MIAMI-DADE TRANSIT

Service Standards

Miami-Dade Transit
Service Planning & Scheduling
701 NW First Court
Miami, FL 33136
www.miamidade.gov/transit

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PURPOSE

This document formalizes Miami-Dade Transit's (MDT) service standards, the framework for guiding the decisions on which services are created and evaluated. This framework is applied to best serve the citizens' varied travel needs, as well as achieve our mission of providing the highest possible quality service within the available budgetary resources. MDT's service standards provide consistent and fair evaluation of both existing and proposed services. MDT service standards follow procedures published by the Transportation Research Board's Transit Cooperative Research Program (TCRP) of the National Academies.

These service standards are intended to support the goals and objectives of Miami-Dade County. The objectives and the resources available to attain them can be expected to change over time. Therefore, these service standards will be revised periodically to reflect those changes. Previous period experience as well as changes in Miami-Dade County's goals and objectives, will be used to determine whether any standards can be added or revised.

The overall mission of MDT is "*to meet the needs of the public for the highest quality transit service: safe, reliable, efficient, and courteous.*" These service standards are applied to improve the efficiency of existing routes and address the needs of the community by implementing new bus service. These service changes and implementation must meet the required standards.

The relationship between MDT's Service Standards and the agency budget is dynamic. The level of service MDT provides to patrons has a direct impact on the operating and capital budgets. In turn, service standards affect the amount of service delivered, and the amount of service to be provided within the bounds of existing financial resources. Balancing transit needs and budget constraints is very challenging, and adjustments are required between the costs and benefits of providing transit service.

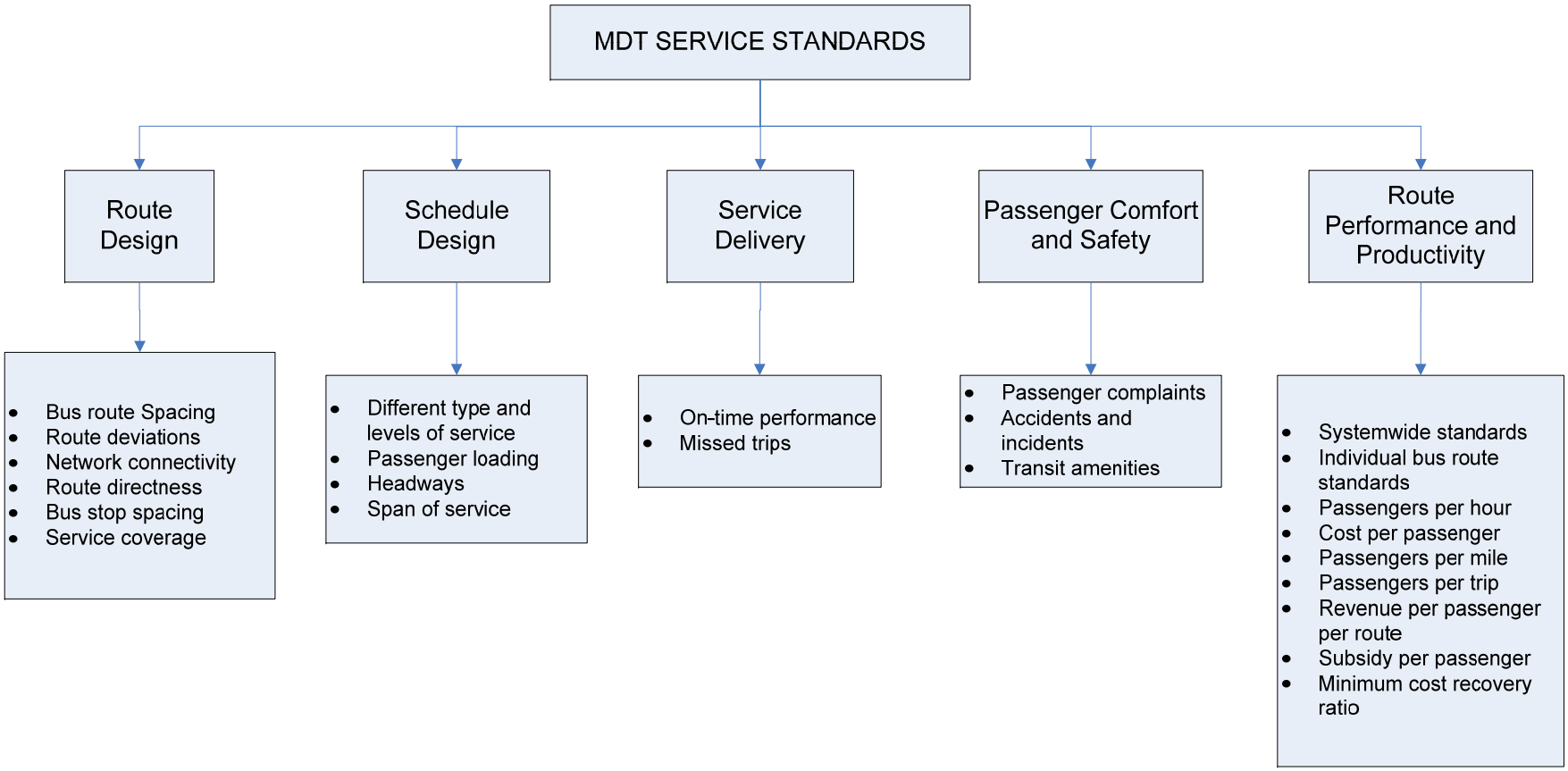
The application of service standards leads to a fair, equitable, and objective comparison of all requests and proposals generated from the general public, elected officials, and

MDT staff. These service standards are maintained and applied to be consistent in the evaluation of service proposals and to ensure that the service being provided represents the most cost-effective use of the Miami-Dade County's resources. MDT service standards establish minimum, maximum, and recommended levels of service. The purpose of MDT's standards is to identify routes which are most in need of service changes, such as restructuring to eliminate lower-productivity segments or branches, adjusting service frequency to better reflect the demand for service, or providing additional promotion of less patronized routes. Routes which do not meet MDT standards are not automatically selected for elimination. Decisions to eliminate a route is only intended as a last resort, when it has been determined that no cost-effective actions are available to improve the productivity of the route. There are two primary applications for the ongoing use of the service standards:

1. The use of standards to evaluate existing services, and
2. Use of standards to evaluate proposals for new service

The service planning process considers four major divisions within Miami-Dade Transit: Metrobus, Metrorail, Metromover, and Special Transportation Services (STS). Metrobus standards include information on the design and redesign of routes and schedules, and a process for route performance evaluation. For Metrorail, service schedule design standards are the only guiding factors since the route follows a set alignment. The operating plan forms the basis for the Metromover service standards. Finally, Special Transportation Services standards include performance and productivity Demand-Response.

The numerical values of these service standards will be evaluated yearly, using the most recent twelve-month period for which data is available. The evaluation compares the current values of productivity standards versus those from the previous year. Operating cost data for the previous year is examined to account for system-wide increases or decreases in expenditures.


MDT SERVICE STANDARDS
Route Design
Schedule Design
Service Delivery
Passenger Comfort and Safety
Route Performance and Productivity
Bus route Spacing
Route deviations
Network connectivity
Route directness
Bus stop spacing
Service coverage
Different type and levels of service
Passenger loading
Headways
Span of service
On-time performance
Missed trips
Passenger complaints
Accidents and incidents
Transit amenities
Systemwide standards
Individual bus route standards
Passengers per hour
Cost per passenger
Passengers per mile
Passengers per trip
Revenue per passenger per route
Subsidy per passenger
Minimum cost recovery ratio

SERVICE PLANNING PROCESS

MDT's service planning process starts by using its service standards to evaluate current service. Many planning and design elements are taken into account when considering a service change. MDT's service changes address issues of route efficiency, cost effectiveness, operational feasibility, and the availability of resources.

MDT applies its service standards to:

- Improve route productivity while keeping customer impact to a minimum
- Assure that service is provided in a fair, consistent, and equitable manner, considering transit-dependent areas / regions
- Provide a baseline for service planning of bus route alignments, and scheduling frequencies for all transit modes

Data collected on MDT service is compared against the service standards to determine whether or not existing services perform at acceptable levels. Remedial action plans are developed to bring the service up to standards, when they are not acceptable. Ridership data is collected using Automatic Passenger Counters (APC), and via manual ride checks. As part of the process this data is evaluated to perform the following remedial actions:

- Enhance/Reduce per-route service span
- Increase/Decrease frequency
- Modify/Eliminate duplicative service
- Modify/Eliminate low ridership route segments
- Modify/Eliminate weekend service (Saturday, Sunday or both)
- Modify/Eliminate off-peak service
- Modify/Eliminate low productivity trips
- Market/Promote low ridership routes

The service planning process identifies and documents service deficiencies. If continued remedial actions cannot bring a service up to MDT's service standards, it may be an indication of changes in demand or travel patterns. Reallocating the resources may be the only alternative to resolve such service deficiencies.

MDT continuously evaluates the performance of its services, analyzing data and developing recommendations for service changes as justified through the use of service delivery standards. Applying a service standard process assures that available resources are deployed in the most effective manner. Although the service routes and schedules are evaluated continuously, major service changes are implemented in June or November of each calendar year, per the Collective Bargaining Agreement with the Transport Workers Union.

Minor recommended changes to service, as defined by Section 2-150 of the County Code, can be implemented as required with the approval of the Administration. Minor changes are defined as modifications affecting less than a quarter (25%) of a route. Major recommended changes, those above the 25% threshold, require approval by the Board of County Commissioners after a public hearing.

The service planning process targets only short-range plans, which are six to eight months into the future. Long-range plans, such as the Transportation Improvement Program (TIP), the Transit Development Plan (TDP), and the Long-Range Transportation Plan (LRTP), are incorporated into the short-range planning process in order to align long-term visions with short-term goals.

MDT works towards the implementation of route and scheduling service changes with input and collaboration from other divisions within the department. These divisions assist in the planning, scheduling, and implementation of the various modes of transit service. Each division works as a team to plan design and deliver optimal transit services to its community.

Planning & Scheduling Flow Chart

SERVICE COVERAGE

Miami-Dade County's policy establishes that ninety percent (90%) of the County population within the Urban Development Boundary (UDB) shall be provided with transit service. The Mass Transit sub-element of the Comprehensive Development Master Plan (October 2006 edition) adopted by Miami-Dade County establishes the following minimum service levels:

> *The minimum peak-hour mass transit level of service shall be that all areas within the Urban Development Boundary (UDB) of the Land Use Plan which have a combined population and work force of 10,000 persons per square mile shall be provided with public transit having a minimum headway of 30 minutes and average route spacing of one mile provided that:*
>
> *The average combined population and employment density along the corridor between the existing network and the area of expansion exceeds 4,000 persons per square mile, and the corridor is 0.25 miles on either side of any necessary new routes or route extensions to the area of expansion.*
> *Areas with lower density will be provided with lower-frequency peak only bus service, or have access to park-and-ride lots within 15 miles*

Service will be provided along major arterials at a route spacing of one mile and one-half mile space for the urban core. The urban core or "the mainland" is defined as, inclusive of NW/NE 79 Street on the north, NW/SW 42 Avenue (Le Jeune Road) on the west, Coral Way on the south and Biscayne Bay on the east, including the area south of 96 Street on Miami Beach.

Geographic coverage may not always be achieved due to constraints such as street network restrictions, or the infeasibility of modifying existing routes without negatively affecting their overall performance. In some cases, it may not be economically feasible to implement and/or modify service coverage. Careful consideration is exercised when such cases arise.

Miami-Dade Transit's Coverage Area

ROUTE DESIGN

MDT uses route design standards to design or redesign of a pathway on which a bus route operates. The factors considered in developing or modifying a route include service area characteristics (population, employment, transit-dependency), route type (express, limited, local), route spacing, travel directness, bus stop spacing, and bus stop amenities.

Bus Service Type

Trunk Routes

MDT designs local trunk bus service in Miami-Dade County to collect and distribute high-turnover ridership along developed arterials radiating to and from the area commonly referred to as the Miami Central Business District (CBD). This service is characterized by frequent stops, short passenger trips, and slow average bus speeds.

Feeder Routes

MDT uses local feeder routes mainly to link trunk routes, though many feeders also serve high density corridors with internal travel markets. This type of service provides travel opportunities linking the feeder routes with other local bus service provided by municipalities, and/or Metrorail and/or Metromover stations. MDT feeder routes also include those which do not directly enter the Miami CBD.

Circulator

MDT uses a circulator, or shuttle bus, for a short route connecting two transportation centers, or as a feeder to another service. For MDT, these routes include the Tri-Rail commuter rail stations in Miami-Dade County, and short area-specific routes.

Limited

MDT uses limited-stop service to serve a limited number of specific bus stops along a route. The MAX routes serve stops at major transfer points or approximately every one-half mile (in the system core and CBD) to one mile (in the non-urban or suburban areas) along the route. This type of route has characteristics of both express and local service.

With fewer stops, the limited routes have significantly increased operating speeds when compared to local service.

Busway

MDT's South Miami-Dade Busway is an exclusive, dedicated two-lane corridor dedicated solely for bus service along U.S. 1 from SW 344th St in South Miami-Dade to the Metrorail Station at Dadeland South. The Busway has bus stop stations along the corridor, with preferential signal phasing provided for the buses at each intersection. Several bus routes currently operate on the Busway. Most of these routes are considered limited-stop service, or have portions that offer limited service, due to the nature of the Busway service and the number of stops.

Express

MDT uses express service as service that has fewer stops and operates at a higher speed than local service. Express routes serve outlying areas (serving designated park-and-ride lots or shopping centers), some with direct service to the CBD. They usually operate along a freeway or major arterial road to increase the operating speed.

Special Transportation Service (STS)

MDT has STS available for people with disabilities who cannot ride Metrobus, Metrorail, or Metromover. STS offers shared-ride, door-to-door travel in accessible vehicles throughout most of Miami-Dade County, in some parts of South Broward County, and in Monroe County Upper to Middle Keys. STS operates 24 hours a day, seven days a week, including most holidays. STS is used for trips to medical appointments, school, work, shopping, business, or recreation. Air-conditioned minivans, small buses, lift-equipped vans, and sedans transport passengers with disabilities safely in a clean, smoke-free environment.

Bus Route Spacing

The average distance between parallel routes is referred to as route spacing. A high level of accessibility enhances the attractiveness of transit. As such, MDT service is

designed to provide all segments of the population with reasonable access from residential areas to areas of employment and essential services. A strong measure of accessibility is the distance between transit routes. A trade-off must be made between an acceptable walking distance and the frequency of service provided in these areas. Nonetheless, it may be necessary to duplicate service where routes merge such as at a Metrorail station, shopping center, or in the Central Business District.

Factors affecting route spacing include geographical conditions, population concentrations, and trip generators and attractors. MDT's standard is to provide service along major arterials at a spacing of one mile; with one-half mile in the urban core, where densities and transit dependency are typically high.

During late night and overnight hours, route spacing will be based on demand along major travel arterials.

Development Characteristics	Distance between Routes *
Urban core	1/2 mile
Suburban and Major Arterials	1 mile
Low Density (Residential/Undeveloped)	As needed

Bus Route Directness

MDT route alignments are as direct as possible to maximize average speed and minimize travel time and miles of operation. Deviations from a direct path from start to end of a route shall not exceed 125% of the direct start to end travel time of a route.

Route deviations are evaluated to determine if the total additional travel time for all through passengers does not exceed five minutes for each rider boarding or alighting along the deviation.

$$\frac{P(t) * VTT}{P(d)} \leq 5 \text{ minutes}$$

where: P(t) = number of through passengers

VTT = additional vehicle one-way travel time,

P(d) = number of passengers served by the deviation

Occasionally, it may be reasonable that MDT deviate a route to a trip generator location, such as a mall or employer site, where there is no alternative transit service to that location. When a deviation is evaluated, the total additional travel time for all through passengers shall not exceed five minutes for each rider boarding or alighting along the deviation. The decision to deviate considers the impact the deviation will have to its existing on-board customers and weigh it against the potential gains in new ridership. When considering a deviation, MDT looks at the gain in convenience to those passengers who are boarding or alighting during the deviation must be balanced against the additional travel time for the passengers traveling through to their final destination.

Bus Stop Spacing

The spacing of bus stops has a major impact on the performance of MDT system. Bus stop spacing affects the riders' overall travel time and, as a result, the demand for transit service. In general, MDT analyses the trade-off between close stops with shorter walking distances but more frequent stops (resulting in longer bus trips for riders), and stops placed further apart with longer walking distances, but less frequent stops (resulting in shorter bus trips). When MDT evaluates locations for Metrobus stops, it is important to strike a balance among passenger convenience, effect on average speed, and safety. The spacing of stops is determined by the nature of the adjacent development. Locations of critical need, such as locations with a high population or the elderly or persons with disabilities, have modified spacing to allow for better accessibility to these patrons with special needs and limited mobility.

MDT uses the following standards for bus stop spacing:

Density	Stops per mile
High density, CBD, shopping centers, special needs	5
Medium density, fully developed residential area	4
Low density, residential	3
Rural	2

Service Type	Stops
Local	Average 5 stops per mile
Limited / Busway	1-2 stops per mile Stops at all major transfer points
Express	Closed door service for at least 50% of the total route length
Circulator	Local or as needed
STS	Door-to-door

SCHEDULE DESIGN

MDT uses criteria for schedule design to establish or re-establish the scheduled interval between buses, and the hours during which a route operates. Factors influencing frequency of boarding are the use of clock-face headways and loading guidelines.

Span of Service

The time between the first and last trip operated on a route defines the span of service. In addition, service span specifies the minimum period of time service will operate at any point in the system. This gives customers confidence that direct and connecting service will be provided during the span hours. The minimum hours of operation for Metrobus service vary by day of week and reflect the predominant peak travel flows in the regions. Evening and weekend service and their respective frequencies will be based on the estimated and actual productivity and customer demand.

Express routes operate at minimum during the peak a.m. and p.m. periods of weekday service, though demographic characteristics and work hours of the area may require a different span of service. Some routes may require only midday service due to special rider demands. The following are the MDT standards:

Scheduling Time Periods		
Peak	Morning Peak	6:00 am – 9:00 am
	Afternoon Peak	3:00 pm – 6:00 pm
Off-Peak	Early Morning	5:00 am – 6:00 am
	Midday	9:00 am – 3:00 pm
	Evening	6:00 pm – 9:00 pm
	Late Night	9:00 pm – 12:00 am
	Overnight	12:00 am – 5:00 am
	Weekend	6:00 am – 7:00 pm

Current Service Span		
Service	Weekday	Weekends
Express Service	Peak Hours Only	Peak Hours Only
Busway	24 hours*	24 hours*
Metrobus	24 hours*	24 hours*
Metrorail	5:00am – 12:00am	5:00am – 12:00am
Metromover	5:00am – 12:00am	5:00am –12:00am
STS	24 hours	24 hours

*select routes

Differing Types and Levels of Service

Metrobus Service Type	Maximum Standees
Express	0%
Busway	15%
Limited	30%
Local	45%

Passenger Loading

The intent of loading standards is to balance safety, passenger comfort and operating efficiency. The frequency of service provided on a route is at least equal to the maximum headway to accommodate changing passenger loads. MDT's vehicle load standards define acceptable passenger loads at different times of the day to help ensure acceptable levels of passenger comfort and operating efficiency. Loading standards are applied and the service is adjusted through the continuous monitoring of the performance measures.

The maximum passenger load factor for a single trip will not exceed 160%. Premium service refers to limited and express routes. Loading standards are at the maximum load point during a 30 minute interval of service. When elderly ridership exceeds 20% of the ridership of a route, the loading standard will not exceed 100%, except during the peak hours where the standard is 110%. When the standing time on a trip is of short duration (less than or equal to 10 min.) such as school trippers with low elderly ridership, the maximum load for a single trip can be 160%**.**

Average Maximum Loading Standards by Time Period for Bus				
Headway (min.)	Peak	Midday/Weekend	Night	Premium
1 – 15	160%	120%	110%	120%
16 – 30	130%	110%	100%	100%
31 – 60	110%	100%	100%	-NA-

The standards for Metrorail passenger loading is for normal scheduled service at the peak load point during a 30 minute interval of service. When loading standards are exceeded, additional cars are added, if possible, prior to decreasing headways.

Average Maximum Loading Standards by Time Period for Rail			
Headway (min.)	Peak	Midday/Weekend	Night
1 – 10	145%	125%	100%
11 – 30	130%	110%	100%

Average Maximum Loading Standards by Time Period for Mover			
Headway (min.)	Peak	Midday/Weekend	Night
1.5 – 3	75%	75%	75%

Headway

Headway is the interval of time between two vehicles running in the same direction on the same route.

Maximum Bus Headways

Maximum Metrobus Headway (minutes)				
Operating Period	Express	Limited	Local	Circulator
Peak	20	30	60	30
Midday	-NA-	30	60	45
Evening	-NA-	-NA-	60	60
Overnight	-NA-	-NA-	60	60
Weekends	-NA-	-NA-	60	30

Maximum Rail Headways

Maximum Metrorail Headway	
Operating Period	Headway (min.)
Peak	7.5
Midday	15
Early Evening	15
Late Evening	30
Weekend	30

Maximum Mover Headways

Maximum Metromover Headway	
Operating Period	Headway (min.)
Peak	1.5
Midday	3
Early Evening	3
Late Evening	3
Weekend	3

ROUTE PERFORMANCE AND PRODUCTIVITY

Systemwide Standards

If minimum systemwide productivity standards are not met, MDT will conduct a thorough evaluation of all routes to identify areas of opportunity to achieve improved productivity and efficiency.

Minimum Systemwide (Boardings per Hour)			
Mode	Weekday	Saturday	Sunday
Metrobus	30	25	25
Metrorail	60	60	50
Metromover	- NA -	- NA -	- NA -

Individual Bus Route Standards

MDT's operation of transit services must be balanced between its public service function and fiscal responsibility. Because of this need, MDT's evaluation of routes is based on two measures of productivity standards, rather than just one. MDT uses the following two productivity standards for individual bus routes:

- Passengers per revenue hour
- Net cost (subsidy) per passenger

The number of "Passengers per revenue hour" denotes the number of passenger boardings in one revenue hour of service. This measure is a very strong indicator of the effectiveness of service consumption. MDT uses the number of riders per hour as a productivity standard for bus routes.

The net cost (subsidy) per passenger is the route's total costs minus farebox revenues, divided by its number of passenger trips. This standard is utilized by MDT for route productivity. The net cost per rider reflects both the efficiency with which service is delivered, and the market demands for the service. Routes that do not meet the net

cost per passenger standard are evaluated to determine if a high percentage of passengers are Golden Passport or Patriot Pass holders. If an MDT bus route fails to meet both the boarding per revenue hour and net cost per passenger standards, the route is considered substandard and corrective action is exercised by MDT, which includes route modification or elimination.

MDT Standards:

Passengers per Mile*:* Number of passengers carried in one bus mile, with a minimum of 0.7 passengers per vehicle mile or minimum of 70% systemwide average passengers per vehicle mile.

Passengers per Trip*:* All bus route trips that exceed a one-way trip time of one hour shall not have less than 8 boarding's on any trip.
If the route is shorter than a one hour one-way trip, the minimum acceptable boarding's for the trip is a rate of five passengers per hour.

Minimum 15 passengers average load for all routes
Minimum Average load on express trips is 30 passengers

Any trips not meeting the minimum ridership level for an individual trip (for mature routes > 2 years) shall be considered for elimination unless the trip cannot be modified because it would result in an ineffective or inefficient schedule.

Minimum Cost Recovery Ratio*:* Minimum of 0.20 ratio and Minimum of 1.0 ratio for express-type service.

Passengers per Revenue Hour	
	Service Average
Pass	> 60% of average
Watch	50% - 60% of average
Fail	< 50% of average

Bus Route indicators	
Net cost (subsidy) per passenger	$4.40
Passengers per hour	Minimum 15
Cost per passenger	Route cost divided by Ridership
Passengers per mile	70% of systemwide average passenger vehicle mile
Passengers per trip	Trip greater than one hour, no less than 8 passengers on any given trip. Trip less than an hour, no less than 5 passengers on any given trip.
Revenue per passenger per route	Revenue collected divided by total boardings
Minimum cost recovery ratio	Min. 0.15 ratio and max. of 1.0 ratio for express-type service

SERVICE DELIVERY

On-Time Performance

On-time performance is the time deviation of actual operating time from the published schedule. MDT buses are considered on-time if the scheduled time is no more than 59 seconds before actual departure and no more than 4 minutes and 59 seconds (the on-time window) past the scheduled time of departure. On-time performance is measured monthly by comparing the actual departure times at all time points using the Automatic Vehicle Locator System (AVL) with the corresponding scheduled departure times, excluding first and last time points for each trip.

Metrorail on-time performance window is no more than 59 seconds before and no more than 4 minutes and 59 seconds past the scheduled time. Metrorail 5 minute on-time performance is calculated using the following formula:

$$\text{5-Minute Reliability} = \frac{(\text{Total Trips - Total Vehicle caused Late Trip})}{(\text{Total Trips})} * 100$$

STS is on-time from 0 to 30 minutes late from scheduled pick-up time. As with bus, any departure before scheduled time (early) is not on-time. On-time performance for all modes is shown below.

Systemwide On-Time Performance Standards	
Metrobus	75%
Metrorail	95%
STS	90%

Missed Trips is defined as trips that are either added to, or removed from, the daily schedule, other than routine schedule changes. Daily operations are dynamic, and although there is an established predetermined schedule, often scheduled trips are either missed (e.g., due to mechanical failure or inordinate driver absences), or trips are added (e.g., bus bridges or extraordinary events – these are commonly called extras). Maximum allowed 5% of trips.

PASSENGER COMFORT AND SAFETY

MDT's passenger comfort and safety is evaluated by the following standard:

Comfort and Safety Standards	
Passenger Complaints	Rail – Max. 1.5 complaints / 100,000 boardings Bus – Max. 11 passengers per 100,000 passengers Mover – Max. 0.5 passengers per 100,000 passengers STS – Max 2% of total trips in a month
Accidents and Incidents	Bus – Max. 6 accidents per 100,000 vehicle miles

Transit Amenities

Amenities selectively placed at bus stops can increase the demand for transit by increasing the passenger's comfort, perception of safety, and image of the attractiveness of the system. For example, seating and/or shelters reduce the inconvenience of waiting at the stop, while lighting can make the passenger feel safer when utilizing the system at night. In addition, amenities such as route maps, permanent structures, or bus bays convey the stability of the system and its presence in the community to both current and potential riders.

MDT uses the following standards:

Metrobus Amenities	Minimum Requirement for New Bus Stops
Future Real Time Information	More than 100 boardings per day and major transfer points
Bench	All stops without a shelter with sufficient right-of-way
* Shelter	All stops with greater than 100 boardings per day with sufficient right-of-way
Litter Bins	All MDT bus stops with benches or bus shelters

*Municipalities install shelters within their own jurisdiction.

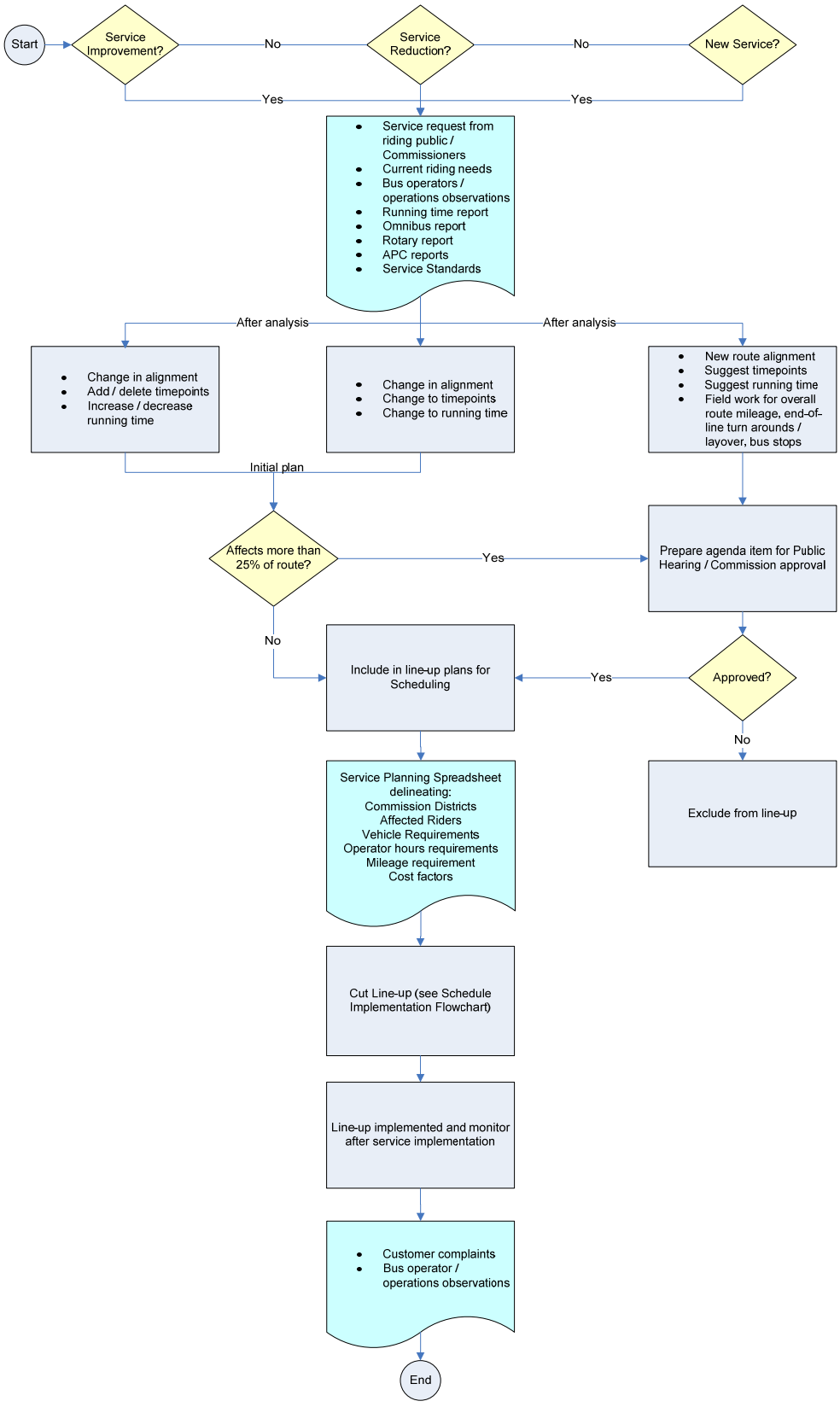
Metrorail Amenities	Minimum Requirement for Rail Station
Information	Passenger information case with a system map and individual route schedules that service that particular station
Litter Bins	At all Metrorail Stations
Emergency Phone	At all Metrorail Stations

New Service Implementation Process

New service recommendations are reviewed based on the following: These requests are evaluated against MDT's service standards. If the request is within the stipulated standards, it is ranked and considered for implementation dependent on funding. New service is implemented during service line-up, which occurs at least twice a year.

New service is implemented as demonstration service. A new bus route is given 24 months to mature and reach the minimum productivity standards. The route will be re-evaluated every six months during this period to check progress and consider potential changes to improve service, including changes to route alignment, schedule, stop spacing, promotional activities or other issues. However, if after 12 months the route has failed to reach the halfway point of the minimum standards, Miami-Dade Transit will make a recommendation to the Commission to restructure or eliminate the route.

Service Planning Flowchart



GLOSSARY OF TERMS

Americans With Disabilities Act Of 1990 (ADA): The law passed by Congress in 1990 which makes it illegal to discriminate against people with disabilities in employment, services provided by state and local governments, public and private transportation, public accommodations and telecommunications.

AM Peak: The weekday time period between 6:00 a.m. and 9:00 a.m**.**

APC Obs: The number of automatic passenger counts obtained during the reporting period. The number of samples used in estimated boarding rides and load information**.**

Arterial Street: A major thoroughfare, used primarily for through traffic rather than for access to adjacent land, that is characterized by high vehicular capacity and continuity of movement.

Automatic Passenger Counters (APC): A technology installed on transit vehicles that counts the number of boarding and alighting passengers at each stop while also noting the time. Passengers are counted using either pulse beams or step treadles located at each door. Stop location is generally identified through use of either global positioning systems (GPS) or signpost transmitters in combination with vehicle odometers.

Automatic Vehicle Location (AVL): A smart technology that monitors the real-time location of transit vehicles (generally non-rail modes) through the use of one or more of the following: global positioning systems (GPS), Loran-C, or signpost transmitters in combination with vehicle odometers. Most installations include integration of the AVL system with a geographic information system (GIS or computer mapping system). The monitoring station is normally located in the dispatch/radio communications center.

Average Maximum Load: The average maximum passenger load of all trips within the defined category.

Average Minutes Late: The average minutes a vehicle departs a scheduled time point. Excludes the ending location of a trip.

Base Period (off-peak period.): The period between morning and evening peak periods when transit service is generally scheduled on a constant interval or non-rush periods of the day when travel activity is generally lower and less transit service is scheduled.

Base Fare: The price charged to one adult for one transit ride; excludes transfer charges, zone charges, express service charges, peak period surcharges and reduced fares.

Branch: One of multiple route segments served by a single route.

Boarding Rides: The number of trips taken on a transit line, group of lines, or entire system, where a transfer is considered as the start of a new trip.

Crosstown Route: A route which does not operate to the city center and, unlike a feeder route, serves primarily non-downtown travel in urban neighborhoods.

Deadhead: The movement of a transit vehicle without passengers aboard.

Downtime: A period during which a vehicle is inoperative because of repairs or maintenance.

Dwell Time: The scheduled time a vehicle or train is allowed to discharge and take on passengers at a stop, including opening and closing doors.

Early: The percentage a vehicle departs a scheduled time point more than 59 early of the published scheduled time. This percentage excludes the ending location of a trip.

Early AM: The weekday time period before 6:00 a.m.

Excess Wait Time (EW): The excess wait time passengers experience as a consequence of unreliable service. As headway variation grows and departures are more variable, passengers are forced to arrive at stops earlier or wait longer and thus experience increased wait times.

Express Service: Express service is deployed in one of two general configurations:

1) A service generally connecting residential areas and activity centers via a high speed, non-stop connection. e.g., a freeway, or exclusive right-of-way such as a dedicated bus way with limited stops at each end for collection and distribution.- Residential collection can be exclusively or partially undertaken using park-and-ride facilities.

2) Service operated non-stop over a portion of an arterial in conjunction with other local services. The need for such service arises where passenger demand between points on a corridor is high enough to separate demand and support dedicated express trips.

Feeder Route: A route connecting neighborhoods (usually suburban) with a transit center and usually having timed connections at the latter point with a trunk line to the city center.

Fare Box Recovery Ratio: Measure of the proportion of operating expenses covered by passenger fares; found by dividing **fare box revenue** by total **operating expenses** for each mode and/or systemwide.

Fare Box Revenue: Value of cash, tickets, tokens and pass receipts given by passengers as payment for rides; excludes charter revenue.

Fare Elasticity: The extent to which ridership responds to fare increases or decreases.

Garage: The place where revenue vehicles are stored and maintained and from where they are dispatched and recovered for the delivery of scheduled service.

Headway: The interval of time between two vehicles running in the same direction on the same route, usually expressed in minutes. See also “frequency.” Frequency is the inverse of headway: a headway of 10 minutes is equivalent to a frequency of one bus every ten minutes or six buses per hour.

Headway Adherence: The percentage of the time the actual headway is between 0.5 and 1.5 of the scheduled headway. (i.e. scheduled headway = 15 minutes. If the actual headway is between 7 ½ minutes and 22 ½ minutes, then it meets the adherence criteria.)

Headway CV (Coefficient of Variation): Illustrates the variability in actual headways. The coefficient of variation (CV) is simply the standard deviation of actual headways divided the mean of the actual headway. The coefficient of variation (CV) standardizes the variation in headways in a way that allows comparison across routes, times and indicators.

Interlining (Through Routes Interlock Routes Interlocking): Interlining is used in two ways: Interlining allows the use of the same revenue vehicle and/or operator on more than one route without going back to the garage. Interlining is often considered as a means to minimize vehicle requirements as well as a method to provide transfer I enhancement for passengers. For interlining to be feasible, two (or more) routes must share a common terminus or be reasonably proximate to each other (see DEADHEAD).

Kiss and Ride: A place where commuters are driven and dropped off at a station to board a public transportation vehicle.

Late: The percentage a vehicle departs a scheduled time point more than 5 minutes late of the published scheduled time. This percentage excludes the ending location of a trip.

Layover Time (Recovery Time): Time built into a schedule between arrival at the end of a route and the departure for the return trip, used for the recovery of delays and preparation for the return trip.

Limited Service: Higher speed arterial service that serves only selected stops. As opposed to express service; there is not usually a significant stretch of non-stop operation.

Linked Passenger Trips: A linked passenger trip is a trip from origin to destination on the transit system. Even if a passenger must make several transfers during a one-way journey, the trip is counted as one linked trip on the system. Unlinked passenger trips count each boarding as a separate trip regardless of transfers.

Load Factor: The ratio of passengers actually carried versus the total passenger capacity of a vehicle.

Max Load: The largest number of passengers on board a vehicle at any given point along the trip.

Maximum Load Point: The location(s) along a route where the vehicle passenger load is the greatest. The maximum load point(s) generally differ by direction and may also be unique to each of the daily operating periods. Long or complex routes may have multiple maximum load points.

Max Load Factor: The maximum number of passengers on board a vehicle divided by the vehicle's seating capacity; expressed as a percentage (e.g. 100% = a full seated load with no standees).

Median Recovery Time: The median (50th percentile) time a bus or light-rail car sits at the end of the trip.

Median Run Time: The median (50^{th} percentile) time it takes a bus (or rail car) to travel over a given route segment.

Median Speed: The median (50^{th} percentile) travel speed (total run time / total distance). Includes dwell time for boarding and alighting passengers.

Midday: The weekday time period between 9:00 a.m. and 3:00 p.m. On most lines, headways remain fairly constant during this period of the day.

Missed Trip: A schedule trip that did not operate for a variety of reasons including operator absence, vehicle failure, dispatch error, traffic, accident or other unforeseen reason.

Network Connectivity – Minimum of 1 to 3 routes that intersect a given route (Transfer point).

Night: The weekday time period after 6:00 p.m.

On Time: The percentage a vehicle departs a scheduled time point within 1 minutes (early) and –5 minutes (late) of the published scheduled time. This percentage excludes the ending location of a trip.

Operating Assistance: Financial assistance for transit operating expenses (not capital costs); such aid may originate with federal, local or state governments.

Operating Deficit: The difference of operating expenses and operating revenues.

Operating Expense: Money paid in salaries, wages, materials, supplies and equipment in order to maintain equipment and buildings, operate vehicles, rent equipment and facilities and settle claims.

Operating Revenue: Receipts derived from or for the operation of transit service, including fare box revenue, revenue from advertising, interest and charter bus service and operating assistance from governments.

Passenger Check (Tally): A check (count) made of passengers arriving at, boarding and alighting, leaving from, or passing through one or more points on a route. Checks are conducted by riding (ride check) or at specific locations (point check). Passenger checks are conducted in order to obtain information on passenger riding that will assist in determining both appropriate directional headways on a route and the effectiveness of the route alignment. They are also undertaken to meet FTA Section 15 reporting requirements and to calibrate revenue-based ridership models.

Passenger Miles: The total number of miles traveled by passengers on transit vehicles; determined by multiplying the number of unlinked passenger trips times the average length of their trips. This calculation is required by the Federal Transit Administration's (FTA) National Transit Database (NTD) for the transit industry.

Peak Period: Morning and afternoon time periods when transit riding is heaviest.

Peak/Base Ratio: The number of vehicles operated in passenger service during the peak period divided by the number operated during the base period.

Peak Express Route: A route which provides express (limited stops) service between an outlying area to the city center.

Percent Due To Headway: The percentage of over capacity trips where the actual headway ratio was greater than 1.4. This figure indicates the percentage of over capacity trips caused by a large gap in the actual headway.

Percent Over Capacity: The percentage of trips greater than the scheduled capacity.

Pick (Bid, Mark-up, Line-up, Shake-up, Sign-up): The selection process by which operators are allowed to select new work assignments, i.e., run or the Extra Board in the next (forthcoming) schedule.

PM Peak: The weekday time period between 3:00 p.m. and 6:00 p.m.

Pull-In Time (Turn-In Time, Deadhead Time, Run-off Time): The non-revenue time assigned for the movement of a revenue vehicle from its last scheduled terminus or stop to the garage.

Pull-Out Time (Deadhead Time Run-on Time): The non-revenue time assigned for the movement of a revenue vehicle from the garage to its first scheduled terminus or stop.

Radial Route: A route which serves the city center (but does not operate entirely within the city center).

Recovery Time (Layover Time): Recovery time is distinct from layover, although they are usually combined together. Recovery time is a planned time allowance between the arrival time of a just completed trip and the departure time of the next trip in order to allow the route to return to schedule if traffic, loading, or other conditions have made the trip arrive late. Recovery time is considered as reserve running time and typically, the operator will remain on duty during the recovery period.

Recovery CV (Coefficient of Variation): Illustrates the variability in actual recoveries. The coefficient of variation (CV) is simply the standard deviation divided the mean of the actual recovery times. The coefficient of variation (CV) standardizes the variation in recovery times in a way that allows comparison across routes, times and indicators.

Recovery Ratio: The median recovery time divided by scheduled recovery time; expressed as a percentage (e.g. 100% = actual recovery is equal to scheduled recovery time).

Revenue Hours: The total amount of time a bus or light-rail car is operating on a publicly advertised route, and is available to transport, pick up and discharge passengers. Recovery (layover) and deadhead times are excluded.

Revenue per Passenger per Route*:* Revenues collected on a route divided by total boardings equal revenue per passenger

Revenue Service: When a revenue vehicle is in operation over a route and is available to the public for transport.

Ridership: The number of rides taken by people using a public transportation system in a given time period.

Route (Line): An established series of streets and turns connecting two terminus locations.

Running Time (Travel Time): The time assigned for the movement of a revenue vehicle over a route, usually done on a [route] segment basis by various time of day.

Run Time CV: (Coefficient of Variation): Illustrates the variability in actual run times. The coefficient of variation (CV) is simply the standard deviation divided the mean of the actual run times. The coefficient of variation (CV) standardizes the variation in run times in a way that allows comparison across routes, times and indicators.

Run Time Ratio: The median running time divided by scheduled running time; expressed as a percentage (e.g. 100% = actual run time is equal to scheduled run time).

Schedule (Headway, Master Schedule Timetable, Operating Schedule Recap/Supervisor's Guide): From the transit agency (not the public time table), a document that, at a minimum, shows the time of each revenue trip through the designated time points. Many properties include additional information such as route descriptions, deadhead times and amounts, interline information, run numbers, block numbers, etc.

Schedule Efficiency: The ratio of revenue hours to vehicle hours. A measure of the degree to which deadhead and recovery time are kept from consuming too high a proportion of total vehicle hours.

Scheduled Recovery Time: The scheduled time a bus or light-rail car sits at the end of the trip in order to provide schedule restoration and allow the operator a break. It often referred to as “layover time.”

Scheduled Running Time: The scheduled time it takes a bus (or rail car) to travel over a given route segment.

Service Area: The square miles of the agency's operating area. Service area is now defined consistent with ADA requirements.

Service Span (Span of Service, Service Day): The span of hours over which service is operated.

Service Hours: Includes revenue hours plus recovery (layover) time. It excludes deadhead time.

Standard Minutes Late: The standard deviation of average minutes late.

Timed Transfer (Pulse Transfer, Positive Transfer)**:** A point or location where two or more routes come together at the same time to provide positive transfer connections. A short layover may be provided at the timed transfer point to enhance the connection. Timed transfers have had increasing application as service frequencies have been reduced below 15 to 20 minutes and hub-and-spoke network deployment has grown.

Total Miles: The total miles includes revenue, deadhead, and yard (maintenance and servicing) miles.

Total Wait Time: The total excess wait time experienced by all passengers during the defined time period. (Excess Wait Time * Boarding Rides). See EXCESS WAIT TIME for more information.

Transfer Center: A fixed location where passengers interchange from one route or vehicle to another.

Travel Time (Relief Time, Travel Allowance): The time allowed for an operator to travel between the garage and a remote relief point.

Trip (Journey , One-Way Trip): The one-way operation of a revenue vehicle between two terminus points on a route. Trips are generally noted as inbound, outbound, eastbound, westbound, etc. to identify directionality when being discussed or printed.

Trips Sampled: The percentage of trips having at least one automatic passenger counter observation during the defined report period.

Vehicle Hours: The total hours of travel by bus, including both revenue service and deadhead travel.

Vehicle Miles: The total miles of travel by bus, including both revenue and deadhead travel.

Wait Time Per Trip: The total excess wait time per trip of all passengers during the defined time period. (Total Wait Time / Trips). See EXCESS WAIT TIME for more information.

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