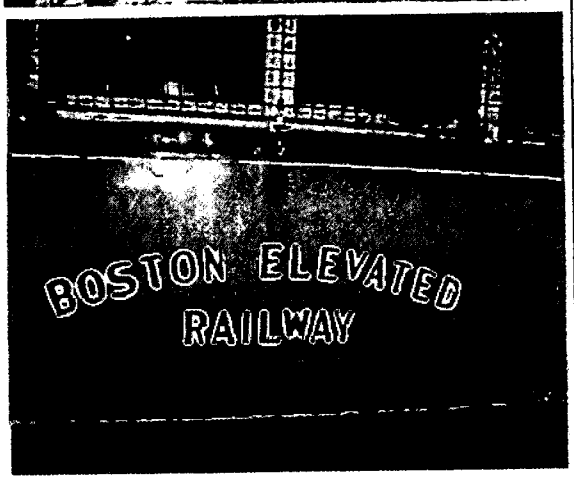
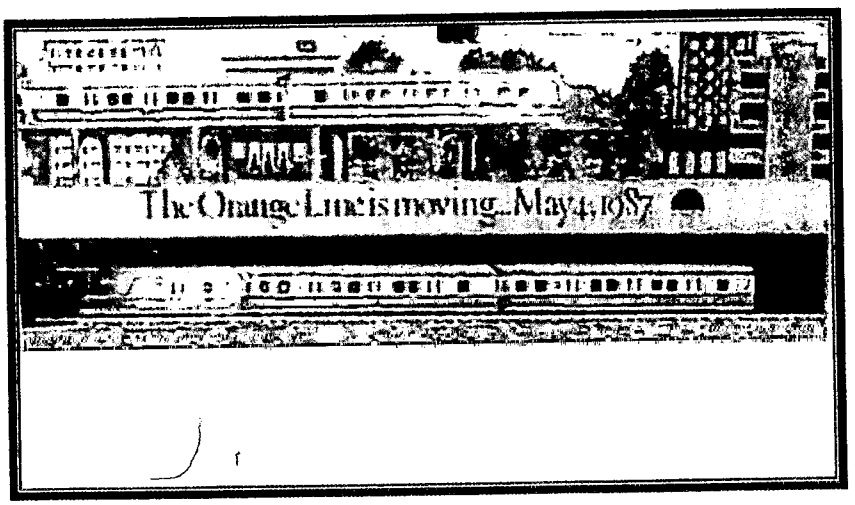


"Better Than or Equal To" Design Alternatives for the Washington Street Corridor



April 28, 2004

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"BETTER THAN OR EQUAL TO" DESIGN ALTERNATIVES FOR THE WASHINGTON STREET CORRIDOR

APRIL 28, 2004

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APPENDIX A: MAPS AND FIGURES
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1.0 EXECUTIVE SUMMARY

In 1987, with the demolition of the elevated Orange Line, the Massachusetts Bay Transportation Authority (MBTA) severed the connection of several communities to Boston's economic and political core. Promising the neighborhood residents a better than or equal to replacement of the former elevated service, the MBTA provided the community with a diesel bus as a temporary replacement, which lasted for over 14 years. In July 2000 a bus rapid transit (BRT) route, known as the Silver Line, was put into service as the final replacement alternative to the elevated Orange Line. This angered many residents of the corridor who felt that a bus line did not live up to the MBTA's promise of equal to or better replacement.

This study defines the light rail and rapid transit transportation development options for Washington Street in Boston, Massachusetts. Our study will also consist of the development of charette materials for a public meeting that will focus on informing residents about the development of a curbside, center reservation light rail, or BRT system. In addition to identifying potential station/stops and economic benefits, the study will focus on the "greening" of Washington Street and the possibilities of a pedestrian mall at Dudley Square.

Between February and April of 2004, the authors of this study conducted field observations and research along Washington Street. The authors researched available records and documents pertaining to historical and current transportation systems located along the Washington Street corridor from the Chinatown MBTA station to the Dudley Square MBTA station. Records for other instances where communities have managed light rail and rapid transit transportation systems through historic districts and communities of economic hardship were also reviewed as potential models for similar development in Boston. In conducting the comparative research, the authors have focused on communities exhibiting similarity and applicability to Boston. This comparative research has focused particularly on the types and impacts of existing rapid transit and light rail systems located within these communities.

Our client is the Washington Street Corridor Coalition, a local transportation advocacy group focused on the development of a better than or equal to transportation service for the defunct elevated Orange Line. The authors' research for this study was born out of the Tufts University Urban and Environmental Policy and Planning Department Field Projects Course. The purpose of this course is to educate and challenge the graduate student authors of this paper to become practical visionaries with the tools and abilities to become resources and leaders within the community while providing high quality research to public, private, and non-governmental clients. The authors of this study were not compensated for their services and the opinions contained within their report are there own and do not reflect the opinions of Tufts University or the Washington Street Corridor Coalition.

2.0 STUDY AUTHORS:

Ms. Heather Knopsnyder is a first year student graduate student in Urban and Environmental Policy and Planning at Tufts University. Ms. Knopsnyder graduated in May of 2003 from Illinois State University with a dual degree in Sociology and German. Ms. Knopsnyder research interests include transportation planning, community development and smart growth. In her spare time, Ms. Knopsnyder enjoys playing piano and exploring her new home of Boston.

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Mr. Thomas Dugan is a first year graduate student in Urban and Environmental Policy and Planning at Tufts University. Mr. Dugan graduated in 1996 from Hartwick College with a degree in Anthropology. After graduation, Mr. Dugan served as a Park Ranger with the Commonwealth of Massachusetts and is currently an environmental regulatory specialist. At Tufts, Mr. Dugan's research interests include corporate responsibility and global warming issues. In his free time, Mr. Dugan enjoys playing guitar and traveling.

The ***faculty advisor*** for this project was **Ms. Veronica Eady**. Ms. Eady, lecturer and Coordinator of Field-based Education, is a graduate of the University of Southern California and the University of California, Hastings College of the Law. Before joining UEP, Ms. Eady was Director of the Environmental Justice and Brownfields Program at the Massachusetts Executive Office of Environmental Affairs where she authored the first environmental justice policy for the Commonwealth of Massachusetts. Ms. Eady also serves as the chair of EPA's federal advisory committee for environmental justice, the National Environmental Justice Advisory Council. She also serves on the Board of Directors for Earth Island Institute in San Francisco, the Community Rights Council in Washington, DC, and the Boston Greenspace Alliance. She is the author of "Environmental Justice in State Policy Decisions," *Just Sustainability: Development in an Unequal World*, ed. By Julian Agyeman, Bob Bullard, And Bob Evans (Earthscan Publications/MIT Press, 2003) (adapted from http://ase.tufts.edu/uep).

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3.0 INTRODUCTION

From the earliest development of Boston, Washington Street has been one of the main arteries for economic and residential life in the city. From agricultural, industrial, and military uses in the 17th, 18th centuries to modern residential and commercial developments of the 19th and 20th, Washington Street typifies the historical development and character of Boston.

The community along Washington Street was traditionally served by an elevated Orange Line which was razed in 1987 and rerouted below-grade through Jamaica Plain to Forest Hills. The Massachusetts Bay Transportation Agency (MBTA) promised the community a "better than or equal to" replacement service in exchange for this removal, but was given the #49 diesel bus instead. In 2002, the MBTA launched Phase I of the Silver Line, their version of a Bus Rapid Transit system (BRT).

This enraged the community, as the Silver Line is still a bus, although the vehicles are articulated, low floor, run on compressed natural gas, and theoretically travel in dedicated bus lanes. The expansion of the Silver Line service to Dudley Square is a contentious issue—environmental justice advocates allege that the MBTA is using the community as a chip to acquire federal funding for the expensive Silver Line project through South Boston and to the airport.

4.0 METHODOLOGY

The purpose of this project is to identify light rail and rapid transit transportation development options for Washington Street in Boston, Massachusetts. The study shall consist of the development of charette materials for a public meeting that will focus on informing residents about the development of a curbside or center reservation light rail or BRT system. In addition to identifying potential stations, stops, and underground tunnel locations, the study will focus on the "greening" of Washington Street and the possibilities of a pedestrian mall at Dudley Square in addition to other urban design elements along the corridor.

5.0 DATA COLLECTION

Data were collected from numerous sources, including articles from local papers and organizations, conversations with professional planners and engineers, official MBTA documents regarding both the Silver Line and the elevated Orange Line, census data, and other historical documents regarding the corridor.

6.0 HISTORY OF WASHINGTON STREET

6.1 EVOLUTION OF THE STREETSCAPE

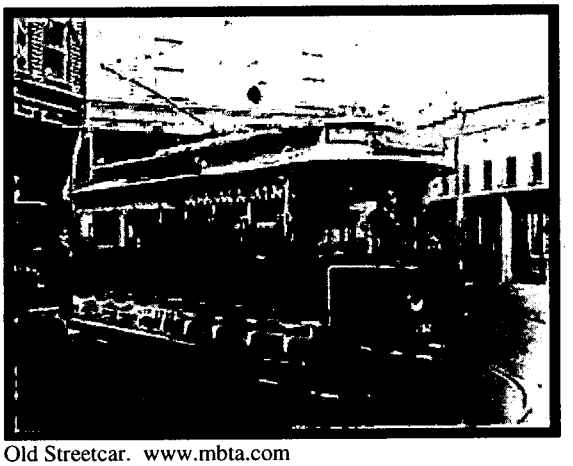
1814 Haley Map of Boston (www.mapjunction.com/places)

Since the 1600s, Washington Street has served as a main thoroughfare, connecting Roxbury to downtown Boston. All traffic from the northern and southern parts of the metropolitan area funneled along either Tremont Street or Washington Street. From the development of the first omnibus in 1826 to the implementation of the Massachusetts Bay Transportation

Authority's Silver Line in 2000, transportation has been an underlying and often contentious theme in every development along the corridor. The use of Washington Street as one of Boston's major transportation corridors dates back to the city's founding. In Bonner's 1722 map *The Town of Boston in New England*, Washington Street is depicted as a boulevard that served as the connection between the mainland communities to the west and the Shawmut Peninsula on which Boston lay (Krieger, 1999). As the only land corridor connecting the city to the mainland, Washington Street was link for the overland trade of goods from the central hub of docks, wharves, and commercial districts to the commonwealth. Bonner's map also portrays the corridor as being a hub of life, dotted with residential homes, mills, farms, and orchards. One hundred years later, as shown in the *1814 Haley Map of Boston* (Krieger, 1999) Washington Street continued to form the main causeway from the center of the Shawmut Peninsula to the outlaying towns and communities.

A discussion of light rail and transportation options for Washington Street must acknowledge the fact that this corridor is one of the most significant portions of the city and as such must be preserved as a testament to the history, culture, and development of Boston and eastern Massachusetts. However, preservation of the corridor must also be balanced by the realities of economic development and progress required by the needs of modern society. The beautification and redevelopment of Washington Street as a grand boulevard of the city is contingent upon the economic development associated with the proposed light rail system.

6.2 STREETCARS



Old Streetcar. www.mbta.com

In response to public demand for rapid transit during the mid-1800s, several horse-drawn rail companies were created. By 1860, 50 million riders were using the system and by 1885, the ridership numbers soared to 80 million (Zaitzevsky, 1987) showing a need for a more sophisticated transit system. Cable cars were adopted by several cities at this time, but because Boston's streets were winding and curvy, the city could not adopt this mode. Two routes, one along the Washington Street Corridor and the other from Bowdoin Square to Harvard Square, were the only available cable cars in the area. As demand for faster and more efficient transportation increased, Boston transportation companies began to seek alternative modes, and eventually settled on electric streetcars. By 1894, more than 90 percent of the lines were electrified, including the Washington Street corridor.

6.3 ELEVATED ORANGE LINE

Elevated train station from the turn of the 20th century (www.mbta.com)

The electric trolleys that lined the street of Boston and its surrounding suburbs served as only a temporary relief to the enormous demand for mass transit. Ridership, especially along the major corridors such as Washington Street was ever increasing. A move was made to implement an elevated rail system, which had successfully fulfilled New York City and Chicago's transit needs. The idea of a light rail system had mixed reviews. Those living in the core city felt that the noise and look of an elevated system were undesirable, but outlying residents were in favor of the system because it would shorten their travel time. It was decided that a subway system would be designed for downtown Boston and four elevated lines would radiate into the outlying areas of the city. One of these lines ran along the Washington Street corridor, which was in service from 1901 to 1987.

The Orange Line began in 1901 running from Dudley Square to Sullivan Square in Charlestown and by 1919 was extended to Forrest Hills and Everett. The two ends of the line connected at Boylston Street and North Station. In 1975, the Charlestown side of the elevated was demolished. By April of 1987, the Washington Street El - the last remaining elevated route in Boston - was also demolished. Reasons cited for the destruction included the age and corrosion of the tracks, the noise and unsightliness of the system and the proposed Southwest Expressway.

6.4 THE EVOLUTION OF THE AUTOMOBILE

Concurrent with growing popularity in automobile-centered transportation planning, the Massachusetts 1948 Master Highway Plan was developed. The plan called for the design of seven arterial highways all terminating in an "Inner belt," that would run through Roxbury, Jamaica Plain, the South End and Cambridge. These residents would be most impacted by the construction of the Interstate System and would receive no benefit from it. However, highways were seen as a way to decrease traffic congestion and increase economic growth in blighted areas such as these.

By the 1960s, residents began to question the automobile as the superior mode of transportation in urban areas. Following a series of protests, Governor Francis W. Sargent declared a moratorium on highway construction in 1970 to study transportation alternatives for the city of Boston. The Boston Transportation Planning Review (BTPR) was formed to initiate the study. Their final recommendations included canceling the construction of the Southwest Expressway and Inner belt, upgrading mass transportation in areas including southwest Boston, and relocating the Orange Line to improve circumferential and cross-town transit (McKinnon, 1988). The historic Orange Line had been suffering from years of decreased ridership, whereas the new line was seen to have a larger base of riders. It would provide more stops and a faster connection to downtown and was moved one half mile from the Washington Street Corridor in 1987 to the land that was originally cleared for the expressway.

6.5 THE #49 BUS

Residents along Washington Street agreed that the defunct Orange Line was not the most desirable service given its aesthetics and noise. Yet, they felt that the new line catered to the more affluent, and requested that a better than or equal to replacement service be provided with a connection downtown. The new location of the Orange Line was not close enough for most residents.

With the demolition of the Orange Line, and interim bus route was established to maintain the connection from Dudley Square to Downtown. Many residents argued that not only were the bus unsightly and polluting, but it also cost more to ride than the pre-existing Orange Line because of transfers.

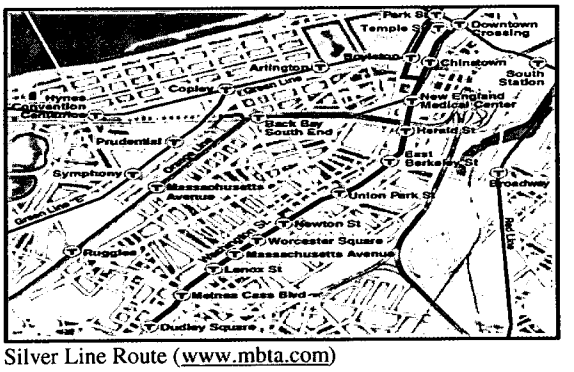
6.6 TROLLEY BUSES AND BUS RAPID TRANSIT

In 1977, the MBTA launched the Replacement/Transit Improvement Study (R/TIS) to determine an adequate Orange Line replacement. Light rail, bus ways, commuter rail and later trackless trolley routes were studied.

Each mode of transit had its advantages and disadvantages. Light rail was deemed by a 1982 interim report as best Orange Line replacement, but some groups along the corridor objected to it, fearing that it would cause gentrification. In addition, light rail would be the most expensive mode to implement because the federal government had recently cut funding to all proposed rail projects. Years of debate followed, but no compromise was ever made that satisfied the city, the MBTA, residents and merchants along the corridor. Despite this, in 1988, the MBTA announced that a trackless trolley system with a reserved median would be the best alternative to implement along the corridor.

Support for the new system was limited. Many argued that light rail would be the only adequate replacement. Other groups felt that a trolley bus would be consistent with the desire to create and maintain a pedestrian friendly environment and that light rail would only separate the two halves of the street and decreased pedestrian cross-traffic. In 1992, the trackless trolley system was given a name - the Silver Line, but it still did not have full neighborhood support. However, by 1998, Mayor Thomas Menino endorsed the new line and encouraged the MBTA to pursue funding for the project.

Two years later, the MBTA connected the Dudley to Downtown project to another project in South Boston. At the same time, they began to research 60-foot long compressed natural gas buses as the new mode of transit for the corridor. The proposed Silver Line would become Boston's first Bus Rapid Transit (BRT) route. Similar to the old Orange Line, Phase I of the Silver Line would run from Dudley Square to Downtown Crossing. The MBTA described the bus as a train on wheels because it combines the physical properties of a bus with intelligent transportation systems. The buses are connected to a GPS system, which enables bus headways to be maintained. Likewise, Silver Line vehicles are in dedicated lanes and are given (in theory) light preemption at Melnea Cass Boulevard, the outbound side of Massachusetts Avenue, East Berkeley Street and Herald Square (Dilday, 2003). Eventually, the line would connect Roxbury residents to the airport and South Boston.



Silver Line Route (www.mbta.com)

On July 20, 2000, the Silver Line began running along the Washington Street Corridor. The MBTA considered BRT to be an adequate Orange Line replacement, however, many residents disagreed. Though the buses are in dedicated lanes, there are no barriers to block drivers from entering them. Likewise, on-street double parking is common in Silver line lanes, serving as an obstacle that only slows travel time down. Many residents and activist groups argued that though the Silver Line is better than the #49 bus, the original promise was that a replacement service would be provided for the elevated Orange Line.

7.0 Economic History along the Corridor

In conjunction with the Silver Line project, the MBTA and the city of Boston have invested $250 million dollars for the infrastructure development along the Washington Street Corridor, which included widening the sidewalks to 12 feet to add lampposts and trees (Dilday, 2003). In addition, $450 million will be invested in both commercial and residential development projects.

The Washington Street Corridor is comprised of four distinct neighborhoods: Roxbury, the South End, Bay Village and Chinatown. Despite being connected along the same corridor, these areas are made up of diverse groups whose rich histories have not been in alignment.

7.1 Chinatown

Chinatown was built on landfill created by the tidal flats in the early 1800s. It quickly became a middle class neighborhood, but by the 1840s experienced large in-migration of Chinese, Irish, Italian, Syrian and Jewish immigrants (Boston Redevelopment Authority, 2004). With the change in demographics, the areas single-family homes were changed into tenement housing. By the 1880s, land values began to decline; however, the neighborhood experienced an economic boom with the construction of the elevated transit line.

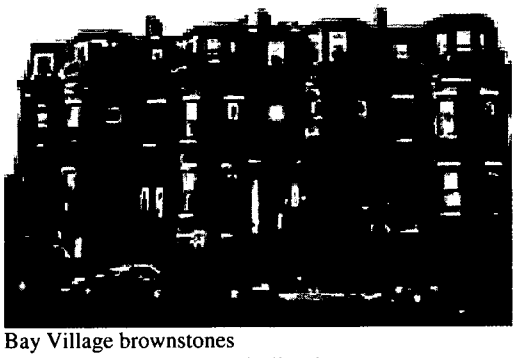
The elevated Orange line allowed textile and leather works to become the main commercial enterprises of the neighborhood. Manufacturing companies lined the street between Dewey Square and Kneeland Street.

During the 1960s, the decaying neighborhood became subject to several urban renewal projects that displaced residents and available housing units. Among the projects were the construction of the Massachusetts Turnpike Extension in 1965 and the construction of the Surface Artery. In addition to the highway projects, Tufts University's medical center and the New England Medical Center have claimed valuable land and housing units in the neighborhood. Some of the housing was replaced during the 1970s in South Cove, including the addition of three senior apartment complexes.

Today, Chinatown's economy consists mostly of small local-owned businesses. Residents remain wary of the city's development efforts and wish to maintain existing and promote future housing developments in the area.

7.2 Bay Village

Like Chinatown, the land that comprises Bay Village was created by filled in tidal flats during the early 19th century. The neighborhood that makes up only six square blocks was created in an attempt to mimic Beacon Hill because many of the craftsmen who designed and built Beacon Hill town houses settled in Bay Village (Bay Village Neighborhood Association, 2004). During prohibition, Bay Village housed many speakeasies and film warehouses for companies such as MGM and RKO. This neighborhood has remained largely residential throughout the years and is inhabited mostly by professionals.



Bay Village brownstones
http://www.bayvillage.net/gallery/

7.3 THE SOUTH END

The South End was originally in part of the city called "The Neck", and was located where the historical isthmus of Shawmut Peninsula widened towards Roxbury. During the early part of the 20th century, this area served as a gateway to Roxbury, which was a booming commercial center. During the 1950s the neighborhood fell into disrepair, and consequently suffered from a great out-migration of residents. The characteristic brownstones were deteriorating from neglect. Several public housing projects were constructed, as well as homeless shelters. By the 1960s, some urban renewal initiatives were implemented, which displaced hundreds of residents.

During the 1970s, the charm of the brownstones began to attract young, more affluent couples to the western section of the neighborhood, which pressured the city for neighborhood improvements. The eastern section of the South End remained blighted, many blaming the defunct elevated Orange Line structure for this.

Today, the section of the South End along Washington Street is made up primarily of upscale restaurants and shops. Housing developments with 40 units priced at affordable rates and about 180 units priced at market rate are also under way along the street (South End, 2004).

7.4 DUDLEY SQUARE

Roxbury was first settled in 1630 as a separate municipality from Boston. With the improvements along "The Neck" came increased development in Dudley Square. However, improved access to outlying towns allowed wealthier residents to move even further out of the city. Textile mills, foundries and lumberyards occupied the neighborhood and spurred an influx of low-income residents and housing. In 1868, Roxbury was annexed by the city of Boston, which spurred the migration of poor Irish, then Jewish, then African Americans from the South.

The development of the Elevated Orange Line allowed for the large numbers of low-income residents, who could not afford private transportation, to travel downtown. The advent of the transportation system along the corridor allowed Dudley Square to become a manufacturing and commercial hub. Retail establishments sprung up along the street allowing the neighborhood to flourish once again. However, the elevated line was considered to have a negative impact on the neighborhood by prohibiting residential growth.

During the 1940s, the neighborhood was predominantly Jewish, but by the 1950s, the population shifted to a mostly Black demographic. Despite the transition, most of the shops remained in the neighborhood, and were run by Jewish merchants.

The 1960s brought on a series of riots, in which stores were burned and looted. These acts drove most of the merchants out of the neighborhood. By 1970, there were 33 vacant structures in Dudley Square compared to the five in 1940. Further disinvestment in the neighborhood followed, so that by 1984, 33 percent of Dudley's land was abandoned (DSNI, 2004).

With the creation of the Dudley Street Neighborhood Initiative (DSNI), Dudley

Square is slowly coming back. The group has initiated plans for affordable housing developments and site remediation and was the first non-government organization in the United States to obtain land through eminent domain.

8.0 DEMOGRAPHICS

The Washington Street Corridor runs from Boylston Street to Dudley Street. Three distinct neighborhoods make up the corridor – Bay Village, the South End (including Chinatown), and Roxbury. Data were compiled by the U.S. Census Bureau and can be found in the American Fact Finder, Summary Tape File 3 at the tract level. Tracts 703 (Bay Village), 704-709, 711-712 (South End), and 804-805 (Roxbury) were analyzed. Transit-dependency indicators were looked at to determine the need for transportation along the corridor, including age, race and income.

Table 1 refers to the total population by neighborhood. The total population along the corridor is 30,731 with most of the residents, about 73 percent, living in Boston's South End. Residents of Roxbury make up 15 percent of the population, whereas residents of Bay Village make up about 12 percent of the population along the corridor.

8.1 AGE DISTRIBUTION

Table 2 refers to the age distribution by neighborhood. Children and the elderly often tend to be transit-dependent. Given this information, it is valuable to know the age distribution along the corridor. Roxbury residents are younger on average than those in the other neighborhoods. About 34 percent of them are under the age of 18, whereas about 13 percent of South End residents and about 6 percent of Bay Village residents fall within this category. In total, about 15 percent of residents along the corridor are under the age of 18. About 9 percent of residents are above the age of 65. Therefore, about 24 percent of the population along the corridor belongs to the transit-dependent age group.

8.2 RACIAL DISTRIBUTION

Table 3 shows the racial distribution by neighborhood. Minorities tend to make up another transit-dependent group. African Americans make up 27 percent of all residents along the corridor. Roxbury, especially, has a high concentration of African American residents – about 66 percent.

8.3 INCOME

Median Household Income was the final variable looked at. The figures are presented in Table 4 by Census Tract. Median household income ranged from $12,165 to $89,056 along the corridor. Two of the tracts, 704 and 805, have median incomes below the poverty level, meaning that car ownership is unlikely and there is a need for adequate and reliable public transportation along the corridor.

Dudley Square (Dugan)

Table 1: Total Population by Neighborhood for the Washington Street Corridor, 2000		
Neighborhood	Count	Percent
Bay Village	3,556	11.6
South End	22,582	73.4
Roxbury	4,593	15.0
Total	*30,731*	*100.0*

Table 2: Age Distribution by Neighborhood for the Washington Street Corridor, 2000								
	Neighborhood Total		Bay Village		South End		Roxbury	
Age Group	Count	Percent	Count	Percent	Count	Percent	Count	Percent
Under 1 to 17	4,656	15.2	199	5.6	2,892	12.8	1,565	34.1
18 to 64	23,233	75.6	3,003	84.4	17,535	77.7	2,695	58.7
65 and Older	2,834	9.2	354	10.0	2,147	9.5	333	7.2
Total	*30,731*	*100.0*	*3,556*	*100.0*	*22,582*	*100.0*	*4,593*	*100.0*

Table 3: Racial Distribution by Neighborhood, 2000								
	Total		Bay Village		South End		Roxbury	
	Count	Percent	Count	Percent	Count	Percent	Count	Percent
White	14,886	48.4	2,807	78.9	11,681	51.7	398	8.7
African American	8,298	27.0	172	4.8	5,083	22.5	3,043	66.3
Asian	3,490	11.4	418	11.8	3,002	13.3	70	1.5
Other	4,057	13.2	159	4.5	2,816	12.5	1,082	23.5
Total	*30,731*	*100.0*	*3,556*	*100.0*	*22,582*	*100.0*	*4,593*	*100.0*

Table 4: Median Household Income by Tract, 1999	
Tract	Median Household Income (in dollars)
703	62,878
704	12,165
705	43,636
706	89,056
707	58,843
708	45,486
709	39,969
711	32,303
712	20,806
804	34,297
805	14,417

Data compiled from United States Census figures, 2000

8.5 COMMUNITIES OF INTEREST

The discussion of transportation options along the Washington Street corridor must begin with asking what communities are being served? As previously discussed, Washington Street crosses four distinct neighborhoods: each unique and differentiated from each other in size, population, and economics. To evaluate the application of mass transit options within the communities we must first define what are the communities of interest being served? This is not a new question. The discussions leading to the removal of the Orange Line in the late 1980's and the implementation of the Silver Line discussed what populations would be best served or impacted by the removal and replacement of the elevated line. Many of the conclusions about the effectiveness of the Silver Line were based upon the assumption that the employment generated by commercial and residential development in the Seaport District and Logan Airport would benefit the residents of the corridor.

However, in 2004, we must ask if these assumptions are correct. A study of the impact of rail by Hall and Hass-Klaus in 1985 focused on the impact of rail systems on the growth and development of business within city cores (Hall, 1985). A weakness of this study in its application to Boston is that the definition of Boston's core is nebulous and unclear. Boston can easily be defined as a conglomerate of neighborhoods united by one centralized political leadership. In the case of Washington Street, the corridor crosses four neighborhoods, each of which have defined cores or squares that served as the locus for historical growth, development, and community identity. It would be difficult to assess the impact the application of the Silver Line as a economic bootstrap for the corridor community as the system is designed to draw development and employment away from the outlying areas of Roxbury, Mattapan, or Dorchester to the current political/economic core defined as the central areas of Shawmut Peninsula (City Hall Plaza, Financial District,), Logan Airport, and the Seaport District (http://www.ci.boston.ma.us/bra/).

The Silver Line should not be considered the final transit engine to drive the economic development of the corridor or southwestern portions of the city. The fundamental basis of economic development along the corridor must be the decision by the city to support the local communities through transit-orientated development. Prior to the 1960's the Washington Street corridor was one of the economic centers of the city forming a vital link between the southwestern portions and central areas of the Shawmut Peninsula (Dilday, 2003). While the elevated Orange Line was a visual and environmental blight on the corridor, it was a permanent fixture that provided a reliable, predictable mode of transportation that allowed easy access to/from the central areas of Shawmut Peninsula and the outlaying neighborhoods for employment, shopping, cultural events, and residences.

The replacement #49 bus and existing Silver Line do not provide the same level of predictability nor do they provide a positive image of travel when viewed against the Red or Green lines. To quote residents of the South End in 1988 prior to the demolition of the elevated Orange Line: "I like light rail vehicles, because I think it would be a more sophisticated solution...buses are filthy and dirty...for people in an area without transportation, buses are no good...they're [buses] never on time...people need to get to Point A fast...buses won't do it (McKinnon, 1988)."

The question of which communities are being served by the Silver Line are further complicated by the nature of Washington Street and the South End. Arguments have been made that there are two South Ends. The first South End is located north of Shawmut Avenue and consists of young to middle-aged professional couples. These residents are primarily perceived as white,

gay, and relatively affluent and wealthy. The second South End is located south of Shawmut Avenue and is perceived as an economically depressed, poor minority neighborhood of service workers (McKinnon, 1988 and Dilday, 2003). The Silver Line was predicated that the southern South End populations would use the Silver Line for access to service jobs in the Seaport District and Logan Airport. This rationale for the Silver Line fails in light of the stalled development of the Seaport District and that the later phases of the Silver Line connecting the Shawmut Peninsula to the Seaport District has not been authorized by the Federal Transportation Agency.

9.0 ECONOMIC IMPACT OF LIGHT RAIL DEVELOPMENT

In order to apply an economic benefit analysis of transportation along the corridor we must define which core or city core(s) are being revitalized-Dudley Square vs. Downtown Crossing? Based upon the Silver Line Annual reports, the goal of the Silver Line is to draw visitors towards the core of the city (http://www.allaboutsilverline.com)

A light rail economic revitalization plan for the Washington Street corridor can be evaluated with three criteria developed by Babalik in 2000. Babalik defines success of an economic plan when the following three criteria are met: (1) stimulation of development in the city core, (2) stimulation of development in declining areas, and (3) changes in the pattern of urban development. Babalik identified the most "successful" system as the Vancouver SkyTrain (Canada) due to the following characteristics "development densities along the SkyTrain route have changed especially as a result of the rezoning plans of the municipalities. These plans increased the densities at station areas, and encouraged office and retail centres at stations. Some of the SkyTrain stations became the new town centres' as proposed in the metropolitan development plan (Babalik, 2000)."

The goal of economic development along the Washington Street corridor should follow the model set forth by Babalik and typified by the Vancouver SkyTrain. Washington Street is one of Boston's main arteries connecting the political/economic core to the outlying neighborhoods of Roxbury, Mattapan, and portions of Dorchester. These areas of the city are some of the poorest, with the largest concentrations of minority and immigrant populations (Census, 2000)

The development of a light rail along from Chinatown to Dudley Station along Washington Street would allow for the future connection to a light rail corridor along Blue Hill Avenue in Mattapan. This would provide the vital link to stimulate development in the outlying declining areas of the city to the political/economic core. In addition, it would also change development in Boston by potentially decreasing the density of the Shawmut Peninsula and forcing development to occur in a mixed use pattern in the residential and former industrial areas of the city.

Building a light rail line or any other rail infrastructure is expensive and large parts of the funding of these investments are undertaken by the state and as such they must be well defined and justified. With over 70 million dollars spent on the existing Silver Line by the Massachusetts Bay Transit Authority, Federal Transit Authority, and the Commonwealth of Massachusetts, the development of a light rail system along the Washington Street corridor must be justified by an economic benefit that is greater than the costs of both development and operation costs. Thus the proposed light rail development must be analyzed for both the benefits and impacts to the light rail corridor and the city and greater metropolitan area. Light rail transit (LRT) has the potential for stimulating and shaping adjacent real estate development at stops and stations. The stimulus of light rail also raises the tax base by increasing land and property values in the vicinity of the

corridor. However, to measure the effectiveness of the Silver Line, an analysis of property values, revenues, and other indicators would provide the basis to judge the Silver Line on Bablik's three-prong test.

To understand the advantages of light rail over other transportation services, we will look at the benefits derived from the implementation of light rail transit systems in three other cities.

9.1 DALLAS DART

Dallas Area Rapid Transit (DART) connects Dallas and 12 surrounding communities with public transit services that include heavy rail, light rail, and bus service. The DART service area covers over 700 square miles with a daily average ridership of 200,000 passengers. In addition, the DART system maintains a system of high occupancy vehicle (HOV) lanes on Dallas area freeways that serve an estimated 100,000 commuters. The light rail portion of the DART was opened in 1996.

According to Dallas Economic Development statistics more than $800 million has been invested in development along DART's light rail system (http://www.dallascityhall.com/). Throughout the 700 square mile DART service area, residential, commercial, and industrial development has been constructed within close proximity to the system's stations and stops. A September 2002 study by the University of North Texas Center for Economic Development and Research documents the economic benefits from the DART system:

- "Over one billion dollars in direct private business development has been invested near the train stations.
- Property values increase near light rail lines; they decrease near freeways. In Dallas again, vacant land values appreciated five times faster around light rail stations than around comparable non-DART areas.
- Average occupancies for certain classes of buildings in the Dallas light rail corridor increased from 80 percent in 1994 to 88.5 percent in 1998, and rents increased from $15.60 to $23.00 a square foot.
- Use of public transit has been shown to increase regional income and regional jobs. A 1999 Texas study found that each one percent shift in regional travel from automobile to public transit causes a $2.9 million increase in regional income and 226 additional regional jobs.
- The existence of a progressive transit system improved the image, confidence, and quality of life of a region in tangible ways which make it more attractive to relocating businesses, and which help existing businesses attract and retain highly-qualified employees.
- Light rail encourages tourism and conventions. Visitors can get around town in a safe, clean, fun, economical way, which encourages them to spend more money over a greater part of the city.

Dart Light Rail (www.dart.org)

The 2002 study also indicated that: "values of properties adjoining DART light rail stations are 25 percent higher than for similar properties not served by the rail system...proximity to DART light rail stations appears to be a plus for most classes of real estate and businesses (North Texas, 2002)." Thus it is reasonable to assume from Dallas' experience the development of a light rail transit system with careful comprehensive planning can provide a

mechanism to promote, guide, and nourish economic development (www.dart.org). It is also important to note that historic properties were targets destinations for the DART system. Combined with DART, the use of tax credits, rebates, and zoning and ordinances that encourage and streamlined the preservation and development of historic buildings and such as the Alwalt Building, and Sears Center, Dallas was able to encourage the redevelopment of many historic, yet underutilized, areas of the city into active and vibrant commercial, residential, and entertainment areas.

While DART is significantly larger than the MBTA, we can take from the Dallas experience that careful planning and revisions to the zoning code that promote and demystify the reuse of historic buildings will greatly assist in the development of TOD in Boston.

9.2 PHOENIX LIGHT RAIL

In 2000, the cities of Phoenix, Tempe, Mesa, and the Arizona Regional Public Transportation Authority completed a comprehensive plan for the development of a twenty-five-mile light rail corridor through the Phoenix Metropolitan Area. Construction of the initial 17-mile system, known as Central Phoenix/East Valley Light-Rail Transit, is set to begin in 2005. The goal of the estimated one billion dollar transit project is to connect the commercial, residential, academic, and industrial centers of Phoenix, Tempe, and Mesa with a light rail system as a replacement for the existing bus system. With the exception of a historic streetcar system in Phoenix and regional heavy rail commuter lines, light rail systems are not present in these communities (http://www.azrail.org/lightrail).

Economic development analysis has focused on four broad areas for use of land along the rail corridor: market potential, planning and design, development strategies, and implementation. The Arizona Regional Public Transportation Authority study (http://www.valleymetro.org/rail/) of the region showed a dramatic increase in population over the past ten years has been accompanied by an increase in population density. This change in density towards greater residential development in the core areas of Phoenix, Tempe, and Mesa fuels the need for an alternative to the existing bus service. The urban core of Phoenix provides additional opportunities due to relatively large tracts of land located along several corridors in the city. Development studies for the project have shown that minorities, families without children, and retirees, populate the residential areas along the proposed route. Further analysis of the region's residential real estate markets conducted by the Authority indicated that affordable and highly concentrated attached dwellings are necessary for the success of light rail, so such development should be encouraged along its route with the stipulation that these developments blend in and are sympathetic to the existing neighborhoods. The Urban Land Institute, a planning firm assigned to study the proposed light rail system, recommended that:

> "Phoenix must focus on product quality when introducing station areas...the focus should be on the building blocks of new services such as ample parking, prevention of through-traffic in neighborhoods, and coordination between bus and light-rail service...recommends financial strategies that will position the city to take full advantage of new transportation-oriented development opportunities and to reposition underused areas affected by the light rail...as a means of capitalizing on public investment, creating new special places, improving residents' quality of life, increasing economic development, and presenting development opportunities for the private sector (ULI, 2001)."

The light-rail plan offers the cities of this region an opportunity to encourage new

development in areas where schools, roads, utilities, police and fire protection, and other public services already are in place. The proposed light rail promotes a smart growth program that is expected to generate a 20 to 30 percent increase in land value along the corridor (http://www.azrail.org/lightrail/). For Boston, this is a model to provide rapid transit to those areas not currently served, but has the required infrastructure.

9.3 PORTLAND LIGHT RAIL

Portland Street Car (www.portlandstreetcar.org)

Portland provides an excellent example for development of light rail along the corridor. Portland has relatively the same population as Boston (529,121) and has similar demographics. The Portland Streetcar is an articulated trolley powered by overhead electric that runs on embedded tracks. Rail lines share the road with normal traffic and independent of the embedded rail tracks, does not have a dedicated restricted lane. A 2.4-mile corridor designed to connect two vacant lots on the northern and southern portions of the city; the streetcar was placed into operation in 2001. A GPS system monitors the location of the streetcars allowing accurate arrival times to be broadcast at stops and on the Internet. Total cost for the project was under 70 million dollars (www.portlandstreetcar.org).

Since development, approximately 4,600 housing units and 2.2 million square feet of commercial space have been developed in the northern section of the route. To the south, the city has entered into development agreements to facilitate the building of a 125 dwelling per acre center. An additional agreement calls for the development of 3,000 housing units and 6,000 jobs through by a plan that connects Oregon Health and Science University and Portland State University through the streetcar system (Planning, 2003). Total economic development along the corridor has been estimated at over one billion dollars. The following statistics show the relative success of the Portland streetcar in the first year of operation (www.portlandstreetcar.org):

- Ridership averages about 5,800 weekdays and 5,000 for Saturdays with a total ridership for the first year at approximately 1,350,000
- The streetcar had no injury accidents and only 11 hours of interrupted service over 19, 599 hours due to accidents.
- The streetcar had less than 40 hours of interrupted service through 19,599 hours of service.

The success of the Portland system has been credited to comprehensive planning and a desire by the community to create a connection between employment, residences, schools, and cultural and entertainment centers within the central portion of the city. As a model for Boston, the Portland Streetcar system shows that an environmentally friendly streetcar system (electric) can operate within densely populated commercial and residential districts on an embedded track without a dedicated lane or preemption of lights.

10.0 ROUTE OPTIONS

There are countless possibilities for route placement along Washington Street between Dudley Square and Boylston station. The two obvious places that need attention are the beginning and the end or terminus. There are also additional options

to consider along Washington Street itself. This section of the report will attempt to evaluate all possible options. For the purposes of this report, Dudley Square will be considered the terminus and Boylston the beginning.

Starting at Boylston, there are several considerations to be made for light rail success. A diagonal bridge linking Washington Street with the corner of Marginal Road and Tremont Street (by the Store 24) is one possibility, but that would require building a new bridge. Another option is to allow vehicular traffic from Washington Street to cross the Mass Pike, take a left at Marginal Road, right onto Shawmut (a one-way street going the other way), and enter the portal at Eliot Norton Park. If the vehicle entered a different portal, that may avoid the turn at Shawmut Street, and transit would then continue underground to Boylston Street

At the terminus (Dudley Square), because of the current design of the area, there are some manmade obstacles to maneuver around. The station itself is quite expansive, occupying a lot of space with both the MBTA Silver Line and other bus and taxi stands. The square is well populated and well traveled, and with some attention and funding, could certainly be transformed into a hub of transit activity it once was before the Orange Line was removed.

Assuming light rail, one option for the terminus is to have a one-way track encircling the Dudley Station area. Washington Street is narrower between Melnea Cass Boulevard and Dudley Square; a two-way rail system would take up too much room at grade. If a two-way rail system were built in this area, there would likely not be enough space for vehicles to travel and park in harmony with the light rail. To incorporate this width of roadway, a one-way track addresses the lack of space.

There is an even more radical approach to evaluate—the option of having a pedestrian walkway between Melnea Cass Boulevard and Dudley Square. Closing off this portion of the street to private vehicles would allow the light rail and pedestrians to reign supreme, but it may wreak havoc with businesses. It could potentially mean more business for certain establishments, but issues such as how to arrange for deliveries arise. Certain businesses prefer to have their storefronts accessible by vehicles and view it as more convenient whereas others may be more open to the idea of a pedestrian mall.

With a more pedestrian-friendly environment, additional benefits may prove worthwhile, such as reduction in vehicle emissions, less noise pollution, and a greater sense of community, aesthetics, and pride in one's surroundings. If the street were closed to private vehicles, safety issues must be addressed, assuring people they are as safe, if not more so, with the new regulations. Safety would be represented with extra lighting, additional police patrols both on bike and on foot, and increased usage of the area by the community.

Another option for the length of Washington Street is to have a rail system completely below grade. This would eliminate any issues that arise at major street crossings like Melnea Cass Boulevard, Massachusetts Avenue and E. Berkeley Street. The major drawback towards building what would effectively be an additional spur of an MBTA line like the Red or Orange line is that the heavier rail system combined with the excavation costs for a two-mile tunnel would be extremely expensive.

An above-grade light rail system forces consideration of certain engineering issues. A logical solution for major intersection approaches would be to either elevate or depress the rail system at these critical junctions, but even these measures would be quite costly. At each depression, the angle of the grade must be considered very

carefully taking many factors into account including soil type, vehicle length and weight, length of track above or below grade, speed, and road support.

11.0 Examining Streetscape Redesigns: Massachusetts Avenue

In the late 1990's, the City of Cambridge embarked upon a major redesign of Massachusetts Avenue between Prospect Street and Main Street. The City is currently evaluating and implementing further improvements extending to Memorial Drive. These measures were critical towards turning around citizens' attitudes towards Massachusetts Avenue. People were generally unhappy with the roadway, claiming safety, aesthetics, and convenience were all suffering. There is currently a drastic difference between the portion of roadway that was revitalized and the portion that has yet to undergo changes.

Revitalized Massachusetts Avenue (Dugan)

Some of the measures that proved worthwhile and have created a more pleasing avenue are well-paved streets with clear lane and crosswalk markings, implementation of bicycle and left-turn lanes, aesthetic street lights and sidewalk configurations providing improved safety for pedestrians, shorter traffic signal cycles, ample time to cross streets, flower boxes and tree plantings, outdoor café seating, proper storm drainage, bus loading bays, and public art (murals). Some cyclists may argue that having any kind of bike lane is progress, while others argue that they are a hindrance and unsafe. The bike lanes on Massachusetts Avenue weave in and out of traffic; this could be considered a design flaw.

For the future revitalization plan between Main Street and Memorial Drive, one of the main components involves the creation of a pedestrian plaza where three streets intersect (Massachusetts Avenue, Main Street, and Columbia Avenue). The City is planning to place permanent, aesthetically pleasing and easily maintainable metal tables, chairs, trash cans, and benches in the plaza to encourage public enjoyment). The plaza will be raised on a curb so it is not on street level. This will serve to discourage cyclists using the plaza as a shortcut. Strategic placement of streetlights and maintaining space to allow sightlines through the plaza will further enhance safety (http://www.cambridgema.gov/index.cfm).

Unchanged portion of Massachusetts Avenue (Dugan)

In order for this or any plan of its kind to be successful, an assortment of cafés and eating establishments must be present. By encouraging a safe, secure atmosphere where people can sit outside, socialize, and eat their lunch, public use will be more likely. In the case of Washington Street, creating a pedestrian mall around Dudley Square would lend itself to a natural location for outdoor eating establishments and public

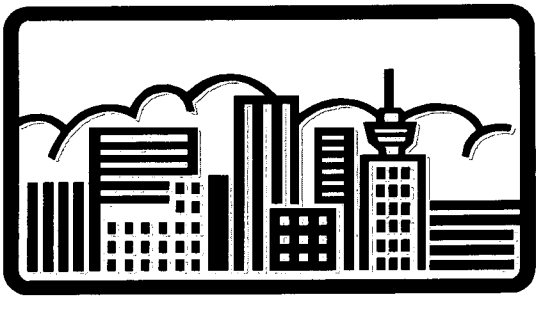
outdoor space. A central plaza or open space for pushcart vendors would provide the location with an appearance and flavor of an urban market.

There are still a few factors to consider regarding this proposed urban oasis. Safety is always priority number one, but other issues include siting of the plaza in the middle of a busy urban landscape. Questions to consider include evaluating how much pollution and particulate material the public might be exposed to, distance from the nearest vehicles, noise pollution, and general comfort level. A creative solution to this dilemma would be to build an enclosed space accessible to the public. Such a structure would eliminate many of the drawbacks and would also allow year-round use. In addition, the existing bus terminal would need to be redesigned in order to allow for seamless transitions from the light rail to connector bus service.

Lessons were learned in the redesign of Massachusetts Avenue, and the continuing revitalization of Washington Street should proceed with these lessons in check. Recommendations for Washington Street include excellent pavement markings for vehicle (including left-turn lanes) and bike lanes, raised and well-lit crosswalks, well-timed, logical traffic signals, exemplary pedestrian crossing capabilities (bird chirps, correct crossing timing), good streetlights, sheltered bus loading bays, and proper grading to eliminate flooding possibilities. Diligent monitoring of the Silver Line's dedicated lane should be a priority for the Boston Transportation Department. A crackdown is necessary to prevent the lane from being blocked. There are constantly parking issues in an urban environment, but vigilant policing may help bring about change.

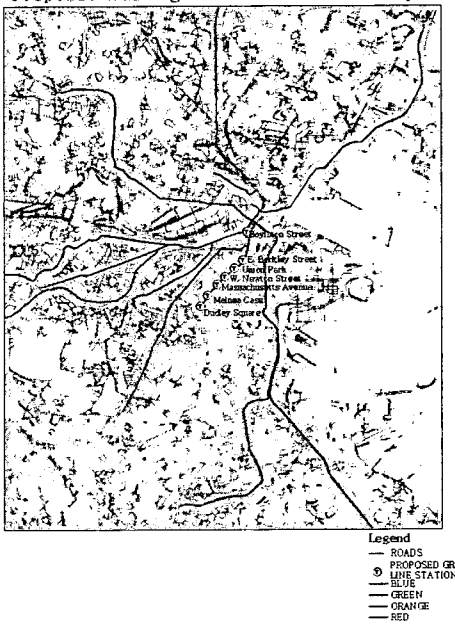
With these new plans and recommendations for Washington Street come uncertainties. Will a light rail system really be faster than the existing Silver Line? Would it be more fruitful to direct the energy and enthusiasm of the community towards trying to make improvements along the Silver Line? If Dudley Square is closed to vehicular traffic will the new pattern be successful once people get used to them? Will traffic really be mitigated in the dedicated Silver Line lanes if police target them for enforcement, or will that only become more cumbersome? Will people use a pedestrian plaza and support the businesses in the affected area, or will it become antiquated and empty? Smart design choices from the start will hopefully lead to success.

The people along the Washington Street corridor may learn from the experiences of Cambridge and other major boulevard revitalization projects in Brighton (Brighton Avenue) and Boston (Huntington Avenue). Certain plans were executed well, and others still retain a sense of unfinished business. Of course, there is always room for improvement, but concerned citizens have a solid base to build upon to create their ideal cityscape. Because these examples are all local, there is more likelihood and hope that this kind of improvement plan may be executed along Washington Street whereas examples from another region may enjoy a warmer political climate, therefore making it easier to implement changes. Boston has a notoriously difficult political climate.



12.0 STOP DESIGNATION AND PLACEMENT-SMART GROWTH IN ACTION

Proposed Washington Street Route and Stops



Citing stops for a light rail system is tricky partly because of the major intersections the system encounters. Heading inbound from Dudley Square to Boylston Street, the ideal placement for the first stop is at Melnea Cass Boulevard by the Eustis Street graveyard. This is a difficult intersection to cross—Melnea Cass is a popular, arterial road, considered to be the replacement for inner belt proposed in the 1970's. The future Urban Ring proposal would travel along Melnea Cass.

The second stop should be placed at the corner of Massachusetts Avenue with the third at W. Newton Street by Blackstone Park. The fourth stop is proposed to be located at Monsignor Reynolds Way, which is a difficult intersection because it is near the Catholic Church's headquarters and the church refuses to allow a transit stop in front of its building. The fourth stop could also be at Union Park Street. The fifth and final stop would be at East Berkeley Street

12.1 Transit Orientated Development

Transit oriented development (TOD) can be broadly defined as development that support the investment by the government into light rail, trolley, or bus service. Projects within TODs should include the classic mix used formula of residential, commercial, recreational, and professional uses within individual buildings, lots, or blocks all of which must be located within close proximity to the rail line or bus route. The goal of TOD themed development is to create a smooth and attractive transition from residential, recreational, or commercial spaces to the transit area that attracts residents and visitors to actively participate in the community along the corridor (http://www.todadvocate.com/pdxcasestudy.htm).

The corridor has many attributes for TOD themed development. The idea of an urban village that combines residential apartments, shopping, entertainment, and professional or commercial use can be developed within existing vacant parcels. A recent example of this would be the Boston University Student Village or Kenmore Square hotel redevelopments that have happened within the past year. The appropriate infrastructure (water, sewer, and zoning) is in place to accept this mixed-use development and the access to a rapid transit system would make the site attractive to developers. In addition, the classic urban nature of majority of buildings along the corridor (storefronts on the first level, residential units on upper levels) is another attractive enticement as the existing uses of residences, offices, retail, and entertainment provide the opportunity for twenty-four hour use of the corridor.

Additionally, there are several storefronts along Washington Street that could undergo revitalization if funding sources can be identified. Much of the landscape seems despondent and depressing. There are hopes that development will occur on several tracts of land, specifically at the

intersection of Melnea Cass Boulevard and Washington Street. Public artwork, such as sculptures and murals, could be an integral part of the revitalization, highlighting diversity and artistic talent of the city.

The Washington Street Corridor has seeds of smart growth in its midst—there are high-density housing complexes nearby, both affordable (Orchard Park) and market-rate (loft conversions), a transportation center, retail and other business footprints, reuse of green and Brownfields, public art contributing to aesthetics, and diversity. Smart growth encourages more growth. Stakeholders include business owners, residents, the MBTA, the Washington Street Corridor Coalition, additional non-profit organizations, police and fire departments, pedestrians, bicyclists, commuters, vehicle operators, transportation officials, developers, infrastructure caretakers and the City of Boston. Each of these stakeholders is part of the community and therefore should all be involved with decisions.

However, as we discuss TOD or smart growth, we must also acknowledge the question of real or perceived gentrification along the corridor. Both Dilday and McKinnon expressed significant concerns that the development of a light rail system along the corridor would displace the low-income residents of the area. In fact, McKinnon related several instances of corridor residents favoring bus service as a way to keep property values low and thus affordable. This is a legitimate concern that can be overcome through covenants and development agreements. The planning process for the corridor must include the realistic development of affordable housing units and if possible rent covenants that limit the cost of housing to a level consistent with the wages and incomes of residents (McKinnon, 1988).

The pedestrian nature of TOD will ultimately create the urban boulevard. The train stops are an anchor for office, residential, retail, and entertainment uses located within close walking distance. The system is designed to connect people with the community. Possible benefits include:

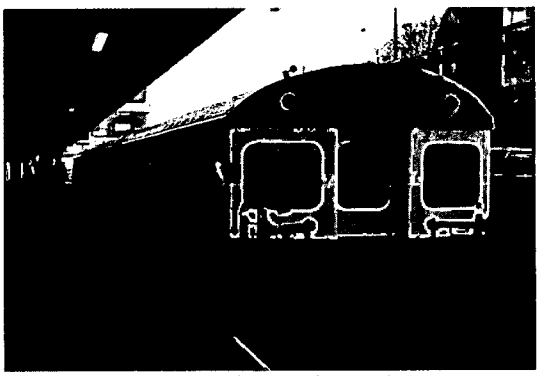
- Better places to live, work, and play
- Greater mobility
- Reduce traffic congestion and driving
- Reduced pollution from vehicles
- Reduced household transportation.
- More customers for area businesses

The result of this is that even low-income families will have more funds available for affordable housing and greater access to community resources both within the Shawmut Peninsula and the outlaying cores. The nature of TOD would also promote healthier lifestyles due to more walking and less stress associated with driving or unpredictable bus services. In addition the train stations can create a sense of community by linking persons to a defined space. The transient nature of bus service does not allow for the community to develop a deep connection to the local area. Being limited by the transit service, bus communities can also be insular both from the inability for residents to easily travel out of the area and the ability for visitors to enter the area. This is especially true along the corridor due to the limited amount of parking and the general negative view of having to take a bus to access the area (Terrell, 2003).

13.0 REPLACEMENT SERVICE OPTIONS

There are several options for the replacement of the old elevated Orange Line. The three main options are heavy rail, bus rapid transit, and light rail. These three different modes vary greatly in start-up, operating costs.

13.1 Heavy rail



Orange Line subway car (www.mbta.com)

To truly replace the old elevated Orange Line with "better than or equal to replacement service" would be to bring back heavy rail to the corridor. However, this is the more costly of the replacement options as it necessitates a reserved right of way, either at-grade or grade-separated, due to its increased speed and electrified third rail propulsion system. A second spine of the Orange Line from China Town Station running through an underground tunnel to Dudley Station would achieve an effective replacement service for the spatial dimensions of Washington Street Corridor.

The benefits of heavy rail running below-grade are increased speed, lack of competition with vehicular traffic, reduction in noise, and station shelters that effectively protect riders from the elements. In addition, the presence of the underground Heavy Rail would have minimal visual impact on the streetscape. Heavy Rail with its extensive infrastructure would also demonstrate the MBTA's greater investment in the neighborhood.

13.2 BRT

Silver Line Articulated bus (www.mbta.com)

In theory, Bus Rapid Transit (BRT) is an innovative approach to mass transit as it combines the convenience and reliability of a rail-based system with the low start up costs and flexibility associated with buses. Traditional bus systems are infamous for delays, cramped spaces, innumerable stops and stations, which lack protection from the harsh weather conditions.

Bus Rapid Transit eliminates these negative aspects of bus travel with novel approaches to vehicle design and designated bus lanes. Generally, the buses are articulated vehicles with higher occupancy capacities which sit low to the ground enabling quicker boarding times with the elimination of steep steps. New technologies are being applied to quicken travel times. Automated fare collection prior to boarding further expedites the boarding process and further shortens trip time. Global Positioning Satellites systems track the locations of the buses and the information is displayed on LED signs indicating the amount of time until the arrival of the next bus. This eliminates the need for schedules, which inevitably delay the buses, as they must adhere to the strict schedules, sometimes having to slow down or stop in order to avoid arriving early. Rapid Buses try to complete their routes as quickly as possible so that riders no longer need to carry or plan around a bus schedule, as the next bus is only minutes away.

Dedicated bus lanes allow the buses to travel unencumbered by the traffic of other passenger vehicles. New technologies controlling the traffic lights grant the buses priority for smoother travel and fewer stops. Signals beamed from the buses to the traffic lights keep lights green for the approaching bus or shorten red light time when a bus is waiting.

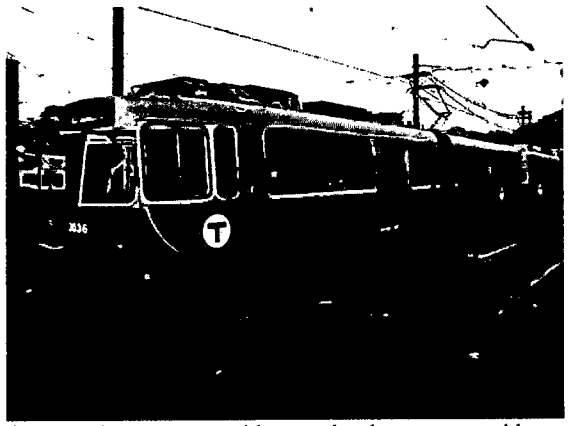
Obviously, the current Phase I of the Silver Line bus system is not a fully realized example of Bus Rapid Transit. Although the low-floor, articulated, compressed natural gas (CNG) burning buses are a step in the

right direction, lack of enforceable designated lanes and the unwillingness of the City of Boston to grant preemption at traffic lights combine to slow down travel time. The social stigma associated with buses also discourage ridership as the mode is perceived as an inferior form of public transit that services poorer communities while rail stations are located in wealthier areas.

13.3 LIGHT RAIL

Light Rail could be described as the happy median between Heavy Rail and Bus Rapid Transit. Light Rail has the benefits of both a heavy rail and bus system. Like a bus system, LRT has lower costs associated with its ability to share the street with vehicular traffic and pedestrians. In addition, LRT has the benefits of heavy rail in that it provides a more comfortable ride to the passenger and provides a feeling of investment in the community as tangible tracks can not be as easily removed.

By definition, Light Rail is a system of electrically powered passenger vehicles with steel wheels that are propelled along a track constructed of steel rails. The power is drawn from overhead wires by means of a pantograph and returned to the electrical substations through the rails. In addition, the light rail vehicles (LRVs) are capable of negotiating curves as sharp as 25 meters (82 feet) in order to traverse city streets (Transportation Research Board 2000.)



Green Line cares with overhead power cables http://www.geocities.com/mbtasystem/

Much goes into the design of a Light Rail transit system. LRT systems can be comprised of single or double tracks, can be oriented in the center of the street or curbside, run along right-of-way ballasted tracks or share the streets with rubber-tired vehicles along embedded tracks. Track/Vehicle interaction is very important and plays a huge role in the overall performance of the LRT system. The track gauge-to-wheel-gauge relationship is important as it controls hunting, truck skewing, and how the vehicle maneuvers special track work. In addition, optimal lateral clearance between wheel flange and rail head reduces wear on the tracks and vehicles and lowers maintenance costs (TRB 2000.)

14.4 TRACK PLACEMENT

14.4.1 CENTER RESERVATION

Green Line Center reservation on Beacon Street (Dugan)

Center Reservation, also referred to as Median-running, is the most common track configuration of most Light Rail Transit systems. The majority of the revenue track miles of Boston's Light Rail Transit system, the Green Line, run along a center reservation.

There are several advantages of center reservation tracks. Median-running LRVs do not interfere with parking lanes or prohibit automobiles from making right-hand turns. In addition, the center reservation is not a foreign concept for drivers as it feels much like the familiar median found in many urban boulevards and highways.

One of the disadvantages of a center reservation orientation is the difficulty in accessibility experienced by the elderly and mobility challenged community. In order to reach the station it is necessary to cross several lanes of traffic, which can be dangerous with the existing short light cycles.

14.4.2 CURBSIDE

Curbside, also referred to as side-running, LRT is the placement of tracks in a very limited grade separation from normal vehicular traffic (www.lightrail.com.) An advantage of curbside running light rail is the elimination of crossing busy streets to board the vehicles. A disadvantage of this form of track placement is the need to reconfigure the existing streetscape. Parking spaces, a scarce commodity in the urban environment would have to be eliminated

14.4.3 TUNNEL

Running the light rail transit system below grade in a tunnel has many advantages similar to Heavy Rail. There is virtually no visual impact on the streetscape as it eliminates the need for tracks and catenary wires above ground. In addition, there is no loss of traffic lanes, parking spaces, or reduction in sidewalk width to accommodate at-grade tracks. A tunnel system has the added advantage of allowing vehicles to travel at top speeds and absence of delays by traffic lights or competing vehicular traffic. However, the costs of continuing the tunnel from Boylston Station may be prohibitively expensive.

14.5 TRACK TYPE

14.5.1 BALLAST

The majority of the Boston Green Line's 46 revenue track miles are composed of wood tie and ballast units (Program for Mass Transportation 2003.) The ballast is what supports the track and is usually made up of stones, usually granite or a similar material, and should be rough in shape to improve the locking of stones to better resist movement (www.hhm.ca 2004). The advantages of ballasted track is that it is the least expensive and provides good noise insulation and resilience (TRB 2000.)

The construction of ballasted track is the least precise of all track types because the track can be realigned by compacting the ballast with specialized vibrating tampers (Central Phoenix/East Valley Light Rail Transit Project 2003.) However, the ease in realignment of ballasted track is also a disadvantage as the lateral movement caused by passing trains on curved track is one of the major causes of maintenance costs (www.hhm.ca 2004.) The cost savings in installation costs must be weighed against expected maintenance cost to ascertain whether ballasted track is the economical option.

14.5.2 EMBEDDED

Embedded track is one of the distinguishing characteristics of LRT in a central business district. This track type is completely covered in pavement except for the top of the rails (TRB 2000.) The advantage of embedded track is that rubber-

tired vehicles, bicycles, and pedestrians can cross over them with little difficulty if the flange ways are narrow enough. However, American Association of State Highway and Transportation Officials (AASHTO) guidelines outline that pedestrian crosswalks should optimally be oriented at 90 degree angles to the tracks and no less than 45 degrees to minimize bicycle tires becoming caught in the flange ways and causing accidents (AASHTO 1999.)

Although it looks simple, embedded track work is the most difficult and expensive type of track to build. Embedded track design must also address problems of electrical isolation and acoustic attenuation in an urban environment where maintenance is not easy to perform (TRB 2000.)

An interesting application of embedded track that could be imported from Europe is the use of "turf track" (TRB 2000.) This type of partially embedded track could contribute to the "greening" of Washington Street. Maintenance of the vegetation would not have to be an issue if short/stunted growth vegetation was used that did not require mowing. Turf Track would also provide surface water recharge in an expanse of pavement and concrete.

Embedded Track on Boston's B Line. www.lightrail.com

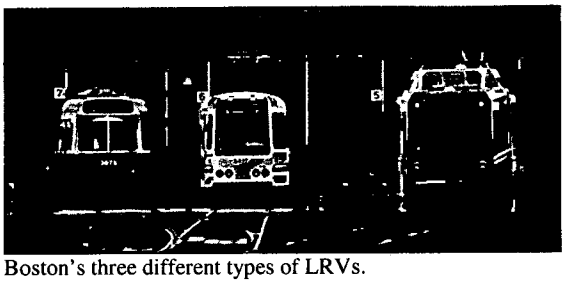
14.5.3 DIRECT FIXATION

Direct Fixation track, also referred to as un-ballasted track is defined as track structure in which the rail is mounted on direct fixation fasteners that are attached to a concrete slab. This method is standard for aerial structures, in tunnels, and at-grade for short distances between bridges to avoid sudden changes in track material modulus, which can cause structural damage (TRB 2000.) Direct fixation track should be used on either a newly constructed bridge or existing bridge to cross over the Mass Pike.

15.0 TYPES OF VEHICLES

Choosing the type of Light Rail Vehicle (LRV) is critical for the overall performance of the Light Rail Transit system for numerous factors. When choosing the vehicle, consideration of its performance and interaction with the tracks is of utmost importance. Information regarding the precise wheel diameter and gauge need to be known before design of the track flangeway gauge can be determined. If the newly acquired vehicles are going to be used on other transit lines already in existence, it must be determined whether the lateral clearance between wheel flange and railhead is optimal. If not, it must be determined whether it is possible and cost-effective to increase wheel gauge or decrease track gauge (TRB 2000.)

There are numerous vendors specializing in Light Rail Vehicles. Boston's LRVs, apart from the Pullman-Standard President's Conference Committee (PCC) cars, are manufactured by Boeing, Kinki Sharyo, and Breda. According to the MBTA vehicle inventory page, there are eight PCC "wartime" cars, 40 Boeing standard LRVs, 111 type-seven Kinki Sharyo cars, and 30 type-8 Breda cars in service on the Green Line and Mattapan section of the Red Line (www.NETransit.com.)

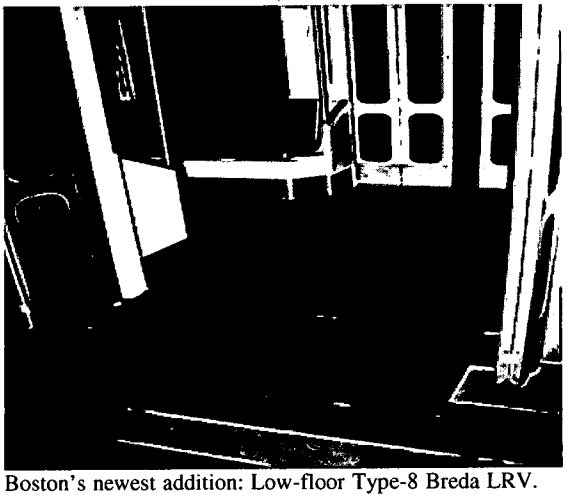


Boston's three different types of LRVs.
www.NETransit.com

Since the newer LRVs would join an existing fleet of LRVs of three differing brands and series, they must be compatible and able to travel on the same track and accommodate station platform heights. If the existing fleets of LRVs are to be able to travel on the new Washington Street line, design of the tracks should take into account the requirements of the different cars. The track designer must then consider the worst-case requirements of each car series and optimize track gauge parameters accordingly (TRB 2000.)

15.1 Low floor

Floor heights of LRVs range from new, modern low floor to high floor with multiple steps. The floors of low floor LRVs are around 14 inches above track level (TRB 2000.) This low floor design satisfies the Americans with Disabilities Act (ADA) compliance regulation that platform edges are within 75 millimeters (three inches) of the edge of the vehicle floor (TRB 2000.) A short ramp from vehicle to platform allows easy boarding for those in wheelchairs or ambulatory challenged, such as the elderly. The elimination of steps also reduces boarding time for all passengers as they can just effortlessly step into the vehicles. Low Floor LRVs would be the ideal car type for the Washington Street corridor due to the large elderly population residing in the three adjacent housing developments.



Boston's newest addition: Low-floor Type-8 Breda LRV.
www.NETtransit.com

15.2 Uni vs. bi-directional

Early traditional streetcars used uni-directional vehicles, cars with a distinct front end with a control station and doors on the right side. Because these vehicles could negotiate tight curves, the amount of real estate needed for turnaround loops was not great (TRB 2000.) However, modern LRVs have a much larger minimum turning radius and require larger turnaround loops. This real estate may be expensive or impossible to acquire.

Most modern LRVs have control cabs in both ends and can reverse direction provided there are crossover track or pocket track (TRB 2000.) Bi-directional LRVs could be used for the Washington Street Corridor line to eliminate the need for turning loops at Dudley and Boylston.

15.3 Size

It is important to consider the size of the LRVs when designing a LRT system. The width of the LRV must be able to accommodate the passage of LRVs on the adjacent track. The LRV must also be able to negotiate the narrow turn-of-the-century tunnels. If the LRVs are to run in mixed traffic for any portion of the journey, the LRVs must be narrow enough to travel in normal vehicle lanes. LRV width is

important concerning the considerable narrowing of Washington Street towards Dudley Square.

Size of the LRV invariably affects the weight of the vehicle. A large, heavy vehicle could put additional stress on the tracks, increasing wear and deterioration resulting in increased maintenance costs.

15.4 Non-articulated vs. articulated

Non-articulated or rigid cars are single car bodies carried on two four-wheel trucks. Articulated cars have two or more body sections connected by flexible joints (TRB 2000.) Articulated LRVs allow for higher passenger capacities per vehicle while still being able to negotiate sever urban street geometry. In addition, articulated vehicles improve the ratio of passengers carried per vehicle operator, reducing operating labor costs (TRB 2000.)

15.5 Wheel diameter and wheel gauge

The diameter and width of a LRV wheel is a major concern in the design of a LRT system. Larger and wider wheels invariably increase the weight on the unsprung portion of the truck. Large diameter wheels raise the floor height creating ADA compliance issues. In turn, smaller wheel diameters are found in newer low-floor LRVs. Wide wheels are prone to developing hollow treads and false flanges, in turn, requiring more frequent wheel turning to maintain proper tracking (TRB 2000.)

Narrow wheels have their own host of problems. Too narrow a wheel results in decreased tread support in the flangeway and can lead to derailments. Medium wheels partially remedy wide and narrow wheel problems, but can experience excessive wheel tread in narrow trackwork or limited tread support in special trackwork (TRB 2000.)

15.6 Performance

When evaluating different LRVs during the procurement process, it is important to choose performance-proven vehicles versus LRVs with newer technology with their inevitable bugs to work out.

15.7 Noise control

According to statistics from the MBTA, LRT operate at 71 decibels, diesel buses at 81 decibels, and CNG at 82 decibels (www.arborway.net.) Washington Street Corridor would be a much quieter place with a LRT system.

15.8 Visual pollution

A LRT system, if done right, can be very visually appealing lending character to the urban corridor. However, it is easy to end up with an ugly tangle of wires held up by harsh-looking steel poles bordered by jersey barriers. This form of "visual pollution" can be avoided if the LRT is build in accordance with a holistic beautification scheme. Mature trees can be planted along the length of the track reservation to camouflage the wires amongst leafy foliage. Creative station design and attractive fencing to separate the reservation from vehicular traffic can transform an LRT system from an eyesore to a beautiful focal point.

16.0 Cost benefit analysis

When evaluating the feasibility of a LRT project and determining whether the benefits will outweigh the costs, it is important to perform a cost-benefit analysis. To calculate the net value of extending the Green Line from Boylston to Dudley Station the following monetarized costs and benefits must be analyzed.

Costs:

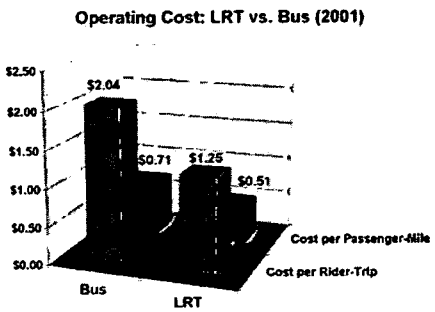
- Capital Costs: $373.6 million (CTPS estimate)
- (New LRVs, tracks, labor, etc.)
- Operating Costs: $6,100 per weekday
- Deletion of parking spots (associated revenue loss, convenience factor)
- Loss of traffic lane (effect on trip time for automobiles)

Benefits:

- Foregone Capital Costs of Silver Line
- Foregone Daily Operating Costs of Silver Line
- Increased ridership revenue: Net increase in riders/Increased fare
- Decreased air pollution and Healthcare costs (ex: asthma)
- Decreased travel times: quantify dollar amount/minute saved
- Decreased noise Pollution: quantify dollar amount/unit decrease in noise

  LRT operates at 71 decibels
  Diesel Bus at 81 decibels
  CNG at 82 decibels

(www.arborway.net)



www.sierraclub.org

17.0 CREATION OF AN URBAN BOULEVARD

Beautification of Washington Street is not limited to the planting of trees and greenery along the sidewalks and corridors. Under the Transportation Enhancements program administered by the Department of Transportation a model can be developed for the development of Washington Street into a transit corridor that benefits the community both socially and economically. Transportation Enhancements (TE) are defined as "federally funded, community-based projects that expand travel choices and enhance the transportation experience by improving the cultural, historic, aesthetic and environmental aspects of our transportation infrastructure (http://www.enhancements.org/)." Historic Preservation and landscaping, public art, improved lighting, and street furniture are aspects of the program that could be applied to Washington Street. A design plan for Washington Street must consider the application of landscaping, lighting, street furniture or community flower beds in the context of if the proposed plan enhances the aesthetic, cultural or historic aspects of the travelers or visitors experience along/to Washington Street.

In order for this or any plan of its kind to be successful, an assortment of cafés and eating establishments must be present. By encouraging a safe, secure atmosphere where people can sit outside, socialize, and eat their lunch, public use will be more likely. In the case of Washington Street, creating a pedestrian mall around Dudley Square would lend itself to a natural location for outdoor eating establishments and public outdoor space. There are still a few factors to consider regarding this proposed urban oasis. Safety is always priority number one, but other issues include siting of the plaza in the middle of a busy urban landscape. Questions to consider include evaluating how much pollution and particulate material the public might be exposed to, distance from the nearest vehicles, noise pollution, and general comfort level. A creative solution to this dilemma would be to build an enclosed space accessible to the public. Such a structure would eliminate many of the drawbacks and would also allow year-round use.

Some business owners along Massachusetts Avenue are not pleased at the prospect of having their businesses cut off from Massachusetts Avenue or the imminent removal of parking spaces. Others are content and believe the new plaza will bring them even more foot traffic than before. If such a plaza or pedestrian mall were to be implemented in Dudley Square, business owners would have to have the opportunity to weigh in with their opinions.

View of Green line and Beacon Street (Dugan)

Maintaining the historical significance of the area would increase public knowledge of the area and keep interest levels high. A combination of history and public art is a natural choice—creating plaques and murals, sculptures and other creations that celebrate people and events of the past, present, and even the future generally create positive attitudes and get citizens excited and enthusiastic. This enthusiasm may be harnessed and can carry over into a general appreciation and love for one's neighborhood and urban setting.

To create a beautiful streetscape, the chosen plan must capture the public's attention and allow them to think of Washington Street as one long, contiguous destination instead of increments of roadway where development trails off and blight takes over. One method towards achieving unity would be to cultivate a well-traveled, high ridership form of transportation either in the form of light rail or an improved Silver Line system.

18.0 ZONING, DEVELOPMENT, AND LIGHT RAIL TRANSIT

The development of light rail transit service can change the density of a city and work to redistribute economic opportunity. By curbing low-density sprawl, older urban areas such as Roxbury, Mattapan, and Dorchester could be revitalized and provide a suitable home for Boston's increasingly diverse population. The development of light rail along Washington Street should be characterized by policies that that help to make light rail as convenient, attractive, and less expensive to use as automobile travel. In general light rail-supportive policies should:

- Develop ways to connect residential uses employment
- Development should place residents and employees no more than ½ mile from their homes and shops
- Mixed-use zoning should be developed to allow for different business and opportunities to attract and satisfy the passenger's needs
- Develop station and stops that are convenient and attractive
- Reduce the amount of free parking in order to increase incentives for transit use

For Boston, these qualities are present. Boston's development is based on a historic pattern that predates the automobile. As little as twenty years ago, the elevated Orange Line provided the basic means of transportation through the southern portion of the city. Our efforts to create a "better than or equal to replacement" for this system must recognize the obstacles of market forces and the inherent characteristics of the new rail lines. The intensive development that took place in both the downtown area and outlaying neighborhoods of Boston probably could not have occurred without the mobility attributed to rail transit. The experience of Dallas demonstrates that the rapid transformation of inner urban business,

commercial, and residential areas corresponded to the advent of new rail service. The merging of growth and transit was supported by comprehensive planning activities by city and regional agencies.

Comprehensive-planning activities must include a review of Boston's planning process. As shown in these attached maps, Washington Street to the east of Massachusetts Avenue is comprised of primarily Neighborhood Development Areas (NDA) and Multifamily Residential Sub-districts (MFR). To the west of Massachusetts Avenue, the corridor is primarily classified as a Boulevard Planning Overlay District. The area to the north of the corridor is primarily composed of MFR, with the south comprising both MFR and Economic Development Area (EDA) designations. The Boston Redevelopment Authority also states the following goal: "In an effort to promote "smart growth" in the City and take advantage of the Boston's urban transit system, the BRA is actively encouraging new and denser commercial and residential development in and near public transportation stations (http://www.ci.boston.ma.us/bra/).

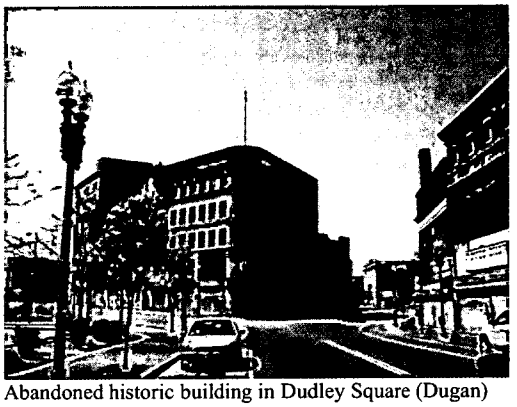
The eastern portion of the of the Washington Street corridor from Massachusetts Avenue to Downtown Crossing is located within the Washington Gateway Main Streets Zone. The Main Streets program is an urban renewal program that developed by the National Trust for Historic Preservation that focuses on the following key points identified as the *Main Street Approach*:

- Design: Enhancing the physical appearance of the commercial district by rehabilitating historic buildings, encouraging supportive new construction, developing sensitive design management systems, and long-term planning.
- Organization: Building consensus and cooperation among the many groups and individuals who have a role in the revitalization process.
- Promotion: Marketing the traditional commercial district's assets to customers, potential investors, new businesses, local citizens and visitors.
- Economic Restructuring: Strengthening the district's existing economic base while finding ways to expand it to meet new opportunities -- and challenges from outlying development (http://www.mainstreet.org/).

The Boston Main Streets program implements the goals of the national program by creating Main Street Districts and zones. In order to create the district, the following four goals need to be meet: (1) community organization, 2) promotion, 3) design and 4) economic restructuring (http://www.ci.boston.ma.us). The Washington Gateway Zone is defined as a 1.2-mile area located in and around the Downtown Crossing area. The goals of the Gateway are to provide economic development and marketing services for business located within the area. The Gateway Program does provide limited funding for historic preservation and restoration as typified by its storefront restoration program (http://www.ci.boston.ma.us).

However, much of the corridor is lined with unattractive and deteriorating commercial, industrial, and residential buildings. Generally these parcels would be unattractive to development due to the density of the area, lack of parking, and general hurdles associated with the zoning and building process. Portions of the Washington Street corridor also offer unique challenges due to restrictions imposed by the area's designation as a National Register Historic District. It is in this case that other national preservations programs may be utilized for both the economic and structural redevelopment of the corridor. First, property owners along the corridor could apply for the 20 percent federal rehabilitation tax credit for National Register of Historic Places building. Under

this program renovation costs for a building that has been listed on the National Register of Historic Places can be offset by a 20 percent tax credit of the qualified costs of the renovation. A second program is the ten percent federal rehabilitation tax credit that provides a ten percent tax credit for the renovation of a structure built prior to 1936 that is not listed or potentially eligible for listing on the National Register of Historic Places (http://www.cr.nps.gov/).


Abandoned historic building in Dudley Square (Dugan)

Boston, state, and regional agencies should create transit-focused development by offering regulatory incentives, site design and infrastructure assistance (including tax credits or other subsidies where necessary). The following steps must be taken along the corridor to set the stage for TOD:

- Developing short term zoning ordinances that prohibit uses not consistent with future dense development and transit.
- Encourage the purchase of vacant land parcels by land trusts, private developers, or by eminent domain.
- Prepare master plans for vacant or underutilized sites.
- Identify and solve problems associated with contaminated land, wetlands, or historic buildings through development agreements.
- Support the neighborhood by developing designs that are sensitive to the nature of the area.

If the city could prove that there are significant benefits for investors or property owners located along the proposed light rail, then it becomes realistic to ask these individuals to make a financial contribution to support the new rail system. In addition, by actively promoting and assisting owners to use federal and state preservation funds and grants, many of the older structures along the corridor could be renewed and redeveloped. Boston's planning programs should promote areas served by the light rail system, encourage light rail-friendly project designs, and increase the costs associated with automobile use (i.e. higher meter fees).

Development of light rail must take into account the unique challenges associated with redevelopment within the National Register South End Historic District. Business developers do support transit-oriented revitalization if the public sector sends the right signals and offers incentives. Transit-related zoning and land use plans, special financial incentives, investment in public infrastructure, and urban design concepts must be used to provide a contrast against the city's auto-centric development focus. Strong historic preservation ordinances enhance and clarify the climate for private development by clarifying the design expectations and standards for review. Boston's and the Commonwealth's preservation ordinances, regulations, and laws should provide a blueprint for private developers to rehabilitate historic resources that are valued elements in the city's fabric.

19.0 CONCLUSION

Transportation does not create economic booms; it facilitates the boom. Washington Street's history shows that an effective and reliable mass transit system fuels growth and spurs development. With the demolition of the Orange Line, a route for community investment was lost, limiting the community's growth potential. In order for the corridor to be fully reborn as a grand boulevard, the objectives of mass transit

along the Washington Street must be clearly defined. If these objectives are to improve air quality, create access to employment, and ease access to Boston and the neighborhood cores, then it is reasonable to assume that the current articulated bus is not a sustainable facilitator to these goals. This assumption is based upon the facts that as a bus system the Silver Line does not provide a reliable transportation service. In addition, the Silver Line is subject to the traffic patterns of local roads and does not have a dedicated lane or preemption over local traffic patterns. This lack of preemption increases the ridership time that provides as disincentive for ridership.

This study has attempted to provide the community with options and information to guide future development. Our intention is to layout a framework for further discussions on the feasibility of two distinct options, improving the Silver Line or creating a new light rail system. Ultimately either form should work towards the goal of creating a mass transit system that can assist in the revitalization of these communities.

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http://www.azrail.org/lightrail

http://www.bayvillage.net/history.php

http://www.census.gov

http://www.ci.boston.ma.us/bra/

http://www.ci.boston.ma.us/mainstreets/about.asp

http://www.cr.nps.gov/helpyou

http://www.dallascityhall.com/

http://www.dart.org/

http://www.dsni.org/Comunity%20 Information/timeline.html

http://www.enhancements.org

http://www.geocities.com/mbtasystem

http://www.hhm.ca 2004

http://www.lightrailnow.org

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http://www.mainstreet.org/About/msapproach.htm

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http://www.sierraclub.org

http://ase.tufts.edu/uep

http://www.valleymetro.org/rail/

APPENDIX A
MAPS AND FIGURES

Washington Street

Boston Redevelopment Authority

Washington Street Corridor

Boston Redevelopment Authority

Proposed Route A

Legend

Proposed Route A

Proposed Route B

Legend

Proposed Route A

Figure 2: Number of Black Residents along the Washington Street Corridor, 1990

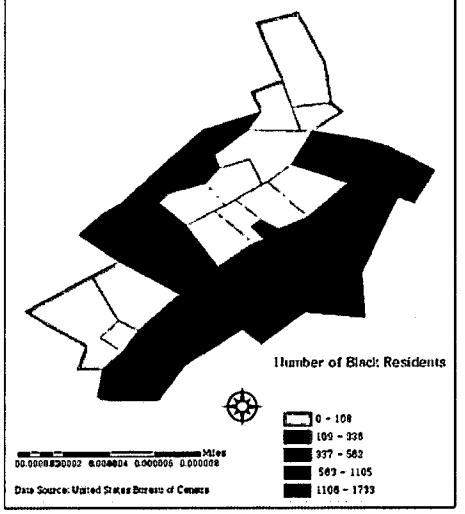


Figure 6: Median Household Income Along the Washington Street Corridor, 1990

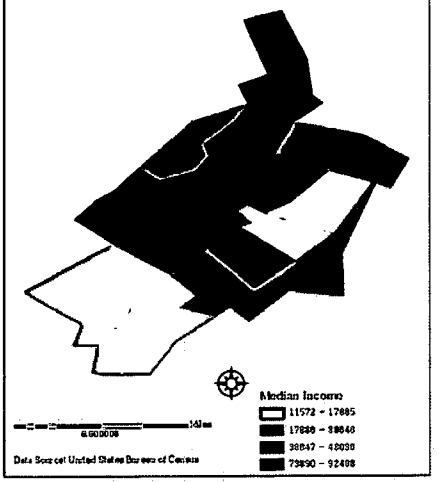


Figure 4: Number of White Residents along the Washington Street Corridor, 1990

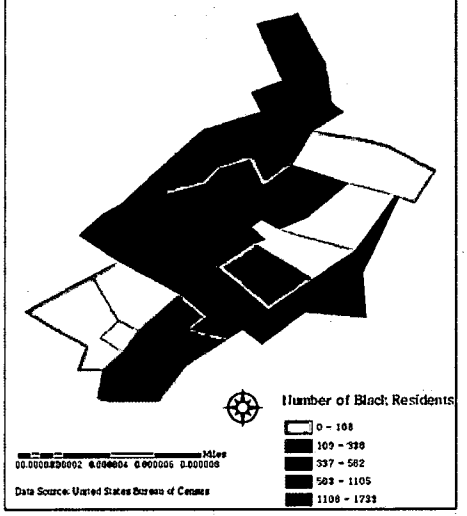


Figure 8: Median Rent along the Washington Street Corridor, 1990

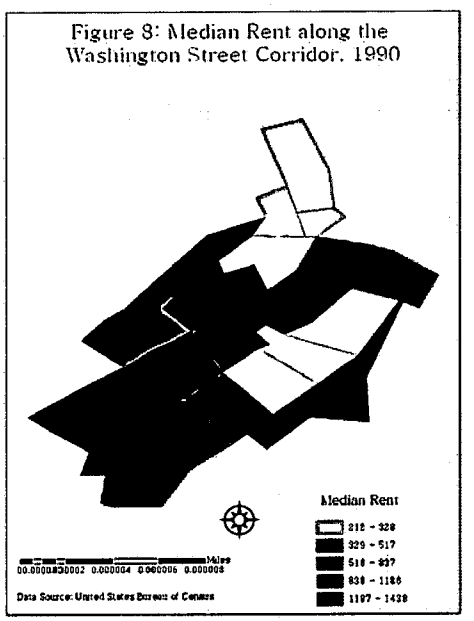


Figure 3: Number of Black Residents along the Washington Street Corridor, 2000

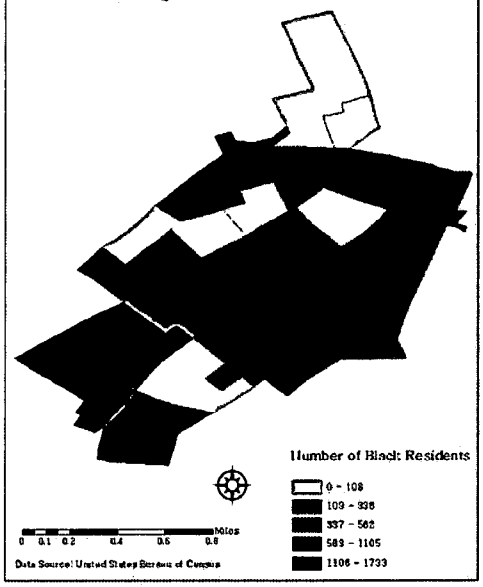


Figure 7: Median Household Income along the Washington Street Corridor, 2000

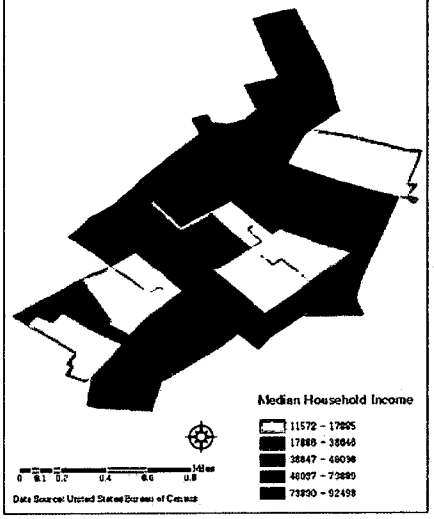


Figure 5: Number of White Residents along the Washington Street Corridor, 2000

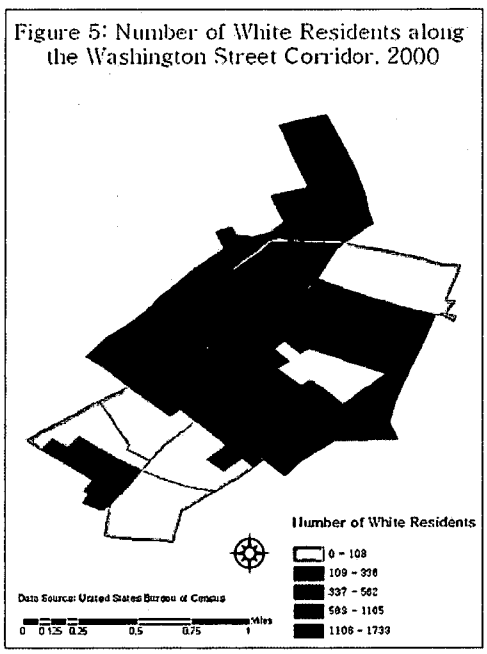


Figure 9: Median Rent along the Washington Street Corridor, 2000

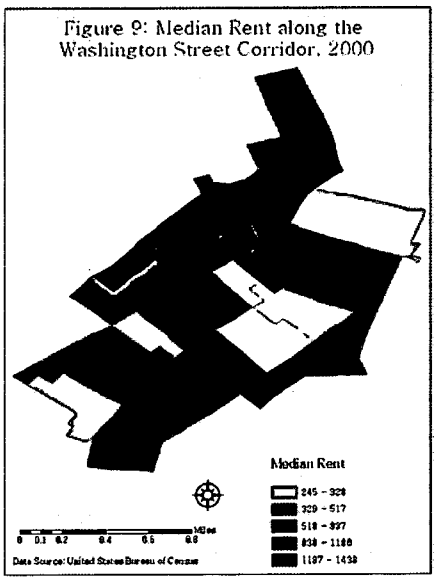
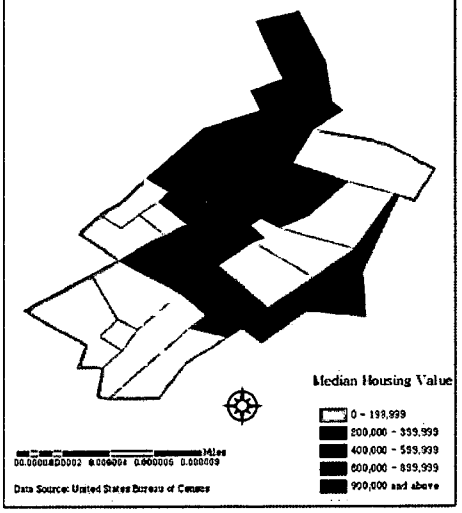


Figure 10: Median Housing Value along the Washington Street Corridor, 1990



Number of Public Transportation Users along the Washington Street Corridor, 1990

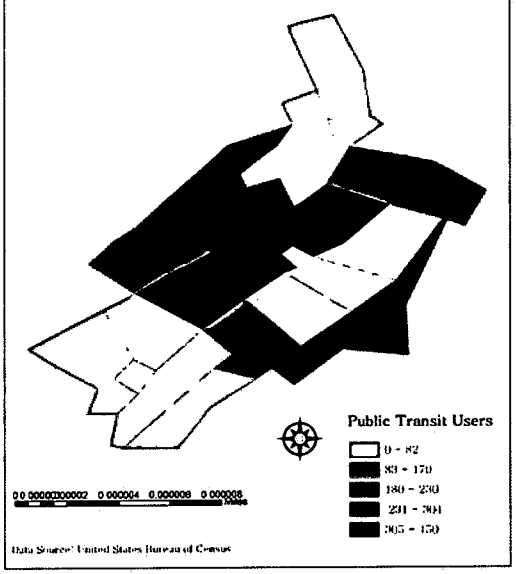


Figure 12: Owner Occupied Housing Units along the Washington Street Corridor, 1990

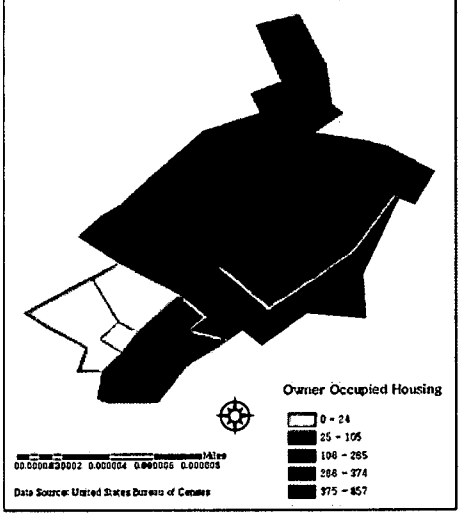


Figure 16: Vehicle Ownership along the Washington Street Corridor, 1990

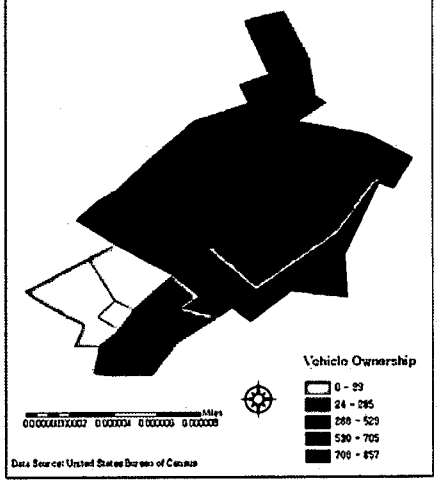


Figure 11: Median Housing Value along the Washington Street Corridor, 2000

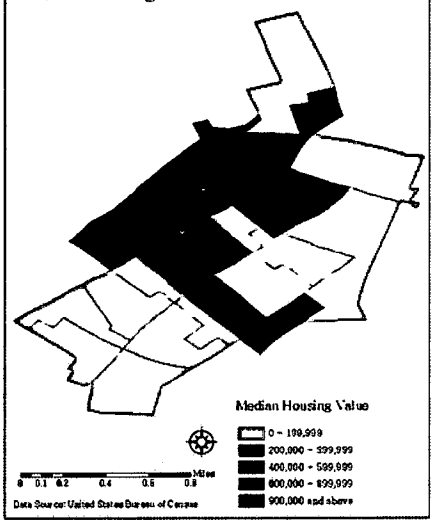


Figure 13: Owner Occupied Housing along the Washington Street Corridor, 2000

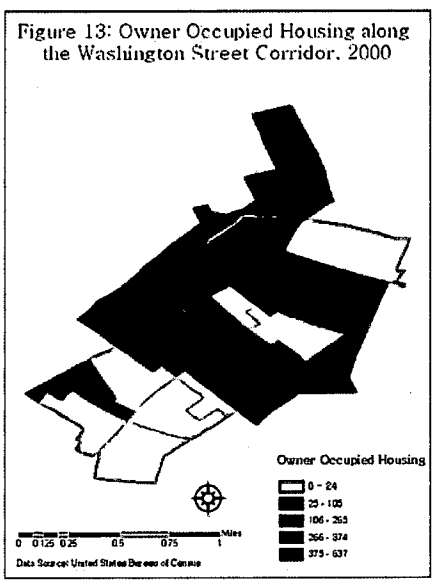


Figure 15: Number of Public Transportation Users along the Washington Street Corridor, 2000

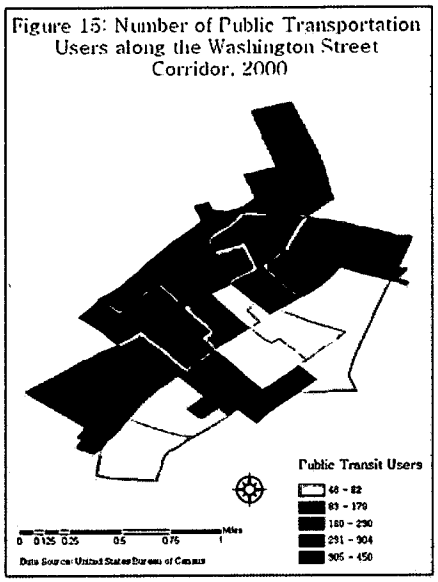
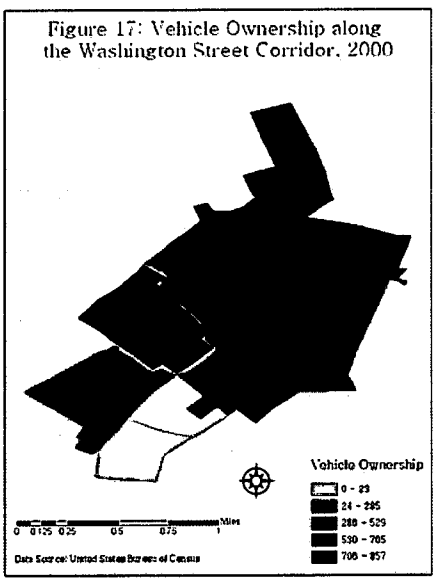
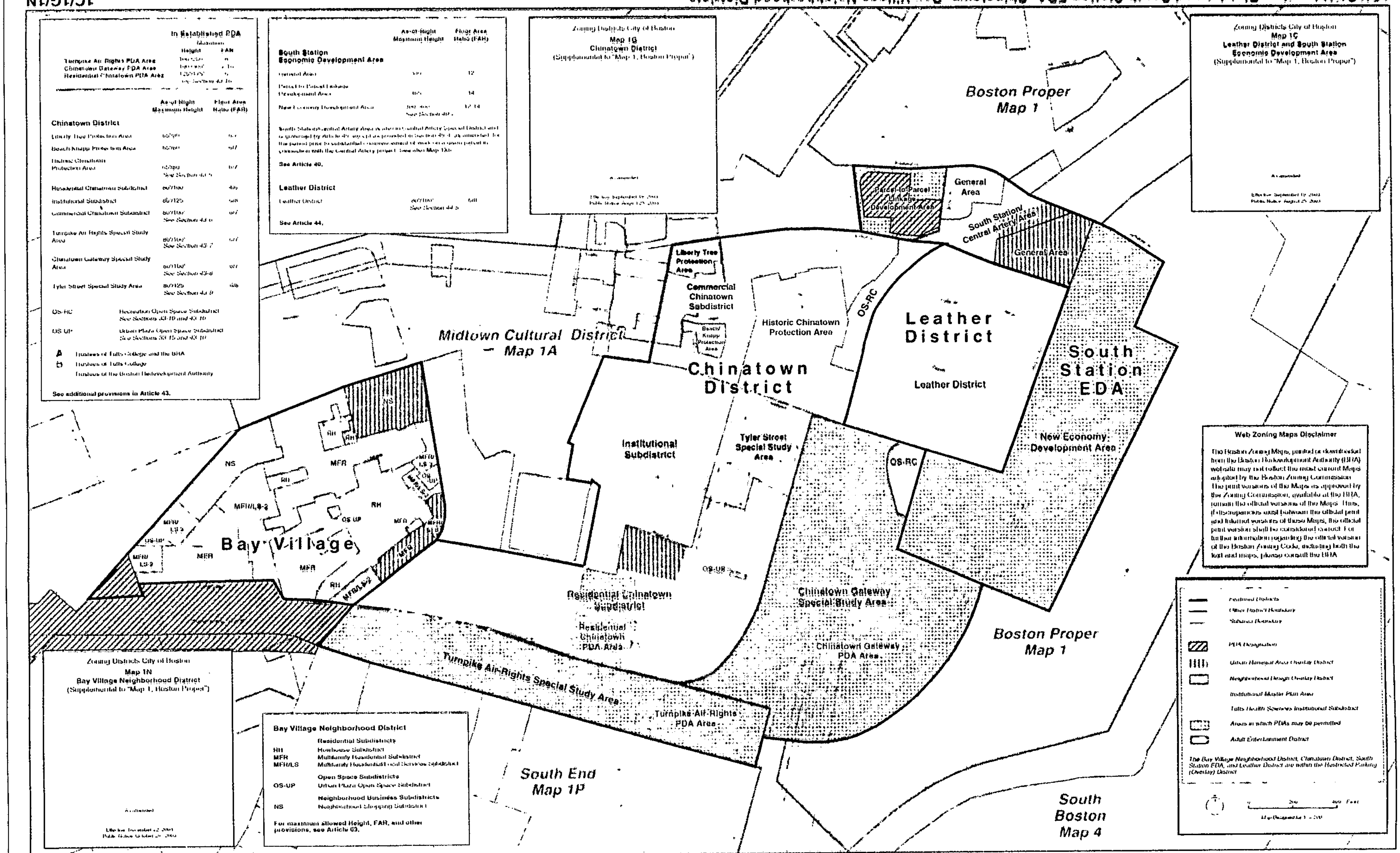


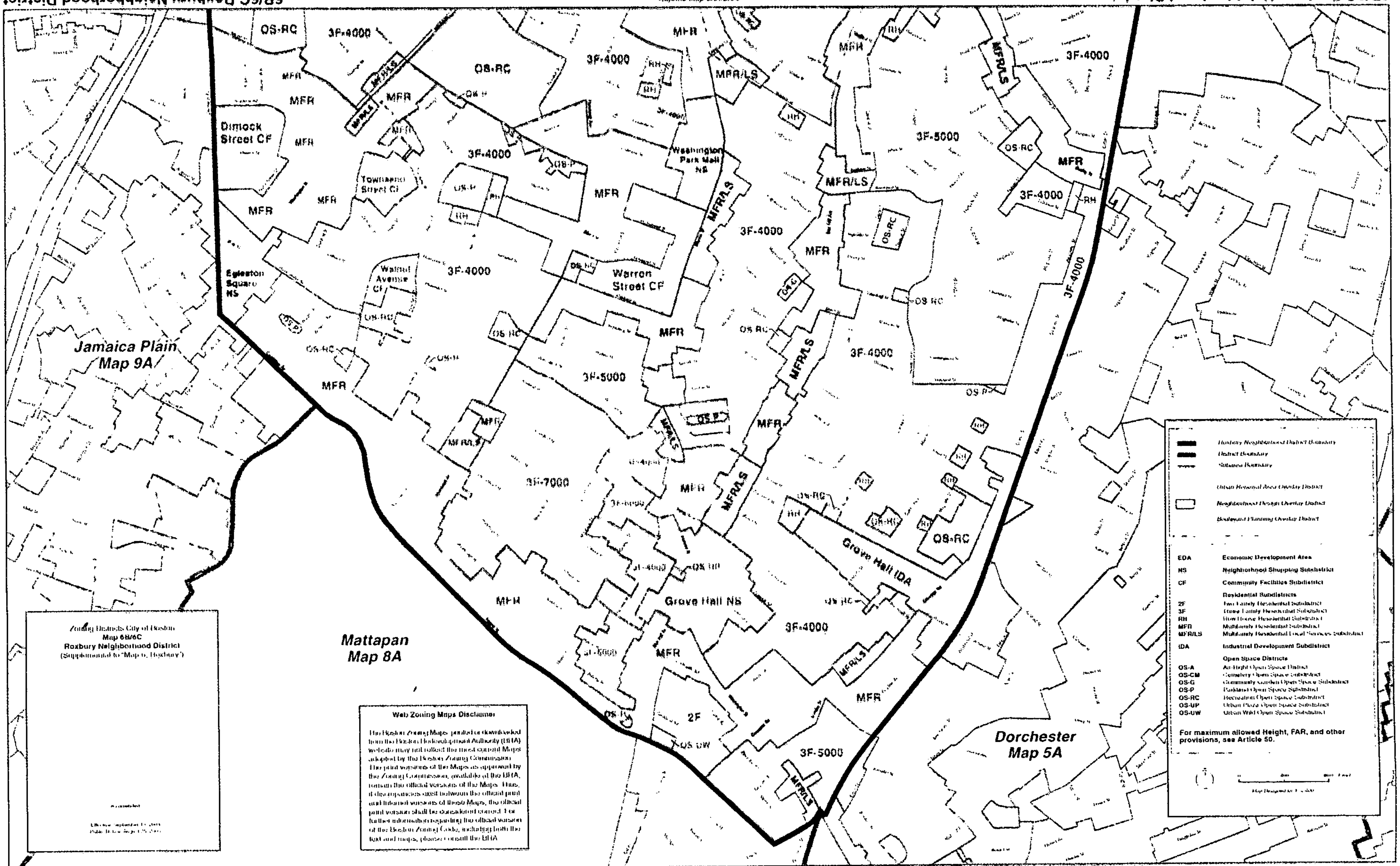
Figure 17: Vehicle Ownership along the Washington Street Corridor, 2000

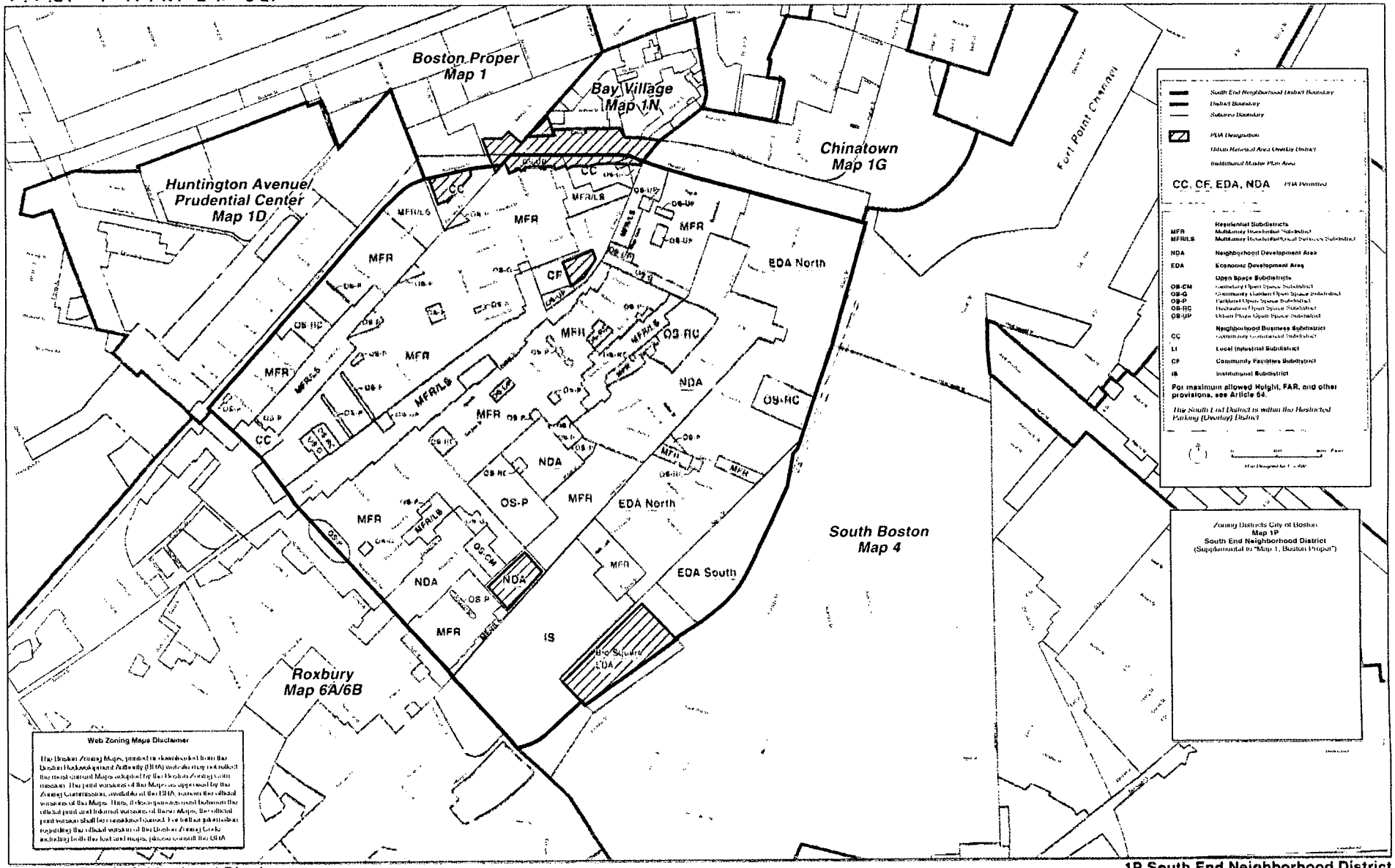




1C/1G/1N Leather District and South Station EDA, Chinatown, Bay Village Neighborhood Districts

1C/1G/1N


Jamaica Plain
Map 9A
Mattapan
Map 8A
Dorchester
Map 5A
Dimock Street CF
Townsend Street CF
Egleston Square NS
Walnut Avenue CF
Washington Park Mall NS
Warren Street CF
Grove Hall NS
Grove Hall IDA
OS-RC
3F-4000
3F-5000
3F-7000
MFR
MFR/LS
RH
OS-P
OS-UW
2F
Zoning Districts City of Boston
Map 6B/6C
Roxbury Neighborhood District
Web Zoning Maps Disclaimer
EDA Economic Development Area
NS Neighborhood Shopping Subdistrict
CF Community Facilities Subdistrict
Residential Subdistricts
IDA Industrial Development Subdistrict
Open Space Districts
For maximum allowed Height, FAR, and other provisions, see Article 50.


Boston Proper
Map 1
Bay Village
Map 1N
Chinatown
Map 1G
Huntington Avenue/
Prudential Center
Map 1D
South Boston
Map 4
Roxbury
Map 6A/6B
Fort Point Channel
EDA North
EDA South
NDA
MFR
MFR/LS
CC
CF
OS-P
OS-RC
OS-UP
IS
South End Neighborhood District Boundary
District Boundary
Subarea Boundary
PDA Designation
Urban Renewal Area Overlay District
Institutional Master Plan Area
CC, CF, EDA, NDA PDA Permitted
Residential Subdistricts
MFR Multifamily Residential Subdistrict
MFR/LS Multifamily Residential/Local Services Subdistrict
NDA Neighborhood Development Area
EDA Economic Development Area
Open Space Subdistricts
OS-CM Cemetery Open Space Subdistrict
OS-G Community Garden Open Space Subdistrict
OS-P Parkland Open Space Subdistrict
OS-RC Recreation Open Space Subdistrict
OS-UP Urban Plaza Open Space Subdistrict
Neighborhood Business Subdistrict
CC Community Commercial Subdistrict
LI Local Industrial Subdistrict
CF Community Facilities Subdistrict
IS Institutional Subdistrict
For maximum allowed Height, FAR, and other provisions, see Article 64.
The South End District is within the Restricted Parking (Overlay) District
Zoning Districts City of Boston
Map 1P
South End Neighborhood District
(Supplemental to "Map 1, Boston Proper")
Web Zoning Maps Disclaimer

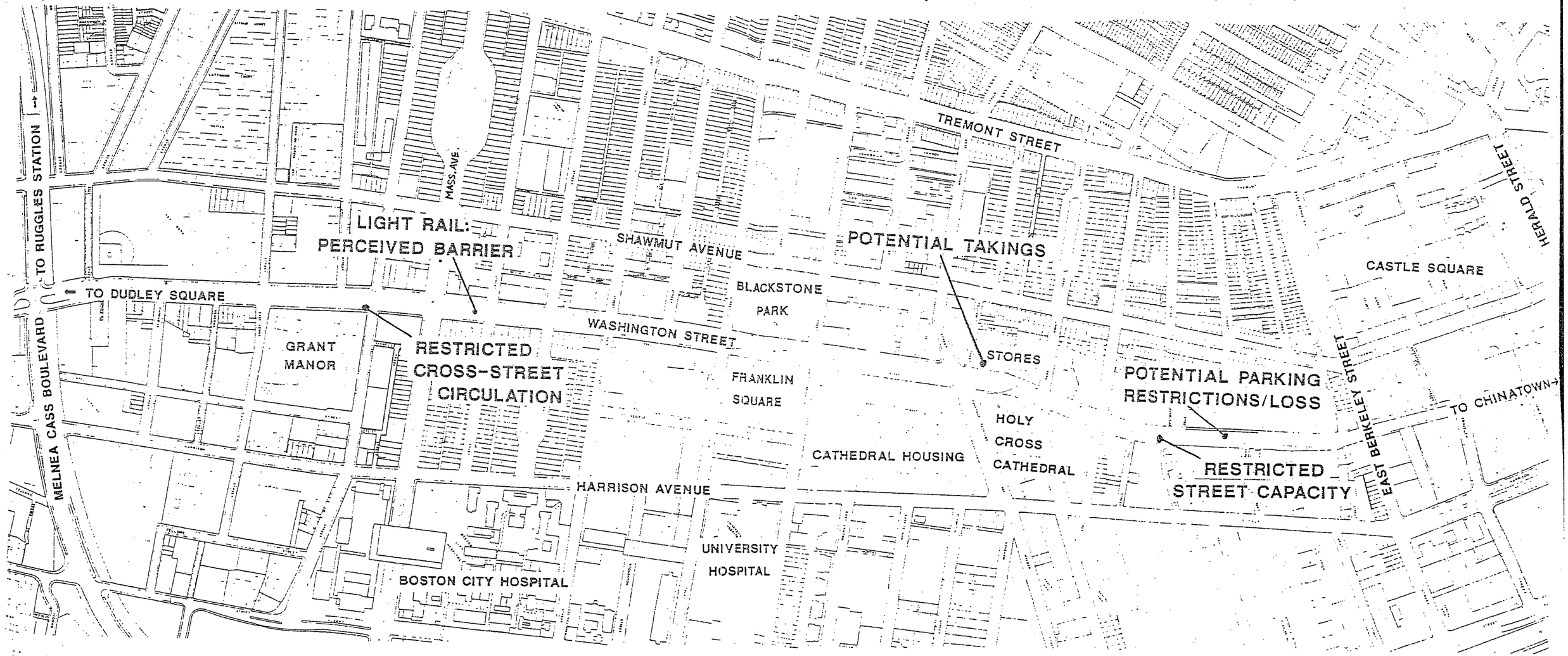
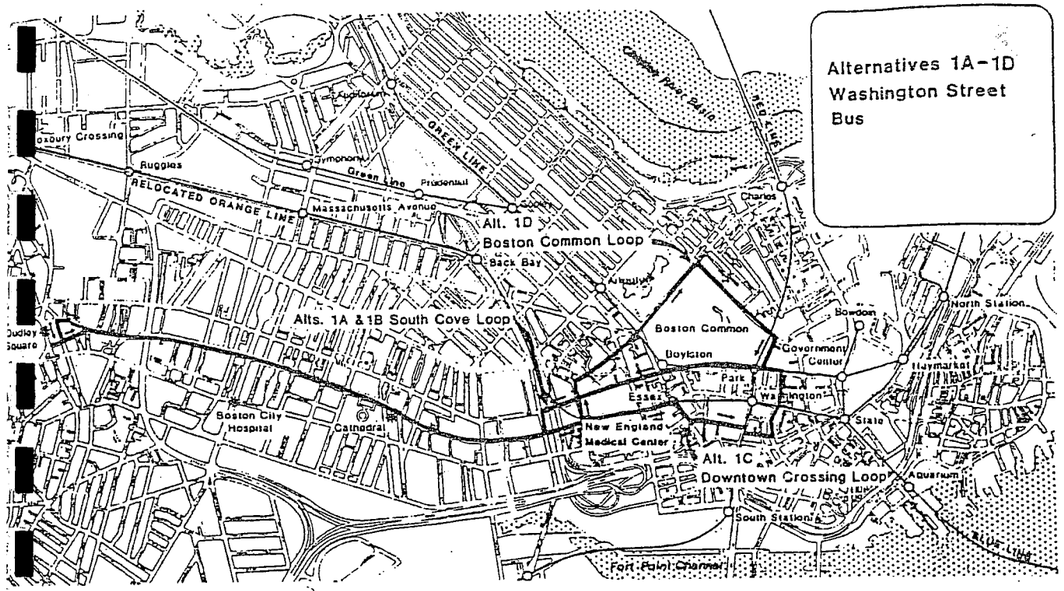
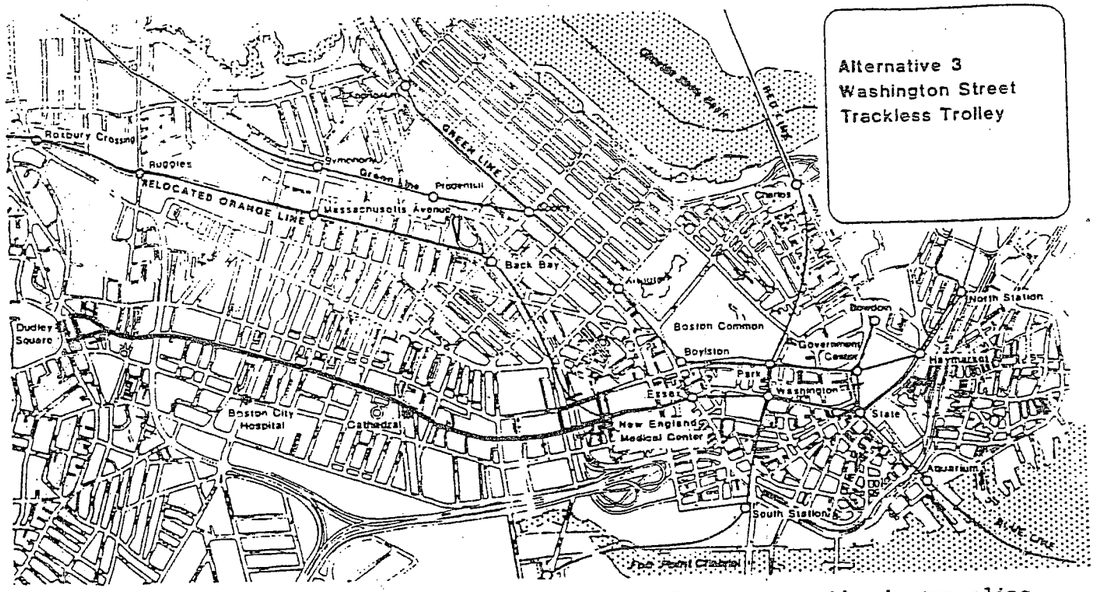


Fig. 10: South End Issues, Herald Street to Melnea Cass Boulevard.

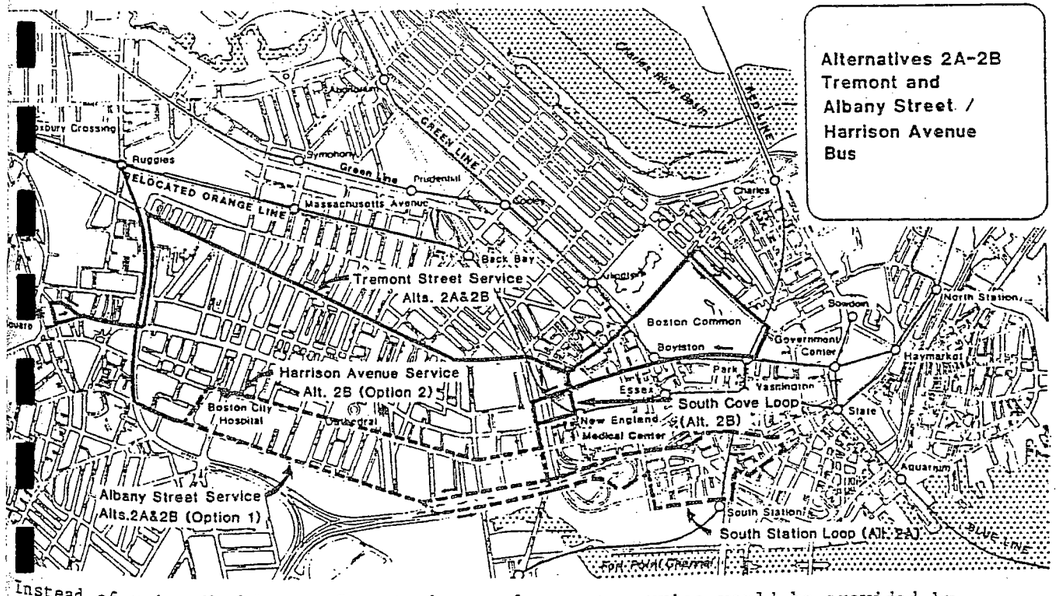
Source: BRA Photogrammetric Base Map, 1975.



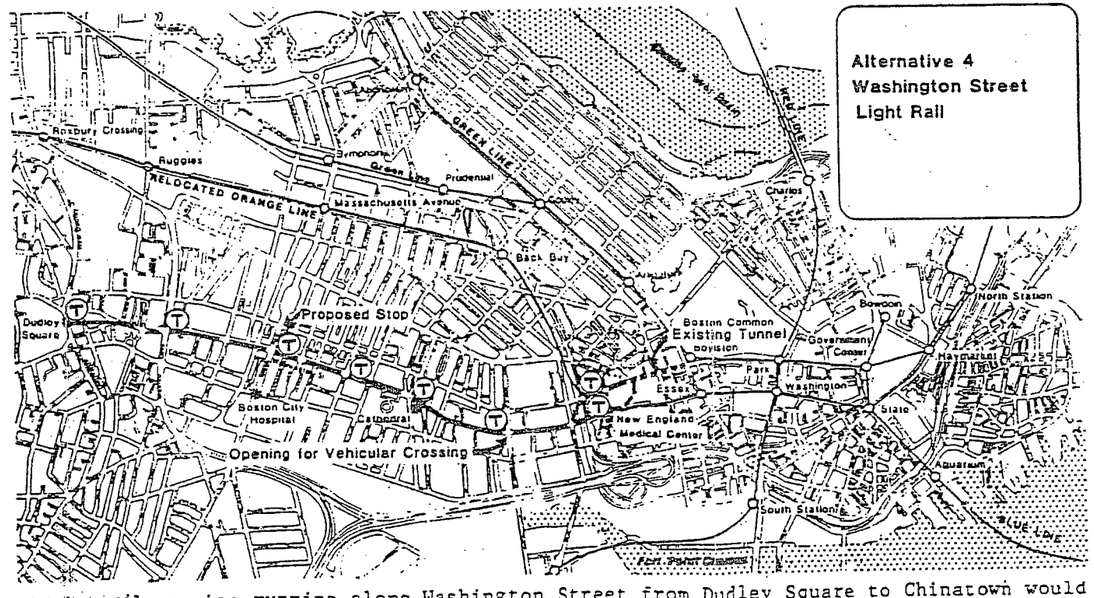
eplacement service from Dudley Square along Washington Street would be provided in this ernative by means of a bus every seven to ten minutes at rush hours.



Trackless trolleys (electric buses) would serve the replacement corridor by traveling down Washington Street from Dudley Square and terminating at the Quincy School in Chinatown. They would then loop around the school and return to Dudley Square via Shawmut Avenue and Herald Street. Service would be every ten minutes at rush hours.



Instead of using Washington Street, bus replacement service would be provided by ilizing two streets at the periphery of the replacement corridor. Under this ternative, buses running every 15 minutes would travel down Tremont Street from udley Square. This bus would be paired with a bus that would run along either Albany Street or Harrison Avenue every ten minutes at rush hours.



Light rail service running along Washington Street from Dudley Square to Chinatown would provide the replacement corridor with service every seven minutes at rush hours. The light rail would run in a separate reservation and enter an existing tunnel under Tremont Street.

Fig. 3: Phase II Replacement Transit Alternatives.

Source: Massachustetts Bay Transportation Authority, "What Happened?" Boston, 1987.

APPENDIX B
PROJECT SCOPE OF WORK

MEMORANDUM OF UNDERSTANDING (MOU) BETWEEN THE STUDENT TEAM (TEAM) FROM THE DEPARTMENT OF URBAN AND ENVIRONMENTAL POLICY PROGRAM AT TUFTS UNIVERSITY AND THE WASHINGTON STREET CORRIDOR COALITION (CLIENT)

This document describes the scope of work, methodology, products, and timeline agreed to by the parties for the satisfactory completion of the project. The project is defined as the identification of light rail and rapid transit public transportation system development options for Washington Street in Boston, Massachusetts. The project shall consist of the development of charette materials for a public meeting which will focus on transportation options available to the community in order to meet the goal of a "better than or equal to replacement" for the now defunct elevated orange line that historically ran above Washington Street.

PROJECT GOAL:

As noted above, the project is defined as the identification of light rail and rapid transit transportation development options for Washington Street in Boston, Massachusetts. The project shall consist of the development of charette materials for a public meeting that will focus on the development of a curbside or center reservation light rail or BRT system. Charette materials will consist of individual poster boards that depict the proposed transportation options with a listing of the specific facts and features of the appropriate system along with an approximate cost of development. In addition to this the Team will focus a portion of its research and analysis on the plans for beautification and greening of Washington Street. Geographic Information System (GIS) maps and graphics of Washington Street's existing and historical transportations systems, proposed systems as well as photographs of representatives systems will be made available for review during the charette. The charette will be presented at a public meeting scheduled for April 1st, 2004.

The public meeting is designed to solicit the comments of the community located within the Washington Street corridor. The purpose of this meeting is to provide for an open, accessible forum for discourse where members of the Washington Street, Roxbury, Mattapan, and communities of color and traditional disenfranchisement can be provided information on potential transportation options within their community. At the completion of the meeting, participants will be presented with the opportunity to vote for the transportation system that they would prefer for development.

METHODS:

The Team will research available, existing Massachusetts Bay Transportation Authority (MBTA), Boston Redevelopment Authority (BRA), Commonwealth of Massachusetts, City of Boston, and privately held records and documents pertaining to historical and current transportation systems located along the Washington Street corridor from the Chinatown MBTA station to the Dudley Square MBTA station. Field observations and/or research will also take place along Washington Street. The Team may also elect to attend community meetings or conduct interviews with relevant authorities and agents

of the MBTA, Commonwealth, BRA, City of Boston, and members of the community. The Team will also research records for other instances where communities have managed light rail and rapid transit transportation systems through historic districts and communities of economic hardship. In conducting the comparative research, the Team will focus on communities having similarity and applicability to Boston, such as New Orleans, Portland, San Francisco, and Chicago. This comparative research will focus particularly on the types and impacts of existing rapid transit and light rail systems located within these communities.

PRODUCT:

The Tufts team will produce a well-researched charette and associated documentation for presentation to the public at the April 1st, 2004 meeting. This charette will designate at least 2 options for light rail or BRT (curbside or center reservation) as replacement for the defunct Washington Street elevated Orange Line. In addition, the charette will present information regarding existing programs and policies as well as potential plans available to achieve the goal of greening and beautifying the existing Washington Street corridor.

The public meeting will be structured to allow for the review of these options by the public, general comments and questions from the public, and for the public to vote on the options most amenable to themselves. These votes will be counted by the assignment of one sticker to each participant. The participant will then be provided the opportunity to affix the sticker to the poster that best represents their wishes and desires for a rapid transit system along Washington Street. The Team will then count the stickers affixed to each poster and provide a summary of findings that includes the results of the voting as well as vocal or written public comments regarding the options. The Team will present these findings in a report to the Client. If possible, the Team will record vocalizations and comments made by the public during the meeting to magnetic tape.

Draft charette materials will be presented to the client on or about March 18th, 2004. Final revisions will be presented to the client on or about March 25th, 2004. As previously stated the public meeting will take place on April 1st, 2004. The Team's final report of findings will be presented to the client on or before April 28th, 2004.

COMMUNICATION:

The Team will report exclusively to ***Bob Terrell*** and will present their findings to ***Bob Terrell*** or his designee or appointee. The Team reserves the right to interview individuals and research sources it deems appropriate for this inquiry.

CONSIDERATION AND EXPENSES:

Each member of the Team shall spend approximately 10/hours per week on this project. No payment is expected from the Client. A small expense account financed by Department of Urban Planning and Policy has been established for copying, travel, and

other project related material. Other expenditures requested by the Client shall be financed by the Client.

Materials supplied by the Team shall not be construed as a certified or executable engineering, planning, economic development, regulatory, or legal study. The Team makes no engineering claims as to the appropriateness or application of available transit technologies to Washington Street. No warranty, professional certification, or determination of appropriateness shall be applied or conveyed via materials supplied by the Team.

This MOU can be revised and renegotiated with the agreement of all members of the Team and the Client.

This agreement is executed this day_____ of February 2004 by the undersigned parties:

Robert L. Tessell, WASHINGTON STREET CORRIDOR COALITION

Client

Danielle Fillis

Danielle Fillis

Heather Knopsnyder

Heather Knopsnyder

Joanne Telegen

Joanne Telegen

Thomas Dugan

Thomas Dugan

Rusty Russell (Tufts Faculty Advisor)