Trends in Somerville:
Transportation & Infrastructure Report
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I. REPORT INTRODUCTION

The City of Somerville depends upon its infrastructure which provides the fundamental systems needed for residents to undertake their daily routines and employment, for businesses to thrive, and new development to proceed. The transportation network within Somerville allows the population to be mobile and brings people and business into and out of the city. The history and patterns of development for both the transportation and infrastructure network affects the City's ability to reach economic development and land use goals. By understanding the historical patterns and current capabilities and functionalities of these systems, and comparing our current conditions with surrounding communities, Somerville can better prepare itself to meet future demands and desires.

This report was prepared by the Mayor's Office of Strategic Planning and Community Development (OSPCD) in order to establish a solid foundation of data from which to inform future policy decisions. Key findings of the report include the following:

Infrastructure

- The majority of Somerville's active sewers were constructed by 1920, and are combined with storm water drainage.
- Somerville's twelve original combined sewer outfall sites have been reduced to only two.
- The eastern portion of Somerville experiences significant drainage problems due to, in large part, the construction of dams and the filling of the historic Millers River with heavy rail infrastructure.
- Average daily consumption of water in Massachusetts Water Resources Authority (MWRA) communities has been steadily decreasing, from about 8 million gallons per day in 1992 to just over 6.3 million gallons per day in 2007(-21.25%); water use in Somerville declined by roughly 20% during the approximate same time period.
- The majority of Somerville's home heating comes from utility gas (62%), significantly more than many of its neighboring cities: Boston (48%), Brookline (41%), Cambridge (63%), Chelsea (41%), Everett (50%), and Medford (43%).
- Due to the commuter and freight rail lines that run through the city much of Somerville is divided, or connected, by bridges.
- Somerville has made significant investments in its roadways – paving 100 streets in the last four years and completing four major road reconstruction projects.
- Somerville's public urban forest comprises over 11,000 trees, which provide an estimated $16 million in annual ecological, economic, and social benefits to the city.

Transportation

- Given Somerville's limited access to public transportation (compared with other nearby cities and towns in the inner core of Boston metro area), Somerville residents use public transportation at high levels—nearly one in three commuters use public transportation to commute to work. This is on par with ridership levels in transit-rich Brookline, and above public transit usage levels in Cambridge.
- The MBTA bus network provides most of Somerville's access to public transportation (along with Davis Square T stop, and nearby Porter and Sullivan Square T stops). Bus reliability is a major concern in Somerville, as on-time service in a problem for nearly half of the 15 bus routes that run through Somerville.
- Most Somerville residents (85%) travel outside of the city to find employment. Somerville is a bedroom community due to the imbalance in available jobs to available housing units, with

a ratio of 0.71 jobs per one housing unit. There are only 0.48 jobs available per Somerville resident in the workforce.

- Somerville has more miles of roads per land area than any other surrounding community—approximately 25 miles of road per square mile of land.
- Somerville homeowners are less likely than most surrounding communities to have access to a vehicle, while Somerville renters are more likely than most surrounding communities to have access to a vehicle.

Future transportation projects

- After years of taking on burdensome transportation infrastructure (elevated highways, heavy rails), Somerville is now poised to benefit from mass transit investment, developed in partnership with the federal and state governments.

The Transportation and Infrastructure Trends report is divided into five major sections and various subsections. They are:

I. Introduction
II. History
III. Infrastructure Trends
    A. Sewers
    B. Water
    C. Telecommunications
    D. Utilities
    E. Tunnels and Bridges
    F. Roadways & Reconstruction Projects
    G. Green Infrastructure
IV. Transportation Trends
    A. Vehicular Traffic
    B. Vehicular Accidents
    C. Commute to Work
    D. Buses
    E. Rail Service
    F. Paratransit
    G. Registered Vehicles, Car Availability, and Car Sharing
    H. Bicyclists and Pedestrians
    I. Bicycle and Pedestrian Accidents
    J. Truck Routes
    K. Water Transportation
    L. Parking
V. Future Transportation Projects
    A. MBTA Green Line Extension
    B. Community Path Extension
    C. MBTA Orange Line Station Addition at Assembly Square
    D. Urban Ring

Data Sources and Methodology:

Infrastructure data was mainly derived from internal city departments and a series of reports commissioned by the City and prepared by the engineering firm Camp, Dresser and McKee. Water data sets were provided by the Massachusetts Water Resources Authority (MWRA).

Information about the pre-20th century transportation development portions of the Transportation History Section relied heavily on information gathered from historical resources such as *Beyond the Neck: The Architecture and Development of Somerville, Massachusetts*. A significant amount of the narrative about highway expansion and mass-transit initiatives was informed by data from various City-sponsored corridor studies and reports.

The primary data sources for the Transportation Section were the U.S. Census, the Boston Metropolitan Agency's (MPO) Central Transportation Planning Staff (CTPS), the Massachusetts Bay

Transportation Authority, and Mass Highway. The Census provides transportation data that are extremely rich in detail; however, significant limitations must be acknowledged:

1. The most complete Census data currently available was collected in 2000, and may not accurately reflect conditions on the ground in 2009.
2. Annual estimates published by the Census Bureau since 2000 (the "American Community Survey", or ACS) offer significantly less detail and less accuracy than the decennial Census. The ACS reports data from 2007. The margin of error for many of these datasets is very high.

Other information, such as data on the services of SCM Community Transportation or the information regarding Zipcar, came through interviews and email conversations with staff at the respective agencies or organizations.

Comparison with Other Jurisdictions:

To provide context for Somerville's ongoing trends and changes, this report uses a number of comparable statistics, including data at the state, metropolitan and local scales.

Nearly all of the metropolitan Boston area has the same, or similar, experiences with infrastructure implementation. This report, then, seeks to identify unique aspects of Somerville's infrastructure improvements and limitations.

For the transportation trends, significant comparison is drawn between Somerville, Boston, Brookline, Cambridge, Chelsea, Everett and Medford. Some communities were chosen based on geographic similarities within the region, such as Brookline, Everett and Chelsea's relative distance from the main city center. As much of the public transportation and road network is focused upon reaching downtown Boston and other key job centers, it was important to consider these communities in commuting and mobility choices. Cities such as Cambridge and Boston were included in order to draw comparisons with easily identifiable trends and policies.

By comparing key transportation and infrastructure findings with surrounding communities, the City of Somerville will be able to study policies and protocols undertaken by other municipalities, and the effects of these policies, to shape the City in ways beneficial to residents, business owners, and visitors.

II. HISTORY

Throughout its modern history, Somerville has served as a vital travel corridor, providing an important link to communities north of Boston via railroads and major roadways developed in the 19th and 20th centuries. The city's auspicious location led to significant industrial and residential development in a relatively short amount of time. This early expansion called for the rapid—and sometimes under-planned—construction of infrastructure to accommodate Somerville's growing population and resource needs. Some elements of Somerville's infrastructure (e.g., its sewers) still exist in their earlier forms, creating challenges for city planners. Even so, while other cities across the nation struggle to restructure their urban fabric to support transit-oriented development, smart growth, and "greener" infrastructure, for instance, Somerville is fortunate to already be adapted for such opportunities, with its grid-like street networks that connect commercial squares with surrounding residential communities.

With its emphasis on city-centered growth, energy efficiency, transit-expansion, and new, local development projects, Somerville is poised to take renewed advantage of its physical history and create greater internal efficiencies within its transportation and infrastructure networks. Understanding how the city evolved as a physical and structural landscape can provide significant insight and guidance as the city moves forward, while offering insight into preserving its unique urban character.

Lay of the Land

> "…*Somerville is perhaps more finely situated for pleasant and healthy residence than any city in the neighborhood of Boston. It contains more high ground than any other suburb…"* –
> Boston Post, 1882

Somerville's geography and topography have directly shaped its development and continue to affect its growth. Its rolling hills, or drumlins (sprung from glacial collisions and floods), provide the setting for ample residential development while lowland river and clay-deposit areas served as ideal locations for industry. Seven hills comprise the topography of Somerville, including Central Hill, Mount Benedict (or Plowed Hill), Cobble Hill, Prospect Hill (or Mount Pisgah), Spring Hill, Winter Hill, and Clarendon Hill (also known as Walnut or Strawberry Hill). Several of these hills were leveled to fill marshes along the Mystic River and at the Miller's River.

First Roads

In 1630, surveyor Thomas Greaves laid out Somerville's first roads. Today's Washington Street is the earliest known thoroughfare in the city. Built in 1628 (two years before Boston's settlement) under the original name of "Road/Highway to Newtowne," Washington Street ran from the Charlestown Neck to Harvard Square. Other early roads include Winter Hill Road (now Broadway), which ran to Medford and later connected with Arlington; Charlestown Lane (once known as Milk Row and now Somerville Avenue), extending from Washington Street to Medford as a main route through Somerville; and Main Street, running from Winter Hill to Medford over Craddock's Bridge (the first bridge built over the Mystic River).

In addition, eight lanes known as "range ways" led from Washington and Bow Streets, Somerville Avenue, and Elm Street over the hills to Broadway, each of them one-quarter mile apart to make space for hay fields. These included Franklin, Cross, Walnut, School, Central, Lowell, and Cedar Streets, and Willow Avenue.

Middlesex Canal

Known as the "big dig" of the late 18th century, the 27-mile-long Middlesex Canal ran through Somerville to connect the Merrimac River (in what is now Lowell) with the Charles River at Sullivan Square in Charlestown. After a decade of construction, the Canal opened in 1803, creating a travel route for boats bringing goods such as textiles and granite from the Merrimack Valley to the Boston Harbor. Though the Middlesex served as a model for later canals such as the Erie Canal, when the Boston and Lowell Railroads began operating in the 1830s, the Canal could not compete and closed in 1852. Parts of its original course, however, can still be traced today.

From Farming Community to Suburban Town

Due largely to the efforts of citizen-lobbyists who encouraged the development of transit between Somerville and Boston, Somerville formally separated from Charlestown and was incorporated as a town in 1842. After numerous failed attempts at operating several toll roads, the Boston and Lowell Railroad was constructed in 1835 on the right-of-way where the Lowell line of the MBTA commuter rail now runs. This corridor soon saw significant residential, industrial, and commercial development. In 1841, the Fitchburg Railroad was constructed, also leading to the creation of a flanking industrial corridor, the remnants of which exist today.

At that the time, the area in and around Somerville's Ward 2 was extremely well-situated to manufacture and distribute goods for Cambridge, Charlestown, and Boston. Thus, industry began to dominate the area, with the construction of slaughterhouses in the 1850s marking Somerville's early transformation from a brick-making and farming town to a manufacturing and food-processing center. Moreover, with industrial development proliferating, residential use became concentrated in the area known today as "Brickbottom," named for the clay-filled marshy soil and the nearby brick kilns. In 1855, Linwood, Chestnut, Joy, and Poplar Streets were platted over brickyard land and developed for workers' homes.

Evolution of Railroads

> *"The city of Somerville, without the Boston and Maine Railroad … is simply an unimaginable community*." – *Somerville Journal* editorial, (turn of the 20th century)

Walking prevailed as the main mode of transportation in Somerville through the 1860s, mostly because of the high price of available transit. In 1841, the Fitchburg Railroad began passenger service, leading to rapid residential development of the Prospect Hill and Spring Hill neighborhoods. This transit-driven pattern was repeated throughout the city—in 1864, when a street railway from Union Square to Boston (extended in 1871 to West Somerville) was created; in 1870, when the Arlington Branch Railroad was extended to Davis Square; and in 1889, when electric streetcar service was introduced. In every location where mass transit was available, residential neighborhoods sprung up, giving urban mobility to thousands.

Widely available, regularly scheduled transportation also fueled the doubling of the city's population between 1850 and 1860 as steam rail service improved on the Boston, Maine, and Fitchburg lines. Two horse cars were also put into service in 1858, connecting Winter Hill and West Somerville with Charlestown and Boston. One of these lines ran through Elm Street, Milk Row, and Washington Street; the other along Broadway. Horse-powered street railways were expanded throughout the 1860s with a new line extending from Union Square to Boston and later to West Somerville directly. Within city limits, the local Somerville Horse Railroad Company extended from Union Square to Davis Square along Somerville Avenue and Elm Street. By the turn of the century, the Boston and

Maine Railroad alone had eight large stations in Somerville and nearly every resident lived within walking distance.

The Building Boom

The late 1800s saw an explosion of new development as cheap land allowed for the construction of inexpensive houses on small lots. Taxes were kept low, and road building and municipal improvements were made slowly; consequently, street quality began to deteriorate. Low land valuation attracted low sales prices which produced a stock of inferior housing construction.[1]

In response to this expansion—and the attendant population growth—the City of Somerville constructed its first sewer line along Marshall Street in 1867. Prior to that time, there were only a handful of crudely build private drains in portions of East Somerville and Prospect Hill. In 1868, public sewers were built in areas of Brickbottom, Union Square, and Spring Hill, and by the mid 1870s nearly 40,000 feet of public sewer lines had been constructed.

Also during this time, the city's first combined sanitary and storm water sewer line was constructed along what is now the McGrath Highway. It is worth noting that the majority of the sewer infrastructure built between the mid 1860s and early 1900s is still in use today. For instance, Somerville's main combined-sewer and storm-water drain, built in 1873, manages about two-thirds of Somerville's land-area water flows (see "Infrastructure Trends").

In 1868, Somerville contracted with the Mystic Water Board of Charlestown to lay a water main line from Walnut Hill Reservoir through the city, thus providing Somerville with its first public water supply system. Twenty years later, the City installed a high service system—consisting of a pumping station on Cedar Street and a wrought iron standpipe on Belmont Street—to better serve Somerville's areas of high elevations. (This system has since been abandoned.) As with sewers, Somerville had installed a majority of its water distribution main lines in use today by the end of the 19th century.

By 1892, Somerville ranked as the nation's third largest meatpacking city, and many industrial districts were being established along the city's edges. Indeed, commercial centers continued to spring up along Somerville's many transfer points. Each of the city's squares was developed around a prime transit node, although Union Square, Davis Square, and Gilman Square quickly became the largest retail and light manufacturing districts. This decentralized commercial district system served residents well, as each residential neighborhood maintained easy access to at least one of the squares.

In the late 1800s, as another surge of passenger rail stations were built by Boston and Maine Railroad, the city's population quickly doubled again, resulting in Somerville's first housing shortage. Electric streetcar service had made transportation cheap and easy between Boston and West Somerville, and the area was receiving daily service from 53 trains via the Arlington and Lexington Branch Railroads as well as three horse-car lines.

During this time, industry erupted along the railroad corridors, particularly in southeastern Somerville, where several railroad lines crossed. This area, a low floodplain, marked the location of the Miller's River marsh. The uncontrolled filling and industrial occupation of the marsh between Somerville and Cambridge caused enough pollution that the Commonwealth, in the late 1920s, issued a

[1] *Beyond the Neck: The Architecture and Development of Somerville, Massachusetts*, Updated Edition 1990

permit allowing the Boston and Maine Railroad Company (B&M) to fill in and develop the Miller's River tidal estuary[2]. As a condition of the permit, B&M built three pipelines to carry drainage to the Charles River. Unfortunately, these pipelines were never maintained, and their conditions worsened when the river's natural tidal action—which flushed the pipelines clean twice each day—was stopped due to the construction of the Amelia Earhart and Charles River Dams. Consequently, the three pipes have become almost entirely clogged with silt and sand, violating the State permitting conditions and effectively land-locking stormwater flowing from most of East Somerville[3].

Demolition of Brickbottom

In the early 1900s, the City conceived of a cross-town boulevard that would connect Cambridge, Somerville, and ultimately communities to the west and north of the city. In addition to increased access, this boulevard would provide residents a path for relaxing "Sunday drives." The final product, however, missed this initial intention, taking the shape of the Northern Artery (aka, McGrath Highway). Completed in 1925, the Northern Artery was designed entirely for the automobile and effectively separated East Somerville and Winter Hill from one another. Because the road bisected Brickbottom, almost an entire block of the neighborhood was consumed by the expanded roadway, and the area was also disconnected from Union Square and the rest of the city.

In anticipation of the Inner Belt Expressway and the redevelopment of an industrial park, all of the houses in Brickbottom were razed in the 1950s. Hundreds of buildings were demolished and several streets eradicated along its route, including the tree-lined Fellsway that had once linked Somerville to the Middlesex Fells Reservation. While Somerville had drafted plans for an Inner Belt Industrial Center to prosper through access to the expressway, construction of the Inner Belt was halted in 1970, saving many homes but also diminishing the prosperity of the former Brickbottom area.

From Rail to Rubber

Still operating primarily by streetcar and rail, Somerville's population continued to grow through the turn of the 20th century, reaching its peak of 105,813 before World War II. A density of 25,365 people per square mile was achieved largely because of the construction of subdivisions on small lots, closely sited streets, terraces and courts, 2-3 family houses, and little open space acquisition. Indeed, the city's excellent street railway and passenger system and the availability of moderately priced homes, welcomed a ready buyer's market. In response to this growth, more hills were leveled to fill marshland for rail yards instead of recreation areas.

As private automobiles became cheaper and more readily available, Somerville's trolley system and street railways began to decline. By 1958, all passenger train service in Somerville had ended, replaced by intermittent busses running on many of the original streetcar routes. While the MBTA continues to run heavily-used bus service on many of the old streetcar routes, they offer far less access and mobility than the old streetcars.

From this point to the present, the primary mode of transportation in Somerville became the private automobile. Just as they were once shaped around the needs of the train and the streetcar, the city's infrastructure and development decisions have in more recent times

[2] Such a permit would not be issued today due to environmental protection laws barring the filling of wetlands (US Clean Water Act of 1977, Section 404).
[3] Sewer Assessment Report (Draft Report), Somerville, Massachusetts, February 2009 CDM

been shaped around the needs of cars, drastically altering the travel behavior and growth patters of the community.

Highway Expansion

I-695/Inner Belt Expressway

Before the MBTA Red Line came to Davis Square, the Massachusetts Department of Transportation had planned to expand its highway system throughout the Boston metro area. In development since 1948,[4] the plans included a large new construction project extending Route 2 through Somerville as an elevated highway (where the Community Path is now located). This new highway was slated to connect with what was to be known as I-695, or the "Inner Beltway." Interstate-695 would have crossed the Charles River near the Boston University Bridge, cut directly through Central and Inman Squares in Cambridge, and met the planned Route 2 extension in Union Square of Somerville. Seeking to include the Inner Belt as part of the proposed Interstate highway network being developed in the late 1940s, the Federal Bureau of Public Roads (BPR) included the Inner Belt as part of the preliminary national network of 1955.

As demolition of the Inner Belt right-of-way began in Roxbury and the South End in the early 1960s, residents, civic leaders, and academics in Cambridge organized a coalition of different community groups along the route to oppose the Inner Belt. This coalition received a boost in 1960 when the State Legislature granted local communities veto power over highway projects. Fred Salvucci, who later served as transportation secretary under Governor Michael Dukakis in the 1970s and 1980s, was one of the leaders of the anti-Inner Belt protests. As a then-transportation consultant to Boston Mayor Kevin White, Salvucci's opinions had significant influence with city and state officials. The battle he led against highway expansion caught the attention of Representative Thomas P. O'Neil (later Speaker of the House), who protested the potential destruction of neighborhoods along the route. Soon, the protests against the Inner Belt spread to Beacon Hill and Capital Hill, where they gained federal traction.

By the early 1970s, momentum had shifted against the Inner Belt. John Volpe, longtime Massachusetts Department of Public Works commissioner and transportation secretary under President Nixon, promised a more balanced national transportation policy, and campaigned for a transfer of urban highway funds to mass transit. In February 1970, Governor Francis Sargent ordered a moratorium on all new expressway construction within MA 128 (Yankee Division Highway) and ordered a review of all expressway and transit plans in the Boston area. The Inner Belt extension project was officially terminated.

Interstate Highway 93

One portion of the Inner Belt project, however, did manage to survive both extreme protest and the Governor Sargent's moratorium: Interstate Highway 93. By 1967, most of its clearances had been completed, and construction contracts were awarded prior to Sargent's declaration.[5] Thus the Commonwealth had to grant an override of the moratorium in order for the highway to be completed.

[4] Master Highway Plan 1948- CITE

[5] I-93 Somerville Corridor Study Recommendations, Justin Gray Associates, December 1972

Residents of East Somerville, many of whom had received notices that their homes would soon be demolished to make way for a new highway, fought to stop the construction of elevated I-93. As an extension of the East Somerville Neighborhood Association, the activist group Somerville Citizens for Adequate Transportation was formed and eventually combined forces with the Ten Hills Neighborhood Association, whose members faced separation from the rest of Somerville by the construction of I-93. Realizing that their activism was too late to block the highway altogether, residents pushed instead for a depressed highway.

Despite their advocacy on grounds of air pollution, negative health effects, neighborhood destruction, and family displacement, Somerville Mayors Lawrence Bretta and James Brennan both supported the I-93 project as a means of increasing much-needed economic development. Not until 1970 did a local mayor—newly elected Lester Ralph—join citizens in their opposition. In his inaugural address in January of that year, Mayor Ralph (Brennan's successor) denounced the project:

> "…these roads will take more of our precious land from our use and our tax base. They will merely provide another corridor for people in the suburbs to drive right on through Somerville and into Boston. They will create the need for new roads, just as all other roads have done. They will add to the already serious problem of air pollution. They merely postpone facing the real solution…developing mass transportation systems through the cities."[6]

[6] S. Lester Ralph, January 1970, Inaugural Address.

At this time, a legal suit had also been filed by the Somerville Citizen's for Adequate Transportation to stop the construction of the highway. The suit, however, failed in court due to lack of required public hearings[7], and the highway construction continued. Ten homes on each of the streets leading to Mystic Avenue (including parts of Connecticut Avenue, Rhode Island Avenue, Vermont Avenue, and Maine Avenue) were razed, and many residents left the community all together. Displaced residents were paid a minimal fee from the state to relocate, and remaining residents were promised double pane windows and central air-conditioning as compensation for the noise and air pollution caused by the high-volume highway. To this day, those compensations have not been fully granted.[8]

Impacts of I-93

While opening the door to massive transportation flows in and out of Boston from the north, I-93 has had profound effects on the health and stability of East Somerville. Besides bisecting the northeastern section of Somerville along the original route of Mystic Avenue and separating the Ten Hills neighborhood from the rest of the city, elevated I-93 resulted in the loss of numerous housing units and estimated tax revenues of over $300,000 per year in the corridor.[9] Households living in close proximity to the highway have been severely affected by the noise and air pollution caused by the arterial highway. Approximately 70 families living along Bailey Road are now less than 45 feet from the elevated roadway, which is level with their second-story living rooms. Mystic Avenue now comes within feet of

[7] I-93 Somerville Corridor Study Recommendations, Justin Gray Associates, December 1972.
[8] I-93 Somerville Corridor Study Recommendations, Justin Gray Associates, December 1972.
[9] I-93 Corridor Study.

abutting homes, and noise from heavy trucks is especially high in this area.

In 1970, Somerville Citizens for Adequate Transportation once again convened to file a grievance against the State DPW contractor for negligence.[10] Citing excessive noise, dust and congestion, and danger to children, the grievance alleged that highway tax dollars were being used to enrich construction companies, while continuing to endanger, intimidate, and ignore local residents. In addition to demanding a halt to the construction, the document asked for continuous overview of equipment and hazardous areas, fencing around construction areas, training of excavations and holes, and disabling of operable equipment after hours. As the grievance read: "The government must not allow companies, which it employs, to abuse the welfare of the public to such an extent. If these conditions cannot be halted immediately, then the government will have failed miserably in its obligation to those it is meant to serve."

In the meantime, it was becoming apparent that the design and purpose of I-93, as originally conceived in the 1948 Master Plan, no longer met the realities of the transportation situation in 1972. Noise standards adopted by the Federal Highway Administration, for example, would no longer have permitted such a road as designed, and new air quality standards would deem such high volumes of traffic in residential areas illegal. The Clean Air Act of 1971 went so far as to question whether or not urban highways should be built at all.[11]

In 1969, while construction of the highway was still taking place, a report was released revealing that unacceptable levels of air pollution would be generated by I-93.[12] The report, produced by Bolt Beranek and Newman, Inc., at the commission of the Mass DPW, documented survey measurements of pollutants from motor vehicles at several locations near Mystic Avenue, Route 1, and I-93. The measurements showed that:

- Carbon monoxide levels during an eight-hour concentration exceeded EPA standards by up to five times;
- Lead concentrations reached 5-10 micrograms per cubic meter; and
- Benzene-soluble organic matter at concentrations of up to 60 micrograms per cubic meter—over six times higher than the national average of 10-12 for urban areas—were found.

Later, in 1972, a Justin Gray Associates study produced with the Somerville Citizens for Adequate Transportation demonstrated that I-93's design and construction had focused almost exclusively on engineering, traffic flow, and auto-safety, rather than human and environmental impacts. The study identified a series of unresolved problems and critical needs:

- Levels of air pollution were substantially above maximum levels established under both state and national standards.
- Noise levels continued to be one of the major disruptive impacts of the road, exceeding federal standards.

[10] A Case Before the Public: The Residents vs. The Intruders: Grievances of Somerville Citizens Against DPW Contractor Negligence in the Construction of I-93. The Somerville Citizens for Adequate Transportation, May 1970.
[11] US Clean Air Act, 1971.
[12] Air Pollution and Noise From Interstate Route 93, Report No.2195, Bolt Beranek and Newman Inc. April 1971.

- Programs should be developed for analysis and abatement of air and noise pollution through an integrated approach to environmental enhancement and beautification of the corridor.

Though the Commonwealth continued with construction and operation of the highway, I-93 was the last of its kind to be built in a densely settled residential neighborhood due largely to health and environmental standards now required by law for such large-scale highway projects.

Red Line Reaches Davis Square

Almost exactly 20 years after I-93 was built and the highway moratorium was approved by Governor Sargent, a new subway was brought to Somerville via an extension of the MBTA Red Line from Harvard Square in Cambridge to Alewife Station, also in Cambridge. The proposal to extend the Red Line had been a response to the Governor's halt to highway construction within Route 28. Somerville Mayor Lester Ralph had asked the Governor's Boston Transportation Planning Review to look at the possibility of including a stop at Davis Square, which was experiencing severe economic decline. A planning study for the City in 1980 found that continued losses, combined with a shifting trade area, a lack of competitiveness among merchants, traffic congestion, inadequate parking, and deteriorating appearance had contributed to the decline of Davis Square.[13] The proposal to bring the Red Line Extension through Davis Square was seen as the stimulus for a thorough City-sponsored plan for the revitalization of the Square.

In 1977, the Somerville Office of Planning and Community Development and the Metropolitan Area Planning Council (MAPC) produced the first Davis Square urban design and business study, and city residents and business owners formed an advisory committee, the Davis Square Task Force. Throughout the planning process for Davis Square, the Red Line was seen as the cornerstone of the revitalization effort. The Davis Square Action Plan of 1982 stated: "Prospects for Davis Square's future are bright. City officials and local residents are convinced that the downward trend has run its course and that Davis Square is on the verge of major revitalization."

Indeed, this renewed optimism resulted in large part from the MBTA's decision in 1976 to extend the Red Line from its former terminus in Harvard Square to Fresh Pond in Cambridge. And just 11 years later, their optimistic projections proved true:

> "Davis Square appears to have passed the turning point on its way to recovery. Businesses in the Square, old and new alike, are generally thriving and public confidence is high. The Red Line clearly helped to stimulate this revitalization, but it was clearly accomplished only by a cooperative effort of the municipality, local merchants and the residents of Davis Square." (Red Line Extension to Alewife: Before/After Study, December 1987)

Costs of Somerville's Transportation System[14]

While Somerville certainly benefits from its transit-based infrastructure, the City pays a high price for the system as it is today. The MBTA commuter rail routes that cut through Somerville place large burdens on the City by chopping it into isolated sections and increasing traffic congestion. Because vehicles are only able to cross

[13] Red Line Extension to Alewife: Before/After Study, December 1987

[14] Denise Provost, Alderman At Large, Comments on the Draft Regional Transportation Plan 2000-2025, February 26, 2002.

the tracks on a few streets (Lowell Street, Central Street, Sycamore Street, School Street, Medford Street and Walnut Street), these streets often create bottlenecks. Pedestrians and bicyclists alike are inconvenienced by having to be routed over bridges.

The Lowell line cuts northwest across the northern portion of the city. The tracks divide the easternmost part of the city, restricting access to the Inner Belt Industrial Park area to a dead-end running off Washington Street. This situation has limited the economic development of that area. The tracks cross a railroad bridge over Washington Street; west of that point, the tracks may be crossed only by bridges owned by the Commonwealth and controlled by the Massachusetts Highway Department.

The greatest transportation cost to the City may be associated with land taken from other uses and removed from the tax base. Somerville encompasses only four square miles, yet almost 44% of its land is tax-exempt. Much of that land includes the vast tracts of East Somerville rail yards and tracks owned by the MBTA or the Guilford Railway. Sizeable areas are also consumed by McGrath Highway and I-93. In 1970, the late Boston Globe columnist Alan Lupo reported that the I-93/Inner Belt project would take 98.7 acres of land in Somerville. Lupo stated that construction of I-93, just at its start then, had already removed $303,340 in tax revenues, or 1.5% of its tax base, from the city. Those acres and taxes are still gone, multiplied by 32 years. As for "hard" costs, Somerville pays the fifth-highest MBTA assessment in the state: $4.81 million in Fiscal Year 2001, while receiving among the lowest levels of service.

Return to Rail

Somerville (and the Greater Boston area) is making great strides to return to a rail-oriented transportation system. The city currently sits at the forefront of efforts to expand the MBTA Green Line beyond Lechmere Station in East Cambridge through southeast and central Somerville and west to Medford, with a spur to Union Square. A new Orange Line stop at Assembly Square is also being planned. Also, the Urban Ring project aims to provide circumferential bus service through Somerville and surrounding communities, and the widely used Somerville Community Path is planned to extend to Boston.

Today, 30% of Somerville's population lives within a half-mile of transit centers. With the above initiatives in place, that number will jump to 85%, an increase in transit service that few cities can boast. The history of infrastructure development within Somerville has allowed the City to make the transition back to rail, which is supported by a neighborhood form that originally supported and continues to be appropriate for transit.

As communities throughout the country seek to embody principles of smart growth and traditional forms of urbanism by the promotion and development of dense, walkable communities, Somerville enjoys the advantage of having a physical form that was built upon these principles years ago. The city's street network—with roads that connect in a modified grid pattern—along with a walkable pedestrian-and bicycle-friendly environment, and the potential for a public transportation system that will provide access throughout the city and the Greater Boston region, all help to make the City prepared to move forward as a walkable, livable place to live, work and play. Its population is diverse, its neighborhoods dense, and its commercial centers well distributed throughout the City in mixed-use patterns. While other cities and towns are working hard to replicate

this fabric and face challenges of contemporary zoning regulations and land-use patterns, Somerville appreciates its assets as a community formed around transit, and works to integrate them into the planning decisions that lie ahead.

III. INFRASTRUCTURE TRENDS

A. SEWERS

Finding #1: The majority of Somerville's active sewers were constructed by 1920.

The City of Somerville's first public sewer line was built shortly after the end of the Civil War, along Marshall Street, in 1867. Prior to that time, there were only a handful of private drains crudely built with brick and stone running across portions of East Somerville and Prospect Hill.

In 1868, public sewers were built in three sections of the town: Brickbottom, along Linwood and Poplar Street; Union Square, along Bow Street; and Spring Hill along Summer Street and Somerville Avenue. As the city grew so did its infrastructure, and by the mid 1870s, nearly 40,000 feet of public sewer lines had been constructed. It was during this time that the first combined sanitary and storm water sewer line was constructed, running along what is now the McGrath Highway. By 1907, Somerville's sanitary sewer system included approximately 90 miles of pipelines handling sewage and storm water; serving 90 percent of the land area in Somerville.[1]

The majority of the sewer infrastructure built between the late1870s and the early 1900s is still in use today (Map 1). Somerville's "Main Drain," a 48-inch brick combined sewer and storm water drain built in 1873, still manages about two-thirds of Somerville's land area water flows. The Main Drain runs southwest from McGrath Highway to Washington Street, northwest from Broadway via Beacon, Elm, and Holland Streets, and then easterly to Powder House Circle. This drains to the Massachusetts Water Resource Authority (MWRA) trunk line and the Deer Island Treatment Plan.

Today the City's collection system consists of varying configurations of sanitary sewers, combined sewers, and storm drains. There are approximately 165 miles of sewer lines currently in operation, serving 2,350 acres:

- 68 miles of combined sewer lines;
- 62 miles of separate sanitary sewers; and,
- 35 miles of storm drains[2].

Finding #2: The majority of Somerville's sewers are combined with storm water drainage.

The type of sewer and storm lines currently serving the city are described below:

- **Combined sewers** (CS) are pipes or conduits intended to carry both sanitary and domestic wastewater, industrial wastewater, and storm water;
- **Separate sanitary sewers** are pipes or conduits intended to carry only sanitary or domestic wastewater;
- **Storm drains** are pipes or conduits intended to carry only storm water.

[1] City of Somerville Engineering Dept.

[2] Sewer Assessment Report (Draft Report), Somerville, Massachusetts, February 2009 CDM Ibid.

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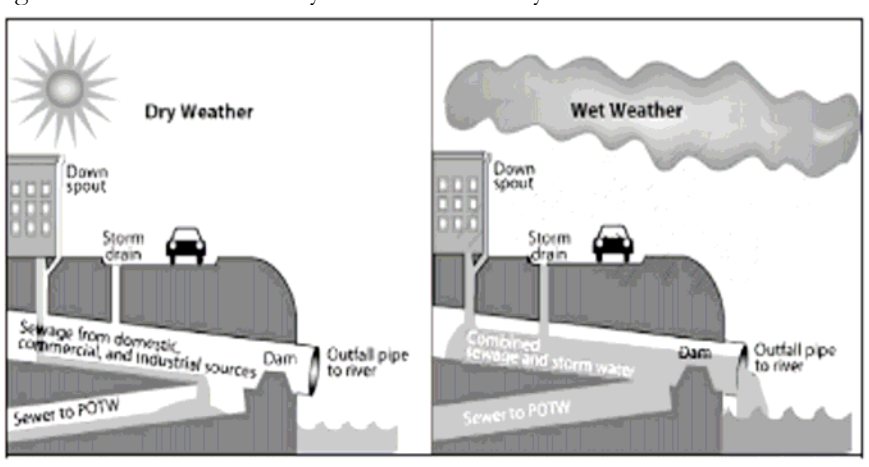
The majority of Somerville is served by a combined sewer system[3]. Combined sewers lines are considered problematic mostly during wet weather when large amounts of storm water overwhelm the pipelines and combine with sewer water, which leads to an overflow in the outfall pipes. Map 2 highlights that, for the most part, the oldest part of the City's sewer system is a combined system; the newer parts of the system (in areas such as Ten Hills and the far western section of the City) are separated sanitary and storm water systems.

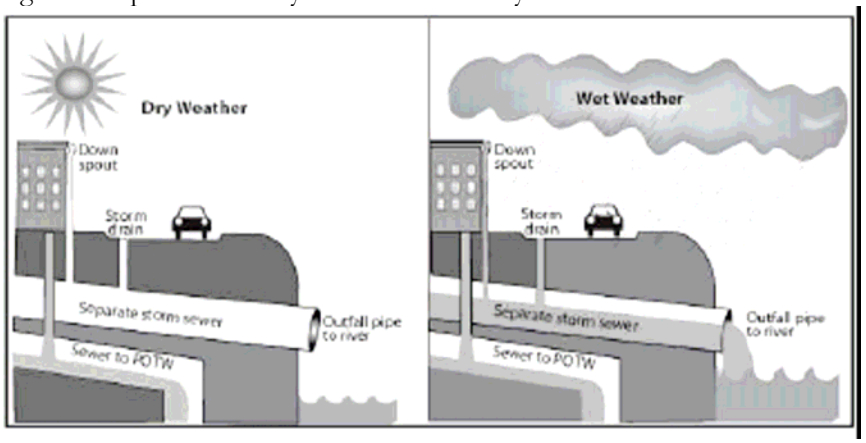
Figures 1 and 2 below illustrate the behaviors of a combined sewer versus a separate sewer during both wet and dry weather:

Figure 1: Combined sewer system in wet and dry weather



Source: EPA, 2004

Figure 2: Separate sewer system in wet and dry weather



Source: EPA, 2004

Finding #3: Somerville's twelve original combined sewer outfall sites have been reduced to only two.

In 1974, civil engineers at CDM reported that the city's sewer system could not adequately manage storm flows of any great magnitude[4]. This problem impacted all of metropolitan Boston. A combination of increased runoff, due to expanding impervious surfaces, increased population and aging pipes had reduced the efficiency of the water flow through the city's collection system. A comprehensive effort, led by the MWRA and its member communities, has eliminated many combined sewer outfalls by rerouting overflow to the Deer Island treatment facility. Today, just two outfalls remain from a high point of twelve: one on the Mystic River and one at Alewife Brook (see Map 2). Efforts are now underway to eliminate the Mystic River CSO and reduce the impact of the Alewife Brook outfall.

[3] Sewer Assessment Report (Draft Report), Somerville, Massachusetts, February 2009 CDM.

[4] "Report on Improvements to the Water Distribution System," City of Somerville, Camp Dresser & McKee Inc. February 1974.

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Further reduction of the remaining City-maintained CSO poses considerable technological and economic challenges, as significant portions of the sewer system in the remaining CSO areas are low-lying and would likely require stormwater pump stations to prevent frequent flooding. CDM consultants, however, have asserted that three principal drain routes for existing drainage could be used to direct separated stormwater drainage to receiving waters[5]:

1. **Marginal Facility Area:** This system (which currently carries both sewage and drainage) has sufficient elevation to potentially allow gravity drainage under most conditions, with potential discharge either upstream of the Amelia Earhart Dam or downstream.
2. **Millers River Area**: This system also holds enough elevation to allow for gravity drainage, although its drain system would likely need extensive modification before it could be used reliably.
3. **Somerville Avenue/Washington Street/Beacon Street Sewer Area:** This area comprises the city's largest drainage area, as well as the highest level of CSO control (all drainage routes to Prison Point or Deer Island). Because the system is low-lying and remote from receiving waters, any direct routing of its stormwater would require a full-time dedicated pump station. The construction of a 120-inch relief drain and subsequent sewer separation in the watershed is the primary solution to the majority of the city's flooding. Accordingly, the current Somerville Avenue project includes a major upgrade to the existing sewer line.

[5] "Sewer Assessment Report, Discussion Draft Transmittal," Camp Dresser & McKee, February 2007.

Finding #4: The eastern portion of Somerville experiences significant drainage problems due in large part, to the construction of dams and the filling of the historic Millers River with heavy rail infrastructure.

Much of Somerville's drainage system pre-dates the construction of two dams: the Amelia Earhart Dam on the Mystic (1967) and the New Charles River Dam (1978)[6]. As a result, the storm drains lay lower than the current level of the receiving waters – specifically the Mystic River along the city's northeastern border and the Charles River to the southeast. Due to the construction of these two dams, the receiving waters are maintained at constant levels well above their historic low levels. This causes flooding when the low-lying system cannot drain correctly. Most of the city's storm water has to be routed to the MWRA and pumped through their sewer system due to the general low elevation the of the city's drainage system relative to the receiving waters.

Somerville's drainage problem is further exacerbated by the filling of its natural outlet to the Charles River. Once a 1,000 foot-wide tidal inlet separating Somerville and Charlestown, the Millers River was progressively filled to build train yards and industrial land. The only visible evidence of the Millers River today is a small culvert running through the MBTA commuter rail yard.

In the late 1920s, the State issued a permit allowing the Boston and Main Railroad Company (B&M) to fill in and develop the Millers River tidal estuary[7]. This marshy area once permeated the

[6] Sewer Assessment Report (Draft Report), Somerville, Massachusetts, February 2009 CDM

[7] Such a permit would not be issued today due to environmental protection laws barring the filling of wetlands (US Clean Water Act of 1977, Section 404).

southeastern section of the city and served as a natural drainage conduit from Somerville to the Charles River. As a condition of the permit, B&M built three pipelines to carry drainage to the Charles River. Unfortunately, these pipelines were never maintained, and their conditions worsened when the river's natural tidal action—which flushed the pipelines clean twice each day—was stopped due to the construction of the Earhart and Charles River Dam. Consequently, the three pipes have become almost entirely clogged with silt and sand, violating the State permitting conditions and effectively land-locking stormwater flowing from most of East Somerville[8].

When the B&M Railroad sold its property in the 1960s, it allowed the developers of what is now known as the Inner Belt Industrial Park to connect their drainage pipes into a poorly functioning and silt-clogged culvert, also referred to as the Old Stone Culvert, just off Inner Belt Road adjacent to the current Holiday Inn Hotel.

In 1990, the MBTA proposed replacing the old, non-functioning drainage system with a new, modern system to handle the flows from the Commuter Rail Maintenance Facility as well as track drainage in Somerville from the Fitchburg Line tracks and the New Hampshire Mainline tracks. To date, this drainage system has not been built. Instead, drainage was built only to Inner Belt Road and tied into the old existing and failing conduit. [9] As a result, the entire Inner Belt district often experiences flooding after a heavy rain. [10].

The State Department of Environmental Protection has required the MBTA to produce a plan for improving drainage at its maintenance sites. The status of this plan, however, remains unclear.

In January 2007, Somerville's City Engineer wrote a letter to the Mass DEP and the U.S. Environmental Protection Agency requesting that the MBTA follow through with their initial plan in the 1990s to replace the non-functioning drainage system at the Commuter Rail Maintenance Facility as well as to implement track drainage in Somerville from the Fitchburg Line tracks and the New Hampshire Mainline tracks. DEP and the EPA responded by ordering the MBTA to complete a study of their drainage system, clean out the three 48-inch pipes that drain to the Millers River, and determine the pipes' adequacy for handling the current drainage volume. The order also required the MBTA to generate a plan for drainage improvements through their property in Somerville. While compliance with this order is required for renewing its National Pollutant Discharge Elimination System (NPDES) stormwater permit, the MBTA has yet to follow through with the actions.

Finding #5: The Assembly Square development provides new opportunities to improve portions of the stormwater collection system.

Federal Realty Investment Trust, the lead developer of the Assembly Square district, has agreed to implement a series of improvements to the poorly configured and outdated sewer system that exists at the project site in East Somerville. This development is expected to add over 15,000 gallons per day into the municipal and MWRA collection system[11]. The following improvements have been recommended and agreed to:

[8] Sewer Assessment Report (Draft Report), Somerville, Massachusetts, February 2009 CDM

[9] Sewer Assessment Report (Draft Report), Somerville, Massachusetts, February 2009 CDM

[10] Charles O'Brien, City Engineer, personal communication, July 16th, 2008.

[11] Preliminary Master Plan PUD, Assembly Square Stormwater Management Maintenance Memo, VHB, 2006.

- Replace the existing 12-inch sewer trunk line and collector pipes to provide sufficient capacity for additional wastewater flows generated by the proposed development;
- Realign the new 18-inch trunk line to pick up sewer flows from existing 12-inch sewer that collects discharge from Home Depot and Circuit City;
- Install a special drop-sewer manhole over the existing sewers in order to connect with the new 18-inch trunk line;
- Divert stormwater runoff from the Ten Hills neighborhood away from the city's sewer system and into the Mystic River (approximately 256,000 gallons of storm drainage); and
- Eliminate infiltration into the existing clay sewer pipes by installing 1,800 feet of new 18-inch sewer pipes and 3,400 feet of 12-inch sewer pipes (diverting about 28,800 gallons per day).

Consultants from Green International Affiliates (GIA) have reported that the existing drainage system in the Assembly Square District is adequate to convey runoff from a 10-year design storm event, with the exception of the drainage system at Foley Street, which is constricted due to incomplete drain line connections to the Somerville Marginal Conduit. A 2001 GIA report recommends the completion of this connection, which would also align the drain with the proposed street grid and building program to allow future access and maintenance to the storm drain system. In addition, VHB has proposed the following improvements to the existing drainage system:

- Create a system that will collect runoff from non-rooftop surfaces to be treated for water quality and conveyed to the Somerville Marginal Facility;
- Create a separate drainage system to collect the majority of rooftop runoff to be conveyed to the Mystic River through two drainage outfalls;
- Include pre-treatment practices such as deep sump catch basins with oil and gas separation hoods, in-line and off-line water quality treatment units, street sweeping programs, pollution prevention, and snow management plans;
- Where possible, provide underground storage to ease peak flow rates at discharge points;
- Include "green roof" technology to decrease proposed surface runoff; and,
- If possible, create a new dedicated storm drain outfall downstream of the Amelia Earhart Dam to allow peak storm flows to discharge to the tidal portion of the Mystic River.

B. WATER

Finding #6: A majority of Somerville's water system was built by 1900, and the entire system was near complete by 1950.

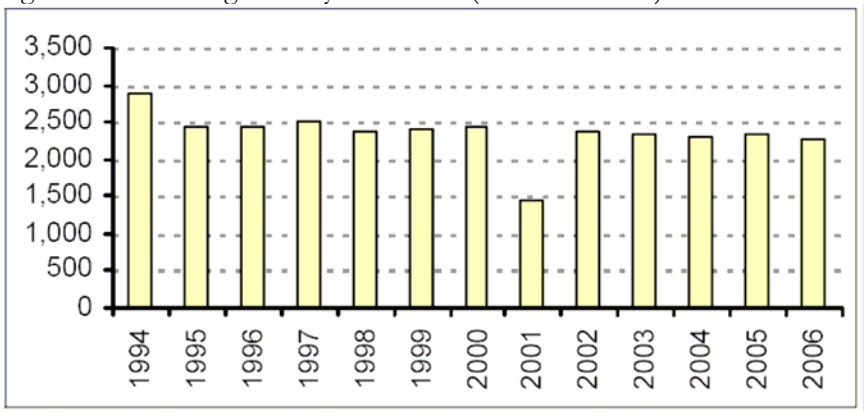
Somerville has had a public water supply system since 1868, when the City contracted with the Mystic Water Board of Charlestown for the laying of the Charlestown water main from Walnut Hill Reservoir through the city. In that year, about 2.5 miles of pipe were installed in Somerville, and the system was expanded rapidly until the turn of the 20th century.

In 1889, the City installed a high service system to better serve Somerville's areas of high elevations. This consisted of a pumping station on Cedar Street and a wrought iron standpipe on Belmont Street, both of which have since been abandoned. By 1900, Somerville had installed about 75 miles of distribution mains, about two-thirds of the present system. Most of the remaining portion of the system was constructed between 1900 and 1950, with very little increase in water piping since. In 2008, however, the City and state replaced about 5,000 feet (.95 miles) of water mains and water services on Somerville Avenue from Union Square to Porter Square. Somerville's distribution system is now made up of approximately 120 miles of water mains ranging from 4 to 20 inches in diameter, with additional water services to be installed in Assembly Square as a part of the planned mixed-use development project.

In their 1974 "Report on Improvements to the Water Distribution System," consultants Camp Dresser and McKee, Inc. estimated that all pipes installed prior to 1950 were coal tar-coated cast iron or wrought iron, while pipe installed after 1950 was cement-lined cast iron.

Finding #7: Average daily consumption of water in Massachusetts Water Resources Authority (MWRA) communities has been steadily decreasing, from about 8 million gallons per day in 1992 to just over 6.3 million gallons per day in 2007(-21.25%); water use in Somerville declined by roughly 20% during the approximate same time period (see Figure 3).

Figure 3: Water Usage: Yearly Water Use (Million Gallons) in Somerville



Source: Massachusetts DEP

All water in the Somerville is purchased by the City Water Department from the Massachusetts Water Resources Authority (MWRA). The source of the MWRA water is the Quabbin Reservoir (capacity 412 billion gallons) located 65 miles west of Boston and the Wachusett Reservoir (capacity 65 billion gallons) about 35 miles west of Boston. The water is delivered through seven MWRA master meters into the distribution system, which is comprised of an elaborate network of pipes, valves, hydrants, and service lines.[12] This

[12] MWRA. *Your drinking water, 2008.* http://www.mwra.state.ma.us/annual/waterreport/2008results/metro/somerville.pdf

system delivers water to homes, businesses, and various facilities for drinking and other uses such as fire protection.

The residential water usage in Somerville between 2005 and 2007 averaged at 47 gallons per capita per day (gcpd).[13] Massachusetts Water Conservation Standards recommend a maximum consumption of 65 gcpd; Somerville falls below this consumption level.[14] As Figure 4 illustrates, 75% of all water purchases are for residential use.[15]

Figure 4: Retail Water Sales in Somerville, 2007			
Residential	1334 MG	3.65 mgd	75 %
Commercial	175 MG	0.48 mgd	10 %
Industrial	191 MG	0.52 mgd	11 %
Institutional	71 MG	0.20 mgd	4 %
2007 Retail Water Sales	1770 MG	4.85 mgd	100 %

Source: MWRA Water Conservation Grant Project. Project Number 07-03/WCG. 2008-2009. p.27.

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The consistent decline in water usage can be attributed, in large part to both technological innovation (see Finding #8 below) and conservation efforts on the part of the MWRA, municipalities, and community groups. The MWRA's water conservation effort consists of three core initiatives: 1) outreach and education; 2) a low-flow toilet retrofit rebate project; and, 3) water use audits designed to reduce non-billed and unaccounted for-water.[16]

In 2008, the MWRA distributed over 490,000 water conservation brochures, 8,500 low-flow shower heads, 17,000 low-flow faucet aerators, and 18,000 toilet leak detection dye-tablets. The total potable water use savings was estimated at over 290,000 gallons per day, more than 100 million gallons total for 2008.[17] In addition, 351 low-flow toilet retrofits were installed in 10 pilot communities (Somerville was not one of these communities). Finally, in Somerville and Quincy, the MWRA conducted pilot water audits designed to balance the volume of water purchased from the Authority with the volume billed by the municipalities to determine the amount of "lost" water (non-billed/unaccounted for).

Note: The drop in 2001 is unexplained and may represent a flaw in existing data.

Finding #8: In 2008, according to the MWRA's Pilot Water Audit Project, Somerville's unaccounted-for water (UAW) was 10% of the total purchased from the Authority. This represented a sharp reduction from the 22% UAW in 2007.[18]

There are five main sources for unaccounted-for-water that is purchased by a municipality from the MWRA but then not-billed to customers: 1) Under-registration due to meter age; 2) Unmetered accounts; 3) Water system leakage; 4) Water main

[13] MWRA Water Conservation Grant Project. Project Number 07-03/WCG. 2008-2009. p.10.
[14] MWRA Water Conservation Grant Project. Project Number 07-03/WCG. 2008-2009. p.10.
[15] MWRA Water Conservation Grant Project. Project Number 07-03/WCG. 2008-2009. p.10.
[16] MWRA Water Conservation Grant Project, Report to Mass DEP, 2008-2009
[17] *Ibid,* page 1.
[18] MWRA, Somerville Non-Billed Water Report, 2007.

breaks; and, 5) municipal water use.[19] Since 2006, Somerville has targeted each of these areas for improvement.

Under-registration: The City first replaced or updated the meters for the highest volume users – primarily industrial or commercial. Outdated or undersized meters that were being overwhelmed by water volumes were upgraded to meet or exceed demands. An estimated 25 MG per year were captured due to this effort.[20]

Unmetered accounts: The City installed meters in 42 commercial or nonprofit buildings that had previously been unmeasured. An estimated 15 MG per year were captured due to the new meters.[21]

Water system leakage: The City switched from a performing a leak detection survey once every two years, as required by MWRA, do an annual survey. Moreover, the City now alternates between digital correlation and sensors in order to improve accuracy. An estimated 50 MG per year will be saved due to the increased monitoring. It is also assumed that 85 MG per year will continue to be lost due to leaks that are too small to be detected.[22]

Water main breaks: As part of the City's lead abatement program, many water main gates are being replaced and updated. These gates allow for greater control of water flow during a water main break. Additionally, over the past eight years, Somerville has invested $8 million to replace over 7.5 miles of unlined cast iron water mains. These improvements should reduce the estimated 17 MG of water lost per year due to breaks.[23]

Municipal water use: Municipal use, in addition to regular building supply, includes flushing hydrants, water system flushing, street cleaning, and open space watering. Since 2007, the City has been installing meters to monitor the open space use and accurately capture the cost to the City. MWRA estimates the municipal water use accounts for 20 MG per year.[24]

Finding #9: In 2008, the City implemented a state-of-the-art, automatic meter reading (AMR) system. Average daily water usage decreased by 5% in 2008, and has been reduced another 5.9% to date.[25]

Using a licensed radio frequency channel, the new "KP Mega-Net" meter reading system will deliver meter information directly to City Hall. Meter Transmission Units (MTUs) will be attached to13,500 meters (many units share meters) in the city, where they will transmit a signal with an actual reading of the water meter to a signalized repeater that will then transfer the information to the City's customer database in real time. At the time of printing, the project was 50% complete.

In addition to the exact and more frequent billing, the new system will allow property owners and the City to monitor water usage. In the event that the water usage pattern at a particular property seems unusually high or low, the City will be able to detect the problem and instantly advise property owners of potential leaks.

[19] MWRA Water Conservation Grant Project, Report to Mass DEP, 2008-2009, pp 24-25.

[20] *Ibid, page25*.
[21] *Ibid,* page 25.
[22] *Ibid,* page 25.
[23] *Ibid*, page 25.
[24] *Ibid,* page 25.
[25] MWRA Water Usage Tables, May 2009.

C. TELECOMMUNICATIONS

Finding #10: High-capacity fiber optic lines were installed along railroad rights-of-way in Assembly Square and down to Inner Belt in the early 1990s.[26]

In hopes that it would spawn a wave of telecommunication uses in the Inner Belt area, a major telecommunications building was constructed at 200 Inner Belt Road in the Inner Belt Industrial Park following installation of the new fiber optic infrastructure in 2001. A downturn in the economy, however, brought the telecom movement to a halt across the region, leaving much of these state-of-the art fiber optic lines underutilized.[27] Only recently have high-tech businesses, such as server farms, begun to take advantage of the technology "cloud" that exists in the Inner Belt District

The Inner Belt is served by two high-capacity fiber-optic backbones that carry a range of providers and provide options to high-tech businesses. One line loops around the outside of the district and then connects to a 100-mile loop around Boston that roughly follows the path of Route 128 and Interstate-93. The second line connects Easts Cambridge to West Somerville via Inner Belt and then extends to Route 16, Route 2 and then out to Route 128. Together, the two lines elevate the Inner Belt levels of access to those of Kendall Square, Waltham and Burlington.[28]

Currently, the City of Somerville does not perform maintenance on fiber optics, although it does own some underground fibers between City Hall and the Somerville Public Library. Most others are owned by and connected directly to RCN. These connections are negotiated through a cable license agreement under which RCN must provide two public access channels.

The biggest telecom service provider in Somerville is Verizon, which the City uses to manage its 311 and 911 calls. All other lines within City Hall are managed and operated internally. By replacing old copper lines with Voice Over Internet Protocol equipment the City has reduced expenditures by 30% over the last few years and is projected to save another 30% as old phone lines continue to be terminated.[29]

Somerville is currently seeking a service provider for a municipal Wi-Fi initiative. The initial setup cost for this system will be between $200,000 and $1 million, though the City's overall investment and involvement will be minimal since it does not seek to own or operate the assets of the system. The City hopes to attract a large vendor capable of building on top of existing towers to produce comprehensive wireless coverage. Overall, the City has very little leverage in this process beyond expressing its interest to the telecommunications industry and providing the permit. The city's density, and its significant population of 21-35 year olds, makes it a prime candidate for the nation's first citywide wi-fi system.

[26] East Somerville NRSA, Five Year Consolidated Plan 2008-2013, City of Somerville, December 2007
[27] Edge as Center: Envisioning the Post-Industrial Landscape, Inner Belt, City of Somerville, January 2006
[28] http://boston.bizjournals.com/boston/stories/2000/07/10/story3.html
[29] Karthik Viswanathan, IT Director, City of Somerville, Personal Communication, August 4th, 2008.

D. UTILITIES

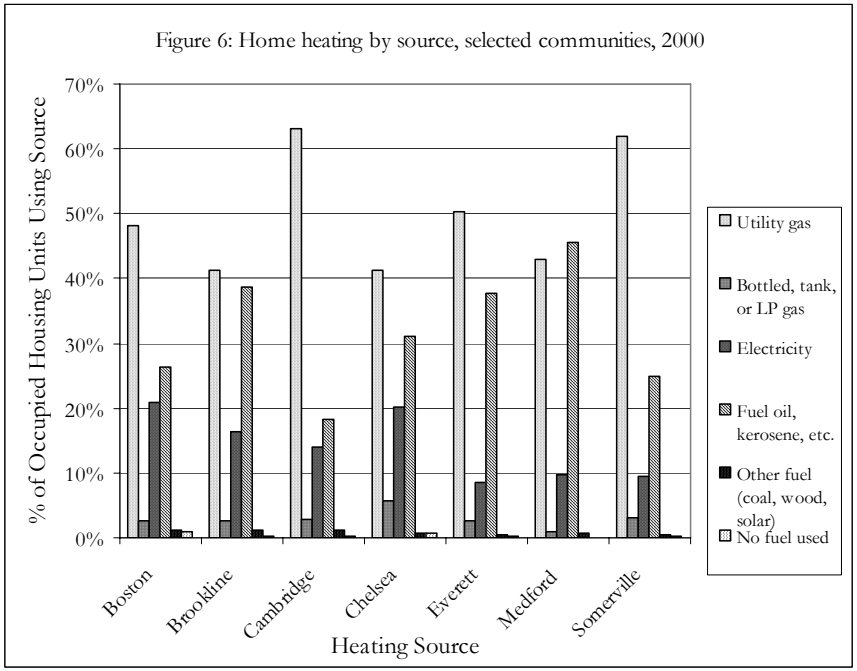
Finding #11: The majority of Somerville's home heating comes from utility gas (62%), significantly more than many of its neighboring cities: Boston (48%), Brookline (41%), Chelsea (41%), Everett (50%), and Medford (43%).

As Figure 5 shows, Somerville has a greater proportion of its home heating source as gas, and uses less fuel oil or kerosene than many surrounding communities. In addition, Somerville, Medford and Everett use 10% or less electricity as a source for heating homes, whereas Boston and Chelsea use 20% or above.

Figure 5: Heating Fuel by Occupied Housing Units

	Boston	Brookline	Cambridge	Chelsea	Everett	Medford	Somerville
Total:	239,528	25,573	42,615	11,888	15,435	22,067	31,555
Utility gas	115,280	10,550	26,903	4,906	7,781	9,479	19,513
Bottled, tank, or LP gas	6,426	639	1,263	689	405	230	954
Electricity	50,270	4,157	5,999	2,403	1,325	2,136	3,009
Fuel oil, kerosene, etc.	62,983	9,874	7,806	3,707	5,807	10,062	7,832
Coal or coke	70	9	0	0	0	5	8
Wood	17	6	0	0	0	7	0
Solar energy	34	0	6	0	0	0	0
Other fuel	2,453	296	491	91	86	122	144
No fuel used	1,995	42	147	92	31	26	95

Source:: U.S. Census, 2000.



Source: U.S. Census, 2000

Only a small number of municipal buildings are warmed with heating oil. Heating oil used by municipal buildings in 2007 (in barrels):

- Franey Road: 59,616
- Public Safety Building: 30,004
- Walnut Street Recreation Building: 6,276
- Somerville High School: 2,705
- Somerville Public Library, East Branch: 1,351
- Edgerly School: 165

E. TUNNELS AND BRIDGES

Finding #12: The narrow, two-lane "tube" railroad bridge providing access to the southern section of the Inner Belt area does not meet current standards and needs to be replaced[30].

Built in the 1960s by the MBTA, the tube bridge was meant to act only as a temporary structure. Nevertheless, today cars, trucks, and emergency vehicles use it to pass under an elevated rail crossing (see Figure 6).

Figure 6: Tube bridge at Inner Belt Road under the Lowell Commuter Rail

Source: City of Somerville.

In an October 2006 letter to the MBTA, the City of Somerville expressed its concerns about the safety of the Inner Belt tube and asked that the MBTA consider re-routing the Commuter Rail so that it no longer passes through the Inner Belt[31]. Earlier discussions between the City and Inner Belt business leaders revealed major concerns about transportation access to the Inner Belt, specifically regarding the tubes under the Lowell Commuter Rail Line; and MBTA staff had already confirmed that the tubes were structurally unsafe, posing a danger to pedestrians and potential liability for the MBTA and Inner Belt businesses[32]. Clearly, such conditions present very real challenges to the economic development of the Inner Belt business district.

The following is a list of specific concerns regarding the tube which the City requested that the MBTA address:

- There is a glare effect inside the tunnels caused by lack of lighting, making visibility poor for drivers. Drivers cannot see pedestrians inside the tubes nor other obstructions.
- As a result of the deformation and inadequate size of the tubes, large vehicles are impeded and become obstructions in the tunnels. Therefore, drivers will often use the other tunnel in counter traffic to avoid waiting for the obstructing vehicle to get through. This is not only a traffic violation but a severe safety hazard.
- There are seven companies in the Inner Belt area that transport hazardous materials in and out of the vicinity. Hence, safe access for Fire Department Rescue and Hazardous Materials trucks, in case of emergency, is of paramount importance.

[30] Inner Belt: Existing Conditions, City of Somerville

[31] Inner Belt Memo, City of Somerville OSPCD to MBTA, October 23, 2006.
[32] Inner Belt Memo, City of Somerville OSPCD to MBTA, October 23, 2006.

The following tunnels and underpasses also have a major impact on Somerville's connectivity:

- Inner Belt Tunnel
  - Strong but restrictive
  - Maintained by MBTA because tracks are above
- Medford Street Underpass
  - Grade separation project in 1912 to raise tracks above the street
  - City maintains walls to bridge and MBTA maintains the abutment
- Washington Street Underpass
  - Rail pumps out underpass
  - Bridge maintained by MBTA and the Guilford freight company
  - Green Line slated to run across this bridge

Finding #13: Due to the commuter and freight rail lines that run through the city much of Somerville is divided, or connected, by bridges.

The following bridges are found in Somerville. Each will have to be re-evaluated in terms of stability and compatibility with the proposed Green Line and Community Path Extensions.

1. **Cross Street Bridge**. This bridge is currently slated for reconstruction but is not on the list for Green Lines Extension replacements.
2. **Walnut Street Bridge**. This is the main route from East Somerville to the city's Central Library and its only High School. The bridge is in poor condition and is subject to a weight limitation. In the first week of January 2002, it was struck by a Guilford freight train and damaged so badly that it had to be closed. Shortly thereafter, MassHighway announced that it would not build a handicapped-accessible pedestrian ramp for use while the bridge was under repair. The City requested a waiver from the accessibility requirement from the Architectural Access Board but was denied.
3. **School Street Bridge**. This bridge was closed abruptly after an inspection in September 2001. Fortunately, the design work had already been bid, so traffic confusion only lasted until construction was finished in December of that year.
4. **Sycamore Street Bridge**. The Sycamore Street Bridge underwent emergency closure in 2000, then re-opened in 2001 with the loan of a surplus Bailey bridge from the Central Artery project. The City paid the costs of installation from its own operating budget.
5. **Central Street Bridge**. The bridge was rebuilt in the early 2000s, allowing it to handle detour traffic from the School Street and Lowell Street bridges to its west.
6. **Lowell Street Bridge**. Closed in May 2000, the Lowell Street Bridge underwent extensive design work for its replacement and is now operational.
7. **Cedar Street Bridge**. The Cedar Street Bridge was closed in 1997 for reconstruction. Mass. Highway used the adjacent City-owned tot lot as a staging area for that project. Their heavy equipment destroyed five mature trees and all of the underground piping for the water play area. The tot lot opened again in the summer of 2001, though the space still lacks trees and a water feature.
8. **Broadway Bridge** (near Ball Square, and the Medford city line).

Finding #14: The City is initiating two separate studies designed to mitigate the negative impacts of the raised Interstate 93 and McGrath Highways.

The studies are looking at the potential to get rid of the raised viaduct portion of McGrath Highway, and to make an additional connection underneath McGrath Highway at Foley Street, improving access for

pedestrians, bicyclists, and automobiles. Both of these projects help restore connections between the two sides of the City. The vision of taking down the raised viaduct of McGrath is to create a multi-modal boulevard in place of a limited-access highway, thus allowing greater connectivity into the commercial areas along McGrath, as well as allowing greater access to the area from the standpoint of both pedestrians and bicyclists. The Foley Street underpass would help establish a safe and efficient route between East Somerville and Assembly Square for all modes of traffic. As the configuration is currently, cars are navigated in dangerous and inefficient routes to access East Somerville or Assembly Square, and an existing pedestrian underpass is dark and has many safety concerns associated with the passing of pedestrians.

F. ROADWAYS & RECONSTRUCTION PROJECTS

Finding #15: Washington Street, Beacon Avenue, Somerville Avenue, Assembly Square Drive and the section of Broadway from McGrath Highway to the Boston line are classified as Urban Principal Arterial roads by the Executive Office of Transportation (EOT).

Road classifications are used to prioritize funding, establish regional truck routes, and influence road design decisions. With the exception of Central Street, which is classified as an Urban Collector, other roads in Somerville not listed in Finding #15 are classified as Urban Minor Arterials. Map 3 shows Somerville's roadway classifications.

Finding #16: Somerville has made significant investments in its roadways – paving 100 streets in the last four years and completing four major road reconstruction projects.[33]

Somerville's road reconstruction projects include:

- **Highland Avenue.** In 1993, as part of a full-depth reconstruction project, this road was excavated to the sub-grade level and built back up with crushed stone, gravel borrow, and bituminous concrete base and pavement. New sidewalks and handicap ramps were constructed, new street trees were planted, and curbing was removed and reset. (Prior to the road project, in 1986, the water services and hydrants had all been replaced.)
- **Somerville Avenue.** Due for completion in the fall of 2009, the Somerville Avenue reconstruction project will consist of the replacement of the sanitary sewer; the installation of a large-diameter storm drain in the street; the installation of new water mains, traffic signals, street lights, roadway and curbs, trees, and street furniture; and the replacement of most of the "combined sewer" in Somerville Avenue with a separate sewer line (the remainder of the combined sewer was lined[34]).
- **Lower Broadway.** Design plans for this future project – slated to begin in 2010 – are underway for the segment of Broadway between Cross Street and the Boston City line. Plans include street resurfacing, wider sidewalks, street trees, benches, new traffic signals, new crosswalks, new pedestrian street lighting, and handicap ramps designed to meet current ADA standards.
- **Beacon Street.** Funded by the Transportation Improvement Program (TIP), this project, slated to begin in 2011, will involve the complete reconstruction of multiple street overlays. Water services have already been replaced here, and two large underground tanks at Star Market will be installed to collect stormwater and lower flooding potential.

[33] Road reconstruction involves a complete dig-up of the street and replacement of water services.

[34] Lining consists of a strong material that reinforces the existing pipe to keep it from collapsing while also preventing stormwater leakage into the pipe.

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G. GREEN INFRASTRUCTURE

Finding #17: Somerville's public urban forest comprises over 11,000 trees, which provide an estimated $16 million in annual ecological, economic, and social benefits to the city.

Although the Infrastructure Section of the trends report focuses heavily on the city's 'gray', or built, infrastructure elements—e.g., sewers, roads, bridges, etc.—it is important to recognize the vital role Somerville's 'green' infrastructure, namely its urban forest, plays in improving the quality of life for individuals, neighborhoods, and the city as a whole. The emphasis placed on Somerville's density often obscures the fact that the city is home to thousands of trees that, individually and collectively, offer numerous ecological, economic, health and social benefits to the community. From removing carbon dioxide and harmful pollutants from the air, to reducing storm water runoff, to reducing the 'urban heat island' effect, to lowering energy costs, to increasing property values and beautifying urban landscapes, trees are one of the most significant investments a city can make. As the science of tree management (know as "arboriculture") has become more sophisticated, so too has our understanding of the far-reaching, positive value trees can add to cities and towns. Indeed, when properly planted and maintained, trees represent one of the few elements of municipal infrastructure that actually ***increase*** in value the more they mature.

In June 2009, the City completed it first comprehensive inventory of trees in the public right-of-way—i.e., all trees under city management, including street and park trees, and trees growing on other public grounds. Even in the short time since the project's completion, the inventory data continues to provide a detailed picture of the composition, health, and maintenance needs of Somerville's public trees, while offering rich baseline information that will guide City tree professional in their efforts to develop a forward-thinking Urban Forest Management Plan.

While a full discussion of the inventory results goes beyond the purview of this report, a few key findings are worth highlighting. According to a preliminary analysis of the inventory data:

- There are 11,404 tree sites located in the public right-of-way;
- There are 244 open tree wells that are potentially available for future tree plantings;
- Citywide, there are 4.3 public trees per acre of land and 1.4 street trees per 100 feet of roadway (see Maps 4 and 5);
- Somerville's current tree stock comprises 101 species and 52 genera (or groups of species that share similar characteristics);
- The ten most frequently occurring species are: Norway maple (22%), callery pear (16%), red maple (11%), thornless honeylocust (9%), green ash (9%), littleleaf linden (8%), Japanese zelkova (4%), London planetree (3%), Japanese flowering cherry (3%), Japanese tree lilac (2%);
- The ten most frequently occurring genera are: maple (32%), pear (14%), ash (9%), honeylocust (9%), linden (8%), sycamore (4%), zelkova (4%), oak (4%), cherry/plum (3%), and lilac (2%);
- 2,801 trees (25% of the total population) are rated in "Good" condition; 6,389 (58%) are rated in "Fair" condition; and 1,777 (16%) are rated in "Poor" condition;
- There are 95 dead trees;
- 64% of the inventoried trees require some kind of routine maintenance (e.g., pruning or trimming); 8% (approximately 860 trees) are recommended for removal;
- The total estimated value of Somerville's public trees is approximately $15.9 million; and

- The total estimated value of each individual tree is approximately $1,400.[35]

The inventory data show that Somerville's public tree resources comprise an urban forest of relatively low species diversity, moderate health, and moderate-to-high maintenance needs. Though not uncommon for dense urban environments, this preliminary assessment suggests that the City should increase the species diversity of its tree-planting program. This strategy, according to urban forestry best practices, will help to minimize the potential for damage caused by potential tree diseases and pests, while increasing the aesthetic palette of trees in the urban landscape.

As Map 6 indicates, the distribution of public trees occurs unevenly throughout the city, with areas of East Somerville, Union Square, and Brickbottom having comparatively fewer trees by area than the central or western portions of the city. Thus, in order to maximize the value and benefits of green infrastructure, the City must significantly increase the number of trees planted in these target areas, while also adhering to arboricultural best-practice in the selection of trees for specific urban growing environments. Such an initiative will do much to enhance the City's green corridors, which connect separate parcels of open space.

Additionally, in an effort to improve the health and longevity of the urban forest, the City has also prioritized the following initiatives, according to a new Urban Forest Management strategy that is currently being developed collaboratively among several City departments:

- Perform recommended tree removals and moderate- and high-risk level maintenance recommendations as soon as possible beginning in 2009;
- Implement a routine maintenance cycle for the tree population to ensure pruning of all trees every five years;
- Implement a "Young Tree Training Pruning Program";
- Educate all City personnel and tree contractors concerning proper mulching, pruning, general arboricultural treatments and techniques;
- Implement an expanded public relations campaign to gain increased citizen interest and City support for an Urban Forestry Program;
- Develop an educational program to highlight the findings of the comprehensive public tree inventory;
- Protect valuable mature trees and all young trees from construction damage and unnecessary removal, especially large specimen trees that are in good or better condition; and
- Implement a tree preservation program in conjunction with infrastructure construction and renovation projects.

[35] This conservative valuation is based on a standard trunk formula method developed by the Council of Tree and Landscape Appraisers and found in the Council's *Guide for Plant Appraisal (9th Edition)*. The City of Somerville will conduct more detailed cost-benefit analyses of its inventory data in the late 2009.

Map 4: Public Tree Inventory, 2009

Public Tree Locations

Streets

Source = City of Somerville

Citywide Total = 11,404 Trees
(9,217 street trees; 2,187 park trees)

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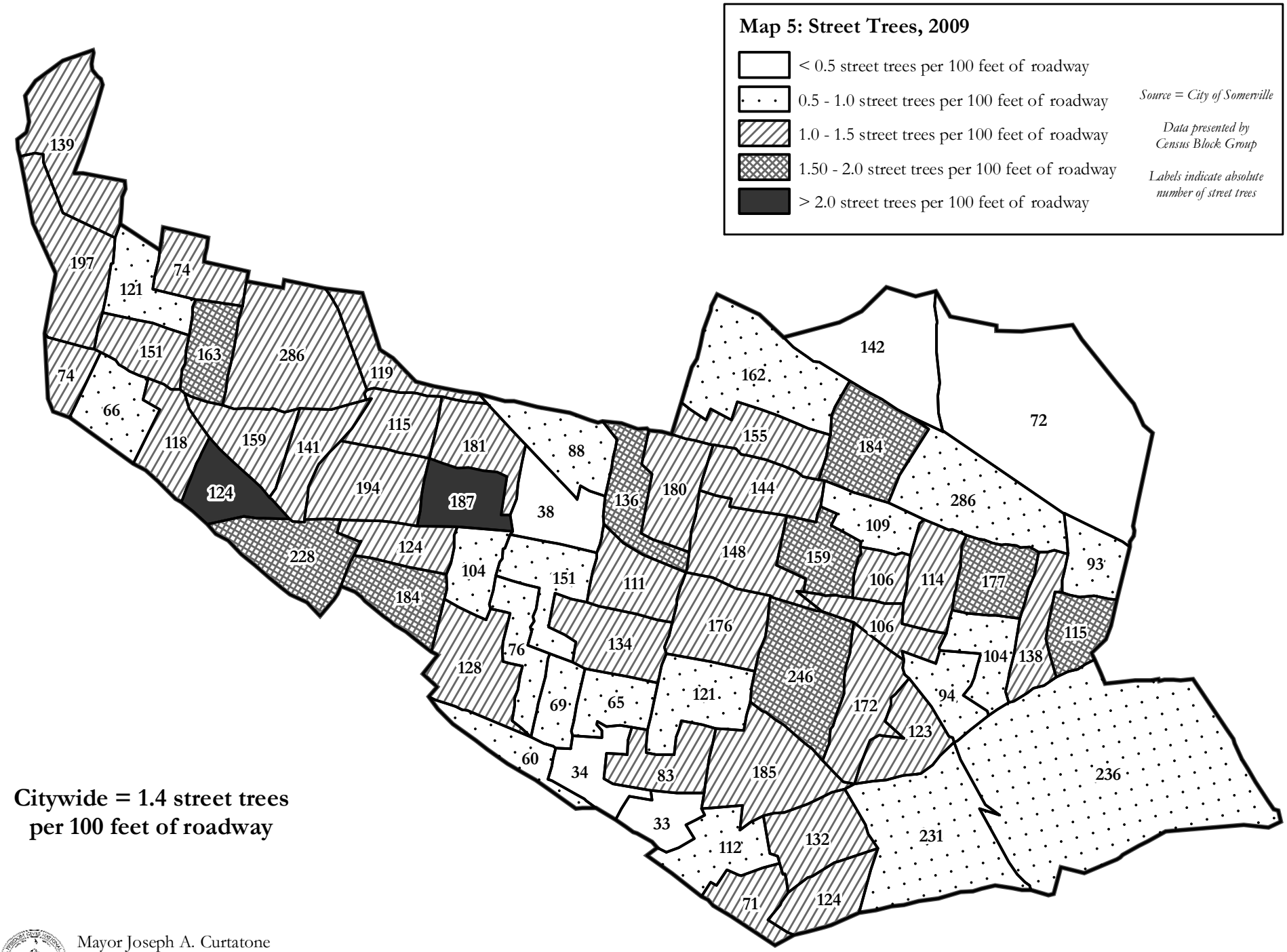

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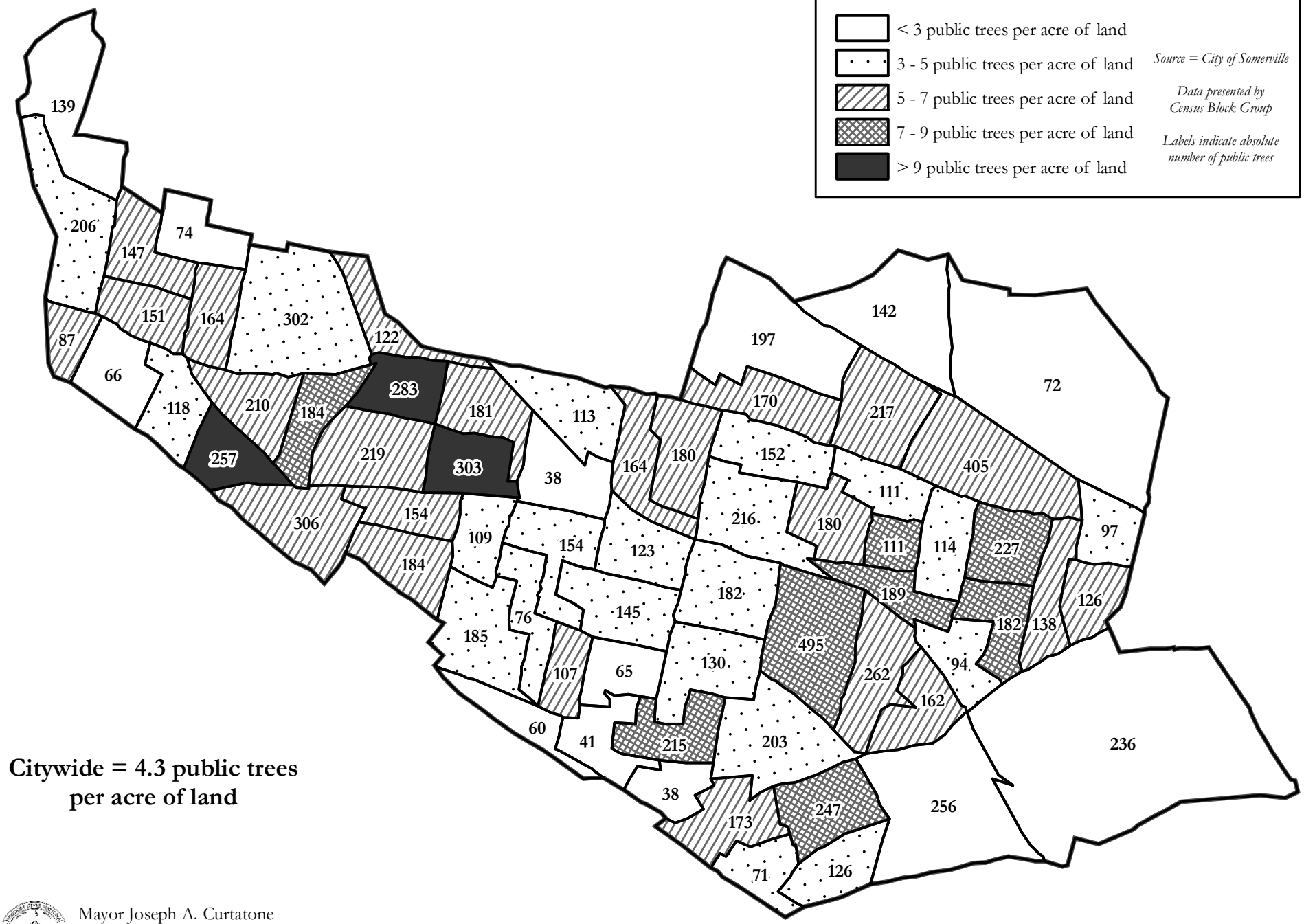

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IV. TRANSPORTATION TRENDS

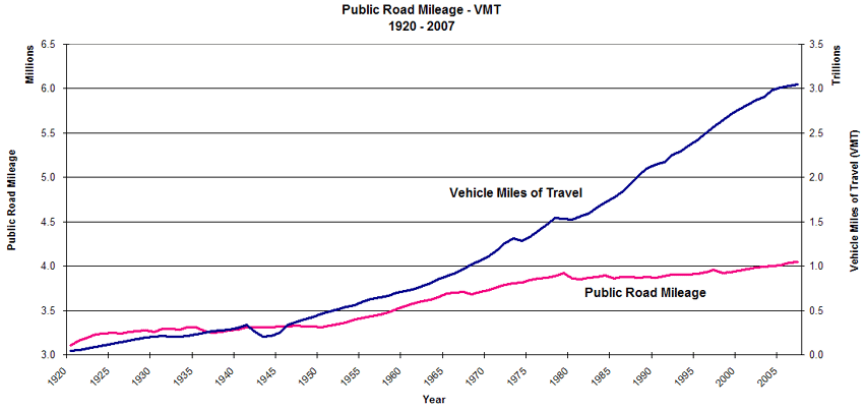
A. VEHICULAR TRAFFIC

Finding #18: Across the U.S., vehicle miles traveled have increased at a greater rate than the increase in road mileage during the past century.

From 1920 to 2007, Vehicle Miles Traveled (VMT) has increased at a greater rate than the increase in the road mileage throughout the United States (i.e. there are more vehicles per mile of roadway than ever before). The increase in VMT is a steady trend with no signs of leveling off, while public road mileage seems to have reached a plateau.

Vehicle Miles Traveled (VMT) is an indicator that demonstrates the volume and intensity of vehicles on the road by accounting for the total amount of miles traveled by all vehicles. Public road mileage is a figure that accounts for all roads that are open to public travel and maintained by a public authority. Figure 7 shows the historical trend line of both VMT and Public Road Mileage for the nation. From 1920 to 2007, the amount of public road mileage has increased over 30%, from 3,105,000 miles to 4,048,518 miles. During this same time period, VMT increased from 47,600 million miles to 3,049,027 million miles—an increase of over 64 times. The rate of change for VMT is dramatically greater than the rate of change for Public Road Mileage; this indicates that there are continually more cars on a largely the same number of public roads throughout the nation. The nation's roads are continually handling a greater number of vehicles.

Figure 7: Public Road Mileage and VMT, USA, 1920-2007



Source: Federal Highway Administration. "Public Road Mileage, Lane Miles, and VMT 1920-2007". Table VMT-421.

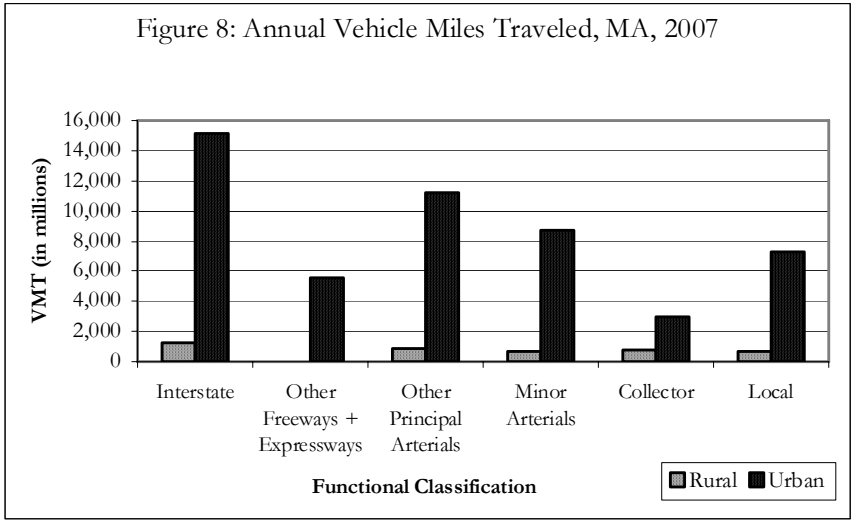
The amount of Vehicle Miles Traveled (VMT) in the state of Massachusetts increased from 45 million to 51 million miles between the years of 1990 and 1998—an increase of 13%[1] (the same percentage as the overall increase in Average Weekday Daily Traffic [AWDT] volumes as noted in Figure 8). The Commonwealth acknowledges that the continued increase of VMT is due in part to land use patterns of dispersed growth that rely heavily on automobile transportation networks, and can be mitigated by mixed-use developments, and high concentrations of housing units, in combination with public transportation amenities.[2]

Figure 8 below also shows the relative VMT per road classification in the Commonwealth. The most heavily traveled roads in urban areas are the Interstates, followed by Other Principal Arterials, Minor

[1] The Commonwealth of Massachusetts. (Spring, 2004). "Massachusetts Climate Protection Plan". p.37.
[2] The Commonwealth of Massachusetts. (Spring, 2004). "Massachusetts Climate Protection Plan". p.37.

Arterials, Local Roads, Other Freeways and Expressways, and finally Collectors. There are substantially more VMT in urban areas in Massachusetts versus rural areas, and Interstates experience the most VMT of all road classifications.

Figure 8: Annual Vehicle Miles Traveled, MA, 2007



Source: Federal Highway Administration, Highway Statistics 2007. Table VM-2.

From 2002 to 2006 the per capita VMT in the Boston-Cambridge-Quincy MA-NH metro area increased 3.3% to 5,238 VMT/capita.[3]

Finding #19: Traffic volumes on major roadways are steadily increasing throughout the Boston metro region.

Traffic volumes on major roadways in the greater Boston area have been increasing dramatically over the last three decades, with average weekday daily traffic volumes (AWDT) per lane capacity rising by 60% or more in most of the inner-core/Route 128 areas from 1993 and 2001.[4] Average daily traffic levels in Middlesex County have steadily increased by over 13% since 1993, which is consistent with statewide trends.[5] Average weekday daily traffic volumes are determined by linked counting devices placed in the road, which counts the number of cars that travel on a given road in a 24-hour period. For AWDT, the counts of all weekdays are averaged together to produce a figure that indicates the volume of traffic traveled on a particular roadway. This differs from vehicle miles traveled (VMT) in that VMT accounts for the duration of the trip while AWDT only accounts for the number of vehicles traveled on a particular section of roadway.

Between 1993 and 2001, Middlesex County experienced the greatest increase in the number of vehicles on the road in the Commonwealth, with an additional 7 million automobile trips, while Worcester and Berkshire counties experienced the greatest percentage change (see Figure 9).[6]

This increased traffic volume translates to greater traffic, more time spent commuting, and more strain on the required maintenance and resources needed to upkeep the road networks.

[3] Brookings Institute. "Brookings VMT Cities Rankings." p.2. Retrieved July 27, 2009 from http://www.scribd.com/doc/9199883/Brookings-VMT-Cities-Ranking.

[4] MassInc. (2004, October). *MASS.commuting.* p.24.
[5] MassInc. (2004, October). *MASS.commuting.* p.23.
[6] MassINC. and University of Massachusetts Donahue Institute. *MASS.commuting.* Retrieved from: http://www.massinc.org/fileadmin/researchreports/mass_commuting/mass_commuting.pdf. p.23.

Figure 9: Average Annual Daily Traffic Counts in Massachusetts by County, 1993 & 2001[7]				
	1993	**2001**	**Change**	**% Change**
Barnstable	8,185,564	9,455,455	1,269,891	15.5%
Berkshire	4,075,274	4,833,067	757,793	18.6%
Bristol	16,202,068	17,680,231	1,478,163	9.1%
Dukes	325,093	328,117	3,024	0.9%
Essex	24,881,011	28,381,574	3,500,563	14.1%
Franklin	2,455,518	2,726,875	271,357	11.1%
Hampden	15,234,632	16,594,450	1,359,818	8.9%
Hampshire	4,276,392	4,677,172	400,780	9.4%
Middlesex	*50,824,049*	*57,745,300*	*6,921,251*	*13.6%*
Nantucket	48,940	47,648	-1,292	-2.6%
Norfolk	26,994,517	30,675,620	3,681,103	13.6%
Plymouth	13,147,574	15,330,761	2,183,187	16.6%
Suffolk	21,652,150	23,767,816	2,115,666	9.8%
Worcester	26,908,018	31,982,728	5,074,710	18.9%
Massachusetts	**215,210,800**	**244,226,814**	**29,016,014**	**13.5%**

Source: Bureau of Transportation Statistics, Highway Performance Monitoring System, 1993-2001.

Finding #20: The areas of highest congestion in Somerville are its largest squares and along Route 28/McGrath Highway; the City controls the squares while the Massachusetts Department of Conservation and Recreation (DCR) controls Route 28. [8]

The areas of highest congestion in Somerville are Davis Square, McGrath Highway at Broadway, McGrath Highway at Washington Street, and Union Square. Map 7 illustrates the most highly congested areas of the City.

Congestion in Commercial Squares and Corridors

Descriptions of the various areas of congestion were documented in the *Beyond Lechmere Northwest Corridor Study,* done by VHB/Vanasse Hangen Brustlin in 2005.[9] The findings of major areas of congestion are as follows:

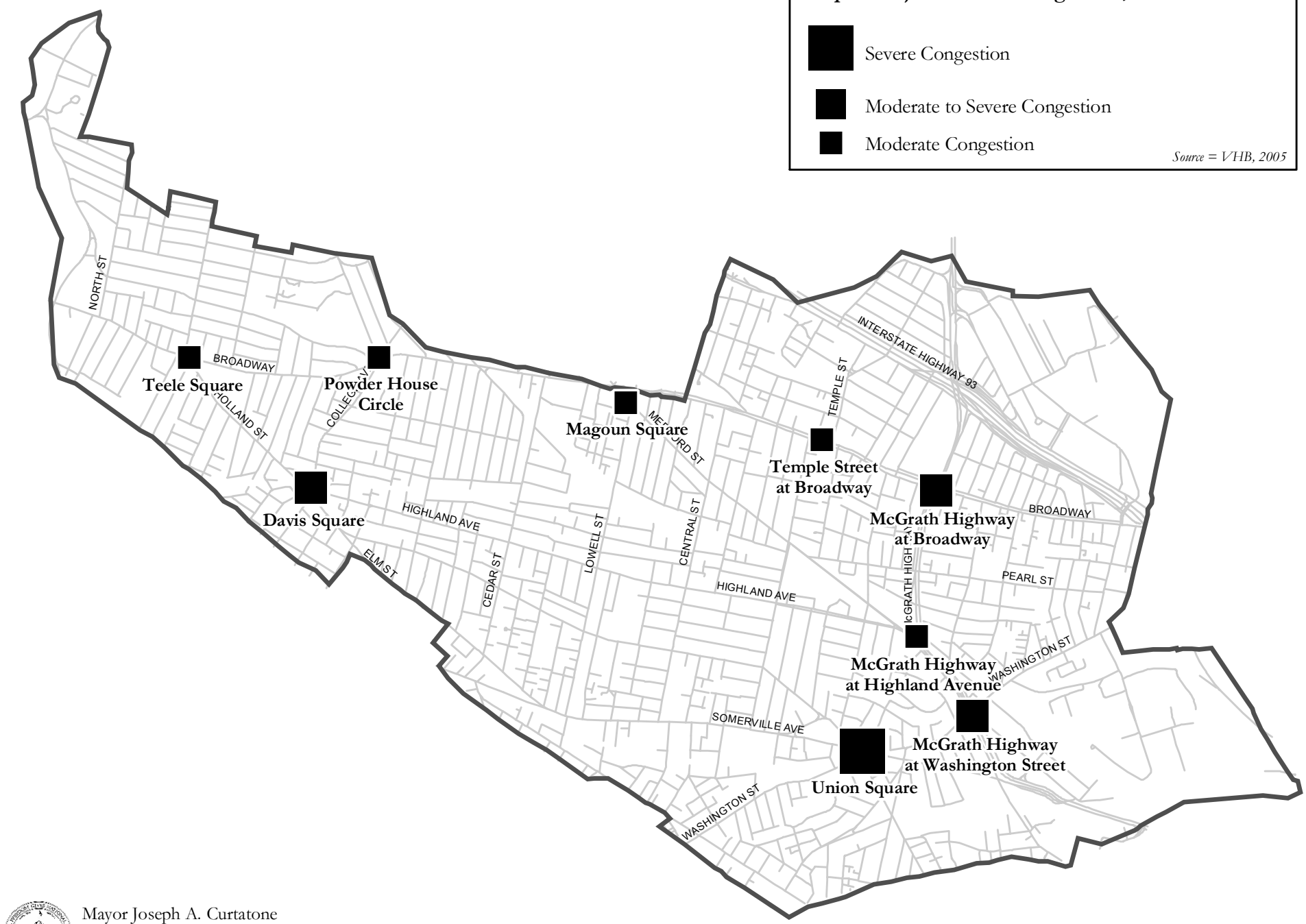
Union Square- A number of intersections between Washington Street, Prospect Street, Somerville Avenue, Webster Street, Stone Avenue, Warren Avenue and Bow Street create severe congestion during peak hours. Bow Street and Somerville Avenue form a one-way loop that is signalized at its intersection with Washington Street and Webster Avenue (one-way traffic flow). To the east, Somerville Avenue intersects Washington Street and Prospect Street (also one-way) at another signalized intersection. Highest levels of congestion occur on Washington Street eastbound and Prospect Street westbound approaching the square, though Somerville Avenue tends to congest between the two traffic signals as well.

Davis Square- Somerville's principal commercial center consists of a one-way circulation pattern along Elm Street, Cutter Avenue, and Highland Avenue. Highland Avenue, Holland Street, College Avenue, Dover Street, and Day Street are connected by a signalized intersection. The longest delays tend to occur along Elm Street westbound and College Avenue southbound entering the square; these delays influence transit connections to the Davis Square Red Line and bus station, which abuts the intersection.

[7] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* Retrieved from: http://www.massinc.org/fileadmin/researchreports/mass_commuting/mass_commuting.pdf. p.23.

[8] Vanasse Hangen Brustlin, Inc. (2005, August). *Beyond Lechmere Northwest Corridor Study: DRAFT*. Chapter 3. pp.3-24 – 3.27.

[9] Vanasse Hangen Brustlin, Inc. (2005, August). *Beyond Lechmere Northwest Corridor Study: DRAFT*. Chapter 3.



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McGrath Highway at Washington Street- Severe congestion occurs at the at-grade intersection of ramps leading to and from Washington Street from the McGrath Highway overpass. Space limitations from the overpass give way to complicated geometry at the signal-controlled intersection, with connections to several other roadways (Medford Street, Linwood Street and Somerville Avenue) further increasing the congestion.

McGrath Highway at Broadway- At this intersection McGrath Highway is three lanes in each direction with a left-hand turn lane. Congestion is prevalent on these heavily traveled corridors especially when incidents on I-93 cause traffic diversions to McGrath Highway. Similar conditions occur along abutting intersections of McGrath Highway, at Pearl Street and Blakely Avenue.

McGrath Highway at Medford Street/Highland Avenue- Medford Street and Highland Avenue intersect McGrath Highway at a traffic signal; the intersection experiences moderate congestion, worsened during diversions from I-93. McGrath is still at three lanes in each direction, with two left-hand turn lanes to the west from McGrath to Medford Street/Highland Avenue. Recent improvements have been implemented here, providing geometry enhancements and interconnections between signals, with the goal of increasing the safety of pedestrian movement at this intersection.

Magoun Square- Magoun Square is formed by the intersection of Broadway, Medford Street and Dexter Street. A traffic signal between Broadway (a two-lane roadway) and Medford Street (one-lane roadway) controls the intersection. Congestion is to blame for frequent traffic and bus operations delays along Broadway and Medford Street.

Powder House Circle- The complicated geometry at the intersection of Broadway, College Avenue, Powder House Blvd, and Warner Street near Tufts University operates as a rotary, which occasionally is controlled via a traffic signal control at some approaches (while stop signs control others). The Circle often experiences delays for traffic flow and bus operations.

Teele Square- The intersection of Broadway, Holland Street and Curtis Street form Teele Square, which is controlled by a traffic signal. The fire department has preemption for the traffic light. Congestion often delays traffic flow and bus operations along Broadway and Holland Street.

Temple Street and School Street at Broadway- Two traffic signals in close proximity to one another manage the intersections of Temple and School Streets at Broadway. These intersections handle traffic flow into Somerville from the Mystic Avenue/I-93 interchange along Temple Street. High traffic volumes on Broadway combined with short queue distances and the two distinct traffic signals lead to congestion along this segment of Broadway.

Major Roadways and Traffic Counts[10]

Aside from I-93 and Route 28/McGrath Highway, which carry considerably more vehicles than other roadways in Somerville (150,000 and 65,000 vehicles per day, respectively), the heaviest vehicular traffic occurs on Broadway (20,000-30,000 vehicles per day) and Washington Street (29,000 vehicles per day).[11]

Major roadway traffic and accident rates in Somerville are enumerated in Figure 10.

[10] Vanasse Hangen Brustlin, Inc. (2005, August). *Beyond Lechmere Northwest Corridor Study: DRAFT*. Chapter 3. pp. 3-20 - 3-24.
[11] Vanasse Hangen Brustlin, Inc. (2005, August). *Beyond Lechmere Northwest Corridor Study: DRAFT*. Chapter 3. pp. 3-20 - 3-24.

Figure 10: Vehicular traffic on major Somerville roadways (2005)			
Road	**# Vehicles/day**	**Accidents/year**	**# Trucks/day**
I-93	150,000	125	
Route 28 / McGrath Hwy	65,000	170	500-1,000
Broadway	20,000-30,000	195	499
Washington St	29,000	120	1,000-2,500
Medford St	21,000	80	0-499
Highland Ave	13,000	90	1,000-1,499
Somerville Ave	18,000	140	1,000-2,499
Elm St	11,000	40	0-499
College Ave	11,000	40	
Boston Ave	11,000-18,000	20	
Curtis Street	8,000-10,000	15	

Source: Vanasse Hangen Brustlin, Inc. (2005, August). *Beyond Lechmere Northwest Corridor Study: DRAFT*. Chapter 3. pp. 3-20 - 3-24.

The following description of major roadways is adopted from the VHB *Beyond Lechmere Northwest Corridor Study.*

Interstate 93: I-93 is the only interstate highway in the city, running from northern Vermont to Canton, Massachusetts. Within Somerville, I-93 runs from the Boston/Charlestown border through East Somerville, and separates East Somerville and Winter Hill from Assembly Square and the Ten Hills neighborhoods.

I-93 serves as a major commuting route from the northern suburbs to Boston. Its only inbound access in Somerville is located at the Route 28/Route 38 intersection adjacent to the Assembly Square mall/redevelopment area. Northbound, there is an entrance at the Medford city line at Mystic Avenue. There are three exits from I-93 into Somerville; a northbound exit at Route 28 and two southbound exits—one at Mystic Ave near the Medford city line and one at Lombardi Street near the Boston city line.

Route 28/McGrath-O'Brien Highway: This multilane arterial provides alternative connections from I-93 to Cambridge and downtown Boston. To the north of Somerville, Route 28 is known as The Fellsway and to the south it connects to the interstate system and Storrow Drive. Route 28 carries approximately 65,000 vehicles per day between Highland Avenue and Washington Streets and experiences about 170 accidents annually.

As a path to and from communities north of Boston, McGrath Highway suffers from both heavy traffic congestion and an unpleasant pedestrian environment. The intersection of Somerville Avenue and Medford Street has consistently been listed on the State's 1,000 Top Accident Locations, and the area is problematic for pedestrians as well as automobile drivers.[12] With its various on- and off-ramps, the elevated highway creates a dangerous place for people on foot. Crosswalks and pedestrian signals are insufficient for pedestrians to feel safe in the area, with vehicles moving at high speeds on and off the highway.

Broadway: This northwest-southeast road is typically a 4-lane arterial linking Powder House Circle and Sullivan Square via the Winter Hill neighborhood. Broadway carries up to 30,000 vehicles per day and experiences 195 accidents per year.

Washington Street: This is the oldest in Somerville; it runs east to west from Cambridge via Union Square to Sullivan Square. It carries about 11,000 vehicles per day, is a 2-lane arterial roadway, and experiences an average of 120 auto accidents per year. The eastern segment past Route 28 experiences much heavier traffic with 29,000 vehicles per day. It is also a major trucking route, with truck volumes range from between 1,000 and 2,500 trucks per day.

[12] McGrath Corridor: Existing Conditions, City of Somerville, January 2002.

Medford Street: Running south from the Medford border, this street enters Somerville as it crosses Broadway at Magoun Square and continues behind the Somerville City Hall/High School complex where it crosses the MBTA's Lowell Line at Gilman Square. Medford Street is generally a 2-lane arterial roadway carrying approximately 21,000 vehicles per day and averaging 80 auto accidents per year.

Highland Avenue: Beginning at Davis Square in the west, this 2-lane roadway runs east-west towards Somerville City Hall, High School and Library, and ends at Medford Street near the intersection with Route 28. Highland Avenue is a primary connector between Davis Square and the city's government and medical facilities and is in many ways a symbolic 'Main Street' of Somerville. About 13,000 vehicles per day travel on this road and there are approximately 90 accidents per year.

Somerville Avenue: Somerville Avenue runs east-west parallel to the MBTA's Fitchburg Commuter Rail line from Porter Square in Cambridge to Somerville's Union Square. Running through a mixture of commercial, light industrial and residential land uses, the road ends at Route 28. The majority of the roadway is bi-directional, with a short one-way section in Union Square. The avenue carries approximately 8,000 vehicles per day and 18,000 vehicles per day near its intersection with Bow Street at Union Square. Truck volumes range from 1,000 to 2,499 trucks per day near Union Square and 1,000 to 1,999 near Davis Square.

Elm Street: From Davis Square, Elm Street connects to Somerville Avenue east of Porter Square, providing an important connection between Davis Square and Union Square via Somerville Ave. This 2-lane arterial carries about 11,000 vehicles per day, and sees approximately 40 accidents per year.

College Avenue: College Ave begins at Davis Square and runs northeast-southwest to Powder House Circle before heading through Tufts University into the City of Medford. The 2-lane arterial carries about 11,000 vehicles per day with an accident rate of approximately 40 incidents per year.

Boston Avenue: Running southeast-northwest from West Medford along the MBTA's Lowell Commuter Rail Line, Boston Avenue enters Somerville at Ball Square and continues in 2-lanes carrying between 11,000-18,000 vehicles per day. Approximately 20 auto accidents occur annually along the Somerville portion of the road.

Curtis Street: Curtis Street begins in Teele Square and runs north-south to the Medford city line, where the name changes to Winthrop Street. The roadway is a two-lane roadway and typically sees between 8,000 and 10,000 vehicles per day, and experiences 15 auto accidents per year.

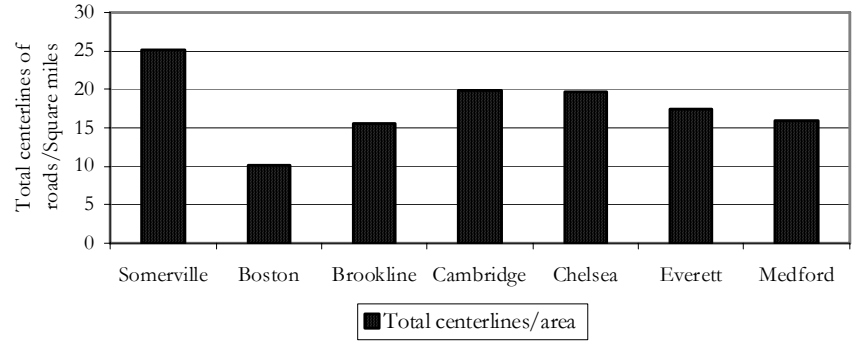
Finding #21: Somerville has more land devoted to roads per square mile than the surrounding communities of Boston, Brookline, Cambridge, Chelsea, Everett and Medford.

The City of Somerville contains a total of 105.6 miles of paved streets, of which 88.1 miles are under local jurisdiction, 3.2 miles are under Mass Highway jurisdiction, and 4.1 are under DCR jurisdiction; the remaining 10.3 miles are listed as 'unaccepted' (those roads which no state, city, or institution has authority over).[13] The City is responsible for maintaining a total of 683 roads, which include both public and private streets. The City does not maintain state roads such as McGrath Highway and Alewife Brook Parkway, which are under DCR's jurisdiction.

[13] EOT, Office of Transportation Planning. (2008). *Road Inventory Year End Report 2008*. "Centerline Miles Table 5: City/Town by Jurisdiction". pp.19-24.

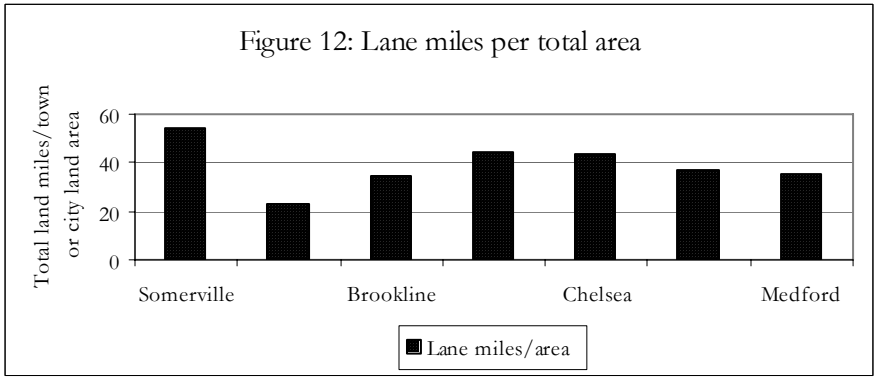
Figure 11 shows the ratio of centerlines per land area in Somerville and surrounding communities. Figure 12 shows the ratio of lane miles per land area. Centerlines refer to the total linear length of roadway in the City, while lane miles takes into consideration the width, in terms of number of lanes, of the roadway. At just 4.2 square miles, the city hosts the highest number of linear feet of roadway per square mile of all the surrounding communities. From both centerlines and lane miles perspectives, Somerville has the greatest length, and thus presumably land devoted to roads, of streets per land area. This measure gives an indication of the amount of paved road area per square mile. In looking at Somerville's history, it is apparent why this is the case. The City developed with this concentration of streets because as a streetcar suburb of Boston, the close-knit street grid allowed people to quickly walk from their homes to transit. On one hand, having such a high a figure could be looked at as a liability in terms of the environmental impacts of this amount of impervious surface (total city-wide impervious surface estimated at 73% of land area[14]), but at the same time it can be viewed as an opportunity for using some of the roadway for other purposes, such as public transit right of ways or recreational amenities. The redundancy of the street pattern and road intensity provides a chance to rethink how to make the best use of this resource.

Figure 11: Miles of roads per town/city land area



Source: EOT, Office of Transportation Planning. (2008). Road Inventory Year End Report 2008. "Centerline Miles Table 5: City/Town by Jurisdiction". pp.19-24. and US Census Bureau, Summary File 1: GCT-PH1. Population, Housing Units, Area, and Density: 2000

Figure 12: Lane miles per total area



Source: EOT, Office of Transportation Planning. (2008). Road Inventory Year End Report 2008. "Centerline Miles Table 5: City/Town by Jurisdiction". pp.19-24. and US Census Bureau, Summary File 1: GCT-PH1. Population, Housing Units, Area, and Density: 2000

[14] City of Somerville. (May 12, 2005). *Developing an Innovative Model for Cost Effective Asset Management and Pollution Prevention in a Municipal Stormwater System.* "Table 12: CITYgreen Results Table". P.21.

Finding #22: With the exception of Medford, Somerville has the least amount of control over the roads that pass through the city.

The major roadways that are not controlled by the City of Somerville are Route 28/McGrath Highway (DCR), Alewife Brook Parkway (DCR) and Interstate 93 (Mass Highway).

Figure 13 shows the breakdown of jurisdiction over roadways for select communities in the region.

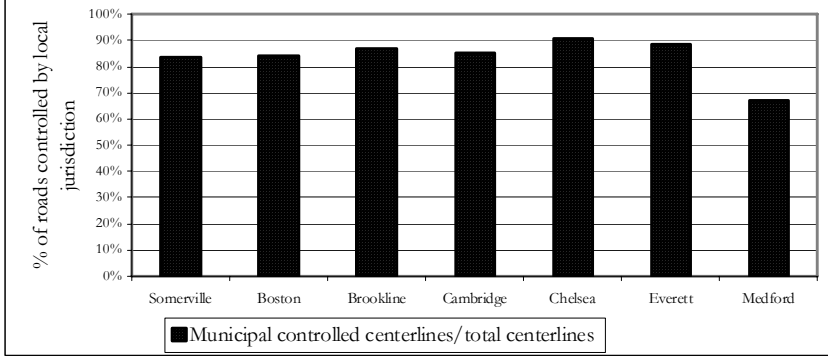
Figure 13: Centerline miles by Jurisdiction

Town	City/ Town Accepted	Mass Hwy	DCR	Mass Pike	Mass Port	State Inst.	Un-accepted	Total
Somerville	88.1	3.2	4.1	0	0	0	10.3	105.6
Boston	770.5	20.6	50.5	13.3	8.3	0.2	51.9	915.3
Brookline	91.8	2.8	3.1	0.2	0	0	8.0	105.9
Cambridge	120.8	0.3	11.4	0	0	0	9.2	141.7
Chelsea	44.2	2.3	1.3	0	0	0	0.1	48.9
Everett	56.6	0.0	3.5	0	0	0	3.7	63.8
Medford	92.2	5.0	12.9	0	0	0	27.3	137.3

Source: EOT, Office of Transportation Planning. (2008). Road Inventory Year End Report 2008. "Centerline Miles Table 5: City/Town by Jurisdiction". pp.19-24.

As compared to other neighboring cities and towns, Somerville has the least local control of their roads than others, with the exception of Medford (see Figure 14). This is an issue in that the City is not able to independently respond to or improve the conditions on the non-city controlled roads, yet the public often expects the City to fix any condition. Instead, the City must lobby and negotiate with the respective state agencies to pay attention to local needs. The recent restructuring of the Commonwealth's transportation functions will likely move all the state-owned rights of way under the jurisdiction of Mass Highway, so the City will no longer need to work with two disparate agencies.

Figure 14: Local jurisdiction over roads, as % of total roads



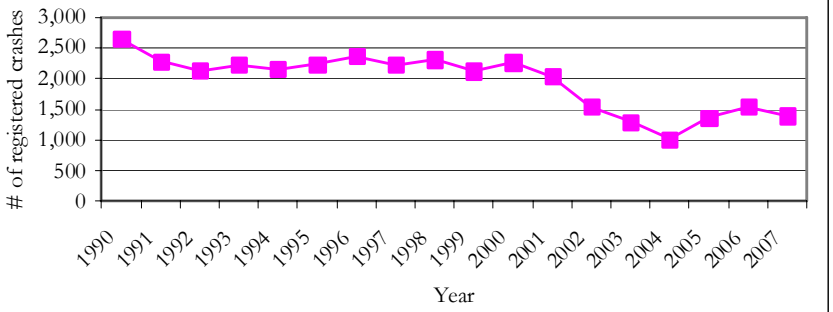
Source: EOT, Office of Transportation Planning. (2008). Road Inventory Year End Report 2008. "Centerline Miles Table 5: City/Town by Jurisdiction". pp.19-24.

B. VEHICULAR ACCIDENTS

Finding #23: The intersection of Broadway and Alewife Brook Parkway is the highest vehicle crash location in the City between 2004-2006, with 60 reported crashes; this is the #158 top crash location in the state.[15]

Over the last three decades the number of crashes in Somerville has decreased (see Figure 15). However, between 2001 and 2002 data reporting methods to the state changed, which resulted in reporting lower statistics throughout the state (approx. 25% decrease between 2001 and 2002 in Somerville). Regardless, the amount of crashes has decreased, albeit the fluctuations from year to year.

Figure 15: Crashes in Somerville, 1990-2007



Source: CTPS

The Massachusetts Registry of Motor Vehicles (RMV) collects crash data and the Boston Region Metropolitan Planning Organization (MPO) geocodes this data and produces reports on the top crash locations in the region.[16] Somerville intersections that made it to these lists between 1997 and 1999 (most recent compiled data) include:

Arterial Highways Top 60 crash list in Boston Region MPO

- #9 crash location: McGrath Highway and Washington Street—235 crashes[17]
- #34 crash location: Somerville Avenue and Washington Street—107 crashes[18]

Limited-Access Highways Top 60 crash list in Boston Region MPO

- #4 crash location: Mystic Avenue and I-93—415 crashes[19]

[15] EOT and Mass Highway. (July 2008). "2006 Top Crash Locations Report". P.3

[16] Boston Region Metropolitan Planning Organization. Mobility Monitoring – Roadways – Crashes. http://www.bostonmpo.org/bostonmpo/3_programs/6_mms/2_roadways/crashes.html.

[17] CTPS. "2004 Congestion Management System Report". Table 3.13: Top 60 Crash Locations on Arterial Roadways in the Boston MPO Region (1997–1999).

[18] CTPS. "2004 Congestion Management System Report". Table 3.13: Top 60 Crash Locations on Arterial Roadways in the Boston MPO Region (1997–1999).

[19] CTPS. "2004 Congestion Management System Report". Table 3.17: Top 60 Crash Locations on Limited-Access Highways in the Boston MPO Region (1997–1999).

C. COMMUTE TO WORK

Finding #24: The length of commute times in Massachusetts has increased considerably and at a much faster pace than the nation over the last two decades.[20]

Between 1980 and 2000, commute times in the Commonwealth increased at the 6th fastest rate in the nation, and time lost to commuting increased by nearly 20% between 1990 and 2000.[21] By 2000, Massachusetts workers lost the equivalent of 25 eight-hour workdays commuting back and forth to their jobs each year.[22]

As noted in Figure 16, in 1980 the average commute time in the state was 21.4 minutes each way, comparable to the national average.[23] By 2000, the average Massachusetts commuter spent 27 minutes traveling each way to work, and nearly 1 in 5 commuters (18%) spent at least 45 minutes getting to work each day.[24]

Figure 16: Average Commute Times, Massachusetts & US 1980-2000[25]

	1980	1990	2000
Massachusetts	21.4	22.7	27.0
U.S.	21.7	22.4	25.5

Source: U.S. Census, Journey to Work Data, 1980, 1990, and 2000.

[20] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.4.
[21] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.4.
[22] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.4.
[23] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.18.
[24] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.18.
[25] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.18.

Figure 17 displays the increasing average length of commute times by mode in Massachusetts between 1990 and 2000, even for those using public transportation. Travel via subway and bicycles experienced substantially smaller increases in commute times than driving, taking a bus, riding a trolley, or commuting via commuter rail.

Figure 17: Average Commute Time in Massachusetts by Mode (in minutes) 1990-2000[26]*****

MODE	1990	2000	% Increase
Drive Alone	21.8	25.7	18.1%
Carpool	24.4	27.5	13.9%
Public Transportation	37.0	44.2	19.4%
Streetcar and subway	*37.0*	*40.6*	*9.9%*
Bus and trolley bus	*33.4*	*40.5*	*21.3%*
Commuter rail	*53.1*	*62.4*	*17.5%*
Ferry boat	*52.3*	*65.0*	*24.2%*
Other private transport	19.6	35.1	79.5%
Taxicab	*15.4*	*17.7*	*15.2%*
Motorcycle	*18.0*	*28.1*	*55.9%*
Bicycle	*16.5*	*17.9*	*8.0%*
Other	*21.8*	*48.8*	*123.6%*
Walk	10.8	12.6	16.6%
Grand Total	**22.7**	**27.0**	**19.3%**

**These times are slightly different than those reported in the U.S. Census Journey to Work Data.*
Source: U.S. Census, 1990, 2000.

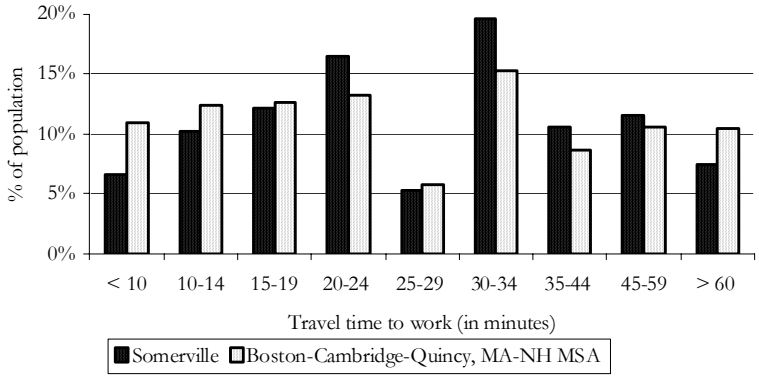
Finding #25: Somerville residents saw significant increases in commute times, with a 50% increase in the amount of people commuting longer than 35 minutes in 2007 than in 1990 (from 20% to 30% of the commuting workforce).[27]

Compared to the rest of the Boston Metro Area (Boston-Cambridge-Quincy area), 4% fewer Somerville residents enjoy short commutes

[26] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p.21.
[27] 1990 U.S. Census, 2000 U.S. Census, 2005-2007 American Community Survey.

of under 15 minutes while 7% more Somerville commuters are faced with journeys to work that last between 15 and 44 minutes; on the upside, 3% fewer commuters compared to the metro region experience commutes greater than 45 minutes (see Figure 18).[28]

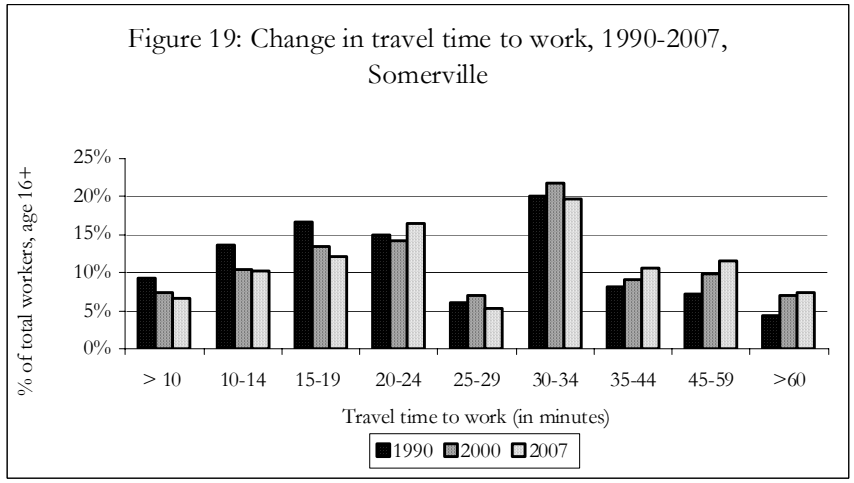
Figure 18: Travel time to work, Somerville v. Boston metro area, 2007



Source: American Community Survey, 2005-2007.

As Figure 19 illustrates, the number of Somerville residents who enjoy commutes of under 20 minutes has continually decreased since 1990. Those with commutes between 20 and 35 minutes have stayed approximately even, while the number of Somerville commuters with trips greater than 35 minutes has increased between 1990 and 2007.

Figure 19: Change in travel time to work, 1990-2007, Somerville



Source: U.S. Census 1990, 2000; American Community Survey 2005-2007.

The City of Somerville has one of the smallest percentages of residents who work in their city of residence compared to surrounding communities. Figure 20 illustrates that Chelsea and Somerville both have fewer than 15% of their resident labor force employed in their city of residence. Boston and Cambridge have the largest percentage of their workforce who finds employment within their respective cities, at 38.1% for Boston and 42.6% for Cambridge. These percentages are important in that if there are not local jobs available for residents in a city, they must travel outside their city of residence to find employment, which could translate to longer commutes.

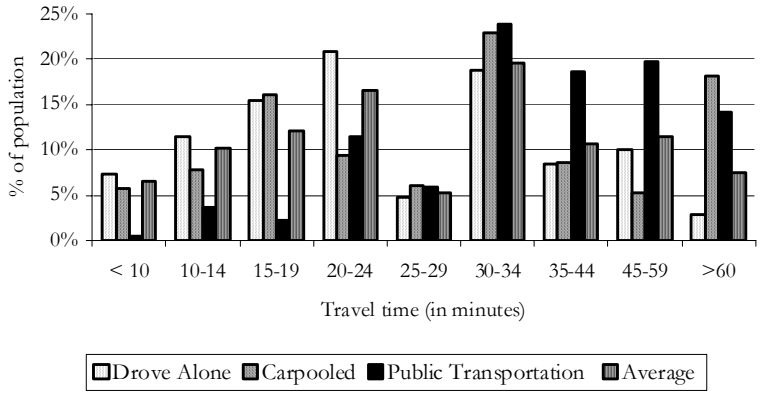
[28] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* pp. 19 and 62.

Figure 20: Distribution of resident work force, by city, 2000								
		Place of work						
Place of Residence	Pop. in Labor Force	Boston	Brook-line	Cambridge	Chelsea	Everett	Medford	Somerville
Boston	484,995	38.1%	1.0%	3.3%	0.5%	0.3%	0.3%	0.4%
Brookline	33,951	44.5%	16.6%	7.6%	0.5%	0.4%	0.3%	0.6%
Cambridge	59,965	24.5%	0.7%	42.6%	0.3%	0.6%	0.8%	2.2%
Chelsea	14,212	30.6%	0.5%	5.0%	19.8%	2.6%	1.3%	2.1%
Everett	19,210	25.7%	0.4%	6.8%	3.0%	14.9%	2.8%	3.0%
Medford	30,133	23.2%	0.6%	10.1%	0.8%	1.6%	16.5%	4.4%
Somerville	47,656	26.2%	0.9%	19.1%	0.5%	1.1%	3.4%	14.9%

Source: U.S. Census, 2000.

Despite Somerville's immediate proximity to major job centers such as Cambridge and Boston, there are still a considerable amount of commutes that extend beyond 45 minutes (16.81%)[29], which may be attributed in part to the city's poor levels of transit service (only one T-stop for over 77,000 people, no commuter rail stations). [For more on employment centers and commuting patterns, see Finding #29, p. 3-56.] For those who take public transportation, travel times to work average more than 30 minutes while those using other means typically experience commutes of less than 30 minutes (see Figure 21).[30]

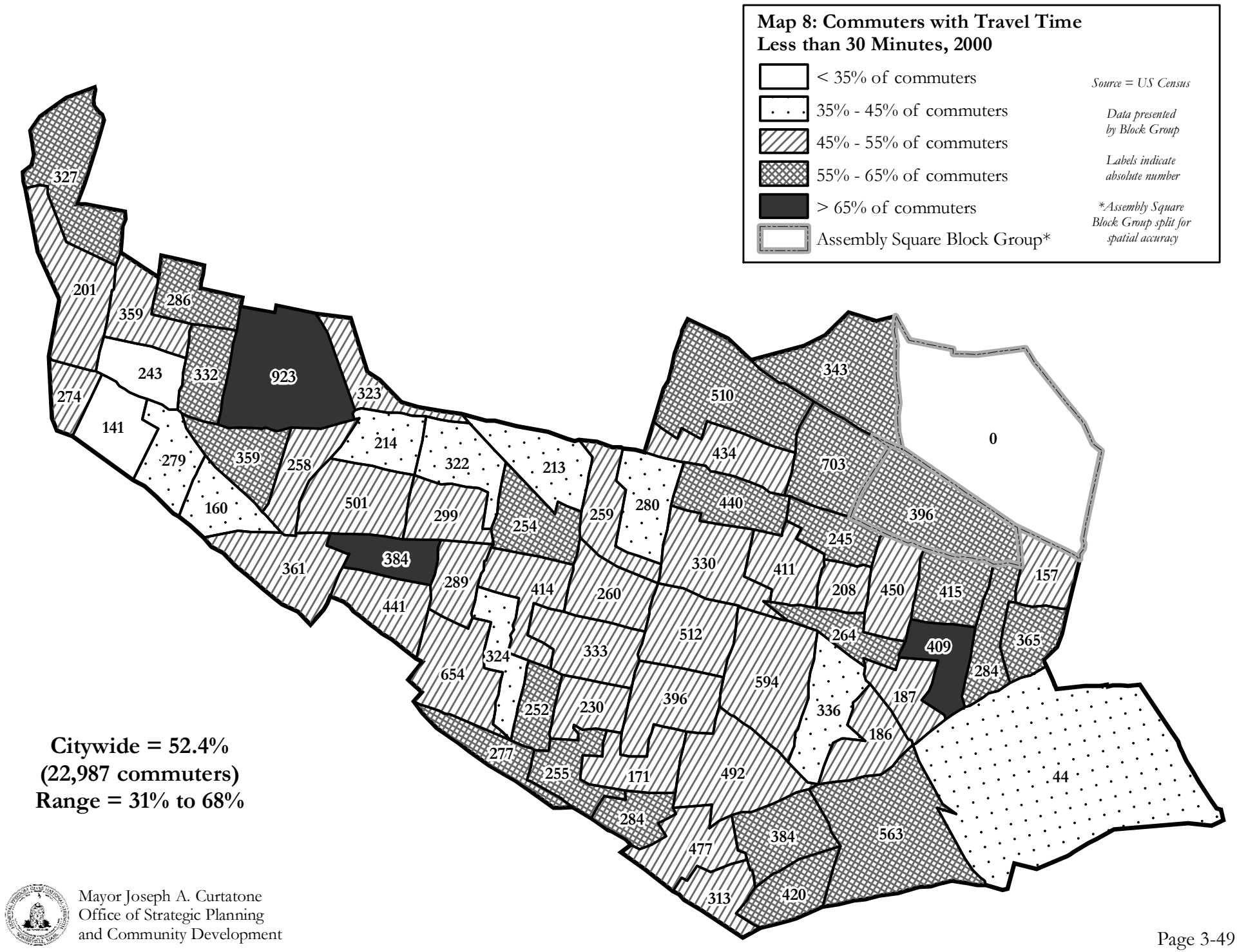
Figure 21: Travel time by mode, Somerville, 2007



Source: American Community Survey, 2005-2007.

Within Somerville, those who have short commutes (under 30 minutes) tend to live near Davis Square in West Somerville and Sullivan Square in East Somerville (see Map 8). In contrast, those with longer commutes (more than 60 minutes) tend to live farther from the rapid transit lines, and within the Inner Belt (see Map 9). The Inner Belt, however, has a high percentage of people who are either retired or are artists with live-work space; the remaining commuters, which are few in number, may influence the data to show greater propensity of longer commuters.

[29] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p. 62.
[30] Source: American Community Survey. (2005-2007). Somerville City. S0802. Means of Transportation to Work by Selected Characteristics [Data set].



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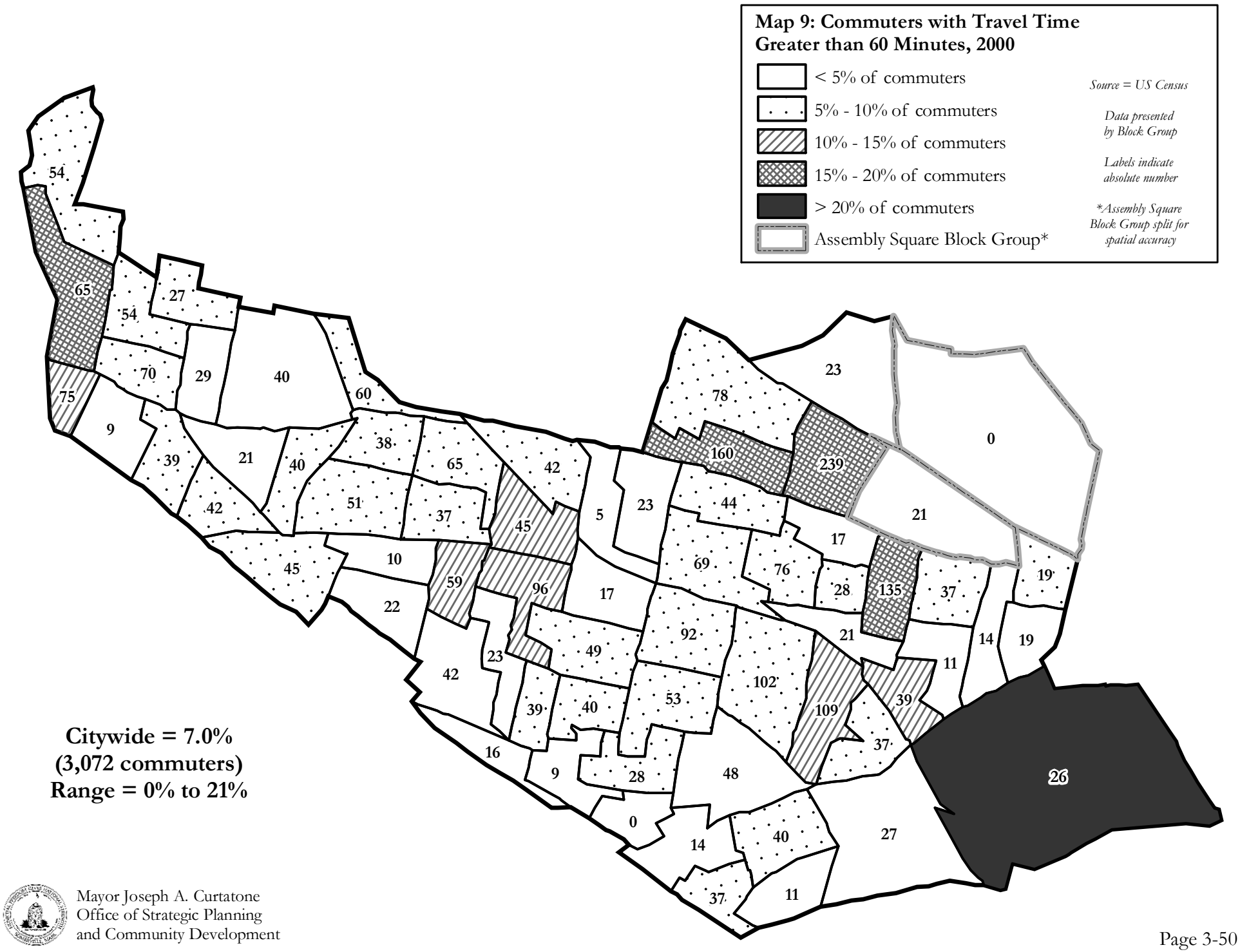

Map 9: Commuters with Travel Time Greater than 60 Minutes, 2000
< 5% of commuters
5% - 10% of commuters
10% - 15% of commuters
15% - 20% of commuters
> 20% of commuters
Assembly Square Block Group*
Source = US Census
Data presented by Block Group
Labels indicate absolute number
*Assembly Square Block Group split for spatial accuracy
54
65
54
27
70
29
40
60
75
9
39
21
40
38
65
42
42
51
37
45
45
10
59
96
22
17
5
23
78
160
239
23
0
44
21
17
69
76
28
135
37
19
19
14
21
92
49
23
42
39
40
53
102
109
39
11
37
16
9
28
48
0
14
40
27
37
11
26
Citywide = 7.0%
(3,072 commuters)
Range = 0% to 21%

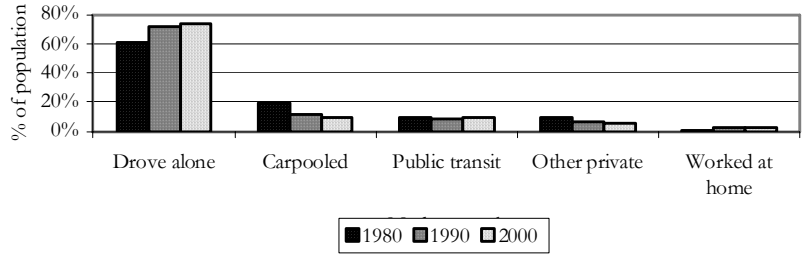
Finding #26: Driving alone is the most common way for people to get to work in Massachusetts, however, the state has the 4th highest rate of public transportation use in the nation, trailing only the District of Columbia, New York, and New Jersey.[31] The Commonwealth has largely rejected the national trend of declining (until recently) transit use.

While just 5% of commuters nationwide used public transportation in 2000, 9% of commuters in Massachusetts used transit.[32] Despite high rates of transit usage, in 2000 nearly 3 in 4 workers in the Commonwealth (74%) drove to work alone, representing more than a 20% increase since 1980.[33] As Figure 22 shows, from 1980 to 2000 the amount of people commuting in single-occupancy vehicles and those working at home increased, while those carpooling, using other private vehicles decreased, while the rate of public transportation usage stayed at approximately 10%.

The summer of 2008 saw a rapid, dramatic increase in gas prices (reaching over $4/gallon[34]) that affected mode choice decisions for commuters. The Executive Office of Transportation reported that in May 2008, there were 600,000 fewer automobiles on the Massachusetts Turnpike compared to a year before, a decrease of 3.4%.[35]

While automobile usage was lower than past years during the gas price increases, the MBTA set an all-time high record of 374.8 million rides in FY2008—up 6.1% from FY2007.[36] In May, Daniel Grabauskas, former MBTA General Manager, claimed that higher gas prices had influenced more people to ride the MBTA's rapid transit and bus systems.[37]

Figure 22: Travel to work via mode, Massachusetts, 1980-2000



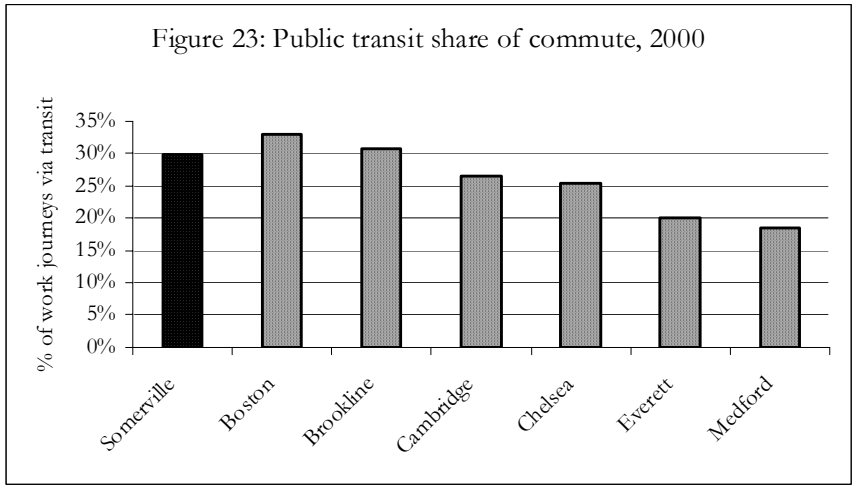
Source: MassINC. and University of Massachusetts Donahue Institute. (2004, October). MASS.commuting. p.15.

Finding #27: As of 2000, almost one in three Somerville commuters used public transportation to get to work. Commuting via transit and bicycling have steadily increased between 1990 and 2007.

Residents of Somerville use public transportation to commute to work more than most other communities in the Boston inner core, including Cambridge; ridership rates trail only those of Brookline and Boston (see Figure 23).

[31] MassINC. and University of Massachusetts Donahue Institute. (2004, October). *MASS.commuting.* p. 6.
[32] U.S. Census, 2000.
[33] MassINC. and University of Massachusetts Donahue Institute. (2004, October). MASS.commuting. p.15.
[34] Hammel, Lee. "Route Bound: Increase in MBTA ridership linked to high gas prices" in *The Worcester Telegram.* August 14, 2008.
[35] Hammel, Lee. "Route Bound: Increase in MBTA ridership linked to high gas prices" in *The Worcester Telegram.* August 14, 2008.
[36] Hammel, Lee. "Route Bound: Increase in MBTA ridership linked to high gas prices" in *The Worcester Telegram.* August 14, 2008.
[37] WBZ 38. "MBTA Ridership On Pace For Record Year". May 5, 2008.

Figure 23: Public transit share of commute, 2000



Source: US Census, 2000.

Somerville is currently served by just one MBTA subway stop at Davis Square, in the northwest corner of the city. Three commuter rail lines pass through the city without stopping and there is no light rail or bus rapid transit. There is however, an intricate network of fifteen bus routes throughout the city (see Section 4: Buses), and two nearby T stops at Porter and Sullivan Squares. Nevertheless, Somerville residents are using public transportation at rates higher than communities such as Cambridge, which have more than quadruple the amount of rapid transit service.

Figure 24 illustrates the commuting mode choice of Somerville residents from 1990 to 2007. Most notable of the findings are: the predominance of automobile use; as of 2007, biking and walking accounted for approximately one in eight commute trips and public transportation accounted for one in three commute trips; the increase in bicycling and public transit usage; the sizable portion of Somerville residents (one in ten) that travel via carpool; and the beginning signs of a shift in commuting patterns of Somerville residents in favor of public transportation and bicycling and away from driving alone.

Walking as a means of travel to work declined by 3% since 1990 (through 2007),[38] which may have been offset by the rise in bicycling and public transportation. The rate of commuters driving alone to work has also declined significantly (by 6% since 1990).

Figure 24: Somerville Travel to Work Trends 1990-2007

	Drive Alone	Car-pool	Public Transport-ation	Bicycle	Walk	Other/ Work at Home
1990	46%	11%	27%	2%	11%	3%
2000	45%	10%	29%	3%	9%	3%
2007*	40%	10%	33%	4%	8%	5%

Source: US Census 1990, 2000 and (*)American Community Survey, 2005-2007.

Brookline and Somerville boast near identical commuting mode patterns, particularly for those using public transportation and those driving alone (see Figures 25 and 26). In both cities, about 45% of residents drive alone to work and about 30% use public transportation. Yet Brookline residents are served by two branches of the MBTA Green Line with 16 stops and easy access to over a dozen more on the B Branch of the Green Line. It is clear from this picture that Somerville residents are utilizing public transportation even when there are significantly fewer opportunities to do so than elsewhere in the Boston metro area.

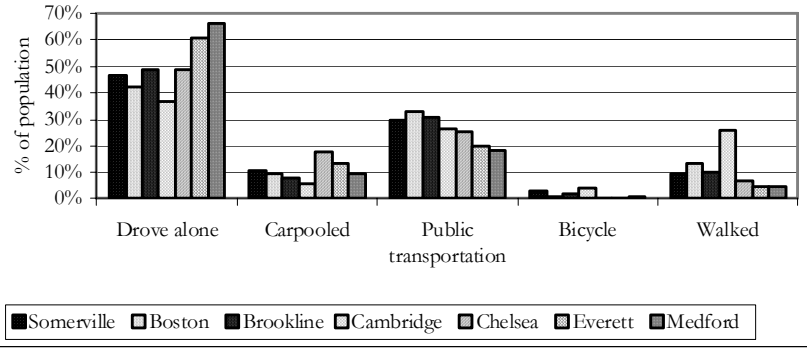
[38] Census 1990, 2000 and American Community Survey, 2005-2007.

Figure 25: Travel to work by mode, Somerville and surrounding communities, 2000

	Boston	Brookline	Cambridge	Chelsea	Everett	Medford	Somerville
Drove alone	43%	49%	37%	49%	61%	67%	46%
Carpooled	9%	8%	6%	18%	13%	10%	11%
Public transport	33%	31%	27%	25%	20%	18%	30%
Bicycle	1%	2%	4%	1%	0%	1%	3%
Walked	13%	10%	26%	7%	5%	5%	10%
Other means	1%	1%	1%	1%	1%	0%	1%

Source: U.S. Census, 2000.

Figure 26: Means of travel to work, Somerville & selected communties, 2000



Source: US Census, 2000.

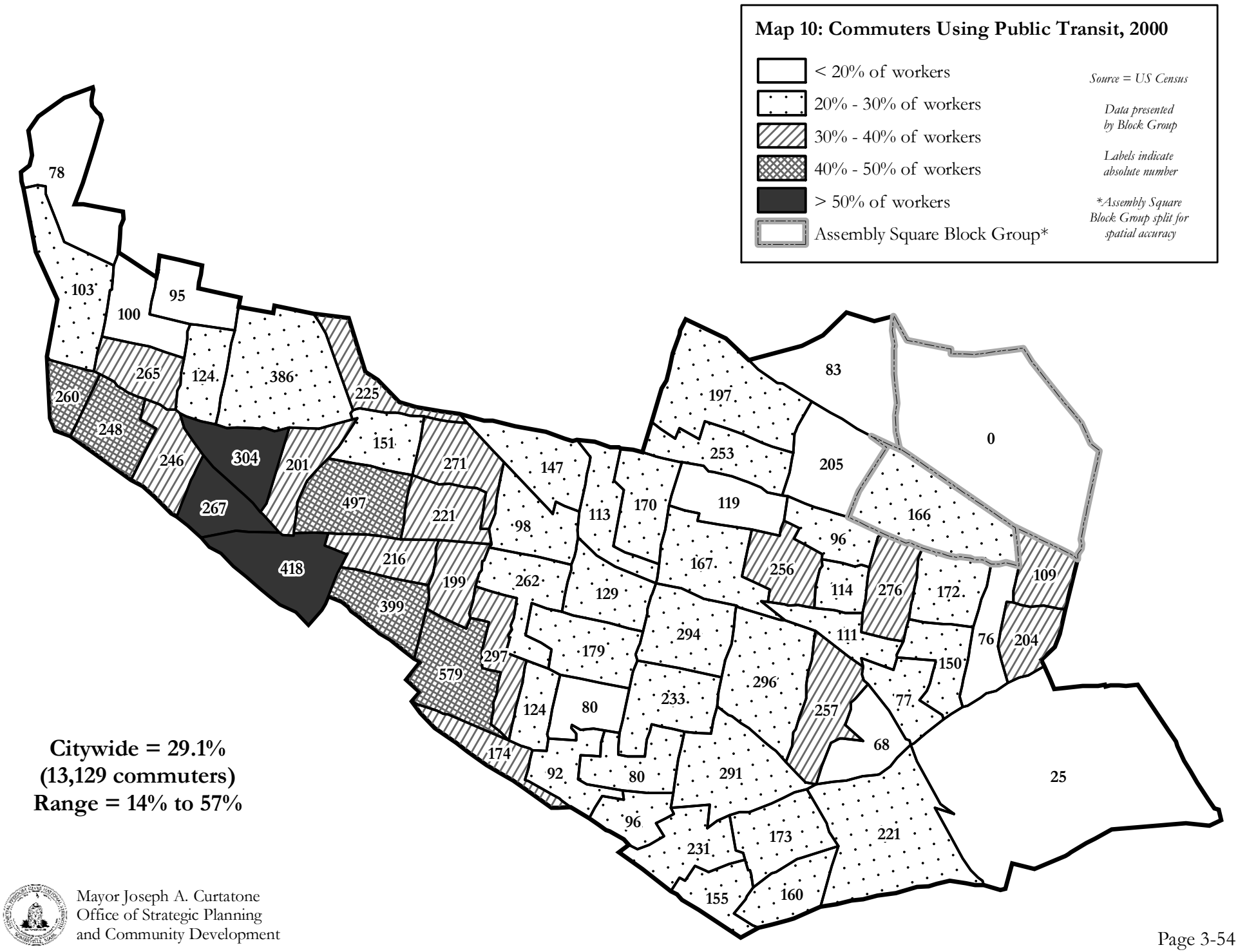
Finding #28: Rates of public transportation commuting are higher in the Davis Square area (>50% in some areas) than in the East Somerville area bordering Sullivan Square station (20%-40%), despite that both areas are located within ¼-mile walking distance of a T stop and numerous bus lines.

The incongruity between commuting patterns near Davis and Sullivan Squares suggests a potential lack of access in East Somerville to the Sullivan Square T station. Other than that, it is clear from Map 10 that residents of neighborhoods within close proximity to rapid public transportation nodes (Davis Square/Teele Square and parts of East Somerville) are more likely to use public transportation than areas located farther from the MBTA rapid rail service (Ten Hills, Inner Belt, Union Square areas).

A potential reason for the smaller rates of public transportation usage for commuting near Sullivan Square may be due to the nature of residential employment near the area. Some occupation types, such as building and grounds cleaning and maintenance occupations, construction trades workers, production occupations, and material moving workers have higher than city-average rates of employment in the Sullivan Square catchment area than elsewhere in the City.[39] These occupations may not follow the same Boston-bound and public-transit commuting patterns that other employment sectors might follow. This is likely due to their employers being located in light industrial or suburban areas without transit access and/or because their vehicle is used as equipment during the regular operation of their job.

In contrast to the areas with high levels of public transit usage are the areas with the highest percentage of commuters who drive alone, shown in Map 11. These areas are located away from the rapid transit nodes, in neighborhoods such as Ten Hills, Winter Hill, some parts of East Somerville and the upper 'thumb' of West Somerville, which all have over 60% of commuters using automobiles to get to work.

[39] U.S. Census 2000.



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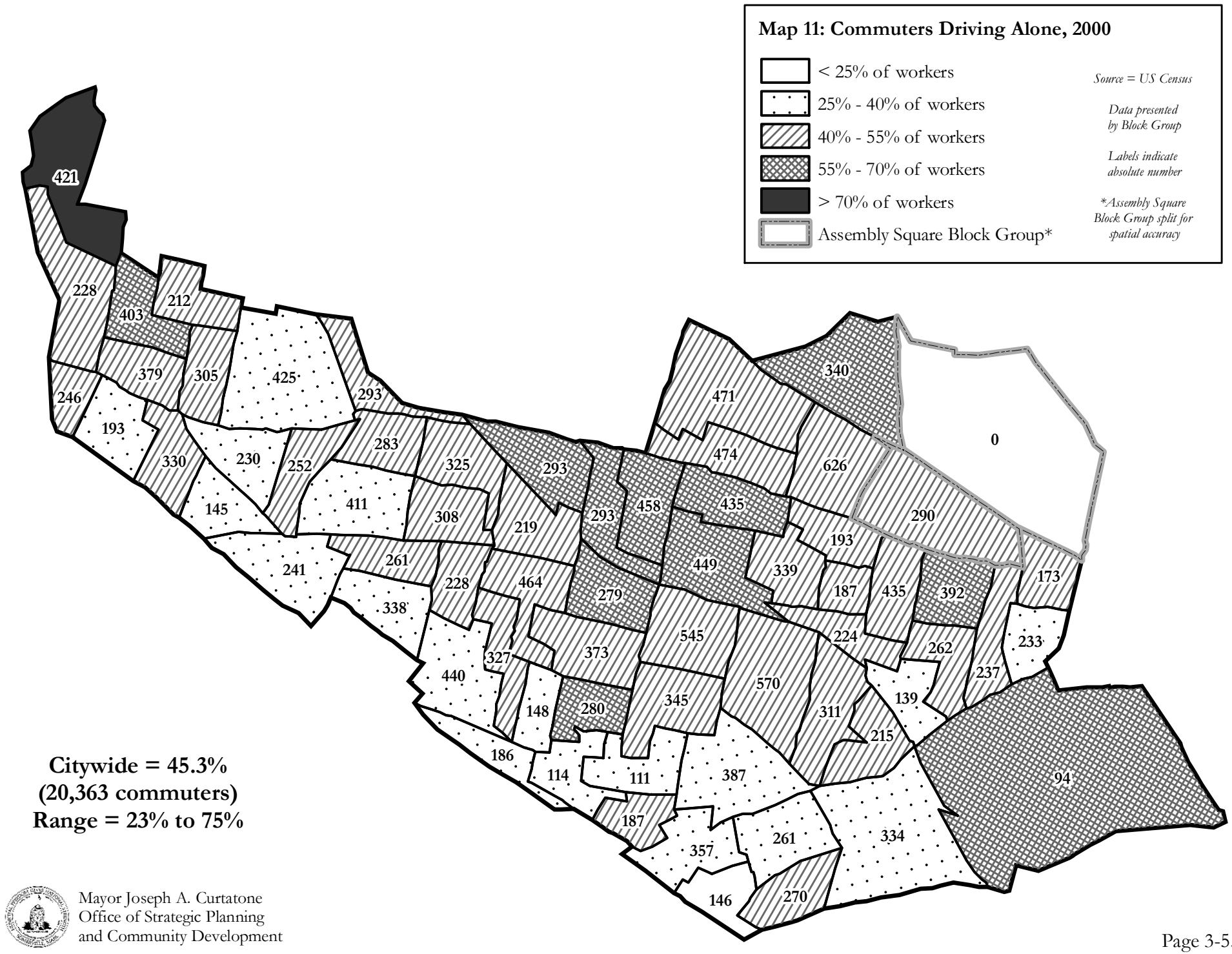

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Finding #29: Just 15% of the resident employees in Somerville find employment in jobs located in Somerville, while the remaining 85% work jobs in other cities. It is estimated that Somerville's daytime population during the workweek decreases from 77,500 to 53,000 residents, as the City loses approximately 40,500 resident employees and only absorbs approximately 16,000 workers from outside the City each day.

Job centers (communities with more jobs than workers) and bedroom communities (those with more workers than jobs) are found throughout the metro area, with job centers typically located along major highways, and bedroom communities in between. Somerville has been identified as a bedroom community, despite I-93's position within the city. Census data from 2000 reveals that a large portion of Somerville residents work in Cambridge (20%) and Boston (28%), making for short-distance (though not necessarily short-time) commutes to neighboring communities.

The city of Boston is a major job center for the region, with approximately 500,000 jobs and just 283,000 resident workers.[40] Other cities within the 'inner core' of Route 128/I-495 that are larger job centers are Cambridge and Newton (see Economic Development Trends Report). Outside of these job centers, most other job centers have been identified along I-495 in Westborough, Southborough, and Marlborough and along Route 128 in Burlington, Waltham and Westwood. All these locations are centered along major highways, with a greater tendency for space for amenities such as large parking lots.

Despite its prime location within the Boston Inner Core communities, Somerville has been identified by MassINC as a bedroom community with significantly more people traveling from the community to outside than traveling from outside of the community to Somerville or within the community itself for employment opportunities.[41] Abutting towns such as Arlington and Medford are also bedroom communities.

The City of Somerville has a 'jobs to housing ratio' of 22,927: 32,477, or 0.71 jobs per housing unit. In addition, there are only 0.48 jobs within the City for every resident who seeks employment.[42] This gives more evidence to Finding #29, that only 15% of Somerville residents work in the City.

Figure 27: Jobs, Employees, Households & Labor Force in Somerville	
Housing Units	32,477
Jobs in Somerville	22,920
Somerville employees that live in Somerville	7,092
Somerville employee that live outside Somerville	15,828
Ratio of Jobs/Housing	0.71 jobs/1 house
# of Somerville residents in labor force	47,656
% of Somerville workforce who work in City	15.77%
# of available jobs in Somerville per Somerville resident in the workforce	0.48

Source: U.S. Census 2000.

While Somerville is fortunate to be in close proximity to Boston and Cambridge's job centers—potentially saving residents from lengthy commutes—it suffers from both its lack of internal job opportunities and poor connectivity to the MBTA rapid transit system, which influence commuting times and mode choice.

[40] MassInc, 2004

[41] U.S. Census 2000. MCD/County-To-MCD/County Worker Flow Files.

[42] U.S. Census, 2000.

D. BUSES

Finding #30: With 15 routes functioning within and throughout the city, Somerville has a strong network of buses; nearly all areas of the City are within a ¼ mile radius from a bus line. Nearly 33,000 passengers board buses that pass through Somerville each day.[43] Bus frequencies, however, are not correlated with ridership levels.

Most of the current bus routes follow the original paths of the old streetcar lines, with major routes running up and down Broadway, Highland Avenue and Washington Street. Bus routes that traverse Somerville include:

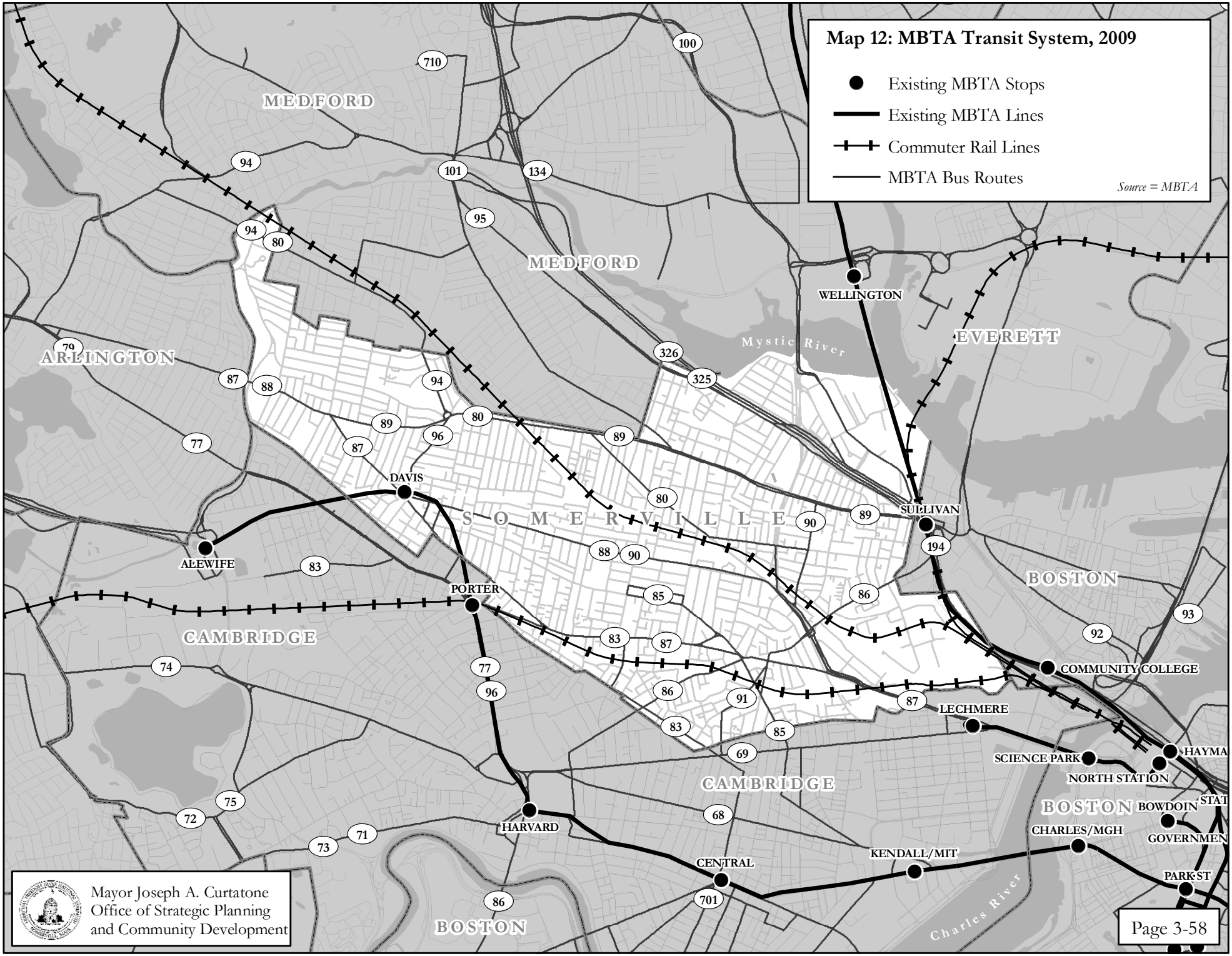
Route 80	Arlington Center - Lechmere Station
Route 83	Rindge Ave - Cambridge Central Square
Route 85	Spring Hill - Kendall/M.I.T. Station
Route 86	Sullivan Square Station - Reservoir (Cleveland Circle) via Harvard Sq
Route 87	Arlington Center or Clarendon Hill - Lechmere Station
Route 88	Clarendon Hill - Lechmere Station via Highland Ave.
Route 89	Clarendon Hill - Sullivan Square Station via Broadway
Route 90	Davis Square - Wellington Station
Route 91	Sullivan Square Station- Central Square, Cambridge
Route 92	Assembly Square Mall – Downtown via Sullivan Square Station
Route 94	Medford Square - Davis Square Station
Route 95	West Medford-Sullivan Square Station
Route 96	Medford Square - Harvard Station via George Street
Route 101	Malden Center – Sullivan Square Station
CT2	Sullivan Station - Ruggles Station

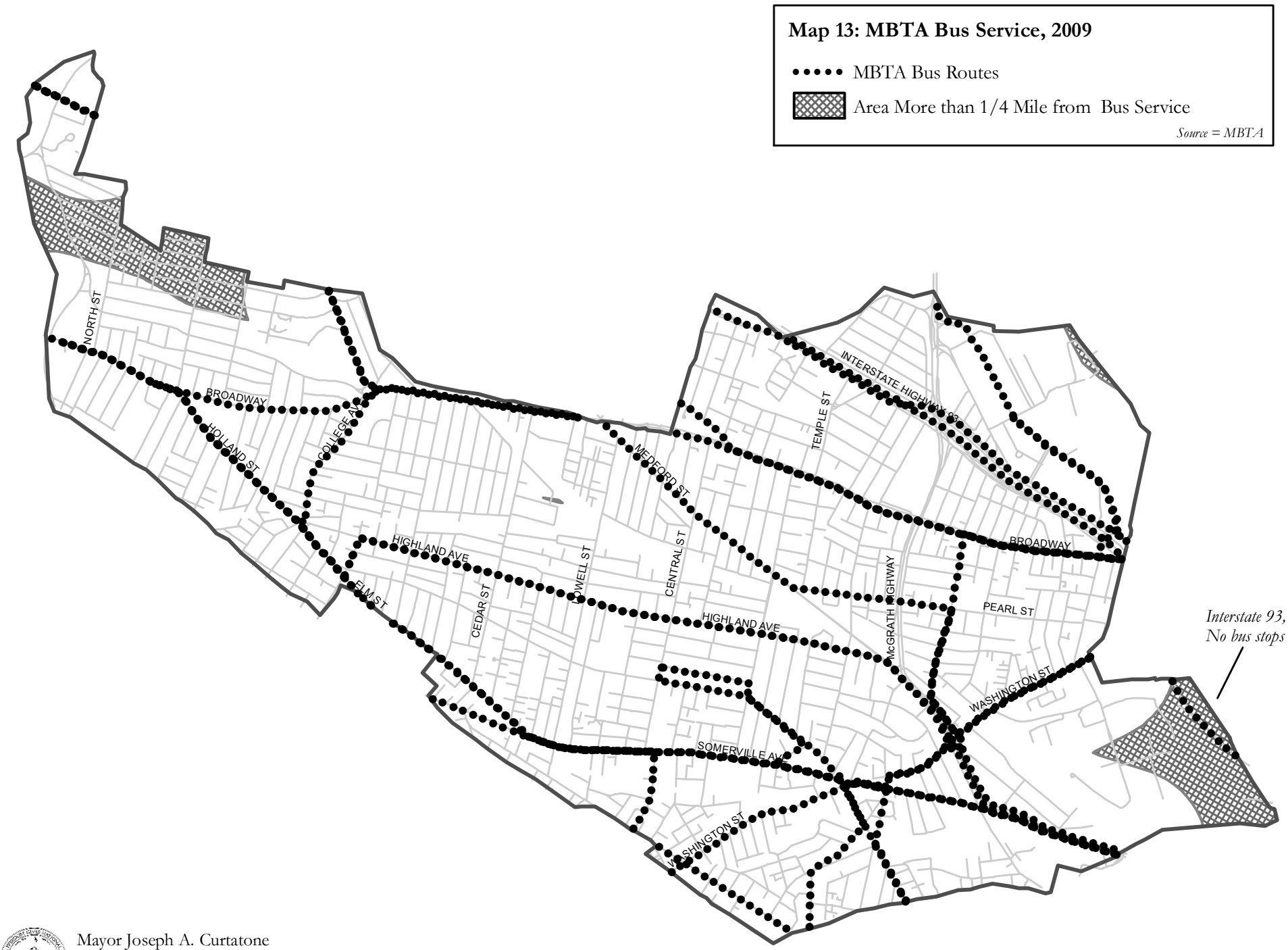
The bus network is fairly extensive throughout the City, with most of the city within a ¼ mile radius of any route (potentially longer to an actual bus stop). Though this service is fairly robust, issues with reliability, transfer waiting time and bus stop conditions, and congestion issues on the roadways, all affect the bus experience and are part of the overall impression of the bus service.

Though the majority of the City is near a bus line, the issue is where the bus routes go, and if they bring people to and from the destinations they want to go. Some routes, such as the #89 (service between Clarendon Hill/Davis Square and Sullivan Station) and the #90 (service between Davis Square and Wellington Station), are quite short, which means that many passengers have to transfer in order to travel greater distances. Several routes that would provide important connections do not exist, such as a route between Community College and points in Somerville, with connections at Lechmere Station.

As Map 12 shows, much of the bus and rail service in Somerville is of a west to east direction, with few routes connecting the City from north to south. The #90 and #96 are exceptions, though the central section of the City is without north to south connections.

[43] MBTA Blue Book 2007. CH 03B p02-8 - Bus Ridership updated Feb08.


Map 12: MBTA Transit System, 2009
Existing MBTA Stops
Existing MBTA Lines
Commuter Rail Lines
MBTA Bus Routes
Source = MBTA
MEDFORD
MEDFORD
ARLINGTON
EVERETT
Mystic River
SOMERVILLE
CAMBRIDGE
CAMBRIDGE
BOSTON
BOSTON
BOSTON
WELLINGTON
DAVIS
ALEWIFE
PORTER
HARVARD
CENTRAL
SULLIVAN
COMMUNITY COLLEGE
LECHMERE
SCIENCE PARK
NORTH STATION
HAYMA
BOWDOIN
STAT
CHARLES/MGH
GOVERNMEN
KENDALL/MIT
PARK ST
Charles River
Mayor Joseph A. Curtatone
Office of Strategic Planning
and Community Development



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The average bus in Somerville makes 41 inbound trips per weekday. During the weekday morning commute, buses make between 5 and 21 inbound trips, while during the evening commute they make between 1 and 27 trips; during the evening commute buses make between 1 and 18 trips (see Figure 28).

Figure 28: Somerville Bus Frequency

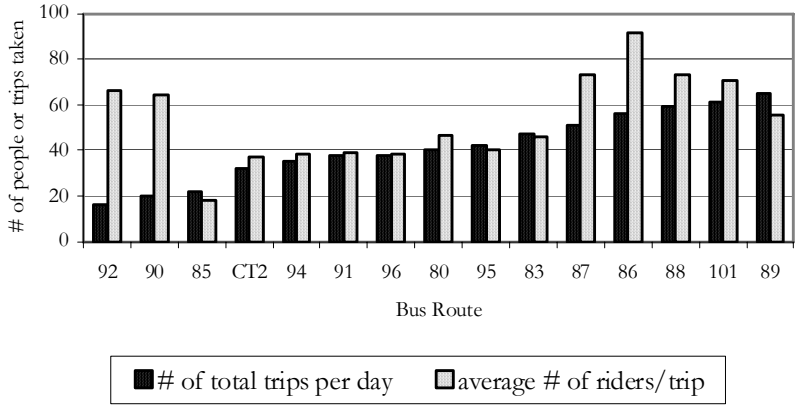
		Number of Weekday Inbound Bus Trips					
Route	Daily Ridership (weekday)	5:00-9:29 a.m.	9:30 a.m.-3:59 p.m.	4:00-6:59 p.m.	After 7 p.m.	Total	# of riders/ total trips
80	1,872	13	12	8	7	40	47
83	2,154	16	15	9	7	47	46
85	402	7	9	5	1	22	18
86	5,139	18	21	9	8	56	92
87	3,720	14	15	11	11	51	73
88	4,299	22	16	9	12	59	73
89	3,586	22	17	18	8	65	55
90	1,280	5	7	5	3	20	64
91	1,482	12	14	6	6	38	39
92*	1,055	1	14	1	0	16	66
94	1,343	11	9	8	7	35	38
95	1,679	13	13	9	7	42	40
96	1,458	11	10	9	8	38	38
101	4,323	27	16	12	6	61	71
CT2	1,192	9	15	7	1	32	37

** Counting only the routes starting at Assembly Square (not Sullivan Station)*
Source: MBTA Blue Book, 2007 and Schedule Information, 2009

As the above table shows, three bus lines servicing Somerville have extremely limited (or no) bus service after 7:00 pm—the #85, #92 and the CT2 routes. The #85 bus and the CT2 do not operate on Saturday or Sunday (providing the only service from Union Square to Kendall/M.I.T) providing a gap in service during those times; the #92 does not operate on Sunday only.

Looking at the total number of riders compared to the total number of trips taken by each route, the experienced capacity of each bus route emerges (see Figure 29). The #86 bus, traveling from Sullivan Station to Chestnut Hill Ave and Reservoir Busway has the most number of riders per trip, based on average daily ridership equally spread between all trips. The #85 bus, traveling between Spring Hill and Kendall/M.I.T., has the least number of passengers per trip. As the following chart shows, the number of trips the bus route makes per day does not correspond directly with ridership levels. Two of the least frequent buses, the #90 and the #92, have quite high levels of passengers per trip. This implies that while these buses do not come very frequently, they are positioned in routes with high demand.

Figure 29: Daily trips/route and average # of riders/trip



Source: MBTA.

Four of the routes serving Somerville rank in the top 30 for typical daily weekday ridership and 12 routes rank in the top 100. Figure 30 shows the MBTA's ranking of typical daily weekday ridership of busses in Somerville as of January 2008 (ranked 1- 196):

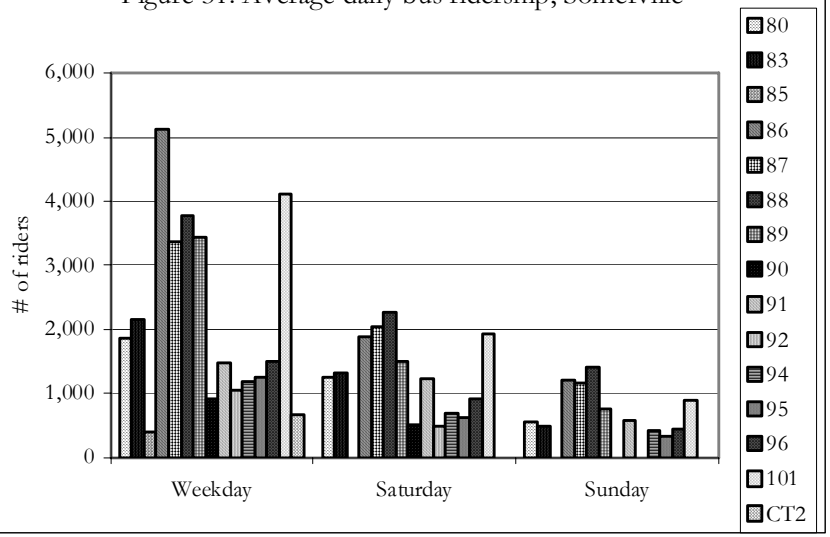
Figure 30: Somerville Bus Ridership Rankings

	Weekday		Saturday		Sunday	
Route #	Ridership	System-wide ranking	Ridership	System-wide ranking	Total	System-wide rank
80	1,872	63	1,257	45	563	47
83	2,154	53	1,328	41	483	55
85	397	144	n/a	n/a	n/a	n/a
86	5,139	15	1,880	31	1,196	22
87	3,373	31	2,052	27	1,165	23
88	3,785	26	2,257	22	1,414	18
89	3,431	29	1,504	38	756	34
90	920	108	502	88	n/a	n/a
91	1,482	68	1,234	46	570	46
92	1,055	96	493	89	n/a	n/a
94	1,174	87	682	66	417	60
95	1,253	83	614	72	338	70
96	1,500	67	917	56	439	58
101	4,116	22	1,921	30	883	31
CT2	660	127	n/a	n/a	n/a	n/a
	36,521		18,610		9,017	

Source: MBTA Blue Book, 2007. CH 03B p02-8 - Bus Ridership updated Feb08

Figure 31 displays a breakdown of typical daily weekday and weekend boardings on Somerville bus routes. The graph shows that while ridership rates decrease during Saturday and Sunday, many routes still serve more than 1,000 people a day during the weekend.

Figure 31: Average daily bus ridership, Somerville



Source: MBTA Blue Book, 200. CH 03B p02-8 - Bus Ridership updated Feb08.7

Figure 32 shows the percentage of riders on each bus route who get on and off the bus within the city of Somerville. From these numbers, it is apparent that:

- Over half of the riders getting on inbound bus routes 80, 85, 87, 88, 89, and 90 do so within Somerville.
- Over half of the riders getting off of inbound bus routes 87, 88, 94, and 101 do so within Somerville.
- Over half of riders getting on outbound bus routes 87, 88, 94, 95 and 101 do so within Somerville.
- Over half of the riders getting off outbound bus routes 80, 85, 87, 88, 89 and 90 do so within Somerville.
- For nine of the fifteen routes within Somerville (80, 85, 87, 88, 89, 90, 94, 95 and 101) more than half of the riders embark in Somerville, disembark or both.

Figure 32: Riders who embark and disembark in Somerville by route

Bus #	Avg. In-bound riders	% on	# on	% off	# off	Avg. Out-bound riders	% on	# on	% off	# off
80	997	61%	610	37%	369	857	34%	289	68%	579
83	1,073	42%	453	47%	499	1,080	38%	408	48%	521
85	233	91%	211	1%	3	164	2%	3	87%	143
86	1,954	19%	373	1%	25	2,177	10%	218	20%	425
87	1,683	55%	917	68%	1,148	1,690	72%	1,212	56%	941
88	1,997	75%	1,488	72%	1,442	1,790	70%	1,244	80%	1,430
89	1,834	99%	1,817	3%	59	1,597	39%	623	100 %	1,597
90	444	93%	411	49%	216	476	42%	201	83%	397
91	771	32%	243	22%	168	712	13%	90	37%	260
92	560	22%	120	7%	39	495	7%	32	29%	142
94	554	8%	42	87%	479	620	83%	515	11%	70
95	495	35%	173	9%	43	758	78%	591	37%	280
96	805	21%	169	42%	338	696	47%	327	24%	167
101	1,992	29%	584	62%	1,241	1,979	62%	1217	22%	427
CT-2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Total			7,612		6,069			6,969		7,380

Source: MBTA, 2005.

Finding #31: In 2006, a survey conducted by the Somerville Transportation Equity Partnership (STEP) found that, out of 245 total respondents, over 80% rode the bus in Somerville at least once a month and half of them relied on buses as their primary mode of transportation.[44]

The survey was conducted via paper and email, was distributed at bus stops and local events, and was linked to many websites, including the City of Somerville and STEP.[45] Though the group was self-selecting in that the survey was voluntary, the results do give insight into the current state of bus operation usage and satisfaction in Somerville.

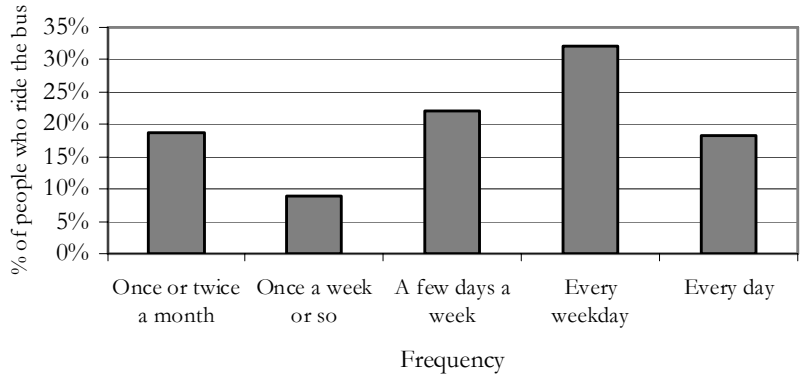
The survey found that:[46]

- Over 70% of respondents use the bus to commute to work;
- Frequency of service is a major source of dissatisfaction with the bus service;
- Bus routes 88, 87, and 80 received the highest satisfaction;
- Bus routes 95, 90, and 92 received the lowest satisfaction;
- Reliability is the number one reason why those who do not use buses do not;
- A majority of respondents (80%) were neutral or negative about bus service, with timeliness and routes cited as top reasons for dissatisfaction; and
- The most important improvements are better adherence to schedule, more trips, and bus schedules posted at stops.

Figures 33, 34, and 35 highlight frequency of use, reason for use and satisfaction with bus service.

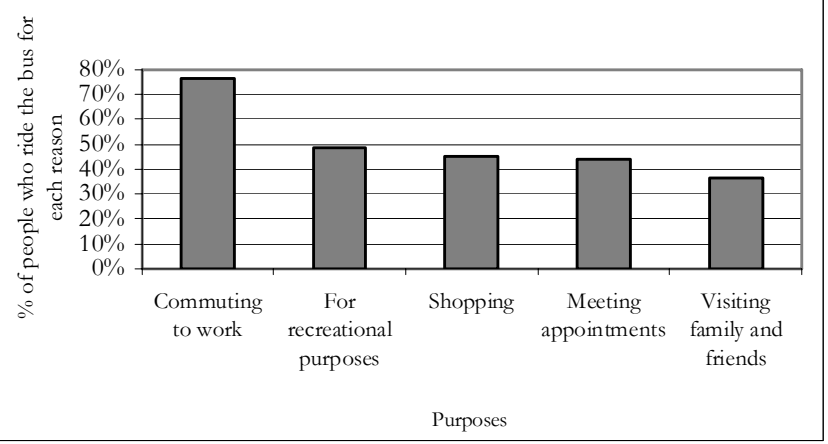
[44] Somerville Bus Survey, STEP, October 2006.
[45] Somerville Bus Survey, STEP, October 2006.
[46] Somerville Bus Survey, STEP, October 2006.

Figure 33: How often do you ride MBTA buses in Somerville?



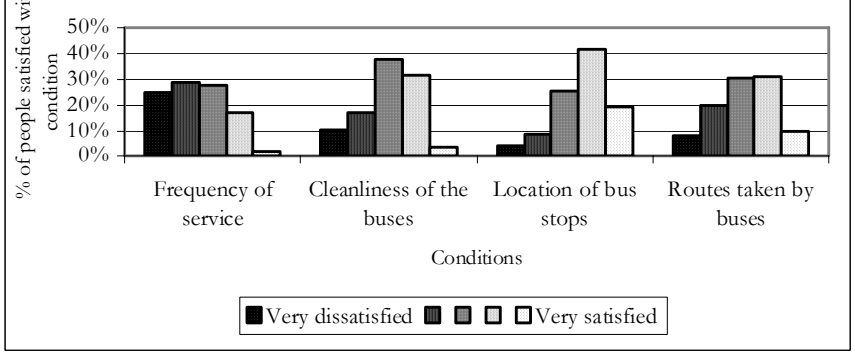
Source: Somerville Transportation Equity Partnership, 2006.

Figure 34: For what reasons do you ride buses? (Check all that apply.)



Source: Somerville Transportation Equity Partnership, 2006.

Figure 35: How would you rate your overall satisfaction with bus service in Somerville?



Source: Somerville Transportation Equity Partnership, 2006.

As seen in Figure 35, the only condition with which over ½ of the respondents were the most satisfied was the location of bus stops in the City. As noted in Map 13, all of Somerville is nearly within ¼ mile of a bus line.

Finding #32: Reliability of bus service is a problem for nearly half of the bus routes that serve Somerville.

The Boston MPO flagged nearly half of the bus routes that run through Somerville in violation of schedule adherence in 2004.[47] More buses fail to arrive on time in the morning than in the evening, but four of Somerville's 15 routes violate schedule adherence during both morning and evening peak hours.[48] System-wide, only 11% of the MBTA's weekly bus routes meet schedule adherence standards.[49]

[47] Boston MPO, www.bostonmpo.org/bostonmpo/3_programs/6_mms/6_transit/on_time.html
[48] Boston MPO, CTPS, 2004 Congestion Management System Report.
[49] Beyond Lechmere Study 2005.

The Boston MPO's mobility management staff (MMS) analyses on-time bus performance measures based on arrivals and not departures. Arrivals are considered off time if the bus arrives at the stop more than two minutes early or five minutes late than the scheduled arrival time (buses must have at least a ten-minute headway for this classification).[50] If 60% or more of morning and evening peak-period trips have on-time arrivals, a bus meets the performance standard; anything less than that and the route is considered a mobility concern.[51]

The MMS system is designed to highlight the connection of bus performance with congested roadways, which is the primary cause of off-time arrivals by buses.

Figure 36 highlights the Somerville bus routes which are failing on-time performance standards in the morning peak hours; the 86 inbound, the 87 outbound, the 90 outbound, the 91 inbound, the 92 outbound, and the 96 inbound have on-time arrivals only one-third of the time, or less.[52] The lower the percentage of on-time arrivals, the greater the non-compliance with the schedule.

Figure 36: Bus Schedule Adherence Violation, Morning peak (7:00 a.m. – 9:00 a.m.)

Route #	Direction	Description	% of morning peak with on-time arrivals (Inbound/ Outbound)
86	Inbound	Sullivan Square Sta. – Reservoir via Harvard	14
87	In/ Outbound	Arlington Center or Clarendon Hill – Lechmere Sta.	50 / 29
88	In/ Outbound	Clarendon Hill – Lechmere Sta. via Highland	53 / 46
90	Outbound	Davis Sq. – Wellington St. via Sullivan Sq.	0
91	Inbound	Sullivan Sq. – Central Sq. via Washington	25
92	In/ Outbound	Assembly Square Mall – Downtown via Main St.	44 / 11*
94	In/ Outbound	Medford Sq. – Davis Sta.	50 / 40
96	In/ Outbound	Medford Sq. – Harvard Sta. via George St.	33 / 50*

* Weekday peak-period service changes have been implemented on these routes since 2002.
Source: Boston MPO, CTPS, 2004 Congestion Management System Report.

On average, it appears that evening peak bus routes more closely adhere to their schedules than morning peak routes. In fact, eight morning peak routes were not on time for more than ½ of their arrivals. For the evening peak, four routes were not on time more than ½ of the time or more (see Figure 37).

[50] Boston Region Metropolitan Planning Organization. "Mobility Management – Transit – On-time performance". http://www.bostonmpo.org/bostonmpo/3_programs/6_mms/6_transit/on_time.html

[51] Boston Region Metropolitan Planning Organization. "Mobility Management – Transit – On-time performance". http://www.bostonmpo.org/bostonmpo/3_programs/6_mms/6_transit/on_time.html

[52] Boston MPO. http://www.bostonmpo.org/bostonmpo/3_programs/6_mms/6_transit/files/ad_violations_am.pdf

Figure 37: Bus Schedule Adherence Violation, Evening peak (4:00 p.m. – 6:00 p.m.)			
Route #	Direction	Description	% of evening peak with on-time arrivals (Inbound/ Outbound)
86	In/ Outbound	Sullivan Square Sta – Reservoir via Harvard	50 / 33
87	Outbound	Arlington Center or Clarendon Hill – Lechmere Sta.	13
88	Outbound	Clarendon Hill – Lechmere Sta. via Highland	50
94	Outbound	Medford Sq. – Davis Sta.	50

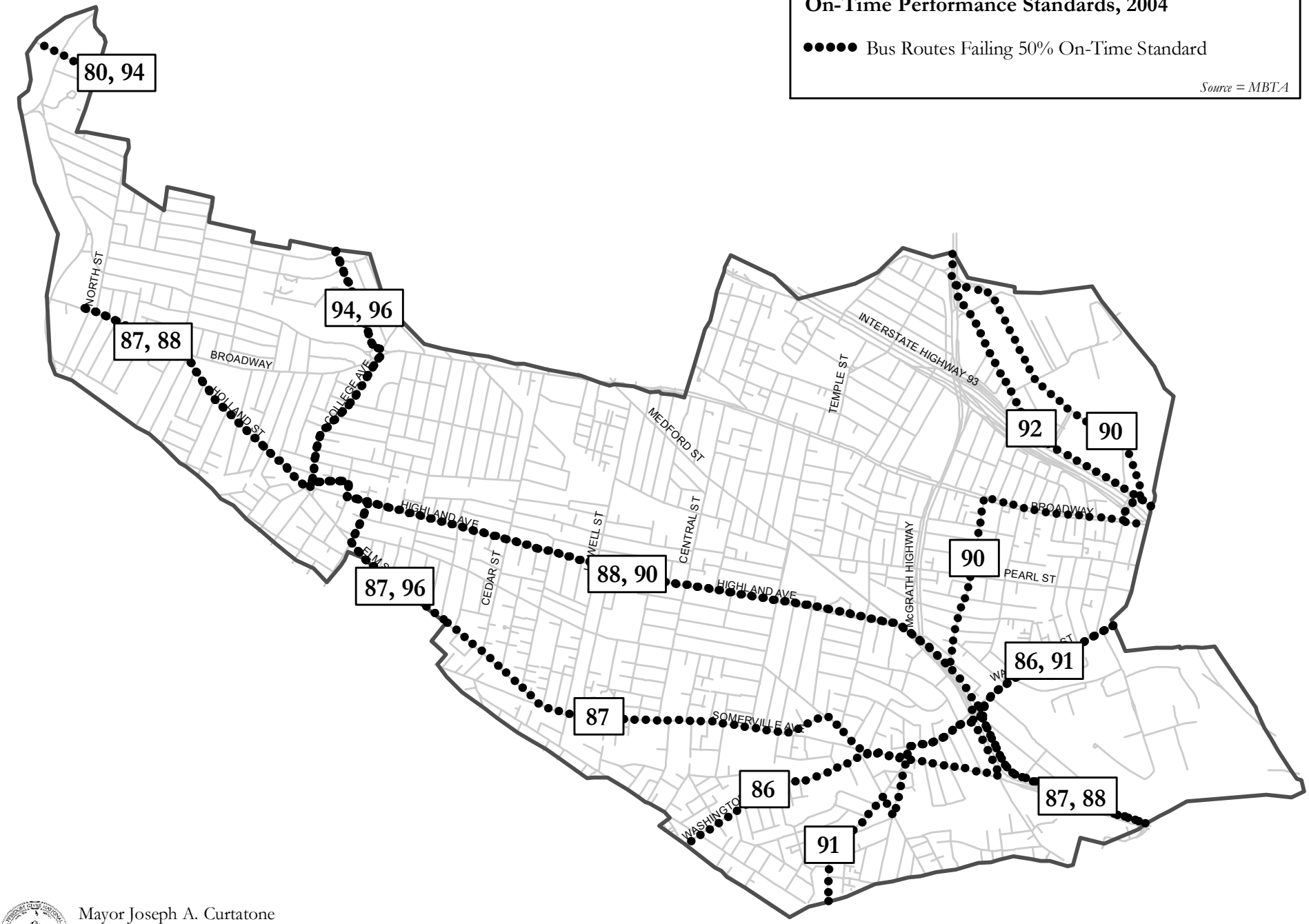
Source: Boston MPO, CTPS, 2004 Congestion Management System Report.

Problems with attaining on-time adherence is a system-wide phenomenon; Maps 14 and 15 show which bus lines are in schedule violation for at least half of their arrivals for the a.m. and p.m. peak periods.

Map 14: MBTA Morning Bus Routes Failing On-Time Performance Standards, 2004

●●●●● Bus Routes Failing 50% On-Time Standard

Source = MBTA



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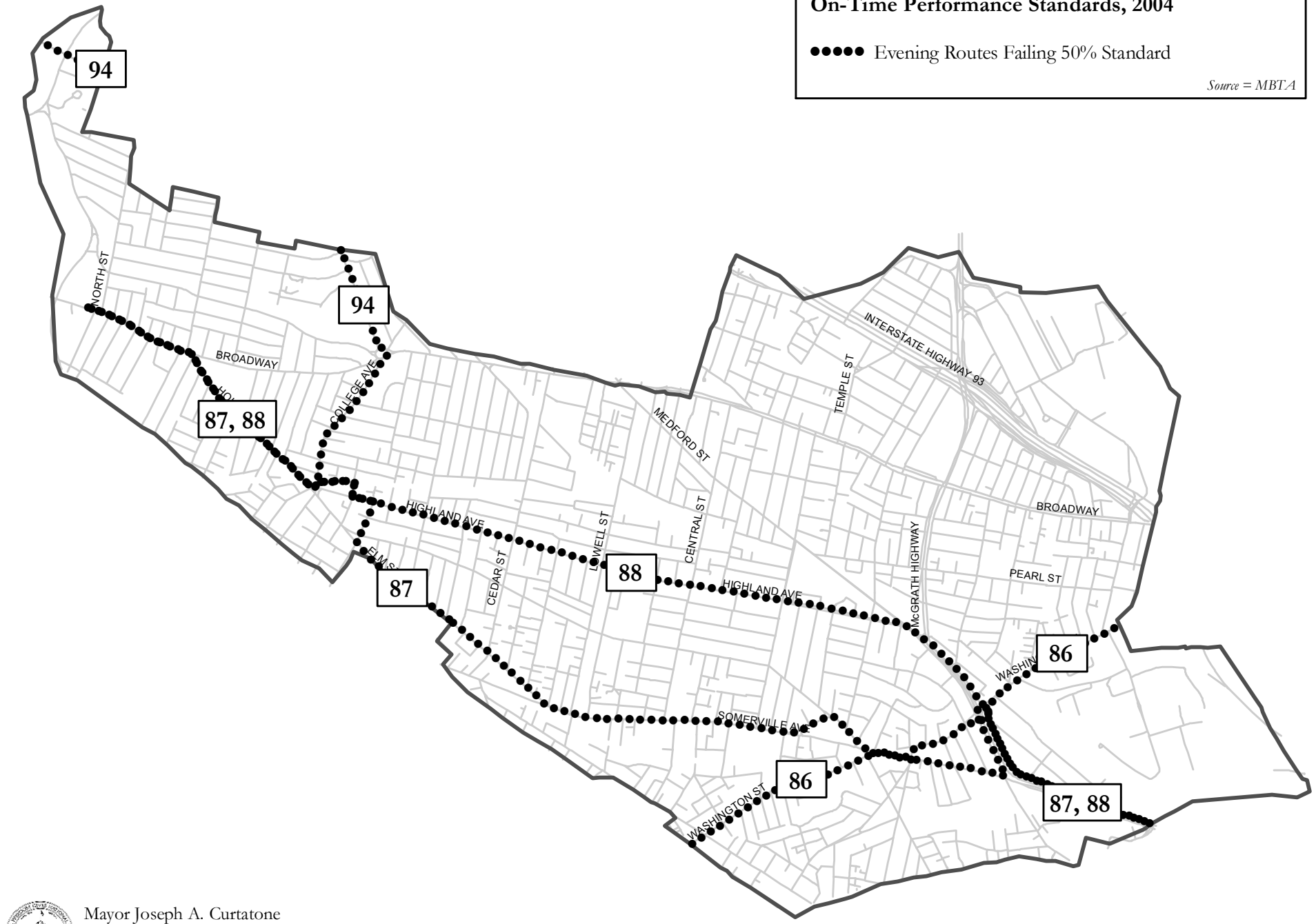
Map 15: MBTA Evening Bus Routes Failing On-Time Performance Standards, 2004

●●●●● Evening Routes Failing 50% Standard

Source = MBTA



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E. RAIL SERVICE

Finding #33: Based on 2000 Census data, approximately 54% of the population within the Boston Metro Area (an area of 101 cities and towns in eastern Massachusetts) lives ¼ mile or less from a rail station and ½ mile or less from a bus stop. In Somerville, only 30% of the population lives within walking distance from the MBTA rapid transit service while all of Somerville is within ½ mile of a bus line.

The Massachusetts Bay Transportation Authority (MBTA) and 15 Regional Transit Authorities provide public transportation service for the Commonwealth of Massachusetts. The MBTA is the nation's fifth-largest mass transit system.[53] It serves 1.1 million passengers each day and covers a district made up of 175 communities throughout eastern Massachusetts.[54] The 15 regional transit authorities serve 231 cities and towns throughout Massachusetts, including Somerville.

The MBTA rapid transit, light rail, and bus rapid transit systems serve 146 stations on six lines: the Green Line, Blue Line, Orange Line, Red Line, Mattapan-Ashmont Trolley, and the Silver Line[55] (see Figure 38). The bus and trackless trolley system serves 44 communities with 204 routes.[56] The commuter rail network comprises 13 radial lines with a total of 127 stations.[57] Commuter boat service connects Hingham, Hull, Quincy, and Charlestown to downtown Boston and Logan Airport.

Within the Boston MPO area, approximately 15% of residents commute to work via public transit; which is slightly greater than that reported in the 1990 Census.[58] In comparison, 55% of all work-related trips, and 42% of all trips into downtown Boston, are made by transit, while 7% of all trips throughout the MPO are made by transit.[59] As discussed in Section 3: Commute to Work, this figure is much higher in Somerville (29%).

Figure 38: MBTA heavy and light rail lines: Ridership, trip and station statistics

Line	Typical weekday ridership	Scheduled weekday one-way trips	Stations and stops
Heavy Rail			
Red Line	226,417	427	22
Orange Line	216,183	312	19
Blue Line	50,515	380	12
Light Rail			
Green Line	237,410	1,227	66
Green Line Surface	*88,911*		53
Green Line Subway	*148,499*		13
Mattapan-Ashmont Trolley*	0	0	8

**Closed for construction in fall 2007*

Source: MBTA Blue Book. 2007. CH 01 p02-7 - MBTA Service and Infrastructure Profile August 2007. p.1, 4, 5.

[53] MBTA.
[54] MBTA.
[55] MBTA Blue Book. 2007. CH01 p. 08-09.
[56] MBTA Blue Book. 2007. CH01 p. 02-7. MBTA Service and Infrastructure Profile August 2007. p.3.
[57] MBTA Blue Book. 2007. CH01 p. 02-7. MBTA Service and Infrastructure Profile August 2007. p.3 and 5.

[58] Boston Region Metropolitan Planning Organization. http://www.ctps.org/bostonmpo/3_programs/6_mms/6_transit/transit.html.
[59] Boston Region Metropolitan Planning Organization. http://www.ctps.org/bostonmpo/3_programs/6_mms/6_transit/transit.html.

Finding #34: With just one MBTA subway stop in its northwest corner (Red Line at Davis Square), Somerville sits within a rapid transit void.

Map 10 shows areas in and around Boston that are located within a 10-minute walking radius of a subway stop. With the exception of its northwest quadrant near Davis and Porter Squares on the Cambridge/Somerville border, and the far eastern portion of Somerville near Sullivan Square, Community College and Lechmere, most of Somerville, in addition to Chelsea, Everett and Medford, lies entirely beyond the service area of the MBTA rapid transit system.

However, the MBTA Red Line at Davis Square provides an important link into the system for Somerville (see Figure 39). The Red Line runs north from Braintree and Ashmont and south from Alewife Station in Cambridge, passing through downtown Boston. The Red Line is a heavy-rail, high-platform, grade-separated operation, powered by a third-rail system. Trains consist of multiple cars (six cars during peak periods and four cars during off-peak hours). The active fleet consists of 218 cars with its oldest cars having been built in 1969-1970 (rebuilt in 1985-88). The total distance from Alewife to Braintree is 17.7 miles and from Alewife to Ashmont, 11.9 miles. Service frequencies on each branch are 9 minutes during peak periods and 16 minutes on Saturday and Sunday.[60] Overall, the Red Line makes more daily trips (427 per day), carries more riders (226,417 per week), and offers more stations and stops (22) than all subway lines in the MBTA T service (excluding surface portions of the Green Line which are considered light rail).[61]

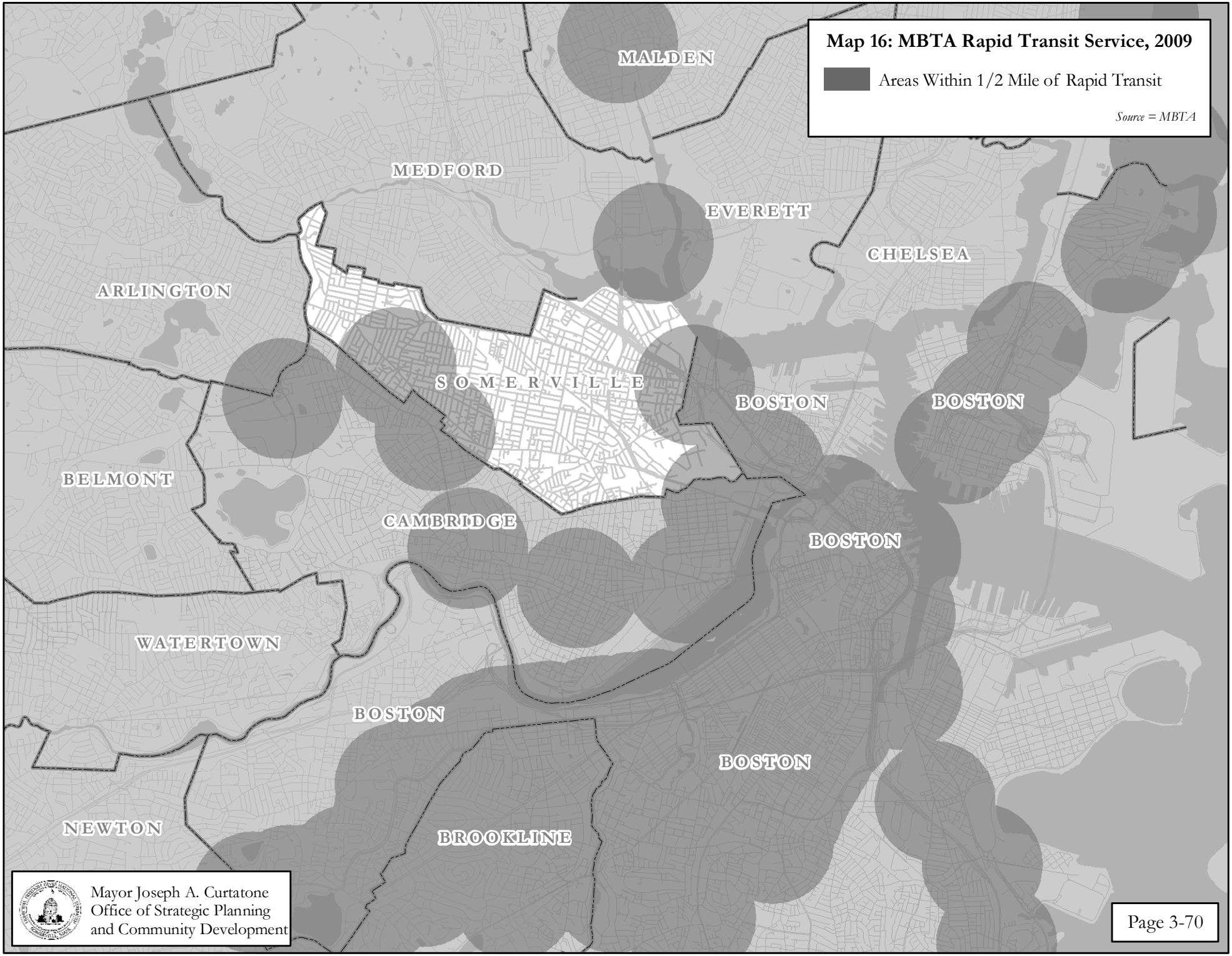
Two routes of existing commuter rail service also bypass Somerville. Both the Fitchburg/South Acton and Lowell MBTA Commuter Rail lines run directly through Somerville with no stops. Somerville residents wishing to connect to a commuter rail line must travel to either Porter Square in Cambridge (Fitchburg Line), West Medford (Lowell Line), or downtown Boston's North or South Station (all lines) to access the commuter rail. With little rail service available to most of the City, this means a trip via bus, auto, bicycle or foot to arrive to a station to board a commuter rail, which may the run back through the city, if headed to points north.

Figure 39: MBTA T lines and Commuter Rail routes, Somerville

Source: City of Somerville

Porter Square is just outside the City Line in Cambridge, and Sullivan Station is just outside the City Line in Boston; both stations attract ridership from many Somerville residents. Map 10 illustrates the portions of land in Somerville that is within a ten-minute walking distance for each station.

[60] MBTA Blue Book. 2007. CH 02 p09 - Rapid Transit Schedule Spring 2007
[61] MBTA Blue Book. 2007. CH 01 p02-7 - MBTA Service and Infrastructure Profile August 2007. p.1, 4, 5.

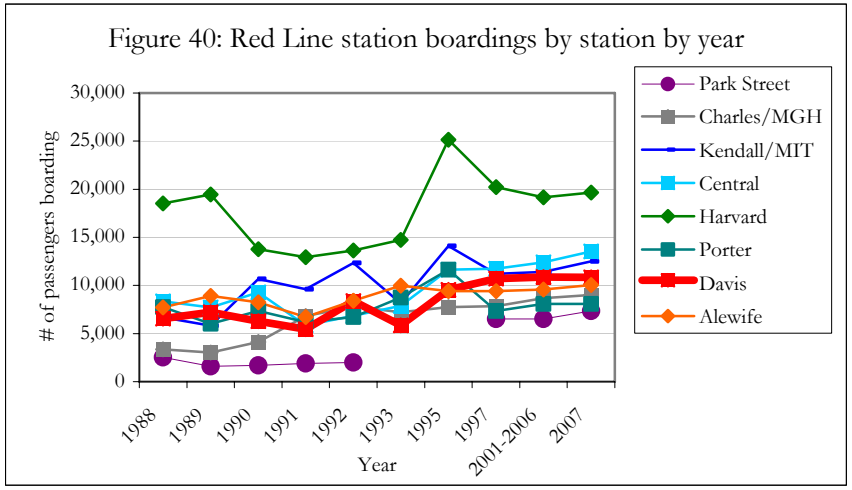

Map 16: MBTA Rapid Transit Service, 2009
Areas Within 1/2 Mile of Rapid Transit
Source = MBTA
MALDEN
MEDFORD
EVERETT
CHELSEA
ARLINGTON
SOMERVILLE
BOSTON
BOSTON
BELMONT
CAMBRIDGE
BOSTON
WATERTOWN
BOSTON
BOSTON
NEWTON
BROOKLINE
Mayor Joseph A. Curtatone
Office of Strategic Planning
and Community Development

Finding #35: At 10,856 daily boardings at Davis Square (2007), Somerville's only T station, ridership rates rank 12th among all 63 MBTA subway stations.[62]

Sullivan Station and Porter Square Station, the two closest T stations to the City, rank 21 and 22, respectively, with average weekday boardings of 8,281 and 8,069.[63] Together, the boardings at these three stations comprise 6% of all boardings throughout the MBTA subway system. On average, each of the 63 stations handle 1.5% of all system passengers; each of these stations handle more than this amount.

As Figure 40 indicates, station entries at Davis Square (approximately 10,856 passengers per day) have increased 65% since 1988, and have exceeded initial weekday boarding projections from 1981 by over 34% (the MBTA projected in 1981 that weekday boardings at Davis Square station would be 8,090 passengers). Average daily station entries at Davis Square are higher than those at Porter Square, Alewife, and Charles/MGH, but trail ridership at Central, Harvard, and Kendall/MIT. Though there is some annual variation, the trend of slightly increased ridership has been realized across all listed stations on the Red Line. Porter Square has followed the approximate same trend line as Davis Square.

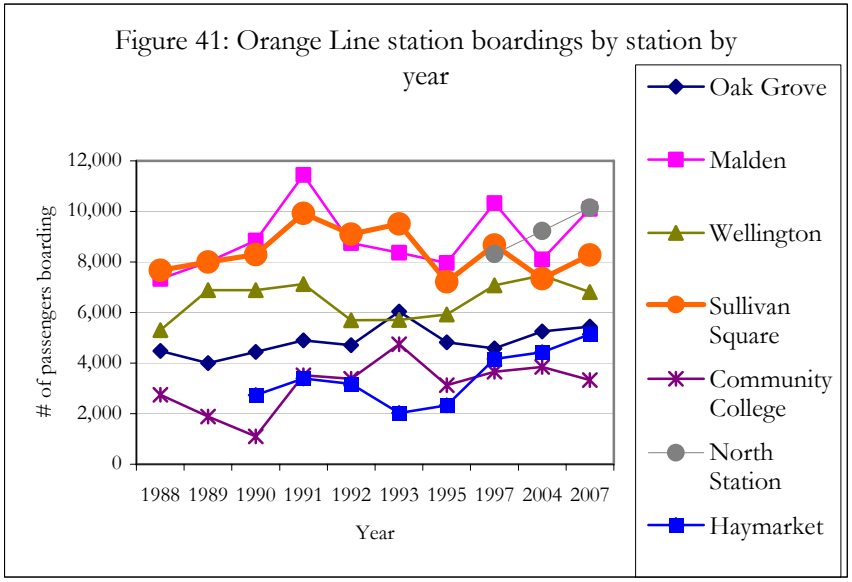
Figure 40: Red Line station boardings by station by year



Source: MBTA Bluebook. 2007. CH 02 p10 - Red Line Station Entries.

Sullivan Station has one of the highest boarding ratings for the northern section of the Orange Line, trailing only Malden Station. Boardings at Sullivan Station have varied throughout the past decades, with higher ridership levels during the early 1990's than were experienced in 2007. Boardings have only slightly increased from late 1980's levels at Sullivan Station (see Figure 41).

[62] MBTA Bluebook 2007. CH 02 p04 - Ranked Station Entries and Transfers.
[63] MBTA Bluebook 2007. CH 02 p04 - Ranked Station Entries and Transfers.



Source: MBTA Bluebook. 2007. CH 02 p22 - Orange Line Station Entries.

Finding #36: The Red Line maintains a 91%-94% on-time adherence, higher than almost all other MBTA rail lines. The Orange Line maintains a 91% schedule adherence.

Determination of 'on-time performance' is defined by the Boston MPO as having at least 95% of all trips operating within five minutes of the scheduled time.[64] Figure 42 shows the percentage of peak-period trips which met this standard.

Figure 42: MBTA Rail On-Time Performance (Schedule Adherence)

Service	Percent On-Time Peak-Periods Trips
Blue Line	92
Orange Line	91
Red Line: Ashmont	94
Red Line: Braintree	91
Green Line: Boston College (B)	97
Green Line: Cleveland Circle (C)	82
Green Line: Riverside (D)	80
Green Line: Heath Street (E)	85

Source: Boston MPO. http://www.bostonmpo.org/bostonmpo/3_programs/6_mms/6_transit/on_time.html.

[64] Boston MPO.

F. PARATRANSIT

Finding #37: Somerville residents use both SCM's Community Transportation program (which provides service for the elderly and those with a mobility impairment) and MBTA's The RIDE (a service for those who are unable to use the fixed-route services due to a disability) for paratransit services. Ridership rates have been decreasing for SCM but increasing for The RIDE.

The two main providers of paratransit services in Somerville are SCM Community Transportation, Inc. and MBTA's The Ride. Green Cab of Somerville also provides a great deal of door-to-door transportation service to Somerville residents (30,000-40,000 trips per month), and the Montachusett Regional Transit Authority provides some transportation to and from Boston area hospitals and clinics.

SCM Community Transportation

SCM is one of the Boston region's longest standing non-profit providers of transportation services for seniors and persons with mobility impairments. SCM has been operational for twenty-five years, and currently provides 9,500 trips a month to 3,000 individuals.[65]

SCM offers several free services to senior citizens (defined as aged 60+) and those persons with mobility impairments; services provided are trips to medical related appointments, the grocery store, Council on Aging meal sites and trips to visit loved ones in a hospital.[66] Funding sources dictate conditions for trip purposes. They also provide for-fee trips for those who do not meet the above criteria, which help support their programming and operations.[67] Riders can request service up to two weeks in advance and as little as two-days before a desired trip.

In general, SCM's ridership has been decreasing over the last eight years for three main reasons: decreased funding, a slight decline in the elderly population, and a healthier and more independent aging population.[68] However, this trend is expected to change as the baby boomers become more senior and the demand for paratransit services from this population increases. SCM's staff speculates that another possible cause of the decline in ridership is that the interests of seniors have changed over the past ten years.[69] Today's seniors want different activities than those decades ago, and they are more likely to have driven all of their lives and thus be less likely to give up their independent driving habits.[70]

The following table (Figure 43) illustrates that most of the rides provided by SCM are used for food and health related activities.

[65] SCM Transportation. Retrieved June 25, 2009 from http://www.scmtransportation.org/index.php.
[66] SCM Transportation. Retrieved June 25, 2009 from http://www.scmtransportation.org/freerides.php.
[67] SCM Transportation. Retrieved June 25, 2009 from http://www.scmtransportation.org/paidrides.php.
[68] SCM Transportation. July, 2008.
[69] SCM Transportation. July, 2008.
[70] SCM Transportation. July, 2008.

Figure 43: SCM Community Transit: Paratransit Data July 1, 2007 – June 30, 2008

Type of ride	# of trips	% of total	Unduplicated riders	% of total	Primary time of service
Adult Day Health	14,900	55%	132	13%	7:30 – 9 AM & 2 – 4 PM (Mon. – Sat.)
Medical	4,650	17%	569	58%	9 AM – 4:30 PM (Mon. – Fri.)
Social/ Activities of Daily Living	1,325	5%	156	16%	
Work Related	25	0%	1	0%	Midday (Mon. – Fri.)
Nutritional Food Shopping	1,250	5%	37	4%	9:30 AM – 12:30 PM (Tues. – Fri.)
Nutritional Meal Site	5,025	18%	92	9%	9:00 AM – 6:00 PM (Mon. – Fri.)
Total	**27,175**		**987***		

**Numbers for unduplicated riders vary slightly from reported data as riders can ride under a variety of purposes and funding sources and may be counted more than once.*

Source: SCM Community Transportation, July 2008.

The arrangement between the City of Somerville and SCM is to have the transportation services available for medical appointments and grocery shopping trips. According to SCM, the organization serves about 500 individuals in Somerville each year.[71]

Average ridership per month in Somerville is 414 one-way rides, with 75% of the trips used for medical purposes and 25% for shopping purposes.[72] Within Somerville, SCM is unable to provide all desired services; the demand for services outpaces available funding. The refusal rate had reached a record high of 32% (for medical trips) as of December 31, 2008.[73] Despite the general decrease mentioned above, from April 2008-May 2009, total trips per month increased 6%, from 406 to 432 rides, though monthly variations fluctuated from 307 to 490 rides.[74]

A bus survey amongst 245 Somerville residents conducted by STEP in 2006 revealed that over half of respondents had never heard of SCM and just 8% of those who had heard of SCM reported ever using their services.[75]

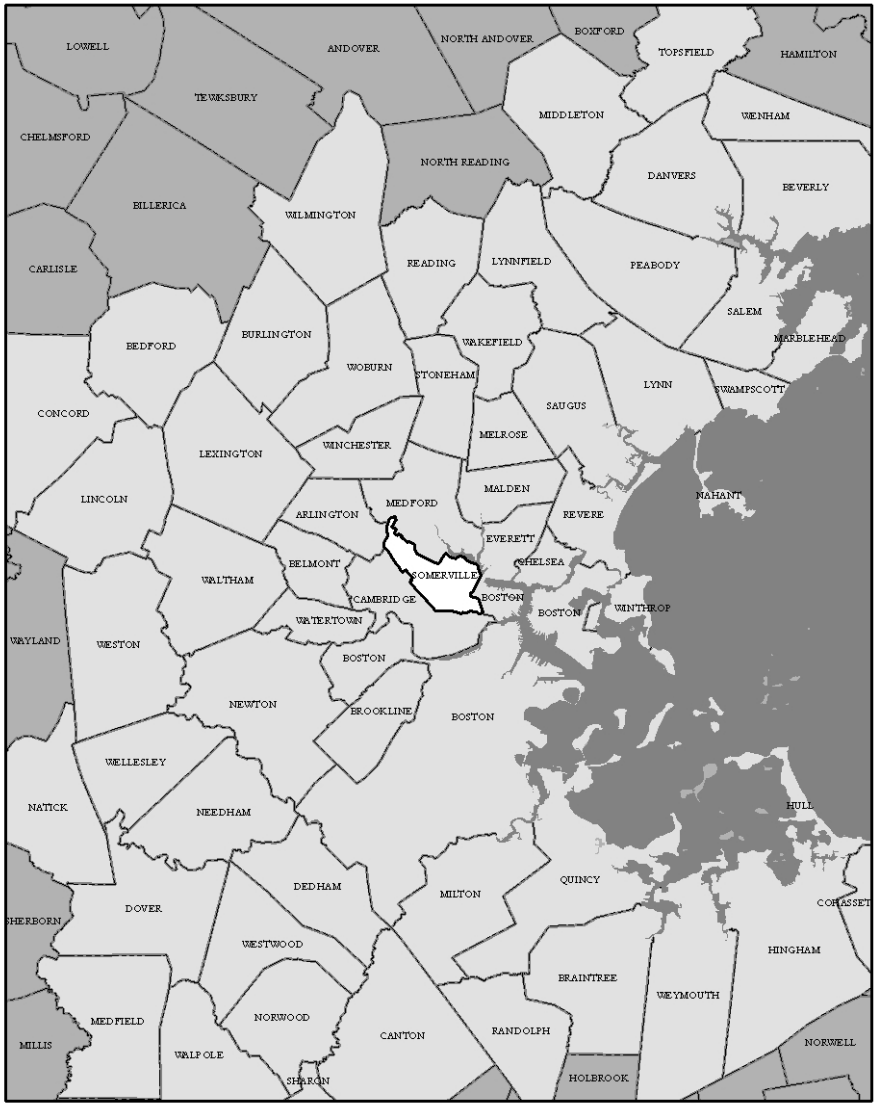
MBTA's The Ride

The MBTA provides a door-to-door paratransit service for those people who are unable to use the fixed-route MBTA services due to a disability. Trip purpose is not a condition for usage. The RIDE began service in the 12 square miles in and around Brookline and Boston in 1977, and has since expanded to cover more than 279 square miles.[76] Figure 44 shows in light grey the service area (Somerville is in white); areas outside the service area are in dark grey. As of spring 2007, THE RIDE serves over 66,000 registered customers across the metro area; customers pay a $2.00 fee, regardless of where in the service area they travel.[77] On average, the RIDE provides 5,173 trips per weekday throughout its service area.[78]

[71] SCM report to Somerville. "2009-2010 Public Service Application Form". P.4.

[72] SCM monthly reports to Somerville, 2008 and 2009.
[73] SCM report to Somerville. "2009-2010 Public Service Application Form". P.5.
[74] SCM monthly reports to Somerville, 2008 and 2009.
[75] Somerville Bus Survey, STEP, October 2003
[76] MBTA Blue Book. 2007. CH 06 p1-2 - The RIDE Overview.
[77] MBTA Blue Book. 2007. CH 06 p1-2 - The RIDE Overview.
[78] MBTA Blue Book. 2007. CH01 p.2-07

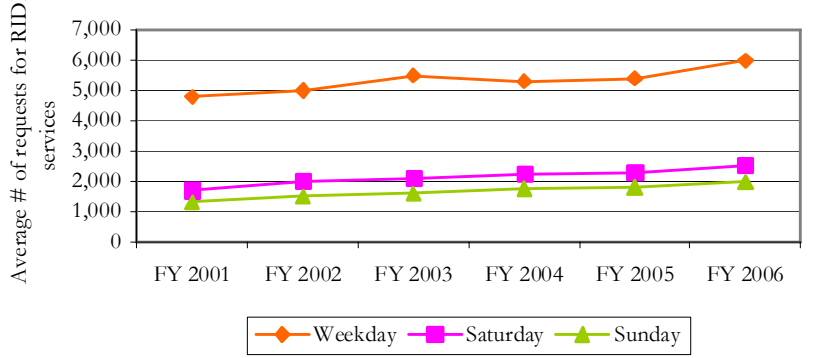
Figure 44: Service area for THE RIDE



Source: MBTA

As Figure 45 indicates, the number of RIDE requests per day has been increasing in recent years, on weekdays as well as weekends. Possible reasons for this increase in ridership include a greater number of the population with mobility-impairments, greater knowledge of the RIDE's services (and thus greater utilization), or increased mobility of those people who qualify for the RIDE's services.

Figure 45: Typical RIDE requests per day, Boston metro region



Source: MBTA Blue Book, 2007.

There are 1,093 residents in Somerville who currently qualify for THE RIDE. THE RIDE vehicles made 1.46 million trips in 2007; 30,051 (2.06%) of them took place in Somerville.

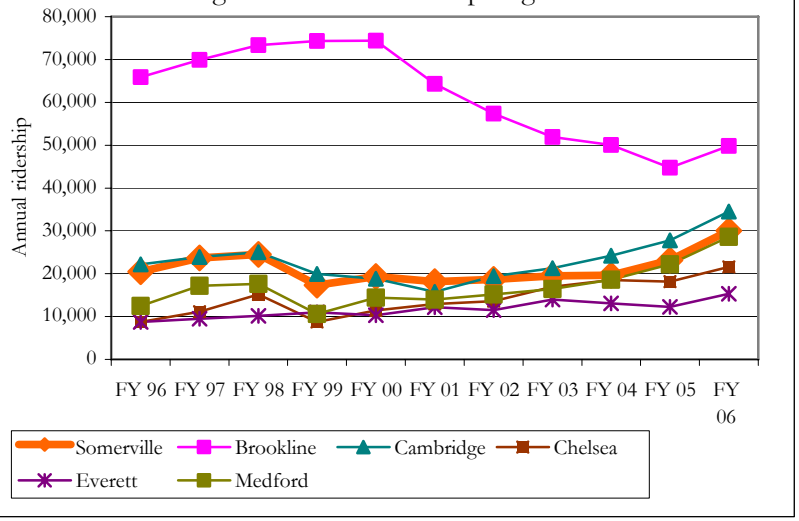
Somerville experienced a 30% growth in ridership of The RIDE between FY05 and FY06, over the 10% overall growth that The RIDE experienced in FY06.[79] Between 1996 and 2006, utilization of The RIDE increased 47%, and growth has been constant with the

[79] MBTA Bluebook. 2007.CH 06 p1-2 - The RIDE Overview and CH 06 p.5.

exception of FY99.[80] Figure 46 shows that ridership in Somerville ranks third highest amongst its neighboring communities, and just under that of Cambridge, though significantly less ridership than Brookline.

The bus survey conducted by STEP in 2006 revealed that most of the 245 respondents *had* heard of The RIDE (65%) but very few of those people had ever used it (6%).[81]

Figure 46: The RIDE trip origin



Source: MBTA Blue Book 2007.

[80] Blue Book 2007. CH 06 p.5.
[81] Somerville Bus Survey. October, 2006.

G. REGISTERED VEHICLES, CAR AVAILABILITY, AND CAR SHARING

Finding #38: Somerville homeowners are less likely than homeowners in most surrounding communities to have access to a vehicle, while Somerville renters are more likely than most surrounding communities to have access to a vehicle. Overall, renter-occupied households have less access to private vehicles than owner-occupied households.

Fifteen percent of the owner-occupied households in Somerville do not own a private vehicle; this number increases to 26% for renter-occupied households.[82] Rates of car ownership in Somerville are slightly lower than surrounding communities for owner-occupied households (see Figure 47), and in contrast, there are slightly more vehicles available per household in renter-occupied households in Somerville than in most other surrounding communities.

Figure 47: Auto Availability by City and Tenure

	% Occupied Housing units with No Vehicle Available		% with one vehicle available		% with two vehicles available		% with three or more vehicles		Vehicles per household	
	Own	Rent	Own	Rent	Own	Rent	Own	Rent	Own	Rent
Somerville	15%	26%	43%	48%	31%	20%	10%	6%	1.4	1.1
Boston	15%	45%	50%	42%	29%	11%	7%	3%	1.3	0.7
Brookline	7%	31%	50%	52%	37%	12%	6%	4%	1.4	0.9
Cambridge	12%	35%	56%	50%	28%	13%	5%	3%	1.3	0.8
Chelsea	13%	40%	51%	46%	26%	12%	11%	2%	1.4	0.8
Everett	13%	28%	42%	50%	35%	19%	11%	3%	1.5	1.0
Medford	8%	21%	38%	47%	42%	26%	12%	6%	1.7	1.2

Source: US Census 2000. QT-H11. Vehicles Available and Household Income in 1999: 2000.

Figure 48 shows the average vehicles per person for both owner and renter occupied households. Cambridge and Boston have fewer vehicles per person for owner occupied households than Somerville, while Everett and Medford have more vehicles per person.

For renter occupied households, Somerville has more vehicles per person than all surrounding communities with the exception of Medford.

Figure 48: Vehicles per person

	Vehicles per household		People per household		Vehicles per person	
	Owner	Renter	Owner	Renter	Owner	Renter
Somerville	1.4	1.1	2.6	2.3	0.54	0.48
Boston	1.3	0.7	2.5	2.2	0.52	0.32
Brookline	1.4	0.9	2.4	2.0	0.58	0.45
Cambridge	1.3	0.8	2.2	2.0	0.59	0.40
Chelsea	1.4	0.8	2.9	2.9	0.48	0.28
Everett	1.5	1.0	2.7	2.3	0.56	0.43
Medford	1.7	1.2	2.6	2.2	0.65	0.55

Source: US Census 2000. QT-H11. Vehicles Available and Household Income in 1999: 2000. and QT-H3. Household Population and Household Type by Tenure: 2000.

Finding #39: Somerville has fewer registered vehicles per person, aged 16 and up, than does Boston, Chelsea, Everett, Medford and Revere; the City has more registered vehicles per person aged 16+ than Cambridge and Brookline. Boston and Chelsea have fewer licensed drivers per population aged 16 and above, Cambridge has the same, and Brookline, Everett, Medford and Revere have more licensed drivers per population aged 16 and up.

There are currently 49,146 registered vehicles in Somerville (including trailers, trucks and motorcycles) and 47,487 actively licensed drivers.[83] In other words, about 70% of eligible Somerville residents (aged 16 and

[82] U.S. Census, 2000.

[83] Massachusetts Registry of Motor Vehicles, Data Sent July 2008.

over) hold a state driver's license and there are about 0.73 registered cars for every person over the age of 16 living in Somerville.

From a regional perspective, there are more registered vehicles per person (aged 16 and up) in Somerville than in Cambridge and Brookline, but fewer registered vehicles per person than in Chelsea Boston, Medford, Revere, and Everett.

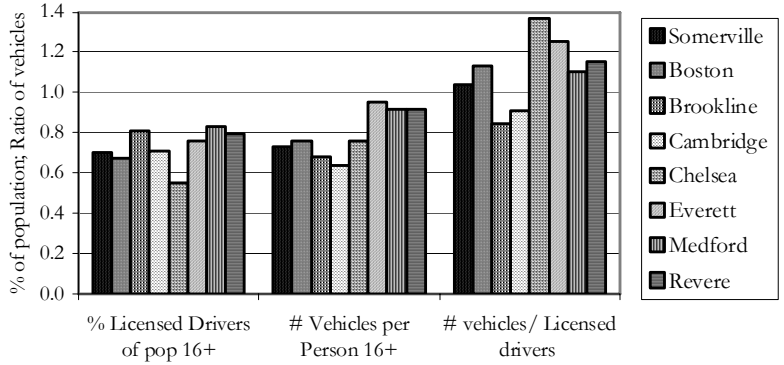
Somerville has one of the lowest rates of registered vehicles per licensed drivers, just over a one-to-one balance (see Figures 49 and 50). Brookline and Cambridge have fewer vehicles per licensed drivers, while the remaining surrounding communities all have more registered vehicles than licensed drivers.

Figure 49: Registered Vehicles and Licensed Drivers in Boston Area Communities

City	# of Licensed Drivers	# of Registered Vehicles	Population aged 16 and up	% Licensed Drivers (of pop 16+)	# Vehicles per Person (of pop 16+)	# Vehicles/ licensed drivers
Somerville	47,487	49,146	67,455	70%	0.73	1.03
Boston	324,764	366,922	484,995	67%	0.76	1.10
Brookline	39,312	33,161	48,737	81%	0.68	0.84
Cambridge	62,944	57,024	89,303	70%	0.64	0.91
Chelsea	14,629	20,042	26,394	55%	0.76	1.37
Everett	23,312	29,267	30,721	76%	0.95	1.26
Medford	39,044	42,903	46,929	83%	0.91	1.10
Revere	30,483	35,179	38,473	79%	0.91	1.15

Source: Registry of Motor Vehicles, July 2008

Figure 50: Registered vehicles and licensed drivers

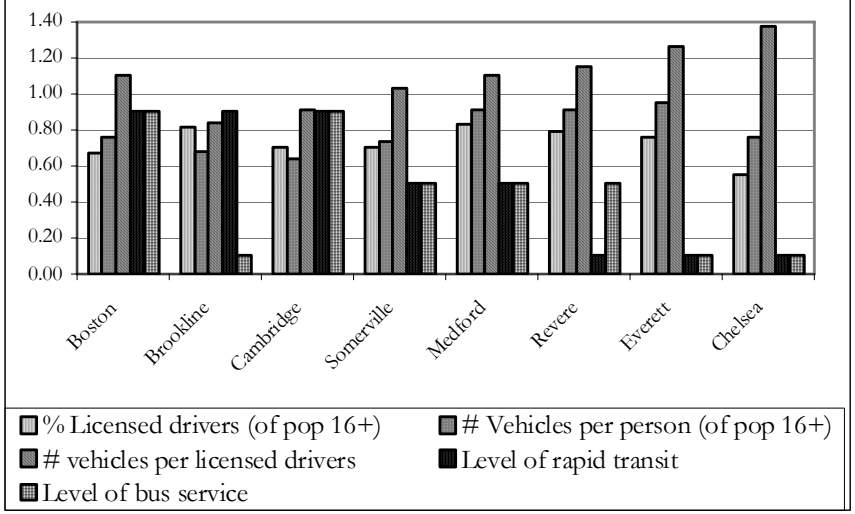


Source: Registry of Motor Vehicles, July 2008

Connections can be made between the patterns seen in licensed drivers and vehicle ownership, and the levels of transit services available in the various communities. For example, the only cities listed above with robust rapid transit service are Boston, Brookline and Cambridge (each has at least five rapid transit stops in a minimum of two different lines of service). Medford and Somerville each have one rapid transit station within the cities' borders, while the other communities have no rapid transit connections. In terms of bus service, Boston and Cambridge have high levels of service (>20 routes through the city), while Somerville, Medford and Revere have medium levels of service (between 10 and 20 routes through the city), and Brookline, Everett and Chelsea have low levels of service (<10 routes through the city). Though comparing the raw number of routes in each city or town doesn't take into account the size of each municipality, it does give an indication to the intensity of the network developed within each area. The conclusions that can be drawn from Figure 51, below, is that as cities or towns have higher levels of rapid transit and bus services, the levels of vehicle ownership per licensed

driver lessen. In contrast, there seems to be no direct relationship between the level of public transit service and percentage of licensed drivers, and a small correlation between the number of registered vehicles per person increasing slightly as public transit access becomes more rare.

Figure 51: Car ownership, licensed drivers and public transit access



Note: Level of rapid transit = 0.9 if more than 5 stops in City, 05 if between 1 and 5 stops in City, and 0.1 if no stops in City. Level of bus service = 0.9 if 20 or more routes pass through City, 0.5 if between 10 and 19 routes pass through City, and 0.1 if under 10 routes pass through City.

Source: Registry of Motor Vehicles, July 2008 and MBTA.

Finding #40: Car sharing is an increasingly popular mode of transportation in Somerville, with approximately 5.5% of the City's population aged 16+ and 7.8% of Massachusetts-licensed Somerville residents belonging to a car sharing program. In addition, the number of available shared cars in Somerville has more than doubled over the past four years.

Allowing residents to rent vehicles placed throughout the city for short-term hourly use, through a car sharing membership based program, is an increasingly popular mode of transportation that fits within the framework of a multi-modal transportation system. In well-connected, transit-served communities, car sharing provides an alternative to car ownership since people are able to walk, bike, or use transit for their daily transportation needs. Car sharing is generally used for specific errands or short trips that require a private vehicle.

Somerville has seen a continued trend towards car sharing as more people register with Zipcar (car sharing) and GoLoco (a program that turns 'social networks into travel networks' through on-line trip sharing).

Zipcar membership in Somerville has been growing steadily since its inception in 2000. As of July 2009, there are 3,700 Zipcar members within Somerville, an over three-fold increase from 1,100 members in 2005.[84] These residents share a total of 75 zip cars located within the city limits, more than tripling from the 2005 figure of 18 cars.[85] Significant portions of these members also use cars outside of Somerville, especially those cars located around Porter and Inman Squares. Based on a report on car sharing published by the Transit Cooperative Research Program (TCRP), 30% of car sharing members say that if it were not for car sharing they would otherwise own a car. When applying that proportion to Somerville's overall membership, it appears that the program has potentially contributed to more than 1,000 fewer cars being parked in Somerville (3,700*0.3-75 existing Zipcars = 1,035 cars).

[84] Zipcar. July 2009.
[85] Zipcar. July 2009.

Zipcar has been working closely with Tufts University to reduce the University's demand for parking; membership data indicates that even though the four cars located on campus are technically located in Medford, their benefits are felt largely in Somerville in the area surrounding the Tufts campus. Zipcar's partnership with Tufts has produced 700 members.[86]

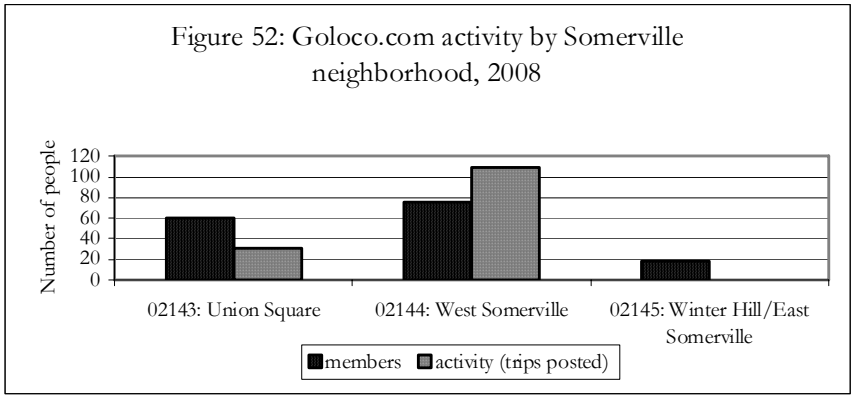
In the past four years, Zipcar has expanded the number of spaces in neighborhoods not formerly served like East Somerville, Magoun Square, Winter Hill and Boston Avenue, and out to Mystic Valley Parkway. Map 11 shows the distribution of the 75 Zipcars within 26 locations throughout the city (as of June 2009). Each point on the map may represent more than one vehicle. The vehicle locations are concentrated around Davis Square, along the major roadways (Broadway, Highland, etc.), and generally toward the south and west parts of the City. As seen on Map 11, approximately ½ of the City is within ¼ mile walking distance (about a five-minute walk) from a Zipcar location. The major areas beyond the ¼ mile radius follow the McGrath Highway Corridor, are in the far western part of the City, or in the Ten Hills, Assembly Square, or Inner Belt neighborhoods.

GoLoco.com

Rather than renting shared cars to private parties, GoLoco is a web-based service that enables people to share private cars with other people in the network. Essentially, it is a service that aims to turn social networks into transportation networks, acting as a virtual 'ride-board' for members to post needed rides and pending trips to combine trips in the fashion of carpooling.

GoLoco has been active in Somerville since 2007, and as of summer 2008 had 153 members. Activity is highest in West Somerville, as shown below in Figure 52, and although there were no trips posted in Winter Hill/East Somerville, there were 18 members as of August 2008.[87]

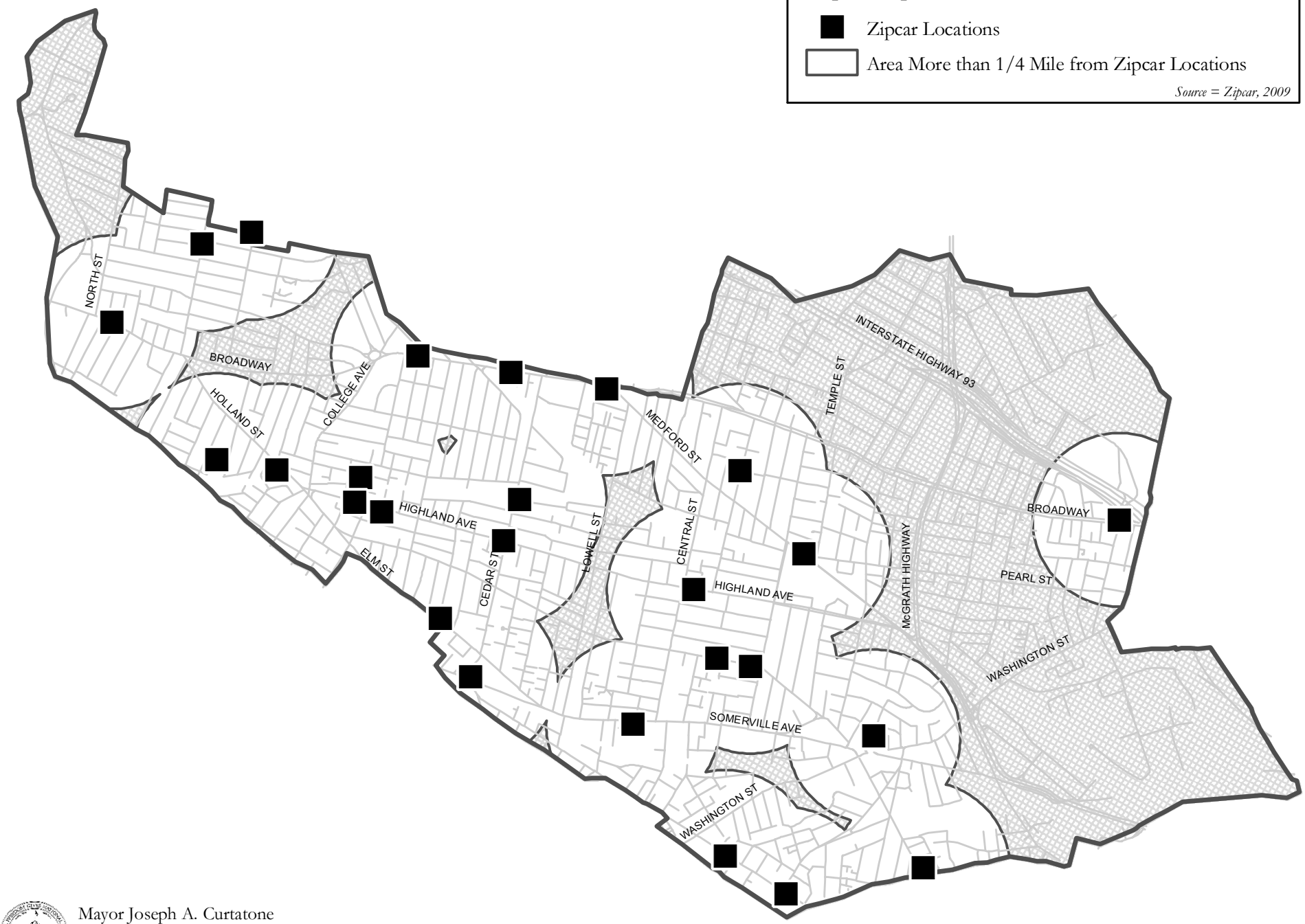
Figure 52: Goloco.com activity by Somerville neighborhood, 2008



Source: Goloco.com, August 2008.

[86] Zipcar. August 2008.

[87] Goloco. August, 2008.



Mayor Joseph A. Curtatone
Office of Strategic Planning
and Community Development

H. BICYCLISTS AND PEDESTRIANS

Finding #41: With an over 10-fold increase in the number of bike lanes and sharrows (shared arrows on streets indicating the need to share the road with bicycles), over the past two years, and the creation of the Community Path from the Cambridge city line to Cedar Street, more Somerville residents are biking for commuting purposes.

Census data from 2000 shows that 2.8% of Somerville workers were commuting to work by bicycle, up from 2.0% in 1990 (see Figure 53). According to the American Community Survey, this number has increased even more to 3.5% by 2006. In 2000, more people biked to work in Somerville than in Boston (1.0%), though there were still slightly fewer bike commuters in Somerville (2.8%) than in neighboring Cambridge (3.9%).

Figure 53: Biking as a means of travel to work, 1990 and 2000

City	Workers		Bicyclists		% Bike	
	1990	2000	1990	2000	1990	2000
Somerville	42,787	44,807	842	1,251	2.0%	2.8%
Boston	282,528	278,463		2,705		1.0%
Cambridge	39,946	54,969	1540	2143	3.9%	3.9%
Chelsea	11,714	12,574	75	62	0.6%	0.5%
Malden	28,068	29,119	37	89	0.1%	0.3%
Everett	17,279	17,818	8	14	0.0%	0.1%
Revere	20,032	20,529	51	50	0.3%	0.2%
Lynn	35,262	38,360	80	72	0.2%	0.2%
Saugus	13,197	13,217	8	31	0.1%	0.2%

Source: U.S. Census, 1990 and 2000.

The City has installed over 4 miles of new bike lanes since 2006 for a total of 4.4 miles of bike lanes citywide. There are also over 3.5 miles of sharrows, arrows that indicate the road should be shared with bicyclists, throughout the City. Figure 54 summarizes the location, construction and type of bike accommodations throughout the City.

Figure 54: Summary of bike lanes and markings, Somerville

Street	Year const.	Begins	Ends	Type	Length (ft)*	Miles
Washington St	2003	Inner Belt Rd	Tufts St	Lane - Bi-directional	3,590	0.7
Subtotal pre-2004					*3,590*	*0.7*
Beacon St**	2008	Oxford St	Inman Sq	Lane - Bi-directional	9,821	1.9
Beacon St	2008	Park St	Museum St	Sharrows	1,795	0.3
Broadway	2008	Packard	Powder House Circle	Lane - Bi-directional	4,435	0.8
Broadway	2008	Powder House Circle	Cedar St	Lane - Bi-directional	4,435	0.8
Joy/Chestnut	2008	Washington St	Fitchburg St	Sharrows	4,118	0.8
Willow Ave	2008	Elm St	Highland Ave	Lane - One-way	1,162	0.2
Subtotal 2008					*25,766*	*4.9*
Elm St	2009	Cutter St	Somerville Ave	Sharrows	7,181	1.4
Washington St	2009	Hawkins St	Beacon St	Sharrows	4,541	0.9
Park St	2009	Somerville Ave	Beacon St	Sharrows	*1,267*	*0.2*
Subtotal 2009					*12,989*	*2.4*
Total bike lanes					23,443	4.4
Total sharrows					18,902	3.6
Total					**42,345**	**8.0**

*The length is in feet and counts lanes in both directions on two-way streets. For instance, if a street is 1000 ft long with bi-directional bike lanes, the length is (1,000 x 2)= 2,000 ft.
**(Excludes Park/Museum, includes other segments with sharrow on downhill)

Source: City of Somerville, OSPCD.

Future and on-going bicycle access improvement projects include:

- Somerville Avenue, between Union Square and the Cambridge City Line (near Porter Square);
- Lower Broadway, between McGrath Highway and the Boston City border;
- Union Square, between the Square and the Cambridge city border (via Prospect and/or Webster Streets);
- Assembly Square Drive, the entire length; and
- Coordination with the City of Boston on Sullivan Square and Rutherford Avenue bicycle improvements.

Map 12 illustrates the bike lanes and sharrows within the City.

The City's Five Year Consolidated Plan, 2008-2013 outlines one goal related to bicycling in the City: "Improve pedestrian and bicycle accessibility in the City to support active transportation alternatives".[88] Strategies to address that goal include: Develop a Pedestrian and Bicycle Master Plan to prioritize improvements; Improve bicycle access on City streets; Extend Community Path to Central Street; Expand Community Path along the Green Line extension; Improve paths along the Mystic River; Identify and address safety impediments; and Improve Access to Water Transportation.[89]

Finding #42: In contrast with biking, the percentage of Somerville workers who walk to work has decreased steadily over the past two decades. This is despite the fact that Somerville's neighborhoods rank high on national walkability indices, based on the services and amenities that are within walking distance.

In 1990, Census data showed that 10.7% of Somerville workers walked to work, a figure that fell to 9.2% in 2000 (see Figure 55 below). The most recent results of the American Community Survey (2007) report less than 8.4% percent of the city's workforce walks to work. While significantly more people walk to work in Somerville than in surrounding communities to the north, the city's percentage of walking commuters still lags far behind that of Cambridge (24.4%). That said, it should be recognized that the ratio of jobs in Somerville to the residents of working age is 0.49 while Cambridge has 2.09 jobs for each resident aged 16 and over in the labor force.[90] There are simply fewer jobs to walk to in Somerville. Furthermore, like biking, there is no data source that captures how people walk for personal or non-work activities.

With 162.8 miles of sidewalks and mostly narrow and highly connected streets built before cars were popular, Somerville ranks very high as a walkable community. According to WalkScore (www.walkscore.com), a website service that calculates the walkability of an address by locating the proximity to nearby stores, restaurants, schools, parks, etc. and measuring how easy it is to live a 'car-lite' lifestyle, Somerville ranks almost entirely in the 2nd highest bracket of "Very Walkable" with one neighborhood scoring as a "Walker's Paradise", Davis Square. This is a national service, and the four-tiered categories as shown on Map 13 are in comparison to all areas throughout the United States, including more spread-out cities such as Phoenix or Houston. The metric does not take into account any barriers, environmental considerations such as noise or pollution, or issues of safety, which all impact an individual's decision to walk or not. The metric, while not perfect, shows the potential for walkability in the neighborhoods—the framework or bones of a good, walkable city are present within the City.

[88] City of Somerville. (February, 2008). Five Year Consolidated Plan 2008-2013. Section Three: Transportation and Infrastructure. P.119.
[89] City of Somerville. (February, 2008). Five Year Consolidated Plan 2008-2013. Section Three: Transportation and Infrastructure. P.119.
[90] U.S. Census, 2000.

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Map 19: Walkability

Figure 55: Walking as a means of travel to work, 1990 and 2000						
City	**Workers**		**Walkers**		**% Walk**	
	1990	2000	1990	2000	1990	2000
Somerville	42,787	44,807	4,578	4,122	10.7%	9.2%
Boston		278,463		36,323		13.0%
Cambridge	39,946	54,969	12,649	13,409	31.7%	24.4%
Chelsea	11,714	12,574	1,038	824	8.9%	6.6%
Malden	28,068	29,119	1,266	1,045	4.5%	3.6%
Everett	17,279	17,818	958	839	5.5%	4.7%
Revere	20,032	20,529	839	489	4.2%	2.4%
Lynn	35,262	38,360	2,117	1,773	6.0%	4.6%
Saugus	13,197	13,217	173	173	1.3%	1.3%

Source: U.S. Census, 1990 and 2000.

Somerville offers a growing selection of off-street, multi-use paths for bicyclists and pedestrians (see Map 14). Currently there are two miles of multi-use paths with plans for major extensions that will eventually link the city from its northwestern Cambridge border east to the Boston city line. The current inventory of paths include:

- The Community Path: Extends 1.2 miles from the Cambridge line through Davis Square to Cedar Street. Plans are in place to continue the path throughout Somerville alongside the Green Line extension.
- The Mystic River Bicycle Path: The path runs along the Mystic River from the Blessing of the Bay Boathouse in the Ten Hills neighborhood and extends to Draw Seven Park near Assembly Square. Renovation and expansion is planned during the 2nd phase of the Assembly Square development.

Finding #43: Bicycle and pedestrian counts conducted by various agencies have found that bicycle traffic is heaviest in the Beacon and Washington Street area approaching Inman Square and, with the exception of on the Community Path, pedestrian traffic is highest near Davis Square and on Lower Broadway near Sullivan Station.

The City of Somerville has not conducted any official bike counts to date. However, Cambridge has collected data from several key locations that include roads leading directly into or out of Somerville. Due to their proximity and direct connectivity to Somerville, these counts are largely reflective of bicycle activity in Somerville as well. Counts were taken during the morning (8:15-9:15 am) and evening (4:30-5:30 pm) commute hours in mid-September 2006 (see Figure 56).

Figure 56: Bike Counts in Cambridge, 2006			
# Bikers	**Inman Square**	**Porter Square**	**Linear Path**
A.M.	293	195	126
P.M.	234	145	126

Source: City of Cambridge.

A brief survey by CTPS (Figure 57) counted bicyclists and pedestrians at various locations throughout Somerville. Heaviest bike traffic was recorded on Elm Street at Willow Street, and Washington Street at Beacon. The Lower Broadway/Sullivan Square area recorded significantly higher foot traffic than anywhere else in the city. Following this area, the heaviest pedestrian traffic was recorded on the Linear Park near the Harvard Vanguard building in Davis Square, on the Somerville Community Path behind Rite Aid, and on Washington Street and Beacon Street. Counts were taken during morning rush hour in May of 2005.

Map 20: Off-Street Multi-Use Paths, 2009

Planned Off-Street, Multi-Use Paths

Existing Off-Street, Multi-Use Paths

Source = City of Somerville

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Figure 57: Bike and Pedestrian Counts, 2005		
TUESDAY AM LOCATION - 5/10/05 7 am – 9 am	**Ped Total**	**Bike Total**
Linear Park, near Harvard Vanguard building, Davis Sq.	497	32
Somerville Community Path, behind Rite Aide	486	32
Washington Street @ Beacon Street and Somerville Avenue	450	73
Washington Street, near Kingman Road (Union Sq)	282	42
Beacon and Washington Street,	192	149
Elm Street @ Willow Avenue	126	91
Day Street in Davis Sq	89	5
Willow Avenue @ Elm Street	70	4
Lower Broadway/ Sullivan Station	600	24
Totals	**4605**	**585**

Source: CTPS.

Extensive pedestrian counts have been recorded along the Community Path by the ICH. Foot traffic on the Community Path has remained high, averaging rates of over 400 pedestrians per hour in 2007-2008. In their most recent report (July 2008), ICH recorded a fairly steady rate of walkers using the path in the morning (over 400 per hour) between October 2007 and June 2008, and a significant increase (almost 30%) of walkers in the evening from March 2008 to June 2008 (see Figure 58).

Figure 58: Average number of pedestrians per hour on Community Path, by season				
	October 2007	**March 2008**	**June 2008**	**Total**
Morning (8-9am)				
Weekdays (Mon, Th)	463	400	438	1301
Weekend (Sat)	92	79	181	352
Afternoon (2-3pm)				
Weekday (Mon, Th)	161	143	148	452
Weekend (Sat)	247	195	286	728
Evening (5-6pm)				
Weekday (Wed)	N/A	347	447	794
Average Per Hour	**246**	**243**	**298**	

Source: Institute for Community Health.

I. BICYCLE AND PEDESTRIAN ACCIDENTS

Finding #44: When crashes occur, pedestrians are proportionately more likely to be fatally injured than any other type of commuter (Figure 59).

Figure 59: Massachusetts Fatal Crashes, 2002-2006

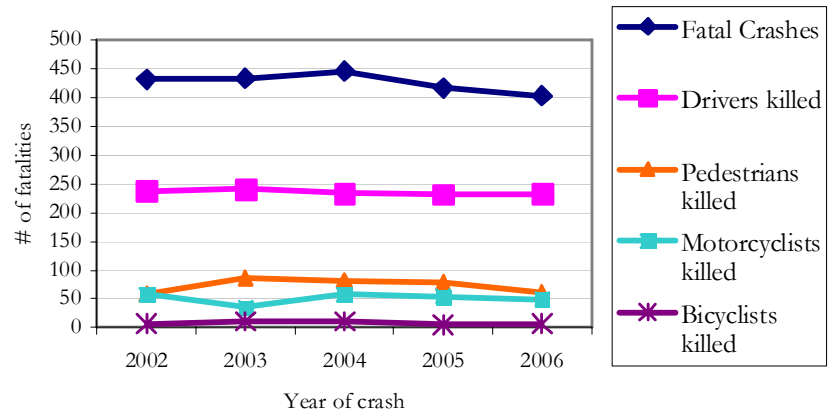
	2002	2003	2004	2005	2006	Total	% of total
Fatal Crashes	433	434	447	417	404	2135	
Drivers killed	238	241	234	232	233	1178	55%
Motorcyclists killed	58	35	58	54	49	254	12%
Pedestrians killed	59	86	82	79	61	367	17%
Bicyclists killed	6	11	11	5	6	39	2%

Note: Massachusetts data, 2000: Percent of commuters that drive alone—74%; Carpool—9%; Take public transportation—9%; Walked—4%; Other means—1%; Worked at home—3%.
Source: Somerville SafeSTART Report 2006, Executive Office of Public Safety and Security (EOPSS), 2009, and U.S. Census 2000.

From 2002 to 2006 pedestrians comprised 17% of total fatal crash victims while pedestrians comprised just 4% of the total commuters in Massachusetts.

Overall fatal crashes, drivers killed, and motorists killed have gone down slightly between 2002 and 2006. The amount of bicyclists and pedestrians killed has remained fairly constant. Figure 60 illustrates the relative amount of fatalities in the past five years.

Figure 60: Massachusetts fatal crashes, 2002-2006



Source: Somerville SafeSTART Report 2006 (CTPS), Executive Office of Public Safety and Security (EOPSS), 2009, and U.S. Census 2000.

In Somerville between 2002 and 2004, 139 reported crashes (fatal and non-fatal) involved pedestrians and 85 crashes involved bicyclists.[91] Most of these crashes involved a single vehicle striking a pedestrian or bicyclist. Though Somerville has a higher proportion of bicycle and pedestrian commuters than the state (walking—9% and biking—3%),[92] pedestrians are proportionately less likely to be involved in a fatal accident than the statewide average, while bicyclists are more likely (given the limited data, see Figures 59 and 61).

[91] City of Somerville. (2006, November). Safe-START. p.11.
[92] City of Somerville. (2006, November). Safe-START. p.11.

Figure 61: Somerville Total Crash Statistics, 2002-2004					
	2002	2003	2004	Total	% of total
Total Crashes (Vehicle/Ped/Bike)	1,298	1,015	1,543	3,856	
Pedestrians	49	40	50	139	3.6%
Bicyclists	20	33	32	85	2.2%
Total fatalities				**7**	
Pedestrian fatalities				1	14.3%
Bicycle fatalities				1	14.3%

Note: Somerville Mode share for Commuter from the 2000 Census: Walked—9%, Bicycle—3%, Other means—88%.

Source: Somerville SafeSTART Report 2006 (CTPS).

As more bikers and pedestrians use the city's streets, motorists could potentially become more aware of 'sharing the road' with other users, and thus continue to make the streets safer for pedestrians and bicyclists in a positive reinforcement cycle.

Finding #45: Bicycle and pedestrian crashes are most likely to occur on the DCR-controlled McGrath Highway.

Between 1995 and 2001 the intersection with the greatest number of motor vehicle-pedestrian crashes was Washington Street at McGrath Highway (35 crashes), followed by Mystic Avenue at McGrath Highway (28 crashes).[93] For bicyclists, the intersections with the greatest number of crashes were Washington Street at McGrath (50 crashes), and Somerville Avenue at McGrath (30 crashes).[94]

Other intersections with seven or more pedestrian crashes during this time period included:

1. Washington Street at McGrath 35 crashes
2. Mystic Avenue and McGrath 28 crashes
3. Davis Square 20 crashes
4. Grove Street at Highland or Elm 15 crashes
5. Union Square area 14 crashes
6. Somerville Avenue at McGrath 14 crashes
7. Beacon at Washington 7 crashes
8. Broadway at McGrath 7 crashes
9. Broadway at Alewife Brook Parkway 7 crashes
10. Broadway at Temple Street 7 crashes

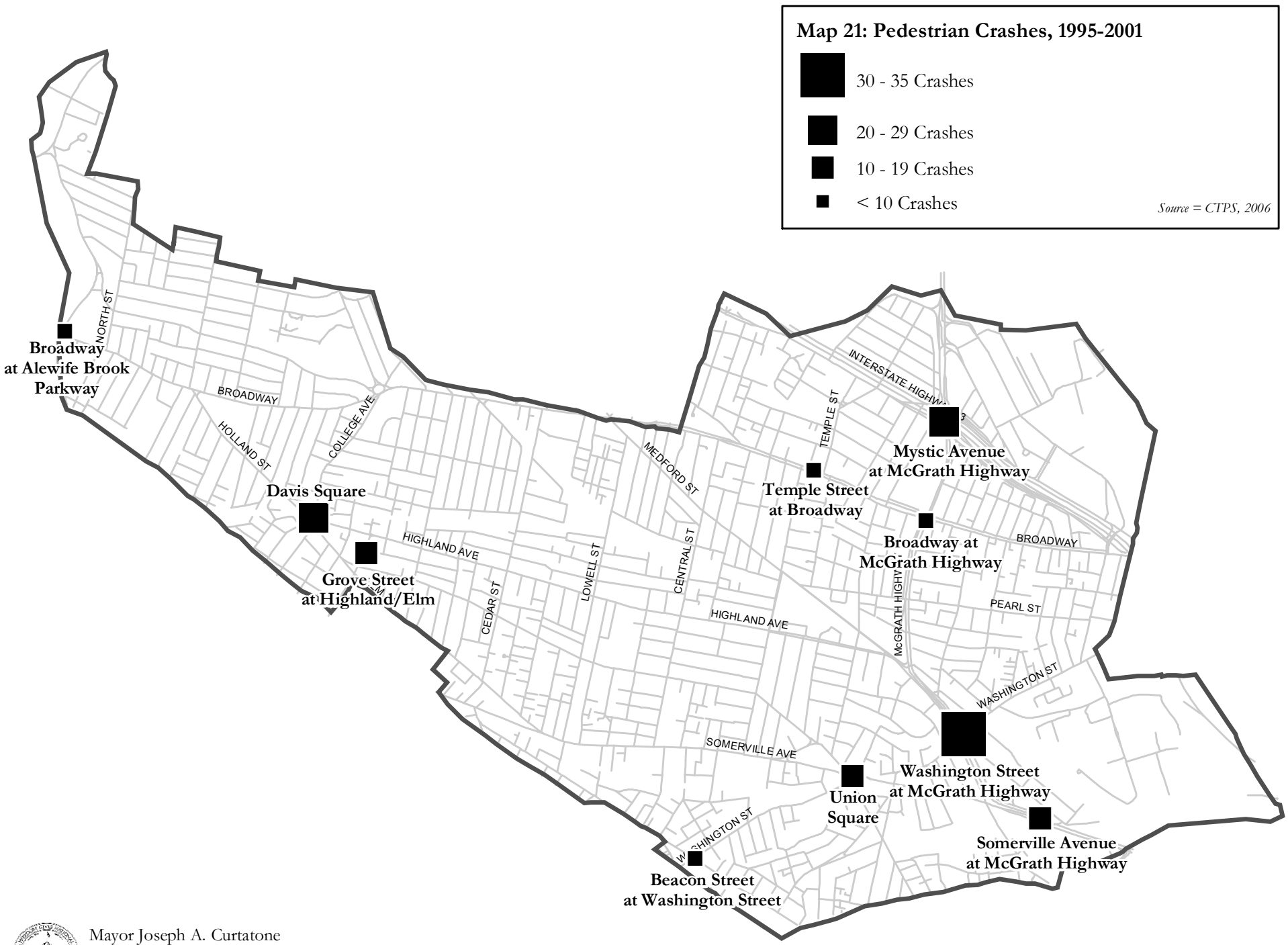
Map 15 shows the location of pedestrian crashes between 1995 and 2001.

For bicyclists, all intersections with 4 or more crashes between 1995 and 2001 include:

1. Washington Street at McGrath 50 crashes
2. Somerville Avenue at McGrath 30 crashes
3. Union Square area 8 crashes
4. Broadway at McGrath 7 crashes
5. Grove Street at Highland or Elm 4 crashes
6. Somerville Avenue at Dane 4 crashes
7. Beacon at Washington 4 crashes

Map 16 shows the distribution of bicycle crashes in Somerville between 1995 and 2001.

[93] CTPS (City of Somerville Safe-START report). (2006, November). p.11.
[94] CTPS (City of Somerville Safe-START report). (2006, November). p.13.



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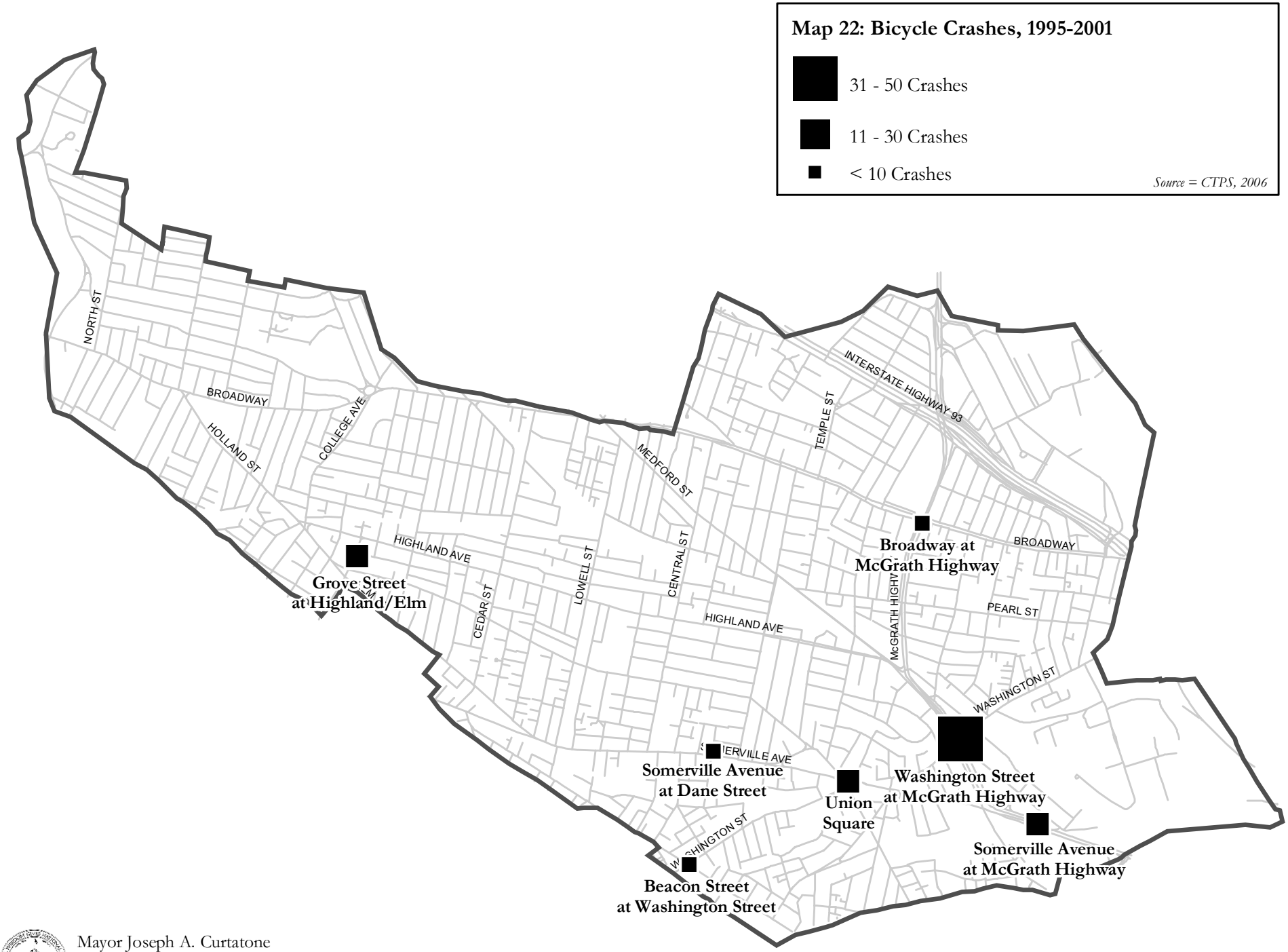
Map 22: Bicycle Crashes, 1995-2001
31 - 50 Crashes
11 - 30 Crashes
< 10 Crashes
Source = CTPS, 2006
NORTH ST
BROADWAY
HOLLAND ST
COLLEGE AVE
MEDFORD ST
TEMPLE ST
INTERSTATE HIGHWAY 93
HIGHLAND AVE
CEDAR ST
LOWELL ST
CENTRAL ST
McGRATH HIGHWAY
PEARL ST
WASHINGTON ST
Grove Street at Highland/Elm
Broadway at McGrath Highway
Somerville Avenue at Dane Street
Union Square
Washington Street at McGrath Highway
Somerville Avenue at McGrath Highway
Beacon Street at Washington Street

Five of the ten locations with high numbers of pedestrian crashes and three of the seven locations with the highest bicycle crashes are located on roadways owned and managed by the Commonwealth's Department of Conservation and Recreation (DCR). As a result, the City of Somerville cannot single-handedly implement improved engineering designs or increase enforcement at these locations. Safe-START, Somerville's bicycle, pedestrian, and traffic safety team, has recommended that the City work with DCR and the City's legislated delegation to address safety improvements at particular locations.

Priority Areas

After conducting an extensive analysis of data concerning pedestrian and bicycle crashes since 1995, the transportation section of the Somerville Community Development Plan, 911 police report data, and input from various community groups, the Safe-START team selected a list of 27 priority locations (shown on Map 17) where there are significant conflicts between vehicles, pedestrians and bicyclists. Many of these locations are currently under review by the City to redesign and/or implement improvements. These locations are spread quite evenly throughout the City, as illustrated in Map 17, and include:

1. Broadway at Alewife Brook Parkway
2. Raymond at Curtis (near West Somerville School)
3. Curtis from Broadway to the Medford City Line
4. Broadway form Powder House to Packard: Special Focus Wallace Street Crossing
5. Holland Street from Teele Square to Davis Square
6. Powder House Boulevard from Powder House Circle to North Street (special focus on North Street)
7. College Avenue from Powder House Circle to the Medford City Line
8. Powder House Circle (Broadway/Powder House Boulevard and College Avenue)
9. Brown School (Josephine and Kidder)
10. Grove Street at Highland and Grove Street at Elm Street (near Davis Square)
11. Elm Street at White
12. Somerville Avenue at Beacon and Elm Street
13. Highland at Lowell
14. Magoun Square (Broadway at Medford)*
15. Summer Street near St. Catherine's School
16. Winter Hill School (Sycamore at Medford)
17. Somerville Avenue at Park and Central
18. Washington Street at Beacon Street
19. Springfield at Concord
20. Union Square**
21. Medford at Highland***
22. Broadway at Temple and School
23. McGrath highway at I-93 and Mystic Avenue and Kensington Street Underpass
24. East Broadway: from McGrath Highway to the Boston City Line, and McGrath Highway at Broadway
25. Cross Street near East Somerville Community School
26. Washington Street at McGrath Highway
27. Somerville Avenue at McGrath Highway

* Re-design is nearly final as of 11/2008
** ADA Improvements slated for spring 2009
*** Improvements made

Map 23: Priority Areas

Priority Conflict Areas

Source = Safe-START, 2005

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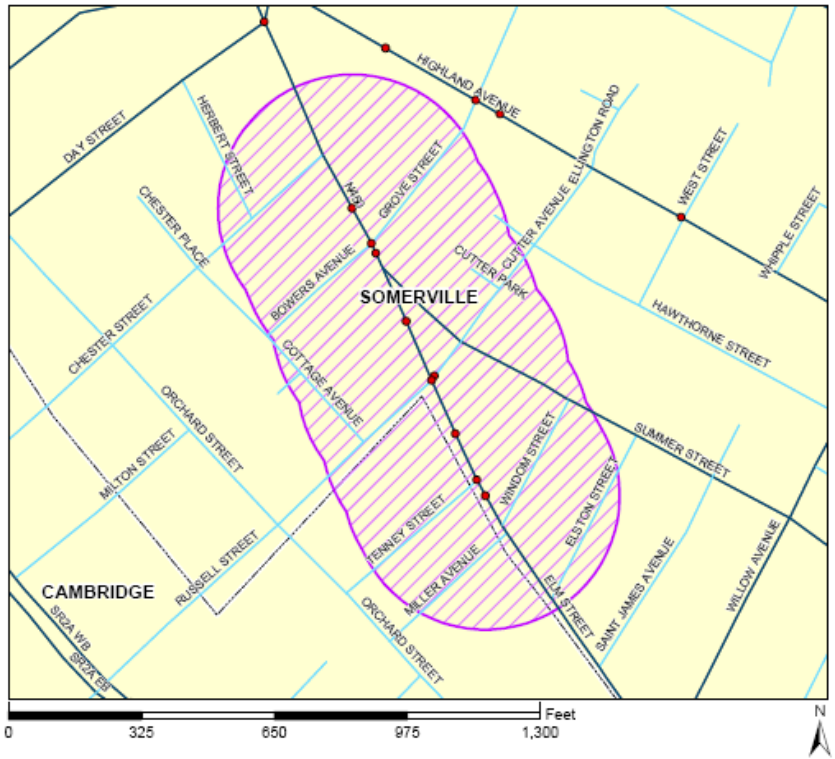
These priority locations are in-line with the findings from Mass Highway Department (MHD) that the 6th highest bicycle crash cluster in the state occurs in Somerville, near the intersection of Summer Street and Elm Street (see Figure 62), where 9 bicycle crashes happened between 2002 and 2006.[95] Eight of the other nine of the top ten crash locations were in Cambridge.

Figure 62: #6 Top Bicycle Crash Cluster in MA, 2002-2006



Source: EOT and Mass Highway. (July 2008). "2006 Top Crash Locations Report".

Somerville was not listed on the top ten Pedestrian Crash Cluster in the report.

[95] EOT and Mass Highway. (July 2008). "2006 Top Crash Locations Report".

10. TRUCK ROUTES

Finding #46: Local truck restrictions center around commercial squares; designated truck routes are mainly authorized on arterial streets such as Washington Street and Somerville Avenue.

Well-planned truck routes are essential to business activity in order to allow the efficient transfer of goods between origin and destination. At the same time, when determining the appropriate truck routes, it is essential to consider the needs of residential communities and the impact of the trucking upon neighborhoods, as well as the physical characteristics of the roads.

Within Somerville, trucks are allowed in areas that are designated as Urban Principal Arterials, including Washington Street, Beacon Street, Somerville Avenue, and Broadway from Route 28 to the Boston City Line. Map 18 shows the official streets with truck restrictions, which are concentrated in Davis, Powder House and Union Squares. The solid lines delineate a restriction of through-vehicles of 2.5 tons and over; the dotted line illustrates those streets with nighttime weight restrictions, 7-days a week. Other streets have unofficial truck restrictions posted, but these are not sanctioned by Mass Highway and are not enforceable.

In order to implement a new, official truck restriction or exclusion, a comprehensive study must be completed by the City and approved by MassHighway. The study must document: (1) the percentage of all vehicles on a route that are trucks; (2) the types of buildings abutting the street, (3) the physical conditions of the street, and (4) the current speed limit of the street. Once the data are established and agreed upon, MassHighway evaluates the roadway for a truck exclusion designation.

Regionally, Map 19 shows official truck routes, hazardous materials routes and roads that have partial or full truck restrictions. National and state routes have no restrictions on truck traffic; the intention is to focus the truck traffic on these routes. As seen on Map 19, Cambridge has an abundance of 24-hour truck restrictions, as well as an evening ban on truck traffic on local roads. These restrictions push truck traffic onto Route 28 and into Somerville. Indeed, in 2001 the state's Committee on Regional Truck Issues determined that all east-west travel outside of Kendall Square should be completed in Somerville via Broadway, Somerville Avenue, and Washington Street.[96]

The Committee further recommended that the following changes be implemented to improve truck flow between Cambridge and southeast Somerville, while also relieving congestion in Union Square:

- Continue the truck exclusion on Prospect Street in Cambridge from Massachusetts Avenue to the Somerville City Line and on Prospect Street in Somerville from the Cambridge City Line to Webster Avenue.
- Remove the truck exclusion on Prospect Street from Webster Avenue to Washington Street in Somerville to allow for truck access from Cambridge Street to Washington Street.
- Remove the truck exclusion on Webster Avenue from Washington Street to Prospect Street to allow for truck access from Union Square in Somerville to Cambridge Street in Cambridge, when Webster Avenue is structurally capable.

[96] Final Recommendations of the Committee on Regional Truck Issues. (2001). http://www.cambridgema.gov/CityOfCambridge_Content/documents/finalrecommend.pdf

- Continue to allow trucks on Webster Avenue in Cambridge from Prospect Street to Cambridge Street.
- After the project to reconstruct the Webster Avenue bridge has been completed, change Webster Avenue from Union Square to Prospect Street, and Prospect Street from Washington Street to Webster Avenue, from one-way to two-way streets to improve traffic flow in the Union Square area.

Storrow Drive, Memorial Drive, Alewife Brook Parkway, parts of Routes 16 and 28, Fellsway West, and Shore Drive all are DCR Parkways with full exclusions of trucks. Other DCR-controlled roadways, such as McGrath Highway, are open to truck traffic.

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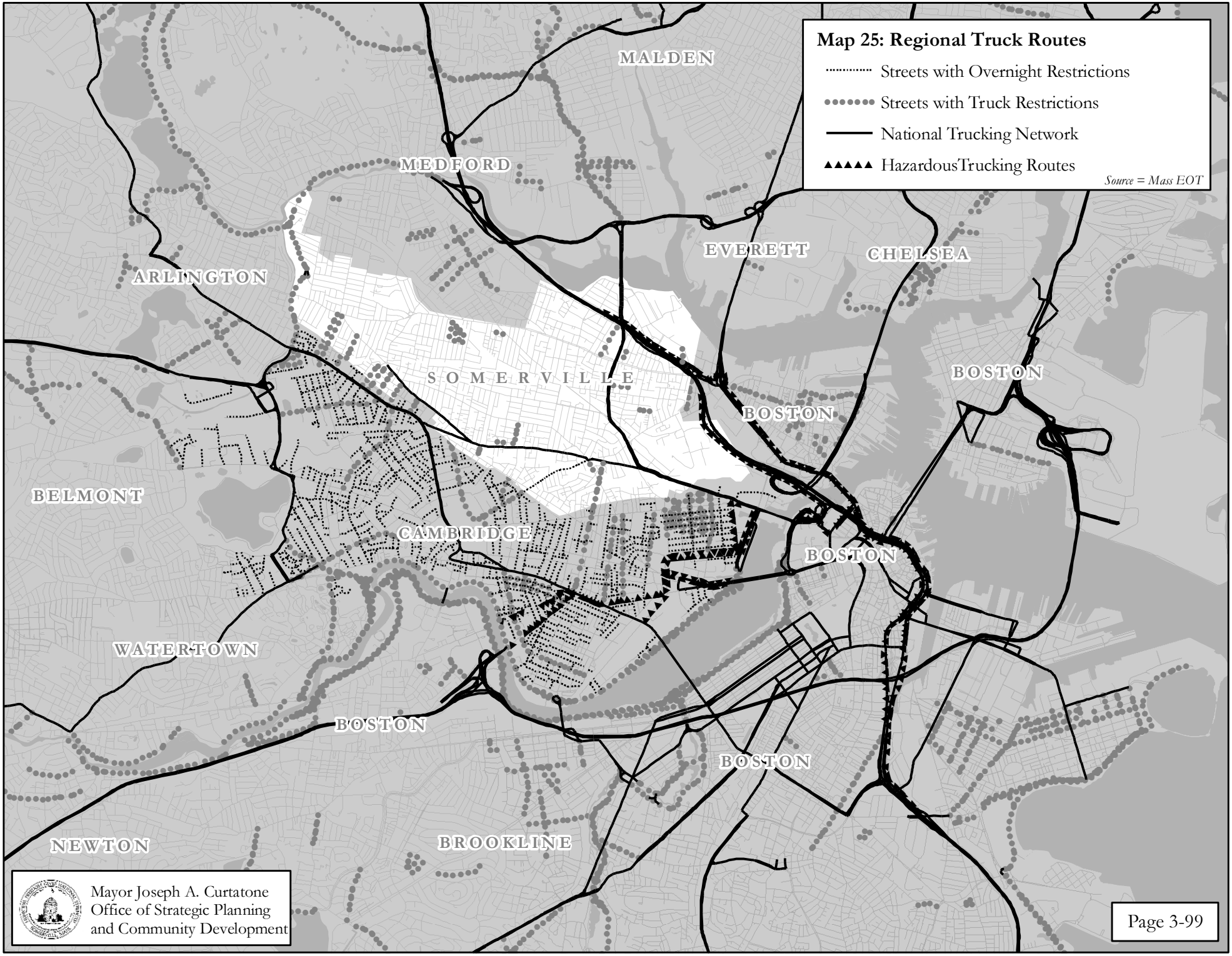
Map 25: Regional Truck Routes
Streets with Overnight Restrictions
Streets with Truck Restrictions
National Trucking Network
HazardousTrucking Routes
Source = Mass EOT
MALDEN
MEDFORD
EVERETT
CHELSEA
ARLINGTON
SOMERVILLE
BOSTON
BOSTON
BOSTON
BELMONT
CAMBRIDGE
BOSTON
WATERTOWN
BOSTON
BOSTON
NEWTON
BROOKLINE
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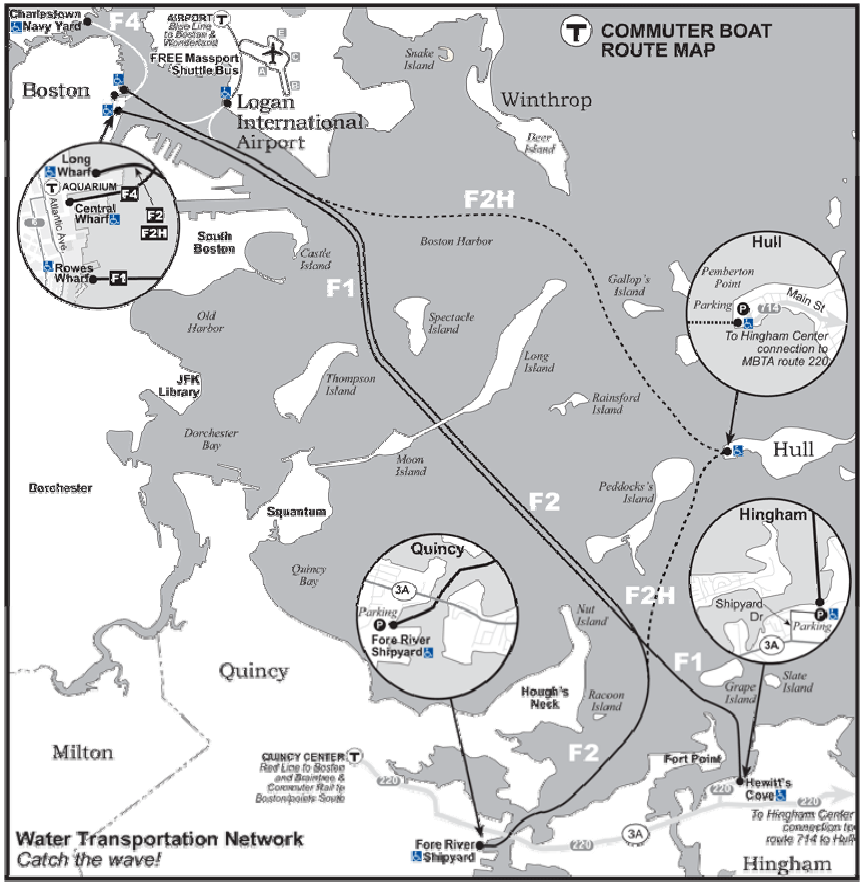
J. WATER TRANSPORTATION

Finding #47: Although commercial transportation on the Mystic River ceased over 150 years ago, funding has recently become available to study potential water transport for commuters destined for downtown Boston, which could be supported by major new development projects along the Mystic River.

The City of Somerville does not currently operate any ports at this time, although it does house two boathouses on land owned by DCR—the Winter Hill Yacht Club and the Blessings of the Bay Boathouse, both along the Mystic River. Until the 1850s, however, commercial ferries ran continually on the Middlesex Canal, carrying goods and supplies from the Merrimack Valley to Boston. MBTA's Inner Harbor Ferry serves the Charlestown Navy Yard and Boston Logan's Airport (see Figure 63). The commuter boat service currently runs from downtown Boston to Hingham, Hull, Quincy, Rowes Wharf, Long Wharf and Boston's Logan Airport. The majority of the water transportation services provide access for communities to the south to downtown Boston; there is little connectivity with communities to the north.

The Mystic River, running along the northeastern edge of Somerville, no longer serves as a major transportation corridor for either commuters or commerce; rather, the river is used almost exclusively for recreational boating. The Amelia Earhart Dam is capable of allowing safe passage of water taxis and commercial barges, and the multiple waterfront projects that have been or will be developed along the Mystic River (i.e., Assembly Square in Somerville, and Station Landing, and River's Edge in Medford) raise the potential of the Mystic River as a transportation resource. With funds that Congressman Edward Markey has secured to evaluate water taxi service between Medford, Everett, Boston, and Logan Airport[97]; Somerville, and in particular Assembly Square, may possibly benefit at some point in the future if that service were to be extended.

Figure 63: MBTA water transportation service



Source: MBTA.

[97] Consolidated Plan 2008-2013, City of Somerville. p.102.

K. PARKING

Finding #48: As of summer 2009, all of Somerville's non-metered streets will be reserved for residential permit parking only.

Beginning summer, 2009, all non-metered streets in the City will be part of the residential permit-parking program. Prior to this, approximately 40% of streets (or street segments) in the City were designated as residential permit parking only (see Map 20). On these streets, cars without a residential permit sticker can be ticketed; this policy is not enforced on Sundays.

The Traffic and Parking Department issues resident permit parking stickers. A household is not limited to the number of permits it has; if the household has more than one vehicle, they are able to apply for multiple permits. As more streets change to residential permit parking only, it is anticipated that the number of parking permits issued will increase. Figure 64 shows the amount and type of parking permit stickers that have been issued during 2006, 2007, 2008 and part of 2009. Note that the reporting system changed in 2008 to record items such as moving van permit requests and temporary no parking signs as 'miscellaneous'. Previously, these items had been captured under the 'commercial' designation.

Figure 64: Parking permits by type

Permit type	2006	2007	2008	2009 (as of 6/14)
Residential	26,841	25,310	25,354	16,926
Visitor	28,401	28,217	28,507	18,067
Commercial	3,973	3,869	2,541	580
Miscellaneous	0	0	2,066	606
TOTAL	59,215	57,396	58,468	36,179

Source: City of Somerville.

Figure 65 shows the changes in the number of parking permits issued between 2006 and 2008. The creation of the miscellaneous category is in large part accountable for the decline in commercial permits requested, as the increase in miscellaneous permits issued is greater than the decline in the number of commercial permits issued.

Overall there has been a slight decrease in the amount of permits issued over the past three years. Of notable decline is the 5.5% decrease in the amount of residential permits issued.

Figure 65: Change in parking permits 2006-2008

Permit type	2006-2007 change		2007-2008 change		2006-2008 change	
Residential	-1,531	-5.7%	44	0.2%	-1,487	-5.5%
Visitor	-184	-0.7%	290	1.0%	106	0.4%
Commercial	-104	-2.6%	-1,328	-34.3%	-1,432	-36.0%
Miscellaneous	0	0.0%	2,066	n/a	2,066	n/a
TOTAL	-1,819	-3.1%	1,072	1.9%	-747	-1.3%

Source: City of Somerville.

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Finding #49: The number of metered spaces in the City is continuing to increase; the price of parking at metered spots has recently increased; and the duration of the time meters are enforced is increasing at specific locations within the City.

In 2005, there were approximately 600 metered spaces in the City; as of July 2009 there are approximately 980 spaces, and the number of metered spaces is expected to increase to approximately 1,100 spaces with the completion of the Parking Solutions Task Force.[98]

In May, 2009, the City's Traffic Commission authorized an increase of the meter rate to $1.00 per hour, and an increase in the time to which the meters are enforced to 8:00 p.m., Monday through Saturday. By increasing the meter rates throughout the City, there is greater incentive for people to not park as long at metered spots. Because these parking spaces are mainly found near commercial areas, the higher price incentivizes greater turnover in the spaces, and thus allows more vehicles to access the commercial zones. In addition, increasing the meter fees helps to price parking more appropriately as a real estate asset in the City. The same theory applies to extending the meter limits by two hours to 8:00 p.m.; the longer the spaces are metered, the more turn-over there will be, and the more people will be able to access commercial zones. Increasing the time of which the meters are enforced is also a reflection of the increased hours that are ever more typical for eating out, shopping, and entertainment; having greater access to metered spaces allows greater availability of the City's dining and cultural resources.

[98] City of Somerville, MA. Traffic and Parking Department.

Finding #50: The City operates 14 municipal lots, in addition to those associated with municipal buildings. These lots are primarily near Davis and Union Squares, and along Broadway.

Almost half of the lots are in areas where there are unregulated on-street parking opportunities immediately adjacent to the lots. The lots tend to be centered around commercial areas and near transit hubs such as both Davis Square and Sullivan Square (see Map 21).

Municipal Parking Lot Locations

- Buena Vista Lot, Buena Vista Road (via Holland Street or Meacham Road).
- Day Street Lot (Day Street).
- Grove Street Lot A (Grove Street at Highland Avenue, referred to as "Brooks/ Lot").
- Grove Street Lot B (Grove Street east side, between Highland Avenue & Elm Street, known as Grove Street Lot).
- Conway Park Lot (Somerville Avenue and Garden Court).
- Cutter Square Lot (Elm Street/ Summer Street at Cutter Avenue).
- Magoun Square Lot (Broadway at Medford Street).
- Winter Hill Lot A (Broadway, north side between Fellsway West and Wheatland Street).
- Winter Hill Lot B (Broadway, north side between Wheatland Street and Grant Street).
- Union Square Lot (Off Washington Street, entrance at Washington Street/Bonner Avenue).
- Prospect Street Lot (Prospect Street at Somerville Avenue/Washington Street).
- Mount Vernon Street Lot (Broadway between Mount Vernon Street and Mount Pleasant Street).
- Foss Park Lot (Foss Park at Broadway)
- Veterans Memorial Skating Rink (581 Somerville Avenue).

Map 27: City Parking Lot Locations, 2009

City Parking Lots

Source = City of Somerville, 2009

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Finding #51: Somerville has less land per vehicle devoted to parking, and more registered vehicles per square mile, than selected surrounding communities.

Using a calculation to compare the length of centerline miles with the length of all registered cars in a city to approximate the relative ease of finding a parking space, it was found that Somerville has the lowest ratio of road space to registered vehicles. This indicates that it is more difficult to find parking on Somerville streets than other surrounding communities. Though this measure is a 'back of the envelope' calculation, and there are numerous factors not accounted for here (such as the amount of parking restrictions on streets in each town, the length of centerlines that are interstate highways and do not allow any parking, the amount of non-city vehicles which enter into a city on any given day, the amount of off-street parking, neighborhood design and form elements such as street length and number of driveways, etc.) this measure gives a rough approximation to show the relationship between the number of cars and the potential space available for parking in each town or city. In the last column of Figure 66, numbers over 1 indicate there is more than one space for each registered vehicle; numbers under 1 indicate there is less than one on-street parking space available per registered vehicle. This measure estimates average car length as 20 feet and does not account for any discrepancies such as the amount of trucks vs. compact size vehicles per city or town.

Figure 66: Estimation of space devoted to parking per registered vehicle

Town	Center-line (feet)	Center-line x 2 (2 sides of street) in feet	75% of centerline ft. (accounting for driveways, intersections, etc.)	# of registered vehicles	Length of registered vehicles (@ 20ft./ vehicle)	Center-line length/ length of all registered vehicles
Somerville	557,779	1,115,558	836,669	49,146	982,920	0.85
Boston	4,832,837	9,665,674	7,249,255	366,922	7,338,440	0.99
Brookline	559,099	1,118,198	838,649	33,161	663,220	1.26
Cambridge	748,070	1,496,141	1,122,106	57,024	1,140,480	0.98
Chelsea	258,034	516,067	387,050	20,042	400,840	0.97
Everett	337,075	674,150	505,613	29,267	585,340	0.86
Medford	724,944	1,449,888	1,087,416	42,903	858,060	1.27

Source: EOT, Office of Transportation Planning. (2008). Road Inventory Year End Report 2008. "Centerline Miles Table 5: City/Town by Jurisdiction". pp.19-24. and RMV, August 2008.

According to the above calculation, Somerville and Everett have the least amount of street length devoted to parking per registered vehicle of each city while Brookline and Medford have the greatest amount of space available per registered vehicle. Part of this is likely due to the large number of registered vehicles in Somerville per square mile, as compared to surrounding communities and shown in Figure 67.

Figure 67: # of registered vehicles per square mile			
Town/City	# of registered vehicles	Area (sq mi)	# of registered vehicles/square mile
Somerville	49,146	4.21	11,674
Boston	366,922	89.63	4,094
Brookline	33,161	6.82	4,862
Cambridge	57,024	7.13	7,998
Chelsea	20,042	2.48	8,081
Everett	29,267	3.67	7,975
Medford	42,903	8.64	4,966

Source: RMV, August 2008 and US Census Bureau, Summary File 1: GCT-PH1. Population, Housing Units, Area, and Density: 2000.

Finding #52: Many of Somerville's parking policies do not account for the limited space on private property for added parking. The parking requirements have supported a car culture that does not match the city's built environment. For every square foot of surface parking required, the City faces a reduction in developable or open space.

Built largely before the dawn of the automobile, Somerville's urban structure was designed for streetcars and foot traffic and, as a result, does not facilitate the surge of cars that have flooded the city since the mid-1950s. Many of Somerville's zoning regulations and parking policies, however, are weighted towards the interest of the automobile. For example, the Somerville Zoning Ordinance requires 1.5 to 2.0 parking spaces per residential unit, a ratio that is typical of suburban communities such as Woburn, MA[99] and Taunton, MA,[100] both of which possess more vacant land and less transit access than Somerville. Additionally, Somerville's parking requirements generally take into account only two variables: land use and the size of development, expressed in terms of the number of spaces required per 1,000 square feet of a particular land use, or per residential unit. Parking demand, however, is affected by many more variables,[101] including:

- Local context of a development such as the quality of the pedestrian environment, the number and variety of other land uses within walking distance, and the availability and quality of transit;
- Demographic characteristics of residents; and,
- Parking demand management programs such as pricing policies and car-sharing.

Furthermore, vehicle ownership levels (and thus residential parking demand) often vary considerably among different parts of a city, based on the following factors:

- Unit size: smaller households tend to own fewer vehicles;
- Affordable housing: there is a strong link between vehicle ownership and income, with less parking demand generated by low-income households;
- Senior housing: senior citizens tend to own fewer vehicles than younger adults, meaning that parking requirements can be reduced for senior housing facilities, including independent living as well as assisted living and convalescent care facilities; and,
- Rental units: households that rent their homes typically own fewer vehicles, on average, than owner-occupiers.

[99] City of Woburn, Zoning Code.
[100] City of Taunton, Zoning Code.
[101] Nelson/Nygaard Associates. (2007, June). *Task 4: Zoning Best Practices Review.*

Finding #53: Somerville's parking policies, as expressed in the zoning code, are based on a car-dependent environment and limit or complicate development.

Parking demand is lower in areas that are well-served by transit and in mixed-use downtown zones that offer employment and services within walking distance. As a densely populated city that is both built-out and growing, it is important understand the relationship between parking, zoning, economic opportunity, and sustainability in Somerville.

Somerville's parking policies are outlined in Article 9 of the Somerville Zoning Ordinance. The use and size of new development determine the specific amount of new parking required (i.e., one space per 250 square feet for retail sales/rental uses in Zoning District "B"). These requirements, however, are often based on generic data derived from demand levels in suburban areas with more vacant land and few transportation choices. Thus, the amount of parking required often exceeds what is actually necessary in Somerville and far exceeds historic patterns of parking provision. At the same time, on-street parking is provided at negligible cost throughout the city, in permit-parking zones, metered areas, and in areas with no parking controls. Together these policies contribute to an apparent shortage of street parking in certain locations, excess off-street parking in other areas, difficulty in changing the uses of existing development, and higher costs for housing and other development throughout the city.[102]

The 2007 report "A Parking Strategy for Somerville, MA: Regulatory and Policy Recommendations"[103] outlines a number of specific sections of Article 9 that particularly complicate parking in Somerville:

1. **Section 9.2 and the amount of parking required.** This section provides parking ratios for all zones throughout the City, with the exception of the University District and Assembly Square Mixed-Use District. As a result of the level of detail and specific requirements, expansion of existing retail space or construction of new mixed-use structures most often can only take place with a variance. The report emphasizes the importance of viewing parking itself as a land use, rather than as a physical or dimensional requirement. Adopting such a perspective would drastically change the way parking policies are considered.
2. **Section 9.4 and redevelopment:** Stringent requirements for change-of-use and additions hamper redevelopment. Redevelopment in Somerville is severely limited by policies which mandate new land uses in old buildings to provide higher levels of parking than what previously existed. Since adding new spaces requires land that is usually unavailable, older buildings are limited to uses for which the existing parking supply meets the current parking requirements or to pre-existing non-conforming uses.[104] As a result, economic development of older areas such as Union Square is stunted or halted altogether. New zoning policies, such as those approved in Union Square in 2009, are needed in order to overcome the existing limitations to development based on parking requirements.

[102] Solomon-Shwartz, Ben. (2008, Summer). Somerville Zoning Report.

[103] Stout, Amanda. (2007). "A Parking Strategy for Somerville, Massachusetts: Regulatory and Policy Recommendations".

[104] Shoup, Donald. (2005). The High Cost of Free Parking. Chicago, IL and Washington, D.D.: Planners Press, American Planning Association.

3. **Section 9.13 and relief:** Exceptions, special permits, and ad hoc relief policies are cumbersome and non-standardized. Most property owners who cannot meet the parking requirements of the Somerville Zoning Ordinance have three options: apply to the ZBA for a variance (which, under state law, can only be granted in the narrowest of circumstances and is extremely vulnerable to legal challenge); modify the project in order to obviate the need for additional parking; or—as many do—abandon the project altogether. In limited cases—on sites that are already nonconforming with respect to parking and require six or fewer spaces—a special permit may be sought where the ZBA finds there would be no adverse impacts. The special permit process is not as legally challenging as the variance option, but it does invoke a well-intentioned but informally structured mitigation process with the Department of Traffic and Parking, which usually requires the applicant to commission a study by a transportation consultant and provide pedestrian- or bicycle-related infrastructure as mitigation. Consequently, this practice is usually implemented on a case-by-case, ad hoc basis, making it expensive and unpredictable for applicants; moreover, it is time-consuming and often confusing, since mitigation payments are discouraged, with applicants typically having to provide such things as street signs in-kind. Nonetheless, since it accommodates economic development and balances transportation needs, this is currently the best option for those applicants who are permitted to seek it.

V. FUTURE TRANSPORTATION PROJECTS

The City of Somerville is actively engaged in four major transportation infrastructure projects: 1) the Green Line Extension beyond Lechmere, with spurs to Union Square and Route 16 in Medford; 2) the associated extension of the Community Path from Cedar Street to the Cambridge/Boston line; 3) the addition of an Assembly Square Station to the MBTA's Orange Line; and, 4) the Urban Ring – a bus rapid transit system designed to connect the "spokes" of transit emanating from the metro area's inner core.

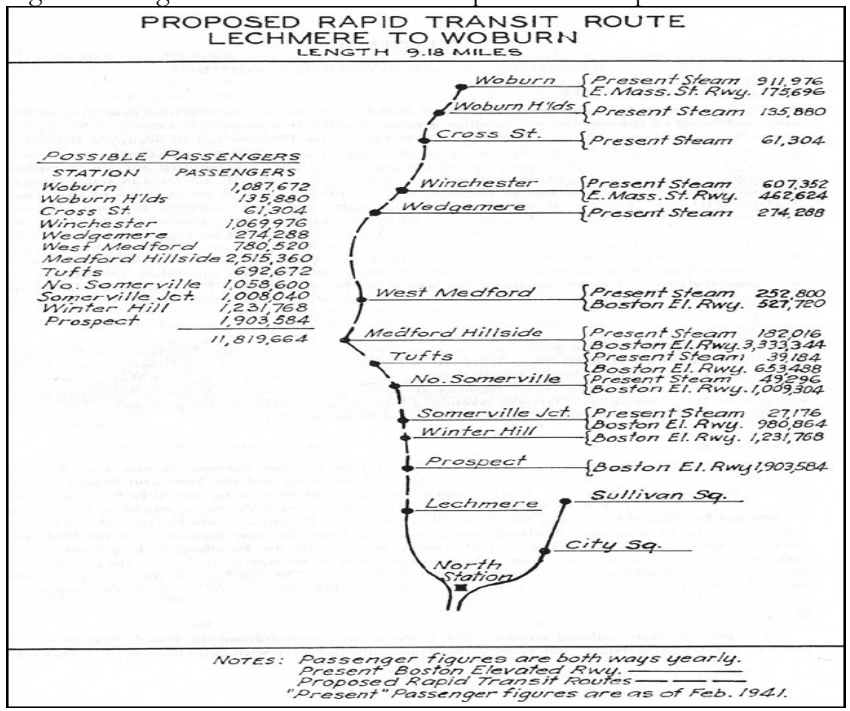
A. GREEN LINE EXTENSION

The Green Line Extension represents the culmination of a decades-long effort to bring rapid transit back to Somerville. Indeed, plans date at least as far back as the "Report of the Legislative Commission on Rapid Transit: 1945," which proposed the construction of several new rail lines, including a North Station to Woburn route (Figure 68).

The current proposed project will extend the Green Line from its existing terminus at Lechmere station in Cambridge to a relocated Lechmere Station, with tracks running northwest through Somerville and into Medford. The project is spearheaded by the Massachusetts Executive Office of Transportation (EOT), in coordination with the Cities of Somerville and Medford, and the MBTA. The main line will extend to Medford along the MBTA's Lowell Commuter Line and a spur will veer south to Union Square along the MBTA's Fitchburg Commuter Line (see Map 28).

The extension includes 5 miles of additional rail service, adds eight stations to the system (including relocated Lechmere station), and is projected to increase daily ridership on the system by at least 8,600 at an estimated cost of $600 million.[1] The City of Somerville has requested that the project be planned and constructed in anticipation of an additional stop in the Inner Belt district, which is slated for intense economic development.

Figure 68: Legislative Commission on Rapid Transit Report: 1945



Source: Somerville Transportation Equity Partnership.

To mitigate the environmental impacts of the Big Dig, the Commonwealth is legally bound to extend the MBTA Green Line, which currently ends at Lechmere Station in East Cambridge, by 2014. This obligation is one of several court-ordered commitments along with the Blue to Red Line connector in downtown Boston,

[1] http://www.somervillema.gov/newsDetail.cfm?instance_id=1131

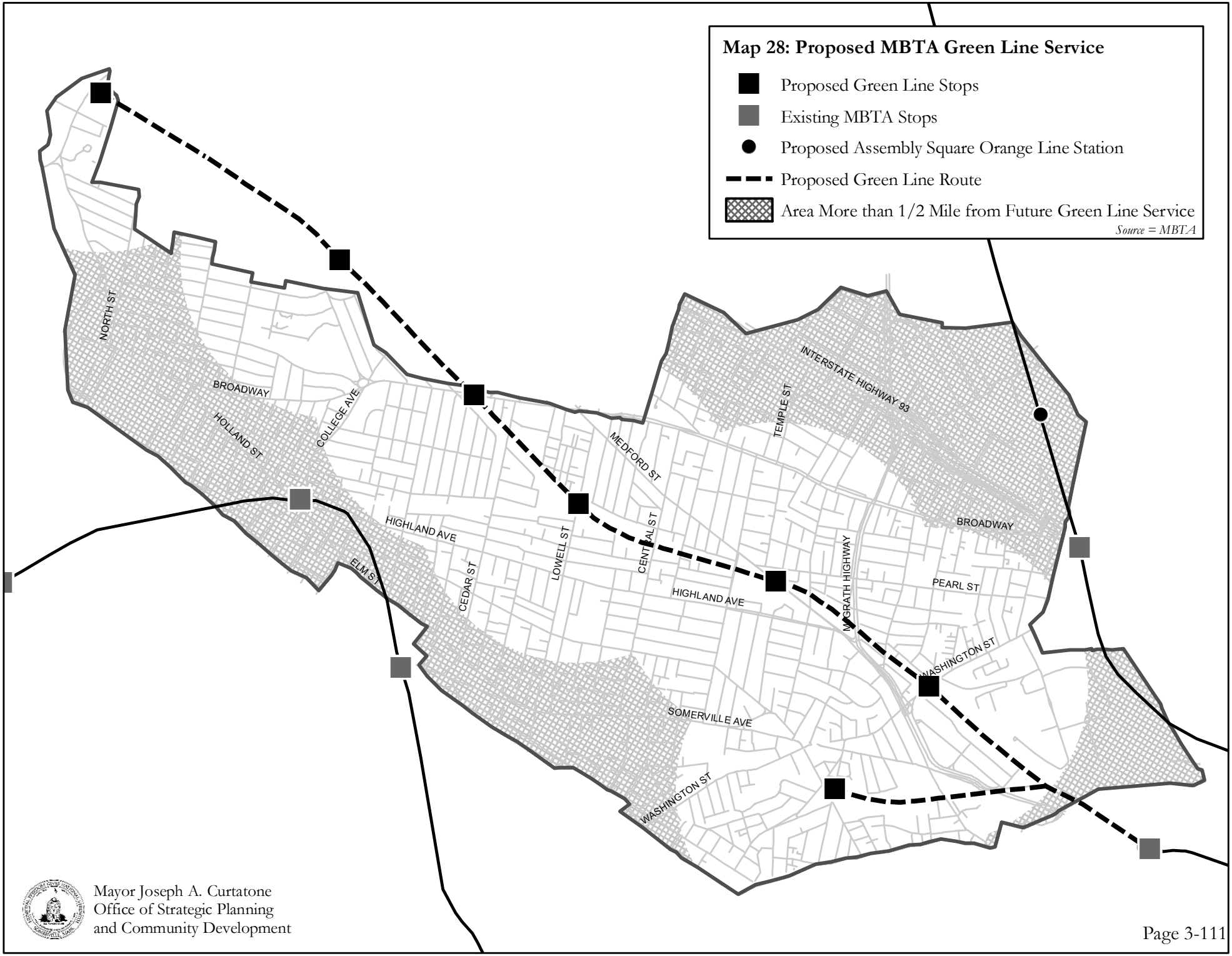
updated Orange Line cars, Blue line station revitalization, and Fairmount Line commuter rail project.[2] This obligation is enforceable under two provisions of the Clean Air Act.[3] These projects were identified for their ability to offset the increased air pollution from the Central Artery Project, mitigate the construction impacts of the lengthy Big Dig project, and improve transportation options in the area.[4]

Extending the Green Line through Somerville will fill the current transit void that currently exists in most of central and eastern Somerville between the MBTA Red and Orange Lines. Additional benefits of the extension include:

1. Improved regional air quality in a corridor with a high concentration of Environmental Justice communities;
2. Increased economic development and job opportunities through improved transportation access;
3. Improvement over historic transportation inequities;
4. Support for smart-growth initiatives and sustainable development;
5. Reduction of automobile congestion along the I-93, Route 38, Route 28, and Route 26 corridors.[5]

In order to maximize the advantages associated with the Extension, and mitigate any potential harmful impacts, the City is currently engaged in both a comprehensive planning process (of which this report is a part) and a citywide transportation plan. The transportation plan will examine current traffic, bike and pedestrian flow and existing bus networks, and recommend strategies to best integrate the new Green Line MBTA stops.

[2] "Boston Public Transit Commitments" on Conservation Law Foundation website. Retrieved April 30, 2009 at http://www.clf.org/programs/cases.asp?id=421.
[3] http://www.somervillestep.org/background/
[4] Conservation Law Foundation. "What you should know about the Central Artery Transit Commitments". Retrieved April 30, 2009 from http://www.clf.org/uploadedFiles/CLF/Programs/Smart_Growth/Public_Transportation/Boston_Public_Transit_Commitments/t%20commitment%20flyer.pdf/
[5] Green Line Extension: "Project Overview". Retrieved April 30, 2009 from http://www.greenlineextension.org/overview.asp.



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B. EXTENSION OF COMMUNITY PATH[6]

The Community Path (see Figure 69) currently extends from Grove Street to Cedar Street in Somerville. This complements the Alewife Linear Park stretching from Davis Square to Alewife MBTA Station in Cambridge and beyond to Arlington and Belmont. The extension of the Community Path will occur in three phases:

Figure 69: Existing Community Path, Somerville

Phase I includes connecting the Community Path to the Linear Path across Davis Square. The path, which reaches Grove Street behind the Rite Aid on Highland Avenue, will continue through the Davis Square Busway. There will be a designated path across the Davis Square plaza that continues past the Somerville Theater and toward Buena Vista Avenue to connect to the Linear Path. See below for a diagram. Included in this phase is a design to improve the landscape along the path between Highland Road and Lexington Avenue. Funding for this phase comes from the Boston Metropolitan Transportation Improvement Program (TIP). This project, managed by MassHighway, is scheduled to be constructed in late 2009.

Phase II will be an extension of the Community Path from Cedar Street to Central Street (see Figure 70). This section will complement and connect to the newly renovated Park at Somerville Junction, and will eventually provide access to the new Lowell Street Green Line T station. Funding for this phase includes MassHighway Congestion Management Air Quality (CMAQ) funds, TIP funds, and an earmark secured by Congressman Michael Capuano. The MaxPac development project will contribute significantly by removing the existing railroad tracks between Cedar Street and Lowell Street and regrading the area.

Figure 70: Area of Community Path Extension

Source: City of Somerville

[6] City of Somerville, http://www.somervillema.gov/Section.cfm?org=OSPCD&page=1336

Map 29: Planned Community Path Extension

Planned Community Path Extension

Existing Community Path

Source = City of Somerville, 2009

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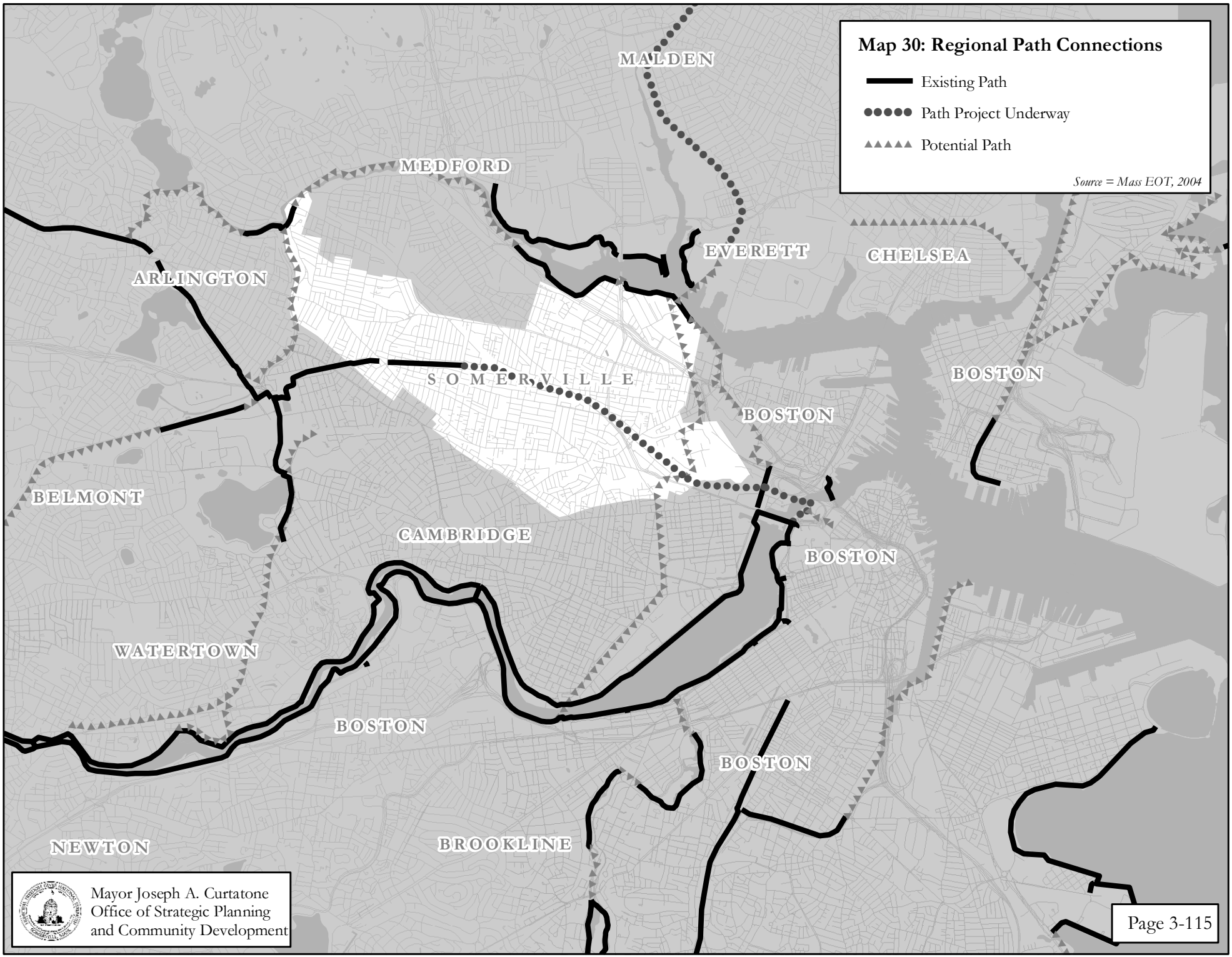
Phase III will connect Central Street to Northpoint in Cambridge. Construction of this portion is being planned in conjunction with the Green Line Extension in 2014. In 2006, the City conducted an engineering feasibility study to make recommendations for the location of the path extension. To view the complete study, see "Somerville Community Path Feasibility Study (2006)" on the right. The City met with MBTA officials to share recommendations for the placement of the path in relation to the Green Line Extension. As part of the Green Line Extension project, the State EOT is preparing concept design for the path alignment. The City will continue to work with the MBTA and state and federal transportation officials throughout the design process and to secure funds for the project.

In addition to providing a safe, healthy, and sustainable transportation infrastructure in Somerville, the Community Path will connect to the regional trail system in several ways. The path will be the final link in the Massachusetts Central Rail Trail that will extend 104-miles along a former rail line from Boston to Northampton. The path will also connect with the Mystic Valley Active and Safe Transportation Network (see link on the right under Programs) that will run along the Mystic and Malden Rivers and the Alewife Brook.[7]


Map 30: Regional Path Connections
Existing Path
Path Project Underway
Potential Path
Source = Mass EOT, 2004
MALDEN
MEDFORD
EVERETT
CHELSEA
ARLINGTON
SOMERVILLE
BOSTON
BOSTON
BELMONT
CAMBRIDGE
BOSTON
WATERTOWN
BOSTON
BOSTON
NEWTON
BROOKLINE
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C. ORANGE LINE STATION ADDITION AT ASSEMBLY SQUARE

As part of the approved redevelopment Assembly Square Master Plan on the Mystic River massive redevelopment project, the MBTA plans to add an additional Orange Line station at Assembly Square, which will be crucial for the area's planned growth as a mixed-used, transit-oriented center (see Figure 71).

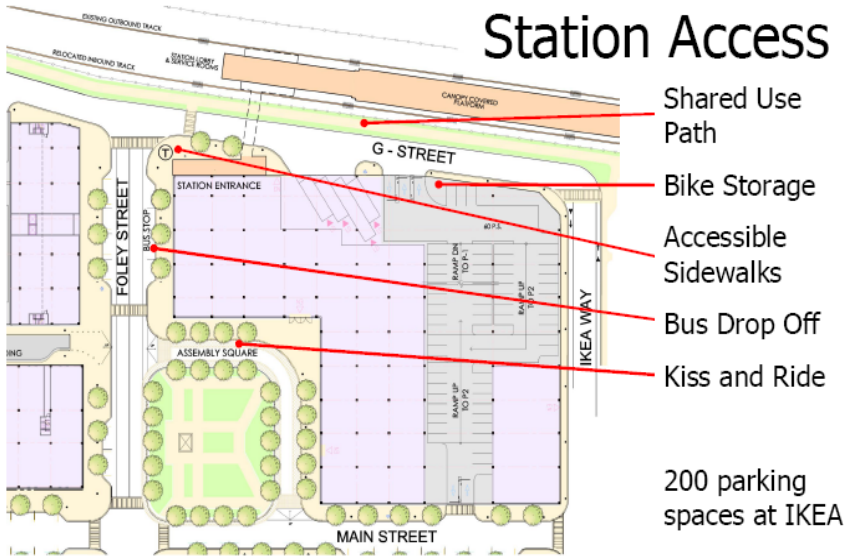
Figure 71: Proposed Orange Line Station, Assembly Square

Source: Approved Master Plan, 2006

The proposed Assembly Square Station will serve as a key component of Federal Realty Investment Trust's plan to build a new "urban village" adjacent to the current Assembly Square Mall, as well as provide service to new IKEA furniture store and a redesigned waterfront park. Assembly on the Mystic will include residential, office, retail and green space, restaurants, and a movie theater. The proposed $50 million station—which would be located between the existing Wellington and Sullivan Square stations – has been funded via a combination of private and public dollars. The station's construction is slated to begin in 2010 and be completed in 2013.

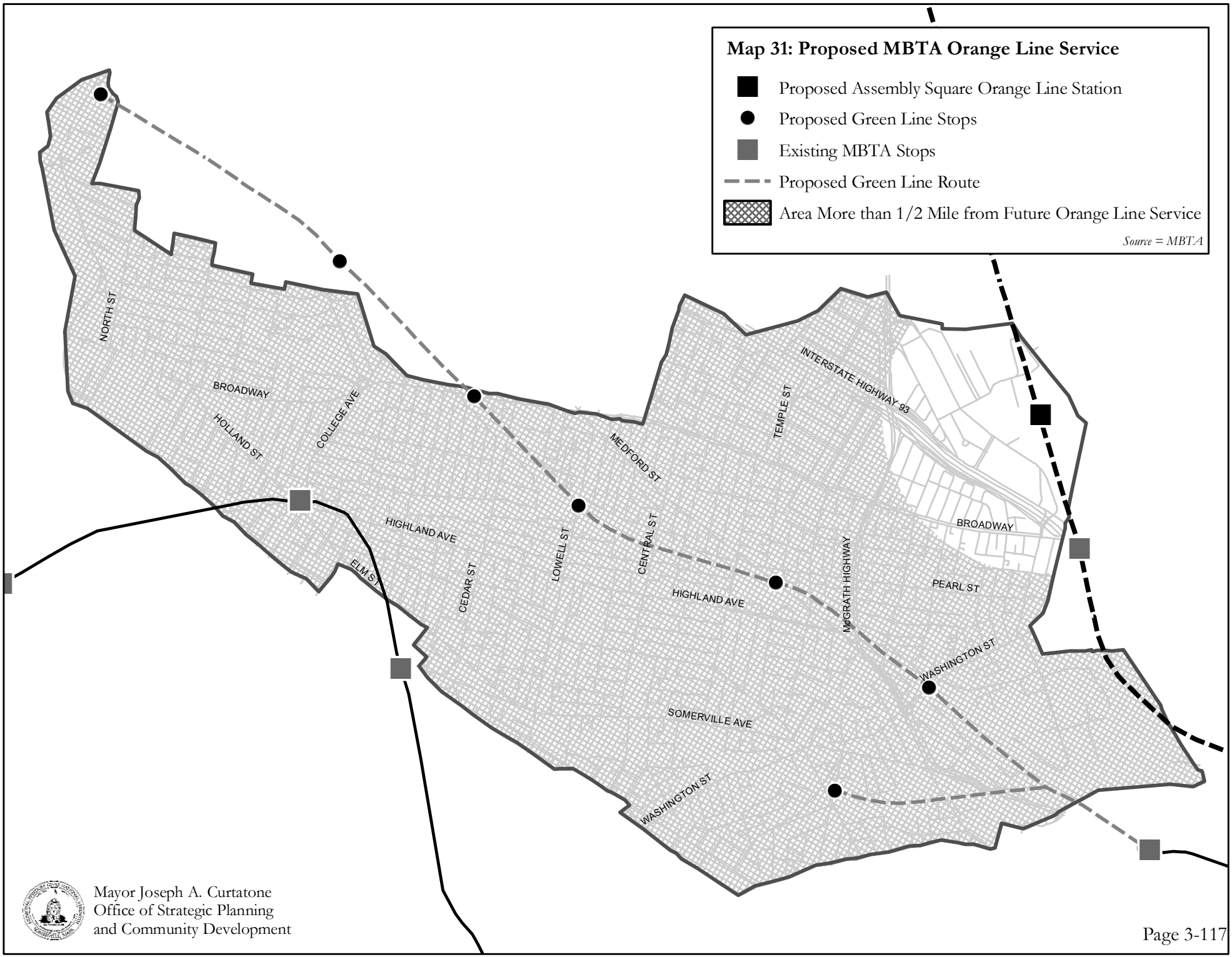
As seen in Figure 72, the station will feature multi-modal access via a pedestrian bridge, a shared use path, bicycle parking, and a bus drop-off area. A canopied center platform will serve both inbound and outbound trains. Green design elements, a passive HVAC system, and sustainable materials will be incorporated whenever possible.

Figure 72: Assembly Square Orange Line Station – Design Elements



Source: MBTA, 2009.[8]

[8]http://www.mbta.com/uploadedfiles/About_the_T/T_Projects/T_Projects_List/ASQ%20Public%20Meeting%20Presentation_29Jun09.pdf


Map 31: Proposed MBTA Orange Line Service
Proposed Assembly Square Orange Line Station
Proposed Green Line Stops
Existing MBTA Stops
Proposed Green Line Route
Area More than 1/2 Mile from Future Orange Line Service
Source = MBTA
NORTH ST
BROADWAY
HOLLAND ST
COLLEGE AVE
MEDFORD ST
TEMPLE ST
INTERSTATE HIGHWAY 93
HIGHLAND AVE
ELM ST
CEDAR ST
LOWELL ST
CENTRAL ST
MCGRATH HIGHWAY
BROADWAY
PEARL ST
HIGHLAND AVE
WASHINGTON ST
SOMERVILLE AVE
WASHINGTON ST
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D. URBAN RING

The Urban Ring is a circumferential transit corridor planned to connect the inner core communities surrounding (and including) Boston, servicing Brookline, Cambridge, Somerville, Medford, Everett, and Chelsea via Bus Rapid Transit (BRT). The system is designed to connect the current hub-and-spoke rapid rail system, which primarily provides service to downtown Boston. Without circumferential connections, Boston's outer core suffers from poor accessibility to nearby areas, congested cross-town arterials, and increased vehicle miles driven into and out of downtown Boston on a highly congested radial roadway network. The project is expected to carry 184,000 daily passengers and cost $2.4 billion (2007 dollars).[9]

The EOT filed a Revised Draft Environmental Impact Report/Draft Environmental Impact Statement (RDEIR/DEIS) in November 2008 -- the result of a two-year planning and analysis of the project.[10] Subsequently, in response to the approval certificate issued by the Commonwealth's Executive Office of Energy and Environmental Affairs, the EOT filed a Notice of Project Change for the Urban Ring Phase 2 project on June 30, 2009.

The NPC includes the following elements:

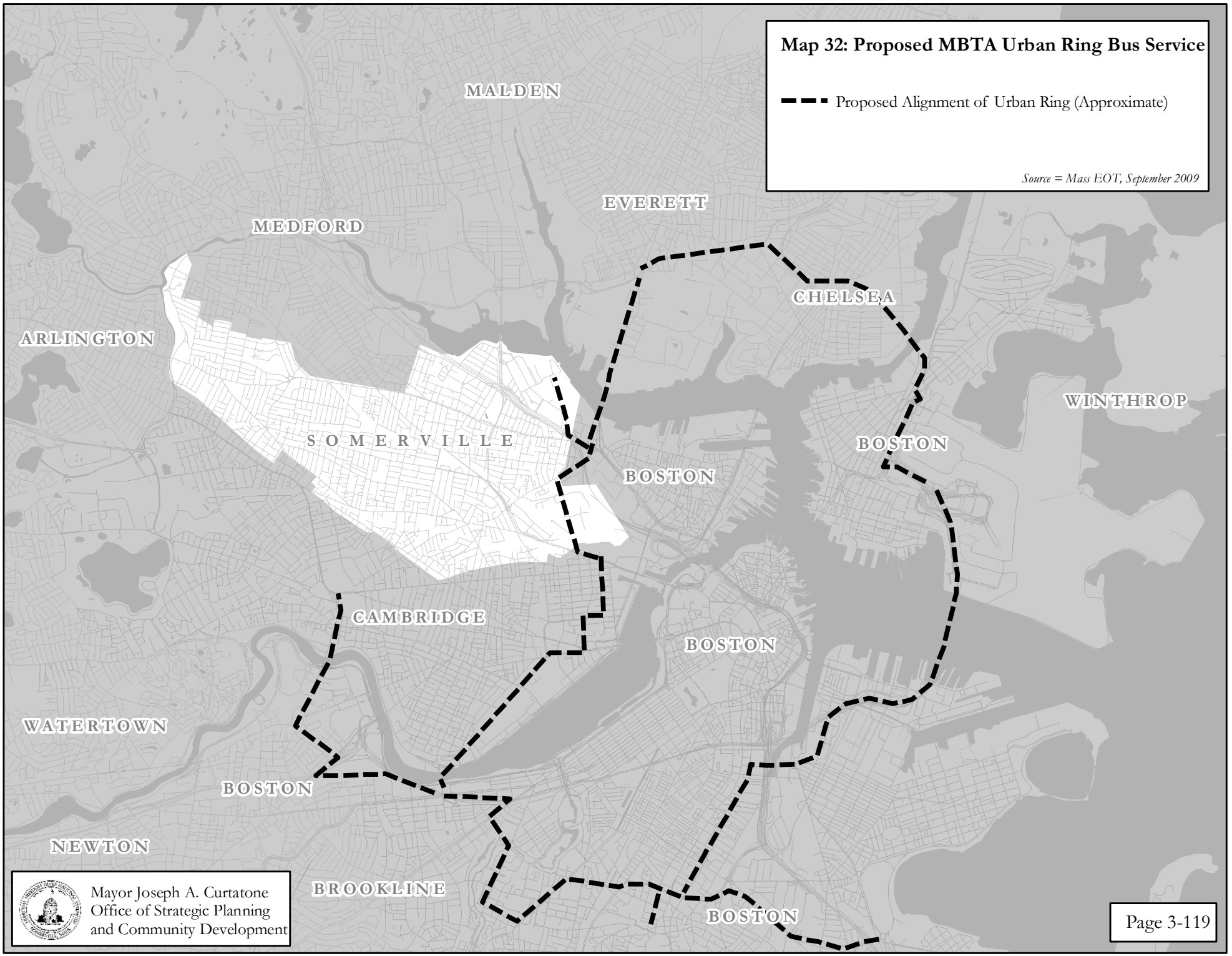
- **Alignment Changes to the Locally Preferred Alternative:** Identifies portions of the locally preferred alternative (LPA) alignment where EOT is proposing a change, the resolution of alignment options or further evaluation of a potential alignment change.
- **Implementation Plan:** Describes EOT's approach to phasing, environmental review and implementation for the Urban Ring Phase 2 project.
- **Response to Comments:** Responds to comments reviewers rose on the RDEIR/Draft Environmental Impact Statement (DEIS).

The NPC proposes a phased approach to implementing the Urban Ring upgrades and removes a proposed link between Medford's Wellington Station and Assembly Square via Route 28. Instead, Assembly Square will be linked to the network via mixed traffic on Assembly Square Drive to Sullivan Square with connections to the Orange Line, a proposed commuter line stop, and bus connections. The route would then continue via Cambridge Street, Washington Street, and Inner Belt Road (in both dedicated bus ways and mixed traffic) to a new Inner Belt Station; and then continue to the relocated Lechmere Station, with connections to the Green Line.[11]

[9] Urban Ring Phase 2: Fact Sheet. https://www.commentmgr.com/projects/1169/docs/URnews0105c.pdf Retrieved May 7, 2009 from https://www.commentmgr.com/projects/1169/docs/URnews0105c.pdf.

[10] Urban Ring Phase 2: Fact Sheet. https://www.commentmgr.com/projects/1169/docs/URnews0105c.pdf Retrieved May 7, 2009 from https://www.commentmgr.com/projects/1169/docs/URnews0105c.pdf.

[11] Urban Ring Phase 2: Fact Sheet. https://www.commentmgr.com/projects/1169/docs/URnews0105c.pdf Retrieved May 7, 2009 from https://www.commentmgr.com/projects/1169/docs/URnews0105c.pdf.


Map 32: Proposed MBTA Urban Ring Bus Service
Proposed Alignment of Urban Ring (Approximate)
Source = Mass EOT, September 2009
MALDEN
EVERETT
MEDFORD
CHELSEA
ARLINGTON
WINTHROP
SOMERVILLE
BOSTON
BOSTON
CAMBRIDGE
BOSTON
WATERTOWN
BOSTON
NEWTON
BROOKLINE
BOSTON
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