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## APPENDIX A

# System Expansion and Service Enhancement Project Performance Measures

### EXPLANATION OF MEASURES

System Expansion and Service Enhancement project ideas were evaluated based on 32 individual performance measures divided into 7 categories. Each of these categories and their component measures are listed and described below. In some cases, certain performance measures were listed as not applicable. This was especially common with service enhancement projects with no quantifiable ridership impact.

Project ideas were also divided into a number of different categories based on the nature of the project. First, system expansion projects were separated from service enhancement projects. In general, system expansion projects would result in the coverage area or span of service for a given mode expanding beyond what is currently provided. Service enhancement projects, however, would improve the quality of service provided on an existing transit line or at an existing station.

Project ideas were then further divided by mode. Commuter rail, rapid transit, bus/trackless trolley, and boat ideas were evaluated separately. This resulted in seven overall groupings of projects – system expansion and service enhancement projects for all modes except for boat. Only system expansion projects were submitted for consideration under the boat mode.

For each performance measure that was applicable to a given project, a high, medium, or low rating was assigned. In the case of quantitative measures, the thresholds for high, medium, and low ratings were defined by first listing the corresponding impacts of each project in order of magnitude. Natural breaks (large gaps between the impacts of successive projects in the list) were then identified and the first grouping was given a high rating, the second group a medium ratings, and so on. This resulted in a set of ratings for individual projects that were relative in nature.

In the case of qualitative measures, the thresholds for high, medium, and low ratings were defined before their application to specific project ideas. Additional details on these definitions for each measure are included below. In some cases, the vast majority of project ideas received the same rating on a given qualitative performance measure, unlike the approach for quantitative measures. For example, almost all project ideas that would have an impact on environmental justice target communities were determined to result in a greater benefit than burden to those communities. Consequently, almost all projects received high ratings on the measure called *Burdens and Benefits to Minority, Low Income, and Transit Dependent Neighborhoods*.

Descriptions of performance measures, by category, are as follows.

## **Utilization**

### ***Total Ridership***

- Projected increase in the number of weekday riders using the mode(s) corresponding to the transit line or station to be improved

### ***New Transit Riders***

- Projected increase in the number of weekday riders on the transit system as a whole

### ***Travel Time Benefit***

- Projected cumulative reduction in travel time experienced by all travelers in the region

### ***Impact on Mode Share to Key Destinations Including Downtown Boston***

- Projected percentage increase in weekday transit mode share, systemwide

### ***Reduction in Crowding***

- Projected reduction in weekday load factor on the transit line impacted by the project

## ***Reduction in Vehicle Miles Traveled***

- Projected percentage reduction in weekday automobile vehicle miles traveled, region-wide

## **Mobility**

### ***Expansion of Transit Access to Geographical Areas Underserved by Transit***

Projects receiving a high rating would:

- Initiate a new transit line or extend an existing line along a corridor connecting multiple urban neighborhoods or suburban municipalities not served by the MBTA or other Boston commuter services, or
- Fill gaps in the rapid transit/commuter rail network in urban core communities.

Projects receiving a medium rating would:

- Extend the rapid transit network beyond its current service area in multiple urban neighborhoods or suburban municipalities already served by transit, or
- Add additional rapid transit/commuter rail access points in an urban neighborhood or suburban municipality not currently served by that mode, or
- Initiate transit service along a corridor connecting multiple urban neighborhoods or suburban municipalities where existing commuter bus service serves the same market.

### ***Expansion of Transit Access During Time Periods Poorly Served by Transit***

Projects receiving a high rating would:

- Provide transit service to an urban neighborhood or suburban municipality during a time period not served by an existing well-utilized MBTA or Boston commuter transit line in that community.

Projects receiving a medium rating would:

- Provide transit service to an urban neighborhood or suburban municipality during a time period not served by an existing lightly-utilized MBTA or Boston commuter transit line in that community.

#### ***Expansion of Transit Access to a Major Employment Center Underserved by Transit***

Projects receiving a high rating would:

- Initiate a new transit line or extend an existing line to a large urban community outside Boston, or
- Initiate rapid transit/commuter rail service to a major employment center along a corridor not currently served by that mode.

Projects receiving a medium rating would:

- Initiate a new transit line or extend an existing line to a small urban community outside Boston.

### **Cost Effectiveness**

#### ***Capital Cost Per New Transit Rider***

- Ratio between the capital cost of the project and the projected increase in the number of weekday riders on the transit system as a whole

#### ***Operating Cost Per New Transit Rider***

- Ratio between typical weekday operating cost of the project and the projected increase in the number of weekday riders on the transit system as a whole

#### ***Capital Cost Per Unit Travel Time Savings***

- Ratio between the capital cost of the project and the projected cumulative reduction in travel time experienced by all travelers in the region.

#### ***Operating Cost Per Unit Travel Time Savings***

- Ratio between the typical weekday operating cost of the project and the projected cumulative reduction in travel time experienced by all travelers in the region.

### **Air Quality**

#### ***Percent Reduction in Volatile Organic Compound (VOC) Emissions***

- Projected percentage reduction in VOC emissions on weekdays, regionwide

#### ***Percent Reduction in Nitrogen Oxide (NO<sub>x</sub>) Emissions***

- Projected percentage reduction in NO<sub>x</sub> emissions on weekdays, regionwide

#### ***Percent Reduction in Carbon Monoxide (CO) Emissions***

- Projected percentage reduction in CO emissions on weekdays, regionwide

#### ***Percent Reduction in Carbon Dioxide (CO<sub>2</sub>) Emissions***

- Projected percentage reduction in CO<sub>2</sub> emissions on weekdays, regionwide

#### ***Capital Cost Per Unit Reduction in VOC Emissions***

- Ratio between the capital cost of the project and the projected reduction in VOC emissions on weekdays, regionwide

#### ***Capital Cost Per Unit Reduction in NO<sub>x</sub> Emissions***

- Ratio between the capital cost of the project and the projected reduction in NO<sub>x</sub> emissions on weekdays, regionwide

### ***Capital Cost Per Unit Reduction in CO Emissions***

- Ratio between the capital cost of the project and the projected reduction in CO emissions on weekdays, regionwide

### ***Capital Cost Per Unit Reduction in CO<sub>2</sub> Emissions***

- Ratio between the capital cost of the project and the projected reduction in CO<sub>2</sub> emissions on weekdays, regionwide

## **Service Quality**

### ***Enhancements to Customers' Personal Safety***

Projects receiving a high rating would:

- Enhance the personal safety and security of passengers and provide MBTA operating personnel with improved means of responding to on-board emergencies.

Projects receiving a medium rating would:

- Enhance the personal safety and security of passengers.

### ***Improvements to Station Access and/or Comfort of Vehicles and Stations***

Projects receiving a high rating would:

- Improve the access to stations or comfort of vehicles or stations for a large portion of passengers on a transit line.

Projects receiving a medium rating would:

- Improve the access to stations or comfort of vehicles or stations for a small portion of passengers on a transit line.

### ***Improvements to Reliability of Service***

Projects receiving a high rating would:

- Improve the schedule adherence of an existing bus line by removing vehicles from mixed traffic and placing them in an exclusive right-of-way, or

- Provide operating personnel with improved means of correcting schedule adherence problems in real time
- Improve the schedule adherence of an existing rapid transit or commuter rail line by expanding the capacity of constricted sections.

Projects receiving a medium rating would:

- Improve the schedule adherence of an existing bus line by removing vehicles from mixed traffic and placing them in a prioritized right-of-way, or
- Provide operating personnel with improved means of identifying schedule adherence problems on transit lines.

### ***Improvements to Interconnectivity Between Modes (Including Non-Motorized Modes)***

Projects receiving a high rating would:

- Initiate new connectivity to an additional mode for an existing transit line, or
- Initiate new connectivity to an additional rapid transit line for an existing rapid transit line, or
- Substantially expand the number of destinations accessible by a single bus-rapid transit transfer for an existing rapid transit line.

Projects receiving a medium rating would:

- Provide an additional transfer point between two lines already connected elsewhere, or
- Expand the number of destinations accessible by a single bus-rapid transit transfer for an existing rapid transit line.

### ***Customer Information Including Navigational Tools***

Projects receiving a high rating would:

- Directly improve the amount of route planning or service performance information available to passengers.

Projects receiving a medium rating would:

- Facilitate the provision of additional route planning or service performance information available to passengers.

### ***Elimination of Transfers/Minimization of Transfer Time***

Projects receiving a high rating would:

- Reduce the number of transfers necessary for residents of multiple urban neighborhoods or suburban municipalities to reach major employment centers, or
- Substantially reduce overall transit travel time by improving the efficiency of vehicle-vehicle transfers.

Projects receiving a medium rating would:

- Reduce the number of transfers necessary for residents of an urban neighborhood or suburban municipality to reach major employment centers.

## **Economic and Land Use Impacts**

### ***Service to a State-Designated Revitalization Area/Initiative***

Projects receiving a high rating are those for which:

- At least 2/3 of the stations along the line are located in Economically Distressed Areas (EDAs).

Projects receiving a medium rating are those for which:

- At least 1/3 of the stations along the line are located in EDAs.

### ***Consistency With Local Plans That Promote Coordinated, Transit-Oriented Development and Support Sustainable Land Use Patterns In the Immediately Surrounding Area(s)***

Projects receiving a high rating are those for which:

- At least 1/2 of the stations along the line are located in areas zoned for mixed-use development.

Projects receiving a medium rating are those for which:

- At least 1/2 of the stations along the line are located in areas zoned for both high density residential and commercial development, or zoned for industrial development.

### ***Consistency with Regional Plans***

Projects receiving a high rating are those for which:

- At least 1/2 of the stations along the line are located in urban areas or Concentrated Development Centers (CDC).

Projects receiving a medium rating are those for which:

- At least 1/2 of the stations along the line are located in urban areas or multi-service areas.

### ***Support for Brownfield and Infill Development***

Projects receiving a high rating would:

- Entirely serve a large brownfield site.

Projects receiving a medium rating are those for which:

- At least 1/2 of the stations along the line are located near an EOEA-designated 21E site.

## **Environmental Justice**

### ***Service to Minority, Low Income, and Transit Dependent Neighborhoods***

Projects receiving a high rating would:

- Almost exclusively serve communities that meet at least two of the following three environmental justice target criteria: above-average minority population, median income less than 75% of regionwide median, and above 50% transit dependent population.

Projects receiving a medium rating would:

- Serve environmental justice target communities, as defined above.

### ***Rectification of Structural and/or Operational Transportation Barriers Faced By Minority, Low Income, and Transit Dependent Neighborhoods***

Projects receiving a high rating would:

- Rectify a substantial structural and/or operational transportation barrier preventing direct access from environmental justice target communities to major urban core employment centers.

Projects receiving a medium rating would:

- Rectify a minor structural and/or operational transportation barrier preventing direct access from environmental justice target communities to major urban core employment centers.

### ***Response to Environmental Justice Issues Identified in MPO Regional Transportation Plans, Including Poor Connections Between Targeted Residential Neighborhoods and Major Employment Centers***

Projects receiving a high rating would:

- Substantially address an environmental justice issue identified in a MPO Regional Transportation Plan.

Projects receiving a medium rating would:

- Partially address an environmental justice issue identified in a MPO Regional Transportation Plan.

### ***Burdens and Benefits to Minority, Low Income, and Transit Dependent Neighborhoods***

Projects receiving a high rating would:

- Provide benefits to an environmental justice target neighborhood at a level commensurate with or greater than any burdens.

Projects receiving a medium rating would:

- Provide benefits to an environmental justice target neighborhood at a level less than the resulting burdens.

Projects receiving a low rating would:

- Result in a burden on an environmental justice target neighborhood without corresponding benefits.

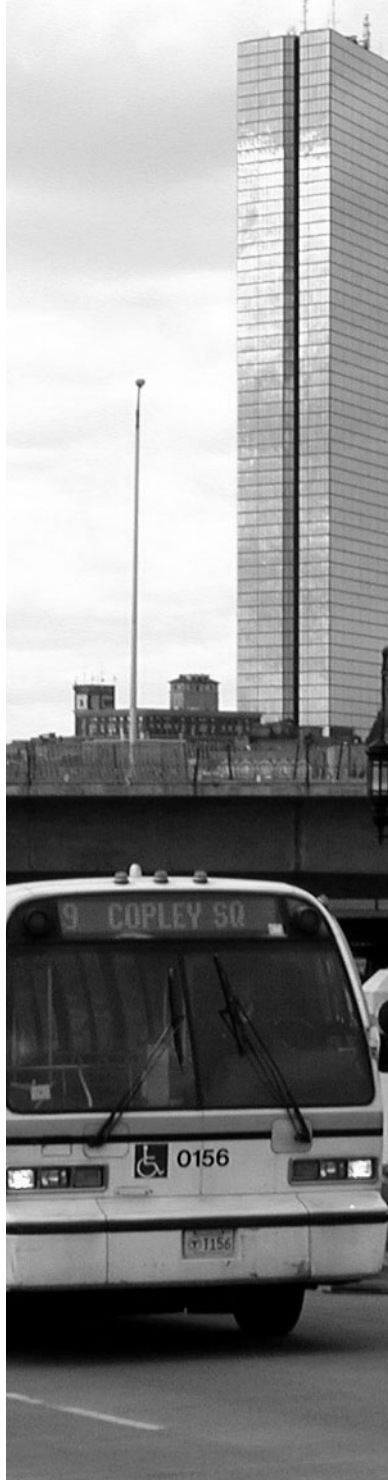




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# APPENDIX B

## Detailed System Expansion and Service Enhancement Project Ratings

As discussed in chapter 1 and described in greater detail in appendix A, each of the system expansion and service enhancement project ideas were evaluated according to 36 individual performance measures (when applicable). These measures were divided into 7 categories.

In this appendix, tables display the ratings of each project with respect to each performance measure. In particular, there are sets of tables for each transit mode, and within each mode there is a table for each category of performance measures. The cumulative project ratings for each of these categories are reflected in the tables, and at the bottom of each project assessment included in chapters 5B and 5C.

Project rating tables begin on the following pages:

- Rapid transit enhancement projects . . . . .B-5
- Bus/trackless trolley enhancement projects . . . . .B-12
- Commuter rail enhancement projects . . . . .B-19
- Systemwide enhancement projects . . . . .B-26
- Rapid transit expansion projects . . . . .B-35
- Bus/trackless trolley expansion projects . . . . .B-43
- Commuter rail expansion projects . . . . .B-50
- Boat expansion projects . . . . .B-58





# Service Enhancement Project Evaluation Ratings



**TABLE B-1 RAPID TRANSIT PROJECT EVALUATION – UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd.	Reduct. in VMT	Travel Time Savings	Total
Operate 4-car trains on Green Line	Facility Improvement	▸	▸	▸	●	▸	▸	▸
Operate 8-car trains on Orange Line	Facility Improvement	▸	▸	▸	●	▸	▸	▸
Operate 8-car trains on Red Line	Facility Improvement	▸	▸	▸	●	▸	▸	▸
Signal and Train Control Imp. on Blue Line	Facility Improvement	●	●	●	●	●	▸	●
Signal and Train Control Imp. on Green Line	Facility Improvement	○	○	○	○	○	○	○
Signal and Train Control Imp. on Red Line	Facility Improvement	●	●	●	●	●	▸	●
Signal and Train Control Imp. on Orange Line	Facility Improvement	●	●	●	●	●	●	●
Commonwealth Flats Silver Line Grade Separation	Travel Time Improvement	○	○	○	○	○	○	○
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improvement	○	○	○	○	○	○	○

**TABLE B-2 RAPID TRANSIT PROJECT EVALUATION – MOBILITY**

Project Description	Type	Service to Areas With Unmet Demand	Service During Time Periods With Unmet Demand	Service to Underserved Employment Centers	Total
Operate 4-car trains on Green Line	Facility Improvement	○	○	○	○
Operate 8-car trains on Orange Line	Facility Improvement	○	○	○	○
Operate 8-car trains on Red Line	Facility Improvement	○	○	○	○
Signal and Train Control Imp. on Blue Line	Facility Improvement	○	○	○	○
Signal and Train Control Imp. on Green Line	Facility Improvement	○	○	○	○
Signal and Train Control Imp. on Red Line	Facility Improvement	○	○	○	○
Signal and Train Control Imp. on Orange Line	Facility Improvement	○	○	○	○
Commonwealth Flats Silver Line Grade Separation	Travel Time Improvement	○	○	○	○
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improvement	○	○	○	○

**TABLE B-3 RAPID TRANSIT PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Operating Cost Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Operating Per Unit Travel Time Savings	Total
Operate 4-car trains on Green Line	Facility Improvement	○	○	○	○	○
Operate 8-car trains on Orange Line	Facility Improvement	▸	▸	▸	▸	▸
Operate 8-car trains on Red Line	Facility Improvement	▸	▸	▸	▸	▸
Signal and Train Control Imp. on Blue Line	Facility Improvement	▸	●	●	●	●
Signal and Train Control Imp. on Green Line	Facility Improvement	○	○	○	○	○
Signal and Train Control Imp. on Red Line	Facility Improvement	▸	▸	▸	▸	▸
Signal and Train Control Imp. on Orange Line	Facility Improvement	▸	●	●	●	●
Commonwealth Flats Silver Line Grade Separation	Travel Time Improvement	○	N/A	○	N/A	○
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improvement	●	N/A	●	N/A	●

**TABLE B-4 RAPID TRANSIT PROJECT EVALUATION – AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Operate 4-car trains on Green Line	Facility Improve.	▶	▶	▶	▶	○	○	○	○	○
Operate 8-car trains on Orange Line	Facility Improve.	▶	▶	▶	▶	▶	▶	▶	▶	▶
Operate 8-car trains on Red Line	Facility Improve.	▶	▶	▶	▶	▶	▶	▶	▶	▶
Signal and Train Control Imp. on Blue Line	Facility Improve.	●	●	●	●	▶	▶	▶	▶	●
Signal and Train Control Imp. on Green Line	Facility Improve.	○	○	○	○	○	○	○	○	○
Signal and Train Control Imp. on Red Line	Facility Improve.	●	●	●	●	▶	▶	▶	▶	●
Signal and Train Control Imp. on Orange Line	Facility Improve.	●	●	●	●	▶	▶	▶	▶	●
Commonwealth Flats Silver Line Grade Separation	Travel Time Improve.	○	○	○	○	○	○	○	○	○
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improve.	○	○	○	○	●	●	●	●	▶



**TABLE B-5 RAPID TRANSIT PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter- connectivity	Customer Info.	Minimize Transfers	Total
Operate 4-car trains on Green Line	Facility Improve.	○	○	○	○	○	○	○
Operate 8-car trains on Orange Line	Facility Improve.	○	○	○	○	○	○	○
Operate 8-car trains on Red Line	Facility Improve.	○	○	○	○	○	○	○
Signal and Train Control Imp. on Blue Line	Facility Improve.	○	○	●	○	○	○	►
Signal and Train Control Imp. on Green Line	Facility Improve.	►	○	●	○	○	○	►
Signal and Train Control Imp. on Red Line	Facility Improve.	○	○	●	○	○	○	►
Signal and Train Control Imp. on Orange Line	Facility Improve.	○	○	●	○	○	○	►
Commonwealth Flats Silver Line Grade Separation	Travel Time Improve.	○	○	●	○	○	○	►
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improve.	○	○	●	○	○	○	►

**TABLE B-6 RAPID TRANSIT PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighborhoods	Rectify Barriers	Responds to EJ Issues in RTP	Burdens on Target Neighborhoods	Total
Operate 4-car trains on Green Line	Facility Improvement	▶	○	○	●	▶
Operate 8-car trains on Orange Line	Facility Improvement	●	○	○	●	●
Operate 8-car trains on Red Line	Facility Improvement	▶	○	○	●	▶
Signal and Train Control Imp. on Blue Line	Facility Improvement	●	○	○	N/A	▶
Signal and Train Control Imp. on Green Line	Facility Improvement	▶	○	○	N/A	○
Signal and Train Control Imp. on Red Line	Facility Improvement	▶	○	○	N/A	○
Signal and Train Control Imp. on Orange Line	Facility Improvement	●	○	○	N/A	▶
Commonwealth Flats Silver Line Grade Separation	Travel Time Improvement	▶	▶	○	N/A	▶
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improvement	▶	▶	○	●	▶

**TABLE B-7 RAPID TRANSIT PROJECT EVALUATION – OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Environ. Justice	Total
Operate 4-car trains on Green Line	Facility Improve.	▸	○	○	○	○	▸	○
Operate 8-car trains on Orange Line	Facility Improve.	▸	○	▸	▸	○	●	▸
Operate 8-car trains on Red Line	Facility Improve.	▸	○	▸	▸	○	▸	▸
Signal and Train Control Imp. on Blue Line	Facility Improve.	●	○	●	●	▸	▸	●
Signal and Train Control Imp. on Green Line	Facility Improve.	○	○	○	○	▸	○	○
Signal and Train Control Imp. on Red Line	Facility Improve.	●	○	▸	●	▸	○	●
Signal and Train Control Imp. on Orange Line	Facility Improve.	●	○	●	●	▸	▸	●
Commonwealth Flats Silver Line Grade Separation	Travel Time Improve.	○	○	○	○	○	▸	○
Preemptive signals on Beacon, Commonwealth, and Huntington	Travel Time Improve.	○	○	●	▸	○	▸	▸

**TABLE B-8 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd- ing	Reduct. in VMT	Travel Time Savings	Total
Install automatic passenger counters on buses	Facility Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install 300 shelters	Facility Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improvement	▸	○	▸	○	▸	▸	▸
Install Intelligent Transportation System(ITS) systems for bus fleet	Travel Time Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Purchase 100 new buses	Frequency Improvement	●	▸	▸	▸	▸	●	●

**TABLE B-9 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – MOBILITY**

Project Description	Type	Service to Areas with Unmet Demand	Service During Time with Unmet Demand	Service to Underserved Employment Centers	Total
Install automatic passenger counters on buses	Facility Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Install 300 shelters	Facility Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Install Intelligent Transportation System (ITS) systems for bus fleet	Travel Time Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Purchase 100 new buses	Frequency Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**TABLE B-10 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Net Operating Costs Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Net Operating Costs Per Unit Travel Time Savings	Total
Install automatic passenger counters on buses	Facility Improvement	N/A	N/A	N/A	N/A	N/A
Install 300 shelters	Facility Improvement	N/A	N/A	N/A	N/A	N/A
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improvement	○	N/A	◐	N/A	○
Install Intelligent Transportation System (ITS) systems for bus fleet	Travel Time Improvement	N/A	N/A	N/A	N/A	N/A
Purchase 100 new buses	Frequency Improvement	◐	○	●	●	◐



**TABLE B-11 BUS/TRACKLESS TROLLEY PROJECT EVALUATION - AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Install automatic passenger counters on buses	Facility Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install 300 shelters	Facility Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improve.	▷	●	▷	▷	▷	▷	▷	▷	▷
Install Intelligent Transportation System (ITS) systems for bus fleet	Travel Time Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Purchase 100 new buses	Frequency Improve.	○	○	○	○	○	○	○	○	○

**TABLE B-12 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter connectivity	Customer Informa- tion	Minimize Transfers	Total
Install automatic passenger counters on buses	Facility Improvement	○	○	◐	○	○	○	○
Install 300 shelters	Facility Improvement	◐	●	○	○	◐	○	◐
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improvement	○	◐	●	○	○	○	◐
Install Intelligent Transportation System (ITS) systems for bus fleet	Travel Time Improvement	●	○	●	○	●	○	●
Purchase 100 new buses	Frequency Improvement	○	○	○	○	○	○	○

**TABLE B-13 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighborhoods	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Install automatic passenger counters on buses	Facility Improvement	○	○	○	N/A	○
Install 300 shelters	Facility Improvement	●	●	●	●	●
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improvement	●	○	●	●	●
Install Intelligent Transportation System (ITS) systems for bus fleet	Travel Time Improvement	●	○	●	●	●
Purchase 100 new buses	Frequency Improvement	●	○	●	●	●

**TABLE B-14 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Environ. Justice	Total
Install automatic passenger counters on buses	Facility Improvement	N/A	○	N/A	N/A	○	○	○
Install 300 shelters	Facility Improvement	N/A	○	N/A	N/A	◐	●	●
Add exclusive lanes and priority signals along the top ten highest ridership bus routes.	Travel Time Improvement	◐	○	○	◐	◐	●	◐
Install Intelligent Transportation System(ITS) systems for bus fleet	Travel Time Improvement	N/A	○	N/A	N/A	●	◐	●
Purchase 100 new buses	Frequency Improvement	●	○	◐	○	○	●	◐

**TABLE B-15 COMMUTER RAIL PROJECT EVALUATION - UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd- ing	Reduct. in VMT	Travel Time Savings	Total
Add bike racks to coaches	Facility Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Expand the waiting area at North Station	Facility Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improvement	○	○	○	○	○	○	○
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Upgrade station signage for commuter rail systemwide	Facility Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Increase speed and frequency of Needham service	Freq./Trav. Time Improv.	◓	◓	◓	○	◓	◓	◓
Build new layover facility in Bellingham for the Franklin Line	Frequency Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Expand Reverse Commuting Options	Frequency Improvement	●	●	○	○	●	●	●
Install a fourth track on the Fort Point Channel Bridge	Frequency Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install double-tracking on entire commuter rail system	Frequency Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improvement	○	○	○	○	○	○	○
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improvement	◓	◓	○	◓	◓	○	◓
Operate more frequent service between Framingham and Worcester	Frequency Improvement	◓	◓	○	◓	◓	◓	◓
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improvement	◓	◓	◓	○	◓	◓	◓
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Electrify all commuter rail lines	Travel Time Improvement	◓	◓	◓	◓	◓	◓	◓
Operate express service from outer stations	Travel Time Improvement	●	●	●	●	●	●	●

**TABLE B-16 COMMUTER RAIL PROJECT EVALUATION - MOBILITY**

Project Description	Type	Service to Areas with Unmet Demand	Service During Time with Unmet Demand	Service to Underserved Employment Centers	Total
Add bike racks to coaches	Facility Improvement	○	○	○	○
Expand the waiting area at North Station	Facility Improvement	○	○	○	○
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improvement	◐	○	○	◐
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improvement	○	○	○	○
Upgrade station signage for commuter rail systemwide	Facility Improvement	○	○	○	○
Increase speed and frequency of Needham service	Freq/Trav. Time Improv.	○	○	○	○
Build new layover facility in Bellingham for the Franklin Line	Frequency Improvement	○	○	○	○
Expand Reverse Commuting Options	Frequency Improvement	○	●	●	●
Install a fourth track on the Fort Point Channel Bridge	Frequency Improvement	○	○	○	○
Install double-tracking on entire commuter rail system	Frequency Improvement	○	○	○	○
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improvement	○	○	○	○
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improvement	○	○	◐	◐
Operate more frequent service between Framingham and Worcester	Frequency Improvement	○	◐	○	◐
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improvement	○	●	○	●
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improvement	○	○	○	○
Electrify all commuter rail lines	Travel Time Improvement	○	○	○	○
Operate express service from outer stations	Travel Time Improvement	○	○	○	○



**TABLE B-17 COMMUTER RAIL PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Net Operating Costs Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Net Operating Costs Per Unit Travel Time Savings	Total
Add bike racks to coaches	Facility Improvement	N/A	N/A	N/A	N/A	N/A
Expand the waiting area at North Station	Facility Improvement	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improvement	●	N/A	▶	N/A	●
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improvement	N/A	N/A	N/A	N/A	N/A
Upgrade station signage for commuter rail systemwide	Facility Improvement	N/A	N/A	N/A	N/A	N/A
Increase speed and frequency of Needham service	Freq/Trav. Time Improv.	▶	○	▶	○	○
Build new layover facility in Bellingham for the Franklin Line	Frequency Improvement	N/A	N/A	N/A	N/A	N/A
Expand Reverse Commuting Options	Frequency Improvement	●	▶	●	▶	▶
Install a fourth track on the Fort Point Channel Bridge	Frequency Improvement	N/A	N/A	N/A	N/A	N/A
Install double-tracking on entire commuter rail system	Frequency Improvement	N/A	N/A	N/A	N/A	N/A
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improvement	○	N/A	○	N/A	○
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improvement	●	●	▶	○	▶
Operate more frequent service between Framingham and Worcester	Frequency Improvement	N/A	●	N/A	●	●
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improvement	○	○	○	▶	○
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improvement	N/A	N/A	N/A	N/A	N/A
Electrify all commuter rail lines	Travel Time Improvement	○	N/A	○	N/A	○
Operate express service from outer stations	Travel Time Improvement	●	▶	●	●	●

**TABLE B-18 COMMUTER RAIL PROJECT EVALUATION – AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Add bike racks to coaches	Facility Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Expand the waiting area at North Station	Facility Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improve.	○	○	▸	▸	●	●	●	●	▸
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Upgrade station signage for commuter rail systemwide	Facility Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Increase speed and frequency of Needham service	Freq/Trav. Time Improv.	○	○	▸	▸	○	○	▸	●	○
Build new layover facility in Bellingham for the Franklin Line	Frequency Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Expand Reverse Commuting Options	Frequency Improve.	▸	○	●	●	▸	○	●	●	▸
Install a fourth track on the Fort Point Channel Bridge	Frequency Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install double-tracking on entire commuter rail system	Frequency Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improve.	○	○	▸	▸	▸	▸	▸	▸	▸
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improve.	▸	○	▸	▸	●	○	●	●	▸
Operate more frequent service between Framingham and Worcester	Frequency Improvement	▸	○	●	▸					▸
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improve.	○	○	○	○	○	○	○	○	○
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Electrify all commuter rail lines	Travel Time Improve.	●	●	●	●	●	●	▸	▸	●
Operate express service from outer stations	Travel Time Improve.	▸	○	●	●	▸	○	●	●	▸

**TABLE B-19 COMMUTER RAIL PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter connectivity	Customer Info.	Minimize Transfers	Total
Add bike racks to coaches	Facility Improvement	○	◐	○	●	○	○	◐
Expand the waiting area at North Station	Facility Improvement	○	●	○	○	◐	○	◐
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improvement	◐	◐	○	●	○	○	◐
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improvement	○	◐	◐	○	○	○	◐
Upgrade station signage for commuter rail systemwide	Facility Improvement	○	○	○	○	●	○	◐
Increase speed and frequency of Needham service	Freq/Trav. Time Improv.	○	○	○	○	○	◐	○
Build new layover facility in Bellingham for the Franklin Line	Frequency Improvement	○	○	○	○	○	○	○
Expand Reverse Commuting Options	Frequency Improvement	○	○	○	○	○	●	◐
Install a fourth track on the Fort Point Channel Bridge	Frequency Improvement	○	○	●	○	○	○	◐
Install double-tracking on entire commuter rail system	Frequency Improvement	○	○	●	○	○	○	◐
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improvement	○	○	○	○	○	○	○
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improvement	○	○	○	○	○	●	◐
Operate more frequent service between Framingham and Worcester	Frequency Improvement	○	○	○	○	○	○	○
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improvement	○	○	○	○	○	○	○
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improvement	○	◐	○	○	○	○	○
Electrify all commuter rail lines	Travel Time Improvement	○	○	○	○	○	○	○
Operate express service from outer stations	Travel Time Improvement	○	○	○	○	○	○	○

**TABLE B-20 COMMUTER RAIL PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighborhoods	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Add bike racks to coaches	Facility Improvement	N/A	○	○	N/A	○
Expand the waiting area at North Station	Facility Improvement	▮	○	○	N/A	○
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improvement	○	▮	○	N/A	○
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improvement	▮	○	○	●	▮
Upgrade station signage for commuter rail systemwide	Facility Improvement	▮	○	○	●	▮
Increase speed and frequency of Needham service	Freq/Trav. Time Improv.	○	○	○	N/A	○
Build new layover facility in Bellingham for the Franklin Line	Frequency Improvement	○	▮	○	N/A	○
Expand Reverse Commuting Options	Frequency Improvement	▮	▮	○	N/A	▮
Install a fourth track on the Fort Point Channel Bridge	Frequency Improvement	▮	▮	○	●	●
Install double-tracking on entire commuter rail system	Frequency Improvement	▮	▮	○	N/A	▮
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improvement	○	▮	○	N/A	○
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improvement	▮	▮	○	●	●
Operate more frequent service between Framingham and Worcester	Frequency Improvement	▮	▮	○	●	●
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improvement	▮	▮	○	N/A	▮
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improvement	○	○	○	N/A	○
Electrify all commuter rail lines	Travel Time Improvement	▮	○	○	N/A	○
Operate express service from outer stations	Travel Time Improvement	▮	○	○	N/A	○

**TABLE B-21 COMMUTER RAIL PROJECT EVALUATION - OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Environ. Justice	Total
Add bike racks to coaches	Facility Improvement	N/A	○	N/A	N/A	▸	○	○
Expand the waiting area at North Station	Facility Improvement	N/A	○	N/A	N/A	▸	○	○
Improve pedestrian access to Anderson RTC from western side of tracks	Facility Improvement	○	▸	●	▸	▸	○	▸
Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines where it is not presently in place	Facility Improvement	N/A	○	N/A	N/A	▸	▸	▸
Upgrade station signage for commuter rail systemwide	Facility Improvement	N/A	○	N/A	N/A	▸	▸	▸
Increase speed and frequency of Needham service	Freq/Trav. Time Improv.	▸	○	○	○	○	○	○
Build new layover facility in Bellingham for the Franklin Line	Frequency Improvement	N/A	○	N/A	N/A	○	○	○
Expand Reverse Commuting Options	Frequency Improvement	●	●	▸	▸	▸	▸	●
Install a fourth track on the Fort Point Channel Bridge	Frequency Improvement	N/A	○	N/A	N/A	▸	●	▸
Install double-tracking on entire commuter rail system	Frequency Improvement	N/A	○	N/A	N/A	▸	▸	▸
Install platforms on both sides of tracks at stations in Newton so that reverse commuting trips may make more stops.	Frequency Improvement	○	○	○	▸	○	○	○
Operate a Yawkey-Back Bay-South Station shuttle	Frequency Improvement	▸	▸	▸	▸	▸	●	●
Operate more frequent service between Framingham and Worcester	Frequency Improvement	▸	▸	●	▸	○	●	●
Purchase diesel multiple unit trains to allow for increased frequency on commuter rail lines	Frequency Improvement	▸	●	○	○	○	▸	○
Construct high platforms at all Providence Line stations not so equipped and expand to other lines at a later date	Travel Time Improvement	N/A	○	N/A	N/A	○	○	○
Electrify all commuter rail lines	Travel Time Improvement	▸	○	○	●	○	○	○
Operate express service from outer stations	Travel Time Improvement	●	○	●	▸	○	○	▸

**TABLE B-22 SYSTEMWIDE PROJECT EVALUATION – UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd- ing	Reduct. in VMT	Travel Time Savings	Total
Add bike racks to coaches	Access Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Add more motorcycle parking spaces systemwide	Access Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improvement	○	○	○	○	○	○	○
Install bike racks at rapid transit and commuter rail stations	Access Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install more enclosed waiting areas along MBTA lines	Access Improvement	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**TABLE B-23 SYSTEMWIDE PROJECT EVALUATION - MOBILITY**

Project Description	Type	Service to Areas with Unmet Demand	Service During Time with Unmet Demand	Service to Underserved Employment Centers	Total
Add bike racks to coaches	Access Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Add more motorcycle parking spaces systemwide	Access Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improvement	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Install bike racks at rapid transit and commuter rail stations	Access Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Install more enclosed waiting areas along MBTA lines	Access Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**TABLE B-24 SYSTEMWIDE PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Net Operating Costs Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Net Operating Costs Per Unit Travel Time Savings	Total
Add bike racks to coaches	Access Improvement	N/A	N/A	N/A	N/A	N/A
Add more motorcycle parking spaces systemwide	Access Improvement	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improvement	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improvement	●	N/A	●	N/A	●
Install bike racks at rapid transit and commuter rail stations	Access Improvement	N/A	N/A	N/A	N/A	N/A
Install more enclosed waiting areas along MBTA lines	Access Improvement	N/A	N/A	N/A	N/A	N/A



**TABLE B-25 SYSTEMWIDE PROJECT EVALUATION – AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Add bike racks to coaches	Access Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Add more motorcycle parking spaces systemwide	Access Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improve.	○	○	◐	◐	◐	◐	●	●	◐
Install bike racks at rapid transit and commuter rail stations	Access Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install more enclosed waiting areas along MBTA lines	Access Improve.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**TABLE B-26 SYSTEMWIDE PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter connectivity	Customer Informa- tion	Minimize Transfers	Total
Add bike racks to coaches	Access Improvement	○	▸	○	●	○	○	▸
Add more motorcycle parking spaces systemwide	Access Improvement	○	▸	○	▸	○	○	○
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improvement	▸	▸	○	●	○	○	●
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improvement	▸	▸	○	●	○	○	●
Install bike racks at rapid transit and commuter rail stations	Access Improvement	○	▸	○	●	○	○	▸
Install more enclosed waiting areas along MBTA lines	Access Improvement	▸	●	○	○	▸	○	●

**TABLE B-27 SYSTEMWIDE PROJECT EVALUATION - ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighborhoods	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Add bike racks to coaches	Access Improvement	N/A	○	○	N/A	○
Add more motorcycle parking spaces systemwide	Access Improvement	◐	○	○	●	◐
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improvement	◐	◐	○	●	●
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improvement	○	◐	○	●	◐
Install bike racks at rapid transit and commuter rail stations	Access Improvement	◐	◐	○	●	●
Install more enclosed waiting areas along MBTA lines	Access Improvement	◐	○	○	●	◐

**TABLE B-28 SYSTEMWIDE PROJECT EVALUATION – OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Environ. Justice	Total
Add bike racks to coaches	Access Improvement	N/A	○	N/A	N/A	▸	○	○
Add more motorcycle parking spaces systemwide	Access Improvement	N/A	○	N/A	N/A	○	▸	○
Improve pedestrian access to all rapid transit and commuter rail stations	Access Improvement	N/A	○	N/A	N/A	●	●	●
Improve pedestrian access to Anderson RTC from western side of tracks	Access Improvement	○	▸	●	▸	●	▸	▸
Install bike racks at rapid transit and commuter rail stations	Access Improvement	N/A	○	N/A	N/A	▸	●	▸
Install more enclosed waiting areas along MBTA lines	Access Improvement	N/A	○	N/A	N/A	●	▸	▸

## System Expansion Project Evaluation Ratings



**TABLE B-29 RAPID TRANSIT PROJECT EVALUATION – UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd.	Reduct. in VMT	Travel Time Savings	Total
Blue-Red Connector	Line Extension	○	▶	▶	▶	▶	●	▶
Convert Dudley-Boylston section of Silver Line to light rail	Line Extension	●	○	○	○	○	▶	○
Extend Blue Line from Bowdoin to West Medford	Line Extension	▶	▶	▶	○	▶	●	▶
Extend Blue Line from Lynn to Salem	Line Extension	▶	●	●	○	●	▶	●
Extend Blue Line from Wonderland to Lynn	Line Extension	▶	●	▶	○	●	●	●
Extend Green Line to West Medford	Line Extension	▶	▶	▶	○	▶	●	▶
New Green Line Needham Branch	Line Extension	○	○	○	○	○	○	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Extension	▶	▶	▶	○	▶	●	▶
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Extension	○	○	○	○	▶	▶	○
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Extension	▶	○	○	○	○	○	○
Red Line extension to Weymouth	Line Extension	○	▶	▶	▶	▶	▶	▶
Red Line NW Ext. from Alewife to Rt 128	Line Extension	○	○	○	○	▶	●	○
Restore Green Line service between Heath St & Arborway	Line Extension	▶	○	○	○	○	○	○
Silver Line East Ext. to City Point	Line Extension	○	○	○	▶	▶	○	○
Silver Line Phase III: South Station-Boylston Connector	Line Extension	▶	▶	▶	▶	▶	●	●
Silver Line So. Ext. to Ashmont & Mattapan	Line Extension	●	○	○	▶	○	▶	▶
Silver Line West Exts. to Allston & Longwood Medical Area	Line Extension	●	●	●	▶	▶	●	●
Urban Ring Phase II	Line Extension	●	●	▶	●	●	●	●
Urban Ring Phase III	Line Extension	●	●	●	●	●	●	●
Construct Orange Line station at Assembly Sq	New Station	○	○	▶	○	○	▶	○
Wonderland Connector	New Station	○	○	▶	○	○	○	○

**TABLE B-30 RAPID TRANSIT PROJECT EVALUATION - MOBILITY**

Project Description	Type	Service to Areas With Unmet Demand	Service During Time Periods With Unmet Demand	Service to Underserved Employment Centers	Total
Blue-Red Connector	Line Extension	●	○	○	►
Convert Dudley-Boylston section of Silver Line to light rail	Line Extension	►	○	○	○
Extend Blue Line from Bowdoin to West Medford	Line Extension	●	○	○	►
Extend Blue Line from Lynn to Salem	Line Extension	►	○	►	►
Extend Blue Line from Wonderland to Lynn	Line Extension	►	○	►	►
Extend Green Line to West Medford	Line Extension	●	○	○	►
New Green Line Needham Branch	Line Extension	►	○	○	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Extension	►	○	○	○
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Extension	►	○	○	○
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Extension	►	○	○	○
Red Line extension to Weymouth	Line Extension	►	○	○	○
Red Line NW Ext. from Alewife to Rt 128	Line Extension	►	○	○	○
Restore Green Line service between Heath St & Arborway	Line Extension	►	○	○	○
Silver Line East Ext. to City Point	Line Extension	○	○	○	○
Silver Line Phase III: South Station-Boylston Connector	Line Extension	●	○	●	●
Silver Line So. Ext. to Ashmont & Mattapan	Line Extension	●	○	○	►
Silver Line West Exts. to Allston & Longwood Medical Area	Line Extension	●	○	○	►
Urban Ring Phase II	Line Extension	●	○	●	●
Urban Ring Phase III	Line Extension	●	○	●	●
Construct Orange Line station at Assembly Sq	New Station	►	○	○	○
Wonderland Connector	New Station	►	○	○	○



**TABLE B-31 RAPID TRANSIT PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Operating Cost Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Operating Per Unit Travel Time Savings	Total
Blue-Red Connector	Line Extension	●	●	●	●	●
Convert Dudley-Boylston section of Silver Line to light rail	Line Extension	○	○	▸	●	○
Extend Blue Line from Bowdoin to West Medford	Line Extension	▸	▸	▸	▸	▸
Extend Blue Line from Lynn to Salem	Line Extension	●	▸	▸	○	▸
Extend Blue Line from Wonderland to Lynn	Line Extension	●	▸	▸	○	▸
Extend Green Line to West Medford	Line Extension	▸	▸	●	▸	▸
New Green Line Needham Branch	Line Extension	▸	○	○	○	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Extension	▸	▸	▸	○	○
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Extension	▸	○	▸	○	○
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Extension	○	○	○	○	○
Red Line extension to Weymouth	Line Extension	▸	▸	▸	○	○
Red Line NW Ext. from Alewife to Rt 128	Line Extension	○	○	▸	○	○
Restore Green Line service between Heath St & Arborway	Line Extension	○	●	○	●	▸
Silver Line East Ext. to City Point	Line Extension	●	●	●	▸	●
Silver Line Phase III: South Station-Boylston Connector	Line Extension	▸	●	▸	●	▸
Silver Line So. Ext. to Ashmont & Mattapan	Line Extension	●	●	●	●	●
Silver Line West Exts. to Allston & Longwood Medical Area	Line Extension	●	●	▸	▸	▸
Urban Ring Phase II	Line Extension	●	▸	●	●	●
Urban Ring Phase III	Line Extension	●	●	●	●	●
Construct Orange Line station at Assembly Sq	New Station	●	N/A	●	N/A	●
Wonderland Connector	New Station	▸	N/A	▸	N/A	▸

**TABLE B-32 RAPID TRANSIT PROJECT EVALUATION – AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Blue-Red Connector	Line Extension	▶	▶	▶	▶	●	●	●	●	▶
Convert Dudley-Boylston section of Silver Line to light rail	Line Extension	○	○	○	○	○	○	○	○	○
Extend Blue Line from Bowdoin to West Medford	Line Extension	▶	▶	▶	▶	▶	▶	▶	▶	▶
Extend Blue Line from Lynn to Salem	Line Extension	●	●	●	●	●	●	●	●	●
Extend Blue Line from Wonderland to Lynn	Line Extension	●	●	●	●	●	●	●	●	●
Extend Green Line to West Medford	Line Extension	▶	▶	▶	▶	▶	▶	▶	▶	▶
New Green Line Needham Branch	Line Extension	○	○	○	○	▶	▶	▶	▶	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Extension	▶	▶	▶	▶	●	●	●	●	▶
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Extension	▶	▶	▶	▶	▶	▶	▶	▶	▶
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Extension	○	○	○	○	○	○	○	○	○
Red Line extension to Weymouth	Line Extension	▶	▶	▶	▶	●	●	●	●	▶
Red Line NW Ext. from Alewife to Rt 128	Line Extension	▶	▶	▶	▶	▶	▶	▶	▶	▶
Restore Green Line service between Heath St & Arborway	Line Extension	○	○	○	○	○	○	○	○	○
Silver Line East Ext. to City Point	Line Extension	○	○	○	○	●	●	●	●	▶
Silver Line Phase III: South Station-Boylston Connector	Line Extension	▶	▶	▶	▶	▶	▶	▶	▶	▶
Silver Line So. Ext. to Ashmont & Mattapan	Line Extension	○	○	○	○	●	●	●	●	▶
Silver Line West Exts. to Allston & Longwood Medical Area	Line Extension	▶	▶	▶	▶	●	●	●	●	▶
Urban Ring Phase II	Line Ext.	●	●	●	●	●	●	●	●	●
Urban Ring Phase III	Line Ext.	●	●	●	●	●	●	●	●	●
Construct Orange Line station at Assembly Sq	New Station	○	○	○	○	●	●	●	●	▶
Wonderland Connector	New Station	▶	▶	▶	▶	●	●	●	●	▶

**TABLE B-33 RAPID TRANSIT PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter- connectivity	Customer Info.	Minimize Transfers	Total
Blue-Red Connector	Line Ext.	○	○	○	●	○	●	►
Convert Dudley/ Boylston section of Silver Line to light rail	Line Ext.	○	○	○	►	○	●	►
Extend Blue Line from Bowdoin to West Medford	Line Ext.	○	○	○	●	○	●	►
Extend Blue Line from Lynn to Salem	Line Ext.	○	○	○	●	○	●	►
Extend Blue Line from Wonderland to Lynn	Line Ext.	○	○	○	●	○	●	►
Extend Green Line to West Medford	Line Ext.	○	○	○	●	○	►	►
New Green Line Needham Branch	Line Ext.	○	○	○	►	○	►	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Ext.	►	►	►	○	►	►	►
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Ext.	○	○	○	►	○	●	►
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Ext.	○	○	○	○	○	●	○
Red Line extension to Weymouth	Line Ext.	○	○	○	○	○	►	○
Red Line NW Ext. from Alewife to Rt 128	Line Ext.	○	○	○	►	○	●	►
Restore Green Line service between Heath St & Arborway	Line Ext.	○	○	►	●	○	●	●
Silver Line East Ext. to City Point	Line Ext.	○	○	►	○	►	►	►
Silver Line Phase III: South Station- Boylston Connector	Line Ext.	○	○	○	●	○	●	►
Silver Line So. Ext. to Ashmont & Mattapan	Line Ext.	○	○	►	●	►	●	●
Silver Line West Exts. to Allston & Longwood Medical Area	Line Ext.	○	○	►	○	►	►	►
Urban Ring Phase II	Line Ext.	○	○	►	●	○	●	●
Urban Ring Phase III	Line Ext.	○	○	●	●	○	●	●
Construct Orange Line station at Assembly Sq	New Station	○	○	○	○	○	►	○
Wonderland Connector	New Station	○	○	○	►	○	►	○

**TABLE B-34 RAPID TRANSIT PROJECT EVALUATION – ECONOMIC & LAND USE IMPACTS**

Project Description	Type	State Revitalization Area	Local Plans	Regional Plans	Brownfield/ Infill Development	Total
Blue-Red Connector	Line Extension	●	●	●	N/A	●
Convert Dudley-Boylston section of Silver Line to light rail	Line Extension	●	●	●	▸	●
Extend Blue Line from Bowdoin to West Medford	Line Extension	●	▸	●	▸	●
Extend Blue Line from Lynn to Salem	Line Extension	▸	▸	▸	▸	▸
Extend Blue Line from Wonderland to Lynn	Line Extension	●	●	●	▸	●
Extend Green Line to West Medford	Line Extension	▸	▸	●	▸	▸
New Green Line Needham Branch	Line Extension	▸	○	▸	▸	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Extension	○	▸	▸	▸	○
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Extension	●	○	●	▸	▸
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Extension	▸	○	▸	▸	○
Red Line extension to Weymouth	Line Extension	●	○	●	●	●
Red Line NW Ext. from Alewife to Rt 128	Line Extension	○	○	▸	○	○
Restore Green Line service between Heath St & Arborway	Line Extension	●	●	●	▸	●
Silver Line East Ext. to City Point	Line Extension	●	▸	●	▸	●
Silver Line Phase III: South Station-Boylston Connector	Line Extension	●	●	●	▸	●
Silver Line So. Ext. to Ashmont & Mattapan	Line Extension	●	▸	●	▸	●
Silver Line West Exts. to Allston & Longwood Medical Area	Line Extension	●	●	●	▸	●
Urban Ring Phase II	Line Extension	●	●	●	●	●
Urban Ring Phase III	Line Extension	●	●	●	●	●
Construct Orange Line station at Assembly Sq	New Station	●	●	●	●	●
Wonderland Connector	New Station	●	○	●	○	●

**TABLE B-35 RAPID TRANSIT PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighbhds	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Blue-Red Connector	Line Extension	▸	○	○	●	▸
Convert Dudley-Boylston section of Silver Line to light rail	Line Extension	●	▸	▸	●	●
Extend Blue Line from Bowdoin to West Medford	Line Extension	▸	▸	●	●	●
Extend Blue Line from Lynn to Salem	Line Extension	▸	○	▸	●	▸
Extend Blue Line from Wonderland to Lynn	Line Extension	●	○	▸	●	●
Extend Green Line to West Medford	Line Extension	▸	▸	●	●	●
New Green Line Needham Branch	Line Extension	○	○	○	●	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Extension	○	○	○	●	○
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Extension	▸	○	○	●	▸
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Extension	▸	○	○	●	▸
Red Line extension to Weymouth	Line Extension	▸	○	○	●	▸
Red Line NW Ext. from Alewife to Rt 128	Line Extension	○	○	○	●	○
Restore Green Line service between Heath St & Arborway	Line Extension	○	○	○	●	○
Silver Line East Ext. to City Point	Line Extension	▸	○	▸	●	▸
Silver Line Phase III: South Station-Boylston Connector	Line Extension	○	○	○	●	○
Silver Line So. Ext. to Ashmont & Mattapan	Line Extension	▸	▸	▸	●	●
Silver Line West Exts. to Allston & Longwood Medical Area	Line Extension	▸	○	○	●	▸
Urban Ring Phase II	Line Extension	●	○	▸	●	●
Urban Ring Phase III	Line Extension	●	○	▸	●	●
Construct Orange Line station at Assembly Sq	New Station	▸	○	▸	●	▸
Wonderland Connector	New Station	▸	○	○	▸	○

**TABLE B-36 RAPID TRANSIT PROJECT EVALUATION – OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Econ/Land Use Impacts	Environ. Justice	Total
Blue-Red Connector	Line Ext.	►	►	●	►	►	●	►	►
Convert Dudley/Boylston section of Silver Line to light rail	Line Ext.	○	○	○	○	►	●	●	○
Extend Blue Line from Bowdoin to West Medford	Line Ext.	►	►	►	►	►	●	●	►
Extend Blue Line from Lynn to Salem	Line Ext.	●	►	►	●	○	►	►	►
Extend Blue Line from Wonderland to Lynn	Line Ext.	●	►	►	●	►	●	●	●
Extend Green Line to West Medford	Line Ext.	►	►	►	►	►	►	●	►
New Green Line Needham Branch	Line Ext.	○	○	○	○	►	○	○	○
Orange Line No. Ext. From Oak Grove to Reading/Route 128	Line Ext.	►	○	○	►	○	○	○	○
Orange Line So. Ext. From Forest Hills to Rt 128 Via Hyde Park	Line Ext.	○	○	○	►	►	►	►	○
Orange Line So. Ext. From Forest Hills to W. Roxbury/Needham	Line Ext.	○	○	○	○	○	○	►	○
Red Line extension to Weymouth	Line Ext.	►	○	○	►	○	●	○	○
Red Line NW Ext. from Alewife to Rt 128	Line Ext.	○	○	○	►	►	○	○	○
Restore Green Line service between Heath St & Arborway	Line Ext.	○	○	►	○	●	●	►	►
Silver Line East Ext. to City Point	Line Ext.	○	○	●	►	►	●	○	►
Silver Line Phase III: South Station-Boylston Connector	Line Ext.	●	●	►	►	►	●	●	●
Silver Line So. Ext. to Ashmont & Mattapan	Line Ext.	►	►	●	►	●	●	●	●
Silver Line West Exts. to Allston & Longwood Medical Area	Line Ext.	●	►	►	►	►	●	►	►
Urban Ring Phase II	Line Ext.	●	●	●	●	●	●	●	●
Urban Ring Phase III	Line Ext.	●	●	●	●	●	●	●	●
Construct Orange Line station at Assembly Sq	New Station	○	○	●	►	○	●	►	►
Wonderland Connector	New Station	○	○	►	►	○	●	○	○

**TABLE B-37 BUS/TRACKLESS TROLLEY PROJECT EVALUATION - UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd.	Reduct. in VMT	Travel Time Savings	Total
Build new busways to Alewife Station	Line Ext./ New Line	○	○	○	○	○	▶	○
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Ext./ New Line	○	○	○	○	○	▶	○
Route 128 Circumferential Bus Service	Line Ext./ New Line	▶	●	●	○	●	○	▶
Suburban Commuter Rail Feeder Bus Services	Line Ext./ New Line	▶	▶	▶	▶	▶	▶	▶
Urban Ring Phase I	Line Ext./ New Line	●	●	●	●	●	●	●

**TABLE B-38 BUS/TRACKLESS TROLLEY PROJECT EVALUATION - MOBILITY**

Project Description	Type	Service to Areas With Unmet Demand	Service During Time Periods With Unmet Demand	Service to Underserved Employment Centers	Total
Build new busways to Alewife Station	Line Extension/ New Line	○	○	○	○
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Extension/ New Line	○	○	○	○
Route 128 Circumferential Bus Service	Line Extension/ New Line	●	○	●	●
Suburban Commuter Rail Feeder Bus Services	Line Extension/ New Line	●	○	●	●
Urban Ring Phase I	Line Extension/ New Line	◐	○	◐	◐



**TABLE B-39 BUS/TRACKLESS TROLLEY PROJECT EVALUATION - COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Operating Cost Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Operating Per Unit Travel Time Savings	Total
Build new busways to Alewife Station	Line Extension/ New Line	●	N/A	●	N/A	●
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Extension/ New Line	▶	●	▶	●	●
Route 128 Circumferential Bus Service	Line Extension/ New Line	▶	▶	○	○	○
Suburban Commuter Rail Feeder Bus Services	Line Extension/ New Line	▶	○	▶	▶	▶
Urban Ring Phase I	Line Extension/ New Line	○	○	▶	▶	○

**TABLE B-40 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Build new busways to Alewife Station	Line Ext./ New Line	○	►	○	►	●	●	●	●	●
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Ext./ New Line	○	►	○	►	►	►	►	►	►
Route 128 Circumferential Bus Service	Line Ext./ New Line	○	○	○	○	○	○	○	○	○
Suburban Commuter Rail Feeder Bus Services	Line Ext./ New Line	►	○	►	►	►	○	►	►	►
Urban Ring Phase I	Line Ext./ New Line	○	○	►	○	○	○	○	○	○

**TABLE B-41 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter- connectivity	Customer Info.	Minimize Transfers	Total
Build new busways to Alewife Station	Line Ext./ New Line	○	◐	●	○	○	○	◐
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Ext./ New Line	○	○	○	○	○	◐	○
Route 128 Circumferential Bus Service	Line Ext./ New Line	○	○	○	◐	○	◐	○
Suburban Commuter Rail Feeder Bus Services	Line Ext./ New Line	◐	◐	○	●	○	○	●
Urban Ring Phase I	Line Ext./ New Line	○	◐	○	◐	○	●	●

**TABLE B-42 BUS/TRACKLESS TROLLEY PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighbhds	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Build new busways to Alewife Station	Line Ext./ New Line	○	○	○	N/A	○
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Ext./ New Line	○	○	○	N/A	○
Route 128 Circumferential Bus Service	Line Ext./ New Line	○	○	○	N/A	○
Suburban Commuter Rail Feeder Bus Services	Line Ext./ New Line	◐	●	◐	●	●
Urban Ring Phase I	Line Ext./ New Line	●	○	●	●	●

**TABLE B-43 BUS/TRACKLESS TROLLEY PROJECT EVALUATION - OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air. Quality	Service Quality	Environ. Justice	Total
Build new busways to Alewife Station	Line Ext./ New Line	○	○	●	●	◐	○	◐
Extend Trackless Trolley #71 from Watertown to Newton Corner	Line Ext./ New Line	○	○	●	◐	○	○	○
Route 128 Circumferential Bus Service	Line Ext./ New Line	◐	●	○	○	○	○	○
Suburban Commuter Rail Feeder Bus Services	Line Ext./ New Line	◐	●	◐	◐	●	●	●
Urban Ring Phase I	Line Ext./ New Line	●	◐	○	○	●	●	●

**TABLE B-44 CRR PROJECT EVALUATION - UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd.	Reduct. in VMT	Travel Time Savings	Total
Build CRR spur from Framingham to Leominster	Line Ext.	▶	▶	▶	▶	▶	▶	●
Build CRR spur from Salem to Danvers	Line Ext.	▶	○	▶	▶	○	▶	▶
CRR branch from existing Old Colony lines to Greenbush	New Line	●	●	●	▶	●	●	●
CRR to Millis	Line Ext.	▶	▶	▶	▶	▶	▶	●
CRR to New Bedford/Fall River	Line Ext.	●	●	●	▶	●	●	●
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	▶	○	○	○	▶	▶	▶
Extend CRR from Fitchburg to Gardner	Line Ext.	○	○	○	○	○	○	○
Extend CRR from Forge Park to Milford	Line Ext.	▶	○	▶	○	▶	▶	▶
Extend CRR from Haverhill to Plaistow	Line Ext.	▶	▶	▶	▶	▶	▶	●
Extend CRR from Lowell to Nashua	Line Ext.	▶	▶	▶	▶	●	▶	●
Extend CRR from Middleborough to Wareham	Line Ext.	▶	○	○	○	▶	▶	▶
Extend passenger rail service from Wareham to Hyannis	Line Ext.	○	○	▶	○	▶	▶	▶
North-South Rail Link	Line Ext.	●	●	●	●	●	●	●
Operate full-time service to Foxboro Sta.	Line Ext.	○	○	○	▶	○	○	○
Operate high-frequency Riverside - South Station CRR	Line Ext.	○	○	○	○	○	○	○
Operate high-frequency Riverside - JFK/Umass CRR	Line Ext.	▶	○	○	▶	○	○	▶
Operate high-frequency CRR Readville - Allston Landing	Line Ext.	○	○	○	○	○	○	○
Add station at Millbury on the Framingham/Worcester line	New Station	○	○	○	○	○	○	○
Add a station at So. Salem on Rockport/Newburyport CRR line	New Station	▶	○	○	○	○	○	○
Build a new Allston/Brighton CRR station	New Station	○	○	○	○	○	○	○
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	○	○	○	○	○	○	○
Build a regional CRR station along Rt 2 west of I-495	New Station	○	○	○	○	○	○	○
Build regional CRR station on I-495 in Metrowest	New Station	▶	○	▶	○	▶	▶	▶
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	○	○	○	○	○	○	○
Fairmount Line Imps.	New Station	●	○	○	▶	○	▶	▶
New CRR station at Riverside	New Station	○	○	○	○	○	○	○

**TABLE B-45 CRR PROJECT EVALUATION – MOBILITY**

Project Description	Type	Service to Areas With Unmet Demand	Service During Time Periods With Unmet Demand	Service to Underserved Employment Centers	Total
Build CRR spur from Framingham to Leominster	Line Ext.	●	○	▸	●
Build CRR spur from Salem to Danvers	Line Ext.	▸	○	▸	●
CRR branch from existing Old Colony lines to Greenbush	New Line	●	▸	○	●
CRR to Millis	Line Ext.	●	▸	○	●
CRR to New Bedford/Fall River	Line Ext.	●	○	▸	●
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	▸	○	▸	●
Extend CRR from Fitchburg to Gardner	Line Ext.	●	○	▸	●
Extend CRR from Forge Park to Milford	Line Ext.	▸	○	▸	●
Extend CRR from Haverhill to Plaistow, NH	Line Ext.	○	○	○	○
Extend CRR from Lowell to Nashua, NH	Line Ext.	●	○	●	●
Extend CRR from Middleborough to Wareham	Line Ext.	▸	▸	○	●
Extend passenger rail service from Wareham to Hyannis	Line Ext.	○	○	○	○
North-South Rail Link	Line Ext.	▸	○	○	▸
Operate full-time service to Foxboro Sta.	Line Ext.	▸	○	○	▸
Operate high-frequency Riverside – South Station CRR	Line Ext.	○	○	○	○
Operate high-frequency Riverside – JFK/Umass CRR	Line Ext.	○	○	○	○
Operate high-frequency Readville – Allston Landing CRR	Line Ext.	▸	○	○	▸
Add station at Millbury on the Framingham/Worcester line	New Station	▸	○	○	▸
Add a station at So. Salem on Rockport/Newburyport line	New Station	○	○	▸	▸
Build a new Allston/Brighton CRR station	New Station	▸	○	○	▸
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	▸	○	○	▸
Build a regional CRR station along Rt 2 west of I-495	New Station	○	○	○	○
Build regional CRR station on I-495 in Metrowest	New Station	○	○	○	○
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	○	○	○	○
Fairmount Line Imps.	New Station	●	○	○	●
New CRR station at Riverside	New Station	○	○	○	○

**TABLE B-46**

**CRR PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Operating Cost Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Operating Per Unit Travel Time Savings	Total
Build CRR spur from Framingham to Leominster	Line Ext.	○	○	○	○	○
Build CRR spur from Salem to Danvers	Line Ext.	▶	▶	▶	▶	▶
CRR branch from existing Old Colony lines to Greenbush	New Line	▶	▶			▶
CRR to Millis	Line Ext.	●	▶	○	▶	▶
CRR to New Bedford/Fall River	Line Ext.	●	▶	○	▶	▶
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	▶	▶	▶	▶	▶
Extend CRR from Fitchburg to Gardner	Line Ext.	○	○	○	○	○
Extend CRR from Forge Park to Milford	Line Ext.	▶	●	▶	▶	▶
Extend CRR from Haverhill to Plaistow, NH	Line Ext.	▶	●	▶	▶	▶
Extend CRR from Lowell to Nashua, NH	Line Ext.	●	▶	●	▶	▶
Extend CRR from Middleborough to Wareham	Line Ext.	▶	○	▶	▶	○
Extend passenger rail service from Wareham to Hyannis	Line Ext.	▶	○	▶	○	○
North-South Rail Link	Line Ext.	○	●	○	●	▶
Operate full-time service to Foxboro Sta.	Line Ext.	▶	○	○	○	○
Operate high-frequency Riverside – South Station CRR	Line Ext.	○	○	○	○	○
Operate high-frequency Riverside – JFK/Umass CRR	Line Ext.	○	○	○	○	○
Operate high-frequency Readville – Allston Landing CRR	Line Ext.	○	○	○	○	○
Add station at Millbury on the Framingham/Worcester line	New Station	●	N/A	●	N/A	●
Add a station at So. Salem on Rockport/Newburyport line	New Station	●	N/A	●	N/A	●
Build a new Allston/Brighton CRR station	New Station	▶	N/A	▶	N/A	▶
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	●	N/A	●	N/A	●
Build a regional CRR station along Rt 2 west of I-495	New Station	○	N/A	○	N/A	○
Build regional CRR station on I-495 in Metrowest	New Station	▶	N/A	○	N/A	▶
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	▶	N/A	○	N/A	▶
Fairmount Line Imps.	New Station	○	▶	▶	●	▶
New CRR station at Riverside	New Station	●	N/A	▶	N/A	●



**TABLE B-47 CRR PROJECT EVALUATION – AIR QUALITY**

Project Description	Type	Reduct. in VOC	Reduct. in NOx	Reduct. in CO	Reduct. in CO <sub>2</sub>	Capital Cost Per Reduct. in VOC	Capital Cost Per Reduct. in NOx	Capital Cost Per Reduct. in CO	Capital Cost Per Reduct. in CO <sub>2</sub>	Total
Build CRR spur from Framingham to Leominster	Line Ext.	○	○	▸	▸	○	○	○	▸	○
Build CRR spur from Salem to Danvers	Line Ext.	▸	○	▸	▸	●	○	▸	●	▸
CRR branch from existing Old Colony lines to Greenbush	New Line	●	○	●	●	●	○	▸	▸	▸
CRR to Millis	Line Ext.	▸	○	●	▸	●	○	▸	●	▸
CRR to New Bedford/Fall River	Line Ext.	●	○	●	●	●	○	▸	●	▸
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	▸	○	▸	▸	●	○	▸	●	▸
Extend CRR from Fitchburg to Gardner	Line Ext.	○	○	○	○	○	○	○	○	○
Extend CRR from Forge Park to Milford	Line Ext.	▸	○	▸	▸	●	○	▸	●	▸
Extend CRR from Haverhill to Plaistow	Line Ext.	▸	●	●	▸	●	●	●	●	●
Extend CRR from Lowell to Nashua	Line Ext.	●	○	●	●	●	○	●	●	●
Extend CRR from Middleborough to Wareham	Line Ext.	▸	○	▸	▸	●	○	▸	●	▸
Extend passenger rail service from Wareham to Hyannis	Line Ext.	●	○	●	●	●	○	●	●	●
North-South Rail Link	Line Ext.	●	○	●	●	▸	○	○	▸	▸
Operate full-time service to Foxboro Sta.	Line Ext.	▸	●	▸	▸	●	●	▸	▸	▸
Operate high-frequency Riverside – South Station CRR	Line Ext.	○	○	○	○	○	○	○	○	○
Operate high-frequency Riverside – JFK/Umass CRR	Line Ext.	○	○	○	○	○	○	○	○	○
Operate high-frequency Readville-Allston Landing CRR	Line Ext.	○	○	○	○	○	○	○	○	○
Add station at Millbury on the Framingham/Worcester CRR line	New Station	▸	▸	○	○	●	●	▸	●	▸
Add a station at So. Salem on Rockport/Newburyport line	New Station	▸	●	▸	▸	●	●	●	●	●
Build a new Allston/Brighton CRR station	New Station	▸	▸	○	○	▸	▸	○	○	▸
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	▸	▸	○	○	●	●	▸	▸	▸
Build a regional CRR station along Rt 2 west of I-495	New Station	▸	▸	○	▸	▸	○	▸	▸	▸
Build regional CRR station on I-495 in Metrowest	New Station	▸	●	▸	▸	●	●	▸	●	●
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	▸	○	▸	○	▸	▸	○	○	▸
Fairmount Line Imps.	New Sta.	○	○	○	○	○	○	○	○	○
New CRR station at Riverside	New Station	▸	▸	○	○	●	●	▸	●	▸

**TABLE B-48 CRR PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter- connectivity	Customer Info.	Minimize Transfers	Total
Build CRR spur from Framingham to Leominster	Line Ext.	○	○	○	◐	○	○	○
Build CRR spur from Salem to Danvers	Line Ext.	○	○	○	○	○	○	○
CRR branch from existing Old Colony lines to Greenbush	New Line	○	○	○	○	○	○	○
CRR to Millis	Line Ext.	○	○	○	○	○	○	○
CRR to New Bedford/ Fall River	Line Ext.	○	○	○	○	○	○	○
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	○	○	○	●	○	◐	◐
Extend CRR from Fitchburg to Gardner	Line Ext.	○	○	○	○	○	◐	○
Extend CRR from Forge Park to Milford	Line Ext.	○	○	○	○	○	○	○
Extend CRR from Haverhill to Plaistow	Line Ext.	○	○	○	○	○	○	○
Extend CRR from Lowell to Nashua	Line Ext.	○	○	○	◐	○	○	○
Extend CRR from Middleborough to Wareham	Line Ext.	○	○	○	○	○	○	○
Extend passenger rail service from Wareham to Hyannis	Line Ext.	○	○	○	◐	○	◐	○
North-South Rail Link	Line Ext.	○	○	○	●	○	●	◐
Operate full-time service to Foxboro Sta.	Line Ext.	○	○	○	○	○	○	○
Operate high-frequency Riverside - South Station CRR	Line Ext.	○	○	○	◐	○	○	○
Operate high-frequency Riverside - JFK/Umass CRR	Line Ext.	○	○	○	◐	○	○	○
Operate high-frequency Readville - Allston Landing CRR	Line Ext.	○	○	○	◐	○	○	○
Add station at Millbury on the Framingham/ Worcester CRR line	New Station	○	○	○	○	○	○	○
Add a station at So. Salem on Rockport/Newburyport line	New Station	○	○	○	○	○	◐	○
Build a new Allston/ Brighton CRR station	New Station	○	○	○	◐	○	◐	○
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	○	○	○	◐	○	◐	○
Build a regional CRR station along Rt 2 west of I-495	New Station	○	○	○	○	○	○	○
Build regional CRR station on I-495 in Metrowest	New Station	○	○	○	◐	○	○	○
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	○	○	○	◐	○	●	◐
Fairmount Line Imps.	New Sta.	◐	●	○	○	◐	●	●
New CRR station at Riverside	New Station	○	○	○	◐	○	●	◐

**TABLE B-49 CRR PROJECT EVALUATION – ECONOMIC & LAND USE IMPACTS**

Project Description	Type	State Revitalization Area	Local Plans	Regional Plans	Brownfield/ Infill Development	Total
Build CRR spur from Framingham to Leominster	Line Ext.	●		N/A	►	●
Build CRR spur from Salem to Danvers	Line Ext.	►	○	►	►	○
CRR branch from existing Old Colony lines to Greenbush	New Line	►	○	○	○	○
CRR to Millis	Line Ext.	○	○	○	►	○
CRR to New Bedford/Fall River	Line Ext.	●	○	N/A	►	►
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	○		N/A	○	○
Extend CRR from Fitchburg to Gardner	Line Ext.	●		N/A	►	●
Extend CRR from Forge Park to Milford	Line Ext.	►	○	○	►	○
Extend CRR from Haverhill to Plaistow, NH	Line Ext.	○		N/A	○	○
Extend CRR from Lowell to Nashua, NH	Line Ext.	○		N/A	N/A	○
Extend CRR from Middleborough to Wareham	Line Ext.	►		N/A	►	►
Extend passenger rail service from Wareham to Hyannis	Line Ext.	►	○	N/A	►	○
North-South Rail Link	Line Ext.	●	●	●	►	●
Operate full-time service to Foxboro Sta.	Line Ext.	○	○	○	►	○
Operate high-frequency Riverside - South Station CRR	Line Ext.	►	►	●	►	►
Operate high-frequency Riverside - JFK/Umass CRR	Line Ext.	►	►	●	►	►
Operate high-frequency Readville - Allston Landing CRR	Line Ext.	●	►	●	►	●
Add station at Millbury on the Framingham/Worcester line	New Sta.	●		N/A	►	●
Add a station at So. Salem on Rockport/Newburyport line	New Sta.	●	○	●	►	►
Build a new Allston/Brighton CRR station	New Sta.	●	►	●	►	●
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Sta.	●	●	●	►	●
Build a regional CRR station along Rt 2 west of I-495	New Sta.	○	○	○	○	○
Build regional CRR station on I-495 in Metrowest	New Sta.	○	○	○	○	○
Connect Fitchburg CRR w/ Red Line at Alewife	New Sta.	●	●	●	►	●
Fairmount Line Imps.	New Sta.	●	►	●	►	●
New CRR station at Riverside	New Sta.	○	○	●	○	○

**TABLE B-50 CRR PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighbhds	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Build CRR spur from Framingham to Leominster	Line Ext.	▶	○	○	●	▶
Build CRR spur from Salem to Danvers	Line Ext.	▶	○	○	●	▶
CRR branch from existing Old Colony lines to Greenbush	New Line	○	○	○	●	○
CRR to Millis	Line Ext.	○	○	○	●	○
CRR to New Bedford/Fall River	Line Ext.	▶	○	○	●	▶
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	○	○	○	●	○
Extend CRR from Fitchburg to Gardner	Line Ext.	▶	○	○	●	▶
Extend CRR from Forge Park to Milford	Line Ext.	▶	○	○	●	▶
Extend CRR from Haverhill to Plaistow, NH	Line Ext.	○	○	○	●	○
Extend CRR from Lowell to Nashua, NH	Line Ext.	○	○	○	●	○
Extend CRR from Middleborough to Wareham	Line Ext.	○	○	○	●	○
Extend passenger rail service from Wareham to Hyannis	Line Ext.	○	○	○	●	○
North-South Rail Link	Line Ext.	▶	▶	○	●	▶
Operate full-time service to Foxboro Sta.	Line Ext.	○	○	○	●	○
Operate high-frequency Riverside – South Station CRR	Line Ext.	○	○	○	●	○
Operate high-frequency Riverside – JFK/Umass CRR	Line Ext.	▶	○	○	●	▶
Operate high-frequency Readville – Allston Landing CRR	Line Ext.	●	●	●	●	●
Add station at Millbury on the Framingham/Worcester line	New Station	○	○	○	●	○
Add a station at So. Salem on Rockport/Newburyport line	New Station	▶	▶	○	●	▶
Build a new Allston/Brighton CRR station	New Station	●	▶	○	●	●
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	▶	●	○	●	●
Build a regional CRR station along Rt 2 west of I-495	New Station	○	○	○	●	○
Build regional CRR station on I-495 in Metrowest	New Station	○	○	○	●	○
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	○	○	○	▶	○
Fairmount Line Imps.	New Station	●	●	●	●	●
New CRR station at Riverside	New Station	○	○	○	●	○

**TABLE B-51 CRR PROJECT EVALUATION – OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air Quality	Service Quality	Econ/Land Use Impacts	Environ. Justice	Total
Build CRR spur from Framingham to Leominster	Line Ext.	●	●	○	○	○	●	▸	▸
Build CRR spur from Salem to Danvers	Line Ext.	▸	●	▸	▸	○	○	▸	●
CRR branch from existing Old Colony lines to Greenbush	New Line	●	●	▸	▸	○	○	○	●
CRR to Millis	Line Ext.	●	●	▸	▸	○	○	○	▸
CRR to New Bedford/Fall River	Line Ext.	●	●	▸	▸	○	▸	▸	●
Extend CRR from Providence to T.F. Green (RI)	Line Ext.	▸	●	▸	▸	▸	○	○	▸
Extend CRR from Fitchburg to Gardner	Line Ext.	○	●	○	○	○	●	▸	▸
Extend CRR from Forge Park to Milford	Line Ext.	▸	●	▸	▸	○	○	▸	▸
Extend CRR from Haverhill to Plaistow	Line Ext.	●	○	●	●	○	○	○	▸
Extend CRR from Lowell to Nashua	Line Ext.	●	●	▸	●	○	○	○	▸
Extend CRR from Middleborough to Wareham	Line Ext.	▸	●	○	▸	○	▸	○	▸
Extend passenger rail service from Wareham to Hyannis	Line Ext.	▸	○	○	●	○	○	○	○
North-South Rail Link	Line Ext.	●	▸	▸	▸	▸	●	▸	●
Operate full time service to Foxboro Sta.	Line Ext.	○	▸	○	▸	○	○	○	○
Operate high-frequency Riverside – South Station CRR	Line Ext.	○	○	○	○	○	▸	○	○
Operate high-frequency Riverside – JFK/Umass CRR	Line Ext.	▸	○	○	○	○	▸	▸	○
Operate high-frequency Readville – Allston Landing CRR	Line Ext.	○	▸	○	○	○	●	●	▸
Add station at Millbury on the Framingham/Worcester line	New Station	○	▸	●	▸	○	●	○	▸
Add a station at So. Salem on Rockport/Newburyport line	New Station	○	▸	●	●	○	▸	▸	▸
Build a new Allston/Brighton CRR station	New Station	○	▸	▸	▸	○	●	●	▸
Build a new CRR station on the Fitchburg Line at Union Sq, Somerville	New Station	○	▸	●	▸	○	●	●	●
Build a regional CRR station along Rt 2 west of I-495	New Station	○	○	○	▸	○	○	○	○
Build regional CRR station on I-495 in Metrowest	New Station	▸	○	▸	●	○	○	○	▸
Connect Fitchburg CRR w/ Red Line at Alewife	New Station	○	○	▸	▸	▸	●	○	▸
Fairmount Line Imps.	New Station	▸	●	▸	○	●	●	●	●
New CRR station at Riverside	New Station	○	○	●	▸	▸	○	○	▸

**TABLE B-52 BOAT PROJECT EVALUATION – UTILIZATION**

Project Description	Type	Ridership	New Riders	Impact on Mode Share	Reduct. in Crowd- ing	Reduct. in VMT	Travel Time Savings	Total
Ferry Expansion– Russia Wharf/ South Station	Line Extension/ New Line	●	●	○	○	○	○	►
High-Speed Ferry Service From the North Shore to Boston & the Airport	Line Extension/ New Line	○	○	►	►	►	►	►
Restore East Boston ferry	Line Extension/ New Line	○	○	○	○	○	○	○
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	►	►	●	●	●	●	●

<b>TABLE B-53 BOAT PROJECT EVALUATION – MOBILITY</b>					
<b>Project Description</b>	<b>Type</b>	<b>Service to Areas with Unmet Demand</b>	<b>Service During Time with Unmet Demand</b>	<b>Service to Underserved Employment Centers</b>	<b>Total</b>
<b>Ferry Expansion- Russia Wharf/ South Station</b>	<b>Line Extension/ New Line</b>	●	○	○	●
<b>High-Speed Ferry Service From the North Shore to Boston &amp; the Airport</b>	<b>Line Extension/ New Line</b>	○	○	○	○
<b>Restore East Boston ferry</b>	<b>Line Extension/ New Line</b>	○	○	○	○
<b>Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.</b>	<b>Frequency Improvement</b>	○	●	○	●

**TABLE B-54 BOAT PROJECT EVALUATION – COST EFFECTIVENESS**

Project Description	Type	Capital Cost Per New Transit Rider	Net Operating Costs Per New Transit Rider	Capital Cost Per Unit Travel Time Savings	Net Operating Costs Per Unit Travel Time Savings	Total
Ferry Expansion–Russia Wharf/South Station	Line Extension/ New Line	●	▶	▶	●	●
High-Speed Ferry Service From the North Shore to Boston & the Airport	Line Extension/ New Line	▶	○	▶	▶	○
Restore East Boston ferry	Line Extension/ New Line	●	●	○	○	▶
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	○	○	●	●	▶



<b>TABLE B-55 BOAT PROJECT EVALUATION - AIR QUALITY</b>						
<b>Project Description</b>	<b>Type</b>	<b>Reduction in VOC</b>	<b>Reduction in NOx</b>	<b>Reduction in CO</b>	<b>Reduction in CO<sub>2</sub></b>	<b>Total</b>
<b>Ferry Expansion- Russia Wharf/ South Station</b>	<b>Line Extension/ New Line</b>	○	○	○	○	○
<b>High-Speed Ferry Service From the North Shore to Boston &amp; the Airport</b>	<b>Line Extension/ New Line</b>	○	○	○	○	○
<b>Restore East Boston ferry</b>	<b>Line Extension/ New Line</b>	○	○	○	○	○
<b>Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.</b>	<b>Frequency Improvement</b>	○	○	○	○	○

**TABLE B-56 BOAT PROJECT EVALUATION – SERVICE QUALITY**

Project Description	Type	Safety/ Security	Comfort/ Convenience	Reliability	Inter connectivity	Customer Informa- tion	Minimize Transfers	Total
Ferry Expansion– Russia Wharf/ South Station	Line Extension/ New Line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
High-Speed Ferry Service From the North Shore to Boston & the Airport	Line Extension/ New Line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Restore East Boston ferry	Line Extension/ New Line	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

**TABLE B-57 BOAT PROJECT EVALUATION – ECONOMIC AND LAND USE IMPACTS**

Project Description	Type	State Revitalization Area	Local Plans	Regional Plans	Brownfield/ Infill Development	Total
Ferry Expansion- Russia Wharf/ South Station	Line Extension/ New Line	●	▶	●	▶	●
High-Speed Ferry Service From the North Shore to Boston and the Airport	Line Extension/ New Line	●	○	●	▶	▶
Restore East Boston ferry	Line Extension/ New Line	●	▶	●	▶	●
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	▶	○	▶	○	○

**TABLE B-58 BOAT PROJECT EVALUATION – ENVIRONMENTAL JUSTICE**

Project Description	Type	Serves Target Neighborhoods	Rectify Barriers	Responds to EJ Issues in RTP	Avoids Burdens Without Benefits	Total
Ferry Expansion- Russia Wharf/ South Station	Line Extension/ New Line	○	○	○	N/A	○
High-Speed Ferry Service From the North Shore to Boston and the Airport	Line Extension/ New Line	◐	○	○	●	◐
Restore East Boston ferry	Line Extension/ New Line	●	○	○	●	●
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	◐	○	○	●	◐

**TABLE B-59 BOAT PROJECT EVALUATION – OVERALL**

Project Description	Type	Utilization	Mobility	Cost Effective	Air Quality	Service Quality	Economic/Land Use Impacts	Environ. Justice	Total
Russia Wharf/South Station	Line Extension/New Line	▸	▸	●	○	▸	●	○	●
High-Speed Ferry Service From the North Shore to Boston and the Airport	Line Extension/New Line	▸	○	○	○	○	▸	▸	○
Restore East Boston ferry	Line Extension/New Line	○	○	▸	○	○	●	●	▸
Improved Ferry Service From South Shore Communities (Quincy, Hingham and Hull) to Boston.	Frequency Improvement	●	▸	▸	○	○	○	▸	▸





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## APPENDIX C

### Projected Impacts of System Expansion and Service Enhancement Projects

The following tables provide detailed information on the projected costs of system expansion and service enhancement projects, as well as projected impacts on travel volumes. More specifically, projections of increased ridership resulting from each capital improvement are included, along with anticipated new riders to the transit system, travel time savings, air quality impacts, and other related figures. Both operating and capital costs are also summarized, along with ratios of cost to projected new transit ridership, regional travel time savings, and unit air quality improvements.

**TABLE C-1 RAPID TRANSIT ENHANCEMENT CAPITAL COSTS AND TRAVEL TIME SAVINGS**

Projects	Total	New Riders	Cost Per New Rider	Time Savings (hrs)	Cost per Hour Saved	Cost per Reduc. CO2	Cost per Reduc. VOC	Cost per Reduc. NOx	Cost per Reduc. CO
Commonwealth Flats Silver Line Grade Separation	\$70,000,000	100	\$700,000	-3	-\$26,250,000	-\$215,750	-\$218,280,002	-\$108,151,276	-\$19,353,670
Operate 4-Car Trains on Green Line	\$339,363,769	410	\$827,717	-116	-\$2,921,352	-\$89,860	-\$91,123,497	-\$44,992,227	-\$8,079,412
Operate 8-Car Trains on Orange Line	\$177,663,692	660	\$269,187	-149	-\$1,196,389	-\$25,668	-\$26,029,022	-\$12,851,830	-\$2,307,848
Operate 8-Car Trains on Red Line	\$261,312,923	950	\$275,066	-162	-\$1,610,061	-\$25,588	-\$25,948,088	-\$12,811,869	-\$2,300,672
Preemptive Signals on Beacon/Comm/Huntington	\$492,480	60	\$8,208	-17	-\$29,847	-\$764	-\$774,313	-\$382,317	-\$68,654
Signal improvements on Blue Line	\$228,084,524	2700	\$84,476	-490	-\$465,875	-\$7,004	-\$7,102,926	-\$3,507,070	-\$629,777
Signal improvements on Green Line	\$327,040,407	None	N/A	None	N/A	N/A	N/A	N/A	N/A
Signal improvements on Orange Line	\$366,970,933	4470	\$82,096	-815	-\$450,317	-\$7,639	-\$7,746,380	-\$3,824,775	-\$686,828
Signal improvements on Red Line	\$789,409,153	3380	\$233,553	-545	-\$1,448,014	-\$21,743	-\$22,049,054	-\$10,886,720	-\$1,954,967



**TABLE C-2 RAPID TRANSIT ENHANCEMENT OPERATING COSTS**

<b>Project</b>	<b>New Riders</b>	<b>Operating Cost</b>	<b>Operating Costs per New Rider</b>	<b>Travel Time Savings (hrs)</b>	<b>Operating Cost Per Hour Saved</b>
<b>Commonwealth Flats Silver Line Grade Separation</b>	100	None	N/A	-3	N/A
<b>Operate 4-Car Trains on Green Line</b>	410	\$267,731	\$653.00	-116	-\$2,305
<b>Operate 8-Car Trains on Orange Line</b>	660	\$26,047	\$39.47	-149	-\$175
<b>Operate 8-Car Trains on Red Line</b>	950	\$42,945	\$45.21	-162	-\$265
<b>Preemptive Signals on Beacon/Comm/Huntington</b>	60	None	N/A	-17	\$0
<b>Signal improvements on Blue Line</b>	2700	\$41,522	\$15.38	-490	-\$85
<b>Signal improvements on Green Line</b>	None	None	N/A	None	N/A
<b>Signal improvements on Orange Line</b>	4470	\$78,143	\$17.48	-815	-\$96
<b>Signal improvements on Red Line</b>	3380	\$128,836	\$38.12	-545	-\$236

**TABLE C-3 RAPID TRANSIT ENHANCEMENT RIDERSHIP AND AIR QUALITY**

Project	Changes in System Ridership	New Transit Trips in the System	VMT	CO2 kg	VOC kg	NOx kg	CO kg	Mode Share Rating	Crowding Relief Rating
Commonwealth Flats Silver Line Grade Separation	180	100	-450	-324	0	-1	-4	Low	Low
Operate 4-car trains on Green Line	4100	410	-5238	-3776.6	-3.7242	-7.5427	-42.004	Medium	High
Operate 8-car trains on Orange Line	3300	660	-9600	-6921.6	-6.8256	-13.824	-76.982	Medium	High
Operate 8-car trains on Red Line	3800	950	-14164	-10212	-10.071	-20.396	-113.58	Medium	High
Preemptive Signals on Beacon/Comm/Huntington	270	60	-894.55	-644.97	-0.636	-1.2881	-7.1734	Low	Low
Signal improvements on Blue Line	8800	2700	-45164	-32563	-32.111	-65.036	-362.17	High	High
Signal improvements on Green Line	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Signal improvements on Orange Line	10900	4470	-66629	-48040	-47.373	-95.946	-534.3	High	High
Signal improvements on Red Line	9650	3380	-50355	-36306	-35.802	-72.511	-403.8	High	High

**TABLE C-4 BUS ENHANCEMENT CAPITAL COSTS AND TRAVEL TIME SAVINGS**

Project	Capital Costs	New Riders	Cap per New Rider	Travel Time		Cost per Hour Saved			
				Savings (hrs)	Hour Saved	Cap/CO2	Cap/VOC	Cap/NOx	Cap/CO
Add bus lanes & priority signals on top 10 busiest bus routes	\$53,118,200	780	\$68,100	-251	-\$211,908	-\$6,927	-\$7,023,936	-\$3,468,069	-\$622,773
Acquire 100 New Buses	\$33,800,000	1430	\$23,636	-918	-\$36,836	\$3,582	-\$7,409,681	\$403,053	-\$639,764
Install 300 Shelters	\$1,000,000	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Install ITS System	TBD	None	N/A	N/A	N/A	N/A	N/A	N/A	N/A

**TABLE C-5 BUS ENHANCEMENT RIDERSHIP AND AIR QUALITY**

Project	Additional Ridership by Mode	New Transit Trips in the System	VMT	CO2 kg	VOC kg	NOx kg	CO kg	Mode Share Rating	Crowding Relief Rating
Acquire 100 New Buses	5720	1430	-10400	9436	-4.5616	83.86	-52.832	Medium	Medium



**TABLE C-7 COMMUTER RAIL ENHANCEMENT OPERATING COSTS**

<b>Project</b>	<b>Added Daily Cost</b>	<b>New Transit Ridership</b>	<b>Op Cost per New Rider</b>	<b>Travel Time Savings (hrs)</b>	<b>Cost per Hour Saved</b>
Install platforms on both sides of stations in Newton for reverse commuting	N/A	10	N/A	-1	N/A
Improve pedestrian access to Anderson RTC from western side of tracks	N/A	20	N/A	-2	N/A
Increase speed and frequency of Needham service	\$13,925	230	\$60.54	-78	-\$178.53
Purchase DMU trains to allow for increased frequency on commuter rail lines	\$7,500	310	\$24.19	-79	-\$94.94
Operate a Yawkey-Back Bay-South Station shuttle	\$4,574	380	\$12.04	-8	-\$571.75
Operate more frequent service between Framingham and Worcester	\$4,350	450	\$9.67	-220	-\$19.77
Electrify all commuter rail lines (excluding yards)	TBD	900	TBD	-335	TBD
Operate Express Service from Outer Stations	\$53,397	3040	\$17.56	-1491	-\$35.82
Expand Reverse Commuting Options	\$60,628	3120	\$19.43	-910	-\$66.62
Build new layover facility in Bellingham for the Franklin Line	N/A	N/A	N/A	N/A	N/A
Install a fourth track on the Fort Point Channel Bridge	N/A	N/A	N/A	N/A	N/A
Install double-tracking on entire commuter rail system	N/A	N/A	N/A	N/A	N/A



**TABLE C-9 RAPID TRANSIT EXPANSION CAPITAL COSTS AND TRAVEL TIME SAVINGS**

Project	Capital Cost	New Riders	Cost per New Rider	Travel Time		Cost per Reduc. CO2	Cost per Reduc. VOC	Cost per Reduc. NOx	Cost per Reduc. CO
				Savings (hrs)	Cost per Hour Saved				
Blue Line: Bowdoin to West Medford	\$696,468,000	5830	\$119,463	2,029	\$343,299	-\$18,569	-\$18,829,955	-\$9,329,685	-\$1,669,547
Blue Line: Build Comm Rail connector at Wonderland	\$70,035,000	500	\$140,070	-116	-\$604,619	-\$13,624	-\$14,007,000	-\$6,366,818	-\$1,187,034
Blue Line: Lynn to Salem	\$363,800,000	8900	\$40,876	-546	-\$666,504	-\$3,311	-\$3,357,439	-\$1,663,512	-\$297,685
Blue Line: Wonderland to Lynn	\$357,606,770	7900	\$45,267	-1,005	-\$355,828	-\$4,409	-\$4,470,783	-\$2,215,141	-\$396,399
Blue-Red Connector: Bowdoin to Charles/MGH	\$174,625,000	2750	\$63,500	-1,625	-\$107,462	-\$11,255	-\$11,411,939	-\$5,654,278	-\$1,011,833
Green Line: Eliot to Needham Junction	\$123,900,806	500	\$247,802	-47	-\$2,655,017	-\$39,687	-\$40,241,395	-\$19,938,420	-\$3,567,980
Green Line: Heath Street to Arborway	\$71,882,000	200	\$359,410	-6	-\$11,115,773	-\$70,210	-\$71,240,710	-\$35,297,662	-\$6,316,516
Green Line: Lechmere to West Medford	\$375,000,000	3540	\$105,932	-1,647	-\$227,641	-\$18,756	-\$19,021,547	-\$9,424,613	-\$1,686,535
Orange Line: Add a Station at Assembly Square	\$29,282,400	1090	\$26,865	-201	-\$145,744	-\$3,672	-\$3,723,762	-\$1,845,014	-\$330,165
Orange Line: Forest Hills to Hyde Park/Rte 128	\$342,803,479	1990	\$172,263	-506	-\$677,143	-\$18,726	-\$18,988,989	-\$9,408,482	-\$1,683,648
Orange Line: Forest Hills to West Rox/Needham	\$316,230,000	615	\$514,195	-113	-\$2,804,701	-\$78,508	\$79,057,500	\$39,528,750	\$7,027,333
Orange Line: Oak Grove to Reading/Rte 128	\$487,762,514	5390	\$90,494	-1,179	-\$413,779	-\$10,615	-\$10,765,155	-\$5,333,815	-\$954,486
Red Line: Alewife to Rte 128	\$749,300,000	1700	\$440,765	-1,777	-\$421,745	-\$44,795	-\$45,504,919	-\$22,546,340	-\$4,034,667
Red Line: Braintree to Weymouth	\$304,156,289	2900	\$104,881	-304	-\$999,966	-\$10,666	-\$10,817,593	-\$5,359,797	-\$959,136
Silver Line Phase III: South Station to Boylston via Chinatown	\$951,900,000	4520	\$210,597	-2,462	-\$386,689	-\$23,069	-\$23,395,694	-\$11,591,873	-\$2,074,366
Silver Line: Convert to LRT - Dudley to Boylston	\$373,556,971	130	\$2,873,515	-581	-\$642,826	-\$539,822	-\$373,556,971	-\$373,556,971	-\$46,694,621
Silver Line West Extension: Boylston to Allston & Longwood	\$540,945,387	7840	\$68,998	-873	-\$619,640	-\$13,153	-\$13,339,438	-\$6,609,296	-\$1,182,734
Silver Line: Dudley Station to Ashmont and Mattapan	\$43,701,138	1250	\$34,961	-250	-\$175,061	-\$7,636	-\$7,283,523	-\$3,972,831	-\$682,830
Silver Line East Extension: S. Station to City Point	\$11,435,857	1360	\$8,409	-159	-\$71,924	-\$1,279	-\$1,039,623	-\$879,681	-\$83,473
Urban Ring Phase II	\$500,000,000	15000	\$33,333	-18,692	-\$26,750	-\$4,237	-\$4,296,401	-\$2,128,739	-\$380,938
Urban Ring: Phase III - Sullivan to Dudley	\$2,800,000,000	54600	\$51,282	-49,695	-\$56,344	-\$6,259	-\$6,346,681	-\$3,144,592	-\$562,725

**TABLE C-10 RAPID TRANSIT EXPANSION OPERATING COSTS**

Project	New Riders	Average Day Costs	Op Cost/New Rider	Travel Time Savings (hrs)	Cost per Hour Saved
Blue Line: Bowdoin to West Medford	5830	\$76,801	\$13.17	2,029	\$37.86
Blue Line: Build Comm Rail connector at Wonderland	500	\$0	None	-116	\$0.00
Blue Line: Lynn to Salem	8900	\$80,505	\$9.05	-546	-\$147.49
Blue Line: Wonderland to Lynn	7900	\$72,454	\$9.17	-1,005	-\$72.09
Blue-Red Connector: Bowdoin to Charles/MGH	2750	\$7,245	\$2.63	-1,625	-\$4.46
Green Line: Eliot to Needham Junction	500	\$16,629	\$33.26	-47	-\$356.34
Green Line: Heath Street to Arborway	200	-\$1,313	None	-6	\$203.02
Green Line: Lechmere to West Medford	3540	\$41,748	\$11.79	-1,647	-\$25.34
Orange Line: Add a Station at Assembly Square	1090	\$0	None	-201	\$0.00
Orange Line: Forest Hills to Hyde Park/Rte 128	1990	\$94,885	\$47.68	-506	-\$187.43
Orange Line: Forest Hills to West Rox/Needham	615	\$79,904	\$129.93	-113	-\$708.68
Orange Line: Oak Grove to Reading/Rte 128	5390	\$109,482	\$20.31	-1,179	-\$92.88
Red Line: Alewife to Rte 128	1700	\$121,837	\$71.67	-1,777	-\$68.58
Red Line: Braintree to Weymouth	2900	\$52,021	\$17.94	-304	-\$171.03
Silver Line Phase III: South Station to Boylston via Chinatown	4520	\$2,556	\$0.57	-2,462	-\$1.04
Silver Line: Convert to LRT - Dudley to Boylston	130	\$6,064	\$46.64	-581	-\$10.43
Silver Line West Extension: Boylston to Allston & Longwood	7840	\$25,621	\$3.27	-873	-\$29.35
Silver Line: Dudley Station to Ashmont and Mattapan	1250	-\$6,790	None	-250	\$27.20
Silver Line East Extension: S. Station to City Point	1360	\$3,752	\$2.76	-159	-\$23.60
Urban Ring Phase II	15000	\$70,736	\$4.72	-18,692	-\$3.78
Urban Ring: Phase III - Sullivan to Dudley	54600	\$195,601	\$3.58	-49,695	-\$3.94



**TABLE C-11 RAPID TRANSIT EXPANSION RIDERSHIP AND AIR QUALITY**

Project	Changes in RTL System Ridership	New Transit Trips in the System	VMT	CO2 kg	VOC kg	NOx kg	CO kg	Mode Share Rating	Crowding Relief Rating
Blue Line: Bowdoin to West Medford	13525	5830	-52020	-37506	-37	-75	-417	Medium	Low
Blue Line: Build Comm Rail connector at Wonderland	850	500	-7130	-5141	-5	-11	-59	Medium	Low
Blue Line: Lynn to Salem	15850	9300	-152400	-109880	-108	-219	-1222	High	Low
Blue Line: Wonderland to Lynn	21000	7900	-112500	-81113	-80	-161	-902	Medium	Low
Blue-Red Connector: Bowdoin to Charles/MGH	6500	2750	-21520	-15516	-15	-31	-173	Medium	Medium
Green Line: Eliot to Needham Junction	3400	500	-4330	-3122	-3	-6	-35	Low	Low
Green Line: Heath Street to Arborway	14220	200	-1420	-1024	-1	-2	-11	Low	Low
Green Line: Lechmere to West Medford	8420	3540	-27730	-19993	-20	-40	-222	Medium	Low
Orange Line: Add a Station at Assembly Square	1740	1090	-11060	-7974	-8	-16	-89	Medium	Low
Orange Line: Forest Hills to Hyde Park/Rte 128	4740	1990	-25390	-18306	-18	-36	-204	Low	Low
Orange Line: Forest Hills to West Rox/Needham	11278	615	-5587	-4028	4	8	45	Low	Low
Orange Line: Oak Grove to Reading/Rte 128	9430	5390	-63730	-45949	-45	-91	-511	Medium	Low
Red Line: Alewife to Rte 128	6710	1700	-23200	-16727	-16	-33	-186	Low	Low
Red Line: Braintree to Weymouth	6650	2900	-39550	-28516	-28	-57	-317	Medium	Medium
Silver Line Phase III: South Station to Boylston via Chinatown	20500	4520	-57230	-41263	-41	-82	-459	High	Medium
Silver Line: Convert to LRT - Dudley to Boylston	34282	130	-960	-692	-1	-1	-8	Low	Low
Silver Line West Extension: Boylston to Allston & Longwood	27940	7840	-57040	-41126	-41	-82	-457	High	Medium
Silver Line: Dudley Station to Ashmont and Mattapan	29330	1250	-7950	-5723	-6	-11	-64	Low	Medium
Silver Line East Extension: S. Station to City Point	6840	1360	-18545	-8940	-11	-13	-137	Low	Medium
Urban Ring Phase II	53000	15000	-163680	-118013	-116	-235	-1313	High	High
Urban Ring: Phase III - Sullivan to Dudley	134700	54600	-620500	-447381	-441	-890	-4976	High	High

**TABLE C-12 BUS EXPANSION CAPITAL COSTS AND TRAVEL TIME SAVINGS**

Projects	Capital Costs	New Riders	Cap per New Rider	Travel Time		Cost per Hour Saved			
				Savings (hrs)	Hour Saved	Cap/CO2	Cap/VOC	Cap/NOx	Cap/CO
Provide Dedicated Bus Lanes Approaching Alewife Station	\$340,000	340	\$1,000	-58	-\$5,913	-\$217	-\$220,679	-\$109,186	-\$19,536
Extend Trackless Trolley #71 from Watertown to Newton Corner	\$1,500,000	590	\$2,542	-65	-\$23,196	-\$586	-\$562,303	-\$378,730	-\$49,916
Improve Suburban CRR Feeder Bus Service	\$7,500,000	1920	\$3,906	-208	-\$36,058	-\$523	-\$404,788	\$1,443,779	-\$36,261
Rte 128 Bus Service Using HOV Lane	\$29,000,000	4200	\$6,905	625,101	\$46.39	\$52	\$239,669	\$193,333	\$32,621
Urban Ring Phase 1	\$100,000,000	5500	\$18,182	-1,388	-\$72,046	-\$2,412	-\$2,439,024	-\$1,075,269	-\$216,920

**TABLE C-13 BUS EXPANSION OPERATING COSTS**

Project	New Riders	Average Day Costs	Op Cost/ New Rider	Travel Time	
				Savings (hrs)	Cost per Hour Saved
Provide Dedicated Bus Lanes Approaching Alewife Station	340	\$0	\$0	-58	\$0.00
Extend Trackless Trolley #71 from Watertown to Newton Corner	590	\$1,410	\$2	-65	-\$21.80
Improve Suburban CRR Feeder Bus Service	1920	\$28,578	\$15	-208	-\$137.40
Rte 128 Bus Service Using HOV Lane	4520	\$22,441	\$5	625,101	\$0.04
Urban Ring Phase 1	5500	\$100,349	\$18	-1,388	-\$72.28

**TABLE C-14 BUS EXPANSION RIDERSHIP AND AIR QUALITY**

Project	Additional Ridership by Mode	New Transit Trips in the System	Air Quality					Mode Share Rating	Crowding Relief Rating
			VMT	CO2 kg	VOC kg	NOx kg	CO kg		
Provide Dedicated Bus Lanes Approaching Alewife Station	620	340	-2170	-1564.57	-1.5407	-3.11395	-17.4034	Low	Low
Extend Trackless Trolley #71 from Watertown to Newton Corner	840	590	-3760	-2558.66	-2.6676	-3.9606	-30.0502	Low	Low
Improve Suburban CRR Feeder Bus Service	2690	1920	-26180	-14337.2	-18.5282	5.1947	-206.835	Medium	Medium
Rte 128 Bus Service Using HOV Lane	4840	4520	-57270	556120	121	150	889	High	Low
Urban Ring Phase 1	21350	5500	-33000	-41458	-41	-93	-461	High	High

**TABLE C-15 COMMUTER RAIL EXPANSION CAPITAL COSTS AND TRAVEL TIME SAVINGS**

Project	Total Capital Cost	New Transit Ridership	Cost per New Rider	Travel Time Savings (hrs)	Cost per Hour Saved	Cost per Reduc. CO2	Cost per Reduc. VOC	Cost per Reduc. NOx	Cost per Reduc. CO
Improve Fitchburg Line by Adding a Station at Alewife	\$4,065,600	40	\$101,640	-3	-\$1,219,680	-\$25,631	-\$26,028,169	-\$12,878,049	-\$2,304,239
Improve Fitchburg Line: new station on Rt 2 west of 495 in Ayer	\$8,200,000	40	\$205,000	-19	-\$424,138	-\$14,216	-\$14,436,620	-\$7,142,857	-\$1,278,055
Extend Line from Fitchburg to Gardner	\$104,212,247	50	\$2,084,245	-19	-\$5,437,161	-\$86,191	\$20,497,275	\$830,003	\$71,086,117
Improve Framingham/Worcester Line: new station in Allston/Brighton	\$4,065,600	50	\$81,312	-18	-\$223,794	-\$20,885	-\$21,208,138	-\$10,493,225	-\$1,877,528
Operate High Frequency Service: Readville to Allston Landing	\$34,288,000	80	\$428,600	-71	-\$482,930	\$12,290	\$1,632,762	\$92,172	\$463,351
Riverside-Backbay-JFK-Umass via Yawkey	\$31,473,000	100	\$314,730	-44	-\$715,295	\$10,512	\$1,388,470	\$76,577	\$393,413
Riverside-South Station	\$31,473,000	130	\$242,100	-27	-\$1,165,667	\$12,931	\$1,573,650	\$86,702	\$456,130
Improve Worcester Line: new station in Millbury	\$7,405,200	140	\$52,894	-62	-\$118,959	-\$2,367	-\$2,403,193	-\$1,189,036	-\$212,752
Improve Fitchburg Line: new station in Union Sq, Somerville	\$4,065,600	160	\$25,410	-69	-\$58,638	-\$7,724	-\$7,844,106	-\$3,881,056	-\$694,428
Improve Fairmount Line: new stations and improve frequency	\$70,000,000	220	\$318,182	-443	-\$158,014	\$105,105	\$7,000,000	\$360,825	\$2,333,333
Improve Framingham/Worcester Line: new station at Riverside	\$10,744,800	250	\$42,979	-81	-\$133,338	-\$3,644	-\$3,700,127	-\$1,830,725	-\$327,567
Extend Line from Middleborough to Wareham	\$35,781,346	420	\$85,194	-200	-\$179,355	-\$2,112	-\$3,389,284	\$392,488	-\$205,797
Operate Full-time Service to Foxborough	\$71,273,859	630	\$113,133	-133	-\$535,894	-\$6,860	-\$6,966,393	-\$3,446,787	-\$616,726
Build Spur from Salem to Danvers via Peabody	\$56,021,064	700	\$80,030	-271	-\$206,974	-\$5,209	-\$8,558,976	\$917,197	-\$509,248
Extend Line from Forge Park to Milford via Bellingham	\$70,463,237	757	\$93,082	-310	-\$227,142	-\$3,872	-\$5,033,088	\$1,761,581	-\$363,213
Improve Rockport/Newbury Line: new station in South Salem	\$8,200,000	840	\$9,762	-102	-\$80,392	-\$998	-\$1,013,096	-\$501,253	-\$89,688
Extend Line from Providence to T.F. Green Airport	\$42,834,000	900	\$47,593	-286	-\$149,726	-\$1,869	-\$2,289,425	\$1,297,180	-\$174,316
Improve Framingham/Worcester Line: new Regional Station at I-495	\$111,078,000	910	\$122,064	-247	-\$449,709	-\$5,033	-\$5,111,006	-\$2,528,790	-\$452,471
Extend Line from Wareham to Hyannis	\$77,090,746	970	\$79,475	-393	-\$196,160	-\$1,513	-\$2,083,534	\$464,402	\$144,095
Extend Line from Haverhill to Plaistow, NH	\$21,780,000	1310	\$16,626	-282	-\$77,143	-\$569	-\$621,680	-\$966,143	-\$51,960
Build Spur from Framingham to Leominster	\$375,470,938	1330	\$282,309	-587	-\$640,098	-\$13,067	\$57,443,078	\$574,855	-\$1,585,377
Extend Line from Lowell to Nashua via North Chelmsford	\$35,534,000	2210	\$16,079	-362	-\$98,115	-\$562	-\$690,447	\$377,014	-\$52,442
Extend Line from Needham to Millis via Medfield & Dover	\$128,800,000	2700	\$47,704	-385	-\$334,908	-\$3,075	-\$4,610,406	\$685,154	-\$296,611
Extend Line from Stoughton to Fall River & New Bedford	\$670,000,000	7090	\$94,499	-4,273	-\$156,814	-\$4,843	-\$6,062,920	\$2,688,268	-\$453,410
Construct North - South Rail Link	\$8,700,000,000	54350	\$160,074	-17,730	-\$490,705	-\$12,000	-\$13,849,482	\$28,480,420	-\$1,106,806

**TABLE C-16 COMMUTER RAIL EXPANSION OPERATING COSTS**

Project	Added Daily Cost	New Riders	Op Cost per New Rider	Travel Time Savings (hrs)	Cost per Hour Saved
Improve Fitchburg Line by Adding a Station at Alewife	N/A	40	N/A	N/A	N/A
Improve Fitchburg Line: new station on Rt 2 west of 495 in Ayer	N/A	40	N/A	N/A	N/A
Extend Line from Fitchburg to Gardner	\$16,882	50	\$337.65	-19	-\$880.82
Improve Framingham/Worcester Line: new station in Allston/Brighton	N/A	50	N/A	-18	N/A
Operate High Frequency Service: Readville to Allston Landing	\$16,150	80	\$201.88	-71	-\$227.46
Riverside-Backbay-JFK-Umass via Yawkey	\$17,787	100	\$177.87	-44	-\$404.25
Riverside-South Station	\$15,957	130	\$122.75	-27	-\$591.00
Improve Worcester Line: new station in Millbury	N/A	140	N/A	N/A	N/A
Improve Fitchburg Line: new station in Union Sq, Somerville	N/A	160	N/A	N/A	N/A
Improve Fairmount Line: new stations and improve frequency	\$2,800	220	\$12.73	-443	-\$6.32
Improve Framingham/Worcester Line: new station at Riverside	N/A	250	N/A	-81	N/A
Extend Line from Middleborough to Wareham	\$16,466	420	\$39.20	-200	-\$82.53
Operate Full-time Service to Foxborough	\$33,600	630	\$53.33	-133	-\$252.63
Build Spur from Salem to Danvers via Peabody	\$10,875	700	\$15.54	-271	-\$40.18
Extend Line from Forge Park to Milford via Bellingham	\$10,083	757	\$13.32	-310	-\$32.50
Improve Rockport/Newbury Line: new station in South Salem	N/A	840	N/A	-102	N/A
Extend Line from Providence to T.F. Green Airport	\$10,367	900	\$11.52	-286	-\$36.24
Improve Framingham/Worcester Line: new Regional Station at I-495	N/A	910	N/A	-247	N/A
Extend Line from Wareham to Hyannis	\$35,269	970	\$36.36	-393	-\$89.67
Extend Line from Haverhill to Plaistow, NH	\$7,082	1310	\$5.41	-282	-\$25.08
Build Spur from Framingham to Leominster	\$93,651	1330	\$70.41	-587	-\$159.66
Extend Line from Lowell to Nashua via North Chelmsford	\$29,028	2210	\$13.14	-362	-\$80.15
Extend Line from Needham to Millis via Medfield & Dover	\$35,777	2700	\$13.25	-385	-\$93.03
Extend Line from Stoughton to Fall River & New Bedford	\$69,156	7090	\$9.75	-4,273	-\$16.19
<b>Construct North - South Rail Link</b>	<b>\$231,000</b>	<b>54350</b>	<b>\$4.25</b>	<b>-17,730</b>	<b>-\$13.03</b>

**TABLE C-17 COMMUTER RAIL EXPANSION RIDERSHIP AND AIR QUALITY**

Project	Additional System	New Transit Trips in the System	New Trips causing Auto Diversions						Mode Share Rating	Crowding Relief Rating
	Ridership by Mode			VMT	CO2 kg	VOC kg	NOx kg	CO kg		
Improve Fitchburg Line by Adding a Station at Alewife	60	40	-40	-220	-159	0	0	-2	Low	Low
Improve Fitchburg Line: new station on Rt 2 west of 495 in Ayer	100	40	-40	-800	-577	-1	-1	-6	Low	Low
Extend Line from Fitchburg to Gardner	50	50	-50	-3,220	-1,209	5	126	1	Low	Low
Improve Framingham/Worcester Line: new station in Allston/Brighton	70	50	-50	-270	-195	0	0	-2	Low	Low
Operate High Frequency Service: Readville to Allston Landing	920	80	-73	-545	2,790	21	372	74	Low	Low
Riverside-Backbay-JFK-Umass via Yawkey	2160	100	-91	-727	2994	23	411	80	Low	Medium
Riverside-South Station	820	130	-118	-945	2434	20	363	69	Low	Low
Improve Worcester Line: new station in Millbury	300	140	-130	-4340	-3129	-3	-6	-35	Low	Low
Improve Fitchburg Line: new station in Union Sq, Somerville	390	160	-150	-730	-526	-1	-1	-6	Low	Low
Improve Fairmount Line: new stations and improve frequency	6480	220	-200	-1400	666	10	194	30	Low	Medium
Improve Framingham/Worcester Line: new station at Riverside	660	250	-230	-4090	-2949	-3	-6	-33	Low	Low
Extend Line from Middleborough to Wareham	1300	420	-380	-25,000	-16,939	-11	91	-174	Low	Low
Operate Full-time Service to Foxborough	790	630	-570	-14410	-10390	-10	-21	-116	Low	Medium
Build Spur from Salem to Danvers via Peabody	1670	700	-640	-15,910	-10,754	-7	61	-110	Medium	Medium
Extend Line from Forge Park to Milford via Bellingham	1830	757	-1530	-26,120	-18,198	-14	40	-194	Medium	Low
Improve Rockport/Newbury Line: new station in South Salem	1140	840	-760	-11400	-8219	-8	-16	-91	Low	Low
Extend Line from Providence to T.F. Green Airport	1520	900	-820	-32,730	-22,915	-19	33	-246	Low	Low
Improve Framingham/Worcester Line: new Regional Station at I-495	1490	910	-830	-30610	-22070	-22	-44	-245	Medium	Low
Extend Line from Wareham to Hyannis	520	970	-880	-73,900	-50,957	-37	166	535	Medium	Medium
Extend Line from Haverhill to Plaistow, NH	1660	1310	-1190	-53,690	-38,245	-35	-23	-419	Medium	Medium
Build Spur from Framingham to Leominster	2980	1330	-1210	-48,420	-28,735	7	653	-237	Medium	Medium
Extend Line from Lowell to Nashua via North Chelmsford	3130	2210	-2010	-90,340	-63,222	-51	94	-678	Medium	Medium
Extend Line from Needham to Millis via Medfield & Dover	4000	2700	-2450	-61,360	-41,881	-28	188	-434	Medium	Medium
Extend Line from Stoughton to Fall River & New Bedford	8700	7090	-6450	-198,200	-138,341	-111	249	-1,478	High	Medium
Construct North - South Rail Link	96100	54350	-49410	-1026600	-724978	-628	305	-7860	High	High

**TABLE C-18 FERRY EXPANSION CAPITAL COSTS , OPERATING COSTS AND TRAVEL TIME SAVINGS**

Projects	Total Capital Cost	New Transit Riders	Cap Cost/New Rider	Op Cost Added per Added Rider	Op Cost per Added Rider	Travel Time Savings (hrs)	Cap Cost per Hour Saved	Op Cost per Hour Saved
Restore Service from East Boston to Boston	\$3,500,000	70	\$50,000	\$2,460	\$35	-3	-\$1,200,000	-\$844
Improve Service from S.Shore	\$39,670,000	270	\$146,926	\$66,284	\$245	-150	-\$263,880	-\$441
New Route from North Shore to Airport	\$16,287,500	100	\$162,875	\$12,377	\$124	-23	-\$723,889	-\$550
New Service to Russia Wharf	\$4,000,000	50	\$80,000	\$3,355	\$67	-9	-\$467,836	-\$392

**TABLE C-19 FERRY EXPANSION RIDERSHIP AND AIR QUALITY**

Project	Additional Ridership by Mode	New Transit Trips in the System	VMT	CO2 kg	VOC kg	NOx kg	CO kg	Mode Share Rating	Crowding Relief Rating
Restore Service from East Boston to Boston	290	70	-320	10.51	13.3028	25.1158	7.8286	Low	Low
Improve Service from S.Shore	760	270	-3630	2297.283	273.0657	515.8235	182.6619	High	High
New Route from North Shore to Airport	350	100	-1640	31.02	66.8956	126.2966	39.1372	Medium	Medium
New Service to Russia Wharf	1000	50	-200	184.75	18.308	34.588	12.571	Low	Low



P M T



## APPENDIX D

### Public Involvement

#### **PUBLIC COMMENTS**

The MBTA actively sought public comments throughout the development of the PMT. Many were received and all have been considered.

Suggestions for capital improvement projects were incorporated into the PMT Universe of Projects. This includes ideas submitted during the earliest outreach efforts until to the development of the preliminary PMT results.

Other types of public comments, such as those on the PMT vision, goals, objectives, project screening, or evaluation process were noted and taken into consideration before developing the final PMT document. Comments received during the January 2003 workshops (where preliminary results were presented) are noted in the workshop summaries later in this appendix. Written comments received by mail, E-mail, or fax during the official public review period for the Draft PMT are also summarized in this appendix. Verbal comments received at the public hearings are recorded in transcripts which may be viewed at the MBTA Planning Department, Room 5750, or at the Central Transportation Planning Staff, Room 2150, State Transportation Building, 10 Park Plaza, Boston.

While most comments were pertinent to the PMT, many referred to operational or policy issues that are not within the document's purview. These were referred to the appropriate MBTA department for consideration.





## MBTA Program for Mass Transportation Public Involvement Meetings, Workshops, and Hearings

The MBTA conducted an extensive public outreach program to contribute to the development of the PMT. The following table lists the meetings at which the PMT was discussed and the PMT workshops and hearings conducted.

<b>Meetings w/ Existing Advocacy Groups and Institutional Organizations</b>	<b>Date</b>
Regional Transportation Advisory Council (formerly JRTC)	5/9/01
MassBike	7/13/01
Access Advisory Committee to the T	7/25/01
Alternatives for Community and Environment	7/30/01
Transportation Planning and Programming Committee	8/30/01
MBTA Advisory Board	9/19/01
Metropolitan Area Planning Council	9/19/01
Artery Business Committee	10/9/01
I-495 Initiative	10/17/01
Kennedy School of Government Rappaport Institute	11/2/01
Caravan for Commuters	11/7/01
Association for Public Transportation	12/12/01
MBTA Advisory Board Capital Planning Committee	12/6/01
Regional Transportation Advisory Council	2/13/02
MBTA Advisory Board Capital Planning Committee	8/2/02
Transportation Planning and Programming Committee	12/18/02
Regional Transportation Advisory Council	1/8/03
Access Advisory Committee to the T	1/22/03
MBTA Advisory Board Capital Planning Committee	1/29/03
MoveMass	3/7/03
<b>Meeting w/Existing Groups – Neighborhood/Regional</b>	<b>Date</b>
<i>Metropolitan Area Planning Council Subregions</i>	
North Shore Task Force	5/10/01
North Suburban Planning Council	7/11/01
SouthWest Advisory Planning Committee	7/19/01
Inner Core	9/5/01
Minuteman Advisory Group on Interlocal Coordination	9/6/01
South Shore Coalition	9/20/01
Three Rivers Interlocal Council	11/29/01
<i>Regional Planning Agencies Outside Boston</i>	
Central Massachusetts Reg. Planning Commission (Worcester RTA)	7/12/01
Northern Middlesex Council of Governments	Summer/01
Merrimac Valley Planning Commission	Summer/01
Montachusett Regional Planning Commission (Montachuset Area RTA)	8/15/01
Southeast Regional Planning & Economic Development District (Greater Attleboro Taunton RTA) and (Southeastern RTA)	8/22/01
Old Colony Planning Council (Brockton Area RTA)	8/23/01
<i>Other Neighborhood or Regional Groups</i>	
Brighton-Allston Improvement Association	9/6/01

<b>Public Workshops</b>	<b>Date</b>
<b><i>MBTA-Sponsored Workshops – Initial Outreach</i></b>	
South Suburban Area Workshop – Quincy City Hall	10/18/01
North Side Commuters Workshop – Fleet Center/North Station	10/23/01
North Suburban Area Workshop – Malden Government Center	10/25/01
MetroWest Area Workshop – Framingham Town Hall	10/29/01
Boston Workshop – Roxbury, Dudley Branch Library	11/1/01
South Side Commuters Workshop – South Station – the Federal Reserve Building	11/7/01
Fitchburg Workshop	11/28/01
Wakefield Workshop	12/5/01
<b><i>Workshops on Preliminary Results</i></b>	
Boston - State Transportation Building	1/15/03
North - Chelsea Senior Center	1/15/03
West - Framingham Town Hall	1/22/03
South - Thayer Public Library, Braintree	1/23/03
<b><i>Public Hearings on Draft PMT</i></b>	
Boston - State Transportation Building	3/5/03
Afternoon – State Transportation Building	3/6/03
<b><i>PMT Working Committee Meetings</i></b>	
State Transportation Building, Boston	8/15/01
State Transportation Building, Boston	9/25/01
State Transportation Building, Boston	10/15/01
State Transportation Building, Boston	11/20/01
State Transportation Building, Boston	12/18/01
State Transportation Building, Boston	1/15/02
State Transportation Building, Boston	2/19/02
State Transportation Building, Boston	3/19/02
State Transportation Building, Boston	5/21/02
State Transportation Building, Boston	6/25/02
State Transportation Building, Boston	9/17/02
State Transportation Building, Boston	10/15/02
State Transportation Building, Boston	11/19/02
State Transportation Building, Boston	12/17/02
State Transportation Building, Boston	1/21/03
State Transportation Building, Boston	3/25/03

## **PMT Working Committee Members**

The MBTA convened the PMT Working Committee to provide guidance and advice on the development of the PMT. The members represent a wide variety of public interests and perspectives and include state agencies, municipalities, and community-based organizations.

The Working Committee provided valuable input to the PMT. It reviewed and refined all PMT materials and provided substantive feedback and direction on the goals and objectives, vision, screening criteria, evaluation measures, preliminary results, and public involvement process.

The MBTA appreciates the involvement of all the members. They brought their professional expertise, constructive ideas, and informed, well-reasoned views to the Committee's work.

### ***Members***

Access Advisory Committee to the MBTA – Philip Beaulieu, Elizabeth Dillard, James Oliver

City of Boston – Vineet Gupta

City of Chelsea – John DePriest

City of Somerville – Stephen Post, Stuart O'Brien

Conservation Law Foundation – Seth Kaplan, Toni Hicks, Scott Darling

Department of Housing and Community Development – Bill Reyelt

Executive Office of Environmental Affairs – Deirdre Buckley

Executive Office of Transportation and Construction – Astrid Glynn, Todd Fontanella

Massachusetts Bay Transportation Authority – Dennis DiZoglio (Working Committee Chair), Joseph Cosgrove, Stephen Woelfel

MBTA Advisory Board – Paul Regan, Noah Berger

Metropolitan Area Planning Council – Barbara Lucas

ReBuildit Collaborative – Curtis Davis

Regional Transportation Advisory Council – Bill Deignan

Town of Burlington – Eleanor O'Connell

Town of Sharon – George Bailey

Transit Riders Union – Khalida Smalls

**Meeting Notes**  
**PMT Working Committee Meeting**  
**August 15, 2001**

**In Attendance:** See attached list.

**Meeting Summary**

The meeting was the first for the MBTA Program for Mass Transportation (PMT) Working Committee. Members introduced themselves and the Deputy General Manager of the MBTA, Michael Mulhern, provided welcoming remarks and an overview of the MBTA's approach to the PMT. The MBTA provided a detailed discussion of the PMT covering the purpose of the PMT, its characteristics, changes resulting from forward-funding, the relationship to other transportation planning documents, the PMT process, and the role of the PMT Working Committee in guiding the PMT. Working Committee members discussed several matters at length, including issues related to the proposed PMT Vision Statement and discussion points for the Goals and Objectives. Members provided input on issues to be addressed by the PMT as well as the public involvement process.

The following summarizes comments from Working Committee members.

**Working Committee Process**

The PMT process should coordinate with other ongoing planning processes.

There are concerns about how the committee and the MBTA will work together in the prioritization process.

The MBTA should meet with the Subregions twice; first to present the projects and later to gather ideas and input.

Use the web to circulate and share information and comments. The committee should exchange information on an email list-serve.

There is value in the Working Committee learning and talking about information as a group, not just by picking up information from the Web site.

The committee should get out into the areas where there are issues (it may mean meeting on a bus/boat/or train) so that people can understand the issues.

Bring in third parties not typically involved in transportation to provide new perspectives, for example, on alternative financing.

Each meeting could focus on a theme, with the MBTA bringing in information, postulating a case, etc.

The committee may want to self-select into interactive sub-groups.

### **PMT Considerations**

Note which project ideas are legally required projects.

Part of the committee's job will be the difficult task of balancing fiscal constraints with "wish-lists".

The committee should be aware of constraints, but should also consider whether a project can be funded by another entity or through another mechanism.

Some of the bus projects listed are already underway and shouldn't be included in a long-range vision document.

The committee should encourage the MBTA to aggressively advocate for public transit, particularly by working with the Massachusetts Congressional delegation seeking funding for programs prioritized in the PMT.

The committee is going to have to prioritize projects and develop trade-offs with an awareness of the MBTA's limited resources.

There should be a discussion of financial issues with input from MBTA financial managers and financial experts from the private sector to get ideas for possibilities for attracting additional private capital.

Should the MBTA shoulder the burden of assuring transportation mobility options equally to all or for those who have limited resources and options on their own?

Two local organizations, the Transit Riders Union (TRU) and Alternatives for Community and the Environment (ACE) can define Environmental Justice (EJ) and work with the committee to integrate it into all elements of the system.

### **Availability of Information**

Committee members should be familiar with earlier PMTs.

The committee should look at the statute that provides goals for the MBTA (e.g. maximize revenue) and the new goal of balancing benefits and burdens (EJ).

Committee members should provide information they want to share with the whole committee. (MBTA Advisory Board, ACE, TRU have volunteered information.)

The committee should be provided specific background information, including information on: the existing system, constraints and congestion in the existing systems, vehicles and fleet, alternative fuels, relative costs per passenger mile, current census data, build-out analyses, EJ definition and measures, the existing PMT, lists of our legal commitments and requirements, the Capital Investment Program (CIP) and CIP criteria.

### **Input for the Vision Statement and Goals and Objectives**

Maintenance is important, but the committee should not be precluded from comparing proposed new with existing service.

Provide a definition of maintenance of existing infrastructure.

There is an opportunity to change maintenance through capital investment. By changing the infrastructure, the maintenance of a portion of the system changes. (Example: if the MBTA establishes a maximum average age for the bus fleet, maintenance needs will change.)

Specifically, add the word “desirable” before “quality of life” in the third bullet; and in the last phrase, add “sustainable” prior to “communities”.

The vision and goals and objectives should have a value-based perspective.

Mobility and improving access to the existing system should be part of the vision and goals and objectives.

Examples of projects advancing this vision are shuttles, additional parking, pedestrian walkways, bicycle facilities.

Define what is meant by “protecting the environment”. The vision should be “improving” the environment.

The MBTA should support economic development that works with the system and helps further the goals of the system. The committee needs to discuss the concept of “sustainable development”.

### **Public Involvement**

Project materials should show people the project ideas that have already been suggested.

Working with large maps (and in small groups) is a good approach and should keep people focused on the product.

It is a good idea to arrange discussions with groups at their normally-scheduled meetings.

### **Action Items**

- The next agenda will include discussion of: the PMT vision, draft goals and objectives, information on the documents requested by the committee, upcoming public forums.
- At other meetings, the MBTA will provide briefings on:
  - CIP and the relationship among the MBTA planning documents and the PMT.
  - Congestion management
  - Environmental Justice
  - Financing/Alternative Financing.
- The MBTA will provide background information for the committee, specifically on: the existing PMT, CIP, EJ Definition and Measures, Congestion Management Study, Forward-funding legislation.
- The MBTA should provide information in print and electronically.
- CTPS will set up a list-serve for information exchange among committee members.
- CTPS will post available background documents on the PMT Web site.
- Working Committee members should bring to the committee any information they think pertinent and useful. TRU will bring a Definition of Environmental Justice and some examples.
- The Working Committee will meet monthly, generally on the third Wednesday of each month.

**Meeting Notes**  
**PMT Working Committee Meeting**  
**September 25, 2001**

**In Attendance:** See attached list.

**Meeting Summary:**

Dave Carney, MBTA Operations, provided a detailed presentation of the MBTA system, fleet and facilities, discussing each of the rail lines, including miles of track, routes, vehicles, stations, garages, ridership, and service characteristics for light and heavy rail, commuter rail, bus and boat. Future service and facilities were outlined, as were plans for CNG-fueled buses, dual mode buses, electric-powered trackless trolleys, and “clean diesel” vehicles and automatic fare collection systems. Other services discussed include the Office for Transportation Access for disabled customers and private carrier bus services. He also summarized MBTA revenues and MBTA coordination with TMAs in the region. (Please see the meeting handout.)

Steve Berrang, MBTA, discussed the MBTA Capital Investment Program and the MBTA definition of State of Good Repair. He discussed MBTA investments in infrastructure, enhancements, and expansions and the projected funding required for the various MBTA programs. He discussed the concepts of State of Ideal Repair (like-new operating condition) and State of Good Repair (without unreasonable limitations on ability to perform and provide service) and the investments required to achieve each. The MBTA is pursuing the State of Ideal Repair. They have developed a data base and program that can be used to understand the status of MBTA inventory and the broad, service consequences of various investments. It is used to inform MBTA decision-making on capital investments. He announced upcoming public hearings on the Capital Investment Program and approval process. (Please see the meeting handout.)

Additional topics discussed included, the PMT Vision statement, Goals and Objectives, schedule of PMT tasks, and public participation activities. (See meeting materials.)

**The following summarizes comments from Working Committee members.**

**The MBTA System**

The MBTA needs to ensure that existing routes and services (which may parallel private TMA services) are maintained. The private TMA’s services may reduce demand for public bus service and therefore undermine the public service. (If federal funds support a TMA service, they must take public fares.) (The TMAs often provide niche services.) (The individual TMA services in an area could be consolidated, combined and marketed as a single entity.)



PMT discussions should include MBTA plans to implement projects to which it is obligated. If such projects are not going to be completed on deadline, the MBTA should plan for substitutions.

### **Capital Improvement Programming**

The PMT Working Committee should consider what internal, MBTA “structure” can be used to insure that new technology is effectively implemented.

Increasing system capacity is an issue to be addressed.

The definition of “serviceable life” should be more than “start up and roll”. It should be an indicator of the quality of the environment in the bus. When considering what must be done to extend the useful life of a bus, there should be indicators considered that include, for example, the status of the air conditioner. There should be a quality of service index including these broader issues. This is important from an environmental justice point of view. There should be a future presentation on the MBTA standards defining a “serviceable vehicle”. There should be a mechanism for setting competitive standards for vehicle condition when customers do not have other transportation options. The PMT Working Committee should be discussing the MBTA values. Customer dissatisfaction affects the system.

Age is not an adequate tool for judging serviceability. Information on the actual condition should be considered.

### **Vision**

Suggestions for changes to the vision:

Add, “Reduce the state’s environmental impact by transporting people in an efficient manner while supporting the sustainable development of communities.” (No consensus to adopt.)

Revise to read, “Transport customers in a system that preserves and improves the quality of the environment throughout the MBTA District.” (Consensus to adopt.)

Add reference to efficiency. (No consensus)

Add a new bullet or combine with second bullet, “Provide attractive, competitive, reliable transportation option that is competitive with private vehicles.” (No consensus)

Add language on, “...maintaining existing infrastructure in a state of ideal repair.”

### **Goals and Objectives**

Add mention of safety. (consensus)

Add language on meeting projected system ridership demand, such as, “Increase ridership in the most efficient manner to meet future demand.” (consensus)

Discuss long-range projections for ridership at a future meeting (consensus)

Increasing ridership is one mission and a core value of the MBTA.

Add a bullet, “Increase ridership on the system.” (consensus)

Add to #2, “...now and in the foreseeable future.” (consensus)

PMT Working Committee members should be looking beyond the current system to envision an ideal system, unconstrained.

Add to #2, first bullet, delete “new” and replace “developments” with “centers” (consensus)

Add language that identifies a target date for achieving the state of good repair and other higher levels of repair.

Add language stating that the MBTA will meet all projected demand for service.

Add an objective stating the MBTA’s goal to reduce greenhouse gas emissions from its operations.

### **Schedule of Tasks**

The results of the modeling of project sets should be used to identify a more complete list of projects for the PMT universe of projects.

The PMT should be a capital planning tool and a policy document with the policies from the Regional Transportation Plan as a basis and guidance for the evaluation of PMT projects.

The Working Committee should be able to identify new ideas for projects.

The Working Committee may be most useful implementing existing ideas, ideas already on the table.

Screening should include two assessments; one for project-level screening and another for policy-level screening from the RTP.

### **Action Items**

- Continue discussion of MBTA/TMA interactions at a future PMT Working Committee Meeting, including exploration of other Massachusetts RTA/TMA relationships.
- Provide additional information on MBTA standards for a “serviceable vehicle” and the qualitative information considered in this decision-making.
- MBTA will propose revised language for the Goals and Objectives on: additional discussion of ridership and capacity; to #2, “...now and in the foreseeable future”; to #2, first bullet, delete “new” and replace “developments” with “centers”; and a statement of the MBTA’s goal to reduce greenhouse gas emissions from its operations
- PMT Working Committee will meet the third Tuesday of every month.
- Other future topics include: in October, Environmental Justice and the Finance Plan, in November, Access to Jobs and the Service Plan, in December, modeling.
- Working Committee members may continue their discussions on the new PMT list serve at: [PMT@ctps.org](mailto:PMT@ctps.org).

**Meeting Notes**  
**PMT Working Committee Meeting**  
**October 15, 2001**

**In Attendance:** Please see attached list.

**Meeting Summary:**

**Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members introduced themselves.

**Vision and Goals and Objectives**

D. DiZoglio explained that the current version of the Vision and of the Goals and Objectives was revised to respond to the comments raised by members at the last Working Committee meeting. One suggestion, made by Dierdre Buckley, EOE, was not incorporated, because the MBTA had concerns that it wished to discuss with the Working Committee. The issue is the suggestion to include as an objective the reduction of “greenhouse gases”. The MBTA said that it shares this objective, but has a concern that adopting this objective would conflict with the MBTA’s current plans to upgrade its bus fleet with Compressed Natural Gas buses (CNG), which reduce particulates and other emissions related to diesel fuels, however, it does not change the fleet’s impact on “greenhouse gas” emissions.

Members’ Suggestions and Comments:

Members did not feel that the two objectives would be exclusive of each other, and that considering the long-range nature of the PMT, adopting this objective would not preclude the acquisition of CNG buses. The proposed “greenhouse gas” reduction objective is a long-range value to be pursued over the long-term by the MBTA.

Members suggested inclusion of the greenhouse gas reduction objective, and concurred with the MBTA suggestion to include narrative explaining that CNG fueled vehicles are a “bridge” technology helping to improve air quality until other technologies are further advanced.

Members agreed to language replacing “State of Good Repair” with “State of Optimal Repair”, in which the MBTA would strive to do more than simply maintain equipment; it would seek to keep it functioning like new.

Changes in the Vision statement were discussed. Regarding the proposed language, “increase transit mode share”, members preferred the language “increase ridership” as more clear and direct. Members suggested using the language, “increase transit ridership”.

### **Evaluation Criteria**

The proposed Evaluation Criteria and their relationships to the Goals and Objectives were discussed. The MPO policies, and other qualitative measures from the proposed PMT Evaluation Criteria, are being considered as the initial screening tool for identifying 60 to 70 projects from the Universe of Projects for inclusion in the PMT. The complete set of criteria in the proposed Evaluation Criteria will be used for prioritization. Projects included in the PMT will be prioritized into high, medium, and low categories. Some criteria are quantitative and some qualitative. The Utilization and Effectiveness categories will be more quantitative. The Service Quality, Economic and Land Use Impacts, and Environmental Justice categories will be more qualitative. Additional, quantitative information on many projects will be provided and used in the evaluation.

#### Members’ Suggestions and Comments:

Under Utilization, revise the language of the fourth bullet to read, “Impact on mode Share to Downtown Boston and other key trip destinations”. This would recognize the demand for travel to other destinations than Downtown Boston, while recognizing the importance of Downtown Boston.

Under Effectiveness, add a bullet to discuss increasing capacity by increasing the number of non-peak direction/hour trips.

Under Economic and Land Use Impacts, add a bullet discussing reverse commuting needs.

Evaluation Criteria should guide the MBTA towards an effective transit system.

Under Environmental Justice, change the first bullet to, “Does the improvement serve or negatively impact a minority or low income neighborhood?”

The Evaluation Criteria are not pertinent to all types of projects. Projects should be organized by function or category, and appropriate criteria applied.

Areas which are more densely populated should have more service than less populated areas, so there should be an additional criterion under Utilization which focuses on how well a project serves a densely populated area. This is different from the concept of supporting transit-oriented development.

Evaluation Criteria should not “double-count” for particular project characteristics.

Make economic and land-use assumptions more specific.

An initial screening should be done to identify a basic starting-point list of projects, which would include projects that have been past commitments, or that have been considered for many years, or that have significant community support.

Substituting the wording “minimization of transfers and transfer times” would be a more realistic objective than “elimination of transfers”.

Add a bullet on reducing “greenhouse gases” in the Air Quality section, and refer to the new EPA standards for fine particulates.

The PMT analysis, in all but the later stages, should focus on quantifiable needs and good transportation policy, rather than on a community’s “wants”.

### **Public Participation Update**

The Workshop schedule and methods for promoting attendance were discussed.

Members’ Suggestions and Comments:

Involve the MBTA Advisory Board to a greater extent in the PMT development process.

There are not enough opportunities to discuss the PMT at suburban venues.

### **Web Site Update**

The list-serve is in operation.

### **Project Ideas – Working Committee Members**

Members were invited to submit their ideas for projects to be considered in the PMT.

Members’ Suggestions and Comments:

Boston is developing a city-wide transportation plan and will share with the Working Committee and the MBTA the list of capital projects that emerge through this process.

Compile a list of projects the MBTA is committed to undertaking.

We need to use a model to identify unmet needs

Create a Suburban Ring, using Route 128 for an intermodal transit corridor. Drivers would park in garages within the Route 128 right of way to access a dedicated HOV lane for buses from Route 128 to radial routes. The Route 128 bus lane suggested in the most recent PMT may serve as an initial starting point for concept development.

Consider ITS and other forms of new technology in the PMT.

### **Action Items**

- In the Goals and Objectives, replace “State of Good Repair” with “State of Optimal Repair”, in which the MBTA would strive to do more than simply maintain equipment; it would seek to keep it functioning like new.
- Use “redline” process when revising documents which will be the subject of additional review by the Working Committee.
- In the Vision, replace “increase transit mode share” with “increase transit ridership”.
- Projects will be organized into clusters of similar projects for evaluation.
- Add a criterion under Utilization which focuses on how well a project serves a densely populated area.
- Make economic and land use assumptions more specific.
- Under Utilization, revise Mobility Enhancement to more specifically ask whether a service is filling an un-met need, such as off-peak hour work trips and reverse commuting.
- Conduct an initial screening to identify an initial list of projects and to include projects that have been past commitments or have been considered for many years.
- Continue discussion of the suggested criterion on community support on the Working Committee’s list serve.
- Arrange a meeting of the MBTA Advisory Board Planning Committee and the Working Committee.
- Spice up flyers announcing workshops in order to induce participation.
- Pass out flyers to commuters enough in advance that they can plan their attendance ahead, probably in the morning commute.
- Consider providing additional opportunities for suburban citizens to discuss the PMT.
- Post list of project suggestions on the Web site.
- Working Committee members may continue their discussions on the new PMT list serve at: [PMT@ctps.org](mailto:PMT@ctps.org).
- Compile a list of the projects the MBTA is committed to undertaking.
- Schedule a future briefing from CTPS modeling staff to discuss results of the Regional Transportation Plan modeling work.
- Add a project idea that proposes Route 128 HOV transit (bus) lane providing parking at access nodes and serving radial lines.
- Add a project idea for a Route 128 multi modal/transit lane.

Meeting Notes  
PMT Working Committee Meeting  
November 20, 2001

**Meeting Summary:**

**Call to Order**

Joe Cosgrove, Deputy Director of Planning, MBTA called the meeting to order. Working Committee members, project team and guests introduced themselves.

**Public Participation**

The MBTA reported to the Working Committee on the public workshops conducted by the MBTA to date. The attendance has been good. Citizens and customers have submitted many ideas and comments. Citizens are pleased with the format of forums. It allows for more constructive, interactive dialogue which seems to be very productive. There will be two additional workshops: one in Fitchburg on November 28<sup>th</sup> and the last in Wakefield, in collaboration with MAPC, on December 5<sup>th</sup>.

Several hundred comments and ideas have been submitted. Some come from the workshops, some via the internet, and some are generated by the newsletter. The project ideas that are submitted are posted on the PMT Web site, which is updated every week.

After December 5<sup>th</sup>, the intensive public outreach phase will be completed. The project will continue to meet with groups, if requested, and will work closely with the MBTA Advisory Board, particularly with its Capital Planning Committee. The next phase of the project will involve screening and evaluating projects.

Addresses and email addresses are collected for our mailing list. The second edition of the PMT newsletter will be published sometime in January.

**Members' Suggestions and Comments:**

Ideas generated by the Regional Transportation Plan outreach process should be incorporated into the PMT Universe of Projects. The results of planning efforts by MPO entities should be shared and coordinated.

Citizens have found the workshop format to be useful.



The MBTA should respond to comments in a way that demonstrates to citizens that their comments have been heard.

The Web site should include a Frequently Asked Questions (FAQ) section. This would show citizens that their comments have registered with the project. The list could also indicate how many times the comment, suggestion, or issues have been raised. Citizens can get an understanding of the ideas that others are raising. This could be very useful and educational.

Indicate when the site was last updated.

The PMT should be included on the MBTA's Web site and linked to the PMT home page at CTPS.

### **Update on PMT Schedule**

The December Working Committee will focus on a CTPS discussion of transportation demand modeling, which is the project's mechanism for developing ridership estimates. The discussion will provide background information for the screening work that the Committee will review at its January meeting. In January, the MBTA will present its draft list of recommended projects to undergo in depth analysis in the PMT. The pre-screening criteria will be posted for members to review prior to the January meeting. Also included in the January agenda will be a discussion of Environmental Justice. The MBTA will ask Ms. Smalls, of ACE, to contribute information for the discussion. A discussion of the MBTA budget will be scheduled for March. The final list of projects and their general ranking is still scheduled for completion in late spring 2002.

The pre-screening will be guided by the Regional Transportation Plan policies and other qualitative criteria (such as community support), not by the evaluation criteria being discussed by the Working Committee.

The MBTA also thanked Working Committee members Bill Reyelt and Peter Abair for their participation in the PMT work now underway to identify evaluation criteria related to economic development and land use impacts.

### **Members' Suggestions and Comments:**

The Working Committee should discuss the pre-screening criteria prior to the MBTA's completion of its draft list of recommended projects.

It is unclear how some projects will be defined.

The Working Committee should discuss the process for dealing with projects that are very conceptual and not well developed.

It is very difficult to have an accurate understanding of “community support” for a project.

The PMT should look at the land use impacts of transportation decisions. There are many tools available for this kind of analysis.

The PMT should have quantitative measures for evaluating environmental justice issues and projects, particularly measures for understanding which projects will most improve transit connections between highly transit-dependent neighborhoods and employment destinations.

### **Evaluation Criteria**

The Evaluation Criteria have been modified to reflect changes suggested by Working Committee members. Changes from the initial draft were noted, particularly in the section discussing mobility and the section on economic land use impacts. Commitments to air quality measurements should be reexamined based on available resources for analysis. One new item calls for review of a project’s consistency with existing economic development, transportation or land use plans. Another new item examines whether a project would improve access to higher density neighborhoods, which reflects members’ desire to give preference to projects that would serve existing high-density residential and employment areas. Another item asks if a project supports development of a Brownfield site. Revisions to the Environmental Justice section were noted. A reference was made to the North Shore MIS. The MIS schedule is not concurrent with the PMT schedule and will not yield a list of recommended projects for the PMT prior to completion of the PMT. If the results of the MIS are not consistent with the PMT, the PMT can be amended.

### **Members’ Suggestions and Comments:**

An item that was missed was consideration of whether a project would create a negative impact on low income or minority neighborhoods.

The MBTA should improve signage showing passengers bus routes.

Regional and local planning efforts are sometimes at odds.

Add a new item which provides that projects that contribute to sustainable development and transit-oriented development are viewed more favorably.

The PMT should consider the goals and objectives of local planning to get a sense of a project’s consistency with them.

In the third bullet on mobility, use of the word “currently” is redundant.

Regarding air quality, emissions of fine particulates and carbon dioxide can be determined and might now be projected for the future, particularly considering new low sulfur fuel requirements. Fuel economy is not always a measurement of “greenhouse gas” reduction.

Vehicle miles traveled may be one of the best measures of emission reductions, particularly since this might be a way that transit and highway projects can be compared.

Change references to “cost effectiveness” to “cost”.

Measuring and evaluating are two different exercises.

The definition and limits of some projects need additional description. Are phased projects and independent project components measured and compared with other projects in phases or as a whole?

The previous PMT used capital cost/new rider as a measure.

The PMT should consider a project’s impact on the transportation network.

The PMT should not automatically omit projects that are in conceptual stages and not well-defined. This would allow the PMT to more accurately reflect the region’s vision for the future. Project definition should not be a pre-screening criteria.

Local and regional plans should be reviewed separately.

Define the following terms: state of optimal repair, mode share, and major employment center. Include the definitions on the first page on which the term is used.

Traffic congestion is not going to go away, as long as the region is economically prosperous.

Regarding travel time, what is important are the kinds of transportation choices available to travelers.

Anxiety, while a factor of service quality, is very difficult to measure.

Members are encouraged to continue their discussions on-line on the PMT list-serve.

### **MBTA Service Planning**

David Carney, MBTA, discussed the proposed changes to the MBTA Service Plan. The MBTA recently held nine community workshops and two public hearings on the preliminary 2002 MBTA Service Plan. It proposed changes to approximately 70 different routes. It is guided by the MBTA Service Delivery Policy which includes the criteria that

the MBTA uses to evaluate service. The objective of making these changes is to put MBTA resources to the best possible use, therefore increasing overall service. The Service Plan discusses major changes to service. Minor changes are implemented quarterly as slight adjustments. The proposed changes were summarized and informational materials, showing changes by route, were distributed. Comments on the 2002 Service Plan are due by the end of November.

### **Members' Suggestions and Comments:**

It would be interesting to understand why the service to Logan was not utilized.

There seem to be two main considerations in service planning: the resources and the demand for service.

Consider whether some of the service planning suggestions might be useful in the PMT.

### **Job Access and Reverse Commute**

There are both federal and state initiatives underway. There are three primary sources of funding: U.S. Department of Labor Welfare to Work funds (improving transportation information given by job counselors), Job Access and Reverse Commute FTA grants (to start some new transit services), and funds available through the Department of Transitional Assistance's Interagency agreement with the Executive Office of Transportation and Construction (for transit passes, transportation coaching, and funds to provide transportation to work sites where no transit is available). The FTA grants might fund new transit services in newly identified origin/destination pairs where there are no service links. The MBTA has received funds for several new bus services: the CT-3 route providing service from Andrew station to Logan Airport; early morning (starting at 3:00 AM) service to the airport from Mattapan, Ashmont and Dudley stations; "sunrise services" to Downtown Boston from Watertown Square, Jamaica Plain, Ashmont, and Hyde Park; and routes to suburban shopping centers.

### **Action Items:**

Incorporate ideas from RTP outreach into the PMT Universe of Projects.

Demonstrate to citizens that their comments have been heard.

Create a FAQ section on the Web site.

Add a note to the Web site indicating the date that the project listing was last updated.

Add the PMT to the MBTA Web site.

Discuss how projects that are very conceptual and not well developed will be considered for inclusion on the draft list of recommended projects.

The PMT will consider air quality projections for fine particulates and carbon dioxide, if they are available.

Discuss performance measures and ways to define projects at the January Working Committee meeting while reviewing the draft recommended list of projects.

Define the following terms: state of optimal repair, mode share, and major employment center. Include the definitions on the first page on which the term is used in the PMT final report.

Meeting Notes  
PMT Working Committee Meeting  
December 18, 2001

**In Attendance:** Please see attached list.

**Meeting Summary:**

**Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves.

Copies of the Consent Order for the Central Artery project were made available for members.

**Public Participation**

There were two additional public workshops since the last meeting; one in Fitchburg, and one in Wakefield (held in conjunction with MAPC). The initial outreach phase for the PMT has now been completed. While the project team will continue to meet with organizations upon request, the PMT Working Committee will be the focal point for public involvement in the upcoming phase.

A Frequently Raised Comment section will be added to the PMT Web-page. There will be a new edition of the PMT Monitor published early in the new year.

The MBTA is reviewing the Capital Investment Program (CIP) with the Transportation Planning and Programming Committee and the MBTA Advisory Board in the near future.

Information from MBTA departments on future needs in the MBTA system is now being gathered. Projects to meet these needs will be considered in the PMT. The CIP includes information that citizens will find useful in understanding long term needs.

**Members' Suggestions and Comments:**

- The MBTA should give the PMT Working Committee members copies of comments received (since January 2001) on the Regional Transportation Plan.
- There is concern that public involvement activity on the MBTA Service Plan and the PMT have detracted from citizens' commenting on the CIP. It is not getting media coverage. Assertive outreach will help. While the CIP is on the Web-site, it is not easy to find. The Advisory Board is concerned about getting good public involvement in the CIP.

- The CIP should be a good indicator of MBTA thinking, both short and long term. Short term projects are sometimes indicators of future trends and needs.
- The PMT pre-screening criteria should be related to the CIP criteria.
- The MBTA views and ideas for the system should be explicitly identified. There may be large differences between the PMT vision and the CIP.
- Members have not received a copy of the CIP/State of Good Repair presentation.

### **Review of Evaluation Criteria**

Most comments from members have been incorporated into the revised December 5<sup>th</sup> Performance Measures. CTPS staff has been consulting with DEP to identify local capability in measuring carbon dioxide emissions and fine particulates, and so this request has not yet been incorporated.

There is no plan for quantifying all the criteria. They will not be used as part of a scoring system, but more informally, as a way to get a sense of how projects rate on a scale of 1 to 5. They will be used as a way of seeing if the particular project meets the goal of the criteria well and then comparing projects, considering all the criteria.

Suggestions raised at this meeting will be incorporated into the performance measures.

### **Members' Suggestions and Comments**

- Add an item on improving mobility for the transit dependent user.
- Add an item on non-motorized access. There should be a measurement for understanding the dollar value (considering increased opportunities for non-motorized access) of locating stations in existing activity centers so that planners can better compare costs of various proposed station locations.
- Potential sites in activity centers are often already used for other than transit purposes.
- Attempt to quantify all the criteria so as to maintain their usefulness in the screening process. Use an objective way of measuring how well a project meets the criteria.
- Expanded descriptions could be useful in instances in which the criteria can't be quantified.
- In comparing cost to benefit, look at total cost (including operating cost, perhaps annualized), not just capital cost.
- The PMT should encourage development consistent with local plans.
- The PMT should be based on development that is already in place in a community, not future plans.
- Regarding land use, the criteria should consider state designated revitalization areas, which are previously developed areas.
- It is important to look at the underlying criteria for designation.
- The evaluation criteria should ask, Does the project spur transit-oriented development?
- The Urban Ring Compact document will provide useful perspectives for this evaluation.

## **Future Needs Assessment and Travel Demand Modeling Techniques**

CTPS staff discussed the CTPS travel demand model and its use in the PMT for developing ridership estimates, travel time benefits analyses, and air quality analyses. The model is multi-modal and includes 90% of all the current transportation facilities and services, including highway and all modes of public transit. Local transit authorities and private shuttles are not in the model. It has been updated to forecast walk trips and has a mode choice model. The model provides very satisfactory forecasts. For air quality, the model can calculate carbon monoxide, volatile organic compounds, and nitrous oxides. CTPS is exploring possible ways to calculate carbon dioxide.

For the PMT, the model will begin with a base case, all the projects believed to be completed by 2025 (projects in the Regional Transportation Plan). Then transportation statistics will be developed. Then, CTPS will model future conditions with proposed projects in place, showing projected benefits. The model can show multi-modal impacts. Model runs will look at the impacts of several projects (with no synergistic interaction) at a time. Current, but not future, emission factors for transit vehicles are included in the model. Assumptions of future fleet mix for buses, assuming the use of known technologies, allows for calculation of future bus fleet emissions. The current model does not have a land use component.

CTPS staff discussed the results of the analysis conducted for the Regional Transportation Plan and showed mapping of the highway and transit corridors projected to be congested. The CTPS analysis considered two land use scenarios, Trends Extended (assuming growth in population and employment will follow similar pattern as the past) and Targeted Growth (assuming growth occurring in areas with existing water and sewer infrastructure). Job growth in the region will outpace housing growth, so, most housing growth is projected to occur outside the region. Projected percentage increases in trips and projected ridership by mode was discussed. The bulk of new trips will be auto trips. However, for new trips, the transit trips and walk trips will have a greater percentage increase and auto trips will show a percentage decrease. Commuter rail will experience the highest percentage increase of all transit modes. Vehicle trips increased less than miles per vehicle trip. Projections also show transit services at- or over-capacity. The highest increase in highway congestion will occur in the outer areas. Projections for both transit and highway show where demand will exceed capacity.

### **Members' Suggestions and Comments:**

- Modeling results must be impacted by subsequent development.
- Please define the transit service characteristics in the model.
- Targeted growth scenario assumes that population will grow in areas with existing infrastructure and resources.
- The volume/capacity ratio is particularly pertinent to PMT considerations.
- Add Scenario C to the tables.
- The Urban Ring best addresses the Green Line crowding problem.



- When the projects for the Regional Transportation Plan have been finalized, will that affect the base case for the PMT? Planning will be more coherent when the RTP and the PMT cycles are synchronized.

**Action Items:**

- Make copies of the Regional Transportation Plan comments available to the Working Committee
- Provide members a copy of the CIP/State of Good Repair presentation.
- Add an item on improving mobility for transit dependent users to the performance measures.
- Expand the discussion in the Interconnectivity bullet to specify interest in pedestrian and bicycle access.
- The Department of Housing and Community Development will develop material discussing general characteristics of state designated revitalization areas.
- Add a bullet that asks if the project spurs transit-oriented development.
- Incorporate all suggestions into the revised performance measures.
- Clarify whether the PMT base case/no-build will be modified to include the final set of projects in the Regional Transportation Plan.

Meeting Notes  
PMT Working Committee Meeting  
January 15, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves. Copies of all comments submitted on the Regional Transportation Plan are available to Working Committee members.

**II. Access Boston Study Recommendations – Vineet Gupta**

Vineet Gupta discussed the Access Boston Study, a city-wide transportation study. The goal of the study is to identify the city's transportation needs. Public transportation is a particularly important element of this study. The study sets out goals and discusses funding needs and constraints.

The study also points out a set of existing and new projects and suggestions which have emerged from the city's outreach through community meetings and focus groups, such as the Urban Ring, an expanded Silver Line, Fast Track Rapid Rail. Based on these ideas, the city has identified a need for Next Generation Studies, to further explore which of these projects are best suited for the Boston area, over the long-term. The Hinge Block Connector is an important concept the city would like to raise for public discussion. This would involve several alternatives for using the Tremont Street tunnel (now proposed for use by the South Boston Transitway) and varied vehicle types to create east/west connections or extensions in service (such as Fenway area to South Boston Waterfront or to Logan airport). Other concepts for additional study would be identifying interceptor stations along I-495 or Route 128, and looking at new Blue Line extensions.

Joe Beggan, Rizzo Associates, discussed specific details of the study's results. The study identified projects that would help the city achieve its transportation goals by building on the Silver Line's Bus Rapid Transit mode. Potential options might be to extend BRT service and provide additional service to Mattapan, Ashmont Station, South Boston Waterfront, or JFK/UMASS. Another option would use the Massachusetts Turnpike and local streets to bring BRT service to the Allston/Brighton area. A next step could be to examine existing rights-of-way and identify potential rights-of-way as Transit Priority Corridors for providing services.

Fast Track Rapid Rail is a concept that suggests using the Fairmount Branch and Framingham/Worcester commuter rail lines to support new, more frequent services and services to new intermediate stations, perhaps using diesel rail cars.

The results of the study will provide input and serve as the basis for the city's recommendations for projects in this and the next PMT. The city recommends adding all the Access Boston projects to the PMT Universe of Projects and also suggests the PMT consider system concepts as well as specific projects.

#### **Members' Suggestions and Comments:**

- Implementing transit priority lanes throughout the metropolitan area is a legal commitment.
- The Urban Ring is a system.
- One way to make the Hinge Block work better would be to explore using the existing tunnel infrastructure, such as the pedestrian link between Park Street and Downtown Crossing and other tunnels now used for storage, instead of using the Essex Street connection.

### **III. Preliminary Results of Pre-Screening Process**

The Working Committee began review of the Prescreened System Expansion Project Listing. Projects listed have been screened, with those to be included for more detailed analysis given checks. After further analysis, these projects will then be given either high, medium, or low priority. Enhancement projects and state of good repair projects will be prescreened after the system expansion projects. (System expansion projects take the system to places it doesn't currently serve and enhancement projects make the system serve existing areas and customers better.)

One item in the project listing is to expand feeder bus service. Some specific feeder bus services are not included because they may be better provided by another transit authority or may be better explored in the service planning process. TMA's should be considered as well. Additional parking is considered in the enhancement category. Projects considered in the North Shore Major Investment Study are included.

#### **Members' Suggestions and Comments**

- Make sure you adequately consider feeder buses and jitneys. View it as an extension of the commuter rail service, not just a local bus service.
- Provide a map of RTA service in the MBTA service area.
- We need a better definition of MBTA responsibility for feeder service to commuter rail and the approach for this project.
- Feeder bus service should be considered as part of the PMT, not just the service plan.
- Think of a larger MBTA role, as not just an operating agency, but a planning and coordinating agency that can facilitate benefits beyond its boundaries. It could use its

funds to leverage other funds for acquisition of needed vehicles that might be operated by other entities.

- The MBTA should take responsibility for disseminating information on transit services and connections.
- There should be information provided in the PMT explaining the reasons a project is not included on the list for further evaluation.
- Projects might be grouped by corridor instead of by mode.
- Some Working Committee members feel they have not been given enough information to fully understand and agree with the screening process.
- Insert the Access Boston Blue Line extension proposal.
- Add the Hinge Block Connector.
- For Fairmont Line, revise description to allow consideration of light rail or diesel rail cars as well as heavy rail.
- Group together projects that are mutually exclusive.
- Consider using Electrified Multiple Units and Diesel Multiple Units. The MBTA should be able to maintain multiple types of equipment, such as EMUs. FRA mandates, such as those restricting this technology, should be addressed.
- Add trackless trolley or light rail service in the Broadway, South Boston corridor.
- Include a Washington Street Corridor project providing service from Dudley to Park Street. Model both service to Dudley Square and service to Mattapan.
- The MBTA should encourage additional residential housing at the South Weymouth Naval Air Station.
- System expansions should be described in such a way as to allow consideration of a variety of modes.
- Add the Environmental Justice proposal for 100 additional buses.
- Add BRT, rapid transit, or commuter rail to Union Square.
- Add a Blue Line/Green Line extension to West Medford.

#### **IV. Action Items:**

- Provide a map of RTA service in the MBTA service area.
- Better define how improvements and expansions of feeder bus services will be approached.
- Add the following projects to the list of projects for further evaluation: Access Boston Blue Line extension proposal, Hinge Block Connector, trackless trolley service in South Boston, Red Line to South Weymouth, 100 additional buses, transit to Union Square, and rapid transit to West Medford.
- Delete “heavy” in the description of Fairmount Line improvements.
- Group together projects that are mutually exclusive.
- System expansions should be described in such a way as to allow consideration of a variety of modes.
- Prepare graphics showing project locations and corridors.
- Post the System Expansion Project List on the Web site after the Working Committee has completed its review.

Meeting Notes  
PMT Working Committee Meeting  
February 19, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves. PMT Working Committee member Khalida Smalls has indicated that she is intending to step down from the committee.

**II. Environmental Justice – David Mohler**

David Mohler, manager of Environmental Justice issues for the MPO, provided an overview of the work of the MPO and its Environmental Justice Ad Hoc Committee, pursuant to federal Title VI and Department of Transportation orders. He explained that the MPO had been asked to review MPO policies and programs in the Regional Transportation Plan (Plan) to ensure that minority and low income communities are treated equitably regarding benefits and burdens of the transportation system. In this process, the MPO inventoried and located low income and minority communities; compared transportation benefits and burdens between these and other communities; and then developed measures (such as level of crowding, schedule adherence, mobility) to evaluate the current system. Most measures relate to transit, the Ad Hoc Committee's major area of interest. The mobility analysis looked at origin and destination points, including non-work trips. Evaluation data will be included in the Plan and will inform PMT analyses.

Results of the evaluations showed that schedule adherence is much the same for minority compared with non-minority buses and for low income and non-low income communities. Buses serving minority and low income communities may be slightly more crowded (but the differences are statistically insignificant). Travel speeds of trips to and from minority neighborhoods tend to be slightly slower while those to and from low income neighborhoods tend to be slightly faster. Some of these results, including the MPO's definition of Environmental Justice and its measures, have been submitted to and approved by the federal government. The Federal Highway Administration has notified the MPO that it has earned "Best Practice" status for its process and analysis. The Environmental Justice work is also trying to address issues of cross-modal comparisons. Other issues requiring additional attention by the MPO include evaluating benefits to low income and minority communities resulting from service to non-low income and non-

minority communities (air quality, traffic reduction), and providing service to low income and minority communities in the suburbs.

If the Plan identifies problems, the PMT can try to address them. In addition, the PMT will incorporate the Environmental Justice concept in its performance measures and will review project ideas considering Environmental Justice as one criteria.

### **Members' Suggestions and Comments:**

- There are concerns that comparisons between bus and rail service should be made (some communities closer to Boston have longer travel times than more distant communities).
- There are concerns that the MPO did not discuss Environmental Justice issues when it identified a transportation network for public circulation in the draft Plan.
- Some perceive that actual travel times for low income and minority communities are greater than those reported.
- Transportation benefits may be a result of implementation of a particular network of projects included in the Plan, but may also be the result of actualization of a land use scenario.
- The Environmental Justice community should be part of the discussion during decision-making as a part of the PMT process.
- The MPO will further discuss the issue of flexing federal highway funds to transit projects, which may result in more funds available for transit.
- The process that prioritizes transit spending should demonstrate how Environmental Justice issues have been considered, particularly through the application of the PMT measures.
- Care should be taken in using the term “minority population”, so as not to imply a larger minority population than exists. It might be useful to look at ridership survey data or take other steps so as to get a better understanding of a neighborhood’s mobility.
- Low income and minority communities should be represented in this process.

### **III. Discussion of Pre-Screened System Expansion Project List**

Clinton Bench, CTPS, reviewed the maps showing the ideas suggested for the PMT with the prescreened project listings highlighted. Other maps were also made to show the areas with existing MBTA and RTA fixed route service and show regional transit authority boundaries. Members referred to the revised Suggested Pre-Screened Project List handout as they continued their discussion of projects to be included in the pre-screened project list. If a project requires a significant capital expenditure, it is considered for the system expansion list; projects proposing more service that do not require a major capital expenditure are moved to the service planning category. Service frequency and routing issues generally belong in the service plan, not the PMT. Some items considered are old ideas that have been suggested for additional review. Accessibility projects are discussed as enhancement projects. There will be a discussion of possible funding sources within the final PMT document.

## **Members' Suggestions and Comments**

- Include reducing the number of stops along the C and D routes of the Green Line in the list of pre-screened projects.
- Add an item for the “Y” connector, which would provide the option of not going to South Station.
- The Working Committee should consider including an item on “four-quad” gates.
- The MBTA should take a position advancing the elimination of grade crossings throughout the commuter rail system.
- Include consideration of a transit option for the South Weymouth Naval Air Station.
- Include a project advancing a signal preemption or an Opticom system.
- Keep the two service planning items, “New express bus routes” and “Intra-suburban bus service” in the system expansion list.
- Concerns were expressed that moving projects to the service planning category minimizes the attention they receive or would put them at risk for service cuts.
- A project that would provide for acquiring buses for inter- or intra-suburban bus service (thereby making the service affordable through leasing vehicles to private operators) could be justified as a service expansion project. One should be included.
- Provide analysis for capital costs for ten potential suburban bus routes.

## **IV. Working Committee Member Ideas and Items**

None were raised.

## **V. Action Items:**

- Provide information that explains the reasons each omitted project was excluded from the list of projects.
- Create a new entry for the combined Silver Line items (page two).
- Revise the commuter rail item “Build a regional commuter rail station on I-495 in the Littleton area” to refer to a regional station at Devens and include in the list.
- Include a narrative describing in general terms the MBTA’s policy regarding grade crossings and “four-quad” gates.
- Remove the “Xed” item on the Union Square station noted on page eight.
- Include narrative that discusses an integrated (flexing and joint funding) approach to fund transit projects that rely on roadway improvements.
- Include the item “Build new busways to Alewife Station” as a system expansion item, not a service plan item.

Meeting Notes  
PMT Working Committee Meeting  
March 19, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves. The first draft of the explanations for project exclusions was distributed.

**II. Draft of Prescreened System Expansion Project Listing – Clinton Bench, CTPS**

D. DiZoglio emphasized that the list is still a draft and ideas and input from the committee are welcome. Clinton Bench said that the PMT and the Plan Update staff have shared ideas on projects raised during their respective outreach and development processes. All items mentioned for the Plan Update are included in the PMT Universe of Projects.

The water transportation items have been added to the list of Prescreened System Expansion Projects and members were asked to review them. Four items passed the prescreening: ferry expansion to Russia Wharf; high speed service from the North Shore to Boston and the airport; increase ferry service from South Shore communities into Boston and improve ferry infrastructure; and restore East Boston ferry. Operation of ferry service through the Cape Cod Canal was not included. More information on project descriptions, including costs, will be included in PMT text as it becomes more fully developed.

The Committee reviewed the first draft of the written explanations for the elimination of projects. This draft addressed only rapid transit projects. Work is underway on text for other modes and another draft will be distributed before the next meeting.

**Members' Suggestions and Comments:**

- Viable services from the Water Transportation Study should be incorporated in the PMT.
- Feeder buses might serve the commuter boats.
- Add “alternative fuel” as an element to the commuter boat projects.



- Remove the monorail idea from the pre-screened list. It is not compatible with the multi-agency visions for future use of the surface between North and South Stations.

### III. Service Enhancement Project Performance Measures

D. DiZoglio explained that the intent of the discussion is to review evaluation criteria for the parking expansion and accessibility enhancement projects. Performance measures for the expansion projects (projects that extend service to new markets) have been developed; those for system preservation projects (projects that maintain a state of good repair) and other enhancement projects will be developed in the future.

#### Parking Expansion

Ron Morgan discussed the MBTA program for planning parking expansions. Parking is a major element of enhancement projects. While the MBTA has three primary criteria for evaluating parking expansion (location, cost effectiveness, and projected demand), there are many other factors (funding, timing, political issues, and reaction to change) that affect the viability of parking expansions. Criteria for identifying parking lots as good candidates for expansion include: convenient access, land and air rights, demand, capacity, cost per space, environmental issues, implementation, community support, and funding options. The MBTA is now in the process of ranking the areas considered for expansion. The list of stations considered was distributed as well as the short-listed set of stations. Evaluations try to balance factors fairly. The MBTA is attempting to address the large public demand for additional parking at transit stations. Information on station usage is included in the MBTA parking study. The MBTA cannot control local land use decisions. Ultimately, the community decides if it wants to take steps to support transit-oriented development when such projects advance.

#### Accessibility

Steve Woelfel presented the five criteria that was previously used to establish the priorities for station accessibility improvements within the Key Station program. These are guided by ADA requirements. These will be the starting point for current planning related to accessibility improvements.

- Passenger boardings – consideration of passenger traffic volume.
- Transfer points – to see if transfers could be made easier.
- Connectivity – identify stations with multiple modes.
- Terminal stations – make them accessible.
- Activity Centers – employment, health care, government services, entertainment.

The development of a new Key Station Plan will dovetail with the PMT. Some input from communities, particularly on commuter rail stations, has been received. Some stations are more accessible than others; sometimes just by virtue of their location. New stations must provide access along the full length of the platform. Existing stations can be upgraded with mini-high platforms. There will be consideration of the varying degrees

of accessibility at existing stations in establishing priorities within the PMT. The MBTA will provide an update on the Key Station Plan and will propose criteria for selecting accessibility projects at the next meeting.

### **Members' Suggestions and Comments**

#### **Parking Expansion**

- Change the title of the general category from “Enhancement Criteria” to “Service Enhancement Criteria”.
- Parking should not be considered as its own independent category. The issue should be providing access and this includes feeder bus, walking, and other modes, not just by additional parking. There should also be a consideration of whether transit-oriented development is encouraged.
- It would be useful if the criteria could be used to determine whether large regional parking lots or expanded local stations are a better approach.
- It might be useful for members to see information on station usage: existing ridership, parking demand, walk-ins, etc.
- It would be interesting to know if the unmet demand for additional parking could be satisfied by another option and whether parking charges affect the demand.
- It should be made clear that the criteria presented are not intended to be used for siting new stations, but for expanding existing stations.
- Add an item asking if the expanded parking would interfere with or support access by other modes.
- There should be a set of criteria for siting new stations and should include: impact on existing stations, access by non-auto modes, and existence of zoning that promotes multi-use development.
- The criteria should encourage walking or taking high occupancy vehicles to transit and should support development around commuter rail stations that optimize this.
- The MBTA should take a leadership role working with communities to develop overall plans for access to the stations.
- The MBTA should look at the cost of a demand-responsive bus service.

#### **Accessibility**

- Please provide information on legal commitments and mandates for improvements.
- Reorganize projects to provide a separate category for stations at which current construction is addressing accessibility issues.
- ADA makes a very clear distinction in defining accessibility. A station is either accessible or not.

### **IV. System Preservation Projects, Criteria and Weighting**

D. DiZoglio discussed the three criteria considered for evaluating system preservation projects: indicators of condition (age), operational impact, cost effectiveness. In identifying Capital Investment Program improvements, the criteria are weighed, with age accounting for 60%, operational impact, 20%, and cost effectiveness, 20%, so that system

preservation projects can be given priorities. Views on these values for criteria were requested. The MBTA approach is a national model for system preservation evaluations.

### **Members' Suggestions and Comments**

- Conduct several model runs giving the criteria varied weights and compare the results.
- Age is an important indicator of state of good repair, particularly if the analysis leads to vehicle procurement.
- Ventilation and lighting of vehicles is important and can affect ridership.
- Deferred maintenance costs should be factored in.
- Condition is a more important consideration than age, which may not be an accurate indicator.
- Budget should be a factor.
- PMT categories should easily relate to the Capital Investment Program categories.
- It will soon be time to review progress with the MBTA Advisory Board.

### **V. Working Committee Member Ideas and Items**

None were raised.

### **VI. Action Items:**

- Discuss the progress and any interim results of the Water Transportation Study.
- Add alternative fuel commuter boats to the System Enhancements category.
- Distribute the next version of explanations of the elimination of projects before the next meeting.
- Change the title of the general category from “Enhancement Criteria” to “Service Enhancement Criteria”.
- Provide information on legally mandated accessibility improvements.
- In list of accessibility projects, create a column to note “being addressed”.
- Provide an update on the Key Station Plan.
- Propose criteria for selecting accessibility projects at the next meeting.
- Conduct several model runs applying varied weights to system preservation criteria: 60/20/20 and 60/10/30.
- Consider the cost of deferred maintenance and budget.
- Meet with the MBTA Advisory Board after the May PMT Working Committee meeting to discuss prescreening and criteria.

Meeting Notes  
PMT Working Committee Meeting  
May 21, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves. He said that much of the agenda will summarize progress to date in the main categories of projects and that the MBTA is hoping to complete evaluations over the next several months. He asked members to make sure they had picked up copies of all handouts.

**II. System Expansion**

D. Dizoglio said that the projects in this category were being analyzed using the criteria discussed previously. Members reviewed copies of the full universe of system expansion projects with notations and explanations on their status in the shorter list of pre-screened projects. The evaluation can include an evaluation of carbon dioxide emissions. The quality of connectivity will be a consideration.

**Members' Suggestions and Comments:**

- It is important to include in the analysis a consideration of connecting neighborhoods (particularly low-income and minority) with jobs and other destinations, and to use the most current demographic information.
- Land use issues should be included in the criteria.
- The Urban Ring should work toward a level of service of one-minute headways.
- Activities that support optimal performance (capacity expansion) should be flagged.

**III. System Preservation**

The MBTA has prepared a database providing information on system status for its infrastructure. When preparing an analysis of which facilities to prioritize for maintenance, the MBTA uses a 60% weighting for the age factor, 20% for cost-effectiveness (number of people served/cost), and 20% for effects to operations. At the request of the Working Committee, the project applied revised ratios of 30% for cost effectiveness and 10% for operational impacts. Under this scenario, more commuter rail and bus station maintenance was called for, but no significant changes emerged. Joe

Cosgrove distributed information showing unconstrained needs. He said that financial assumptions from the Regional Transportation Plan (RTP) (70% of MBTA budget spent on state of good repair projects) were being entered into the model. More heavily weighting the ridership factor would tend to reduce emphasis on maintenance of facilities. This database is an evaluation tool, not a programming tool. Allocation of funds to the Central Artery has deferred maintenance of other portions of the existing highway system, so that flexing highway funds to transit may not be feasible. The MPO will consider flexing and make decisions about it in the future.

### **Members' Suggestions and Comments**

- Flexing funds from highway to transit would give the MBTA greater capacity to apply money where its needed.
- There may be a middle ground between totally unconstrained and constrained funding programs.
- The MBTA should base its revenue projections on a 7% increase in sales tax income, instead of the currently-used factor of 3%. This would expand the amount of funds available for projects.
- The PMT is a vision-document and should not be constrained by the RTP.
- Expand the amount of funding for these projects.
- Heavy weighting of the age factor may not account for incremental maintenance and repair of some system elements.
- The Working Committee needs to understand the most pressing system preservation needs.
- The issue is not necessarily the dollar value of a resource, but also its usefulness that should be considered in system preservation decisions.
- The Working Committee should assist in evaluating transit needs for the future.
- Transit has a suburban element, not just an urban one.

### **IV. Service Enhancements**

The MBTA has received many suggestions on service enhancements. We are looking at how to expand capacity through enhancements. The universe of suggestions has been pre-screened using the same criteria as that used for the expansion projects. Expansion criteria will also be used for further evaluation.

Enhancement projects might improve the experience of existing riders, attract new riders, or better utilize existing capacity. Examples are automatic fare collection and improved signals and communication for better on-time performance. Some ideas in the universe were pre-screened out because they did not increase ridership. For commuter rail, double-tracking is an example. Non-motorized mode projects belong in enhancements, not system expansions. The MBTA does not support the use of four-quadrant gates at commuter rail grade crossings. MBTA policy does not allow shared rights-of-way with

existing commuter rail and does not construct bike paths, but is working with the City of Somerville on a bike path project.

### **Members' Suggestions and Comments**

- The Red/Blue connector should remain a consideration.
- Some proposals seem to conflict with or make others obsolete.
- Clarify the differences between the two commuter rail references, one on page 3 and the other on page 5.
- Regularity of service is a big factor in decisions to choose transit.
- Signs and notices at bus shelters should include route numbers and maps of routes.
- The PMT should address the issue of sharing rail rights-of-way with bike paths.
- The PMT should be a vision document going beyond a strict discussion of capital expenditures.
- In general, pedestrian access should be in place for non-motorized mode facilities.
- Members, as well as citizens, should be able to make suggestions.
- There seems to be a movement to avoid new trackless trolleys.

### **VI. Service Enhancements – Parking**

#### **Members' Suggestions and Comments**

- Conduct several model runs giving the criteria varied weights and compare the results.

### **VII. Working Committee Member Ideas and Items**

None were raised.

### **VIII. Action Items:**

- For System Preservation, conduct three model runs: based on unconstrained funding, funding projected in the RTP, and expanded funding which considers increased sales tax revenues.

- Discuss the issue of shared right-of-way in the PMT text.
- Take out references to exclusive lanes and priority signals on page 6.
- Add more text discussing the bicycle parking stations.

Meeting Notes  
PMT Working Committee Meeting  
June 25, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves.

**II. Prioritization of System Preservation Projects**

Mr. DiZoglio introduced the MBTA's infrastructure asset management database. Clinton Bench handed out a listing of elements in the infrastructure and funds needed for maintaining their state of good repair. The list shows the level of expenditure required to bring the entire system to a state of good repair in 20 years. He explained that the MBTA decided to look at possible spending with both fiscally unconstrained and constrained parameters. Projects listed in the high priority group were consistent with the Regional Transportation Plan (Plan) and that could be undertaken with a funding level of \$470 million/year (the level of expenditure to maintain the current state of repair) for the first five years. Unconstrained, the figure is \$4.5 billion over seven years. Seventy-five percent of the capital budget will be targeted for state of good repair items. Medium priority projects were those that, within the fiscal constraints of the Plan, could be undertaken over a 20-year period. All other projects that are needed for a state of good repair were given low priority. The Plan is a 25-year document, while the MBTA asset management database is a 20-year program, so some adjustments might need to be made.

The asset management database is an evaluation tool, not a programming tool. These priority groupings are recommendations, not mandates, and they are not compared with system expansion projects. This listing, however, could be useful in advocating for state of good repair projects. Decision-makers can use them for identifying projects they want to target for earmarked funding.

The prioritization is based on a loose formula: 60% age, 20% operational impacts, and 20% ridership. (Testing other percentage splits yielded outcomes that unduly favored facilities with high ridership over system-wide support and maintenance facilities.) Members can consider these listings and make recommendations about adjustments they think should be made. The committee might take a look at how much state of good repair work should be front-loaded in the early, high priority years.



The text of the report will provide explanation for these figures. The PMT will make it clear that the highest priority will be system preservation and will explore ways to identify elements as projects in some areas.

#### **Members' Suggestions and Comments:**

- This listing and prioritization of projects should be seen as dynamic and changing.
- There should be some analysis, reviewed with the public, of requirements to bring the system to a state of good repair.
- The figures should be better explained.
- Auditors, project managers, and planners will view these numbers differently. That should be explained in the preface.
- Use project-based or funding methods to identify the work to be accomplished.

### **III. Justifications for Projects Excluded from Service Enhancement List**

S. Woelfel presented information on items excluded from the Service Enhancement List. The material distributed gave reasons some projects were not included. In comparison, fewer System Preservation items were screened out because they have been part of planning for a long time. One item, the Back Bay/South Station Shuttle, would use existing tracks to provide service between the two locations for Old Colony riders and the Longwood Medical area workers, and Back Bay residents. For the Mishawam STation, connections to allow access to the other side of the right of way would cost millions of dollars. There might possibly be an at-grade solution. Concerning bus stops, planning their locations is a service delivery issue and might be best considered in service planning instead of in this section of the PMT.

#### **Members' Suggestions and Comments**

- Include double-tracking of the Old Colony Main Line in the PMT.
- The hotel owners abutting the old Mishawam Station believe the new station is not as convenient.
- Page 9, Bus/Trackless Trolley section, third bullet, “add exclusive lanes and priority signals...”, and be more specific on which routes are good candidates for these improvements. The Boston Access project has a list of suggestions.
- A good relationship between the MBTA and the communities is very important.
- In signalization improvement projects, some projects are multi-jurisdictional and need good coordination between the entities. Grade separating Massachusetts Avenue and Melnea Cass Boulevard would be a very important, multi-jurisdictional improvement in Boston. This specific issue needs to be identified. There might be opportunities to bring in more resources.
- On page 9, add a new bullet with a general discussion of bus stop locations. This is an important issue. The City of Boston is looking forward to working with the MBTA on locating bus stops (on the far side of intersections). Also painting the pavement with special markings would prevent illegal parking (blocking buses) at bus stops. Modify text with, “Work with communities to identify better bus stop

locations, sometimes on the far side of intersections.” There is a capital element involved in this item.

- Add “and schedule and vicinity map” to bus stop signing.
- Consider walls at bus stops, privately funded in exchange for advertising.
- Add a general discussion of a program or pilot project on improved access (including bike racks, bike lockers) at stations for bicycles.
- Standardize low-level door access on more cars on the Green Line.

#### **IV. Outline for PMT Document**

S. Woelfel discussed the draft PMT outline distributed to PMT members. The MBTA is looking for feedback from the Working Committee on the direction suggested by this outline. J. Cosgrove explained that the PMT has two functions: 1) the project screening for the capital planning process and 2) articulating the MBTA ‘s vision for public transit in the region. If the PMT focuses on the project list, the larger vision might be diminished. The document should spell out policy and priorities and inform the public of the choices, constraints, issues, and balancing among competing needs required to develop a capital program. Project evaluation is required, and might best be included in the Appendices, so that global content is more the focus. The PMT will use maps and other graphics. The PMT will discuss mobility challenges. Discussion and reference to MAPC land use information will be included. Section E summarizes the rationale for project screening and prioritization and references the detailed data in the Appendices. Local communities can use the PMT to inform local decisions. In local land use planning, the MBTA can make suggestions and cooperate, but communities have to lead the way.

#### **Members’ Suggestions and Comments**

- Illustrating the data is important. The use of graphics will be key.
- In Section F, add information on the project implementation process.
- Add a discussion of multi-jurisdictional coordination issues and items.
- In Section C., include a discussion of land use.
- Look at land use as a comparable level of interest. Take regional planning issues by the horns
- Make specific references to how this relates to the regional land use plans and planning, and reference MAPC’s work on this topic.
- Challenge the local control/home rule land use issues; stimulate creative thinking.
- The PMT should include a discussion on: congestion, options for controlling growth, planning for transportation mobility, and ways the investments in the infrastructure support planners’ work to manage wisely.
- Make a statement explaining how the PMT vision supports the regional and local planning processes.
- Stimulate creative thinking; get people talking about policy, more than projects.

## **V. Working Committee Member Ideas and Items**

The MBTA and the MBTA Advisory Board Capital Planning Committee will meet in July to continue discussions and coordination.

## **VI. Action Items:**

- Include in the PMT a clearer explanation of the state of good repair project listings and their funding, and include this topic in discussions with the public.
- Revise language on page 9, Bus/Trackless Trolley section, third bullet, to read, “add exclusive lanes and priority signals....”
- Add the following text as a new bullet on page 9 at the end of the discussion, “Work with communities to identify better bus stop locations, sometimes on the far side of intersections.”
- Add “and schedule and vicinity map” to the discussion on bus stop signing.
- Add a general discussion of a program or pilot project on improved access (including bike racks, bike lockers) at stations for bicycles.
- Reference MAPC work on land use planning and discuss the PMT’s relationship to regional and local land use planning and possible use in growth management.
- In Section F., add information on the project implementation process.
- Add a discussion of multi-jurisdictional coordination issues and items.

Meeting Notes  
PMT Working Committee Meeting  
September 17, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Assistant General Manager for Planning and Real Estate, MBTA, called the meeting to order. Working Committee members, project team and guests introduced themselves.

**II. Initial Model Results for System Expansion Projects – Clinton Bench, Vijay Mahal**

Updated lists of Service Enhancement projects and System Expansion projects were handed out. While there have not been many projects added to the list, there have been language changes and minor edits. A table showing the status of current prioritization (high, medium, low) for Parking Service Enhancements was handed out. Tables showing the status of Commuter Rail Service Enhancement and System Expansion projects' evaluations were discussed. The tables will eventually include rating information on all the performance measures. Model runs showing both utilization and air quality impacts for the system expansion projects have been done. Overall ratings shown are not final and are based only on these two performance measures. This is an example of how the MBTA is proposing to present information in the PMT. Commuter rail and rapid transit system expansion ideas will be divided into two groups, line extensions and new stations. The material will be organized so projects can be evaluated both overall and compared to others in the same mode and project type.

For air quality, performance measures examined were volatile organic compounds, nitrogen oxide, and carbon monoxide. The material shows the percent reduction in each for all projects listed. (The increase in pollutants from locomotives on commuter rail extensions has not been accounted for.) The results fell into natural groupings in high, medium, or low performance in each of these measures. Projects that rank high in reduction of pollutants tend to rank high in utilization, too. Air quality and ridership performance are often related. In view of these measures, new station ideas seem to rank lower than line extension ideas, but when cost per unit evaluations are done, the (low cost impact) new station ideas may be ranked higher.

CTPS personnel have been working with the Department of Environmental Protection (DEP) to identify a way to accurately estimate carbon dioxide impacts. Several approaches have been identified, but not yet implemented. Regarding particulate emissions, CTPS has draft calculations, but has no agreement yet with DEP on the process.

There are five different performance measures for utilization. Ridership, new riders, impact on mode share, and reduction in vehicle miles that have been projected. Reduction in crowding will be evaluated soon. The user benefit (travel time) measure has been taken out of the analysis because the state of the practice for measuring this has changed because the Federal Transit Administration has recently set new guidelines. CTPS does not have the software to measure this yet, despite its efforts to contact FTA. Commuter rail to New Bedford/Fall River, to North Chelmsford, and to Greenbush, along with the North/South Rail Link, ranked the highest. One new station idea, the MetroWest Regional Station at Route 495 is a medium priority and may become a high priority when all performance measures are factored.

Total priority rankings will be calculated from the number of high, medium, and low evaluations each project has earned. Natural breaks will define the three main groupings.

The model used for projecting ridership is more sophisticated than any other used in the past. The land use assumptions were the same as those in the Regional Transportation Plan. Projections are for the year 2025 and assume unconstrained capacity conditions. After the modeling results are in, staff fine-tunes them to account for specially-generated trips, such as to T.F. Green Airport in Rhode Island or to the Convention Center in Boston, that may not show up in the model.

The MBTA is working on parking expansions and other options for improving access to service. It is examining opportunities for shuttle services, looking at Quincy Adams pedestrian access, and working with MassHighway to identify possible pedestrian and bicycle improvements. Improved access is a PMT objective.

A decision about whether to weight performance measures in the final evaluations hasn't been made yet, but cost per new rider and reducing overcrowding seem to be very important factors. Increasing ridership on the system is a PMT goal. The MBTA will be looking for feedback on these issues.

### **Members' Suggestions and Comments:**

- Add information identifying the specific site for each parking project listed
- Re-orient the "Service Enhancement – Parking Project Evaluations" to address broader "Access Improvements" issues. This would expand the evaluations to include actions that would improve patrons' ability to get to a station and use the service, not simply expand parking. Shuttle service, sidewalks, or land use issues are examples of actions that could improve access to service. An alternative approach would be to include text in the final PMT document discussing the issue.

- Local officials are generally interested in expanding parking, but neighborhoods aren't. If the planning approach involves developing and discussing a variety of possible options for improving access, the community may be more able to work as partners with the MBTA.
- There should be a discussion of greenhouse gases and transit project energy efficiency.
- Use the qualitative information, such as census tract data, to identify populations served and accessibility to jobs and to transit, in the evaluation of projects.
- Evaluate both traditional and new ridership patterns when making ridership projections.
- The MBTA should encourage FRA to modernize its requirements to focus on crash avoidance. Then, vehicles might be lighter and better.
- Cost per unit reduction is a more important performance measure than percentage reductions in emissions.
- The evaluation should rank projects within modes, then compare across modes or look at the entire system and evaluate the importance of each element in relation to its context in the region's broad geographical framework. This would allow an understanding of the benefits of interconnectivity.

### **III. Proposed Public Review Process – Steve Woelfel**

Referring to the text distributed to members earlier, Steve Woelfel provided an overview of the possible schedule for next steps in the PMT process. Evaluations are scheduled to be complete by November, after which public reviews of the results may begin. There will be more editions of the newsletter and public workshops. Finally, the PMT will go to the MBTA Board of Directors for approval and then to the MBTA Advisory Board. Working Committee members will be notified of workshop dates. Completing and reviewing the evaluations may cause the schedule to slip a bit. Maps of ranked prescreened ideas and other visual materials will be used to facilitate discussions at workshop discussion stations. Workshops will be scheduled so as not to compete with the Capital Investment Program (CIP) public meetings.

#### **Members' Suggestions and Comments**

- The Advisory Board will be updated on PMT progress at its October meeting and through a mailing to all members. The Advisory Board will help provide public notice of the workshops.
- The public outreach should explain how the PMT and CIP relate.

### **IV. Working Committee Member Ideas and Items**

The MBTA should consider using the rapid transit technology in operation in Toulouse, France for the Urban Ring, Phase III. It is automated, rubber-tired, and runs on one-minute headways.

**V. Action Items:**

- Develop a more comprehensive discussion of steps underway and planned to improve access to service, including bicycle and pedestrian access.
- Continue work projecting carbon monoxide impacts of new projects and provide text on greenhouse gases and energy efficiency.
- Provide information on public workshops to Advisory Board for circulation to its member communities.

Meeting Notes  
PMT Working Committee Meeting  
October 15, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Assistant General Manager for Planning and Real Estate, MBTA, called the meeting to order. Working Committee members, project team, and guests introduced themselves.

**II. Additional Results of Project Evaluations – Clinton Bench  
- System Expansions**

Clinton Bench explained that the evaluation process is still underway. He summarized progress on the system expansion commuter rail project evaluation ratings, reported in the sets of matrices handed out. For commuter rail, project ratings in the utilization category haven't changed. The mobility category ratings have been completed. Air quality has been advanced but is not yet complete and is waiting for information on project costs so that per unit-reduction costs can be calculated. Information on greenhouse gases will be added. Environmental justice ratings have been completed. The rapid transit evaluations have been completed to the same level as commuter rail. The overall ratings in both sets of matrices are preliminary, pending more information, analysis, and input from the committee. Project cost is an important element. All should be filled out for discussion at the next meeting.

C. Bench explained the components of the Environmental Justice and mobility measures. Some of them are qualitative which makes evaluation more difficult.

Processes and procedures for measuring Environmental Justice are evolving both locally and nationally. The Boston region is on the cutting edge of this work. Most projects being evaluated in the PMT won't result in burdens to a community without benefits.

Regarding mobility, the component "Service to Areas with Unmet Demand" means bringing service to an area in a way that improves access to transit and refers to bringing service to an area or time period where or in which it did not already exist. Trip time and frequency are criteria used to determine whether a new service is actually an improvement on any existing service. Projects that would provide additional reverse



commuting options can be given a medium or high ranking for “service to areas without unmet demand”.

Increasing the evaluation weighting of ridership and/or other performance measures may be considered after the initial evaluations have been done.

The Federal Transit Administration (FTA) is planning to calculate “user benefits” instead of “new riders” for its project evaluations. This will help areas with older transit properties to be more competitive compared with brand new transit systems.

Text in the PMT will provide definitions of the components used in each performance measure evaluation. The PMT will use the most current data available, but some of the 2000 census data will not be available in time for use in the PMT. There will be opportunities to revise the PMT every five years.

### **Members’ Suggestions and Comments:**

- Ridership should be more heavily weighted in the evaluation. It should be its own category, not just one of seven considerations in the utilization category. Ridership also is integral to air quality improvements and might have funding implications, since it is highly valued by the FTA.
- Be sure to allow time for discussion of relative weightings among the categories.
- Apply the Executive Office of Environmental Affairs (EOEA) definition of low income (65% or less of average income) to see if it would change the PMT’s Environmental Justice evaluation outcomes. EOEA data could be more up to date.
- Revise the title of the Environmental Justice “Burdens on Target Neighborhoods” component to make it clear whether the evaluation indicates a reduction or increase in burdens.
- Make measures in Environmental Justice more quantitative and specific.
- Be more specific defining the components.
- Benefits to Burdens ratings should not be included for projects that do not serve or impact target communities. Where there are no effects to these communities, an “NA” should be used instead of the circle ranking.
- Change the title of the component from “Burdens on Target Neighborhoods” to “Reduced Burden through Increased Service”.
- Diverting a trip to Boston from the suburbs from highway to mass transit reduces the burden on the inner city and should be factored into the analysis.
- Members need the text of the report to fully understand and comment on the evaluations and proposed rankings.
- Mobility evaluations should consider land use and future development. Projects that have a high ranking based on land use potential for transit oriented development should be reviewed for consistency with existing local land use plans.
- Potential mobility and ridership benefits should be used in weighting projects.
- Federal agencies do not consider land use; ridership is the key factor.
- Remove Greenbush from projects under consideration. It is in construction.
- Provide written material on land use and ridership issues prior to the next meeting.

### **III. Financing Options – Dennis DiZoglio**

D. DiZoglio reminded the members that though the PMT is a fiscally unconstrained document, it will discuss possible funding mechanisms. The PMT will include information on standard methods, new options provided by forward funding, and creative possibilities. (Please see meeting handout.)

The MBTA has a \$1.065 billion operating budget. Revenue comes from the sales tax, the farebox, advertising, parking concessions, real estate, federal operating assistance and local assessments. One third must go to debt service.

Capital funding comes from MBTA revenue bonds and from federal funding sources (Section 5307 Urbanized formula funds, 5309 Rail Modernization, 5309 Bus Discretionary, 5309 “New Starts” grants). Another source is the Transportation Infrastructure Finance and Innovation Act (TIFIA) which provides federal credit to projects that have potential to stimulate investment from the private sector. Local funding options include tax increment financing, payment in lieu of taxes, joint development, betterment assessment districts, impact fee, and parking surcharge. State funding options include general obligation bonds, highway-flexed funding, and outside sections in the state budget. Private funding options include property transfers, station sponsorships, private employers financing transit, and MBTA promoted development.

#### **Members’ Suggestions and Comments**

- Two additional funding sources are Grant Application Notes (GANS) (used at Maverick Station) and 121B funds (which could provide funds for station improvements/construction if it is part of a municipality’s urban renewal plan).
- The FTA’s BRT pilot program might be a source of funding.
- We should have more information on the implementation of impact fee procedures. Communities that are informed about transit have negotiated effectively to get transit funding from developers. DHCD provides training and this agency and the Executive Office of Economic Affairs might be able to provide information.
- The MBTA should coordinate with the Massachusetts Environmental Policy Act Unit (MEPA) to see if MEPA thresholds could relate to transit improvements.
- Include examples of possible applications for each of the funding options.
- Assembly Square should be considered for full public funding.

#### **IV. Working Committee Member Ideas and Items**

- Installing gates at grade crossings along commuter rail lines could be included in the PMT. This may improve safety and avoid whistle-blowing. This is promoted by the City of Gloucester.
- Information about the light rail service in Orleans, France was distributed. Additional information can be found at the city’s Web site.

## **V. Action Items:**

- Revise the mobility evaluations to better reflect the sense of the measurement components.
- Include discussions of performance measure weightings, land use, and ridership in the agenda of the November meeting. Provide information prior to next meeting.
- Change the title of the criterion from “Burdens on Target Neighborhoods” to something that more accurately reflects that we are trying to measure whether a project avoids placing burdens on a target community without providing substantial benefits. Where there are no effects to these communities, an “NA” should be used instead of the usual circle ranking.
- For the November meeting, prepare text that identifies the themes that have emerged from the evaluations.
- Remove Greenbush from the project list.
- Add to list of funding alternatives GANS funds and urban renewal (121B) funds through coordination with the state Department of Housing and Community Development.
- Provide additional information on implementation of impact fees.
- Provide additional detail on funding options for inclusion in the PMT, including examples of possible project applications.
- Post the Orleans, France Web site address on the PMT list server.

Meeting Notes  
PMT Working Committee Meeting  
November 19, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Joe Cosgrove, Director of Planning, MBTA, called the meeting to order. Working Committee members, project team, and guests introduced themselves.

**II. Additional Results of Project Evaluations and Evaluation Issues**

J. Cosgrove opened the discussion of the progress on project evaluations. MAPC has worked to provide additional information on land use for the evaluations and Ann McGahan is on hand to discuss evaluation of air quality issues.

Air Quality

A. McGahan said that she has contacted Sonia Hammel at the Executive Office of Environmental Affairs for direction on how to develop factors for greenhouse gas emissions. Transit vehicle fuel usage correlates to their greenhouse gas emissions. A. McGahan has contacted the major fleet owners in the region to identify fuel usage for buses (diesel and CNG projections) commuter rail locomotives, and commuter boats. Gallons of gasoline used by these fleets can be converted to grams of emissions per mile for new transportation services. This is a first step. Other pertinent information will be forthcoming. Methods are always being updated.

Initial system expansion evaluations with respect to air quality were discussed for commuter rail and rapid transit projects. Air quality ratings were included. The project ratings on volatile organic compounds, nitrogen oxides, and carbon dioxide came out in the same order, so all three have been combined into one air quality performance measure. The commuter rail projects showed an increase of pollutants, so the measure title should be changed from “cost per unit reduction” to “cost per unit reduction in vehicle miles traveled.” Carbon dioxide emissions are directly related to VMT. The increases in pollutants from diesel commuter rail service will be discussed in the PMT. Consideration of cold starts and fuel usage (miles per gallon) are included in the analysis.

Service Quality

There were six different sub-measures for service quality: personal safety, comfort and convenience of access, improved reliability, improved interconnectivity, customer information, and elimination of transfers/minimization of transfer time. Ratings for commuter rail service quality have been completed. Commuter rail and rapid transit projects don't always relate directly to these measures, and sometimes earned lower ratings as a result. Several projects did improve reliability, interconnectivity, and transfer time.

Communications projects will be included in the system preservation category. Some of these projects can also be funded from the operations budget. Safety will not be compared between modes or projects. There is little differentiation among them. The capital management database, using weighting factors as agreed upon by the Working Committee, will identify system preservation projects that might be funded given various levels of funding, within certain time frames. Projects that are fundable within the first five years (and are in the Regional Transportation Plan) will be high priority. Other projects will be ranked either medium (in the Plan) or low priority (if fundable in an unconstrained environment). Everything that defines a state of good repair will be included, but will be prioritized by funding availability. The database will be used as an evaluation tool. Prioritization can be adjusted, based on Working Committee and other public comments.

#### Land Use and Economic Impacts

B. Lucas presented the results of MAPC's information gathering on these topics. There are five different categories of land use impacts. For economic impacts, we identified the economically distressed areas that are targeted for development. Projects with at least 2/3 of station locations in the designated zones were given high ratings. Year 2000 zoning was also a factor. If 50% or more of the proposed stations were in a mixed use zoning area, the project would be given a high rating for "consistency with local plans"; if 50% or more were zoned for commercial or industrial use, a medium rating; if neither, a low rating. The MAPC regional plan, MetroPlan 2000, was used as a measure for "consistency with regional plans." The three service areas in the Plan (urban, multi-service with water and sewer infrastructure, and non-multi-service) provided ratings of high, medium, and low, respectively. Projects were rated high for Brownfield/Infill development if they used a site; medium if 50% or more of stations had 21E issues; and low for remaining projects. There is an amendment process that allows for modifying the PMT after it is adopted. Because local plans and priorities change frequently, the PMT should be able to reflect these in a timely fashion. Low priority projects may also be included in the Regional Transportation Plan. Comments that might improve the measures of land use and economy are welcome.

#### Costs

All costs are not yet available. Using MBTA information, experience, and studies, a set of unit costs to calculate project costs was developed. Mitigation costs have not been

included. The project cost estimates will be circulated as they are further developed. The model package calculating user benefits has just been received and will not be producing results for at least several months, possibly in 2003 for the new Regional Transportation Plan. User benefits as a measure has emerged as a way to fairly compare new rapid transit systems in the U.S. with existing transit systems for federal funding consideration. There are no plans to weight the performance measures in the PMT.

### **Members' Suggestions and Comments:**

- Confirm whether the commuter rail fleets will use “clean” diesel fuel.
- Some buses are more fuel efficient than others.
- Emissions for a bus in traffic will be different than those on the expressway. It might make sense to separate out the express bus service.
- Diesel soot is also a major greenhouse gas component.
- Could the air quality model Mobile 6 be used in the evaluations, when it is available for use by CTPS?
- European rail equipment is much more efficient and reduces pollution by 50%.
- “Cold starts” result in more emissions, so VMT should be weighted to account for this in the early segment of auto trips to and from transit. Factoring in the number of trips (Mobile 5) would provide this analysis.
- The analysis should report just the emissions and not relate to costs. It should consider both the direct effects of transit use on air quality and the reductions resulting from auto usage changes. If cost is considered, capital and operating costs should both be factored in.
- Add a legend for each of the project rating charts.
- The analysis should consider fuel efficiency and should report the amount of fuel used.
- Report the figure for the change in the amount of pollutants from transit and the figure for automobiles.
- Add a broader definition of safety that would include a factor for automobile accidents.
- Should a funding-related document (the capital improvement data base) be used to rank projects for the PMT, an unconstrained document?
- Both local plans and local zoning should be considered.
- Maintaining internal consistency is important.
- The use of zoning data doesn't appear to be a good approach for project evaluations.
- Sometimes development proposals do not materialize, and local communities are sometimes reluctant to change zoning based on them.
- Building rail line extensions encourages development in suburban and rural areas and could result in additional highway construction, stations with surface parking and sprawl. These conditions should be picked up in the analysis.
- Local strategic planning along with commuter rail expansion can result in community revitalization, access to jobs, and other positive development outcomes. Commuter rail expansion could stimulate concentrated development around nodes, as well as strengthen access to the urban core.

- The PMT should include text that lays out the vision for the extensions and stations (size, aesthetics, zoning, related development), maybe through the description of an ideal situation.
- Include a narrative that describes the level of detail in the cost analysis.
- Combine capital costs and operating costs as a way to compare service enhancements and service expansions more equitably.
- Focusing on new transit riders gives an incomplete picture. Travel time savings should be considered, too, perhaps combining them into a single measure.
- The PMT should have a place holder for an improved user benefit analysis and discuss it in the narrative. Then, when completed, the new analysis can be inserted, before the document is finalized.
- Trip quality is important, too.
- Travel time should definitely be part of the analysis.
- How will the measures be weighted?
- Access to a commuter rail station in the Fort Devens development would be difficult.
- Add to possible funding sources: capital revenue bonds through non-profit corporations. These are being used to fund highway projects and may be used to fund transit.

### **III. Action Items:**

- Confirm whether the commuter rail fleets will use the “clean” diesel fuel.
- Check on whether the current model considers cold starts.
- Report on projected emissions changes for projects.
- Add a legend for each of the charts.
- Include a narrative that describes the level of detail in the cost analysis.
- Add capital revenue bonds through non-profit corporations to the section on innovative funding sources.

Meeting Notes  
PMT Working Committee Meeting  
December 17, 2002

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Deputy General Manager for Planning and Real Estate, MBTA, called the meeting to order. The MBTA made a power point presentation on the PMT so that members could provide comments and feedback. This presentation will be made at the public workshops scheduled for January 2003. The evaluations will be provided to the public for review and comment. After the public workshops, the MBTA will make revisions and submit a draft to the MBTA Board of Directors in March. After Board approval, it will be submitted in March or April to the MBTA Advisory Board for final approval.

The discussion in the public meetings will include project descriptions, an explanation of the evaluation criteria and measures and the process for developing the evaluations. Comments on the priority rankings will be incorporated into the first draft PMT document. Project ratings can be adjusted.

It was suggested that the MBTA might evaluate cost relative to total ridership, not just new riders. The evaluations were set up to address a lot of priorities. Other performance measures exist which can counter-balance any bias resulting from the cost effectiveness/new rider analysis. Environmental Justice evaluations are included in the PMT analysis. It is difficult to model travel time savings system-wide. There is no way to apply a consistent method to all projects when some cross into other MPOs. Comparisons with projects within the model may not be accurate. Central Artery commitments will be identified in the project descriptions.

The Chair will consider a possible ongoing role for the Working Committee.

**Members Suggestions and Comments:**

- Parking Enhancements shouldn't be a stand-alone category. The category should be more broad and include access by all modes. It could be called "Station Access" and include more than just parking for automobiles. The goal should be "improving access to the system". Text might include a list of possible projects and their



schedules for implementation. It could also include discussion of transit oriented development.

- Add to the “System Preservation” slide, detail on the percentage weighting. This dovetails with the state of good repair issue.
- Explain the importance of “pay as you go”.
- Add the “pyramid” slide and the pie chart of the capital budget. It is important to show how the elements of the system work together.
- The Advisory Board has been supportive of investing in the existing infrastructure.
- The PMT should be an advocacy tool arguing for greater investment in enhancements and expansion projects. It should include information generating support for credible priorities. This document represents a future system. This is a vision document. The PMT can also be a tool for advocating for transit funding in general. It is also hoped that the state legislature will use it to screen earmarked projects.
- Striving for a balanced program is important. CLF wants to see the PMT support a program that serves the urban core and focus on transit dependent riders.
- Show whether a project, such as automatic fare collection, will improve the efficiency of the system.
- It is important to look at land use within the enhancement category of projects.
- There should be a different approach to the system expansion cost effectiveness analysis. It shouldn’t relate only to new transit riders. This disadvantages existing elements. It shouldn’t be a stand-alone category. Perhaps cost effectiveness should be a sub measure or linked to the goals of the PMT. At least explain it more. (Evaluate the cost relative to all riders.) If there is related private investment, this might improve cost effectiveness.
- Connect mobility to some measure of planned employment centers as well as existing centers.
- Consider a measure for whether a project would “serve transit dependent communities” and whether a project provides expanded access for transit dependent riders.
- Consider adding travel-time savings for existing riders to the analysis. Any information on this issue would be useful, even if not exactly comparable.
- How are Central Artery commitments factored in?

## **II. Results of Project Evaluations**

Members reviewed the meeting handouts summarizing the preliminary results of the analysis. Clinton Bench, CTPS, answered questions.

If an expansion project does not have a component that helps the service quality, it will be given an “NA”.

### **Member Comment:**

- It seems as though many more boxes were filled in than left blank. Were there situations in which some circles were filled in when they might have been left blank?

### **III. Action Items:**

- Revisit the cost effectiveness measure. Perhaps analyze cost relative to total ridership.
- Be more specific about considerations for providing additional service for transit dependent riders.

The next meeting will be January 21, 2003.

Meeting Notes  
PMT Working Committee Meeting  
January 21, 2003

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Joe Cosgrove, Director of Planning, MBTA, called the meeting to order.

**II. Update on Recent Public Process**

Pam Wolfe, CTPS, reported on the first of the January series of public workshops to review the preliminary results with members of the general public. The Boston workshop was very well attended, and though attendance at the Chelsea workshop was more sparse, both had lively discussions. The workshops were publicized in the December issue of the Monitor (sent through the PMT E-mail list, the MPOINFO E-mail list, to the Environmental Justice Committee, and by mail to interested parties outside the MPO region), in the January edition of TRANSREPORT (sent to more than 2000 recipients), in flyers (posted in rapid transit stations, passed out on buses and commuter rail, and faxed to municipal offices), and in press releases sent to daily and weekly newspapers in the region. In some instances, follow-up telephone calls to local and state officials provided reminders.

**III. Schedule Update**

Steve Woelfel reported that the draft PMT is scheduled to be available on February 12<sup>th</sup>. Its availability and notice of the 30-day public comment period will be advertised in the Boston Globe. There will be two public hearings: March 5<sup>th</sup> and 6<sup>th</sup>. The comment period will end March 14<sup>th</sup>. The PMT will then be reviewed by the MBTA Board of Directors before being sent in April to the MBTA Advisory Board for approval. There will be a Working Committee meeting in March, after the close of the public comment period. The PMT will be posted on the MPO Web site.

The PMT will be more streamlined than the last, but will still have sufficient details in the appendices on topics such as the evaluations and the public comments. While the narrative descriptions of projects, costs, and other information will be included in the circulation draft document, some lower level detail information, such as the interaction between projects on ridership, might not yet be available. The PMT will include for each project the following:

- a map and
- a narrative including a project assessment highlighting the overall rating,
- a narrative description of the project and its capital improvement highlights, and
- comparative information about costs and other performance measures.
- mitigation commitments.

#### **Members' Suggestions and Comments:**

- Members of the public need to see the complete analysis to do their review and assessments. All the analysis should be done and available.
- Legal commitments should be accompanied by narrative explaining status and information on the schedule for completion. This information lends support to these particular projects in the programming process.

#### **IV. Performance Measure Review**

Dennis DiZoglio explained that the MBTA had examined the issues raised by the Working Committee and has made adjustments to the performance measures. Clinton Bench said that the description of the individual performance measures for environmental justice were changed to give greater consideration to transit dependency. Improvements to connectivity between modes were reviewed to ensure they were adequately considered. Travel time savings will be incorporated in the analysis under Utilization as a way to consider more than just new ridership. Because the new software for calculating user benefits analysis is not yet ready for application in the PMT, the MBTA is using travel time savings as a way to provide similar information. This measure may give a boost to the ratings of projects that serve an existing, urban population and will not draw a large number of new riders.

Changes to some ratings were also made. Some capital costs were modified to reflect additional information and better cost estimates. Cost changes also resulted in new evaluations for air quality and new rider costs. Some projections of new riders and of air quality benefits also changed. Qualitative measures were also reviewed to ensure that performance measures were applied consistently; some revisions resulted. For environmental justice ratings, it is important to look at who is benefiting from the project. Changes to specific project evaluations were highlighted.

The MBTA will consider evaluating capital cost per reductions in emissions and moving consideration of vehicle miles traveled from Utilization to Air Quality. So far, the evaluations have tried not to weight performance measures.

Projects are not compared across modal categories. The scoring mechanism is different for each category. Performance measures are not weighted. Ratings will be done “on a curve” so that projects will be divided approximately into thirds for high, medium, and low ratings. The PMT is not intended to specify which projects will be built. Identifying too many projects as high priority would not improve its usefulness for decision-makers.

## **Members Suggestions and Comments:**

- Include a list of environmental justice issues in the Regional Transportation Plan.
- Project definitions should include information on the capital elements involved. It is important to be consistent about which costs are included in projects and in the identification of any environmental justice communities served.
- The capital costs of reductions of emissions should be considered cost effectiveness measures.
- Reduction in vehicle miles traveled should be included in the air quality measure, not as a Utilization measure.
- Some found that it is not always possible to duplicate these preliminary results. The process should be transparent so that the analysis is consistent and can be replicated.
- It is important that this rating system not give a distorted view of how many important transit projects there are in the region. This system could give the impression there are fewer important projects than there actually are.
- There should be a discussion of why each project was scored as it was and of the qualitative information used in the decision, showing how the evaluation was made.

### **V. Access to Service**

D. DiZoglio explained that based on Working Committee comments, the MBTA has broadened its definition of enhancement projects to consider all those that improve access to service, including those that address Americans with Disabilities Act issues; parking needs; pedestrian and bicycle access; and shuttle services.

### **VI. Members Items**

George Bailey suggested using diesel multiple units (DMU) to increase frequency of service and provide additional off-peak service on commuter rail lines; one promising project might be Fall River/New Bedford. He suggested the MBTA explore this technology, widely used in France. Paul Regan said that this approach might resolve some of the mid-day storage and capacity issues at North and South Stations, as a DMU would not necessarily require its own berth. However, it should not be associated with only one project. DMUs might be used on the Fairmount Line and also might be used to provide reverse commute service. He said that this technology could give the MBTA flexibility and the ability to supplement other services. C. Bench noted that the ridership demand still calls for a relatively consistent train consist during peak hours. S. Woelfel said that the Fall River/New Bedford project has already decided against using DMUs and that this technology is currently not used in the United States. Ridership projections show a 45% increase in commuter rail ridership, which indicates that smaller vehicles will not provide enough capacity. Projects that increase capacity at North and South Stations or that provide added mid-day storage are pre-cursors to commuter rail expansion projects. This is a “super-priority”. Barbara Lucas said that there should be a cost estimate for this.

The next meeting will be scheduled in March after the close of the public comment period.

Meeting Notes  
PMT Working Committee Meeting  
March 25, 2003

**In Attendance:** Please see attached list.

**Meeting Summary:**

**I. Call to Order**

Dennis DiZoglio, Assistant General Manager for Planning and Real Estate, MBTA, called the meeting to order.

**II. Report on Public Comments**

D. DiZoglio discussed the comments received during the public review period. Written comments were received at the two public hearings, by mail, and by E-mail. A preliminary matrix, summarizing all comments and providing responses, was sent to committee members. One hundred twelve comments supported particular projects in the PMT; eleven opposed certain projects. For comments supporting projects, responses note that the commentor's project is in the PMT and will be considered for future funding.

Twenty-one comments said that a particular project should get a higher rating. Most of these were relative to several project ideas: Arborway Restoration, Assembly Square, extension of commuter rail to Millis, and extending the Green Line to Needham. The MBTA reviewed the referenced evaluations to see if there were errors or inconsistencies but after considering the additional data and the correspondent's anecdotal information, did not agree that those ratings should be changed.

Eleven comments recommended ideas for the Universe of Projects. There had been a lot of outreach to identify project ideas at the start of the PMT process. Many of the ideas mentioned had been considered and will be revisited for the next PMT.

Four comments stated that the legal commitments should be given high priority. The information in this section will be expanded. The MBTA will consider language submitted by member Toni Hicks, Conservation Law Foundation.

Seven comments focused on the evaluation methods, suggesting criteria be weighted or that the analysis be more transparent (easier to follow). Weighting was discussed frequently during the PMT process and participants suggested weighting a number of the criteria. Giving a preference for one measure over another would put the MBTA in a

position of valuing one individual's suggestion for a weighted measure over another's, a position the MBTA does not want to take. Overall ratings do not decide a project's status for future implementation. Each project has a narrative that talks about its evaluation. In addition, information in the appendices discusses the inputs and reasoning that led to the rating. The quantitative information is also included in an appendix. People do have an opportunity to see how the evaluations were made.

Comments suggesting changes in the actual ratings did not criticize the process; they provided views on why a change should be made. A discussion of how the regional travel model is applied will be included in the appendices. Because funding sources for most of the projects is uncertain, it is not possible to determine the debt-service cost. It was suggested that this measure be included in the operating costs.

### **III. Refinements to the Draft PMT**

Members provided comments and specific suggestions for revising the PMT prior to its submission to the MBTA Board of Directors and, subsequently, to the MBTA Advisory Board. The MBTA agreed to make several suggested changes.

The following ideas were raised and will be addressed in the PMT Executive Summary, which will be prepared prior to consideration and action by the MBTA Advisory Board:

- Clarify the vision,
- Explain the PMT's role in regional planning and transportation decision making,
- Develop a matrix showing priority projects,
- Discuss system preservation and the improvements made in the transit system,
- Point out the Universe of Projects, and
- Emphasize the importance of continued progress.

Members Paul Regan and Scott Darling will be in touch with the MBTA as it develops this material.

Staff is preparing an Acknowledgement page for the Draft PMT for the Advisory Board.

The PMT suggests general categories for system preservation so that there will be flexibility to meet future needs. The CIP is the place for a more detailed listing of system preservation projects. Specifying a time frame for spending on certain systems might be useful. Policy-makers might look to the high priority projects across all modes if they are implementing this PMT's vision. However, there are many factors in decision making, and there are also more projects listed than can be undertaken. The PMT provides information, makes suggestions, and can be used in advocating for projects.

#### **Members' Suggestions and Comments:**

- Check to make sure comments from the Inner Core and the Central Artery Environmental Oversight Committee are included. Their comment on developing

systems maintenance and operations facilities should be considered in the Regional Transportation Plan (Plan).

- It was hard to understand the ridership forecasts because the assumptions do not seem to be documented.
- The total cost (capital and operating) should be identified.
- The evaluation uses precise numbers, but some are estimates. Round off the numbers.
- There should be information showing how well a project meets anticipated demand and relates to others. This might make the PMT more useful.
- Make several specific changes: a) add “current” before “manufacturers” on page 5-B/25 regarding DMUs; b) note in the narrative on the Urban Ring an objective of one-minute headways at peak hour and three-minutes during off-peak hours; c) include an acknowledgement page with the names of the Working Committee.
- More information on specific system preservation projects should be included. The MPO has been discussing spending the bulk of available funding on system preservation. This information should be considered in the Plan, perhaps even to the extent of including all the PMT high priority projects. The PMT should feed information and priorities into the Plan.
- The PMT defines an ideal and infers a directive; but it is a passive approach. It does not reinforce the gains made for transit during the Central Artery construction and the importance of system preservation. It should be more clear on how the vision might be implemented; particularly the system preservation elements. The vision articulated in the document is conservative, and could be better formulated so that the PMT has a more active influence on stimulating continued progress in improving the system.
- A clear vision in the PMT will be more useful than the list of high priority projects. This would help project proponents improve their project definitions. An empty circle in one performance measure doesn't mean that the project is bad.
- Evaluations of land use impacts should be based on existing conditions, not plans.
- The PMT is a dynamic process and document that will change over time. This should be explained in the Executive Summary, along with the vision, the importance of system preservation, and the discussion of the PMT's application in decision making.
- It is important that the review and approval of the PMT stay on schedule, with the Advisory Board taking action before the end of May. Members of the public want votes on documents like the PMT to take place before summer schedules begin in June.
- Put the Universe in its own appendix.



## Summary of Public Workshops on PMT Preliminary Results

The MBTA conducted a series of workshops in January 2003 to review the preliminary results with members of the general public. Workshops included a Powerpoint presentation on the process for developing the PMT and an overview of the evaluations and analyses. A question and answer session followed. Workshops were held:

Wednesday, January 15, 2003 in the State Transportation Building,  
Wednesday, January 15, 2003, in the Chelsea Senior Center,  
Wednesday, January 22, 2003, in Framingham Town Hall, and  
Thursday, January 23, 2003, in the Thayer Public Library, Braintree.

## Overview of Comments

- There is a large backlog of demand for projects.
- There is a down-side to depending on the private sector for funds; project funding will reflect the private sector's needs, not necessarily those of the public.
- Chelsea supports the Urban Ring project as high priority.
- To accomplish smart growth in the suburbs, reduce parking and invest in feeder transit.
- If roadways adjacent to MBTA stations don't have sidewalks, the MBTA should invest in them.
- Clarify the categories of performance measures for system preservation projects. They seem subjective.
- The MBTA should partner with Zipcar.
- Look at the fare structure and eliminate the artificial barriers that fares create.
- Compare and prioritize projects between modes.
- Let Combo pass-holder riders use commuter rail at a discounted rate. You will get more riders and more Combo patrons.
- Communities that are just now getting service shouldn't be asked to pay.
- Building transit works against affordability for housing.
- Chelsea needs improved bus services.
- Bus service in Chelsea should be better coordinated with access to the Blue Line.
- Consider extending the late night hours of service. People who work at night need bus service. If there were more service, people would use transit more.
- Rail technology on the Urban Ring service would be more comfortable and reliable than bus technology.
- There is not enough information (schedule and pick-up locations) to take the Night Owl service.
- Keep commuter rail stations clean.
- More bus shelters are needed.
- Commuter rail expansion on the Marlborough rail spur would destroy an adjoining neighborhood and negatively impact Route 9 traffic. Existing freight traffic creates serious vibration impacts. There would be safety issues at grade crossings and potential fuel spills from derailed locomotives.

- Commuter rail service is run with different standards than rail freight. Providing service on the Marlborough spur would improve safety.
- There should be a balance between the needs of the urban core and those of the suburbs.
- MetroWest would like to work out developers' contributions to the LIFT service. Because of the direct relationship between development and traffic, developers must contribute to the LIFT.
- If the public is allowed to have input earlier in the planning process, it is more effective.
- The communities of Dover, Westwood, Needham, and Medway favor the commuter rail extension to Millis. Please make it a high priority.
- The Natick Bicycle Committee is very interested in getting people out of cars. Bicycles could travel long distances.
- Bicycle and parking proposals for solving our traffic and parking problems are not working.
- Move accessibility projects higher on the priority list.
- Lower parking prices at transit so more people will ride.
- Convert some parking spaces to bicycle parking spaces.
- Let the public use the Cochituate rail line right of way for bicycling. The MBTA says it will sign the access agreement with Framingham if the town will be responsible for hazardous waste clean up, but the town can't examine the right of way until it has access. The path also must have lighting.
- Consider raising fares as a potential funding source.
- There is not enough funding for the LIFT bus. There is no mid-day service. It makes it very difficult to travel. If one has a morning appointment, he/she have to wait all day to get home. Make paratransit a priority.
- Tax Increment Financing looks good on paper, but doesn't work here.
- Tax Increment Financing does work.
- Framingham is working to provide increased frequency for its suburban bus service.
- Framingham is concerned about the impact, particularly at grade crossings, of increased service on the Worcester line.
- Make the Newton/Needham light rail project a priority. This will lead to mixed use land uses and result in economic benefits. Newton Upper Falls has a dense population and could contribute 5,000-10,000 daily riders. The mobility evaluation should result in higher ratings, since there are about 200,000 cars per day on local arterial roadways from which to draw ridership. Cost effectiveness should be ranked higher as there are no land-takings required. Air quality will be improved by the cars taken off the road. This is an opportunity for an economic development park and for reverse commuting.
- Please schedule one more hearing in Fitchburg. *(The MBTA scheduled a meeting with the Fitchburg Line Improvement Working Committee, February 3, 2003.)*
- Natick needs bus service that is better coordinated with train service. We need service that links the train to the business district.
- The LIFT service is wonderful. I need it to get to my job.
- Bring back the Route 9 bus. There should be more feeder bus service to the train stations.

- Bus routes need to serve sites of medical services, not just employment.
- Bus lifts for wheelchairs often have problems.
- The park and ride lot at Shoppers World is under-utilized and not well-marked. There should be more funding to provide additional and better bus service.
- The Riverside Line should have automatic card readers. Passes shouldn't be limited to specific time-frames (monthly) and should allow access to all modes.
- If the MBTA provides facilities, commuters will use them.
- Maintenance should be programmed and automatic.
- Government agencies should place a limit on how much mitigation they are willing to provide, then move forward with the project. Citizens who simply want to block a project shouldn't be allowed to do so.
- Do not eliminate station personnel when the automatic fare collection is implemented.
- A number of people get free transportation on the commuter rail system.
- Some adjustments should be made to the performance measures.

### **Overview of Questions**

- Will the next PMT reconsider projects that did not pass the screening process?
- How does the PMT relate to land use policy?
- Have you estimated the amount of funding to seek from the private sector in public/private partnerships?
- To what extent has the potential for car-sharing been considered in the analysis?
- Do some of the PMT projects overlap with on-going projects?
- How are the legally-mandated projects being funneled into the PMT?
- How was the utilization evaluation done?
- What is the progress on the Newton bus project?
- Is suburban transit in the PMT?
- Could buses be used to link North and South Stations?
- Is extending the Blue Line a high priority?
- What is the goal of Urban Ring Phase III?
- We have a development project that will create thousands of jobs. With whom do we work to improve transportation to our site?
- Can you make it easier for communities to secure transportation mitigation from developers?
- Will the MBTA maintain commuter rail stations?
- What is Tax Increment Financing?
- Has the MBTA begun to identify innovative funding options for specific projects?
- Is the MBTA working on the enabling legislation needed to move some projects forward?
- Why is Massachusetts providing commuter rail service to New Hampshire and Rhode Island?
- What is the impact (savings, reduction of jobs) of a smart card approach to fare collection? How will it help with accounting?
- Why is the E Line project called an expansion project in the PMT and an enhancement project in the CIP?

## Written Comments Received During the Workshop Period

- Develop a grade crossing safety program for the Green Line along Commonwealth Avenue.
- Provide dollar bill changing machines on all surface lines.
- Avoid the cost of a tunnel at Union Square, Somerville, by branching the Green Line. One Branch could go to Union Square; the other to Gilman Square and beyond.
- Save the LIFT bus service and restore service on LIFT 5 from Framingham to Hopkinton and on LIFT 6 traveling to and from Holliston/Milford.
- Move “Reduction in VMT” from the Utilization measure to the Air Quality measure; and move “cost per unit reductions in emissions” from Air Quality to Cost Effectiveness.
- Reliability is the most critical service quality factor.
- Show how the evaluations were arrived at.
- Add an “operating cost per existing rider” factor to the Cost Effectiveness measure.
- Expand commuter rail parking at the Natick station.
- Streetcars can operate on busy city roadways and coexist with auto traffic.
- Give high priority to the restoration of the streetcar service on the Green Line through Jamaica Plain. It is important for air quality. Diesel and CNG vehicles are not good enough. (Several submissions)
- Place crosswalks and a “Yield to Pedestrians” sign at the corner of Washington and Northampton Streets along the Silver Line route. Safety is very important.
- Criteria are skewed against the Arborway Restoration project. It is a transportation control measure within the State Implementation Plan and should be given the highest priority. (Several submissions)
- Restoring the Green Line to Forest Hills/Arborway should be on the highest priority list. It will help the environment and thousands of commuters. (Several submissions)
- Move the E Line restoration to “SUPER HIGH #1” priority.
- A Fleet Center ticket should act as a commuter rail pass. Co-market transportation services.
- Evaluate all stations for bicycle/pedestrian accessibility
- Reduce the cost of off-peak train service and improve off-peak headways. This can be done by reducing the size of train sets and training some personnel to do several tasks.
- Consider a project that would provide rapid bus service along Mass. Ave through Arlington and Lexington.
- Improve bicycle/pedestrian access to stations.
- Work with Zipcar to place cars at transit stations.

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Contact	Date	Summary	Response
Michael Gulbankian Gulbankian Bus Lines	2/10/03	Program for purchase of 20 45-foot parlor coaches every four years for the Commuter Bus program; will allow for replacements and growth.	The present MBTA commuter bus program requires carriers to provide the equipment.
Richard Magoon	2/10/03	Proposes a Southern New Hampshire MBTA Green Line Extension, using ultra-light hi-rail buses and light rail trains	The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to extend the Green Line to Southern New Hampshire can be considered in the 2008 PMT.
Mary Samuels	2/12/03	Asks for rush hour express train from Fitchburg to North Station.	The PMT examined the operation of express service from outer stations on all commuter rail lines including Fitchburg.
John Kyper	2/11/03	<p>Make the Arborway light rail service a high priority and fully fund it so that construction can begin in 2004. (It is an environmental mandate.)</p> <p>Change the Silver Line Phase III bus tunnel to a light rail branch of the Green Line. The current proposal will not work well, nor will it meet the needs of the communities it serves.</p> <p>Address the deterioration of the Orange Line stations and subway.</p>	<p>The PMT includes a project to extend Green Line service to Arborway. All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and this project did not rate as highly as others based on those measures.</p> <p>The Silver Line Phase III project has been in development for many years. The PMT includes the project proposal as defined through this process.</p> <p>The System Preservation chapter of the PMT includes preservation and replacement costs for all station facilities. Upgrades to station facilities would be eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT.</p>
Katherine Trapani State of Rhode Island and Providence Plantations	2/7/03	Include service to Wickford Junction, Rhode Island.	The T. F. Green project is included in the PMT. If the scope of this project is determined to include operation as far as Wickford Junction, then it will be included.
Mak Trifkovic	2/22/03	<p>Route Blue Line to Medford extension via Charles/MGH; it will provide important connections.</p> <p>The Blue/Red connector should be a high priority. It is a commitment.</p>	<p>Changing the proposed Blue Line extension to Medford to operate via Charles can be considered in the universe of projects for the 2008 PMT.</p> <p>The PMT includes a project to construct a Blue Line-Red Line connector. All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>A project's status as a legal commitment was used as an initial</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

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Contact	Date	Summary	Response
			screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and this project did not rate as highly as others based on those measures.
Scott Delano	2/22/03	Expansion projects will attract new riders and improve the areas served. Recommends the Silver Line become rail.  The North/South Rail Link and the Fairmont Line will help control sprawl and bring economic benefit.	The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.  The PMT includes the North-South Rail Link project The PMT includes a project to improve the Fairmount Line.
Name Not Available	2/25/03	Weatherize the waiting areas at the bus stops along Washington St.  The Silver Line is an inadequate replacement for the Orange Line	The design of shelters currently used at Silver Line stations was a product of both the MBTA and a community advisory committee to the Mayor of Boston. As a result, no substantial modifications are expected.
Anne Marie Leonard	2/26/03	Extend the Orange Line to Reading.  Add Sunday and holiday bus service in Melrose.  Eliminate grade crossings in these areas, particularly near the Wyoming Station on the Haverhill Line.	The PMT includes a project to extend Orange Line service to Reading.  Proposals to changes local bus service are made through the MBTA's Service Plan process, not the PMT.  The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to eliminate grade crossings can be considered in the 2008 PMT.
Garrett Bradley State Representative	2/28/03	Add two boats to existing Hingham, Hull, and Quincy service. Provide feeder bus to boat in Boston. Commuter boat service gets cars off of the road.	The PMT includes a project to expand commuter boat service to the South Shore.
Mike Dorsey	3/4/03	Supports the North/South Rail Link; reduce traffic and pollution and save travel time.  Convert the Silver Line to light rail; save money and reduce health and community impacts.	The PMT includes the North-South Rail Link project.  The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.
Glenn Dickson	3/4/03	Extend the Green Line to High Street, W. Medford or if not, to Tufts/Hillside in Medford. The right of way is there. The community needs the direct service.	The PMT includes a project to extend the Green line to West Medford.
Melissa Marantz Medical Academic and Scientific Community	3/5/03	Strongly supports the Urban Ring. Give the Urban Ring Project, Phases 1-3 high priority. State clearly that the project is 3 phased – not 3 projects. Put Phase 1 in the	The text of the PMT will be modified to make clear that the Urban Ring is three phased. The PMT is a financially unconstrained capital planning document.

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Contact	Date	Summary	Response
Organization, Inc.		CIP. The current need is great; facilities are growing.	Therefore, it does not provide funding for project implementation.
John McDonald	3/5/03	Commit planning resources for the Green Line Extension to Medford Hillside.	The PMT includes a project to extend the Green line to West Medford. The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation.
Menno Koning	3/5/03	Asks the MBTA to make the Millis Extension a top priority. It is feasible due to the increasing population and traffic congestion, will have more value than the Greenbush Line restoration, and can be implemented little by little; the track and signal upgrades are needed anyway; use Needham equipment. Links to the Green Line would improve service.	The PMT includes a project to extend commuter rail to Millis.
Carolyn Manson, Arborway Committee	3/5/03	Asks that the Arborway (E-Line) Project be given high priority. Supports the planning work to date on restoring light rail service, but would like it expedited. It will carry more people than buses; provide a no-transfer ride, clean, reliable service; reduce air pollution. Buses create soot and harm air quality.  Also asks that the MBTA cease operating CNG buses and using the Arborway Yard to garage them. They may cause an explosion. Suggests moving the operation. Use electric vehicles.	The Arborway project was evaluated using standard criteria applied to all projects in the PMT. A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and this project did not rate as highly as others based on those measures.  The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation.  Your concern of CNG buses will be forwarded to MBTA Bus Operations.
Ralph Walter	3/5/03	Supports speaker at the March 5 <sup>th</sup> public hearing suggesting electrification of the Attleboro Line. Electrification might be phased, beginning in segments close to Boston (Fairmont Line, Yawkee to South Station.)	The PMT includes a project to electrify commuter rail lines.
Bill Walker, Water Transportation Alternatives, Inc.	3/5/03	Construct additional vessels for existing and planned ferry routes and more parking; capital costs for ferry systems are competitive with other modes of transit. Ferry services are an integral part of Homeland Security.	The PMT includes a project to expand ferry service.
Leueen Lapitsky	3/6/03	Supports the North/South Rail Link; reduce traffic and pollution and save travel time.	The PMT includes the North-South Rail Link project.

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Contact	Date	Summary	Response
		Convert the Silver Line to light rail; save money and reduce community impacts.	The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.
Mark Penner	3/6/03	Strengthen mass transit in the urban core; economic growth and reduce sprawl. Four commuter rail lines and the Orange Line traverse Somerville, but there are no stations. There is noise, pollution, community impacts. Suburbanites have better transit access to Boston.	The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square. The PMT includes a project to construct an Orange Line station at Assembly Square.
Mark Penner	3/6/03	Fast track design and construction of a commuter rail stop in Union Square.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville.
Franklyn Salimbene, Arborway Committee	3/6/03	Prioritize the Arborway restoration project in the TIP. It is a Transportation Control Measure. It must be fully funded to maintain the region's SIP compliance.  Arborway project capital costs should not include vehicle acquisition costs.	The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation. A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and this project did not rate as highly as others based on those measures.  All Green Line expansion proposals evaluated in the PMT include the cost of rolling stock.
Gina Hahn	3/6/03	Strengthen mass transit in the urban core; economic growth and reduce sprawl.  Four commuter rail lines and the Orange Line traverse Somerville, but there are no stations. There is noise, pollution, community impacts. Suburbanites have better transit access to Boston.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square. The PMT includes a project to construct an Orange Line station at Assembly Square.
Katie Bacon	3/6/03	Somerville provides transportation infrastructure but gets no service; only noise and pollution. Suburbanites have better transit access to Boston.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square. The PMT includes a project to construct an Orange Line station at Assembly Square.
Terry Fancher South Shore Chamber of Commerce	3/6/03	Supports the PMT.  Make implementation of an intermodal pass system a priority.	Changing fare policy is not within the scope of the PMT.



**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

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Contact	Date	Summary	Response
		<p>The Greenbush Line should be completed.</p> <p>Improve traffic flow at the Braintree Split on Route 3, widen Route 18, Weymouth, improve commuter boat service. The project development process should be streamlined. Citizens' groups have prevented many projects in the PMT from being constructed.</p>	<p>An assessment of the Greenbush commuter rail project has been added to the PMT.</p>
Ann Hershfang	3/6/03	<p>Emphasize providing safe and convenient access to transit stations. Post schedules at bus stops. Invest in GIS for buses; prevent bunching.</p>	<p>The service enhancements section of the PMT includes a project to improve pedestrian access to all rapid transit and commuter rail stations The section also includes a project to add 300 bus shelters and to install Intelligent Transportation systems (ITS) on the bus fleet.</p>
Karen Wepsic	3/8/03	<p>Include operational cost per transit rider.</p> <p>Give the environmental justice measure a greater weight because of past dis-investment.</p> <p>Check high priority projects' sprawl effects.</p> <p>Central Artery commitments should be high priority.</p> <p>Environmental justice benefits of Silver Line Phase 3 and Urban Ring Phase 2 are questionable. Urban Ring benefits suburban motorists.</p>	<p>The travel time savings analysis is intended to reflect the benefits a new project would bring to existing riders, and considers the impact on all riders.</p> <p>The MBTA and the PMT working committee, as part of an 18-month process to develop performance measures, determined it was best not to apply any weights to measurements. Changes to the performance measures used can be considered in the 2008 PMT</p> <p>Economic and Land Use impacts were considered for rail expansion projects.</p> <p>A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and some projects did not rate as highly as others based on those measures.</p> <p>Appendix A has greater details of the environmental justice evaluations.</p>
Daniel Radov	3/10/03	<p>Prioritize bringing transit links to Union Square.</p> <p>Questions the number of new riders projected to use the Union Square, Somerville, commuter rail (seems low); how ranking determinations were made.</p>	<p>The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville.</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p>

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Contact	Date	Summary	Response
			Performance measures were applied equally to all projects considered in the PMT.
Kathryn Cotter	3/11/03	Encourages the extension of the Green Line to Union Square, Somerville; would bring multiple benefits to the community.	The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.
Tom Connors	3/10/03	Extend the Green Line to Needham St., Newton (instead of to Needham Hts./Junction) using existing tracks parallel to Needham St.; would provide access to work, shopping, and recreation destinations.	The project definition of the Green Line extension to Needham was developed during an 18-month open process, which included extensive public participation. Examining a Green Line branch operating only to Needham Street in Newton can be considered in the universe of projects for the 2008 PMT.
Helen Kim	3/12/03	Supports commuter rail or rapid transit to a Union Square, Somerville station.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.
Cindy Bishop	3/12/03	Bring rail-based public transportation to Union Square, Somerville.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville.
Kathleen Ruane	3/12/03	Union Square needs a rapid transit or commuter rail station.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.
Cheri Ruane	3/12/03	Bring rail-based public transportation to Union Square, Somerville.	The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.
Aileen Bonilla	3/12/03	Supports the North/South Rail Link; reduce traffic and pollution and save travel time.  Convert the Silver Line to light rail; save money and reduce community impacts.	The PMT includes the North-South rail link project  The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.
Representative Carol A. Donovan	3/12/03	Reopen the Mishawum station. It formerly accommodated reverse commuting and would do so again. It would restore the ridership lost with the opening of the Anderson RTC, which is not easily accessible on foot.  Make double tracking the commuter rail system, especially in Reading/Lawrence area, a high priority.	Mishawum station remains open for several reverse commute trains. The PMT includes a project to improve pedestrian access to Anderson RTC.  The PMT includes a project to install double track in existing single-track segments of the commuter rail network.

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Contact	Date	Summary	Response
James Rooney, Massachusetts Convention Center Authority	3/12/03	<p>Construct the Commonwealth Flats Grade-Separation Project (T under D Street project). It is essential for Silver Line full potential; reliable service; aggressive headways. The MBTA should review and coordinate findings of related alternative analyses.</p> <p>Reanalyze possible Silver Line South Boston connections to the Red Line. Supports the PMT's ranking of the Silver Line South Boston Piers Project.</p>	<p>The PMT includes a project to construct an extension of the Silver Line right of way under D street. The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation.</p> <p>The final routings of the surface portion of Silver Line beyond World Trade Center can be addressed as part of the MBTA's Service Plan process.</p>
Robert Feigin	3/12/03	<p>Strong support for the Medford Hillside Green Line extension. It is an important project with a commitment target date. Begin planning now.</p> <p>The community would welcome an extension of the Blue Line, too.</p>	<p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square. A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and this project did not rate as highly as others based on those measures.</p> <p>The PMT includes a project to extend the Blue Line to Medford Hillside.</p>
Kimberly Driscoll, Ward Five Councilor, City of Salem	3/13/03	<p>Residents are concerned about a possible commuter rail and/or Blue Line stop in South Salem. The MBTA has not explored the possible impacts of these stations; should conduct a feasibility study. The City Council does not support extending the Blue Line to South Salem. Questions its inclusion in the PMT when most citizens have asked for increased commuter rail service and a connection to the Blue Line in Lynn or Revere. Improve the existing station before building another.</p>	<p>The PMT includes projects presently under consideration by the North Shore MIS/EIS process. The PMT examined the operation of express service from outer stations on all commuter rail lines including the Newburyport and Rockport lines.</p>
Sally Shabaka	3/13/03	<p>Construct ramps at stations for people who have luggage, grocery carts, and to ease pedestrian access.</p> <p>Silver Line buses are quieter and less polluting</p>	<p>The PMT includes a project to improve pedestrian access to all rapid transit and commuter rail stations.</p>
Joshua Mello	3/13/03	<p>The existing system should get more emphasis.</p> <p>Pre-emptive signals for the Green Line should have higher priority than improvements for the Red Line;</p>	<p>The MBTA has set a policy that at least 70% of its annual capital expenditures will go toward preserving the existing system.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria. The Red Line signal improvements would accommodate projected</p>

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Contact	Date	Summary	Response
		<p>The item Install 300 Shelters should include reconstruction of bus stop locations;</p> <p>Converting the Silver Line Phase II and III to light rail connecting to the Green Line would be better than the Yawkey/South Station shuttle.</p> <p>Urban Ring phase II and Phase III should be built as light rail the entire length.</p> <p>Improved bus service from New Bedford/Fall River to Boston , Route 128 and Quincy Adams should be considered.</p> <p>A commuter rail station in Union Square should include a multi-modal transfer facility.</p> <p>Fairmount Line should be converted to a full rapid transit line using DMUs</p> <p>A possible extension of Fairmount Line service to a new Riverside Station combined with pieces of the OPERATE HIGH-FREQUENCY READVILLE-ALLSTON LANDING and OPERATE HIGH-FREQUENCY RIVERSIDE-JFK/UMASS COMMUTER RAIL SERVICE projects should be studied. The trains, preferably DMUs would run at 10-15 minute headways from Route 128 Station to Readville, along the Fairmount Line to Broadway Station (transfer to Red Line), along the Worcester Line, stopping at Back Bay, improved Yawkey, Allston, Brighton, Faneuil, Newton Corner, Newtonville, West Newton, Auburndale, and new Riverside in Weston (connect to Green Line). Worcester Line trains could be</p>	<p>increases in demand by 2025.</p> <p>The final design of shelters to be installed can be considered if this project is implemented.</p> <p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to construct a Green Line branch from Arlington St. to South Station in place of the Silver Line can be considered in the 2008 PMT.</p> <p>The development of the Urban Ring project has been the subject of an extensive public process prior to the PMT. The PMT includes those proposals generated from that process.</p> <p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to improve New Bedford/Fall River bus service can be added to the universe of projects for the 2008 PMT.</p> <p>The final design of a possible station at Union Square can be considered if this project is implemented.</p> <p>The PMT includes a project to upgrade the Fairmount Line. Final definitions of system parameters will be considered in greater detail as this project is advanced.</p> <p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to operate a commuter rail line from Riverside to Route 128 via Back Bay can be included in the universe of projects for the 2008 PMT.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

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Contact	Date	Summary	Response
		<p>rerouted along a short connector in Weston and Waltham to the Fitchburg tracks to allow frequent headways on the Riverside-Route 128 service</p> <p>Orange Line extension beyond Forest Hills should only operate to Roslindale Square.</p>	<p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to extend the Orange Line only as far as Roslindale Square can be included in the universe of projects for the 2008 PMT.</p>
Edward Ganshirt	3/13/03	<p>The PMT is too "Boston centric". The MBTA should address suburb to suburb commuting, not just commuting to Boston.</p> <p>Create a secure funding mechanism for the successful suburban transit providers.</p> <p>Too much attention is paid to system preservation.</p> <p>Expedite the Route 128 circumferential bus and the Urban Ring.</p> <p>Abandon the Hyannis, Fall River, and Millis projects (promote sprawl).</p>	<p>The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation. The PMT includes a project to develop suburban commuter rail feeder bus services.</p> <p>The PMT includes a project to develop a Route 128 circumferential bus service.</p>
Jeff Perkins	3/13/03	<p>Construct a rapid transit or commuter rail stop at Union Square, Somerville</p>	<p>The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville.</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p>
Terry Jamro	3/13/03	<p>Construct: 128/I-95, Needham to Canton; Green Line to Medford Hillside; North/South Rail Link; electrification of all commuter rail lines and improve track from Worcester and Providence; make the Urban Ring either light or heavy rail, not BRT; extend the Blue Line to Lynn; keep all equipment in a state of good repair; extend Night Owl hours (as long as vehicles do not need to be maintained at this time.)</p> <p>Provide discounts for users of alternative fuels.</p> <p>Increase the state gas tax to pay for transit projects.</p>	<p>The PMT is a transit planning document and does not include highway projects.</p> <p>The PMT includes a project to extend the Green Line to Somerville. The PMT includes a project to electrify commuter rail lines, construct phase III of the Urban Ring, and extend the Blue Line to Lynn.</p> <p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to eliminate curves on the Providence and Worcester commuter rail lines can be added to the universe of projects for the 2008 PMT.</p> <p>The PMT includes a state of good repair analysis.</p> <p>Any consideration of changes to Night Owl service would be the responsibility of the MBTA's service planning process, not the PMT. It is outside the purview of the PMT to consider changes in tax structure.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
Form Letter on the Somerville Commuter Rail Line Station in Union Square – Sent by 40 Individuals	3/13/03	Make building a new commuter rail station on the Fitchburg commuter rail line in Union Square the highest priority. There are many benefits: direct service, lowest capital costs per new rider, small operating cost, provide access to service that has excess capacity, would serve a minority neighborhood. It also would help mitigate closure of the Lechmere station during Green Line viaduct construction; improve air quality; stimulate investment.	The PMT includes a project to construct a commuter rail station in Union Square, Somerville.
Srdjan S. Nedeljkovic, M.D.	03/13/03	Regarding the proposal to construct a Green Line branch to Needham: 1)The line should extend only to Needham Heights 2)The ridership numbers stated in the PMT are too low and may have omitted some aspects of the current base demographic and economic situation 3)There is ongoing and planned development which needs to be considered.	The project definition of the Green Line extension to Needham was developed during an 18-month open process, which included extensive public participation. Examining a Green Line branch operating only to Needham Street in Newton can be considered in the universe of projects for the 2008 PMT. CTPS travel demand forecasts utilize population and employment growth projections generated for the MPO by the Metropolitan Area Planning Council (MAPC).
Mark Penner	3/14/03	Supports the North/South Rail Link; reduce traffic and pollution and save travel time.  Convert the Silver Line to light rail; save money and reduce community impacts.	The PMT includes a project to construct the North-South rail link.  The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green line branch.
Miranda Elmorsi	3/14/03	Extend the Green Line to Union Square, Somerville. Access to Red Line is 25-minute walk; buses are unreliable.	The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.
Dorit Ron	3/14/03	Supports the Green Line extension to Union Square and a commuter rail station there.	The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square. The PMT includes a project to construct a commuter rail station in Union Square, Somerville.
Shawn Hockert	3/14/03	Give the Green Line extension to Union Square, West Medford, a high priority. Access to Red Line is a 20-minute walk.	The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.
Salem City Council	3/14/03	Asks the MBTA to provide more frequent service to Salem and use modern passenger cars; and construct a link between the current commuter rail line and the Blue Line in Lynn or Revere; but not to extend the Blue Line to Salem.	The PMT includes a project to construct a commuter rail station at Wonderland which would allow for transfers to the Blue Line. The PMT includes projects presently under consideration by the North Shore MIS/EIS process. The PMT examined the operation of express service from outer stations on all commuter rail lines including the Newburyport and Rockport lines.
Bill Reidy	3/14/03	Regarding the extension of commuter rail from Wareham to Hyannis, the capital cost is highly inflated; the track upgrades made in the 1980's should suffice for commuter	The capital costs for this project include rolling stock acquisition in addition to track, signal, and station improvements.

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Contact	Date	Summary	Response
Margaret Sanfilippo	3/14/03	<p>service.</p> <p>Strongly supports Green Line extension to Union Square; would greatly improve weekend mobility; help economic development</p>	<p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p>
Menno Koenig	3/14/03	<p>Develop a Kneeland Street to Causeway Street bus loop; would provide key link between North and South stations and points in between; would be important for tourist access.</p> <p>Asks the MBTA to make the Millis Extension a top priority. It will have more value than the Greenbush Line restoration and can be implemented little by little; the track and signal upgrades are needed anyway; use Needham equipment..</p>	<p>Changes to MBTA bus routes which do not require a capital investment would be considered by the MBTA's Service Plan process, not the PMT.</p> <p>The PMT includes a project to extend commuter rail to Millis.</p>
Kellie Connelly	3/15/03	<p>Plan a rapid transit or commuter rail stop in Union Square.</p>	<p>The PMT includes a project to construct a commuter rail station in Union Square, Somerville.</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p>
Steven Paris	3/15/03	<p>Enclose staircases from street level to train platforms on the Framingham Line at the Newton commuter rail stations and on the Rockport Line at the Salem station.</p> <p>Re-open some currently closed station entrances: Boylston St. entrance to Hynes Convention Center, and Berkeley Street entrance to Arlington station.</p> <p>Construct a new station near Charles River Park, if the Blue Line is extended.</p> <p>Convert the Silver Line to light rail; use the existing abandoned tunnel.</p>	<p>The PMT includes a project to install more enclosed waiting areas along all lines.</p> <p>The closed entrances are opened during special events as required. It would be part of the MBTA's Service Plan process to determine if the facilities should be opened full time.</p> <p>If the project the Blue Line to west Medford is further developed, more detailed examination of exact intermediate station locations will be developed.</p> <p>The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.</p>
Karen Wepsic	3/18/03	<p>The analysis should be more rigorous and reviewed by neutral professionals.</p>	<p>The MBTA and the PMT working committee developed performance measures over an 18-month open process.</p> <p>The existing universe of projects was developed over an 18-month period.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Projects should consider operational costs per passenger, not per new passenger.</p> <p>Analyze projects across modes.</p> <p>Give more weight to projects with environmental justice benefits.</p> <p>Questions whether high priority projects as a group fairly allocate benefits and whether they will encourage sprawl.</p> <p>Increased parking encourages auto use and sprawl.</p> <p>Questions the environmental justice element of: the Yawkey-Back Bay shuttle; the Fourth track on the Fort Point Channel Bridge; Double tracking the commuter rail system; and the Urban Ring Phase II. Environmental justice ratings for the various Green Line improvements seems arbitrary.</p> <p>Use signal preemption to prevent bunching; the exclusive</p>	<p>The travel time savings analysis is intended to reflect the benefits a new project would bring to existing riders, and considers the impact on all riders.</p> <p>Each transit mode provides unique mobility options and is defined by unique operating characteristics that are not applicable to all communities in the MBTA service area. For these reasons, and because of the fiscally unconstrained nature and broad regional focus of the PMT, the MBTA has decided to create lists of high priority projects for each individual mode instead of a single high priority project listing for the entire system. The PMT Executive Summary does, however, provide information on the MBTA's highest immediate systemwide priorities, for which capital funding is already being pursued. Subsequent determinations of specific project-level funding priorities will continue to occur in the MBTA's Capital Improvement Program, as specified in the MBTA's enabling legislation. The MBTA and the PMT working committee developed performance measures over an 18-month open process.</p> <p>The MBTA and the PMT working committee, as part of an 18-month process to develop performance measures, determined it was best not to apply any weights to measurements. Changes to the performance measures used can be considered in the 2008 PMT</p> <p>Land use impacts were considered as part of the PMT analysis of each project.</p> <p>Parking has been raised as an issue of concern during the PMT process.</p> <p>Environmental Justice analysis is described in greater detail in Appendix A.</p> <p>Signal priority improvements are considered separately as part of the implementation of Intelligent Transportation Systems (ITS).</p>



**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

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Contact	Date	Summary	Response
		<p>lane and priority signal project should be divided into two.</p> <p>100 new buses should serve environmental justice routes to warrant this rating.</p> <p>Implement a bus to subway transfer policy.</p> <p>Choose accessibility upgrades by boardings and proximity to handicapped housing/jobs.</p> <p>Expresses concerns that the Urban Ring Phase II rights of way will become general use roadways.</p> <p>Questions the high priority ranking for the East Boston ferry project.</p> <p>Ridership projections for Restoration of Arborway service are low and should be revised; the Longwood Medical Area is a major job center; there is also an environmental justice component.</p> <p>Spell out a project's impacts on the system.</p> <p>Include modeling data and ridership projections.</p>	<p>The 100 new buses would be added to the busiest bus routes in the present network. Many of these routes service environmental justice communities.</p> <p>It is not in the purview of the PMT to include fare policy analysis.</p> <p>Accessibility ratings considered proximity to major activity centers, such as employment or government centers, institutions of higher education, hospitals, or other facilities that are major trip generators for persons with disabilities.</p> <p>The proposed BRT elements of the Urban Ring are being considered as exclusive busways.</p> <p>After additional analysis, the East Boston ferry project is now designated as a medium priority project.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria. All PMT ridership analysis utilize population and employment growth projections generated for the MPO by the Metropolitan Area Planning Council (MAPC).</p> <p>Each project includes estimates of total new riders to the system the project would generate.</p> <p>Additional information for each project can be found in the Appendix section.</p>
Christopher Irwin	3/18/03	<p>Evaluating projects within modes creates unintended bias. The modes do not equally advance the PMT vision; some projects contributing less may be advanced before others contributing more.</p>	<p>Each transit mode provides unique mobility options and is defined by unique operating characteristics that are not applicable to all communities in the MBTA service area. For these reasons, and because of the fiscally unconstrained nature and broad regional focus of the PMT, the MBTA has decided to create lists of high priority projects for each individual mode instead of a single high priority project listing for the entire system. The PMT Executive Summary does, however, provide information on the MBTA's highest immediate systemwide priorities, for which capital funding is already being pursued. Subsequent determinations of specific project-level funding priorities will continue to occur in the MBTA's Capital Improvement Program, as specified in the MBTA's enabling legislation.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Projects should direct growth to the urban core. Be more responsive to urban core mobility needs than to suburban demand for transit.</p> <p>Current estimates of travel time savings do not adequately represent those of the future, considering future development and transit services.</p> <p>Supports extension of the Silver Line to City Point for cost effectiveness, connections, and air quality improvements and asks that these factors be taken into consideration.</p>	<p>The MBTA and the PMT working committee developed performance measures over an 18-month open process.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>All PMT ridership analysis utilize population and employment growth projections generated for the MPO by the Metropolitan Area Planning Council (MAPC).</p> <p>The PMT includes a project to extend the Silver Line to City Point. All projects in the PMT were evaluated using consistent and objective criteria.</p>
Jodi Sugerman-Brozan, Program Director, Alternatives for Community & Environment	3/18/03	<p>Give more weight to environmental justice and land-use criteria in choosing priorities; weight seems to be given to cost-effectiveness.</p> <p>Cost-effectiveness criteria should assess the capital costs and operating costs per rider, not per new rider; excessive operating costs are a financial burden; this also disadvantages areas with high transit use, as an investment yields fewer new riders and the project seems very expensive; the Dudley light rail conversion would cost \$10,880 (capital) and \$0.17 (operating) per rider, while New Bedford commuter rail would cost \$94,499 (capital) and \$9.75 (operating) per rider.</p> <p>Criteria for assessing utilization should take into account the total riders, not just the increase; transit dependent riders must use the existing system, so enhancements cannot yield large numbers of new riders. Criteria also do not consider needs for weekend and off-peak riders.</p>	<p>The MBTA and the PMT working committee, as part of an 18 month process to develop performance measures, determined it was best not to apply any weights to measurements. Changes to the performance measures used can be considered in the 2008 PMT</p> <p>The MBTA and the PMT working committee developed performance measures over an 18-month open process. Changes to the performance measures used can be considered in the 2008 PMT. The travel time savings analysis is intended to reflect the benefits a new project would bring to existing riders, and considers the impact on all riders.</p> <p>The MBTA and the PMT working committee developed performance measures over an 18-month open process. Changes to the performance measures used can be considered in the 2008 PMT. The travel time savings analysis is intended to reflect the benefits a new project would bring to existing riders, and considers the impact on all riders.</p>

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Contact	Date	Summary	Response
		<p>Mobility evaluations should also consider decrease in travel time per mile; in urban areas a commute of shorter distances can take more time than a similar distance on other modes. Projects that fill gaps in the network in urban core communities should also be given high ratings.</p> <p>Projects that have high priority for environmental justice in the PMT do not represent the priorities of affected communities. Community groups oppose Silver Line Phase III (South Station-Boylston Connector); they have advocated for light rail on Washington Street (given a low PMT priority rating) connecting into downtown via the existing Tremont St. tunnel; a new tunnel is unnecessary. Benefits of the Urban Ring project to environmental justice communities has not been determined and are overstated.</p> <p>The PMT should evaluate projects across modes, giving equal weight to environmental justice, economic and land-use impacts, and cost-effectiveness.</p> <p>Installing bus shelters would improve bus ridership.</p> <p>Purchasing 100 new buses should be a high priority; they should not be used for Urban Ring Phase I; they should be used to expand capacity on existing, overcrowded routes</p>	<p>The Travel Time Savings analysis considers the total travel time savings generated by each project. The Mobility evaluation of each project considered the filling of gaps in the network. Greater details of these evaluations can be found in Appendix A.</p> <p>Environmental Justice analysis is described in greater detail in Appendix A.</p> <p>Each transit mode provides unique mobility options and is defined by unique operating characteristics that are not applicable to all communities in the MBTA service area. For these reasons, and because of the fiscally unconstrained nature and broad regional focus of the PMT, the MBTA has decided to create lists of high priority projects for each individual mode instead of a single high priority project listing for the entire system. The PMT Executive Summary does, however, provide information on the MBTA's highest immediate systemwide priorities, for which capital funding is already being pursued. Subsequent determinations of specific project-level funding priorities will continue to occur in the MBTA's Capital Improvement Program, as specified in the MBTA's enabling legislation. The MBTA and the PMT working committee developed performance measures over an 18-month open process.</p> <p>The PMT includes a project to install 300 bus shelters.</p> <p>The PMT includes a project to purchase 100 new buses. These buses would be used to enhance existing service, not to initiate a new service. Urban Ring Phase 1 is a separate project.</p>

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Contact	Date	Summary	Response
		<p>and replace the dirtiest diesel buses in the fleet.</p> <p>Installing bus counters should receive higher environmental justice ratings; it is the only way to get an accurate count of ridership on MBTA buses, needed for planning.</p>	<p>Purchase of automatic passenger counters is now considered to be part of Intelligent Transportation Systems (ITS) installation. This project is considered a high priority service enhancement.</p>
<p>Andy Sumanadesa Traffic Engineer Town of Weymouth</p>	03/18/03	<p>As extending the Red Line to South Weymouth is rated as a low priority, the town recommends extending existing Route 225 bus service from Weymouth Landing to South Shore Hospital on Route 18 in South Weymouth.</p>	<p>Changes to MBTA bus routes which do not require a capital investment would be considered by the MBTA's Service Plan process, not the PMT.</p>
<p>Tony Fields, Chairman, North Suburban Planning Council</p>	3/19/03	<p>The Reverse Commute project analysis does not refer to the closing of Mishawum station for reverse commuting.</p> <p>The Council believes double tracking should be a high priority.</p> <p>The council would like the project to improve pedestrian access to Anderson RTC from West Side upgraded from medium to high priority.</p> <p>The Council supports improved pedestrian access to all rapid transit and commuter rail stations.</p> <p>The Council would like to see the definition of bicycle parking expanded so that the option of bicycle lockers or other forms of sheltered, secured parking are provided.</p> <p>Route 128 Circumferential Bus Service requires a detailed study which should be a high priority.</p> <p>The North Suburban Transit Opportunities Study should be referenced in the PMT.</p> <p>The council support extending the Orange Line to Reading if commuter rail service is retained between Boston and North Wilmington.</p>	<p>Mishawum station remains opened for several reverse commute trains.</p> <p>The PMT includes a project to install double track in existing single-track segments of the commuter rail network. All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>The PMT includes a project to improve pedestrian access to Anderson RTC. All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>The PMT includes a project to improve pedestrian access to rapid transit and commuter rail stations.</p> <p>The MBTA is working with EOTC and Mass Highway to analyze bicycle and pedestrian access to MBTA stations. The MBTA will consider the use of bicycle lockers.</p> <p>The council should make a request to the Boston MPO to include such a study in the 2004 UPWP.</p> <p>The North Suburban Access study identified possible shuttle bus services to commuter rail stations. This analysis was considered as part of the Suburban Commuter Rail Feeder analysis.</p> <p>The PMT includes a project to extend the Orange Line to Reading, however the analysis assumes that all commuter rail service north of Reading would be diverted via the "Wildcat Branch" and Lowell line to Boston. Service to North Wilmington would be discontinued.</p>

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Contact	Date	Summary	Response
Joshua Channell	3/19/03	<p>Supports the methodology used in developing the PMT. Particularly supports consideration for air quality and smart growth.</p> <p>Would like to make subway expansion projects high priority. The MBTA is an asset to the region.</p>	<p>Thank you for your comments.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria.</p>
Joe Beggan	03/19/03	<p>The Silver Line extension west should operate on surface streets with transit priority improvements.</p> <p>A Blue Line extension to West Medford should include a station at North Station and include a connection to the Green Line</p>	<p>If the Silver Line West proposal is further developed, an alternative plan to operate via surface streets can be considered.</p> <p>If a Blue Line extension to West Medford is further developed, the exact location of stations can be further refined.</p>
Jarret T. Barrios State Senator Middlesex, Suffolk, and Essex district	03/20/03	<p>Supports the Urban Ring</p> <p>Supports extension of the Green Line to Union Square and Medford.</p> <p>Bus Route 86 should be extended to the Charlestown Navy Yard.</p> <p>Would like the MPO to prioritize the structural repair of the Sullivan Square overpass project.</p>	<p>The PMT includes a 3-phase project to construct the Urban Ring</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>Changes to MBTA bus routes which do not require a capital investment would be considered by the MBTA's Service Plan process, not the PMT. This is a roadway repair project outside the purview of the PMT.</p>
Lowell L. Richards, III, Chief Development Officer, Massport	3/20/03	<p>Supports cost-effective efforts that improve access to airport for customers and employees, including: Silver Line beyond Phase II (completing connection to the South Boston waterfront) which should be one of highest priorities; surface service to BMIP (not using D Street between Northern Ave. and Summer Street). The Silver Line D Street grade separation should have a higher rating due to the at-grade impacts to service reliability.</p> <p>Keep Massport informed of progress on Red/Blue Line Connector studies.</p> <p>Extend the Blue Line from Wonderland to Lynn, and Massport will help identify New Starts funding.</p> <p>Supports the Urban Ring Phases I and II, with continued</p>	<p>The analysis of this project considered existing year 2025 demand for the service. Future PMTs can consider the impact of a full build-out on the street network and the resulting demand.</p> <p>The MBTA will keep Massport informed of the connector studies.</p> <p>The PMT includes a project to extend the Blue Line to Lynn. Funding strategies for proposed projects will be considered in greater detail as projects reach more advanced stages of planning and design.</p> <p>The PMT includes a project to construct the three-phase Urban Ring</p>

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Contact	Date	Summary	Response
		<p>coordination on use of Chelsea truck route.</p> <p>Supports the expansion and enhancement of ferries serving Boston Harbor, including the East Boston ferry (with stops at Rowes Wharf, Russia Wharf, and the World Trade Center instead of Long Wharf) Make Harbor Express South Shore service a high priority. Improve Russia Wharf/South Station ferry service and other Inner Harbor services between Lovejoy Wharf and Charlestown and Russia Wharf/South Station, the Federal Courthouse, and World Trade Center. The Logan Dock has additional capacity.</p>	<p>project.</p> <p>The PMT includes projects to improve ferry service.</p>
Anne Fanton, Executive Director and Robert Tuchman, Chair, Central Artery Environmental Oversight Committee	3/20/03	<p>Change in table 2-2, 12/31/96 to 12/31/01.</p> <p>EOC does not view the Washington Street Replacement Service as complete as it is not connected to subway or light rail.</p> <p>Make Blue Line track and platform improvements a high priority.</p> <p>System preservation projects should be given priority rankings (this will assist tracking and differentiation from enhancement and expansion)</p> <p>Priority station improvement projects should be identified; more information would better support the policy.</p> <p>Text should refer to details found in the appendices.</p> <p>Provide an explanation of how the performance measures were applied and how the inputs to the analysis were generated; explain why changes in ratings were made.</p> <p>Revise text on page 5B-31 "Access to Service", to read, "Capital expansion of commuter rail has also produced further demand for parking," to reflect that the</p>	<p>The table has been changed.</p> <p>The Washington St. project has always been considered a separate phase of a multi-phase project. Phase 1 is complete.</p> <p>Improvements to the Blue Line have been included in past TIPs and CIPs. The PMT includes Blue Line improvements in the list of legal commitments found in Table 2-2</p> <p>The PMT is a financially unconstrained long-term capital planning document. The MBTA's annual Capital Investment Program (CIP) is the vehicle for identifying and implementing specific preservation projects.</p> <p>The PMT is a financially unconstrained long-term capital planning document. The MBTA's annual Capital Investment Program (CIP) is the vehicle for identifying and implementing specific station improvement projects.</p> <p>Additional references to the appendix will be added to the test.</p> <p>The Appendix includes a more detailed review of performance measures. The draft PMT was made available while final analysis work was still underway. Some numbers were later changed and will be reflected in the final version.</p> <p>The text will be changed.</p>

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Contact	Date	Summary	Response
		<p>Commonwealth, not the regulatory agencies, offered to expand mass transit in the CA/T Project FEIS/R.</p> <p>The MBTA implements the CA/T transit commitments it agrees with while delaying or making substitutes for others.</p> <p>Clearly identify CA/T commitments for: Blue Line station improvements and Green Line station and track work at North Station.</p> <p>Blue Line platform extensions for 6-car trains should be listed separately and rated.</p> <p>Note the assumptions and describe the data used in the evaluations on each project page and fully detail it in the appendices.</p> <p>Questions ridership and level of information used in the analysis of the Suburban Commuter Rail Feeder Bus Services and the Route 128 Circumferential Bus Service projects. Bus emissions from these projects should be factored into the air quality rating.</p> <p>Add a description of the Lovejoy Wharf to Russia Wharf connection as a version of the North-South Rail Link; it is</p>	<p>Table 2-2 identifies CA/T commitments.</p> <p>The Blue Line platform work is an ongoing project. Wonderland, Revere Beach, Beachmont, Suffolk Downs, and Wood Island stations are complete. Work is presently underway at Airport and Aquarium stations. The remaining station work required at Orient Heights, Maverick, State, and Government Center has already been identified in the MBTA Capital Investment Program (CIP) and funded.</p> <p>The PMT includes Blue Line improvements in the list of legal commitments found in Table 2-2</p> <p>These projects are included in the PMT as part of the total costs for station improvements in the System Preservation category.</p> <p>The PMT is intended to compare the relative merits of capital improvement project ideas only at a broad level of detail with a goal of categorizing projects in three tiers of ratings: high priority, medium priority, and low priority. If and when a particular project is advanced to serious consideration for inclusion in a regional capital programming document, more in-depth feasibility studies will be conducted that will provide a greater level of detail on costs, ridership impacts, and other performance indicators.</p> <p>Bus emissions are factored into the air quality rating.</p> <p>Once a facility is constructed at Russia Wharf, the MBTA's Service Plan</p>

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Contact	Date	Summary	Response
		<p>included in the January 1991 MEPA CA/T Certificate.</p> <p>Noting the East Boston ferry service as a high priority seem to be an error.</p>	<p>process will determine the specific route and level of service to be operated.</p> <p>The East Boston ferry is now designated as a medium priority project after completion of further analysis.</p>
Jeffrey Levine, Chair, Inner Core Committee	3/20/03	<p>Particularly supports: all three phases of the Urban Ring, Extension of the Green Line to West Medford, and construction of an Orange Line station at Assembly Square.</p> <p>Would like to see more information on the North-South rail link, electrification of commuter rail lines, Union Square station on the Fitchburg Line, and the commuter rail/Red Line connection at Alewife, and other (including UPWP) projects.</p> <p>Sees value in all of the enhancement and expansion projects.</p>	<p>The PMT includes all three phases of the Urban Ring, a project to extend the Green Line to West Medford, and a project to build an Orange Line station at Assembly Square.</p> <p>Additional information for each project can be found in the Appendix section.</p>
Conservation Law Foundation	3/20/03	<p>Develop a compelling 25-year vision; it should be used to advocate for the vision and increased funding for transit, including through flexing highway funds to transit.</p> <p>Refine the PMT performance measures. Include information on how project data is generated and show how analysis supports each rating. Quantitative inputs for analysis of all performance measures should be included. Supports the Environmental Justice and Economic and Land Use Impacts performance measures as important way to promote transit that supports equitable and sustainable development. Weight the performance measures. The addition of Travel Time Benefit evaluations helps counter emphasis on new riders. Update the PMT with transportation system user benefit analysis when possible.</p> <p>Move “Capital Cost Per Unit Reduction of VOC, Nox, and CO2 Emissions to Cost Effectiveness. “Percent Reduction of VOC, Nox, and CO2 Emissions should explain they are the result of VMT reductions. Define “Travel Time</p>	<p>The PMT includes an Executive Summary which address this.</p> <p>The MBTA decided, in conjunction with the PMT Working Committee, that each performance measure category would be weighted equally when applied to individual project ideas. These categories were, however, defined in such a way that reflected the priorities of the Working Committee, as a whole.</p> <p>For example, the ability of a project to generate ridership was effectively addressed in both the utilization and cost effectiveness categories. This approach allowed for a more simplified and transparent application of performance measures than would have been possible if direct weightings were applied to each measure.</p> <p>The MBTA and the PMT working committee developed performance measures over an 18-month open process. Changes to the performance measures used can be considered in the 2008 PMT.</p>



**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Benefit” as “projected cumulative reduction in travel time experienced by all riders of the transit system”.                      “Reduction in VMT should not be included in Utilization; it is already included in Air Quality. “Capital Cost Per Unit Travel Time Savings” should be defined as the projected cumulative reduction in travel time experienced by all riders of the transit system.</p> <p>Include background information proposed by CLF on Central Artery commitments. Update table 2-2 to include revised commitments and deadlines of the September 2000 Administrative Consent Order and the April 2001 amendment, other deadlines and project status. Add commitment and status information to project descriptions.</p> <p>Extend the review process to allow for these revisions.</p>	<p>The MBTA is working to include elements of CLF language and some changes have been made to table 2-2.</p> <p>The review process was extended by one week. A further extension would have prevented the use of the PMT in developing the Boston MPO's Regional Transportation Plan for 2003</p>
Terry Brennan	03/21/03	Supports Green Line branch to Needham Junction	The PMT includes a project to construct a Green Line branch to Needham Junction.
Stephane Geuns-Meyer	03/21/03	<p>Legal commitments including the Green Line to West Medford should be identified in the text.                      Legal commitments should be considered in the priority weighting.</p> <p>Supports the Urban Ring as a high priority.</p> <p>Please revise document to have two, at most three significant figures for every number.</p> <p>Daily ridership should be calculated for a period of time after an extension is estimated to be in operation.                      West Medford extension of Green Line should be evaluated with the context of a completed Urban Ring</p>	<p>Chapter 2 of the PMT includes a list of legal commitments and the present status of each project.                      A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT. The PMT evaluates projects according to consistent and objective criteria, and this project did not rate as highly as others based on those measures.</p> <p>The PMT includes the Urban Ring.</p> <p>The MBTA will round-off figures in the PMT to a lesser level of precision.</p> <p>Model projections are based on 2025 ridership for a mature service.</p> <p>All projects are compared individually to the present base in order to offer a fair comparison. When and if the project reaches an advanced stage, the impacts of other transit projects that have also been advanced can be</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
Heidi Roddis Ricci Mass Audubon Society	03/21/03	The Society supports the North-South Rail Link	considered in ridership estimates. The PMT includes the North-South Rail Link project
Denise Provost City of Somerville Alderman At Large	03/21/03	<p>Union Sq. should be linked to Boston by rapid transit, probably a branch of the Green Line.</p> <p>Urges the MBTA to look at all assets of the area when considering an Assembly Square Orange Line stop.</p> <p>The extension of the Green Line through Somerville to West Medford is a positive obligation of the Commonwealth, why are we not seeing its planning and design process now?</p>	<p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>The PMT includes a project to construct an Orange Line station at Assembly Square.</p> <p>A project's status as a legal commitment was used as an initial screening criterion for the PMT universe of projects. Consequently, all legal commitments were included in the PMT, and are thus eligible for programming in the Capital Improvement Program (CIP). The actual order of implementation for capital improvement projects is determined by the CIP - not the PMT.</p>
Dorothy A. Kelly Gay Mayor, City of Somerville	03/21/03	<p>The employment and population projections in the final version of the PMT underestimates the amount of planned and projected growth in the Assembly Square district.</p> <p>Bringing rapid transit to Union Sq. with either a Green Line or Blue Line extension should be considered the preferred route, not an alternative.</p> <p>The city is pleased at the high rating of a new commuter rail station in Union Square. This station should not be viewed as a substitute for viable rapid transit access in Union Square.</p> <p>Urban Ring phase III is erroneously shown beginning at Sullivan Square instead of Assembly Square or Wellington.</p> <p>The evaluation the proposal to operate 8-car trains should consider the impacts of an Assembly Square station.</p>	<p>CTPS travel demand forecasts utilize population and employment growth projections generated for the MPO by the Metropolitan Area Planning Council (MAPC). After further analysis, the Assembly Square Orange Line station has been rated as a medium priority project.</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>The commuter rail station is considered as a separate project from rapid transit proposals serving Union Square.</p> <p>The map has been corrected.</p> <p>All projects are compared individually to the present base in order to offer a fair comparison. When and if the project reaches an advanced stage, the impacts of other transit projects that have also been advanced can be considered in ridership estimates.</p>
Wig Zamore	3/21/03	Asks that the Urban Ring (single technology) be given top priority.	The PMT includes the three-phase Urban ring project. All projects in the PMT were evaluated using consistent and objective

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Supports the North-South Rail link; it will take cars off the road and improve air quality</p> <p>Suggests that the Green Line Extension to Medford Hillside might not meet its deadline and suggests that instead, the Green Line be extended to Union Square, linked with adjacent roadway improvements and development.</p> <p>Notes Somerville's many transportation burdens; and high population density, current transit use, and modest median income levels.</p> <p>Requests that the Orange Line station at Assembly Square be a very high priority, consistent with local employment oriented mixed use development goals; this would save 100 million VMT's per year.</p> <p>Construct new commuter rail stops along the Lowell Line.</p>	<p>criteria. The PMT includes a project to construct the North-South Rail Link</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville. The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>The PMT includes a project to construct an Orange Line station at Assembly Square. All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however new projects to add commuter rail stops along the Lowell line can be added to the universe of projects for the 2008 PMT.</p>
William Newton, Executive Director, Central Massachusetts Regional Planning Commission	3/21/03	<p>Supports: 1.) more frequent service between Framingham and Worcester. Address the increasing demand for service. Also, expand the Worcester layover, upgrade the signal and track in the corridor, improve agreements with CSX. 2.) the extension of commuter rail from Forge Park to Milford, including a station in Bellingham. There is identified need for this service in the Blackstone Valley. 3.) a new station at Millbury on Framingham/Worcester Line; ridership estimates in the PMT are low.</p>	<p>The PMT includes a project to operate more frequent service between Framingham and Worcester.</p> <p>The PMT includes a project to extend commuter rail from Forge Park to Milford with a stop in Bellingham.</p> <p>The PMT includes a project to construct a station in Milbury on the Worcester line. Ridership estimates do account for the location of turnpike Exit 11. All projects in the PMT were evaluated using consistent and objective criteria.</p>
Sean Sullivan, Arborway Rail Restoration Project Advisory Committee	03/21/03	<p>Give additional weight to high frequency/high speed transit expansion projects as this mode reduces the region's auto dependency and results in many</p>	<p>The MBTA and the PMT working committee, as part of an 18-month process to develop performance measures, determined it was best not to apply any weights to measurements. Changes to the performance measures</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>environmental and social benefits.</p> <p>The Silver Line is the only expansion project likely to increase HF/HS service and this shows that the methodology must not be balanced. Current methodology evaluating projects by considering new ridership disadvantages these HF/HS projects as they are likely to draw riders from existing transit. This methodology passes over HF/HS projects that could be implemented at a reasonable cost and would greatly expand coverage.</p> <p>Suggests new projects for the Universe:                      1.) Replace or supplement the Yawkey shuttle with a new project, the Readville/Riverside shuttle, (high-frequency Readville-Allston Landing commuter rail and extend service to Newtonville, West Newton, Auburndale and new Riverside stations,) that would combine several proposed projects and bring HF/HS service to new stations. Does the Readville/Allston shuttle include the upgrade of Fairmount Line stations?                      2.) Extend Orange Line service to Wyoming station, involving conversion of one commuter rail track and the Wyoming commuter rail station to Orange Line use, bringing HF/HS service to Melrose.                      3.) Extend the Orange Line to Roslindale or West Roxbury instead of Needham, a more economical project that would improve air quality, and increase transit ridership.</p> <p>Several operations might mitigate Green Line congestion: operating Riverside/Needham cars on the same train unit east of Newton Highlands; or a Newton/Needham Shuttle; or Needham trains or split vehicles via Beacon St. or at Kenmore.</p> <p>Extend #71 bus to Newton Corner.</p> <p>Suggests careful consideration of the impacts of eliminating any commuter rail stations.</p> <p>Highway funds should be used for the Route 128 HOV lanes.</p>	<p>used can be considered in the 2008 PMT</p> <p>The travel time savings analysis is intended to reflect the benefits a new project would bring to existing riders, and considers the impact on all riders.</p> <p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however new projects can be added to the universe of projects for the 2008 PMT.</p> <p>The PMT includes a project to extend Green Line service to Needham. If this project is pursued, operational details can be considered as part of a more in depth project analysis.</p> <p>The PMT includes a project to extend Route 71 to Newton Corner.</p> <p>The PMT is a financially unconstrained capital planning document.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Supports ITS improvements for buses.</p> <p>Does not support double tracking the entire commuter rail system.</p> <p>Four-car Green Line trains would increase capacity in the central subway and attract new riders.</p>	<p>Therefore, it does not provide funding for project implementation. The PMT does consider the use of highway dollars as part of overall funding strategies identified in Chapter 4.</p> <p>The PMT includes a project for ITS improvements for buses</p> <p>Ridership projections are based on 2025 demand and do not place capacity restrictions in the projections.</p>
Nicole Jabaily MASSPIRG	3/21/03	<p>Seeks to curb air pollution by improving and expanding MBTA.</p> <p>Has concerns about process and criteria for determining priorities: the weighting of performance measures is ambiguous; air quality and land use should be given more weight; cost effectiveness should be determined through capital costs and operating costs per passenger, not new passengers only; utilization should consider total riders, not just the increase.</p> <p>Make conversion to light rail of the Dudley-Boylston Silver Line segment a high priority; it would improve air quality where greatly needed.</p> <p>Expresses concerns that the Urban Ring Phase III will never be upgraded from bus to light rail.</p> <p>Supports the North/South Rail Link as a high priority.</p>	<p>The PMT includes MBTA expansion projects.</p> <p>The MBTA and the PMT working committee, as part of an 18-month process to develop performance measures, determined it was best not to apply any weights to measurements. Changes to the performance measures used can be considered in the 2008 PMT</p> <p>The travel time savings analysis is intended to reflect the benefits a new project would bring to existing riders, and considers the impact on all riders.</p> <p>The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.</p> <p>The development of the Urban Ring project has been the subject of an extensive public process prior to the PMT. The PMT includes those proposals generated from that process.</p> <p>The PMT includes a project to construct the North-South Rail Link.</p>
Robert W. Healy, City Manager, City of Cambridge	3/25/03	<p>States that projects that ensure that transit ridership in the inner core remains strong should have priority over commuter rail service.</p> <p>Supports the following projects: Red Line Signal and Train Control Improvement; Install 300 Bus Shelters; improved access to stations for pedestrians and cyclists (suggests the MBTA conduct pilot programs in collaboration with communities); and Urban Ring all phases.</p>	<p>All projects in the PMT were evaluated using consistent and objective criteria.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

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Contact	Date	Summary	Response
		<p>Asks: for more information on reductions in fare and sales tax collections; if bus shelters will increase boardings;</p> <p>if there is a relationship between the Red Line Signal Improvements and the 8-Car Train projects.</p> <p>Expresses concerns that the Minuteman Bikeway might be closed permanently if a Red Line Extension to Route 128 were implemented.</p>	<p>Analyzing changes in fare and sales tax collections is outside the scope of the PMT.</p> <p>No information is available to indicate what impact on ridership the installation of bus shelters would have.</p> <p>The projects to improve Red Line signals and to operate 8-car trains on the Red Line are independent of each other. They are two alternative approaches to increasing capacity to meet demand by 2025. Implementing both projects would increase capacity beyond expected demand.</p> <p>If a project to extend the Red Line north of Alewife is pursued, more detailed analysis would determine the possible temporary or permanent impacts on the bikeway.</p>
<b>Public Hearing Oral Comments</b>			
<b>March 5, 2003</b>			
Menno Koenig, MAPC Representative to South West Advisory Planning Committee		See written comment above.	The PMT includes a project to extend commuter rail to Millis.
Fred Moore, The Association for Public Transportation (APT)		<p>APT endorses the Fairmont Line.</p> <p>Asks the MBTA to make the Red-Blue Connector a higher priority; look at connections to Alewife, Cambridge, or Lynn.</p> <p>Move forward with the automated fare collection.</p> <p>Set up a spider web system for suburban bus service.</p> <p>Expedite expansion of the Riverside Line light rail.</p> <p>Make the Silver Line phases lower priorities.</p> <p>Do not pursue the Lynn ferry service.</p> <p>Give the Millis project a higher priority than Fall</p>	<p>The PMT includes a project to upgrade the Fairmount Line.</p> <p>The PMT includes a project to extend the Blue Line to Charles. All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>The MBTA has initiated the procurement of new fare collection equipment.</p> <p>Changes to MBTA bus service which do not require a major capital investment are studied under the MBTA's Service Plan process.</p> <p>The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>All projects in the PMT were evaluated using consistent and objective</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>River/New Bedford.</p> <p>Make service expansions outside the former MBTA district a priority.</p> <p>Thinking of the commuter rail system as “regional rail” supports the concept that the stations could be destinations; it has great potential.</p> <p>Increase frequency on a three-branch system serving the North Shore.</p> <p>The PMT process has been very open; we can see how decisions are made.</p>	<p>criteria.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria.</p>
Carolyn Manson		See written comment above.	
Bill Tedoldi, Needham Board of Appeals, and Charles River Watershed Association		Make the Millis extension a high priority. Transit, particularly rail expansion, is an important way to help manage sprawl; through transit-oriented design.	The PMT includes a project to extend commuter rail service to Millis. All projects in the PMT were evaluated using consistent and objective criteria.
Roland Hebert, Southeast Regional Planning and Economic Development District		<p>Supports the high priority ranking given the Fall River/New Bedford commuter rail project. It will serve two major cities and a region with more than 90,000 people.</p> <p>Supports improvements to stations in Mansfield and Attleboro; the intermodal transit center and parking garage in downtown Attleboro. The South Attleboro station needs a parking deck.</p> <p>Keep the Middleborough to Wareham commuter rail extension a medium priority.</p>	<p>The PMT includes a project to extend commuter rail to Fall River and New Bedford.</p> <p>The PMT includes evaluations of parking expansion needs throughout the entire system.</p> <p>The PMT includes a project to extend commuter rail to Wareham.</p>
Tony Wai Tommee, New Transit, Northeastern University Transit Club		<p>Make providing warning and delay information on the Green Line and at bus stops a high priority.</p> <p>Add a commuter rail station at Newton Corner; it would be a strategic location.</p>	The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however a new project to construct a commuter rail station at Newton Corner can be added to the universe of projects for the 2008 PMT.
John Deacon, Sierra Club		Show the Central Artery commitments in a separate list.	Table 2-2 lists Central Artery commitment projects.

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Evaluate the Red-Blue Connector, the Silver Line, and Fall River/New Bedford as bus rapid transit projects.</p> <p>Check the methodology for the Arborway evaluations; the ridership will be much higher than projected; make it a high priority.</p> <p>Restore the Silver Line as a rail line. Show the ridership projections for the Silver Line. The replacement transit has not been accomplished; the bus rapid transit service does not meet rapid transit standards. Separate the Transitway-to-Boylston section from the line.</p> <p>The diesel buses are concentrated in one area and their emissions pose a health risk.</p> <p>Include a dual mode vehicle for the North/South Rail Link project.</p> <p>Make the Orange Line station at Assembly Square a high priority.</p> <p>Focus on a Green Line station at Union Square, not commuter rail.</p> <p>Electrify the Fairmont Line.</p> <p>Build a stairway on the other side of the Anderson Regional Transportation Center.</p>	<p>The existing universe of projects was developed over an 18-month period. The deadline for adding a new project to the existing PMT has passed, however projects to construct a Bus Rapid Transit line between Bowdoin and Charles/MGH; to construct a Bus Rapid Transit system from Boston to New Bedford and Fall River; and to electrify the Fairmount line can be added to the universe of projects for the 2008 PMT.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.</p> <p>The MBTA has ordered 343 additional CNG buses.</p> <p>The North-South Rail Link project includes dual-mode vehicles.</p> <p>The PMT includes a project to construct an Orange Line station at Assembly Square.</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>The PMT includes a project to electrify all commuter rail lines. Electrification of a single line can be considered in greater detail if this project advances.</p> <p>The PMT includes a project to improve pedestrian access to the Anderson Regional Transportation Center.</p>
Divah Payne		<p>Replace the rapid transit in the Washington Street Corridor. The bus shelters don't shelter people. The buses are poorly designed for the handicapped and elderly. Seats are cheap, poorly situated, unmarked, cramped.</p>	<p>The design of shelters currently used at Silver Line stations was a product of both the MBTA and a community advisory committee to the Mayor of Boston. As a result, no substantial modifications are expected. MBTA low-floor buses are built to standard transit industry designs.</p>



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Contact	Date	Summary	Response
		<p>Construction diversions are unfair to (do not make accommodations for) elderly and handicapped.</p> <p>The Ride operations need to be improved. The operators don't communicate with you and are often not on time or at the time you requested. Some drivers have been verbally abusive.</p>	<p>Complaints of poor performance from Ride operators have been forwarded to the Office of Transportation Access.</p>
Toni Hicks, Conservation Law Foundation		<p>Priority ratings should be more prominent.</p> <p>Do an overview, including a summary of all projects and their ratings.</p> <p>The description of the legal commitments should be expanded to include discussion of the Central Artery permitting. Update the list of legal commitments, including the 2001 amendment. Include deadlines when tracking the status of legally required projects and substitution criteria.</p> <p>The use of performance measures for environmental justice and economic land use results shows that urban core projects are valued. There should be more transparency for the link between the performance measures and the outcomes.</p>	<p>Appendix A of the PMT includes a description of PMT performance measures and how they were applied.</p> <p>The PMT includes an Executive Summary which includes a summary of projects. Appendix C of the PMT provides detailed results for each project evaluated in the PMT.</p> <p>Legal commitment language has been changed.</p> <p>Appendix A of the PMT includes a description of PMT performance measures and how they were applied.</p>
John Kyper		See written comment above.	
Gene Gobby, the Allston-Brighton CDC Design Environment Committee, and the Association for Public Transportation		<p>Analyze whether a stop in Allston-Brighton would reduce traffic.</p> <p>Promote commuter rail for tourists.</p> <p>The bus from South Station is an excellent way to get to South Boston.</p> <p>Use ramps at stops instead of the Green Line Breda cars, which are poorly designed and dangerous. Consider the design issues for passengers who are short.</p>	<p>The PMT includes a project to construct a commuter rail station in Allston.</p> <p>Your concerns about the Breda cars will be forwarded to Green Line Operations.</p>
Peter Griffin, New Hampshire Railroad		Extend commuter rail from Newburyport to Kittery, Maine; from Lawrence to Manchester, New Hampshire.	Projects to extend commuter rail to Kittery and to Manchester and to restore the Saugus branch were removed during the pre-screening process

# SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION

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Contact	Date	Summary	Response
Revitalization Association		Explore accommodating double stack freight service to the Port of Boston. Maintain the Saugus Branch as an active rail corridor.  Evaluate North Station rail and ridership capacity.	of the PMT. It is outside the purview of the PMT to consider improvements for freight transportation.  The PMT includes a project to expand the waiting area at North Station.
Bill Walker, Water Transportation Alternatives		See written comments above.	
Jeremy Marin, Sierra Club		Supports the North/South Rail Link.  Use existing light rail tunnels for the Silver Line.	The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch. The PMT includes the North-South Rail Link project
<b>March 6, 2003</b>			
Melissa Marantz, MASCO		See written comments above.	
Mike McGurl, Water Transportation Alternatives		Make the expansion of water transportation to the South Shore a high priority; it is cost effective, reduces air pollution, provides quality service.  Change routing of MBTA buses along Route 3A to stop at the Quincy commuter boat dock.	The PMT includes a project to improve ferry service from South Shore communities to Boston. All projects in the PMT were evaluated using consistent and objective criteria. Changes to local bus service are made through the MBTA's Service Plan process.
Paula Walach		Supports use of electric transit vehicles. Purchase electric trains. Electrify the Attleborough Line.  Commuter rail schedules should be adjusted to serve other than 9-5 workers. Install bike racks on trains	The PMT includes a project to operate electric powered equipment on the Attleborough line. The PMT includes a project to install bike-racks on commuter rail trains. Changes to specific train schedules are made through the MBTA's Service Plan process.
Gill Wooley, Sierra Club		Washington Street replacement is the number one priority. Make the Silver Line light rail. Opposes the bus tunnel from Chinatown to Boylston.  Supports the North/South Rail Link.	The PMT includes a project to convert the Washington Street segment of the Silver Line to a Green Line branch.  The PMT includes the North-South Rail Link project
Scott Darling, Conservation Law Foundation		Put information about the priority rankings and project definitions in the front of the document.  Create a clear introduction and description for legal commitments, their funding, and deadlines.	Appendix A of the PMT includes a description of PMT performance measures and how they were applied. Appendix C of the PMT provides detailed results for each project evaluated in the PMT.  Legal commitment language has been changed with input from CLF.

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION**

**FEBRUARY AND MARCH 2003**

Contact	Date	Summary	Response
		<p>Supports the use of the environmental justice and economic land use performance measures; they support the urban core.</p> <p>Project evaluations should be more transparent. Some performance measures (utilization, cost per unit reductions) do not make sense.</p> <p>Reliability of service should be highlighted.</p> <p>Extend the public comment period by thirty days.</p>	<p>The PMT includes these performance measures.</p> <p>Appendix A of the PMT includes a description of PMT performance measures and how they were applied.</p> <p>Consideration of reliability is included under the service quality performance measure.</p> <p>The review process was extended by one week. A further extension would have prevented the use of the PMT in developing the Boston MPO's Regional Transportation Plan for 2003</p>
Wig Zamore, Mystic View Task Force		<p>Supports the Green Line extension to Medford Hillside. Construct temporary commuter rail stops in Somerville. Bring the Green Line to Union Square as a substitution for full extension.</p> <p>Get state and federal funding for an Orange Line station at Assembly Square.</p> <p>There should be a balance between urban and suburban projects in the PMT.</p> <p>Supports the North/South Rail Link.</p> <p>Use a single mode (light or heavy rail) for every phase of the Urban Ring; it is a very important project.</p> <p>Somerville bears a heavy burden of transportation infrastructure and environmental and community impacts and gets little direct service.</p>	<p>The PMT includes a project to construct a commuter rail station on the Fitchburg Line at Union Square, Somerville.</p> <p>The PMT includes a project to extend the Green Line to Somerville, one of the possible routing alternatives under consideration includes a stop in Union Square.</p> <p>The PMT is a financially unconstrained capital planning document. Therefore, it does not provide funding for project implementation.</p> <p>All projects in the PMT were evaluated using consistent and objective criteria.</p> <p>The PMT includes a project to construct the North-South Rail Link.</p> <p>The development of the Urban Ring project has been the subject of an extensive public process prior to the PMT. The PMT includes the project descriptions generated from that process.</p>
Jack Leary, Massachusetts Bay Commuter Railroad Company		<p>Supports investments in the state of good repair; will work with the MBTA in its decision-making on transportation investments; will preserve system safety and improve system reliability.</p> <p>Supports projects that improve operational flexibility; additional track to permit express services; multi-modal</p>	<p>The PMT includes a project to double-track single-track segments of the commuter rail network.</p>

**SUMMARY OF COMMENTS ON THE DRAFT PROGRAM FOR MASS TRANSPORTATION****FEBRUARY AND MARCH 2003**

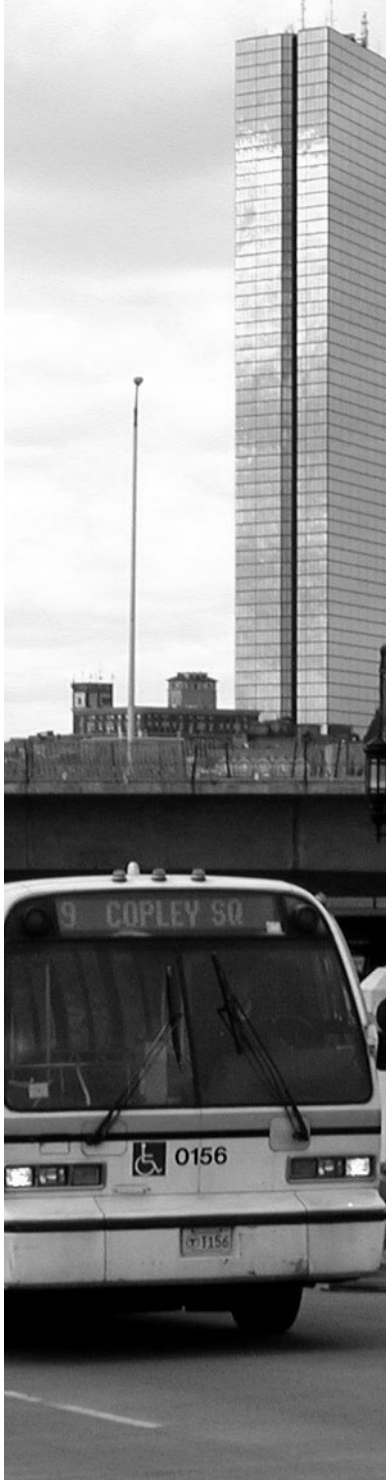
Contact	Date	Summary	Response
		access improvements to stations.	
Ginger Esty, Town of Framingham		Suggests the MBTA divide into three branches: bus, rail, commuter boat, to improve financial management.	It is outside the purview of the PMT to change the organizational structure of the MBTA.
Roger Nicholas		Develop a modern transportation system.	The MBTA has set a policy that at least 70% of its annual capital expenditures will go toward preserving the existing system.



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## APPENDIX E

### Universe of Projects

As part of the PMT visioning phase described in Chapter 1, the MBTA developed the Universe of Projects—the set of all projects considered in the PMT. An important part of this effort was the project-level review of previous PMTs and other MBTA planning documents, the Capital Investment Program, the State of Good Repair Program, the Parking Expansion Program, and other various studies conducted to support capital investment planning by the MBTA. The 2000–2025 Regional Transportation Plan was also reviewed. The results of this work provided the essential, baseline inputs to the set of projects considered for inclusion in the PMT. Extensive public outreach and review by the Working Committee, the MBTA Advisory Board, and members of the public yielded hundreds of project ideas to supplement this initial list.

After the universe of project ideas was developed, the MBTA and the PMT Working Committee screened the list to create a smaller and more viable group of projects that warranted further evaluation. A set of criteria, reviewed with the Working Committee and the MBTA Advisory Board, identified issues to be considered in this screening process. These criteria, along with the performance measures described in Appendix A, are consistent with the MBTA’s amended enabling legislation.

The screening criteria included a project’s ability to meet an identified need or an existing legal commitment. Environmental justice issues, such as ensuring equitable provision of service to minority and low-income communities, were also taken into account, along with whether a project was included in the 1994 PMT. Community support and coordination with local plans were considered. Concepts that were technically infeasible, currently impracticable, or inconsistent with established MBTA transit priorities were screened out. In addition, those project ideas that did not require additional capital resources for implementation were referred to the MBTA’s service

planning process. All system preservation projects were forwarded for further evaluation without undergoing screening.

At the end of the visioning phase, the PMT team had developed a universe of project ideas which is shown on the following pages.

An \* indicates projects that were screened out and did not warrant further evaluation. Justifications are provided in italics.

## SYSTEM EXPANSION PROJECTS

### Blue Line

Blue-Red connector

Wonderland Blue Line-commuter rail connector

Extension to Lynn

Extend from Bowdoin to Copley/Back Bay and then to Riverside, replacing the Green Line D Branch\*

*This project was found to be cost-ineffective in the 1994 PMT. There is nothing to suggest that this conclusion would change in the 2002 PMT.*

*Furthermore, the City of Boston has expressed its support for consideration of an alternative new east-west rapid transit line through the Back Bay along Stuart Street.*

Build spur direct to airport\*

*This project was rejected in a previous North Shore transit improvement study. Furthermore, the Airport Intermodal Transit Connector will soon be operational and will serve the same markets that such a Blue Line spur would.*

Build a spur to Winthrop \*

*Existing transit service in Winthrop does not suggest that there would be sufficient demand for rapid transit service. Furthermore, the operation of such a spur would result in less frequent service to existing Blue Line stations east of Orient Heights.*

Build a spur to Chelsea and Everett\*

*Such a service would serve a number of the same crosstown transit markets that the Urban Ring is*

*intended to serve. Given the advanced status of the Urban Ring Major Investment Study and substantial public support for its construction, this potential Red Line improvement will not be examined in greater detail in this PMT.*

Extend to Salem

Extension from Bowdoin to West Medford via Lechmere and Somerville

### Orange Line

Extension from Oak Grove to Reading/Route 128

Extension from Forest Hills to West Roxbury/Needham

Extend to Route 128 at both ends

Extend to Saugus\*

*Existing transit ridership in the area that would be served by this Orange Line branch does not suggest that there is adequate demand for rapid transit service. Furthermore, the North Shore Major Investment Study Steering Committee, which includes a number of community representatives, has voiced its opposition to consideration of this project.*

Build spur to Chelsea and Everett

Build a spur to Chelsea\*

*Such a service would serve a number of the same crosstown transit markets that the Urban Ring is intended to serve. Given the advanced status of the Urban Ring Major Investment Study and substantial public support for its construction, this potential Red Line improvement will not be examined in greater detail in this PMT.*

Construct station at Assembly Square

### Red Line

Extension beyond Ashmont to Mattapan in place of present streetcar service\*

*Communities along the Mattapan High-Speed Line have expressed a strong desire to preserve the historic streetcar service, especially with the MBTA's*

recent commitment to rebuilding existing PCC trolleys. Furthermore, many passengers would be inconvenienced by the elimination of four of the six intermediate stations if the line was converted to heavy rail rapid transit.

Northwest Extension: Alewife-Arlington Heights-Lexington

Red Line loop to serve South Boston waterfront\*

A large portion of such a Red Line loop would duplicate Silver Line service currently under construction from the new convention center to South Station. This project idea may be reconsidered in future PMTs once the Silver Line is open and its impact on travel in the area can be measured.

Extend from Alewife to Route 128 via Route 2

New variation from Central Square, Cambridge to JFK/UMass via Massachusetts Avenue\*

Such a service would serve a number of the same crosstown transit markets that the Urban Ring is intended to serve. Given the advanced status of the Urban Ring Major Investment Study and substantial public support for its construction, this potential Red Line improvement will not be examined in greater detail in this PMT.

Extend from Braintree to Randolph\*

Existing commuter rail ridership in this corridor does not suggest that there is adequate demand for such an extension to the rapid transit network.

Replace light rail service with busway on Mattapan High Speed Line\*

Communities along the Mattapan High-Speed Line have expressed a strong desire to preserve the historic streetcar service, especially with the MBTA's recent commitment to rebuilding existing PCC trolleys.

Extend to Weymouth via Plymouth/Kingston Line right-of-way

Add a stop on the Braintree branch at Savin Hill Station\*

Existing transit ridership at Savin Hill Station does not suggest that there is adequate demand for both

branches to stop there. The cumulative negative travel time impact to existing South Shore Branch customers would far outweigh the benefits of increased frequency to Savin Hill Station customers.

## Green Line

Reopen Arborway-Heath Street segment

Green Line to Brighton (Watertown Line)\*  
Restoration of the former Green Line A Branch would face numerous challenges to providing handicapped accessibility in mixed traffic. Instead, a Silver Line western spur will be examined in detail as part of the PMT and would serve many of the same destinations in Allston and Brighton.

Brookline Village Connector (D Line-E Line)\*  
According to the 1994 PMT, there has been a considerable amount of new construction in the Brookline Village area since 1978. As a result, construction of this connector would face prohibitive technical challenges.

Green Line to Needham (branch from Riverside Line after Newton Highlands)

Urban Ring: Construct a transit system following a circular route around the inner core

Extend Riverside Line to Wellesley\*  
Existing commuter rail service in Wellesley does not indicate that there would be adequate demand for a parallel rapid transit service. This PMT will, however, examine the potential for a commuter rail-rapid transit connection between the Framingham/Worcester Line and the Green Line at Riverside Station to provide better transit access from western suburbs to Newton and Brookline.

Extend Green Line from Lechmere to Harvard Square via Union Square, Somerville\*  
Existing transit service connecting Lechmere, Union, and Harvard Squares does not indicate that there would be adequate demand for streetcar service on such a routing. A Green Line extension to West Medford via Union Square will, however, be examined as part of this PMT.

Extend Green Line from Lechmere to Saugus\*  
*The areas that would be served by this Green Line branch are either (1) already served by Orange Line service, or (2) do not generate enough ridership on existing bus service to suggest that a new rapid transit line would be cost-effective. Furthermore, the North Shore Major Investment Study Steering Committee, which includes a number of community representatives, has voiced its opposition to consideration of a similar rapid transit expansion, using heavy rail vehicles instead.*

Convert Silver Line between World Trade Center and South Station to light rail and connect to Green Line at Boylston\*  
*The Silver Line between World Trade Center and South Station is already under construction and will be operated using buses. However, the underground portion of the line is being constructed such that light rail conversion would be possible in the future. This project idea may be considered in a future PMT after actual service performance of the new Silver Line can be assessed.*

Build a new branch from North Station to Boylston via the Waterfront and South Station\*  
*Such a branch would serve markets that either the North-South Rail Link or a surface transit line in the Central Artery right-of-way is intended to serve. Given that this right-of-way would facilitate construction of a new north-south rapid transit line in downtown Boston, a waterfront routing will not be considered in greater detail in this PMT.*

Extend the proposed Medford Hillside extension from Medford Hillside to Davis Square to connect with Red Line\*  
*Existing feeder bus service from Medford Hillside to Davis Square operates efficiently under present conditions, and streetcar service is unlikely to provide substantially better travel times, reliability, or service frequency.*

Extension from Lechmere to West Medford via Somerville

## **Silver Line**

Build South Station-Boylston section of Silver Line (Silver Line Phase III)

Extend Silver Line from Dudley Station to Mattapan and Ashmont Stations

Extend Silver Line from Boylston Station to Kenmore Station via new subway under Stuart Street and operate two western branches: one to the Longwood Medical Area and one to Oak Square, Brighton via Allston Landing

Extend Silver Line from Convention Center to City Point via Summer Street and East Broadway

Convert Washington Street Silver Line to trackless trolley or light rail and extend to Mattapan via Grove Hall

Operate branch from Forest Hills to Dudley via Washington Street\*

*Most of the market that would be served by such a branch is already within walking distance of the Orange Line. Furthermore, existing bus service along this corridor does not generate adequate demand to warrant consideration of rapid transit service.*

## **Commuter Rail**

Expand reverse commute options

Fairmount Line improvements/Indigo Line

Extend Providence Line to T. F. Green Airport (RI)

Reconstruct rights-of-way and extend service from Stoughton to New Bedford and Fall River via Taunton

Reconstruct tracks and extend service from Needham Junction to Millis

Extend service from Lowell to Nashua with stop at North Chelmsford

Extend service from Middleborough to Wareham

Extend passenger rail service from Wareham to



Hyannis

Extend service from Fitchburg to Gardner

Extend service from Forge Park to Milford

Extend service from Salem to Peabody

Institute a new line from Worcester to Providence\*

*Such service would generate low demand. Any such connection would be the responsibility of the Worcester Regional Transit Authority.*

Institute a new line from Worcester to Haverhill\*

*Such service would generate low demand.*

Build Central Massachusetts (Waltham to Berlin via Weston, Wayland, Sudbury, and Hudson) commuter rail or busway\*

*Currently, the local communities have expressed their preference for a bikepath along this corridor, and therefore this proposal, at this time, does not support the local plans for this right-of-way. Future PMT's may consider transit improvements for this corridor.*

Build Alewife commuter rail station

Build Allston/Brighton commuter rail station

Build commuter rail station at Riverside and intermodal transfer facility between commuter rail and Green Line

Build regional commuter rail station on I-495 in MetroWest area

Build regional commuter rail station along Route 2 at or near I-495

Purchase hybrid bus-train vehicles that would have both steel and rubber wheels to operate on Framingham-Worcester Line\*

*Given that such vehicles are not currently in regular passenger service in the United States or abroad, the technical complexity of implementing this idea in a corridor without proven substantial demand for traditional feeder bus service would be prohibitive.*

Make improvements to the Foxborough commuter rail station to accommodate regular commuting trips, and open stadium parking facilities to park-and-ride customers

Connect the Fairmount Line to the Red Line at Mattapan\*

*This project does not support local plans that favor an upgrade of Fairmount Line service.*

North-South Rail Link: Construct a commuter rail tunnel connecting the north side and south side networks with stops at North Station, South Station, and possibly an intermediate location

Build a new commuter rail connection from North Station to South Station via Logan Airport\*

*This option does not support local and regional plans. This improvement was considered and eliminated within the North-South Rail Link planning process.*

Build a rail line from Framingham to Leominster via Northborough and Southborough

Operate service from Worcester to North Station via Cambridge over the Grand Junction line, with stops at Boston University, Massachusetts Institute of Technology and East Cambridge\*

*This project does not support local plans for this area, since the Urban Ring planning process incorporates this right-of-way into its proposed service.*

Commuter rail "Inner Ring": Melrose to Winchester\*

*This project is technically infeasible. Such service would likely also generate low demand using this mode choice.*

Extend Newburyport trains to Kittery, Maine\*

*This extension is technically complex, and it does not support the current plans of Massachusetts and New Hampshire.*

Extend commuter rail from Haverhill to Plaistow, NH

Build commuter rail spur from Framingham to Sudbury Center\*

*Such service would generate low demand.*

Extend commuter rail from Worcester to Springfield\*

*Such service would generate low demand. This project would not fall within the MBTA's current service area.*

Restore Saugus Branch from Malden to Lynn via Saugus\*

*This project poses significant environmental, social, and physical impacts to the communities along the new alignment, as well as potential operational issues that would negatively impact the level of commuter rail service already provided.*

*Furthermore, during public outreach for the North Shore Major Investment Study, the Cities of Malden and Everett stated that this project is inconsistent with the "Bike to the Sea" concept favored by these municipalities.*

Operate service from Boston to Route 1 in Peabody (branch off of Haverhill Line at Wakefield)\*

*This project does not support local plans that have been developed within the North Shore Major Investment Study planning process.*

Operate to Danvers (branch from Salem)

Add South Salem stop

Add a new station at Millbury on Framingham/Worcester Line

Add a station at Route 128 on the Needham Line\*

*The PMT is considering such a service through an Orange Line extension.*

Operate high-frequency Riverside-JFK/UMass commuter rail service

Operate high-frequency Riverside-South Station commuter rail service

Operate high-frequency Readville-Allston Landing commuter rail service

Build new spur from South Weymouth Station into old Air Base\*

*Such service would generate low demand and would result in reduced frequency to the Kingston and Plymouth terminals.*

Restore Randolph Branch through Randolph Center\*

*The MBTA already supplies service to Randolph, and this project is not likely to generate significant additional demand.*

Build a station in West Acton on Fitchburg Line\*

*The communities along the Fitchburg Line have clearly stated the need for shorter trip times into/out of Boston. An additional station on this line would further deteriorate the quality of service by adding additional time to the current trip.*

Extend proposed Greenbush line from Scituate to Marshfield\*

*Although there was a rail right of way between these points, it has been built on over the years, and a new right-of-way may be required. This project is not likely to generate significant demand.*

Add a station on Fitchburg Line at Union Square, Somerville\*

*The communities along the Fitchburg Line have clearly stated the need for shorter trip times into/out of Boston. An additional station on this line would further deteriorate the quality of service by adding additional time to the current trip.*

Build Greenbush branch of Old Colony rail lines

New station on Fitchburg Line near Twin City Plaza on Cambridge/Somerville Line

Add a station at Route 128/Masspike on the Framingham/Worcester line

Build a commuter rail branch to Logan Airport\*

*This project does not support local and regional plans. AITC would provide the same service to Logan Airport. The North Shore Major Investment Study is also looking at several connec-*

tions between commuter rail and subway (Revere and Lynn) that would provide similar service. This option would also be technically infeasible.

Extend commuter rail service from Cordage Park to Plymouth Center\*

*This extension has significant right-of-way issues, and it appears that there is limited community support for this project.*

Extend proposed Millis Line to Medway\*

*After the Town of Millis, there are significant right-of-way/encroachment issues along this corridor.*

Institute a new commuter rail line from Lowell to New Bedford\*

*Given that existing transit demand has not yet warranted bus service along this circumferential corridor, it is unlikely that a new commuter rail line would attract enough riders to be cost effective. In addition, since Phases 2 and 3 of the Urban Ring have not yet been included in the Regional Transportation Plan, it is premature to consider additional circumferential transit lines that would serve less densely-developed neighborhoods.*

Institute a new commuter rail line from South Acton to Marlborough\*

*Given that existing transit demand has not yet warranted bus service in this intersuburban corridor, it is unlikely that a commuter rail service would attract enough riders to be cost effective.*

Operate EMU commuter rail trains from Hynes Convention Center to new convention center\*

*While this new service would provide a one-seat ride from the Seaport District to the Back Bay, it would likely operate less frequently and have a more circuitous routing than the proposed one-transfer service via the Green Line in the Back Bay and Silver Line from Boylston Station to the new Convention Center. Furthermore, the City of Boston has expressed its support for consideration of a new east-west rapid transit line from the Seaport District to the Back Bay using the Silver Line tunnel to Boylston Street and a new right of way under Stuart Street.*

## **Bus**

Better downtown bus distribution: Expand the coverage of downtown stops for bus routes serving downtown\*

*This concept was tested in a pilot program for bus routes operating between the North Shore and Downtown Boston. It was found that demand for extending these routes beyond their Haymarket terminal was very low, and that service reliability suffered.*

Operate suburban commuter rail feeder bus services

Improve feeder bus service to Fitchburg commuter rail station\*

*Fixed-route local bus service in Fitchburg is the responsibility of Montachusett Area Regional Transit (MART). Proposals for routing changes should be addressed to their service planning staff.*

Urban Ring: Construct a transit system following a circular route around the inner core.

Phase I includes new conventional bus routes, and Phase 2 includes new bus rapid transit segments

New bus service from Framingham Exit 12 park-and-ride lot to T. F. Green Airport and Manchester Airport\*

*Regional express bus service to area airports is the responsibility of the Massachusetts Port Authority and other regional airport authorities. Proposals for new routes should be addressed to their ground transportation planning staffs.*

Operate feeder buses to Mansfield commuter rail station\*

*Fixed-route local bus service in Mansfield is the responsibility of the Greater Attleboro-Taunton Regional Transit Authority (GATRA). Proposals for routing changes should be addressed to their service planning staff.*

Run from Rhode Island to Fall River to connect with the proposed commuter rail line\*

*Fixed-route local bus service in Fall River is the responsibility of the Southeastern Regional Transit*

Authority (SRTA). Fixed-route local bus service in Rhode Island is the responsibility of the Rhode Island Public Transit Authority. Proposals for routing changes should be addressed to their service planning staffs.

Run a jitney van loop from Forest Hills to Longwood Medical Area to Coolidge Corner\*  
Frequent bus service already operates from Forest Hills to the Longwood Medical area with convenient connections to another frequent bus route serving Coolidge Corner. Jitney van service would be redundant and operate much less frequently, resulting in very low ridership.

Extend Trackless Trolley #71 from Watertown to Newton Corner

Build a bus rapid transit line along the Saugus Branch\*  
Existing transit service connecting Saugus to Malden does not suggest that there would be sufficient demand for rapid transit service between these two points. Furthermore, the operation of such a line would likely result in less frequent service on existing commuter-oriented routes from Saugus to Downtown Boston and from Saugus to Wonderland Station. This idea has also not received the support of the North Shore MIS Steering Committee.

Run more express buses to Boston from Scituate, Cohasset, Norwell, Marshfield, and Hingham\*  
Most of the market for improved bus service in this area will be served by the new Greenbush Commuter Rail Line. Consequently, demand for this service would likely be extremely low.

Add 100 additional buses regionwide

Create HOV lanes on Route 128 and operate circumferential bus service

New busways to Alewife Station along heavily congested portions of Alewife Brook Parkway and Route 2

Build a surface busway along the Central Artery right of way\*

The concept of extending express bus routes further into Downtown Boston was tested in a pilot program for routes operating between the North Shore and downtown. It was found that demand for extending these routes beyond their Haymarket terminal was very low, and that service reliability suffered. In general, the subway system is better equipped to provide efficient circulator service in Downtown Boston.

Intersuburban bus service

Operate express buses from Lowell to Hanscom area\*

There is very low demand for existing bus service from the Red Line to the Hanscom area. Since the number of Hanscom area employees with convenient access to the Lowell bus terminal would be much lower than those with access to the MBTA rapid transit system, it is likely that demand for service from Lowell would be extremely low.

## **Boat**

Build a passenger terminal at Russia Wharf (near South Station)

Operate commuter boats through Cape Cod Canal\*

Commuter service to Boston from towns in the South Coast region and along Cape Cod's south shore is already provided by multiple bus companies. These existing bus services would provide much faster travel times than commuter boats traveling through the canal. Consequently, ridership would likely be extremely low.

High-speed ferry service from North Shore (Lynn/Salem) to Boston and the airport

Restore East Boston ferry

Improve ferry service from South Shore communities (Quincy, Hingham, Hull, Cohasset, and Scituate) to Boston. Improve ferry infrastructure as part of expansion

Operate ferry service to Assembly Square, Somerville\*

Ferry routes from Assembly Square to downtown

*Boston and the South Boston Waterfront would serve some of the same general transit markets that the new Orange Line station at Assembly Square is intended to address. Given the wider set of destinations that could be served from Assembly Square with direct Orange Line access and the substantial public support for station construction, this potential ferry improvement will not be examined in greater detail in this PMT.*

### **Systemwide and Miscellaneous**

*Light rail from Route 495 to Burlington\*  
Most of the markets that would be served by such a line are already served by the MBTA's Lowell Commuter Rail Line. It should also be noted that feeder bus service from suburban commuter rail stations to major employment centers and residential neighborhoods will be examined as part of this PMT.*

*Connect Telecom City to Urban Ring with a busway\*  
Demand for transit service to/from Telecom City does not yet warrant local bus service, and traffic congestion is not heavy enough to require use of a dedicated right-of-way if such service was to be implemented. Suggestions for new local bus routes should be directed toward the MBTA's Service Planning Process.*

*Build light rail feeder lines to Framingham from Walpole, Milford, and Marlborough\*  
Since fixed-route bus service has not even been implemented between these towns, the consideration of light rail feeder service to the Framingham/Worcester Commuter Rail line is premature.*

*Add an outer Urban-Ring from Harvard Square to Dudley via Allston and Brookline (Route 66 routing) or from Roxbury Crossing to Wellington via Coolidge Corner, Harvard, and Davis Stations\*  
Since Phases 2 and 3 of the Urban Ring have not yet been included in the Regional Transportation Plan, it is premature to consider additional urban circumferential rapid transit lines that would serve*

*less densely-developed neighborhoods.*

*Build light rail line from South Acton Station to Maynard Center\**

*This corridor is served by an existing shuttle bus route. Since initial observations of ridership on this route indicate very limited cost effectiveness, it is unlikely that adequate demand exists for a rail rapid transit line.*

*Build light rail line in South Boston to replace #9 bus\**

*Existing plans call for both the Silver Line and the Urban Ring to serve markets along the Bus Route 9 corridor. Furthermore, the negative impact of a light rail line on traffic flow and parking along Broadway would be substantial. It is also unclear that the line would provide travel time savings or frequency improvements over existing bus service.*

### **Monorails and Bullet Trains**

*North Station-South Station monorail\*  
Since existing rapid transit lines are well designed to provide circulator service in downtown Boston for commuter rail passengers, and since the Orange Line provides service between North Station and Back Bay Station for intercity passengers, a monorail along the Central Artery right-of-way would likely attract very few riders.*

*Build a monorail system on a circumferential route along the I-495 right-of-way\*  
Given that existing transit demand has not yet warranted bus service along this circumferential corridor, it is unlikely that a monorail service would attract enough riders to be cost effective.*

*Build monorail along Saugus Branch railroad\*  
Commuter service along the Saugus Branch right-of-way would be more efficiently provided by conventional commuter rail equipment than a monorail. Conventional trains would be compatible with vehicles used on other suburban commuter lines and could operate in a potential North-South Station Rail Link. Monorail trains would also not provide substantially faster service than conventional trains.*



Build monorail along Route 3 north right-of-way\*

*Most of the markets that would be served by such a monorail line are already served by the MBTA's Lowell Commuter Rail Line. It should also be noted that feeder bus service from suburban commuter rail stations to major employment centers and residential neighborhoods will be examined as part of this PMT.*

### **Non-Motorized Modes**

Build bikeways next to commuter rail lines\*

*While the MBTA is willing to work with other transportation agencies to facilitate capital improvement projects that encourage non-motorized transportation as an access mode to transit services, the MBTA is not responsible for funding or constructing roadways for non-transit vehicles.*

*Furthermore, any new roadways on MBTA commuter rail rights of way must be built with the provision that they could be closed in the future for the purpose of expanding commuter rail capacity.*

Build bikeway from Alewife to Waltham Center\*

*While the MBTA is willing to work with other transportation agencies to facilitate capital improvement projects that encourage non-motorized transportation as an access mode to transit services, the MBTA is not responsible for funding or constructing roadways for non-transit vehicles.*

*Furthermore, any new roadways on MBTA commuter rail rights of way must be built with the provision that they could be closed in the future for the purpose of expanding commuter rail capacity.*

Extend bikepath from Somerville to Lechmere\*

*While the MBTA is willing to work with other transportation agencies to facilitate capital improvement projects that encourage non-motorized transportation as an access mode to transit services, the MBTA is not responsible for funding or constructing roadways for non-transit vehicles.*

*Furthermore, any new roadways on MBTA commuter rail rights of way must be built with the provision that they could be closed in the future for the purpose of expanding commuter rail capacity.*

## **SERVICE ENHANCEMENT AND SYSTEM PRESERVATION PROJECTS**

### **Blue Line**

Signal and train control improvements

Maintain access to Blue Line from Bowdoin Station\*

*The existing Bowdoin Station platform is of a center island design and is built into the Blue Line's loop terminus. Trains begin reversing direction on this loop while inside the station and complete their turn just to the west of the station. Because of this design, the lengthening of the platform to six car lengths would result in unsafe gaps between the platform and the train. Furthermore, new station entrances being built at Government Center Station will provide Blue Line access very close to existing Bowdoin Station entrances. For these reasons, keeping Bowdoin Station open permanently would be both prohibitively technically complex and would serve very few customers.*

Install an escalator to the inbound platform at Airport Station

Operate six-car trains

### **Orange Line**

Rebuild and operate third track from Medford to Charlestown\*

*Operation of express trains on a separate track between Wellington Station and North Station would avoid stops at only Sullivan Square and Community College Stations, thereby not saving substantial running time. It would also inconvenience the large number of people boarding/alighting from trains at Sullivan Square Station, especially during peak periods when some existing trips already operate at near maximum capacity.*

Signal replacement, Haymarket to Oak Grove

Operate eight-car trains

### **Red Line**

Signal and train control improvements

Update Mattapan-Ashmont line to full light-rail standards

Replace 74 Red Line #1 cars built in 1969

Flood prevention for Wollaston Station fare collection area

Operate eight-car trains

## **Green Line**

Signal and train control improvements

Preemptive signals on Beacon, Commonwealth, and Huntington

Relocate Lechmere Station to the other side of Msgr. O'Brien Highway

Build third Green Line track between Park Street and Kenmore to allow for express trains\*  
*The technical complexity of this proposed project is extremely high given that a third track could not be accommodated within the confines of the existing right of way. Expansion of the right of way would impact numerous large buildings and result in significant disruptions of business there. Instead, expansion of subway capacity in this corridor will be explored by means of constructing a new parallel subway along Saint James Avenue.*

Build a by-pass tunnel from Kenmore to Park St. under the Commonwealth Avenue Mall\*  
*While this project is technically feasible, it was reviewed in the 1994 PMT where it was not recommended. Furthermore, recent planning studies by the City of Boston give preference to a Saint James Avenue alignment for expanding subway capacity in the Back Bay's east-west corridor. That alternative will be reviewed in greater detail in this PMT.*

Provide accessibility at locations not covered by "Key Station" plan. Stations and stops include: (Subway) Boylston, Hynes Convention Center/ICA, Prudential, Symphony; (Highland Branch) Beaconsfield, Brookline Hills, Chestnut Hill, Eliot, Longwood, Newton Highlands, Waban,

Woodland; (Huntington and South Huntington Avenues) Back of the Hill, Fenwood Road, Mission Park, Riverway; (Beacon Street) Brandon Hall, Dean Road, Englewood Avenue, Fairbanks Street, Hawes Street, Kent Street, St. Paul Street, Summit Avenue, Tappan Street; (Commonwealth Avenue) Allston Street, Babcock Street, Blandford Street, BU West, Chestnut Hill Avenue, Chiswick Road, Fordham Road, Greycliff Road, Griggs Street, Mt. Hood Road, Packards Corner, Pleasant Street, South Street, St. Paul Street, Summit Avenue, Sutherland Road, Warren Street; (Mattapan-Ashmont) Butler, Capen Street, Cedar Grove, Central Avenue, Milton, Valley Road.

Flood prevention for Fenway portal

Operate four-car trains

## **Silver Line**

Construct Commonwealth Flats grade-separation project

## **Commuter Rail**

Install double-tracking on entire commuter rail system

Install a fourth track on the Fort Point Channel Bridge

Install welded rail along sections of Haverhill, Lowell, and Fitchburg lines not presently equipped with it

Flood prevention at Natick Station and on Fitchburg Line near Boston Engine Terminal

Rebuild Fitchburg layover facility

Construct high platforms at all Providence Line stations not so equipped and expand to other lines at later date

Improve Rockport Station facility

Improve Lawrence Station facility

Keep Mishawum Station open as a full-time

facility\*

*Before the opening of the Anderson Regional Transportation Center, most customers accessed Mishawum Station by automobile and traveled in a traditional commuting pattern (inbound during the morning and outbound during the evening). These customers are now fully accommodated at the Anderson Regional Transportation Center, which provides more parking spaces and improved waiting facilities. Those customers who were not fully accommodated by the new station were generally reverse commuters who worked at businesses located within walking distance of Mishawum Station. These commuters are now served by the limited reverse direction peak period service being provided there. As a result, reopening Mishawum Station for peak direction trains during the peak period would attract very few new customers, but would inconvenience many with longer commuter rail travel times.*

Improve pedestrian access to Anderson RTC from western side of tracks

Make necessary track improvements and purchase additional equipment required to operate express service

Operate express service from outer stations

Operate a Yawkey-Back Bay-South Station shuttle

Expand parking at Fitchburg Station

Operate more frequent peak period service between Framingham and Worcester

Build new layover facility near Worcester Station

Build new layover facility in Bellingham for Franklin Line

Electrification of commuter rail lines

Hourly service on commuter rail during week-day evenings

Add bike racks to coaches

Renovate Wedgemere Station and charge for

parking

Increase the size of the waiting area at North Station

Rebuild West Medford Station

Install additional platforms at Forest Hills Station so all trains coming from Hyde Park Station can stop there without switching tracks\*

*Since the rapid transit and commuter rail tracks at Forest Hills Station are built in an open cut below ground level, it would be necessary to excavate additional land in order to build a new commuter rail platform. While this is technically feasible, it presents a major barrier when considering the potential cost effectiveness of the project.*

*Furthermore, the demand for commuter rail service at Forest Hills station is quite low given that Orange Line service is also available there. This demand is adequately served by the frequency of trips provided on the Needham Line, and existing passengers on other lines would likely be opposed to making an additional stop at Forest Hills.*

Install platforms on both sides of tracks at stations in Newton along the Worcester Line so that more trains in both directions can stop at these stations.

Expand capacity of South Station

Expand capacity of North Station

Upgrade Yawkey Station

Place bicycle racks on commuter rail locomotives\*

*Since many commuter rail stops utilize high level platforms, it would not be feasible for passengers to reach the fronts of locomotives and secure bicycles there. Furthermore, at stations with low-level platforms, passengers are not permitted to walk on the tracks except at designated crosswalks.*

*Consequently, they would not be able to secure bicycles on the fronts of locomotives at these stations either.*

Purchase diesel multiple unit trains to allow for



increased frequency on commuter rail lines

Build new sidings at selected commuter rail stops to reduce delays for Acela trains\*

*While the MBTA would be willing to help facilitate capital improvements that would reduce delays on Acela trains in the commuter rail service area, it would not be the MBTA's responsibility to fund such projects. Since MBTA customers would not benefit from such improvements, it will not be considered in greater detail as part of the PMT.*

Install quadrant gates at all commuter rail grade crossings in Gloucester\*

*Adequate evidence which shows the ability of quadrant gates to improve safety does not exist.*

*Communities may currently petition the Legislature for legislation to eliminate train whistling at locations within their community. The addition of quadrant gates at specific locations would not in and of itself allow the MBTA to discontinue its practice of "whistle blowing". The MBTA firmly believes that whistle blowing at grade crossings is a key part of the warning system. Whistling provides an increased measure of safety and no other measure, short of crossing elimination, has proven an effective replacement.*

Refurbish single-level commuter rail coaches as cafes and health clubs\*

*Since the length of most commuter rail trips is relatively short and stops are closely spaced, it is not practical to offer cafes and health clubs on board trains. Among other issues, conductors would find it more difficult to collect fares if customers were walking from car to car throughout the trip. More importantly though, since the number of cars on each train is limited by station platform lengths, new cafe or health club cars would have to take the place of passenger coaches. This could result in a less cost effective service and/or additional crowding which would generate opposition in the communities served.*

Provide accessibility at stations not covered by "Key Station" plan. Stations include: Auburndale, Ayer, Belmont, Chelsea, Concord, Endicott, Franklin, Greenwood, Hastings,

Islington, Kendal Green, Lincoln, Littleton, Melrose, Melrose Highlands, Morton Street, Natick, Newtonville, North Leominster, North Wilmington, Plimptonville, Prides Crossing, Riverworks, Rockport, Sharon, Shirley, Silver Hill, South Acton, Uphams Corner, Wakefield, Walpole, Waltham, Waverley, Wedgemere, Wellesley Farms, Wellesley Hills, Wellesley Square, West Medford, West Newton, Winchester, Windsor Gardens, Wyoming Hill

Replace 164 single-level cars built in 1979 and 1987 with 100 new bilevel cars

Replace 18 locomotives built in 1978 and 1980

Fairmount Line: Bridge replacement work

Build new layover facility in North Andover to replace Haverhill (Bradford) facility

## **Bus**

Install 300 new shelters

Install automatic passenger counters on buses

Upgrade destination signs and install automatic stop announcement equipment on 1989, 1994, and 1995 buses

Install Intelligent Transportation System (ITS) systems for bus fleet (signal prioritization, Automatic Vehicle Locator (AVL), passenger information kiosks)

Build new park-and-ride lots along existing express bus routes

Improve bus stop signage

Provide State Police escorts through heavy traffic for express buses\*

*While State Police escorts could facilitate slightly faster travel times for MBTA buses, this practice would be inconsistent with regional transportation plan policies to improve air quality by easing congestion on area roadways. State Police escorts would further disrupt traffic flow on already congested expressway segments.*

Convert diesel bus routes in Cambridge (1, 74,

and 77) to trackless trolley\*

*While the MBTA is committed to continued operation of existing trackless trolley lines in Cambridge, Watertown, and Belmont, local plans in these municipalities – and in Arlington where the northern terminus of Route 77 is located – do not call for the conversion of other diesel bus routes to trackless trolleys. Such conversions would make it more difficult for vehicles to divert around construction areas or traffic accidents, and for the MBTA Service Planning Department to make long-term routing adjustments based on passenger demand and mobility needs.*

Convert Route 57 (Watertown-Kenmore) to trackless trolley\*

*While the MBTA is committed to continued operation of existing trackless trolley lines in Cambridge, Watertown, and Belmont, local plans in these municipalities – and in Boston where the eastern terminus of Route 57 is located – do not call for the conversion of other diesel bus routes to trackless trolleys. Such conversions would make it more difficult for vehicles to divert around construction areas or traffic accidents, and for the MBTA Service Planning Department to make long-term routing adjustments based on passenger demand and mobility needs.*

Add exclusive lanes and priority signals along the top ten highest ridership bus routes

Install new dispatch and communications systems

Replace 600 diesel buses built in 1989, 1994, and 1995

Construct a new bus maintenance/garaging facility

### **Systemwide and Miscellaneous**

Expansion of park-and-ride lots beyond the 20,000-spaces commitment that was fulfilled

Provide increased security at power stations\*  
*Increased patrols of any MBTA facility is primarily an issue of personnel allocation for the MBTA Police Department. It is not clear that there are*

*any capital expenditures associated with power facility safety improvements that should be examined in detail as part of the PMT.*

Improve designs of transportation facilities\*  
*Aesthetic features of MBTA stations are often upgraded as part of larger capital improvement projects. However, since aesthetic improvements alone do not necessarily attract additional riders, they will not be considered in greater detail as part of the PMT.*

Add more bike and motorcycle parking spaces systemwide

Construct a pedestrian passageway from Back Bay Station to Copley Square\*

*While it would be technically feasible to construct a pedestrian tunnel from Copley Station to Back Bay Station, deep-bore tunneling methods would be necessary to pass underneath the Massachusetts Turnpike right of way. Given that this tunnel would not result in any improvement in the pedestrian transfer time between the two stations, the number of new passengers attracted would be extremely low. However, it should be noted that new automatic fare collection equipment being purchased by the MBTA could allow for free transfers between the station entrances, even though passengers would be obliged to walk via surface sidewalks.*

More enclosed waiting areas

Have signs in multiple languages

Have unmanned turnstiles at entrances closed in the past due to lack of staffing

Provide walkways between inbound and outbound sides at stations which do not have them (Boylston, Copley, Symphony, Chinatown, Kendall, and Central)\*

*While new walkways between inbound and outbound platforms would benefit the occasional traveler, they would not result in an improvement in station walk access times for regular customers. New walkways of this type have also not been a priority of any local municipalities in their advocacy efforts to the MBTA. Consequently, the cost effective-*

tiveness of this improvement would likely be prohibitively low. However, it should be noted that new automatic fare collection equipment being purchased by the MBTA could allow for free transfers between the station entrances, even though passengers would be obliged to walk via surface sidewalks.

Provide spaces for short term rental car parking at rapid transit stations

Implement automated system to inform passengers about delays on their regularly traveled routes using pagers, cell phones, and E-mail

Build future rapid transit cars to provide windows at both the front and rear of cars\*  
*While some passengers may desire the ability to look out the front and back of trains while traveling on rapid transit lines, the installation of such windows would prevent operators and door attendants from being able to look out both sides of the train without having to leave their cabs.*

Implement radio-based train control systems to replace block signaling systems on rapid transit lines

Install new equipment to enhance the security of passengers at MBTA stations and on board vehicles

### **Monorails and Bullet Trains**

Operate high-speed rail equipment on commuter rail lines\*

*The operation of high-speed rail equipment would not be practical for operation on most commuter rail lines, and the resulting travel time improvements would be too small to attract a substantial number of new passengers. Since the stop spacing on commuter rail lines is so short, high-speed rail equipment would not be able to attain travel speeds that are substantially faster than those of existing conventional commuter rail locomotives.*

### **Non-Motorized Modes**

Improve bicycle and pedestrian access to rapid transit and commuter rail stations

More bike parking at MBTA stations (consider bike valets)

Provide automated bike rental machines at selected rail stations\*

*The MBTA would consider leasing space to bicycle rental enterprises at most of its rail stations. However, this project would not qualify as a MBTA capital expenditure, and thus will not be examined in greater detail in the PMT.*

## **PROJECTS TO BE CONSIDERED IN THE MBTA SERVICE PLANNING PROCESS**

### **Blue Line**

Operate shorter trains with higher frequency

### **Orange Line**

Operate shorter trains with higher frequency

### **Red Line**

Operate shorter trains with higher frequency

### **Green Line**

Operate B Line trains through to North Station

### **Commuter Rail**

Operate late service Friday and Saturday

Operate all Plymouth/Kingston Line trains to Kingston

Increase service frequency on Haverhill/Reading Line

Increase speed and frequency of Needham service

### **Bus**

New express bus routes, Burlington-Boston and Burlington-Alewife, which would serve new park-and-ride facilities

Express buses from Lowell to Hanscom area

Add limited-stop bus routes

Express service from Reservoir to Copley/Downtown via Commonwealth Avenue and Masspike

Operate express service from Mattapan to South Station via Blue Hill Avenue, Hampden Street, and Route 93

Extend the CT1 bus line from Central Square to Arlington Heights

Operate an 'outer ring' bus line from Alewife to Logan Airport via Arlington Center and Medford Square

Operate an 'outer ring' bus line from Roxbury Crossing to Wellington via Coolidge Corner, Harvard, and Davis Stations

Evaluate the benefits of moving all bus stops located at street intersections to the 'far sides' of those intersections

## **Boat**

Operate new ferry route from Lovejoy Wharf to Russia Wharf

## **Systemwide and Miscellaneous**

Improve access to suburban employment districts

Operate 24-hour service

Operate 10-minute-or-better frequencies at all times (including evenings and Sundays) on rapid transit system and busiest bus routes



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# APPENDIX F

## Ridership Forecasting

### INTRODUCTION

The travel model set that was used for the Program for Mass Transportation (PMT) is based on procedures and data that have evolved over many years at the Central Transportation Planning Staff (CTPS). This report describes the basic attributes of the model set, how it was applied for the PMT.

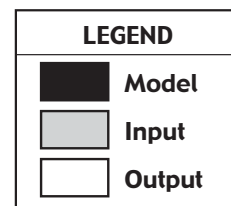
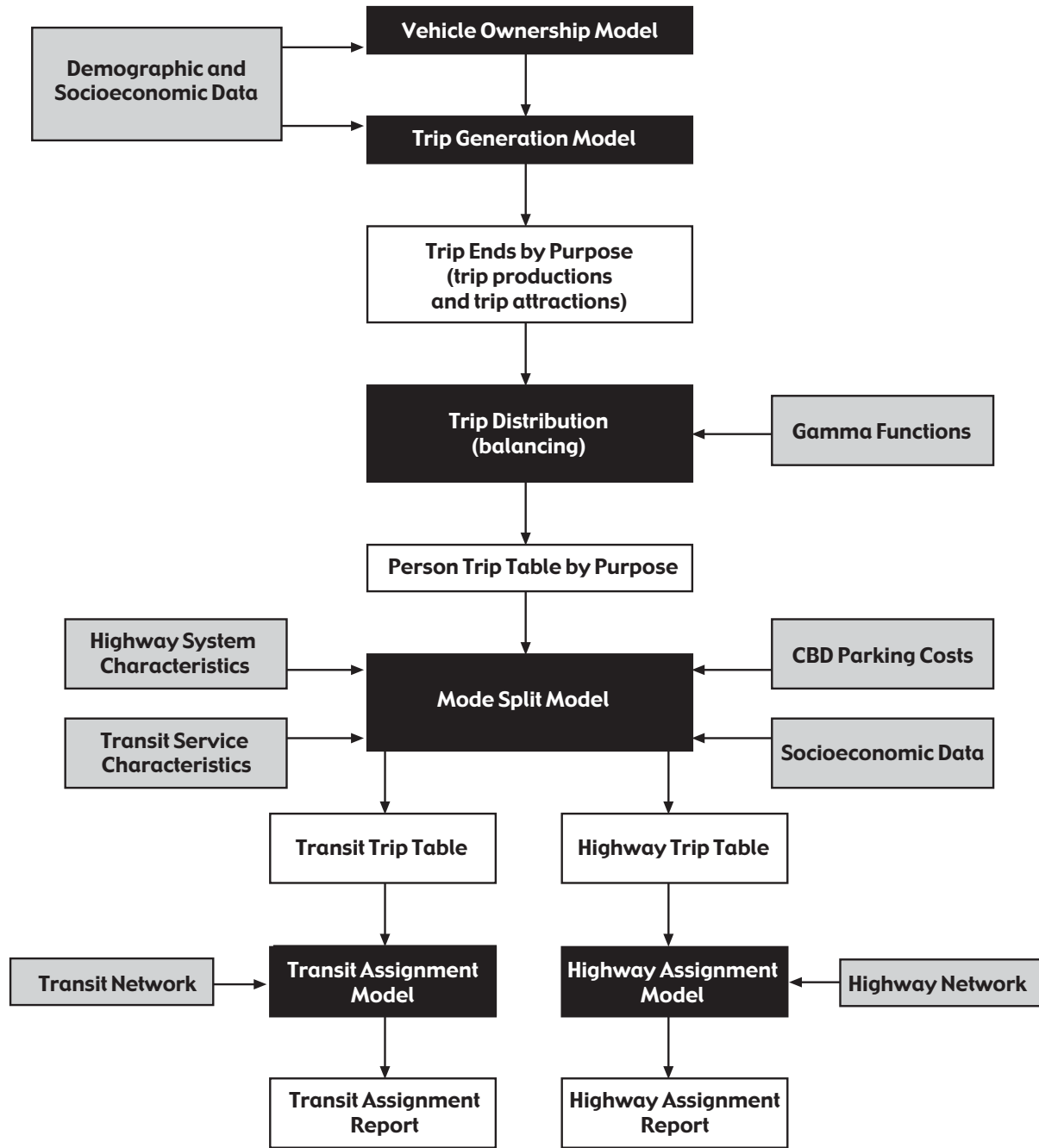
The following section presents an overview of the travel model used in this study and describes each major step in the travel model process including the calibration procedure. Section 3 describes how the calibrated model was applied to various PMT analyses.

### CTPS TRAVEL MODEL

#### General Description of the Model

The travel model used for the PMT study is more sophisticated and versatile than the any other travel model developed by CTPS. It is based on the traditional four-step urban transportation planning process of trip generation, trip distribution, mode choice, and trip assignment. This process is used to estimate the daily transit ridership and highway traffic volumes, primarily on the basis of forecasts of study area demography and projected highway and transit improvements. The model set simulates travel on the entire Eastern Massachusetts transit and highway system. As such, it contains all MBTA rail and bus lines and all private express bus carriers. The model contains service frequency (i.e. how often trains and buses arrive at any given transit stop), routing, travel time and fares for all these lines. In the highway system, all express highways and principle arterial roadways and many minor arterial and local roadways are included. Results from the computer model provide us with detailed information relating to transit ridership demand. Estimates of passenger boardings on all the existing and proposed transit lines can be obtained from the model output. A schematic representation of the modeling process is shown in Figure 1.

**FIGURE F-1 FOUR STEP TRANSPORTATION PLANNING PROCESS**



In the first step, the total number of trips generated by the residents of the Eastern Massachusetts area is calculated using demographic and socio-economic data. Similarly, the number of trips generated by different types of land use such as employment centers, schools, hospitals, shopping centers etc., are estimated using land use data and trip generation rates obtained from travel surveys. This information is produced at highly disaggregated geographic areas known as traffic analysis zones (TAZ). All calculations are performed at the TAZ level.

In the second step, the model determines how the trips generated would be distributed throughout the region. Trips are distributed based on transit and highway travel times between TAZs and the relative attractiveness of each TAZ which is influenced by the number of jobs available, size of schools, hospitals, shopping centers etc.

Once the total number of trips between all combinations of TAZs is determined, the mode choice step of the model divides the total trips among the available modes of travel. In our case, the available modes of travel are walk, auto and transit. To determine the proportions of each mode, the model takes into account the travel times, number of transfers required, and costs associated with these options. Other variables such as the auto ownership and household size are also included in the model.

After estimating the number of transit and auto trips for all possible TAZ combinations, the model assigns them to their respective transportation networks (this is the fourth and final step). Various reports showing the transit ridership on different modes and traffic volumes on the highway network can be produced according to our needs.

The model set uses the best component models, networks and input data available to CTPS at this time, and contains enhancements rendered specifically for each project included in the PMT study. The following is a list of some

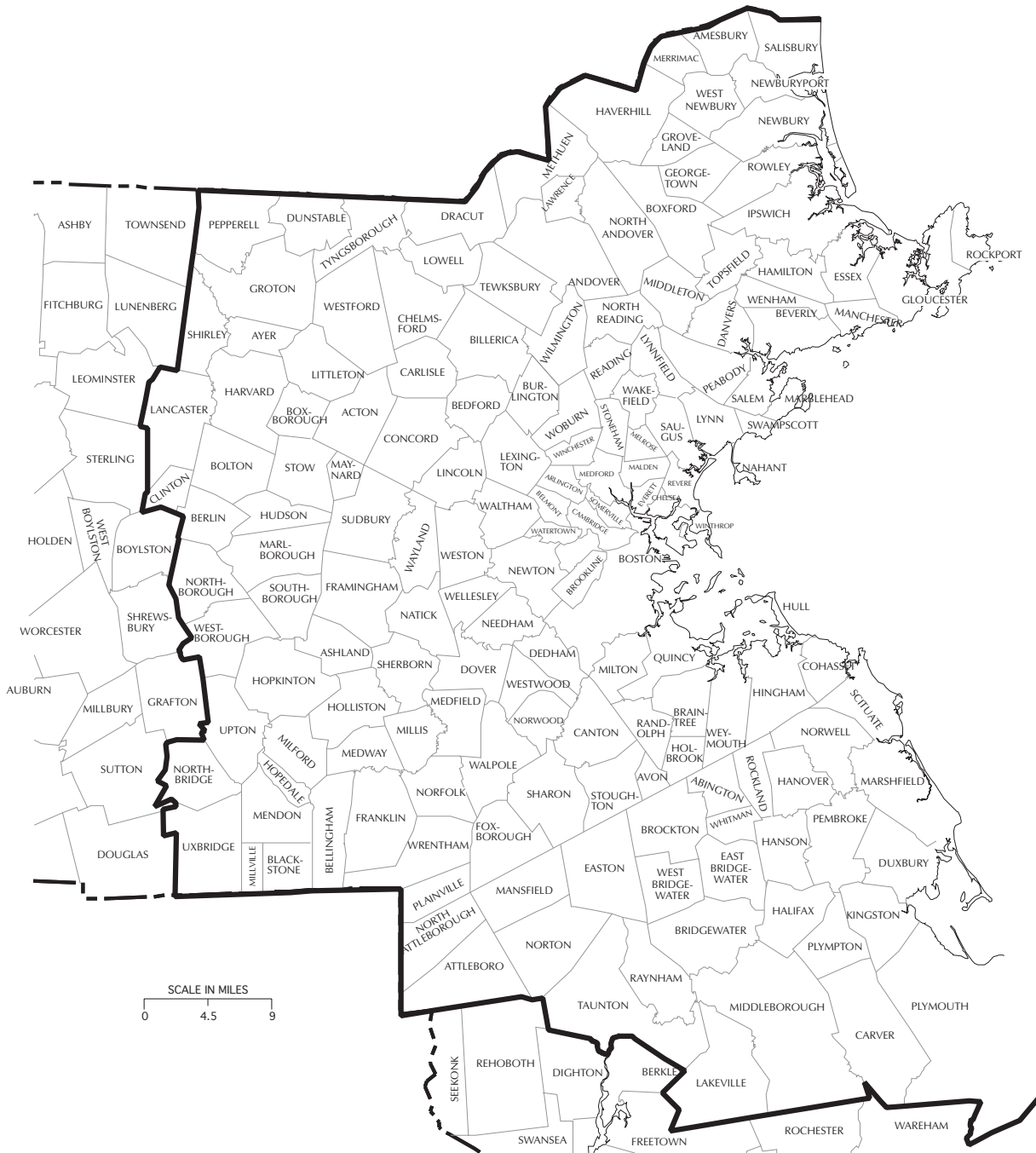
of the enhancements incorporated in the model.

- The model is set up to simulate passenger and highway travel during AM and PM peaks of a typical weekday.
- The model set incorporates motorized and non-motorized trips.
- EMME/2 software used in implementing the model is capable of performing multi-class, multi-path assignment that is superior to the traditional all-or-nothing assignment.
- The model set recognizes the parking lot capacity constraints indirectly when assigning park and ride trips.
- The transit assignment procedure can be constrained to a given line capacity.
- The park and ride trips can be reassigned to the highway network for a more realistic highway assignment.
- The procedure that estimates air quality benefits is more sophisticated and well integrated within the main model.
- The trip generation and distribution portions of the model set are better calibrated than the previous versions.

In addition, the model set was calibrated with the specific needs of this project in mind. That is, transfer behavior, cross-town travel, study area transit line boardings and other relevant items were calibrated particularly well. Since this study focuses mainly on transit alternatives, more emphasis was placed in calibrating the transit component of the model. The highway component of the model was calibrated such that the simulated traffic volumes on the area's major highways and arterials matched the observed count data within 15 percent. The base data on which the models were calibrated are for year 2003.



**FIGURE F-2 EASTERN MASSACHUSETTS MODELED AREA**





## **Modeled Area and Zone System**

The modeled area encompasses 164 cities and towns in Eastern Massachusetts, as shown in Figure 2. The figure also shows the boundaries of five concentric rings into which the modeled area is divided for model estimation and calibration purposes. These rings will be referred to in subsequent discussions. The modeled area is divided into 986 internal Traffic Analysis Zones (TAZs). There are 101 external stations around the periphery of the modeled area that allow for travel between the modeled area and adjacent areas of Massachusetts, New Hampshire and Rhode Island. The 986 internal zone system was created by completely revamping the 787-zone system through zonal disaggregation. The disaggregation process was conducted such that the boundaries of the disaggregated zones respected the U.S. Census Tracts. This enabled us to use the 1990 Census data (at the tract level) to prepare some of the base year model inputs.

## **Major Data Inputs**

CTPS's travel model set underwent a major revision in 1993, and several important data sources were used in that revision. The model set was improved still further for the PMT analysis, and more data were collected for that purpose. This section lists the major data items underlying the model set. These items will be cited or discussed elsewhere in this report, but they are listed together here for convenience.

### **Data Items Used in the 1993 Revision**

*Household Travel Survey:* In 1991, CTPS conducted a household travel survey. The survey took the form of an activity-based travel diary that was filled out for one weekday. Approximately 4,000 households, generating some 39,000 weekday trips were represented in the final database. The data were used to estimate new trip generation, auto ownership distribution and mode choice models.

*External Cordon Survey:* Also in 1991, a survey of automobile travelers bound for the modeled area from adjacent areas was performed. Survey results were used in trip generation and distribution to update estimates of external trips.

*Site-level Employment Database:* Employment estimates for 1991 were taken from state-provided sources and a commercial vendor's database purchased by CTPS, and combined into a single, unified regional employment database.

*1990 U.S. Census:* Various files were used in model estimation and calibration processes.

*Ground Counts:* Transit ridership and highway traffic volume data representing early 1990's conditions were amassed into a database and used to calibrate the travel models.

While the model set is based primarily on the data items cited above, additional data were collected in 1996 and 1997 in order to refine and improve the models still further for the PMT analysis. Floor space by type for 1996 was collected from assessors in the ten communities in the study area. The planning and development departments of those communities provided 2025 forecasts of land use by type as well. As discussed later, these land use data were transformed into estimates of households and employment and used in trip generation.

## **Transportation Networks**

The regional highway and transit networks are integrated and are contained in EMME/2.

### **Highway**

The regional highway network contains in excess of 40,000 links and 15,000 nodes. It is fairly dense in the study area, although like any modeled network, it does not include some local and collector streets. Speed and capacity classes are not used. Each link is coded with the appropriate free-flow speed, number of lanes and lane capacity. Functional class is coded, as are various geographic flags useful for

summarizing emissions. Another code is used to distinguish links open only to High-Occupancy Vehicles (HOV) from all other links.

## **Transit**

The transit network represents all MBTA bus and rail services in Eastern Massachusetts, as well as private express buses and Boston Harbor ferries. Most-likely travel paths are built through the network, then skimmed and the resulting impedances are input to the trip distribution and mode choice models. After mode choice, transit trip tables by time of day are assigned to the network travel paths.

## **Network Building Conventions**

### *Transit Links and Lines*

Bus lines are overlaid on highway links and rail links are coded separately. Bus speeds can be made a function of highway travel speeds. However, for the PMT analysis, no such function was used. Instead, future-year bus speeds were estimated on the basis of future-year congested highway speeds. In some instances, where special busways were assumed in certain alternatives, bus speeds were determined on the basis of the level-of-service data provided by the client and their consultants.

### *Walk-access Links*

Walk-access times coded onto walk links represent the average walk time from all points in a zone to the transit node. These times were initially measured using the Arc/Info Geographic Information System (GIS) and then input to the EMME/2 transit network. Walking speed was assumed to be three miles per hour. The maximum walking distance for a bus is coded as one-fourth of a mile while it is one-half to three-quarters of a mile for rapid transit and commuter rail.

### *Drive-access Links*

Each TAZ beyond the Boston core area is connected to the four closest park-and-ride nodes

with drive-access links. Appropriate drive time and distance values were obtained from the highway network and coded onto these links. Each park-and-ride node is connected to its associated transit node with a short walk link. In the Boston core, no drive-access links are provided. The parking lot fare is coded directly on the link connecting the park-and-ride node to the station node.

### *Transfer Links*

Transfer links are provided in the network where appropriate. For all downtown and some other rail stations, actual walking times from line to line were recently measured in another CTPS project, and these values are coded onto the transfer links.

### *Walk Network*

A walk network covers downtown Boston and serves as a circulator system between TAZs and transit stations/stops. In the CBD, travelers often alight the line-haul line and then walk several blocks to their final destinations instead of transferring downtown from one line to another and riding one more station before alighting. Prior to the introduction of the walk network, when each TAZ was directly connected to one or more stations, the pathbuilder usually found a path involving a transfer; hence, downtown transferring was overestimated.

With the walk network, the pathbuilder finds more accurate paths. Each station and each TAZ is connected to the walk network, which then acts as a distribution system for the walk portion of downtown transit trips. The walk speed on the walk network is coded as three miles per hour. Each downtown TAZ is connected to a node on the network with a distance of 0.1 mile. TAZs on the periphery of the walk network are connected using the actual distance involved. Links connecting transit stations to the walk network are coded either with observed walk time, if available, or a distance of 0.1 mile.

### Fare Coding Conventions

Fares were coded in the EMME/2 network at the appropriate transit nodes. Adult cash fares were used. Each mode is assigned a boarding fare and up to seven fare link codes. Because of the complexity of the area's fare system, not all private express bus, Green Line and Red Line Braintree branch fares are represented exactly as is, but are represented reasonably well. Park-and-ride parking charges are coded onto the walk link that connects the park-and-ride node to the transit station node. The matrix in Table 1 summarizes the fare policy used in this study. The fares shown are in year 2000 cents. The fare assumptions for all of the new stations are consistent with the existing MBTA fare policy.

### Path Building Conventions

The transit assignment implemented in EMME/2 is a multipath assignment, based on the computation of optimal strategies. The optimal strategy is one that minimizes the total expected perceived travel time. The values

shown in Table 2 are currently being used in estimating the perceived travel times between a given origin and a destination. These values apply both to walk-access transit and drive-access transit and to all submodes. They relate to in-vehicle time. For example, a transfer wait time factor of 2.45 implies that travelers perceive a minute of such time as 2.45 times more onerous than a minute spent riding in a transit vehicle. Although these values are theoretically supposed to correspond to marginal rates of substitution implicit in mode choice model coefficients, their final values are partly based on what is needed to force the pathbuilder to find what are deemed reasonable paths through the network.

### Household and Employment Forecasts

Households and employment by type are the major input into the travel model process: they are the variables upon which trip generation is done. The forecasts of households and employ-

**TABLE F-1**  
**Matrix of Fares**

From	To									
	CRR	RT(t)	RT(g)	LRT(t)	LRT(g)	BT(t)	BT(g)	XB	LB	Boarding
CRR	NA	100	100	100	100	100	100	Z	75	Z
RT(t)	Z	F	F	F	F	F	F	Z	75	100
RT(g)	Z	F	F	F	F	F	F	Z	75	100
LRT(t)	Z	F	F	F	F	F	F	Z	75	100
LRT(g)	Z	F	F	F	F	F	F	Z	75	100
BT(t)	Z	F	F	F	F	F	F	Z	75	100
BT(g)	Z	F	F	F	F	F	F	Z	75	100
XB	Z	100	100	100	100	F	F	Z	100	Current premium fare
LB	Z	100	100	100	100	30*	30*	Z	100	75

F Free Transfer  
 CRR: Commuter Rail  
 RT(t): Rapid transit in tunnel  
 RT(g): Rapid transit at grade  
 LRT(t): Light Rail Transit in tunnel  
 LRT(g): Light Rail Transit at grade

XB Express Bus  
 LB: Local Bus  
 Z: Zone fare  
 \* A transfer fee of 30 cents assessed if LB enters BT

**TABLE F-2**  
**Current Pathbuilding Parameter**

<b>Parameter</b>	<b>Value</b>
<b>Initial wait time factor</b>	<b>1.1</b>
<b>Transfer wait time factor</b>	<b>2.45</b>
<b>Drive-access time factor</b>	<b>2.65</b>
<b>Walk-access time factor</b>	<b>1.6</b>
<b>Walk speed</b>	<b>3.0 mph</b>
<b>Maximum transfers</b>	<b>5.0</b>
<b>Maximum/minimum initial/ transfer wait times</b>	<b>20 min.</b>
<b>Fare factor</b>	<b>1.0</b>

ment for this region were developed by MAPC using what is called “Targeted Growth” method. In this method, growth is targeted to denser areas with available water and sewer infrastructure with a focus on development around transit stations. As indicated in Table 3, regional population, households, and employment are forecasted to grow by 16%, 25%, and 31% respectively between 1995 and 2025. The growth is expected to be greatest in the center of the region (Downtown Boston).

### **Auto Ownership Model**

Household auto ownership is an input to trip generation and mode choice. It is forecast using a logit model developed with the 1991 Household Travel Survey and 1990 U.S. Census data. The model is integrated with the trip production procedures described in the next section. The model forecasts the number of autos available to a household-by-household income class. The independent variables are household size, workers per household, zonal population density, zonal employment density, and zonal percent transit utilization.

### **Trip Generation Model**

The current trip generation model includes both motorized and non-motorized trips. Trip generation is done separately for internal and

external trips. Furthermore, internal trips are generated differently in different parts of the modeled area.

In all cases, trips are ultimately generated for the following five purposes.

- Home-based work
- Home-based shopping, social, recreational, and other
- Home-based school
- Non-home-based work
- Non-home-based other

### **Internal Trips**

Internal trips are trips with both ends in the modeled area. In past studies, all internal trips were generated using one set of equations for all of the modeled area. For the PMT analysis, however, two different procedures were employed for trip attractions and non-home-based productions and attractions: one for rings Zero and One, and another for rings Two through Four.

### **Trip Productions**

A set of cross-classification models, developed on the basis of the 1991 Household Travel Survey, were for home-based trip productions. The trip generation rates (productions per household on an average weekday) vary according to household size and the location of the household within the modeled area. The number of workers per household is another variable used for home-based work trips, and the number of vehicles per household is another variable used to generate home-based non-work trips. Table 5 shows average home-based trip production rates by purpose and ring. These production rates were used everywhere in the modeled area for the study.

On average, a household in the region generates 5.56 home-based trip productions, of which 1.89 are for work trips. The rate is low-

**TABLE F-3**  
**Households and Employment Forecasts**

Socioeconomic Characteristic	1995	2025	% Growth 1995-2025
<b>Households</b>	1,544,100	1,927,374	24.8
Ring 0	86,400	115,453	33.6
Ring 1	288,000	339,797	18
Ring 2	289,400	338,453	17
Ring 3	443,900	549,313	23.7
Ring 4	436,400	584,358	33.9
<b>Total Employment</b>	2,133,900	2,799,729	31.2
Ring 0	432,700	588,522	36
Ring 1	285,900	378,373	32.3
Ring 2	341,900	439,008	28.4
Ring 3	628,300	806,778	28.4
Ring 4	445,100	587,048	31.9
<b>Basic Employment</b>	673,400	646,010	-4.1
Ring 0	82,900	80,034	-3.5
Ring 1	59,200	65,516	10.7
Ring 2	105,000	86,038	-18.1
Ring 3	232,900	225,449	-3.2
Ring 4	193,400	188,973	-2.3
<b>Retail Employment</b>	295,800	448,802	51.7
Ring 0	36,000	50,736	41
Ring 1	36,200	48,843	34.9
Ring 2	46,500	63,698	37
Ring 3	107,200	159,241	48.5
Ring 4	69,900	126,284	80.6
<b>Service Employment</b>	1,164,700	1,704,917	46.4
Ring 0	313,800	457,752	45.9
Ring 1	190,500	264,014	38.6
Ring 2	190,400	289,272	52
Ring 3	288,300	422,088	46.4
Ring 4	181,800	271,791	49.5

**TABLE F-4**  
**Household Forecasts by Market Segmentation**

	1995	2025 No-build	Growth 1995-NB
<b>Households by</b>			
<b>HH Size</b>	1,544,114	1,927,374	24.8%
1 person	401,904	626,274	55.8%
2 people	471,997	532,896	12.9%
3 people	269,885	333,744	23.7%
4 people	236,647	260,278	10.0%
5+ people	163,681	174,182	6.4%
Avg. HH Size	2.604	2.508	-3.7%
Population	4,160,082	4,834,012	16.2%
<b>Households by</b>			
<b>HH Income</b>	1,544,114	1,927,399	24.8%
< \$20,000	371,217	458,131	23.4%
\$20-40,000	397,738	492,063	23.7%
\$40-60,000	335,194	419,324	25.1%
> \$60,000	439,965	557,881	26.8%
<b>Households by</b>			
<b>Workers/HH</b>	1,544,115	1,927,392	24.8%
0 workers	356,591	552,072	54.8%
1 worker	531,174	690,187	29.9%
2 workers	490,800	520,730	6.1%
3+ workers	165,550	164,403	-0.7%
Avg. Work/HH	1.374	1.240	-9.7%
Total Workers	2,121,591	2,390,152	12.7%
<b>Households by</b>			
<b>Vehicles/HH</b>	1,544,114	1,927,117	24.8%
0 vehicles	230,060	369,077	60.4%
1 vehicle	551,597	732,054	32.7%
2 vehicles	550,212	579,988	5.4%
3+ vehicles	212,245	245,998	15.9%
Avg. Veh/HH	1.51	1.39	-7.9%
Total Vehicles	2,331,612	2,679,223	14.9%

**TABLE F-5**  
**Average Motorized Trip Production Rates**

Trip Purpose	Ring 0	Ring 1	Ring 2	Ring 3	Ring 4	Region
HB work	1.36	1.65	1.88	2.19	1.88	1.89
HB shop & personal business	1.16	1.50	2.20	2.64	2.32	2.16
HB social & recreational	0.52	0.81	0.99	1.25	1.12	1.04
HB school	0.41	0.52	0.48	0.48	0.42	0.47
<b>TOTAL</b>	<b>3.45</b>	<b>4.48</b>	<b>5.55</b>	<b>6.56</b>	<b>5.74</b>	<b>5.56</b>

est for households in Ring Zero (Boston Proper) because many trips are being made on foot, and the rate is lower for Ring Four than for Ring Three because more external trips are being made in the former.

Trip productions at college dormitories were estimated based on dormitory populations obtained from the 1990 STF-3A census table. Modifying the cross-classification trip production rates derived trip production rates for dormitory residents. The resulting values are 0.75 for home-based work, 0.59 (rings 0 through 2) and 1.39 (Ring 3 and 4) for home-based shop and personal business, and 0.37 (rings 0 through 2) and 0.36 (Ring 3 and 4) for home-based social and recreational trips. The trips were estimated only for zones with a dormitory population of 50 or more.

### ***Trip Attractions***

Although the trip attraction rates developed from the 1991 Household Travel Survey cover-

ing the entire modeled area, they were not used in rings Zero and One. Instead different, more refined procedures were used in those two innermost rings, as described below.

A set of linear additive equations was developed for home-based trip attractions and non-home-based trip productions and attractions. The average values of the trip rates are shown in Table 6. These equations were used beyond Ring One of the modeled area.

In the inner part of the modeled area, home-based trip attractions and non-home-based productions and attractions were generated with a different method. This is made possible by the fact that there is more and better information for this area than for the rest of the modeled area. First, in this area, the 1991 Household Travel Survey was designed to yield a higher sampling rate than elsewhere, so the data are richer and more stable. Second, as described earlier, land use data were collected for this

**TABLE F-6**  
**Average Motorized Trip Attraction Rates**

Trip Purpose	Retail Employment	Service/Fire/Gvt Employment	Other Employment	Households
HB work attractions	1.40	1.40	1.12	----
HB shop & PB attractions	4.68	1.17	----	0.20
HB S & R attractions	0.65	0.65	----	0.41
HB school attractions	0.13	0.13	----	0.35
Non-HB prod. or attr.	4.49	1.13	0.38	0.59



study in rings Zero and One, and these data can be used as independent variables in the attraction model estimation process. In addition to the Household Travel Survey and the land use data, the other data sources for this effort were: the 1991 External Cordon Survey, the 1990 U.S. Census and the 1991 CTPS Site-level employment database.

All these data were aggregated into about twenty sub-areas, each representing a data point for multiple regression analysis. The regression analysis was done using attractions plus non-home-based productions and attractions as dependent variables. Independent variables included number of households, employment by type and land use by type.

In this approach, trip ends by trip purpose were not estimated directly, as is usually done. Instead, trip ends were first estimated on the basis of the “activity” at the trip end. For example, consider a store where a Household Travel Survey respondent might engage in the activity “shop”. There are six types of trips and five modeling “purposes” that could be represented by the respondent shopping at this store, as depicted in Table 7 below.

Using regression analysis, the dependent variable was all trip ends with the activity “shop” in a sub-area. Those independent variables

with the best predictive power (possibly including retail floor space) were then identified and their coefficients estimated. It is only after this regression analysis was completed that the “activity” trip ends were translated into the same five model-usable trip purposes for which trips are generated in the other rings. For consistency with the other rings, non-motorized trip ends were removed from this process.

Within each sub-area, the portion of trip ends for an activity that were allocated to each modeling “purpose” were measured directly from the Household Travel Survey. This sub-area allocation among the various purposes is assumed to be uniform across each individual traffic zone in a sub-area, and this allocation is assumed to hold in 2025 as well. For example, if in the 1991 Household Travel Survey, 80 percent of the trips in the Financial District to “Eat Out” were non-home-based, it is assumed that for every zone in the Financial District, this portion will be 80 percent, both now and in the year 2025. Combining the non-home-based portions of trips estimated by the various activities resulted in the required non-home base production and attraction totals.

**External Trips**

External trips are those that have at least one trip end outside of the modeled area. There are

**TABLE F-7**  
**Example Relating Activity Definition to Model-usable Purpose**

<b>Nature of Trip at Activity “Shop”</b>	<b>Modeling “Purpose” of Trip End*</b>
<b>From Home to Shop</b>	<b>Home-based Shop Attraction</b>
<b>From Work to Shop</b>	<b>Non-home-based Work Attraction</b>
<b>From Other to Shop</b>	<b>Non-home-based Other Attraction</b>
<b>From Shop to Home</b>	<b>Home-based Shop Attraction</b>
<b>From Shop to Work</b>	<b>Non-home-based Work Production</b>
<b>From Shop to Other</b>	<b>Non-home-based Other Production</b>

\*The non-home-based categories shown here are intermediate categories. The “work” and “other” non-home-based trips are later collapsed into just “non-home-based”, one of the five purposes for which trips are generated in the other rings.



three kinds of external trips. External-Internal trips are produced outside the area and attracted within it. Internal-External trips are produced within the modeled area and attracted to a point outside it. External-External trips, also called through-trips, begin and end outside the modeled area, but pass through it.

The external trip ends at each external station and for each internal zone are based on the 1991 external travel survey and traffic counts at each station. The external trip ends are divided into external-internal/internal-external trip ends and through trip ends, and the former are further divided by type of trip end (trip productions and trip attractions) and by trip purpose (the same five trip purposes used for the internal trip ends). Finally, the external-internal/internal-external trip productions and attractions by trip purpose are combined with the internal-internal trip ends. The split of trip ends into internal-external trips and internal-internal person trips for the trip distribution model determines each internal zone later.

External commercial vehicle trips were not developed separately, in order to simplify the modeling process. Rather, they are included in these external person trip productions and attractions.

### **Trip Distribution**

Trip distribution was conducted for two categories of trips: External-Internal person trips and Internal-Internal person trips. In the past, trip distribution was done using standard aggregate-level gravity models. However in the current study, advanced matrix balancing procedures are used in distributing the trips. This procedure relies on the implementation of a three-dimensional trip balancing strategy, as provided by the EMME/2 transportation planning software. The three-dimensional trip balancing consists of the distribution of production and attraction vectors, which constitute the first and second dimension respectively, subject to a third constraint on the distributed

trips pre-defined by the modeler. The third dimension is a combination of the scaled composite impedance and the total number of trips between districts. The data obtained from the 1990 Home Interview Survey was used to develop the third dimension constraint. The actual mechanics of the trip distribution procedure is highly mathematical and beyond the scope of this report and hence been omitted. Trip distribution was performed for two time periods: peak period (AM and PM) and off-peak period and four trip purposes namely, home-based work, home-based school, home-based other, and non-home-based.

### **Mode Choice**

Mode choice models were recently developed using the 1991 Household Travel Survey data, travel impedances obtained from the networks, 1990 U.S. Census data and other data sources. There were not enough survey records for each chosen mode to estimate separate model parameters for home-based shopping/personal business and home-based social/recreational trips. Therefore, these two purposes were combined into one, and four mode choice models were developed.

Mode choice model coefficients are shown in Tables 8 through 11 below. Variables are discussed after the tables. The four models differ from one another in structure, modes represented and variables included. These differences result from both differences in initial hypotheses and in what the data were ultimately able to support in a statistically valid fashion.

The modal constants shown in the tables vary by ring of attraction as a result of the calibration process. The home-based work model has five modes: walk-access transit, drive-access transit, drive alone, two persons per vehicle and three-or-more persons per vehicle. Walk-access and drive-access transit is nested.

The home-based shopping, personal business, social and recreational model shown below has

**TABLE F-8**  
**Mode Choice Coefficients – Home-based Work**

Variable	Transit Nest	Walk-access Transit	Drive-access Transit	Drive Alone	Shared Ride 2	Shared Ride 3+
Tree Coeff.	0.8137	–	–	–	–	–
In-vehicle Time	–	-0.04792	-0.0479	-0.0705	-0.0705	-0.0705
Out-of-Vehicle Time	–	-0.06415	-0.0710	–	–	–
Terminal Time	–	–	–	-0.3799	-0.3799	-0.3799
Fare	–	-0.4158	-0.4158	–	–	–
Auto Cost	–	–	–	-0.3623	-0.3623	-0.3623
Household Size	–	–	–	–	0.0813	0.1810
Vehicles/Person	–	–	0.6614	–	–	–
Population Density	–	0.0333	–	–	–	–
<b>Constants</b>						
Boston CBD	-4.4597	–	-0.8936	–	-0.2119	-2.6028
Rest of Ring 0 and 1	-5.7470	–	-4.0054	–	-0.7106	-2.3031
Rings 2,3, and 4	-7.9294	–	-6.2659	–	-1.1297	-2.9957

only four modes. There is just one shared-ride mode instead of two. As with the home-based work model, walk-access transit and drive-access transit is nested.

As shown in Table 10, the home-based school model has only three modes. There is only one transit mode, unlike in the preceding two models.

**TABLE F-9**  
**Mode Choice Coefficients – Home-based Shopping, Personal Business, Social and Recreational**

Variable	Transit Nest	Walk-access Transit	Drive-access Transit	Drive Alone	Shared Ride 2+
Tree Coeff.	0.5578	–	–	–	–
In-vehicle Time	–	-0.0141	-0.0141	-0.0533	-0.0533
Out-of-Vehicle Time	–	-0.0448	-0.0448	–	–
Terminal Time	–	–	–	-0.2062	-0.2062
Drive-access Time	–	–	-0.1380	–	–
Fare	–	-0.4128	-0.4128	–	–
Auto Cost	–	–	–	-0.3930	-0.3930
Household Size	–	–	–	–	0.2379
Vehicles/Person	–	–	1.6460	–	–
Population Density	–	0.0386	–	–	–
<b>Constants</b>					
Boston CBD	-3.0827	–	-2.2115	–	0.1728
Rest of Ring 0 and 1	-4.4888	–	-4.1662	–	-0.0178
Rings 2,3, and 4	-6.2226	–	-10.3837	–	-0.4096

**TABLE F-10**  
**Mode Choice Coefficients - Home-based School**

Variable	Transit	Drive Alone	Shared Ride 2+
In-vehicle Time	-0.0250	-0.0909	-0.0909
Out-of-Vehicle Time	-0.0397	—	—
Terminal Time		-0.2491	-0.2491
Drive-access Time	-0.0996	—	—
Fare	-0.2106	—	—
Auto Cost	—	-0.5314	-0.5314
Vehicles/Person	—	1.5660	—
Population Density	0.0199	—	—
<b>Constants</b>			
Rings 0 and 1	1.2599	—	3.4206
Rings 2,3, and 4	0.2196	—	4.0557

The non-home-based model shown in Table 11 consists of four modes. Unlike the first two models, though, walk-access transit and drive-access transit is not nested here.

The mode choice model variables are defined as follows.

*Tree coefficient:* This represents the combined utilities of the drive-access and walk-access components of the transit nest.

*In-vehicle time:* For the shared-ride modes, in-vehicle and out-of-vehicle time are functions of drive alone time, as estimated by a procedure developed at CTPS in a previous study.

*Out-of-vehicle time:* Includes all walk and wait time and drive-access time, unless the last is specified separately.

*Drive-access time:* Time, by automobile, to drive from a trip origin to a transit station.

**TABLE F-11**  
**Mode Choice Coefficients - Non-Home-Based**

Variable	Walk-access Transit	Drive-access Transit	Drive Alone	Shared Ride 2+
In-vehicle Time	-0.0144	-0.0144	-0.0496	-0.0496
Out-of-Vehicle Time	-0.0172	-0.0172	—	—
Terminal Time	—	—	-0.0647	-0.0647
Drive-access Time	—	-0.0286	—	—
Fare	-0.2671	-0.2671	—	—
Auto Cost	—	—	-0.2303	-0.2303
% Transit				
origin/destination	0.0514	0.0514	—	—
Work Dummy	—	—	0.9704	—
<b>Constants</b>				
Boston CBD	-0.1309	-1.3651	—	0.5462
Rest of Ring 0 and 1	-0.9579	-3.2618	—	0.3641
Rings 2,3, and 4	-3.2666	-3.6198	—	0.0687

*Terminal time:* The time needed to park and unpark a vehicle. That is, it is the time spent getting in a vehicle at the production end and entering the modeled highway network and the time spent leaving the modeled network and parking the vehicle at the attraction end of the trip. These times are as high as five minutes in the Boston CBD and as low as one minute in suburban areas. They are assumed to remain constant in the future.

*Fare:* Transit fare, in dollars, including one-half of any park-and-ride charges (because fare per one-way trip is needed). The adult cash fare is used because that is what is coded into the transit network. Fares are assumed to remain constant over time.

*Auto cost:* Auto operating cost in dollars, computed using 9.8 cents per mile (\$1991) and toll costs, if any. Also, one-half any applicable parking costs (because costs per one-way trip are needed). These parking costs are based on the 1991 Household Travel Survey, and are computed from reported district average costs paid by auto mode choosers. They are assumed to remain constant over time. For shared ride modes, total costs are divided by the appropriate auto occupancy.

*Household size:* Persons per household. For 2025, population and household forecasts are provided by MAPC.

*Vehicles/person:* Total household vehicles per person in the household. Vehicles are forecast for 2025 using the vehicle availability model described earlier.

*Population density:* Total population per acre.

*Percent transit origins/destinations:* The transit share of work trip ends in the TAZ, as computed by the home-based work mode choice model.

*Work dummy:* Equal to one, if the trip is work-related. Zero otherwise.

**Trip Assignment and Associated Computations**

Trip assignment is the final step in the four-step travel modeling process. Trips by mode created in the mode choice step are assigned to their respective networks in order to estimate traffic volumes and transit ridership on specific transportation services. In addition, systemwide statistics such as vehicle-miles traveled, total amount of pollutants emitted in the air etc., are computed in this step.

**Pre-assignment Computations**

After mode choice, but prior to trip assignment, daily highway person trips were transformed into vehicle trips and combined with other types of vehicle trips. Internal and external-internal auto person trips that are output from the mode choice model were transformed into vehicle trips using the occupancy rates shown below.

The rates for external trips were derived from the 1991 External Cordon Survey, while those for internal trips were derived some years ago at CTPS.

**TABLE F-12**  
**Vehicle Occupancy Rates**

<b>Trip Purpose</b>	<b>Internal Trips Boston CBD</b>	<b>Attracted to: Other</b>	<b>External Trips</b>
<b>Home-based work</b>	<b>1.20</b>	<b>1.10</b>	<b>1.18</b>
<b>Home-based other</b>	<b>1.70</b>	<b>1.60</b>	<b>1.65</b>
<b>Non-home-based</b>	<b>1.30</b>	<b>1.20</b>	<b>1.31</b>

**TABLE F-13**  
**Time Periods for Trip Assignment**

<b>Time Period</b>	<b>Highway Vehicle Trips</b>	<b>Transit Person Trips</b>
<b>AM Peak Period</b>	<b>6:00 am – 9:00 am</b>	<b>6:30 am – 9:30 am</b>
<b>Midday</b>	<b>9:00 am – 3:00 pm</b>	<b>9:30 am – 3:30 pm</b>
<b>PM Peak Period</b>	<b>3:00 pm – 6:00 pm</b>	<b>3:30 pm – 6:30 pm</b>
<b>Early/Evening/Night</b>	<b>6:00 pm – midnight</b>	<b>6:30 pm – midnight</b>

**Time of Day Considerations**

In the current version of the travel model set, the mode choice and transit assignment are conducted for four time periods: AM peak period, Midday, PM peak period, and Nighttime. The trip generation model however, is based on daily trips. The trip distribution model considers two time periods, peak and off-peak periods.

The highway and transit networks are built separately for each time period. Table 13 shows the time intervals associated with each time period. The highway vehicle trips created by the mode choice model were converted from production/attraction format to an origin/destination format prior to network assignment. Transit person trips were also transformed from production/attraction format to origin/destination format, for each time period and assigned to the transit network.

The factors used in dividing the highway person trips into different time periods were obtained from the 1991 Household Travel Survey. The final trip tables created for each

time period correspond roughly with observed levels of congestion on the highway system. The results of the four assignments were summed to obtain daily (AWDT) results.

The temporal factors used in creating the transit trip tables were based on the 1994 MBTA boarding counts. Prior to trip assignment, other types of trips are added to the highway vehicle trips that result from the trip generation, distribution and mode choice steps described above. These other types of trips are commercial vehicle trips, taxi trips, trips to/from Logan Airport and through trips.

**Trip Assignment**

The final travel model step is trip assignment in which highway vehicle trips and transit person trips are assigned to their respective networks.

**Highway**

Highway vehicle trips were assigned to the highway network using EMME/2's multiclass assignment procedure. This procedure is a true

**TABLE F-14**  
**Highway Assignment Characteristics**

<b>Assignment Period</b>	<b>Number of Hours</b>	<b>Capacity Hours</b>	<b>CONFAC</b>	<b>Exponent of BPR Curve</b>
<b>24-Hour</b>	<b>24</b>	<b>10.00</b>	<b>0.100</b>	<b>4</b>
<b>AM Peak Period</b>	<b>3</b>	<b>2.67</b>	<b>0.375</b>	<b>6</b>
<b>Midday</b>	<b>6</b>	<b>5.00</b>	<b>0.200</b>	<b>4</b>
<b>PM Peak Period</b>	<b>3</b>	<b>2.67</b>	<b>0.375</b>	<b>6</b>
<b>Early/Evening/Night</b>	<b>12</b>	<b>5.00</b>	<b>0.200</b>	<b>4</b>

equilibrium assignment in which several classes of users perceive or use the network differently. Each user class has access to a subnetwork of the auto network. Therefore, auto trips, HOV trips and truck trips can all be assigned simultaneously to their respective routes. The assignment is restrained by link capacity according to an equilibrium-seeking capacity-restraint method. The CONFAC parameters and the exponents of the BPR curve used for assignments are as shown in Table 14.

Highway assignment speed and volume results were saved and input to a post-processing routine that computes regional ozone precursor emissions using MOBILE emissions rates. The routine processes each link in the highway network. The routine finds the VOC and NOX emissions rates corresponding to a link's modeled speed and then applies those rates to that link's vehicle-miles of travel. This yields emissions per link, and these are then summed over all links to obtain regional emissions.

**Transit**

Transit person trips are assigned to the transit network using multi-path assignment procedure embedded in the EMME/2 software. In the conduct of the PMT forecasting, these assignments were examined to ensure that there are no serious distortions or lumpiness in passenger boardings. A plethora of information – linked transit trips, ridership by line and station, peak loads, transfer volumes, modal splits, etc., -- were generated from the transit assignments. These statistics are discussed in greater detail under 'Model Application and Results'.

**Model Calibration**

**Calibration of Trip Distribution and Mode Choice**

Model calibration was performed in the last three steps of the modeling process. Trip distribution model calibration was performed by balancing the base year trip productions and attractions subject to a third constraint which was a combination of scaled composite impedances (observed) and total distributed trips (observed). The multipliers associated with the

**TABLE F-15  
Results of the Mode Choice  
Model Calibration for Peak Period**

		Peak Survey	Model
<b>Home Based Work</b>	<b>Transit Nest</b>	11.75%	12.82%
	<b>Walk Access</b>	8.25%	9.67%
	<b>Drive Access</b>	3.50%	3.15%
	<b>Drive Alone</b>	67.50%	67.41%
	<b>Shared Ride (2)</b>	12.15%	12.09%
	<b>Shared Ride (3+)</b>	3.25%	3.17%
	<b>Walk</b>	5.35%	4.51%
	<b>TOTAL</b>	<b>100.00%</b>	<b>100.00%</b>
<b>Home Based Other</b>	<b>Transit Nest</b>	3.48%	3.60%
	<b>Walk Access</b>	3.11%	3.20%
	<b>Drive Access</b>	0.37%	0.39%
	<b>Drive Alone</b>	48.32%	40.80%
	<b>Shared Ride (2)</b>	35.28%	39.53%
	<b>Walk</b>	12.91%	16.08%
	<b>TOTAL</b>	<b>100.00%</b>	<b>100.00%</b>
<b>Home Based School</b>	<b>Motor Nest</b>	68.40%	61.79%
	<b>Walk Access</b>	9.10%	8.18%
	<b>Drive Access</b>	1.20%	2.28%
	<b>Drive Alone</b>	12.45%	9.56%
	<b>Shared Ride (2)</b>	45.70%	41.76%
	<b>Walk</b>	31.60%	38.21%
	<b>TOTAL</b>	<b>100.00%</b>	<b>100.00%</b>
<b>Non Home Based</b>	<b>Walk Access</b>	5.37%	5.08%
	<b>Drive Access</b>	1.23%	0.68%
	<b>Drive Alone</b>	59.13%	52.39%
	<b>Shared Ride (2)</b>	22.59%	25.18%
	<b>Walk</b>	11.68%	16.67%
	<b>TOTAL</b>	<b>100.00%</b>	<b>100.00%</b>



third dimension constraint are used to estimate what is called “gamma function”. The purpose of the gamma function is to make sure that the distributed trips from matrix balancing closely match the observed distribution obtained from travel surveys. For each zonal interchange, the gamma function is used to estimate the number of trips that fall into a certain category of composite impedance. Separate gamma functions were developed for each trip purpose.

After the calibration of trip distribution was completed, the mode choice models were run, and the modal bias coefficients in them were adjusted until estimated mode shares by ring matched observed shares. Table 15 shows the final transit trips by trip purpose and mode of access that resulted from the model calibration.

### ***Calibration of Assignment***

The trips tables obtained from the mode choice models were assigned to the appropriate highway and transit networks. Highway calibration was limited to ensuring the assigned highway volumes on major freeways and expressways matched the observed volumes within 15 percent. On the transit side, a significant effort was expended in the model calibration to ensure the assigned transit trips matched the observed ridership within 5 to 10 percent. Adjusting the network attributes such as walk and drive access links, transfer links and access connections were performed for calibration.

### **Air Quality Analysis**

The air quality impacts of alternative transportation scenarios can be analyzed using the standard traffic forecasting models. Our models estimate future traffic volumes, average highway speeds, vehicle miles and vehicle hours traveled within the transportation network at a highly disaggregate level. Since the amount of air pollution emitted by the highway traffic depends on the prevailing highway speeds and vehicle miles traveled on the network, it is now

possible to estimate the air quality impacts with reasonable accuracy.

Typically, we estimate three major pollutants emitted by the transportation sector: Carbon Monoxide (CO), Volatile Organic Compounds (VOC) and Nitrous Oxides (NO<sub>x</sub>). The model uses Mobile 5A emission factors to calculate these three pollutants on a link-by-link basis. Carbon Dioxide wasn't a component of MOBILE 5B model so this was calculated off model for both autos and transit vehicles.

There are other components contributing to traffic pollution which can not be handled directly within the model. These are:

1. The pollutants emitted by the Diesel Locomotives of the Commuter rail system.
2. The pollutants emitted by the MBTA bus system.
3. The automobile pollution resulting from park and ride trips.

The pollutants from the above mentioned categories can be estimated outside of the model. The following paragraphs describe the general off-model procedure that was used to handle these categories.

### ***Estimation Procedure for Non-Modelable Pollutants***

#### **Commuter Rail Diesel Locomotives**

Using extensive data supplied by the MBTA and the diesel locomotive manufacturers, the EPA has developed pollutant emission factors that express the amount of pollutants emitted as a function of daily train-miles run. Our basic approach involved the following steps.

1. Obtain the current train-miles run by the MBTA per day.
2. Based on the MBTA's future service plan, estimate the number of train-miles to be run per day for each forecast year on all the existing rail lines as well as on all future

extensions and new services such as the Old Colony lines.

3. Using the emission factors developed by the EPA, and the number of train-miles calculated from the previous step, estimate the amount of pollutants emitted by the commuter rail system for each horizon year.

The emission factors developed by the EPA are based on the total diesel fuel consumption by the entire MBTA's commuter rail system. Therefore, the pollutants emitted during the long idling periods have also been figured into the calculations.

### **MBTA'S Diesel & CNG Buses**

The bus emissions were calculated in the same way as the commuter trains but with an emission factor specific to the bus fuel type. The bus emission factors for each forecast year were calculated from the MBTA's future plans regarding the vehicle procurement rate, vehicle replacement rate and the fleet composition by vehicle age.

## **ANALYSIS**

This section will describe how the calibrated model discussed above was applied to forecast transit ridership and estimate air pollution impacts of the PMT analysis.

### **Analysis by Model**

In any alternative analysis such as this, it is customary to model a base case alternative generally known as the No-build and compare all the build alternatives to it. The No-build is designed to serve as a point of reference for the environmental and alternative analysis. It usually consists of those highway and transit projects that are nearly certain to be completed by the forecast year. The build alternatives assume the No-build conditions and add to it the proposed transit or highway improvements.

The No-build scenario has all of the projects that were in the 2000 Transportation Plan. If a transit project was in the Plan and in the PMT, it was not included in the No-build scenario.

The build scenarios involved updating the transit network for each mode considered in the PMT. This involved adding new lines, new stations, improved frequencies, run-times, park-and-ride lots, and adjusting capacities on the lines to reflect the utilization of that service improvement, whether it be expansion or enhancement. The result was a summary of new trips using transit switching generally from the automobile to transit. Diverted trips represent those trips that were transit to begin with

but switched from another transit mode to the new / improved service.

### **Analysis Off-Model**

The Regional Model was used to analyze the majority of the projects in the PMT but when it wasn't other methods were employed. Some examples of when the model wasn't employed include commuter rail projects that extended outside the study area into areas in like Cape Cod, Western Massachusetts, New Hampshire, or Rhode Island. In order to examine these types of projects other means of analysis were employed like sketch planning, spreadsheet based models, and reports by consultants were used to derive the levels of utilization that these projects would have. Each project was examined on a case by case basis to determine what method would prove the most suitable for it. In order to allow for comparison between model and off-model projects, similar demographic and background transportation services were used in both analyses.