

Governing Greater Boston

The Politics and Policy of Place

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4. *Moving Greater Boston: Transportation Challenges of the Region*

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IN 1996, THE MASSACHUSETTS BAY TRANSPORTATION AUTHORITY restored commuter rail service along two branches of the Old Colony Railroad to Boston's South Shore for the first time since 1959. Bringing back service on the lines cost the state \$604 million, making it the third most expensive transportation project in Massachusetts after the Central Artery/Third Harbor Tunnel project and the relocation of the Orange line. By 2000, some 8,400 passengers boarded trains daily on the Plymouth/Kingston line and another 9,000 passengers boarded trains daily on the Middleborough line. The lines were so popular that the MBTA was forced to expand its parking facilities at stations along the rail corridors. Communities along the South Shore, in turn, experienced a boom in property values and the strongest economic growth in the state. As commuters took advantage of the restored service, towns along a third branch of the Old Colony system, the so-called Greenbush Line to Scituate, fought to keep service from resuming. Opponents claimed that restored service would worsen traffic congestion, damage the environment, and undermine the small-town feel of their communities.

The revival of commuter rail travel in Greater Boston offers a telling glimpse into the many tradeoffs facing transportation planners in Massachusetts. The success of the Old Colony lines heartened many rail advocates who see public transportation as the state's best hope for reducing automobile congestion along highways such as Interstate 93 and Routes 3 and 24, which have dramatically changed the quality of life for residents in the suburban and rural communities not only to Boston's south but all over the metropolitan area. By taking tens of thousands of cars off the road, commuter rail also might offer a quicker trip to the city for those who must travel by car. Commuter rail boomed in Greater Boston in the 1990s, with the number of riders up by 41 percent in the decade, even though it remained a minor part of the overall transportation system. Perhaps the greatest benefit

of new commuter rail service is that a new generation of workers will develop new habits and expectations for the kind of infrastructure that the state should offer its residents.

But critics say these benefits are far outweighed by the costs of commuter rail—and the unintended consequence of even greater traffic congestion and an even more sprawling pattern of housing, office, and shopping development. The MBTA estimates that the commuter service to the South Shore will remove 6,600 cars from the highway, but the overall traffic on these roads is about 200,000 on Routes 3 and 24 alone. A reduction of 3.3 percent of all cars on the roadways will not make much of an impact, transportation experts say, especially considering the fact that many of the people using rail still have to drive to huge parking facilities to catch the train. But there are other impacts as well. The private bus carriers that operated service between the South Shore and Boston have seen a precipitous decline in ridership as people shift from bus to commuter rail. Meanwhile, the old belt-loosening strategy to relieve highway congestion continues; for the past decade the state has been studying the feasibility of expanding Route 3 South to provide more road capacity for commuters and shoppers.

The debate about where and how to invest in transportation infrastructure along the South Shore mirrors the dilemmas and tensions that have marked transportation investment across Massachusetts since Colonial times. The questions are basic. Should the private or public sector dominate travel? How much money should the government spend on infrastructure? How can government use its leverage to assure that travelers enjoy the widest possible range of choice? How do transportation issues relate to housing and economic development? What is the best way to provide people with access to the kinds of lifestyles that they want—urban, suburban, and rural—while insuring economic and environmental sustainability? How do transportation choices affect the classic “town village” lifestyles in New England? Should transportation policy lead or follow demographic trends? Should policy makers consciously seek to change people’s behaviors? All of the questions are complex. None of the questions are easy to answer.

Two major events have dominated the planning and programming of transportation projects within the Boston region over the past thirty years. The first was the Boston Transportation Planning Review (BTPR) begun in 1971 under Governor Francis W. Sargent and led by Alan Altshuler, Sargent’s secretary of the Executive Office of Transportation and Construction (EOTC). Despite his early support for the project—and intense pressure from U.S. Transportation Secretary John A. Volpe, who previously served as Massachusetts governor—Governor Sargent halted the design and construc-

tion of a series of highways, including the Inner Belt expressway through the communities of Boston, Brookline, Cambridge, and Somerville. The BTPR helped shift transportation policy away from highway expansion within the inner core and resulted in the first-in-the-nation transfer of federal highway construction funds for transit construction. The BTPR led to the extension of the Red Line from Harvard Square to Alewife and created a new Orange Line along the path of the planned highway. The BTPR also engaged the public and community groups in a way that had not happened before—and has not happened since.

The second major event involved the planning of the Central Artery and Third Harbor Tunnel project, popularly known as the “Big Dig.” Besides replacing the elevated section of Interstate 93 downtown, the state agreed to a number of transit and environmental projects to “mitigate” the impacts of the project on nearby communities. This process, begun under Governor Dukakis in the late 1980s and continued under Governor William F. Weld starting in 1991, committed the state to pursue an aggressive set of specific transit and non-SOV (“single-occupancy vehicle”) highway commitments costing billions of dollars. These commitments were subsequently incorporated into State Implementation Plan (SIP) by the Massachusetts Department of Environmental Protection. The projects that have already been completed include the extension of the Ipswich commuter rail line to Newburyport, the construction of the South Station inner-city bus terminal, the extension of the Framingham commuter rail line to Worcester, the reinstatement of the Old Colony commuter rail lines, the creation of high-occupancy vehicle (HOV) lanes on Interstate 93 north and south of Boston, and the addition of 20,000 new park-and-ride parking spaces in suburban locations. The projects under construction include the South Boston Piers Transitway and the modernization of the Blue Line. Projects with uncertain futures include the restoration of Green Line service to Forest Hills, the connection of the Red Line and Blue Line, and the extension of the Green Line from Lechmere to Medford Hillside.

These commitments still dominate the discussion about which future transportation projects are funded. Although vociferous public debate has occurred for each of these projects, formal processes for engaging the public and constituency groups has been less comprehensive than it was under the BTPR. Selected environmental advocacy groups, such as the Conservation Law Foundation, have played the major role in driving these decisions.

Transportation Issues Facing the Region

Over the past three hundred years, several patterns have characterized transportation systems in Greater Boston and Massachusetts. The first major

pattern is *modal succession*. Every generation or two, one form of transportation investment pushes out the others. A major form of transportation in the mid-1600s was the water ferry. By the early 1800s, the state legislature approved the construction of private turnpikes. The mid-1800s saw the rise of passenger and freight rail with the Worcester line in 1834, the Lowell line in 1835, the Fitchburg line in 1845 and the Old Colony lines in 1846. They prevailed until competition from the automobile made fixed-routes seem like a needless inconvenience. Limited-access highways for automobile traffic forced many of the private commuter rail lines into bankruptcy in the 1950 and 1960s. From the 1960s until the present, the car has been king. But planners desperate to reduce highway congestion have embraced Commuter Rail.

The second major pattern concerns the *difficulty of developing multi-model transportation*. Because of the volume of daily automobile trips and dispersion of jobs and homes, residents of the South Shore rely primarily on highways and other roads. Residents are often eager to get out of their cars, and the government has responded with Commuter Rail, expanded Red Line service, and water ferries. What makes multi-modal systems difficult is that each mode needs infrastructure, customers, and policies that serve its own needs—and which frequently are in conflict with the needs of other modes. The Old Colony line, for example, requires 54 road crossings at street level, frustrating drivers on those streets. National highway standards, to take a second example, also impose the goals of speed to the expense of streetscape design and pedestrian spaces, to the detriment of walking and transit. Private buses and vans, to take a third example, often undo the environmental gains of public transportation. The best strategy for fostering multi-modal transportation is to encourage dense clusters of housing, shopping, offices, and factories. But with a few exceptions, land-use patterns have moved in the opposite direction—toward tract housing, malls, and office parks. No amount of investment in multi-modal transportation systems can overcome dispersed development patterns.

A third pattern is *the inevitability of public financing of transportation*. Although the automobile is considered the ultimate form of private transportation, it requires billions in publicly financed streets and highways. Rail travel was once private, but competition from cars and complications along routes requires public subsidy and coordination. Ferries, once considered an anachronism in the blustery communities in Greater Boston, have returned to provide a way to stay off the roads for extended periods—but requires considerable subsidies to survive. The key question in transportation policy is not whether to spend public money, but how to spend money and how much. Each expenditure on one form of transportation means less money for

others; in the world of transportation, win-lose propositions are more frequent than win-win solutions.

As the region approaches the end of construction for the Central Artery, the \$14.5 billion mega-project to replace the existing elevated highway and provide improved access from the Massachusetts Turnpike, the Commonwealth faces a host of questions about where the next major capital investments should be. The lead-time for the planning and construction of large projects is at least a decade. Given the period of time between the visioning of a project and the completion of construction, the policy leaders and the public need to determine what the major transportation needs of the next twenty years will be and how to mobilize the political will and financial capacity to pay for them.

Whatever the priorities, the capital and operating costs for the transportation system in Massachusetts exceed the amount of public money available. Over the next three years, the Boston Metropolitan Planning Organization will allocate over \$4.3 billion in highway and transit capital projects.¹ The decision to fund one project means that money may not be available to fund other competing or complementary projects. Hard decisions over which projects to fund confront policymakers on a daily basis. Areas of competition include trade-offs between highway and transit, urban versus suburbs, and maintenance needs versus expansion projects.

The process of deciding when and how to fund transportation projects in eastern Massachusetts is highly political. The Governor and Legislature each weighs in on the decisions with vocal input from the private sector, local communities, and public interest groups. The state legislature has been and remains dominated by Boston area politicians. Governor Michael S. Dukakis worked to forge a suburban-urban coalition to support increased investment in mass transportation. Building that coalition required extending commuter rail service to the suburbs to gain political support for reinvestment in the urban core. For the most part, this coalition has remained unified in its support of transit capital projects. But some dissent has come from urban bus proponents who believe that recent commuter rail expansions have been funded at the expense of bus modernization.

Demographic Trends

The demographics of Greater Boston hold the key to transportation issues in the region. The Boston Metropolitan Planning Organization uses demographic data to understand current travel patterns and make projections about future patterns. After predicting how, when and how often people travel within the region, the model predicts the demand on each of the major

portions of the existing or proposed system. The model area includes a total of 164 communities in Eastern Massachusetts with socioeconomic and land use forecasts from MAPC and transportation baseline information gathered through various data collection methods. Four major variables help to predict the type of travel within the region: population, households, employment, and automobile ownership.

From 1970 to 2000, the population of the 101 communities that make up the Boston region has remained relatively stable at around 3 million people, but the number of households has increased by over 25 percent.² The average household has decreased from 3.2 people in 1970 to 2.6 in 2000 as the composition of a family unit has changed and more people live on their own. This means that more people travel alone and are more likely to own an automobile. The employment within the region has grown by over 50 percent during this three-decade period. While Boston and Cambridge remain the major employment centers of the region, there has been a dispersion of jobs beyond the Route 128 corridor.

Of the 1.1 million households within the region, approximately 88 percent own at least one automobile and 57 percent of households have two or more autos according to the 1990 U.S. Census. The 2000 Census will presumably show an even higher rate of auto ownership. During the 1990s, the number of vehicles registered in the state of Massachusetts grew by 40 percent. As of 1998, there were more vehicles registered in Massachusetts than licensed drivers.

These demographic patterns have profound implications on how we travel. As household size decreases, people are less able to share automobiles or coordinate trips. As employment grows but population stays the same, those jobs tend to be filled by workers driving in from outside the region, with resultant longer commutes. There is also a correlation between income and auto ownership. As household income rises, the number of automobiles per family increases. As more people own their own auto, the marginal cost of any one automobile trip is relatively inexpensive. Therefore it becomes harder to provide attractive transportation alternatives to an automobile trip to a large segment of the public.

Residents within the greater Boston region make about 14 million trips per day. About one-third of all daily trips are work-related; the rest involve shopping, recreation, school or other types of travel. Approximately 79 percent of all of these trips within the region are by automobile, 16 percent are by walking and 5 percent are by transit. The high level of auto trips and corresponding low level of transit trips is directly linked to the socioeconomic and land use shifts that have been evolving within the region since World War II.

Over time, the region has seen a greater dispersion of trips as population and employment has shifted from the inner core to the suburbs outside of Route 128 and I-495. Today, trips produced outside of Route 128 account for 56 percent of all trips within the region. These trips that involve suburb to suburb travel are the ones that are most difficult for transit to serve. As the economic and housing base expands beyond the urban core, residents become more and more dependent upon the automobile.

Unlike areas in the South and the West, the majority of the transportation infrastructure within the region was in place well before the dominance of the automobile. The urban core has maintained a dense mix of housing and employment centers. The older suburban towns are usually anchored by a traditional village center with a transit station. But many of the suburban communities outside of the Route 128 corridor have seen the same pattern of sprawl as the South and West.

For a time, the dispersion of jobs and residents to the suburbs reduced the amount of congestion experienced on the major roadways of the region as travel was spread out into the suburbs. Growing suburb-to-suburb travel has exacerbated congestion on both urban and suburban roadways throughout the region. But this dispersion of jobs and housing has made residents more dependent on the automobile and made it more difficult for the transportation agencies to provide travel alternatives to the automobile.

Roadways and Congestion

Whatever hopes “smart growth” advocates have for creating a new generation of public transportation in Massachusetts, automobiles will continue to dominate transportation in the coming decades. The major transportation challenge, then, will be to provide adequate infrastructure for automobiles that do not cause needless traffic congestion, damage the fabric of traditional city and town centers, or provide undue disincentives for potential public transit users to shift to automobile travel.

Major problems involving the roadways include growing urban and suburban congestion, competition within the streetscape, the aging of the existing infrastructure and the cost to maintain or expand it. There is also the need to better understand the impacts of transportation investment decisions on the land use and economic development of the region.

There are 23,000 lane miles of roadway within the Boston region with a daily average of 62.5 million vehicle miles of travel. Arterial streets, those that provide a high level of mobility at a relatively high speed, account for 29 percent of the lane miles but carry over 80 percent of all the daily vehicle miles of travel.³

The growth in roadway traffic is expected to continue into the future. The Boston Metropolitan Planning Organization (MPO) projects that from 1995 to 2025 VMT within the region will increase from 109 million miles per day to 143 million miles per day, a 33 percent increase. Vehicle hours of travel within the region will increase from 3.3 million hours per day to 4.8 million hours per day. Because of increased congestion, average travel speeds will be reduced by 10 percent from approximately 33 miles per hour to 30 miles per hour.⁴ One of the positive by-products of the congestion and relatively slow driving speeds within Boston and Massachusetts as a whole is the fact that Massachusetts has the lowest auto-related fatality rate in the nation. There are an average of 2.2 fatalities per 10,000 licensed drivers nationally, while the rate in Massachusetts is .9 fatalities.⁵

In the past, urban congestion was a fact of life for many commuters; in recent years, the congestion has spread to the suburbs as population and employment have shifted out from the urban core. The answer to solving congestion used to be to simply build more roadway capacity—the equivalent of a fat man loosening his belt to accommodate a growing belly—but transportation experts now agree that such an approach is not as feasible as it has been in the past. The costs associated with acquiring new right-of-way and complying with environmental requirements have become exorbitant. New roadways also meet with stiff neighborhood opposition and require expensive mitigation measures to offset burdens placed on the area.

With the passage of the Inter-modal Surface Transportation Enhancement Act (ISTEA) in 1991, the Federal Highway Administration began the process of shifting its focus away from financing roadway expansion and is now promoting the better, more efficient use of the existing roadway network. ISTEA initiatives include the use of intelligent transportation measures such as the coordination of signals, the introduction of better monitoring of roadways, and measures to provide better real-time information to travelers. ISTEA also allowed for road money to be diverted to transit improvements, traffic-calming strategies, and bicycle paths.

Massachusetts has invested little money to expand its interstate system within the region since Governor Sargent's decision to halt the Southwest Expressway and Inner Belt projects in the 1970s. Besides the completion of I-93 from the Tobin Bridge to Medford and the expansion of I-495 and Route 3 North, the only additions have been projects related to the Central Artery project. The Central Artery North Area (CANA) was completed in the early 1990s to provide improved access from the Tobin Bridge on-ramps in Charlestown to the Central Artery connection near North Station. The Ted Williams Tunnel, constructed at a cost of \$1.5 billion, opened in 1995 to

commercial traffic. This tunnel provided a doubling of capacity to the cross harbor connection between Boston proper and East Boston and the North Shore. The South Boston Bypass Road, opened in 1993 to commercial traffic, provided a connection between I-93 South and the new tunnel. Other projects outside the region, including Interstate 90 and stretches of Interstate 495 in southeastern Massachusetts, have added to Greater Boston's highway network.

The only current major MassHighway roadway expansion projects in the region include the widening of a portion of Route 128 and the expansion of Route 3 North. Route 128 will be widened by one travel lane in each direction from Route 24 in Randolph to Route 9 in Wellesley, a total of 13.7 miles. This federally financed \$100-million project will bring the capacity of this section of Route 128 to the same level as segments to the north and south. MassHighway is studying the expansion of Route 3 South but is meeting stiff opposition from the environmental community over the impacts on wetlands in the median.

After input from the business community, the state legislature passed a bill allowing for the Route 3 North project to be constructed under a design-build contract, a new approach for Massachusetts. The project will widen Route 3 along a 21-mile corridor from Burlington to the New Hampshire border. Under the design-build system, a contractor works under a compressed time schedule and designs and builds the roadway improvements as part of the same process—rather than creating a complete design ahead of time and then building the road afterwards. The total cost for the project, approximately \$640 million, comes from an innovative financing plan that obligates bond money by pledging future highway funds that Massachusetts will receive from the federal government. A concern with pledging future federal funds is that it reduces the amount of money available in those future years for other roadway projects.

One of the byproducts of the Central Artery project is that the state has not had sufficient funding to support other major highway expansion projects. Even though total funding for highways increased in the state as part of the political deal to keep the Big Dig on track, there is some dispute about how much money was actually committed. Since 1995 and continuing through 2002, 71 percent of all the federal highway funding has been dedicated to the Central Artery project. For the period 1996 through 2000, the Boston region programmed approximately \$98 million annually in non-Central Artery roadway and bridge projects. For the five-year period from 2001 through 2005, MassHighway will spend approximately \$732 million per year on its highways. Of that, an average of \$305 million is dedicated to

the Central Artery. Of the remaining statewide funds, the Boston region will receive approximately \$144 million annually for all of its non-Artery related road and bridge projects. Even after the construction of the Central Artery is completed, the state will continue to dedicate 50 percent of all its federal highway money to the Central Artery through the year 2010.⁶ The state also pays in the interest on GANS (notes issued in anticipation of future federal grants), which does not show up in budgets as highway spending.

A major concern today for the communities is how to balance competing interests along existing roadways. Most of the arterial roadways connecting town centers have been in existence for over a hundred years and were designed to carry limited traffic. These roads usually do not meet the modern design standards for capacity and safety of the American Association of State Highway and Transportation Officials (AASHTO). All across the region, communities face difficult tradeoffs between the need to expand the road capacity, provide parking, meet bicycle and pedestrian needs, and maintain the roads' historic or rural characteristics. Some towns have the knowledge and political will to balance these competing needs, but others do not. The town of Hingham is trying to improve sections of Route 228 that travels through its historic downtown, but in order to meet MassHighway standards, the project would require the removal of over 100 trees, something residents are loathe to do. The Town of Brookline recently went to the state legislature to force MassHighway to allow a design waiver for improvements to Beacon Street. The governor vetoed the legislation, but the House and Senate overrode the veto.

To promote alternative means of travel, the state legislature has required that bicycle and pedestrian needs be taken into account whenever roadways are reconstructed. Many cities and towns have sought to accommodate bicycle needs by widening the roadways, which in turn means encroaching on open or historic space and cutting down trees along the path of travel. This is especially difficult when these roads pass through the historic centers of towns and threaten to change the quality of life that makes town centers so desirable. MassHighway has safety and capacity as its top concerns; in many towns, the primary goal is retaining the existing character of the road and community.

Rather than investing money in capital improvements, many times operations activities can enhance or expand the use of the roadways. Operations activities include strategies to increase the average occupancy rate for vehicles, help in relieving congestion, and allow for a more efficient use of the roadway. Operations activities address issues of recurring congestion, regular rush hour traffic, and non-recurring activities such as accidents,

roadway construction, or other kinds of isolated incidents. Having the resources to respond to these everyday contingencies can save hours of motorists' time.

Currently, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) are leading a national effort to adopt Intelligent Transportation Systems (ITS). ITS involves the integration of computers, communications and electronics into the operations of the roadway network. Some of the better known ITS measures implemented in the Boston region include the SmartTraveler information service, the *SP program, the FastPass and the Motorists Assistance Program (MAP). SmartTraveler is operated by a private company with support from the state to provide real-time driver and transit information. If commuters are more aware of the status of the transportation system, they are more likely to make changes in response. The *SP program allows cell phone users to make a toll-free call (by punching the *, S, and P keys on cellular telephones) to the State Police to report accidents or problems. By responding more quickly to an accident, the resultant backup can be reduced. FastPass is the MassPike's electronic toll collection system which is interoperable with other Northeast states toll facilities. The MAP provides vehicles that patrol the interstate system and provide assistance to motorists. FHWA has estimated that non-recurring congestion, accidents and other events, are responsible for 60 percent of all roadway congestion. Each minute saved in responding to an incident can save 15 minutes of congestion build up.

Transportation demand management (TDM) measures offer another strategy to reduce automobile traffic on city streets especially. Under TDM systems, major employers and institutions such as universities and medical institutions provide a wide range of transportation alternatives, such as van service, free or subsidized transit passes, access to cars for family emergencies, and carpooling and other ride coordination services. TDM also works with employers to create flex-time so that workers can travel to the job on off-peak hours. Major institutions like Harvard University, the Longwood Medical Area, and Artery Business Committee have set up TDM systems. Even the most aggressive TDM efforts, however, yield only marginal changes in traffic patterns in the city and region. The "CommuteWorks" program of the Longwood Medical Area in Boston exhorts its workers and students: "People who use alternatives to driving alone save as much as 75 percent on the cost of commuting. Make your commute easier on you and your wallet." But most workers resist the appeal because of the convenience of auto travel.

Greater Boston's infrastructure is aging and in desperate need of rehabilitation. The average age of the bridges in the region is 40 years.⁷ Most of

the interstate highways were built between 1950 and 1970. The major arterial roads connecting regional centers have been in use since the early 1900s. In the most recent transportation plan of the Metropolitan Planning Organization, the Boston region allocated 70 percent of its non-Central Artery funding to maintenance and preservation of the existing system. This will allow the region to go from spending roughly \$90 million per year for the period 1996 through 2005 to spending \$105 million in the years 2006 through 2010 and then at least \$155 million in the “out” years of 2011 and beyond. The condition of Massachusetts bridges and roads is generally considered among the worst in the nation.

At times transportation systems are used as a tool to promote economic development. The Dukakis administration instituted a program of public works and economic development grants, entitled PWED. These grants were awarded to targeted communities to help promote economic development. But the awarding of these grants was often caught up in the world of political spoils. While the state does not have any formal method for targeting transportation infrastructure—as do states like Georgia, Maryland, and Oregon—a number of redevelopment projects in Massachusetts are dependent upon the state providing the roadway and transit investment. The Woburn Industriplex Intermodal Center involves the reclamation of an Environmental Protection Agency (EPA) Superfund site by MassHighway, Massport, and the MBTA. This center will include a commuter rail and Amtrak station, a 2,400-space parking lot, and a Logan Express shuttle. The project is possible because of the construction of a new I-93 interchange and associated roadways. The new interchange also allows the redevelopment of adjacent land for industrial and commercial uses in Woburn.

Another example of transit-driven development is the set of roadway improvements in association with the Telecom City redevelopment project in Malden, Medford, and Everett. This redevelopment project, coordinated by the state-chartered Mystic Valley Development Commission, is heavily dependent on state transportation improvements. The Boston MPO has included \$24 million in highway improvements in its transportation plan for the site. Possible transit improvements include improved access to the Orange Line and commuter rail lines.

A third example of transportation-driven development is the redevelopment of the Weymouth Naval Base. The proposed development was contingent upon roadway improvements to support the volume of new traffic generated. The development is on hold and the transportation improvements were never committed. In each of the cases the governor and state legislature were involved in targeting state financial assistance and infrastructure money

to the projects. But these were all done on an ad-hoc basis. There is no mechanism to identify, prioritize and designate funding of transportation dollars to promote economic development.

The Central Artery

The “Big Dig” project—the multi-billion-dollar project to replace the downtown Boston portions of the elevated Interstate 93 with an underground highway and tunnel—has dominated transportation policy in the region for more than a decade. But concerns about the Central Artery in fact go back to 1951, when construction of the highway began.

The elevated highway runs from the area south of South Station through Chinatown, the Financial District, the North End, and a crossing over the Charles River near North Station. Discussion on improving or replacing the Central Artery began even as the structure was being built. In fact at one point, construction of the highway was halted by John A. Volpe, then the Massachusetts Commissioner of Public Works, so that the South Station section could be redesigned and placed in an underground tunnel. Volpe’s redesign of the artery near South Station also involved intense disputes about the route, particularly its place in downtown Boston. The highway exacted a heavy price on the social fabric of downtown Boston with the removal of over 1,000 residential and commercial buildings.

At the center of the issue were Michael Dukakis, who served as governor from 1975 to 1979, and Edward King, who served as chairman of Massport and then defeated Dukakis in 1978 and served as governor from 1979 to 1983. (King was fired at Massport in 1975.) At the urging of Secretary of Transportation Frederick W. Salvucci, Dukakis advocated placing the Central Artery underground, while King supported building a third harbor tunnel from Boston to East Boston. The tunnel project would have required the taking of homes and businesses in densely populated East Boston. In 1983, Governor Dukakis, once again at the urging of Salvucci, proposed a blending of the two projects. The new tunnel would run along a railroad right-of-way through South Boston and surface on Massport property in East Boston, thereby avoiding any takings of homes. By overriding President Ronald Reagan’s veto, Congress approved federal funding for the Central Artery project in 1987. Originally estimated to cost \$2.7 billion, the price tag has now risen to \$14.7 billion with construction expected to be completed in 2005.

When finished, the Central Artery project will move underground sections of I-93 passing through downtown Boston, extend the Massachusetts Turnpike to Logan Airport, and create a third harbor tunnel known as the Ted Williams Tunnel. The resulting freed-up land will provide 27 acres of

land for development and park space. Out of the approximately \$510 million Massachusetts receives in annual federal highway funding for the state, 71 percent is devoted to the Central Artery project through the year 2002. The remaining 29 percent is used to rehabilitate and construct all of the rest of the roads and bridges in the Commonwealth.⁸

In 1997, the Massachusetts legislature created the Metropolitan Highway System (MHS) to unify the operations of the Central Artery and other toll facilities in the urban Boston area. The other components of the system include the three harbor tunnels, the Central Artery North Area (CANA), the Massachusetts Turnpike to Route 128, and the Seaport Access Road (the extension of the Mass Pike to the Ted Williams Tunnel). As part of the MHS the Central Artery will have a state-of-the-art system of electronic monitoring and incident management to maintain the flow of traffic. Elements include a traffic-control center that monitors the roads and tunnels 24 hours a day, stationing emergency vehicles at key points along the system to quickly respond to accidents or incidents. The operations of this system will cost an estimated \$25 million annually.

A common public misconception is that the Central Artery has a dedicated pot of federal money allocated to its construction; but specific earmarked funding for the Central Artery expired in 1997 with the passage of TEA-21. All federal funds now used for the Central Artery project are funds that could be used for any of the other road and bridge projects across the state. Big Dig money was earmarked as Interstate Construction money, which realistically could only be used for the Artery.

Public Transit Within Greater Boston

In 1964, the state legislature created the Massachusetts Bay Transportation Authority to replace the Metropolitan Transit Authority. The MBTA is charged with providing public transit to the eastern Massachusetts area, including the densely populated urban core and the more dispersed, auto-centric suburbs.

Public transportation in Greater Boston has grown incrementally over the past three hundred years along a hub and spoke pattern with downtown Boston as the center. The transit system includes three heavy rail lines (Blue, Red, and Orange), a streetcar/light-rail line (Green), 170 local and express bus routes, 13 radial commuter rail lines, water ferry service for the Inner Harbor and South Shore, and a complementary paratransit service. The transportation system is designed mostly to bring workers into the major employment centers of the Boston area. The system does a good job bringing people into Boston from outside neighborhoods of the city and region; crosstown trips or trips through the city to outlying regions are more diffi-

cult. The Commuter Rail system is also fragmented; passengers from the north come into North Station, and passengers from the south come into South Station, and there is no connection between the two entrepôts. As a result, a commuter coming to Boston from Rockport on the North Shore will have to take a separate trip to an office that is not near North Station. It is uncertain how many people actually have this problem, which is one of the reasons the project is viewed skeptically by planners.

Recent changes in settlement patterns pose difficult challenges for public transit, most notably the dispersal of both employment and residential areas and a dramatically lower level of density. In the 1950s over 60 percent of the residents and over 50 percent of the jobs were located in the urban core, which is defined as Boston and 13 communities surrounding it. This density of residents and employment present in the inner core makes transit a viable alternative to the automobile. Since then, the region has experienced the same trend of suburban sprawl in both housing and jobs as the rest of the nation. This dispersion of jobs and housing makes it harder for the MBTA to provide transit in an efficient and effective manner.

On a typical weekday, the MBTA has approximately 1.15 million boardings. The chart below shows the boardings for each of the major branches of transit service and gives the percentage of daily ridership for each mode.⁹

Mode	Daily Ridership	Ridership Share
Bus	375,000	32 percent
Red Line	225,000	19 percent
Green Line	223,000	19 percent
Orange Line	157,000	13 percent
Commuter rail	130,000	11 percent
Blue Line	57,000	5 percent
Total	1,167,000	100 percent

While often dismissed as not “real transit” by activists, the bus system serves as the workhorse of the system. The 170 routes provide urban circulation, feeder service to other transit modes, and express and suburban service for the suburbs. The bus system’s 8,500-plus stops are marked with nothing more than a sign on a post. According to the MBTA’s own figures, the system has fewer than 400 bus shelters throughout the system. The alignment of many of today’s bus routes has been maintained since the days of the streetcars in the early 1900s. While the past two decades have seen major investments in fixed rail and commuter rail, the same cannot be said for the bus system. The average age of the buses in the MBTA’s fleet is over 10 years, while the newest buses in the system date from 1995.¹⁰ As is true in most

other major urban areas, the average bus rider is more likely to be lower-income and minority than the average rider of the rapid rail or the commuter rail system.

For all of the capital expenditures over the past two decades on commuter rail and fixed rail, the bus still accounts for one in every three daily boardings within the system. In fact, there are more daily boardings on the top fifteen MBTA bus routes than on the entire commuter rail system. Of the ten most used bus routes, six of them originate in the Roxbury neighborhood at either Dudley Square or Ruggles Station. Each of these ten routes carry more than 7,500 daily passengers, roughly equivalent to any one of the five commuter rail lines servicing North Station.¹¹

The decade of the 1980s saw a major investment in rapid transit. The two major projects were funded with money transferred from the federal highway fund (FHWA) to transit (FTA). The Red Line was extended at both ends. The extension from Quincy Center to Braintree in 1980 pushed the Red Line further into the working class suburbs of Quincy and Braintree and provided over 3,500 additional parking spaces at Quincy Adams and Braintree stations. The extension of the Red Line north from Harvard was originally envisioned to go through Arlington and Lexington and terminate near Route 128. But this proposal met with opposition from residents in Lexington and then Arlington who worried about the changes a rapid transit line would bring to their suburban community. Ultimately, the Red Line extended only to Alewife with intermediate stops in the working class neighborhoods of Porter Square in Cambridge and Davis Square in Somerville. The right-of-way for the Red Line extension to Lexington has now been turned into the Minuteman Bike Trail, making a future extension of the Red Line to the north vastly more complicated. After the state abandoned the proposal for the Southwest Expressway, the Washington Street Elevated portion of the Orange Line was shifted to the Southwest Corridor right-of-way. The old Orange elevated line, which served the predominantly minority neighborhood of Roxbury, was seen by some as a hindrance to economic development along Washington Street. The Orange Line from Chinatown to Forest Hills was relocated in 1987 along the Southwest Corridor, which now has a continuous bicycle path as well. Whether or not to provide replacement transit service for the Washington Street corridor has occurred every year since. Some planners say that building the new Silver Line down Washington Street makes sense, while others would like the Silver Line to go down Blue Hill Avenue in Dorchester and Mattapan.

Driven for the most part by the Central Artery environmental agreements, the 1990s saw an infusion of capital into the region's commuter rail

lines. All of these projects undertaken by the Weld Administration extend the commuter rail system further into the more affluent suburban communities outside of Route 128, a Republican base. Most of the new stations are located along major roadways and are designed more for auto transfers, in contrast to the older stations located in or near town centers with pedestrian-friendly stations. The Framingham line was extended west to Worcester with limited service beginning in 1994 at a cost of \$78 million. Subsequently, four intermediate stations have been opened in Ashland, Southborough, Westborough, and Grafton.

Two branches of the Old Colony Line resumed service during the 1990s after a 40-year absence at a cost of approximately \$604 million. The Kingston branch of Old Colony opened in 1997 and provides service to Weymouth, Abington, Halifax, Plymouth and Kingston. The Middleborough branch opened in 1998 and provides service to Braintree, Holbrook, Randolph, Brockton, Bridgewater, Middleborough and Lakeville. The South Shore of the Boston region was the least developed portion of the region because of water and sewer constraints and the reintroduction of these two commuter rail lines has increased the development pressure within the South Shore. The Ipswich line was extended north to the communities of Rowley, Newbury and Newburyport in 1999 at a cost of \$56 million.

As of July 1, 2000, the state legislature and governor agreed to a restructuring of the financing of the MBTA. Under the previous financing arrangement, the MBTA would annually report its budgetary expenditures to the legislature after the fact, which would then appropriate the money to cover whatever gaps existed during the previous year. The MBTA's cost of service in excess of income for the years 1999 and 2000 was \$1.48 billion. But, after 26 years of paying the MBTA's bills after they were already expended, the legislature adopted the so-called "forward funding" system. This meant that the MBTA would have to adhere to a set budget and be responsible for any shortfalls in revenues. The legislation for the first time gave the MBTA a dedicated source of revenue (a one-cent allocation of the state sales tax). In addition it expanded the number of communities paying local assessments to the MBTA (an increase from 78 to 195) and recommended a fare increase. The reform also gave the MBTA the authority to issue bonds under its own credit. Previously, all bonds were issued by the Commonwealth under the full faith and credit of the state. Now the MBTA must go to the financial markets and borrow money under its own credit.

For fiscal year 2001, the cost of operating the MBTA system and paying current debt service was \$991 million. The MBTA collected a total of \$164 million in fare revenue and an additional \$39 million in non-fare rev-

enue. This includes advertising, real estate rental income and sales. The deficit of \$788 million is paid for with revenue from the state sales tax (\$644 million) and local assessments (\$136 million) and federal maintenance assistance (\$6 million). The MBTA is spending a total of \$395 million on capital projects. This includes a total of \$314 million in federal funds and \$78 million in T bond funds.

The MBTA faces numerous difficult decisions as it decides where to allocate its resources. The authority must make a number of tradeoffs, including:

- Capital expansion versus maintenance: How much capital funding should be expended on new projects as opposed to upkeep of the existing system
- Urban versus suburban service: How much should the authority seek to reinforce traditional patterns of transit use, with Boston's downtown as the hub to outlying communities? How much should the MBTA invest in new transit systems that connect suburban communities with other suburban communities?
- Environmental and accessibility responsibilities: How should the MBTA address its legal requirements for improve the environmental quality of its vehicles and service? What kinds of financial and service tradeoffs are necessary when considering the environment?

The Investment Debate: Expansion Versus Maintenance

In 2000, a Blue Ribbon panel appointed by the governor and headed by Patricia McGovern, recommended that the MBTA allocate 70 percent of all future capital expenditures to the maintenance of the existing system. Those recommendations set a new ground for debate about whether the state can afford to make significant investments in new transit systems and services. Implicit in the decision to restrict spending on new expansion projects is the realization that every expansion project increased the operating deficit of the MBTA, currently above \$787 million per year.

Maintenance investment would pay for station upgrades, accessibility enhancements, replacement vehicles, bridge rehabilitation, and other maintenance needs. Current major maintenance and rehabilitation projects in the MBTA's five year capital plan include a new automated fare collection system (\$120 million), modernization of Red Line stations along the Ashmont branch (\$83 million), Blue Line modernization (\$226 million), enhancements to bus facilities (\$80 million), and the purchase of new low-emission buses (\$126 million).¹² This investment in the existing system would allow precious little money for the expansion of capacity.

In 2001, the MBTA had at least four categories of expansion projects on the drawing board that would cost in excess of \$1 billion each. The MBTA will not have the financial resources to build them all. The projects are the Urban Ring, the North-South Rail Link, Commuter Rail expansion (Greenbush, Fall River-New Bedford, and Rhode Island and New Hampshire extensions), and the Silver Line (the bus connection between Chinatown's Washington Street and the South Boston Piers). These projects all compete for the same funds. With the exception of the South Boston Piers project—for which the late Congressman J. Joseph Moakley was instrumental in securing \$600 million in the Federal Transportation Agency's "New Starts" money—none of the projects has secured federal funding commitments for construction. The Greenbush Line (\$580 million) and the Fall River-New Bedford commuter rail extension (\$500 million) would both be totally dependent upon state funds for construction. Each of these projects has its supporters and detractors.

Urban Ring: The Urban Ring project represents a vision for providing a "rim" to connect the "spokes" of Boston's radial transit system, while at the same time promoting economic development in Boston and surrounding communities. The Urban Ring could reduce travel times and improve access to employment centers outside of the downtown core, especially the Longwood Medical area and Cambridge. The MBTA's existing transit lines are set up in a radial pattern from the suburbs to downtown Boston, like spokes in a wheel, with little opportunity to make lateral connections with other lines except by traveling into the city and out again on another line. This idea to connect the spokes has been raised over the past several decades, but the cost of providing the service and the MBTA's focus on other projects meant that it never approached a design stage before.

A number of MBTA subway and trolleys are operating close to capacity, especially during rush hour. Problems are most pronounced in the Green Line subway and the Red Line from Charles Street to South Station. The Boston Redevelopment Authority (BRA) has been leading a regional coalition of six communities (Boston, Cambridge, Somerville, Brookline, Everett, and Revere) to promote the concept of the Urban Ring as both a transportation improvement and an economic land-use stimulus.

In June 2001, the MBTA released an initial environmental proposal presenting alternative options for the Urban Ring. Phase 1 would consist of enhanced bus service along the ring and would cost \$100 million in capital and \$23 million in annual operating costs. Phase 2 would introduce Bus Rapid Transit (BRT) technology, costing approximately \$500 million in cap-

ital costs and \$31 million in annual operating costs. Under this phase, several segments of the circular route would be outfitted with dedicated rights of way (lanes that are closed to cars), “intelligent vehicle” technology (in which transponders on buses change the light from red to green to reduce stops), and more frequent service. Phase 3 would expand upon the previous two phases and include light rail or heavy rail transit segments. This phase would cost an additional \$2.3 billion and would bring the total annual operating cost to \$56 million per year. Ridership estimates range from 40,000 riders per day for Phase 1 to 290,000 riders per day for Phase 3.¹³

Debates about the Urban Ring center on whether the service will provide “real” transit service or “just” bus service. Many transit advocates maintain that anything less than light rail would doom the project to insignificance. Rail service is considered superior because it provides more regular service and serves as a basis for large-scale development in the area. The pragmatists note that buses provide greater flexibility and lower cost of service compared to light or heavy rail. One leading proponent of the Urban Ring, however, states that the essential element is not so much what kind of service will be offered, but rather what kind of development would occur along the corridor. George Thrush of Northeastern University would develop the character of the transportation corridor by imposing strict design standards that create a strong “street wall,” civic monuments, and strong pedestrian spaces. Good urban design, Thrush offers, would lay the groundwork for a strong transit line.¹⁴

North/South Rail Link: This project has been under study ever since North and South Stations were constructed in 1894 and 1899 respectively. But since the trains were operated by private companies, there was little incentive by the owners to connect the services.

The rail link would connect commuter rail service between North Station and South Station via an underground tunnel with a possible Central Terminal near the Aquarium Station. This would allow for expanded MBTA commuter rail and Amtrak service with improved connections for suburban riders. A similar project undertaken by Philadelphia in the 1980s now allows commuter rail trains to run from one suburban corridor through the city and out the other end. Preliminary estimates for the project range from \$1.5 to \$3 billion. During the preliminary environmental review of the Central Artery project in the late 1980s, the possibility of constructing the rail link beneath the Artery corridor was explored. But a decade later, the Central Artery is in peak construction and the Rail Link has progressed no further than the discussion stage. In many ways both the Urban Ring and the Rail

Link are trying to provide better connectivity within the region but they go about it from different starting points. One is mostly urban based and the other is suburban based. Because of the enormous costs of each of the two projects they are both dependent upon federal funding for full completion. In the competition for dollars, the Urban Ring has the support of Boston and the five surrounding communities and it is also able to be built incrementally.

Commuter rail expansion: Other commuter rail projects under consideration at the MBTA include the reinstatement of the Greenbush commuter rail line (\$500–\$600 million), the extension of commuter rail service to Fall River and New Bedford (\$400 million), and extensions to New Hampshire and within Rhode Island (T.F. Green Airport). The Greenbush line received final environmental certification to proceed with construction. EOTC is negotiating separate mitigation agreements with each of the South Shore communities it runs through.

Silver Line: When the MBTA removed the Washington Street elevated railway system in 1987 because of the relocation of the Orange Line to the Southwest Corridor, Washington Street was left without high-quality rail transit service. Ever since that day, there has been discussion and dissention about what type of replacement service to provide. The Number 49 bus now serves the Washington Street corridor. The MBTA is currently constructing a Bus Rapid Transit line (BRT) along Washington Street that will run from Dudley Square to Downtown Crossing. The project is estimated to cost \$54 million and use alternative fuel buses to run within a combination of reserved bus lanes and general traffic lanes. The Washington Street Coalition has been vocal in its opposition to this service and believes that light rail is the superior alternative. But many of the businesses along this route opposed light-rail service because of the amount of right-of-way required and the loss of on-street parking needed to accommodate the larger vehicles.

The other phase of this project under construction is the South Boston Piers Transitway. This federally funded transitway will run in a tunnel from South Station to the World Trade Center in South Boston. At this point the buses will run along surface streets and circulate in general traffic. The tunnel connection between Boylston and South Stations (\$700 million) is in the planning stages. Once all of the pieces of the system are put together, the Silver Line would provide a direct line from Roxbury through downtown to Logan Airport using bus rapid transit technology.¹⁵

Urban versus suburban: The MBTA is under constant pressure to expand service, but which service areas should be served? Urban residents are more likely to be transit dependent whereas many suburban communities have no

transit at all or only commuter rail service to Boston. Increased housing costs within the Boston urban area has forced many low-income residents out into the suburbs. Should existing service be increased, or should new service be instituted to help those who now reside in communities such as Framingham, Lynn or Quincy? Under the Clinton Administration the federal government and the U.S. Department of Transportation were placing a greater emphasis on environmental justice. The order requires transportation agencies to give explicit consideration to the impacts that transportation decisions have on low income and minority communities. It is unclear whether the Bush Administration will push the concept of environmental justice as hard. Organizations including Alternatives for Community and the Environment (ACE) and the Washington Street Coalition have been promoting environmental justice to prod the MBTA to spend more on urban riders, who are more likely to be minority, low income and transit dependent.

Environmental and accessibility commitments: As discussed earlier, the Central Artery environmental permitting process committed the MBTA to provide a set of new transit projects. The cost of these is in the billions. The state and the MBTA have made other environmental commitments such as agreeing to purchase only alternative fuel vehicles. The federal government requires the MBTA to move to a fully accessible transit system.

At the same time, the MBTA is faced with mounting costs for complying with the Americans for Disability Act (ADA) and environmental commitments that while they do not add expansion to the system are necessary to maintain or upgrade the existing system. The Blue Ribbon Panel estimated that the MBTA would need to spend approximately \$500 million annually on maintenance needs.¹⁶

Intercity Travel

The Northeast Corridor stretching between Boston and Washington is the nation's largest generator of travel between cities. As personal and business travel has increased throughout the Northeast Corridor, the pressure to expand the air and rail components of the system has increased. The free flow of people and goods within the corridor is important to the economic well being of the Boston region. People and companies have a range of choices for travel between the major metropolitan areas. The variables that go into the decision making process involve trade offs among time, cost, safety and reliability.

The most popular means of travel along the northeast corridor remains the automobile. The car offers the greatest flexibility, a low marginal cost per

trip, and convenience. But travel by automobile can be time consuming for trips longer than 100 or 150 miles. Other land-based alternatives include private intercity bus and the train. For long distances or time-sensitive travel, the airplane is the mode of choice. Nationwide, approximately 80 percent of intercity miles traveled are by auto, 18 percent by air, and 2 percent for bus and rail.¹⁷

The terrorist attacks of September 11, 2001 have affected at least two of those variables: time and safety. Added security measures have increased the amount of time needed to navigate within the airport. Airlines have recently suggested that passengers arrive two hours early for domestic flights. The safety procedures at airports have become the focus of a national and regional debate, with reports of travelers carrying weapons walking past security checkpoints at Logan Airport. Massport's executive director resigned and the director of security was reassigned in the aftermath of the security breaches. In the first month after the terrorist attacks, the volume of passengers traveling declined by approximately 30 percent. It is unknown what the longterm effects will be. But the additional time required for a door-to-door trip by air may provide a boost for Amtrak's Acela service within the Northeast.

Beginning in December 2000, Amtrak began service on its new Acela train, the nation's only high-speed passenger train service, between Boston and Washington, D.C. The Acela project included the electrification and upgrading of the tracks from New Haven to Boston and the purchase of new train sets that take advantages of tilt technology advancements that allow the train to travel faster on curves to increase its average speed. By the end of 2001, Amtrak will be providing 10 daily round trips on its new Acela train. In its first six months of operation, Acela carried a total of 130,000 passengers along the Washington to Boston corridor. So far the service has been experiencing growing pains. The on-time performance of the trains have suffered because of delays due to the aging infrastructure between New Haven and Penn Station.

According to Amtrak's acting chairman, Michael Dukakis, Acela offers a convenient alternative to air travel to New York and other cities because of its downtown connections and more spacious and comfortable cars. With speeds reaching a maximum of 150 miles per hour—but averaging only 60 miles an hour door to door—Amtrak hopes to lure business people who are bothered by the persistent delays and cramped trips on airlines.

On the national scene, the U.S. Congress is debating the merits of funding additional high-speed corridors across the United States. In a separate action in 1997, Congress mandated that Amtrak break even on its operations

or face liquidation by the year 2003. There is strong sentiment among the Republican Party that Amtrak should be disbanded and given over to private operators who will operate service with the aid of state funding.

A low-cost alternative to Amtrak is bus. Private carriers such as Greyhound and Peter Pan provide frequent service to other major cities in the Northeast, including New York, Philadelphia, Montreal, and Washington. Throughout most of the day, express or direct bus service is available every 15 minutes between Boston-South Station and New York City. A trip between Boston and New York takes approximately four hours, comparable with regular Amtrak service, but only costs \$35. To provide a centralized location for intercity private bus carriers, the MBTA opened a new bus terminal adjacent to the South Station rail terminal in 1995. The bus terminal serves approximately 12,000 people daily.

While improvements have been made to Amtrak's Northeast Corridor and private carrier buses provide frequent service, the private automobile is still the dominant mode of travel for short-haul trips (less than 400 miles). According to the Eno Foundation, auto trips make up 80 percent of all intercity passenger miles. The automobile provides flexibility, low marginal cost, and direct access to the destination. To improve traffic flow, the Coalition of Northeast States has designed standards for electronic fare collection systems. The Mass Turnpike's electronic toll collection system, FastPass, is interoperable with the other toll facilities within the Northeastern states. Now a traveler is able to pass through toll facilities throughout much of the East Coast without having to stop to pay tolls, thereby reducing travel time and congestion. The FastPass can also be used at the MBTA Route 128 train station to pay for parking.

While the auto is suitable for short distances, travelers who need to get to a destination quickly often choose air travel. In 1999, some 42 million passengers used New England airports to travel. Logan Airport is the dominant airport in New England, carrying 27 million of those passengers. This represents 63 percent of the total number of passengers at New England airports.

But the dynamic of the regional air travel is changing. The introduction of low-cost airlines servicing T.F. Green Airport in Providence and Manchester Airport in New Hampshire has increased the choice for consumers within the Boston region. From 1996 to 1999, there was a 22 percent increase in passenger activity in New England airports overall. During that time, Logan saw an increase of only 8 percent, while both Green and Manchester increased by over 100 percent. In 1999, T.F. Green Airport handled 5.1 million passengers and Manchester handled 2.8 million.

Even with this diversion of passengers to other New England airports, Logan remains congested. In 2000, Logan was ranked the sixth worst airport

in the nation for total delays. The Logan Airside Improvements Final Environment Impact Report (FEIR) stated that Logan Airport experienced approximately 142,000 hours of delay in 1998. Of those, approximately 120,000 were runway-related and 22,000 hours of delay were taxiway-related.¹⁸ The airport currently has five runways. Because aircraft have to take off and land into the wind, the weather plays an important part in the operation of the airport. Logan is especially vulnerable when the wind is out of the northwest. When the weather is favorable, three runways operate at one time with a capacity of 120 flight operations per hour. During periods of northwest winds, the airport is reduced to one or two runways; 90 flights occur hourly with two active runways and 60 flights occur hourly with one active runway.

Massport has responded to bottlenecks in air travel with a number of “airside” improvement proposals—including the construction of a new runway. Massport projects these improvements will result in an annual decrease of 105,000 to 160,000 hours of delay by 2010, depending on the future volume of passenger traffic. Runway 14/32—a 5,000-foot slab of concrete that directs takeoffs and landings over Boston Harbor—is the most contentious strategy. In order to build the runway, Massport will have to have a 25-year old court order rescinded by the judiciary. The three recent Republican Governors—Weld, Cellucci and Swift—have all supported the new runway. The mayors of Boston, Somerville, Cambridge, Everett and Revere all oppose it on the grounds that urban residents will bear the brunt of the noise and pollution from the aircraft. During the Dukakis administration, construction at the Bird Island Flats area of the airport included the building of a Hyatt Hotel that restricted the ability of aircraft to perform takeoffs and landings over land. The Administrator of the Federal Aviation Administration, Jane Garvey, has authority to decide whether Logan will get the new runway; she is a former director of aviation at Massport and Commissioner of Public Works. Critics say that because the runway is short it will have modest impact on delays because commuter jets will not be able to use it.

“Peak period pricing”—which increases the landing fees imposed on carriers during the airport’s busiest times—offers perhaps the most strategic approach to controlling traffic at Logan Airport. By charging more for busy times, peak pricing would give small aircraft incentives for flying less at less congested times. Only 57 percent of all aircraft operations flying in and out of Logan Airport are jets; the rest are general aviation aircraft or small commuter planes. In 1999, there were more flight departures to the Cape and the Islands (12,500) than to any other airport in the country. At one point in 1990, Massport introduced peak pricing at Logan Airport; within months, Logan improved its position from 18th to second nationally in on-time arrivals and departures. But the FAA refused to authorize its continued use

based on a set of technicalities. Three very powerful groups oppose peak period pricing. These include the general aviation community composed of private pilots who usually own their own plane, the commuter air carriers who service smaller communities within New England, and the elected representatives from those small communities.

In June 2001, Massachusetts Environmental Affairs Secretary Robert Durand ordered Massport to use peak pricing or some other demand-control policy to reduce air traffic congestion at Logan Airport.

Freight Transportation Systems

An old adage of the shipping industry is that freight does not vote, so it is rarely paid much attention in debates about economic development or transportation policy. Anne Aylward, former director of the Port of Boston, jokes that most people believe goods arrive on store shelves as “the Immaculate Conception of Cheerios.” The Port of Boston played a major role in the development of Boston. The port was an economic engine providing jobs and creating wealth related to the import and export of raw materials and finished goods. At the beginning of the 21st century, the health of the port is in question and the shipment of goods is a much smaller part of the overall economy of the region.

The Port of Boston is the largest port in New England, handling over 17 metric tons of cargo in 1999.¹⁹ Its major activities include the import of oil and gas products, containerized cargo and other bulk cargo (automobiles, salt, sand and building materials). Petroleum products represent 88 percent of the volume of cargo handled. The major categories of petroleum products include gasoline, home heating oil, and natural gas. In addition the port handled 80,000 automobile imports (mostly Volkswagens) and 158,000 intermodal containers. The port imports far more goods than it exports, with over 90 percent of bulk cargo being imported and only 10 percent exported.

The port's natural features include a deep-water harbor, direct access to the open ocean and a safe harbor from storms. These traits were critical in its rise to prominence during the seventeenth through nineteenth centuries but are less of a competitive advantage in the twenty-first century. The competition faced by Boston from the Port of New York and New Jersey to the south and the Port of Halifax to the north is formidable. The Port of New York and New Jersey serves the largest metropolitan area in the country and is a major intermodal transportation center with all of the major shipping companies calling there. The Port of Halifax has a natural deep water port, direct on-dock double stack rail access and is one shipping day closer to the major ports of Northern Europe.

The growing dominance of the containerized freight system poses the greatest threat to Boston's port. Boston lacks the channel depth and land-side train connections to become a major player in containerized cargo ships. Most freight is now shipped in containers that can be directly transported from a ship onto a tractor-trailer truck or railroad flatbed car for delivery to its final destination. A wide spectrum of goods—clothing, electronics, appliances, building materials, perishable foods—arrive in these containers. Major shipping companies increasingly rely upon larger container ships that call at a fewer number of ports.

Boston is less and less competitive because of the channel depth required to handle the bigger container ships. The newest ships, dubbed post-Panamax because they are too large to fit through the Panama Canal, are capable of carrying over 8,000 container units at a time and require a port water depth of at least 45 feet. Because of their size, these ships are only able to call at a few dozen ports throughout the world. In 2000, Massport completed a major dredging project within the harbor, but this project only brought the main shipping channel and Conley and Moran Terminals to a depth of 40 feet.

The other major constraint is the lack of either on-dock rail service or double-stack capability. For the rail industry the most efficient means to transport containerized cargo is by the use of double-stack rail cars, which hold two containers, one on top of the other. Even one bridge obstacle between the beginning and end of the route is enough to prevent the use of double-stack rail. The preferred national standard for double-stack rail clearance is 22 feet and 6 inches and a minimum of 20 feet and 8 inches. At present, the operation of double-stack rail is not possible east of Worcester on the CSX main line or south of Ayer on the Guilford line because of a series of low clearance bridges along the rail corridors. Because of this, freight that has traveled on double-stack trains across the country have to be broken down and repositioned on single-stack trains before entering the Boston area.

In 1996, Governor William Weld proposed a joint \$200-million capital program to rebuild the bridges along the Conrail main line to bring double-stack capabilities all the way to Beacon Yards in Allston. The proposal was stillborn in part because Boston's port has no strong market potential and in part because it was perceived to assist one mode at the expense of others. The breakup and sale of Conrail to CSX and Norfolk Southern railroads also complicated the policy discussions.

The inability to fully utilize rail for the shipment of goods means that there is a greater reliance on trucks for the movement of goods. Every one of the approximately 158,000 water-borne containers shipped through the Port

of Boston must be transported by truck due to the lack of on-dock rail facilities. The reliance on trucks for cargo puts strain on the highway system—and even some local roads—throughout the metropolitan area.

The freight market within Greater Boston is compact. Approximately 95 percent of all the freight shipped through the Port of Boston has a final destination within 75 miles of the port. By contrast, Halifax, with a deep-water port, has strong rail connections to the whole Midwest market. Because Boston is located between New York and Halifax, the two largest shipping ports on the east coast, shippers do not find Boston an attractive point of entry for goods to be delivered throughout the northern part of the continent. Greater Boston's infrastructure is old and poorly equipped to handle double-stack rail shipments. The region also does not manufacture a high volume of goods for export. Finally, the bulk of the cargo is gasoline and home heating oil destined for consumption within the local market.

Another major issue facing the Boston region is the uncertain future of Beacon Yards, located in Boston's Allston neighborhood, as an intermodal freight facility. The site is operated by CSX, one of the two remaining East Coast major rail companies. In 2000, the Massachusetts Turnpike Authority sold a portion of the land adjacent to Beacon Yards to Harvard University. This land is currently used as a transfer facility for freight moving between the port and Beacon Yards. The conversion of this land from freight handling to university development would further constrain the ability of the Port of Boston or CSX's Beacon Yard Intermodal rail terminal to compete in the future.

One infrequently noted issue in recent discussions of Boston's potential as a port is the Jones Act, which requires all ships used to transport cargo and passengers between U.S. ports to be owned by American citizens, built in American shipyards, and operated by American crews. The Jones Act, passed in 1920, limits the number and kind of ships that can move about American ports and raises prices for shipping. Halifax is free of the restraints of the Jones Act and therefore has more competitive fees for moving goods.

With the terrorist attacks on America on September 11, 2001, security surrounding dangerous materials has become a major issue for transportation in Greater Boston. Mayor Thomas Menino of Boston and other municipal officials sought to block the shipment of 33 million gallons of liquefied natural gas into Boston Harbor. Menino said that the city and state were ill equipped to deal with the catastrophe that would result from a terrorist attack, but Director of Homeland Security Thomas Ridge and U.S. District Court Judge Reginald C. Lindsay refused to halt the shipment.

Key Transportation Actors in Greater Boston

In what might be understood as a corollary of Thomas P. O'Neill Jr.'s adage that "all politics is local," a Washington, D.C., adage states that there are no Republican or Democratic roadway projects on Capitol Hill. All projects are bipartisan, appreciated on both sides of the aisle regardless of fiscal philosophy. The saying applies to Massachusetts, which sends an all-Democratic delegation to Washington, a city controlled by the Republicans in the executive branch and the House of Representatives.

Over the past five years, the federal government has provided an average of \$750 million annually to Massachusetts for highways and transit. The bulk of this money comes from Federal Highway Administration (FHWA) to support the road and bridge program, which in turn has been used to support the construction of the Central Artery project.

Once the congressional delegation brings home the bacon, transportation infrastructure decisions in the Boston region are dominated by the political world of the State House. Unique among the major industrial states, the city of Boston is both the state capital and the largest city, so the rivalry between the big city and the state capital does not take the same form that it does in New York or Illinois. Boston-area politicians—including governors like Michael Dukakis and William Weld and legislative leaders like Thomas Birmingham and Thomas Finneran—have traditionally dominated the leadership of the state legislature and the governor's office. Just as important, Massachusetts does not have a strong Republican Party presence in the suburbs and rural areas, giving Boston-area voices more sway in leadership and policy debates.

Amtrak, created by Congress in 1971 to operate and maintain a national system of intercity passenger rail in the nation, has been the focus of much controversy in recent years. The quasi-public corporation runs large deficits every year and a national reform council has proposed that it be disbanded or reorganized. Amtrak's operations are supposed to be self-supporting by 2002 but, if it continues in its present form, it will still rely on Congressional authority to issue bonds for its capital needs.

The state legislature exerts its influence through its use of the purse. On average, it passes a Transportation Bond Bills once every two years. These bond bills allow for the long-term capital borrowing needed to construct the major highway and transit projects across the state and region. Within these bills, the legislature is able to earmark money for certain projects and to demonstrate its priorities for which projects should get funded. The leadership of the state Senate and House exert powerful control over what projects

get authorized, using pet projects as chits and rewards in negotiations with other legislative leaders.

The projects the legislature authorizes, however, do not always get the appropriations they need to become reality. The legislature usually approves about five times as much capital spending bills than the state will fund by selling bonds. To protect its bond rating, the Commonwealth has set an annual bonding ceiling of \$1.2 billion for all of its capital needs. The Governor relies on the Executive Office of Administration and Finance (A&F) to determine the appropriate amount of bond money to be made available for the state's competing capital needs. Transportation competes against other capital projects, such as new courthouses, schools, and open spaces. Over the past decade, transportation has received over 50 percent of the money appropriated under the bond cap.

The Governor appoints a cabinet-level Secretary of Transportation and Construction, who presides as Chairman of the MBTA. The Executive Office of Transportation and Construction provides the overall policy guidance to the state agencies and authorities. The Secretary has more direct control over MassHighway and the MBTA and less so over the independent authorities of Massport and MassPike.

While formally independent, the authorities operate under the political influence of the Governor. Recent examples of this were Governor A. Paul Cellucci's public firing of Massport Director Peter Blute in 1999 and Turnpike Chairman James Kerasiotas in 2000, and Governor Jane Swift's reassignment of Massport personnel in the wake of the airplane hijackings from Logan Airport in September 2001. This power is the responsibility of each agency's board of directors but in both cases the boards followed in lock step with the Governor's wishes. The top managers for the transportation agencies are usually drawn from the political world of state government rather than career transportation managers. In recent years the two most public transportation secretaries were Fred Salvucci and Kerasiotis. Salvucci was the prototypical visionary, planner and consensus-builder, while Kerasiotis was the aggressive project administrator.

The independent authorities of the MBTA, Massport and MassTurnpike were created by the legislature to operate a specific portion of the transportation system. Massport and the Massachusetts Turnpike Authority are self-financing and tend to have more independence than the MBTA, which receives subsidies from the state legislature and state revenue sources like the sales tax.

Lesser state transportation actors include the Metropolitan District Commission (MDC) and the Massachusetts Aeronautics Commission

(MAC). The MDC, created in 1893 and now operated under the authority of the Executive Office of Environmental Affairs, owns and operates parkways and bridges in the metropolitan Boston area. Most of these roadways were originally constructed in the 1930 through 1960s. The MDC operates on a small annual appropriations budget. For the past decade it has operated under the constant threat of legislative extinction with its roadway responsibilities being given to the MassHighway Department. The MAC oversees aviation activities for the 27 smaller regional airports across the Commonwealth. Municipal airports in the Boston region are located in Plymouth, Norwood, Stow, Beverly and Norfolk.

At the local level, 101 cities and towns make up the Boston Metropolitan Planning Organization area. Because of a tradition of strong local control over zoning and the absence of regional or even sub-regional cooperation, the cities and towns operate mostly as separate units. This lack of cooperation and the absence of a direct funding source for transportation infrastructure means that the communities are in many cases at the mercy of the state decision makers when it comes to which projects to fund and which to defer.

The Mayor of Boston is able to use his influence in determining policy by virtue of the city's importance to the region. But some decisions such as the construction of a new runway at Logan Airport are being pursued by agencies in spite of the vocal opposition of the Mayor's office. The Boston Redevelopment Authority was created during the heyday of urban renewal to help guide the economic development of the city. While the agency possesses many technical skills, the Mayor exerts great control over the agency through his appointment of board members. Because of members' staggered terms, the board could be a more independent voice when there is turnover in the Office of the Mayor. The BRA's transportation planning is limited to specific projects. The Boston Transportation Department is responsible for citywide transportation planning.

The federal government provides funding and oversight to the state but does not play an active ongoing role in the day-to-day decision making process for which projects should be built. In response to concerns about the total cost of the Central Artery project and at the request of Congress, FHWA imposed a cap of \$8.55 billion of federal funds that could be used for the project. The rest will have to come from the state in direct appropriations and a mix of tolls and user fees. But in some ways this is a meaningless cap since there is no line item allocation of federal highway money for the Central Artery project.

The region's major transportation decisions are made by public processes, but many times are in response to public interest and private sector pressures.

The environmental lobby has been an active participant in forcing state commitments in association with major construction projects. Public activism has played a large role in the decision-making process since the protests against Logan Airport by East Boston residents in the 1960s and the anti-highway activists protesting the construction of the Inner Belt and associated interstates in the 1970s. In 1997, the U.S. Department of Transportation issued orders requiring the evaluation of “environmental justice” in the transportation decision-making process. The proposed expansion of Logan Airport and the construction of the Greenbush Commuter Rail Line have both met with outspoken public opponents that have forced years of environmental review and comment. The motives of these movements tend to be mixed—not only concern for the environment, but also the standard NIMBY pressures in communities that oppose any new investment or development.

Greater Boston does not have a broad public-interest lobbying group for transportation issues like New York’s Straphangers organization. But a number of organizations play a powerful role in public processes and legal action. The Conservation Law Foundation (CLF) has played an instrumental part in securing “mitigation” benefits for public transportation as part of the Central Artery project. The CLF also has been one of the major forces pressing for smart growth in the region. The CLF has produced a number of how-to kits to promote the development of transit-oriented development. Alternatives for Community and Environment has pushed for better transit service in the inner city as part of its campaign for environmental justice. Most activism, however, has been episodic. A small band of trolley supporters has pushed for restoration of service along the Green Line’s E trunk in Boston’s Jamaica Plain neighborhood from Heath Street to Forest Hills. Another group has worked with the Metropolitan District Commission to control the traffic along the Arborway in Jamaica Plain. A coalition of neighborhood groups has lobbied to control bus activity near Boston’s North End, where tour buses often idle while tourists visit historic sites.

In 2000, a private company began an experiment in Greater Boston that could alter behavior among residents and workers in select neighborhoods. Zipcar, a for-profit company, offers short-term car rentals to people who use the car sparingly but wish access to cars for emergencies, shopping, and special occasions. If it catches on—and early indications are that it has in Boston, Brookline, and Cambridge—the concept of car-sharing could cause some households to either sell their car or cut back from two cars to one. Developers around the region have expressed interest in integrating Zipcar spaces into their designs. If urban centers are designed to accommodate car-sharing, the congestion in neighborhoods like Jamaica Plain could

be reoriented to emphasize public transit once again. Where the “tipping point” for car-sharing lies, no one knows, but it is too limited to have any major effect on transportation options even at the neighborhood level.

Major Policy Options for the Region

For the better part of a generation, the Central Artery has been the subject of major debates about the future of transportation in the region. Since it was constructed, the elevated highway has produced massive traffic congestion, damaged Boston’s urban fabric, and eventually produced the lengthy and expensive Big Dig project. But within five years, the Central Artery will be gone and the region will have the opportunity to think anew about its options for transportation policy.

The Big Dig has consumed 71 percent of all federal highway funding for the state over the past decade and has also consumed a large portion of the state’s bonding cap. But now that the Central Artery is nearing completion, it is a good time for the region to debate where the focus for transportation infrastructure should turn. A major policy debate for the Boston region is how much mobility to provide for people and businesses, and at what cost. Congestion continues to grow on the roads, in the subways and at the airports. How should the region respond with its investment decisions?

During the past decade there has been precious little federal or state money for the regular maintenance of the existing roadway system. For fiscal year 2002, the Boston MPO programmed \$1.41 billion in federal and state money for the Central Artery and \$115.7 million for the rest of the road and bridge program for the region.²⁰ Because of the large amounts of capital resources applied to the Central Artery, the region will now need to focus on how much money should the state put towards maintenance and how much to expansion projects.

Future roadway improvements or expansions probably will be at the margins or restoring facilities to a state of good repair. Because of the financial and environmental costs, it will be extremely difficult to construct new additions to the roadway system. Many individual communities are grappling with this as roadway improvement projects come under design. The main problem comes from the fact that there are numerous competing interests at play. The national highway association, AASHTO, sets standards with safety and speed as its top priorities. But these standards are often at odds with the reality of the types of roads built a century ago that dominate the New England landscape. According to AASHTO the safest road is one that has 12-foot travel lanes, a five-foot bicycle corridor, sidewalks, and no curves in the layout. There are not many roads in the Boston region that

meet this standard. In response to concerns from local communities, MassHighway has recently instituted a task force of state and local officials to explore this issue and provide better guidance. That task force's work bears watching.

The state will continue to wrestle with the appropriate goals and standards to follow in modernizing its highway system. If safety is the primary factor and national standards are followed then roadways will be widened to allow for wider travel lanes, shoulders and space for bicycle paths and sidewalks. But an ever-expanding roadway means encroachment onto those qualities that make the Boston area special. Trees will be cut down, winding roads may be straightened and the sense of space and balance as one travels through an historic town center may be thrown off.

Congestion is another difficult subject for debate. Activists and leaders in some communities, like Cambridge, do not think that slow-moving traffic is necessarily a bad thing. The Cambridge Department of Community Development has established a formal goal of slowing traffic along its streets. The city employs a number of measures to "calm" traffic, including reducing the number of travel lanes, installing textured surfaces and bulb-like sidewalks, and reducing speed limits. Cambridge also sought to ban all trucks driving through the city during the night-time hours.

Cambridge's traffic activism poses the classic dilemma for a state composed of small, independent-minded communities. When one community adopts strong measures to direct traffic outside its neighborhoods, nearby cities and towns often suffer the consequences. When Cambridge instituted its night-time truck ban, the communities of Somerville and Arlington were ready to go to court to overturn the ban. Only the intervention of Attorney General Thomas Reilly prevented legal action. One way to deal with congestion is to better manage the existing assets of the transportation network. In the case of the roads, this could mean using highway money to pay for park-and-ride lots, or implement intelligent transportation strategies to give the public more information so that they can make alternative decisions, or implementing services that can respond to and clear accidents quickly. Should the state and the region make a larger commitment to non-traditional measures with increased funding? Should it do this at the expense of routine maintenance and repair? Recent Massachusetts examples include the introduction of the reversible HOV lane on the Southeast Expressway and the implementation of the FastPass system on the Turnpike.

Another strategy to relieve roadway congestion is to reduce the number of automobile trips by shifting people onto transit. In the high employment centers of downtown Boston the transit and walk percentage of all trips is over 60 percent. But even with the billions of dollars spent over the past two

decades to upgrade and expand the transit network, only 6 percent of all the trips in the region are made by transit.²¹

The policy choices dealing with transit may be even more difficult than those involving the roadways. The question about the proper provision of transit service for the urban versus suburban resident exists with each decision to fund certain projects and defer others. At least all the suburban communities have roads and access to the highway network. The reach of transit grows more limited in scope the farther one travels from Boston. It is expected that the 2000 U.S. Census will show an increasing number of minority and low-income families in the suburbs. Workers and families living in the suburbs without cars suffer a severe estrangement from the region's economic and social opportunities.

Because the operating and capital funding of the MBTA has historically been subject to legislative approval, it has always been important for the MBTA to preserve its coalition of urban and suburban users by providing new projects or expanded service to both constituencies. The state legislature has traditionally been dominated by representatives from Greater Boston who have fought for Boston-area projects. In the past the legislature made sure that the suburban residents got their commuter rail extensions while the majority of the money continued to be expended on the urban core. Now that the legislature has given the MBTA its own funding source and its own budget power, it will be interesting to see how much influence the legislature continues to exert. Dennis DeZoglio, Director of Planning for the MBTA, noted that it took the legislature only 29 days after the institution of forward funding before it directed the MBTA to perform work on the Ashmont Red Line stations.

This struggle between cities and suburbs extends to the commuter rail division. One dilemma concerns the relative merits of extending commuter rail service to the South Shore or Fall River/New Bedford as opposed to building additional commuter rail stops within the urban core. As Somerville works to redevelop the Assembly Square area, improved transit connections have emerged as a key to the success of the redevelopment. A new commuter rail stop and Orange Line station at Assembly Square could bring shoppers to the area without worsening the congestion of the area. Residents of the Mattapan area of Boston wonder why the Readville commuter rail line passes through their neighborhoods but provides inadequate service for the residents. This line provides service from the southwest to South Station but its schedule is geared for commuters and carries almost no local, urban traffic.

An MBTA Blue Ribbon Panel appointed by former Governor A. Paul Cellucci recommended allocating 70 percent of the capital program to maintenance of the existing system. The Boston Metropolitan Planning

Organization (MPO) estimated that the MBTA will have approximately \$8 billion for the capital program over the next twenty-five years.²² This figure does not include any specially designated Federal Transit Administration (FTA) money dedicated to new transit service. This federal money, “New Starts,” funds about 50 percent of new transit programs—but the Massachusetts share of this money is uncertain, since the Commonwealth must compete with other states and there is a long queue of projects under consideration. Working within these constraints, the T would have approximately \$2.5 billion to spend on new projects, after reserving money for the maintenance of the system. It is crucial that the MBTA use this money wisely even if it means rethinking previous transit expansion commitments.

The state already has committed to construct a number of new transit facilities during this period to meet its legal environmental commitments under the Central Artery project. These include the Greenbush commuter rail line, reinstatement of the Arborway Green Line service, extension of the Green Line to Medford Hillside and a Blue/Red Lines connector. These projects in conjunction with the three Silver Line projects would use all of the available MBTA capital until the year 2016. Because of this the state and region should reexamine these 10-year-old environmental commitments. The Greenbush line has faced vocal local opposition from those residents opposed to the reinstatement of train service. The latest plan for the Greenbush line would cost at least \$410 million while serving approximately 3,200 riders per day. Of those 3,200 only 1,700 would be new transit riders.²³ The remaining would be people who transferred from one of the other Old Colony lines, the ferry boat or the Red Line. The costs for the line have escalated as the communities involved, most notably Hingham and Weymouth, have extracted concessions from the MBTA. It might be time to recognize that the result is not worth the cost.

The Blue/Red connector would provide a connection from Bowdoin Station, near Government Center, to Charles Street Station and would provide a direct connection between these two transit lines. The main objective of the \$220-million project, creating a one-seat transfer from the Red Line to Logan Airport, is being achieved by the Silver Line extension to the airport. While it might be desirable to link the Blue and Red Lines, it might make more sense from a policy standpoint to invest money in improvements to the urban bus system instead.

Most experts and activists consider restoration of the Green Line’s E trunk to be all but impossible. EOTC has already submitted a request to EOEA to provide enhanced bus service along the Arborway line instead of Green Line service. Tracks along South Huntington Avenue have been paved

over. Businesses along the Centre Street portion of the line in Jamaica Plain, concerned about traffic congestion and a loss of parking spaces for businesses, have objected vigorously to the trolley restoration. In November 2001, the Massachusetts Executive Office of Environmental Affairs ruled that Arborway line restoration is feasible and that the Executive Office of Transportation and Construction must restore the service.

In 1996, Governor Weld pledged that the MBTA would not purchase any additional diesel fuel buses for its service fleet in response to environmental concerns about the health effects of diesel buses. Since that time the MBTA has been exploring alternative fuel vehicles and has recently placed an order for 100 CNG 40-foot buses. The new CNG buses will require the construction of a new set of infrastructure and cost \$400,000 each. This is a \$100,000 premium over a new 40-foot diesel bus. It is possible that the MBTA will not be able to replace its aging fleet of 1,000 buses as quickly as it would have if it purchased clean-fuel diesel buses. This policy decision may add as much as \$100 million to the cost of replacing the entire fleet. This does not include the tens of millions of dollars in infrastructure costs involved in upgrading every bus facility to handle alternative fuels.

Two large capital projects that have not been allocated capital funds are the North-South Rail Link and the Urban Ring. In many ways these two projects are in competition with each other. Each could cost over \$1 billion, much of it in federal money. But both would provide a number of similar benefits—relieving the problem of excess ridership at certain key points of the subway system and providing a better distribution of riders.

At the same time, the communities of Fall River and New Bedford are strongly lobbying for the extension of commuter rail service to their communities. The political leadership from Southeastern Massachusetts see it as an economic issue. A direct connection between their cities and Boston would help provide the stimulus for additional jobs and housing to a region that has suffered an economic decline with the loss of the manufacturing and fishing industries over the past three decades. They also argue that it is the last remaining segment of Eastern Massachusetts without commuter rail.

While the MBTA faces demands from a number of communities and interest groups for expanded service, it lacks the capital capacity to meet those demands. Massport, on the other hand, has the capital capacity to expand at Logan or Hanscom Airports but has vocal opponents for expansion.

Recent years have seen the institution of high-speed rail to New York City and beyond and the emergence of regional airports in Rhode Island and New Hampshire with low cost carriers providing national service. But these

actions have not decreased the demand for air travel at Logan, but merely slowed the increase in demand. Massport argues that Logan is an economic engine for the Boston region and it must add an additional runway along with other operational improvements to properly serve the region's needs.

Boston's Mayor Thomas M. Menino and Congressman Michael Capuano, among others, have voiced opposition to any expansion plans and believe that the environmental quality of the urban neighborhoods should trump the needs of air travel. This battle over airport expansion is not isolated to Boston. Chicago, San Francisco and New York City are all in the process of trying to expand airport runway capacity. All of the proposals have met opposition from surrounding communities.

Over 20 percent of all the flights from Logan are bound for the New York/Washington corridor. It is expected that over the coming years, Amtrak's Acela service will be able divert a portion of this demand from the air to rail. But at the same time Congress has demanded that Amtrak begin operational sufficiency by 2003. Amtrak is depending upon the Acela to provide enough revenue to help it achieve profitability but it will still depend upon Congress for its capital needs during a time when federal dollars are harder to come by and political support for Amtrak is lukewarm at best. The recent terrorist attacks in New York and Washington using airplanes might very well spur Congress to increase its support of a national rail system.

Experts and political figures agree that Massachusetts and other north-eastern states need to develop a regional strategy for improving intercity travel options. The state's three recent Republican governors, most recently Jane M. Swift, have been strong proponents of the Logan expansion but were blocked by the late Congressman J. Joseph Moakley of South Boston and other opponents. The MBTA has initiated discussions with the state of Rhode Island to extend the commuter rail to T.F. Green Airport outside Providence. Massport also is exploring the options of providing bus service from its Logan Express Centers to the other regional airports. Massport's fiscal capacity has been in question since the 2001 terrorist attacks in the U.S. and it is unclear whether the authority will be able to fund major new initiatives such as regional airport linkages.

Massport has not pursued a peak-period pricing approach at Logan Airport since the waning days of the Dukakis Administration. The brief experimentation with this concept, which used a cost allocation strategy, was overturned by the FAA. The Weld Administration, under pressure from small plane operators from Cape Cod and New Hampshire, did not seek to address the legal issues to make the strategy legally viable. Peak-pricing would provide financial incentives to shift air travel to non-peak hours and other air-

ports. Small aircraft made a total of 38,000 flights in and out of Logan in 2000, about 8 percent of all aircraft operations. These flights averaged 3.2 passengers per plane versus 55 for commercial flights.²⁴

Most transportation policy debate focuses on the challenge of transporting people to jobs, school, recreation, and other destinations. But freight transportation poses several pressing issues. As the cost of shipping goods increases due to an inefficient transportation network, that cost gets passed onto the consumer and makes the Boston region a more expensive place to live. It also drives importers and exporters away from Boston's ports.

The Mass Turnpike's decision to sell its land adjacent to Beacon Yards to Harvard University evoked little opposition. But that act may foreshadow the end of Beacon Yards as an intermodal freight terminal and decrease the ability of the Port of Boston to compete as a viable freight port. Transportation policymakers often state their desire to increase the volume of freight shipped by rail, but that requires a viable intermodal terminal and the infrastructure to handle the distribution of the freight. A \$200-million bond bill, which would share the cost of upgrading freight lines in Massachusetts, languished in 1996 with the sale of Conrail. The issue has not been championed since then.

Few people love trucks driving down their street, but many love the fact that UPS will deliver a package to their door from across the country overnight. In response to a Cambridge night-time truck ban, the Metropolitan Area Planning Council oversaw a regional truck study, which offered recommendations for improving truck movements while reducing the impacts upon neighborhoods. Several of the recommendations were rejected by the operating agencies because it meant changing the character of certain of its roads. One of the recommendations was to allow limited truck access along a stretch of Alewife Brook Parkway from Massachusetts Avenue to Broadway in Somerville. The MDC, who operates this road, has strenuously objected. The town of Arlington rejected the proposal to include Broadway as part of the regional truck network.

The Boston area is almost totally dependent upon the Port of Boston for its supply of oil. But the main oil terminals along the Chelsea Creek and Mystic River pose navigational constraints on modern oil tankers. Many of these tankers must transfer oil to barges in the harbor in order to reach its final destination, which adds to delivery costs and, ultimately, the cost of the product. These oil terminal facilities are inadequate and should probably be replaced, but finding new sites could prove impossible. Such facilities must be located on the waterfront, but they pose environmental hazards that no community would welcome.

Even if there could be an agreement on the list of infrastructure improvements necessary there is the question of whether the region can afford to pay for it.

Toward a New Vision for Regional Transportation

Transportation poses perhaps the most difficult set of issues for regional planning and development. The parameters of growth are set by the region's network of roads, bridges and tunnels, transit and commuter rail lines, bus routes, and air and water ports. But while it is true that major transportation projects like Boston's old streetcars, interstate highways, and airports can drive development—"If you build it, they will come"—it is not always the case that the transportation networks determine where people live and work.

At a recent discussion of transportation issues at the John F. Kennedy School of Government, many experts and activists agreed that Greater Boston needs a comprehensive study of all aspects of the transportation system. Not since Governor Francis Sargent's Boston Transportation Planning Review in the early 1970s has such an analysis been conducted. But several participants urged caution. The Sargent-era study was necessary because of a major political crisis, when community activists were protesting plans for a major new highway. Replicating that sense of urgency might be impossible. Even if that urgency existed, it would also require bold leadership and a willingness to accept conclusions that might be contrary to established political agendas.

In the absence of a crisis and a comprehensive planning process, Massachusetts and Greater Boston can do much to confront difficult transportation challenges. The state already possesses powerful planning tools, like powerful authorities and strategic legislative statutes. The challenge—from the governor to local planning officials to private developers—is to marshal those tools to balance the economic and social needs. That could happen with or without a comprehensive plan.