In 1994 a Presidential Executive Order required federal agencies to achieve Environmental Justice by identifying and addressing disproportionately high and adverse human health and environmental effects, including the interrelated social and economic effects of their programs, policies and activities on minority and low-income populations. The objective of this report is to examine the issue of Environmental Justice in Caddo & Bossier Parishes at the census tract level. The report considers the relationship between the existing transportation and public transit systems in combination with low-income groups and four minority groups: Blacks; Hispanics; Asian or Pacific Islanders; and American Indians, Eskimos, or Aleuts. In addition, there will be a discussion of gender in relation to the transportation and public transit systems, as well as some general remarks on the Transportation Improvement Program (TIP), relative to the minority and low-income populations.

Purpose of an Environmental Justice Report

At its broadest level, the purpose of completing an Environmental Justice report is to better understand the potential effects of transportation system changes; especially those changes that might adversely and disproportionately affect low-income and/or minority populations. By examining the existing transportation and public transit systems in the Caddo & Bossier Parishes in relation to the aforementioned groups, one can better assess the impact of any future transportation system changes on these groups. One strength of an examination of this sort will be in its mapping component, or graphical component. By graphically depicting where these aforementioned groups are located, one can better see where existing transportation and public transit systems are situated and
can better assess how future changes might potentially impact low-income and/or minority populations. The purpose of Environmental Justice is to focus efforts on estimating where standards might be exceeded if particular transportation system changes were to be implemented. Completing a report of this nature allows us to see the present situation, so we can better respond to changes in the future.

Development of an Environmental Justice Report

The development and preparation of an Environmental Justice Report should be considered as part of the overall transportation planning process. All socioeconomic and demographic data for this report were obtained using the 2000 United States Census of Population and Housing. All maps for this report were produced using Caliper’s TransCAD software, and the 2000 census data. Much of the background research for this report was completed using information from the United States Department of Transportation Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), with a small portion of the research coming from the 1995 Nationwide Personal Transportation Survey (NPTS) report. NPTS serves as the nation’s inventory of daily personal travel. It is an authoritative source of national data on daily trips including purpose of the trip, means of transportation, length of trip, day of week and month, and number of people on the trip.

It should be noted that the emphasis of this report will center on the interstates in terms of the transportation system and its negative or adverse effects. The reason for this is historically speaking, interstates have been the most destructive to neighborhoods and communities and have been most likely to cause adverse effects. However, additional or continuing studies could look at other road surfaces, like major arterials or freeways.
Study Area

The study area for this report is the Caddo, Bossier, and Webster Parishes at the census tract level, refer to Figure 1.

Caddo, Bossier, & Webster Parishes

Figure 1

The three parishes, located in the northwest corner of Louisiana, include the Shreveport-Bossier City metropolitan areas. This is the third largest metropolitan area in Louisiana. In 2000, Bossier’s population was 98,310, Caddo’s was 252,161, and Webster’s was 41,831, for a three-parish total of 392,302. Census tracts are defined to include approximately 4,000 people who are as similar as possible in terms of their demographic and socioeconomic characteristics. However, to evaluate the impacts of a particular transportation system change, a much smaller unit of analysis is usually desirable, since spatial resolution can have a significant effect on the results of the
In terms of the transportation infrastructure, several important federal and state highways serve this area. Interstate 20 and Interstate 49 pass through this area, as well as Interstate 220, a circumferential route. There are also a number of major arterials that carry a significant amount of traffic within and through the area. Shreveport and Bossier City are separated by the Red River, a major waterway and trade route in the area; therefore, there are a number of Red River bridge crossings. Primary and minor arterials are other important components of the total transportation system. They serve as both feeders to freeways and expressways, and as principal travel ways between major land use concentrations within the area. Collectors provide both land service and traffic movement functions. They serve as immediate feeders between arterials and local streets and primarily accommodate short distance trips. Figure 2 displays the transportation system in the Caddo, Bossier, and Webster Parishes.
Transportation System in Caddo & Bossier Parishes

Figure 2
Another intention of the report will be to examine the existing public transit system in the Caddo & Bossier Parishes. Public transportation in this area is provided by SporTran, which presently supplies sixteen fixed bus routes. Current ridership on SporTran is more than 3.5 million passengers annually. The following map, Figure 3, shows the weekday transit routes.

**Public Transit Routes in Caddo & Bossier Parishes**

**Figure 3**

**Definitions**

Before any further discussion of Environmental Justice can occur, it is necessary to clearly define the terms used throughout this report. First, an Environmental Justice community is defined as any aggregated or dispersed population that is a low-income population, and/or the composition of the population is comprised of more than 50% minority.
A low-income population is 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. Low-income is defined as a household income at or below the Department of Health and Human Services poverty guidelines. The poverty guidelines are issued each year in the Federal Register by the Department of Health and Human Services. The guidelines are a simplification of the poverty thresholds for use for administrative purposes, like determining financial eligibility to certain federal programs. The poverty guidelines are designated by the year in which they are issued. The 2000 poverty guidelines for the state of Louisiana for one person were $8,860 and $18,100 for a family of four.

A minority population is any readily identifiable group of minority persons who live in geographic proximity, and if circumstances warrant, geographically dispersed/transient persons, such as migrant workers or Native Americans. A minority in terms of Environmental Justice is defined as a member of the following groups. Black, a person having origins in any of the Black racial groups of Africa. Hispanic, a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race. Asian or Pacific Islander, a person having origins in any of the original people of the Far East, Southeast Asia, and the Indian subcontinent, or the Pacific Islands. American Indian, Eskimo or Aleut, a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition.

Environment includes the physical environment and the “built environment”, the area within which people live, work and recreate. Adverse effects refer to the totality of
significant individual or cumulative human health or environmental effects, including
interrelated social and economic effects. Further, an effect is considered to be
disproportionately high or having an adverse effect if it is predominately borne by a
minority and/or a low-income population. The effect could also be considered adverse if
it will be suffered by minority and/or low-income populations and is appreciable more
severe or greater in magnitude than will be suffered by the non-minority and/or non-low-
income populations.

Finally, program, policies and/or activities refers to all projects, programs,
policies and activities that affect human health or the environment, and that are
undertaken, funded or approved by the Federal Highway Administration.

Understanding Environmental Justice

There are three fundamental Environmental Justice principles. First, to avoid,
minimize, or mitigate disproportionately high and adverse human health and
environmental effects on minority and low-income populations. Second, to ensure the
full and fair participation by all potentially affected communities in the transportation and
decision-making process. Third, to prevent the denial or, reductions in, or significantly
delay in the receipt of benefits to minority and low-income populations.

It is important to understand the interplay between transportation, minority status,
and residential location for several reasons. First, there is growing public policy concern
that transportation resources be equitably distributed. Second, ethnic and racial
minorities are disproportionately represented among the unemployed and welfare-
dependent, and access to employment is critical to achieving the goals of the new federal
welfare policy. Third, racial and ethnic minorities tend to be concentrated spatially in
inner city areas and the central parts of older suburbs. Finally, there is growing interest among transportation planners in fostering higher density, transit- and pedestrian-oriented development.

According to the principles of Environmental Justice, if a disproportionately adverse impact would result, the program, policy, or activity cannot be carried forward using federal funds unless it can be demonstrated that alternative approaches, or further mitigation measures, that would avoid or reduce the disproportionate effect, are not practical; or a substantial need exists for the program, policy, or activity, based on the overall public interest. The crux of Environmental Justice is to focus efforts on estimating where these standards might be exceeded if a particular transportation system change were to be implemented.

Two considerations emerge with respect to transportation system changes. The first consideration is the overall effect on society. Will society be better off with the change than without it? The second consideration is the distribution impacts. Will certain members of society benefit, while other members become worse off? The effects from a transportation change can affect people from time travel savings to epidemiological issues, such as air quality. The total forecasted benefits over the life of a system change or development should exceed the total forecast costs in order for the project to be economically efficient. However, one of the fundamental elements of Environmental Justice is that adverse impacts should not fall disproportionately on low-income or minority populations. This means that if Environmental Justice is to be part of the planning process, a transportation project that will impose significant costs on minority or low-income populations may be rejected, even if compensation is offered
equal in value to that of the costs borne. Alternatively, conditions could be imposed on the project that would minimize damaging or burdensome costs and provide compensation in return for the costs the affected people feel they can endure. The opposition from affected populations could be diminished if these protected populations would stand to gain substantially by greater accessibility or mobility.

The discovery of environmental racism can be traced to the plan for a new polychlorinated biphenyl (PCB) landfill in a predominantly Black community in Warren County, North Carolina in 1982. Unfortunately, Warren County, was, and is not an exception. Studies by the United States General Accounting Office reveal that three out of the four major hazardous waste facilities in the southern United States are located in low-income, predominately Black communities. The proportion of minorities in communities with hazardous waste dumps is on average twice as high as in communities without them. Race is the single best predictor of where commercial hazardous waste facilities are to be located. However, the complexity of the problem is such that it is difficult to draw definite conclusions from even the clearest statistical results. While the high correlation between health, race, and pollution is undeniable, cause and effect relationships can remain ambiguous. Proving that a specific environmental condition is the cause of a specific health problem is almost impossible, as some of the variables that need to be considered can remain unidentified.

One possible explanation for why minority and low-income populations are repeatedly the victims of environmental hazards is the “Not In My Backyard Syndrome”. Those with more education and political power are much more likely to successfully protest against environmental hazards in their communities, and companies tend to
choose the way of least resistance. It is only when every community becomes concerned and outspoken about environmental concerns that the industry’s path of least resistance will change. Minority communities are targeted for such hazards because they are poorer, less informed, less organized, and less politically influential.

Finally, the reality that minorities have limited access to nice housing areas adds a new dimension to the problem. Land value decreases when an environmental hazard is placed in a neighborhood. Housing in this neighborhood may have originally been unaffordable for members of minorities, but with the introduction of an environmental hazard, this is likely to change. Minority communities are not only more likely to be targets of environmental hazards, but they are also more likely to move towards them.

Adverse Effects

Expansion of transportation facilities and infrastructure has not benefited everyone equally. In particular, minority and low-income populations have had to contend with unacceptable noise and air pollution levels and concrete structures that do little for the aesthetics of local neighborhoods. The Department of Transportation is concerned with four categories of adverse effects: changes in air quality; changes in noise levels; social effects; and economic effects. Disparate impacts to job access, storm-water runoff cleanup, exposures to small particle air toxics and diesel exhaust, pedestrian safety, and community destruction by massive highways are all factors that need to be considered by transportation planners.

Air Quality

When vehicles burn fuel they emit carbon monoxide (CO). CO production is higher at low air-to-fuel ratios such as when an auto is started, idling, or improperly
tuned. Although autos are cleaner, auto use is increasing, and the increase is projected to continue. Consequently, the growth in vehicle miles traveled may offset the benefits of cleaner fuels, better emission control systems, and engines that are more efficient. In addition, household vehicles are remaining in operation significantly longer than those in previous years. For example, in 1969 automobiles averaged 5.1 years of age while in 2000 automobiles average 9 years of age, a 4-year, or 78% increase.

Emissions for CO are much higher at intersections, where vehicles spend time idling. The acceleration and deceleration phases through intersections are also more polluting than the steady speed cruising that occurs at mid-block. Pollution levels are also generally highest near roadways. Wind and precipitation generally disperse pollutants downwind and possibly downhill from a roadway. Most pollutants tend to reach normal levels between 1,640 and 3,280 feet from a roadway. Transportation contributes 66% of all CO emissions. CO forms carboxyhemoglobin in the lungs, reducing the flow of oxygen in the bloodstream. CO is, therefore, especially dangerous to populations who have difficulty getting adequate oxygen when they breathe. People most at risk from CO exposure are those with heart disease, followed by those with anemia or other blood disorders and chronic lung disease.

A second form of pollutant from auto use is nitrogen oxides. When released from fuel combustion, nitrogen oxides can cause upper respiratory irritation, as well as lower resistance to pneumonia and streptococcus. Nitrogen oxides of greater than one part per million (ppm) can irritate airways and pulmonary effects can occur at greater than two ppm.
Researchers have yet to determine the magnitude of synergistic health effects when exposure to multiple pollutants occurs simultaneously. Different fuels release particles of varying sizes, all of which disperse differently and have diverse health effects. Particulate matter (particulates) are essentially very small pieces of grit. Particulates found in the road environment range from 0.1 to 0.2 micrometers (microns) to ten times this size. Larger particulates fall to the ground quickly, and, if aspirated, are easily caught in the upper respiratory system. Fine particulates can remain suspended in the air for days or even weeks and can travel deeply into the lungs. There is no evidence that vehicle-generated or mobilized particulate matter causes asthma, but particulates do irritate this condition in both children and adults.

Asthma rates are negatively correlated with minority status and income. The asthma mortality rate for the Black population is six times that of the White population. People who belong to households earning less than $10,000 a year have a higher rate of reported cases of asthma than do those in households with higher incomes. Seniors at greatest risk, in order of severity, are those who suffer from chronic obstructive pulmonary disease, pneumonia, and cardiovascular disease. Growing children are susceptible to the health effects of particulates because their respiratory systems are still developing. In addition, children breathe more air per pound of body weight than do adults. Because children have comparatively higher rates of asthma, they are more susceptible to health problems due to particulates.

Noise Levels

An additional adverse effect is noise; defined as unwanted or detrimental sound. Residents usually list traffic noise as the most disruptive indoor problem caused by
nearby highways. The degree of disruption depends on the volume, speed, and composition of the traffic, with traffic composition having the greatest effect. For example, one combination truck produces as much noise at 55 miles per hour as twenty-eight autos. A traffic stream moving at 65 miles per hour is twice as loud as one traveling at 30 miles per hour. Traffic volume has less of an effect. For instance, 2,000 vehicles per hour sound only twice as loud as 200 vehicles per hour. Traffic noise, which is dependent on traffic mix, speed, and volume, tends to dwindle away from the road until it reaches background levels at about 1,000 feet from a highway source.

As was mentioned in the previous section, cars produce more CO when idling and with acceleration and deceleration. Further, a traffic stream moving at 65 miles per hour is much louder than one traveling at 30 miles per hour. A roadway that is designed for speeds of 30 to 35 miles per hour will have more intersections, causing more stop and go traffic, thereby creating more CO. One can then pose the question, which of these has a greater negative effective, the production of CO or the high noise levels.

Second, to distance, barriers, structures that can block, deflect, and absorb noise, are likely to be the most important determinant of noise level. Because structures act as barriers, most noise impacts are absorbed by the first row of houses along a given transportation corridor. The degree to which a building impedes traffic noise depends on the building’s height relative to the noise source.

Social Effects

A “sense of danger” increases directly with traffic volume. Children’s accident rates are associated with their living environment. For example, the risk of injury due to being struck by a motor vehicle is 5.5 times greater for children living in multifamily
The presence of identifiable landmarks in an area can lead to greater satisfaction and community attachment. Proximity to landmarks has been linked to community cohesiveness. The greater its historical significance, the more importance an object has as a community focal point. However, several actions can greatly diminish the role of landmarks in a community. The most severe of these is removal, but blocking visual or physical access to the landmark by placement of a transportation structure can also result in individual and community loss. Increasing vehicular traffic past a park so that pedestrian access is more difficult is another example of how a transportation system change may construct a barrier to a landmark. Local perceptions of the cultural, historic, or symbolic importance of a landmark or valued focal point are important factors when considering community aesthetics. Increasing the number, scale, or height of signage and fencing can contribute to a commercial or industrial appearance and constitutes a potential aesthetic impact.

Studies have also shown that the combination of tall buildings and raised highways can lead to a sense of enclosure that is aesthetically displeasing. Narrow streets and tall buildings also magnify the impacts of traffic noise, vibration, and pollution, compared to wider street spaces and setbacks. If highway overpasses decrease the horizontal space used for walking and driving to a relationship less than a one unit vertical to two units horizontal, intensified feelings of enclosure can lead to anxiety.
Parking lots or large multilane highways can add excessive open horizontal space or “dead space” to an area.

Heavier traffic in residential areas can also reduce residents’ sense of place, leading to significant decreases in social interaction with neighbors. Increases in traffic volumes along an upgraded urban highway may or may not lead to greater traffic on neighborhood streets that intersect with the highway. Barriers to mobility are closely tied to sociability along a street. Sociability, or comfort with surrounding neighbors, is an important part of community cohesion. When traffic volume is small, such as 200 vehicles per hour during peak hours, residents are three times as likely to form friendships with neighbors and twice as likely to have acquaintances in their neighborhood than when traffic volume is heavy, such as 1,900 vehicles or more per hour. Projects that increase traffic density and speed in residential areas may therefore have a detrimental impact on community cohesion.

Economic Effects

A final adverse effect is the impact on property values. It certainly is possible that improved access to employment, shopping and recreational sites can improve property values within a neighborhood. However, close proximity to major transportation facilities, such as interstates and urban freeways, can adversely affect residential property values. The Federal Highway Administration determined that the houses in the first row of structures abutting a freeway could experience a ten percent decline in value, compared to non-abutting houses. Residential property values can also be lowered by elevated highway structures that can block light to surrounding homes for all or part of the day. Households not directly in the shadow that have views that are
blocked and therefore degraded by a structure also experience a loss, if prior to
collection of the structure they once enjoyed a pleasant view.

Achieving Environmental Justice

Environmental Justice can only be achieved by involving the potentially affected
groups in developing transportation projects that will fit harmoniously within their
communities, without sacrificing safety, mobility, or accessibility. In terms of
transportation, Environmental Justice means that transportation system changes, such as
road improvements, are carefully studied to determine the nature, extent, and incidence of
probable impacts, both favorable and adverse. Effective transportation decision-making
requires understanding and properly addressing the unique needs of different
socioeconomic and racial/ethnic groups.

Planners generally have the best interests of the community at heart, but they do
not necessarily have a clear grasp of the needs, concerns, or preferences of populations
that are less well represented, such as minority and low-income populations. One of the
major difficulties in achieving or assessing, Environmental Justice is that evaluating the
magnitude of economic and social impacts of transportation system changes requires a
complex blend of carrying out objective analysis and extracting subjective opinions.
Every person has an opinion as to what aspects of the built environment are important,
what constitutes good living space, and what is aesthetically pleasing. Further, changes
in transportation systems and services that are desirable to one group may be
unacceptable to another. Even within the same city, different neighborhoods with
comparable ethnic and economic circumstances may vary considerably in terms of their
priorities and concerns. Transportation system changes are not simple; they tend to have
dual effects. They can improve access for the public, but they can also result in some of the aforementioned adverse effects.

If the principles and procedures of Environmental Justice are properly implemented, all levels of the transportation decision-making process will improve. An improved decision-making process can better meet the needs of all people. Second, proper implementation of Environmental Justice principles can encourage the design of transportation facilities that fit more harmoniously into communities. Third, Environmental Justice can enhance the public-involvement process, strengthen community-based partnerships, and provide minority and low-income populations with opportunities to learn about and improve the quality and usefulness of transportation in their lives. Effective public involvement programs enable transportation professionals to develop systems, services, and solutions that meet the needs of the public. Environmental Justice should be integrated into every transportation decision, from the initial transportation plans to post-construction operations and maintenance.

Methods to Evaluate Environmental Justice

Currently there is no consensus as to which approaches are most appropriate for evaluations of Environmental Justice. One method is to use Geographic Information Systems (GIS) as a qualitative and quantitative tool for examination. GIS provide a visualization of the current situation that can be a useful instrument to inform the public. GIS allow one to see the geographic dispersion and density of low-income and minority populations, as well as quantitative values for the racial, ethnic and economic compositions of potentially affected populations. The primary method used in this report includes the application of GIS to demonstrate absolute and relative concentrations of
minority and low-income populations with the transportation and public transit infrastructure.

Another method of evaluation might be to compare the contours of noise or air pollution generated by an upgraded transportation facility in an area with relative concentrations of minorities and/or low-income populations. While it is infeasible to model with confidence the dispersion of reactive pollutants, such as ozone and nitrous oxides, it is possible to show race/ethnic and income data with pollution concentration data. Percent minority and low-income populations, surrounding the project in question can be overlaid with pollution contours for carbon monoxide. Further, using available pollution models of vehicle generated emissions, along with dispersion models, it is possible to derive good estimates of air quality at specific points, such as intersections. Air pollution levels with and without a transportation system change can then be compared. Each of these air quality levels can then be overlaid on spatial data pertaining to race or ethnicity and income level to discern whether protected populations would experience a disproportionate impact. Finally, one could compare the relative accessibility (distance, travel time, ability to use transit) of minority and low-income populations to various trip destinations with and without the transportation facility upgrade.
Before discussing Environmental Justice in the Caddo and Bossier parishes in detail, it is perhaps beneficial to discuss general travel and mobility patterns. Transportation investments in facilities and services can be most wisely planned, and issues such as demand, impacts, and equity, best addressed in the context of a rich understanding of travel behavior. The transportation planning community is best prepared to be responsive to travelers when they have a strong knowledge base of travel behavior. A board understanding of travel behavior involves many aspects including why, when, and how people travel; how far, how fast and how often people travel; and how each of these aspects varies with time, geography, and demographic group characteristics.

Transportation is an important part of American society. During the last three decades, the number of vehicles has increased at a steeper rate than any other demographic indicator.

People travel to two types of destinations: involuntary and voluntary. Involuntary are sites people are required to visit for normal activities in locations that cannot be chosen, such as schools, places of employment, or government agencies. Voluntary, are sites people can choose, such as supermarkets, health clinics, park and recreational facilities, commercial and retail establishments. The fast growth in voluntary or non-work travel has important implications to transportation planning because it influences both temporal and spatial distributions of travel in metropolitan areas.

The history of the 20th century is also one of declining transit use and a decentralizing of both population and employment. Trends in travel and land use have complemented and re-enforced one another: general car ownership generated demand for
highways, development of the highway system changed accessibility patterns, and population and jobs responded to these new patterns of accessibility.

The Importance of Mobility

Nearly all of the benefits of modern society depend on one’s ability to transport themselves from one location to another. High levels of mobility mean high levels of access, choice, and opportunity, which can lead to self-fulfillment and enrichment. Low levels of mobility can lead to isolation and cultural impoverishment. America may be one of the most mobile of societies, however, the nature and distribution of this mobility is uneven, especially concerning minorities and low-income populations. In many ways minorities have yet to experience some of the shifts in travel that have occurred for the White population.

Mobility reflects an individual’s “activity sphere”: the geographic range of activities conducted over the course of the day. This activity sphere is determined by resources and constraints of the individual and by the spatial distribution of activity locations. Resources include income, supply of transportation services, and time. Constraints may be resource related or schedule related. The spatial distribution of activities determines the number of opportunities that may be accessed for a given quantity of travel resources. Travel outcomes are the result of the individual’s activity choices, given their set of resources, constraints, and spatial opportunities.

Uneven Mobility

For minorities, historically speaking, many of their characteristics limited them from having the high level of mobility provided by the automobile. For example, larger proportions of minorities live in households with low levels of income. Reasons for such
income disparities include minorities being younger on average, having lower levels of educational attainment, and being more likely to live in single-adult households with children.

Racial segregation is also a factor for uneven mobility. Three facts about racial segregation stand out, according to the 2000 *Travel Patterns of People of Color* report. First, it can be extreme, as has long been the case for the Black population. Nationally, the Black-White index of dissimilarity or segregation score stood at 0.64 in 2000. This means that almost two-thirds of the Black population would have to change their current place of residence to accomplish a random race distribution. Second, where people live can have important effects on economic opportunities and overall quality of life. Neighborhoods vary tremendously in quality of services, amenities, and level of exposure to unwanted social conditions, such as crime, severe unemployment, poverty, and failing schools. Further, minorities face racial discrimination and other constraints in the housing market, and are less likely to have ready access to areas rich in employment opportunities. In addition, they are less likely to form personal ties to individuals who can link them to other important economic opportunities. Segregative processes in the housing market impose limitations in terms of the value of the homes minority individuals own, and in terms of mortgages and other loans they may obtain; thereby driving up the cost of insurance.

Over the last decade, the formula for new development has included rapid population growth scattered across the suburban fringe and clusters of high-tech businesses in “technology corridors” along interstates. Consequently, many have changed the way they work, how they shop, where they go and when. Those owning an
automobile enjoy a significant advantage in terms of higher employment rates and total earnings. Employment prospects and variability increase with an automobile. Increasing vehicle ownership reflects not only increasing reliance on private vehicles for day-to-day travel, but also the economic prosperity of the last part of the 20th century.

People without cars, and the working poor with limited access to cars, are disproportionately low-income minorities, low-income women, the elderly, and the physically challenged. If we examine the situation in the Caddo, Bossier, and Webster parishes, Figure 4, we see the clustering of the largest numbers of minorities in areas with the least number of vehicles per household. This is especially true where there is less than one vehicle per household. If we examine the areas where there are more than two vehicles per household, we see very little of the total minority population. According to the 2000 Census, the percentage of occupied housing units with no vehicles available for Caddo Parish is 12.8%, Bossier it is 7.7%, and for Webster it is 10.8%. For the state of Louisiana the percentage is 11.9%. 
Number of Vehicles Per Household & the Minority Population in the Study Area

Figure 4
Those without an automobile may rely on public transit as their mode of travel. Public transit may afford an individual their desired level of mobility, but likely there are temporal, if not spatial constraints on this mobility. Spending more time to cover the same distance amounts to a time burden, or cost, primarily paid by minorities. This time burden could lead to lower motivation to seek employment, and for those with jobs, it could mean more tardiness and absenteeism at work. It could also lead to poorer job performance, poorer promotion prospects and less economic gains in the lifetime earnings.

Mode of Travel

Transit use and carpooling have declined as more and more people chose to drive (alone) to work. This is true not only for the White population, but also for the minority groups. Nevertheless, while the patterns may be converging, the Black and Hispanic populations continue to show much higher proportions using transit and walking than the White population. Although the Black and Hispanic populations, and especially new immigrants, compose the broad base of transit users in many areas, many workers shift to commuting by car when one becomes available.

Licensed drivers among minorities and the White population are surprisingly similar in their shares of non-work travel as drivers of privately operated vehicles. However, Black licensed drivers are over five times as likely as White licensed drivers to use public transit. Asian or Pacific Islander licensed drivers are about two and a half times as likely to walk for non-work travel as White licensed drivers. The traditional explanation, for observed differences in travel characteristics across racial/ethnic groups, has been attributed to differences in socioeconomic or location characteristics. For
example, the traditional explanation for the fact that minority groups use transit more than the White population is that minorities tend to have lower incomes and are more likely to live in central cities than the White population.

**Commuting Patterns**

Commuting trips have a tremendous impact on local traffic, especially during peak periods. Further, there has been a remarkable shift to driving alone, especially for work travel. The average American worker now spends more time commuting than doing many other common daily tasks. Minorities tend to reside in central cities, have lower incomes, and higher levels of transit use, all of which are associated with longer commute times.

A multi-variant analysis of commute time, controlling for an array of demographic, economic, and location factors (gender, ethnicity, presence of children, presence of other adults, location in suburbs or urban centers, travel mode, household income, education level, and age), shows that increased commute time is most closely associated with transit use, being Black, being female, and not trip-chaining non-work trips into the commute. In most trip chaining analysis, the primary anchors are generally considered home and work. A “chain” is a series of trips in a tour. A tour is defined by the anchors, such as home to work or work to home chains. A trip is a one-way segment of travel between an origin and a destination, by any means of travel.

Commutes within central cities are shorter in distance but slower in speed due to both congestion and more use of public transit. Commutes within suburbs are longer in distance and faster in speed. Commutes between central cities and suburbs are longer than commutes within either central cities or suburbs. High education groups may opt to
Trip chaining is an important transportation phenomenon for three reasons. First, the trend toward chaining contradicts the increasingly complicated nature of travel behavior. If each individual’s daily journey to work is interlaced with a different errand stop, it will be much more difficult for transportation planners and policy makers to accurately predict such complex, contingent travel behavior patterns. However, trip chaining may represent more efficient use of urban transportation investments, from both a user and a system perspective. While women in particular may be more likely to trip chain in order to economize on time, more stops by anyone in fewer trip-hours also means slower growth in vehicle- and person-miles of travel, relative to the growth in trip-making. Further, working mothers are more likely to trip-chain than other women because they take more trips. Mothers who do not work outside their household responsibilities are more likely than men to chain their trips together, suggesting that the more rigid time constraints of multiple trips and purposes causes mothers to trip-chain. The unequal distribution of household responsibility reflected in travel patterns may also differ by ethnicity.

Households (particularly those with children) that can afford to suburbanize typically do. This is because the gains in housing amenity for the price, including neighborhood and quality of local schools, offset the increased costs of commuting. That is, higher-income households (which are typically male-headed), intentionally self-select for longer commute durations at higher speeds from suburban homes, leaving singles (mostly minority women) and low-wage workers in the center city. The lower average travel more to pursue high-income opportunities. However, the extra commute may not result in a significant income differential for low-education groups.
income of central city workers, in turn, increases the use of slower travel modes, particularly public transit in more congested conditions. Single mothers and childless married women were more evenly distributed between the city and suburbs than single women, suggesting that either marriage (which typically includes an increase in income) or a child (which increases the desirability of suburban living) may encourage women to locate in the suburbs. Except for Black women, parents in multiple-adult households are most likely to live in the suburbs, while Black single mothers are significantly concentrated in the city center.

**Spatial Mismatch Theory**

The flight or suburbanization of blue-collar industries from the inner cities after World War II led many who lived in the core of urban metropolitan areas into unemployment and thus poverty. Because inner city minorities, and more specifically the Black population, on average, are modestly skilled and educated, the loss of these jobs entails special hardships. Tied to the cities by housing discrimination and low incomes, minorities are geographically disconnected or “mismatched” from well paying, often unionized blue-collar jobs that have left these areas for the suburbs. Although two-thirds of all new jobs in the nation have sprouted in the suburbs, three-quarters of welfare recipients live in central cities or rural areas. The lack of automobile ownership and sparse public transportation linkages stifle commuting options to peripheral areas. This especially holds true for those from the working and poor classes. The growth of central city employment in the post-war era has been largely white-collar with substantial skill or education requisites. As a result, central city residents, most of whom are Black, Hispanic, and in the largest cities, Asian or Pacific Islander, are not connected to jobs
nearest their place of residence. Residential and transportation are linked as either fostering or hindering economic opportunities that allow one to escape structural neighborhood forces.
This next section will map the various minority groups in the Caddo & Bossier parishes in conjunction with the transportation and public transit systems. Travel by minorities is of interest to policy makers because it is a growing and changing share of the total travel market and is expected to continue to grow much faster than overall travel well into the next century. This growth has been driven both by the increase in minority populations and by the significant rise in travel rates by minority individuals. The mode choice of this population segment is also changing rapidly. Another reason for the interest in the travel behavior of minority populations is the fact that mobility is essential to the quality of life and economic well being of all people. Minority populations have not had the same level of mobility enjoyed by the White population in America. Understanding travel behavior for minorities enables policy makers to better explore the role that transportation is playing in influencing the economic opportunity and quality of life for minority populations.

In order to effectively evaluate the principles of Environmental Justice, it is necessary to examine the impacts of future transportation system changes on minority populations. To do this, one must first identify where these populations reside. By knowing the race/ethnic composition of small geographic units of analysis, census tracts, one can evaluate to what degree a transportation system change could or will affect these populations, either in a positive or negative sense. One of the greatest advantages of using GIS for a report of this nature is its display capabilities. This, and subsequent sections, will feature a number of different maps, all showing minority and low-income populations and the transportation system or the public transit system.
The Black Population and the Transportation System:

Before discussing the individual minority groups, it is important to examine the breakdown of the racial and ethnic status of these groups in the Caddo and Bossier parishes. The following charts, Chart 1 and 2, display both the numbers and percentages of the White, Black, Asian/Pacific Islanders/Hawaiian, American Indian/Eskimo/Aleut and those of Hispanic origin. The White population makes up the largest percentage, followed by the Black, Hispanic, Asian/Pacific Islander/ Hawaiian, American Indian/Eskimo/Aleut populations.
Figure 5 shows the percentage of the Black population and the location of the transportation system. In terms of what areas are displaying a high percentage of the Black population, the areas are mostly concentrated around the metropolitan areas of Shreveport and Bossier City. This is also where the highest density of people is located. For example, if we examine a population density map of the area, Figure 6, we see that the area surrounding the metropolitan area Shreveport and Bossier City is indeed a high-density area.
The Transportation System & Percentage of the Black Population in the Study Area

Figure 5
2000 Population Density in the Study Area

Figure 6
Returning to the initial map of the Black population and the transportation system, we see that much of the interstate sections pass through these high-density areas, areas that have a high percentage of the Black population. On the one hand, it makes sense that the interstates pass through the areas with the highest number of people, since the interstates are meant to serve a great deal of people. Passing through these areas allows a greater number of people higher levels of accessibility and mobility. However, it also means that a high number of minorities, in this case, the Black population, are dealing with an interstate passing through their area, or neighborhood, potentially causing some, or all of the aforementioned adverse effects, such as air quality issues, noise, and areas that are not aesthetically pleasing. Interstate 20 in the Bossier parish, Figure 7, primarily runs through areas comprised of up to 25% Black population per census tract. However, if quarter and half mile buffers are created on either side of Interstate 20, areas with more than 50% of their population as Black are also included. Quarter and half mile buffers were completed due to the fact that the effects from an interstate highway can be felt some distance away from the actual road surface. In other areas, such as the area where Interstate 220 runs, the percentage of the Black population is less, up to 10% in a census tract, except when the quarter and half mile buffers are taking into account. Parts of Interstate 20 also pass through census tracts that have up to 10% of their population as Black.
Upon examination of the Caddo area, Figure 8, we see that Interstate 20 moves easterly through areas with up to 50% of the population in a census tract being Black. Once Interstate 20 reaches the metropolitan area of Shreveport, the percentage of the Black population in many of the census tracts reaches 75%. Interstate 220 also passes through areas that have more than 75% of their population as Black. With the inclusion of the buffers, Interstate 220 also affects areas with population comprised of more than 50% Black.
Interstate 20 & 220 in Caddo Parish – Black Population

If we look at Interstate 49, Figure 9, we see that it progresses through a variety of different neighborhoods. Some of the areas are made up of more than 75% Black, while others have up to 1 - 10% of their population as Black. According to Environmental Justice’s definition, an Environmental Justice community has 50% of its population as a minority. According to the map, many areas with an Interstate passing through, or with the inclusion of the buffers, are indeed Environmental Justice communities. Once Interstate 49 leaves the inner city area, it progresses through a census tract with up to 25% of its population as Black. It is interesting to note on the map that Interstate 49 passes beside areas that have up to 10% of the population as Black, and then continues to pass right through an area of up to 75% Black.
Interstate 49 in Caddo Parish – Black Population

Figure 9

Some of these observations can be explained by the fact that traditionally, minorities have lived in the urban centers of cities. Further, interstates have traditionally passed through the urban centers of cities, since this is where they can service a great number of people. There are two ways of looking at this. Interstates were built where they could provide a great deal of access to a large number of people; or people live where they can have relatively easy access to the Interstates. However, since land in close proximity to the interstates tends to be less valuable or less desirable because of negative or adverse effects, such as noise and air pollution, it is the minorities, with traditionally lower incomes, who have moved to these areas. In addition, interstates were built where there was the least amount of opposition, typically minority neighborhoods. In this case it is likely a combination of factors.
The Hispanic Population and the Transportation System

**Figure 10** examines a second minority group, those of Hispanic origin. Among the minority populations, Hispanic mobility is the highest, according to much of the literature on this subject. These maps display some patterns that are slightly different compared to what was displayed by the Black population map. For the most part, the largest percentages (up to 10%) of the Hispanic population are located just outside of the metropolitan area of Shreveport and Bossier City. However, much like the Black population, the interstates still pass through the areas that have the higher percentages of the minority population.
The Transportation System & Percentage of the Hispanic Population in the Study Area

Figure 10
For example, when looking at the path that Interstate 20 follows in the Bossier Parish, Figure 11, it is completely through areas with up to 10% Hispanic population.

The situation is different in the Caddo census tracts. Figure 12 displays Interstate 20 passing in and out of neighborhoods of less than 1% and up to 10% Hispanic population. Interstate 220 mainly passes through neighborhoods of less than 1% Hispanic population but grazes a few with up to 10% Hispanic population.
Interstate 20 & 220 in Caddo Parish – Hispanic Population

Figure 12

Interstate 49, as shown on the following page Figure 13, passes through both neighborhoods of less than 1% and those of up to 10% Hispanic population.
The same assumptions can likely be made about the Hispanic population as were made for the Black population. One can raise the same argument about interstates being located where they can service the most people. Further, minority groups may locate near these areas where land is less expensive. Finally, the point can be made that interstates may pass through areas of least resistance.

The Asian or Pacific Islander Population and the Transportation System

Among the minority populations, Asian or Pacific Islander mobility is the lowest. They also experience longer travel times because of their geographic location of residence. This may be explained by the likelihood that Asian or Pacific Islanders are the least oriented toward nonmetropolitan areas, as will be displayed in the subsequent map. **Figure 14** shows a similar pattern to that of the Hispanic population.
The Transportation System & Percentage of the Asian/Pacific Islander Population in the Study Area

Figure 14
The areas with the greatest percentage (up to 10%) of the Asian or Pacific Islander populations are primarily located just outside of the metropolitan area. No areas within the Caddo and Bossier census tracts show an Asian or Pacific Islander population of more than 10%. In terms of the interstates in Bossier Parish, Figure 15, Interstate 20 and 220 pass through areas where there is an Asian or Pacific Islander population per census tract of up to 10%. Areas with less than 1% Asian or Pacific Islander population are also discernable if the buffers are included. As Interstate 20 leaves the Bossier City metropolitan area, it passes through areas with less than 1% Asian or Pacific Islander population.

Interstate 20 & 220 in Bossier Parish – Asian or Pacific Islander Population

![Figure 15](image)

In terms of the Caddo Parish, Figure 16, Interstate 20 and 220 completely pass through areas with less than 1% Asian or Pacific Islander population.
Figure 16

Interstate 20 & 220 in Caddo Parish – Asian or Pacific Islander Population

Interstate 49, Figure 17, passes through areas that have less than 1% Asian or Pacific Islander population inside the metro area. Outside the metro area and with the buffers it includes areas with up to 10% Asian or Pacific Islander population. The number of Asians or Pacific Islanders in this area is minimal.
The American Indian, Eskimo or Aleut Population and the Transportation System

The final minority is the American Indian, Eskimo, or Aleut population, as shown by Figure 18.
The Transportation System & Percentage of the American Indian/Eskimo/Aleut Population in Caddo & Bossier Parishes

Figure 18
This map is interesting because there are only two areas with a population comprised of up to 10% American Indian, Eskimo, or Aleut. In the Bossier Parish, Figure 19, Interstate 20 passes predominately through areas that have less than 1% American Indian, Eskimo, or Aleut population, although the quarter and half mile buffers include areas with up to 10%.

As illustrated in Figure 20, both Interstate 20 and 220 pass through areas with less than 1% American Indian, Eskimo, or Aleut population.
Interstate 20 & 220 in Caddo Parish – American Indian, Eskimo or Aleut Population

The same pattern holds true for Interstate 49, Figure 21.
With the discussion of each of the four minority groups, each group had less and less of an impact on the urban landscape, in terms of their percentage of the population within the census tract. However, what did remained consistent was the fact that for each group the interstates passed through areas with least 10% of the minority population, although there are some exceptions, as displayed by examining a map with all four minorities grouped together, Figure 22.
The Transportation System & Percentage of the Minority Population in the Study Area

Figure 22
In Bossier Parish, **Figure 23**, Interstate 220 passes completely through areas with less than 10% minority population. However, if one takes into account the quarter and half-mile buffers, a reasonable distance from which one could still be affected by adverse effects, areas with up to 50% minority populations are also included. Interstate 20 passes through areas that are up to 10% minority population, as well as through areas that are up to 50% minority. Again, with the inclusion of the buffers, areas with populations of more than 75% minority are also included.
The situation worsens in Caddo Parish, Figure 24, in that Interstate 220 passes through areas with more than 75% minority population, as well as areas with up to 25% minority population. The buffers include areas with more than 50% minority population.

Interstate 20 & 220 in Caddo Parish – Minority Population

Interstate 20 passes completely through areas with more than 75% minority population and then as it leaves the metropolitan area it passes through areas with up to 50% minority population. These would all be considered Environmental Justice communities. Interstate 49, Figure 25, runs beside areas with up to 10% and up to 75% minority populations, and then as it leaves the metropolitan area it passes through census tracts that have up to 75% minority population. As it begins to leave the study area the percentage decreases, up to 25% minority population. The buffers also include areas with populations of more than 75% minority.
If we look at the White population and the location of the interstates, we see a different situation, Figure 26.
The Transportation System & Percentage of the White Population in the Study Area

Figure 26
In Bossier Parish, Figure 27, Interstate 20 and 220 are primarily in areas with more than 75% White population.
However, in Caddo Parish, Figure 28, the situation changes somewhat. In the metropolitan area of Shreveport, Interstate 20 primarily runs through areas which are less than 50% White. When Interstate 20 leaves the metropolitan area, it moves through an area with up to 75% White population. Interstate 220 passes through areas that are up to 10% White and then into subareas with more than 75% of their population comprised of White population.
Interstate 20 & 220 in Caddo Parish – White Population

Interstate 49, Figure 29, traverses through areas with up to 50% White population and then leaves the area through census tracts with more than 75% of their populations as White.
This is a helpful comparison to do; otherwise, one might think that the interstates only pass through areas with high percentages of minorities. From the examination of the White population and the transportation system, one can clearly see that the interstates go through areas with large numbers of people. However, the point needs to be made that Whites make up almost 59% of the population in Caddo and Bossier Parishes. The next highest racial group is the Black population at 37%. A larger population means higher percentages within census tracts. What is most alarming about this however, is the fact that the Black population is proportionately small, one third of the overall population of the area, yet so many of the census tracts with a high percentage of the Black population have an interstate passing through their neighborhood. Blacks are not contributing large numbers to the overall population, yet they are being affected by the interstates almost to
the same degree as a group that makes up the majority of the population. This is what is meant by minority groups being disproportionately affected. Interstates and their relative location have likely affected the Black population more than the other three minority groups. The aforementioned factors of poverty and racial segregation are likely very influential.

Minority Populations and the Public Transit System

The same techniques will now be used to look at the public transit system and the minority population. By understanding the travel and mobility patterns of the populations who use public transit, one will be better suited to assess how a transportation system change could affect them, either positively or negatively. Across the country, but particularly in cities with predominantly low-income and minority populations, public transportation is disappearing. Many of these cities are leveraging federal money to finance a highway-building boom erecting bypasses and outer beltways to accommodate suburban sprawl partially caused by “white flight”. The working poor, elderly, and physically challenged are left stranded, as the suburbanization of roads has increased at the expense of transit. Welfare recipients required to find jobs will not be able to get to the suburbs where job growth is strongest unless they have a car. Forty years of building highways to outlying communities reduced the cost of development in those areas to the detriment of older, urban areas.

Transit serves two primary users, those that have the means or choice of transit and those who do not. People in the transit-dependent market have no personal transportation, no access to such transportation, or are unable to drive. People who have a choice in their transit mode are mostly workers, environmentalists, travelers, and
people on recreational, social, medical, or other journeys that do not have to use transit but do so for reasons of speed, comfort, convenience, traffic avoidance, or environmental principle.

Despite substantial public subsidy, productivity continues to decline, and ridership is flat or declining in most metropolitan areas. New suburban transit services have done an especially poor job of attracting (new) riders. National transit ridership for commute trips declined from 5.3% of total riders in 1990 to 4.7% in 2000. Such numbers obscure the value of transit in large urban areas and mask the significance of transit to minorities, elderly travelers, women, low-income travelers, and choice riders. For example, those with family incomes below $15,000 comprise 28% of all transit trips. At all household income levels, Black, Hispanic, and Asian or Pacific Islander populations were more likely to commute using public transit than were White populations. For example, if we look at Figure 30, we see that the areas with the highest ridership also have populations with a great number of minorities, more specifically members of the Black population.
If there is a graphic examination of household income and public transit ridership, Figure 31, the number of people who take the bus to work are overwhelmingly in the low-income areas.
Significant mobility problems still exist in low-income and minority populations. The call for improved public transit and/or automobile ownership for the working low-income groups could provide an important intervention strategy to lessen unemployment among inner-city residents. Currently, urban public transit systems operate efficiently in densely developed urban areas. However, these systems may do a poor job of serving dispersed trip origins and destinations. Public transit should not only be a question of accessibility, but it should meet the needs of the community it serves. For example, is the transit schedule conducive for commuting if one has to commute to the suburbs? From the preceding discussion on the spatial mismatch theory, it is well known that many of the employment opportunities for low-income and minority populations are in the suburbs. To preserve transit markets, planners need to understand and serve the needs of...
customers and make it attractive for people to continue to ride the bus, even if a vehicle is available.

Other innovations are also needed. Tax-free mass transit benefits through employers; shared-ride taxis, taxi vouchers, vans, and smart shuttle services can economically serve travel markets not well-suited to fixed-route transit. Guarder bicycle parking garages, other secure bike parking and rental bikes at park-and-ride lots, and major transit stops can expand transit access in suburban employment areas. By creating communities that are better suited to walking, biking and transit, healthier communities can be created with more mobility, accessibility to jobs, reduced congestion and cleaner air, all of which are beneficial to everyone.

The Black Population and Public Transit

The willingness of the Black population to use public transit even when other characteristics of the population are held constant, may be explained by the Black population having a greater awareness of transit options, generally living in areas with better transit service availability; and/or there being less of a stigma associated with transit use in the Black population. Members of the Black population, and Black women in particular, tend to use transit at significantly higher rates than other populations.

Because so many of the Black population depend on public transportation as their means of transport, it is important to examine how well transit is serving their needs in within the metropolitan area. Further, if a transportation system development included some sort of change to the public transit system, according to the principles of Environmental Justice, it would be necessary to know how the change would affect minority and/or low-income populations. Upon examination of Figure 32, one can see
that the routes are primarily focused where the greatest proportion of the Black population is located. However, one concern worth noting is the large area just north of the metropolitan area, an area that has over 50% of its population as Black.

**Weekday Transit Routes & Percentage of the Black Population in Caddo & Bossier Parishes**

![Map showing Weekday Transit Routes & Percentage of the Black Population in Caddo & Bossier Parishes](image)

Figure 32

There is a strong probability that a great number of the Black population in this area may need to use transit, but are not being serviced by the transit routes. However, if we refer back to the population density map, Figure 6, we see that this area is one of low population density. Further, if we refer back to the map displaying all the minorities and the number who use the bus for traveling to work, Figure 30, we see that the bus routes are servicing where the most people who take the bus live.

However, it must be noted that this does not account for the number of people who may want, or need to take the bus, but are unable because the bus does not service...
their area; those with unexpressed demand. This is something that is perhaps worthy of additional study: how many potential riders exist in Caddo and Bossier Parishes who would like, or need to take the bus, but who live in an area that is not serviced by the current transit service? Further, it may also be worthwhile to see how well transit is matching minority commuting patterns. The SporTran service has limited evening service and no late night service; it operates until approximately 6 p.m (Editor’s note: since this update SporTran has implemented an Extended Hours Service, 9/2007, that serves many low income and minority population areas). For example, by looking at where all the minorities are located and when they leave for work, Figure 33, one sees that the people who leave for work in this time frame include many areas with higher proportions of minority populations.

**Departure Times For Work Outside of Public Transit Service Hours – Minority Population in Caddo & Bossier Parishes**

![Figure 33](image-url)
If we refer back to the vehicles per household map, **Figure 4**, we see that the same households without a vehicle are the same households who must leave for work outside the hours that transit operates. If according to the spatial mismatch theory, these minorities need to go to the suburbs for work, these groups are going to face some definite mobility issues, given that they do not have a vehicle, and transit does not run at the required hours. In addition, one can also map the departure times for work and median household income, **Figure 34**, and a similar pattern emerges.

**Departure Times For Work Outside of Public Transit Service Hours – Median Household Income in Caddo & Bossier Parishes**

![Map showing departure times for work outside of public transit service hours and median household income](image)

People who leave for work outside of transit hours, live in low-income areas, and have a high probability of not owning a vehicle are likely going to experience some mobility difficulties.
The Hispanic Population and Public Transit

If we look at the public transit situation for those of Hispanic origin, Figure 35, we see that the bus routes, for the most part, are passing through areas with less than 1% and up to 10% Hispanic population. However, what is more noteworthy, is that with so much of the Hispanic population living outside the metropolitan area, there could be a population not receiving required or desired transit services.

Weekday Transit Routes & Percentage of the Hispanic Population in Caddo & Bossier Parishes

The Asian or Pacific Islander Population and Public Transit

If we examine where public transit passes through in relation to the Asian or Pacific Islander population, Figure 36, we see that most of the routes pass through areas where the proportion of Asian or Pacific Islander is less than 1%, although there are a
few exceptions, primarily located within Bossier Parish. With so few Asian or Pacific Islanders in this area, it is difficult to tell if transit is meeting the required demand.

**Weekday Transit Routes & Percentage of the Asian/Pacific Islander Population in Caddo & Bossier Parishes**

![Weekday Transit Routes & Percentage of the Asian/Pacific Islander Population in Caddo & Bossier Parishes](image)

Figure 36

The American Indian, Eskimo, or Aleut Population and Public Transit

Our final consideration for the minorities is the American Indian, Eskimo, or Aleut transit map, Figure 37. Again, without any areas displaying an American Indian, Eskimo, or Aleut population greater than 10%, no clear patterns are readily seen from this map. One of the routes does however pass through an area that has up to 10% American Indian, Eskimo, or Aleut population.
Weekday Transit Routes & Percentage of the American Indian/Eskimo/Aleut Population in Caddo & Bossier Parishes

Figure 37
The second major component of Environmental Justice is low-income groups within the study area. When we look at the map, Figure 38, we see that the interstates primarily move through areas of lower income. The inner city is displayed as the poorer area, with fringes of increasingly wealth. This is likely because the center city has a great deal of minority populations, and traditionally minorities have been of lower economic status.
The Transportation System & Median Household Income in Caddo & Bossier Parishes

Figure 38
In Bossier Parish, **Figure 39**, Interstate 20 moves through low-income areas until it begins to move east out of the metropolitan area where it passes through a higher income area. Interstate 220 moves almost exclusively through higher income areas unless the buffer zones are taking into account.

**Interstate 20 & 220 In Bossier Parish – Median Household Income**

Interstate 20, in Caddo Parish, **Figure 40**, is completely in low-income areas until it moves out of the metropolitan area and passes through a higher income area. Interstate 220 follows a similar pattern, predominately in low-income areas until it moves out of the metropolitan area.
Interstate 49, **Figure 41**, is interesting in that it passes beside the high income areas, but passes right through the low-income areas. However, its quarter and half mile buffers do affect some of the higher income areas. As it moves south out of the metropolitan area, it passes through areas of increasingly wealth.
As with the minority issue, an interstate passing through an area can lower its value; thus allowing people with lower economic wealth to be able to afford the housing. Alternatively, it could be the fact the interstates pass through areas of least resistance, which again would more likely be the low-income areas. Traditionally these areas have not held the political power or influence that middle income and higher income areas have held. It must be reiterated that close access to an interstate is not necessarily only a negative consequence. It can mean accessibility to employment, recreational, or social opportunities. Completing an Environmental Justice assessment provides a picture of the current situation, so one can know what to anticipate given a transportation change or development in the future.
Income and Transit

Accessibility is usually not an issue for middle income (and higher) families because they have personal transport options, usually a personal vehicle. If we look at the transit situation in relation to the economic status of people living in Caddo and Bossier Parishes, Figure 42, we see that the routes are primarily in areas with low incomes.

Weekday Transit Routes & Median Household Income in Caddo & Bossier Parishes

This is because if people can afford a car, they will more than likely drive for all of their transportation needs. The bus routes barely venture outside areas where incomes are above $25,000. There are of course a few exceptions, but for the most part the bus routes are servicing the inner city areas, which are predominately of lower income.
Income, Minorities, and Transportation

We can also examine Environmental Justice by combining the two major factors, minority status, and income status. The minority populations will be examined as a whole, all groups together, in combination with median household income. The minority population is predominately in lower income areas, as shown by the following map, Figure 43. Again, the minority population coalesces around the center city and primarily in areas with less than $15,000 as their median household income. However, there are a couple of the other areas with incomes of greater that $50,000 that have a number of minorities in them. Further, the area where the coalescing is occurring is also the area where the highest density of population occurs.
The Minority Population & Median Household Income in Caddo & Bossier Parishes

Figure 43
Although gender is not included in the formal definition of Environmental Justice, many of the changes and adverse effects due to transportation system changes and developments affect women, especially those of minority or low-income status. Therefore, this report will devote a small section to gender and transportation. Even though race and ethnicity appear to be more important influences than gender on mode choice and travel behavior, gender differences persist, especially by household type. For example, over the last three decades, the number of families headed by women alone has increased substantially. Larger percentages of single headed households below the poverty threshold and among minority women are seen. For example, if we look at Figure 44, one can notice a coalescing of households headed by women in the poorest sections of the parishes, the $0 – $15,000 category.
Median Household Income & the Number of Female Householders in Caddo & Bossier Parishes

Figure 44
These same areas are primarily minority populations of more than 50% per census tract, as shown by Figure 45.
The Minority Population & the Number of Female Householders in Caddo & Bossier Parishes

Figure 45
Most discouraging to first timers entering the work force is the lack and inaccessibility of
day care, further complicating and lessening a mother’s wage potential and opportunities.
Improving access to jobs and providing child care options that extend beyond the
tradition 7 a.m. to 6 p.m. time frame are an important part of the public policy debate.

One of the major reasons for the increase in driving in the last thirty years has
been the increase in labor force participation, especially for women. It is not simply the
added work trip, but the greater availability of autos to women, the greater household
income provided by working women, and the need to purchase goods and services to
sustain the household, that have fueled the increase in travel.

However, despite significant increases in paid labor force participation by women
over the last third of the 20th century, these data also suggest that women continue to
shoulder far more responsibility than men for maintaining households, and for
household-serving travel. Consequently, women, regardless of race/ethnicity, are more
likely than men to chain trips together into tours. This has important implications for
urban transportation planning and policy. For example, the relative inflexibility of fixed-
route transit service is often poorly suited to chaining multiple trips together across a
metropolitan area. Public transit systems may need to develop new, more flexible forms
to better adapt to the needs of trip-chaining travelers.

The average mother spends more than an hour driving, traveling 29 miles, and
taking more than five trips daily. Women are making more and more of these trips and
are driving further to accomplish them. They are often the sole transportation provider
for children and elderly parents who cannot drive and have few other options. Children
have become highly dependent on adults with cars, because the places where they learn
or play often cannot be reached by foot or by bicycle. Mothers are finding themselves driving farther and farther to shop and run errands, because the stores have moved to the edge of town, far from home or work. As sprawling subdivisions and “big box” stores sprout up along brand new roads, families living in new homes find that driving is the only way to reach parks, shops, and schools. Because of these driving and mobility patterns, any transportation system changes can have a substantial impact.

Concerning mode of travel, women are more likely to carpool than men in each ethnic group. In single-person households the difference is slight only for single parents, although the relatively few men in this category are notably less likely to drive alone as well. It may be that women have found ways to access an automobile when their household responsibilities and personal security demand it; even where single fathers have not done so. Despite income differences, lower-income women, particularly mothers, are likely to seek automobile access in whatever ways they can because the requirements of juggling paid employment and household responsibilities demand the flexibility, security and speed of an automobile.

As previously discussed, income is often considered one of the most powerful (inverse) predictors of transit use. However, income is a far weaker predictor of transit use among women with small children. Females in low-income households are three times more likely to ride transit than those in the second quartile, but that women at each income level are also more likely to travel by car than similarly situated men. Thus, while public transit is clearly most important for households in the lowest income quartile, on average the automobile is by far the most important mode, even for the income groups that are ostensibly most transit-dependent. Women ride public
transportation two to three times as often as men do. However, women’s use of transit seems to be converging with that of men, primarily because women’s transit use has been decreasing at a faster rate. Black women rely heavily on public transit. They are nine times as likely to use public transit as White men or women. Black women continue to be an important market for both choice and captive transit riders.
The next section of this report examines the Transportation Improvement Program (TIP) for Caddo and Bossier parishes, from the present year to 2007. By examining the TIP in conjunction with the minority and low-income populations, one can see the potential areas of impact of future transportation system changes. The TIP has four objectives. First, to identify and prioritize transportation improvements for each period. Priorities are evaluated based on each project’s status in the overall program and its merits. Second, to provide financial constraint measures that are developed through realistic and current estimates of individual project costs and overall funding allocations. A third objective is the coordination of the TIP with the financially constrained Long Range Transportation Plan for the urbanized area. Finally, the TIP maintains a continuing, coordinated and comprehensive transportation planning process for the two-parish area.

The TIP is developed to show the staged implementation of the transportation plan on a fiscal_year-by-fiscal_year basis. Each project contained within the TIP is judged and reviewed against those in the transportation plan. The projects contained in the TIP are derived from the region’s twenty year Metropolitan Transportation Plan (MTP). The TIP consists of all projects related to highway and transit facilities; transit vehicles; pedestrian walkways, bicycle transportation facilities and additional transportation related enhancement projects. Both the TIP and the MTP have been financially constrained to reflect realistic and available levels of project funding. Only projects that are mutually agreed upon with the Louisiana Department of Transportation and Development (DOTD) as to overall benefit and funding availability are included in
the TIP and the State Transportation Improvement Program (STIP). Some of the types of projects included in the TIP include widening certain roads, bridge replacements, capacity and safety improvements, intersection improvements, bridge rehabilitation, interstate lighting, bridge painting, railroad crossing improvements and other highway safety improvements.

In order to meet the four objectives of the TIP, the Metropolitan Planning Organization (MPO) refers to the seven Planning Factors of the Transportation Equity Act for the 21st Century (TEA-21) from the Federal Highway Administration. These factors are concerned with supporting the economic vitality of the metropolitan planning area by enabling global competitiveness, productivity and efficiency; increasing the safety and security of the transportation system for motorized and non-motorized users; increasing the accessibility and mobility options available to people and for freight; protecting and enhancing the environment, promoting energy conservation and improving quality of life; enhancing the integration and connectivity of the transportation system, across and between modes, for people and freight; encouraging efficient system management and operation; and emphasizing the preservation of the existing transportation system.

The Caddo and Bossier parishes place a high priority on projects which will improve the economic competitiveness of the area, the safety of its citizens, and the efficiency of the overall transportation system. The TIP includes a transit element and a highway element that is comprised of three components: right-of-way, engineering and construction. In the engineering phase, all preliminary field survey, utility location, environmental/historical studies, road design alternatives, drawings, final field
inspections and public hearings are completed. This phase can take a few months to several years to complete. Negotiations with property owners occur during the right-of-way phase. In addition, during this stage payments are made and arrangements with utility companies are finalized in order to obtain the necessary land for the project. The right-of-way phase will not begin until most of the preliminary engineering steps are complete. Right-of-way work will only be included for projects that require additional right-of-way or changes within the existing right-of-way. The final stage is construction, whereby the project is advertised to prospective contractors for bids. Once the bids are opened and a contract awarded, actual construction can begin.

The next portion of the report will look at the TIP in conjunction with the Black population, the four minority groups as a whole and the low-income population. The Black population was highlighted because they have large percentages within the area, enabling one to see a number of different patterns. The other three minority groups do not show much spatial variation when they are mapped as individual groups, due to their low numbers.

The first series of maps (Figures 46 to 51) show the engineering costs and the fiscal years for the Black population, the entire minority population and low-income population. The maps do not display any readily seen patterns. Engineering improvements are occurring in areas with high and low percentages of Black and minority populations. Similar patterns hold true for the low-income maps; engineering improvements are occurring in low- and mid-income areas.
The Black Population & Engineering Costs in Caddo & Bossier Parishes

Figure 46
The Black Population & Engineering by Fiscal Year in Caddo & Bossier Parishes

Figure 47
The Minority Population & Engineering Costs in Caddo & Bossier Parishes

Figure 48
The Minority Population & Engineering by Fiscal Year in Caddo & Bossier Parishes

Figure 49
Figure 50
Engineering By Fiscal Year & Median Household Income in Caddo & Bossier Parishes

Figure 51
For the right-of-way maps, Figures 52 – 57, we see a similar pattern to that of the engineering maps. The improvements are happening in both areas with high and low percentages of the Black and minority populations. In terms of the low-income population, the right-of-way improvements appear to be occurring in the low and mid strata. There appear to be fewer scheduled right-of-way activity in the higher income areas.
The Black Population & Right-of-Way Costs in Caddo & Bossier Parishes

Figure 52
The Black Population & Right-of-Way by Fiscal Year in Caddo & Bossier Parishes

Figure 53
The Minority Population & Right-of-Way Costs in Caddo & Bossier Parishes

Figure 54
The Minority Population & Right-of-Way by Fiscal Year in Caddo & Bossier Parishes

Figure 55
Right-of-Way Costs & Median Household Income in Caddo & Bossier Parishes

Figure 56
Right-of-Way by Fiscal Year & Median Household Income in Caddo & Bossier Parishes

Figure 57
The final series of maps, Figures 58 – 63, clearly demonstrate that the construction portion of the TIP is happening in areas with high and low percentages of Black and minority populations. Again with the income map we see that the higher income areas are not experiencing as many of the improvements as are the low and mid income levels.
The Black Population & Construction Costs in Caddo & Bossier Parishes

Figure 58
The Black Population & Construction by Fiscal Year in Caddo & Bossier Parishes

Figure 59
The Minority Population & Construction Costs in Caddo & Bossier Parishes

Figure 60
The Minority Population & Construction by Fiscal Year in Caddo & Bossier Parishes

Figure 61
Construction Costs & Median Household Income in Caddo & Bossier Parishes

Figure 62
Construction by Fiscal Year & Median Household Income in Caddo & Bossier Parishes

Figure 63
It is difficult to draw definite conclusions from the maps that display the TIP for Caddo and Bossier parishes. These projects can be advantageous for its citizens allowing or creating more accessibility and mobility. However, these improvements can also create adverse effects, such as increased pollution and noise, or create a landscape that is not aesthetically pleasing. Further, if an area does not show any transportation improvements, like much of the higher income areas, one cannot make any assumptions; the possibility exists that no improvements were necessary, or other areas were in greater need for transportation system improvements.
This examination of Environmental Justice in the Caddo and Bossier parishes has brought forth a number of important issues that minority and low-income populations face concerning their own personal mobility and the adverse effects from the transportation system. The four adverse effects, air quality, noise levels, social effects, and economic effects only touch on part of the issue. Hopefully, any future transportation system changes will follow the principles of Environmental Justice, to avoid any and all adverse effects falling disproportionately on minority and/or low-income populations; to ensure the full and fair participation by all potentially affected communities in the transportation and decision-making process; and to prevent the denial or, reductions in, or significantly delay in the receipt of benefits to minority and low-income populations. However, there are also questions of accessibility and mobility for the general well being of these populations. These questions of personal mobility and accessibility are not such paramount concerns for non-minorities and/or those with higher levels of income. This next section of the report examines a number of possible solutions to alleviate or eliminate some of these personal mobility and accessibility issues.

**Improving Public Transit**

In situations where access to transit service is an important consideration, an on-board or household survey could be conducted to estimate current usage patterns, to determine the magnitude and nature of latent (unexpressed) demand among low-income and/or minority neighborhoods, and to see if transit is meeting the mobility needs of those it services. For example, if a sizable number of households express a desire to travel to certain employment centers during certain hours that are not well served by transit,
planners may wish to explore the possibility of adjusting transit routes and schedules. Improved access to public transit can overcome the physical separation between the residential locations of minority workers and job locations.

New Urbanism

As well as improving public transit, new urban design concepts exist that are intended to improve neighborhoods and communities. They promote higher density, transit- and pedestrian-oriented urban designs as a means of reducing automobile use and hence reducing its associated environmental damage. Walking to local shopping areas is more frequent in neighborhoods where such areas are nearby. Some communities are finding that they can create neighborhoods where children can walk to school or bike to the park. Others are trying to bring the services women really need like daycare centers and dry cleaners to the transit stations in order to make for a more convenient commute. Building more subdivisions and strip malls at the far edges of the cities, and more roads between them will just contribute to even more driving, more environmental damage and more amounts of uneven mobility and accessibility.

Transportation Policy

In addition to different planning methods to improve mobility and personal accessibility, there have also been some recent developments in transportation policy. A United States Department of Transportation sponsored conference on Environmental Justice and transportation planning produced a series of recommendations regarding involvement by protected populations in the process of determining whether to make particular changes in transportation systems. Their findings are as follows. First, strengthen the role of neighborhood and community-based organizations in the planning
process and hold community leaders accountable for participation. Second, educate planners on ways to actively promote citizen involvement, to develop culturally sensitive communications and to conduct sensitivity training to help decision makers and agency staff understand different cultures. Further, when appropriate, use intermediary or liaison organizations to make linkages between neighborhoods and area-wide planning. Fourth, recognize the limitations of traditional public hearings and opportunities to comment on proposed transportation system changes. In addition, involve minority and low-income populations in the facility planning process at the early stages. Finally, provide information on key issues related to the system changes under consideration at such common locations as grocery stores, churches, and schools.

It is also hoped that the new federal transportation bill, Transportation Equity Act of the 21st Century (TEA-21) will alleviate some of these problems mentioned in this report. For example, according to TEA-21, the funding guarantee for transit is set at a fixed amount of $36 billion and will not vary over time as revenues rise and fall. In addition, there is to be a 54% decrease in the share of total funding dedicated to the construction of new highways. 18.1% of the funding that falls under TEA-21’s spending guarantee is for transit. TEA-21 also creates a completely new Transit Enhancements program, which sets aside a small amount from the Urban Area formula program for enhancement-like activities that relate directly to transit. Urbanized areas with a population over 200,000 will be required to spend 1% of urban area formula funds for transit enhancements. The integration of a transit station with the surrounding community can be key to how people view both the community and the station, and how much they use it.
Another possible solution is the Job Access and Reverse Commute Grants, designed to increase the transportation options for low-income workers and develop transportation services to suburban employment centers. Mass transit is the program’s focus. The Access to Jobs program authorizes $400 million from the Transit Account of the Highway Trust Fund, and $350 million from the general fund. All of the trust fund money is subject to TEA-21’s funding guarantee, as is $100 million of the general funding. Transit authorities and other service providers may apply for grants to cover the cost of developing and implementing services to transport welfare recipients and other eligible low-income individuals to and from jobs.

One of TEA-21’s most innovative programs is the Transportation and Community and System Preservation Pilot (TSCP) program. It addresses the complex links between land use, community quality of life, and transportation. This program will provide $120 million over 6 years in guaranteed funds. The stated purpose of the program is to “increase the efficiency of the transportation system while decreasing its impacts on the environment, lessening the need for costly future investments and providing efficient access to jobs”. Land use and transportation and inextricably linked. For example, land and use decisions, primarily made at the local level, drive transportation decisions. Building a transportation system that provides for economic growth, preserves quality of life, and minimizes environmental impacts and adverse effects will require strong coordination between land use and transportation decisions. The TCSP program will fund projects that link transportation and land use decisions with community quality of life. The program contains a strong bias toward project teams that include non-traditional partners like community groups, non-profit organizations, and business groups.
TEA-21 also expands the support for bicycling and walking. Use of federal funds for bicycle and pedestrian facilities increased $8 million in 1990 to more than $265 million in 1997. Bicycle and pedestrian facilities must be considered, where appropriate, in conjunction with all new construction and reconstruction of transportation facilities, except where bicycle and pedestrian use is not permitted. New provisions, such as eligibility for safety funds and development of design guidance, will help ensure that the needs of bicyclists and pedestrians are addressed. Most of the new money provided by TEA-21 will go into categories that cannot fund new roads.

Finally, a word of caution concerning transportation policy. Even though TEA-21 mandates public involvement in the decision making process, it does not guarantee that decision makers will respond accordingly. Public hearings may be held, but they are only effective if the input is not ignored. Truly addressing local concerns will always be a challenge. However, it is a fundamental principle of Environmental Justice to ensure all communities and all groups are not adversely affected by transportation system changes.

Future Challenges

While this report is only an initial study of Environmental Justice in the Caddo and Bossier Parishes, it does provide a picture of the current situation for minority and low-income populations. However, it is still important to examine what future endeavors could hold. Supplementary or continuing studies of Environmental Justice could geocode locations of destinations, such as schools and major employment centers. One could then compute the shortest path between origins and destinations. Estimations of changes in access could be carried out using the transportation system both before the
system change and after it. Another possibility is to examine the locations of minority and low-income populations and compare the locations with contours of noise or air pollution if a significant change were made to a transportation route.

Conclusion

Completing an Environmental Justice report accomplishes two objectives. First, it provides a complete picture or examination of a particular area’s transportation system in conjunction with its low-income and minority populations. This examination leads to the second objective. Once an examination of the existing situation has occurred, one can better assess how any future changes to the transportation system will affect these low-income and minority populations.

A report of this nature not only draws conclusions regarding the current situation, but also provides a baseline for future developments. Conclusions from this report are that minority and low-income populations in Caddo and Bossier Parishes, for the most part, are disproportionately located in close proximity to the major roadways, like the interstates, than are non-minority and higher income populations. Living in close proximity to the interstates means living with and dealing with a number of adverse effects. Future transportation developments or changes must ensure, according to the principles of Environmental Justice that these adverse or negative effects do not continue to disproportionately affect low-income and/or minority populations. Further, the transportation system and its planners should continue to strive for a system that ensures the well being of all, and that all populations have equal amounts of personal mobility and accessibility.