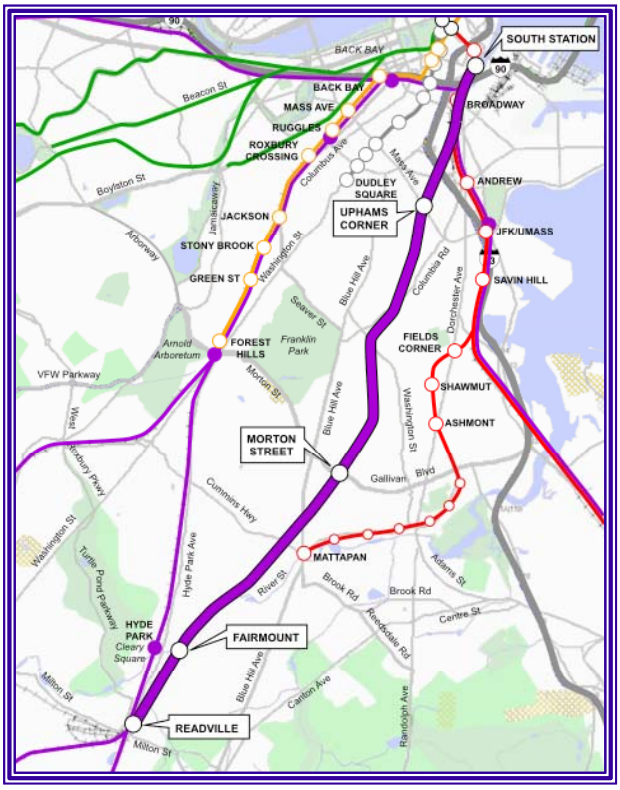
Fairmount Line Feasibility Study



Final Report

Executive Summary

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Prepared for
Massachusetts Bay Transportation Authority
Planning Department

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Introduction

Public transportation is a critical for mobility in Boston. The MBTA offers subway, bus, ferry, and commuter rail service to Boston and Eastern Massachusetts to provide options to personal automobile use, reducing highway congestion, improving air quality and reducing energy consumption. The MBTA Fairmount Commuter Rail Line passes through some of the most densely populated neighborhoods in the region, yet residents seldom use the line for travel. Instead, Fairmount corridor residents tend to use the overcrowded bus and rapid transit network to travel to downtown Boston. This report documents the methods and findings of a 14 month planning study to investigate strategies that would increase the attractiveness and utility of MBTA services on this under utilized line.

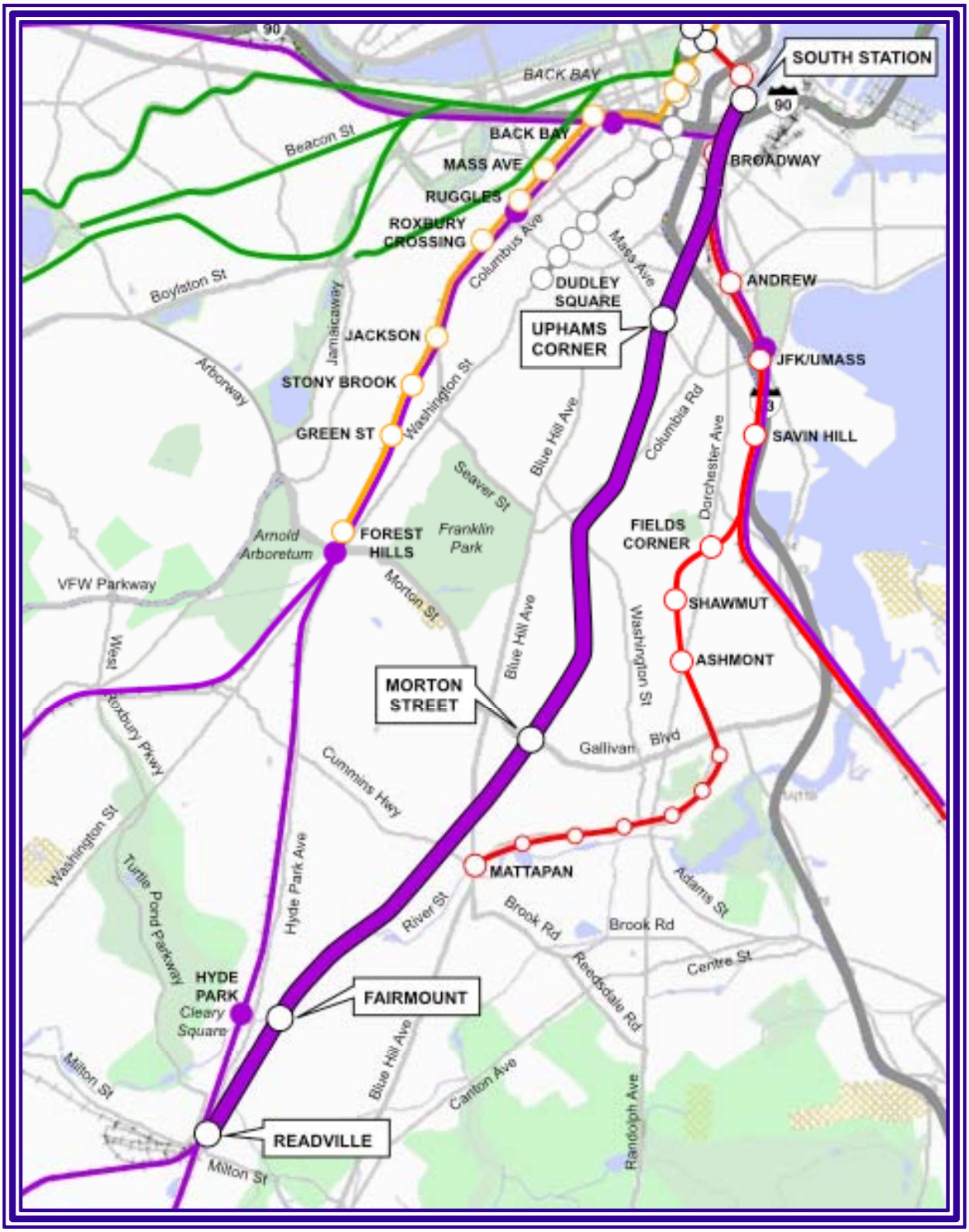
History

The Boston and New York Central Railroad (B&NYC) initially opened the Fairmount Line as the "Midland Railroad" in January of 1855. Within six months, the Town of Dorchester filed injunction halting the trains until the railroad removed all grade crossings in Dorchester. Service resumed in 1856. Passenger service on the line ran uninterrupted for the next 88 years under various corporate entities. Competition from other modes of transit reduced ridership. Passenger service on the line was abandoned in 1944, but the line remained open for freight operations.

In 1979 the MBTA restored passenger service on the line, when construction along the Southwest Corridor necessitated rerouting trains destined for South Station through Dorchester. To facilitate revived passenger service, infrastructure along the right of way was substantially upgraded. When the Southwest Corridor project was completed in 1987, most passenger service was reassigned to the Southwest Corridor.

The MBTA had planned to abandon the Dorchester Branch temporary service in 1987 but public sentiment would not allow abandonment. MBTA Railroad Operation designed a shuttle service between Readville and South Station to replace the service that had been rerouted to the Southwest Corridor. This "Fairmount Line" has operated essentially unchanged for the last 14 years.

MBTA Fairmount Line



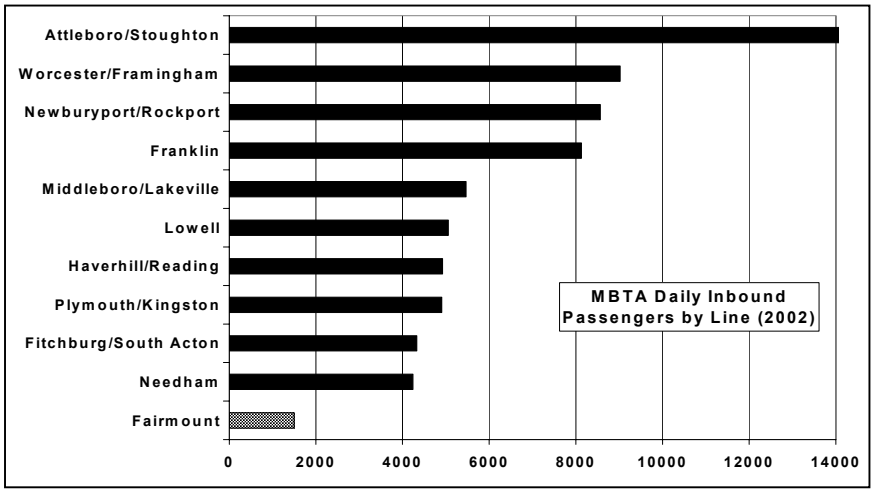
Background
In the MBTA commuter rail network, the Fairmount Line has several unique traits that make it stand out from services on other lines.

1. The Fairmount Line is the MBTA's shortest commuter rail line. At 9.2 miles, it is the only service less than 12 miles in length. The Worcester and Fitchburg services are both approximately 50 miles long.

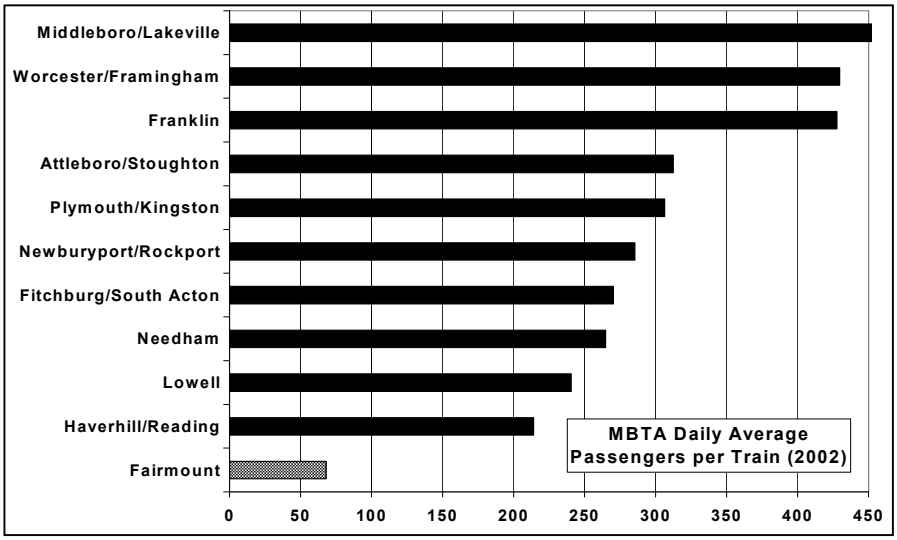
2. The Fairmount Line is the only commuter rail line that serves only the City of Boston. All the other services reach into at least one suburban community.

3. The Fairmount Line is the only MBTA commuter rail line not served on Saturdays and Sundays.

4. The Fairmount Line is the MBTA's lowest ridership commuter rail line. It is the only line with fewer than 2,000 inbound boardings on a typical weekday.



5. The Fairmount Line service has, arguably, the lowest productivity of any MBTA commuter rail service. On weekdays, it is the only line that averages fewer than 200 passengers per train.



Ridership on the Fairmount Line has always been light, despite a high level of service. On this line, 2.3% of the MBTA's total daily commuter rail ridership is serviced by more than 10% of the trains terminating in Boston. Over the last 20 years, Fairmount ridership growth has lagged behind the balance of the system despite the fact that the line serves some of the most transit dependent population in the region. This circumstance is a cause for concern.

The Expansion Planning Project
A planning team led by KKO and Associates and the MBTA Planning Department was formed in 2001to study options for expansion on commuter rail service on the Fairmount Line to improve mobility on the corridor.

The planning study consisted of three major tasks:

1) Review Existing Conditions
2) Identify Improvement Options
3) Evaluate Improvement Options

Task One: Review Existing Conditions
The first task reviewed existing conditions along the Fairmount Line corridor relating to travel demand and transportation services available. The assessment covered four topics:

1. Demographics and Travel Patterns – The team assembled a demographic and travel profile of the Fairmount service corridor using a mix of US Census Journey-to-Work survey data and Central Transportation Planning Staff forecasts. Key findings of the demographic and travel pattern analysis include:

- The study area as defined by the rail line and its neighboring transit services on the MBTA Red and Orange lines consists of 23 square miles with approximately 160,000 inhabitants.
- The population density of the study area ranges from 20,000 persons/square mile at the northern end of the corridor, to 3,000 a square mile at the southern end.
- Household sizes at the north end of the corridor are somewhat larger than at the south end; 3 persons per household versus 2.75 persons per household in the south.
- Household incomes are much lower at the north end of the corridor with median household incomes less than $25,000 per year in many northern sub areas.
- The racial and ethnic composition of the north end of the corridor is overwhelmingly minority. Some areas along the line (Mattapan) are mixed. Residents at the Readville/ Fairmount end of the line are overwhelmingly white.
- The pattern of automobile ownership in the corridor follows income and density. Nearly half the households at the northern end of the line do not own an automobile.
- The built environment in the study area is overwhelmingly residential in character for nearly its entire length.
- Well less than half of the study area residents hold jobs outside their homes.
- Most employed study area residents travel to work by private automobile (alone or with someone else), 24% use MBTA services.
- Almost one quarter of employed residents of the study area work in downtown Boston.

- Study area residents working in downtown Boston are much more likely to use MBTA services (44%) and are much less likely to drive alone to work.
- There are many fewer jobs in the study corridor than employed residents. One fifth of all study area jobs are held by study area residents.
- Nearly two thirds of all persons working in the study area drive alone to work.
- Over the next twenty years, the Metropolitan Area Planning Council projects only modest growth in the study area. (Approximately 2% overall growth from 1996 to 2020)
- Forecast growth in development and employment is also minimal. The greatest growth in development and employment is forecast for the retail sector, which is currently very modest in the study corridor.

2. Existing Transit Services in the Corridor – The study team prepared a description of existing fixed route transit services in the Fairmount Line corridor. The description of existing services covers commuter rail, rapid transit and local bus services available to local residents and workers. Data were derived from MBTA operations, planning, and schedules statistics. Key findings relative to transit service in the corridor include:

- Commuter rail is the fastest and most direct transit route to downtown Boston from all four Fairmount Line stations.
- From Uphams Corner and Morton Street, the commuter rail service is also the lowest fare transit route to downtown Boston.
- 19 different MBTA local bus routes serve the study corridor. All of these routes run to Red or Orange Line stations. ***There is no direct bus service in the study area to downtown Boston***.

Fairmount Avenue Station

3. Fairmount Line Railroad Service and Infrastructure – The study team prepared an overview of the physical and operational characteristics of the Dorchester Branch. Key findings relating to railroad service and infrastructure include:

- The current MBTA service on the line operates roughly every 30 minutes in the peak, and hourly in the off peak. The service operates from 6:00AM to 10:30PM. There is no weekend service.
- A total of 57 daily MBTA trains move on the line, 45 of theses trains serve some or all of the Fairmount Line stations. The balance of the trains are non-revenue trains or express trains from further south.
- Ridership on the line has grown dramatically since 1987 but growth has been stagnant since 1997.
- Daily ridership patterns on the line suggest that a larger than usual fraction of passengers on the Fairmount Line use it for the 7AM to 3PM shift work, part-time work, and

educational purposes. The afternoon peak on this service is earlier than on the other MBTA lines.

- Rail freight service on the line is important to the City's economy, but is not very great in volume.
- The rail infrastructure on the line was completely rebuilt 22 years ago.
- The track is generally rated for 60mph operations.
- Approximately one quarter of the ties on the line were recently replaced.
- There are numerous (41) bridges and structures crossing the line. Some of the more substantial bridges are due for rehabilitation. Three bridges are overdue for replacement at a forecast cost of $19.1 million.
- The existing signal system will likely support trains operating on five minute headways but is in need of a $7 million upgrade and rehabilitation to keep all its features fully functioning and to facilitate required bridge replacement projects.
- None of the stations on the line meet MBTA standards with respect to platform length. Only the Readville station is handicapped accessible. Fairmount station is planned for an upgrade to be completed in 2003.
- Ridership performance at each of the Fairmount Line stations is relatively high as compared to their peers.
- The right of way along the line is owned by the MBTA and is generally of ample width to build new station platforms along the existing track.
- All the right of way along the line is fenced.
- No infrastructure impediments along the line were found that would restrict the MBTA from operating more frequent service or building more stations stops. However, raising speeds would likely require a significant investment in track and signals.
- The most significant identified constraints to changing and improving service relate to peak capacity for trains in South Station and off peak capacity to store and maintain railroad equipment.

South Bay Center station site on Massachusetts Avenue

Task Two: Identify Improvement Options
The second task identified potential improvement options for the line. To develop improvement options, the study team relied on the information pertaining to the existing conditions as well as input from four public meetings and the project steering committee. The study team also received guidance from the steering committee for evaluation measures for the project.

The four public meetings averaged 42 attendees per meeting. Steering committee meetings typically included 70% of the 24 committee members in attendance. A large pool of suggestions to guide the study team was critical to the development of the improvement packages.

Improvement Packages
The study team, with steering committee guidance, generated six improvement packages for evaluation. The packages were specifically designed so that they could be implemented in sequential increments with each package building upon infrastructure and service improvements from earlier packages of improvement.

- State of Good Repair *Plus*: Substantial improvements in station appearance, lighting, station amenities, station access and public information. No Changes in fares, schedules or station locations.
- Package One: State of Good Repair improvements plus four new passenger station: Newmarket, Four Corners, Talbot, and Blue Hill Avenue.
- Package Two: Package One improvements plus: longer hours of service, weekend service, and improved off peak service frequencies.
- Package Three: Package Two improvements plus: improved peak service frequencies.
- Package Four: Package Three improvements plus: one additional station at Columbia Road and fares comparable to MBTA rapid transit service.
- Package Five: Package Four improvements plus: a free transfer to the Red Line.

Task Three: Evaluate Improvement Options
Evaluation measures were based on the policies defined in MBTA's 1996 Service Delivery Policy.

The policy describes measures to be used in evaluating the impact of proposed service improvement packages on financial, environmental, social, community development, and transportation mobility goals.

- The rationale for the change
- Net cost per passenger
- Net cost per new passenger
- Existing and projected ridership
- The number of new transit riders
- Existing and projected operating costs
- Existing and projected fare revenue
- The change in travel time for existing riders
- Added travel time for existing ridership per new passenger

- Key characteristics and demographics of the market (environmental justice)
- Contribution to the achievement of policy objectives
- Other factors, as appropriate

When the MBTA policy guidelines were reviewed with the MBTA and the steering committee, it was determined that the following "other factors" should also be considered in evaluating Fairmount service upgrade options.

- Contribution to community goals and objectives (High/Medium/Low)
- Projected capital cost
- Capital cost per new transit rider
- Capital cost per daily minute of traveler time savings
- Ease and speed of implementation
- Changes in regional vehicle miles traveled
- Changes in air quality
- Change in average transit passenger wait time
- Increased demand for station parking (a negative neighborhood impact)
- Number of walk-in commuter rail passengers (measure of economic development and liveable community goals)
- Number of non-downtown oriented trips on commuter rail and other MBTA services

Ridership

CTPS prepared weekday ridership forecast for each of the six improvement packages. CTPS has built and maintains the most accurate and sophisticated model for predicting future travel in the Boston Metropolitan Area. Forecasts from this forecasting tool guide most of the travel planning and policy analysis conducted for public agencies in Eastern Massachusetts.

Ridership forecasts are reported relative to several factors:

- Total commuter rail boardings in the study corridor
- Change in commuter rail boardings
- Impact on other MBTA services
- Impact on MBTA Revenues

Table 1.1 presents the ridership forecasts by station for each package in 2025. Ridership forecasts were prepared to show typical weekday boardings both inbound and outbound at all stations. Packages One, Three and Four have the largest incremental effect on ridership. Packages Two and Five also increase ridership, but the growth in ridership is small compared with the additional service provided by these packages. No estimates of weekend ridership or revenue were prepared for this project. Consequently all evaluation measures focus exclusively on weekday forecasts.

Table 1.1

Weekday Forecast Boardings for Fairmount Improvement Packages in 2025 by Station

Stations	Base Year 2000	No Action 2025	State of Good Repair *Plus*	Package One	Package Two	Package Three	Package Four	Package Five
Readville	700	930	970	1,095	1,100	1,000	1,180	1,205
Fairmount	350	470	510	680	700	830	860	875
Blue Hill Ave				130	135	230	400	400
Morton Street	220	225	235	300	310	550	700	720
Talbot				380	400	800	1,050	1,090
Four Corners				1,350	1,400	1,850	1,880	1,900
Columbia Road							950	980
Uphams Corner	125	220	240	250	250	450	450	450
Newmarket	0	0	0	75	90	90	375	390
South Station	1,395	1,845	1,955	3,070	3,160	4,175	5,650	5,770
Total	**2,790**	**3,690**	**3,910**	**7,330**	**7,545**	**9,975**	**13,495**	**13,780**

Impacts on Other MBTA Services

CTPS forecasts indicate for all the improvement packages that most new Fairmount Line boardings would not be new MBTA customers. Only a small fraction of the trips forecast to use the new Fairmount Line services would be replacing an automobile trip with a new transit trip.

Most forecast Fairmount Line boardings for the improvements would otherwise be trips by MBTA bus or rapid transit services. CTPS estimates of the anticipated changes in weekday travel choices are presented in Table 1.2.

Automobile trips are the least affected by the new service. Even with the most ambitious service plan, Package Five, the Fairmount Line would only replace 700 daily automobile trips. On the other hand, the reduction in bus trips is much greater. The State of Good Repair Plus Package generates all of its new commuter rail ridership from bus users. Lost bus ridership in the other packages accounts for 60-70 percent of the new commuter rail users.

Table 1.2

Weekday Changes in Regional Travel Choices (Boardings) in 2025						
	State of Good Repair Plus	**Package One**	**Package Two**	**Package Three**	**Package Four**	**Package Five**
Commuter rail trips	220	3,640	3,855	6,285	9,805	10,090
Auto Trips	0	-250	-280	-280	-700	-700
Bus Trips[1]	-220	-2,500	-2,650	-4,250	-6,000	-6,150[2]
Rapid Transit Trips		-1,500	-1,550	-2,575	-4,100	-4,400

Changes in Revenue for the MBTA

The forecast changes in weekday revenues are reported in Table 1.3. The State of Good Repair Plus is expected to yield a marginal increase in MBTA revenue. Packages One, Two, and Three are expected to increase revenue on a typical weekday by approximately $3,300 to $4,700. Packages Four and Five are each expected to yield daily revenue increases of approximately $2,600 to $2,200 respectively.

Table 1.3

Forecast Change in Weekday Revenue						
Change in Daily MBTA Revenue	**State of Good Repair *Plus***	**Package One**	**Package Two**	**Package Three**	**Package Four**	**Package Five**
Commuter rail (from new riders)	$387	$5,859	$6,164	$9,098	$10,433	$10,755
Commuter rail (lower fares: existing riders)	$0	$0	$0	$0	-$1,282	-$1,672
Bus services	-$124	-$1,407	-$1,491	-$2,391	-$3,376	-$3,461
Rapid Transit services	$0	-$1,178	-$1,218	-$2,023	-$3,221	-$3,457
Daily Change in Weekday Revenue	**$263**	**$3,274**	**$3,455**	**$4,684**	**$2,554**	**$2,166**
Change in Annual Weekday Revenue	**$66,804**	**$831,646**	**$877,572**	**$1,189,714**	**$648,771**	**$550,050**

The lower fares offered in Packages Four and Five reduce the revenue generated by the service for a number of reasons.

- First, when fares on the Fairmount Line are set at rapid transit levels the additional revenue derived by MBTA bus and rapid transit users choosing to pay the higher commuter rail fare is lost.
- Second, the revenue derived from current commuter rail passengers is reduced.
- Third, the relatively small number of new transit riders attracted to the railway by the service improvement also pay a lower average fare.

[1] Diverted bus trips include trips that were being made on the Silver Line.
[2] The study team's extrapolation of CTPS Package Four diversion rates.

Parking
To increase ridership on the Fairmount Line, the study team documented plots of vacant land near current or proposed stations that could potentially be developed for parking. Typically the MBTA provides some parking space for its commuter rail stations, even the stations that are relatively close to Boston. The study team documented land near the right of way at each existing and potential station sites. The team found sufficient vacant land to store at least 100 cars at every station, except at the proposed Columbia Road station.

Package Costs
The study team calculated the two principle financial costs associated with each package. Capital costs represent a one time investment to MBTA infrastructure and rolling stock. Incremental operating costs are the annual costs necessary to run the additional service and maintain the expanded infrastructure and rolling stock.

Capital Costs
The study team, assisted by the engineering firm HNTB, prepared estimates of the capital costs that would be required to develop each of the five improvement packages and the state of good repair in several stages. Capital costs for rolling stock and railway infrastructure were developed separately. The combined capital cost estimates range from $34.3 million for the State of Good Repair *Plus* to $112 million for Package Five as shown in Table 1.4.

Table 1.4

Fairmount Line Total Estimated Capital Costs (in millions)			
Service Option	**Rolling Stock**	**Railway Stations and Infrastructure**	**Total**
State of Good Repair	$ 0.0	$26.1	$ 26.1
State of Good Repair *Plus*	$ 0.0	$34.3	$ 34.3
Package One	$11.3	$57.2	$ 68.5
Package Two	$23.3	$57.2	$ 80.5
Package Three	$39.8	$57.2	$ 97.0
Package Four	$48.8	$63.2	$112.0
Package Five	$48.8	$63.2	$112.0

Packages Three, Four and Five entail additional capital costs that are not included in these calculations. These significant costs relate to the need for more terminal space at South Station and the need to develop more storage space for additional train sets to support the expansion of peak service on the line. These costs have not been determined.

Operating Costs

The forecast incremental operating costs of providing the level of service required for each package ranges from approximately $500,000 to slightly more than $3,000,000.

Table 1.5

Fairmount Line Total Estimated Annual Incremental Costs for Weekday Service Improvements	
Service Option	**Weekday Service Improvements**
State of Good Repair	$0
State of Good Repair *Plus*	$0
Package One	$465,242
Package Two	$2,443,194
Package Three	$2,851,407
Package Four	$3,182,635
Package Five	$3,182,635

Possible Next Steps

The study team notes that Package One is forecast to significantly increase ridership and revenue on the line with a relatively modest capital expenditure of approximately $70 million. Such an improvement would not adversely impact other MBTA commuter rail services and would be expected to reduce congestion on MBTA bus routes and connecting rapid transit services in the corridor.

Table 1.6

Summary Presentation of Improvement Package Characteristics						
	State of Good Repair *Plus*	**Package One**	**Package Two**	**Package Three**	**Package Four**	**Package Five**
Annual Weekday Ridership	993,140	1,861,820	1,916,430	2,533,650	3,427,730	3,500,120
Incremental Annual Revenue	$66,804	$831,646	$877,572	$1,189,714	$648,771	$550,050
Incremental Annual Operating Costs	$0	$465,242	$2,443,194	$2,851,407	$3,182,635	$3,182,635
Capital Costs (millions)	$34.3	$68.5	$80.5	$97.0	$112.0	$112.0

Recalling that the improvement packages were all designed to build upon one another and that evaluation of Package One is generally positive, the study team suggests that the MBTA consider funding the State of Good Repair package to rebuild Uphams Corner and Morton Street Stations. In addition the MBTA might consider implementing the strongest elements of the Package One improvements:

- Forecast ridership at the proposed Four Corners and Talbot (Codman Square) stations were especially strong. It might be attractive to consider building the Package One improvements without new stations at Newmarket and Blue Hills.
- Any further planning for a station at Four Corners will need to address the incompatibility of the site with the need for a high platform station.
- Forecast ridership for a Columbia Road Station in Packages Four and Five is impressive. The MBTA may wish to consider building and operating a Columbia Road Station without implementing the relatively expensive fare reductions and peak period service improvements associated with Packages Four and Five.

Table 1.7

Fairmount Line Service Upgrade Study
Weekday Service Only

Evaluation Measures	State of Good Repair *Plus*	Package 1	Package 2	Package 3	Package 4	Package 5
Rationale for the change	Improve transit service and mobility options for low income minority neighborhood of Boston					
Added annual operating cost per annual Fairmount Line passenger	$0.00	$0.25	$1.27	$1.13	$0.93	$0.91
Added annual operating cost per new annual Fairmount Line passenger	$0.00	$6.81	$30.15	$32.54	$16.11	$15.24
Projected annual ridership (weekday only)	993,140	1,861,820	1,916,430	2,533,650	3,427,730	3,500,120
Number of annual new transit riders	508	68,326	81,026	87,630	197,612	208,788
Projected change in annual MBTA operating costs	$0	$465,242	$2,443,194	$2,851,407	$3,182,635	$3,182,635
Projected change in MBTA fare revenue	$66,804	$831,646	$877,572	$1,189,714	$648,771	$550,050
The change in travel time for existing transit riders (in minutes) per day	-785	-27,800	-29,450	-43,160	-55,250	-56,300
Added travel time for existing ridership per new passenger (in minutes)	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
Key characteristics and demographics of the market	Low income transit dependent minority neighborhood of Boston					
Projected capital cost (in millions of dollars)	$8.18	$42.44	$54.44	$70.94	$85.89	$85.89
Capital cost per new transit rider (divert from auto or walk)	NA	$157,773	$170,661	$205,626	$110,394	$104,485
Capital cost per weekday minute of traveler time savings per year	NA	$2.86	$3.53	$3.66	$2.85	NA
Ease and speed of implementation	Medium	Medium	Medium	Low	Low	Low
Changes in regional VMT	0	1,375	1,540	1,540	3,850	3,850
Changes in air quality						
Reduction in CO (in Kg)	0	11	12	12	30	30
Reduction in Nox (in Kg)	0	2	2	2	5	5
Reduction in VOC (in Kg)	0	1	1	1	3	3
Change in average passenger wait time	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
Increased demand for station parking	50	545	545	665	745	745
Number of walk in commuter rail passengers	3,810	6,240	6,455	8,745	12,005	12,290
Number of new non-downtown oriented trips on Fairmount Line	0	1,650	1,700	2,200	3,375	3,450
Contribution to the achievement of policy objectives	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*	*No Data*
Contribution to community goals and objectives	Improve service delivery Improve marketing Improve passenger safety Improve transit connections Improve neighborhood integration Improve existing stations	Improve service delivery Improve marketing Improve passenger safety Improve transit connections Improve neighborhood integration Improve existing stations Provide new stations	Improve service delivery Improve marketing Improve passenger safety Improve transit connections Improve neighborhood integration Improve existing stations Provide new stations Increase service levels	Improve service delivery Improve marketing Improve passenger safety Improve transit connections Improve neighborhood integration Improve existing stations Provide new stations Increase service levels	Improve service delivery Improve marketing Improve passenger safety Improve transit connections Improve neighborhood integration Improve existing stations Provide new stations Increase service levels Reduced Fares	Improve service delivery Improve marketing Improve passenger safety Improve transit connections Improve neighborhood integration Improve existing stations Provide new stations Increase service levels Reduced Fares