There's No Justice In Transit!
—Transit Equity, Land Use, and Air Quality in Boston

By
Laura Beth Machala
Oberlin College

Submitted to the Department of Urban Studies and Planning
in partial fulfillment of the requirements for the degree of
Master in City Planning

at the
Massachusetts Institute of Technology

June 2007

© 2007 Laura Machala. All Rights Reserved.

The author hereby grants to MIT the permission to reproduce, and to distribute publicly,
paper and electronic copies of the thesis document in whole or in part.

Author...........................................
Department of Urban Studies and Planning
May 18, 2007

Certified by...........................................
Professor James Hamilton
Department of Urban Studies and Planning
Thesis Supervisor

Accepted by.................................
Professor Langley C. Keyes
Department of Urban Studies and Planning
Chair, MCP Committee

MASSACHUSETTS INSTITUTE
OF TECHNOLOGY
JUL 13 27
ROTCH
ABSTRACT:

As a result of air pollution created by the Central Artery/Tunnel Project (CA/T), aka “the Big Dig,” transit and other air quality mitigation projects were incorporated into the State Implementation Plan (SIP). The SIP is mandated by the Clean Air Act (CAA) for areas that do not attain or need to maintain air quality above federally mandated levels. Originally, the transit commitments that were made to mitigate the effects of the Big Dig were located in urban and suburban areas. However, while an urban/suburban balance was arguably intended in the SIP, over the years, the urban SIP commitments have been largely neglected. As a result, transit justice in Greater Boston has been negatively effected. If the SIP is truly meant to improve air quality, its focus should be on making cities more viable and healthy places to live and on curtailing sprawling suburban land use. Furthermore, SIP requirements should change to influence a more equitable distribution of transit investment in Boston and other metropolitan areas.
“Harbingers of the modern civil rights movement, Rosa Parks and the Montgomery Bus Boycott of the 1950s challenged transportation racism. Later, the Freedom Riders of the 1960s defied ‘Jim Crow’ on interstate transportation. Despite the heroic efforts of many and the monumental human rights gains over the past five decades, transportation remains a civil rights and quality of life issue.”¹

“Harbring[ers] of the modern civil rights movement, Rosa Parks and the Montgomery Bus Boycott of the 1950s challenged transportation racism. Later, the Freedom Riders of the 1960s defied ‘Jim Crow’ on interstate transportation. Despite the heroic efforts of many and the monumental human rights gains over the past five decades, transportation remains a civil rights and quality of life issue.”¹

“Harbring[ers] of the modern civil rights movement, Rosa Parks and the Montgomery Bus Boycott of the 1950s challenged transportation racism. Later, the Freedom Riders of the 1960s defied ‘Jim Crow’ on interstate transportation. Despite the heroic efforts of many and the monumental human rights gains over the past five decades, transportation remains a civil rights and quality of life issue.”¹

“The national transportation system should be socially equitable and strengthen civil rights; enabling all people to gain access to good jobs, education and training, and needed services. Where possible, personal transportation expenses should be minimized in ways that support wealth creation. Integrated with land use planning, transportation should also enhance the quality, livability, and character of communities and support revitalization without displacement. The transportation system should allow every American to participate fully in society whether or not they own a car and regardless of age, ability, ethnicity or income.” –New Transportation Charter²
Acknowledgements—

Throughout the course of my studies at MIT and especially during the last 4½ months, I have thanked my lucky stars on multiple occasions that Jim Hamilton happened by DUSP the same time I did. I have learned a lot from Jim—not just about brownfields and how to deal with clients, but also about how to really think critically about issues. He has been my professor, advisor, therapist, life coach, and friend. The process of writing this thesis would have been much more difficult if it weren’t for his constant thoughtfulness and sense of humor. I must also thank Scott Darling, one of the busiest people I know, for agreeing to be my reader. When I called Scott initially and explained to him that I wanted to write my thesis on transit justice issues in Boston, he exclaimed, “There’s no justice in transit!,” a response which I later decided had to be memorialized as the title of my thesis. I thank Scott for pushing me to consider the hardest issues—things that I might have otherwise avoided.

I am also eternally grateful to my parents and wonderful friends for being so supportive throughout this process.
# Table of Contents

**ABSTRACT** .............................................................................................................................................. 3

**ACKNOWLEDGEMENTS** ............................................................................................................................. 7

**I. INTRODUCTION/EXECUTIVE SUMMARY** ................................................................................................. 11

**II. BACKGROUND** ....................................................................................................................................... 13

A) **DEFINITION OF ENVIRONMENTAL JUSTICE** .............................................................................................. 13
Title VI and Executive Order 12898 .................................................................................................................. 14
The Environmental Justice (EJ) Movement today ............................................................................................... 16
Environmental justice in Massachusetts ........................................................................................................ 17

B) **DEFINITION OF TRANSIT JUSTICE** ........................................................................................................... 18
Transit Injustice nationally .................................................................................................................................... 20
Who is not getting equitably served by transit? .................................................................................................... 22
Transit equity in Boston ....................................................................................................................................... 25
Transit equity and the State Implementation Plan ............................................................................................. 27

C) **DEFINITIONS OF URBAN SPRAWL AND SMART GROWTH** ...................................................................... 27
Urban Sprawl ...................................................................................................................................................... 27
Smart Growth .................................................................................................................................................... 29

D) **THE CAUSE OF SPRAWL AND THE NEED FOR SMART GROWTH** ................................................................. 31
Federal highway spending .................................................................................................................................... 32
Post-WWII home ownership incentives ........................................................................................................... 32
Racist and race-driven zoning/redlining and segregation .................................................................................. 33
Conclusion ........................................................................................................................................................ 35

**III. HOW TRANSIT IS FUNDED ON THE FEDERAL, STATE, AND LOCAL LEVELS** ........................................ 36

Federal .............................................................................................................................................................. 36
State/Local ........................................................................................................................................................... 40
The transportation planning process .................................................................................................................. 44

**IV. BOSTON** ................................................................................................................................................ 47

A) **TRANSPORTATION HISTORY** ................................................................................................................... 47
Early transit history ............................................................................................................................................... 47
The Central Artery/Tunnel Project (CA/T) aka. “The Big Dig” ........................................................................... 48

B) **THE CLEAN AIR ACT AND POLLUTION REDUCTION** ................................................................................ 50
The State Implementation Plan .......................................................................................................................... 51
The SIP and social equity ....................................................................................................................................... 52
The SIP and transportation ...................................................................................................................................... 53
The Big Dig and air quality .................................................................................................................................... 55
As-yet to be completed urban transit commitments .......................................................................................... 57
The proposed SIP revision .................................................................................................................................... 59
SIP commitment update ....................................................................................................................................... 65
Transit justice and commuter rail ........................................................................................................................ 66

**V. THE SIP AND LAND USE** ........................................................................................................................................ 67

A) **UNITED STATES LAND USE HISTORY AND THE CURRENT PARADIGM** ......................................................... 68
B) **LAND USE AND THE CLEAN AIR ACT** ....................................................................................................... 69
Land use, the SIP, and the conformity determination process ............................................................................ 70
Forecast of future emissions to be included in the SIP ........................................................................................ 70
Control strategies included in the SIP ................................................................................................................ 72
Conformity determination without inclusion in the SIP ...................................................................................... 74
Critique .............................................................................................................................................................. 76

C) **ACCOUNTING FOR LAND USE ACTIVITIES AT THE STATE AND REGIONAL LEVELS** ................................ 76
Barriers to including land use measures in SIPs .................................................................................................. 78

D) **THE ROLE OF EPA IN LAND USE PLANNING** ............................................................................................ 79
VI. RECOMMENDATIONS ...................................................................................................................... 80

#1—FOCUS SIP COMMITMENTS (ESPECIALLY TRANSIT) IN EJ COMMUNITIES........................................... 81
   Recommendation .......................................................................................................................... 81

#2—EXTEND THE ATTAINMENT SIP TIMELINE TO ALLOW FOR LARGE-SCALE LAND USE CHANGES ........ 83
   Recommendation .......................................................................................................................... 84

#3—ELIMINATE THE SIP/CONFORMITY DETERMINATION ACCOUNTABILITY LOOPHOLE ....................... 85
   Recommendation .......................................................................................................................... 86

#4—DEVELOP MORE RELIABLE TECHNOLOGY TO MODEL SMART LAND USE/EMISSIONS BENEFITS ...... 87
   Recommendation .......................................................................................................................... 88

#5—PROMOTE REGIONAL PLANNING AND ALLOW FOR SIP ECONOMIC DEVELOPMENT CREDIT .......... 88
   Recommendation .......................................................................................................................... 90

VII. CONCLUSION .................................................................................................................................. 91

VI. APPENDIX ........................................................................................................................................ 95

VII. BIBLIOGRAPHY ............................................................................................................................... 103
I. Introduction/Executive Summary—

The environment is not just Yellowstone or the Amazon. The environment is not just a mountain stream or an endangered turtle. The environment is where people live. The environment is blighted property and facility siting. In a forest, we measure the health of the environment by how well the entire system functions and can be sustained. We should judge the health of an urban area in the same way. In other words, an urban environment is not healthy if its residents do not have sufficient access to affordable housing and quality education. An urban environment is not healthy if large numbers of its residents do not have jobs that pay a living wage or streets where they feel comfortable letting their children play. Nor is an urban environment healthy if certain neighborhoods, communities, and people are served adequately by public transportation while others lack the means to efficiently and comfortably get around and access economic opportunities.

It is this last point—the equitable distribution of accessible and quality public transit service across metropolitan areas—that this thesis seeks to examine. This topic is quite large and multifaceted. I could have focused on the internal decision-making processes of local transit authorities and regional planning organizations or the politics behind the development of federal transportation enabling legislation. I could have studied the stigma associated with bus versus rapid transit ridership. Since poor transit service often exists in areas with declining or blighted housing stock, I could have looked at the connection between gentrification and improved transit service. All of these angles would make interesting and meaningful contributions to the transit justice field of research.
However, because I chose to focus on Boston, I decided to analyze the tremendous influence that the Central Artery/Tunnel Project (CA/T), aka “the Big Dig,” has had on the city’s transportation and transit system over the last several decades. The nearly $15 billion project to relocate a 7 mile portion of a large expressway underground, reuniting city neighborhoods that had been divided for decades, would take years to complete and create significant air pollution. As a result, transit and other air quality mitigation projects were eventually incorporated into the State Implementation Plan (SIP), a document that is mandated by the Clean Air Act (CAA) for areas that do not attain or need to maintain air quality above federally mandated levels.

Moreover, the SIP transit commitments were meant to mitigate location-specific pollution caused by the Big Dig. Therefore, the transit commitments that were made were both in urban and suburban locations. However, while a urban/suburban balance was arguably intended in the SIP, over the years, the urban SIP commitments have been largely neglected. What effect has this had on transit justice in Greater Boston? If the SIP is truly meant to improve air quality, should its focus not be on making cities more attractive and on curtailing sprawling suburban land use? How could SIP requirements change to influence a more equitable distribution of transit funds in metropolitan areas?

What follows are the necessary definitions, history, and information about environmental justice and transit justice, land use, the Central Artery/Tunnel project, and the Clean Air Act (CAA) to provide a basis for this discussion. In Section II, I define environmental justice, transit justice, as well as urban sprawl and smart growth/sustainability to provide a background from which to start. Section II also includes a discussion of past race-driven land use regulations and their impacts today. In
Section III, I describe the history and current day practice of how transportation and transit are funded on the federal, state, and local levels. Then, in Section IV, I begin to talk specifically about Boston. This section describes transit in the city’s early days, the Big Dig, and how Clean Air Act (CAA) State Implementation Plan (SIP) commitments have influenced the resulting mitigation, i.e. transit projects in the Boston metropolitan area. Section V brings the four previous sections together by addressing how the CAA SIP process relates to land use strategies that could make cities more dynamic, sustainable, and attractive places to live in for a diverse set of people. Finally, in Section VI, I conclude with a series of recommendations for imbuing the SIP with an appreciation for regional transit equity and smart land use. I chose these particular recommendations, which are ambitious but practical, because I believe that they can help stimulate and aid a movement to revitalize cities and make them sustainable and healthy places to live.

II. Background—

a) Definition of Environmental Justice

The environmental justice (EJ) movement was born in 1982 when the mostly low-income, African American residents of Warren County, North Carolina protested the siting of a polychlorinated biphenyl (PCB) landfill in their community. PCBs are believed to be carcinogenic and have been linked to various immune, reproductive, nervous, and endocrine system health effects. While the protesters were not successful in blocking the landfill, they brought national attention to facility siting inequities. The Warren County struggle was followed by the 1987 United Church of Christ Commission for Racial Justice landmark Toxic Wastes and Race study. The study not only found a relationship between the siting of environmentally undesirable facilities and low-income
communities, but also found that people of color, independent of their income level, were more likely to live in communities with a disproportionate number of polluting/undesirable facilities. After the study was published, grassroots EJ organizations soon formed all over the country to address environmental inequities. Then, in 1991, the First National People of Color Environmental Leadership Summit sought to advance the EJ movement beyond its anti-toxics focus. Summit delegates adopted “The Principles of Environmental Justice” to take back to their communities.

**Title VI and Executive Order 12898:**

Title VI of the Civil Rights Act of 1964 has been used by advocates to fight for environmental justice via the legal system. It prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving federal financial assistance. Title VI has been interpreted by the Supreme Court to give federal agencies the authority to promulgate regulations precluding recipients of federal funds from engaging in activities that have a discriminatory effect. In other words, regulations cannot intentionally discriminate nor disproportionately impact a particular group.

In theory, the disproportionate impact (or “discriminatory effect”) standard is less difficult to prove than the intentional discrimination standard contained within the equal protection clause. In practice, however, this has not turned out to be the case. In 1973, the Environmental Protection Agency put forward regulations aimed at promoting a discriminatory effect standard. However, it was not until 20 years had passed, in September 1993, that the EPA began to see a significant number of administrative complaints alleging Title VI violations. In October 1999, after much pressure, the EPA’s Office of Civil Rights issued its first ruling on a Title VI complaint, *St. Francis*
Prayer Center v. Michigan Department of Environmental Quality. The EPA found no adverse (or disproportionate) impact and dismissed the complaint. In addition to administrative complaints, community groups have tried to prosecute private lawsuits to enforce section 602—the section of Title VI under which EPA promulgated its discriminatory effect regulations. A private lawsuit bypasses the administrative process and goes directly before a court for relief. However, in the 2001 case, Alexander v. Sandoval, the Supreme Court eliminated any private right of action to enforce disparate impact regulations under Title VI.

The Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA) jointly issued internal guidance entitled “Implementing Title VI Requirements in Metropolitan and Statewide Planning.” While the guidance does address public involvement in planning activities, it fails to address the “accumulation of negative economic and environmental impacts caused by transportation projects and their location and the distribution of resources across metropolitan communities over time.” To prove that they are in compliance with Title VI requirements, in most cases, state agencies must only submit a one-page document assuring their compliance without any accompanying evidence. While federal agencies can still enforce the regulations, enforcement of Title VI’s disparate impact language has been practically non-existent.

In 1992, President Clinton issued Executive Order (EO) 12898, “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” which required all federal agencies to carefully evaluate how their activities affect low-income communities and communities of color. Following Clinton’s Executive Order, in April 1997, the Federal Department of Transportation issued its “Order on
Environmental Justice,” requiring the state DOTs to comply with EO 12898. In December 1998, the Federal Highway Administration (FHWA) issued a mandate requiring that all of its activities incorporate environmental justice. However, such guidance is only as good as its enforcement and agencies are rarely compelled to amend their activities on the basis of EJ. Moreover, Title VI and EO 12898 apply to state DOTs and Metropolitan Planning Organizations (MPOs), which are jointly tasked with transportation planning for regions.

The Environmental Justice (EJ) Movement today:

In addition to facility siting issues, the EJ movement also formed in reaction to a deficiency that many inner-city, mostly low-income communities of color saw in the mainstream environmental movement. While the mainstream movement focused its energies on issues rooted in places traditionally seen as “the environment,” such as open spaces, parklands, and national forests, the burgeoning EJ community felt that the environments where its constituency lived—dense urban centers—were neglected. After all, low-income urban communities not only suffered from the inequitable distribution of environmental hazards such as diesel pollution from buses and disproportionate facility sittings but also the inequitable distribution of environmental benefits such as public transit service, economic opportunities, and access to an array of services.

As mentioned previously, there has historically been a rather large divide between the mainstream environmental and environmental justice (EJ) movements. To some extent, the mainstream environmental movement has integrated urban environmental issues and other issues that affect low-income communities and communities of color into its mission for sustainability. However, mainstream organizations need to reach out
to EJ leaders and these figures must be willing to set aside past conflicts in order to form a productive alliance. The nexus of theoretical compatibility between EJ and traditional environmental sustainability can be found in an “emphasis on community-based decision making; on economic policies that account fiscally for social and environmental externalities; on reductions in all forms of pollution; on building clean, livable communities for all people; and on an overall regard for the ecological integrity of the planet.”

If the two movements can come together, they could productively work on a number of common issues.

**Environmental justice in Massachusetts:**

In 2002, the Massachusetts Executive Office of Environmental Affairs (EOEA) issued an environmental justice policy applying to all EOEA agencies. This effort came about after EOEA encountered significant environmental injustice during the initial implementation of its Community Preservation Initiative, an effort to protect natural resources in the Commonwealth. The policy states that *environmental justice*:

> is based on the principle that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. Environmental justice is the equal protection and meaningful involvement of all people with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies and the equitable distribution of environmental benefits.

The policy was formed with guidance from the Environmental Justice Working Group (an interagency group comprising representatives from a range of agencies including but not limited to the Department of Environmental Protection (DEP), the Massachusetts Environmental Policy Act (MEPA) Office and the Department of Public Health) and with input from an advisory committee – the Massachusetts Environmental Justice Committee (MEJAC) – composed of “representatives of community groups, industry, the faith
community, academia and the indigenous community." In parallel with the formation of the EOEA EJ policy, MassGIS developed EJ community maps and interactive online tools to display EJ areas across the state.¹⁸ ¹⁹

b) Definition of Transit Justice

Part of environmental justice is equitable access to community amenities. Historically, transportation has been one of the public accommodations most fraught with discrimination, namely Jim Crow era segregation. “For decades, it was legal and common practice for transit agencies to operate separate and unequal systems for whites and blacks and for city, county, and state government officials to use tax dollars to provide transportation amenities for white communities while denying the same services to black communities.”¹²⁰ The legacy of such blatantly discriminatory laws manifests itself today in several forms. Falling under the umbrella of environmental justice, transit justice is the notion that the environmental effects of transit service should not fall disproportionately on low-income communities and communities of color and that the benefits of transit service should be equitably enjoyed by all.

Weinstein and Sciara identify three main sub-areas of transit justice: 1) Inequitable service (lower service levels than those enjoyed by comparable areas as well as the “spatial mismatch” between where low-income people and low-skilled jobs are located); 2) Pollution/noise/health effects of transit; 3) and Equity of cost and investment (issues relating to transit fares and investment in infrastructure).²¹ Schweitzer and Valenzuela, in their survey of the empirical literature on claims of injustice in transportation, identify three main issues that are discussed: access inequality, differential enforcement of environmental regulations, and the frequent failure to employ low-income and people of
color in the construction and maintenance of transportation facilities in their communities.\textsuperscript{22} Robert Bullard, in \textit{Highway Robbery: Transportation Racism and New Routes to Equity}, defines three general types of transportation justice, or equity:

1. **Horizontal Equity**, focusing on fairness of cost and benefit allocation between individuals and groups who are considered comparable in wealth and ability
2. **Vertical Equity With Regard to Income and Social Class**, concerning the allocation of costs between income and social classes
3. **Vertical Equity With Regard to Mobility Need and Ability**, focusing on how well an individual’s transportation needs are met compared with others in their community.\textsuperscript{23}

Based on the topics identified by these scholars, meaningful transit justice exists when areas that are similar but for their demographic make-up enjoy similar levels of transit access, enforcement of environmental regulations, and transit-related employment—while experiencing similar environmental and financial burdens due to transit systems.

While much has been made of the inequitable effects of localized pollution due to transit (from the maintenance and operation of the vehicles themselves), this thesis will focus on inequities that center on mobility and accessibility—a fusion of Bullard’s three types of transportation equity.\textsuperscript{24}

Mobility and accessibility concerns may not seem to fit neatly into the “environmental framework,” not having to do with pollution, \textit{per se}. However, this inclination implies an unnecessarily and dangerously narrow view of “the environment.” In a 2000 article entitled “The land that could be: Environmentalism and democracy in the twenty-first century,” William Shutkin advocates for a \textit{civic environmentalism}. He writes that:

members of a particular geographic and political community should engage in planning and organizing activities to ensure a future that is environmentally healthy and economically and socially vibrant at the local and regional levels. It
is based on the notion that environmental quality and economic and social health are mutually constitutive.\textsuperscript{25}

Indeed, environmental justice is integral to \textit{true environmentalism}—it is impossible to extricate economic and social factors from environmental quality. A sustainable society is one in which the majority of no community or population is excluded from the majority of societal benefits and at the same time overly burdened by waste and other negative societal byproducts. Furthermore, the health of the “traditional environment” depends heavily on the economic and social sustainability of urban centers. Without cities that can sustain and are planned around vibrant, dense development—something that is only possible with a mix of uses and income levels—our open spaces and wilderness areas will inevitably be swallowed by rapid suburban expansion. Rapid suburbanization, in turn, aggravates social equity issues and contributes to climate change by necessitating more energy consumption.

\textit{Transit Injustice Nationally:}

The current transportation enabling legislation, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was signed into law in 2005. It has only been since the 1990s with the passage of the precursor to SAFETEA-LU, the Intermodal Surface Transportation Efficiency Act (ISTEA), that federal transportation funding policy has redirected a portion of its focus from highways to transit.\textsuperscript{26} Naturally, this action had the effect of benefiting many urban residents.

However, today, despite modest efforts by the government, “In many cities, the differentiation of transit quality between services for suburban commuters and those for urban residents is analogous to the segregation fought in the bus boycotts of the 1950s and the Freedom Riders campaign in the 1960s (Bullard and Johnson 1997).”\textsuperscript{27} From a
transit justice perspective, promoting suburban commuter rail instead of increasing city bus service has troubling implications. In 1995, “the median household income of an urban bus passenger was below $20,000, compared to over $40,000 for commuter rail patrons and over $45,000 for drivers of private vehicles…” In addition studies have shown that bus ridership declines with rising income, but the use of streetcars, subways, and commuter railroads tends to increase with higher income.\(^{28}\)

Certainly, the focus of transit funding is, for the most part, currently misplaced. In their article, “Reconsidering Social Equity in Public Transit,” Garrett and Taylor write that, “Current federal and state transit subsidy policies…have tended to support suburban and downtown commuter services, including radial rail transit networks, in an effort to attract more discretionary commuters out of their automobiles.” This shift of resources from the inner city to the suburb has many negative consequences for urban transit riders, including diminished accessibility to employment opportunities.\(^{29}\) In part, they write, this shift results from “public pressure to… address traffic congestion and air pollution problems in metropolitan areas …” However, as will be discussed later in the “Transit justice and commuter rail” section on pages 63-65, conventional radial suburban rail service does not seem to spur denser development which would allow for fewer vehicle miles traveled (VMT).\(^{30}\) Moreover, the increased attention garnered by suburban commuter-oriented express bus and rail service negatively affects the many transit-dependent, low-income, urban residents, many of whom are people of color who depend on public transportation.\(^{31}\)

Two general points must be made about the transportation patterns of low-income people. First, while they drive less than higher income people, low-income people are
often forced to drive given the lack of adequate transit service to the places where they live. Since low-income people often cannot afford newer cars that pollute less, their vehicles are on average nearly three years older than the vehicles of higher income people. \(^{32}\) Therefore, air pollution could be reduced by providing low-income inner cities communities with quality, efficient transit. Secondly, while transit dependents—those riders who are “too young, too old, too poor, or physically unable to drive”—are the most reliable customers for transit systems, transit policy has tended to focus on suburban markets. \(^{33}\) Again, this focus can be attributed to bias toward getting suburban single-occupancy vehicles off of the road. Other possible reasons for the bias include the substantial political clout of suburban communities and the fact that cutting a ribbon on a new commuter rail line is more politically bankable than decreasing urban bus headways.

**Who is not getting equitably served by transit?:**

Public transit is disproportionately utilized by low-income people and people of color. \(^{34}\) On average, public transit users are 45 percent white, 31 percent African American, and 18 percent Latino. In general, the U.S. population is 75 percent white, 12 percent African American, and 13 percent Latino. \(^{35}\) In urban areas, African Americans and Latinos together make up 54 percent of public transportation users (62% of bus riders, 35% of subway riders, and 29% of commuter rail riders). \(^{36}\) Furthermore, low-income people of color disproportionately live in poor, urban neighborhoods. “Only one-quarter of poor whites live in poverty-impacted neighborhoods; three-quarters live in working-class or middle-class neighborhoods scattered all over our metropolitan areas. By contrast, half of poor Hispanics and three-quarters of poor blacks live in poor neighborhoods in inner cities and inner suburbs.” \(^{37}\) In addition, only 7 percent of white
households do not own a car, compared with 24 percent of African American households, 17 percent of Latino households, and 13 percent of Asian American households.\textsuperscript{38}

Dependable transportation provides access to jobs, medical care, educational opportunities, and other necessities. Indeed, one study found that students traveling to and from school in cities larger than 500,000 accounted for 15 percent of all transit trips.\textsuperscript{39} While many urban households cannot afford a car, and therefore depend on public transportation, many low-income urban families own cars (which again, are often older vehicles, and thus pollute more), even though the expense of owning, maintaining, and driving cars strain their already tight budgets.\textsuperscript{40} Many make this financially difficult decision because transit accessibility is inadequate in their neighborhoods. A \textit{Surface Transportation Policy Project} report found that in 1998, those in the lowest income quintile spent 36 percent of their household budget on transportation, while those in the highest income quintile spent only 14 percent on transportation (see figure below).

\begin{quote}
Households that own a motor vehicle tend to spend far more of their income on transportation than zero-vehicle households, as illustrated in Figure 2.
\end{quote}

\begin{center}
\begin{figure}
\centering
\includegraphics[width=\textwidth]{figure2.png}
\caption{Portion of Household Income Devoted to Transport (BLS, 2003)\textsuperscript{13}}
\end{figure}
\end{center}

\textit{Transport costs tend to be regressive for vehicle-owning households, but not zero-vehicle households.}

\textsuperscript{15} Equity impacts can also be evaluated with respect to expenditures rather than income. Expenditures are less volatile and include other types of wealth such as savings and benefits such as foodstamps.

\textsuperscript{13} This figure assumes that all vehicle costs are borne by vehicle-owning households and all public transport costs are borne by zero-vehicle households. This is not exactly accurate since vehicle-owning households do use public transport and zero-vehicle households pay some vehicle expenses, but is consistent with other research showing much lower transport expenditures in vehicle-owning than zero-vehicle households.


23
Furthermore, “low-income workers who use a vehicle to commute spend 7 percent more of their income on transportation costs compared with those using public transportation.”

Although major reforms in favor of transit have occurred, today, the focus of transportation funding still favors those who drive. This highway/automobile bias has large environmental and social implications. When compared with passenger cars of the 1970s, today’s vehicles emit 60 to 90 percent less air pollution over their lifetimes due to increased vehicle emissions standards. However, these emissions savings has been negated because of the vast amounts of highway spending that have allowed Americans to drive more and more (see figure below). In excess of a third of greenhouse gas emissions are produced by cars.

**Figure 1. Trends in Vehicle Emissions and Vehicle Miles Traveled**

Cars are getting cleaner, but people are driving more, offsetting progress in ozone pollution control

Indeed, the average total annual mileage driven by Americans in 1995 (9,567 miles per year) was almost twice as high as it was in 1970 (4,587 miles per year). Furthermore,
“according to the Sierra Club, the average American driver spends 443 hours each year driving.”

**Transit equity in Boston:**

There are several large areas in Boston’s urban core that are widely recognized as lacking adequate transit service. Researchers at the Rappaport Institute for Greater Boston’s Center for Urban and Regional Policy highlight an area they call “The Heart of the City.” “The Heart of the City” is made up of parts of Jamaica Plain, Roxbury, Dorchester, Mattapan, and Roslindale (See Appendix for a map). Jamaica Plain is 50 percent non-white, Roxbury is 95 percent non-white, Dorchester is about 70 percent non-white, Mattapan is over 95 percent non-white, and Roslindale is about 55 percent non-white. Boston as a whole is approximately 50 percent non-white. While the median household income in Boston is $39,629, the median household income in Jamaica Plain is $41,524; in Roxbury is $27,133; in North Dorchester is $36,193, in South Dorchester is $39,657; in Mattapan is $32,749; and in Roslindale is $46,847.

<table>
<thead>
<tr>
<th></th>
<th>Boston</th>
<th>Jamaica Plain</th>
<th>Roxbury</th>
<th>North Dorchester</th>
<th>South Dorchester</th>
<th>Mattapan</th>
<th>Roslindale</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Non-White</td>
<td>50</td>
<td>50</td>
<td>95</td>
<td>70*</td>
<td>70*</td>
<td>95</td>
<td>55</td>
</tr>
<tr>
<td>% of Boston Median Household Income</td>
<td>100</td>
<td>105</td>
<td>69</td>
<td>91</td>
<td>100</td>
<td>83</td>
<td>118</td>
</tr>
</tbody>
</table>

The 2000 U.S. Census
* The racial demographics for Dorchester were calculated for the area as a whole. Certain sections of Dorchester are populated almost exclusively by people of color.
Communities in East Boston, Chelsea, and Revere as well as parts of Somerville and Medford are also notable for their lack of adequate and equitable transit service (as compared to similarly dense areas in the urban core) and are home to large numbers of immigrant, and low-income residents. In the cases in which these areas have lower percentages of non-white residents and/or higher median household incomes than the Boston average, they frequently contain smaller subsections with higher percentages of people of color and low-income people.

A report focusing on Roxbury entitled, “Analysis and Strategies for Transit Justice in Greater Boston,” by Masaya Otake, a Kennedy School public policy degree candidate, was completed in 2002 on behalf of Alternatives for Community and the Environment (ACE), a local environmental justice organization. The analysis undertaken by Otake indicates that in Greater Boston, the subsidy per commuter rail passenger is $6.89, $1.90 per bus passenger, and $1.68 per subway passenger. Otake also shows that subsidization disparities exist even within Boston’s bus system. In Roxbury, bus routes receive a subsidy of $0.69 per passenger, while other communities in the MBTA’s reach receive $0.71 per bus passenger. Furthermore, Roxbury residents use transit four times more frequently than the typical suburbanite but drive only half as often. Perhaps predictably, Roxbury residents also express less satisfaction with quality of service than did riders of other bus routes or commuter rail. Otake writes: “The evaluation of reliability or seating availability is worse in Roxbury bus routes than in other routes. Roxbury residents feel bus service is inherently inferior to subway or commuter rail in such aspects as reliability or comfortableness because of its vulnerability to traffic jams.”
Transit equity and the State Implementation Plan:

While many of the suburban transit commitments that the Commonwealth made in the State Implementation Plan (SIP) have been fulfilled, most of the urban projects have yet to be completed. When the Conservation Law Foundation (CLF) delivered its “Notice of Intent to Sue” on January 12, 2005, Foundation President Philip Warburg remarked that the transit commitments made by the state were not just meant to “make up for the air pollution generated by the cars and trucks using the Big Dig road system,” but “promised to serve the underserved” and improve mobility for those hundreds of thousands of Boston area residents who depend on public transportation for commuting and other purposes. Specifically, Warburg spoke of Jamaica Plain residents who were promised Arborway streetcar restoration, Somerville and Medford residents who were promised that the Green Line would be extended to Medford Hillside, and Chelsea and East Boston residents who were promised a one-seat ride between the Blue and Red Lines allowing for a smooth commute to Cambridge and Massachusetts General Hospital job opportunities. See “The Big Dig and air quality” section on pages 53-55 for more discussion of urban SIP commitment neglect.

c) Definitions of Urban Sprawl and Smart Growth

Urban Sprawl:

The urban transit commitments discussed above are extremely important because they would provide disadvantaged communities with accessible and clean transportation—key to the health, equity, and sustainability of communities everywhere. Urban transit projects increase the efficiency of cities, helping to make cities attractive and enjoyable places to live, thereby curtailing sprawl. In essence, smart growth is the
opposite of urban sprawl—a term that was coined by the city planner and writer William H. Whyte in an essay in 1958.

Sprawl is low density, auto-dependent land development taking place on the edges of urban centers, often ‘leapfrogging’ away from current denser development nodes, to transform open, undeveloped land, into single-family residential subdivisions and campus-style commercial office parks and diffuse retail uses.\(^{53}\)

Many argue that the bias toward sprawl is embedded in the American psyche as part of the frontier mentality.\(^ {54}\) Indeed, even today, many in the U.S. seem to view land as unlimited.

Perhaps because of this sense, the forces that influence land use in the United States have created a landscape in which employment and goods and services are located further and further away from residential development. In fact, land in the U.S. is not unlimited and is being devoured at an alarming rate—about 15 percent of all the land in the nation was developed between 1992 and 1997.\(^ {55}\) The density of urban settlement decreased by 23 percent between 1970 and 1990 and during the 50 years from 1950 to 2000, new development consumed land at 2.5 times the rate of population growth.\(^ {56}^{57}\) "Between 1985 and 1999, Massachusetts lost 40 acres of open space per day to development; 65 percent of this was for large-lot housing construction."\(^ {58}\)

In Urban Sprawl: A Comprehensive Reference Guide, David C. Soule highlights five arguments that planners commonly make about the consequences of sprawl:

1) Sprawl is expensive
2) Sprawl is aesthetically uninspired
3) Sprawl threatens public health (water, air, land)
4) Sprawl creates traffic congestion
5) Sprawl is elitist\(^ {59}\)
The following diagram depicts these characteristics as a self-reinforcing cycle resulting in auto dependency:

**Figure 1** Cycle of Automobile Dependency

Individual market distortions reinforce the cycle of automobile dependency, leading to economically-excessive automobile ownership and use.


**Smart Growth:**

Smart growth, in many ways the opposite of sprawl, emerged as a planning philosophy in the 1980s. Smart growth advocates call for denser, more mixed-use, transit-oriented communities. In general, local governments lack the vision to see the positive economic, social, and environmental benefits of high density, contiguous development. Instead, land use policies are often shaped by fiscal concerns—commercial development as well as low density (high value) residential development is typically seen as a simple and efficient way to increase the local tax base. 60

The Smart Growth Network was formed in 1996 and is made up of the U.S. Environmental Protection Agency and several non-profit and government organizations. The Network created the “Principles of Smart Growth,” a list of ten items that embody the concept:

1. Create a range of housing opportunities and choices
2. Create walkable neighborhoods
3. Encourage community and stakeholder collaboration
4. Foster distinctive, attractive communities with a strong sense of place
5. Make development decisions predictable, fair, and cost effective
6. Foster mixed land uses
7. Preserve open space, farmland, natural beauty, and critical environmental areas
8. Provide a variety of transportation choices
9. Strengthen and direct development towards existing communities
10. Take advantage of compact building design

Starting with the Clinton Administration in the mid-1990s, the EPA began to target and invest in smart growth initiatives. An awards program was developed and geared towards emerging efforts. Not unexpectedly, efforts on the part of the Bush Administration have been minimal in this arena. However, in some areas of the country, state smart growth policies and programs have picked up where the federal government has backed away. In Massachusetts, the Executive Office of Environmental Affairs (EOEA) put together a Smart Growth Toolkit. This effort consists of guidance and support for the following 12 techniques that communities can use to change and grow sustainably:

1. **Transfer of Development Rights**—shifting development densities within a community to achieve both open space and economic goals
2. **Traditional Neighborhood Development**—also known as “new urbanism,” or “neo-traditional,” this type of development mixes housing types and land uses while including walkable, compact, and centered neighborhoods
3. **Transit Oriented Development**—seeks to design mixed-use nodes around transit facilities
4. **Open Space Residential Design**—promotes open space preservation based on environmental and social priorities in the context of residential development
5. **Accessory Dwelling Units**—ADUs are self-contained apartments in owner occupied single-family homes/lots that are either attached to the principle dwelling or are separate but on the same property
6. **Agricultural Preservation**—several financial and legal tools exist to help preserve agricultural land
7. **Low Impact Development**—promotes a sustainable land development pattern through a site planning process that first identifies critical natural resources before determining the appropriate building envelopes
8. **Inclusionary Zoning**—requires a portion of the housing units in certain developments to be affordable
9. District Financing (DIF)/Tax Increment Financing (TIF)—DIF and TIF “are economic tools that promote redevelopment by use of public/private partnerships”

10. Chapter 40R—a special type of zoning that encourages housing production in the context of smart growth development by offering incentives for communities to allow as-of-right high density residential development

11. Reuse: Brownfields—the redevelopment of properties that have been underutilized because they are thought to be, or are, contaminated

12. Water Resource Management—ways that communities can manage water resource concerns through the implementation of state water policies

The Massachusetts EOEA also provides communities with assistance in redrafting their land use regulations and provides $3 million over two years through the Priority Development Fund (PDF) for land use planning and housing development projects. In addition, the EOEA runs the Smart Growth Technical Assistance Grant Program which offers grants to cities and regional planning agencies “in support of their efforts to implement land use regulations that are consistent with Massachusetts’ Sustainable Development Principles (see Appendix).”

d) The cause of sprawl and the need for smart growth

While the champions of Euclidean zoning at the turn of the 20th century worked to separate hazardous industrial and manufacturing uses from residential units, today we are left with a land use planning legacy that encourages too much separation. In addition to the inherent push to consume land that is facilitated by the tradition of separating uses, urban sprawl in the United States has historically been created by three main factors: (1) massive highway spending that began in the World War II era; (2) post-WWII home ownership incentives; and, (3) racist and race-driven zoning and segregation. In 1940, only one-third of U.S. metropolitan residents lived in the suburbs, but by 1970, suburbanites were the majority in metropolitan areas.
Federal highway spending:

In 1956, the federal government passed the Interstate and Defense Highway Act. While the Act was originally conceived to evacuate cities in the event of a nuclear attack and for rapid movement of troops, the Eisenhower Administration used national defense to justify federally-financed highway expansion. "The gasoline tax allowed an unprecedented self-financing mechanism—the 'highway trust fund.' Automobile manufacturers, petroleum refiners, and road builders created one of the strongest forces in American politics."66

Post-WWII home ownership incentives:

The urban renewal movement, spurred by the Federal Housing Act of 1954, influenced cities to remove blighted neighborhoods. However, the low-income residents from these neighborhoods moved into other city neighborhoods, simply shifting the blight and thus causing upwardly mobile households to relocate to the suburbs.67 The trend toward suburbanization was shaped by veterans returning from World War II who received inexpensive and easy credit to purchase homes. "Real estate interests purchased large tracts of rural land at the edges of large urban centers and subdivided the property into house lots."68 In addition, the Federal Housing Act of 1945 provided federal support for emerging communities to build water and sewer systems.69 The well-to-do Baby Boom families of the 1950s, who sought large homes with big yards in areas with good schools, were thus wooed into the suburbs. Single-family home ownership became the American Dream—at least for the mainly white, middle-class population that could afford to flee the inner city.70
Racist and race-driven zoning/redlining and segregation:

Moreover, sprawl isolates central cities—places where new immigrant and disadvantaged populations continue to live in disproportionate numbers.71 Soule writes:

It is impossible to discuss sprawl without including a presentation of the concept of social separation by race and class. Suburban development has often been about the flight of white populations from central cities and the economic separation of the affluent from the isolated concentrations of the poor in cities.72

Post-WWII, whites left the city in large numbers partly because they were economically able to do so. However, the impact of race on land use and housing patterns (and therefore, transit service), before the War and throughout the post-War period, should not be underemphasized. Racial zoning laws were struck down by the Supreme Court in the 1917 case Buchanan v. Warley, but the decision was disregarded in much of the South for several more decades—Birmingham, Alabama passed a racial zoning law that existed from 1926-1951.73 Redlining—the practice of denying people business loans, mortgages, and other financial support based on their race or national origin—was the norm in American cities until the Fair Housing Act of 1968 made the practice illegal.

Indeed, the repercussions of racial zoning and redlining are still felt today. From 1970 to 2000, residential segregation by race declined only modestly in most U.S. metropolitan areas. Meanwhile, economic segregation, though still lower than racial segregation, is increasing.74 In Boston, the degree of racial segregation declined somewhat, on a scale of segregation from 0 to 100 (with 100 denoting complete segregation) from 72.90 in 1990 to 68.45 in 2000 for non-Hispanic blacks, and from 52.66 to 51.84 for Hispanics. However, indices for all of the other Metropolitan Area Planning Council communities combined showed a slight increase in the degree of racial
segregation — from 47.21 in 1990 to 49.18 in 2000 for non-Hispanic blacks and from 40.23 in 1990 to 45.74 in 2000 for Latinos.\textsuperscript{75, 76}

In “Social Framework: Sprawl, Race, and Concentrated Poverty—Changing the ‘Rules of the Game,’” David Rusk contrasts 18 urbanized areas in “White America,” metropolitan areas he defines as cities with no significant black or Hispanic population—less than 2 percent black and less than 5 percent Hispanic—with 19 urbanized areas in “Diverse America,” cities that are 12-18 percent black, and 7-18 percent Hispanic. He writes that on average, White America consumed land at a rate only 1.8 times the rate of population growth compared to Diverse America’s land consumption rate of 3.0 times the rate of population growth.\textsuperscript{77} In other words, cities with significant populations of color sprawl more, presumably partly because of the greater impetus for whites to distance themselves from non-white populations.

In addition to the racial tensions and racist views that supported racial zoning decisions and redlining in the business and housing loan markets, the forced integration of public schools from the 1950s through the 1970s caused many affluent white households to relocate outside of the city, away from people of color. The effect of white flight on urban public education was thus compounded as wealthy families took their tax base with them—causing the further decline of inner city schools, and spurring even more middle class families to relocate to the suburbs.

Today, over 50 years after \textit{Brown v. Board of Education} officially desegregated schools in the United States, “in metropolitan Boston, 7 in 10 white students attend schools in the outer suburbs that are over 90 percent white, while almost 8 in 10 African American and Latino students attend schools in the city of Boston or in one of the
urbanized satellite cities.” Of course, in addition to the aforementioned factors, perceived urban decay in the form of violence and economic decline, as well as the view that cities are dirty and polluted, also led to the rise of the sprawling suburban archetype.

**Conclusion:**

Cities were not such segregated places in America until the turn of the 20th century. However, racial zoning and redlining practices that resulted in the stark and near complete segregation of cities created the perfect precursor environment for whites to desert the inner city for racist as well as economic reasons.

Ironically, while today’s suburban residents who live in McMansions on large lots of land enjoy the feeling of being “in nature,” their excessive homes far from employment, retail opportunities, and other services consume vast amounts of energy. This energy consumption causes significant air, water, and land pollution. Therefore, while people can use compact fluorescent light bulbs to reduce electricity usage, and buy Toyota Priuses to consume less gasoline, these shifts are not going to truly curb the level of consumption that threatens the sustainability of our urban centers and the destabilization of the climate. Furthermore, for those who cannot afford to drive, sprawling land use presents real problems. Smart growth could address many of the transportation woes experienced by urban low-income communities and communities of color by discouraging sprawl and thus redirecting resources to cities.

Truly sustainable urban centers are not possible if smart growth is not combined with transit justice and other balancing policies such as affordable housing measures and small business assistance programs. Agyeman, Bullard, and Evans (2002) define *sustainability* as: “the need to ensure a better quality of life for all, now and into the
future, in a just and equitable manner, whilst living within the limits of supporting ecosystems.” Only through a comprehensive strategy that seeks to address the many aspects of healthy communities can transit justice and smart growth be fully effective.

III. How Transit is Funded on the Federal, State, and Local Levels

It is necessary to understand the history of how transportation and transit have been funded and how transit dollars are currently allocated by government in order to understand the difficulties that transit justice and smart growth advocates are up against. The following section explains the history of how transportation and transit have been funded at the federal, state, and local levels.

Federal:

Funding policies emphasizing highway construction have created a nation dependent upon cars and burdened by rising transportation costs. Though roadway congestion continues to mount and many other problems persist with the transit system in Greater Boston, the city still has better transit service than most other U.S. urban areas. Indeed, many decades of federal and state policies have created sprawling land use patterns and inadequate transit service that make cars optimal, if not entirely necessary for a lot of people. Although some efforts have been made to tailor transit services to more suburban and rural locations, public transportation works best in densely populated urban areas. However, even in cities, funding decent transit service is quite difficult.

In the United States, all public transit is heavily subsidized. Funds are acquired from federal, state, and local sources. In 1997, federal sources accounted for about 54 percent of the funds, state sources another 13 percent, and local dollars provided 11 percent of the total subsidy. The remainder was generated through taxes levied by transit
agencies and other directly generated sources. Federal transit funds mainly come from:

1) General Revenues of the U.S. government and 2) revenues credited to the Mass Transit Account (MTA) of the Highway Trust Fund. Transit funding was first made available from the MTA in 1983 when the Motor Fuel Tax was increased to include a portion for transit uses. Currently, 15.5 percent of the total per gallon tax on gasoline and 11.7 percent of the total per gallon tax on diesel fuel are dedicated to the MTA.

Federal transportation funding was overhauled in 1991 with the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA). ISTEA changed the way funding was allocated and began to erode the long-standing preference for highway funding. The new law primarily endowed Metropolitan Planning Organizations (MPOs) with the responsibility for planning and allocating transportation funding in metropolitan areas by giving these entities approval power of how funds are spent. However, MPOs only have direct control over 6 percent of federal transportation funds. "This distribution formula discourages establishment of integrated transportation and land use policies." California is the exception to this rule as it gives 75 percent of its federal and state transportation program funds to regional and metropolitan transportation agencies. See "The transportation planning process" on pages 43-45 for more on MPOs.

In addition, ISTEA mandated that MPOs create 20-year regional plans detailing future efforts for their regions' transportation systems. Metropolitan Planning Organizations were also required to produce—with community involvement—a Transportation Improvement Program (TIP) listing the projects scheduled to be undertaken in the next three years. ISTEA also "strengthened requirements for
community involvement in regional transportation planning and the federal commitment
to funding public transportation." Finally, ISTEA gave transit the same federal
matching funds as highways—a big step toward equalizing transportation policy. Still,
under the law, formula allocations continued to be weighted heavily toward new
construction.

Then, in 1998, the Transportation Equity Act for the 21st Century (TEA-21) was
passed. TEA-21 recognized equity as a priority for U.S. transport policy. TEA-21,
though similar in content to ISTEA, included provisions to fund programs that
specifically targeted welfare recipients and low-income urban residents. "TEA-21
allow[ed] states to use a percentage of federal transportation funding to pay for
supportive services to help women and minorities enter the transportation construction
trades, but few states exercise[d] this option." The law also mandated further public
involvement in state and federal transportation planning and established grant programs
to improve transportation in low-income and communities of color.

TEA-21 expired on September 30, 2003. The Safe, Accountable, Flexible,
Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was enacted on
August 10, 2005. Its authority will last through FY 2009. The projected amount of
transit funding available for FY 2007 is $8,974,800,000, an increase of only about
$350,000 from FY 2006. Due to Federal budgetary constraints, Massachusetts expects
to receive about $50 million a year less for the years 2007 through 2009 compared to the
three previous years (2004-2006). Indeed, the Commonwealth will likely receive less
Federal funding in 2009 than it did in 1998.
Eligible expenditures for transit funds fall into two general categories—capital expenditures, for which most federal funds can be used, and other expenditures which are program-specific. The Urbanized Area Formula program (49 USC 5307), which has existed in more or less its present form since 1982, defines “urbanized areas” as “contiguous urban area[s] of 50,000 or more population.” Starting with TEA-21, and continuing into SAFETEA-LU, areas over 200,000 population are no longer eligible for operating assistance. For rural areas, and small urban areas under 200,000, the federal government provides up to a 50 percent match of operating costs. Federal funds can amount to up to 80 percent of the net project cost of new capital projects in all areas.

Therefore, federal funding allocations in urbanized areas over 200,000 bias new, infrastructure-intense projects. Indeed, the effect of federal law is to encourage rail projects over expanding bus service. This, of course, effects the many low-income residents of color who depend on transit in cities. Ninety percent of the funds available under Section 5307 are reserved for urbanized areas exceeding 200,000. Of this share, about one-third is designated according to the amount of fixed guideway service provided by the transit operator and the remaining two-thirds is based on bus service, though about 95 percent of all transit service is provided by buses. The majority of these funds are distributed to individual urbanized areas by a formula that is weighted as follows: 50 percent for miles of bus service, 25 percent for population, and 25 percent for population density.

The overall logic of federal and state regulations is to disperse transit funds to voters on a roughly geographical basis rather than by transit use or need. Since funding is distributed based on characteristics such as population, density, and existing service,
eligible areas do not compete directly for money. The result of this funding structure is that "each service area has an incentive to apply for and expend the full amount available regardless of any regional planning rationale to the contrary."  

An amendment to TEA-21—the Job Access and Reverse Commute (JARC) program—was proposed in 1998. JARC was intended to establish "a coordinated regional approach to job access challenges" by authorizing $150 million annually to connect low-income workers, who often live in inner cities, to jobs and employment services, many of which exist in the suburbs. This program is especially important given that "as of 1996, only 16 percent of jobs in the average metropolitan area were within three miles of the central business district." JARC was reauthorized and incorporated into SAFETEA-LU, though the amount that Congress decided to put toward the program was significantly less in FY 2004. However, every year since then, JARC funding appropriation has been on the rise.

TEA-21 and its predecessor, ISTEA, have altered transportation policy in substantial ways. Whereas before, transportation funds were almost completely biased toward highways and roads, now the federal-state match requirements are equal. More funding is now allocated for transportation alternatives, more attention is placed on maintaining existing infrastructure, and broader thinking is being done about how transportation policy effects other community priorities such as air quality, housing, and economic development. Still, given the amount of people who can be transported by a bus versus a car, federal transportation funding still disproportionately favors highways over transit.

*State/Local:*
The way transit is funded and the state of transit finance in the Boston metropolitan area also has significant implications for transit-dependent populations. Before FY 2001, the Massachusetts Bay Transportation Authority (MBTA), aka "the T," was funded through annual state budget appropriations. In other words, the T had no dedicated revenue stream. In this environment, the Authority billed the state for the net cost of service and the annual operating budget and capital priorities were decided by the state in the form of annual appropriations. Therefore, for a project to receive funding, it needed to be backed by a political mandate. Moreover, the MBTA, although an independent authority in some respects, operated as a quasi-state agency for budgetary purposes. The Forward Funding legislation, which became effective July 1, 2000, dramatically changed this relationship.

In May of 2000, the MBTA prepared the Forward Funding Finance Plan for submittal to the Federal Transit Administration and Wall Street bond rating agencies. With Forward Funding, the T has three revenue streams to finance operations and debt service: fare box (as well as other income such as advertisements, leased land, etc.), assessments, and one cent on every dollar generated by the 5 percent state sales tax.

Exhibit 32. MBTA Revenue Sources in FY 2006

| Source: MBTA. |
With Forward Funding, bonds issued by the Authority were no longer pledges of the state, but were instead backed by MBTA revenue. The Forward Funding Finance Plan projects operations and maintenance costs on a nominal dollar basis through 2008. It then makes long-range projections (from 2009-2030) on a real (constant) dollar basis. Costs with clearly identified payout schedules are excluded from this reasoning.

Furthermore, implicit in the MBTA’s assuming fiscal responsibility for its own management is the need for costs and revenues to remain in equilibrium over the long-term—even if the only options are to raise fares or reduce service.118

It should be noted that while before 2001, sales tax revenue growth had consistently been five percent annually, and the T assumed a conservative three percent growth rate, after 2001, sales tax revenue ceased to grow at all. When the MBTA assumed a three percent growth rate, the excess funds generated by the dedicated revenue stream (the one cent on every dollar of the state sales tax revenue) were going to be diverted into a cash account to be used as rainy day funds, funds for system improvements, or to cover debt. However, since sales tax revenue growth did not occur, the MBTA is now in dire financial straights and in need of another dedicated revenue stream.119

On March 28, 2007, the Massachusetts Transportation Finance Commission (TFC) report came out. Chapter 196 of the Acts of 2004 established the TFC “to develop a comprehensive, multimodal, long-range, transportation finance plan for the Commonwealth. The report analyzes the state’s long-term capital and operating needs for the transportation system, the funds expected to be available, and the extent to which a gap exists. The Commission will later issue a report that offers recommendations to close the funding gap through potential cost savings, efficiencies, and additional revenue.
The conclusion of the TFC, using very conservative estimates, is that over the next 20 years, "the cost just to maintain [the] transportation system exceeds the anticipated resources available by $15 to $19 billion. This does nothing to address necessary expansions or enhancements."\textsuperscript{120} Indeed, the Commission writes that "It is not practical, plausible, or prudent to pursue a course excluding any transportation enhancement or expansion projects for two decades." The bottom line is that there is no money for actual construction of projects even if funding has been identified for design and preliminary engineering.\textsuperscript{121}

While the Commission projects at minimum a $15-19 billion dollar total transportation state-wide shortfall over the next 20 years, it estimates that the MBTA alone is likely to experience a funding gap of between $4-8 billion over the next two decades. This projection accounts for funds necessary to pay for operating and legally-binding capital needs.\textsuperscript{122} The T has recently been spending $470 million per year on its capital program (excluding expansion projects). The TFC, however, recommends that the MBTA should invest $570 million each year to bring the system to a state of good repair. In 2006, $254 million of this capital funding came from the federal government through SAFETEA-LU.\textsuperscript{123} Furthermore, the MBTA currently has outstanding debt of $8.1 billion (principal and interest) that, post-Forward Funding, it is now responsible for repaying. This debt, incurred over the past decades to finance capital projects, is typically in the form of 30-year bonds.\textsuperscript{124}

The TFC report also explains the revenue shortfalls that have occurred post-Forward Funding, as well as other large costs that the MBTA shoulders. For example, the MBTA has historically provided its employees with exceedingly generous pension
and health care benefits. While most pension plans allow an employee to retire at an earlier age, but with reduced benefits, the MBTA allows employees to retire at any age and immediately collect full benefits after 23 years of service. Consequently, the T may carry retirees, with full pensions, for three or four decades—frequently longer than the employee actually paid into the system.125 Furthermore, the MBTA’s debt service, $337 million in FY 2006, represents nearly 25 percent of its expenses. This is more money than was brought in by fares during the same time period.126

The dismal financial state of transportation, and specifically transit in the Commonwealth will especially impact low-income, transit-dependent communities. For instance, one of the recommendations with Forward Funding was to have fares “catch up” to inflation. With the MBTA’s latest fare increase, now fares have increased at more than double the rate of inflation over the past 20 years.127

The transportation planning process:

The manner in which transportation planning occurs also has significant transit equity implications. Several Agencies and organizations on the federal, state, regional, and local levels produce planning documents that guide transit investment in a region. The federal Department of Transportation’s (DOT) planning regulations require areas of more than 50,000 people to have a metropolitan planning organization (MPO). MPOs are charged with the creation of the area’s long-range transportation plan and its shorter-term transportation improvement program (TIP). The long-range plan addresses at least a twenty year planning horizon and lays out a strategy for maintenance and improvement of an area’s transportation system. The TIP is a region’s spending plan for anticipated transportation improvement in the short-term. It contains a multi-year prioritized list of
projects (during a minimum 3 year time period) proposed for funding or approval by the Federal Highway Administration (FHWA) or the Federal Transit Administration (FTA). Long term transportation plan goals are implemented through the TIP. State departments of transportation handle transportation responsibilities outside of metropolitan areas.\textsuperscript{128}

Before a plan or a TIP is adopted, the MPO and federal DOT must show that the planned transportation activities in the area are consistent with (or “conform to”) the purpose of the State Implementation Plan (SIP) for nonattainment and maintenance areas under the Clean Air Act (CAA); \textit{this process is called the transportation conformity determination process}. See the sections on the Clean Air Act (page 48), the State Implementation Plan (page 50), and conformity determinations (page 67) for more information on how air quality requirements influence transportation and transit planning.

The local transit agency, in the Boston metropolitan area’s case, the MBTA, prepares a Capital Investment Program (CIP). Projects in the CIP are “selected through an ongoing prioritization process that strives to balance capital needs across the entire range of MBTA transit services.” Unfortunately, the number of capital projects identified each year generally exceeds the Authority’s capacity to provide capital funds. Therefore, the “highest priority needs for funding” are selected annually. The highest priority for the MBTA is to maintain the current system in a \textit{state of good repair}. This costs the MBTA approximately $470 million per year. However, as mentioned earlier, the Transportation Finance Commission (TFC) recommends that the T spend $570 million.\textsuperscript{129 130}

Otherwise, project prioritization for the CIP is supposedly based on “the impact of the project on the effectiveness of the Commonwealth’s transportation system, service
quality, the environment, health and safety...and the Authority’s operating costs and debt service.” Furthermore, projects that receive the highest priority are those that create the greatest benefit and the least cost, as defined by the following five factors:

- **Factor One: Safety, Health, and the Environment.** Proposed projects must correct an existing deficiency for passengers and/or employees in safety, health, and/or the environment.
- **Factor Two: State of Good Repair.** This criterion measures the degree to which the proposed project improves the condition of the Authority’s existing infrastructure.
- **Factor Three: Cost/Benefit.** Projects receive scores based on the number of passengers affected by the proposed project, its net operating cost, and the debt service necessary to support its capital cost.
- **Factor Four: Operational Impact.** This measures the extent to which proposed projects are deemed operationally critical, as well as projects’ ability to improve the effectiveness for the Commonwealth’s transportation network in general.
- **Factor Five: Legal Commitments.** To qualify for points in this area, projects must demonstrate a legal obligation for the MBTA, such as fulfilling the Authority’s Key Station Plan in compliance with the Americans with Disabilities Act (ADA) [or the State Implementation Plan (SIP)].

The Draft Capital Investment Program document for FY2007-FY2012 also mentions that the MBTA considers environmental justice in its capital investment decision-making, though no details are provided as to how this is done. The document only states that, “The MBTA has worked with the Central Transportation Planning Staff (CTPS) and the Boston Metropolitan Planning Organization (MPO) to ensure that minority and low-income regions are treated equitably regarding the delivery of transportation services.” Penn Loh, the executive director of Alternatives for Community and Environment (ACE), a Roxbury-based environmental justice group, criticizes the lack of emphasis that the MPO gives to environmental justice and transit equity. ACE spear-headed the push for and joined the MPO’s ad-hoc Environmental Justice Committee in 2000. The Committee tried to work to shift the organization’s consideration of regional equity in terms of long-term transportation planning. The
Committee submitted comments on two rounds of the MPO’s long-rang plan. However, with the exception of the MPO’s inclusion of a project to add 100 clean buses to relieve system overcrowding in 2001, there were few positive outcomes and ACE left the Committee in 2003.¹³³¹³⁴

IV. Boston—

a) Transportation History

While many factors, including how transit is funded and planned, have influenced the state of transit justice in the Boston region, this thesis focuses on the equity impact of Big Dig-related SIP transit commitments. Before delving into the circumstances that brought about the Big Dig and the transit commitments, it is useful to understand how transportation has evolved in Boston.

Early transit history:

Mass transportation began in Boston in 1631 when the city was a peninsula connected to the mainland by a narrow strip of land, now the South End. At the time, freight was transported by ox cart from what is now Chelsea to Boston—the relatively short trip took two days. During 1793, the first stagecoach operation began between Boston and Cambridge. In the 1820s, the omnibus (OMNI—a bus for all, everywhere) entered the scene. The omnibus, though still pulled by horses, was longer than a conventional stagecoach. Unlike the stagecoach, which went directly from one city or town to the next, the omnibus made several stops along an assigned route. A decade later, New York experimented with running horse-drawn omnibuses on rails. Given that roads remained largely unpaved, muddy, and contained many ruts, rail tracks prevented the vehicles from getting stuck and allowed for a smoother ride. After some public
discord over laying track, Boston soon followed New York’s lead. Needless to say, the 8,000 horses needed to run the system were frequently injured and difficult to care for.

After traveling to Richmond, Virginia, Boston transit officials were impressed with the streetcar electrification system there and decided to electrify the entire Boston network. The first electric streetcar began operation in Boston on January 1, 1889. In 1897, the nation’s first subway line began operation in Boston and in 1922, Boston established its first motor bus route. While first known as the Bay State Street Railway, and then the Eastern Massachusetts Street Railway, the Massachusetts Bay Transportation Authority (MBTA) was formed in 1968.

Today the MBTA is the nation’s 5th largest mass transit system, serving a population of 4,667,555 in 175 cities and towns with an area of 3,244 square miles. The MBTA maintains 183 bus routes, 2 of which are Bus Rapid Transit (BRT) lines, 3 rapid transit lines, 5 streetcar routes, 4 trackless trolley lines, and 13 commuter rail routes. The average weekday ridership for the entire system is approximately 1.1 million passenger trips. (See Appendix for a map of the MBTA system.)

The Central Artery/Tunnel Project (CA/T) aka, “The Big Dig”:

Many who have been to Boston marvel at the city’s network of tangled and narrow streets. Clearly, unlike Detroit, the automobile did not shape the early development of this colonial city. The lack of a coherent street grid coupled with increasing private vehicle ownership meant that by mid-20th century, traffic in the city was extremely congested. Then-Commissioner of Public Works William Callahan advocated for an elevated expressway which was eventually constructed (1951-1959) between the downtown area and the waterfront. The expressway displaced thousands of residents and
businesses and physically divided the downtown from the market areas and the waterfront. During construction, Governor John Volpe stepped in to make the last section of the Central Artery go underground through the Dewey Square Tunnel. While this improved traffic somewhat, the expressway contained many tight turns and an excessive number of entrances and exits without sufficient merge lanes.\textsuperscript{139}

In the years that followed the Central Artery’s construction, local business owners and residents, seeking to reunite the neighborhood, rallied to remove the expressway. In the 1970s, then-state Secretary of Transportation Frederick P. Salvucci and others envisioned moving the entire expressway underground. This effort would come to be known as the Central Artery/Tunnel Project (CA/T), aka, “The Big Dig.”

The Central Artery/Tunnel Project (CA/T) rerouted the Central Artery (Interstate 93), the primary controlled-access highway that runs through Boston, into a 3.5 mile tunnel under the city. The Big Dig is the most expensive highway project the U.S. has ever seen. While the project was estimated at $2.8 billion in 1985, as of 2006, over $14.6 billion had been spent in federal and state dollars.\textsuperscript{140} Adjusted for inflation, the project’s budget exceeded that of the Panama Canal and the Alaska Pipeline.\textsuperscript{141}

As dictated by state and federal laws, the Big Dig could not be built until state officials analyzed the project’s environmental impacts, and assigned various mitigation measures. In 1990, Salvucci and Doug Foy, head of Conservation Law Foundation (CLF), signed a legally-binding commitment requiring the state to construct all 14 transit projects named in the Big Dig’s environmental documents.\textsuperscript{142} Founded in 1966, CLF is a non-profit, member-supported New England environmental advocacy organization. In return for agreeing to the transit mitigation measures, CLF promised not to challenge the
project in court, and to defend the Big Dig against other lawsuits challenging its environmental approvals. In 1992, CLF secured another settlement, asserting that the Weld administration had not been following through with the transit commitments. In response, in 1993, Weld agreed to make the commitments part of the SIP for complying with federal Clean Air Act requirements.¹⁴³

b) The Clean Air Act and Pollution Reduction

Congress passed the Clean Air Act (CAA) in 1955. While the CAA was heralded as a breakthrough in environmental law, within two decades, concern over deteriorating air quality in many cities led to a significant amendment called the Air Quality Act of 1967, which was followed three years later by the Clean Air Amendments of 1970. The 1970 amendments recognized that while the construction of new highways was seen as a means of reducing congestion, it also tended to generate additional travel demand, thus increasing air pollution.¹⁴⁴ The 1970 amendments also gave states broad authority to adopt transportation control measures (TCMs) to restrict automobile use and provide alternatives to single-occupant vehicle (SOV) trips.¹⁴⁵ Transportation Control Measures may be any measure adopted for the purpose of reducing emissions or the concentration of air pollutants from transportation sources by reducing vehicle use, changing traffic flow, or mitigating congestion conditions. They may be voluntary programs, incentives, regulatory programs, and/or market based/pricing programs.¹⁴⁶ Examples of TCMs are: on-street parking restrictions, limits on heavy-duty commercial vehicle use, mandatory parking fees, preferential bus/car pool lanes, bike paths, and mass transit projects.¹⁴⁷

The Clean Air Act (CAA), which was updated in 1977 and 1990 with strong bipartisan support, charges the Environmental Protection Agency (EPA) with setting
National Ambient Air Quality Standards (NAAQS) for criteria air pollutants. There are six criteria air pollutants: carbon monoxide (CO), nitrogen dioxide (NO2), ozone (O3), lead (Pb), particulate matter with particles 10 micrometers or less (PM10) and particulate matter with particles of 2.5 micrometers or less (PM2.5), and sulfur dioxide (SO2). “Primary” standards are set at the necessary level to protect public health with an “adequate margin of safety” and must safeguard the entire public. Primary standards also give special consideration to certain sensitive groups, including the elderly, children, pregnant women, and people with heart or respiratory diseases. “Secondary” standards must be set at the level required to protect public welfare. “Public welfare” includes all forms of environmental damage. The NAAQS are set after a rigorous multi-year process is conducted. This process uses all available scientific data and takes into account input from the scientific community and other groups. Importantly, the EPA may not consider the cost of meeting the standards it eventually selects—only the level needed to prevent harm to human health and the environment. Rather, the CAA implementation provisions take into account cost-related issues.

The 1977 amendments enforced consistency between transportation planning and air quality plans by requiring all DOT projects and assistance as well as MPO plan approval to be subject to CAA standards. A project would conform if it came from a conforming transportation improvement program (TIP) or did not otherwise adversely affect the TCMs in the SIP.

The State Implementation Plan:

The 1990 Clean Air Act sought to further facilitate compliance monitoring and enforcement by implementing an expansive operating permit program and imposing
stricter administrative, civil, and criminal enforcement provisions. The 1990 Act also required each state to develop a State Implementation Plan (SIP) that explains how it will attain and/or maintain the primary and secondary National Ambient Air Quality Standards (NAAQS) set forth in Title I, Section 109 of the Clean Air Act (CAA) and Section 40 Code of Federal Regulations 50.4 and 50.12. In general, a state’s air quality agency prepares SIPs with input from metropolitan planning organizations, industrial pollution sources operating in the state, and members of the public. Typically, the SIP is a plan that contains procedures and programs to monitor, control, maintain, and enforce compliance. The SIP must include “emission limitations, schedules of compliance and such other measures as may be required” to attain and maintain the standards, including land use and transportation policy and projects. If a SIP is deemed to be inadequate by EPA, the Agency can call for a SIP revision. In this case, the state is not relieved of any requirements or deadlines, though EPA has discretion to adjust deadlines and commonly does so.

**The SIP and social equity:**

Areas where air quality standards are exceeded are called “nonattainment areas.” These areas are usually rather large—the entire eastern half of Massachusetts is one area, for example. The SIP must be designed to reduce emissions enough to bring nonattainment areas into compliance with the NAAQS. However, while the average emissions across the entire nonattainment area must go down to or below mandated levels, certain neighborhoods could continue to experience pollution levels well above the NAAQS. Indeed, emissions levels usually vary significantly across nonattainment areas. Evidence of this exists in Boston, where the areas of the city with the highest
percentages of black and Latino children have the highest asthma-related hospitalization rates for children under 5. Asthma has been linked to ground-level ozone, a pollutant formed from vehicle emissions.\textsuperscript{160}

Furthermore, most urbanized areas carry nonattainment designation for some NAAQS criteria pollutants.\textsuperscript{161} This is largely a result of the sprawling nature of U.S. land use which also causes a strain on urban transit systems by shifting limited transit dollars from dense city locations to dispersed outer areas. In other words, the shift in land use from urban to suburban and from dense to sprawling has caused an inequitable and also inefficient distribution of transit resources as well as excessive amounts of air pollution. Moreover, given that urban, low-income populations, many of whom are of color, heavily depend on public transit, the allocation of transit dollars has become an issue of social equity.

\textit{The SIP and transportation:}

As part of the SIP, the Massachusetts Department of Environmental Protection (DEP), like other DEPs, mandates measures to control emissions, among them, transportation control measures (TCMs). As mentioned earlier, a TCM is "any measure that is directed toward reducing emissions of air pollutants from transportation sources by improving traffic flow, reducing congestion, or reducing vehicle use."\textsuperscript{162} Transportation sources contribute significantly to emissions of volatile organic compounds (VOCs) and nitrogen oxides (NOx), precursors to ozone, a criteria pollutant. Transportation sources also contribute to the other criteria pollutants regulated by EPA such as carbon monoxide (CO).\textsuperscript{163} The entire state of Massachusetts is in nonattainment for ozone.\textsuperscript{164}
Transportation Control Measures must satisfy the following eight criteria before EPA will consider them for approval in a SIP:

1. A complete description of the measure and its estimated emissions reduction benefits,
2. Evidence that the measure was properly adopted by a jurisdiction with legal authority to commit to and execute the measure,
3. Evidence that funding has been (or will be) obligated to implement the measure,
4. Evidence that all necessary approvals have been obtained from all appropriate government agencies (including MPOs and State transportation departments, if applicable),
5. Evidence that a complete schedule to plan, implement, and enforce the measure has been adopted by the implementing agency or agencies,
6. A description of the monitoring program to assess the measures' effectiveness and to allow for necessary in-place corrections or alterations,
7. The Governor's approval of the SIP, and
8. A public hearing (as part of the SIP approval process). 165

The following types of programs can count as TCMs under a SIP:

1. Programs for improved public transit;
2. Restriction of certain roads or lanes to, or construction of such roads or lanes for use by, passenger buses or high-occupancy vehicles (HOV);
3. Employer-based transportation management plans, including incentives;
4. Trip-reduction ordinances;
5. Traffic flow improvement programs that achieve emissions reductions;
6. Fringe and transportation corridor parking facilities serving multiple-occupancy vehicle programs or transit service;
7. Programs to limit or restrict vehicle use in downtown areas or other areas of emissions concentration particularly during periods of peak use;
8. Programs for the provision of all forms of high-occupancy, shared-ride services;
9. Programs to limit portions of road surfaces or certain sections of the metropolitan area to the use of non-motorized vehicles or pedestrian use, both as to time and place;
10. Programs for secure bicycle storage facilities and other facilities, including bicycle lanes, for the convenience and protection of bicyclists, in both public and private areas;
11. Programs to control extended idling of vehicles;
12. Programs to reduce motor vehicle emissions which are caused by extreme cold-start conditions;
13. Employer-sponsored programs to permit flexible work schedules;
14. Programs and ordinances to facilitate non-automobile travel, provision and utilization of mass transit, and to generally reduce the need for single-occupant vehicle travel, as part of transportation planning and development efforts of a
locality, including programs and ordinances applicable to new shopping centers, special events, and other centers of vehicle activity;

15. Programs for new construction and major reconstruction of paths, tracks, or areas solely for use by pedestrian or other non-motorized means of transportation when economically feasible and in the public interest. For purposes of this clause, the Administrator shall also consult with the Secretary of the Interior; and

16. Programs to encourage the voluntary removal from use and the marketplace of pre-1980 model year light duty vehicles and pre-1980 model light duty trucks.\textsuperscript{166}

\textit{The Big Dig and air quality:}

As mentioned earlier, out of the six criteria air pollutants, Eastern Massachusetts—like over 90 metropolitan areas—is only out of compliance for ozone.\textsuperscript{167,168} Originally, the 1970 Clean Air Act defined a one-hour national ambient air quality standard (NAAQS) for ozone of 0.12 parts per million, meaning that this level could not be exceeded at each monitor averaged over one hour no more than once per year. The 1990 Amendments classified degrees of nonattainment of the one-hour standard and the entire state of Massachusetts was classified as being in serious nonattainment and was required to comply by 1999. The attainment date was later extended first to 2003, and then to 2007. In 1997, the EPA proposed a new eight-hour ozone standard that replaced the one-hour standard in June of 2005. Scientists had shown that ozone could affect human health at lower levels and over long exposure times. The eight hour standard is 0.08 parts per million, averaged over eight hours and not to be exceeded more than once per year. Under the new eight hour standard, Massachusetts was classified as being in moderate nonattainment and the state was broken into two separate nonattainment areas—Eastern Massachusetts and Western Massachusetts.\textsuperscript{169}

Ground-level ozone, unlike stratospheric ozone which protects the planet from ultraviolet radiation, is dangerous for humans, and is a precursor to smog. The transit
commitments that are included in the SIP as a result of Big Dig-related smog are included in state code in two places: 310 CMR 7.36 and 310 CMR 7.38. The 7.36 regulation is where the original 1993 SIP is located in state law. The 7.36 regulation lists projects that account for certain emissions reductions benefits. Currently, the Executive Office of Transportation/Central Transportation Planning Staff (EOT/CTPS) is pushing to alter the SIP to account for substitute mitigation measures which are discussed in the paragraphs that follow. The other regulation, 7.38, describes mitigation that will occur if permitted tunnel ventilation system elements are out of compliance with the Clean Air Act (CAA). The emissions for specific items in the permit were measured in the Summer of 2006, and were not found to be out of compliance. However, some of the mitigation dictated by 7.38, will still occur. There is overlap in terms of the projects covered between 7.36 and 7.38. Finally, an updated list of commitments was included in the Administrative Consent Order (ACO) of September 2000—an agreement prompted by a Conservation Law Foundation threat to sue in federal court and a parallel state lawsuit.

Some of the Big Dig-related TCMs have been completed. They include the Framingham Commuter Rail Extension to Worcester, the Ipswich Commuter Rail Extension to Newburyport, additional park and ride facilities, and a high occupancy vehicle (HOV) lane on the Southeast Expressway. Furthermore, other projects were included that have yet to be designed, let alone completed. These include the Arborway Restoration Project, the Green Line Extension, and the Red Line/Blue Line Connector. While the state built many of the suburban transit commitments, it fell significantly behind on many of the promised projects in the urban core.
As-yet to be completed urban transit commitments:

The Arborway project (see map in Appendix) would restore Green Line service from Arborway along Center Street in Jamaica Plain to Health Street, where the E branch of the Green Line ends. The Arborway Line would consist of light rail and would service Jamaica Plain, Roxbury, Fenway, and Downtown Boston. The estimated cost of this project is $71.9 million and it was scheduled for completion by December 31, 2001. The Green Line project calls for the extension of the Green Line from Lechmere to West Medford. While this project has been primarily envisioned as an extension of the rail line, the MBTA has investigated other options, including bus rapid transit. The project would provide service to Somerville and Medford, as well as Cambridge and Boston. Many areas of Somerville, one of the densest communities in the Boston area, are currently poorly served by public transportation. This project would therefore be a substantial urban transit equity investment. The project has an estimated cost of $375 million and is to be completed by December 31, 2011, a deadline that is likely to be violated.

The Administrative Consent Order (ACO) mandates that the Blue Line at Bowdoin Station be connected to the Red Line at Charles Station. The Charles/MGH Station has been renovated to accommodate this project. The Red and Blue Lines are the only MBTA rapid transit lines that do not have a direct transfer point. Another prudent urban transit investment, this project would reduce transfers for many riders, ease congestion at other stations, and directly connect communities and resources along the Red and Blue Lines. Support for the Blue-Red Connector was high when the project was initially conceived of because the many Harvard and MIT graduates in state government wanted a
direct connection between Cambridge and Logan International Airport. This support diminished once the Silver Line came on line and provided this same service.\textsuperscript{176} However, perhaps the most important function of the Blue-Red Connector would be to connect low-income communities in East Boston, Chelsea, and Revere with employment opportunities in Cambridge and at the Massachusetts General Hospital (as well as health care services at MGH).\textsuperscript{177} This project effects Downtown Boston, Beacon Hill, Dorchester, South Boston, Quincy, North Quincy, East Boston, Cambridge, Somerville, and Revere. Also due to and unlikely to be completed by December 31, 2011, it has an estimated cost of $174.6 million.\textsuperscript{178}

In fact, in addition to the aforementioned projects, the 1990 CLF Agreement included a renewed and expanded Orange Line fleet by 1995, now scheduled for 2016, and upgraded commuter rail service to Worcester, both of which still have not occurred. Also still incomplete is the preliminary engineering of Phase III of the Silver Line, and the Draft Environmental Impact Statement for the Urban Ring, which was to have been completed by December 2005, according to the Administrative Consent Order of 2000.\textsuperscript{179}

It should be noted that while the entire Silver Line project (Phases I, II, and III) has been widely spoken of as an environmental justice project, in effect, only Phase I of the Line runs through a community of color (Roxbury). Executive Director of Alternatives for Community and Environment (ACE), Penn Loh, notes that many community leaders believe that Phase III of the project (linking the two branches of the Silver Line—the Roxbury branch and the Logan International Airport branch) should be stopped given its $600 million price tag and its relative lack of benefit to low-income communities of color in Boston. However, South Boston waterfront developers and Back Bay hotels have
continuously lobbied for the project since it would benefit their clientele. Furthermore, the 1990 CLF Agreement also included a provision that MBTA fares would not increase faster than the rate of inflation—a promise that was again violated in February 2007.

The 2003 Program for Mass Transportation (PMT), an MBTA document that prioritizes transit capital investments within modes and by investment category type, rated the Arborway Restoration, the Red Line/Blue Line Connector, and the Green Line Extension as medium priorities, suggesting that these projects may not be the best investments for the region. Then, when the Boston Regional Metropolitan Planning Organization (MPO) issued the Regional Transportation Plan in 2004, it used the PMT ratings to select transit projects. However, even though the above projects were given a medium rating, the MPO prioritized funding for them because of their status as SIP commitments. Furthermore, the state is required to show timely implementation of the TCMs.

The proposed SIP revision:

For these reasons and given the Romney Administration-driven initiative to have the Executive Office of Transportation (EOT) develop objective criteria for ranking projects in a transparent process, the Office for Commonwealth Development (OCD), EOT, Department of Environmental Protection (DEP), and others began reexamining the Arborway, Red/Blue Connector, and Green Line projects. The first step in the reevaluation process, which began in December 2004, was initial outreach and setting air quality goals. DEP then reviewed public comments and provided an air quality budget to EOT that quantified the air quality benefits needed to complete the Commonwealth’s SIP obligations. The Department established the air quality benefits that each of the three
projects would provide and required that any proposed changes equal or exceed 110 percent of those benefits.\textsuperscript{184} In other words, EOT, along with the Central Transportation Planning Staff (CTPS) was to use this standard in evaluating any SIP substitutions for the above mentioned projects.\textsuperscript{185} In addition, the original CLF/DOT agreement signed in 1990 required that substitutions be made “in the same area” to assure transit equity.

The objective criteria that EOT/CTPS officially used in the evaluation process were:

- Utilization
- Mobility
- Cost-effectiveness
- Air Quality
- Service Quality
- Economic and Land Use Impacts
- Environmental Justice

When EOT reviewed the results of the analysis, it formulated a preferred alternative for accomplishing air quality improvements mandated by the SIP. The preferred alternative included the Green Line extension to Medford Hillside and Union Square, the Fairmount Commuter Rail Line Improvements, and 1,000 Additional Commuter Rail Parking Spaces in the Boston Region. Also, the state agreed to examine alternatives for Arborway and design the Blue-Red Connector. These commitments partially mirror those that CLF secured in November 2006.\textsuperscript{186}

In November 2006, CLF sued the Commonwealth of Massachusetts for failing to move ahead with the Arborway Restoration Project, the Green Line Extension, and the Red Line/Blue Line Connector. The resulting settlement required the state to explore transit improvements for the Arborway corridor through a public process, as well as prepare a final design of the Red-Blue Connector.\textsuperscript{187} In addition, the Commonwealth
promised to speed up its completion of the Greenbush Commuter Rail Line, finish the ongoing modernization and platform lengthening of the Blue Line, and build 1,000 new parking spaces for transit users.\textsuperscript{188} The settlement also ensures the extension of the Green Line beyond Lechmere to Medford Hillside and Union Square and the addition of four stops in the Dorchester and Mattapan neighborhoods on the Fairmount commuter rail line. Although not originally included in the SIP, the Fairmount project, which will serve communities in Dorchester and Roxbury, was substituted into the plan.

Regular passenger service on the Dorchester Branch of the New York and New England Railroad ran until 1944. Since then, large sections of Dorchester and Roxbury have been without convenient rail service. The 9.1 mile-long Fairmount branch of the MBTA’s commuter rail runs through this area of Boston, but offers few stops and has limited service (\textit{see map in Appendix}).\textsuperscript{189} The MBTA’s agreement to add four new stops to the line in this under-served community of color is a real victory for transit justice advocates.

However, regarding the Fairmount Line improvements, in a February 2007 letter to EOT/CTPS, former Transportation Secretary Frederick Salvucci (1975-1978 and 1983-1990), writes, “...EOT is not committing to the improved frequency requested by the community, nor the additional equipment required for improved frequency, nor the necessary expansion of South Station required for improved frequency…” Salvucci argues that without increasing frequency of service, the Fairmount upgrades are likely to attract people from bus to rail, but not reduce auto vehicle miles traveled (VMT).\textsuperscript{190} A coalition of local organizations including the Conservation Law Foundation (CLF) also question the effectiveness of the state’s commitment to the Fairmount Line based on the
same service level concerns voiced by Salvucci. In addition, in the context of the SIP, the coalition says the state should investigate cleaner technology for the line since more stops will inevitably lead to more diesel pollution in the neighborhoods that border the track.191

In a February 2007 letter to the current Secretary, Salvucci argues that the report that EOT/CTPS put forth on proposed changes to the SIP fails on several levels.192 Salvucci argues that EOT/CTPS provide no credible basis for claiming that the substitutions they propose will meet the DEP 110% criterion. Furthermore, he argues that "projections that the Big Dig would lead to decreased vehicle hours of travel and air quality improvement were based on assumptions that strict parking limits would be maintained in Boston and Cambridge, that transit fares would rise no faster than the rate of inflation, and that all of the transit investments in the MBTA approved Program for Mass Transportation then in force would actually be implemented in a timely fashion."193 He continues, stating that most of the commitments relative to urban areas have not been honored.194 Salvucci also claims that the technical capacity of CTPS is being "...wasted in playing games pretending to document air quality benefits with no specifics and providing cover for more inaction."195

Salvucci notes that the EOT/CTPS report does not admit that a renewed and expanded Orange Line fleet, a 1993 SIP commitment, is being dropped. He writes that, "from other sources it appears that fleet expansion and replacement is now contemplated for 2016."196 Furthermore, the report describes the addition of 1,000 park & ride spaces without identifying the location of the spaces. This violates EPA guidance that any SIP park & ride spaces be targeted to useful locations. "[U]nless park & ride paces are
located where unused rail capacity and passenger demand are available to attract auto
trips to the rail system, park & ride spaces are as likely as not to attract existing rail
passengers out of feeder buses and into auto access, worsening congestion and increasing
VMT and air pollution.”

Indeed, many have argued that suburban SIP commitments have been prioritized
over urban SIP commitments. In a CLF letter dated January 12, 2005, the organization
delivered its Notice of Intent to Sue the state and wrote,

...the Commonwealth has disproportionately failed to complete or make
appropriate progress on the Transit Commitments that presented the most benefits
for the residents and commuters in the urban core...where the adverse air quality
impacts of the CA/T Project itself are felt most profoundly, the [and] failure to
provide promised transit projects to mitigate the impacts from the highway project
is an environmental injustice. 197

In another letter dated June 29, 2005, a coalition of organizations including Conservation
Law Foundation (CLF) wrote to John Cogliano, the Chair of the Boston Metropolitan
Planning Organization and other MPO members expressing dissatisfaction that the region
was out of compliance with a number of transit SIP commitments associated with the Big
Dig. 198 The letter highlights that while some of the transit commitments have been
completed, many projects, particularly those serving urban communities, remain
unfulfilled. Furthermore, the current SIP requires that substitutions provide equivalent or
better air quality benefits to areas that were promised projects—the proposed SIP revision
ignores this requirement. As a result, the proposed changes provide no air quality
mitigation projects for Jamaica Plain, East Boston, Revere, Beacon Hill and other
communities that would be served by either the Red-Blue Connector or Arborway
Restoration. 199
The coalition also argued that while the Fairmount Line would serve urban communities, the proposal for 1,000 park and ride spaces as one of the substitute projects would likely benefit suburban riders who already received many thousand additional such parking spaces in the original SIP. They write: “An additional 1000 parking spaces, likely in the suburbs, simply won’t provide the needed urban transit infrastructure investment that would be achieved by completion of the Red-Blue Connector and Arborway Restoration.” Salvucci also argues this point, emphasizing that both the 1990 CLF Agreement and the 1993 SIP require that if a transit project becomes infeasible, replacement projects have to be in the same area. This was to preclude suburban park & ride lots from replacing transit improvements in urban areas with congestion and air quality problems—exactly what EOT/CTPS is suggesting. Salvucci writes in his letter that “the proposal to use the suburban park & ride lots as substitutes for urban transit commitments is offensive on its face, and violates the Environmental Justice principles.”

No deadlines have been proposed for any of the substitute projects. The Arborway Line was due to open in 1997 and the Red-Blue Connector is scheduled to be functioning by the end of December 2011. The coalition wrote that the state has not provided assurance that equivalent mitigation will take place in a comparable timeline. The Commonwealth has also failed to indicate where the 1,000 additional spaces will be built, their cost, or who they will benefit.

The total estimated cost of the SIP commitments is $750 million. This only includes design money for the Red-Blue Connector.
Exhibit 38. Boston Region Transit Projects included in the State Implementation Plan

<table>
<thead>
<tr>
<th>Statewide Improvement Plan Environmental Commitments (December 2006)</th>
<th>Dollars (in Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fairmount Commuter Rail Improvements</td>
<td>$80</td>
</tr>
<tr>
<td>Red Line-Blue Line Connector (Design Only)</td>
<td>$30</td>
</tr>
<tr>
<td>1,000 Parking Space Initiative</td>
<td>$30</td>
</tr>
<tr>
<td>Green Line Extension to Medford</td>
<td>$610</td>
</tr>
<tr>
<td>Total Projected Capital Costs</td>
<td>$750</td>
</tr>
</tbody>
</table>

Source: MBTA, December 2006.


Currently, the MBTA has no financial capacity to fulfill this legally-binding obligation.

“The presumption is that [the SIP commitments] will be funded through state bonds, and that none of these projects will qualify for federal transit funding.” This assumption is reasonable because the MBTA is already seeking federal funds for the Silver Line Phase III project and it previously received funds for the earlier Silver Line phases.

Furthermore, the Transportation Finance Commission report includes the SIP commitments in its calculations of the MBTA’s funding gap. 203

**SIP commitment update:**

On March 14, 2007, newly-elected Governor, Deval Patrick, along with legislative leaders, proposed an emergency $1.47 billion borrowing package. They claimed that the bond bill is needed for a number of long over-due projects, including the outstanding transit projects that the state is bound to in the SIP. “The bill is just a stopgap measure to address…urgent or immediate needs,” said the Governor, adding that he will propose a five-year capital spending plan in July. The bill includes $100 million to design four transit projects tied to the Big Dig, estimated to cost a total of $739 million. They are the Green Line Extension to Union Square, 1,000 additional parking spaces at commuter rail stops, new stations along the Fairmount commuter rail line, and a connector between the Red and Blue subway lines. 204
**Transit justice and commuter rail:**

Since the 1970s when the MBTA took over the commuter rail lines, it has spent several billion dollars to sustain, expand, and operate the system. Currently, the state is considering several more costly commuter rail projects, most notably the almost $1.4 billion project to extend commuter rail service to Fall River and New Bedford. In fact, on April 4, 2007, Governor Patrick pledged to bring this rail service to the state by 2016. The philosophy of smart growth encourages dense, mixed-use development. Smart growth advocates argue for designing communities for walking and public transit ridership. Therefore, while one of the Smart Growth Network’s ten principles is to provide a variety of transportation choices, commuter rail lines that radiate out of the city only serve to allow people to live further away from where they work and receive other services.

Indeed, in the U.S., the “percentage of people working outside of their counties of residence increased by 200 percent between 1960 and 1990...” Furthermore, commuter rail projects largely benefit suburban populations which tend to be disproportionately white and more affluent than their urban counterparts. Though the Fall River/New Bedford project would certainly benefit South Shore residents, perhaps it makes more sense from an equity perspective to first invest in much-needed urban core transit projects since central city communities already depend on transit service.

Eric Beaton, a Harvard master’s student, wrote a policy brief using census data and GIS analysis for the Rappaport Institute for Greater Boston on the effect of commuter rail on the Greater Boston landscape. He concluded that: “Density turns out to be highly correlated with transit ridership, much more than the presence or absence of commuter
rail,” and that “Looking at rates of change, there is little evidence that the presence or introduction of commuter rail has produced significant increases in density.” In other words, radial suburban commuter rail lines do not seem to create denser, more transit-oriented land use. This finding goes against the traditional argument that suburban commuter rail limits sprawl, although, this line of thinking is in many ways a throw-back to the days of inter-city rail networks when people could travel by rail or trolley from town to town without going into a central city. If anything, suburban commuter rail allows people to live further and further from employment opportunities. Today, with Americans wedded to the freedom that driving provides, massive amounts of highway spending, and gas prices still quite affordable, such rail travel is no longer viable.

V. The SIP and Land Use

The State Implementation Plan (SIP) component of the Clean Air Act’s (CAA) criteria air pollutant regulations was developed in response to rising emissions levels, especially in urbanized areas. At first, emissions could be easily reduced by forcing dirty power plants and other industrial facilities to pollute less. Today, however, with vehicle miles traveled (VMT) steadily rising, air quality officials should focus on the air quality impacts of low-density, sprawling development. As discussed earlier, the SIP attempts to force areas that are out of compliance with one or more of the six criteria pollutants to reduce emissions to specified acceptable levels. The Boston ozone SIP was amended as a result of pollution expected from Big Dig construction to include several transit upgrades and new projects. While excess traffic congestion associated with the construction of the Central Artery/Tunnel Project was the original reason for these transportation control
measures (TCMs), the SIP is meant to serve as a broad tool to reduce harmful emissions no matter how or where they originate.

Since the inception of the CAA, metropolitan Boston, along with the majority of other urban areas, has not achieved acceptable ozone levels, casting the efficacy of the SIP into question. *If the SIP is going to be more than an empty threat from EPA, air quality areas should be forced to deal with the root cause of these emissions—unsustainable land use, i.e. rampant disinvestment from certain urban neighborhoods and sprawl outside of the inner city.*

To understand how we have arrived at the land use patterns of today, it is important to understand how urban land use has changed and the forces that have created this change over time.

**a) United States Land Use History and the Current Paradigm:**

The foundational principles of the United States are a direct response to the English feudal system under which royalty owned all land and leased it to tenants. The U.S. adopted the *allodial* paradigm instead. This system allows individuals to have clear title on property and real estate. In the U.S., if land is not owned by a private citizen or entity, it is in the public domain. The government can dispose of its land holdings, but cannot take land from individuals without just compensation. In many parts of the country, including Massachusetts, a system of “home rule” exists in which cities and towns have virtually total control of the land use that occurs within their borders. While local government agents should use planning and zoning to enhance the quality of life of residents, mechanisms such as large lot size requirements and restrictions on multi-unit
dwellings are used to bar outsiders and preserve economic, racial, and ethnic stratification. This is called exclusionary zoning.211

Many of these exclusionary mechanisms are related to municipal property taxation—a key driver of sprawling land use in this country (see smart growth discussion on pages 27-28). Potential local property tax revenue “stimulates” local land use decisions. This is especially true of commercial and industrial properties since they consume fewer services than their taxes provide. Conversely, residential growth is often problematic for communities “because the average single-family home consumes substantially more services, particularly if there are children in the school system…”212 For example, “A recent study in the Boston region projects that a single-family residence in Bedford, Massachusetts, needs to be valued at $700,000 to generate enough revenue to pay for the services that a family, with two school-age children living in the house, will consume.”213

b) Land Use and the Clean Air Act:

Given that land use evolved into a locally controlled system in most of the U.S., the Clean Air Act very explicitly disassociates itself with land use control. Section 131 of the Clean Air Act states: “Nothing in this Act constitutes an infringement on the existing authority of counties and cities to plan or control land use, and nothing in this Act provides or transfers authority over such land use.” Therefore, while our sprawling land use patterns create the need to use more energy both in our buildings and for transportation purposes, and while this energy use causes air pollution, the federal government cannot impose land use regulations on localities. However, states can
promote smart land use strategies that municipalities can voluntarily adopt to meet air quality requirements.

**Land use, the SIP, and the conformity determination process:**

In general, a state can account for the air quality benefits derived from land use activities for nonattainment and maintenance areas in one of three ways:

- Including land use activities in the initial forecast of future emissions in the SIP;
- Including land use activities as control strategies in the SIP; and
- Including land use activities in a conformity determination without including them in the SIP.

(See chart in Appendix)

**Forecast of future emissions to be included in the SIP:**

In January 2001, EPA’s Office of Transportation and Air Quality issued a guidance document entitled, “Improving Air Quality Through Land Use Activities.” The document describes how existing EPA regulations and policies can be used “to account for the air quality benefits of land use activities that encourage travel patterns and choices that reduce vehicle miles of travel, and consequently reduce emissions from motor vehicles...”

The EPA document explains that “land use activities are incorporated in the air quality and transportation processes by modeling the emission reduction impacts of land use activities.” To calculate emissions, planners “consider the ways that land will be used in the future and how the future transportation network will support those uses. This process involves establishing planning assumptions (regarding the population, economy, and land use), conducting travel demand forecasting, and performing emissions modeling.” Mathematically-based computer models predict the location of future jobs and households based on past trends and available land. Modeling can then be done to
predict the vehicle miles traveled (VMT) in a region and the resulting emissions. “If a local government adopts policies that call for restrictions on new low density greenfield development and more infill development, then the forecasted growth in that city would be allocated to reflect this…”218

More specifically, policies such as zoning ordinances, subdivision regulations, parking codes, and development standards can be considered for air quality accounting. These policies are normally adopted by local governments and may be incentive programs with voluntary participation by developers and citizens.219 A specific land use policy can be included in land use assumptions made in a SIP if it a) has already been adopted by an appropriate jurisdiction, or b) if it is planned and there is an enforcing mechanism to ensure it will happen, and c) the effects of the policy have not already been accounted for in land use assumptions (used in the SIP).220

In addition to policies, site-specific projects with quantifiable emissions benefits can be included in a SIP. These projects are usually initiated by private sector actors, but partnerships between government agencies, public advocacy organizations, and developers can occur.221 A specific land use project can be incorporated into the initial forecast if it is a) already built, b) is currently under construction or is planned (necessary zoning is already in place and there is an enforceable mechanism to ensure that it will occur), and the effects of the project have not already been accounted for in the general land use assumptions.222 “Note that supporting transportation elements of land use developments, such as the addition of transit lines and stops in the area, may be accounted for as transportation control measures [TCMs].”223
While land use measures are not always TCMs, some TCMs that are also land use activities are: parking management programs, ride-share incentives, improved public transit, and park-and-ride programs. It should be noted that TCMs that support land use projects may be eligible for funding under the Congestion Mitigation and Air Quality Improvement (CMAQ) program. ISTEA first authorized CMAQ in 1991 to provide funds for surface transportation and other related projects that contribute to air quality improvements and reduce congestion. Jointly administered by the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), the program was reauthorized in 1998 as part of TEA-21, and again in 2005 as part of SAFETEA-LU.

**Control strategies included in the SIP:**

Land use control strategies can only be included in a SIP if they are either enforceable by the state or a local government. Since states typically do not have control over local land use, municipalities must verify that they will enforce land use measures to be included as traditional control strategies in a SIP. The EPA provides the following example:

A local government may adopt a policy of high-density zoning in various areas in its jurisdiction. In many cities, while such a zoning policy is enforceable, the local government reserves the right to waive zoning requirements, in response to citizen complaints or developer requests. The need for enforceability, and/or funding at the local level to include such a zoning policy in a SIP could be a disincentive for some local governments to include their land use activities in the state’s SIP, as it would, in effect, bind the local government to enforcing the action. The answer to this balance of incentive and disincentive must be addressed at the state and local level.

Such a problem is indeed difficult to resolve. States should offer cities and towns incentives for agreeing to include their land use measures in a SIP.

Furthermore, contrary to what one might think logically, even if neither the state nor municipality agrees to directly enforce a local land use measure, the state can still...
account for the emissions benefits of the activity under one of two special EPA policies. One way a state can do this is with what is known as the Voluntary Mobile Source Emissions Reduction Programs (VMEP) policy. These measures rely completely on voluntary actions of businesses or individuals to achieve emissions reductions to improve National Ambient Air Quality Standards (NAAQS). Examples of VMEPs include: economic and market-based incentive and trip reduction programs, as well as growth management strategies. The enforceability requirement is different for VMEPs than for traditional control strategies. With VMEPs, “The state must make an enforceable commitment to monitor, assess and report on the emission reductions…and remedy any shortfalls…in a timely manner.” The procedure for this assessment is not made clear and again, the measures are voluntary. Since it is uncertain how effective VMEPs are, the EPA only allows VMEPs to amount to three percent of the total emission reductions needed to reach attainment.

The other way in which states can include land use measures that are non-enforceable in a SIP is by accounting for them in Economic Incentive Programs (EIP). This policy is designed to encourage the use of market-based incentives or information to reduce emissions from stationary, area, and mobile source emissions. A cap-and-trade program is a good example of an EIP. Like VMEPs, states are responsible for showing that EIPs are actually taking place if they are to be incorporated into a SIP. If not, they must be removed from the SIP. Finally, there is no 3% cap on EIPs. In addition, the enforceability requirement for EIPs is different in that emissions reductions must be either identifiable against a specified source, or the state must use one of the three following measures to fulfill the enforceability requirement:
• The EIP submittal includes fully adopted contingency measures and contains a state commitment to automatically implement contingency measures, if necessary;
• The state will only count emission reductions on a retrospective basis; or
• The state has used the control strategy in a similar situation, has achieved positive results, and gets preliminary approval from EPA to use the provision. 230

**Conformity determination without inclusion in the SIP:**

Transportation conformity, a CAA requirement, is jointly overseen by the EPA and DOT. Metropolitan Planning Organizations (MPOs) make initial conformity determinations, while the FHWA and the FTA make final determinations. A conformity determination estimates emissions that result from an area’s transportation system. Furthermore, a conformity determination is required of nonattainment areas and demonstrates that emissions are within the limits outlined in the SIP. 231 The conformity process seeks to ensure that future transportation activities will not create new air quality violations, increase the frequency or severity of an existing air quality violation, or delay timely attainment. 232

Conformity determinations also ensure that transportation and air quality agencies consult with one another, and that transportation control measures (TCMs) in an approved SIP are implemented on time. 233 In fact, any land use activity that is included in a SIP must also be accounted for in the conformity determination process. 234 TCMs and other projects/policies are selected based on their ability to reduce pollution from the existing fleet or prevent pollution from being emitted in the first place. “Smart growth, transit-friendly transportation projects, commuter programs, the purchase and use of alternative-fuel buses for public transit systems, diesel retrofit programs, and anti-idling reduction projects are examples of how some areas have met their conformity challenges.” 235
To reiterate, *land use activities that are included in a SIP must also be included in a conformity determination*. However, *if a land use activity is accounted for in a conformity determination it does not have to be included in a SIP*. There are certain advantages of accounting for activities and projects in a conformity determination and not in a SIP. First, it is less difficult to include land use activities as they occur in a conformity determination because conformity determinations must be re-evaluated at least every three years. State Implementation Plans, on the other hand, are generally prepared at a single time, though revisions can be made at a later date. Second, conformity determinations look at the effects of land use and transportation systems further into the future as they must examine the life of a transportation plan. The federal Department of Transportation’s metropolitan planning regulations require plans to have at least a 20 year planning horizon and some areas adopt plans that cover an even longer time period. In contrast, attainment demonstrations for SIPs are only considered up to the attainment date, which should be set within 5 years of the area being designated. Maintenance plans require standards to be maintained for two consecutive 10 year time periods. The conformity determination process allows for the fact that it may take more than a decade for land use policies and projects to produce measurable emissions benefits.

In the past, transportation plans were developed independently of the state’s air quality planning process. Therefore, “…SIPs developed by air quality planners often failed to consider the feasibility of their plans with respect to the development of transportation infrastructure.” The transportation conformity process requires the integration of air quality and transportation planning.
Critique:

While it appears that EPA has formulated a method for accounting for local land use efforts in both the SIP and air conformity processes, the ability of the state or the DEP to encourage these policies and projects for emissions benefits is dubious. The EPA writes that including land use activities in the SIP:

…allows you to account for all of the smart growth policies, programs and projects that you are already doing. The composite impact of these smart growth activities may reduce your forecasted emissions level in the future, thereby reducing the amount of additional emissions reductions needed from control strategies.\(^{240}\)

In fact, while the EPA directs states to include land use activities and other emissions control strategies in the SIP, it also indicates that areas that have already submitted a SIP, but discover that they need additional reductions, can do a SIP revision.\(^ {241}\) In other words, if a state DEP is scrambling to come up with required emissions reductions, it can search for reductions that are already taking place because of local land use decisions.

Finally,

an MPO might prefer to have effects of land use activities in a conformity determination that haven’t been accounted for in the SIP. These reductions are then ‘surplus’ to the SIP and could be used to offset the emission-creating effects of other projects in the transportation plan.\(^{242}\)

Moreover, by accounting for emissions reductions in one document versus another, areas can come out ahead in terms of meeting clean air obligations, but not actually achieve maximum air quality benefits.

c) Accounting for land use activities at the state and regional levels:

In the mid-1990s, the EPA conducted a study to see how state and regional organizations responsible for developing regional transportation plans and conformity determinations were accounting for land use activities. The EPA surveyed air quality
agencies at the state and regional levels. Air agency personnel were questioned about land use measures in air quality plans and about barriers to adopting such measures.\textsuperscript{243} The results of the survey showed that most municipalities do not include land use measures in their air quality plans. In fact, only 9 of the 27 surveyed nonattainment cities incorporate land use related control measures in an air quality plan, and only one (1) of these has quantified emission reduction benefits in a SIP, though several have SIPs that include land use controls.\textsuperscript{244}

San Francisco includes three transportation control measures (TCMs) in an air quality plan prepared for the state. One measure, TCM \#15: “Local Clean Air Plans, Policies and Programs,” encourages cities and counties to incorporate air quality beneficial polices that focus on subdivision, zoning and site design measures to reduce the number and length of single-occupant vehicle trips. The second measure, TCM \#19: “Pedestrian Travel,” calls for cities and counties to incorporate policies to promote pedestrian-friendly development into general/specific plans. The third measure, TCM \#20: “Promote Traffic Calming Measures,” aims for cities and counties to include traffic calming strategies (such as speed humps and curb bump-outs) in general and specific plans as well as capital improvement programs.\textsuperscript{245}

Sacramento also includes land-use related TCMs in its SIP. “The land use measures are included to take credit for policies in the Sacramento County General Plan that are intended to reduce vehicle emissions.” One such policy, AQ-15, requires that new developments achieve a 15\% reduction in vehicle emissions. While local municipalities have been reluctant to adopt this policy, the county has also modified zoning ordinances to promote greater mixed use development around transit stations.
The SIP for ozone identifies a 1 ton per day reduction in both NOx and reactive organic gases (ROGs) from the full set of TCMs, including the land use measures. This amount was based on the professional judgment of the Air District, which continues to monitor the resulting emissions reductions.\textsuperscript{246}

**Barriers to including land use measures in SIPS:**

When EPA asked survey respondents what barriers they felt exist that complicate the inclusion of land use activities in the SIP, many expressed “that the potential emission reduction benefits are small, that they are difficult to commit to in SIPS, and that their benefits are too far in the future for the attainment schedules required in SIPS.

Furthermore, in areas where regional agencies have no jurisdiction over local land use decisions—the land use standard in the U.S.—regional agencies are concerned about committing to emissions reductions from policies that have to be adopted by local government. Finally, several respondents believe that it may not be credibly possible to quantify emissions benefits of land use policies with existing travel demand models.

Part of the reason why land use measures are only included in SIPS in a few parts of the country is because of modeling unreliability. Modeling the air quality effects of land use measures is still an emerging field, with few standard protocols. While some techniques can account for large-scale land use policies that discourage sprawl or protect open space, smaller-scale interventions like high density zoning around transit facilities and pedestrian/bike-friendly design are more challenging to capture.\textsuperscript{247} Nevertheless, the cities of Portland, Oregon and Sacramento, California are modeling pedestrian amenities.

“A panel of experts scores each one in terms of its pedestrian-friendliness. By including
this Pedestrian Environmental Factor (PEF) as a mode choice variable, small-scale design attributes that encourage walking (and biking) can be shown to reduce vehicle use." 248

d) The role of EPA in land use planning

While planners are concerned about a number of structural and technical issues that impede the inclusion of land use measures in the SIP, even if these barriers are overcome, the lack of any real regional government in the U.S. makes it difficult to effectively build sustainable land use practices. If land use controls that limit growth exist in one part of a region, without a powerful regional planning body, growth will just occur in other parts of the region. This could amount to no regional net air quality gain. 249

The EPA study identifies several factors that stand in the way of metropolitan land use policies:

- State or metropolitan growth management programs are less feasible in areas that are not growing rapidly. Restrictions on new growth in cities that are experiencing little or no growth will not be politically (or economically) feasible. Therefore, it is not surprising that such growth management programs are mostly being discussed in growing Western states.
- Since regional land use policies may increase the costs of new development, construction and real estate interests have fought to prevent their adoption. For example, in the Los Angeles region, “vociferous opposition by the Building Industry Association... to land use-related measures in air quality plans led to their removal.”
- While the federal government requires the formation of MPOs, these bodies exist to serve local governments. The only reason Portland, Oregon’s MPO was able to gain land use authority over the region was through state legislation and a voter referendum. Local governments have ultimate control over their land use decisions.
- Local government development policies are heavily influenced by fiscal needs. New commercial development, especially big box retail, can provide cities with sorely needed sales tax revenue. Exacting anti-sprawl, pedestrian-friendly, mixed-use design elements can be impossible as they increase developer costs. Finally, “local governments may not recognize that compact, contiguous development can produce fiscal benefits in terms of lower infrastructure and service provision costs.” 250

79
Suburbs generally do not experience the cost of regional air quality problems as acutely as inner city areas.

When cities do adopt growth management policies, it is usually in response to rapid growth. Such reactionary policy making may actually encourage sprawl and vehicle use by forcing new development farther out.

**Conclusion:**

Most air agency staff surveyed thought that EPA could play a useful role in promoting land use policies. Thirty-six percent thought that it is not really possible to accurately quantify emissions benefits from land use policies, but that it would be useful if EPA were to publicize relevant [land use] examples. Twenty-seven percent of air agency staff surveyed felt that EPA should try to clearly quantify the emissions benefits that could be expected from various land use measures because the current lack of believable quantification hinders the adoption of such policies. However, 36 percent thought that there is no useful role EPA can play in promoting land use policies.

Conversely, most MPO and Council of Governments (COG) managers who were surveyed did not think that EPA could play a useful role in promoting sustainable land use. Since many of them are directly responsible for emissions modeling, and are therefore familiar with the difficulties of estimating the benefits of land use activities, their pessimism is not surprising. Many MPO and COG personnel “seemed resigned to the fact that there was no way to influence local government land use decisions.”

**VI. Recommendations**

Sustainable land use is one of the ultimate solutions necessary to reduce air emissions that threaten human health and the environment. While politicians may reap the publicity benefits of opening a new suburban commuter rail line, this decision may be at the expense of regional transit equity since transit funding is very limited. Only by
making our cities more equitable can they truly become places that attract a broad spectrum of people. While transit is just one component of this necessary transformation, its impact encompasses the social, economic, and environmental well being of communities. That being said, the recommendations that follow do not call for a complete transit or land use policy overhaul—such a paradigm shift will take many decades to effectuate. While ambitious, this series of recommendations seeks to address changes that are possible in the near term by removing barriers that currently impede the meaningful integration of transit equity and sustainable land use into the State Implementation Plan (SIP).

#1—Focus SIP commitments (especially transit) in EJ communities

While there does not seem to be a “danger” that attainment areas will actually achieve the level of air quality mandated by the EPA in a timely fashion, there currently is no incentive for areas to push for air quality levels better than those required by EPA. This situation is especially damaging to inner city neighborhoods, many of which continue to experience very high levels of pollution, though the region as a whole may be in compliance or have better air quality. Furthermore, if equity concerns are not emphasized, planners may craft land use and other policies that reduce region-wide vehicle emissions, but concentrate emissions in smaller areas and thus create higher localized pollutant levels.254 Therefore, some inner city neighborhoods may not realize regional air quality benefits because they have less access to reliable transit and more traffic congestion. These neighborhoods are often populated with low-income communities of color, creating a serious environmental justice issue.

Recommendation:
SIP commitments—especially transit projects—should be focused in Environmental Justice (EJ) communities. The current Massachusetts definition of “EJ community” is a community that is described by one or more of the following:

- 25% or more people of color
- Median household income is 65% or less than the statewide median (less than $30,515)
- 75% or fewer residents are proficient in English
- 25% or more residents are foreign born

Using this definition, practically the entire Boston urban core is considered an EJ community (See map in Appendix). While the current EJ community definition draws a distinction between the city and the suburbs, it does not distinguish among urban communities. This year, state Senator Jarrett Barrios (D-Cambridge) re-proposed legislation (Docket No. SD00102) to change the EJ community definition to include a “Communities Health Index” that would provide:

> a cumulative evaluation of the health of communities based on specific health outcome indicators that rank communities based on their health status so as to identify communities whose residents suffer disproportionately high rates of disease and premature death.\(^{255}\)

Communities with the worst health indices should be prioritized for transit commitments and other attainment and maintenance SIP projects. By integrating this new EJ standard into the prioritization of SIP commitments, air quality will not only be considered on the regional level, but on the smaller community level.

**Implications for Metro Boston:**

In the Boston area, while people in Jamaica Plain have been promised the restoration of rapid transit service to Arborway for decades, the state most likely has managed to get out of this commitment even though any SIP substitutions were to be “in the same area.” Instead, the state has proposed the addition of 1,000 park & ride spaces in as-yet unspecified locations. This is certainly a transit equity issue.
If SIP projects were prioritized for Environmental Justice (EJ) communities, the Executive Office of Transportation/Central Transportation Planning Staff (EOT/CTPS) would not be able to evade the 1993 SIP commitments by proposing projects that do not affect the original areas of the city that were meant to benefit. Instead, if EJ communities were prioritized in the SIP for transit commitments and other measures, many long-neglected areas of Boston’s inner core would benefit from better mobility and transit efficiency as well as cleaner air.

#2—Extend the attainment SIP timeline to allow for large-scale land use changes

Given the current short-term time horizon, it often does not make sense to include land use activities geared toward smarter, denser, and mixed-use development in an attainment SIP. A 1998 literature review on urban form and travel behavior by Apogee and Haigler Bailly concluded that the land use activities necessary to truly reshape the physical configuration of sprawl would take 10 to 20 years to have a discernable effect on travel and emissions. When EPA surveyed planners at Metropolitan Planning Organizations (MPOs) and Councils of Government (COGs) they made this same point. While longer term strategies can be included in maintenance SIPs, many years—in Boston’s case, decades, given the many extensions that EPA has granted the area to reach attainment—may pass before the maintenance stage is reached. While extending the time horizon of the attainment SIP is attractive for this reason, the possibility must be considered that this action could have negative consequences. Nonattainment areas may not work to reduce emissions as expeditiously under a longer timeline. That being said, the Eastern Massachusetts nonattainment area has not met Clean Air Act (CAA)-mandated air quality levels for ozone to date—the deadline for attainment simply continues to get extended. By lengthening the allowable time for reaching attainment, an administrative barrier will be removed, encouraging states to work towards larger,
comprehensive land use changes. While land use is largely controlled at the municipal level, states can incentivize and provide guidance and technical assistance to cities and towns.

**Recommendation:**

Currently, as is the case in most air quality areas, land use measures are not incorporated in the Eastern Massachusetts SIP. While a thorough analysis should be done to identify the reasons why this is the case, extending the SIP time horizon provides the state with one more incentive for promoting major land use change. The attainment time horizon should be extended to 20 years for states that want to include large-scale land use measures in their SIPs. During this time period, frequent reviews should be required as long as commitments are outstanding. States that choose not to include large-scale land use measures in their SIPs should still be held to an earlier attainment date. The 1990 CAA was amended such that the time horizon for several key programs including those addressing acid rain as well as regional haze and air toxics was expanded from five to ten or more years. There is, therefore, no reason why the time period for attainment SIPs cannot also be extended. While the Commonwealth does do some work to encourage cities and towns to adopt smart growth measures, these actions would be made more prominent if they could be counted for their emissions benefits in an attainment SIP. Furthermore, since Massachusetts already designates EJ communities, this effort could be coordinated with EOEA’s Smart Growth programs and policies.

---

1 A large-scale land use change could be defined as a change that impacts 10 acres or more and results in significant air quality benefits.
Implications for Metro Boston:

Coupled with Recommendation #1, which calls for focusing SIP projects in Environmental Justice (EJ) communities, extending the SIP time horizon for large-scale land use measures could potentially have a major impact on communities in Boston’s inner core. For instance, residents of the Dorchester neighborhood of Grove Hall, an EJ community currently experience high levels of traffic congestion along with limited parking opportunities. If mixed-use development and transit projects were spurred in this area as a result of an extended SIP time horizon, residents could see these problems alleviated. Additionally, if this time horizon extension resulted in smarter growth metro-wide, future transit resources would be more focused on Dorchester and other communities in the inner core—home to a large proportion of low-income people of color.


#3—Eliminate the SIP/Conformity Determination accountability loophole

The dominant culture of air quality agencies leans heavily in favor of regulating power plants and other large stationary emitters. For awhile, these sources have been the “low-hanging fruit” since they emitted large quantities of pollutants and sizable air quality benefits could easily be expected by tightly regulating their emissions. While this “low-hanging fruit” is disappearing, air quality agencies continue to focus on large stationary sources instead of on air quality benefits that could result from smart land use and transit improvements.260 The current Clean Air Act (CAA) regulations allow for States that have attainment or maintenance SIPs to fulfill more air quality requirements by choosing to account for emissions reductions in a SIP or in a conformity determination. While any land use activity that is included in the SIP must also be accounted for in the conformity determination, if a land use activity is accounted for in a conformity determination it does not necessarily have to be included in a SIP. In other words, if a state is having trouble meeting emissions reductions required in the SIP, it can choose to account for certain
land use activities in the SIP instead of in the conformity determination; or, vice versa, if certain transportation projects in the conformity determination push an area’s air emissions budget over, air quality officials can opt to only include these same land use activities in the conformity determination. This type of shuffling of projects reduces a state’s impetus to encourage more projects that will improve air quality because it allows for differences in accounting to make up emissions benefit shortfalls.

**Recommendation:**

States should be required to always include conformity determination projects in SIPs. SIP and conformity determination regulations should be reformed such that states cannot meet their various CAA air quality requirements by choosing to account for emissions reductions in one way instead of another. The State Implementation Plan explains how an area will achieve mandated National Ambient Air Quality Standards (NAAQS). Since components of ground-level ozone, a criteria pollutant, are in large part emitted by vehicles, it is logical to include all transportation projects and policies in ozone SIPs. Additionally, such a mandate would force air quality and agencies responsible for transportation planning to work together more closely than they do now.

**Implications for Metro Boston:**

The entire state of Massachusetts is out of attainment for ozone. Volatile Organic Compounds (VOCs), Nitrogen Oxides (NOx), and other ozone precursors are often present in the highest concentrations in urban areas that lack adequate transit—areas that are frequently low-income communities of color. Ozone is linked to asthma and other serious health problems. In Boston, black children are hospitalized for asthma at three times the rate of white children and Latino children are hospitalized for asthma at twice the rate of white children. “Boston’s highest hospitalization rates for asthma in children under age 5 are found in Roxbury (14.7 per 1000), North Dorchester (12.3 per 1000), Jamaica Plain and Fenway (11.2 per 1000), Mattapan (10.3 per 1000) and South Dorchester (10.1 per 1000).
These neighborhoods also have the highest concentration of children in the city, as well as the highest percentage of black and Latino children. Therefore, any attempt by Massachusetts or another state to take advantage of an administrative loophole and thus require fewer emissions reductions, is a step in the wrong direction in terms of social equity. While the Boston Region MPO insists that the transportation projects included in Journey to 2030, the Transportation Plan for Eastern Massachusetts, conform to the area’s air emissions budget and are consistent with the SIP, there is still the possibility that the flexibility allowed in accounting for emissions reduction projects, results in fewer emissions reductions in the Eastern Massachusetts air quality area. While large stationary emitters continue to be the “low-hanging fruit,” if the SIP/conformity determination loophole is eliminated, MA and other states in nonattainment could be forced to consider land use measures that integrate transit and otherwise reduce vehicle miles traveled. This could have important and meaningful implications for Boston area Environmental Justice (EJ) communities that suffer from inequitable transit service (especially given Recommendation #1’s prioritization of projects in EJ communities).


#4—Develop more reliable technology to model smart land use/emissions benefits

There seems to be a general view amongst agencies responsible for air quality and Metropolitan Planning Organizations (MPOs) that emissions benefits resulting from land use measures are difficult to measure or model accurately. This is a significant barrier to the inclusion of land use measures in air quality plans such as the SIP. Along these lines, Gary Kleiman, Northeast States for Coordinated Air Use Management’s (NESCAUM’s) Science and Technology Program Manager, reports that the Northeast states are trying to develop an integrated regional modeling approach and that methods for determining how land use impacts air quality could be improved. While simply “moving in the right direction” in terms of smart land use is commendable and what planners should always strive for, numbers are needed for enforcement to take place. If state and local agencies felt that they could accurately calculate projected emissions benefits from land use
activities, they would be more likely to promote these activities because they could take credit for them in the SIP.

Recommendation:

The Environmental Protection Agency (EPA) should devote funding for developing reliable techniques that model air emissions benefits from land use measures. EPA should then offer states training and guidance documents on these techniques. While pressure should be placed on the EPA now, it is unlikely that funding for this project will be allocated in the remaining two years of a Bush Administration.

Implications for Metro Boston:

With the considerable expertise that is available in Massachusetts, the state Executive Office of Environmental Affairs (EOEA) should work in partnership with academic and private institutions to develop more accurate software to model the air quality impacts of land use decisions. This effect could be financed with EPA and state funds, but could benefit other areas of the country, assuming the transferability of the models developed. Furthermore, these institutions along with EOEA should work with the state-designated Environmental Justice communities to better understand the particular land use issues in these neighborhoods. For instance, if integrated modeling could predict decreased rates of asthma hospitalization amongst East Boston residents because of land use and transit improvements, state regulators would be more inclined to include these measures in an ozone SIP.

#5—Promote regional planning and allow for SIP economic development credit

"Since jurisdiction for land use control lies at the local level, regional and state air quality and transportation planners need to be able to gain a consensus of local governments in order to implement regional land use programs. EPA could play a useful role by identifying or developing model processes for achieving consensus among local governments on regional land use policies and priorities."263 Bringing together local governments to reach a consensus on future growth patterns is a very difficult task given
that cities on the urban fringe have very different priorities than older, inner-ring cities and urban centers. Therefore, EPA could also help foster regional cooperation by better documenting existing examples of states and regions that have been able to agree on a future planning priorities.\textsuperscript{264} The Boston urban area is made up of a less-affluent center city (with pockets of extreme wealth), an inner-ring of lower-income suburbs, and then several very wealthy suburbs that exist on the outer-edge of the metropolitan area. While these communities have very different interests and priorities, the health of the entire region is in jeopardy if basic services are not accessible to all. In terms of transit, with more and more service jobs located outside of the inner core, and not enough workers to fill these positions in the suburbs, a strong transportation link needs to be made between center city neighborhoods with elevated rates of unemployment and these employment opportunities.\textsuperscript{265} In Greater Boston, 60.2 percent of blacks reside in areas different from areas in which jobs are located (in contrast, 56.5 percent of blacks in all large metropolitan regions live in areas different from where jobs are located).\textsuperscript{266} According to Evelyn Blumenberg and Margy Waller, authors of the Brookings Institution report, “The Long Journey to Work: A Federal Transportation Policy for Working Families,” working families face a number of transportation challenges. Unable to afford personal vehicles, and faced with a fixed-route transit system that is ill-suited to dispersed suburban employment opportunities, urban low-income residents are often unable to connect with jobs in the suburbs. Furthermore, even if a job in the suburbs is possible to get to via public transit, such a job is often an impossibility for the low-income urban resident given the travel time necessary to commute.\textsuperscript{267} While programs have been explored by the federal government to provide money to low-income households to purchase cars
through the Department of Health and Human Service's Temporary Assistance to Needy Families (TANF) program, the efficient solution to the “spatial mismatch” problem would be to incentivize locating companies in dense inner-city areas where workers already live. The spatial mismatch between inner-city workers and suburban jobs is a direct result of the lack of meaningful regional planning.

**Recommendation:**

The EPA should work to publicize and promote examples of successful regional planning cooperation. Lessons on how to plan regionally for economic development should be emphasized. Cities in the same metropolitan area should be encouraged to consider their planning goals as a unified entity. To further incentivize this line of thinking, economic development initiatives to attract companies with a significant quantity of service-level jobs to center city areas should be credited in State Implementation Plans (SIPs).

Private initiatives by centrally-located companies to incentivize inner-city transit ridership for their employees could also be incorporated into the SIP if emissions benefits could be quantified. While cities do currently take advantage of economic development strategies such as Tax Increment Finance (TIF) districts to attract employers, states could use the opportunity to count such strategies toward air quality plans to spur even more reinvestment by large employers.

**Implications for Greater Boston:**

Residents in many areas of Boston's inner core experience elevated levels of unemployment. According to the 2000 Census, the unemployment rate in Greater Boston was 2.4%, as compared to an unemployment rate in Boston proper of 7.2%, and an unemployment rate in North Dorchester of 9.6%. Within Boston, the unemployment rate varied by race—3.4% for whites and 6.5% for blacks.
The unemployment rate in North Dorchester also varied by race—6.5% for whites and 11.9% for blacks. Moreover, unemployment was higher in the city than in the suburbs, unemployment was higher in certain areas of the city than in others, and unemployment varied significantly by race in the city as a whole and within neighborhoods. By integrating economic development into the SIP, employers could be encouraged to locate in high-unemployment neighborhoods, such as North Dorchester.


VII. Conclusion

Transit justice, an off-shoot of the larger Environmental Justice movement, continues to influence the employment, retail, educational, and other opportunities that are available to many low-income communities of color. Since a substantial number of these communities are located in dense, inner-city areas, the lack of transit access and mobility as compared with similarly situated more affluent, more white communities is especially egregious. In theory, low-income neighborhoods should not suffer transit injustice and other iterations of inadequate public and private sector investment. Ultimately, however, public and private investment decisions dictating the condition of public schools, parks and open space, and other neighborhood amenities, determine the quality of transit service and vice versa. This “natural” flow of transit resources raises the concern that better transit to low-income, disinvested communities will lead to displacement and gentrification. Hopefully, though, with a coordinated, regional planning approach, this dynamic can be controlled.

The tug between urban and suburban and low-income and affluent is currently manifested in transit projects directed at fulfilling Clean Air Act (CAA) State Implementation Plan commitments. As mentioned earlier, when an area does not attain
EPA mandated air quality standards for one or more criteria air pollutant, the state must submit a SIP, explaining how the area will be brought back under attainment in a timely fashion. While Title VI of the Civil Rights Act as well as Executive Order #12898 mandate that all federal agencies—including EPA, DOT, FHWA, and FTA—only provide financial assistance to projects and programs that do not [negatively] disproportionately impact a particular group, it is unclear how equity concerns play into how SIP commitments are currently determined.

In the case of Boston, the transit commitments which were inserted into the SIP as a result of the Big Dig were initially meant to be distributed equally between the city and the suburbs. However, over the nearly two decades since the commitments were originally made, virtually all of the suburban projects have been completed while many of the urban projects have yet to even be designed. Certainly the state's propensity to wrestle itself out of legally-enforceable urban transit commitments while bowing to influential suburban political pressure is reprehensible.

Furthermore, many attainment State Implementation Plans (SIPs) call for the reduction of single-occupancy vehicle trips in order to decrease total vehicle miles traveled (VMT). This is largely due to sprawling land use. While in the United States, cities and towns have control over land use, to realize the full benefits of smart growth measures, land use decisions must be conceived of on the regional, not just the municipal level. This is because the cumulative impacts of uncontrolled sprawling development are most intensely felt by inner-ring suburbs and urban core areas, yet controls must be put in place in the outer-lying suburbs where unmanaged growth is occurring. While
development may have locally beneficial impacts for these outer suburbs, their actions may harm the region as a whole.\textsuperscript{270}

The reason many of the transit projects called for in the 1993 Boston-area SIP agreement were focused on serving suburban communities, was because of their ostensible pollution reduction benefits. However, Garrett and Taylor write that, "Even though most air quality forecasts suggest that public transit will make very small contributions to air quality, transit systems are nonetheless charged with the task of attracting automobile drivers..."\textsuperscript{271} While New England used to have a regional rail network that connected people from town to town, radial commuter rail systems like Boston’s are now the norm. Research supports the contention that the radial configuration does not promote dense and more sustainable land use, but actually facilitates people living further away from their places of employment.\textsuperscript{272} Therefore, smart land use policies should be meaningfully integrated into the SIP—without sustainable land use planning, transit cannot deliver maximum air quality benefits and regional transit inequities will only grow.

Although flawed in its present state, the Clean Air Act (CAA)-mandated State Implementation Plan (SIP) system could be used as a tool to leverage resources to advance the cause of transit equity. The Massachusetts Bay Transit Authority (MBTA) and the Commonwealth should a) complete the remaining urban SIP commitments in a reasonable amount of time, and b) develop and promote a variety of land use measures to reduce emissions, promote smart growth, and ensure the viability of all communities. This second step would be best complimented by certain SIP reforms on the state and federal levels (see the "Recommendations" section on pages 78-87).
Transit is an integral and key component of sustainable urban land use and should be fully integrated into a regional land use planning effort. While there is currently insufficient political will in the Boston area for comprehensive regional planning, incremental steps should be taken by planners and other officials toward a more coordinated planning effort that takes equity into consideration in a meaningful way.
VI. Appendix—

Boston Metropolitan Planning Council Cities and Towns

Source: The Boston Indicators Project.
Source: http://www.panoramamagazine.com/panoramamagazine/images/mbta_map.gif
The Commonwealth's Sustainable Development Principles

1. **Redevelop First**: revitalizing existing neighborhoods doesn't require expensive new infrastructure or consume forest and fields and finds new uses for historic buildings and underutilized brownfield sites.

2. **Concentrate Development**: compact development conserves land and fosters vibrant and walkable districts. According to the Lincoln Institute, more compact development could save the public sector in the Northeast $40 billion over 25 years.

3. **Be Fair**: the benefits and burdens of development should be equitably shared by all. Transparent and predictable permitting will result in cost-effective and fair outcomes.

4. **Restore and Enhance the Environment**: the conservation, protection, and restoration of water, land, and cultural resources provides a high quality of life and ecological health.

5. **Conserve Natural Resources**: renewable energy and efficient use of building materials and water contribute to a healthier environment, limit waste, and are cost-effective.

6. **Expand Housing Opportunities**: expanding the number, affordability, and diversity of housing units will ensure that people of all abilities, income levels, and ages have appropriate housing options.

7. **Provide Transportation Choice**: opportunities for public transit, walking, and biking should be expanded.

8. **Increase Job Opportunities**: connecting people with jobs in their communities and close to homes and transportation infrastructure will expand our economy.

9. **Foster Sustainable Businesses**: great potential exists for new innovative industries and for resource-based industries to contribute to the social, economic, and environmental health of our state.

10. **Plan Regionally**: economic development, water, transportation, and housing are regional in nature they don't stop at the town boundary. Regional planning recognizes this and results in inter-municipal coordination and better outcomes.

Map of Arborway in Jamaica Plain

Source:
http://www.vanshnookenraggen.com/FutureT/Green_ext1.jpg

Source:
Map of the Fairmount Line

Transit Accessibility and MA Environmental Justice Communities
Greater Boston (2000)

*A community is designated as an *EJ community* if it meets the following four criteria:

1) % People of color >= 25%
2) Median household income is 65% or less of Statewide median income (or, <$30,516)
3) % English proficiency <= 75%
4) % Foreign-born >= 25%

Author: Laura Machala
Source: MassGIS
Figure 2-1: Potential Land Use Considerations in the SIP and Conformity Process

Baseline Land Use

Consider Land Use

Most Recent Land Use Projections

Perform Regional Analysis for PLAN

PLAN Conformity

No

TIP

Perform Regional Analysis for TIP

TIP Conformity

Yes

PROJECT

Perform CO or PM10 Hot Spot Analysis

Project Conformity

Yes

No

SIP Revision Needed

Consider Land Use

Yes

No

Plan Revision Needed

Consider Land Use

Yes

No

TIP Revision Needed

Consider Land Use

OR

Revise Project

VII. Bibliography—


“Attachment A: Comments from the Northeast States for Coordinated Air Use Management (NESCAUM) on the U.S. Environmental Protection Agency (EPA’s) Proposed Regulatory Text for Implementing the 8-hour Ozone National Ambient Air Quality Standard (NAAQS)” Northeast States for Coordinated Air Use Management, 2. <www.nescaum.org/documents/comments030905-8hr-attacha.pdf/>


Daniel, Mac. “Governor vows to link South Coast by rail: Funding at issue for $1.4b project.” The Boston Globe. 5 Apr. 2007.


Dorchester: <http://www.cityofboston.gov/dnd/PDFs/Profiles/Dorchester_PD_Profile.pdf>

Jamaica Plain: <http://www.cityofboston.gov/dnd/PDFs/Profiles/Jamaica_Plain_PD_Profile.pdf>

Mattapan: <http://www.cityofboston.gov/dnd/PDFs/Profiles/Mattapan_PD_Profile.pdf>

Roslindale:
Roxbury:


“Health Effects of PCBs,” Environmental Protection Agency.


Kleiman, Gary (Science and Technology Program Manager, Northeast States for Coordinated Air Use Management (NESCAUM)). Interview, 8 May 2007.


Loh, Penn (Executive Director, Alternatives for Community and Environment). Interview. 19 Mar. 2007.


“MBTA Service District.” <http://www.mbta.net/mbta/towns.htm>


Regan, Paul (Executive Director, MBTA Advisory Board). Interview. 21 Jan. 2007.


Salvucci, Frederick (Former Secretary, Massachusetts Department of Transportation). Interview. 3 Apr. 2007.


“The Big Dig.”
<http://en.wikipedia.org/wiki/Big_Dig_%28Boston%2C_Massachusetts%29>

<http://www.cleartheair.org/proactive/newsroom/release.vtml?id=24720>

“The Indigo Line: Background.”
<http://www.geocities.com/indigoline/background.html>


<http://www.fhwa.dot.gov/environment/conformity/ref_guid/chap3.htm#cdn1>

<http://www.maroundtable.com/RESOURCES/07_TFCreport.pdf>


<http://www.tbf.org/indicators/economy/indicators.asp?id=1157&fID=209&fname=Race/Ethnicity#>

“Vanshnookenraggen: notes on the urban environment.”
<http://www.vanshnookenraggen.com/FutureT/Green_ext1.jpg>


“Health Effects of PCBs,” Environmental Protection Agency. [http://www.epa.gov/pcb/pubs/effects.html]


Ibid., 352.

Ibid., 369-370.


Ibid., 35.


Sanchez, Stolz, and Ma, “Moving to Equity,” 32.


Agyeman and Evans, “Toward Just Sustainability in Urban Communities,” 36.


Switz and Valenzuela, Jr., “Environmental Injustice and Transportation,” 384.


Agyeman and Evans, “Toward Just Sustainability in Urban Communities,” 49.

Sanchez, Stolz, and Ma, “Moving to Equity,” vi.
27 Agyeman and Evans, “Toward Just Sustainability in Urban Communities,” 46-47.
29 Ibid., 9.
34 Bullard, Johnson, Torres (eds.), introduction to Highway Robbery.
36 Sanchez, Stolz, and Ma, “Moving to Equity,” vi.
38 Sanchez, Stolz, and Ma, “Moving to Equity,” vi.
39 Ibid., 22.
40 Murakami and Young, “Daily Travel by Persons with Low-income,” 1.
41 Sanchez, Stolz, and Ma, “Moving to Equity,” 12.
50 Ibid., xv.
51 Ibid., xiv.
54 Ibid., 4.
58 Ibid.
67 Ibid., 17-18.
68 Ibid., 17.
70 Massey and Denton, American Apartheid, 44.
72 Ibid., 7.
79 Agyeman and Evans, “Toward Just Sustainability in Urban Communities,” 36.
80 Sanchez, Stolz, and Ma, “Moving to Equity,” 11.
84 “APTA Primer on Transit Funding,” American Public Transportation Association, 12.
85 Sanchez, Stolz, and Ma, “Moving to Equity,” vi.
86 Ibid., 5.
87 Ibid., 15.
88 Ibid., vi.
89 Ibid., vi.
90 Ibid., 5.
92 Schweitzer and Valenzuela, Jr., “Environmental Injustice and Transportation,” 383.
93 Ibid., 383-384.
94 Sanchez, Stolz, and Ma, “Moving to Equity,” 27.
95 Ibid., vi.
96 Ibid., 38.
97 “APTA Primer on Transit Funding,” American Public Transportation Association, 8.
98 Ibid., 13.
100 “APTA Primer on Transit Funding,” American Public Transportation Association, 13.
101 Ibid., 14.
103 “APTA Primer on Transit Funding,” American Public Transportation Association, 14.
105 “APTA Primer on Transit Funding,” American Public Transportation Association, 14.
107 Ibid.
108 “APTA Primer on Transit Funding,” American Public Transportation Association, 16.
110 Ibid.
112 Blackwell and Fox, “Regional Equity and Smart Growth,” in Urban Sprawl, (ed.) Soule, 408.
113 Ibid.
114 Paul Regan (Executive Director, MBTA Advisory Board), interview, 21 Jan. 2007.
116 Ibid.
117 Paul Regan (Executive Director, MBTA Advisory Board), interview, 21 Jan. 2007.
119 Paul Regan (Executive Director, MBTA Advisory Board), interview, 21 Jan. 2007.
121 Ibid., 27.
122 Ibid., 50.
123 Ibid., 54.
124 Ibid., 53.
125 Ibid., 4.
126 Ibid., 8.
127 Ibid., 21.
132 Ibid.
134 Penn Loh, (Executive Director, Alternatives for Community and Environment), interview, 19 Mar. 2007.
136 Ibid.
137 For a list of the cities and towns served by the MBTA, go to “MBTA Service District.” <http://www.mbta.net/mbta/towns.htm>
138 “About the MBTA—History,” MBTA. <http://mbta.com/about_the_mbta/history/>
140 Ibid.
145 Ibid., 9-10.
147 Garrett and Wachs, Transportation Planning on Trial, 11.
148 Ibid., 15.
151 Garrett and Wachs, Transportation Planning on Trial, 15.
152 Wooley and Morss, Clean Air Act Handbook, xviii.
154 The SIP is required and approved by EPA pursuant to Section 110 of the Clean Air Act (CAA). SIP requirements particular to nonattainment areas are mandated by Part D of the CAA. Section 110 and Part D describe the elements of a SIP, which is extensive, containing such elements as emission inventories, monitoring network, air quality analysis, modeling results, attainment demonstrations, enforcement mechanisms, and regulations which have been adopted by the State to attain or maintain NAAQS (see Section C). Additional regulatory requirements which spell out the procedures for preparing, adopting and submitting SIP’s and SIP revisions are codified in 40 CFR part 51 (see Section D). "What is a State Implementation Plan?,” <http://www.epa.gov/regions/revISED%20WHAT%20IS%20A%20SIP.pdf>
157 Garrett and Wachs, Transportation Planning on Trial, 11.
158 Wooley and Morss, Clean Air Act Handbook, 35.


Garrett and Wachs, *Transportation Planning on Trial*, 12.


Carrie Russell (Staff Attorney, Conservation Law Foundation), interview, 22 Mar. 2007.


Carrie Russell (Staff Attorney, Conservation Law Foundation), interview, 22 Mar. 2007.


Carrie Russell (Staff Attorney, Conservation Law Foundation), interview, 22 Mar. 2007.


"Description of Modeling Assumptions and Analysis Methodology for the SIP,” prepared by the Central Transportation Planning Staff, 2.


Carrie Russell, (Staff Attorney, Conservation Law Foundation) “Summary of Transit Commitments.”

Frederick Salvucci (Former Secretary, Massachusetts Department of Transportation), interview, 3 Apr. 2007.

Ibid.

Carrie Russell, (Staff Attorney, Conservation Law Foundation) “Summary of Transit Commitments.”


Penn Loh (Executive Director, Alternatives for Community and Environment), interview, 19 Mar. 2007.


"Description of Modeling Assumptions and Analysis Methodology for the SIP,” prepared by the Central Transportation Planning Staff, 2-3.

Ibid., 2.

Ibid., 3.


"Description of Modeling Assumptions and Analysis Methodology for the SIP,” prepared by the Central Transportation Planning Staff, 3-4.


Ibid.


Mac Daniel, “Governor vows to link South Coast by rail: Funding at issue for $1.4b project.” The Boston Globe. 5 Apr. 2007.


Paul Regan (Executive Director, MBTA Advisory Board), interview, 21 Jan. 2007.


Ibid., 7.

A maintenance area is an area previously designated nonattainment, which has since met the national standards and has an EPA approved maintenance plan covering at least 10 years. "EPA Guidance: Improving Air Quality Through Land Use Activities," 3.


Ibid., 1.

Ibid., 27-28.

"Background Information for Land SIP Policy.” EPA, 31.

"EPA Guidance: Improving Air Quality Through Land Use Activities,” 27.

Ibid., 35.

Ibid., 27.

Ibid., 37.

Ibid., 27.

Ibid., 52.


"EPA Guidance: Improving Air Quality Through Land Use Activities,” 43.

Ibid.

Ibid., 44-45.
270 “Background Information for Land SIP Policy.” EPA, vii.