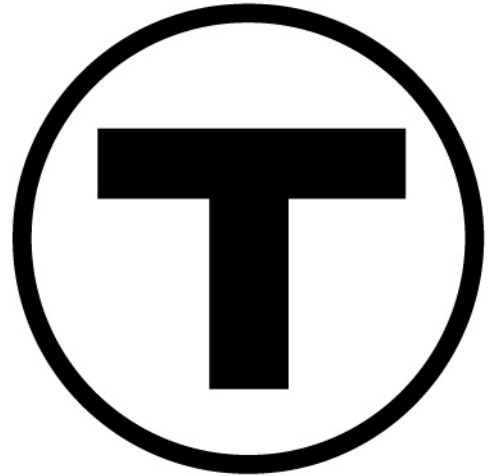

Service Delivery Policy



MBTA Board of Directors approved
June 2, 2010

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Chapter 1: Introduction

Purpose

The purpose of the *Service Delivery Policy* is to ensure that the MBTA provides quality transit services that meet the needs of the riding public and are consistent with the MBTA's enabling legislation and other external mandates, such as Title VI of the Civil Rights Act of 1964, by:

- establishing Service Objectives that define the key performance characteristics of quality transit services;
- identifying quantifiable Service Standards that are used to measure whether or not the MBTA's transit services achieve the Service Objectives and to evaluate whether MBTA services are provided in an equitable manner (as defined by Title VI);
- outlining a Service Planning Process that applies the Service Standards in an objective, uniform, and accountable manner; and
- involving the public in the Service Planning Process in a consistent, fair and thorough manner.

Background

This document presents the 2009 update of the MBTA's *Service Delivery Policy*. The genesis of this current document was the MBTA's 1996 *Service Delivery Policy*, which was based on a study that examined the service standards and service planning methods used by other North American transit systems.¹ The intent of the 1996 *Service Delivery Policy* was to improve the MBTA's performance by adopting best-practice techniques for planning and evaluating services. The 1996 *Service Delivery Policy* anticipated that future revisions to the policy would be necessary and appropriate, and revisions are proposed, when needed, as part of the biennial Service Plan process.

In particular, as new technologies that will enhance the MBTA's ability to collect and analyze data are adopted, policy modifications are needed to adapt the use of this information for service planning purposes. Future revisions to the service standards or the service planning process are reviewed by the public as part of the Service Plan and approved by the MBTA Board of Directors. All modifications to the *Service Delivery Policy* are designed to enhance the effectiveness of the policy and, thus, to improve the quality of MBTA services.

¹ "Final report: Design of Service Quality Measures and Service Evaluation Standards," MacDorman & Associates, Dr. Nigel Wilson, November 27, 1995

Chapter 2: Services & Service Objectives

Services

The MBTA operates a comprehensive set of transit services. This policy addresses all of the MBTA's fixed route services, including:

- **Bus**

For the purposes of this policy, "Bus" encompasses all rubber-tired vehicles, including diesel, CNG, trackless trolley, dual-mode, etc. The MBTA operates several different types of bus services including:

- Local Bus Routes provide full weekday service between 7:00 AM and 6:00 PM for all trip purposes. In general, stops on local routes are closely spaced (where practical), and pick-ups/drop-offs are allowed at all stops over the entire route; however, some local routes operate with limited stops.
- Key Bus Routes are similar to local routes, but generally operate longer hours and at higher frequencies to meet high levels of passenger demand in high-density travel corridors. Some key bus routes operate in dedicated rights-of-way as bus rapid transit (BRT). A list of Key Bus Routes can be found in Addendum A of this policy. Addendum A will be updated as changes to key route designations occur.

In concert with light rail and heavy rail (discussed below), the Key Bus Routes ensure basic geographic coverage of frequent service in the densest areas of the city's core and offer intermodal connections to other MBTA services that extend throughout the region.

- Commuter Bus Routes provide a limited number of peak-direction trips during peak-periods for work commuting purposes. Stops are closely spaced (where practical) and pick-ups/drop-offs are allowed at all stops over the entire route.
- Express Bus Routes provide a limited number of peak-direction trips during peak-periods for work commuting purposes. A large part of any express route is characterized by high-speed, non-stop operation, and a limited number of stops are provided only near route termini. Some restrictions on drop-offs/pick-ups may apply.
- Community Bus Routes provide weekday service between 9:00 AM and 4:00 PM primarily for non-work commuting purposes. Stops are closely spaced (where practical) and pick-ups/drop-offs are allowed at all stops over the entire route.

- **Light Rail**
The MBTA's primary light rail system, the Green Line, provides local service in outlying areas through its surface operations and provides core subway services in the heart of the city with its underground operations. In addition, the MBTA operates the Mattapan High Speed Line, which serves as a Red Line extension from Ashmont Station to Mattapan via light rail.
- **Heavy Rail**
The MBTA operates three heavy rail lines—the Red Line, the Blue Line and the Orange Line—which also provide core subway services.
- **Commuter Rail**
The MBTA's commuter rail routes provide long haul, primarily commuter-oriented services, which link the outer portions of the region with downtown Boston.
- **Boat**
The MBTA provides Inner Harbor Ferry services for travel between destinations in Boston and Commuter Boat services from the South Shore to downtown Boston and Logan Airport.

Service Objectives

The MBTA's mission states that:

The MBTA is a dedicated world-class transit system built upon customer service excellence, accessibility, reliability, state-of-the-art technology, and a diverse workforce that reflects our commitment to the communities we serve.

To evaluate progress toward achieving this mission, the MBTA has identified the following Service Objectives, which the Authority believes represent the most important characteristics of "world-class" transit system:

- **Accessibility**
Services should be geographically available throughout the community and should operate at convenient times and frequencies
- **Reliability**
Services should be operated as scheduled
- **Safety**
Services should be provided a safe manner
- **Comfort**
Services should offer a pleasant and comfortable riding environment

- **Cost Effectiveness**

Services should be tailored to target markets in a financially sound and cost-effective manner.

Service Standards

For each of the Service Objectives, the MBTA has established quantifiable Service Standards, which allow the MBTA to evaluate the performance of MBTA services relative to each of the Service Objectives. These Service Standards are summarized in the following table and are discussed in detail in the Chapter 3.

Table 1: Summary of Service Standards

Service Objective	Service Standard/Guideline
Accessibility	<ul style="list-style-type: none">• Coverage• Span of Service• Frequency of Service
Reliability	<ul style="list-style-type: none">• Schedule Adherence
Safety & Comfort	<ul style="list-style-type: none">• Vehicle Load
Cost Effectiveness	<ul style="list-style-type: none">• Net Cost/passenger

Chapter 3: Service Standards

The Service Standards perform two important functions. First, they establish the minimum or maximum acceptable levels of service that the MBTA must provide to achieve the Service Objectives.² Second, they provide a framework for measuring the performance of MBTA services as a part of the Service Evaluation Process, which is discussed in Chapter 4. Through the Service Evaluation Process, data collected on MBTA services are compared against the Service Standards to determine whether or not individual existing services perform at acceptable levels and to evaluate the potential of possible service changes. The Service Evaluation Process also uses the Service Standards to compare the performance of existing services, with those of proposed service changes and/or possible new services, to prioritize the allocation of resources within the system.

It should be noted that the performance of service is often affected by conditions that are beyond the control of the MBTA. For example, buses may run late on some days as a result of roadwork, lack of snow removal, or lax parking enforcement by a municipality. When such factors are known to be a source of poor performance for a particular service, the MBTA will work with the other involved parties, and the remedies developed for improving the service may be different than when external factors are not a known issue.

Use of the Service Standards in the Service Evaluation Process is designed to help ensure a cost-effective allocation of service within the overall levels of operations funding, which are determined through the annual budget process. The Service Evaluation Process also documents Service Standard violations, which, if they cannot be resolved within the existing fiscal constraints, indicate a failure of the budget to provide sufficient resources to satisfy the Service Objectives discussed in Chapter 2. Over time, only increasing the budget or revising the Service Standards can resolve such inconsistencies.

Each of the Service Standards is expressed as either a threshold that must be met, or a guideline that the Authority strives to meet. Following is a discussion of the MBTA Service Standards, in the context of the Service Objective to which each applies. These Standards address the fixed route modes operated by the MBTA (as described in Chapter 2).

² The Schedule Adherence Standard provides an exception to this general rule. For example, the Span of Service Standard sets the minimum hours of service, and the schedules are built accordingly, so that operation of the service either meets the minimum standard, or does not. By contrast, the Schedule Adherence Standard describes the degree of acceptable variability from the published schedules (for evaluation purposes), but does not prescribe the rules of how service is operated. In the field operators are instructed to adhere to the published schedules as closely as possible (given traffic and road conditions, etc.)—they are not instructed that they have a range of acceptable arrival/departure times.

Accessibility Service Standards

The Accessibility standards/guidelines define the minimum levels of service that will provide access to the transit system, in terms of geographic Coverage, the length of the service day (Span of Service) and the Frequency of Service. Each of these standards varies by mode.

- **Coverage Guidelines**

An important aspect of providing the region with adequate access to transit services is the geographic coverage of the system. Coverage is expressed as a guideline rather than a standard, because uniform geographic coverage cannot always be achieved due to constraints such as topographical and street network restrictions. In addition, coverage in some areas may not be possible due to the infeasibility of modifying existing routes without negatively affecting their performance.

The Coverage guidelines are established specifically for the service area in which bus, light rail, and heavy rail operate, as riders most frequently begin their trips on these services by foot. Because commuter rail and boat are usually accessed via the automobile, the coverage guidelines do not apply in areas where commuter rail or boat are the only modes provided by the MBTA.

Table 2: Coverage Guidelines

Service Days	Minimum Coverage
Weekdays & Saturday	Access to transit service will be provided within a ¼ mile walk to residents of areas served by bus, light rail, and/or heavy rail with a population density of greater than 5,000 persons per sq/mile.
Sunday	On Sunday, this range increases to a ½ mile walk.

- **Span of Service Standards**

Span of Service refers to the hours during which service is accessible. The MBTA has established Span of Service Standards that define the minimum period of time that any given service will operate. This provides customers with the confidence that particular types of services will be available throughout the day.

The Span of Service Standards, stated in Table 3 below, vary by mode and by day of the week, reflecting the predominant travel flows in the region. The standards require that the first trip in the morning in the peak direction of travel (typically toward Boston) must arrive at the route terminal at or before the beginning span of service time (e.g., 7:00 AM for local bus). At the end of service day, the last trip in the evening in the peak direction of travel (typically away from Boston) must depart from the route terminal at or after the ending span of service time (e.g., 6:30 PM for local bus).

Table 3: Span of Service Standards

Mode	Day	Minimum Span of Service	
Bus*	Local Routes	Weekday	7:00 AM – 6:30 PM
		Guideline for high density areas:	
		Saturday	8:00 AM – 6:30 PM
	Sunday	10:00 AM – 6:30 PM	
Community Routes	Weekday	10:00 AM – 4:00 PM	
Express/Commuter Routes	Weekday	7:00 – 6:30 PM (no service required 9:00 AM – 4:00 PM)	
Key Bus Routes	Weekday	6:00 AM – midnight	
	Saturday	6:00 AM – midnight	
	Sunday	7:00 AM – midnight	
Heavy Rail	Weekday	6:00 AM – midnight	
	Saturday	6:00 AM – midnight	
	Sunday	7:00 AM – midnight	
Light Rail	Weekday	6:00 AM – midnight	
	Saturday	6:00 AM – midnight	
	Sunday	7:00 AM – midnight	
Commuter Rail	Weekday	7:00 AM – 10:00 PM	
	Saturday	8:00 AM – 6:30 PM	
Boat	Weekday	7:00 AM – 6:30 PM	

* For the purposes of the Span of Service standard, "Bus" encompasses all rubber-tired vehicles, including diesel, CNG, trackless trolley, dual-mode, etc. The definitions of types of bus services are found in Chapter 2.

The minimum Span of Service indicated in the table above may be extended at either end of the day, based on customer demand and in accordance with the other service standards stated in this policy.

- Frequency of Service Standards**

To maintain accessibility to the transportation network within a reasonable waiting period, the MBTA has established minimum frequency of service levels for each mode, by time of day. On less heavily traveled services, these minimum levels dictate the frequency of service, regardless of customer demand.

Table 4 shows the weekday Time Period definitions used by the MBTA for all modes for both the Frequency of Service and Vehicle Load Standards. Because travel patterns on the weekend are different than on weekdays, specific time periods are not defined for Saturdays and Sundays. Table 5 shows the Minimum Frequency of Service levels for each mode by time period.

Table 4: MBTA Weekday Time Period Definitions

Time Period	Definition
Early AM	6:00 AM – 6:59 AM
AM Peak	7:00 AM – 8:59 AM
Midday Base	9:00 AM – 1:29 PM
Midday School	1:30 PM – 3:59 PM
PM Peak	4:00 PM – 6:29 PM
Evening	6:30 PM – 9:59 PM
Late Evening	10:00 PM – 11:59 PM
Night/Sunrise	12:00 AM – 5:59 AM

Table 5: Minimum Frequency of Service Standards

Mode	Weekday Time Periods	Minimum Frequency*	
Bus**	Local/Community Rts.	AM & PM Peak	30-minute headway
		All Other Periods	60-minute headway (Mid-day policy objective of 30-minute headway in high density areas)
	Express/Commuter Rts.	Saturday & Sunday – all day	60-minute headway
		AM Peak	3 trips in the peak direction
Key Routes	PM Peak	3 trips in the peak direction	
	AM & PM Peak	10-minute headway	
	Early AM & Midday Base/ School	15-minute headway	
	Evening & Late Evening	20-minute headway	
	Saturday – all day	20-minute headway	
	Sunday – all day	20-minute headway	
Light Rail/Heavy Rail	AM & PM Peak Periods	10-minute headway	
	All Other Periods	15-minute headway	
	Saturday & Sunday – all day	15-minute headway	
Commuter Rail	AM & PM Peak Periods	3 trips in peak direction	
	All Other Periods	180-minutes in each direction	
	Saturday – all day	180-minutes in each direction	
Boat	AM & PM Peak Periods	3 trips in the peak direction	
	Off-Peak Periods	180-minute headway	

*The Minimum Frequency of Service standards are primarily expressed as “Headways,” which indicate the number of minutes scheduled between trips on a route.

** For the purposes of the Frequency of Service standard, “Bus” encompasses all rubber-tired vehicles, including diesel, CNG, trackless trolley, dual-mode, etc. The definitions of types of bus routes are found in Chapter 2.

On heavily used services, the minimum frequency of service levels may not be sufficient to meet customer demand. When load levels indicate that additional service is warranted, as defined in the Vehicle Load Standard, the frequency of service will be increased to provide a sufficient number of vehicles to accommodate passenger demand.

Reliability Service Standards

The on-time performance of service is affected by many variables, including traffic congestion, accidents, weather, road/track conditions, infrastructure maintenance work, vehicle failures, etc. The Schedule Adherence Standards provide ways of measuring how reliably services adhere to the published schedules. If a service does not pass the Schedule Adherence Standards, the MBTA will determine the reason why it does not perform reliably and will take action to correct the problems. In terms of service planning, this may mean adjusting running times, changing headways, etc.

- **Schedule Adherence**

Schedule Adherence Standards vary by mode and provide the tools for evaluating the on-time performance of individual MBTA routes. The Schedule Adherence Standards also vary, based on frequency of service; passengers using high-frequency services are generally more interested in regular, even headways than in strict adherence to published timetables, whereas passengers on less frequent services expect arrivals/departures to occur as published.

Bus Schedule Adherence Standards: The Schedule Adherence Standards for bus routes are designed to ensure that routes operate as reliably as possible without early departures, chronic delays, or unpredictable wait and/or travel times.

1. **Bus Timepoint Tests:** To determine whether a bus is on-time at an individual timepoint, such as the beginning of a route, end of a route, or a scheduled point in between, the MBTA uses two different tests based on service frequency:
 - **Scheduled Departure Service:** A route is considered to provide scheduled departure service for any part of the day in which it operates less frequently than one trip every 10 minutes (headway >10 minutes). For scheduled departure services, customers generally time their arrival at bus stops to correspond with the specific scheduled departure times.
 - **Walk-Up Service:** A route is considered to provide walk-up service for any part of the day in which it operates every ten minutes or better (headway ≤10 minutes). For walk-up service, customers can arrive at a stop without looking at a schedule and expect only a brief wait.

A route might operate entirely with walk-up service, entirely with scheduled departure service, or with a combination of both throughout the day. Because any given route may have both types of service, each trip is considered individually to determine whether it represents scheduled departure service or walk-up service, and each timepoint crossed on that trip is measured accordingly. Therefore, there are two separate timepoint tests:

- **On Time Test for Scheduled Departure Timepoints:** To be considered on time, a timepoint crossing of any trip with a leading headway of 10 minutes or more must meet the relevant condition out of the following:
 - **Origin:** The trip must leave its origin timepoint between 0 minutes before and 3 minutes after its scheduled departure time.
 - **Mid-route timepoint:** The trip must leave the mid-route timepoint(s) between 0 minutes before and 7 minutes after its scheduled departure time.
 - **Destination:** The trip must arrive at its destination timepoint between 3 minutes before and 5 minutes after its scheduled arrival time.
 - **On Time Test for Timepoints on Walk-Up Trips:**
 - **Origin or mid-route timepoint:** To be considered on time, any timepoint of a trip with a leading scheduled headway of less than 10 minutes must leave its origin timepoint or mid-route timepoint within 1.5 times the scheduled headway. For example, if “trip A” is scheduled to start at 7:30 AM and the route’s next trip “trip B” is scheduled to start at 7:38 AM, trip B has an 8-minute scheduled headway. Therefore, trip B must start no more than 12 minutes after trip A actually starts for the origin timepoint to be considered on time.
 - **Destination:** The actual run time from the origin timepoint to the destination timepoint must be within 20% of the scheduled run time for the destination timepoint to be considered on time.
2. **Bus Route Test:** The second part of the Bus Schedule Adherence Standard determines whether or not a route is on time, based on the proportion of timepoints on the route that are on time over the entire service day. 75% of all timepoints on the route over the entire service day must pass their on-time tests.

Table 6: Summary of Bus Schedule Adherence Standard

Time Point Test	Origin Timepoint	Mid-Route Time Point(s)	Destination
Scheduled Departure Trips (Headways ≥10 minutes):	Start 0 minutes early to 3 minutes late	Depart 0 minutes early to 7 minutes late	Arrive 3 minutes early to 5 minutes late
Walk-up Trips (Headways <10 minutes):	Start within 1.5 times scheduled headway	Leave within 1.5 times scheduled headway	Running time within 20% of scheduled running time
Route Test	For any given bus route to be in compliance with the Schedule Adherence Standard, 75% of all timepoints must be on-time according to the above definitions over the service period measured.		

Exceptions:

- Express routes that serve only two points do not have a midpoint.
- Express routes may arrive more than 3 minutes early at their final destinations.
- A schedule may note that certain trips will not leave until another vehicle arrives and allows passengers to transfer. (For instance, the last bus trip of the day might wait for passengers from the last train of the day.) When applying the standard, these trips are not included.
- The first trip of the day, which does not have a leading headway, is considered a scheduled departure trip.
- If a route does not have published departure times (such as Silver Line Washington Street, which does not need a published timetable because it runs so frequently all day) its trips shall be considered walk-up trips regardless of scheduled headway.

Light Rail & Heavy Rail Schedule Adherence Standards: As with frequent bus services, passengers on light rail and heavy rail do not rely on printed schedules, but expect trains to arrive at prescribed headways. Therefore, schedule adherence for light rail and heavy rail is measured similarly to the way in which frequent bus service is measured. The percent of individual trips that are on time is calculated, based on a measure of how well actual headways correlate to scheduled headways. In addition, the percent of trip times that correspond to scheduled trip times is measured.

Two different measures are used to evaluate headway performance. For surface light rail and heavy rail, Schedule Adherence is measure based on the percent of trips that operate within 1.5 scheduled headways. For example, a trip with a 4-minute headway would be considered late if the observed headway were greater than 6 minutes (1.5 x 4 minutes). Because the headways in the core area for light rail are less than two minutes, Schedule Adherence is measured by the percent of trips with headways less than 5 minutes. Table 7 provides a summary of the Schedule Adherence standards for Light Rail and Heavy Rail services.

Table 7: Schedule Adherence Standards for Light Rail & Heavy Rail

Mode	Headway Performance	Trip Time Performance
Light Rail – Surface	85% of all trips operated within 1.5 scheduled headways over the entire service day.	95% trips operated within 5 minutes of scheduled total trip time over the entire service day.
Light Rail – Subway	95% of all service operated with headways less than 5 minutes over the entire service day.	95% of all trips operated within 5 minutes of scheduled trip time over the entire service day.
Heavy Rail	95% of all trips within 1.5 headways over the entire service day.	95% of all trips operated within 5 minutes of scheduled trip time over the entire service day.

Commuter Rail & Boat: The Schedule Adherence standards for Commuter Rail and Boat measure the percent of trips that depart/arrive within 5 minutes of scheduled

departure/arrival times. These standards reflect the long distances and wide station spacing of commuter rail, and the absence of intermediate stations on most boat services. Table 8 shows the Schedule Adherence standards for Commuter Rail and Boat services.

Table 8: Schedule Adherence Standards for Commuter Rail & Boat

Mode	Standard
Commuter Rail	95% of all trips departing and arriving at terminals within 5 minutes of scheduled departure and arrival times
Boat	95% of all trips departing and arriving at ports within 5 minutes of scheduled departure and arrival times

Safety & Comfort Service Standard

The public’s perception of comfort and the reality of public safety are influenced by the number of passengers on the vehicle and whether or not a seat is available to each rider for all or most of the trip. The Vehicle Load Standards, which vary by mode and time of day, establish the average maximum number of passengers allowed per vehicle to provide a safe and comfortable ride.

- **Vehicle Load**

As indicated in the Frequency of Service Standard, the level of service provided by the MBTA is primarily a function of demand, as demonstrated through the number of customers using the service at different times during the day. On weekends and during some weekday time periods, most MBTA services operate with sufficient frequency to provide every passenger with a seat. However, at the heaviest weekday travel times or locations some passengers will need to stand.

During time periods when some passengers will be standing, the MBTA will provide sufficient service so that vehicles are not excessively crowded. The purpose of the Vehicle Load Standard is to define the levels of crowding that are acceptable by mode and time period. The time periods used by the MBTA for all modes, for both the Frequency of Service and Vehicle Load Standards, are defined earlier in this chapter (see Frequency of Service Standard).

Because heavy and light rail in the core area are heavily used throughout the day, some standees can be expected during all time periods. For the purposes of this policy, the core area is defined as follows:

Table 9: MBTA Core Area Boundaries

Light Rail & Heavy Rail Core Area	
Blue Line	Bowdoin to Maverick
Orange Line	Back Bay to North Station
Red Line	Kendall to South Station
Green Line	All underground stations as well as Lechmere and Science Park

By mode and time period, the acceptable levels of crowding are shown in the following table. The load standards in the table are expressed as a ratio of the number of passengers on the vehicle to the number of seats on the vehicle. To determine whether a service has an acceptable level of crowding, the vehicle loads are averaged over specified periods of time. Due to scheduling constraints and peaking characteristics, some individual trips may exceed the load levels expressed in the standards.

For most modes the load standards shown represent average maximum loads over any time period on weekdays and over the whole day on weekends. For bus, on weekdays the loads cannot exceed the standard when averaged over any 30-minute segment of an Early AM, AM Peak, Midday School or PM Peak period, or any 60-minute segment of a Midday Base, Evening, Late Evening or Night/Sunrise period. On weekend days, the loads cannot exceed the standard when averaged over any 60-minute segment of the whole service day.

Table 10: Vehicle Load Standards by Mode

Mode	Time Period	Passengers/ Seats**
Bus*	Early AM, AM Peak, Midday School & PM Peak	140%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	
	Surface routes	100%
	Tunnel portions of BRT routes	140%
Green Line	Early AM, AM Peak, Midday School & PM Peak	225%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	
	Core Area	140%
	Surface	100%
Red Line #1 & 2 Cars	Early AM, AM Peak, Midday School & PM Peak	270%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	
	Core Area	140%
	Outside Core Area	100%
Red Line #3 Cars	Early AM, AM Peak, Midday School & PM Peak	334%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	
	Core Area	174%
	Outside Core Area	100%
Orange Line	Early AM, AM Peak, Midday School & PM Peak	225%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	
	Core Area	140%
	Outside Core Area	100%
Blue Line	Early AM, AM Peak, Midday School & PM Peak	225%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	
	Core Area	140%
	Outside Core Area	100%
Commuter Rail	Early AM, AM Peak, Midday School & PM Peak	110%
	Midday Base, Evening, Late Evening, Night/Sunrise & Weekends	100%
Boat	Inner Harbor – All time periods	100%
	Outer Harbor – All time periods	100%

* For the purposes of the Vehicle Load Standard, “bus” encompasses all rubber-tired vehicles, including diesel, CNG, trackless trolley, dual-mode, etc.

** For Bus, Light Rail and Heavy Rail, the Vehicle Load Standard is based on the ratio of passengers to seated capacity at maximum load. For Commuter Rail the load standard is based on the ratio of boarding passengers per vehicle to seated capacity. For Boat the load standard is based on vessel passenger capacity.

In addition to looking at loads within time periods, the MBTA will routinely evaluate loads at the beginning and end of the service day to determine whether changes in frequency and/or span of service are warranted. The Net Cost/Passenger Standard will be used as one means of flagging routes that may be candidates for such changes.

Because there are a number of different types of vehicles in the MBTA’s fleets at any given time, and because the fleets change over time, the actual seating capacity and maximum number of passengers allowed by the load standards for each type of vehicle are included in an addendum to this policy. This addendum will be regularly updated as the fleets change.

Cost-Effectiveness Service Standard

The operation of MBTA service must be conducted within the resource levels budgeted for each mode. It is therefore important to have a measure that can compare the economic productivity of any given route in relation to other routes or to the system average for that mode. As a part of the 1996 *Service Delivery Policy*, the MBTA developed the Net Cost Per Passenger standard to measure the cost-effectiveness of bus routes. This Cost-Effectiveness Standard was developed only for bus at that time, because bus services were considered most appropriate for this type of comparative analysis. Unlike rail services, bus route alignments and services can be easily adjusted to accommodate changes in ridership patterns and demands. The MBTA will consider development of similar service productivity standards for other modes that would allow comparative evaluations within each mode and would support the efficient use of budgeted operating resources.

- **Bus Net Cost per Passenger Standard**

Net cost per passenger is calculated by subtracting the average revenue from the cost of operating a route and dividing by the number of passengers. This ratio reflects the benefits of a given service (measured in customers) against the public cost of operating the service.

During the regular service planning process, all bus routes and their respective net cost per passenger are compared against the bus system average. Routes that have a net cost per passenger more than three times the system average are considered deficient and are subject to review for modifications that could improve the performance. Exceptions to the net cost per passenger standard can be made, on a case-by-case basis, due to extenuating circumstances such as geographic isolation.

Table 11: Bus Cost-Effectiveness Service Standard

Net Cost/Passenger:	$\frac{\text{Operating Costs} - \text{Service Revenue}}{\text{Boarding Customers}}$
Deficient Route:	≥ 3 times the system average

Chapter 4: Service Planning Process

The MBTA regularly evaluates the performance of its services through the service planning process. The primary objective of the service planning process is to ensure that the MBTA uses available resources in the most effective manner by developing strategies to improve performance and/or to reallocate service within the system.

Service Planning Process

The service planning process takes place on two levels. One is the on-going evaluation and implementation of incremental service changes that occur on a quarterly basis. The other is a two-year planning cycle for development of the biennial Service Plan, which can include major restructuring of existing routes and proposals for new services.

The data used for all service evaluations are collected on a regular basis through various means to track and evaluate the performance of services against each of the Service Standards (as defined in Chapter 3).

The primary differences between the on-going service planning process and the planning process used to develop the Biennial Service Plan include:

- the magnitude of the service changes considered (minor or major—as defined below);
- the extent and type of analysis used;
- the level of public participation; and
- whether the effort is incremental or comprehensive in nature.

Minor changes to transit services are made through the on-going service planning process and can be implemented with existing equipment, within the adopted budget, and without significantly affecting route structure or service delivery.

Major changes are ones that will have a significant effect on riders, resource requirements, route structure, or service delivery (as defined in Table 12). These are evaluated and implemented only through development of the Biennial Service Plan (with the exception of new services associated with a major capital investment).

Table 12: Minor & Major Service Changes

Magnitude:	Type:	Resource Implications:
Minor	<ul style="list-style-type: none"> • Running time adjustments • Departure time adjustments • Headway changes to match ridership and service levels (provided the frequency and loading standards are still met) • Changes to stop locations • Alignment changes • Span of service changes within 1 hour or less • Route extensions of 1 mile or less • Route variation modifications 	Changes that can be implemented with existing equipment and within the adopted budget
Major	<ul style="list-style-type: none"> • Major service restructuring • Implementation of new routes or services • Elimination of a route or service • Elimination of part of a route • Span of service changes greater than 1 hour • Route extensions of greater than 1 mile 	Changes that will have a significant effect on resources, and may potentially have a significant effect on riders

The On-going Service Planning Process: The service changes that are evaluated in the on-going service planning process can be initiated in a variety of ways. These include, but are not limited to:

- service requests and/or complaints from the public;
- feedback from Operations staff, such as drivers, garage superintendents or schedule makers;
- proposals made by the MBTA Service Planning staff; and
- studies completed by CTPS (for the Boston MPO), by other regional entities, or by municipalities.

Service Planning staff screen all potential service changes to determine whether they are minor or major in nature (as defined above). In addition, each potential change is considered using the criteria listed below (not all criteria are necessarily used in every evaluation).

- Performance measured against the Service Standards
- The rationale for the change
- Net cost per new passenger
- Net savings per lost passenger
- Changes in ridership
- Changes in travel time for existing riders
- Changes in operating costs
- Changes in fare revenue
- Key characteristics and demographics of the market
- Contribution to the achievement of external mandates, such as Title VI
- Other factors, as appropriate

Proposed minor changes that have been analyzed by the Service Planning Department are presented to the Service Committee, which is chaired by the Director of Planning and Schedules or Manager of Service Planning, and includes representatives of the following departments:

- Service Planning
- Plans and Schedules
- Operations: Bus, Heavy Rail, Light Rail, or Railroad
- Private Carrier Services
- Operations Support
- Customer Support Services
- Office for Transportation Access
- Public Affairs
- Intergovernmental Affairs
- Other Departments, as appropriate

Minor changes that are approved by the Service Committee, and that can be made within the adopted budget, are implemented as soon as possible—usually in the next quarterly schedule change.

The Biennial Service Plan Process: Every two years, the MBTA develops a biennial Service Plan that describes the performance of the system and the services that will be operated in the upcoming two years. The plan encompasses all fixed-route services and includes:

- a description of the performance of existing services;
- recommendations for major service changes;
- a discussion of service changes that were considered and/or evaluated, but are not recommended at the time; and
- a general review of the effectiveness of previous major service changes (major service changes would not be reported on in the service planning cycle immediately after their implementation, but would be evaluated in the following planning cycle to allow time for ridership to build).

As with the on-going service planning process, a major goal in the development of the biennial Service Plan is to ensure that the MBTA uses available funds in

the most effective manner. However, this planning process can also identify major service changes and enhancements that have merit, but that cannot be funded within the existing operating budget. In such cases, the need for additional operating funds can be identified for request, and the service can be implemented when sufficient resources become available.

A key component of the biennial service planning process is an evaluation of the performance of existing services, as measured using the Service Standards found in Chapter 3 of this policy. Based on this analysis, the Service Planning Department proposes major service changes that will improve the performance of services that fail any of the Service Standards. (Minor service changes may also be identified at this time; however, they may be implemented as soon as possible, rather than waiting for the full acceptance of the Service Plan.)

Service changes considered in the biennial Service Plan can also be proposed through all of the same avenues as those considered in the on-going service planning process. Indeed, many may be identified through the on-going screening of projects. In addition, public input for the biennial Service Plan is sought through public meetings and public hearings, as described later in this chapter.

During development of the biennial Service Plan, potential major changes are evaluated through a comparative evaluation to determine which represent the best allocation of available resources. To complete the comparative evaluation, the Service Planning Department creates a list of all proposed service increases and reductions. The proposed service increases are ranked using the net cost per new passenger: those that garner the most new passengers at the lowest incremental cost are ranked highest priority for implementation. The proposed service reductions are ranked using the net savings per lost passenger: those that save the most money with the lowest loss of passengers are ranked highest priority for implementation.

Other evaluation criteria are also used in the comparative evaluation, as appropriate, to determine the rank of service change proposals. For example, higher priority would be given to a proposed change that improved a route's performance on one or more of the service standards (as defined in Chapter 3).

After the rankings are completed, the savings from the major service reductions are compared to the cost of major service enhancements to help select the proposed service changes. The goal is to maximize ridership and service performance in a cost-effective manner. The recommendations that result from this process are reviewed by the Service Committee to assess the feasibility of implementation before they are included in the Preliminary Service Plan. Each Preliminary Service Plan is made available to the public for review and comment (as described later in this chapter). A list of the final recommendations, an indication of the routes that still violate one or more of the service standards, and the Title VI analysis are then submitted to the MBTA Board of Directors for final approval before the changes are implemented.

Table 13: Summary of Service Planning Processes

	On-going Service Planning Process	Biennial Service Plan Process
Magnitude of changes:	<ul style="list-style-type: none"> • Minor 	<ul style="list-style-type: none"> • Major
Initiation of changes:	<ul style="list-style-type: none"> • Requests/complaints from public • Bus Operations feedback • Service Planning Staff • Service Studies 	<ul style="list-style-type: none"> • Requests/complaints from public • Bus Operations feedback • Service Planning Staff • Service Studies • Public Meetings
Evaluation of changes:	<ul style="list-style-type: none"> • Route or garage level analysis using the Evaluation Criteria • Review by Service Committee 	<ul style="list-style-type: none"> • Route or garage level analysis using the Evaluation Criteria (including performance review of all services using Service Standards) • Comparative evaluation of proposed service changes, and possible new services • Review by Service Committee • Public review and comment • Title VI analysis
Implementation of changes:	<ul style="list-style-type: none"> • Quarterly with regular schedule changes 	<ul style="list-style-type: none"> • Biennially, upon approval of the Service Plan by the MBTA Board of Directors

Public Participation

Public participation in the service planning process varies somewhat by mode and occurs as both an on-going process and as a Service Plan specific process. The purpose of public involvement in the service planning process is to promote a regular dialogue with existing and potential riders, elected officials, and communities regarding their ever-changing service needs

- **On-Going Public Outreach**

The MBTA provides avenues for on-going communication through the MBTA's website, as well as the customer complaints phone line and comments sent to individual MBTA officials. Service related comments/requests are directed to the appropriate department for consideration and response. Upon request, MBTA staff also attend public meetings held by municipalities and meetings with public officials to address specific service issues. In addition, from time to time, the MBTA may conduct specific market or route-based surveys to gather direct input on a major service change or potential new service.

- **Biennial Service Plan Public Outreach**

Service Plan outreach efforts are intended to provide members of the public with the opportunity to submit service requests to the MBTA for consideration in development of the Biennial Service Plan. To this end, the MBTA solicits ideas for service changes through written comments (submitted on-line or via the mail), as well as through public meetings throughout the service area, before a draft plan is written.

Upon completion of the draft biennial Service Plan, the MBTA schedules a second round of public meetings in appropriate locations. At these open meetings the MBTA presents the analysis and issues behind the proposed service changes and solicits public comments on them. In addition, at least one Public Hearing is held to receive formal public comments on the draft Biennial Service Plan. MBTA staff then assess and analyze the suggestions made through the public comments and, as appropriate, incorporate them into the final recommendations that go to the MBTA Board of Directors for approval before implementation.

All Service Plan public notifications, meetings, and hearings will conform to the requirements of the Americans with Disabilities Act, Title VI of the Civil Rights Act of 1964, and MBTA policies associated with these laws.

Glossary of Terms & Acronyms

BRT: Bus Rapid Transit

CAD/AVL: Computer Assisted Dispatch/Automatic Vehicle Locator

CNG: Compressed Natural Gas

Coverage: The geographic coverage of the MBTA system (specifically for the service area in which bus, light rail, and heavy rail operate). Coverage is a Service Guideline that is used to measure progress toward achieving the Accessibility Service Objective.

CTPS: Central Transportation Planning Staff. CTPS is the staff to the Boston MPO.

Dual Mode: Buses that can operate using electrical power from overhead catenary wires or using a diesel engine to power the electric traction motors that turn the wheels.

Fixed Route Service: MBTA services that operate on designated routes with published timetables including all light rail, heavy rail, commuter rail, and boat services, and all bus service except for The Ride, which operates as paratransit.

Frequency of Service: The number of trips/hour provided on a route (e.g., a route that operates every 15 minutes has a frequency of 4 trips/hour). Frequency of Service is one of the Service Standards that are used to measure progress toward achieving the Accessibility Service Objective.

Headway: The number of minutes between scheduled trips on a route (e.g., a route that operates 4 trips/hour has a 15-minute headway).

Heavy Rail Services: Red Line, Orange Line, and Blue Line.

Key Routes: Key Bus Routes are similar to local routes, but have policy standards for a longer Span of Service and a higher Frequency of Service

Leading Headway: The number of minutes between a trip and the trip before it.

Light Rail Services: Green Line and Mattapan High Speed Line.

MPO: Metropolitan Planning Organization.

Net Cost/Passenger: Reflects the benefits of a given service (measured in customers) against the public cost of operating the service. Net Cost/Passenger is the Service Standard that is used to measure progress toward achieving the Cost-Effectiveness Service Objective.

Peak Direction: The direction in which most commuters are traveling on a route during the peak period (e.g., toward Boston in the morning and away from Boston in the afternoon).

Schedule Adherence: An indication of on-time performance, or how reliably services adhere to the published schedules. Schedule Adherence is the Service Standard that is used to measure progress toward achieving the Reliability Service Objective.

Service Evaluation Process: Through the Service Evaluation Process, data collected on MBTA services are compared against the Service Standards to determine whether or not individual existing services perform at acceptable levels and to evaluate the potential of possible service changes. The Service Evaluation Process also uses the Service Standards to compare the performance of existing services, with those of proposed service changes and/or possible new services, to prioritize the allocation of resources within the system.

Service Objectives: To evaluate progress toward achieving its mission, the MBTA has identified five Service Objectives that the Authority believes represent the most important characteristics of high quality service: 1) Accessibility—services should be geographically available throughout the community and should operate at convenient times and frequencies; 2) Reliability—services should be operated as scheduled; 3) Safety—services should be provided a safe manner; 4) Comfort—services should offer a pleasant and comfortable riding environment; and 5) Cost Effectiveness—services should be tailored to target markets in a financially sound and cost-effective manner.

Service Plan: Through preparation of a biennial Service Plan, the MBTA ensures that the MBTA uses available funds in the most effective manner by evaluating the performance of existing services against the Service Standards. Based on this analysis, the Service Planning Department proposes new service and/or major changes to existing services to improve their performance on the Service Standards.

Service Planning Process: The MBTA regularly evaluates the performance of its services through the service planning process. The primary objective of the service planning process is to ensure that the MBTA uses available resources in the most effective manner by developing strategies to improve performance and/or to reallocate service within the system. The Service Planning Process includes on-going service evaluation and modification, as well as preparation on the biennial Service Plan.

Service Standards/Guidelines: The Service Standards/Guidelines perform two important functions: 1) they establish the minimum or maximum acceptable levels of service that the MBTA must provide to achieve the Service Objectives; and 2) they provide a framework for measuring the performance of MBTA services in the Service Evaluation Process.

Span of Service: Refers to the hours during which service is accessible and is defined by the times that a service begins in the morning and ends in the evening. Span of Service is one of the Service Standards that are used to measure progress toward achieving the Accessibility Service Objective.

SSTAC: Service Standards Technical Advisory Committee.

Title VI: Title VI of the Civil Rights Act of 1964 requires that transit agencies that receive federal funding demonstrate that they do not discriminate in the provision of services on the basis of race, color, or national origin.

Vehicle Load: Defines the level of passenger crowding that is acceptable for a safe and comfortable ride. Vehicle Load is expressed as a ratio of the number of passengers on the vehicle to the number of seats on the vehicle. Vehicle Load is the Service Standard that is used to measure progress toward achieving the Safety and Comfort Service Objectives.

Key Bus Route Addendum

Key Bus Routes are similar to local routes, but have policy standards for a longer Span of Service and a higher Frequency of Service. The Key Bus Route Network was designed to complement the MBTA's light and heavy rail system and to ensure that all high-demand corridors have access to frequent transit service seven days a week.

The MBTA's *Service Delivery Policy* establishes Key Bus Route Service Standards, which make the Span of Service and the peak period Frequency of Service on Key Bus Routes equivalent to light and heavy rail. This guarantee of high-frequency service provides assurance to riders that they will not have to wait long for the next bus, even if they do not know the published schedule. To encourage this kind of "walk up" use of Key Bus Routes, they will be included with the light and heavy rail system on MBTA's "spider" maps as they are updated. Key Bus Routes will also be designated on the MBTA's system map, schedule cards and other marketing materials.

Initially, Key Bus Routes were selected based on their demonstrated heavy demand for service on all days of the week and to provide high frequency service to areas of the region's urban core not served by light or heavy rail. Additional Key Bus Routes may be designated based on consideration of a number of characteristics. Not all of these characteristics must be present in a given route to make it eligible for Key Bus Route status. Each route will be considered in the context of the MBTA's transit system as a whole and within available operating resources.

The characteristics that may trigger consideration of a route for Key Bus Route status include:

- high ridership demand;
- connectivity within the system;
- geographic coverage;
- accommodation of major new development; and
- operation as BRT (all BRT route segments that operate in dedicated rights-of-way will automatically be designated as Key Bus Routes).

The Key Bus Routes currently include:

- Silver Line Washington Street: Dudley Station – Downtown Crossing via Washington St.
- Silver Line Waterfront: South Station – Silver Line Way
- Route 1: Dudley – Harvard via Mass. Ave.
- Route 15: St. Peter's Square – Ruggles via Dudley
- Route 22: Ashmont – Ruggles via Grove Hall
- Route 23: Ashmont – Ruggles via Codman Square
- Route 28: Mattapan – Ruggles
- Route 32: Wolcott Square – Forest Hills
- Route 39: Forest Hills – Back Bay
- Route 57: Watertown – Kenmore via Oak Square

- Route 66: Harvard – Dudley via Allston
- Route 71: Watertown Square – Harvard via Mount Auburn St.
- Route 73: Waverley – Harvard via Mount Auburn
- Route 77: Arlington Heights – Harvard via Mass. Ave.
- Route 111: Woodlawn – Haymarket Station
- Routes 116 & 117: Broadway @ Park Avenue – Maverick Station (the corridor in which the trunk portions of both routes operate is assigned Key Bus Route status)

Vehicle Load Addendum

Bus & Trackless Trolley	Fleet ID	Number of Seats	Peak Load Standard	Peak Max Load
RTS 40' Diesel	0001-0400	40	140%	56
Flyer 40' Electric Trolley Bus	4000-4049	44	140%	62
New Flyer 40' Emission Controlled Diesel	0600-0754	39	140%	55
New Flyer 60' Hybrid Diesel	1200-1224	57	140%	80
New Flyer 40' Compressed Natural Gas	6000-6016	39	140%	55
NABI 40' Compressed Natural Gas	2001-2299	39	140%	55
Neoplan 40" Emission Controlled Diesel	0401-0593	38	140%	53
Neoplan 40' Electric Trolley Bus	4101-4128	31	140%	43
Neoplan 60' Compressed Natural Gas	1001-1044	57	140%	80
Neoplan 60' Dual-Mode Articulated	1101-1124	47	140%	66
Neoplan 60' Airport Dual-Mode Artic.	1125-1132	38	140%	53

Rapid Transit	Fleet ID	Number of Seats	Peak Load Standard	Peak Max Load	Off Peak Core Area Load Standard	Off Peak Core Area Max Load
Green Line Type 7	3600-3719	46	225%	104	140%	64
Green Line Type 8	3800-3899	44	225%	99	140%	62
Mattapan PCC	3087-3268	40	210%	84	NA	NA
Blue Line	0600-0669	42	225%	95	140%	59
Orange Line	01200-01319	58	225%	131	140%	81
Red Line #1 Cars	01500-01651	63	270%	170	140%	88
Red Line #2 Cars	01700-01757	62	270%	167	140%	87
Red Line #3 Cars	01800-01885	50	334%	167	174%	87

Commuter Rail	Fleet ID	Number of Seats	Peak Load Standard	Peak Max Load
Pullman	200-258	114	110%	125
Bombardier	350-389	127	110%	140
Bombardier	600-653	122	110%	134
Bombardier	1627-1626	122	110%	134
Kawasaki	700-749	185	110%	204
Kawasaki	750-781	182	110%	200
Kawasaki	900-932	180	110%	198
Kawasaki	1700-1724	175	110%	193
MBB	500-532	94	110%	103
MBB	1500-1533	96	110%	106

Boat	Vessel Type	Peak Max Load
Flying Cloud	Catamaran	149
Lightning	Catamaran	149
Voyager III	Catamaran	349
Nora Vittoria	Catamaran	400
Aurora	Catamaran	400
Matthew J. Hughes	Mono Hull	348
Massachusetts	Mono Hull	346
Rookie	Mono Hull	149
Rita	Mono Hull	190

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1.258J / 11.541J Public Transportation Systems
Spring 2017

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