



CHAPTER 5C

System Expansion

System expansions are projects that would extend a transit line to an area it does not currently serve, implement service on an existing line at a time of day when it is not currently provided, or change the mode of transportation operated on an existing route. The assessments of expansion projects in this chapter are divided into two groups: projects within Massachusetts and multistate projects. The latter consist mostly of commuter rail extensions crossing into New Hampshire or Rhode Island that would require cooperative capital funding agreements with those states. The North-South Rail Link in Boston is also classified as a multistate project, as it would be used by interstate passenger trains in addition to commuter trains.

The evaluation criteria used in the project assessments have been discussed in Chapter 1. The ratings for each project for each of these criteria are shown at the bottom of the assessment page for that project. A ● indicates a high rating, a ◐ indicates a medium rating, and a ○ indicates a low rating. An overall rating based on a composite of the ratings for all of the evaluation criteria appears at the top of the same page. For the overall ratings the icons meanings are as follows:

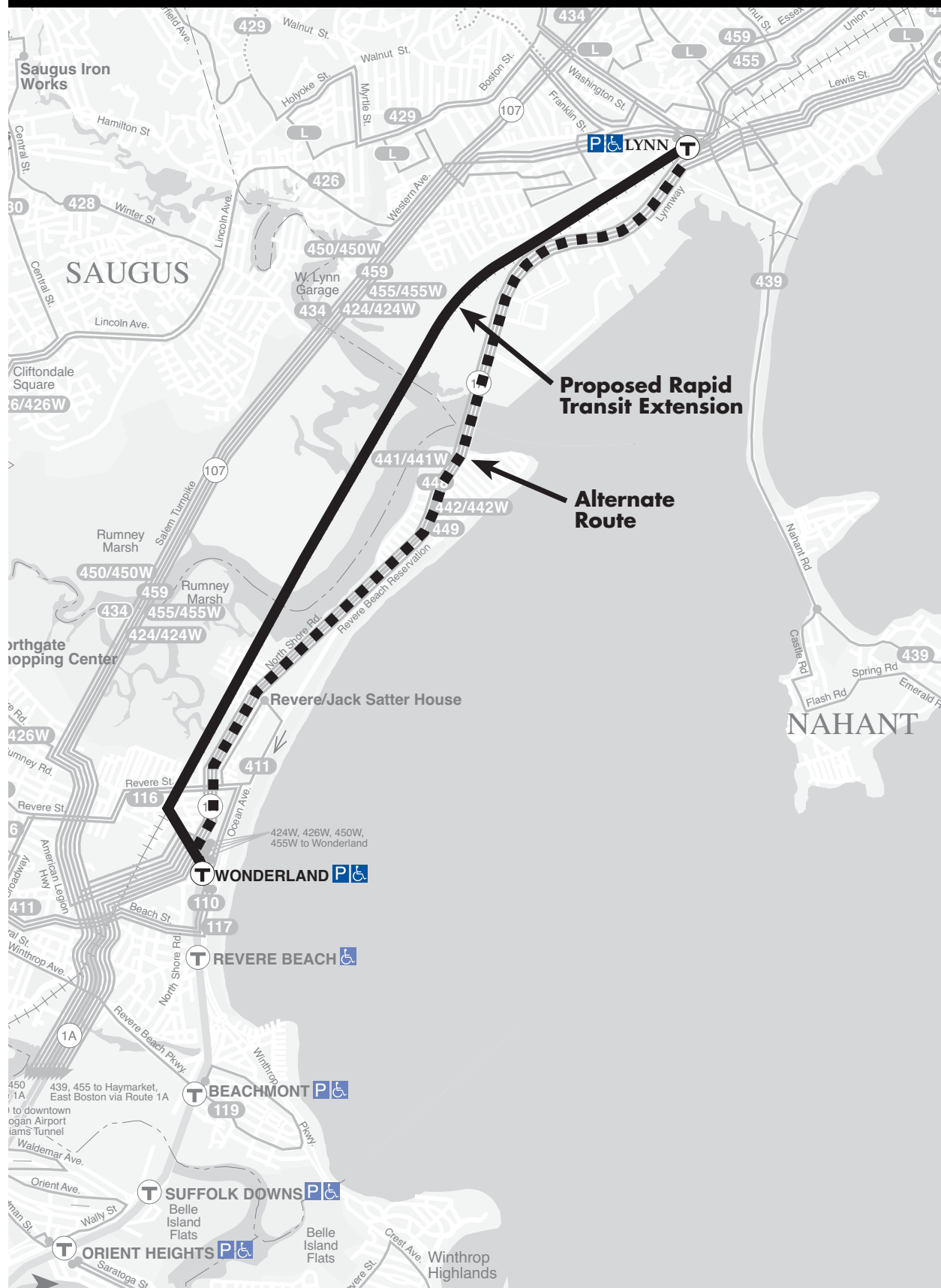
- High priority
- ◐ Medium priority
- Low priority

The individual-criteria ratings for each project were based on performance relative to other projects being evaluated within the same mode only. For this purpose, projects were divided into four modes: rapid transit (including the Red, Orange, Blue, Green, and Silver Lines, and Phase 2 and 3 Urban Ring), commuter rail, bus/trackless trolley, and boat. In combining individual-criterion ratings to produce its overall rating, a ○ was considered to be equivalent to 1/3 of a ●, and 1/2 of a ◐.

The projects within Massachusetts are presented first, followed by multistate projects. Within each of these groups, the order of presentation is from high priority to medium priority to low priority. In each priority category, projects are grouped according to the four modes described above. Key cost and ridership estimates are included with each assessment. Additional details on other quantitative indicators for each project are included in Appendix C.

Expansion Projects within Massachusetts

MAP 5C-1 EXTEND BLUE LINE FROM WONDERLAND TO LYNN





EXTEND BLUE LINE FROM WONDERLAND TO LYNN

Description

This project would extend the Blue Line rapid transit line 4.5 miles from Wonderland Station in Revere to Central Square, Lynn. The alignment would either be parallel to the Newburyport/Rockport commuter rail line or it would make use of the abandoned narrow gauge right of way through Oak Island Center and Point of Pines Center. The MBTA is currently evaluating these options as part of its Draft Environmental Impact Statement (DEIS) for the Revere to Salem corridor. The DEIS will provide additional details on the relative benefits of each alignment. The extension would also include a crossing of the Saugus River, which is a navigable waterway. Consequently, a bridge there would need to accommodate both large vessels on the river and high-frequency rapid transit service. It should be noted that this extension of the Blue Line is intended to complement – not replace – existing commuter rail service to the North Shore.

Capital Features

Rapid Transit line extension including a major river crossing, possible wetlands mitigation requirements, two potential new stations, and purchase of additional Blue Line vehicles.

Capital Cost	\$357.6 million (CTPS estimate)
Operating Cost	\$72,500 per weekday
Daily Ridership Increase on Mode	21,000
Net Increase in Daily Transit Ridership	7,900
Capital Cost/New Transit Rider	\$45,300
Operating Cost per Wkday/New Transit Rider	\$9.20
Capital Cost/Travel Time Benefit	\$355,800 per hour
Operating Cost/Travel Time Benefit	\$72.10 per hour
Travel Time Savings	1005 hours per weekday

Assessment

This is a high priority rapid transit expansion project. The capital cost for the project would be \$357.6 million and the typical daily operating cost would be \$72,500. Extending Blue Line service to Lynn would attract 21,000 new rapid transit riders of which 7,900 would be new transit riders. The remaining 13,100 would be diverted from MBTA bus routes and from the Rockport/Newburyport commuter rail line. The capital cost per new transit rider would be just over \$45,000 and the operating cost per new rider would be \$9.20. The extension is expected to have major land use and economic impacts on Lynn, particularly in the downtown area, which is a state designated revitalization area with substantial commercial and residential development. Lynn is considered a target area for projects providing environmental justice. Service quality would improve for those passengers now riding MBTA bus service in the area, as transfers would be reduced, travel times to Boston would be improved compared to the bus mode, and frequency of service would be greatly expanded. The extension would provide for transfers between the Newburyport/Rockport commuter rail line and the Blue Line at Lynn Station, and improve access to Logan Airport from locations on the North Shore.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	●	►	►	●	►	●	●

Proposed Connector

South Station (3 am, 3, 6, 7, 448, 449, 459)

Downtown Crossing (3, 11)

Chinatown (3, 11)

Boylston (3, 11)

New England Medical Center

Herald St (3, 9, 11)

East Berkeley St (3, 9, 11, 47)

Broadway (3, 9, 11, 47)

Landmarks: State House, Government Center, Aquarium, South Station, Chinatown, Boylston, New England Medical Center, Herald St, East Berkeley St, Broadway.

Bus Lines: 3, 6, 7, 448, 449, 459, 3 am, 3, 11, 43, 55, 92, 93, 90, 9, 47, 171 am, pm 3.

Other Features: Public Garden, Boston Common, Children's Museum, Intercity bus terminal & Amtrak, Red Line, Silver Line.



SILVER LINE PHASE III: SOUTH STATION-BOYLSTON CONNECTOR

Description

This project would construct a new transitway tunnel from South Station to New England Medical Center station with intermediate stops at Boylston and Chinatown stations. The segment would link Phase 1 of the Silver Line, which runs between New England Medical Center and Dudley, with Phase 2 from South Station to Logan Airport via the World Trade Center. The Phase III segment would also allow for direct transfers from all segments of the combined Silver Line with the Red Line, Orange Line, and Green Line. Silver Line Phase III is an ACO legal commitment (see table 2-2).

Capital Features

Construction of a transitway tunnel with three new underground stations at major transfer points with other rapid transit lines. Purchase of additional dual-mode vehicles.

Capital Cost	\$951.9 million (MBTA Planning Dept. estimate)
Operating Cost	\$2,600 per weekday
Daily Ridership Increase on Mode	20,500
Net Increase in Daily Transit Ridership	4,500
Capital Cost/New Transit Rider	\$210,600
Operating Cost per Wkday/New Transit Rider	\$0.60
Capital Cost/Travel Time Benefit	\$386,700 per hour
Operating Cost/Travel Time Benefit	\$1.00 per hour
Travel Time Savings	2,462 hours per weekday

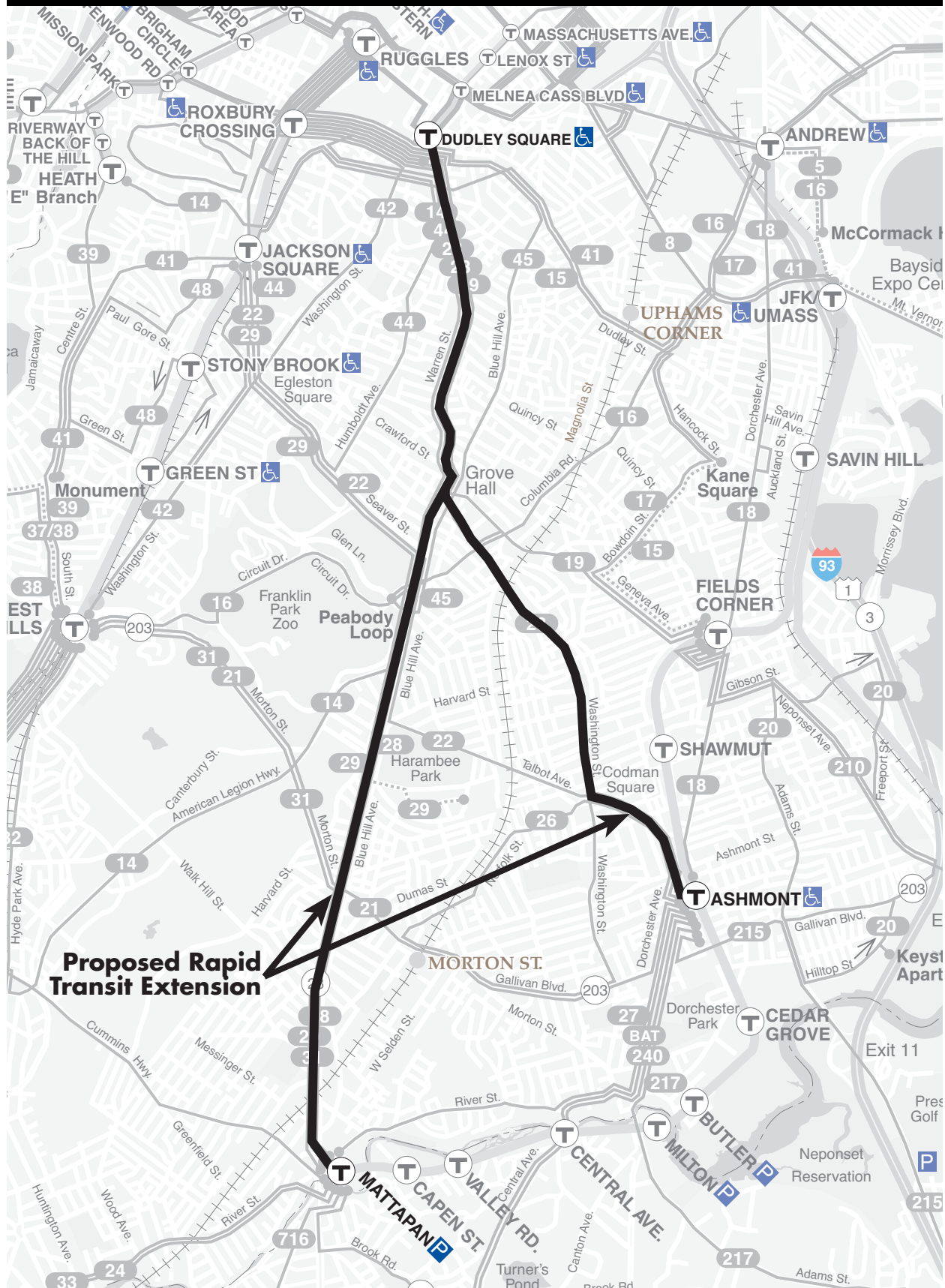
Assessment

This is a high priority rapid transit expansion project. The capital cost for this project would be \$951.9 million. This figure is a planning level estimate that includes 50% contingency and inflation based on a projected year of expenditure with completion by 2010. The typical daily operating cost would be \$2,600. This project would connect two disconnected segments of the Silver Line and created one through route between Roxbury, Downtown, South Boston, and Logan Airport. The project would attract 20,500 passengers to the mode of which 4,500 would be new transit riders. This project would result in a moderate reduction in air pollution. The anticipated high construction costs result in moderate cost effectiveness per new transit rider despite drawing a large number of new riders. Because the segment of new construction is short and would also result in a combination of two planned or existing services, the operating cost per new passenger would be very low.

The project would provide improved access and connections to the South Boston Waterfront area, which is expected to be an area of high employment growth and mixed use development with residential areas, and would provide improved access from residential areas in Roxbury which are a high priority for environmental justice. Direct transfers would be provided to the Green Line, Orange Line, and the Red Line.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	●	●	►	►	►	●	●

MAP 5C-3 SILVER LINE SOUTH EXTENSION TO ASHMONT AND MATTAPAN





SILVER LINE SOUTH EXTENSION TO ASHMONT AND MATTAPAN

Description:

This project would extend Silver Line bus rapid transit service beyond Dudley station to Ashmont and Mattapan. Service would follow Warren Street from Dudley to Grove Hall, and would then split into two branches. One branch would be 4.4 miles in length (including the segment between Dudley and Grove Hall) and continue on Blue Hill Avenue to Mattapan station, and the other would be 3.5 miles long and continue along Washington Street to Ashmont. These branches would replace present MBTA bus Routes 23 and 28. Bus priority lanes and sheltered stops containing passenger information would be constructed along the route. ITS technology would be used to monitor and regulate service.

Capital Features

Construction and installation of dedicated bus lanes, priority signals, and passenger shelters with amenities. Purchase of additional dual-mode buses.

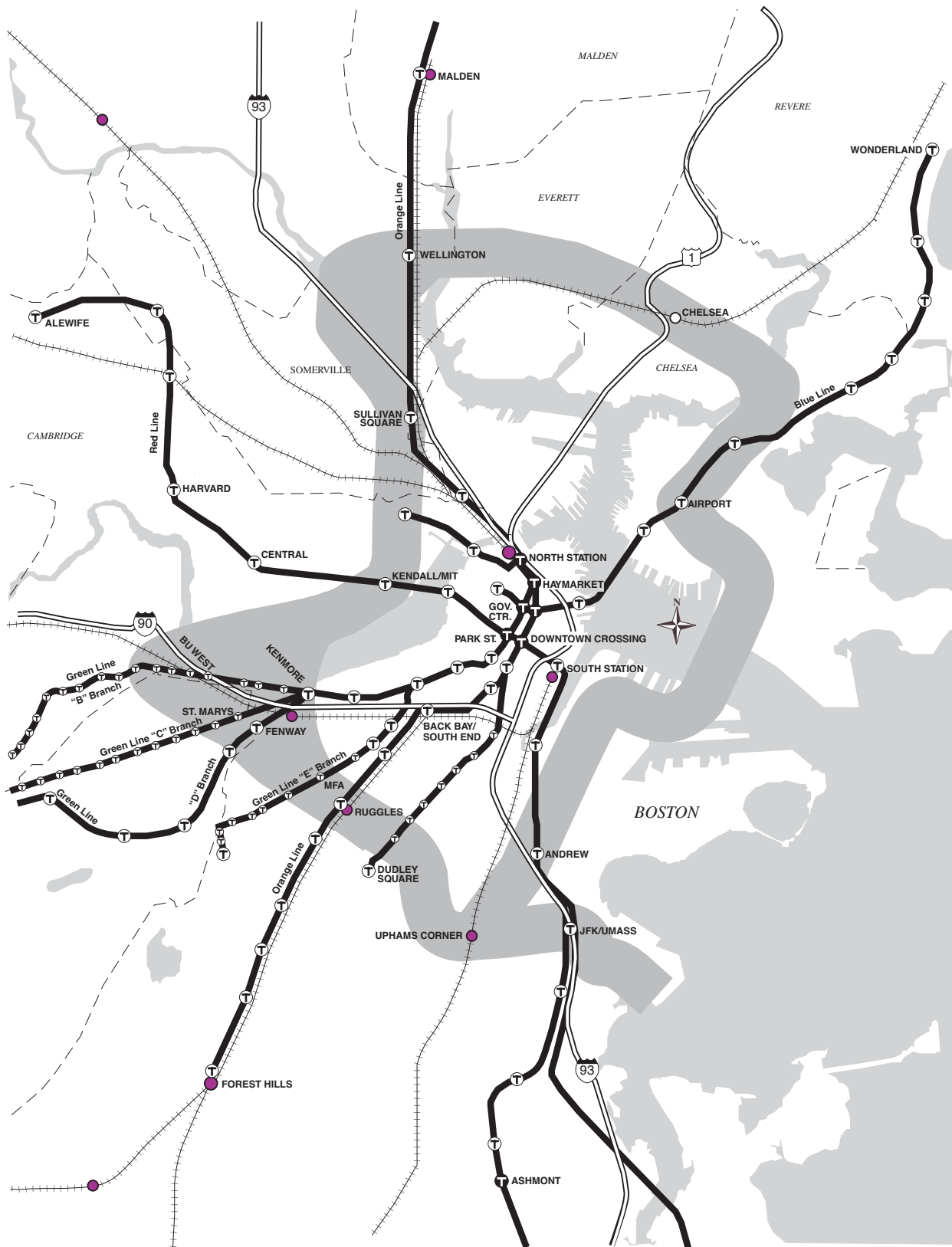
Capital Cost	\$43.7 million (CTPS estimate)
Daily Operating Cost	No added cost, replaces bus Routes 23 and 28
Daily Ridership Increase on Mode	29,300
Net Increase in Daily Transit Ridership	1,300
Capital Cost/New Transit Rider	\$35,000
Operating Cost per Wkday/New Transit Rider	No increase, would replace existing service
Capital Cost/Travel Time Benefit	\$172,300
Operating Cost/Travel Time Benefit	None
Travel Time Savings	250 hours per weekday

Assessment

This is a high priority rapid transit expansion project. The capital cost for this project would be \$43.7 million. This project would replace existing bus service and there would be no added operating cost compared to the service replaced. This service would attract 29,300 riders to the mode, of which only 1,300 would be new transit riders. The capital costs per new rider would be \$35,000. The majority of riders would be diverted from existing bus Routes 23 and 28 which would be replaced by this service. There would be no major improvements in air quality resulting from this service, as few riders would be drawn from automobiles. Reducing the number of stops, installing signal priority systems for buses, and installing bus-only lanes would however improve travel time compared to existing local bus service. The larger articulated vehicles used on this service would reduce crowding. Reliability would be improved through the use of dedicated rights of ways, priority lanes, signal prioritization, and Automatic Vehicle Locator systems that provide real time vehicle location information to dispatchers, planners, and customers. Direct service to Downtown Boston would be available without transferring at Dudley or Ruggles as required now. Service would be provided to neighborhoods in Dorchester and Roxbury, which are target neighborhoods for environmental justice purposes. The population served would be within low-income, high-minority, and transit-dependent neighborhoods. The project would fill a gap in the rapid transit system between the existing Red Line Dorchester branch and the Orange Line.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	►	►	●	►	●	●	●

MAP 5C-4 URBAN RING PHASE 2





URBAN RING PHASE 2

Description

The Urban Ring is a multi-phase project. Three phases have been defined and each phase will be additive; that is each new service will add capacity to previous improvements-not replace them. Phase 2 of the Urban Ring builds upon the bus routes of Phase 1 by adding seven Bus Rapid Transit (BRT) routes through the Urban Ring corridor. Some of the BRT routes in Phase 2 would be new and others would be modified or upgraded versions of Phase I bus routes. Phase 2 would utilize 60' articulated low-floor, low emission buses, segments of exclusive busway, Intelligent Transportation System (ITS) features, and supporting elements to improve connections with radial transit and commuter rail lines. Among the supporting elements would be new or expanded commuter rail stations at Downtown Chelsea, Sullivan Square, Gilman Square, Union Square, Yawkey, Ruggles, and Uphams Corner.

Capital Features

Construction of grade-separated and exclusive lane BRT segments, construction of new or expanded commuter rail stations, installation of signal priority systems for BRT vehicles, and purchase of BRT vehicles.

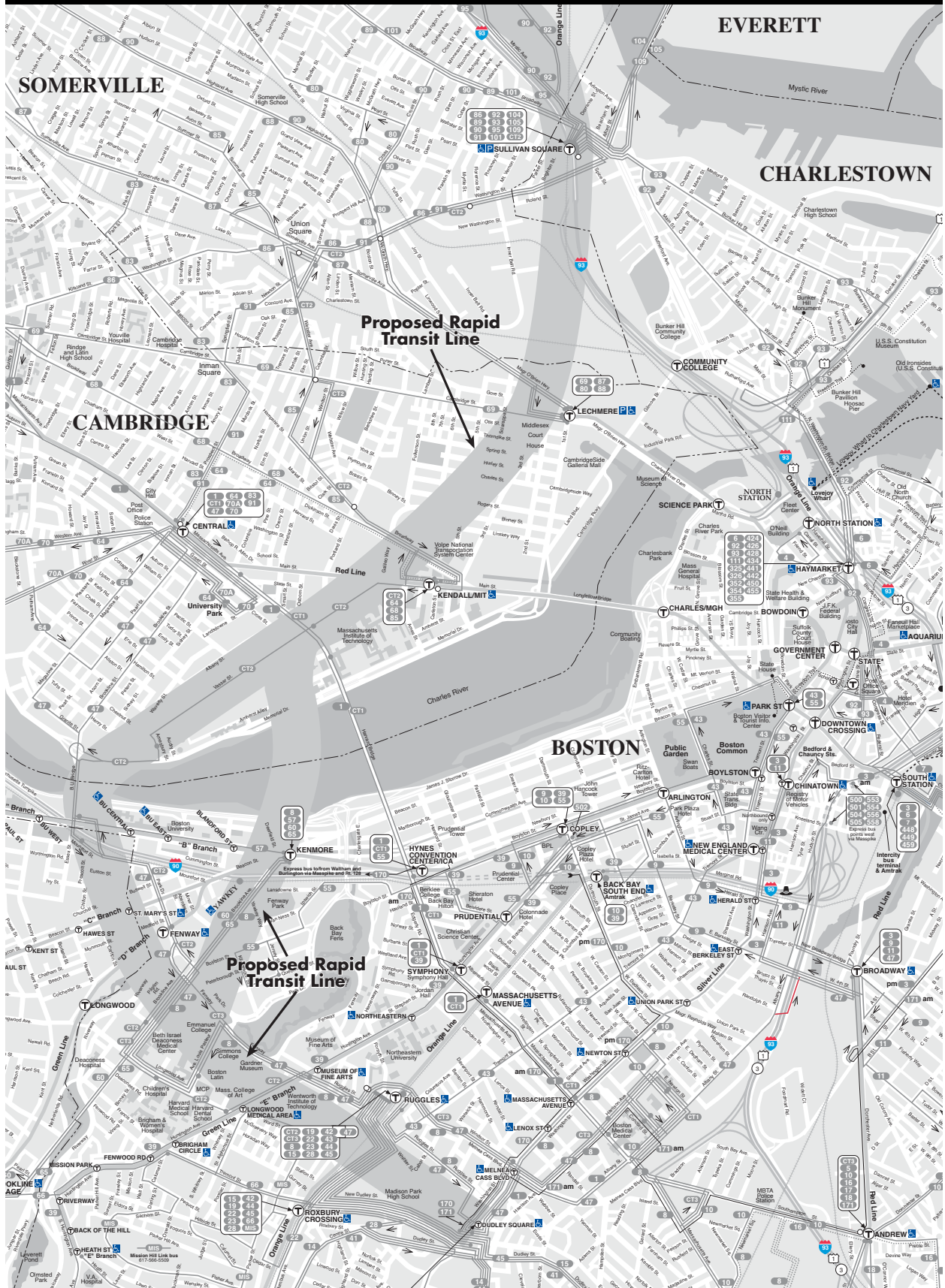
Capital Cost	\$500.0 million (Urban Ring MIS)
Operating Cost	\$70,700 per weekday
Daily Ridership Increase on Mode	53,000
Net Increase in Daily Transit Ridership	15,000
Capital Cost/New Transit Rider	\$33,300
Operating Cost per Wkday/New Transit Rider	\$4.70
Capital Cost/Travel Time Benefit	\$26,800 per hour
Operating Cost/Travel Time Benefit	\$3.80 per hour
Travel Time Savings	18,692 hours per weekday

Assessment

This is a high priority rapid transit expansion project. The capital costs for this project would be \$500 million and the typical daily operating cost would be \$70,700. Phase 2 of the Urban Ring would bring in 53,000 riders to the mode of which 15,000 would be new transit riders. The remaining riders would be diverted from other modes. The capital cost per new transit rider would be \$33,300. The operating cost per new transit rider would be \$4.70. The Urban Ring scores high for cost effectiveness both for capital and operating costs per new transit rider. Improvements to air quality as a result of this project would score highly, thanks to the large number of new transit riders diverted from automobiles. The routes would serve a number of environmental justice target neighborhoods including parts of Everett, Chelsea, Somerville, Cambridge, Roxbury, and Dorchester. Existing or proposed employment areas at Logan Airport, Chelsea, Assembly Square, Kendall Square, Cambridgeport, Longwood Medical Area, and Crosstown Center would receive direct service from this project. This results in a very high rating for land use and economic impacts. All existing radial rapid transit and commuter rail lines would interface with Urban Ring Phase 2 routes. Riders could avoid traveling through Downtown Boston by using the Urban Ring instead of transferring between existing services. Riders diverted to the Urban Ring would free up capacity on other parts of the transit network including the Red, Orange, and Green Lines. Reliability would be improved through the use of dedicated rights of ways, priority lanes, signal prioritization, and Automatic Vehicle Locator systems.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	●	●	●	●	●	●	●

MAP 5C-5 URBAN RING PHASE 3





URBAN RING PHASE 3

Description

The Urban Ring is a multi-phase project. Three phases have been defined and each phase will be additive; that is each new service will add capacity to previous improvements-not replace them. Phase 3 of the Urban Ring adds a new Urban Ring rail system between the Orange Line at Assembly Square and Dudley Square operating through Sullivan, Lechmere, Kendall Square, MIT, Boston University, Longwood Medical Area, and Ruggles. Light rail or heavy rail technology would be utilized.

Capital Features

Construction of a rail rapid transit line and stations using either light rail or heavy rail modes.

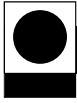
Capital Cost	\$2.8 billion (Urban Ring MIS)
Operating Cost	\$195,600 per weekday
Daily Ridership Increase on Mode	134,700
Net Increase in Daily Transit Ridership	54,600
Capital Cost/New Transit Rider	\$51,300
Operating Cost per Wkday/New Transit Rider	\$3.60
Capital Cost/Travel Time Benefit	\$56,300 per hour
Operating Cost/Travel Time Benefit	\$3.90 per hour
Travel Time Savings	49,695 hours per weekday

Assessment

This is a high priority rapid transit expansion project. The capital cost for this project would be \$2.8 billion and the typical daily operating cost would be \$195,600. This project would complete the proposed Urban Ring network by constructing a rail system using either heavy rail technology similar to the Orange Line or light rail technology similar to the Green Line. The routing would replace a portion of the proposed Phase 2 BRT service. The total ridership increase for the mode would be 134,700 of which 54,600 would be new transit riders. The project capital cost of \$2.8 billion is the most expensive rapid transit project evaluated. The capital cost per new rider would be \$51,300. The operating cost per new transit rider would be \$3.60. Despite the high total costs, the project scores high for both capital and operating costs per new transit rider compared to all rapid transit expansion projects. Urban Ring Phase 3 would improve mobility by reducing the number of transfers required to reach areas of anticipated employment growth in Cambridge, Allston, and Roxbury. This results in a very high rating for land use and economic impacts. Riders could avoid traveling through Downtown Boston by using the Urban Ring instead of transferring between existing services. Passengers diverted to the Urban Ring would free up capacity on other parts of the transit network including the Red, Orange, and Green Lines. There would be positive improvements in air quality, because of the large number of new transit riders this service would attract. Environmental justice needs would be met, as service would be expanded and improved to target neighborhoods in Somerville, Cambridge and Roxbury.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	●	●	●	●	●	●	●

MAP 5C-6 SUBURBAN COMMUTER RAIL FEEDER BUS SERVICES



SUBURBAN COMMUTER RAIL FEEDER BUS SERVICES

Description

This project would implement new feeder bus services to several suburban commuter rail stations that currently have no transit service connections.

Capital Features

An average of two vehicles would be needed to operate peak-period service on each new feeder route.

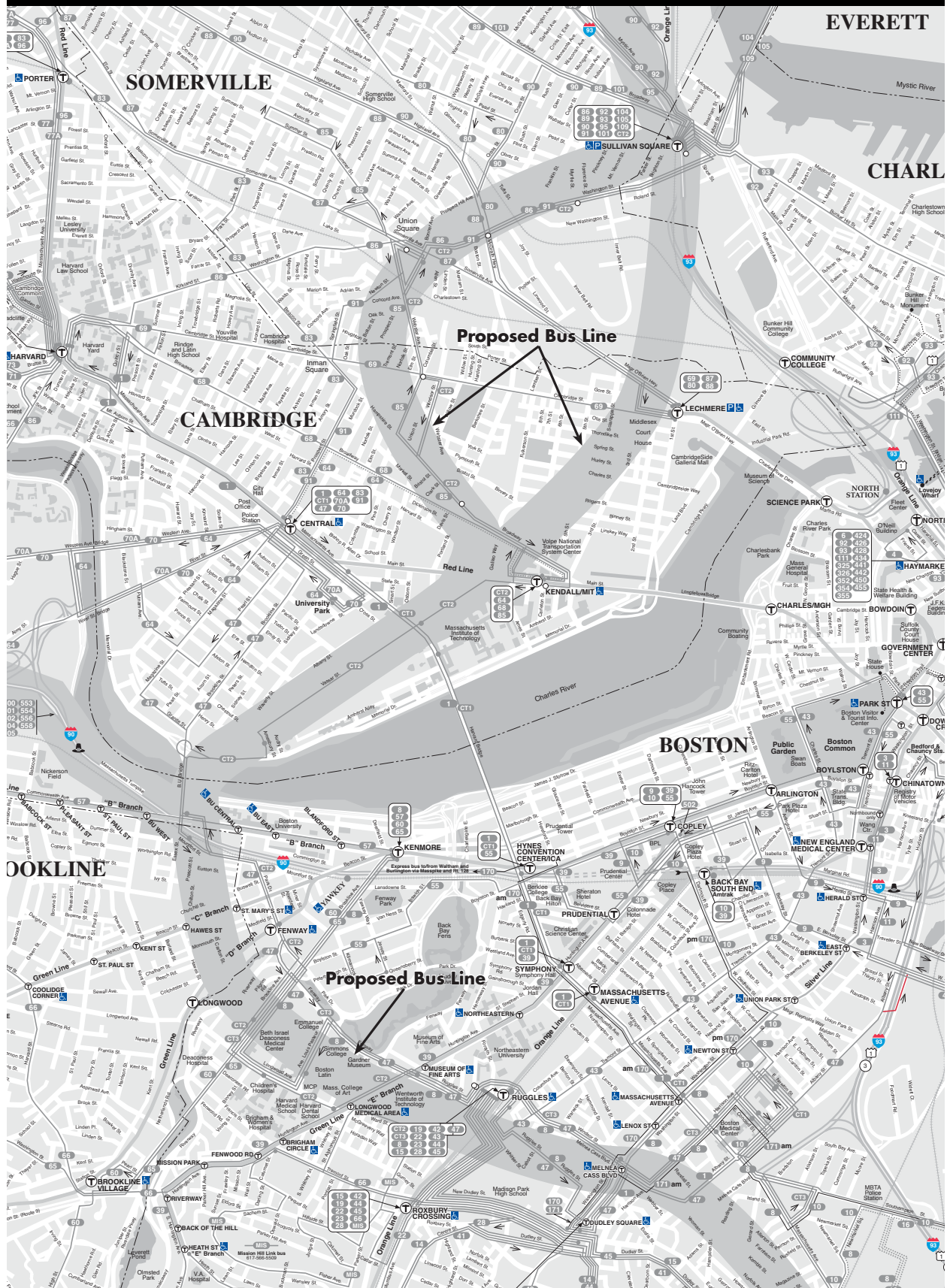
Capital Cost	\$7.5 million (assuming up to 15 routes--CTPS estimate)
Operating Cost	\$29,000 per weekday (for 15 routes with all-day service)
Daily Ridership Increase on Mode	2,700
Net Increase in Daily Transit Ridership	1,900
Capital Cost per New Transit Rider	\$3,900
Operating Cost per Wkday/New Transit Rider	\$14.90
Capital Cost/Travel Time Benefit	\$36,100 per hour
Operating Cost/Travel Time Benefit	\$137.40 per hour
Travel Time Savings	208 hours per weekday

Assessment

This project would provide a new alternative for access to suburban commuter rail stations. At present, use of many stations is constrained by shortages of parking capacity and a lack of access alternatives other than private automobile. Designing productive suburban routes is difficult because of low population density and scattered trip origins. Preliminary analysis indicates that the more promising new routes would include ones from the south side of Billerica to Wilmington Station, from the southeast side of Ashland to Ashland Station, from Medway via Millis to Norfolk Station, from Foxborough to Sharon Station, from Hanover via Rockland to Abington Station and from South Duxbury via Pembroke to Hanson Station. While many new suburban routes would not serve environmental justice target areas, some would serve small urban areas with low income neighborhoods. Overall, this project is rated high.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Environ. Justice
Line Extension/ New Line	▸	●	▸	▸	●	●

MAP 5C-7 URBAN RING PHASE 1





URBAN RING PHASE 1

Description

The Urban Ring is a multi-phase project. Three phases have been defined and each phase will be additive; that is each new service will add capacity to previous improvements-not replace them. Phase 1 of the Urban Ring consists of a significant expansion in the number of routes and reach of the Crosstown (CT) bus route network within Boston, Brookline, Cambridge, Chelsea, Everett, and Somerville, and the addition of new Express Commuter (EC) service to provide single seat radial and crosstown service from suburban locations into the Urban Ring corridor communities. Phase 1 bus routes will utilize 100 40-foot low-floor CNG powered buses. Maintenance facilities must be expanded to accommodate these vehicles.

Capital Features

Purchase of 100 additional CNG buses and expansion of CNG maintenance facilities.

Capital Cost	\$100.0 million (Urban Ring MIS)
Operating Cost	\$100,300 per weekday
Daily Ridership Increase on Mode	21,400
Net Increase in Daily Transit Ridership	5,500
Capital Cost/New Transit Rider	\$18,200
Operating Cost per Wkday/New Transit Rider	\$ 18.20
Capital Cost/Travel Time Benefit	\$72,000 per hour
Operating Cost/Travel Time Benefit	\$72 per hour
Travel Time Savings	1388 hours per weekday

Assessment

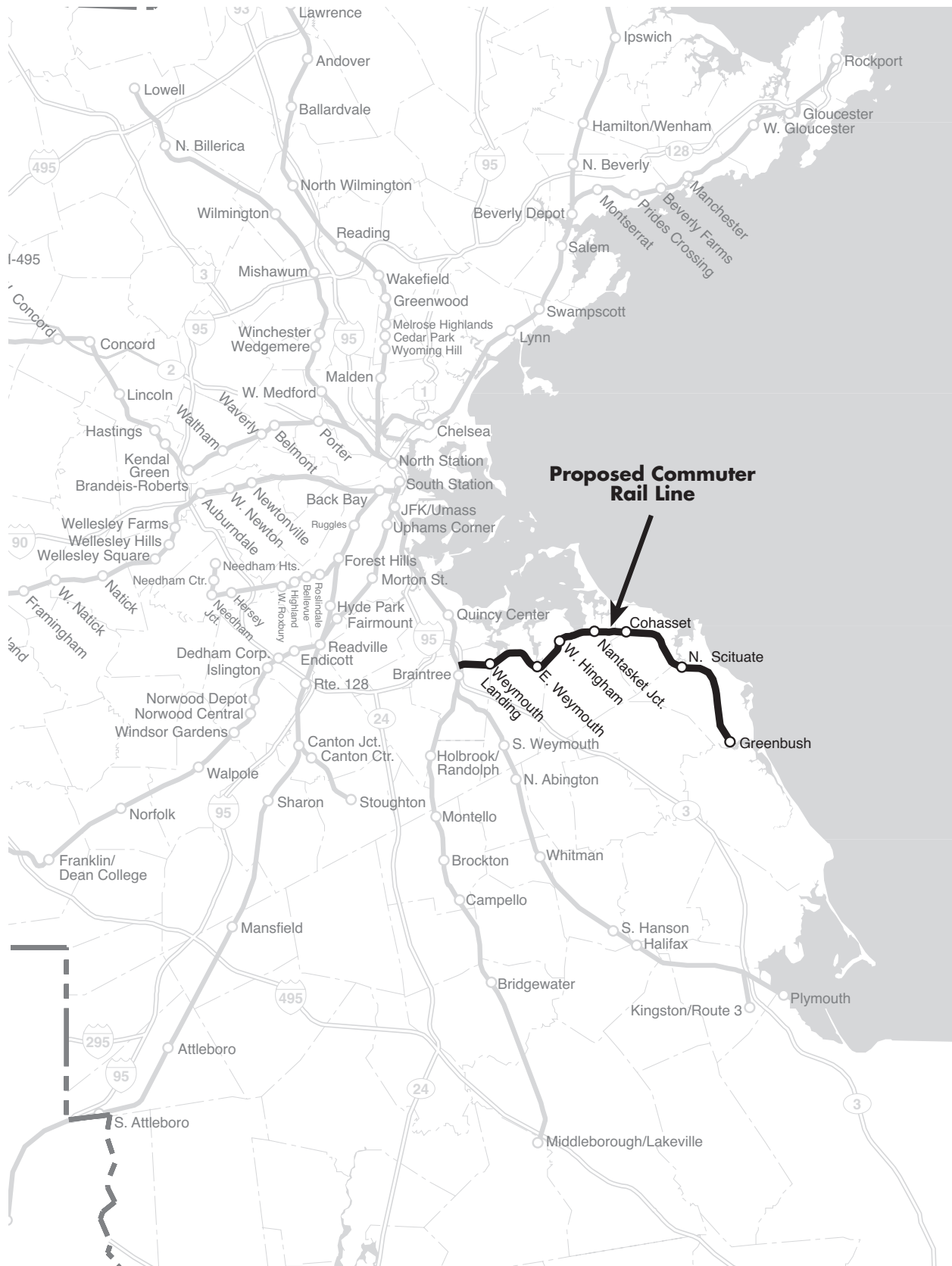
This is a high-priority bus expansion project. The capital costs for this project would be \$100 million and the typical daily operating costs would be \$100,300. This project would attract 21,400 riders to the mode of which 5,500 would be new transit riders. Capital cost per new transit rider would be \$18,200 and operating cost per new transit rider would be \$18.20. Capital costs would be limited to the acquisition of vehicles and the provision of maintenance facilities for the vehicles. The project would not be very cost effective for either capital or operating costs per new rider compared to other bus/trackless trolley expansion projects. The project would have little impact on air quality.

The service would have high utilization though and would help reduce crowding on other transit services by diverting riders. There would be a moderate impact on mobility, as the Phase I routes serve areas that have other transit alternatives, although total service offered would be increased.

Service quality would improve, as Phase I routes would reduce the amount of transfers required to complete journeys in the urban core area. The routes would serve target neighborhoods for environmental justice including parts of Chelsea, Everett, Somerville, Cambridge, Roxbury, and Dorchester. Existing or proposed employment areas at Logan Airport, Chelsea, Assembly Square, Kendall Square, University Park, Longwood Medical Area, and Crosstown Center would receive direct service from this project. All existing radial rapid transit lines would interface with Urban Ring Phase 1 routes. Riders diverted to the Urban Ring would free up capacity on other parts of the transit network including the Red, Orange, and Green Lines.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Environ. Justice
Line Extension/ New Line	●	◐	○	○	●	●

MAP 5C-8 COMMUTER RAIL BRANCH FROM EXISTING OLD COLONY LINES TO GREENBUSH





COMMUTER RAIL BRANCH FROM EXISTING OLD COLONY LINES TO GREENBUSH

Description

This project would restore commuter rail service on a third branch of the Old Colony lines, diverging from the route of the Middleborough/Lakeville and Plymouth/Kingston lines in Braintree and following a combination of active and inactive rail freight routes to the Greenbush section of Scituate. Rail passenger service on this branch was last operated in 1959. This project is a SIP, CA/T, and ACO legal commitment (see table 2-2).

Capital Features

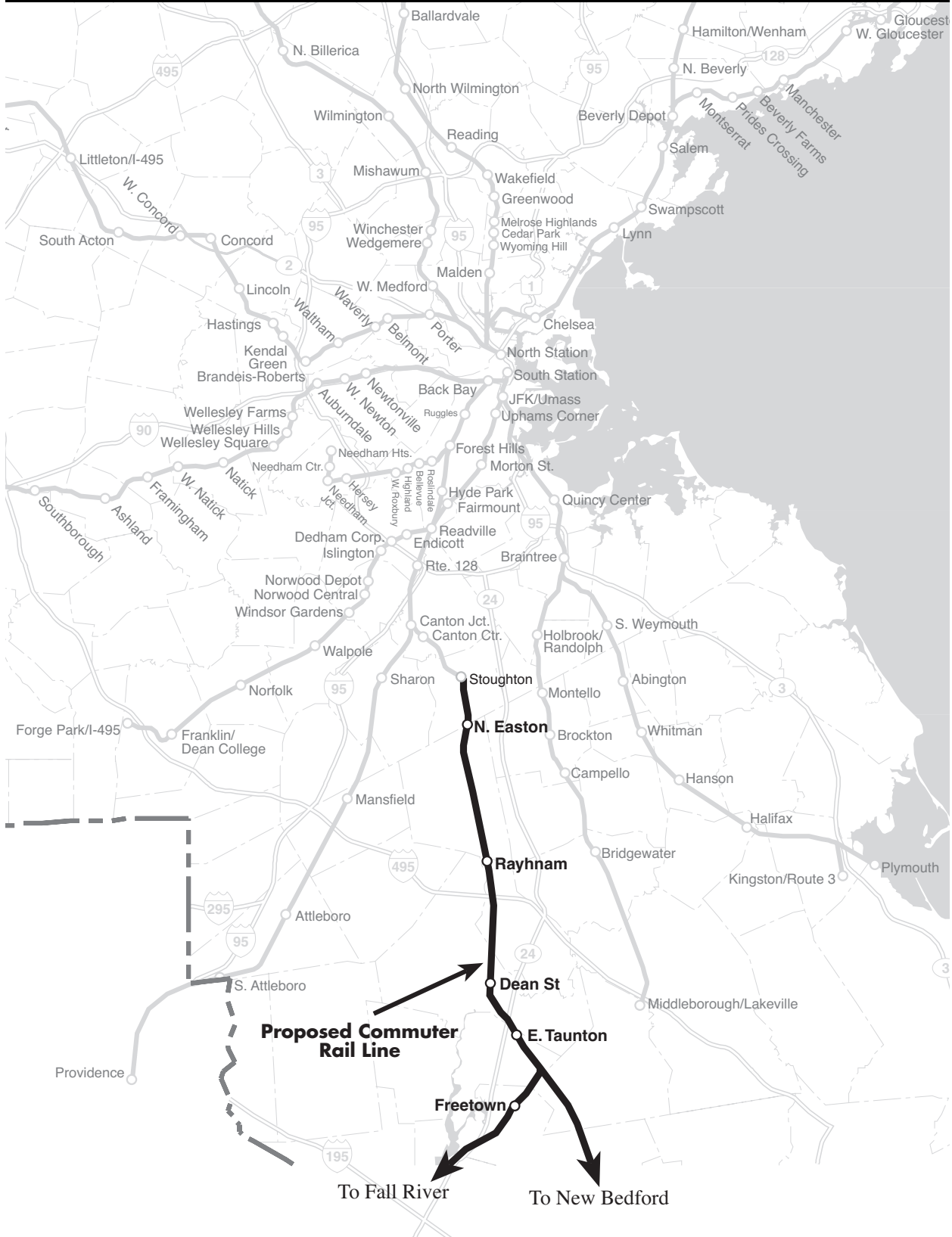
Commuter rail service would be extended over 18 route-miles, of which about one mile is currently used for freight service. Extensive reconstruction on the inactive segment and upgrading of track on the active segment would be required. Several grade crossings at Hingham Center would be eliminated by placing the rail line in a tunnel. A major grade-separation project at Weymouth landing is also anticipated. There would be seven new stations on the line, in Weymouth, Hingham, Cohasset, and Scituate. The Greenbush terminal would be a short distance from the border of Marshfield.

Capital Cost	\$470.0 million
Operating Cost	\$34,000 per day
Daily Ridership Increase on Mode	11,400
Net Increase in Daily Transit Ridership	4,600
Capital Cost per New Transit Rider	\$102,000
Operating Cost per Wkday/New Transit Rider	\$7.40
Capital Cost/Travel Time Benefit	\$435,500 per hour
Operating Cost/Travel Time Benefit	\$31.40 per hour
Travel Time Savings	1,079 hours per weekday

Assessment

Overall, this project is rated high priority. It would attract the second-largest number of total riders and the third-largest number of new transit riders of all commuter rail projects examined for the PMT. In absolute terms it would have one of the highest capital costs of all commuter rail projects, but because of the high ridership, the capital cost per new rider would be near the upper end of the mid-range among such projects. The operating cost per new rider would be at the lower end of the mid-range for commuter rail projects. The project would not serve any environmental justice target communities, but three of the seven stations would serve state-designated revitalization areas. It would rank fourth among all commuter rail projects in reductions of CO, CO₂, and VOC emissions, but it would result in the sixth-highest increase in NO_x emissions of all commuter rail projects. It would produce the fourth-highest travel time savings among such projects.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
New Line	●	●	▸	▸	○	○	○

MAP 5C-9 COMMUTER RAIL TO NEW BEDFORD/FALL RIVER



COMMUTER RAIL TO NEW BEDFORD/FALL RIVER

Description

This project would extend commuter rail service from the end of the Stoughton Line via a combination of inactive and active rail freight routes to Fall River and New Bedford. Rail passenger service to Boston from Fall River and New Bedford was last operated in 1958.

Capital Features

Commuter rail would be extended over 47 route-miles, of which 21 would be used by trains from both Fall River and New Bedford, and the rest would consist of separate branches to the two cities. Extensive reconstruction on the inactive segments and upgrading of tracks and signals on the active segments would be required. There would be seven new stations, in Easton, Raynham, Taunton, Freetown, Fall River, and New Bedford.

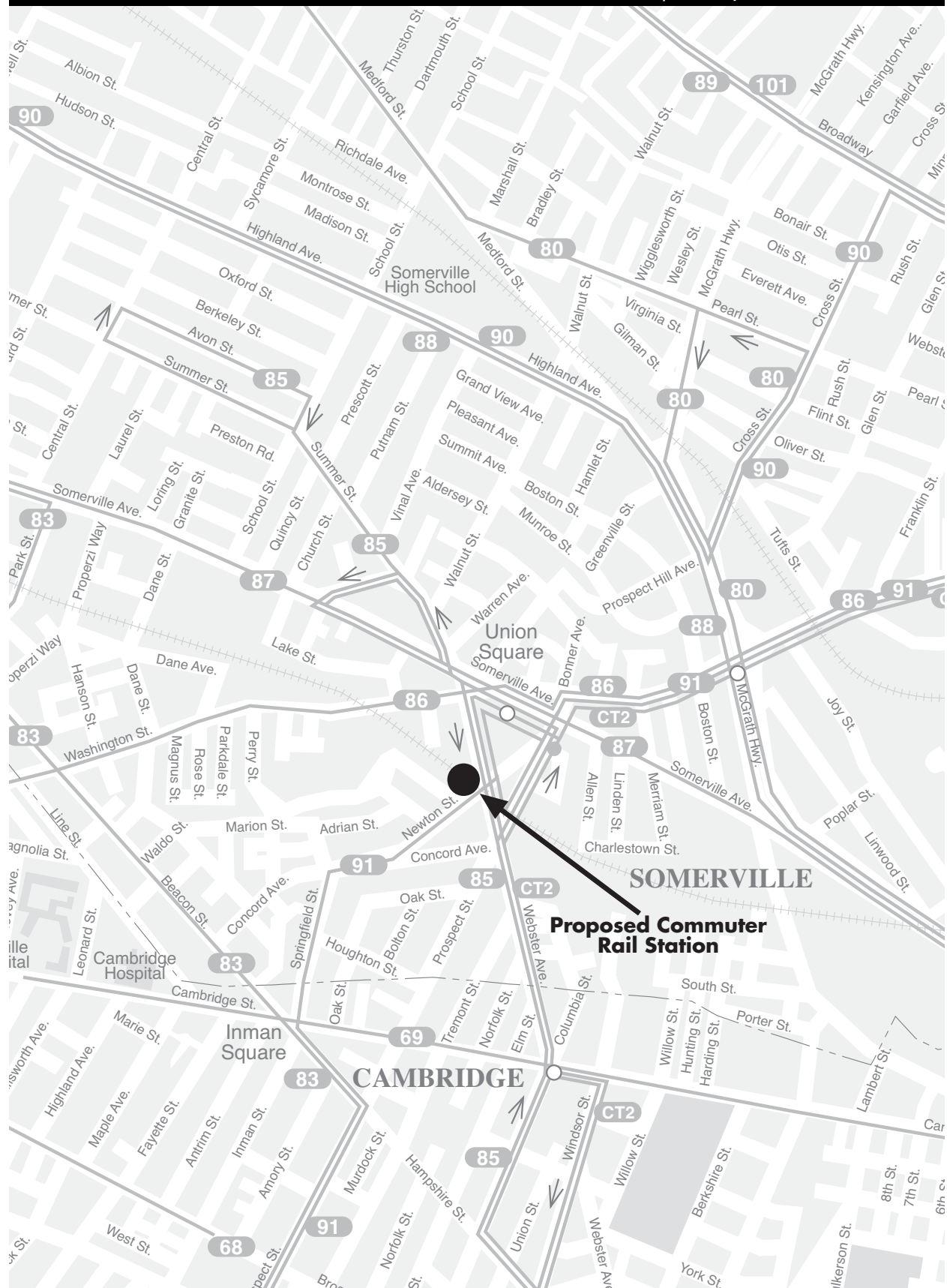
Capital Cost	\$670.0 million (MBTA Planning Dept. estimate)
Operating Cost	\$69,200 per weekday
Daily Ridership Increase on Mode	8,700
Net Increase in Daily Transit Ridership	7,100
Capital Cost per New Transit Rider	\$94,500
Operating Cost per Wkday/New Transit Rider	\$9.80
Capital Cost/Travel Time Benefit	\$156,800 per hour
Operating Cost/Travel Time Benefit	\$16.20 per hour
Travel Time Savings	4,273 hours per weekday

Assessment

Overall, this project is rated high-priority. It would attract the second-largest number of commuter rail riders and new transit users of all commuter rail projects examined for the PMT. New Bedford and Fall River are the seventh and eighth largest cities in Massachusetts in total population, and the largest municipalities within a 50-mile radius of Boston that now have neither commuter rail nor other rail transit service. The majority of the stations would be in state-designated revitalization areas. The project is rated medium in cost-effectiveness and in air quality benefit. In absolute terms, it would be the second-costliest commuter rail project examined, but the cost per new transit rider would be in the mid-range among such projects. It would be second only to a North-South rail link in reductions of CO, CO₂, and VOC emissions, but because of the substantial number of additional locomotive-miles required, it would increase NO_x emissions more than any project except a Framingham/Leominster extension.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	●	●	▸	▸	○	▸	▸

MAP 5C-10 NEW COMMUTER RAIL STATION AT UNION SQUARE, SOMERVILLE





NEW COMMUTER RAIL STATION AT UNION SQUARE, SOMERVILLE

Description

This project would add a new commuter rail station on the Fitchburg commuter rail line near Union Square in Somerville, between the existing Porter Square Station in Cambridge and North Station in Boston. A previous Union Square station was discontinued in 1938.

Capital Features

This project would consist of one new station on an existing line. No upgrading of tracks would be needed. No increase in rolling stock would be needed.

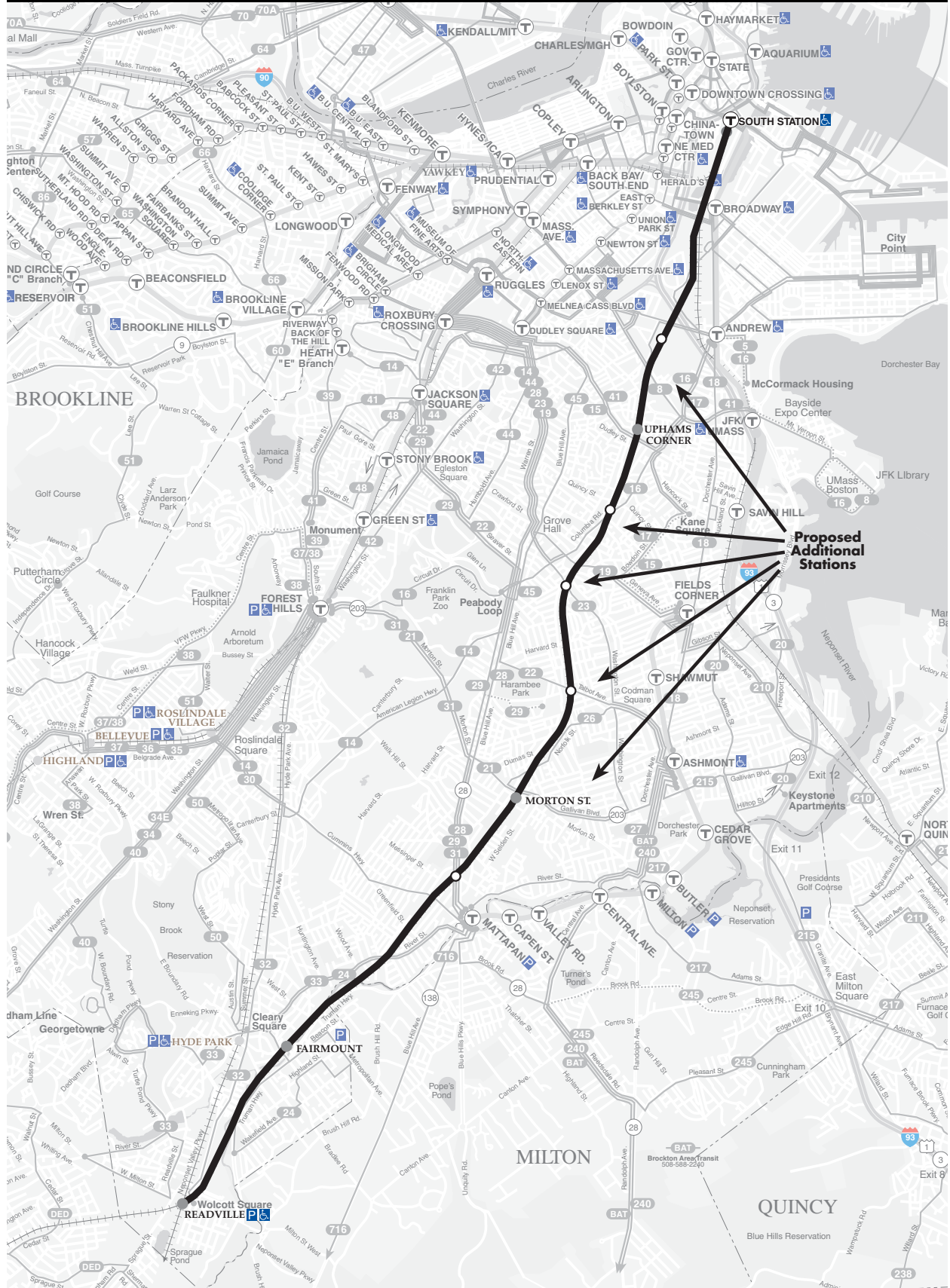
Capital Cost	\$4.1 million (CTPS estimate)
Operating Cost	Increased fuel from extra starts and stops, too small to calculate
Daily Ridership Increase on Mode	390
Net Increase in Daily Transit Ridership	160
Capital Cost per New Transit Rider	\$25,400
Operating Cost per Wkday/New Transit Rider	Too small to calculate
Capital Cost/Travel Time Benefit	\$58,600 per hour
Operating Cost/Travel Time Benefit	Too small to calculate
Travel Time Savings	69 hours per weekday

Assessment

Overall, this project is rated high priority. It would provide direct commuter rail service to a densely developed section of Somerville that is now served by several local bus routes that connect with rapid transit lines. It would attract relatively few new transit riders, but because the only cost involved would be that of a new station, the capital cost per new rider would be among the lowest of all commuter rail expansion projects analyzed for the PMT. The maximum load point on Fitchburg Line trains occurs west of Porter Square, so there is sufficient excess capacity for new riders between Union Square and North Station. This project has excellent ratings in terms of environmental justice, as it would introduce direct rail service to downtown Boston from a minority neighborhood. It also rates high in economic and land use impacts because it would be in a state-designated revitalization area with plans for substantial mixed-use development. It would, however, have only a limited impact on air quality.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
New Station	○	►	●	►	○	●	●

MAP 5C-11 FAIRMOUNT LINE IMPROVEMENTS





FAIRMOUNT LINE IMPROVEMENTS

Description

This project would upgrade service on the Fairmount commuter rail line by adding new stations on the existing route and by increasing the frequency of service.

Capital Features

Up to five new stations would be built in Boston neighborhoods, interspersed with existing stations. Approximate locations under consideration include Blue Hill Avenue near Mattapan Square, Talbot Avenue, Washington Street and Columbia Road in Dorchester, and Newmarket Square in Roxbury. Route length would not change. Some additional rolling stock would be needed to increase peak service frequency.

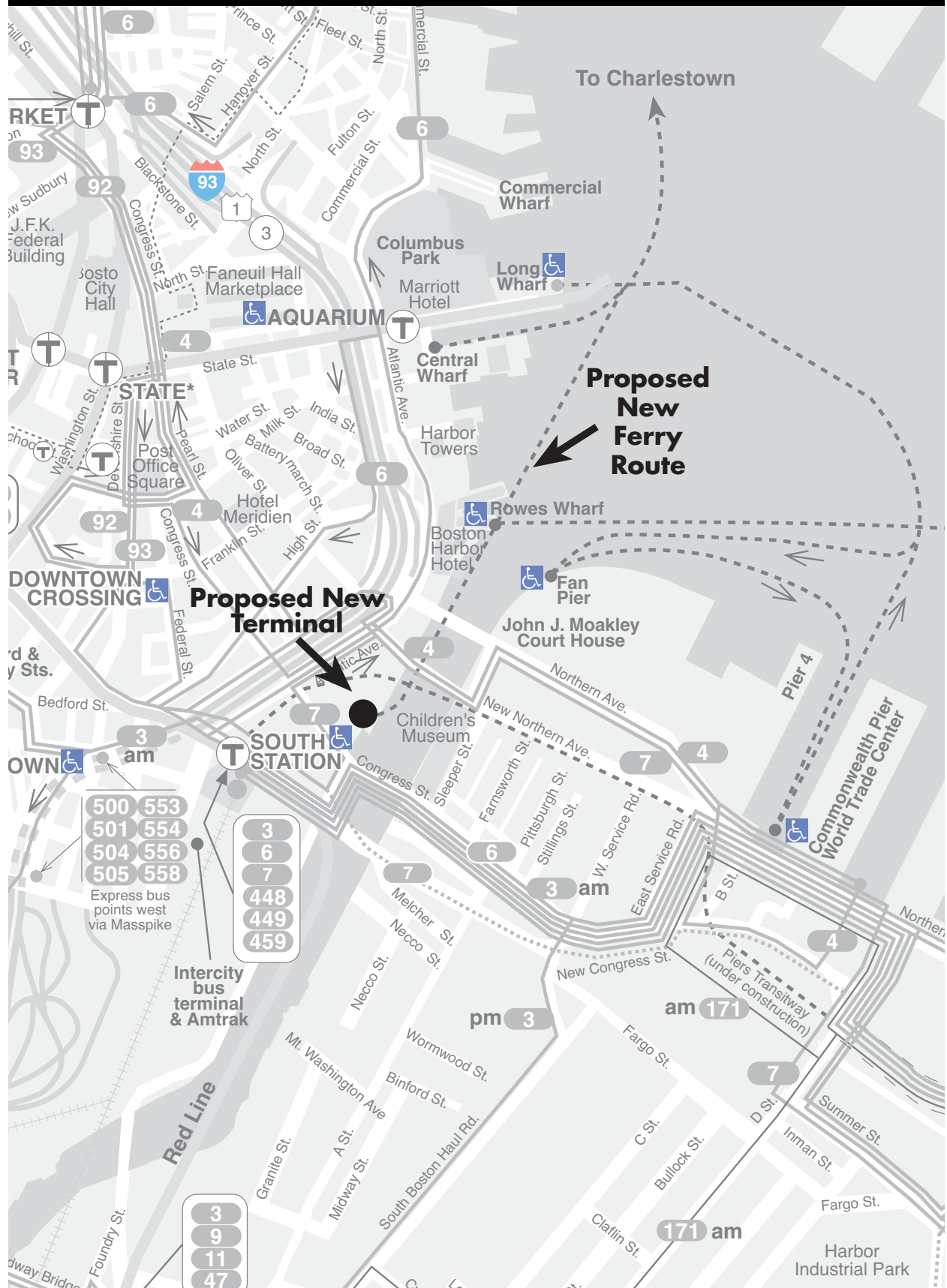
Capital Cost	\$70.0 million (MBTA Planning Dept. estimate)
Operating Cost	\$2,800 per weekday
Daily Ridership Increase on Mode	6,500
Net Increase in Daily Transit Ridership	220
Capital Cost per New Transit Rider	\$318,180
Operating Cost per Wkday/New Transit Rider	\$12.70
Capital Cost/Travel Time Benefit	\$158,000 per hour
Operating Cost/Travel Time Benefit	\$6.30 per hour
Travel Time Savings	443 hours per weekday

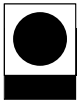
Assessment

Overall, this project is rated high priority. It would provide direct rail service to the Financial and Waterfront districts from sections of Dorchester now served by feeder buses to rapid transit lines. The number of riders served would be among the largest of any of the commuter rail expansion projects examined for the PMT, but the majority of them would be diverted from other transit services. Consequently, the capital cost per new transit rider would be among the highest of any commuter rail project, but the capital cost per hour of travel time saving would be among the lowest. There would be little benefit to air quality, because few auto trips would be eliminated. The project is rated high in economic and land-use impacts. All of the existing and proposed new station sites are located in state-designated revitalization areas. Local plans call for high-density residential development near these sites, along with new commercial or industrial development. Most of the stations would be in environmental justice target neighborhoods, and most of the new ones would serve areas that are not currently served directly by rail transit lines to downtown Boston. It is the only commuter rail project with a high rating for service quality, because of its contributions to passenger safety and security, comfort and convenience, and reductions of transfers.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
New Station	►	●	►	○	●	●	●

MAP 5C-12 FERRY EXPANSION-RUSSIA WHARF/SOUTH STATION





FERRY EXPANSION–RUSSIA WHARF/SOUTH STATION

Description

This project would implement a new ferry route in Boston Inner Harbor, from the existing terminal at the Charlestown Navy Yard to a new terminal at Russia Wharf, in Fort Point Channel at Congress Street. The construction of Russia Wharf is a CA/T legal commitment (see table 2-2).

Capital Features

This route would require acquisition of two medium-size low-speed commuter ferries, and construction of a new terminal at Russia Wharf.

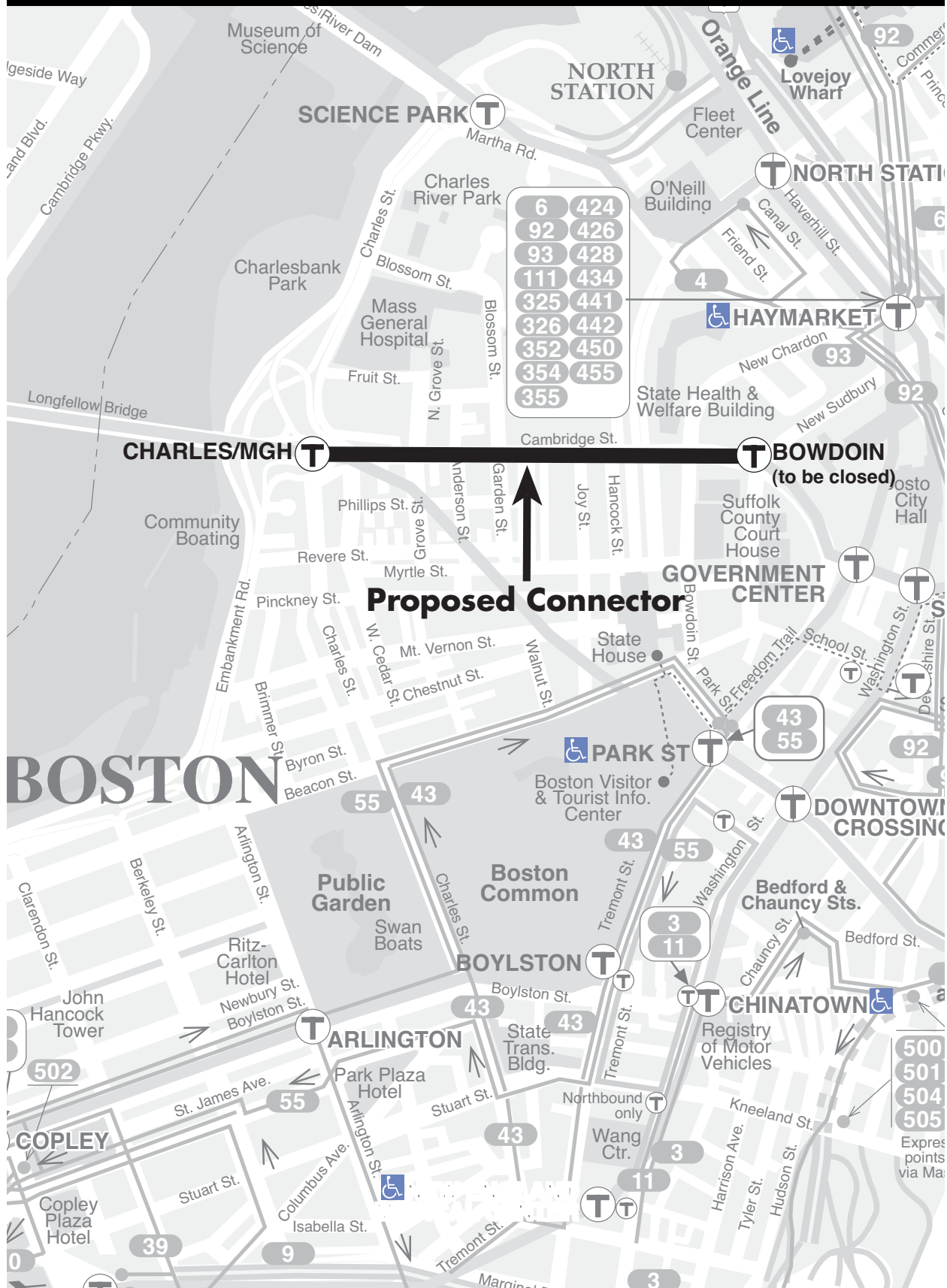
Capital Cost	\$4.0 million (CTPS estimate)
Operating Cost	\$3,400 per day
Daily Ridership Increase on Mode	1,000
Net Increase in Daily Transit Ridership	50
Capital Cost per New transit Rider	\$80,000
Operating Cost per Wkday/New transit Rider	\$67.10
Capital Cost/Travel Time Benefit	\$467,800 per hour
Operating Cost/Travel Time Benefit	\$397.70 per hour
Travel Time Savings	9 hours per weekday

Assessment

This project would provide more convenient connections from homes in the former Charlestown Navy Yard complex to work locations in much of the Financial/Retail and Waterfront districts than is currently provided by existing transit alternatives. It would attract few riders that would not otherwise use some form of transit. The capital and operating costs per new transit rider would be the second-lowest among water transportation projects examined for the PMT. The route would not provide direct service to any environmental justice target communities, but the Russia Wharf terminal would serve a state-designated revitalization area. The overall rating of this project is high priority.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension/ New Line	▮	▮	●	○	▮	●	○

MAP 5C-13 BLUE-RED CONNECTOR





BLUE-RED CONNECTOR

Description

This project would extend the Blue Line from Bowdoin Station in Boston to the Charles/MGH Red Line Station via a new subway, allowing a direct transfer between these lines. The Blue-Red Connector is a SIP, CA/T, and ACO legal commitment (see table 2-2).

Capital Features

This would be a 0.4-mile extension, entirely in a new subway, including the addition of a new level to the Charles/MGH Station. (Bowdoin Station is scheduled to be closed in conjunction with implementation of six-car train service on the Blue Line.)

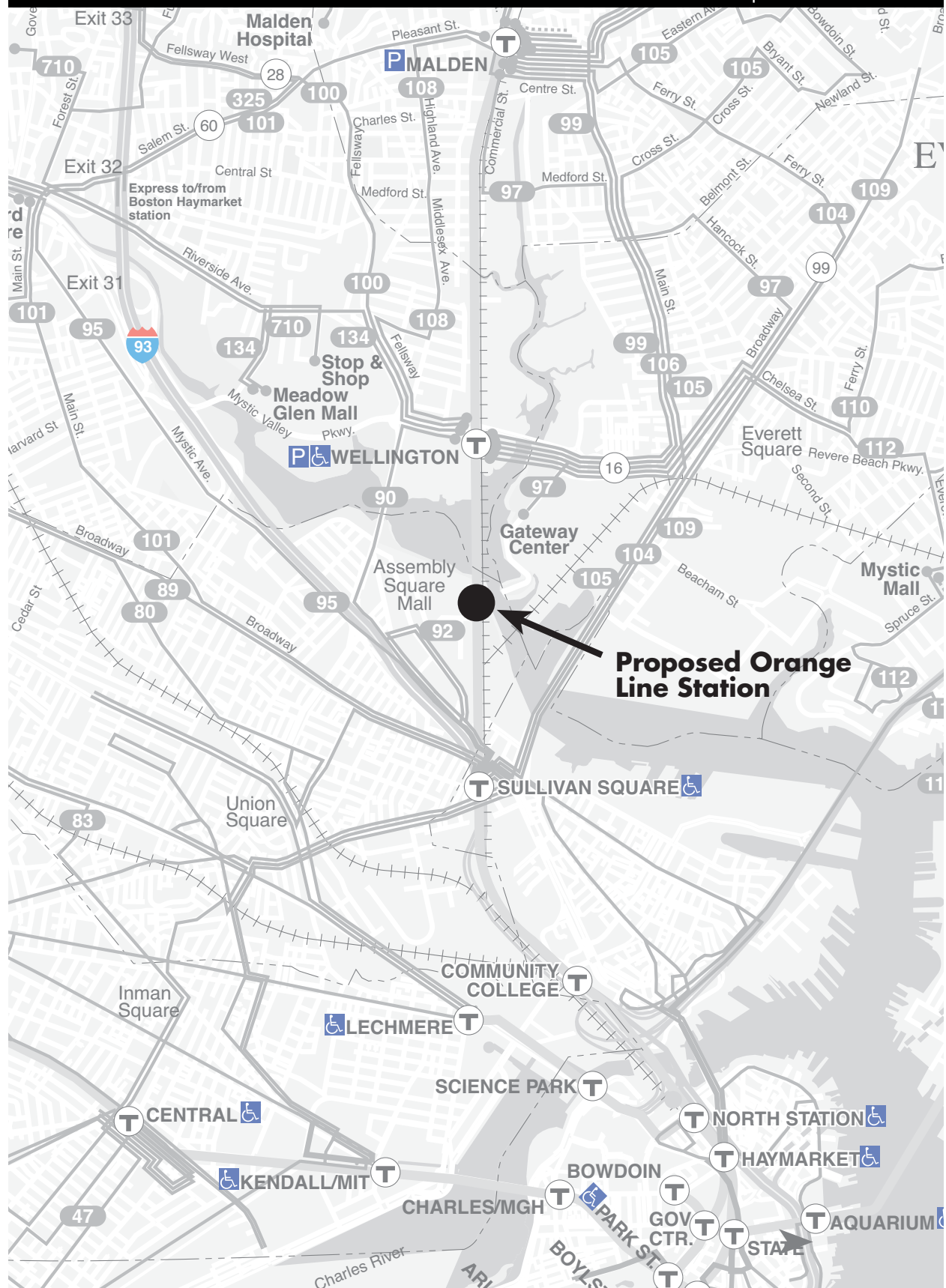
Capital Cost	\$174.6 million (Based on 2000–2025 RTP update)
Operating Cost	\$7,200 per weekday
Daily Ridership Increase on Mode	6,500
Net Increase in Daily Transit Ridership	2,800
Capital Cost per New Transit Rider	\$63,500
Operating Cost per Wkday/New Transit Rider	\$2.60
Capital Cost/Travel Time Benefit	\$107,500 per hour
Operating Cost/Travel Time Benefit	\$4.50 per hour
Travel Time Savings	1,625 hours per weekday

Assessment

Overall, this project is rated medium priority. Capital cost would be in the mid-range among rapid transit extension projects analyzed. It would be among the more cost-effective projects in terms of capital cost relative to new transit rider and to air quality improvements. Operating cost per new passenger would be among the lowest of any project. The connector would permit direct transfers between the Blue Line and the Red Line for the first time. It would be used mostly by passengers traveling between Red Line stations from Alewife to Charles/MGH inclusive and Blue Line Stations from State to Wonderland (or beyond if the Blue Line is extended in that direction). It is rated high in economic and land-use development impacts. It would be located in a state-designated revitalization area, where local plans call for mixed-use development. The MBTA will soon begin work on an analysis of the Blue-Red Connector that will provide greater detail on this project.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	►	►	●	►	►	●	►

MAP 5C-14 CONSTRUCT ORANGE LINE STATION AT ASSEMBLY SQUARE





CONSTRUCT ORANGE LINE STATION AT ASSEMBLY SQUARE

Description

This project would add a station on the existing Orange Line at the Assembly Square development in Somerville, between Sullivan Square Station in Charlestown and Wellington Station in Medford.

Capital Features

This project would consist of one new rapid transit station, but would not add any route mileage.

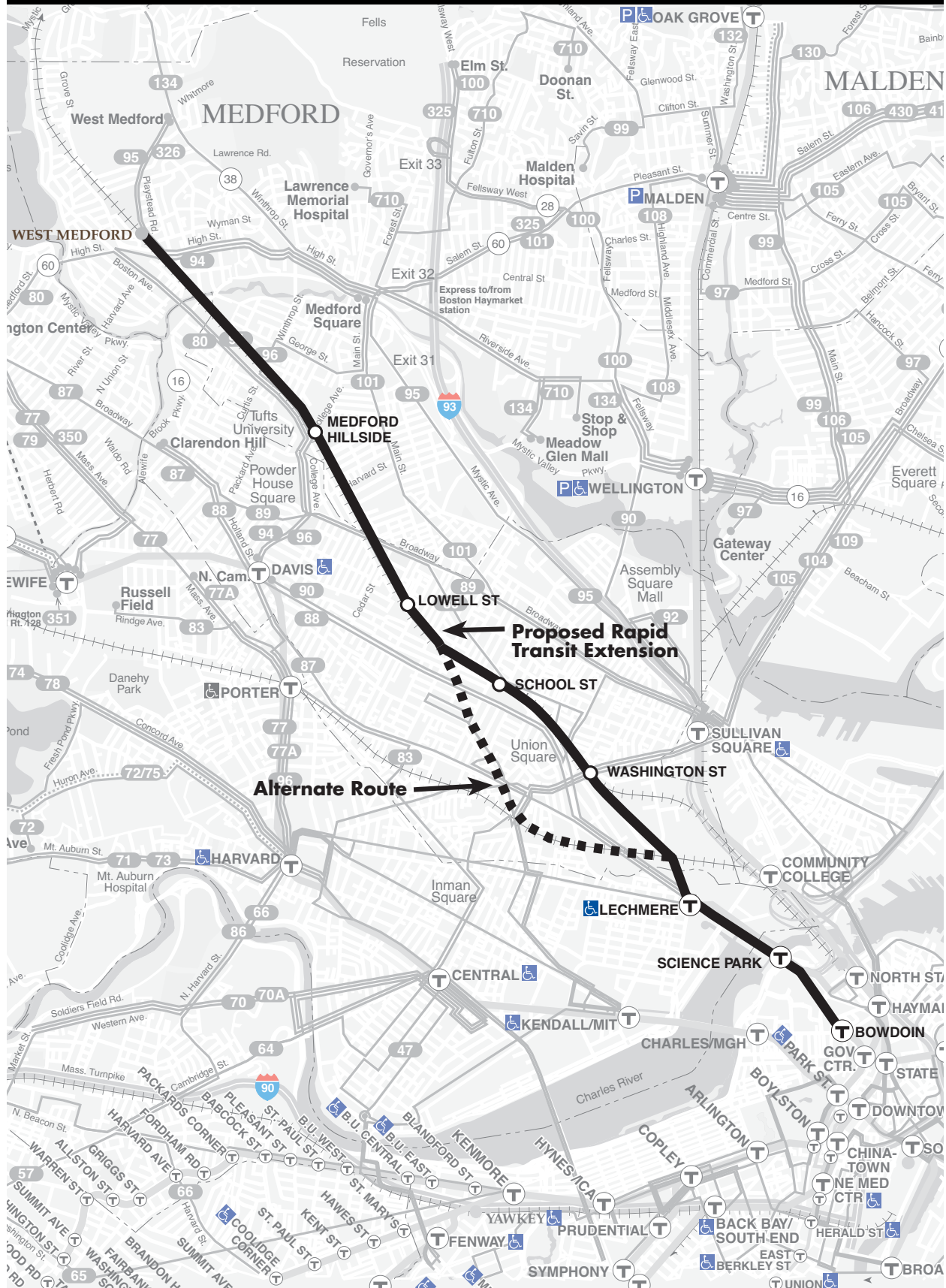
Capital Cost	\$29.3 million (MBTA Planning Dept. estimate)
Operating Cost	None, unless demand requires more frequent service
Daily Ridership Increase on Mode	1,700
Net Increase in Daily Transit Ridership	1,100
Capital Cost per New Transit Rider	\$26,900
Operating Cost per Wkday/New Transit Rider	None, unless demand requires more frequent service
Capital Cost/Travel Time Benefit	\$145,700 per hour
Operating Cost/Travel Time Benefit	None, unless demand requires more frequent service
Travel Time Savings	201 hours per weekday

Assessment

Overall, this project is rated medium priority. It would add a station in a section of Somerville that the Orange Line currently runs through without stopping. This would be one of the least costly of all rapid transit expansion projects analyzed, both in absolute terms and relative to the new ridership attracted. Because of its location relative to roads, other transit stations, and most of the population of Somerville, such a station would be of use mostly for travel to and from the Assembly Square redevelopment. At this time, the mix of uses in this project has not been finally determined, making demand projections difficult. Adding an Assembly Square station would increase travel times slightly for passengers riding between stations further north and stations further south, and could worsen crowding on trains during peak hours. It gets a high rating in economic and land use impact because the station would be in a state-designated revitalization area. This includes a brownfield site. Several mixed-use transit-oriented development projects are under consideration for this location. The project receives a medium rating for environmental justice since the station is not located in a minority or transit-dependent neighborhood.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
New Station	○	○	●	◐	○	●	◐

MAP 5C-15 EXTEND BLUE LINE FROM BOWDOIN TO WEST MEDFORD





EXTEND BLUE LINE FROM BOWDOIN TO WEST MEDFORD

Description

This project would extend Blue Line service from Bowdoin Square in downtown Boston to West Medford via a new subway to Lechmere, then partly via an existing rail freight line and partly beside the Lowell commuter rail line. It would be an alternative to a Green Line extension to West Medford.

Capital Features

This would be a 5.3-mile extension, including a new subway between Bowdoin and Lechmere, six new stations in Somerville and Medford, a relocated Lechmere Station, and a new underground Science Park Station. (Bowdoin Station itself is scheduled to be closed in conjunction with implementation of six-car train service on the Blue Line.) A variation adding about one half mile would run closer to Union Square in Somerville, via a new subway under Prospect Hill. This variation is not reflected in the capital cost estimate.

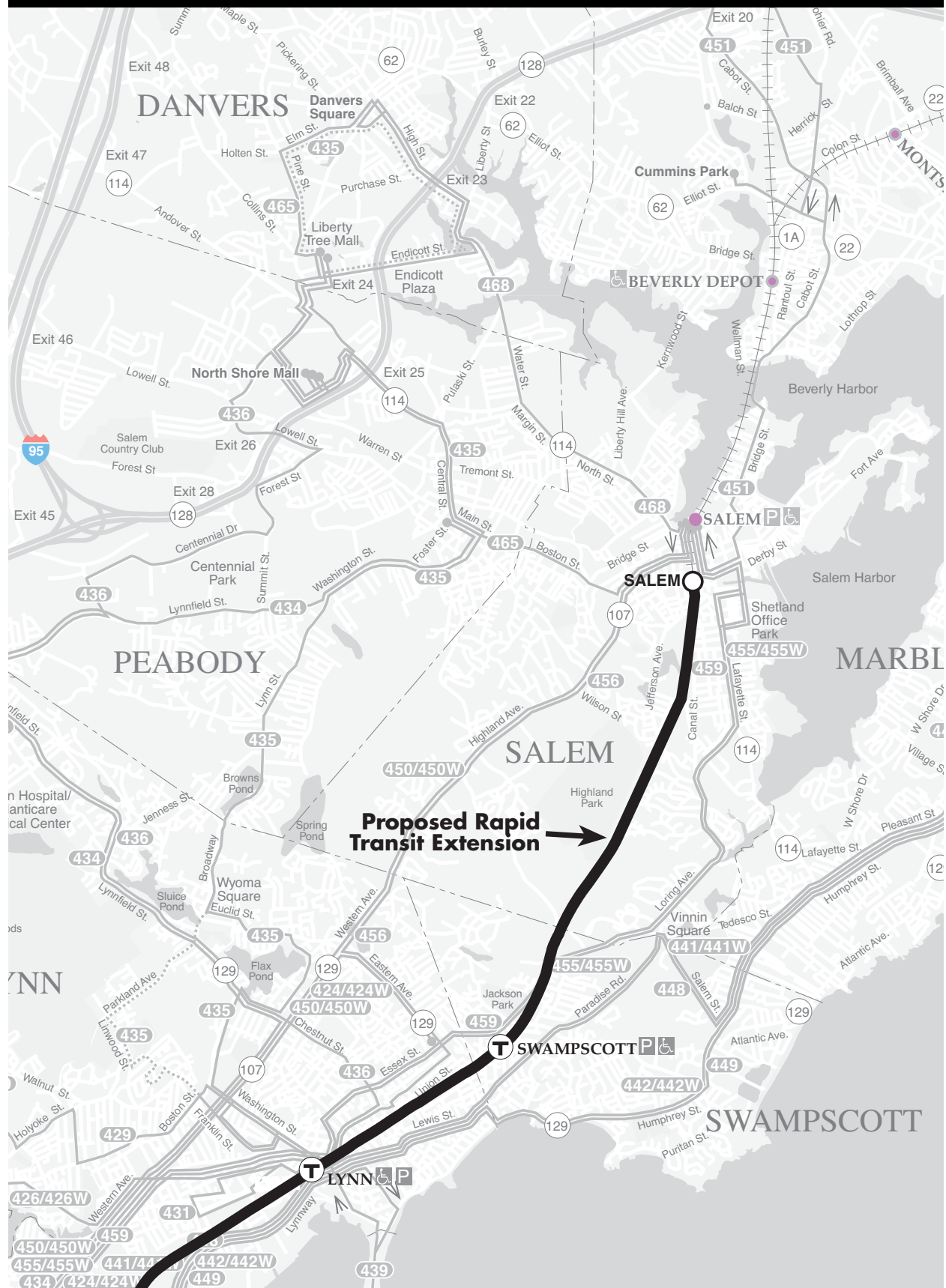
Capital Cost	\$696.5 million (Based on 1994 PMT, adjusted to 2003)
Operating Cost	\$76,800 per weekday
Daily Ridership Increase on Mode	13,500
Net Increase in Daily Transit Ridership	5,800
Capital Cost per New Transit Rider	\$119,500
Operating Cost per Wkday/New Transit Rider	\$13.20
Capital Cost/Travel Time Benefit	\$343,300 per hour
Operating Cost/Travel Time Benefit	\$37.90 per hour
Travel Time Savings	2,029 hours per weekday

Assessment

Overall, this project is rated medium priority. It would provide rail transit service to densely developed sections of Somerville and Medford that are currently served by bus routes connecting with the Green, Red, or Orange lines. It would serve more total riders and new transit riders than a Green Line extension to West Medford, but would also have a much higher capital cost per new transit rider. In absolute terms, it would be one of the most costly rapid transit projects examined. Travel times between extension stations and destinations in downtown Boston would be a few minutes faster via the Blue Line than via the Green Line. Air quality improvements would be about twice as great for a Blue Line extension as for a Green Line extension. It is rated high in economic and land use impacts. The majority of the stations would be located in state-designated revitalization areas where transit-oriented development is planned. This would include a mixture of high-density residential, commercial, and industrial development.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	►	►	►	►	►	●	●

MAP 5C-16 EXTEND BLUE LINE FROM LYNN TO SALEM





EXTEND BLUE LINE FROM LYNN TO SALEM

Description

This project would continue the proposed Lynn extension of the Blue Line 5 miles further north to Salem. The Blue Line would be constructed parallel to the Newburyport/Rockport commuter rail line, and the terminus would likely be placed south of the existing portal at the south end of the commuter rail tunnel under Downtown Salem. An intermediate stop would be located at Swampscott. The MBTA is currently evaluating this project as part of its Draft Environmental Impact Statement (DEIS) for the Revere to Salem corridor. It should be noted that this extension of the Blue Line is intended to complement – not replace – existing commuter rail service to the North Shore.

Capital Features

Construction of a rapid transit line extension parallel to an existing commuter rail line, purchase of additional vehicles.

Capital Cost	\$363.8 million (CTPS estimate)
Operating Cost	\$80,500 per weekday
Daily Ridership Increase on Mode	15,500
Net Increase in Daily Transit Ridership	8,900
Capital Cost/New Transit Rider	\$40,900
Operating Cost per Wkday/New Transit Rider	\$9.10
Capital Cost/Travel Time Benefit	\$666,400 per hour
Operating Cost/Travel Time Benefit	\$147.50 per hour
Travel Time Savings	546 hours per weekday

Assessment

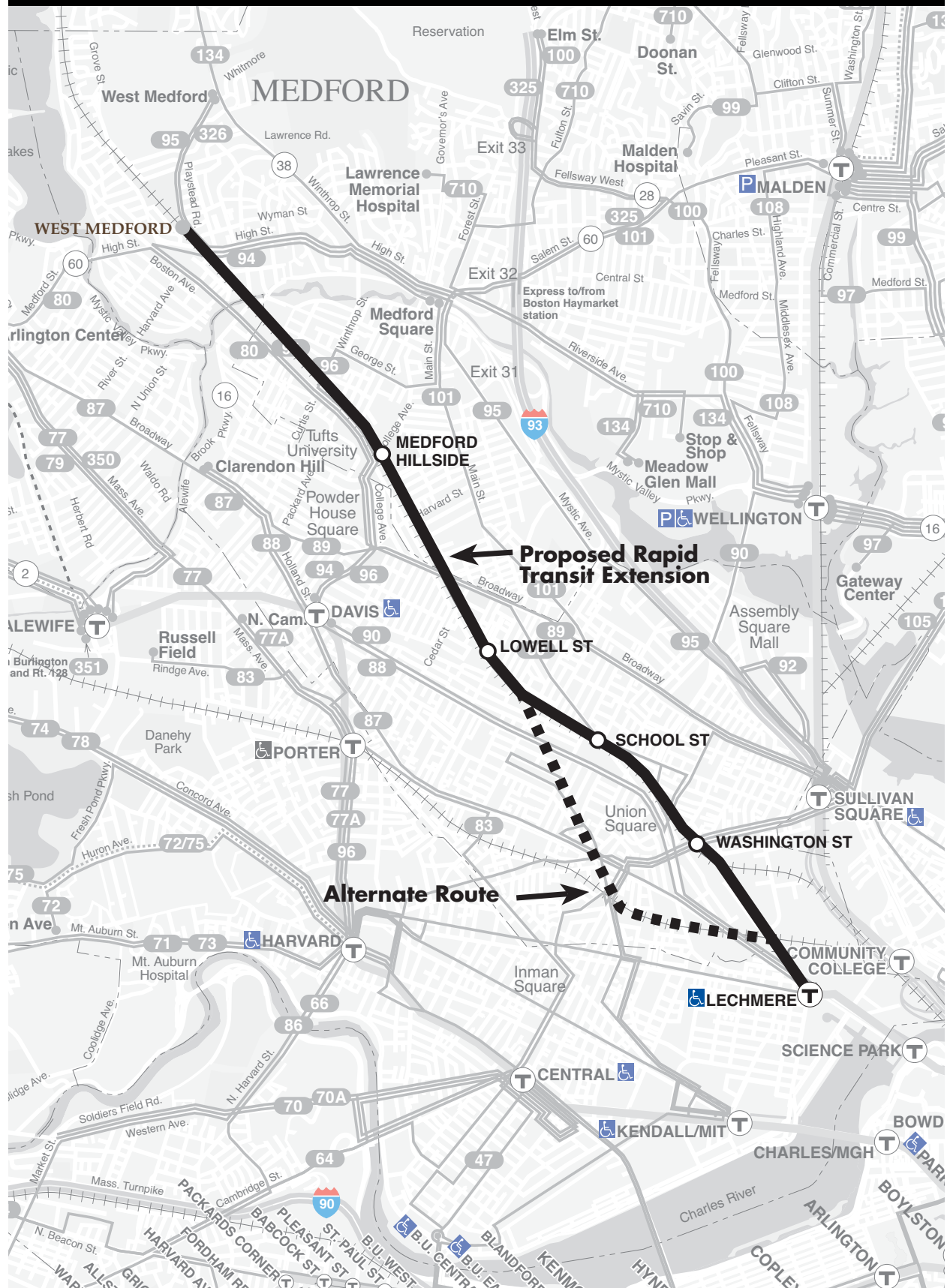
This is a medium priority rapid transit expansion project. The capital cost for this project would be \$363.8 million and the typical daily operating cost would be \$80,500. The extension would draw 15,900 riders to the rapid transit mode, of which 8,900 would be new transit riders. Capital costs per new transit rider would be \$40,900 and operating cost per new transit rider would be \$9.10. These costs are at the lower end of proposed rapid transit expansion projects, but they are surpassed by several other projects.

The improvements in air quality associated with this project are high, as there a large number of riders diverted from automobiles.

Frequency of transit service to Swampscott and Salem would increase compared to existing bus and commuter rail service. The proposed new station in Salem would also provide direct rapid transit access to an environmental justice target neighborhood not currently served by that mode.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	●	►	►	●	○	►	►

MAP 5C-17 GREEN LINE TO WEST MEDFORD





GREEN LINE TO WEST MEDFORD

Description

This project would extend Green Line service from Lechmere Station to West Medford partly via an existing rail freight line and partly beside the Lowell commuter rail line. It would be an alternative to a Blue Line extension to West Medford. A Green Line extension to Medford Hillside is a SIP, CA/T, and ACO legal commitment (see table 2-2).

Capital Features

This would be a 4.2-mile extension, including six new stations, in Somerville and Medford and a relocated Lechmere Station. A variation adding about one half mile would run closer to Union Square in Somerville, via a new subway under Prospect Hill. This variation is not reflected in the capital cost estimate.

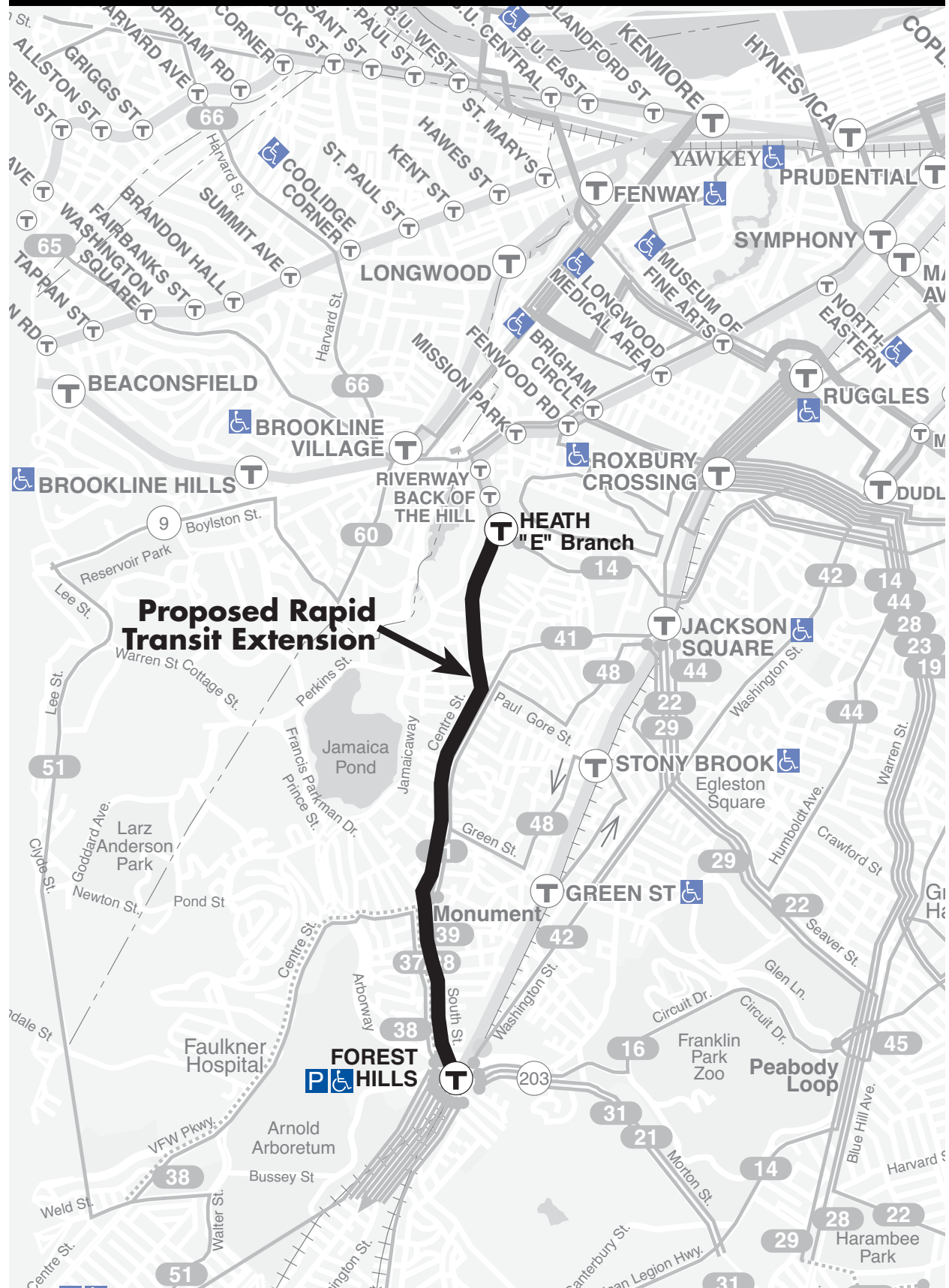
Capital Cost	\$375.0 million (Based on 2000–2025 RTP update)
Operating Cost	\$41,700 per weekday
Daily Ridership Increase on Mode	8,400
Net Increase in Daily Transit Ridership	3,500
Capital Cost per New Transit Rider	\$105,900
Operating Cost per Wkday/New Transit Rider	\$11.80
Capital Cost/Travel Time Benefit	\$227,640 per hour
Operating Cost/Travel Time Benefit	\$25.30 per hour
Travel Time Savings	1,647 hours per weekday

Assessment

Overall, this project is rated medium priority. It would provide rail transit service to densely developed sections of Somerville and Medford that are currently served by bus routes connecting with the Green, Red, or Orange lines. This would be of greater benefit in terms of convenience than of actual trip time, as it would result in fewer passengers having to transfer from bus to rail to make their trips. Air quality improvements would be only moderate, but the capital cost relative to the air quality benefits would fall in the lower range among rapid transit extensions examined. It is rated medium in economic and land use impacts. The majority of the stations would be located in state-designated revitalization areas where transit-oriented development is planned. This would include a mixture of high-density residential, commercial, and industrial development. The MBTA will soon begin work on an analysis of the extension of Green Line service to West Medford that will provide greater detail on this project.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	■	■	■	■	■	■	●

MAP 5C-18 RESTORE GREEN LINE SERVICE BETWEEN HEATH ST AND ARBORWAY





RESTORE GREEN LINE SERVICE BETWEEN HEATH ST AND ARBORWAY

Description

This project would restore service on the Green Line E-branch between Heath Street and Arborway, a distance of 1.9 miles. Rail service in this segment was last operated in 1985 with PCC streetcars. The infrastructure would need to be replaced and upgraded to allow for operation of modern light-rail equipment.

Restoration would include replacement of track, replacement of catenary and power systems, installation of accessible station platforms at intermediate stops, and construction of a storage yard at Arborway. This project is a SIP and ACO legal commitment (see table 2-2).

Capital Features

Reconstruction of 1.9 miles of street-running light rail trackage, construction of intermediate stations, and purchase of additional vehicles.

Capital Cost	\$71.9 million (Based on 2001 MBTA Planning Study)
Operating Cost	No added cost, would replace Route 39
Daily Ridership Increase on Mode	14,200
Net Increase in Daily Transit Ridership	200
Capital Cost/New Transit Rider	\$359,400
Operating Cost per Wkday/New Transit Rider	No added cost
Capital Cost/Travel Time Benefit	\$11,115,800
Operating Cost/Travel Time Benefit	No added cost
Travel Time Savings	6 hours per weekday

Assessment

This is a medium priority rapid transit expansion project. The capital cost for this project is \$71.9 million. Because this project would replace Route 39 bus service, there would be no anticipated increase in total system operating costs. Green Line service between Heath Street and Arborway was replaced with Route 39 bus service in December 1985. Restoration of Arborway service is a project required as part of Central Artery mitigation agreements. The existing E-Heath Street Green Line branch would be extended back to Arborway (Forest Hills) and Route 39 bus service discontinued. Green Line ridership would expand by 14,200 compared to the existing Heath Street service. Of this total, 200 passengers per day would be new transit riders, the majority would be former patrons of Route 39 bus service. The capital cost per new transit rider would be very high at \$359,400. There would be no increase in operating costs per new passenger however, as this project would replace bus Route 39.

Impacts on air quality would be low, as few new riders would be diverted from automobiles to this service. Part of the line would serve environmental justice communities. Restoration of service would provide one-seat rides between Jamaica Plain and Park Street, with improved transfers to the remainder of the rapid transit system. Frequency of service available in the entire corridor between Forest Hills and Copley, however, would be reduced, as the present overlap of service in the Heath Street-Copley segment between bus Route 39 and E-Heath Street Green Line service would be eliminated.

Type of Project	Utilization	Mobility	Cost-Effectiveness	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice
Line Extension	○	○	►	○	●	●	►