Environmental Quality (CEQ) guidelines (1997) states that an EJ community exists if one of the following conditions is present:

- The minority or low-income population exceeds 50 percent in the impacted area.
- The minority or low-income population percentage in the impacted area is “meaningfully greater” than the minority or low-income population in the general population or other appropriate geographic area.
- There is more than one minority or low-income group present and the minority or low-income percentage, as calculated by summing all minority or low-income persons, meets one of the thresholds presented above.

The USDOT and the FHWA require minority populations to be examined separately from low-income populations, but they do not specify exact thresholds for distinguishing minority or low-income communities. Several state DOTs and MPOs have adapted the CEQ guidelines to reflect the demographic characteristics and cost of living in their states and

regions. For example, the Bay Area’s Metropolitan Plan in California—a region with a high minority population and a much higher cost of living than the national average—identified “communities of concern” as zones with (1) more than 70 percent minority residents or (2) more than 30 percent residents with a household income twice the federal poverty

Who is Considered Low-Income?

A low-income person is defined as an individual in a household whose median income is at or below the Department of Health and Human Service (HHS) poverty guidelines, but FHWA allows a state or region to adopt a higher income-threshold if it is not selectively implemented and if it includes all persons at or below the HHS poverty guidelines.

level (ICF Consulting, 2003).

It is important to emphasize again that the use of thresholds for identifying EJ communities is a function of the geographic scale of analysis chosen, the socio-demographic characteristics of the COC, and ultimately the geopolitical unit chosen (e.g., state, county, etc.) as the COC. The text box includes an example of how some EJ communities might be overlooked when the COC is specified at a very aggregate (i.e., state) level.

**Could the Demographic Scale of the Community of Comparison
Impact the Identification of EJ Communities?**

Using the Texas poverty rate, for example, to distinguish EJ communities may overlook some EJ communities at the project level. From the table below, it is evident that some of the most populous Texas counties, such as Harris and Dallas, have a lower estimated poverty rate than the state, (U.S. Census Bureau, 2005a and 2005b), while several less densely populated counties, such as Cameron and Hidalgo, have poverty rates almost at or above of 35 percent. Using the state as the COC and thus the state poverty rate as the threshold value to identify EJ communities in an impacted study area in Harris County, for argument sake, could potentially overlook a number of low-income communities impacted by a toll project.

Texas Poverty Facts (2002)

County	Estimated Poverty Rate (%)	Total Poor (Inhabitants)
Collin	5.2	28,967
Williamson	5.7	16,323
Fort Bend	7.2	28,285
Denton	7.3	34,869
Montgomery	7.4	24,007
Tarrant	11.6	173,307
Galveston	12.8	32,846
Harris	14.6	512,131
Travis	14.8	122,607
Dallas	15.2	341,573
Bexar	15.6	219,384
Nueces	23.1	71,233
El Paso	26.7	182,362
Cameron	34.8	121,577
Hidalgo	36.2	220,153
Texas (Total)	15.6	3.3 million

TxDOT Technical Report 0-5208-R2 proposes an innovative approach for identifying minority and low-income communities and zones with small, medium, high, and extremely high levels (concentrations) of EJ populations within the impacted area (see Figure 3). This approach overcomes some of the limitations of the threshold analysis whose results depend on the COC chosen and the geographic scale of analysis used. If notwithstanding the threshold approach is used, it is recommended that the COC specified is only one level more aggregate than the geopolitical unit chosen for developing the demographic profiles of the impacted area. Ultimately, the demographic profiles developed need to be validated through visual inspection techniques (e.g., windshield surveys) of a sample of geopolitical units.

Compiling EJ Concentration Zones

1. Calculate the percentage of EJ individuals in each geopolitical unit chosen by dividing the number of EJ individuals by the total population in the geopolitical unit.
2. Determine concentration levels (e.g., small, medium, high, and extremely high) by ranking and grouping the percentages calculated in Step 1 by these categories. For example if four concentration levels are specified, the geopolitical units with the lowest 25 percent of the percentages calculated would be considered units with small EJ population concentration levels.
3. Compile EJ concentration zones by grouping geopolitical units together that have the same value (i.e., low, medium, high or extremely high) and that share a boundary.

Figure 3: Minority Population Concentration Levels within the Impacted Area



Legend

— Toll Road SH 130

Concentration levels:

- Small
- Medium
- High
- Extremely high



Legend

— Toll Road SH 130

Significance levels (p-values)

- 0.0020 - 0.0100
- 0.0101 - 0.0500
- 0.0501 - 0.1000
- 0.1001 - 0.5000
- 0.1001 - 0.5000

What are the Additional Impacts of Concern Imposed by the Toll Roads versus the Non-Toll Roads?

A TxDOT Technical Report entitled “Impacts of Toll Projects and Simplified Methodology for Candidate Evaluation Road” synthesized the potential impacts imposed by tolled facilities in the U.S. and abroad (see Table 4).



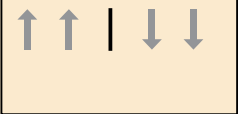
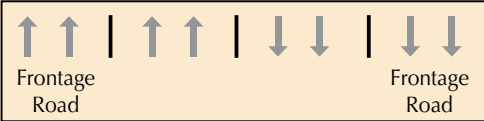
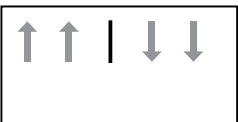



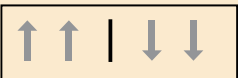
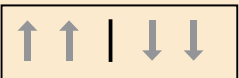


Table 4: Potential Impacts of Toll Roads

Impacts	Outcomes
Air quality (pollution)	If traffic is diverted through neighborhoods adjacent to toll roads, then these neighborhoods may experience higher levels of pollution.
Mobility (ability to move between different activity sites measured by average travel speed or time)	Because of significant travel speed improvements, significant time savings accrue to commuters who can afford the toll.
Accessibility (number of opportunities - also called activity sites - accessible within a certain distance, travel time or trip cost)	Toll roads improve the access of upper-income commuters. For lower-income commuters, the extra cost imposed by the toll may result in less access to services and opportunities.
Route and trip time shifting	Low-income commuters may be forced to change their trip times to avoid congestion on non-toll roads, or low-income shoppers may have to go to another shopping center to avoid paying a toll.
Safety	Diverted traffic through neighborhoods adjacent to toll roads may pose a higher safety risk to residents, pedestrians, cyclists, and local drivers in these neighborhoods.
Property values and land use	Higher prices of housing units near toll nodes because of increased access to services and opportunities. Industries and businesses that value mobility and reliability tend to locate at nodes and along connectors, which in turn attract high-income developments and leisure businesses.
Social	For low-income individuals tolls are an additional expense and therefore they may be forced to live and work close to non-toll roads. Since property values tend to be higher at toll road nodes, these areas may become unaffordable for low-income individuals to live in. Toll roads thus have the potential to encourage segregation of population groups by income level.
Economic	Potential positive effects in terms of business relocations, increases in employment, and increased tax revenues.

Source: Adapted from Persad et al. (2004)

Step 3 of the EJEM identifies the additional impacts of concern imposed by a toll road (alternative 2) compared to a non-toll road (alternative 1) given the four conceptualized scenarios (see Figure 4).

Figure 4: Schematic Representation of the Compared Alternatives Given the Four Studied Scenarios*

Scenario 1		Scenario 4	
Existing Conditions			
Alternative 1	Non-Toll Road (do nothing) 	Free Frontage Roads, Free Main Lanes 	
Alternative 2	Toll Road 	Free Frontage Roads, Tolled Main Lanes 	
Scenario 2		Scenario 3	
Existing Conditions	No Road 	No Road 	
Alternative 1	Non-Toll Road 	Non-Toll Road 	
Alternative 2	Toll Road 	Toll Road 	

The following questions and sub-questions are examples of what needs to be answered when determining the additional impacts

* See Table 2 for an explanation of the toll scenarios.

(i.e., benefits and burdens) imposed by toll roads on EJ communities compared to non-toll roads:

- What are the additional physical environmental quality impacts?
 - Will the toll road result in a substantial amount of traffic being diverted through an EJ community? If yes, what are the additional air pollution impacts? If yes, what are the additional noise impacts?
- What are the additional mobility and safety impacts?
 - Will the toll result in low-income drivers being “priced out” of certain trips?
 - What reasonable alternative transportation modes are available to those that cannot afford the toll?
 - Will EJ individuals be forced to use less desirable (to them) modes or routes to satisfy their mobility needs?
 - Are there adequate reasonable non-tolled north/south and east/west corridors to serve as alternative roads?
 - Will diverted traffic through EJ communities impose a higher safety risk to local pedestrians and bicyclists?
 - How will the toll road impact transit (e.g., altered bus routes, transit times/schedules)?
- What are the additional social and economic impacts?
 - Will the non-toll alternatives be equitable in terms of travel time or distance?
 - How will the toll road impact business access for both customers and deliveries?
 - Will the toll road displace a larger number of residents and businesses compared to the non-toll roads?
 - How will the toll road impact property values (i.e., commercial vs. residential)?
 - How will the toll road impact the access of EJ communities to work, schools, hospitals, etc.?

- What are the additional cultural impacts?
 - Will the toll road impact or discourage access to cultural and recreational resources (e.g., historic sites, historic landmarks, etc.)?

The answers to these and other questions were the basis of a detailed Toll Road Impact Matrix (see CD in back of guidebook) that may be used by the analyst as a reference when identifying the additional benefits and burdens associated with toll roads (alternative 2) as compared to non-toll roads (alternative 1). Finally, NEPA requires that a transportation agency distinguishes among and considers direct, indirect, and cumulative impacts associated with transportation investments, including toll roads. The text box provides the CEQ definitions for each of these types of impacts. The potential additional impacts included in the toll road impact matrix have to be reviewed in light of these definitions.

Direct, Indirect and Cumulative Impacts Defined

“‘Effects’ include:

- (a) **Direct effects** [emphasis added], which are caused by the action and occur at the same time and place.
- (b) **Indirect effects** [emphasis added], which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.” (Sec. 1508.8 Effects).

“‘**Cumulative impact**’ [emphasis added] is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (Sec. 1508.7 Cumulative impact).

What is the Magnitude of the Additional Impacts?

The objective of the EJEM is to determine whether a toll road would burden EJ populations disproportionately as compared to non-EJ populations. This requires the measurement of the additional impacts—both positive and negative—that minority and low-income populations are most likely to experience as a result of the proposed toll road. Step 4 of the EJEM thus measures the additional impacts associated with toll roads compared to non-toll roads. A number of measures and analysis techniques have been identified for quantifying or qualitatively describing the EJ impacts (see Table 5).

Table 5: Measures and Analysis Techniques to Assess EJ Impacts at the Project Level

Impacts	Measures	Types of Analysis
Ecological	Air Quality	Quantitative
	Noise	Quantitative
Socio-economic	Accessibility to employment, shopping, and community services	Quantitative and Qualitative
	Community cohesion	Quantitative and Qualitative
	Economic development	Qualitative
	Displacement	Quantitative
	Safety and security	Qualitative
	Aesthetics	Qualitative
	% of income spent on transportation	Quantitative

Source: Adapted from Cambridge Systematics, Inc. (2002)

The literature provides insights into the strengths and weaknesses of the traditional types of analysis tools and models available for measuring the impacts of transportation projects among different population groups. The text box provides a brief overview of the strengths and weaknesses of some of these analysis methods.

Available Methodologies and Analysis Techniques

Questions, Interviews, and Panels are useful techniques to identify and collect information on the social and environmental impacts associated with a particular project. Information can be gathered through key person interviews with opinion leaders, indigenous peoples, and technical experts (Executive Office of the President, 1997). For example, researchers tend to use surveys and focus groups to determine the impacts of proposed transportation projects on community cohesion. Neighborhood surveys, however, only measure community cohesion at a specific point in time. In other words, neighborhood surveys cannot be used to predict how cohesion might be affected by a significant change in the community. Focus groups can be used in situations where the views of a few knowledgeable participants are considered representative of the majority view, a technique recommended for use in small communities in which cohesion is weak to moderate or in medium-sized communities where cohesion is strong (Forkenbrock and Weisbrod, 2001).

Modeling Tools, such as air quality models and travel demand models, can be used to quantify the cause and effect relationships of specific projects. In addition, simulation models can be used to simulate the environmental and socioeconomic effects of various actions over time and space. For example, urban travel forecasting models have traditionally been used to estimate the impacts of transportation projects on trip distance and the spatial distribution of trips (FHWA, 1983). Newer activity-based approaches can, in addition, consider the interdependences in the trip decisions made by individuals (RDC, Inc., 1995). According to Forkenbrock and Weisbrod (2004), the Transportation Analysis and Simulation System (TRANSIMS) is a state-of-the-art, activity-based model that can (a) replicate a virtual metropolitan region with a completely disaggregated population and (b) simulate the movements of individual travelers across the transportation network using multiple modes. The model can thus forecast how infrastructure investments might impact individual trips by time of day and the impacts on different sub-population groups (e.g., EJ communities) by considering their demographic characteristics. Developing project specific models are, however, costly in terms of resources, time, and data. In general, it is advised that an agency calibrate an existing and recognized model using collected baseline data rather than develop a new model (Executive Office of the President, 1997).

Overlay Mapping and Geographic Information Systems (GIS) allow the analyst to (1) overlay the socio-demographic characteristics of the impacted community and the anticipated impacts and (2) assess whether the measured impacts affect minority or low-income communities disproportionately compared to non-EJ communities. These map overlays can also be very useful in communicating adverse impacts and the proposed mitigation options to the impacted communities.

Economic Impact Analysis determines the economic impacts and well-being of a community by considering the changes in business activity, employment, income, and population attributable to an activity, such as toll road building. Economic models (i.e., economic base models, input-output models, and econometric models) can be very complex and data intensive, but, in general, economic models are invaluable in the analysis of economic impacts (Executive Office of the President, 1997).

Social Impact Analysis entails the subjective perception of impacts. This type of analysis appraises the impacts of particular activities on certain key social variables. Key social variables include: population characteristics (e.g., the ethnic and racial diversity of the community), community and institutional structures (e.g., the activities of religious organizations), political and social resources (e.g., the leadership capacity within the community), individual and family changes (e.g., changes in family and community networks), and perceptions of risk, health, and safety. A number of methods can be used to determine social effects, including linear trend analysis, expert testimony, and simulation modeling (Executive Office of the President, 1997).

TxDOT Technical Report 0-5208-R2 provides guidance on the use of a number of analytical tools (see Table 6) to measure the additional impacts of toll roads in terms of accessibility, air and noise quality, residential and commercial property values, and pedestrian and bicycle safety as conceptualized in the Toll Road Impact Matrix. The study further evaluated the proposed tools in terms of data needs, robustness, assumptions, required expertise, and cost.

Table 6: Analytical Tools to Measure the Additional Impacts

Effect	Impact	Recommended Tool
Mobility	Access to: <ul style="list-style-type: none"> • work • educational facilities • healthcare facilities • shopping centers 	TransCAD UrbanSim
Physical Environmental Quality	Air quality	CALRoads View (CALINE4 + CAL3QHC + CAL3QHCR) MOBILE 6.2 EPA's CAMx SURFER (contours of pollutant concentrations)
	Noise quality	FHWA's Traffic Noise Model (TNM)
Economic Development	Residential property values	Property comparison (Appraiser's Opinion)
	Commercial property values	UrbanSim
Social	Pedestrian safety	Pedestrian Danger Index
	Bicycle safety	Bicycle Safety Index

Are the EJ Communities Disproportionately Impacted by the Toll Road?

This is arguably the least well-defined aspect of EJ analysis. No guidance is available from Title VI or EO 12898 as to the criteria for adverse or disproportionate and limited guidance is provided by the CEQ. Step 5 of the EJEM thus determines whether the impacts imposed by a toll road on zones with medium and high concentrations of EJ populations are statistically significantly higher compared to zones with no or low concentrations of EJ populations. This requires two sub-steps:

- First, the analyst needs to determine whether the measured impacts (Step 4) with the toll road (alternative 2) are statistically significantly higher than the measured impacts with the non-toll road (alternative 1) by EJ concentration level (i.e., vertical comparison).
- Second, if a statistically significant impact is imposed by the toll road, the analyst needs to determine whether the impact imposed on zones with high and medium concentrations of EJ populations are statistically significantly higher than the impact imposed on zones with no or low concentrations of EJ populations (i.e., horizontal comparison). Figure 5 provides a graphical representation of the vertical and horizontal comparisons that needs to be undertaken.

Figure 5: Comparisons Required to Determine Significant Impacts

Alternatives	EJ Concentration Zones					
	Low		Medium		High	
1 (non-toll road condition)	MI ₀₁		MI ₀₂		MI ₀₃	
2 (toll road condition)	MI ₁₁	↕	MI ₁₂	↕	MI ₁₃	↕
		↔		↔		↔

Notes: ↕ = comparison between the toll and not-toll alternative

↔ = comparison between impacted EJ concentration zones given a statistically significant impact

MI = measured impact

The statistical test to determine whether there is a statistically significant difference between the impacts imposed by alternatives 1 and 2 (i.e., vertical comparison) is the “paired t test” based on paired data analysis. In essence the test determines whether the mean difference between the measured impacts of alternative 1 and 2 is statistically significant for zones with low, medium, and high concentrations of EJ populations, respectively. To test whether the mean difference is statistically significant, a one-sample t test (based on $n - 1$ degrees of freedom) on the differences is carried out. The text box illustrates how the “paired t test” may be applied to determine if a toll road imposes a statistically significant access burden compared to a non-toll road.

Analysis of Paired Data Using a One-Sample t Test

A transportation agency is considering the conversion of a planned non-toll road into a toll road prior to the opening of the road to the public. To assess whether a disproportionate impact will be imposed, access to employment by EJ concentration zone has been estimated using TransCAD. The table below shows the number of employment opportunities that can be reached within 30 minutes by car, in zones with high concentrations of minority and low-income populations given the two alternatives. Does the data suggest that the number of employment opportunities accessible within 30 minutes by car in zones with high concentrations of EJ populations is significantly less, given the toll road compared with the non-toll road, at a 0.05 significance level?

High concentration zones of EJ populations	Number of jobs accessible within 30 minutes by car		Difference (D)
	Toll Road condition	Non-toll road condition	
1	19	15	4
2	21	20	1
3	18	22	-4
4	5	8	-3
5	34	25	9
6	12	17	-5

The hypothesis of interest is $H_0 : I_2 - I_1 = 0$ (versus $I_2 - I_1 < 0$). At level 0.05, H_0 should be rejected if $t \leq -t_{0.05,5} = -2.015$. Since the value of the test statistic is 0.15, H_0 cannot be rejected. Therefore, the data does not provide enough evidence to conclude that access to employment in zones with high concentrations of minority and low-income population is less given the toll road at a 0.05 significance level.

Given that a statistically significant impact is imposed by the toll road, the statistical test to determine whether the impact on zones with high and medium concentrations of EJ populations is significantly higher than on zones with no or low concentrations of EJ populations is a “large-sample test” based on differences between population proportions. Assuming a normal distribution, a statistically significant difference exists if the observed difference in the proportion of the impacted zones with high and medium concentrations of EJ populations and the proportion of the impacted zones with no or low concentrations

of EJ populations cannot be explained by chance alone. The text box below provides a hypothetical example of how “inferences about population proportions” can be used to determine whether traffic noise is significantly higher in zones with medium and high concentrations of EJ populations.

Inferences Concerning a Difference Between Population Proportions

A traffic noise analysis reveals that neighborhoods located near a toll plaza are exposed to noise levels that exceed the FHWA’s noise abatement criteria (67 dbA). An analyst has identified the impacted EJ concentration zones by overlaying the racial characteristics of these zones with the results from the noise analysis (see Table below). Does the data suggest that the proportions of populations in zones with high/medium concentrations of EJ populations affected by excessive traffic noise is less than the proportion of populations in zones with no/low concentrations of EJ populations at a 0.025 significance level?

	EJ Concentration Zones		
	High/Medium	No/Low	Total
Total population in the study area	m= 569	n = 178	747
Population exposed to noise level > 67 dbA	x = 301	y = 156	457
Sample proportion	$p_1 = 0.529$	$p_2 = 0.876$	$p_3 = 0.612$

Let p_1 and p_2 denote the two population proportions. The hypotheses of interest are $H_0 : p_1 - p_2 = 0$ versus $H_a : p_1 - p_2 < 0$. At a 0.025 significance level, H_0 should be rejected if $Z \leq -Z_{0.025} = -1.96$. Since the value of the test statistic is -8.30, H_0 must be rejected. The p -value is so minuscule that at any reasonable level α , H_0 should be rejected. The data thus strongly suggests that zones with high/medium concentrations of EJ populations are not disproportionately affected by traffic noise compared to zones with no/low concentrations of EJ populations.

For a more detailed explanation of the statistical tests and specific applications, the analyst is referred to TxDOT Technical Report 0-5208-R2.

What are Potential Mitigation Options?

Step 6 of the EJEM identifies actions to mitigate or offset identified impacts imposed on zones with high and medium concentrations of EJ populations. Mitigation or enhancement measures comprise (1) avoiding or minimizing impacts by reducing the degree or magnitude of the implemented action, (2) mitigating or eliminating the impact by repairing, rehabilitating, or restoring the impacted environment or community resource, (3) reducing or eliminating the impact over time by long-term preservation and maintenance operations, and (4) compensating for the impact incurred. Table 7 lists a number of documented mitigation strategies that have been found acceptable by EJ Communities to reduce or eliminate the impacts of highways and toll roads on their communities.

Table 7: Actions to Mitigate or Offset the Burdens Imposed by Toll Projects on EJ Communities

Impacts	Mitigation Options
Neighborhood Effects	
Displaced residential properties	Temporary or permanent relocation of housing units Construction of new housing units Fair relocation benefits
Remaining residential properties	Renovation of housing units
Neighborhood cohesion, social interaction	Relocation of the entire community Renovation of public areas used for community activities
Disruption of areas of unique significance (cemeteries)	Relocation of graves
Neighborhood safety	Crossing guards at local schools during project construction
Neighborhood traffic patterns	Ban heavy vehicles from neighborhood streets
Access to work	Relocation site accessible by primary neighborhood transportation mode Use of toll revenue to finance transportation improvements, such as new or expanded transit services that benefit low-income travelers Increase the quantity and quality of low-cost transportation alternatives Provide toll exemptions to low-income travelers

Table 7: Actions to Mitigate or Offset the Burdens Imposed by Toll Projects on EJ Communities (continued)

Impacts	Mitigation Options
Neighborhood Effects (continued)	
Access to community facilities and services	Conversion of former buildings to community centers Construction of parks and community centers
Noise effect	Noise barriers to reduce highway noise levels Soundproofing systems at sensitive sites (e.g., churches)
Local Business Effects	
Displaced businesses	Permanent relocation of businesses
Effects on employment	Fair share of contracts generated by the project earmarked for local businesses
Effects on business access	Maintain or enhance access to local businesses
Economic Development Effects	
Job creation	Fair employment opportunities for local residents during construction phase
Effects on income	Return toll revenue to low-income households in the form of reduced regressive taxes and improved social services Reduce general taxes or other user fees Redistribute toll revenues according to income (i.e., lowest-income individuals receive the largest compensation)

Sources: Litman (1999), FHWA (2000), Lee (2003), DeCorla-Souza and Skaer (2003), and Litman (2004)

Ultimately, however, mitigation actions have to be determined in consultation with the impacted EJ communities.

Effective Public (EJ) Participation

One of the core principles of EJ analysis is the “meaningful” involvement of minority and low-income communities potentially impacted by a proposed investment in the decision-making process surrounding the proposed investment. In general, transportation agencies recognize the need for and the clear benefits of EJ community participation in the decision-making process surrounding toll projects, but the tasks are often times more challenging than anticipated at first.

This section of the guidebook outlines some of the key considerations in informing and involving EJ communities in toll road decisions, as well as guidance on which stages of the EJEM require EJ participation.

EJ Participation: General Approach

Public participation techniques have been well researched, but the meaningful involvement of EJ communities requires a new perspective and emphasis. Partly because conditions need to be created that encourage the participation of people who likely do not have technical backgrounds, do not speak English, or do not have previous knowledge of toll road issues. A distinct approach is thus needed to ensure the meaningful participation of low-income and minority communities in the decision-making process regarding toll road projects. The general approach to ensure meaningful participation at each step of the EJEM can be outlined as follows:

- Understanding the EJ community, including the barriers faced by EJ communities and options on how to overcome these barriers,
- Defining the goals of the EJ outreach/participation effort,
- Identifying and selecting the most appropriate participation techniques, and
- Managing and implementing the selected participation technique(s).

Effective and meaningful EJ participation should, in principle, result in a win-win situation for both the impacted EJ communities and the transportation agency. For example, the transportation agency will face

less controversy during the planning, design, and construction of toll projects and the EJ communities will ensure projects that consider their wants and needs.

Understanding the EJ Community

First and foremost, the analyst should gain a true understanding of the impacted EJ communities. Understanding the impacted EJ communities is critical to reaching out to these communities effectively and to

The FHWA highlights a number of techniques that, when used with proper management, overcome many of the barriers to involving minority and low-income populations. In almost all cases, the techniques require agency staff to gain an improved understanding of the EJ communities impacted by a transportation investment and the need to take the public participation effort to the communities as opposed to requiring community members to attend meetings at specified times and locations away from the impacted communities.

distinguish the effort from public participation efforts in general.

Without a true understanding of the impacted EJ communities and the barriers that prevent meaningful participation, the analyst risks selecting a participation technique

or location to hold events that is inappropriate. The U.S. Census captures information about a number of variables that can help the analyst to understand the community and also to identify potential barriers that might prevent participation in the outreach activities (see Table 8).

Table 8: 2000 U.S. Census Data Relating to EJ Community Barriers

Attribute	U.S. Census Product	Lowest Geographic Level	Examples of Variable that Describe the Attribute
Household and family type	Summary File 1	Blocks	QT-P10_Households and families: 2000 (household type, household size, family type and presence of own children)
Mobility	Summary File 3	Block groups	P30_Means of transportation to workers 16+ Years
Disability	Summary File 3	Block groups	P42_Sex by age by disability status by employment status for the civilian non-institutionalized population 5 years & over
Work status (part-time, full-time)	Summary File 3	Block groups	P47_Sex by work status
Education (school enrollment and educational attainment)	Summary File 3	Block groups	P147_School enrollment by level of school by type of school for the population 3 years & over (by race) P148_Sex by educational attainment for the population 25 years & over (by race)
Vehicle availability	Summary File 3	Census tracts	QT-H11_Vehicle availability and household income
Language	Summary File 3	Census tracts	DP-2_Profile of selected housing characteristics: 2000 (language spoken at home)

Besides basic demographic information, the analyst should also gain an understanding of the lifestyles and daily activities of minority and low-income populations potentially impacted by the proposed toll road to ensure that selected public participation techniques fit into their lives and, with proper management, get the most useful results. The

analyst should be asking questions such as “How do members of this community live?” and “What do they do from day-to-day?” Although each community impacted by a proposed toll road would have unique barriers to participation, there are some common barriers that might be expected (see Table 9). These barriers should, however, only be viewed as a starting point.

Table 9: Typical Barriers Faced by EJ Communities

Barrier	Resulting Challenges
Individuals holding multiple jobs/unusual job hours	Time constraints prevent participation in community outreach activities
Low levels of education/literacy issues	Less understanding of potential impacts of toll roads Less understanding of rights Unable to provide written responses/comments
Unique family structures (e.g., single parents, multi-generational families)	Time constraints prevent participation due to family obligations, such as caring for children and elderly
Less likely to have modes of personal transportation (i.e., private car)	Greater difficulty getting to community outreach activities Less concerned about toll road projects if they do not intend to use them
Less access to internet/technology/computer literacy issues	Use of Web sites and e-mails to inform and involve EJ communities would be ineffective
Language barriers	Less ability to participate in public involvement efforts Less aware of opportunities to influence toll road project outcomes
Distrust of government agencies	Less likely to participate in community outreach activities
Limited understanding of how a project will affect their lives and how participation in the process would benefit them	Less likely to participate in community outreach activities Need to convince people of their power to influence decisions
Cultural differences	Techniques need to be adapted to consider how cultural groups interact with one another and make decisions

Table 10 lists a number of measures that can be implemented to overcome the barriers listed in Table 9.

Table 10: Overcoming EJ Barriers

Barrier	Overcoming the Barrier ñ Examples
Individuals holding multiple jobs/unusual job hours	<ul style="list-style-type: none"> • Take outreach activities to them (e.g., schedule community outreach activities at days and times convenient to EJ people or at an already scheduled community event)
Low level of education/literacy issues	<ul style="list-style-type: none"> • Hire consultants with special expertise in communicating with people who have low or no education
Unique family structures	<ul style="list-style-type: none"> • Provide care for children and elderly during community outreach activities
No modes of personal transportation (i.e., private car)	<ul style="list-style-type: none"> • Hold meetings at locations accessible by public transit • Schedule community outreach activities at places within the community, such as schools, parks, and community centers • Provide transportation to community outreach activities • Ensure access for the elderly and people with disabilities
Less access to internet/technology/ computer literacy issues	<ul style="list-style-type: none"> • Distribute printed materials at laundry facilities, homeless shelters, employment offices, food banks, post offices, bus stops/transit stations, churches, parks, health clinics, grocery stores, community centers, etc. • Distribute information via local radio stations (National Academy of Public Administration, 2001) • Use flyer inserts in newspapers (e.g., Latino papers) or distribute information via school district newsletters/cultural programs
Language barriers	<ul style="list-style-type: none"> • Translate public documents, notices, and hearings for limited English speaking populations • Provide translations and use bilingual speakers during community outreach activities • Prepare communication materials for limited English speaking populations (e.g., bilingual flyers, bilingual radio announcements)

Table 10: Overcoming EJ Barriers (continued)

Barrier	Overcoming the Barrier n Examples
Distrust of government agencies	<ul style="list-style-type: none"> • Work with EJ community leaders to increase the credibility of the participatory planning process (FHWA and FTA, 1996) • Hire consultants with special expertise working with minority and low-income populations • Hold public meetings or events in non-governmental (or less traditional) buildings such as schools, churches, and community centers (National Academy of Public Administration, 2001) • Provide opportunities for EJ communities to comment prior to making each decision • Keep the EJ community informed • Reply to EJ public input promptly and respectfully
Limited understanding of how a project will affect their lives and how participation in the process would benefit them	<ul style="list-style-type: none"> • Hold informal meetings early in the process to increase public understanding of how the project may impact the community and their input is important • Seek public input early in the process and make information available • Involve the EJ communities in decisions that might impact them and in approvals and implementation/Provide opportunities for EJ communities to comment prior to making each decision • Keep the EJ community informed • Reply to EJ public input promptly and respectfully • Hire consultants with special expertise working with minority and low-income populations
Cultural differences	<ul style="list-style-type: none"> • Identify preferred community outreach techniques (e.g., in Orange County, California, the open-house format and one-to-one interaction made Mexican-Americans uncomfortable, while informal, small-group meetings increased the participation of Latino neighborhoods) (FHWA and FTA, 1996) • Work with local church leaders, school principals, community center staff, health clinic staff, etc. to learn more about cultural factors (National Academy of Public Administration, 2001) and to identify venues for outreach activities (e.g. meetings at churches, schools, libraries, or community service centers, or talking face-to-face at individual homes).

Finally, it is important for the analyst to determine “How does the EJ community currently receive information?” By having more knowledge of the typical lives led by people in these communities, the community outreach efforts through which they can best be reached become clearer.

Defining the Goals of the EJ Outreach/Participation Effort

The next step is to define the goals for the public participation efforts. The goals and what can be gained will vary depending on the community and the particular stage in the EJEM. This is an important step, because the analyst should be clear about the information provided to the community and the decisions they can impact to ensure a trusting relationship. Public participation efforts can be divided into “inform and involve” techniques (Creighton, 2005). It is helpful to evaluate participation techniques in terms of a specific task. In the case of EJ communities it is foreseeable that more time will be required “informing” EJ communities as their interest in toll projects and their willingness to participate may not come as quickly as in other communities. Finally, the analyst must be aware of the difference between public consultation and public participation. Public consultation implies that the community is, for example, presented a plan with alternatives and then asked for their views and comments. The analyst takes these results and then decides which plan to put forward, bearing all of the responsibility for the decision. This is a much more passive way of involving the public and does not necessarily indicate that they have participated in the decision making. They have been considered but they essentially have no ownership or responsibility concerning the project decisions (Tyler, 2003).

Public Involvement Techniques

Methods for enhancing public participation have advanced to a point where a substantial body of knowledge is found in the literature (FHWA and FTA, 1996; Lawrence, 2003; Creighton, 2005). In selecting the most appropriate technique(s), the analyst has to consider everything learned about the community and select techniques that will overcome most of the barriers identified. These might be:

- proven techniques used in other projects,
- completely new techniques, or
- previously used techniques adapted to overcome the barriers to participation of the specific EJ community.

Table 11 lists a number of techniques and their strengths and weaknesses as EJ participation techniques.

Table 11: Public Participation Techniques

Participation Techniques	Details	Strengths	Weaknesses
Personalized Involvement			
Walkabouts	<ul style="list-style-type: none"> • Door-to-door canvassing of neighborhoods • Inform and involve • Opportunities for surveys/interviews • Opportunities to distribute flyers 	<ul style="list-style-type: none"> • Immediate communication with EJ community members • Takes the project and participation opportunities to the EJ communities • More likely to fit into lives of EJ people 	<ul style="list-style-type: none"> • Large time commitment by agency • Relatively small number of people involved
Personalized Letters	<ul style="list-style-type: none"> • Send letters addressed to specific individuals • Send personal invitations to events • Send personal informative letters 	<ul style="list-style-type: none"> • Makes an impact on community members if they think their opinions are important to the agency • More likely to capture public interest in the project 	<ul style="list-style-type: none"> • Costly • Might not significantly increase attendance at events
Outreach Booth	<ul style="list-style-type: none"> • Similar to “info booths” • Set up stands at popular locations within the community • Provide information and involve community members 	<ul style="list-style-type: none"> • Brings participation opportunities to the community • Flexible in terms of time and location • May overcome language barriers 	<ul style="list-style-type: none"> • Not many people may take the time to learn about project and get involved
Local Teams			
Create a local team	<ul style="list-style-type: none"> • Team formed by local community members • Team help to inform and involve 	<ul style="list-style-type: none"> • Increase attendance at community outreach activities • More personal • Community members relate to other community members better than to agency staff 	<ul style="list-style-type: none"> • Requires substantial resources in terms of time, manpower, and funding • If the community is transitional or too divided, it may be hard to find leaders who are able to bring a strong effort to the community
Meeting Variations			
EJ Public Meeting	<ul style="list-style-type: none"> • Integrate in the activities people already partake in, such as church activities and community or school events • Increase attendance by having interpreters, refreshments, and staff available to care for children • Multiple meetings at varying times 	<ul style="list-style-type: none"> • Facilitate a large number of community members to get together • Good attendance may produce a lot of results 	<ul style="list-style-type: none"> • Risk low attendance • May not represent full spectrum of EJ community members

Table 11: Public Participation Techniques (continued)

Participation Techniques	Details	Strengths	Weaknesses
Meeting Variations (continued)			
Open House	<ul style="list-style-type: none"> • Similar to public meeting but no speeches/lectures • Lots of visual aids • Agency staff speaks to attendees on a one-to-one basis • Opportunities to do surveys/interviews 	<ul style="list-style-type: none"> • Lots of opportunities for feedback • Overcomes language barriers • Flexible in terms of time • Not as strict as public meeting 	<ul style="list-style-type: none"> • Risk low attendance • May not represent full spectrum of EJ
Deliberative Polling®	<ul style="list-style-type: none"> • Representative sample of community participate in deliberations about proposed project • Exposed to continuing dialogue with experts and stakeholders • Participants are surveyed before and after deliberations 	<ul style="list-style-type: none"> • Lots of opportunities for feedback • Informed judgments about toll projects 	<ul style="list-style-type: none"> • Requires substantial resources in terms of time, manpower, and funding • Participants are required to meet at a specified location for a significant period of time (e.g., weekend) • Risk low participation if participants are not compensated • Significant number of barriers to participation (e.g., transportation to location, available time, etc.)
School Programs			
Create School Programs	<ul style="list-style-type: none"> • Programs to educate the children about the project and then parents receive information from children • Parents attend a school event where children present information and parents participate 	<ul style="list-style-type: none"> • Flexible • Far-reaching • Overcomes language barriers • It can be designed to fit the specific community 	<ul style="list-style-type: none"> • Not all community members connected to school
Media			
Using the media	<ul style="list-style-type: none"> • Advertise events/ information regarding project using the most popular media resources in area: newspaper, radio, TV, flyers, community news boards, etc. 	<ul style="list-style-type: none"> • Flexible • It can reach a lot of people 	<ul style="list-style-type: none"> • It does not guarantee increased involvement • It can be expensive

For a detailed discussion of various special techniques to enhance public participation, the reader is referred to the FHWA document entitled “Public Involvement Techniques for Transportation Decision-Making” (FHWA and FTA, 1996).

Manage and Implement the Selected Participation Technique(s)

While the analyst might experience some level of success by simply getting the EJ community together and informing them about the toll project and getting basic feedback, the process will be much more meaningful when managed well. This does not necessarily require the involvement of management experts but rather careful planning, organization and preparation.

Each of the public participation techniques listed in Table 11 will have specific management requirements, but there are several general concepts to keep in mind:

- Everything about the technique and the subsequent participation event needs to be well thought through and planned ahead of time. For example, any disorganization, down to the set up of seating or the position of posters, can lead to wasted time and effort on the day of the event.
- The location must be well prepared. For example, handout materials must be ready and translated into the languages spoken in the EJ community if English is not the only language spoken.
- Staff must be well trained and prepared in terms of what they have to say and ask, in order to give the best impression to the EJ community and extract the most useful contributions from those attending.
- Time management is essential and allotting time for different components of the event will be helpful in making the best use of the little interaction time the agency staff typically has with those participating.
- The analyst could demonstrate to the EJ communities that their inputs are important by showing EJ participants what was gained from past public participation efforts and how it affected the project outcome. This is especially important when the EJ community distrusts the agency.

Effective EJ Participation Component

The overall objective of the analyst is to ensure meaningful representation and participation by minority and low-income individuals living within the impacted area of the toll road in the decision process. EJ outreach efforts are foreseen in various stages of the EJEM to ensure that (1) all EJ communities are identified and given the opportunity to participate in a meaningful way, (2) all the adverse impacts are identified and prioritized, (3) the measured impacts are shared with the impacted EJ communities, and (4) effective mitigation options are designed in consultation with the impacted EJ communities to lessen or offset identified disproportionately high or adverse impacts.

Who Would Be Impacted?/ Is There a Potential EJ Concern?

EJ communities should be invited to participate as early as possible.

The goals of the EJ outreach effort during this step of the EJEM are to:

- Validate the U.S. Census data used to identify EJ communities within the impacted area.
- Identify potential “avenues” that can be used to distribute information about the proposed toll project to minority and low-income people living in the impacted area.
- Obtain input from those that can speak on behalf of the EJ community. In other words, identify and engage individuals that can speak on behalf of the impacted EJ communities, such as presidents of neighborhood associations, religious/ community leaders, school district officials, environmental group leaders, leaders of charity organizations, elected local government representatives, and local health officials.
- Identify the most appropriate participation technique(s) for informing and involving the impacted EJ communities.

- Identify strategic locations for liaising with EJ communities.

A telephone survey and personalized letter and mail survey might be appropriate participation technique(s) to contact and engage individuals from community-based organizations that can speak on behalf of the impacted EJ community. During the survey, the analyst should ask questions that can help the analyst gain a better understanding of the impacted EJ communities and questions that can help in the development of future outreach activities, such as questions that provide information about:

- Number of minority and low-income people served or represented by the organization,
- Existing awareness of proposed toll roads and foreseen potential impacts,
- Preferred language(s) of communication,
- Willingness to participate by informing the community about the proposed toll project and or facilitating future EJ outreach activities,
- Preferred community outreach activities (e.g., formal meetings, informal meetings, focus groups, telephone surveys, personal interviews, and mail questionnaires),
- Strategic locations (e.g., markets, schools, libraries, and parks), days, and times most appropriate for obtaining input from EJ communities, and
- Special arrangements needed to ensure community participation (e.g., childcare and transportation for those who do not have means to get to the meeting places).

By contacting these community-based organizations early on, the analyst will gain a better understanding of the potentially impacted EJ communities and how to inform and involve them in the subsequent steps of the EJEM.

What are the Additional Impacts of Concern Imposed by the Toll Road versus the Non-Toll Roads?

The goals during this step of the EJEM are to: inform the EJ community about the proposed toll road project (educate the community) and to involve the community by obtaining their views and concerns about how the proposed toll project will impact their trips and community.

It is very important that the EJ community and representatives of the community are educated about the proposed toll project and understand the potential impacts to ensure an informed and meaningful discussion and prioritization of the impacts of concern surrounding toll roads relative to non-toll roads. The EJ analysis of toll road projects is especially complex, because toll roads may impose additional burdens as well as benefits on EJ communities compared to non-toll roads. For example, the conversion of an existing non-toll road into a toll road may have a disproportionate impact on low-income drivers if they have to shift to congested roads to get to their workplaces to avoid the toll. On the other hand, local minority communities may benefit from the conversion and operation of a non-toll road into a toll road if it generates employment opportunities for them. Furthermore, EJ communities might be unsure of how a toll road will impact them, especially if they do not

have their own cars and tend to use public transportation. These benefits and burdens need to be identified and discussed with the impacted EJ communities.

Once the communities understand the technical issues and can articulate their views and concerns, meaningful and informed participation can be accomplished. At this stage, EJ communities should be in a position to articulate how they think the proposed toll road would impact their activity space (i.e., the places where they live, work, shop, and partake in other activities).

A number of avenues exist to share information about the proposed toll project, such as personalized letters, outreach booths, church bulletins, neighborhood organization newsletters, public meetings, open houses, and the media. On the other hand, focus groups, mail questionnaires, personal interviews, and walkabouts can be used to obtain the input of impacted EJ communities. At least two techniques—school programs and Deliberative Polling®—can be used to both inform and involve the community.

Are the EJ Communities Disproportionately Impacted by the Toll Road?/ What are Potential Mitigation Options?

The goals of the EJ outreach effort during this step of the EJEM are to inform the EJ community about the magnitude of the additional impacts (benefits and burdens) associated with the proposed toll road project compared to the non-toll road (educate the community) and to involve

the EJ community in the conceptualization and design of acceptable options to avoid, minimize, or mitigate any disproportionate impact on the community.

The analyst should present upfront the measured benefits and burdens imposed by the toll road project on the EJ communities calculated in steps 4 and 5 of the analytical component of the EJEM. Once the EJ communities have gained an understanding of how they will be impacted by the toll road, appropriate mitigation options can be designed. EJ communities should actively participate in problem solving to mitigate or remediate the adverse impacts imposed on their communities. Ultimately, these mitigation options should help ensure that the toll road project is designed, built, and operated without disproportionate burdens the EJ community.

A number of avenues exist to share information about the impacts of the proposed toll project, such as personalized letters, outreach booths, public meetings, and open houses. On the other hand, focus groups and Deliberative Polling® may be appropriate tools to obtain the input of community members regarding potential mitigation option.

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