

## APPENDIX D

### SAMPLE PERFORMANCE EVALUATION STANDARDS

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# Service Guidelines and Standards

Revised Summer 2015



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## **INTRODUCTION**

### **Purpose**

The Capital Metropolitan Transportation Authority connects people, jobs and communities by providing quality transportation choices. Service guidelines and standards reflect the goals and objectives of the Authority.

*Capital Metro Strategic Goals:*

- 1) Provide a Great Customer Experience
- 2) Improve Business Practices
- 3) Demonstrate the Value of Public Transportation in an Active Community
- 4) Be a Regional Leader

### **Overview**

Service guidelines provide a framework for the provision, design, and allocation of service. Service guidelines incorporate transit service planning factors including residential and employment density, land use, activity centers, street characteristics, and demographics. Design criteria include defining service attributes such as route directness, span, frequency, stop spacing, and passenger amenities. Service guidelines are to be used with some flexibility.

Service standards include methodology by which services are evaluated in terms of productivity and cost-effectiveness. Schedule reliability, load factors, and ridership performance help identify high and low performing routes. This methodology is to be applied regularly and rigorously. A series of corrective actions may be taken to address specific issues.

### **Update**

Capital Metro staff will conduct a review of service guidelines and standards regularly in anticipation of each Service Plan Update to ensure alignment with goals, objectives, and resource availability. This allows an opportunity to revise content based on recent experience and best practices.

### Service types

Throughout this document, a set of common group names are used to describe similar services. These groups are designed to permit evaluation of a given route relative to the performance of similar routes within the system. This approach avoids the difficulty of comparing routes with fundamentally different designs, purposes, and operating characteristics.

### Service classification:

Core services	Route #’s	
Radial	1-99	Local stop service on primary corridors connecting to downtown Austin
Frequent	7, 300, 325, 331	High-frequency, high-ridership Radial or Crosstown routes
Limited/Flyer	101-199	Limited stop service on primary corridors
Feeder	200-299	Local stop service from low-density areas to connecting services
Crosstown	300-399	Local stop service on primary corridors that bypass downtown Austin
MetroRail	500-599	Limited stop commuter rail service
MetroRapid	800-899	High-frequency, limited stop service on primary corridors
Express	900-999	Long-distance limited stop commuter service
Special services	Route #’s	
MetroAirport	100	Limited stop service from downtown to Austin-Bergstrom Int’l. Airport
Ebus	410-419	Late-night/early morning safe ride service from entertainment district
Rail Connector	460-469	Service between rail stations and areas of employment or activity
Night Owl	480-489	Late night/early morning service on primary corridors
Senior	490-499	Midday service between senior housing and shopping and medical
UT Shuttle	600-699	Local and limited stop services between and within areas with dense UT population and the University of Texas campus

### Services not covered in this document:

- Access-a-Ride - On-demand taxi service for Capital MetroAccess customers
- Rideshare - Carpool and vanpool service for registered customers
- Guaranteed Ride Home - Emergency taxi service for registered customers
- MetroAccess - Demand-responsive paratransit service complementary to fixed-route service provided in accordance with the Americans with Disabilities Act

## **SERVICE GUIDELINES**

This section of the document includes guidelines for service design and allocation at the route and system level. Service guidelines are also utilized for the evaluation of potential service. The following guidelines outline basic concepts of where transit will work most efficiently and effectively when applied generally to the urban environment; however, situational deviations from these guidelines will likely occur when and where analysis and expert consensus deem necessary or logical.

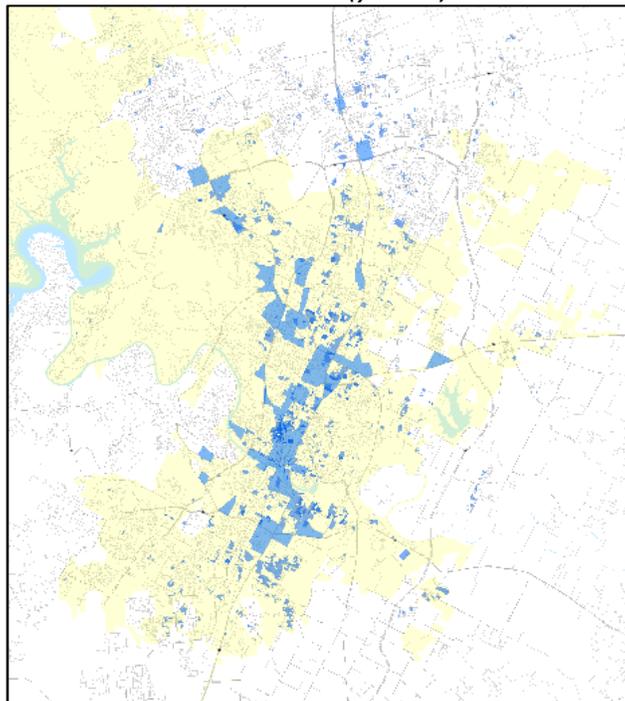
### **Density and service coverage**

Residential and employment density are primary influences on transit demand. Service coverage guidelines reflect industry standards for minimum density needed to support cost-effective transit service.

Contiguous areas of the following densities are deemed transit supportive and should be prioritized for transit service within walking distance ( $\frac{1}{4}$  mile):

- Residential densities of 16 persons per acre or
- Employment densities of 8 employees per acre

*Areas with transit supportive residential and/or employment densities (blue) and Capital Metro Service Area (yellow).*



*(Data from 2010 Census, 2007 CAMPO Employment Data Survey, and 2015 CMTA Service Area)*

## Land use

Transit demand is also heavily influenced by land use. Some land use patterns are more transit supportive than others. Mixed use, commercial, institutional, and high-density residential land uses are typically favorable. Low-density residential and industrial land use types are less likely to generate sufficient ridership to maintain cost-effective services.

## Destinations and activity centers

Capital Metro should strive to serve multiple destinations. The strongest transit destinations include intense, all-day activity. Activity centers may be suitable for several transit services, depending upon ridership demand. Transit activity centers include major destinations and transit attractions such as large employment sites, educational institutions and universities, significant healthcare institutions and major social service agencies.

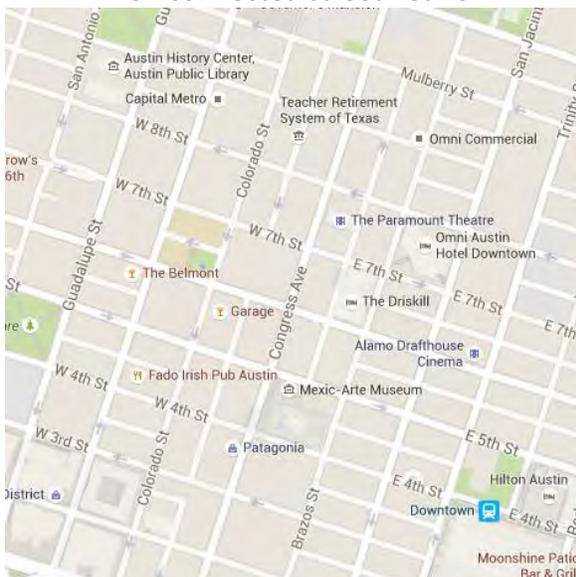
Areas with high residential densities should have direct transit service to appropriate destinations (e.g. Downtown Austin, the University of Texas, Austin Community College campuses, transit centers, and major retail centers).

Commuter services, such as express bus, may be provided between park and ride facilities and major employment or activity centers, such as downtown Austin and the University of Texas. These services should operate primarily on highways with a limited number of stops to minimize travel time. If possible, these routes should take advantage of managed express lanes on highways in order to expedite service.

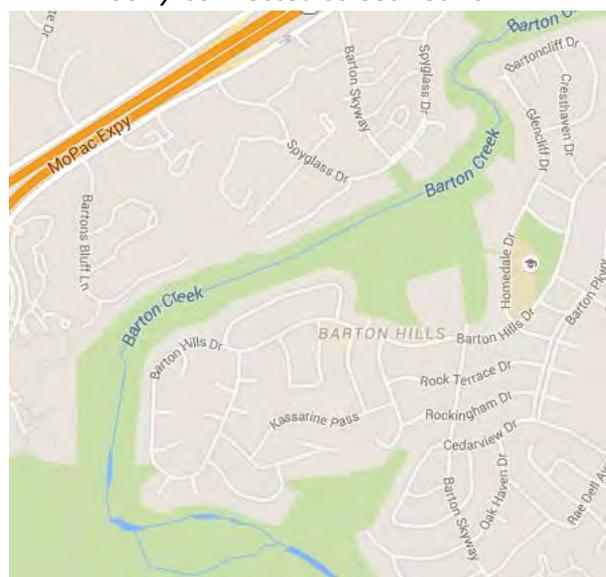
### Street and sidewalk characteristics

Street and sidewalk characteristics are another important consideration, even in areas of high residential and employment density. Areas that have interconnected streets have a higher potential for transit use than areas that have fewer streets or have barriers to movement, like natural features or private property lines. Frontage roads tend to be uncondusive to providing safe and effective transit service due to high vehicle travel speeds and lack of pedestrian safety infrastructure and amenities. Limitations in street network connectivity, poor pedestrian access, physical barriers, or any other conditions may make operating transit unsafe or unfeasible. Capital Metro shall partner with appropriate entities to improve pedestrian and bicycle access to proposed or existing service.

*Well-connected street network*



*Poorly-connected street network*



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### Demographic and socioeconomic characteristics

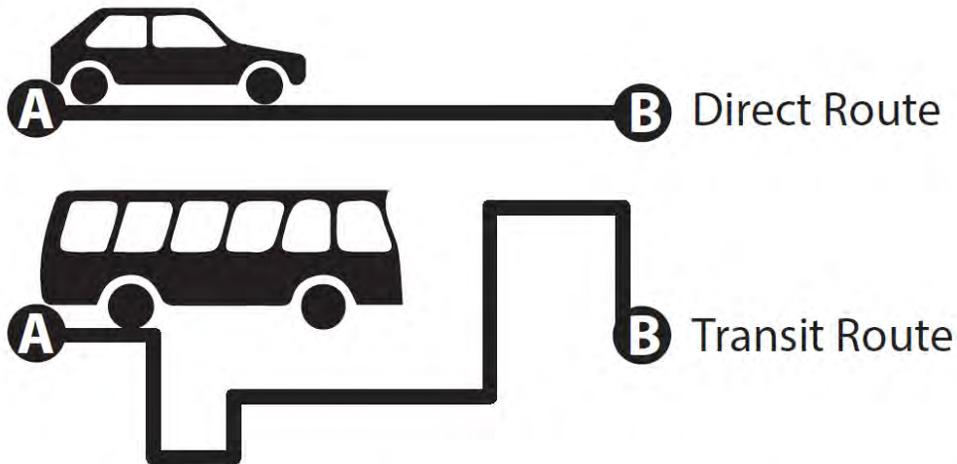
Many Capital Metro riders rely on transit as their lifeline to employment, educational opportunities, medical facilities, shopping, and other activities.

Capital Metro should pay particularly close attention to areas with the following characteristics (see Appendix A for maps depicting these areas):

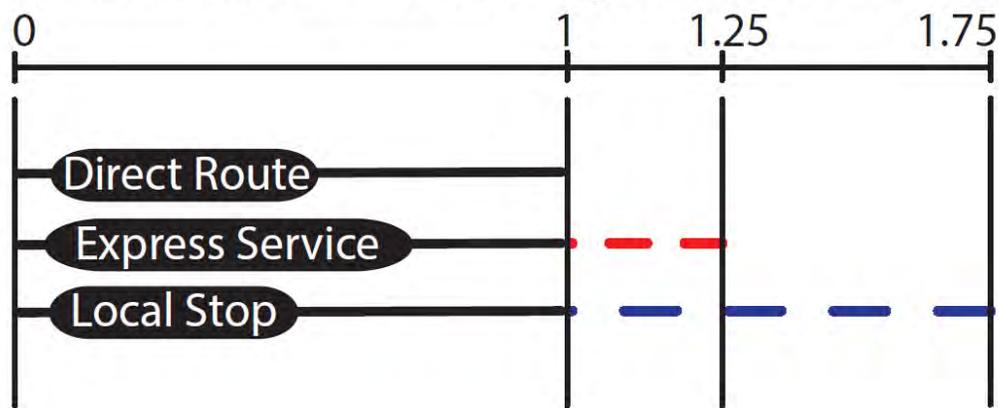
- Households without access to an automobile exceeding 10% of total population
- Elderly population (65 years of age and older) exceeding 10% of total population
- Children/youth population (under 18 years of age) exceeding 25% of total population
- Average household income below 50% of regional median income

### Route directness

Routes should be designed to operate as directly as possible to minimize travel time while maintaining access to key destinations. Bus routes should operate on arterial streets or transit lanes to maximize customer access and minimize impacts to adjacent land uses.



### Maximum Distance Traveled to get from Point A to B:

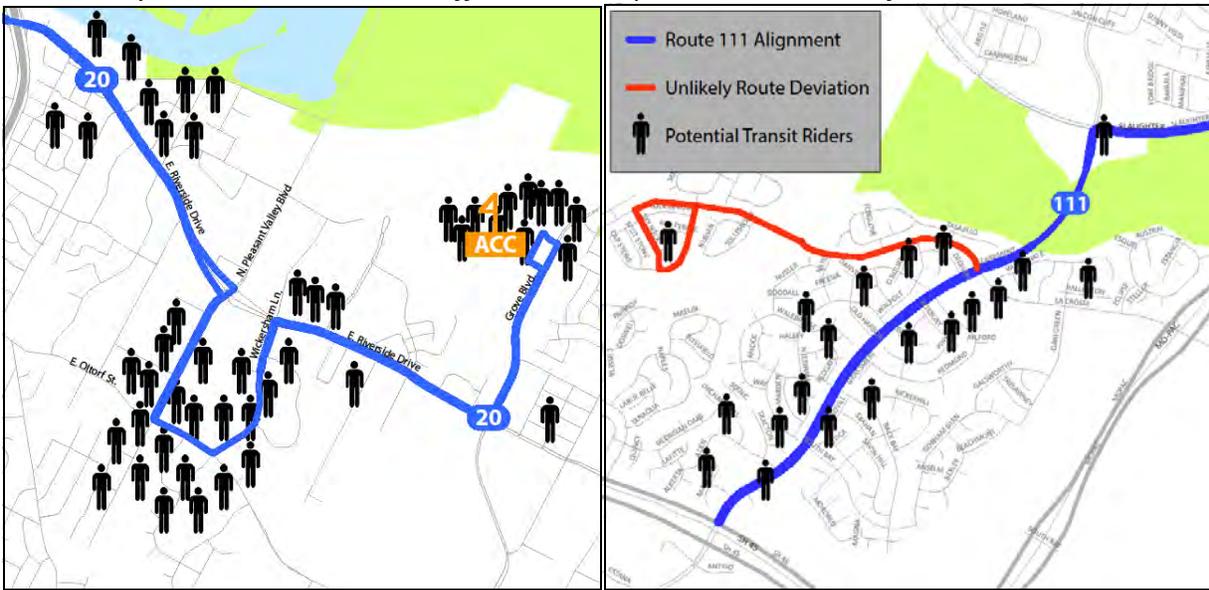


The distance between terminal points for local stop services should not exceed 175% of the shortest possible driving distance by automobile. The distance between terminal points for limited stop services should not exceed 125% of the shortest possible driving distance by automobile. Routes that exceed these guidelines should be evaluated to determine if more direct routings are possible. Some routes may exceed this standard when a selected path provides travel time advantages over a more direct routing.

### Route deviation

Deviations off the primary alignment of a fixed route should be minimized whenever possible. However, routes may deviate off their primary alignment to serve major activity centers or provide coverage to areas with limited access. The additional time necessary for the deviation should not exceed five minutes, or 10% of the one-way travel time of the existing route without deviation. Deviations should result in an overall ridership increase. Routes should also strive to utilize existing transit prioritization infrastructure (e.g. transit-only lanes, corridors with transit signal priority, etc.).

*Ridership supports the route deviation of Route 20 (left), but deviating Route 111 (right) would likely not result in the most efficient and equitable allocation of transit resources.*



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### Two-way service

Services should be designed to operate in two directions on the same street whenever possible in order to minimize passenger confusion and maximize service effectiveness. However, due to one-way street configurations, it may be necessary to operate a route on parallel streets. In such cases, efforts should be made to allow no more than a two block separation.



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### Branching and short-turns

Routes should branch no more than once when serving areas of lower ridership potential. Vehicles along the trunk portion of the route should alternate branches. Branch portions of routes are subject to meeting all service guidelines such as minimum frequency and directness.

Routes may also include up to one short-turn, where some vehicles travel the entire length of the route and others turn around at a selected point. This treatment will be considered when routes experience a significant drop in demand at a certain point.

### Route spacing

Parallel routes operating closely together have the potential to split service demand. Appropriate route spacing requires a tradeoff between walking distance and service frequency. The guideline for route spacing in areas outside downtown Austin is ½ mile. Special conditions may exist that require routes to operate within closer proximity such as terrain or barriers.

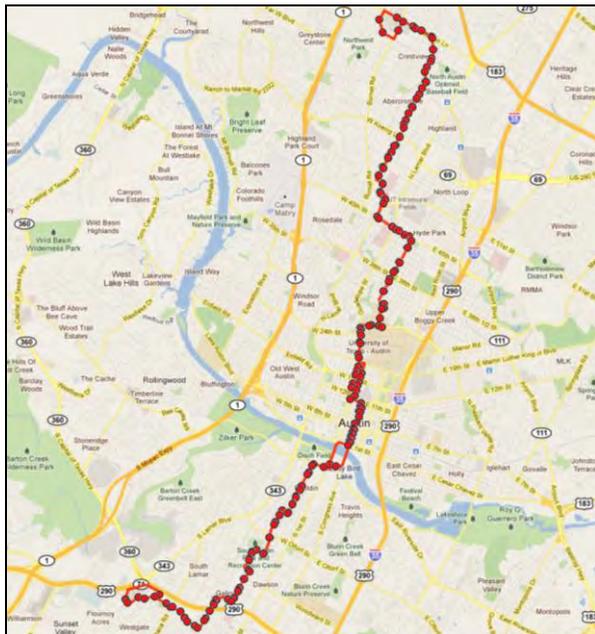
### Route length

Routes should be the appropriate length to maximize ridership potential and minimize operational issues. Two routes serving different parts of the service area with a shared terminus, such as downtown Austin or a transit center may be linked together as one route in order to operate more cost-effectively. The two routes involved should be listed as a single route.

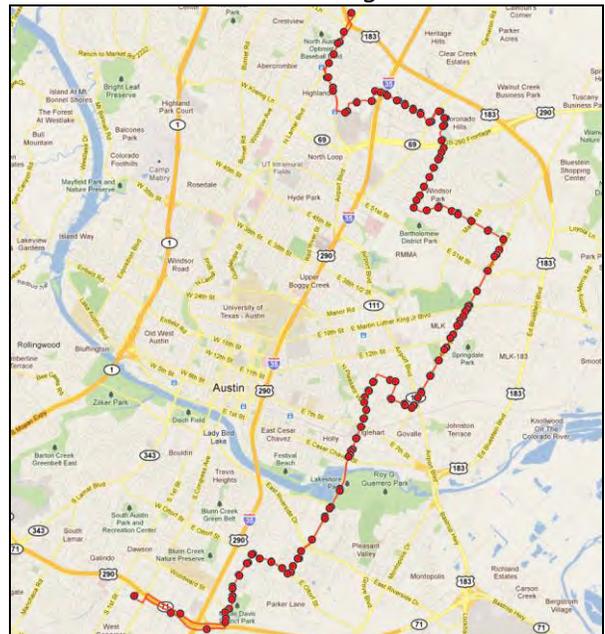
### Route terminals

Designated route terminals shall ideally be considered at transit facilities, park and ride facilities, or activity centers. When such a facility does not exist, locations shall be reviewed for consideration based on safety, security, operator restroom availability, and impacts on adjacent land uses.

*Radial routes linked in Downtown Austin*



*Crosstown route terminating at transit centers*



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### Service span

Service span refers to the hours that service is available. Service span guidelines vary by route type. Routes with high ridership activity may operate over a broader span of service.

*Desired minimum service span:*

Route type	Weekday	Saturday	Sunday
Radial	6am – 10pm	7am – 10pm	8am – 8pm
Frequent	6am – 10pm	6am-10pm	7am-9pm
Limited/Flyer	6am – 8am, 5pm – 7pm	Based on demand	Based on demand
Feeder	7am – 8pm	Based on demand	Based on demand
Crosstown	6am – 10pm	7am – 9pm	8am – 8pm
MetroRail	6am – 6pm	4pm – 11pm	N/A
MetroRapid	5am – Midnight	6am – Midnight	7am – Midnight
Express	6am – 8am, 4pm – 6pm	N/A	N/A
MetroAirport	6am - 11pm	6am - 11pm	8am – 11pm
Night Owl	Tu.-Fri. 12am – 3am	12am – 3am	12am – 3am
UT Shuttle	7am – 11pm	N/A	2pm – 11pm

### Service frequency

Service frequency has a major influence on transit ridership. Frequent service is costly to provide but is valued by regular and occasional customers.

Due to the expense of providing frequent service, frequency is based upon existing or potential demand, translating into variations in frequency throughout the day. Clock headways (frequency intervals of 15, 20, 30, 40, or 60 minutes) are preferred as they are easier for passengers to remember and can help facilitate better transfer connections between routes.

*Desired minimum frequencies:*

Route type	Weekday			Saturday	Sunday
	Peak	Midday	Night		
Radial	30	60	60	60	60
Frequent	15	15	20	30	30
Limited/Flyer	20	-	Based on demand	Based on demand	Based on demand
Feeder	40	60	Based on demand	Based on demand	Based on demand
Crosstown	30	60	60	60	60
MetroRail	40	60	-	40	-
MetroRapid	15	15	20	30	30
Express	20	-	-	-	-
MetroAirport	30	30	30	30	30
Night Owl	N/A	N/A	60	60	60
UT Shuttle	20	20	40	-	60

Other special routes (e.g. Senior, Rail Connector, and Ebus) will be provided based on demand.

### Bus stop spacing

Bus stop spacing is based on several factors including customer convenience, ridership demand, and service type.

Customer convenience involves a tradeoff between proximity to stops and bus travel time. Closely spaced stops reduce customer walking distance but result in slower bus speeds. Few stops spaced further apart increase walking distance but result in faster, more reliable service.

Sufficient ridership demand is necessary to support the investment of stops. Specific service types such as limited stop, rapid, and express require increased stop spacing to maintain higher speeds, while radial and crosstown services have frequent stops to maximize ridership potential and convenient access to local activity centers and/or residences.

Recommended minimum distance between bus stops:

<i>Area type:</i>	<i>Ideal stop spacing range (min-max):</i>
Regular local stops in Downtown or on arterial streets	800 – 1,600 feet
Suburban and other low-density areas	1,200 – 2,500 feet

Stops serving downtown Austin or major activity centers should be spaced more than 800 feet apart. For reference, the average block size in downtown Austin ranges between 350 and 450 feet, so this essentially means a bus stop may occur every other block for local stop services. Regular local stops on arterial streets should be spaced every 800-1,200 feet. In suburban and other low-density areas, stops may be spaced over 1,200 feet apart.

### Bus stop placement

Bus stop placement involves a balance of customer safety, accessibility, and operational efficiency. All stops should be fully accessible with a concrete landing and access to sidewalk or pathway. Bus stops should be compatible with adjacent land use and minimize adverse impacts on the built and natural environment.

Bus stops should optimally be placed at intersections to maximize pedestrian safety; however, infrastructure considerations that can affect bus stop placement may include: right-of-way availability, cost of installation and maintenance, potential future changes to stop location, City, County, State or Federal laws and regulations, or other operational reasons.

Near-side and far-side stops are generally preferred over mid-block stops. Specific ridership generators may determine the placement of a bus stop.

Near-side stops allow passengers to board and alight closer to intersection crosswalks, which may facilitate better transfers. Near-side stops also eliminate the potential of alighting passengers waiting through a red light.

Far-side stops are preferred at intersections in which buses make left turns and intersections with a high volume of right turning vehicles. Far-side stops are also preferred on corridors with transit signal priority. Far-side stops encourage pedestrians to cross behind the bus.

Mid-block stops should be considered when pedestrian crosswalks are present. If pedestrian crossings are not present, Capital Metro will work with appropriate entities to address the potential of installing treatments like flashing pedestrian beacons to accommodate this issue. Mid-block stops may be the only option at major intersections with dedicated turn lanes.

Infrastructure considerations for bus stop placement include lighting, topography, and roadside constraints such as driveways, trees, poles, fire hydrants, etc.

### **Bus stop amenities**

Bus stop amenities improve customer comfort, convenience, and safety. They also have the potential to increase ridership. Bus stop improvements should promote system-wide equity.

Bus stops generating at least 50 daily boardings qualify for a shelter. Shelters may be considered for stops with at least 25 daily boardings provided that it meets at least 3 of the following criteria:

- Adjacent major activity/employment centers
- Adjacent hospitals or social service agencies
- Adjacent apartments with 250+ units
- Adjacent schools
- Route intersections
- Service frequency greater than 30 minutes

Bus stops generating at least 15 boardings per weekday qualify for a bench. All bus stops with shelters or benches should also have a litter container. Other stops may have a litter container installed upon request.

Bike racks may be installed at stops in areas of high demand or in concert with other local entities.

Circumstances that might preclude installation of amenities at a stop meeting threshold warrant are as follows:

- Amenities would threaten pedestrian or operational safety
- Adequate right-of-way is not available
- Regulations enforced by City, County, State, or Federal government
- Service to the location is subject to potential changes
- Installation and maintenance costs are excessive
- Other circumstances that would negatively impact operations or service

Bus stop signage should contain route name, number, direction and destination, Capital Metro customer service phone number, and website address. Detailed schedule and route information should be provided at major boarding locations and transfer points. All signage should also contain the unique bus stop ID number and instructions about how to look up real-time information pertaining to buses that serve that particular stop using the mobile app, texting functions, or the online trip planner.

#### **MetroRapid Stations vs. Bus Stops:**

MetroRapid transit station amenities include:

- Cantilever transit shelter with MetroRapid branding
- Real time arrival display
- Aluminum seating and lean bars
- MetroRapid specific route maps for routes departing from station

In general, MetroRapid stops should be placed on the far-side of the intersection to accommodate transit signal priority, which is outfitted on all MetroRapid buses to date.

When possible, nearby bus stops can be consolidated to MetroRapid stations in order to make best use of the existing infrastructure and also improve customer convenience.

#### **Transit Centers and Park & Rides:**

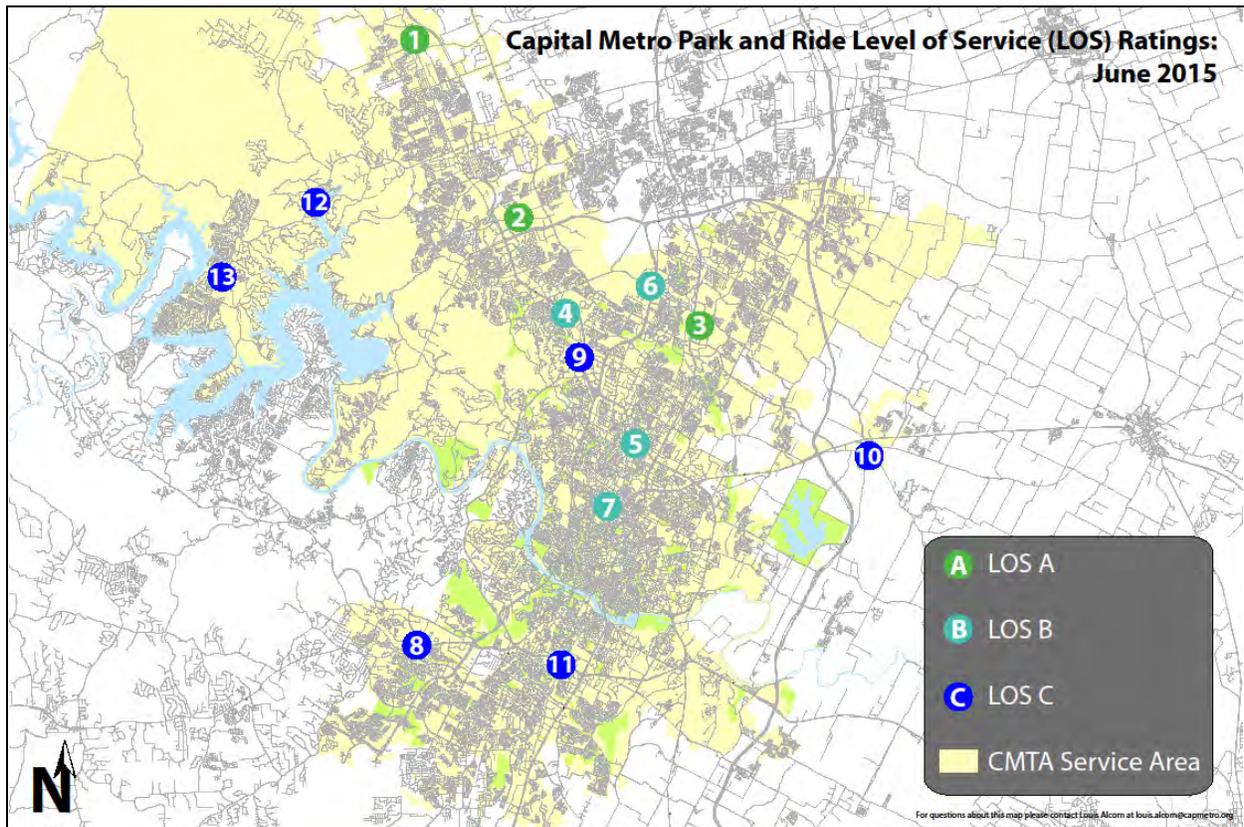
In order to accommodate travel in peripheral, usually more suburban or rural areas, Capital Metro has followed the strategy of developing park and ride facilities, with the intention of attracting commuters within a five mile radius to use our transit services. Capital Metro provides transit services to 14 existing park-and-ride facilities in the region. Small park-and-ride facilities (under 200 spaces) are related to rural or outlying suburban communities with flexible bus service or MetroExpress. Mid-size facilities (200-400 spaces) are related to closer-in urban and suburban locales with MetroExpress, MetroRapid, and/or several fixed-bus routes. The large commuter parking lots (400+ spaces) are related to suburban activity centers with

MetroExpress and several fixed-bus routes or related to suburban residential areas with MetroRail and multi-modal bus services.

Level of Service (LOS) classifications help to generate rough order-of-magnitude cost estimates for future park-and-rides. LOS classifications were determined in direct relation to park-and-ride lot capacity. For the following classifications, amenities incorporated into transit facilities should be directed to meet safety, security, comfort, and convenience needs. (*Reference Appendix B for the following documented in tabular form*):

- **LOS A:** A park-and-ride lot with 400 or more parking stalls. This facility may serve different modes, such as bus, light rail, or commuter rail. Amenities consist of an enclosed climate-controlled facility from 1,250 square feet to 1,800 square feet in size, security personnel or facility attendants, water fountains, vending equipment, information kiosks, single use restroom for attendant and operators, extensive lighting, landscaping to enhanced surroundings, signage and graphics, and additional seating areas with shelters/canopies at bus positions.
- **LOS B:** A park-and-ride lot with 200-400 parking stalls that generally serves one mode of transportation (bus) or varying route types (feeder and express routes). Amenities include an enhanced shelter (lighting, heating/ventilation and windscreen protections, and integrated seating for 12 or more customers and additional seating areas outside sheltered areas. Security at these facilities could incorporate an on-site security officer, but in most cases emergency services are provided on an on-call basis and with frequent facility site surveillance. An emergency call box, lighting for parking areas, and enhanced lighting at bus loading and unloading areas could be incorporated to enhance security. A facility with this parking capacity could require more than one bus position. Landscaping and other site enhancements are limited. Other amenities may include call boxes, vending machines located outside the sheltered area, and system and route information.
- **LOS C:** A park-and-ride lot with up to 200 parking stalls. In most cases, these facilities are served by one express route and generally transfer activity is limited or non-existent. Amenities consist of one or two canopies with integrated benches. Additional seating areas can be implemented, if required. Landscape enhancements are minimal. Newspaper racks and other publications racks are the extent of the vending equipment/concessions serving these facilities. Public telephones and system information are also provided.

#	Park and Ride Facility	Level of Service (LOS)	Parking Capacity	Opening Year
1	Leander Station	A	619	2007
2	Lakeline Station	A	485	2004
3	Tech Ridge Park-and-Ride	A	476	2006
4	Pavilion Park-and-Ride	B	348	1992
5	North Lamar Transit Center (NLTC)	B	268	1986
6	Howard Station	B	200	n/a
7	Triangle Park-and-Ride	B	200	2005
8	Oak Hill Park-and-Ride	C	181	n/a
9	Great Hills Park-and-Ride	C	127	2011
10	Manor Park-and-Ride	C	70	2011
11	South Congress Transit Center (SCTC)	C	32	2008
12	Lago Vista Park-and-Ride	C	16	Over 15 years ago
13	Jonestown Park-and-Ride	C	13	Over 15 years ago



Capital Metro conducts vehicle count surveys at its park-and-ride facilities to determine occupancy levels, identify trends, and assess future needs. The seasonal surveys typically take place during one week in the fall (September – November) and one week in the spring (March – April). The time of year is chosen based on transit industry standards to target “normal” travel periods, excluding non-holiday months, winter weather months, and summer vacation months. The survey methodology typically involves two or more days of vehicle counts during the chosen week to produce an average occupancy. As a result the two seasonal averages are produced each year to help identify trends. Once a facility reaches the industry standard average occupancy range (70-85%), plans for expansion are developed in accordance with the following policies.

#### Park & Ride Planning Policies:

##### *Existing Facility Policies*

1. Capital Metro will conduct bi-annual (fall and spring) seasonal surveys for each park-and-ride facility’s occupancy in order to track overall utilization.
2. Capital Metro will investigate future expansion options for any park-and-ride facility has achieved 80% occupancy for three consecutive seasonal surveys.
3. Capital Metro will investigate potential solutions to improve utilization for any park-and-ride facility that has less than 60% occupancy for three years in a row.
4. Capital Metro will investigate potential re-use or redevelopment of any park-and-ride facility that has less than 40% occupancy for five years in a row.
5. Capital Metro will evaluate the utilization of existing park-and-ride facilities every five years during its Service Plan update process.

##### *Future Facility Policies*

1. Capital Metro will consider potential future park-and-ride facilities every five years during its Service Plan update process.
2. Capital Metro will evaluate the costs and benefits of future park-and-ride facilities, including user benefits and ridership impacts, proposed along a high-capacity transit corridor during the corridor-level study, environmental review process or through an independent planning process.
3. Capital Metro will coordinate with affected jurisdictions on proposed park-and-ride facilities during the corridor-level study, environmental review process or independent planning process.
4. Capital Metro will coordinate with other regional transportation providers for input on purpose and need, goals and objectives, and financial resources necessary to construct and service future park-and-ride facilities. These providers may include City of Austin, Capital Area Metropolitan Planning Organization (CAMPO), Central Texas Regional Mobility Authority (CTRMA), Texas Department of Transportation (TXDOT), and Capital Area Rural Transportation System (CARTS).

## **SERVICE STANDARDS**

Capital Metro strives to allocate resources equitably and efficiently. Service standards describe the methodology by which services are evaluated and modified. Routes and schedules should be evaluated tri-annually following each service period. Evaluation criteria include schedule reliability, load factors, ridership productivity, and cost effectiveness.

### **Schedule reliability**

On-time performance is a critical measure of the quality and reliability of services. Buses are considered on-time if they depart a designated timepoint between 0 seconds earlier or 6 minutes later than scheduled.

Buses should never depart a timepoint ahead of schedule unless operators are given explicit permission to do so. Permission to depart early should only be provided for destination stops on limited stop or Express services during peak travel hours.

Under normal circumstances, system-wide on-time performance should exceed 90% at end of line locations, and 75% at timepoints along the route. Services that fall below the guideline should be examined to determine the factors behind schedule adherence problems, which may include running time problems, traffic conditions, construction, or other issues.

### **Load factors**

Load factors reflect the ratio of passengers to total seated capacity. Load factors vary by route type and time of day. Consistent overcrowding on buses may indicate the need for improved frequency or increased capacity. Load factors should not exceed the following thresholds:

Maximum load factor standards

Route type	Peak hours	Off-peak hours
Radial	140%	120%
Crosstown	140%	120%
Frequent	140%	120%
Limited	140%	120%
Feeder	140%	120%
Express/Flyer	100%	100%
MetroRail	140%	120%
UT Shuttle	140%	120%
MetroRapid	140%	120%

### Ridership productivity and cost-effectiveness

Productivity standards are used to evaluate ridership and cost-effectiveness of each route. Routes are assessed by type, allowing comparison with peer services. Ridership data is collected by on-board automatic passenger counters present on nearly 100% of Capital Metro’s bus services.

All service types are evaluated based on the average number of riders per revenue hour. Direct, commuter-based services such as Express and MetroRail may also be evaluated based on the average number of riders per trip, as route and passenger trip length may vary significantly.

In order to generate a relative comparison metric, a rating is generated by comparing average riders per revenue hour on each individual route to a cumulative value of average riders per revenue hour indexed by service type. Routes performing below 66% (lowest-performing routes) are classified as probationary and require corrective action. At the opposite end of the scale, ratings above 133% (highest-performing routes) may indicate the demand for additional service or capacity.

The table below is an example of ridership productivity ratings for a specific route type:

Route	Riders	Riders per revenue hour		Operating Cost Per Passenger
		Average	Rating	\$/boarding
300 Govalle	5,813	37.3	143%	\$3.52
311 Stassney	1,205	27.9	107%	\$4.98
320 St. John's	2,620	26.9	103%	\$4.51
323 Anderson	1,044	17.5	67%	\$6.90
325 Ohlen	1,674	28.5	109%	\$4.54
331 Oltorf	2,649	34.0	130%	\$4.00
333 William Cannon	1,576	19.3	74%	\$6.69
338 Lamar/45th	827	16.8	64%	\$6.96
350 Airport Blvd.	2,317	26.5	102%	\$4.82
383 Research	1,526	17.9	69%	\$6.69
392 Braker	458	12.9	50%	\$10.11
All crosstown routes	21,709	26.1	-	Average: \$5.79

In addition to peer service comparison, all non-special services should exceed the following minimum thresholds for route productivity:

- Weekdays: 15 riders per service hour
- Weekends: 12 riders per service hour

Cost-effectiveness indicators measure the operating cost per passenger. Passenger subsidy and operating cost per passenger boarding for each route should be calculated and assessed each service period.

### **Potential corrective actions**

Poor-performing services failing to meet minimum productivity standards may be considered for a series of potential corrective actions, including schedule adjustments, route modifications, or elimination.

Schedule adjustments including frequency and service span reductions can improve productivity and cost effectiveness with minimal negative impacts.

Route modifications can help improve productivity and cost effectiveness in many cases. Ridership should be closely examined at the stop level to identify unproductive segments or service gaps. Route extensions or minor realignments may improve access to destinations. Route consolidations or short-turns may reduce duplicative or excess service.

Service elimination may be considered if ridership is consistently underperforming with minimal likelihood for sufficient future growth. All alternative means of maintaining service should be considered before proposing elimination. Elimination does not preclude restoration of service at a later time; however, proven ridership demand must exist before such a step is considered.

Service alternatives may be considered in low-density areas with moderate ridership potential. Demand-responsive service may carry a small passenger market more cost-effectively than traditional fixed-route bus service. Vanpool may be a suitable alternative for feeder or connector service. Park and ride facilities at peripheral transit centers or hubs may be the only cost effective solution to serving lower-density areas with fixed-route transit infrastructure.

### **New and altered services**

The evaluation of new service proposals will take place as proposals are received or needs identified. Ridership and cost projections for new and altered services should be prepared whenever service changes are proposed. New services should meet minimum standards within one year. Staff may make fine-tuning adjustments during this period. New services are implemented on a trial basis, with the length of the trial period determined at the time of implementation.

## Service change process

Service changes allow an opportunity to modify existing route alignments, schedules, bus stops, and facilities. New services are also developed through this process. Service changes occur tri-annually to coincide with University of Texas and Austin ISD calendars. Typically, major changes are implemented in August and minor changes are implemented in January and June.

The service change process spans 6-9 months from initial planning to implementation. Each route is reviewed 6 months after implementation.

### Proposal development

- Service analysis
- Initial concepts
- Review of customer and operator input
- Concept refinement and cost estimates
- Title VI and ADA review
- Initial proposals
- Community outreach (riders, general public, advisory committees, etc.)
- Public meetings
- Proposal revisions

### Board process

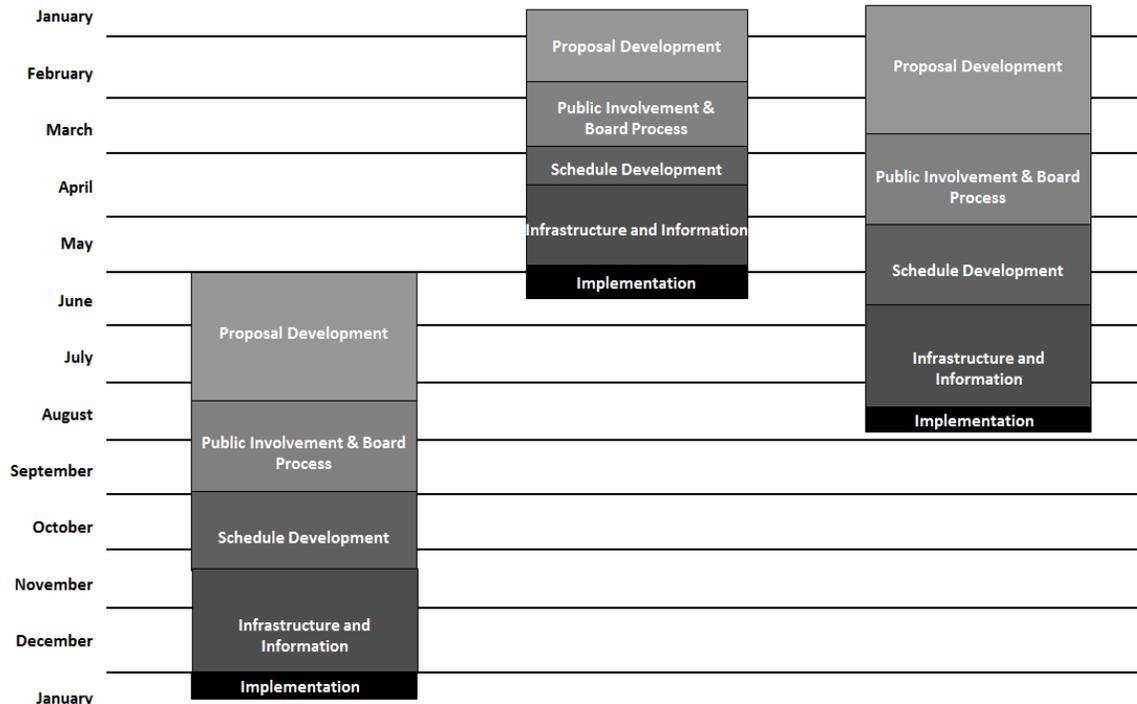
- Board committee review
- Public hearing
- Final recommendations
- Board decision

### Implementation preparation

- Schedule development
- Operator work assignments
- Marketing and communication materials
- Capital upgrades (vehicles, facilities, stops, etc.)
- Information technology updates

### Implementation

## Capital Metro Service Change Timelines

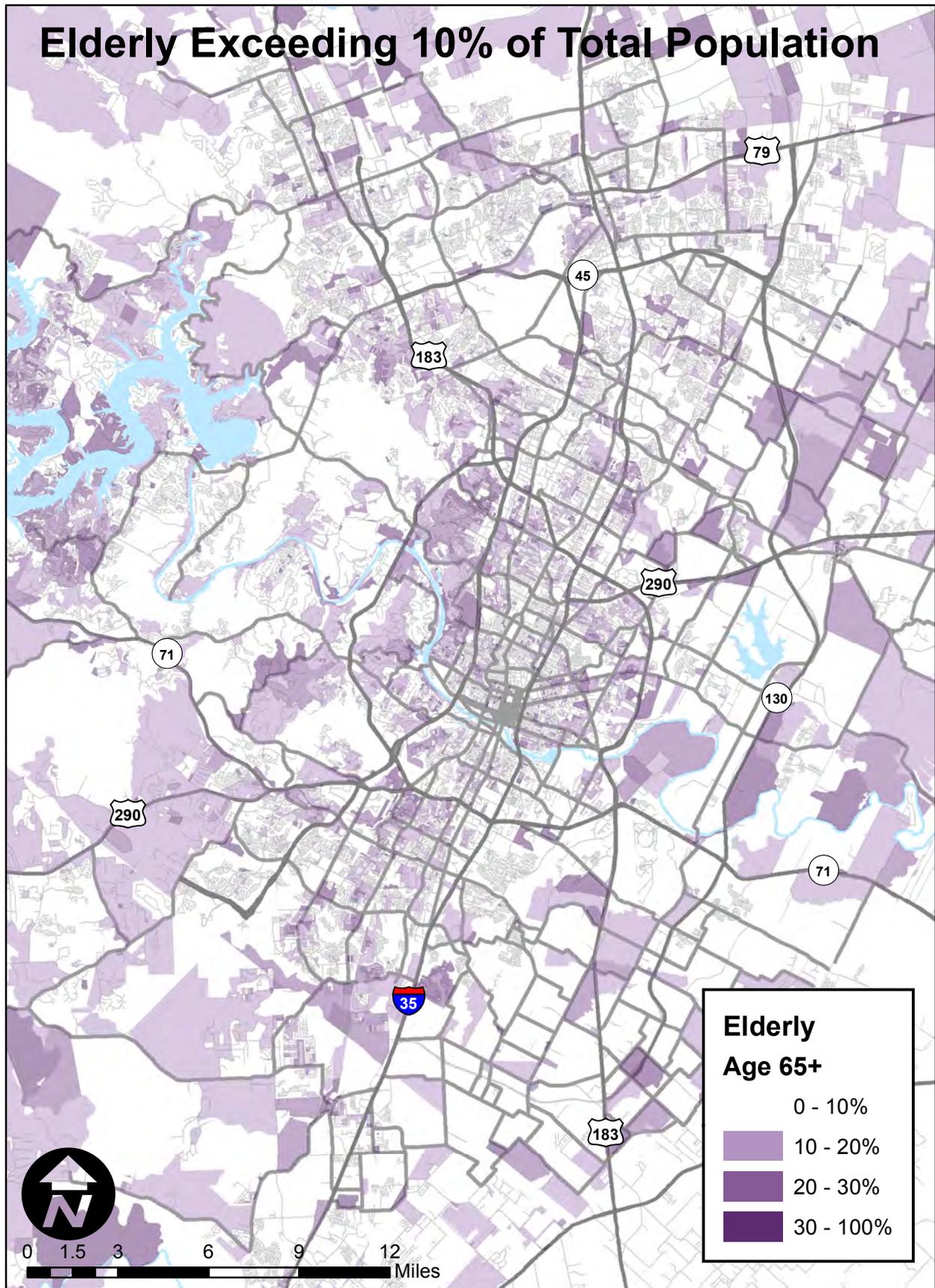


### RESOURCES

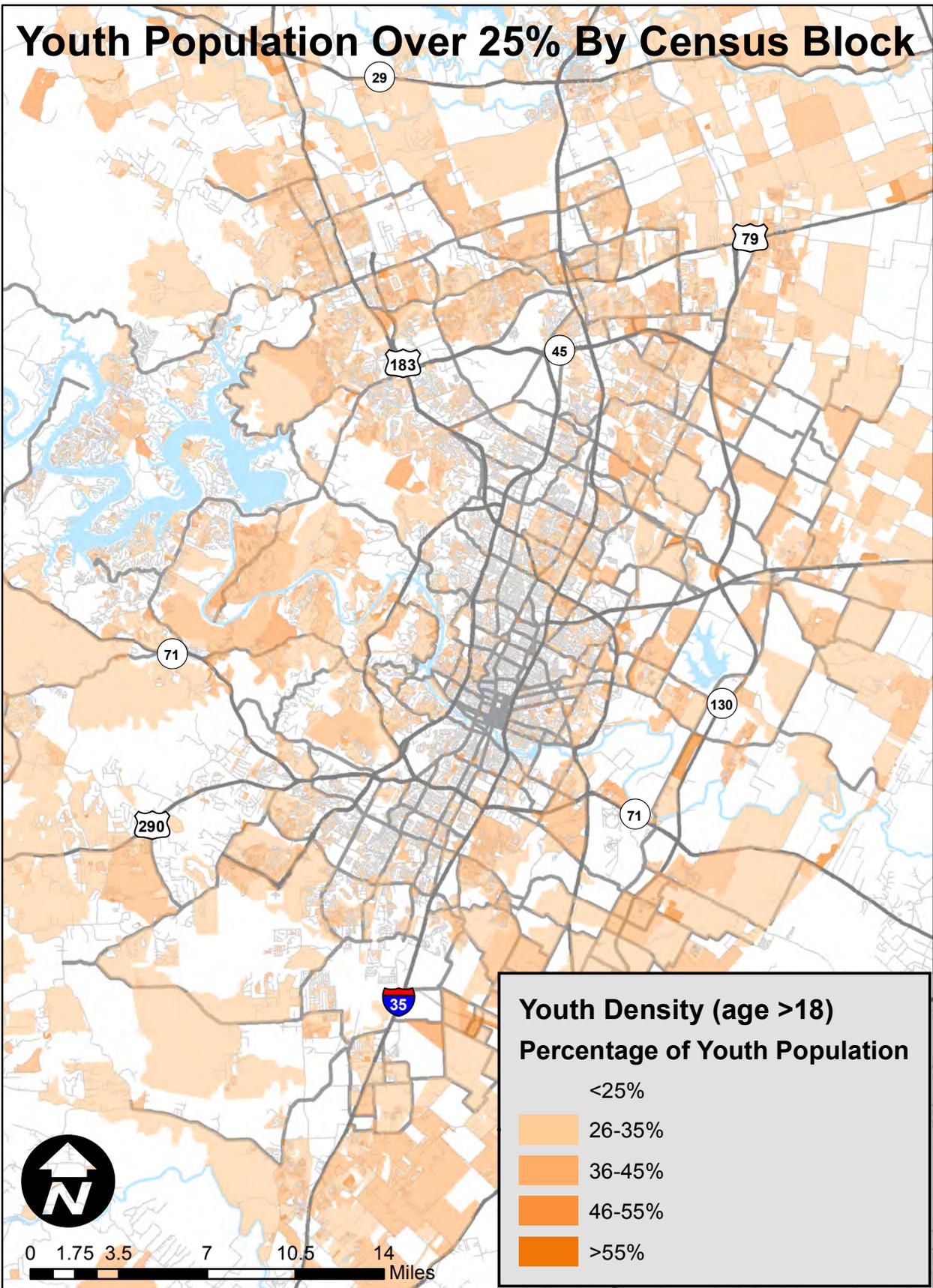
- AC Transit Board Policy No. 550: Service Standards and Design Policy
- Capital Metro Park-And-Ride Assessment Report (April 2015)
- Capital Metro ServicePlan2020
- Capital Metro Transit-Ready Development Guide
- Capital Metro Service Guidelines and Standards – Revised November 2011
- Central Ohio Transit Authority – Standards for Service Design
- King County Metro – Service and Facility Guidelines (2013 Update)
- Miami-Dade Transit – Service Standards
- Regional Transportation District (Denver) – Service Standards
- San Diego Metropolitan Transit System Policies and Procedures (June 2013)
- Spokane Transit – Service Design Standards
- TCRP Report 100 – Transit Capacity and Quality of Service Manual
- TCRP Report 19 – Guidelines for the Location and Design of Bus Stops
- Tri-Met – Bus Stop Guidelines
- TriMet’s Service Guidelines Framework (Adopted: January 2014)
- Victoria Transport Policy Institute – Land Use impacts



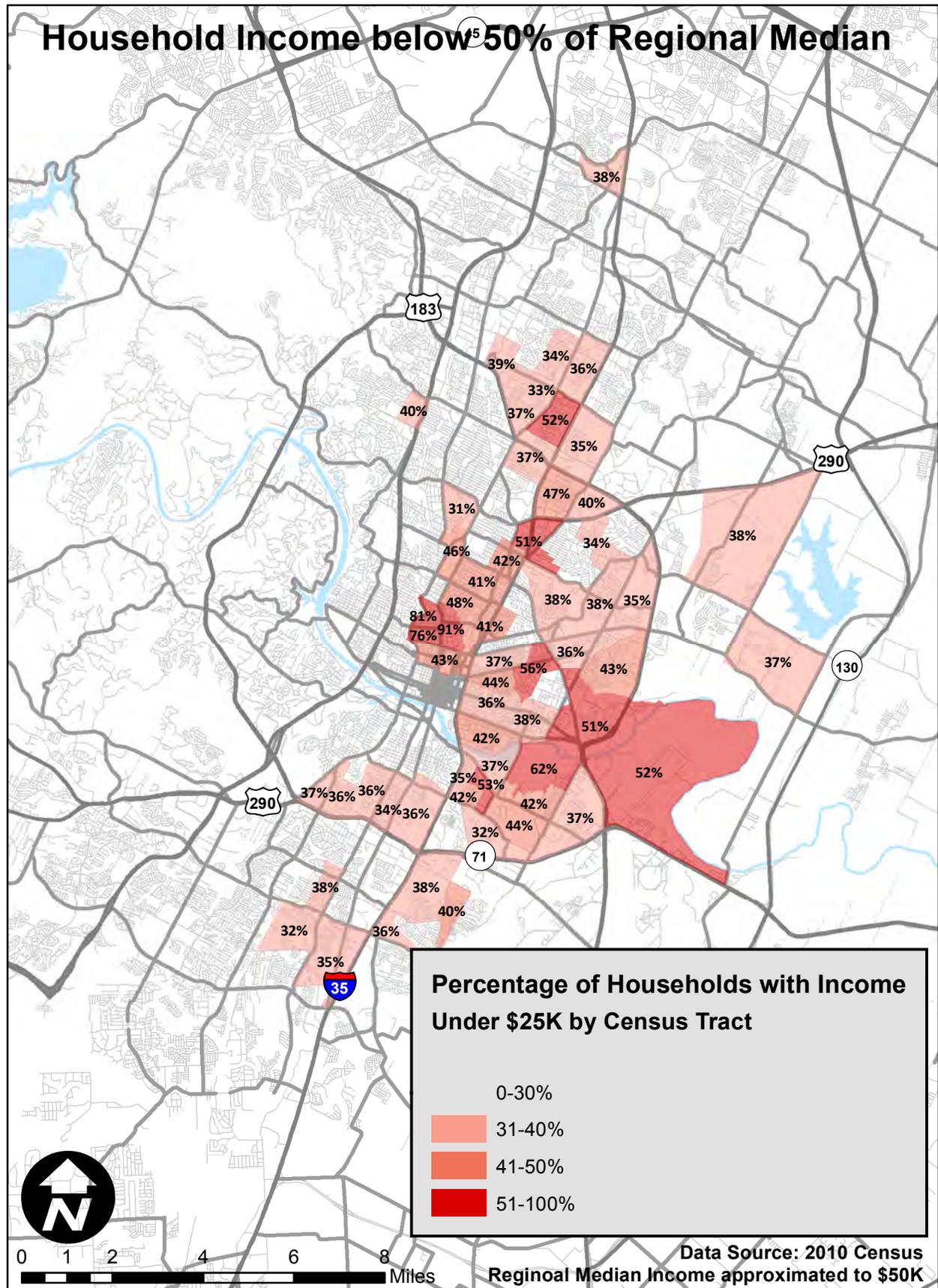
# Appendix A2



# Appendix A3



# Appendix A4

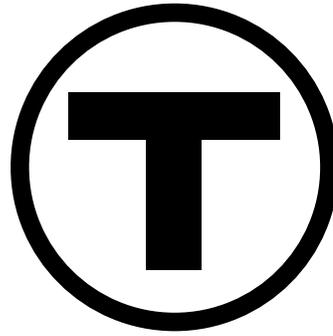




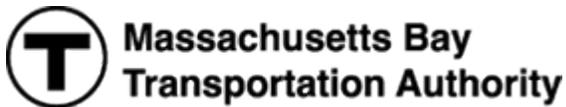
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# ***Service Delivery Policy***

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MBTA Fiscal and Management Control Board  
Approved January 23, 2017



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# Chapter 1: Introduction

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## Purpose

The Service Delivery Policy sets how the MBTA evaluates service quality and allocates transit service to meet the needs of the Massachusetts Bay region. It is consistent with the MBTA's enabling legislation and other external mandates, such as Title VI of the Civil Rights Act of 1964 (Title VI), and the Americans with Disabilities Act of 1990 (ADA). As such, the Service Delivery Policy:

- Establishes the aspects that define service availability and sets parameters for levels of provided service
- Establishes objectives that define the key performance characteristics of quality transit services
- Identifies quantifiable standards that are used to measure whether the MBTA's transit services achieve their objectives, within the context of federal, state, and local regulations
- Outlines a service planning process that applies the service standards in an objective, uniform, and accountable manner
- Sets the priorities for the service planning process by setting minimum levels and targets for the service standards
- Involves the public in the service planning process in a consistent, fair, and thorough manner

## Background

This document is the 2017 update of the MBTA's Service Delivery Policy. The 2017 Service Delivery Policy takes advantage of the capabilities offered by newer technologies to collect and analyze data and to take the first steps towards creating standards from a passenger perspective. To this end, the MBTA worked with two committees to produce this document: 1) a policy advisory committee tasked with developing the service objectives, and 2) a technical advisory committee tasked with establishing standards, metrics, and thresholds designed to address the service objectives. These committees included staff from the MBTA, the Massachusetts Department of Transportation (MassDOT), and the Central Transportation Planning Staff (CTPS), along with members of academia, and various planning and advocacy groups. In addition, the MBTA engaged members of the public through a series of workshops throughout the region, via an online survey, and through public meetings.

This policy is intended to be updated regularly as the MBTA expands its ability to collect and analyze data, build out metrics, and define service parameters and targets. In addition, as priorities for service change, this policy can be updated to reflect these new priorities. Future updates will have a public input component and will be adopted by the MBTA governing board.

## Document Structure

Chapter 2 lays out the service *objectives*. The service objectives include service availability and service quality. Service availability objectives describe where, when, and how often service is available to residents of the service area, and the ADA accessibility of the MBTA network. Service quality objectives describe the quality of the delivered service, from a passenger perspective whenever possible.

Since the MBTA offers a number of different types of service that play different roles in the overall network, and services also vary by time period during the service day, Chapter 2 also defines each type of service provided by the MBTA and the time periods of the service day.

Chapter 3 sets the quantifiable *standards* used to measure the objectives. These standards are divided into two categories: service planning standards used in the service planning process to evaluate and allocate service, and accessibility standards that fall outside the service planning process. The service planning standards will be evaluated in the Service Monitoring portion of the MBTA Title VI Program.

The standards for accessibility that fall outside the service planning process are set within the context of the ADA. These standards are used to inform capital and operating decisions outside of the service planning process.

Each standard has a number of components. The *definition* describes what conditions are considered passing for that standard. Within a single standard, the definition changes depending on the type of service or time period. The pass/fail condition is measured at different levels of aggregation depending on the standard. For example, whether a bus is considered on-time is measured at each time point on the route.

All standards are designed in the positive direction, so 100% would be perfect performance. This means improvement is always measured by increasing the percentage. Depending on the standard, performance can be measured at the route level, at the mode level, or for the entire network.

Each standard has a target. The targets provide a medium term goal for improving service; targets can be updated on a yearly basis as progress is made.

In addition the bus service planning standards have a *minimum*; since service planning requires trade-offs between standards the minimums are used to set priorities. If performance at a route or mode level falls below the minimum level on a standard, that

standard becomes a priority to address in the service planning process as appropriate. This document includes the 2016 performance on each of the standards to provide context for the minimums and targets.

In addition, Chapter 3 describes the methodology the MBTA uses to assess the cost-benefit ratio of bus routes. This metric is used to identify bus routes that are providing a high value for their cost and those providing a low value for their cost. This allows the MBTA to understand the characteristics of high-performing routes to emulate, and identify changes to modify or otherwise improve low-performing routes.

Chapter 4 lays out the service planning process. It includes the quarterly changes, the rolling service plan process and the annual gap analysis. Within the rolling service planning process Chapter 4 describes how the service standard minimums and targets are used to prioritize service changes.

The appendices provide additional information used to calculate the standards. Appendix D summarizes the standards and the targets, minimums, and 2016 performance levels.

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## Chapter 2: Services and Service Objectives

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### Service Objectives

The MBTA, in collaboration with stakeholders and passengers, identified the following service objectives representing the most important characteristics of a high-quality transit system. These objectives also address the requirements of the MBTA's enabling legislation.

#### Service Availability (Convenience)

People should be able to use the MBTA to travel throughout the service area at convenient times and frequencies.

#### Accessibility

As many people as possible should be able to use the entire system and all of the MBTA's services regardless of their abilities.

The MBTA will comply with ADA precepts to ensure that its services are accessible to the extent possible.

#### Reliability

The MBTA should operate the services it schedules.

Passengers should experience consistent headways on frequent services and on-time performance on infrequent services. Passengers should not experience excessive wait times.

#### Comfort

Passengers should have a reasonable amount of personal space during their trips.

#### Communication

Passengers should receive accurate and relevant information about the services they use in languages consistent with the MBTA's Language Access Plan (LAP) in a timely manner and in alternative formats if requested.

#### Safety and Security

Passengers should experience safe and secure traveling conditions.

The MBTA should operate and maintain the system with the highest regard for the safety of passengers and employees.

#### Rider Satisfaction

Passengers should be satisfied with the service the MBTA provides.

#### Environmental Benefit

The MBTA should reduce its own environmental impact and should offer passengers a

service experience that supports travel choices other than single-occupancy vehicle trips.

## **Service Standards**

For the service planning and accessibility objectives cited above, the MBTA established quantifiable standards that allow the MBTA to evaluate the performance of its services relative to each objective. Not all objectives are addressed in this Service Delivery Policy.

Specifically, the standards for safety and security are set with the MBTA's state and federal regulatory partners and are monitored and reported outside of this policy. The standards for communication are currently being developed and will be adopted at a later date.

The MBTA monitors rider satisfaction through a monthly customer opinion panel and other survey efforts. These results are reported on the MBTA Performance Dashboard monthly. The MBTA Environmental and Energy Department monitors the MBTA's environmental impact, including measures of greenhouse gas emissions per unlinked passenger trip and greenhouse gas displacement. These results are published in the MBTA Sustainability Report.

Table 1 summarizes the remaining service objectives and standards, what types of tools the MBTA has to improve them, and the Title VI implications; Chapter 3 discusses the service standards in detail.

**Table 1: MBTA Service Objectives and Standards**

<b>Service Objective</b>	<b>Standards</b>	<b>Tools to address</b>	<b>Title VI Implication</b>
Service Availability	Span of service	Service planning	Service monitoring and equity analyses for major service changes
	Frequency of service Coverage: <ul style="list-style-type: none"> <li>• Coverage of the service area</li> <li>• High-frequency service coverage for high-density areas</li> <li>• Coverage for low-income households</li> </ul>		
Reliability	Schedule adherence	Service planning, operational changes, municipal partnerships	Service monitoring
	Passenger wait time Service operated		
Comfort	Vehicle load	Service planning, operational changes, municipal partnerships	Service monitoring
Accessibility	Platform accessibility	Capital budget, operational changes	Elevators included in service monitoring
	Vehicle accessibility		

Source: MBTA.

## Services

The MBTA operates a comprehensive set of transit services. This policy addresses all of the MBTA's fixed-route services including bus, light rail, heavy rail, commuter rail, and boat, as described below<sup>1</sup>.

Contracts with the service providers who operate The RIDE, the MBTA's paratransit service, include performance standards. Appendix C: The RIDE Service lists these requirements.

### **Bus**

For the purposes of this policy, "bus" includes all rubber-tire vehicles regardless of the vehicle's power source. The MBTA operates several different types of bus services including:

**Local Bus Routes** provide full weekday service that extends beyond the morning and afternoon peak travel hours. Local routes are not necessarily designed to target any specific trip purpose. In general, stops on local routes are closely spaced, and pick-ups/drop-offs are allowed at all stops across the entire route; however, some local routes, such as the crosstown 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. Key bus routes are identified in maps and schedules.

Silver Line routes meet or exceed the characteristics of key bus routes and operate on dedicated right-of-ways for a portion of the routes.

In concert with light rail and heavy rail (discussed below), the key bus routes ensure geographic coverage of frequent service in the densest areas of Greater Boston'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 periods when commuters would use the services. Commuter routes include **express bus routes**, which are identified as such in schedules and are characterized by a limited number of stops that are provided only near the ends of the routes. Some stops may be drop-off or pick-up only. Some commuter routes include closely spaced stops.

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<sup>1</sup> Service standards also apply to all contracted services. The MBTA will take steps in all future contracts to ensure the collection of all data necessary to calculate the standards.

**Community Bus Routes** provide weekday service between the morning and afternoon peak hours primarily for non-work travel. Stops are closely spaced (where practical) and pick-ups/drop-offs are allowed at all stops across the entire route.

**Supplemental Bus Routes** either provide limited service early in the morning or are designed to support other bus routes.

Tables showing the route type for each route is in the attached Appendix A: Route Types, which is updated as changes to route designations occur.

### ***Rapid Transit***

The MBTA's rapid transit system includes its heavy rail and light rail services, described below. For the purposes of this policy the Silver Line is evaluated on Key Bus Route standards.

#### **Light Rail**

The MBTA's primary light rail system, the Green Line, provides local service in outlying areas via its surface operations and core subway services in the heart of the city. In addition, the MBTA operates the Mattapan High Speed Line, which serves as a Red Line extension from Ashmont Station to Mattapan Station via light rail.

#### **Heavy Rail**

The MBTA operates three heavy rail lines—the Red Line, the Blue Line, and the Orange Line—that provide core subway services.

### ***Commuter Rail***

The MBTA's commuter rail lines provide long-haul, primarily commuter-oriented services that 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.

### ***The RIDE***

The MBTA's paratransit program, The RIDE, is mandated under the ADA. It provides door-to-door, shared-ride transportation to eligible passengers who cannot use fixed-route all or some of the time because of a physical, cognitive or mental disability. The service area currently covers 58 cities and towns in and around Boston. The program provides ADA trips (trips with origins and destinations within three-quarter miles of a

fixed-route service) at one fare rate and non-ADA trips (trips with origins and destinations greater than three-quarter miles away from a fixed-route service or for same-day trip request) at a higher fare rate.

## Time periods

The MBTA provides different levels of services depending on the time of day and days of the week. Table 2 provides the time periods for weekdays. Saturdays and Sundays are measured separately for most standards.

This time periods are designed for the purposes of bus service planning. Due to the different nature of the service Commuter Rail has different time periods. Its AM Peak includes all trains that arrive in their final Boston terminal between 6:00AM to 10:00AM and its PM Peak is all trains that originate in Boston and depart between 3:30PM and 7:00PM.

**Table 2: MBTA Weekday Time Period Definitions**

<b>Time Period</b>	<b>Definition</b>
Sunrise	3:00 AM – 5:59 AM
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	12:00 AM – 2:59 AM

Source: MBTA.

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## Chapter 3: Standards and Planning Tools

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The service standards perform two important functions. First, they establish the acceptable levels of service that the MBTA must provide to achieve the service objectives. Second, the standards provide a framework for measuring the performance of MBTA services as a part of the service planning process, which is discussed in Chapter 4. Through the service planning process, performance data collected on MBTA services are compared against the service standards to determine whether individual existing services perform at acceptable levels and to evaluate the need for service changes. The service planning process also uses the service standards to prioritize and reallocate resources within the system.

There are a multitude of factors that can impact the performance of the MBTA services. Service planning is one of the tools the MBTA uses to improve performance. In addition, the MBTA works with our municipal partners to address factors that are in our mutual control.

The service planning process is designed to use the service standards to help ensure a cost-effective allocation of service and basic availability throughout the region within the overall amount of operations funding, which is determined through the annual budget process. This policy also provides a service planning tool to measure the cost-efficiency of bus routes. In addition, the service planning process also documents the resource gap between meeting all of the service standards at the target levels and the performance of the operated service each year.

The progress towards the performance targets is reported in the Massachusetts Department of Transportation annual performance report *Tracker*. This allows the MBTA to track progress toward targets regularly and revisit them as necessary. All of the service standard targets and minimums are listed in Appendix D: Service Standard Targets. Appendix D also lists the time frame for all the reported 2016 performance data.

Some of these standards are evaluated over a relatively short period (for example, daily or quarterly), and others are evaluated when the MBTA considers modifying service. How often each standard is evaluated is listed in Table 14.

The 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 as described in Chapter 2.

### Service Availability Standards

The availability standards define the levels of service that will provide meaningful access to the transit system, in terms of the length of the service day (span of service)

and the frequency of service. Each of these standards varies by mode. In addition, the MBTA measures geographic access to the system using a coverage standard with three components.

Many of the service standards differ depending on the time of day the service is offered. Table 2 defines the weekday service time periods. Because weekend travel patterns differ from weekdays, specific periods are not defined for Saturdays and Sundays.

### ***Span of Service***

Span of service refers to the hours during which service is available. The MBTA has established span of service standards that define the expected hours that any given service will operate. This provides passengers with the confidence that particular types of services will be available throughout the day. The MBTA may extend a service's span beyond the expected hours in response to customer demand.

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 must arrive in downtown Boston, or the route terminal if the route does not serve downtown Boston, at or before the beginning span of service time (for example, 7:00 AM for local bus). At the end of the service day, the last trip in the evening in the peak direction of travel must depart downtown Boston, or the route terminal if the route does not serve downtown Boston, at or after the ending span of service time (for example, 7:00 PM for local bus).

For example, the Orange Line serves downtown Boston, so the standard requires that the first northbound and southbound trips must each reach Downtown Crossing by 6:00 AM. On the other hand, Key Bus Route 66 does not serve downtown Boston, and more passengers travel towards Harvard in the AM Peak period, so the standard requires that the first trip in the morning must arrive at Harvard before 6:00 AM.

If Table 3 does not specify an expected span of service for a mode or time period, then there is no respective standard. Service hours are set based on demand.

**Table 3: Span of Service**

<b>Mode</b>	<b>Day</b>	<b>Expected Span of Service</b>
<b>Bus</b>		
Local	Weekday	7:00 AM – 7:00 PM
	Saturday <sup>1</sup>	8:00 AM – 6:30 PM
	Sunday <sup>1</sup>	10:00 AM – 6:30 PM
Community	Weekday	10:00 AM – 4:00 PM
Commuter	Weekday	7:00 AM – 9:00 AM 4:00 PM – 6:30 PM
	Supplemental	Weekday
Key Bus Routes	Weekday	6:00 AM – midnight
	Saturday	6:00 AM – midnight
	Sunday	7:00 AM – midnight
<b>Heavy Rail</b>		
	Weekday	6:00 AM – midnight
	Saturday	6:00 AM – midnight
	Sunday	7:00 AM – midnight
<b>Light Rail</b>		
	Weekday	6:00 AM – midnight
	Saturday	6:00 AM – midnight
	Sunday	7:00 AM – midnight
<b>Commuter Rail</b>		
	Weekday	7:00 AM – 10:00 PM
	Saturday	8:00 AM – 6:30 PM
<b>Boat</b>		
	Weekday	7:00 AM – 6:30 PM
	Saturday <sup>2</sup>	8:00 AM – 6:30 PM

<sup>1</sup> This is a standard for high-density areas. There is no span standard for low-density areas on weekends.

<sup>2</sup> Memorial Day–Columbus Day

Note: The RIDE generally operates from 5:00 AM to 1:00 AM. The MBTA provides extended hours for trips starting and ending within 0.75 miles of a fixed-route service that operates outside of these hours.

Source: MBTA.

During the service planning process the MBTA will evaluate vehicle loads at the beginning and end of the service day to determine whether expanding the span of service is warranted.

The MBTA's performance on this measure is weighted by ridership; passenger trips taken on services that operate at least during the expected span are counted as "passing", while trips taken on services that operate less than the expected span are counted as "failing". This weighting prioritizes meeting the expected span of service on routes and services with high ridership. Performance is evaluated for each mode.

**Table 4: Span of Service Targets and Performance**

<b>Standard</b>	<b>Minimum</b>	<b>Target</b>	<b>2016 weekday performance</b>
Bus	90%	95%	93%
Heavy Rail	—	100%	100%
Light Rail	—	100%	100%
Commuter Rail	—	100%	100%
Boat	—	100%	100%

Bus performance data from Spring 2016. Other data from Dec. 2016.

Source: MBTA.

### ***Frequency of Service***

To maintain access to the transportation network within a reasonable waiting time, the MBTA established expected frequency of service levels for each mode, by time of day. On less heavily-traveled services, these expected levels set the standard for the frequency of service, regardless of customer demand. Frequency of service standards are measured using either headway (minutes between trips) or frequency (trips per time period).

If Table 5 does not specify an expected frequency for a mode or time period, then there is no respective standard. Frequencies for these services are set based on demand.

**Table 5: Service Frequency**

<b>Mode</b>	<b>Weekday Time Periods</b>	<b>Expected Frequency or Headway</b>
<b>Bus</b> Local, Community	AM and PM Peak	Every 30 minutes
	All other periods	Every 60 minutes
	Saturday and Sunday	Every 60 minutes
Commuter	AM Peak	3 trips in the peak direction
	PM Peak	3 trips in the peak direction
Key Bus Routes	AM and PM Peak	Every 10 minutes
	Early AM and Midday Base/School	Every 15 minutes
	Evening and Late Evening	Every 20 minutes
	Saturday and Sunday	Every 20 minutes
<b>Rapid Transit</b>	AM and PM Peak	Every 10 minutes
	All other periods	Every 15 minutes
	Saturday and Sunday	Every 15 minutes
<b>Commuter Rail</b>	AM Peak	3 trips in peak direction
	PM Peak	4 trips in peak direction
	All other periods	Every 3 hours in each direction
	Saturday	Every 3 hours in each direction
<b>Boat</b>	AM and PM Peak	3 trips in the peak direction
	Off-Peak periods	Every 3 hours

Note: There is no frequency standard during the Sunrise or Night times or for supplemental bus service. AM Peak and PM Peak are defined differently for Commuter Rail.

Source: MBTA.

The frequency of service levels may not be sufficient to meet passenger demand on heavily used services or on services with peak ridership that is outside the traditional peak hours. When load levels indicate that additional service is warranted on a particular route, as defined in the crowding standard, the MBTA may increase that service's frequency or provide larger vehicles to provide sufficient capacity to accommodate passenger demand.

MBTA's performance on this measure is weighted by ridership in each time period; passenger trips taken on services that operate at least at the expected frequency are counted as "passing", while trips taken on services that operate less than at the expected frequency are counted as "failing". This weighting prioritizes meeting the expected frequency at peak periods and on routes and services with high ridership. Performance is evaluated for each mode.

**Table 6: Service Frequency Targets and Performance**

Standard	Minimum	Target	2016 weekday performance
Bus	90%	95%	90%
Rapid Transit	—	100%	100%
Boat	—	100%	100%

Bus performance data from Spring 2016. Other data from Dec. 2016.

Note: This version of the Service Delivery Policy has focused on bus service planning; future versions will address Commuter Rail service planning once more granular ridership data is available.

Source: MBTA.

### ***Coverage Standard***

An important aspect of providing the region with adequate access to transit services is the system's geographic coverage. The MBTA recognizes that coverage means different things to different markets. To address these different groups, the MBTA measures coverage in three ways:

- Base Coverage
- Frequent Service in Dense Areas Coverage
- Low-income Household Coverage

Because of constraints such as topography and street network restrictions, it is not always possible to achieve uniform geographic coverage. In addition, demand for transit does not exist uniformly across the service area; high population density and low-income households create higher demand and need for transit access.

The MBTA prioritizes high frequency service in high density area and service to areas with high proportions of low-income households, while maintaining an acceptable level of base coverage. For the coverage standard, the MBTA will set a minimum for the base coverage and targets for the coverage of frequent service in dense areas and coverage of low-income households<sup>2</sup>.

The MBTA will monitor the effect of proposed service modifications on all three components of the coverage standard as part of its service planning process, described in Chapter 4.

<sup>2</sup> The base coverage will be evaluated as part of the Title VI Service Monitoring.

In order to calculate the coverage the MBTA uses walkshed distances to bus stops, rail stations, or boat docks. This means the half-mile distance is calculated based on the walking distance using the street network instead of a straight line distance that is usually impossible for pedestrians to travel. This means that another way to increase the coverage is by changes to the street network to shorten walking distances.

### **Base Coverage**

People expect the MBTA to provide a basic level of coverage throughout its service area. Some of this service may be relatively infrequent for some or all of the service day; but people throughout the service area expect and should have a minimum level of service.

The MBTA will measure the:

*Percent of the population that lives no more than 0.50 miles from a bus stop, rapid transit station, commuter rail station, or boat dock in the municipalities in the MBTA's service area, excluding municipalities that are members of a regional transit authority (RTA).*

Supplemental bus routes will not be counted in the base coverage calculations.

### **Frequent Service in Dense Areas**

Beyond a basic level of service throughout the entire service area, there are dense, urban areas where people expect frequent service. Within these urban areas, people can be reasonably sure that if they want to make a trip, they will have convenient access to frequent service.

In this section, frequent transit service is defined to include all bus stops along key bus routes, all rapid transit stations, and any bus stop that receives frequent service during its span of service.

A bus stop in the MBTA bus network is considered to receive frequent service if the average headway at that bus stop during the hours when any route serves the bus stop is less than a headway of:

- 15 minutes on weekdays (set to the expected headway for key bus routes during the midday base time period) *and*
- 20 minutes on Saturdays and Sundays (set to the expected headway for key bus routes on Saturdays and Sundays)

A bus stop can only be considered to receive frequent service if the span of service of all routes serving the bus stop meets or exceeds the span of service definitions for key bus routes.

The MBTA will measure the:

*Percent of the population that lives no more than 0.50 miles away from high-frequency service in the census block groups within the MBTA's service area that have densities greater than or equal to 7,000 people per square-mile, excluding census block groups within municipalities that are members of an RTA.*

The goal of this standard is to identify mostly contiguous, dense areas in the MBTA's service area that would support sufficiently effective frequent bus services. Choosing census block group densities below approximately 7,000 people per square mile creates many noncontiguous high-density "islands" throughout the MBTA's service area. At approximately 7,000 people per square mile, few high density islands remain.

### ***Low-income Households***

To reflect the importance of transit service to people who live in lower income households, the MBTA will measure the percentage of low-income households in its service areas that are located near transit.

The MBTA will measure the:

*Percent of the low-income households that are located no more than 0.50 miles away from any stop or station in the municipalities in the MBTA's service area, excluding municipalities that are members of an RTA.*

For all three components of the coverage standard, the MBTA will use the smallest census-based geography that is available and reliable. The distance to a transit stop will be measuring using walking distances.

**Summary of Coverage Standard**

**Table 7: Summary of Coverage Standards**

	<b>Numerator</b>	<b>Denominator</b>	<b>Minimum/ Target</b>	<b>2016 performance</b>
Base	Population living in census block groups within 0.50 miles of transit	Population of the MBTA service area	Minimum 75%	80%
Frequent service in dense areas	Population living no more than 0.50 miles away from high-frequency service in the census block groups that have densities greater than or equal to 7,000 people per square-mile	Population living in the census block groups that have densities greater than or equal to 7,000 people per square-mile	Target 85%	80%
Low-income households	Number of low-income households located in census block groups within 0.50 miles of transit	Households in the MBTA service area	Target 85%	83%

Performance data from Fall 2016.

Note: All populations include people living in municipalities in the MBTA’s service area, excluding people living in municipalities that are members of an RTA.

Source: MBTA.

**Accessibility Standards**

**Platform Accessibility Standard**

If elevators are not available to people who need or want to use them, they may not be able to gain access to MBTA services. The MBTA’s goal is for people to be able to access the platforms in each station at all times service is offered.

The MBTA will measure the:

*Percent of the total platform-hours<sup>3</sup> that are accessible.*

The MBTA will measure this separately for rapid transit stations, commuter rail stations, and boat docks; and it will continue to measure progress towards this standard. The minimum will always be set as the current annual performance.

**Vehicle Accessibility Standard**

The MBTA should provide at least one ADA-compliant vehicle on each trip it operates. The MBTA will measure the:

*Percent of trips that the MBTA provides with at least one ADA-compliant vehicle.*

A trip on Commuter Rail is considered compliant if at least one ADA-compliant car/coach in the trainset matches the location of each high-level platform at stations served by the trip. ADA-compliant Commuter Rail coaches must include ADA-compliant restrooms. Trips on the Green Line are considered noncompliant if none of the vehicles in a train set is ADA-compliant. Bus trips are not measured since ramps can be deployed manually. Heavy rail and boat trips are covered in the platform standard.

The minimum will always be set as the current annual performance and the MBTA will continue to measure progress toward this standard.

**Table 8: Accessibility Standards Targets and Performance**

Standard	Minimum	Target	2016 performance	2016 data
Platform Accessibility (Rapid Transit stations)	92%	100%	92%	Apr 2015–Mar 2016
Vehicle Accessibility (Green Line)	98.6%	100%	98.6%	Jul 2015–Jun 2016

Rapid Transit stations, include gated Silver Line Waterfront stations, but exclude surface-level stops on Green and Silver lines.

Source: MBTA.

<sup>3</sup> One hour of service offered to trains traveling each direction at a station. For each hour of service, a station can provide two accessible platform-hours, one hour for trains traveling in each direction. Stations with multiple platforms serving multiple branches or lines can have more than two accessible platform-hours per hour.

## Reliability Service Standards

Reliability standards vary by mode and provide tools to evaluate the on-time performance of individual MBTA lines and routes. Reliability standards also vary based on frequency of service; passengers using high-frequency services generally are more interested in regular vehicle arrivals than in strict adherence to published timetables, whereas passengers who use less-frequent services expect arrivals/departures to occur as published.

### ***Bus Reliability***

#### ***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 the scheduled frequency of the service:

**Scheduled-Departure Service:** A trip is considered to provide scheduled-departure service when it operates with a headway longer than 15 minutes. For scheduled-departure services, passengers generally time their arrivals at bus stops to correspond with the specific published departure times.

**Frequent Service:** A trip is considered to provide frequent service when it operates with a headway of 15 minutes or shorter. For frequent service, passengers can arrive at a stop without looking at a schedule and expect a reasonably short wait. Key bus routes, whose passengers use the services as if they were frequent services despite occasional longer than 15 minute headways, are always evaluated using the frequent service definition even when their headways exceed 15 minutes.

Routes other than key bus routes might operate entirely with frequent 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 frequent 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 at a timepoint, any trip evaluated using the scheduled-departure standard must meet one of the conditions cited below.

**Origin timepoint:** The trip must *depart* 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 1 minute before and 6 minutes after its scheduled departure time.

**Destination timepoint:** The trip must *arrive* at its destination timepoint no later than 5 minutes after its scheduled arrival time.

This standard allows vehicles to arrive early at their mid-route timepoints and at their destinations. The MBTA's communication standards will assesses the accuracy and timeliness of vehicle arrival predictions in order to make sure passengers have information on early mid-route arrivals.

### ***On-Time Test for Timepoints on Frequent Services***

**Origin or mid-route timepoint:** To be considered on time at a timepoint, a trip evaluated using the frequent service standard must leave its origin timepoint or mid-route timepoint no later than the scheduled headway plus 3 minutes.

For example, if “trip A” is scheduled to depart at 7:00 AM and the route’s next trip, “trip B,” is scheduled to depart at 7:07 AM, trip B has a 7-minute scheduled headway. Therefore, trip B must depart no more than 10 minutes (3 minutes more than the scheduled headway) after trip A actually depart for the origin timepoint to be considered on time. If trip A departs at 7:05 (5 minutes after its scheduled departure time), trip B can depart no later than 7:15 (10 minutes after trip A’s actual departure) to be considered on time.

**Destination:** The actual run time from the origin timepoint to the destination timepoint must be no more than 120 percent of the scheduled run time for the trip to be considered on time at the destination timepoint.

### ***Treatment of Dropped Trips in the Bus Reliability Standard***

The MBTA does not currently track dropped bus trips on a trip-by-trip basis. If the reliability data for a trip is not available, the MBTA excludes the trip from the calculation—the trip is removed from the total number of timepoints that are on time (or not on time) and from the total number of timepoints. In the case of the frequent service test, this means that the MBTA excludes headways preceding and following a trip with missing data from the calculation.

In the future, when the MBTA is able to track dropped trips on a trip-by-trip basis:

In the scheduled-departure test, dropped trips will count as failures for all timepoint crossings.

In the frequent service test, a dropped trip does not count towards the number of timepoint crossings, and the headway of the next operated trip, following the dropped trip(s), is measured from the previous operated trip.

### ***Bus Route Test***

Bus reliability is calculated as the:

*Percent of each route’s timepoints that meet the above definitions.*

The numerator is the number of time points that met the above definitions and the denominator is the number of total time points.

**Table 9: Summary of the Bus Reliability Timepoint and Route Tests**

	Origin	Mid-route	Destination
<b>Scheduled Departures</b> (Headways > 15 min.)			
<b>Standard</b>	Depart 0 min. early to 3 min. late	Depart 1 min. early to 6 min. late	Arrive no more than 5 min. late
<b>Arrival Standard</b>	—	—	$A \leq 5.0$
<b>Departure Standard</b>	$0.0 \leq D \leq 3.0$	$-1.0 \leq D \leq 6.0$	—
<b>Frequent Service Departures</b> (Headways $\leq 15$ min.)			
<b>Standard</b>	Depart no later than the scheduled headway plus 3 minutes		Actual run time is no more than 120% of the scheduled running time
<b>Standard</b>	$h_a \leq h_s + 3 \text{ minutes}$		$t_a \leq 1.2 \times t_s$

Source: MBTA.

**Where:**

- $A$  = arrival time
- $D$  = departure time
- $h_s$  = schedule headway
- $h_a$  = actual headway
- $t_s$  = scheduled running time
- $t_a$  = actual running time

Exceptions:

The first trip of the day on *each* route, which does not have a leading headway, is considered a scheduled-departure trip. All key bus routes are considered frequent services at all times, except for their first trip of the day.

## ***Heavy and Light Rail Reliability***

### ***Passenger Wait Time***

As with frequent bus services, passengers on light rail and heavy rail do not rely on printed schedules; rather, they expect trains to arrive at consistent headways. Therefore, schedule adherence for light rail and heavy rail is measured based on the proportion of a line's passengers who wait the scheduled headway, or less, for a train to arrive.

The passenger wait time standard is measured based on the:

*Percent of passengers traveling in each time period that wait the scheduled headway, or less, at each station.*

For people traveling in the trunk section of the Green Line, the headway is defined as 3 minutes.

### ***On-Time Test for Stations on the Mattapan Line***

The Mattapan Line is currently separate from the other light rail lines because the systems do not exist to evaluate the line using the passenger wait and travel time standards<sup>4</sup>. The Mattapan Line is evaluated using the On-Time Test for Timepoints on Frequent Services standard, used to measure the on-time performance of frequent bus services, with station departures corresponding to timepoint crossings.

The Mattapan Line reliability is measured by the:

*Percent of all station departures (or arrivals for terminal stations) on the Mattapan Line over the entire service day that pass their on-time tests.*

## ***Commuter Rail Reliability***

Commuter rail passengers expect to arrive at their destination station at the time posted in the schedule. The MBTA will measure the number of trains that arrive at the destination terminal no later than 5 minutes after the time published in the schedule.

Commuter rail reliability is measured as the:

*Percent of trains that arrive at their destination station on time.*

---

<sup>4</sup> Once the technology systems necessary to evaluate Mattapan Trolley service is finished being implemented, it will switch over to the same standard as the Light and Heavy Rail.

The MBTA and its commuter rail operator are working to develop passenger weighted measures for commuter rail reliability.

### ***Boat Reliability***

Boat passengers expect to arrive at their destination dock at the time posted in the schedule. The MBTA will measure the number of boats that arrive at the destination terminal no later than 5 minutes after the time published in the schedule.

Boat reliability is measured as the:

*Percent of boats that arrive at their destination dock on time.*

### ***Service Operated Standard***

The MBTA intends to operate all of the service it schedules. A multitude of factors, including equipment failure, lack of personnel, and unforeseen delays like medical and police emergencies, can sometimes prevent the MBTA from operating scheduled service.

The MBTA will measure the:

*Percent of scheduled service that is actually provided for each bus route, light rail line, heavy rail line, commuter rail line, and boat route.*

Planned heavy, light, and commuter rail outages where the MBTA offers substitute service do not count against this standard. For bus this standard will also be examined at the route level to determine if some bus routes have higher dropped trips rates, so steps can be taken to address significant imbalances.

**Table 10: Reliability Standards and Performance**

<b>Standard</b>	<b>Minimum</b>	<b>Target</b>	<b>2016 performance</b>	<b>2016 data</b>
Bus Reliability (non-Key)	70%	75%	65%	Mar–Dec 2016
Key Bus	75%	80%		
Rapid Transit Passenger Wait Times	—	90%	89%	Mar–Dec 2016
Commuter Rail Reliability	Contract requires 92% adjusted		93.8% (adjusted)	Jan–Dec 2016
Boat Reliability	—	99%	98%	Jul 2015–Jun 2016
Bus Service Operated	—	99.5%	98.5%	Jul 2015–Jun 2016
Light Rail Service Operated	—	99.5%	96.5%**	March–December 2016
Heavy Rail Service Operated	—	99.5%	99.1%**	March–December 2016
Commuter Rail Service Operated	Contract sets fines for canceled service		99.8%	Jan–Dec 2016

\*\* Data subject to change with improvements in data collection methodologies

Source: MBTA.

## Comfort Standards

Passenger comfort is influenced by the number of people on the vehicle and whether or not a seat is available to each rider for all or most of the trip. Passenger comfort

standards, which vary by mode and time of day, establish the maximum number of passengers per vehicle to provide a safe and comfortable ride.

### ***Passenger Comfort Standards***

As indicated in the frequency of service standard, the level of service provided by the MBTA is primarily a function of demand, as demonstrated by the number of passengers using the service at different times during the day. On weekends and some weekday 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 periods when some passengers will be standing, the MBTA strives to provide sufficient service so that people are reasonably comfortable. The purpose of the passenger comfort standard is to define the levels of crowding that are acceptable by mode and time period. The periods used by the MBTA for all modes, for both frequency of service and vehicle load standards, are defined earlier in this chapter (see Table 2).

There are a number of different types of vehicles in the MBTA's fleets at any given time, and the fleets change over time. Hence, the actual seating capacity and maximum number of passengers allowed by the comfort standards for each mode changes periodically. These load standards are included in Appendix B: Vehicle Load, which is updated as the fleets change.

### ***Bus***

The MBTA will measure the passenger hours of travel experienced by comfortable bus passengers during each time period. The maximum comfortable load is expressed as a ratio of the number of passengers on the vehicle to the number of seats on the vehicle. The maximum comfortable loads are set based on Department of Public Utility (DPU) Regulation 220 CMR 155.02 (26), which states "passengers in excess of 40 percent above the seating capacity of a motor bus shall not habitually be carried... ."

#### ***High-volume Time Periods***

The maximum comfortable passenger-to-seat ratio for high-volume travel periods is 140%. At loads of 140% or less of seated capacity, all passengers are considered comfortable. No passengers are considered comfortable when the vehicle load exceeds 140% of seated capacity.

#### ***Low-volume Time Periods***

The maximum comfortable passenger-to-seat ratio for lower-volume travel periods is 125%. At loads up to 125% of seated capacity, all passengers are considered comfortable; above 125% and up to 140% of seated capacity, seated passengers are

considered comfortable; and no passengers are considered comfortable when the vehicle load exceeds 140% of seated capacity.

Appendix B: Vehicle Load contains the number of seats and the loading thresholds for each vehicle type.

The MBTA will measure the:

*Percent of passenger travel time experienced in comfortable conditions<sup>5</sup>.*

**Table 11: Passenger Comfort Standard Targets and Performance**

<b>Standard</b>	<b>Minimum</b>	<b>Target</b>	<b>2015 performance</b>
Bus Passenger Minutes in Comfortable Conditions	92%	96%	94%

Data from average weekday September 1- December 14, 2015

Source: MBTA.

***Heavy and Light Rail***

The MBTA currently lacks the data to accurately measure passenger loads on heavy and light rail vehicles. As of 2016, the MBTA is working to procure heavy and light rail vehicles that have Automatic Passenger Counters (APCs) installed. This will allow for a standard similar to bus that measures the passenger time in crowded conditions.

In the meantime, the MBTA is developing a capacity metric for heavy and light rail that compares the number of people entering stations over 30 minute time periods to the capacity of the number of trains operated in that time period. This capacity metric will identify segments in the system that need additional service to address overcrowding.

***Commuter Rail***

The MBTA currently lacks the data to accurately measure the passenger loads on individual commuter rail coaches. The MBTA and its commuter rail operator are working to collect this type of data to allow for better planning. The contract does set expectations on the number of seats the operator should provide based on expected loads.

<sup>5</sup> For bus routes without enough data to model the passenger time in comfortable conditions, the proxy variable of maximum load will be used for all service planning decisions.

**Boat**

Federal laws prohibit boats from carrying more than their certified capacity—boats will leave people behind before they exceed their capacity. The MBTA does not have crowding-based comfort standards for its boat services. The MBTA will monitor if passengers are being regularly left-behind to determine if additional capacity is necessary.

**Service Planning Tools**

In addition to service standards, the MBTA can and should use diagnostic tools as part of its service planning process. For example, the MBTA needs to be able to evaluate the cost-effectiveness of its bus routes, even without establishing a cost standard. This Bus Route Cost-Benefit Ratio Tool will not be used to direct service cuts, but instead will be used to determine the cost-efficiency of the service provided and to identify service changes to improve performance.

**Bus Route Cost-Benefit Ratio**

Services may be valuable for different reasons; while carrying many passengers is an important characteristic, it is not the only factor that determines whether a service is effective or valuable. The MBTA considers three primary characteristics, or aspects, when evaluating whether a service is valuable to the system:

- **Ridership:** The number of people who use a service.
- **Transit Dependent Passengers:** The percentage of transit dependent people who use the service.
- **Value to Network:** Whether a service provides access to the greater network and the region. Value to the Network is composed of three characteristics:

**Catchment Area:** The number of people uniquely covered by each service.

**Destination Coverage:** The number of jobs and destinations sited near each service.

**Transferring Passengers:** The share of passengers who transfer to other services—these passengers contribute to the service effectiveness of other routes and modes.

Each bus route receives a benefit score for each of these aspects. Each aspect (Ridership, Transit Dependent Passengers, and Value to the Network) may be weighted depending on priorities set by the governing board. Table 12 has the current weights.

**Table 12: Weighting of Components of Bus Route Benefit**

Weight	Ridership	Transit Dependent	Value to the Network
	70%	15%	15%

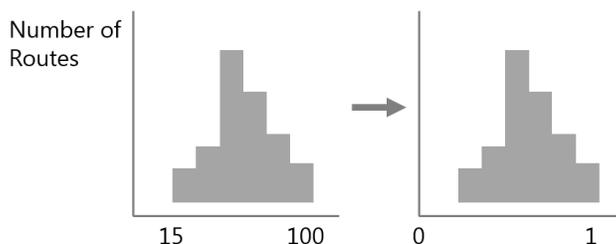
After summing the scores for each aspect, the score is divided by the net operating cost to develop a cost-benefit ratio. A cost-allocation formula uses a route’s peak and off-peak service hours and the total miles of service provided to calculate the route’s operating cost.

Routes in the 10<sup>th</sup> percentile or lower will be reviewed to determine what actions could be taken to improve the route’s performance or to determine whether the route is a worthy use of resources. In addition, routes that perform above the 90<sup>th</sup> percentile will be analyzed to determine the characteristics of high performing routes.

**The Methodology for Benefit**

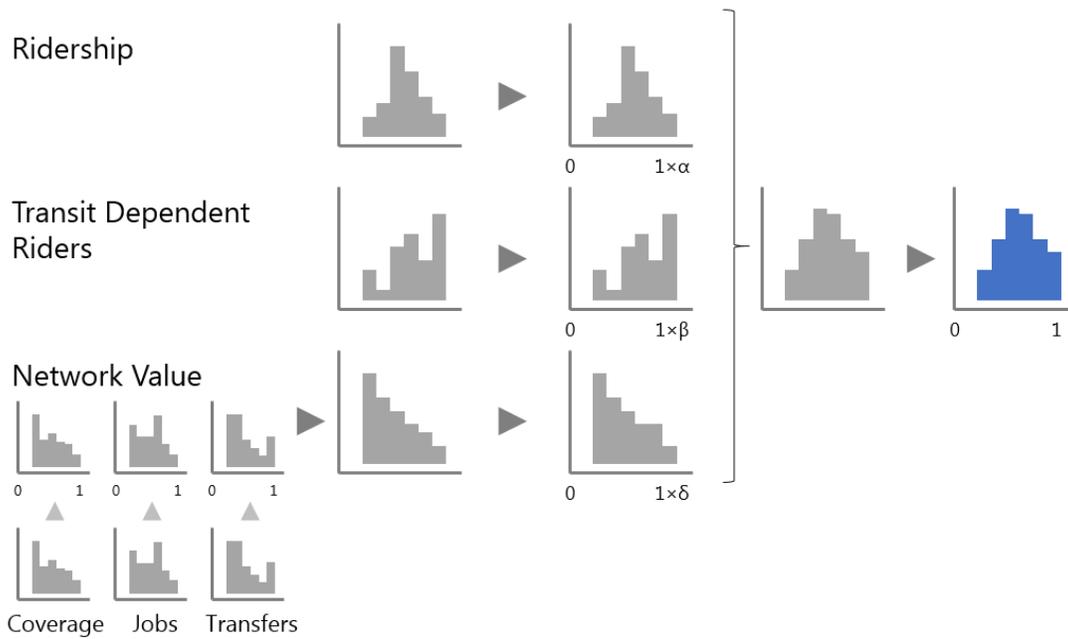
The MBTA combines the scores for each aspect to develop a single value for each service. Since the aspects have significantly different orders of magnitude<sup>6</sup>, they need to be standardized before they can be combined.

To scale the values to comparable values, the MBTA scales each aspects distribution to values between 0 and 1:



Within the Value to the Network portion of this equation, the values are added together. The scores for Value to the Network are renormalized to be combined with Ridership and Transit Dependent Passengers metrics. When combining the three top-level aspects, first the weights are applied to each aspect, then the values are added and renormalized.

<sup>6</sup> Ridership per route varies between 50 and 15,000 trips per day. Transit dependent passengers and transferring passengers vary between 0 and 100%. Catchment area and destination coverage can be in the tens of thousands.



For example:

**Table 13: Evaluation of an Example Route**

Metric	Value	Normalized	×	Weight	Final	
<b>Ridership</b>	13,000	<b>0.95</b>	×	<b>4</b>	<b>3.80</b>	
<b>Transit Dependent Passengers</b>	20%	<b>0.25</b>	×	<b>2</b>	<b>0.30</b>	
<b>Value to the Network</b>	1.10	<b>0.60</b>	×	<b>1</b>	<b>0.60</b>	
<i>Catchment Area</i>	2,000 people	0.10				
<i>Destination Coverage</i>	10,000 jobs	0.60				
<i>Transferring Passengers</i>	10%	0.40				
<i>Total Score</i>	<i>1.10 (0.10+0.60+0.40)</i>	<i>0.60</i>				
<b>Productivity Score</b>					<b>4.70</b>	
<b>Normalized Score</b>					<b>0.68</b>	

## Frequency of Analysis

The MBTA measures all of the standards at different frequencies depending on the availability of data and the use of the specific metric.

Table 14 shows often each of the standards are measured.

**Table 14: Frequency at which Each Standard is Typically Measured**

<b>Standard</b>	<b>Daily</b>	<b>Quarterly</b>	<b>Annual/ Service Plan</b>
<i>Availability</i>			
Span of service	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Frequency	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Coverage	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Accessibility</i>			
Platform accessibility	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Vehicle accessibility	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Reliability</i>			
Bus and all rail reliability	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Boat reliability	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Service operated	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Comfort</i>			
Crowded passenger minutes	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<i>Service Planning Metric</i>			
Bus cost benefit ratio	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Source: MBTA.

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## Chapter 4: Service Planning Process

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The MBTA regularly evaluates performance of its services and recommends and implements service changes through the service planning process. The service planning process strives to ensure that the MBTA uses resources in the most effective manner by developing strategies to improve performance and/or to allocate service within the system. Additionally, the process also identifies the gap between actual service levels and the targets set in this policy. The service planning process includes system-wide quarterly changes, ongoing rolling Service Plan changes, and an annual evaluation to inform the MBTA's budget process.

This chapter focuses on planning for bus and subway modes; many of the processes described in this chapter may be used in planning for commuter rail and boat modes.

### Service Planning Process

The service planning process takes place on two levels. One is the quarterly evaluation and implementation of incremental service changes. The other is an annual review of system performance along with rolling service plans focused on development of proposals for more substantial service changes in particular regions or on individual routes.

The primary differences between the quarterly service changes and the rolling service plans include:

- Magnitude of service changes considered (as defined below)
- Extent and type of analysis used
- Level of public participation

Quarterly service changes to transit services can be implemented with existing equipment, within the adopted budget, and without significantly affecting route structure or service delivery.

Rolling Service Plan changes have a notable effect on passengers, resource requirements, route structure, or service delivery.

**Table 15: Quarterly and Service Plan Changes**

<b>Magnitude</b>	<b>Resource Implications</b>	<b>Type</b>
<b>Quarterly</b>	Changes that can be implemented with existing equipment and within the adopted budget	Running time adjustments
		Departure time adjustments
		Headway changes to match ridership and service levels (provided the frequency and comfort minimums are still met)
		Changes to stop locations
		Route alignment changes
		Span of service changes within 1 hour or less
		Route extensions of 1 mile or less
		Route variation modifications
<b>Service Plan</b>	Changes that will have a significant effect on resources, and may potentially have a significant effect on passengers	Major service restructuring
		Implementation of new routes or services
		Elimination of a route or service
		Elimination of part of a route greater than 1 mile
		Span of service changes greater than 1 hour
		Route extensions greater than 1 mile

Source: MBTA.

## Initiation of Service Planning Ideas

Service changes may be initiated in a variety of ways, including, but not limited to:

- Service requests and/or comments from the public, including municipalities and organizations through various media (public meetings or workshops, written correspondence, MBTA website, MBTA customer call center, email, Twitter, etc.)
- Proposals made by MBTA staff (Service Planning; Operations staff, such as drivers, inspectors, or garage superintendents)
- Studies completed by regional entities or municipalities

- Gaps identified between provision of MBTA services and performance targets established in this document. If, during the Quarterly or Rolling Service Plan process, a route is found to fall below the minimum on one of the established standards, it should be prioritized.

## Quarterly Service Planning Process

The MBTA Service Planning Department screens potential service changes to determine whether they should be evaluated and implemented as part of the Quarterly process or Service Plan process. Potential changes are considered with respect to their impact on Service Delivery Policy standards.

Proposed changes are presented to the Service Committee, which includes representatives of the following departments:

- Service Planning
- Schedules
- Operations
- System-wide Accessibility
- Office of Performance Management and Innovation
- Other departments, as appropriate

Quarterly changes are approved by the Service Committee and implemented within the adopted budget as soon as practical.

## Rolling Service Plans Process

Two inputs inform the Service Plan process, which will be performed on a continuous rolling basis in particular areas or on certain routes.

- Current service performance measured against performance targets
- Recommendations for service changes that improve route or network performance

The priorities for the rolling service plan are determined by which service planning standards fall below their minimum level. Depending on the standard, the analysis is done at the network, mode, and/or route level. If the performance level of a mode below the minimum on any standard, that standard must be prioritized. Since there are tradeoffs between standards, allocating resources to address priority standards can impact other standards. After suggested changes, the performance levels on all standards must be re-evaluated to determine if the changes lowered performance on any other standards below the minimum levels (at the route, mode, and/or network

level). Since crowding and reliability can only be measured for operated service, proxy variables can be used to model the impact of the proposed changes.

During the Rolling Service Planning process, the routes are evaluated using the Cost-Benefit Ratio tool corresponding to the most recent data available. Routes that fall below the 10<sup>th</sup> percentile are flagged for analysis. The tool is used to determine which aspect(s) of the service are driving the low ratio and could be addressed to improve the service, or how the cost could be lowered, up to and including route elimination. Routes that perform at higher than 90<sup>th</sup> percentile will also be evaluated to consider which aspect(s) may have contributed to extraordinary performance and whether they can be emulated in other services.

The Service Committee recommends service proposals to include in the Preliminary Service Plan. Each Preliminary Service Plan is made available to the public for review and comment. A list of final recommendations are then submitted to the MBTA governing board for approval before the changes are implemented, along with Title VI and environmental justice service equity analyses, if necessary.

As with the Quarterly service planning process, a goal in developing service plans is to ensure that the MBTA uses available resources effectively. However, the rolling planning process also can identify service changes and enhancements that have merit, but which cannot be provided within the existing operating budget. In such cases, additional operating funds may be requested, and the service(s) may be implemented when sufficient resources become available.

With seven bus districts and four heavy rail or light rail districts, the MBTA anticipates that the rolling process will take 2-3 years to complete an entire cycle. The MBTA may consider substantial service changes for a specific route or corridor either individually or grouped with other routes, areas, or bus districts.

## **Annual Service Evaluation**

Once a year, the MBTA will publish a summary report of route and network performance according to the standards included in the Service Delivery Policy. Included in this report will be an analysis of the “gap” between the level of service that the MBTA is currently providing and the levels of service the MBTA would need to provide to reach the performance targets set in the Service Delivery Policy.

The MBTA will quantify gaps and identify potential actions to close the gaps. Options include those internal to the Service Planning process, such as shifting resources to benefit one service or standard over another without dropping below the minimum on any standards. The gap analysis will also consider external measures, such as securing additional operating funds, future capital investments, or more inter-governmental cooperation. Both internal and external measures will give policymakers, MBTA officials, and the public a better sense of the tradeoffs inherent in budget-constrained service

planning and suggest how additional resources could be used to provide service according to Service Delivery Policy performance targets.

## **Public Participation**

Public participation in the general service planning process occurs both on an on-going basis and as part of the Service Plan-specific process. The purpose of public involvement in the service planning process is to promote regular dialogue with existing and potential passengers, elected officials, and communities regarding their service needs.

Public participation is always required for a Service Plan. In addition, specific changes, for example route elimination, require public participation regardless of when the change takes place.

### ***Ongoing Public Outreach***

The MBTA provides avenues for ongoing communication through its website, customer phone line, social media outlets, standing committees, and comments sent to individual MBTA officials. Service-related comments and requests are directed to the appropriate department for consideration and response. Upon request, MBTA staff also attend public meetings held by municipalities or with public officials to address specific service issues. From time to time, the MBTA may conduct specific market or route-based meetings to gather direct feedback on potential service changes. This ongoing public outreach informs both the quarterly service planning process and the rolling service plan process.

### ***Rolling Service Plan Public Outreach***

Once a Preliminary Service Plan is complete, the MBTA schedules one or more 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. MBTA staff then assesses and analyzes the suggestions made through the public comments and, as appropriate, incorporates them into the final recommendations that go to the Board of Directors for approval.

All Service Plan public notifications and meetings conform to ADA and Title VI requirements and MBTA policies associated with these laws.

**Table 16: Summary of Service Planning Processes**

	<b>Quarterly Service Planning Process</b>	<b>Rolling Service Plan Process</b>
<b>Initiation of changes:</b>	<p>Requests/comments from public, including public and non-profit entities</p> <p>Bus Operations feedback</p> <p>Service Planning staff</p> <p>Service studies</p>	<p>Requests/comments from public, including public and non-profit entities</p> <p>Bus Operations feedback</p> <p>Service Planning staff</p> <p>Service studies</p> <p>Public meetings</p>
<b>Evaluation of changes:</b>	<p>Route-level analysis using the evaluation criteria</p> <p>Review by Service Committee</p>	<p>Area or district-level analysis using the evaluation criteria including performance review of all services using service standards</p> <p>Comparative evaluation of proposed service changes and possible new services</p> <p>Review by Service Committee</p> <p>Public review and comment</p> <p>Title VI and Environmental Justice analysis as needed</p>
<b>Implementation of changes:</b>	<p>Quarterly with regular schedule changes</p>	<p>Rolling, upon approval of the Service Plan by the MBTA governing board</p>

*Source: MBTA.*

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## Glossary of Terms and Acronyms

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**ADA:** Americans with Disabilities Act of 1990, and as amended in 2008.

**Automated Fare Collection (AFC) System:** The specific instruments, such as faregates and fareboxes, and back-end infrastructure the MBTA uses to collect fares.

**AVL:** Automatic Vehicle Locator.

**Boston Region MPO:** Boston Region Metropolitan Planning Organization. The Boston Region Metropolitan Planning Organization, staffed by CTPS, is responsible for conducting the federally required metropolitan transportation-planning process (often called the 3C—continuing, cooperative, and comprehensive—process) for the Boston metropolitan area. The MPO uses this process to develop a vision for the region, then decides how to allocate federal and state transportation funds to programs and projects—roadway, transit, bicycle, and pedestrian—that support that vision.

**Coverage:** People living within the geographic area served by the MBTA system.

**CTPS:** Central Transportation Planning Staff (to the Boston Region MPO).

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

**Fixed-Route Service:** Services that operate on designated routes with published timetables including all light rail, heavy rail, commuter rail, boat, and bus services. (The RIDE, the MBTA's paratransit service, is not a fixed-route service.)

**Frequency of Service:** The number of trips per hour provided on a route (for example, a route that operates every 15 minutes has a frequency of four trips per hour).

**Headway:** The number of minutes between scheduled trips on a route (for example, a route that operates four trips per 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 and higher frequency of service.

**Language Access Plan (LAP):** Includes the MBTA's language access needs assessment, based on the US Department of Transportation "four-factor analysis" and it prescribes:

- Methods and measures the MBTA uses to communicate with passengers with limited proficiency in English
- Training programs for educating staff about the Authority's Title VI obligations, including providing accessible services to passengers who are not proficient in English

- Methods the Authority uses to provide notice to the public of the Authority's Title VI obligations, including providing language assistance to passengers who are not proficient in English
- Plans for monitoring and updating the Language Assistance Plan.

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

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

**Limited English Proficiency (LEP):** Individuals who have a limited ability to read, write, speak, or understand English are limited English proficient, or 'LEP. According to the American Community Survey (ACS), those who indicated they spoke English "well," "not well," or "not at all" were considered to have difficulty with English—identified also as people who speak English "less than very well."

**MPO:** Metropolitan Planning Organization.

**Paratransit:** A transit mode operating with flexible schedules and without fixed routes. Generally, paratransit operators use cars, vans, or small buses to serve passengers. The MBTA's ADA paratransit service is known as The RIDE.

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

**Public Participation Plan:** The Public Participation Plan, or PPP, serves to guide agency public participation efforts, including populations that have been underserved by the transportation system and/or have lacked access to the process. The PPP guides in its efforts to offer early, continuous, and meaningful opportunities for the public to help identify social, economic, and environmental impacts of proposed transportation policies, projects and initiatives across MassDOT/MBTA.

**Schedule Adherence:** An indication of on-time performance, or how reliably services adhere to published schedules. Schedule adherence is the service standard that is used to measure progress toward achieving the reliability service objective.

**Shared Segment:** A portion of the bus network that is used by multiple bus routes.

**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 availability service objective.

**Timepoint:** A bus stop for which the MBTA lists the scheduled arrival time on its schedules. Timepoints are frequently found at major intersections along a route. There is neither a set distance between timepoints nor a specific number of timepoints for a route.

**Timepoint Crossing:** The act of passing a timepoint.

**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 based on race, color, or national origin in providing services.

**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 used to calculate the service standard for measuring progress toward achieving the comfort service objectives.

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## Appendix A: Route Types

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**Table A1: Local Bus Routes**

7	City Point – Otis and Summer Streets
8	Harbor Point /U Mass – Kenmore Station
9	City Point – Copley Square via Broadway Station
10	City Point – Copley Square Via BU Med Center
11	City Point – Downtown
14	Roslindale Square – Heath Street Loop
16	Forest Hills Station – U Mass. Or Andrew Station
17	Fields Corner Station – Andrew Station
18	Ashmont Station – Andrew Station
19	Fields Corner Station – Ruggles or Kenmore Station
21	Ashmont Station – Forest Hills Station
24	Wakefield Ave. – Mattapan Station or Ashmont
26	Ashmont Station – Norfolk and Morton Belt Line
27	Mattapan Station – Ashmont Station
29	Mattapan Station – Jackson Square or Ruggles
30	Mattapan Station – Forest Hills Station
31	Mattapan Station – Forest Hills Station
33	River and Milton Streets – Mattapan Station
34/34E	Walpole Center or Dedham Line – Forest Hills Station
35	Dedham Mall – Forest Hills Station
36	VA Hospital – Forest Hills Station Via Chas. River Loop
37	Baker and Vermont Streets – Forest Hills Station
38	Wren Street – Forest Hills Station
40	Georgetowne – Forest Hills Station
41	Centre and Eliot Streets – JFK U Mass Station
42	Forest Hills Station – Dudley or Ruggles Station
43	Ruggles Station – Park and Tremont Streets
44	Jackson Square Station – Ruggles Station
45	Franklin Park – Ruggles Station
47	Central Square Cambridge. – Broadway Station
50	Cleary Square – Forest Hills Station Via Metropolitan
51	Reservoir – Forest Hills Station
52	Dedham Mall – Watertown Yard
55	Queensberry Street – Park and Tremont Streets
59	Needham Junction – Watertown Square
60	Chestnut Hill Station – Kenmore Station
62	Bedford V.A. Hospital – Alewife Station
64	Oak Square – University Pk. Cambridge
65	Brighton Center – Kenmore Station
67	Turkey Hill – Alewife Station
68	Harvard Square – Kendall MIT Station
69	Harvard Square – Lechmere Station
70/70A	Cedarwood – Central Square Cambridge
72	Aberdeen and Mt. Auburn – Harvard Station
74	Belmont Center – Harvard Station via Concord Ave
75	Belmont Center – Harvard Station via Fresh Pond Pkwy
76	Hanscom Air Force Base – Alewife Station
78	Arlmont Village – Harvard Station
79	Arlington Heights – Alewife Station
80	Arlington Center – Lechmere Station
83	Rindge Ave. – Central Square, Cambridge
85	Spring Hill – Kendall MIT Station
86	Sullivan Station – Reservoir Station

87	Arlington Center or Clarendon Hill – Lechmere Station via Somerville Avenue
88	Clarendon Hill – Lechmere Station via Highland Avenue
89	Clarendon Hill or Davis Square – Sullivan Station via Broadway
90	Davis Square Station – Wellington Station
91	Sullivan Station – Central Square, Cambridge
92	Assembly Square Mall – Downtown Via Main Street
93	Sullivan Station – Downtown Via Bunker Hill
94	Medford Square – Davis Square Station
95	West Medford – Sullivan Station
96	Medford Square – Harvard Station
97	Malden Station – Wellington Station
99	Boston Reg. Med Center Stoneham – Wellington Station
100	Elm Street – Wellington Station
101	Malden Station – Sullivan Station Via Medford Square
104	Malden Station – Sullivan Station Via Ferry Street
105	Malden Station – Sullivan Station Via Main Street
106	Franklin Square or Lebanon Street Loop – Wellington Station
108	Linden Square – Wellington Station
109	Linden Square – Sullivan Station
110	Wonderland Station – Wellington Station
112	Wellington Station – Wood Island Station
119	Northgate Shopping Center – Beachmont Station
120	Orient Heights Station – Maverick Station
132	Redstone Shopping Center – Malden Station
134	North Woburn – Wellington Station
136	Reading Depot – Malden Station Via Lowell St
137	Reading Depot – Malden Station Via North Ave
201/202	Fields Corner Station – Fields Corner Station
210	Quincy Center Station – No. Quincy Station or Fields Corner Station
211	Quincy Center Station – Squantum
214	Quincy Center Station – Germantown
215	Quincy Center Station – Ashmont Station
216	Quincy Center Station – Houghs Neck
220	Quincy Center Station – Hingham
222	Quincy Center Station – East Weymouth
225	Quincy Center Station – Weymouth Landing or Columbian Square
230	Quincy Center Station – Montello Station
236	Quincy Center Station – South Shore Plaza
238	Quincy Center Station – Holbrook/Randolph Comm. Rail St
240	Avon Line – Ashmont Station
245	Quincy Center Station – Mattapan Station
350	North Burlington – Alewife Station
411	Malden Station – Revere/Jack Satter House
426	Central Square Lynn – Haymarket or Wonderland Station Via Clifondale Square <b>(Partially Express)</b>
429	Northgate Shopping Center – Central Square Lynn
430	Malden Center Station – Saugus Center via Square One Mall
435	Liberty Tree Mall – Central Square Lynn
436	Liberty Tree Mall – Central Square Lynn
441	Marblehead – Haymarket or Wonderland Station via Paradise Rd.
442	Marblehead – Haymarket or Wonderland Station via Humphry St.
450	Salem Depot – Haymarket or Wonderland Station via Western Ave <b>(Partially Express)</b>
455	Salem Depot – Wonderland Station
456	Salem Depot – Central Square Lynn
465	Danvers Square – Salem Depot
553	Roberts – Downtown Boston <b>(Partially Express)</b>
554	Waverley Square – Downtown Boston <b>(Partially Express)</b>
CT1 (701)	Central Square Cambridge. – B.U. Medical Campus/Boston Medical Ctr. Via MIT
CT2 (747)	Sullivan Station – Ruggles Station via Union Square Kendall/MIT and Longwood Medical Area
CT3 (708)	Beth Israel Deaconess or B.U. Medical Campus – Andrew Station

*Private Carrier Local Bus Routes*

710	North Medford – Medford Square Meadow Glen Mall or Wellington Station
712/713	Point Shirley, Winthrop – Orient Heights
714	Pemberton Pt., Hull – Station St., Hingham
716	Cobbs Corner – Mattapan Station via Canton Center

**Table A2: Key Bus Routes**

1	Harvard Square – Dudley Station via Mass. Ave.
15	Kane Square or Fields Corner – Ruggles Station
22	Ashmont Station – Ruggles Station Via Talbot Ave
23	Ashmont Station – Ruggles Station via Washington Street
28	Mattapan Station – Ruggles Station
32	Wolcott Square or Cleary Square – Forest Hills Station
39	Forest Hills Station – Back Bay Station
57/57A	Watertown Yard – Kenmore Station
66	Harvard Square – Dudley Station via Brookline
71	Watertown Square – Harvard Station
73	Waverley Square – Harvard Station
77	Arlington Heights – Harvard Station
111	Woodlawn or Byway and Park – Haymarket Station
116	Wonderland Station – Maverick Station Via Revere (in combination with 117)
117	Wonderland Station – Maverick Station via Beach (in combination with 116)
SL1 (741)	Logan Airport – South Station
SL2 (742)	Boston Design Center – South Station
SL4 (751)	Dudley Station – South Station
SL5 (749)	Dudley Station – Downtown

**Table A3: Commuter Bus Routes**

4	North Station – Tide Street
84	Arlmont Loop – Alewife Station
121	Wood Island Station – Maverick Station
131	Melrose Highlands – Malden Station
170	Waltham – Dudley Station (Limited Service) <b>(Express)</b>
212	Quincy Center Station – North Quincy Station
217	Quincy Center Station – Ashmont Station
221	Quincy Center Station – Fort Point
325	Elm Street – Haymarket Station <b>(Express)</b>
326	West Medford – Haymarket Station <b>(Express)</b>
351	EMD Serono/Bedford Woods – Alewife Station <b>(Express)</b>
352	Burlington – State Street <b>(Express)</b>
354	Woburn Line – State Street <b>(Express)</b>
424	Eastern and Essex – Haymarket or Wonderland <b>(Express)</b>
428	Oaklandvale – Haymarket Station via Granada Highlands
434	Peabody Square – Haymarket Station via Goodwins Circle <b>(Express)</b>
439	Bass Point Nahant – Central Square Lynn
448	Marblehead – Downtown Crossing <b>(Express)</b>
449	Marblehead – Downtown Crossing <b>(Express)</b>
451	North Beverly – Salem Depot
459	Salem Depot – Downtown Crossing <b>(Express)</b>
501	Brighton Center – Downtown Boston <b>(Express)</b>
502	Watertown Yard – Copley Square <b>(Express)</b>
503	Brighton Center – Copley
504	Watertown Yard – Downtown Boston <b>(Express)</b>
505	Waltham Center – Downtown Boston <b>(Express)</b>
556	Waltham Highlands – Downtown Boston <b>(Express)</b>
558	Auburndale – Downtown Boston <b>(Express)</b>

**Table A4: Community Bus Routes**

5 City Point – McCormack Housing

**Table A5: Supplemental Bus Routes**

114	Bellingham Square – Maverick Station
171	Dudley Station – Logan Airport via Andrew Station
191	Mattapan – Haymarket via Ashmont, Fields Corner and Dudley Station
192	Cleary Square – Haymarket via Forest Hills and Copley Square
193	Watertown Yard – Haymarket via Kenmore Station
194	Clarendon Hill – Haymarket via Sullivan Square Station
195	Shattuck Hospital – Temple Place
SLW (746)	Silver Line Way – South Station
9701	Cambridge Street at Warren Street – Ruggles Station
9702	Cambridge Street at Warren Street – Andrew Station
9703	Cambridge Street at Warren Street – Jackson Station

## Appendix B: Vehicle Load

**Table B1: Bus and Trackless Trolley**

Vehicle Type	No. of Seats	Off-Peak Standard	Off-Peak Max Load	Peak Load Standard	Peak Max Load
RTS 40' Diesel	40	125%	50	140%	56
New Flyer 40' Emission Contr. Diesel	39	125%	48	140%	55
New Flyer 40' Compressed Natural Gas	39	125%	48	140%	55
New Flyer 40' XDE40	37	125%	46	140%	52
NABI 40' Compressed Natural Gas	39	125%	48	140%	55
Neoplan 40" Emission Controlled Diesel	38	125%	47	140%	53
Neoplan 40' Electric Trolley Bus	31	140%	43	140%	43
New Flyer 60' Diesel-Electric Hybrid	57	125%	71	140%	80
Neoplan 60' Compressed Natural Gas	57	125%	71	140%	80
Neoplan 60' Dual-Mode Articulated	47	140%	66	140%	66
Neoplan 60' Airport Dual-Mode Artic.	38	140%	53	140%	53

*Note: Dual-mode vehicles used in Silver Line tunnels and electric trolley buses are always evaluated using the Peak Load Standard because of the operating characteristics of that service and because those vehicles have more standing room per seat.*

Source: MBTA.

**Table B2: Vehicle Load on Light Rail, Heavy Rail, Silver Line Waterfront**

Vehicle Type	No. of Seats	Floor Area (sq. ft.)	Total Passengers			
			Early AM/ AM Peak	Midday Base	Midday School/ PM Peak	Evenings and Weekends
Green Line 7/8	46/44	207	100	66	100	66
Mattapan Line	41	120	73	53	73	53
Red Line 1	63	306	165	94	165	94
Red Line 2	62	297	161	92	161	92
Red Line 3	50	338	163	84	163	84
Orange Line	58	249	141	83	141	83
Blue Line	35	154	86	50	86	50

Source: MBTA.

**Table B3: Commuter Rail**

<b>Vehicle Type</b>	<b>Fleet ID</b>	<b>Number of Seats</b>	<b>Peak Load Standard</b>	<b>Peak Max Load</b>
Pullman	200–258	114	110%	125
Bombardier	350–389	127	110%	140
Bombardier	600–653	122	110%	134
Bombardier	1600–1652	122	110%	134
Kawasaki	700–749	185	110%	204
Kawasaki	750–781	182	110%	200
Kawasaki	900–932	178	110%	196
Kawasaki	1700–1724	175	110%	193
MBB	500–532	94	110%	103
MBB	1500–1533	96	110%	106
Rotem	800–846	179	110%	197
Rotem	1800–1827	173	110%	190

*Source: MBTA.*

**Table B4: Commuter Boat (MBTA-Owned)**

<b>Vessel Name</b>	<b>Vessel Type</b>	<b>Max Load</b>
Flying Cloud	Catamaran	149
Lightning	Catamaran	149

*Source: MBTA.*

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## Appendix C: The RIDE Service Standards

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The MBTA monitors The RIDE contractors using performance metrics. If a contractor fails to meet standards set in the contracts, as well as FTA ADA requirements, they incur monetary penalties.

These metrics include:

### ***Reliability***

#### **Missed trips** (service provider at fault)

Vehicle does not show or is more than 30 minutes late.

#### **Late trips** (service provider at fault):

Pick up is more than 15 minutes late and/or drop-off is more than 10 minutes after appointment time.

#### **Not Available trips** (service provider at fault)

#### **No Show/Late Cancellation trips** (customer at fault)

#### **Travel time**

Total registered trips that violate travel time standards should not exceed 2% of all registered trips.

#### **Percent of registered trips assigned to non-dedicated vehicles**

Total registered trips assigned to non-dedicated vehicles should not exceed 5% of all registered trips, unless the Contractor has received prior approval to do so by the MBTA.

#### **Complaint rates**

The number of complaints concerning The RIDE should not exceed 0.2% of the trips requested.

#### **Accident rates** (At fault/not at fault)

All incidents and accidents should be reported.

### ***Accessibility***

#### **Lift or ramp failures**

Ramps should be operable.

***Comfort*****Air Conditioning/heating failures**

Air conditioners and heaters should be operable.

***Communication*****Telephone communication system failures**

The telephone communication system should be operable. The MBTA levies penalties for interruptions in excess of 30 minutes.

**Vehicle communication system failures**

The vehicle communication system should be operable. The MBTA levies penalties for interruptions in excess of 60 minutes. Any occurrence of <90% functionality of these systems for all vehicles deployed in service shall also constitute a failure/ interruption.

**Computer system disruptions**

The computer systems used in the delivery of services (reservations, scheduling, dispatching, reporting) should be operable. The MBTA levies penalties for interruptions in excess of 60 minutes.

**Telephone hold time**

The average hold time is over 1.5 minutes and/or where 5% of the total calls have a hold time that exceeds 5 minutes.

**Staff uniform policy violations**

Staff should abide by the uniform policy.

**Failure to respond to complaints**

Complaints should be responded to within 10 days.

***Management and Staffing*****Key senior staff vacancies**

Vacancies in one of the eight “key senior staff” positions should not last longer than 60 calendar days.

**Personnel complement compliance**

Each month, 100% of the proposed complement of personnel for each position should be maintained.

## Appendix D: Service Standard Minimums and Targets

Table D1: All Service Standards

Standard	Minimum	Target	2016 performance	2016 data
<b>Span of Service Standards</b> (minimums, targets, and 2016 performance apply to weekdays only)				
Bus	90%	95%	93%	Spring 2016
Heavy Rail	—	100%	100%	Dec 2016
Light Rail	—	100%	100%	Dec 2016
Commuter Rail	—	100%	100%	Dec 2016
Boat	—	100%	100%	Dec 2016
<b>Service Frequency Standards</b> (minimums, targets, and 2016 performance apply to weekdays only)				
Bus	90%	95%	90%	Spring 2016
Rapid Transit	—	100%	100%	Dec 2016
Boat	—	100%	100%	Dec 2016
<b>Coverage Standards</b>				
Base	75%	—	80%	Fall 2016
Frequent service in dense areas	—	85%	80%	Fall 2016
Low-income households	—	85%	83%	Fall 2016

Table D1 continues on next page

**Table D1: All Service Standards, continued**

<b>Standard</b>	<b>Minimum</b>	<b>Target</b>	<b>2016 performance</b>	<b>2016 data</b>
<b>Accessibility Standards</b>				
Platform Accessibility (Rapid Transit, gated stations)	92%	100%	92%	Apr 2015–Mar 2016
Vehicle Accessibility (Green Line)	98.6%	100%	98.6%	Jul 2015–Jun 2016
<b>Reliability Standards</b>				
Bus Reliability (non-Key)	70%	75%	65%	Mar–Dec 2016
Key Bus Reliability	75%	80%		
Rapid Transit Passenger Wait Times	—	90%	89%	Mar–Dec 2016
Commuter Rail Reliability	Contract requires 92% (adjusted)		93.8% (adjusted)	Jan–Dec 2016
Boat Reliability	—	99%	98%	Jul 2015–Jun 2016
Bus Service Operated	—	99.5%	98.5%	Jul 2015–Jun 2016
Light Rail Service Operated	—	99.5%	96.5%*	Mar–Dec 2016
Heavy Rail Service Operated	—	99.5%	99.1%*	Mar–Dec 2016
Commuter Rail Service Operated	Contract sets fines for canceled service		99.8%	Jan–Dec 2016
<b>Passenger Comfort Standards</b>				
Bus Passenger Minutes in Comfortable Conditions	92%	96%	94%	Weekdays, Sep–Dec 2015

\* Data subject to change with improvements in data collection methodologies



CORPUS CHRISTI REGIONAL  
TRANSPORTATION AUTHORITY



**CORPUS CHRISTI REGIONAL TRANSPORTATION  
AUTHORITY BOARD POLICY**

**FIXED ROUTE SERVICE STANDARDS  
JUNE 2017**

**CORPUS CHRISTI REGIONAL TRANSPORTATION AUTHORITY  
BOARD POLICY**

**FIXED ROUTE SERVICE STANDARDS**

**I. PURPOSE**

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**1. Policy Goals**

The RTA operates a family of services that is designed to be consistent throughout the service area. While the service area is diverse in its needs and demand for transit services, the goal of this policy is to ensure equitable treatment throughout the service area. Decisions on services provided or modifications to services provided are to be based on conditions that exist relevant to the services provided. These standards address when, where, and how the RTA obligates itself to provide transit services to the community it serves.

**2. Non-Discrimination**

For any RTA service, no person shall be denied access or shall be provided a different level of access based on race, ethnicity, gender, religious or other affiliation, or presence of a disability. No person wishing to use RTA transit services shall be denied service granted they have paid the requisite fare and adhere to all RTA rules. Further, in provision of services, all requirements of Title VI of the Civil Rights Act of 1964, Presidential Executive Order 12898 on Environmental Justice, and the Americans with Disabilities Act (ADA) will be adhered to by all times in the services provided and by persons employed by the RTA or its contractors.

**II. BUS SERVICE DELIVERY STANDARDS**

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RTA operates the following types of bus services:

- Primary Transit Network (PTN): These are routes identified by the RTA Long Range Plan and that serve as the backbone of service delivery. These corridors connect major hubs or serve areas of very high ridership.
- Standard Routes: Local routes operate within the Corpus Christi urban area in areas with high to medium demand and connect various areas with RTA stations or Emphasis Corridors.
- Connector Routes: These routes connect outlying portions of the service area with the urban area at major stations. Connector routes may be demand response in outlying areas, but have fixed stops within the urban area.
- Local Circulators: These routes serve lower density areas where demand is low to medium and provide a basic level of service.

- Flexible Routes: These routes serve specific stops via a designated schedule, but may be scheduled as a demand response service within a designated zone provided the ability to adhere to fixed time points. Flexible service is appropriate in low demand areas.
- Demand Response Service: Demand response service is provided in areas where demand is very low. Service is offered in a designated zone and should connect passengers to fixed-routes for out-of-zone trips.
- Commuter Routes: These are express services traveling point-to-point for commuters. These routes typically operate morning and evening trips matching specific shift times.
- Downtown Routes: Service that operates to connect short trips downtown and to North Beach and is geared toward providing workers or visitors with access to various attractions.
- Shuttle Services: Shuttle service is a higher frequency, short service offered for specific trip attractors such as a university where parking is limited or difficult.

## **1. Route Directness Standard**

RTA bus routes shall be designed to operate as directly as possible between its terminals as possible to minimize passenger travel time. Routes shall operate on major arterial streets and operate in a single direction to the extent possible. There may be situations in which a route deviates from the preceding to serve particularly large traffic generators. Deviations from arterial streets should be very rare on Transit Emphasis Corridors and Standard Routes, but are more permissible for Local Circulators. When a deviation exists or is being considered, 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.

All RTA bus routes are two-way service. Exceptions are permissible for one-way streets. Terminal loops shall be avoided when possible through the use of terminal interlines and not exceed 15 minutes of scheduled run time.

## **2. Service Frequency**

*Bus Headway* is defined as the interval of time between buses traveling in any given direction (inbound or outbound) on any given route. Headways shall vary between peak periods and off-peak periods where demand dictates in order to minimize operating expenses and provide the most efficient service during weekday peak demand periods.

The following factors will be examined when adjusting headways:

- ❖ Load factor;
- ❖ Passenger demand;
- ❖ Running time;

The following are maximum guidelines for RTA service frequency for each service category:

Emphasis Corridors: 15 minutes weekday peak and midday and 30 minutes during other periods.

Standard routes / Downtown routes: 30 minutes weekday peak and midday and 60 minutes during other periods.

Local circulators / Flexible services: 60 minutes during all times weekdays. Operated on evenings, Saturday and Sunday as demand warrants.

In order to make transferring as convenient as possible and consistent ‘pulsing’ between routes, headways of 10, 15, 30, and 60 minutes will be employed where practical and feasible within fiscal and contractual constraints. Such headways also make passenger schedules simpler to remember.

### **3. Service Duplication**

Whenever possible, service duplication is to be avoided to reduce system waste. Service duplication is essentially the servicing of the same geographic area during the same time period by multiple routes. To avoid duplication, routes operating on the same road segment for one mile or longer must have schedules that create improved frequency on the corridor to the extent possible. Additionally, routes will not serve two parallel streets less than ¼ mile apart for more than ½ mile.

### **4. Bus Load Standard**

*Bus Load Factors* is defined as the ratio of passengers on board a bus to the number of seats available. The intent of load standards is to balance passenger comfort and safety with operating costs.

Generally acceptable load factors are higher for routes with shorter trip distances; requiring someone to stand is less acceptable as time on vehicle increases. For Connector Routes and Commuter Routes, load factors of over 1.0 are not tolerable and either different vehicles should be assigned or additional vehicle trips added to alleviate the situation. For all other services, load factors should not exceed 1.25.

### **5. Vehicle Assignment**

Vehicles shall be equitably distributed throughout the service area. The primary concern in vehicle assignment is matching vehicle length with maximum loads to comply with vehicle load requirements. Among routes requiring same size vehicles, buses will be distributed evenly across the system in respect to vehicle age and amenities provided.

Service Development will advise Operations on the required length of vehicle for each route, and Operations will make vehicle assignment decisions. Regular vehicle assignment must be reviewed and approved by RTA’s Title VI Officer.

## **6. Timed Connections**

Because direct service from every origin and destination is impractical, transfers are unavoidable. Where system design requires transfers between routes, those transfers shall be timed whenever practical. Service Development will determine where timed connections are to exist and adjust schedules accordingly. Because actual arrival and departure times will vary from what is scheduled, buses may need to wait for connecting routes. When possible, time should be added to bus schedules at timed connections to accommodate the volatility of bus schedules. Buses will wait up to 10% of their headway to permit connections, regardless of requests by passengers.

## **7. Hours of Operation**

Hours of operation refer to the time between the first and last trip operated on a route. As the various routes are designed to work as a complete system, a consistent span of service among routes is desirable.

*Span of Service Hours* is defined as the hours that service will operate at any given point within the system. The span of service varies by route according to demand and may be limited to peak hour service only. Minimum span of service for each Service Category is:

### Weekday

Emphasis Corridors / Standard .....5:30 am to 10:30 pm  
Connector / Local / Flexible .....6:00 am to 8:30 pm  
Commuter / Shuttle / Downtown .....Varies

### Saturday

Emphasis Corridors / Standard .....6:30 am to 10:30 pm  
Connector / Local / Flexible .....6:30 am to 8:30 pm  
Commuter / Shuttle / Downtown .....Varies

### Sundays and Holidays

Emphasis Corridors / Standard .....8:00 am to 8:00 pm  
Connector / Local / Flexible .....8:00 am to 7:00 pm  
Commuter / Shuttle / Downtown .....Varies

Due to operations considerations and financial constraints, some variation in days operated and start / end times among routes are expected. Variation from this standard for specific routes will have reasons for the variation documented.

Service periods are identified as peak and off-peak and are defined as follows:

### Peak

❖ Morning Peak .....6:00 a.m. – 9:00 a.m.  
❖ Afternoon Peak .....3:00 p.m. – 6:00 p.m.

Off-Peak

- ❖ Early Morning.....before 6:00 a.m.
- ❖ Midday .....9:00 a.m. – 3:00 p.m.
- ❖ Evening .....6:00 p.m. – 8:00 p.m.
- ❖ Late Night .....after 8:00 p.m.
- ❖ Weekend service is considered off-peak all day.

**8. Service Holidays**

Each calendar year, as part of service changes, the Board of Directors will adopt a set of service holidays to be implemented for the following year. For some holidays, no service will be provided and for others the RTA will operate a reduced level of service. Holiday service should be a common service type (such as Saturday, Sunday, or a common holiday schedule) so as not to add confusion to passengers.

**9. On-Time Performance**

To ensure that transit riders have confidence that the service will perform reliably in accordance with the public timetables prepared and distributed by RTA, on-time performance standards have been established. Service should deviate as little as possible from the published timetables. Early departures from time points that risk leaving on-time passengers and late arrivals to time points are considered deviations from on-time performance. This standard applies to every stop on a route that could reasonably be considered a timing point based on published customer information.

It is impossible to achieve and maintain 100% on-time performance due to varying traffic and weather conditions, ridership activity, road construction, detours, accidents and other service interruptions. Nevertheless, every effort will be made to ensure that all RTA buses operate on-time. The following on-time performance standards shall apply:

- Early departures of any kind.....Less than 1%
- Departures within 0-5 minutes.....>85%

In building schedules, Service Development should consider all of the above on-time standards and ensure that all would likely be achieved by a schedule.

**III. BUS STOPS**

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**1. Bus Stop Spacing**

The spacing of stops on a bus route often represents a trade-off between the convenience for those accessing the bus (walking distances) and the convenience of those on-board the vehicle (speed of travel, reliability of schedule). Ultimately, the goal of the RTA in this regard is to minimize the total travel time (both on the vehicle and off) for passengers using the service and ensure high schedule reliability. Additionally, higher operating speeds permit greater amounts of service relative to operating cost.

As the RTA serves multiple users with multiple trip purposes, differing types of bus services require different bus spacing levels. Bus stops will be less frequent on routes within the Primary Transit Network (PTN) and will be greatest among on local circulators. Additionally, flexible routes and demand response services will provide access to the system beyond designated bus stops. Stop spacing will be dependent on the level of ridership within an area served as well as level of ridership on the route overall.

The RTA established typical guidelines for minimum bus stop spacing.

<b>Service Type</b>	<b>Typical Spacing</b>	<b>Minimum Spacing Distance</b>
Frequent or PTN	2-4 per mile	1,320 feet (1/4 mile)
Standard/Local	4-8 per mile	660 feet (1/8 mile)
Flexible*	1-2 per mile	2,640 feet (1/2 mile)
Regional Express	Varies based on market demand.	

\*Stop spacing on Flexible routes should be spaced sufficiently to permit the vehicle to deviate as requested. Commuter and Shuttle services have targeted service markets and thus stop spacing will vary significantly. Demand response services will only have designated stops at transfer locations.

## **2. Bus Stop Location and Safety**

Standard industry practice for bus stops is now to place stops on the far side of intersections. Far side stops are preferable due to safety considerations, specifically that it encourages exiting passengers to cross the street behind the bus. Stops should be placed a great enough distance from the intersection that vehicles behind the bus have a path around, so as not to block the intersection. Where a safe stop cannot be located on the far side of an intersection, near side stops can be considered.

Stops should usually be paired on both sides of the street and the path across street to opposing bus stops should be safe, so as not to have bus stop placement encourage unsafe pedestrian movements. Mid-block stops far from legal crosswalks are discouraged for this reason. Safety to pedestrians is the principal concern in bus stop placement.

## **3. Bus Stop Accessibility**

All bus stops will be accessible in providing a surface for waiting for the bus and an accessible path onto the vehicles. Existing non-conforming stops will be improved to meet this requirement in accordance with RTA Transition Plan.

The RTA is committed to maximizing access to services by all individuals in compliance with the RTA Accessibility Policy. Accessibility improvements for bus stops should not necessarily be limited to what is required by the ADA.

## **4. Bus Stop Amenities**

### ***Bus Shelters or Shade Structures***

Bus shelters are important amenities for ensuring passenger comfort. The selection of a shelter location depends on the physical characteristics of a site. A bus stop location with at least 30 daily passenger boardings with adequate right-of-way warrants a shelter or shade structure.

In addition, bus stops that generate at least 10 daily passenger boardings and meet one of the following criteria qualify for a shelter or shade structure:

- Medical, senior, social service, public or special needs facilities within ¼ mile
- Major grocery stores within ¼ mile
- Apartments, student dormitories, or senior housing with 100+ units within ¼ mile
- High schools, colleges, or universities within ¼ mile
- New major developments conducive to increasing ridership growth within ¼ mile

New or replaced bus shelters or shade structures shall be installed or positioned so as to permit a wheelchair or mobility device user to enter from the public way and to reach a location, having a minimum clear floor area of 30 inches by 48 inches, entirely within the perimeter of the shelter or shade structure. Shelters or shade structures will be connected by an accessible route to the boarding area. Shelters or shade structures will contain trash receptacles.

### ***Bus Benches***

A bus stop location with at least 15 daily passenger boardings with adequate right-of-way warrants a bench(s).

Circumstances that may preclude installation of shelters or shade structures, benches, or trash receptacles at a particular bus stop are as follows:

- Plans are in place to relocate or close the stops
- Amenities would compromise pedestrian or operational safety
- Adequate right-of-way is not available
- Installation costs are excessive

### ***Geographic Equity***

RTA bus stop amenities of all types will be geographically representative of all ridership – that is, within a geographic area with a certain proportion of bus ridership, the proportion of bus stop amenities should be similar. Plans for adding bus stop amenities or changing their location will be approved by the RTA Title VI Officer.

## **IV. MINIMUM ACCEPTABLE SERVICE**

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The RTA will maintain a minimum service level for all portions of its service area that meet particular demographic thresholds. Communities that contribute to the RTA financially shall have a minimum level of general purpose service that is appropriate given the size and activity within each.

### **1. Small Communities**

For all incorporated places or Census Designated Places with fewer than 50,000 residents, the following service requirements will apply. Demographic data for the purposes of this requirement will be from most recent decennial census or American Community Survey, whichever is most current.

Service levels will be based upon the sum of total population and employment for areas in which data is available. For all other areas, total population alone will be used as a metric.

Population + Employment	Population Only	Minimum Service Level	
		Local	Connector
10,000+	7,000+	70 hours / wk	60 trips / wk
5,000+	3,500+	40 hours / wk	30 trips / wk
2,000+	1,250+	N/A	20 trips / wk
750+	500+	N/A	10 trips / wk

### **2. Large Community & Unincorporated Areas**

For larger geographic areas – communities with 50,000 or more people – and unincorporated parts of the service area, minimum service requirements will be based on Census Tract population density. Each tract wholly or partially within large communities and unincorporated parts of the service area will be evaluated. Minimum revenue hours are totals for all routes and services located in or adjacent to each Census Tract.

Population Density (people/sq. mile)	Minimum Revenue Hours
1,000+	100 / wk
500+	75 / wk
200+	30 / wk

### **3. Service Type**

While level of service minimums are established by this section of the Service Standards, type of service shall remain dependent on historic or anticipated demand levels. Generally, when demand is less than five passengers per hour, demand response type services are likely to be most cost effective. Demand over 15 passengers per hour should have fixed stops and schedules. Hybrid flexible routing services may also be appropriate. Road conditions and passenger

demographics should also be considered in determining service type. See Section V for details on minimum thresholds for various service types.

#### **4. Maximum Limit of Requirement**

The total of all services which do not meet fixed route service standards as described in Section V and are provided due to minimum levels described in this section, shall not exceed 10% of all general purpose service hours offered by the CCRTA.

### **V. SERVICE MONITORING AND RIDERSHIP DATA REPORTING**

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On a monthly basis, Service Development staff will present a report to the Board and public concerning the performance of RTA services. This report will detail in what services the RTA has invested public funds and what transportation benefits have accrued from use of the funds. The following metrics will be provided for services in general:

#### **Operation Statistics:**

- Unlinked Passenger Trips (UPT) per Vehicle Revenue Hour (VRH) – This metric is the most common standard metric within the transit industry for evaluating services. The metric takes two readily accessible pieces of data that roughly provide a cost-benefit ratio.
- Unlinked Passenger Trips per Vehicle Revenue Mile (VRM) – This metric uses a different denominator exchanging hours for miles. In general, it is somewhat less useful since costs that vary by hour (cost of operator and supervision) are a larger share than those that vary by mile (maintenance and fuel).
- Passenger-Miles (PM) per Vehicle Revenue Hour – This is another variation on passengers per hour that changes the benefit estimate to passenger miles. This not only considers the number of system users, but also estimates (through trip length) the cumulative benefit to each rider.

#### **Financial Statistics:**

- Operating Cost per Unlinked Passenger Trip – This metric provides a cost-benefit ratio which uses system users as the benefit metric. This is more understandable for the public than operating statistics, but the actual cost calculation is dependent on allocation method.
- Operating Cost per Passenger Mile – Metric is similar to cost per trip, but substitutes passenger-miles as the benefit metric.
- Fare box Recovery – This is a completely financial metric in how it estimates cost-benefit. The benefit here is estimated economically – in what people are willing to pay for the service. The drawback is that fare rates are typically a policy measure established far lower than what users would be willing to pay.

Route specific information will be provided on a semi-annual basis in order to inform decision making on services that should be considered for greater or lesser service amounts. An overall Route Performance Indicator will be calculated using each of the financial characteristics. Each

route will be ranked and those scoring significantly above or below the system average will be identified.

Additionally, minimum thresholds will be determined for varying service levels. These thresholds will correspond to specific passengers per hour levels presuming system averages for trip length, fares per passenger, and cost per revenue hour. These thresholds are as follows:

- For service with headways over 40 minutes: 15 passengers per hour
- For service with headways between 20 and 40 minutes: 20 passengers per hour
- For service with headways under 20 minutes: 25 passengers per hour
- For flexible services: 5 passengers per hour

Where service is significantly lower than system averages or for routes that fail to meet the minimum thresholds, the service should be reviewed for changes. Those changes could include different routing, modified headways, or change in service delivery type.

## **VI. SERVICE CHANGES**

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Service changes are appropriate on occasion as development patterns and other factors influencing transit demand changes in the community. Most service changes will be scheduled on an annual basis through a regular process that occurs annually. Emergency changes can be made at other times during the year if needed. Emergencies include only those changes necessitated by unacceptable vehicle load or on-time performance.

### **1. Factors Considered for Service Changes**

#### *Long Range Plan*

The RTA will create and update regularly a Long Range Plan with medium-term (5 to 7 years) specific service recommendations. These service recommendations will be financially constrained and consistent with the RTA's long range financial plan. Recommended service changes should be in conformance with all such long term planning documents. This will ensure that incremental service changes work to move the RTA towards a planned future and that resources are available long-term to maintain any recommended changes.

#### *Customer Service Measures*

Among the most important factors in modifying services are to correct known failures of customer service metrics. Most common are changes needed to alleviate unacceptable levels of vehicle crowding or poor schedule adherence. As problems are identified, Service Development will investigate causes of such failures and create solutions to rectify the issues.

### *Service Effectiveness Measures*

Those routes or service underperforming according to Section V of the Service Standards should be evaluated for modification or in some cases elimination. Service significantly outperforming other similar routes should be evaluated for enhanced service if warranted. In cases where a route is near established service effectiveness thresholds, trends in demand should also be considered.

New routes and services should be permitted a reasonable amount of time to establish a demand pattern prior to any changes or elimination. Within one year of a route or service being introduced, it should meet half the effectiveness standard proscribed in Section V. Within two years of introduction, the service should meet service standards.

### *Community and Employee Input*

Regularly, the RTA hears from customers and others in the community suggesting modifications to existing services. These requests will be considered in the RTA service planning process. Additionally, front line staff, such as operators and customer service representatives, who have more frequent contact with customers can be valuable assets in recommending improvements to services. Service Development will regularly reach out to all of the above parties for feedback in how services are performing.

### *Current Resources*

Any service change recommendations must factor in the necessary capital and human resources necessary to implement the change. In some cases, changes may need to be delayed to allow purchase of vehicles or increased staffing necessary to implement the changes. A spare ratio of 15-20% must be maintained for vehicles and an extra board capacity of 15% of assigned runs is desirable for operator staffing.

## **2. Major Service Changes**

All service changes which permanently (a) adds or deletes 25% of route miles to a route or (b) adds or deletes 25% of the average daily revenue hours to a route is considered a Major Service Change. For proposed major service changes, a Title VI review will be presented to the Board of Directors and the Federal Transit Administration prior to the decision to make the change.

## **3. Other Service Changes Requiring Board Authorization**

All other service changes which permanently alters 10% or more of any route alignment or schedule will be authorized only by action by the RTA Board of Directors. Smaller service changes may be authorized by the Service Development department.

#### **4. Public Input**

Any service change that requires Board of Directors authorization must be presented to the public for comment. Public comment process will be governed by an RTA Public Input and Information Policy. The results of the public input process must be presented to the Board of Directors prior to authorization of changes.

#### **5. Detours**

Occasionally, due to road construction, other temporary traffic conditions, irregular events that effect passenger demand, or other events that effect bus operations, the RTA may need to temporarily detour routes. These detours should minimize impacts to existing customers to the greatest extent possible. Detours that are required by foreseen circumstances will be part of a detour plan developed by Service Development. In some cases when conditions change that were not anticipated, RTA dispatch will determine a detour for the short term (up to one week). For major detours that have significant impacts on passengers, the Board of Directors shall be notified.

Adopted May 12, 2010

Revised June 6, 2012

Revised December 11, 2013

Revised June 7, 2017



# SERVICE GUIDELINES FOR BUS SERVICE

2018 EDITION

JANUARY 5, 2018



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## Attachment A Definitions

# Introduction

## About the service guidelines

Cherriots has developed service guidelines to steer the process for designing, evaluating, and modifying bus service. Staff use the guidelines to plan service that is efficient, high-quality, and appropriate. The guidelines help ensure the decision making process is objective and transparent, and that Cherriots bus service meets the needs of riders and the community.

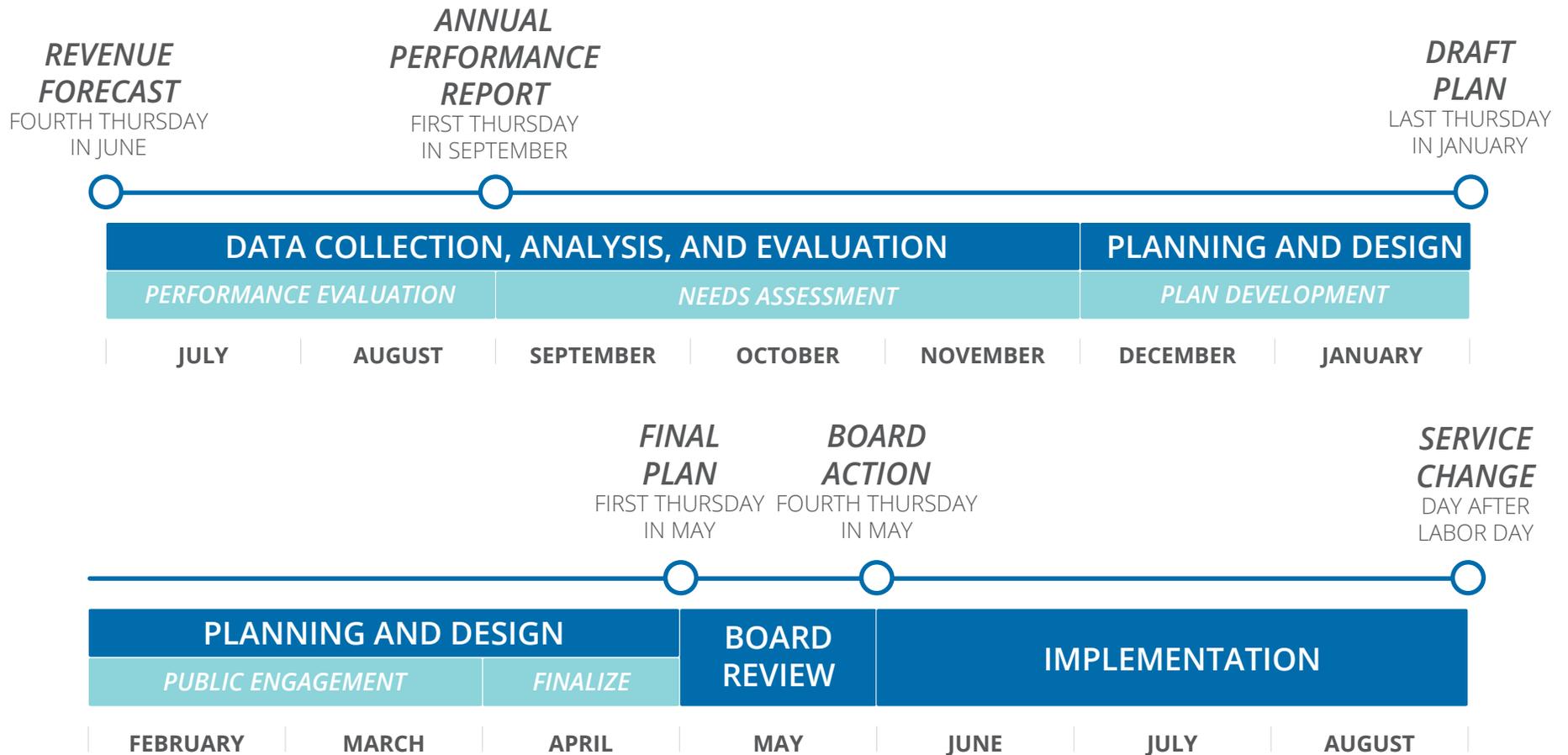
This document provides the framework for planning and evaluating Cherriots bus service for both the local and regional systems. The process for planning and evaluating demand-responsive services is currently not included in this document.

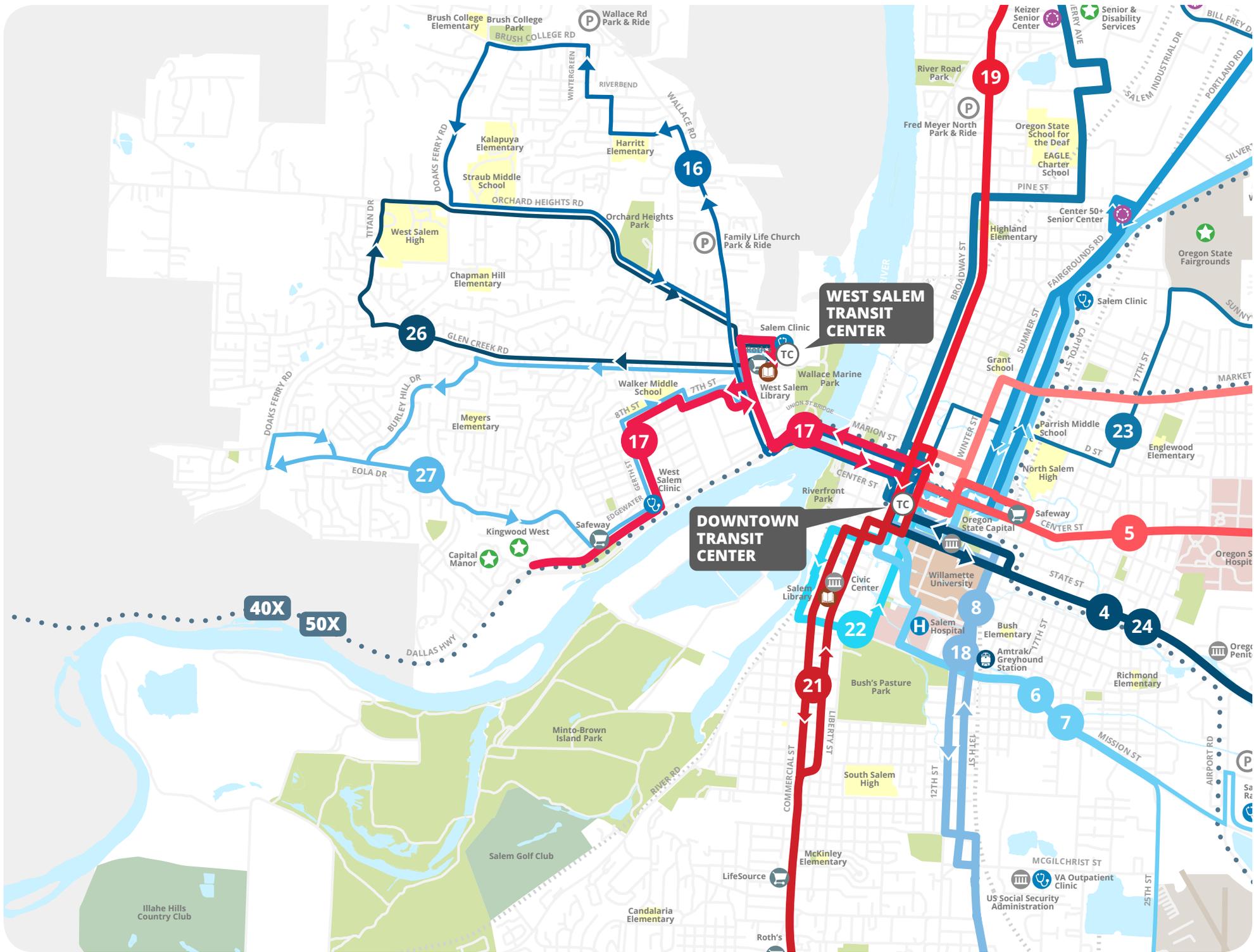


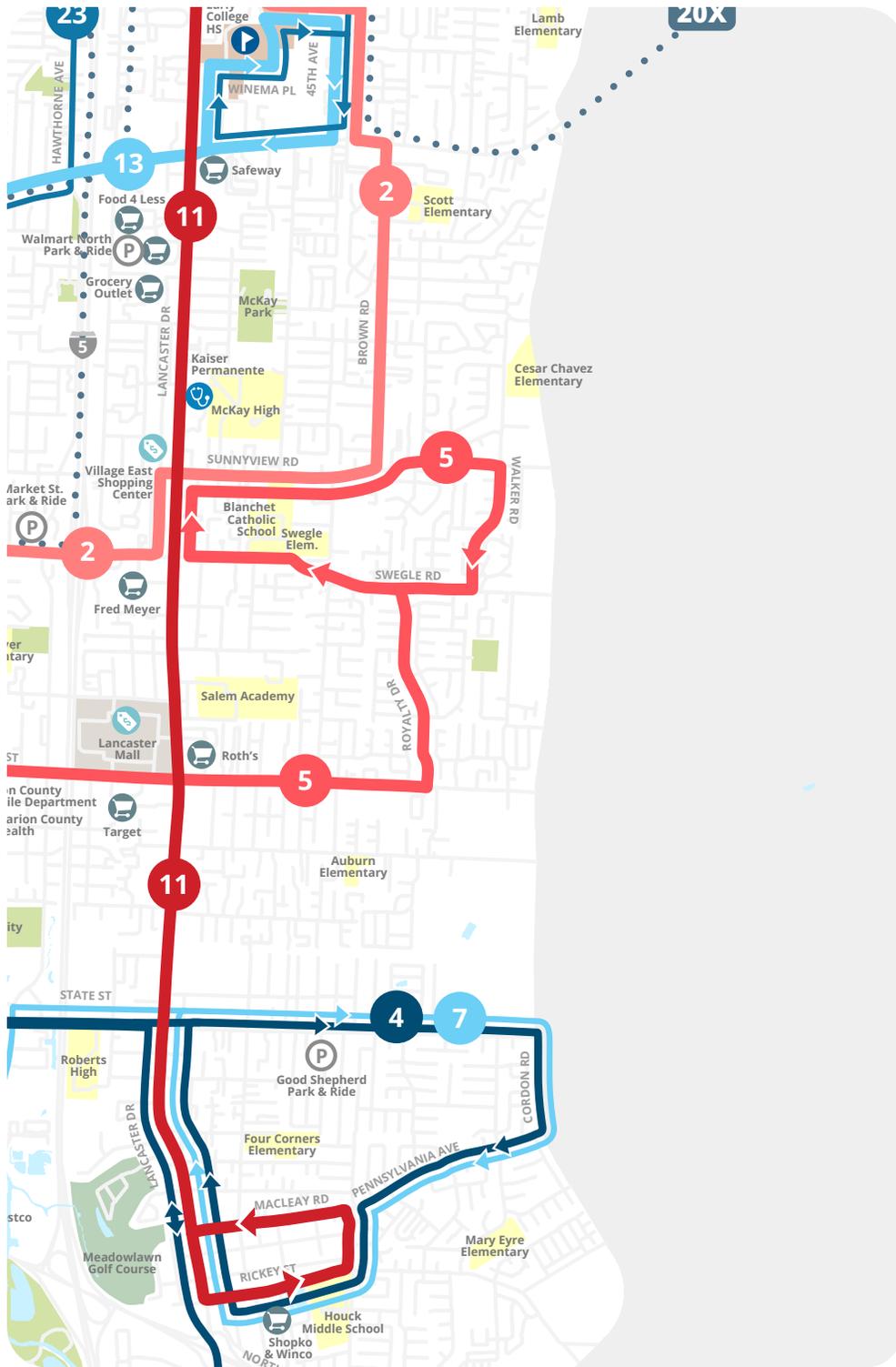
## Annual service planning process

At the core of this document is the annual service planning process. Each year staff use the service guidelines to steer this process, from initial revenue forecast through implementation of new service in September. The timeline below both summarizes the planning process and acts as the foundation for the organization of the chapters in this document.

Additionally, a planning process takes place every four months for service being modified in January and May. This process is much smaller, as those months are typically reserved for minor changes to service.







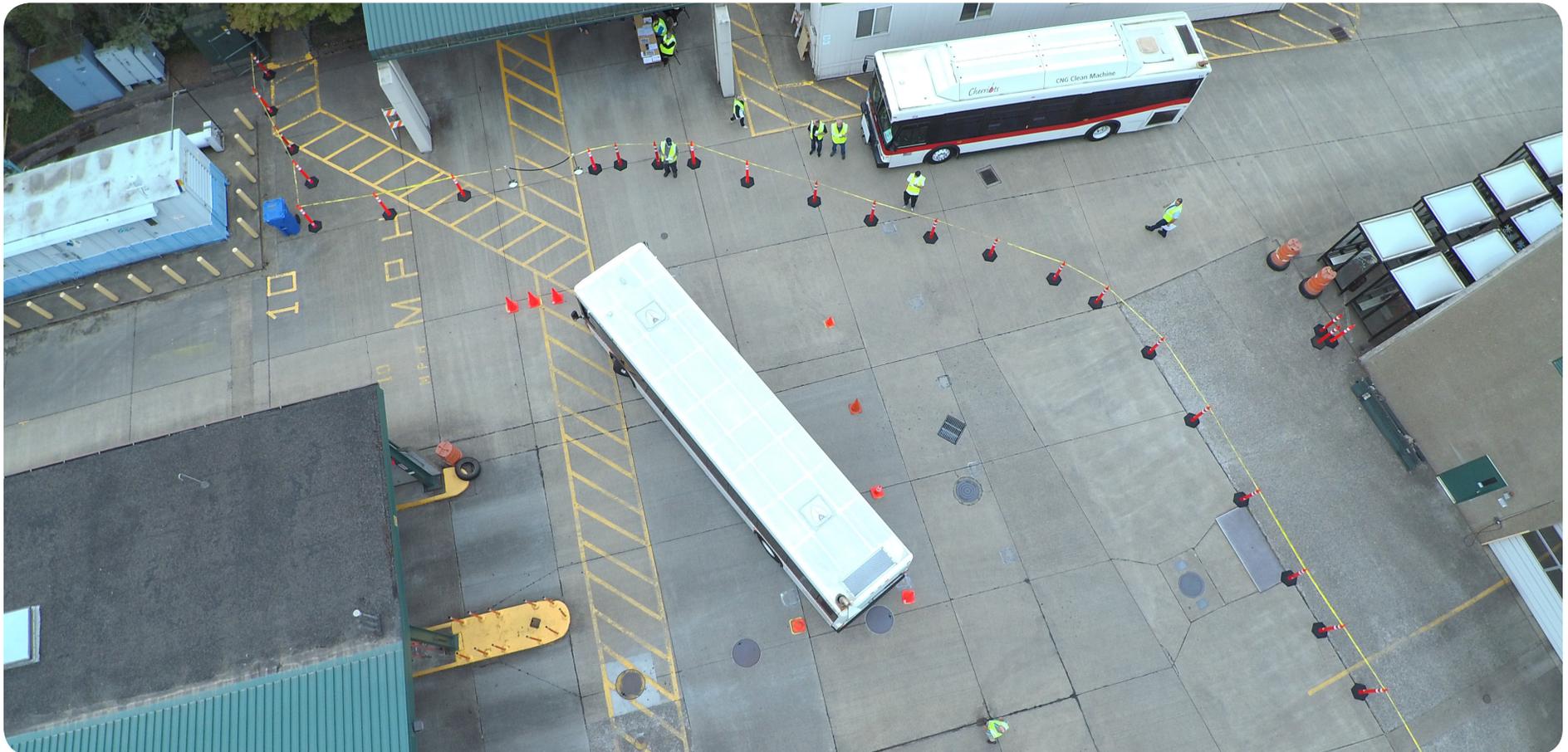
# 1 Service overview

Before delving into the service planning process, this chapter presents a snapshot of the current Cherrits system. This includes an overview of the Cherrits organization, a summary of each of the Cherrits services, and maps of the local and regional bus system.

# 1.1 About Cherriots

Salem Area Mass Transit District, more commonly known as Cherriots, is a transit district based in Salem, Oregon. Cherriots provides weekday bus and paratransit service in Salem and neighboring Keizer, as well as to Marion and Polk counties (referred to throughout this document as the “region”). Salem Area Mass Transit District was established by the State of Oregon in 1979. Before then, the City of Salem operated bus service under the name Cherriots.

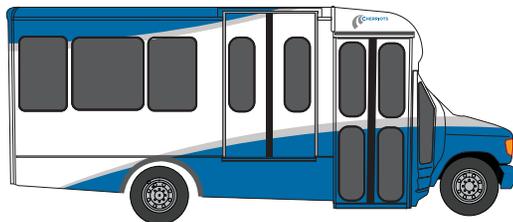
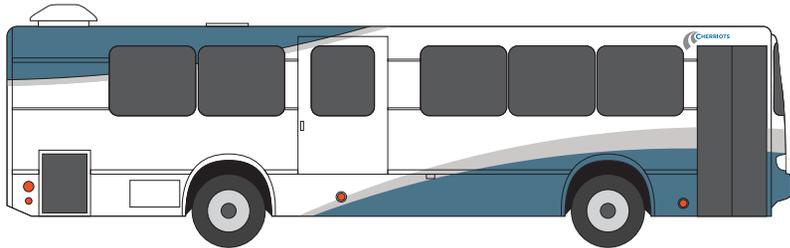
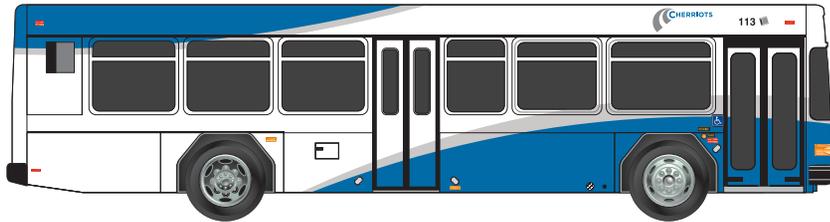
The population of Salem’s urbanized area is around 236,000 and the population of the overall Cherriots service area is around 410,000. In Fiscal Year 2016, annual Cherriots ridership between all services was just over 3.6 million, averaging 14,300 rides per day. Bus service operates with just under 60 peak vehicles. There are an additional 46 vehicles dedicated to providing Cherriots LIFT paratransit service.



## 1.2 Cherriots services

Cherriots operates local bus service in the Salem-Keizer area. Other services Cherriots provides are Cherriots Regional, Cherriots LIFT, and Cherriots Shop and Ride (see below). In addition to operating service, Cherriots offers travel training to riders and runs the Cherriots Trip Choice program—helping connect riders with transportation options, including transit, carpools and vanpools, biking, and walking.

This Service Guidelines document focuses on the service planning process for local and regional express bus service.



### Cherriots

Local bus routes serve local streets in the Salem-Keizer area, providing service within the Salem-Keizer urban growth boundary.

### Cherriots Regional

Regional express routes provide bus service between towns and cities mostly in Marion and Polk counties. Additionally, Cherriots provides the Polk County Flex, a origin-to-destination service in Dallas, Monmouth, and Independence.

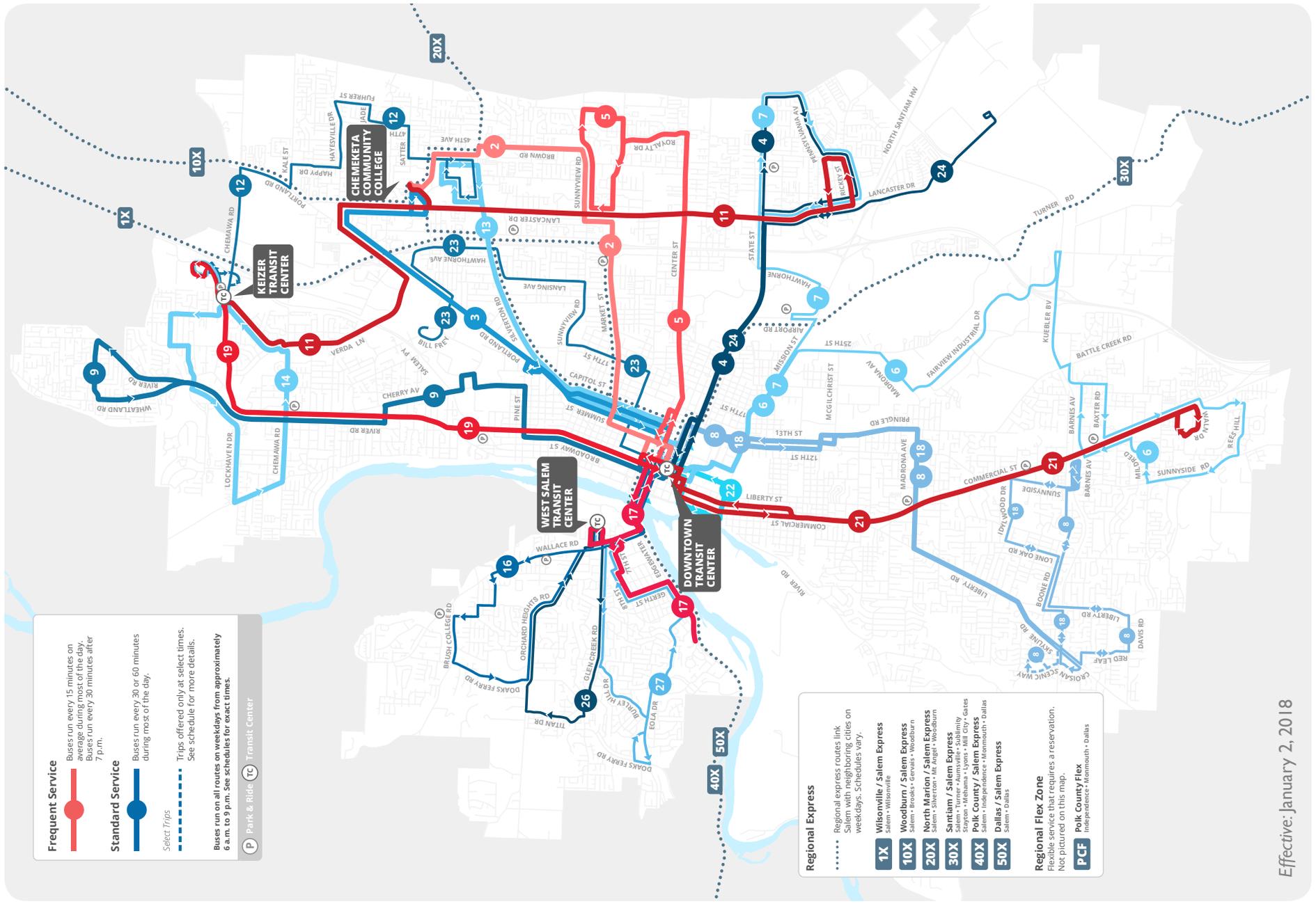
### Cherriots LIFT

Origin-to-destination paratransit service provides rides to those who are unable to access regular bus service. LIFT serves the Salem-Keizer urban growth boundary. Riders must be found eligible and trips must be scheduled in advance.

### Cherriots Shop and Ride

Shop and Ride includes both a shopper shuttle and origin-to-destination service for seniors and individuals with disabilities. This service operates throughout the Salem-Keizer urban growth boundary and trips must be scheduled in advance.

# 1.3 Local routes



**Frequent Service**  
 Buses run every 15 minutes on average during most of the day. Buses run every 30 minutes after 7 p.m.

**Standard Service**  
 Buses run every 30 or 60 minutes during most of the day.

*Select Trips*  
 Trips offered only at select times. See schedule for more details.

Buses run on all routes on weekdays from approximately 6 a.m. to 9 p.m. See schedules for exact times.

**P** Park & Ride **TC** Transit Center

**Regional Express**

- Regional express routes link Salem with neighboring cities on weekdays. Schedules vary.

<b>1X</b>	Wilsonville / Salem Express Salem • Wilsonville
<b>10X</b>	Woodburn / Salem Express Salem • Woodburn • Corvallis • Madras
<b>20X</b>	North Marion / Salem Express Salem • Marion • Mt. Angel • Woodburn
<b>30X</b>	Santiam / Salem Express Salem • Stayton • Heppner • Lyons • Mill City • Gates
<b>40X</b>	Polk County / Salem Express Salem • Independence • Mouth • Dallas
<b>50X</b>	Dallas / Salem Express Salem • Dallas

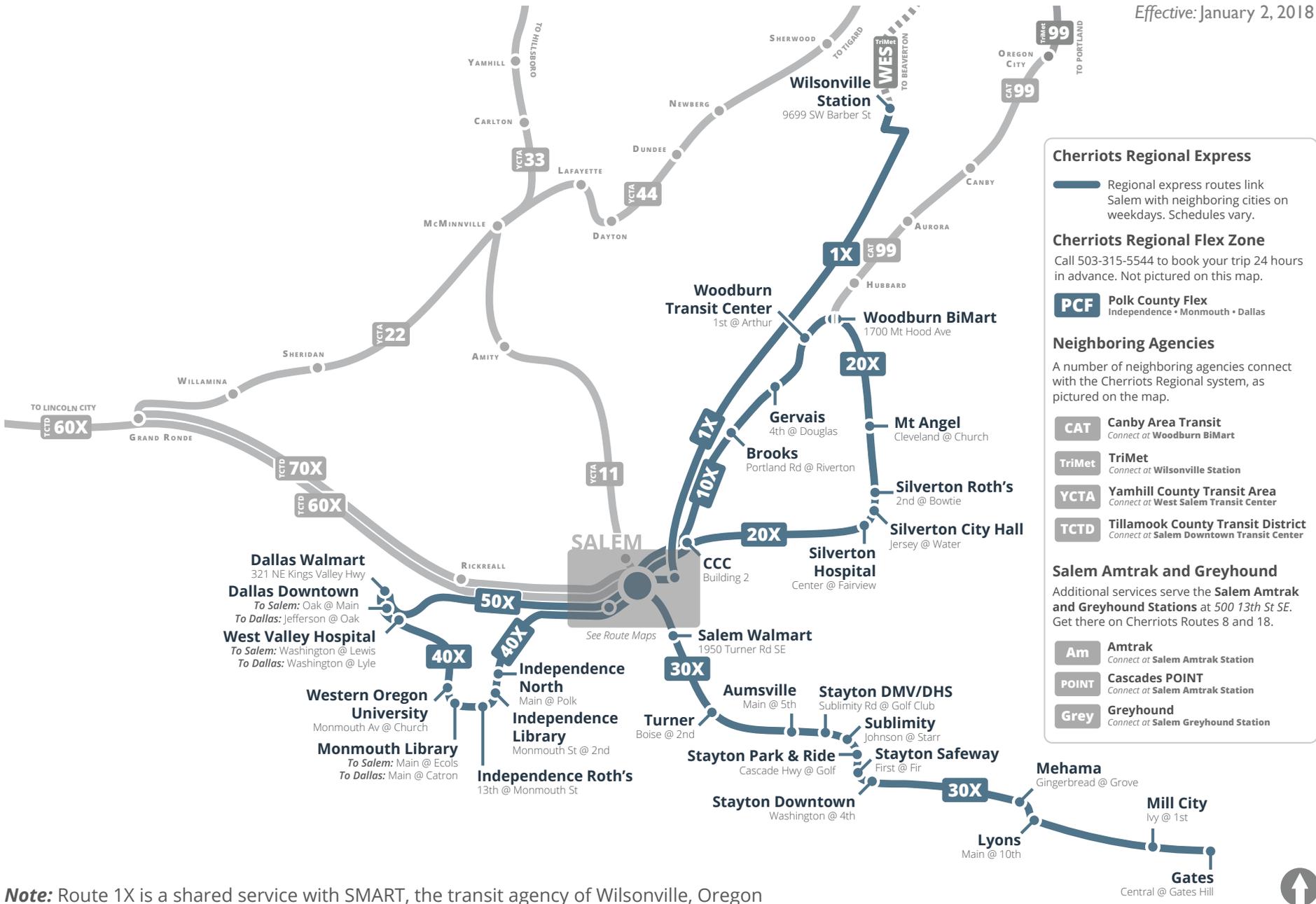
**Regional Flex Zone**  
 Flexible service that requires a reservation. Not pictured on this map.

**PCF** Polk County Flex  
 Independence • Mouth • Dallas

Effective: January 2, 2018

# 1.4 Regional routes

Effective: January 2, 2018



**Note:** Route 1X is a shared service with SMART, the transit agency of Wilsonville, Oregon





# 2

## Performance evaluation

Staff routinely monitors performance throughout the year. Cherriots has established a number of performance measures and targets to ensure performance objectives and goals are met. Staff produces performance reports on a monthly, quarterly, and annual basis.

Cherriots monitors service because it enables staff to make short-term adjustments where problems are occurring; to make intelligent, informed decisions during the service planning process; and to measure how a route is performing in relation to how it is expected to perform.

## 2.1 Performance goals

When evaluating route and system performance, Cherriots uses five performance goals to determine how productive, efficient, reliable, comfortable, and safe service is.

### Productive

Service should be well-utilized in relation to how much service is provided.

### Efficient

The cost to provide service should be reasonable in relation to how much service is provided and how much that service is used.

### Reliable

Riders should be able to count on the bus to pick them up and drop them off on time.

### Comfortable

Riding the bus should be a pleasant experience and not overcrowded.

### Safe

Riders should feel safe and secure when riding a Cherriots bus.



## 2.2 Performance measures and targets

Goal	Objective	Measure	Target	Evaluation Level	
				System	Route
Productive	Provide service to as many riders as possible given available service	Riders per revenue hour	<b>Corridor route:</b> 20 rides / hr <b>Neighborhood shuttle:</b> 10 rides / hr <b>Regional express:</b> 10 riders / hr	✓	✓
Efficient	Keep costs at reasonable levels	System cost per revenue hour	Year-over-year increase less than regional consumer price index	✓	✓
		Operating cost per ride	<i>No specific target; for reporting purposes only</i>	✓	✓
	Be good stewards of public funds	Share of fare revenue in relation to operating costs	<i>No specific target; for reporting purposes only</i>	✓	✗
		Operating subsidy per ride	<i>No specific target; for reporting purposes only</i>	✓	✓
Reliable	Ensure trips depart on time	Share of trips on time, late, very late, and early	<b>All day:</b> 85% on time, 10% late, 5% very late, 0% early <b>PM:</b> 75% on time, 15% late, 10% very late, 0% early	✓	✓
	Maintain enough buses and available operators to run scheduled service	Share of maintained pullouts	99.5% or higher	✓	✗
	Maintain buses to avoid mechanical failures while in service	Frequency of mechanical failures resulting in a road call	Less than one for every 10,000 vehicle miles traveled	✓	✗
Comfortable	Limit number of standing riders	Average rider to seat ratio at maximum load point	<b>Local:</b> 1.3 <b>Regional express:</b> 1.0	✗	✓
Safe	Limit preventable bus collisions	Frequency of preventable bus collisions	Less than 2 for every 100,000 total miles traveled	✓	✗

## 2.2.1 Productivity

Service productivity is a measure of how well a service is utilized. To determine productivity, Cherriots measures the number of rides for every hour a bus is in service (rides per revenue hour).

Targets for productivity differ depending on the type of route:

- **Corridor routes:** 20 rides per revenue hour
- **Neighborhood shuttles:** 10 rides per revenue hour
- **Regional express:** 10 rides per revenue hour

Bus routes not meeting their targets are evaluated on an annual basis.



## 2.2.2 Efficiency

Cost efficiency measures how effectively Cherriots provides service. Revenue efficiency is a measure of how much revenue Cherriots collects in relation to the cost of operating service. In order to be a good steward of public funds, Cherriots seeks to have the most efficient service possible.

Cherriots uses two measures to determine the efficiency of service:

- **System cost per revenue hour** - The total system cost of each hour vehicles are in service. Each year, this measure should not increase by more than the regional consumer price index.
- **Farebox recovery ratio** - The amount of revenue received by riders in relation to the total operating costs.

Cherriots also reports on two measures, both of which combine efficiency and productivity measures to provide information in a more intuitive format.

- **Operating cost per ride** - The amount of operating costs it takes to provide each ride.
- **Operating subsidy per ride** - The average operating cost per ride minus the average amount of revenue received per ride.



## 2.2.3 Reliability

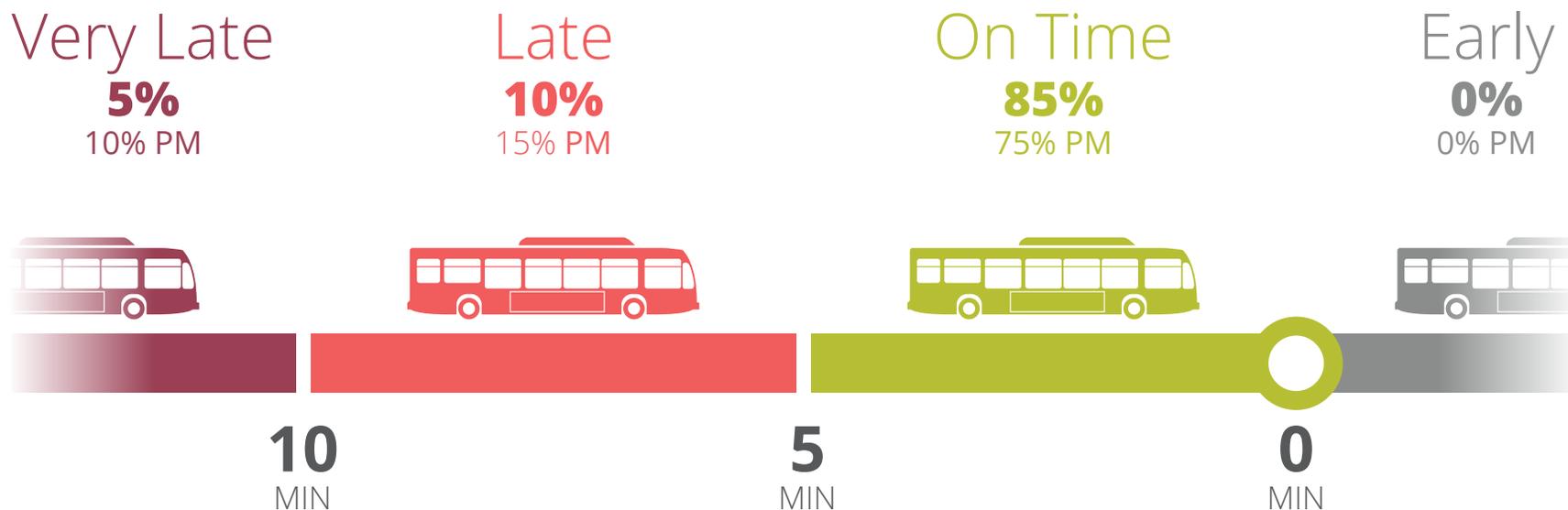
### Share of trips on time

On-time performance is the measure of how close a bus adheres to its schedule. Schedules are designed to give riders certainty about when their bus will depart so they can make informed decisions about when to travel.

However, it is difficult to predict exactly when a bus will arrive at every bus stop due to changing conditions on the ground, fluctuations in traffic, number of mobility devices, etc. As a result, on-time performance is measured only at bus stops with scheduled departure times, known as time points. Additionally, buses are considered “on time” if they

depart up to five minutes late from their time points. On-time performance is measured on the route level and system level, both for the entire day and the PM peak (2-6:59 p.m.)

At least 85% of buses should depart time points no more than five minutes late (75% in PM peak). No more than 10% of buses should depart their time points between five and 10 minutes late (15% in PM peak). No more than 5% of buses should depart their time points more than 10 minutes late (10% in PM peak). No buses should depart their time points before their scheduled departure times.



## Sampling on-time performance

Cherriots is currently working to procure computer-aided dispatch and automatic vehicle location (CAD/AVL) software, which will allow all buses to be tracked in realtime and make it possible to comprehensively measure the share of trips on time, as described in this section. This will also allow us to consider monitoring headway adherence of frequent service—in other words, whether buses are evenly spaced. Until then, staff use a different methodology to sample on-time performance—the best methodology given Cherriots technology and resources.

Every April and October, Cherriots uses security cameras at the Downtown Transit Center and Keizer Transit Center to measure end-of-route on-time performance. Buses arriving five minutes after their scheduled arrival time or later are considered late. Everything else is considered on-time. (The target is 85% on time throughout the day, and 75% on time during the PM peak.) Additionally, operations supervisors conduct point checks in the field to ensure buses are not departing their time points early.

Once the CAD/AVL solution is fully implemented (likely in 2019) staff will no longer need to sample trips to determine on-time performance.

## Maintained pullouts

When a bus successfully leaves the yard to complete its trip, this is known as a maintained pullout. Sometimes pullouts are missed if there is not an operator available to drive a bus or if no bus is available.

The number of maintained pullouts should be at least 99.5% of all scheduled pullouts.

## Mechanical failures

Sometimes buses experience mechanical failures while in service that require a road call. A road call can result in either a bus being repaired out in the field or a bus being towed back to the yard for maintenance.

Mechanical failures requiring a road call should occur less than once every 10,000 miles a bus is in operation.

## 2.2.4 Comfort

### Overcrowding

Crowding is measured as a proxy for rider comfort. To measure how full a bus is, Cherrriots monitors its load factor—a measure of how many riders are on the bus compared to the number of available seats.

The load factor is expressed in decimal form (e.g. a bus that has 30 seats and 30 riders on the bus would have a load factor of 1.0, while a bus that has 30 seats and 33 riders would have a load factor of 1.1).

#### Local *1.3 riders per seat*

On local routes, the average load factor should not exceed 1.3 at the route's maximum load point (the place along the route where the bus is most full) over a three month period.



35-foot low floor



32 seated



9 standing



40-foot low floor



39 seated



11 standing

#### Regional Express *1.0 riders per seat*

On regional express routes, the average load factor should not exceed 1.0 at the route's maximum load point (the place along the route where the bus is most full) over a three month period.



35-foot high floor



35 seated



0 standing



40-foot commuter



37 seated



0 standing

### Monitoring overcrowding

Staff will not be able to use the established methodology to measure overcrowding until Cherrriots procures new automatic passenger counters (APCs). In the interim, when a bus is at capacity, transit operators notify dispatch that they have passed up riders waiting for the bus. These occurrences are logged and monitored.

## 2.2.5 Safety

### Bus collisions

Transit operators are trained to drive in a safe manner. However, conditions on the road and other factors can sometimes lead to a collision. The number of preventable bus collisions should be less than two per 100,000 total miles traveled.



## 2.3 Performance monitoring and reporting

Performance is monitored throughout the year. Reports are published monthly, quarterly, and annually, and compare current performance to the performance over the same period during the previous year.

### Monthly

Monthly Performance Reports are published on the fourth Thursday of the month following data collection. These reports are used to guide decisions about route maintenance for the triannual service changes.

### Quarterly

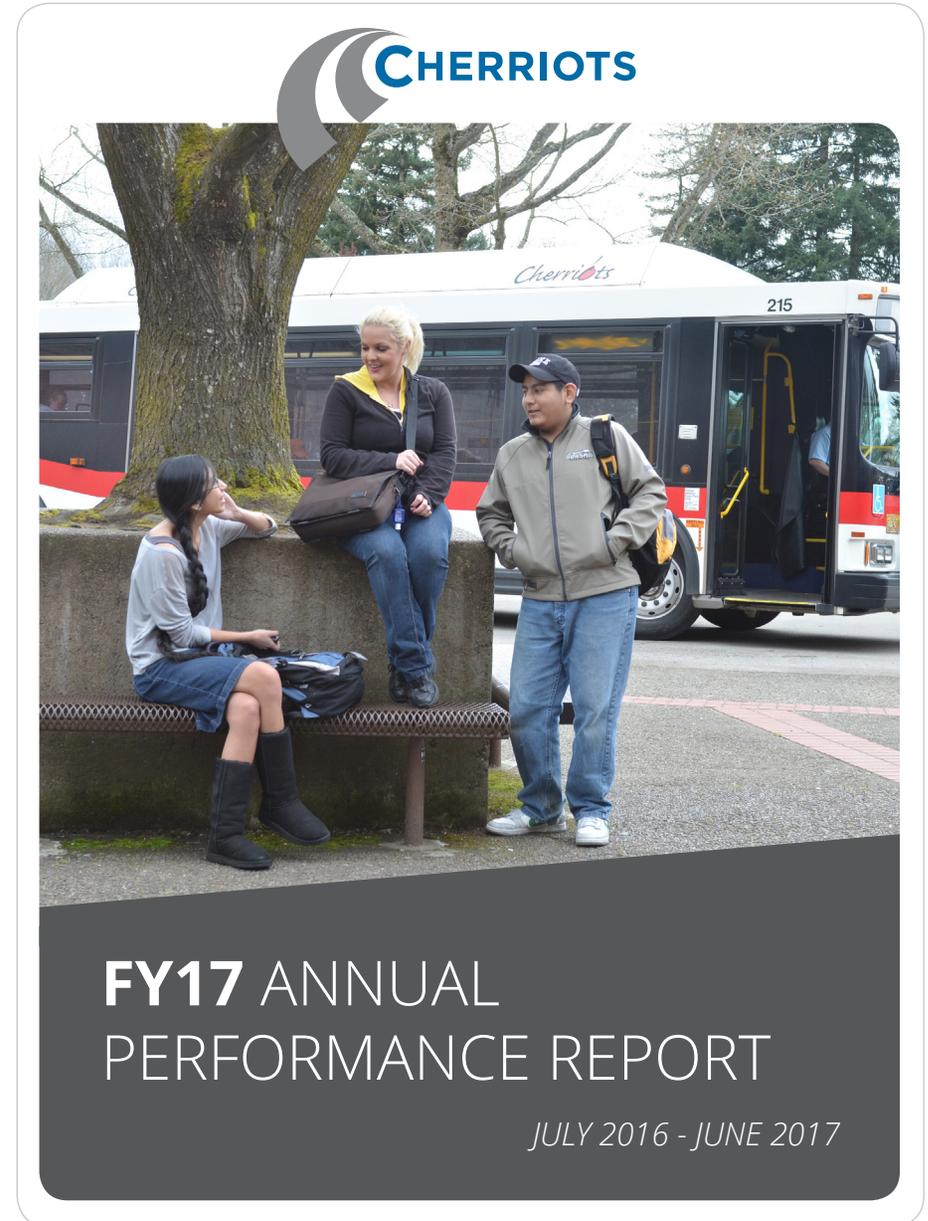
Quarterly Performance Reports are three month summaries of each fiscal quarter. These reports are presented to the Board of Directors on the fourth Thursday two months following data collection and are primarily used to keep the Board informed about route and system performance.

**Q1** Jul-Sep • **Q2** Oct-Dec • **Q3** Jan-Mar • **Q4** Apr-Jun

### Annual

Annual Performance Reports are yearly summary reports for the fiscal year. Additionally, they include individual route profiles. The reports are published by the first Thursday in September and presented to the Board of Directors on the fourth Thursday of September. Results from the reports are used to inform the needs assessment.

**Fiscal Year** Jul-Jun



## 2.4 Peer agencies

Staff sometimes look to agencies similar to Cherriots to evaluate how Cherriots service is performing compared to theirs. Agencies considered peers are listed below. Many of the cities these agencies serve are state capitals and their urbanized areas are of similar geographic size and population as the Salem area (236,632 residents). These agencies provide similar levels of annual bus service as Cherriots (494,032 revenue hours), and see a similar number of annual rides (3,637,860).



### Lane Transit District

Eugene, Oregon  
247,421 residents  
10,710,596 rides  
514,915 rev. hrs.



### DART

Des Moines, Iowa  
450,070 residents  
4,775,768 rides  
302,173 rev. hrs.



### Spokane Transit

Spokane, Washington  
387,847 residents  
10,922,108 rides  
590,751 rev. hrs.



### Valley Regional Transit

Boise, Idaho  
349,684 residents  
1,424,738 rides  
124,079 rev. hrs.



### Intercity Transit

Olympia, Washington  
176,617 residents  
4,889,081 rides  
365,304 rev. hrs.



### Ben Franklin Transit

Tri-Cities, Washington  
210,975 residents  
3,632,286 rides  
367,600 rev. hrs.

### Agencies that inspire

There are also a couple agencies that are not Cherriots peers, but that staff look to for ideas and inspiration.



### TriMet

Portland, Oregon  
1,849,898 residents  
101,702,561 rides  
2,999,817 rev. hrs.



### King County Metro

Seattle, Washington  
3,059,393 residents  
127,384,761 rides  
4,662,806 rev. hrs.





# 3

## Needs assessment

Once the Annual Performance Report is complete, Cherrlots conducts a needs assessment to seek out unmet transit needs in the region. In order to determine current needs, Cherrlots assesses current demographics, locates new and shifted development and businesses, and gathers input from current riders, community partners, and frontline employees.

From there, staff determine whether Cherrlots bus service, other Cherrlots services, and public and private transportation services in the region meet all transit needs. For any transit needs determined to be unmet, Cherrlots evaluates whether those needs can be met using current resources.

# 3.1 Determining needs

## Analyzing populations and travel patterns

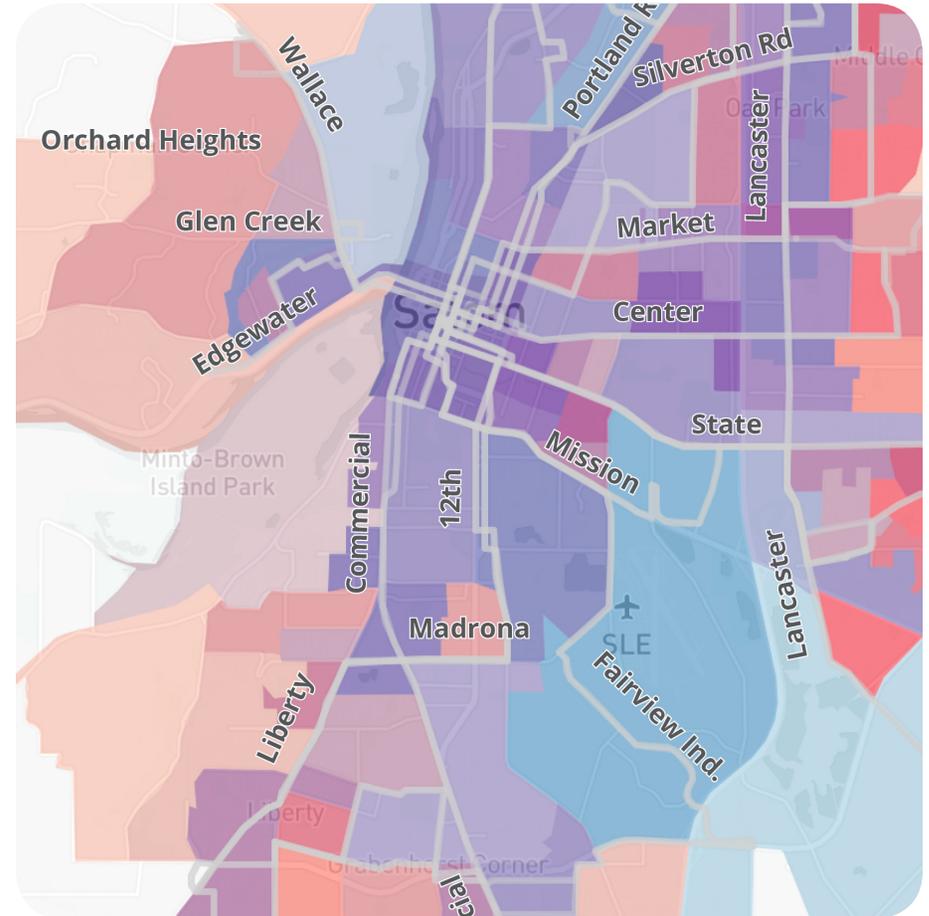
To ensure residents have access to bus service they can use to get to employment and other activities, Cherriots maps population and jobs using the latest available American Community Survey (ACS) data.

Staff also evaluate travel patterns for work trips and non-work trips using survey data provided by the Salem-Keizer Area Transportation Study (SKATS) and the Longitudinal Employer-Household Dynamics (LEHD) program.

Staff note both recent and upcoming shifts in business locations and new development.

Finally, Cherriots determines where those who are more likely to need transit are concentrated using ACS data. Populations include:

- **Poverty** - Individuals below the nationwide poverty level
- **Minorities** - Individuals who are non-white or Hispanic
- **Car free** - Households with no vehicle available
- **Seniors** - Individuals who are 65 years or older
- **Youth** - Individuals who are 18 years or younger
- **Disabled** - Individuals who have a disability
- **Limited English** - Household with limited English speaking status



## Engaging riders

Those who ride Cherriots buses know more than anyone what issues arise while riding transit. In order to gather their input, Cherriots conducts robust rider engagement.

See *Chapter 6 - Public Engagement* to learn more about the public engagement strategies used by Cherriots staff.

## Engaging frontline employees

Frontline employees are Cherriots employees who engage directly with riders, including transit operators, customer service representatives, travel trainers, transit ambassadors, mobility assessors, and security officers. It is important to engage with frontline employees, both to get their perspectives on service as well as to learn more about the needs of riders.

Strategies that may be employed to gather frontline employee input include sounding boards, ride-alongs, and surveys.

## Working with partners

A partnership is a relationship in which Cherriots and an external organization work together to help advance opportunities and conditions for travelers to use alternatives to driving alone. Partners will be engaged during the needs assessment process to learn what diverse needs exist throughout the community.

See *Chapter 6 - Public Engagement* to learn more about the groups Cherriots partners with in the community.



## 3.2 Service assessment

Once data and input are gathered and analyzed, Cherriots assesses whether current transit and transportation options in the service area meet the needs of the community.

### Cherriots bus service

Staff begin by evaluating the route path, trip time, frequency, span, and performance of current Cherriots bus routes.

### Other Cherriots services

Staff then look at other services Cherriots operates or facilitates in the region, including:

- **Cherriots LIFT** - Paratransit service for the Salem-Keizer Urban Growth Boundary.
- **Cherriots Shop and Ride** - Both a shopper shuttle and dial-a-ride for seniors and individuals with disabilities.
- **Polk County Flex** - A shared-ride reservations-based service for Dallas, Monmouth, and Independence.
- **Vanpools** - Facilitated by the Cherriots Trip Choice program. Vanpools are organized and subsidized for those with similar travel patterns.

### Other Transportation Services

Finally, Cherriots evaluates other transportation services provided in the area, including city circulators and dial-a-rides, intercity transit routes, non-emergency medical transportation (NEMT), and private transportation services.



## 3.3 Unmet transit needs

An unmet transit need is any need in the region for additional public transportation services to meet existing basic mobility needs not currently being met through the existing bus service or alternative services.

Once an unmet transit need is identified, staff will determine if it is reasonable for Cherriots to meet that need using the following criteria:

- 1 Can be implemented consistent with the design standards.
- 2 Can be implemented safely and in accordance with local, state, and federal laws and regulations.
- 3 Excluding the first three years of operation, the proposed service would not fail to meet performance targets.
- 4 Excluding the first three years of operation, the proposed service would not cause the overall system to fail to meet performance targets.
- 5 The proposed service would not cost more than the budget allows given available funds.

When unmet transit needs are determined to be reasonable, Cherriots will incorporate solutions to meet those needs into the plan development process.







# 4

## Plan development

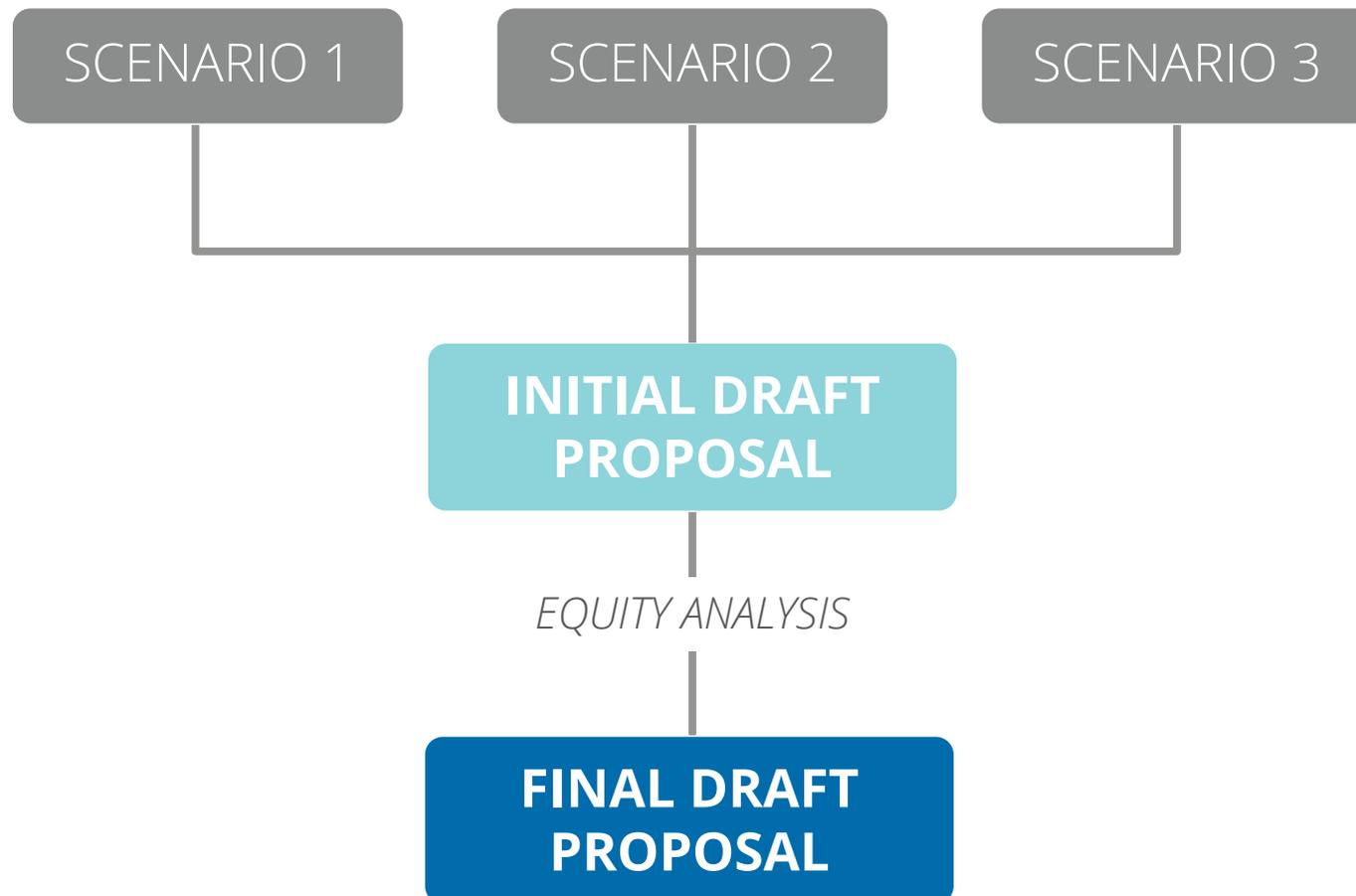
Once staff have a revenue forecast, performance results, and a determination of the unmet needs throughout the region, the next step is to begin the development of a service change plan to address both performance issues and unmet needs given available resources. Once drafted, the plan will be analyzed to ensure it is equitable.

When the revenue forecast remains largely the same as the previous year, the focus of the plan will be to maintain and optimize current service. This is typically the case with all triannual service changes, and can be the case for the annual service change. When revenue is projected to increase, the focus shifts to expanding service. In the case of a decrease in projected revenue, the focus shifts to reducing service.

## 4.1 Overview

During the plan development process, Cherrriots considers a range of potential scenarios to meet the needs of riders, given available funding. Once those scenarios are distilled into an initial draft proposal, staff performs an equity analysis to ensure the proposal is equitable. If the proposal is found to have potential inequities, staff will either modify the proposal, mitigate the effects of the proposal, decide not to move forward with the proposal, or provide a substantial legitimate justification for why the proposal is the most equitable solution. From there, staff will develop the final draft proposal for the public, which will be completed by the last Thursday in January.

To learn about how service is designed for these proposals, see *Chapter 5 - Design Standards*.



## 4.2 Service change frequency

### Triannual

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Triannual Service Changes take place about every four months in conjunction with the transit operator bid change. The first service period begins the first Sunday in September, the second service period begins the first Sunday in January, and the third service period begins the first Sunday in May.

Typically the January and May service changes are focused on maintaining and optimizing current service for routes that are not meeting their performance targets.

**SP1** Sep-Dec • **SP2** Jan-Apr • **SP3** May-Aug

### Annual

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The September service change is also known as the Annual Service Change. This change takes place once a year as a result of the annual service change process.

When the revenue forecast has significant changes, the Annual Service Change is typically when service is expanded or reduced. Additionally, service can be maintained or optimized at this time if routes are not meeting their performance targets.

**Service Year** Sep-Aug



## 4.3 Long-range plan

Cherriots currently has a long-range regional transit plan that was developed in 2013. This plan provides long-term strategic guidance for Cherriots over a 20 year period. It provides the basis and justification for seeking transit funding for service investments. The plan also addresses coordination with other transit agencies in the region to integrate service and create efficient transit connections.

The plan established implementation time frames based on cost, ease of implementation, and need. Time frames are:

- **Short term** - within 1-5 years
- **Medium term** - within 5-10 years
- **Long term** - within 10-20 years

As staff develop annual service plans, they refer back to the long-range plan to ensure the goals of that plan are being met and the suggested projects are being implemented.

See the *Long-Range Regional Transit Plan* for more information.

### Future long range plan

The long range plan is typically updated every five years. In future years, the long range plan will provide recommendations not just for the region, but for Salem's urbanized area more specifically.



## 4.4 Service change types

When developing plans for service changes, Cherriots considers whether service will be maintained, optimized, expanded, or reduced. The direction Cherriots takes depends on the revenue forecast as well as the results of the performance evaluation and needs assessment.



**MAINTAIN**

**Improve reliability and decrease crowding**



**OPTIMIZE**

**Better match service to demand**



**EXPAND**

**Add service when budget grows**



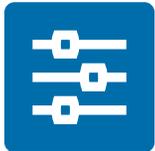
**REDUCE**

**Decrease service when budget shrinks**

## 4.4.1 Maintain

Over time, as traffic patterns change and ridership shifts, routes may become unreliable or overcrowded. In order to maintain these routes so they operate as expected, Cherriots has a number of tools at its disposal depending on the source of the issue.

### Unreliable service



#### Adjust schedules

Sometimes routes have enough runtime, but the scheduled departure times at time points are not very accurate. Adjusting times can prevent buses from having to hold up at bus stops for long periods of time and help make the schedule better match reality.



#### Add runtime

Adding runtime on a route might be necessary throughout the day or during a specific time period if there is not enough time to complete trips. This is easier to accomplish on routes that run every 15 minutes or better. The lower the frequency, the more difficult it is to add runtime.



#### Interline routes

When one bus route is tight on time and another bus route has extra time, sometimes interlining the routes can take pressure off the route that is tight. Interlining is the process of switching a bus from one route to another at a shared location.



#### Modify routing

If buses are struggling to stay on time due to a bottleneck along the route, one option is to modify the path of the route to avoid that bottleneck.



#### Shorten route

Sometimes routes do not have enough runtime and there are not additional resources to add more runtime. In those cases, routes may need to be shortened. This is especially the case for routes running every 30 and 60 minutes, as adding runtime to these routes must come in increments of 30 or 60 minutes, respectively.



#### Adjust traffic signal timing

When traffic signals are causing a choke point along a route or having a major impact on traffic flow along a corridor, Cherriots can work with the cities or counties to make adjustments to the timing of those signals.



### Operator coaching

When evaluating the on-time performance of a route, it is important to determine if the issue is happening for most operators along a route, or just one. In some cases, individual operator coaching can help improve on-time performance.



### Eliminate or consolidate bus stops

Sometimes bus stops can be eliminated or consolidated to help the route flow better. Additionally, bus stops in some cases can be moved from nearside of an intersection to farside of the intersection to prevent operators from having to wait at traffic signals.



### Invest in capital improvements

In places with major bottlenecks that cannot be avoided, it is sometimes worth investing in capital improvements to provide long-term fixes to on-time performance issues. Capital improvements include transit signal prioritization, queue jumps, and dedicated bus lanes.

## Overcrowding



### Increase bus size

As long as the turn radius and bus availability are not constraints, using larger buses on a route experiencing overcrowding is the simplest way to alleviate this issue.



### Add overload trips

Another option is to add select overload trips. For example, on a route that runs every 30 minutes, a few extra trips might be added around times where the buses are getting overcrowded.



### Increase frequency of service

If the overcrowding is happening over for a longer period of time, the frequency of the route may need to be increased during those hours.

## 4.4.2 Optimize

When service is evaluated on an annual basis, it is likely staff will find a mismatch between level of service and the utilization of service in some parts of the system. In those cases, resources should be shifted to better match service levels with demand.

### Poor performers

When routes are performing below their ridership targets, staff first determines if there is an underlying cause for the poor ridership, such as poor on-time performance or a major service disruption (such as a long-term detour). If those causes are ruled out, the following strategies can be used to improve the productivity of the service:



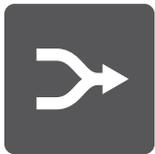
#### Promotion

When a route has the potential to perform well but the service is not well known, targeted promotion can be a useful strategy to help that route reach its ridership target.



#### Reduction in frequency

In some cases, there are more resources given to a route than is merited by demand. In these cases, frequency can be dropped during low-ridership times, or all day.



#### Realignment

Route performance should be analyzed by segment and stop. A realignment might be necessary to bring service to places where it would be better utilized.



#### Route elimination

In extreme cases, routes might be eliminated due to poor performance. This should only be considered if there is comparable service nearby.

## Exceptional performers

Routes that are performing well above their targets will be considered for increased frequency as resources become available. Sometimes resources are available because of reductions to other service throughout the system. There are a few strategies to respond to routes that are outperforming their productivity targets:



### Realignment

Underperforming routes can be realigned to help provide more frequency on corridors served by the route exceeding its target. This could help take pressure off the exceptional performer.



### Increase in frequency

If resources are available, frequency can be increased on the route during the most productive hours or throughout the day to reduce loads and increase the quality of service.

## New development and relocated facilities

As new residential and commercial units are developed and as businesses and facilities relocate, ridership might shift along with them. Cherriots will evaluate the impact these shifts have on ridership on overall efficiency. In some cases, staff might need to modify routes or frequency to respond to these changes.



### Realignment

Realign routes to serve new facilities or to stop serving facilities that have been closed.



### Increase in frequency

Increase or decrease frequency on routes if new or closed facilities have had a significant impact on ridership.

## 4.4.3 Expand

When additional revenue is available, service expansion will be planned using the following priorities:

### 1 Maintenance of current routes

Ensure Cherriots is able to meet its targets for predictability and comfort for current weekday service.

### 2 Weekends, holidays, and weeknights

#### Saturday service

Service should be expanded to Saturdays with the expectation of about half of the current weekday ridership.

#### Holiday service

Holiday service should be established at a level matching weekday, Saturday, or Sunday service, or a modified version of one of these.

#### Sunday service

Service should be expanded to Sundays with the expectation of about a quarter of the current weekday ridership.

#### Later weeknight service

Weekday service should be extended to 11 p.m. on routes that have adequate ridership demand.

### 3 Increased weekday frequency

Weekday route frequency should be increased based on demand. Hourly service should be improved to 30-minute service whenever possible, especially during peak times.

### 4 Additional coverage and connections

Cherriots should offer service closer to more residents and jobs. Additionally, Cherriots should make it easier to ride on transit without having to travel through downtown Salem.

## 4.4.4 Reduce

Every service reduction is different, and the unique circumstances will dictate exactly how the service reduction looks. However, when developing a service reduction plan, service will be reduced using the following guiding principles:

### Maintain Core Network and frequent service

- Maintain levels of service on routes serving the corridors of the Core Network. Do not remove service completely along these corridors.
- Maintain frequent service that runs every 15-minutes or better on weekdays between 7 a.m. and 7 p.m.

*For more on the Core Network, see Section 5.3.5.*

### Protect vulnerable populations

- Evaluate proposed reductions in service to avoid, minimize, or mitigate adverse effects on minorities and low-income populations.
- Evaluate proposed reductions in service to avoid or minimize impacts to seniors and riders with disabilities.
- Generally, reduce frequency before reducing span to preserve basic access to jobs and other needs.

### Preserve for as many riders as possible

Generally, Cherrlots tries to preserve service for as many riders as possible:

- Preserve the trip with the highest demand for as long as possible.
- Attempt to maintain a minimal level of service on better-performing lines.
- Eliminate or reconfigure any redundant bus service where other accessible service exists and has adequate capacity to serve the current demand.
- Eliminate lowest ridership bus service trips and times of day.
- Reduce frequencies during lower demand days and times of day.
- Reduce service in off-peak direction with lower ridership.
- If necessary, eliminate full routes that are underperforming.

## 4.5 Costing

When developing a service plan, staff need to know the cost to add and remove service in order to ensure the plan is within budget. For each service, staff begin by assessing current operating costs. The next step is to determine how much it would cost to add or remove service on standard days and holidays. From there, costs are projected for future fiscal years.

Currently costs are projected using Fiscal Year 2016 numbers, as presented on the next page. In addition to local and regional service, Cherriots LIFT cost estimates are included because an increase in hours or days operated on the local system results in an increase in hours or days LIFT operates.

### Determining operating costs

Operating costs include wages and benefits for operators and operations supervisors, vehicle and facilities maintenance staff and supervisors, and all administrative staff—including managers and executives. Also included are the costs of fuel, vehicle parts, and other miscellaneous expenses required to operate service. Which costs are included is determined by the National Transit Database (NTD). The total operating costs are then divided by the number of revenue hours for each service to determine the cost per revenue hour of each service.

### Projecting costs for future years

To project the cost to operate service and to add or remove service in future years on the local system, all wages and benefits related to wages (50% of benefits) are increased 3% per year. On contracted services, the same increases are assumed for general administrative wages and benefits. Projected increases in other operational costs are based on the agreed upon annual increases in the street services contract.

### Determining cost to add or remove service

The cost to add or remove service differs from that of the standard operating cost. One reason is adding or removing service typically does not result in a change to general administrative staff.

#### Standard day

To determine the cost of adding or removing service on a standard weekday or weekend, the wages and benefits of all general administrative staff are removed from the equation. This is the case both for service operated directly by Cherriots, as well as service that is contracted.

#### Holiday

For local service, adding or removing holiday service is different than standard service in two ways: benefits not tied to wages can be removed because no new staff are hired to provide holiday service, and all remaining benefits and wages are multiplied by 150% because staff are paid at a rate of time and a half on holidays. For contracted service, costs match that of a standard day.

Cost per revenue hour

Cost per added or removed  
rev. hour on a standard day

Cost per added or removed  
rev. hour on a holiday

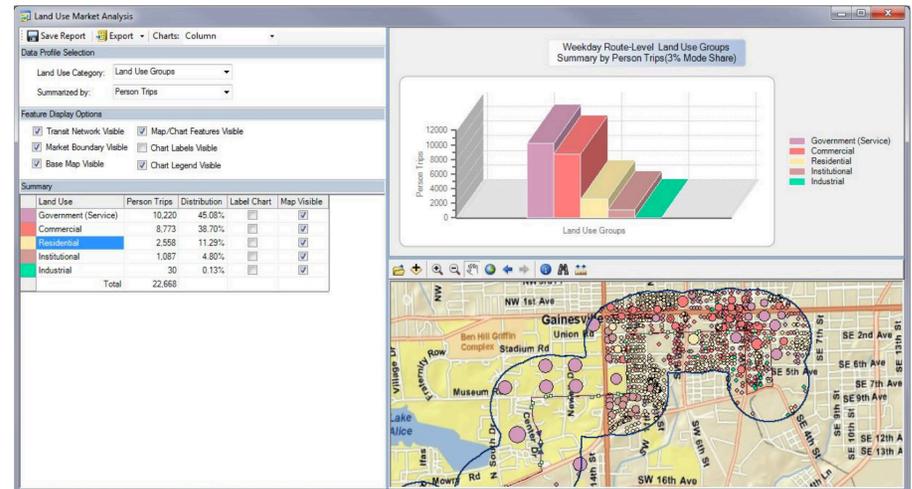
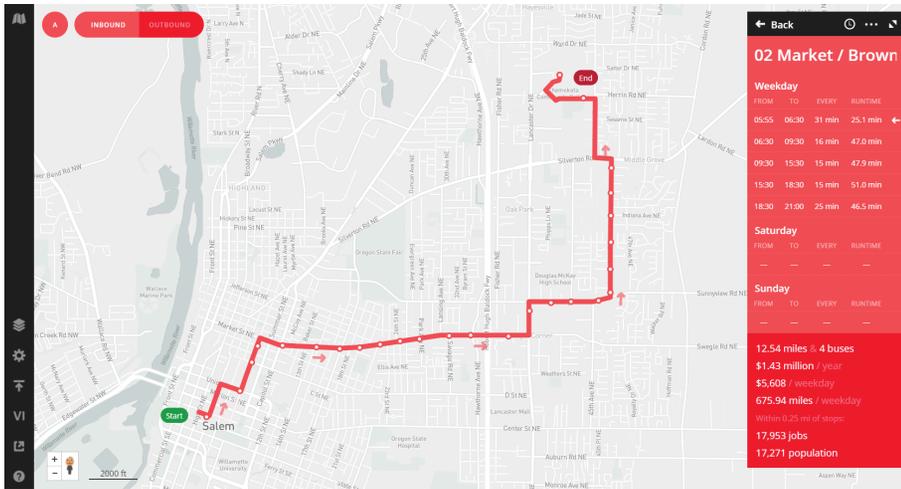
	Cost per revenue hour	Cost per added or removed rev. hour on a standard day	Cost per added or removed rev. hour on a holiday
<i>Local</i> * DIRECTLY OPERATED	FY 16 <b>\$136.23</b> FY 17 <b>\$138.67</b> FY 18 <b>\$141.19</b> FY 19 <b>\$143.68</b>	FY 16 <b>\$113.95</b> FY 17 <b>\$115.90</b> FY 18 <b>\$117.91</b> FY 19 <b>\$119.97</b>	FY 16 <b>\$124.63</b> FY 17 <b>\$127.55</b> FY 18 <b>\$130.57</b> FY 19 <b>\$133.67</b>
<i>Regional</i> CONTRACTED	FY 16 <b>\$83.86</b> FY 17 <b>\$83.28</b> FY 18 <b>\$88.12</b> FY 19 <b>\$86.38</b>	FY 16 <b>\$81.17</b> FY 17 <b>\$80.53</b> FY 18 <b>\$85.31</b> FY 19 <b>\$83.51</b>	FY 16 <b>\$81.17</b> FY 17 <b>\$80.53</b> FY 18 <b>\$85.31</b> FY 19 <b>\$83.51</b>
<i>LIFT</i> CONTRACTED	FY 16 <b>\$68.44</b> FY 17 <b>\$67.96</b> FY 18 <b>\$76.43</b> FY 19 <b>\$79.45</b>	FY 16 <b>\$66.24</b> FY 17 <b>\$65.71</b> FY 18 <b>\$74.13</b> FY 19 <b>\$77.10</b>	FY 16 <b>\$66.24</b> FY 17 <b>\$65.71</b> FY 18 <b>\$74.13</b> FY 19 <b>\$77.10</b>

\* Operating costs for local service also apply to Route 1X trips directly operated by Cherriots (not SMART trips)

Source: National Transit Database and Cherriots budget, Fiscal Year 2016

# 4.6 Projections and modeling

When developing new service, especially with the introduction of new routes, it is important to create models to project the impact the changes will have on service hours, service miles, cost, and ridership. Cherriots currently uses Remix to estimate impacts to service hours, service miles, and cost based on the numbers on the previous pages. At this time staff does not have a methodology for projecting changes in ridership, but will be looking into software such as TBEST in the future.



Remix allows Cherriots planners to quickly test multiple service scenarios to see the impact on service hours, service miles, and cost. This platform is used to help guide the planning process during the plan development phase. Remix is currently paid for by the Oregon Department of Transportation (ODOT), so all transit agencies in the State of Oregon have access to it.

The Transit Boardings Estimation and Simulation Tool (TBEST) is free software developed by the Florida Department of Transportation (FDOT). TBEST is a GIS-based modeling, planning, and analysis tool that integrates socio-economic, land use, and transit network data into a platform for scenario-based transit ridership estimation and analysis. Staff will be looking into using TBEST to estimate ridership in the future.

## 4.7 Equity

As Cherrriots plans service changes, all proposals are looked at through the lens of equity. Design standards—outlined in the next chapter—help ensure staff are making decisions in a transparent, unbiased manner. However, even when following all design standards a service change proposal still has the potential to negatively impact minorities and low-income populations.

In order to ensure all proposals are equitable before being adopted and implemented, Cherrriots has a Title VI program, which was developed in accordance with the Federal Transit Administration (FTA) Title VI Circular 4702.1B.

The intent of Title VI of the Civil Rights Act of 1964 is to remove barriers and conditions that prevent minority, low income, Limited English Proficiency (LEP), and other disadvantaged groups and persons from receiving access, participation and benefits from federally assisted programs, services and activities. In effect, Title VI promotes fairness and equity in federally assisted programs and activities and is based on the fundamental principle that all human beings are created equal. Title VI is rooted in the constitutional guarantee that all human beings are entitled to equal protection of the laws and specifically addresses involvement of impacted persons in the decision making process.

See the *Cherrriots 2017 Title VI Program* for more information.



### 2017 TITLE VI PROGRAM

*Submitted in fulfillment of  
Title VI of the Civil Rights Act of 1964  
and FTA Circular 4702.1B*





# 5

## Design standards

When designing new service or changing existing service, Cherriot adheres to a series of design standards. Standards exist for the system as a whole, routes, and stops. These design standards were developed to ensure Cherriot is meeting both performance and design goals. When service is introduced that does not meet the design standards, those exceptions need to be justified.

# 5.1 Service design goals

In addition to the five performance goals discussed in *Chapter 2 - Performance Evaluation*, Cherrits has five service design goals. Service should be designed to be:

## Appropriate

Service span and frequency should match both potential demand and actual usage.

## Available

Service should be available to homes and businesses throughout the service area.

## Equitable

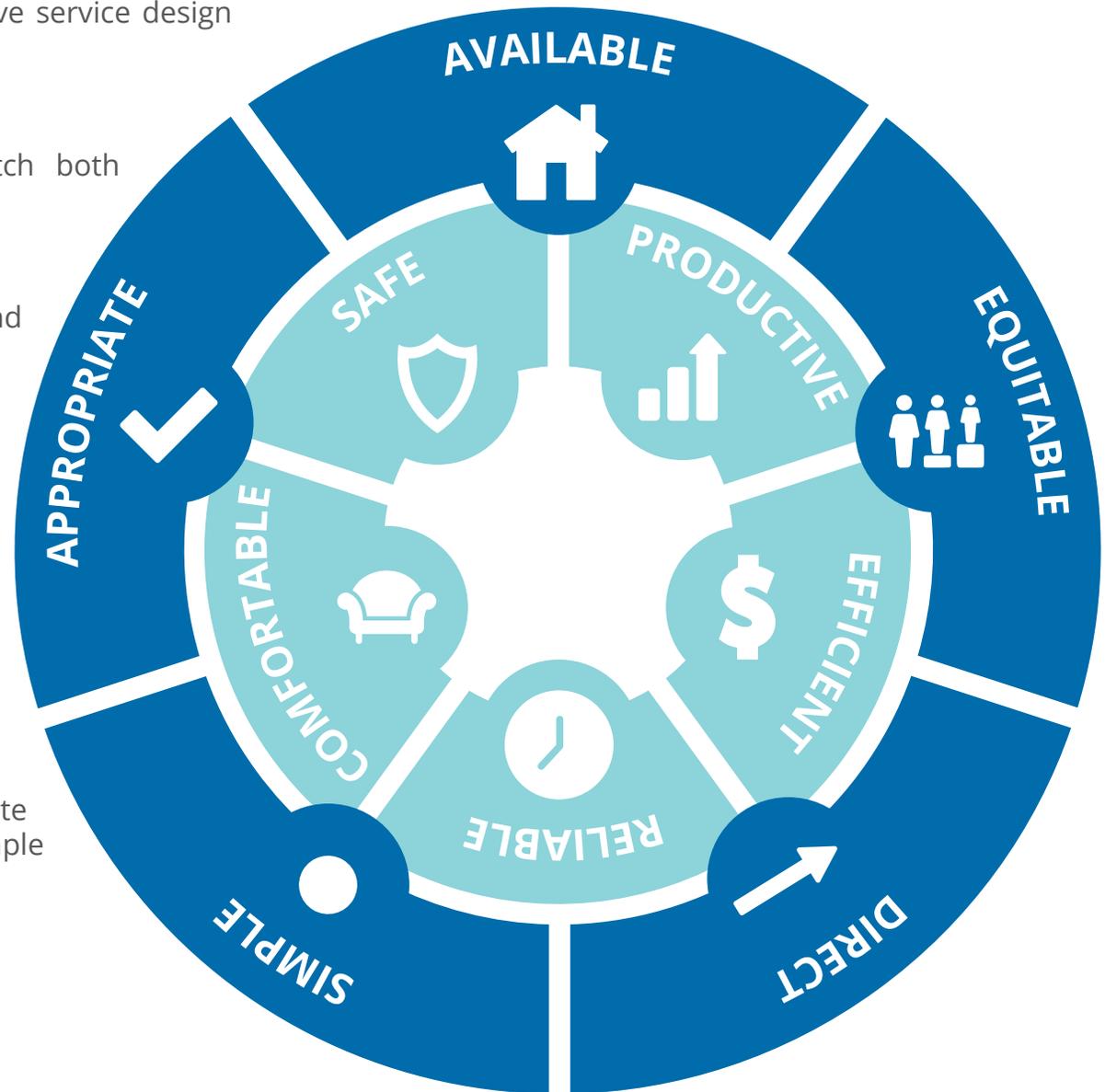
Service should be distributed in a way that does not unfairly impact any protected population.

## Direct

Whenever possible, service should be direct and fast.

## Simple

Network design, route design, and route naming and numbering should all be simple and easy to comprehend.



## 5.2 Distribution



### Productivity 75%

In the urban area, 75 percent of revenue hours will be deployed with a focus on increasing ridership, predominantly on high demand corridors. This service will include frequent 15-minute service, express service, and standard 30-minute frequency routes, which are expected to provide overall high ridership.



### Coverage 25%

The remaining 25 percent of urban revenue hours will be allocated to service that provides needed coverage throughout the community with less consideration for expected boardings per revenue hour. This service will predominantly include neighborhood shuttle routes with 30-minute and 60-minute headways.

### Classification

An entire route or individual segments of a route may be classified as either productivity-focused or coverage-focused. Service distribution must remain within plus or minus five percentage points of the target (e.g. 70-80% productivity-focused, and 20-30% coverage-focused).

## 5.3 Network

### 5.3.1 Centers, corridors, and neighborhood shuttles

All local routes are designed either as neighborhood shuttles or corridor routes. Neighborhood shuttles funnel riders into activity centers, and corridor routes connect those centers at higher frequencies.

#### Neighborhood shuttles

Neighborhood shuttles are focused on getting close to riders and bringing them on short trips to their neighborhood activity centers. Typically buses used on these routes are smaller, quieter, and more neighborhood-friendly.

These shuttles can take a variety of forms, including small one-way loops, two-way service, or on-demand service.

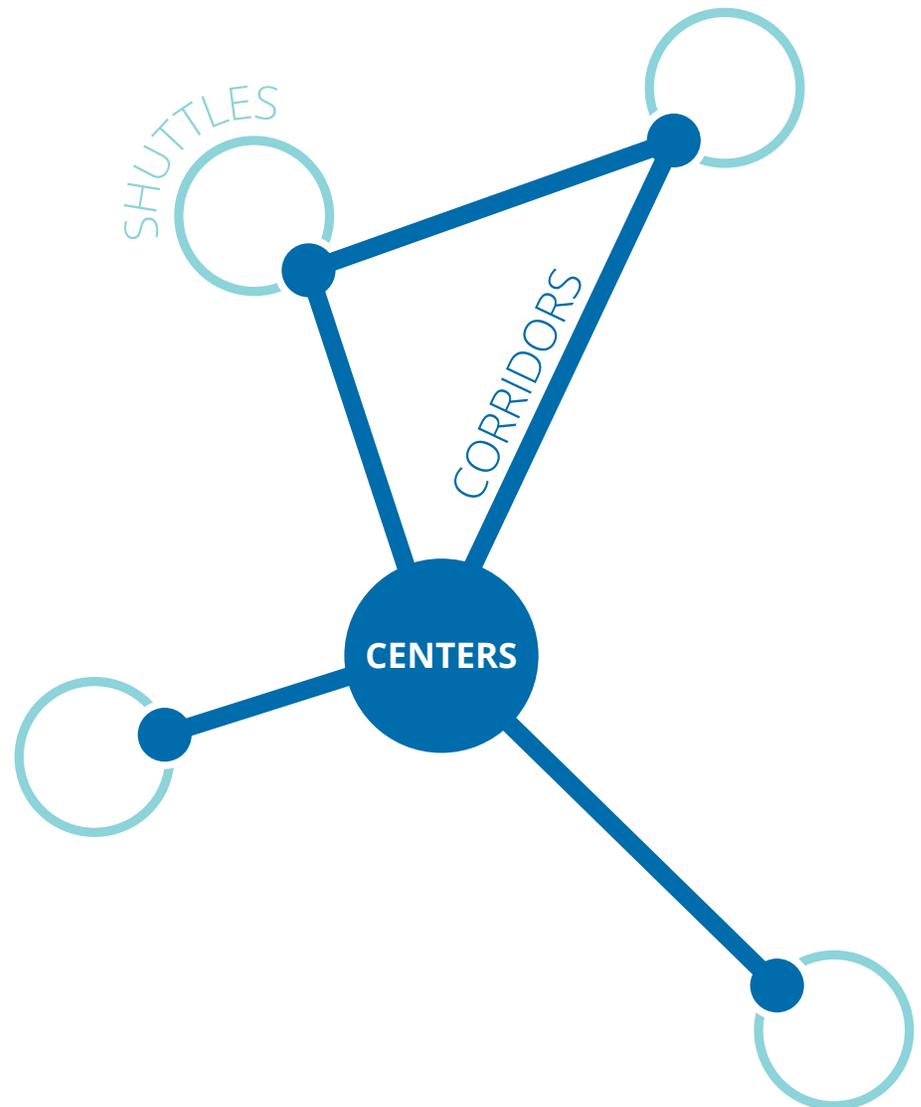
#### Activity centers

Activity centers are community hubs with a variety of shops, stores, and services. These are both primary destinations for riders, as well as places to transfer between routes.

Cherriots builds transit centers at some of these activity centers. Transit centers help facilitate transfers and create a better environment for riders waiting for the bus.

#### Corridor routes

Corridor routes serve the main corridors in Salem and Keizer. They also help riders quickly travel between activity centers, ideally at frequencies of every 15 minutes or better.



### 5.3.2 Multiple purposes

Service should help connect businesses, high-density residential, and other activity centers. A route is more useful and productive when there are multiple destinations along its path, with pickups and drop-offs occurring throughout the entire length of the route.



### 5.3.3 Network connections

Routes should be coordinated in a well-designed network. Transfers between routes allow for a more efficient service that doesn't require as much duplication. Routes should be designed to connect with one another at transit centers and major destinations. Additionally, Cherriots should install appropriate rider amenities at major transfer locations in order to provide riders with a comfortable experience while waiting.



### 5.3.4 Route start and end

Ideally routes start and end at transit centers or major activity centers. This allows for easy access to those places and makes it easier to communicate to riders where a route is heading. The ends of routes should also have a good place for a bus to layover, as well as a place for operators to use the restroom when possible.



## 5.3.5 Core Network

When designing and realigning routes, staff must ensure service remains on the Core Network corridors. Additionally, routes on these corridors will receive the priority for frequent service on weekdays and 30-minute service on weekends.

### What is the Core Network?

The Core Network is a set of transit corridors where Cherriots has committed to providing stable service with a focus on frequency and reliability. By establishing a sense of permanency and an expectation for high-quality service, the Core Network signals to riders, business owners, and developers where to locate and build if they wish to orient themselves and their businesses around transit.

### What gives the Core Network its permanency?

In July 2017, the Cherriots Board of Directors adopted Core Network Policy 118. The routes serving the Core Network corridors may change over time, but the corridors must be served. Service changes that result in completely removing service from any piece of the Core Network will require formal action from the Board with a public hearing process in advance of implementation.

### What makes up the Core Network?

The Core Network is comprised of the following corridors:

- **High, Broadway, and River Rd** - Union to Lockhaven
- **Lockhaven** - River Rd to Chemawa
- **Summer, Capitol, and Portland Rd** - Union to Hayesville
- **Lancaster** - Hayesville to Rickey
- **Market** - Capitol to Lancaster
- **Center** - 13th to Lancaster
- **State** - 13th to Lancaster
- **Commercial** - Kuebler to Trade
- **Liberty** - Commercial to Trade
- **Madrona** - Liberty to Commercial
- **Skyline and Liberty** - Kuebler to Madrona
- **Marion and Center Street Bridges** - Wallace to Front
- **Edgewater** - Eola to Gerth

#### Flexible routing

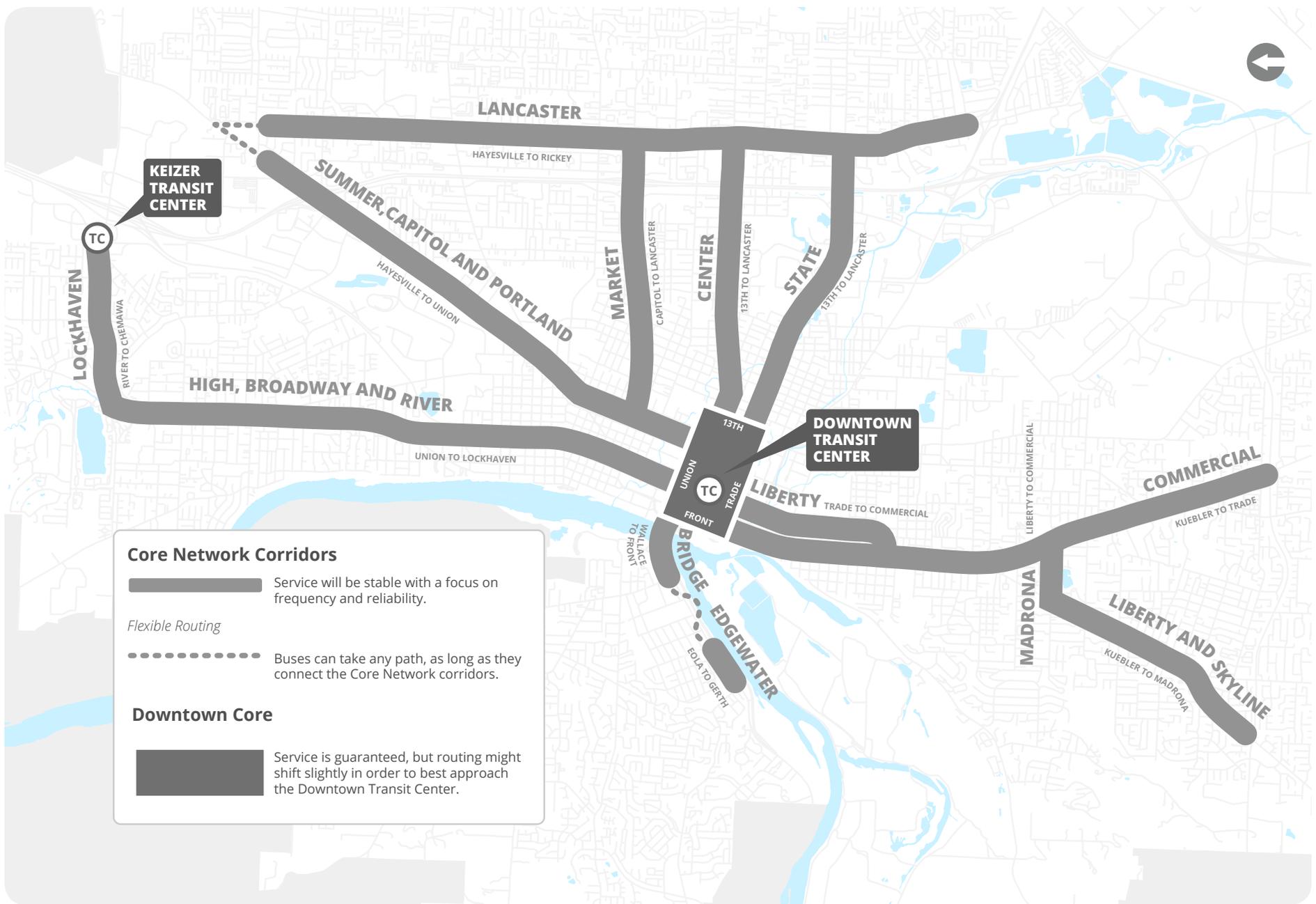
There are also some places where the corridors are disconnected and flexible routing is allowed. Buses can take any path to connect those corridors.

#### Downtown core

Cherriots guarantees service in the downtown core (between Front, Union, 13th, and Trade). In the downtown core, routing might shift slightly over time in order to best approach the Downtown Transit Center.

#### Transit centers

The Downtown Transit Center and Keizer Transit Center are both considered permanent fixtures of the Core Network.



**Core Network Corridors**

Service will be stable with a focus on frequency and reliability.

*Flexible Routing*

Buses can take any path, as long as they connect the Core Network corridors.

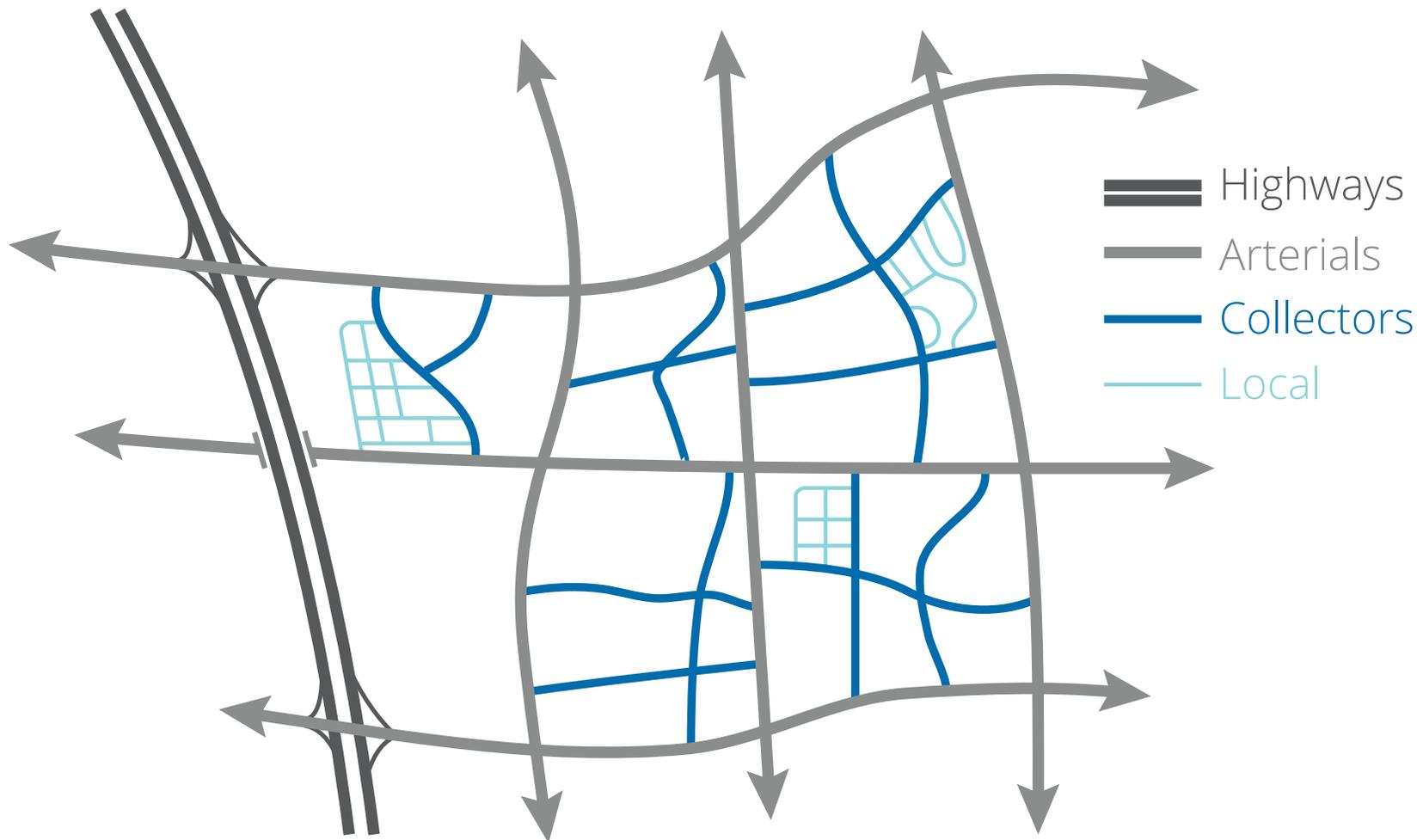
**Downtown Core**

Service is guaranteed, but routing might shift slightly in order to best approach the Downtown Transit Center.

## 5.4 Routing

### 5.4.1 Travel streets

Buses are routed primarily down arterials and collector roads. Express routes can also be routed down limited access roads, such as highways. When traveling down streets with speed limits 45 mph or greater, however, bus stops should only be placed if they are in a turnout where the bus is pulled out of traffic—as specified in the 2012 ODOT Highway Design Manual. Local streets should be avoided unless there are no good alternatives. Buses should not be routed through parking lots when possible. Finally, routes must be designed to allow for vehicles to make safe turns.



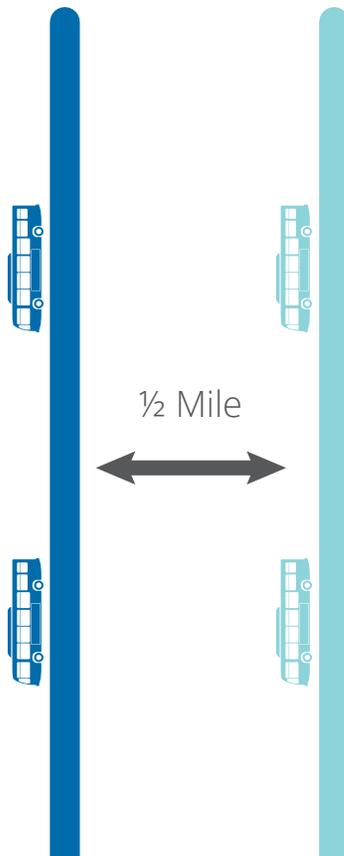
*Source:* Arterial Street Access Control Study

## 5.4.2 Spacing and duplication

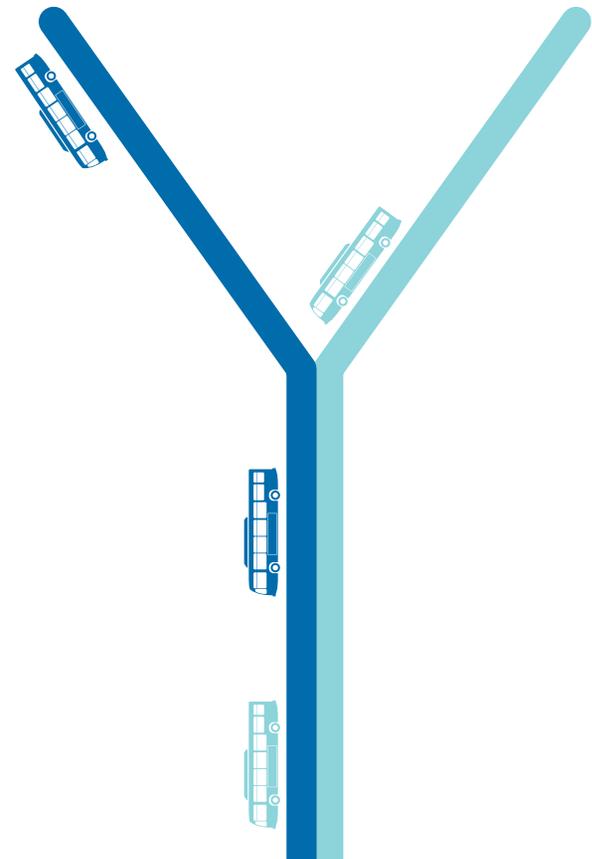
Routes traveling along parallel corridors should be placed at least  $\frac{1}{2}$  mile apart. When routes share a path, their timing should be offset to avoid duplication. For example, two hourly routes sharing a path for half their length should provide 30-minute service along that shared path.

This standard does not apply to routes as they are approaching a transit center.

### Parallel corridors



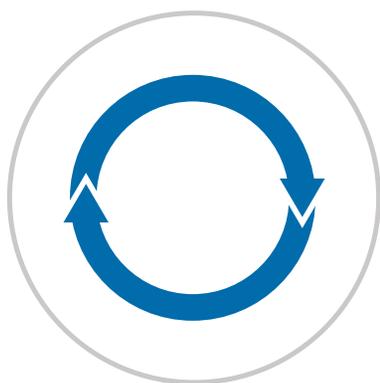
### Shared path, offset schedules



### 5.4.3 Directness and complexity

A bus traveling directly between two places is faster and more desirable than a bus that takes a roundabout, circuitous path. The more a route loops, the less it can compete with other modes of travel. Loops may be necessary at times to turn a bus around at the end of its route or to provide necessary coverage. However, loops should generally be avoided.

A route that is easy to understand and predictable helps give riders confidence they are boarding the correct bus and will end up at their desired destination. In order to limit route complexity, the number of paths a route takes should be limited. When routes take multiple paths, buses should have very specific and unique destination signs to clearly state the trip's final endpoint.



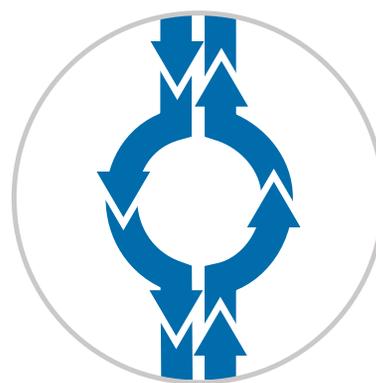
**One-Way loops**

In order to provide coverage in some neighborhoods, one-way loops are sometimes the most efficient option. In these cases, one-way loops should be limited to 30 minutes round trip, including layover / recovery time.



**Lassos**

One-way loops at the end of routes are known as lassos. When it is necessary—either to provide coverage to a neighborhood or to turn the bus—the lasso should be limited to no more than 1/4 of the roundtrip route miles.



**Mid-route loops**

Loops in the middle of routes cause confusion for riders and should be avoided in all cases. Buses traveling on a pair of one-way streets does not qualify as a mid-route loop, and is therefore acceptable.



**Deviations**

A bus traveling away from its primary path to serve a specific place is known as a route deviation. Deviations should only be considered when the expected ridership gains outweigh the delay the deviation will cause for the riders already on board (*less than 10 rider-minutes per person boarding or exiting the bus along the deviation*).

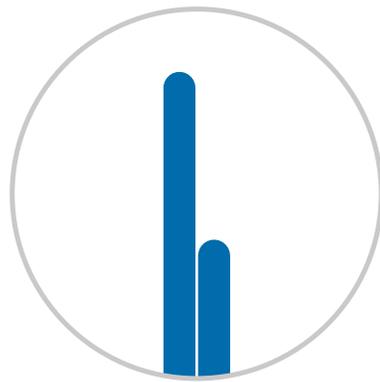
## Two-way, direct

Routes that are direct and travel the same path in both directions are preferable to all other route configurations.



**Branches**

One way to provide low-frequency coverage service in a neighborhood while still providing higher-frequency service along a main corridor is to design a route that splits into branches at one end. Routes should have no more than two branches.



**Shortlines**

Buses may not always need to travel to the end of their route at the same frequency at all times of the day. When buses turn around before the end of the route, this is referred to as shortlining. Routes should be limited to one shortline routing.



**Two-way loops**

Two-way loops are a useful way to provide two-way service while avoiding having to turn the bus around. However, they can be confusing to riders. To provide clarity, each half of the two-way loop should be branded as a separate two-way route.

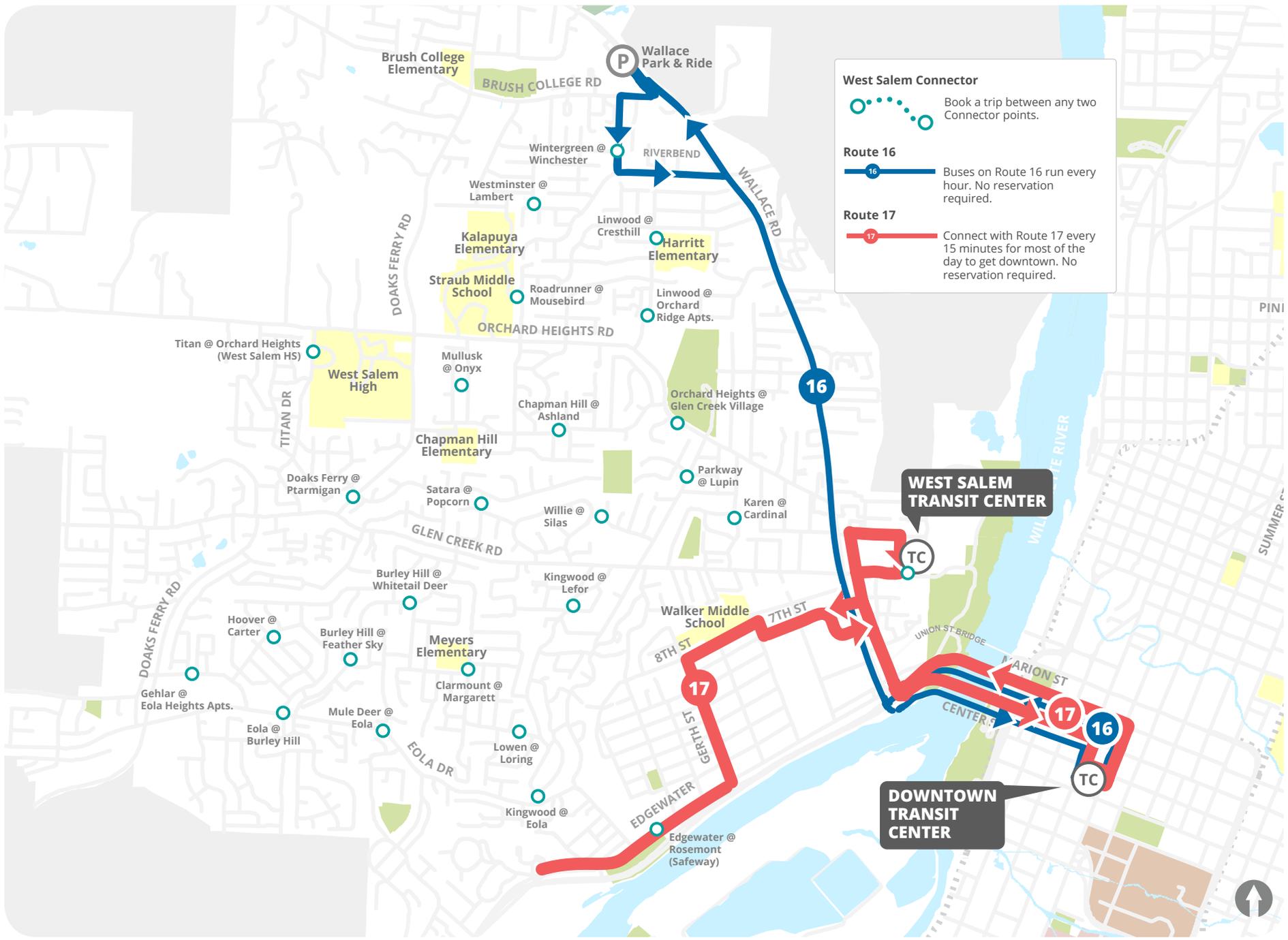
## 5.4.4 On-demand routing

From 2015 through 2017, Cherriots operated an on-demand service called the West Salem Connector. The Connector operated in the hills of West Salem with a 14-seater cutaway bus, and did not have a set path. Instead, the routing of the bus was determined on a trip-by-trip basis given the needs of those who booked a ride. Riders could book their trip up to 30 minutes in advance either online or by calling Cherriots Customer Service. From there, the booking software automatically generated a manifest and sent it to the transit operator's tablet on the bus. The primary purpose of the service was to act as a last-mile solution, feeding riders into the West Salem Transit Center, where they could transfer to frequent bus service to downtown Salem.

As of 2018, Cherriots no longer operates the Connector program. Ridership was not high enough to justify maintaining the service, even though the bus got closer to riders' homes and was relatively well-received.

In the future, Cherriots might consider bringing on-demand service back to the Salem area. For the time being, though, staff is focused on sharing the lessons learned while operating the Connector and listening to lessons other agencies are learning with their on-demand programs.





**West Salem Connector**  
 Book a trip between any two Connector points.

**Route 16**  
 Buses on Route 16 run every hour. No reservation required.

**Route 17**  
 Connect with Route 17 every 15 minutes for most of the day to get downtown. No reservation required.

**WEST SALEM TRANSIT CENTER**

**DOWNTOWN TRANSIT CENTER**



# 5.5 Timing

## 5.5.1 Buses per hour and daily round trips

Service levels on routes should be appropriate to demand. Local and regional express level of service is expressed differently, as local service often runs multiple times per hour, and regional express service often runs just multiple times per day.

### Local

Local Cherriots routes have three levels of weekday service: frequent (every 15 minutes), standard (every 30 minutes), and basic (every 60 minutes). Service is designed to be consistent for most of the day to provide robust midday service and to help riders quickly learn how often their bus arrives. At a minimum, local buses must be scheduled to arrive once an hour to provide a base level of service. *Public facing system maps currently define standard service as every 30 or 60 minutes.*

### Regional express

The level of service for regional express routes is measured by the number of daily round trips, because these buses are scheduled less frequently than local bus service. Buses on express service can either be scheduled throughout the day or only during the morning and evening peaks. At a minimum, regional express routes must have two round trips per day on weekdays.

#### Frequent 15 minutes

30 minutes after 7 p.m.



Frequent bus routes form the backbone of the Cherriots system. Unlike buses running every 30 or 60 minutes, buses running every 15 minutes or better allow riders to use the bus without having to look at a schedule. These routes are ideal for attracting new riders and providing great service for existing riders.

#### Standard 30 minutes



#### Basic 60 minutes

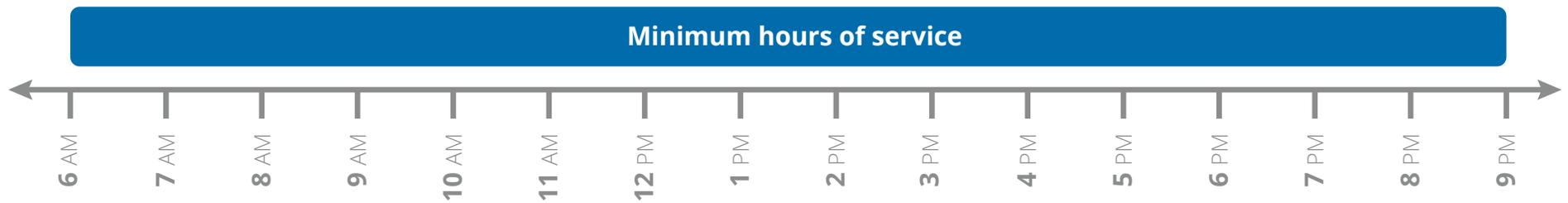


## 5.5.2 Hours of service

A robust span of service is necessary to allow riders to get to work and other appointments early in the morning, and to help assure riders they will have a trip home. Even though buses are likely to be less utilized early in the morning and later in the evening, a good span of service helps build ridership in the midday and during the AM and PM peaks.

### Local

At minimum, all local routes must operate from 6 a.m. to 9 p.m. on weekdays.



### Regional express

Regional express routes have no minimum requirements for hours of service.

## 5.5.3 Time periods

### Local

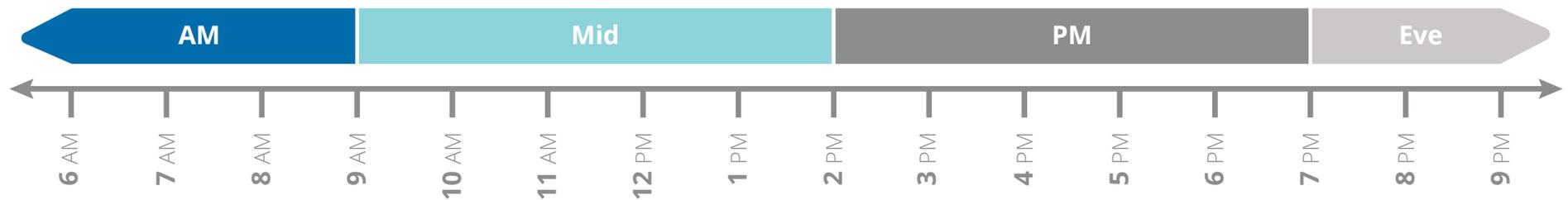
Every trip on a route takes a different amount of time to complete. Often the differences are slight, but during times of heavy traffic or for trips that often have mobility devices, trip time can vary significantly. Although it might be tempting to create a unique schedule for every trip, doing so could be confusing for riders and difficult to remember for operators.

In order to strike a balance between these competing needs, Cherriots typically creates different schedules for four periods of time (but can use less or more).

The standard time periods are:

- **AM** (start of service until 8:59 a.m.)
- **Midday** (9:00 a.m. until 1:59 p.m.)
- **PM** (2:00 p.m. until 6:59 p.m.)
- **Evening** (7:00 p.m. until end of service)

Scheduled times remain consistent during each period in order to provide consistency. However, schedule times can be different between each period in order to reflect the differences in expected runtime throughout the day.



### Regional express

Time periods are not used for regional express service. Because express service runs less frequently and for much longer distances than local service, custom schedules are developed for each individual trip.

## 5.5.4 Time points

### Local

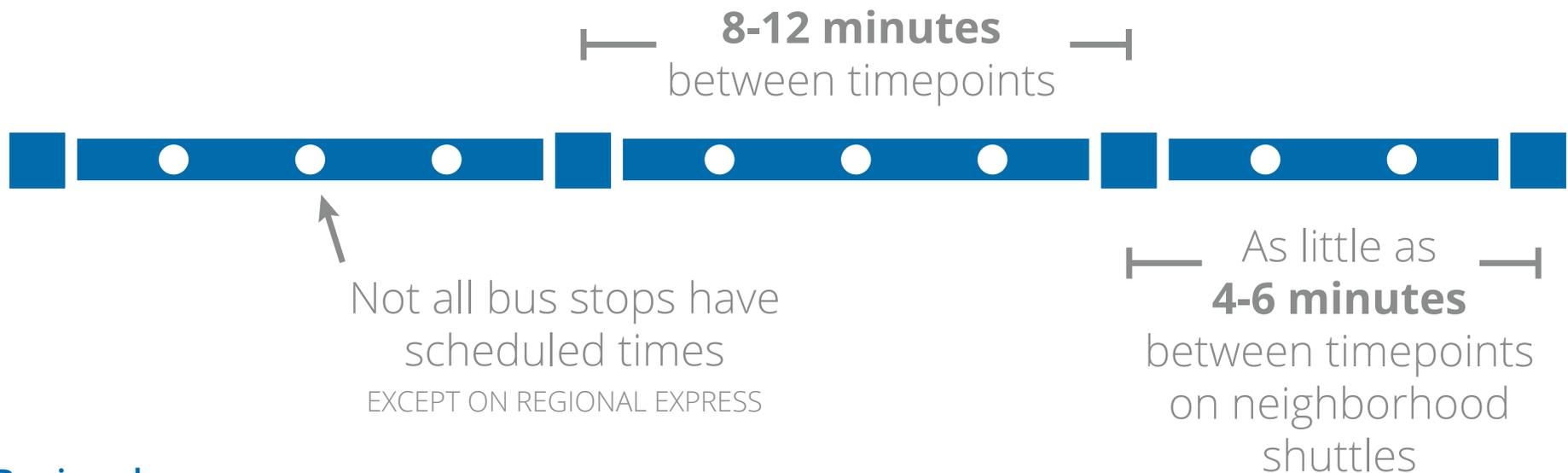
Bus stops with scheduled times are called time points. Time points are used to help give riders an idea of when the bus will arrive. They are also used by operators to help ensure buses remain evenly spaced throughout the route.

Time points on local routes are spaced to balance the need to give riders accurate information with the need to give operators some flexibility to help with the flow of the route. Typically, time points are spaced every 8-12 minutes. However, on neighborhood shuttles time points can be spaced as close as every 4-6 minutes.

When deciding which bus stops will be time points, the priority is given to bus stops that:

- Serve a lot of riders
- Are at major intersections
- Are major transfer points
- Have a safe place for the bus to layover

On routes that share a path, time point locations are ideally the same for both routes along the shared stretch.



### Regional express

On regional express routes, typically all bus stops are treated as time points as there are often long stretches of time between stops.

## 5.5.5 Runtime

Two methods are used to determine how much time should be scheduled on each route throughout the day. The first method is used when Cherrits already operates bus service along a path and has good runtime data. The second is used when service is added to a street that currently does not have bus service.

### Currently served

When Cherrits already operates service along a path, runtime is determined by using real-world observations of current bus speeds. Samples of real bus travel time are collected, and Cherrits determines the 60th percentile running time within each time period.

For example, the time it takes to travel between two time points during the AM time period might range between five and eight minutes, but 60% of trips take seven minutes or less. Because of this, seven minutes of runtime will be scheduled for that time period.



### New streets

When developing schedules for service traveling down paths currently not served, Cherrits determines runtimes using the following three methods:

- 1 Assumed speed**  
For high-level planning, Cherrits assumes buses travel at 15 mph on arterials and 17 mph on collectors.
- 2 Google Maps estimates +20%**  
Next, Cherrits uses Google Maps to evaluate travel speeds throughout the day, adding 20% to account for time spent at bus stops.
- 3 Drive in buses**  
Once schedules are drafted using Google Maps estimates, operators drive the new routes to see if the proposed schedules are realistic. Schedules are then modified based on operator input.

After new routes are put into service, special attention is given to their on-time performance. If there are any issues, they will be addressed as soon as possible.

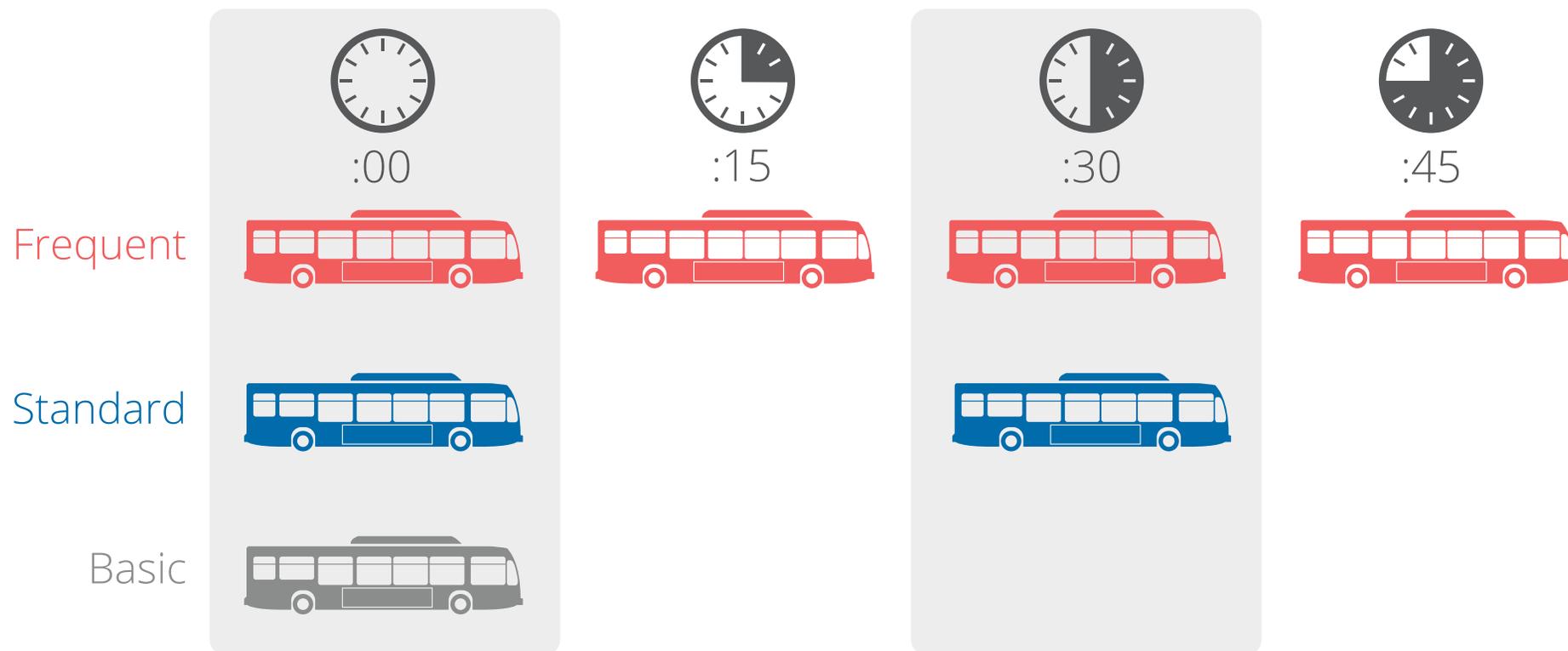
## 5.5.6 Timed connections and pulsing

For most Cherriots routes, the primary transfer point is the Downtown Transit Center in the heart of Salem. In order to facilitate the transfers taking place at DTC, Cherriots schedules buses to connect on a pulse. A pulse is a timed transfer designed around a clock schedule. Buses typically layover at pulses for longer periods of time in order to ensure riders do not miss their transfers. This is especially important for routes that run infrequently where missing a transfer could mean waiting 30 minutes or an hour for the next bus.

Frequent service pulses at :00, :15, :30, and :45. Typically, standard 30-minute service is pulsed at :00 and :30, and hourly service is pulsed at :00. However, there are exceptions

when two routes share a similar path and are timed to be offset. Regional express routes are pulsed at either :00 or :30 in order to allow riders to transfer to and from the local routes.

Whenever possible, routes that connect at other locations should be timed together to make it easy for riders to transfer. This can be difficult, however, because the pulse at the Downtown Transit Center has a big impact on when buses arrive at other points along the route. Depending on route length and runtime, timed connections at other places are sometimes possible, such as at Keizer Transit Center.



## 5.5.7 Layover and recovery

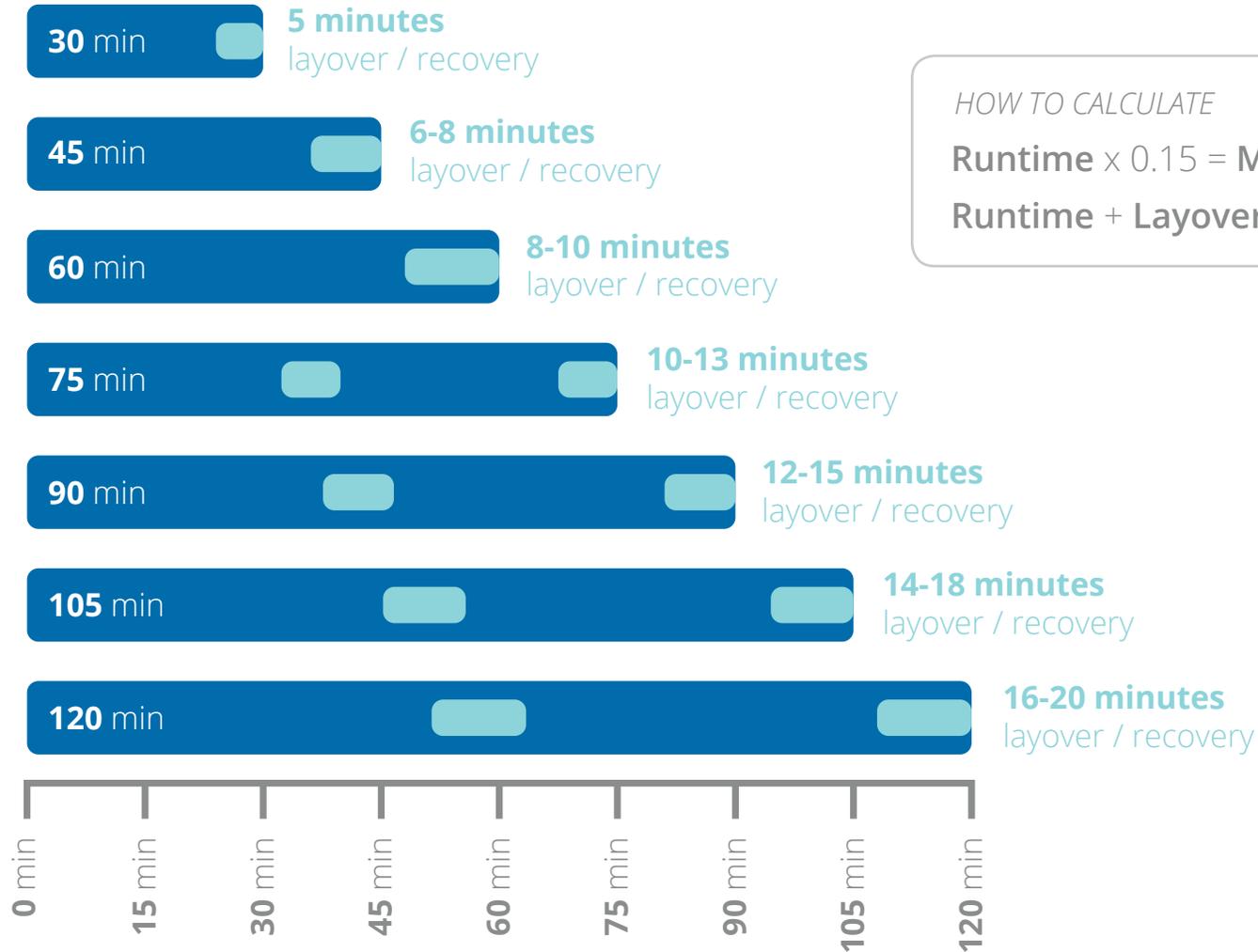
At the end of a route, there is typically time scheduled both to allow for an operator break (layover) and for a bus to get back on schedule if it is running late (recovery). Together, this is known as the layover / recovery time.

Layover / recovery should be between 15 and 20 percent of a route's runtime (and a minimum of five minutes). Together, the layover / recovery and runtime add up to the total cycle time of the route. If a route's cycle time is more than 60 minutes round trip, layover / recovery time should be scheduled on both ends of the route.

### HOW TO CALCULATE

**Runtime** x 0.15 = **Minimum Layover / Recovery**

**Runtime** + **Layover / Recovery** = **Cycle Time**



## 5.6 Bus assignment

### Local

Buses are reassigned during each bid period in order to equitably rotate all buses through the system, regardless of age or amenities. Cherriots uses three criteria for placing buses on routes:

1. **Mileage of the buses** in order to maintain approximately equal odometer readings on all of the buses based on their ages
2. **Ridership of routes** to avoid overcrowding
3. **Turning limitations of routes** to ensure safety

Additional criteria may influence vehicle assignment from time to time, such as rotation required by the Cherriots advertising contract or other service provision contracts.

### Regional express

Regional express routes are treated differently than the local routes. This is due to a combination of funding sources and geographic constraints.

Route 1X to Wilsonville is operated using two commuter-type buses. These buses have commuter style seats and luggage racks designed for regional express service.

The other regional routes are funded differently and operated by a contractor. They also have a different fare structure and do not use the magstripe electronic fare cards used by other Cherriots routes. Buses within this contracted regional fleet are rotated regardless of age or amenities whenever possible.



## 5.7 Bus stops

### 5.7.1 Stop spacing

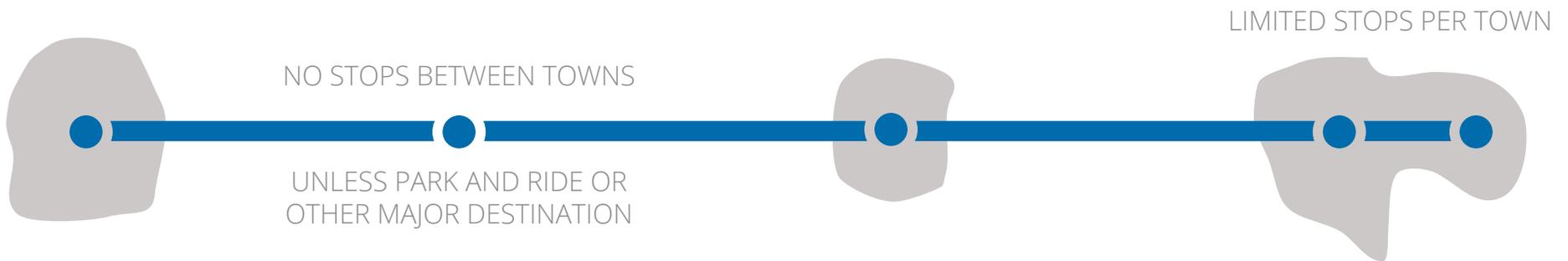
#### Local

For local bus service, bus stops should be placed about every quarter mile. Research shows this is typically how far riders are willing to walk to access the bus. When access to cross streets is limited, stops can be placed farther apart. All two-way bus service should have a corresponding bus stop in the opposite direction of travel so riders can get off the bus as close as possible to where they got on the bus earlier in the day.



#### Regional express

For regional express routes, limited stops should be placed within towns and cities. Unlike local service, the primary point of regional express service is to help riders travel between cities, not within. Typically stops are placed at major destinations such as shopping centers, universities, and in the downtown core. Stops can also be placed in unincorporated areas if there is a park and ride or other major destination.



## 5.7.2 Stop placement

Bus stop placement in relation to an intersection can have an impact on both safety and timing. Below is the preferred order of stop placement:

### 1 Farside of intersection

Farside bus stops are located after crossing through an intersection. Farside placement is preferred because it makes it easier for buses to get back into a travel lane due to gaps in traffic created by traffic signals. However, multiple buses serving a farside stop at the same time might block an intersection.

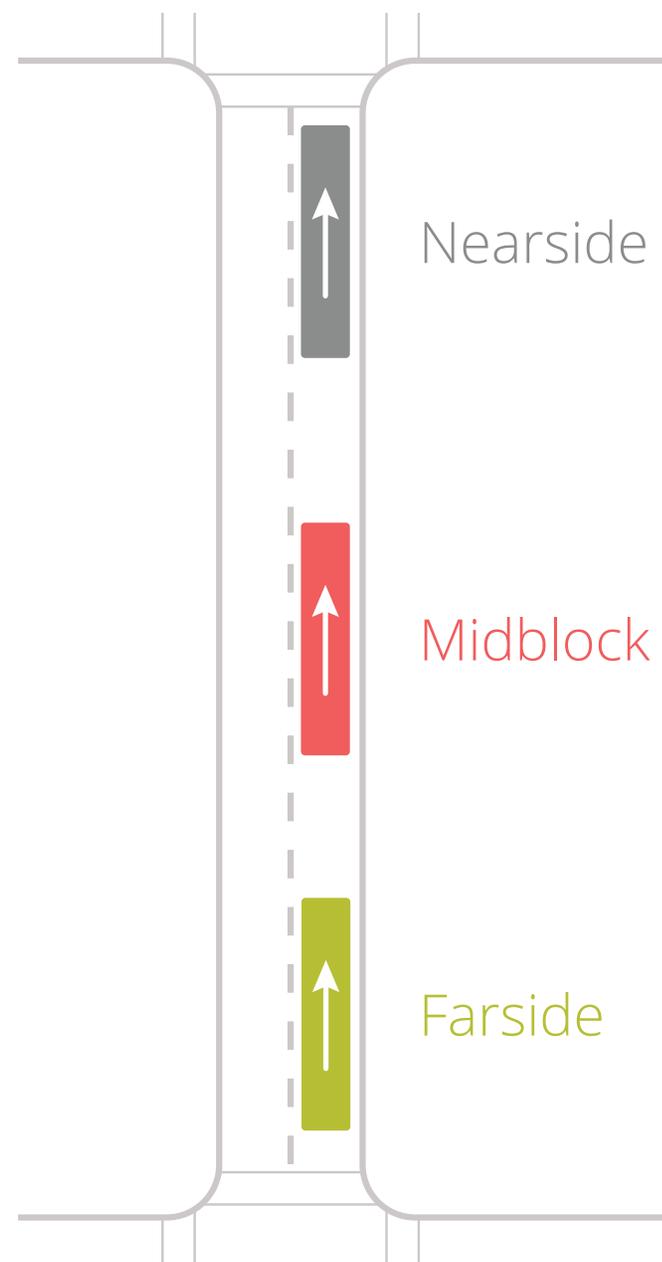
### 2 Nearside of the intersection

Nearside bus stops are located at the side of the block prior to crossing an intersection. An advantage of nearside stops is that time spent waiting at a red light can overlap time loading and unloading riders. However, there is an increased risk of conflicts with vehicles making right turns.

### 3 Midblock

Midblock stops experience less pedestrian congestion than the other two stop locations. However, unlike farside and nearside stops, midblock stops encourage riders to cross the street in the middle of the block, which is unsafe. Other riders may have to walk long distances to safely cross at an intersection.

In the end, every bus stop has unique circumstances and should be evaluated individually to determine the best and safest placement given conditions on the ground.



## 5.7.3 Stop amenities

Bus stop amenities should be installed based on ridership in order to benefit the largest number of riders. Additionally, special consideration may be given to areas where a high number of transfers are expected; waiting times for riders may be longer; stops are close to facilities such as schools, medical centers, or senior centers; and where the physical constraints of bus stop sites, preferences of adjacent property owners, and construction costs could require variance from standards.



### Signs and poles

#### All bus stops

Signs and poles are placed at most bus stops.

Exceptions include transit centers, where there might be special bay signs.



### Maps and schedules

#### Shelters and TCs

Maps and schedules are provided at all transit centers and on all shelters that have schedule holders.

#### Partner institutions

Additionally, maps and schedules are provided to partner institutions across the region to be available to the public. These partners include libraries, colleges, and social services agencies.



### Waste receptacles

#### Shelters and TCs

Receptacles are placed at all transit centers and at stops with shelters in the Salem-Keizer area.

#### 10 boardings per day

The installation of a waste receptacle will be considered for stops with 10 or more boardings per day and high amounts of trash.



### Seating

#### Shelters and TCs

Transit centers and most bus shelters have benches that meet ADA standards.

#### 10 boardings per day

The installation of a pole-mounted seat will be considered for stops with 10 or more boardings per day when allowed by the local jurisdiction.



## Shelters

### 20 boardings per day

Shelters will be considered for any bus stop with 20 or more boardings per day.

### Other considerations

Shelters will be considered at bus stops with a high number of transfers, as well as stops that are near facilities such as schools, medical centers, or senior centers.



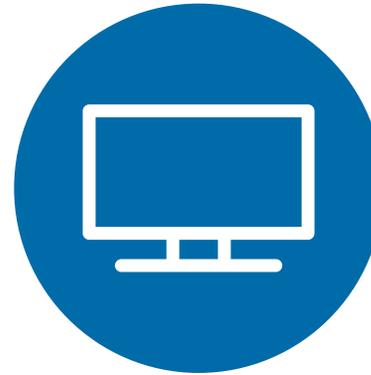
## Lighting

### Transit centers

All transit centers have lighting to provide a safe environment for riders and to help transit operators see riders.

### Poorly lighted shelters

Solar lights are installed in shelters that do not have adequate ambient light in the evenings and early mornings.



## Digital signs

### Transit centers

Currently digital signs are only placed at the Downtown Transit Center and Keizer Transit Center.

In the future, digital signs might be considered at more locations, including shelters and other bus stops with adequate ridership.

## 5.8 Numbering and naming

### 5.8.1 Route numbering and naming

#### Route numbers

All bus routes are assigned numbers to help riders identify what bus they are getting on. No route number should overlap with another route number (e.g. Route 1 and Route 1X).

##### Local

**3**

The Cherriots bus network is relatively small and simple so the route numbering should reflect that. When route numbers are in the 100s, some might not ride because the service seems too complex to learn. Local bus routes should be assigned small and simple numbers.

##### Local express

**15X**

Local express routes should follow the same numbering pattern as local routes, but they should have an 'X' on the end to show riders they run express. *As of September 2017, there are currently no local express routes in operation.*

##### Regional express

**30X**

Regional express routes should be divisible by 10 and have an 'X' on the end to show riders they run express. Exceptions can be made when a route is shared with another transit agency. Routes may follow the numbering convention of that partner agency as long as they don't overlap with existing route numbers.

#### Route names

Route names are used to further identify the main corridors or cities a route serves. Every route has a unique name that can be used in conjunction with its route number.

##### Local

Local routes should be named after the major streets they operate on. They can be named after one or two streets:

**Market / Brown**

##### Local express

Local express routes should be named after the park and ride or primary street they serve, along with the word 'Express':

**Airport Rd Park & Ride Express**

##### Regional express

Regional express routes should be named after the cities they travel to and the word 'Express.' Routes traveling to multiple cities should be named after a corridor or county instead of a city:

**Wilsonville / Salem Express**

## Route directions

All two-way routes have two directions: one for outbound and one for inbound. One-way loops have just one direction. Direction names should not overlap route names in any way.

### Local and local express

All local route directions should be named after the end of the route. In some cases, there is a distinct destination like Chemeketa Community College or Downtown Transit Center. In other cases, the part of town can be used, such as South Salem or West Salem:

To West Salem

### Regional express

Directions for regional express routes should be named based on the city where the route ends:

To Woodburn

### Via

The word “via” can be added to directions to signify when there’s a major destination along the route, or when trying to distinguish between two alternative paths:

To South Lancaster  
via Chemeketa CC



## 5.8.2 Stop numbering and naming

### Stop names

Stops are named to help riders know where to board and exit the bus.

#### Standard stop name

The standard formula for a stop name is Travel Street @ Cross Street:

Center @ 24th

There is no need to add 'Rd' or 'St' to the end of the street name unless the street name can be confused with something else, such as Portland Rd. In this case, 'Rd' clarifies the stop name is not referring to Portland, the city.

Portland Rd @ Hyacinth

#### Major destination

When a bus stops at a major destination, that destination can be placed in parentheses to help riders identify what stop they want to get off at:

Edgewater @ Rosemont (Safeway)

#### Regional stop

All regional stops should follow the same naming convention of a standard stop, but the name of the city served and the destination it is at should be placed in parentheses:

Ivy @ 1st (Mill City Market)

#### No cross street

When bus stops have a travel street but no nearby cross street, a nearby address can be used for the stop name:

3925 Fairview Ind

#### Transit center

Transit Centers do not follow the typical naming convention. Instead, the name of the transit center is used:

Keizer Transit Center

#### Park and ride

When a bus stops off-street in a park and ride lot, the stop can be named after the park and ride:

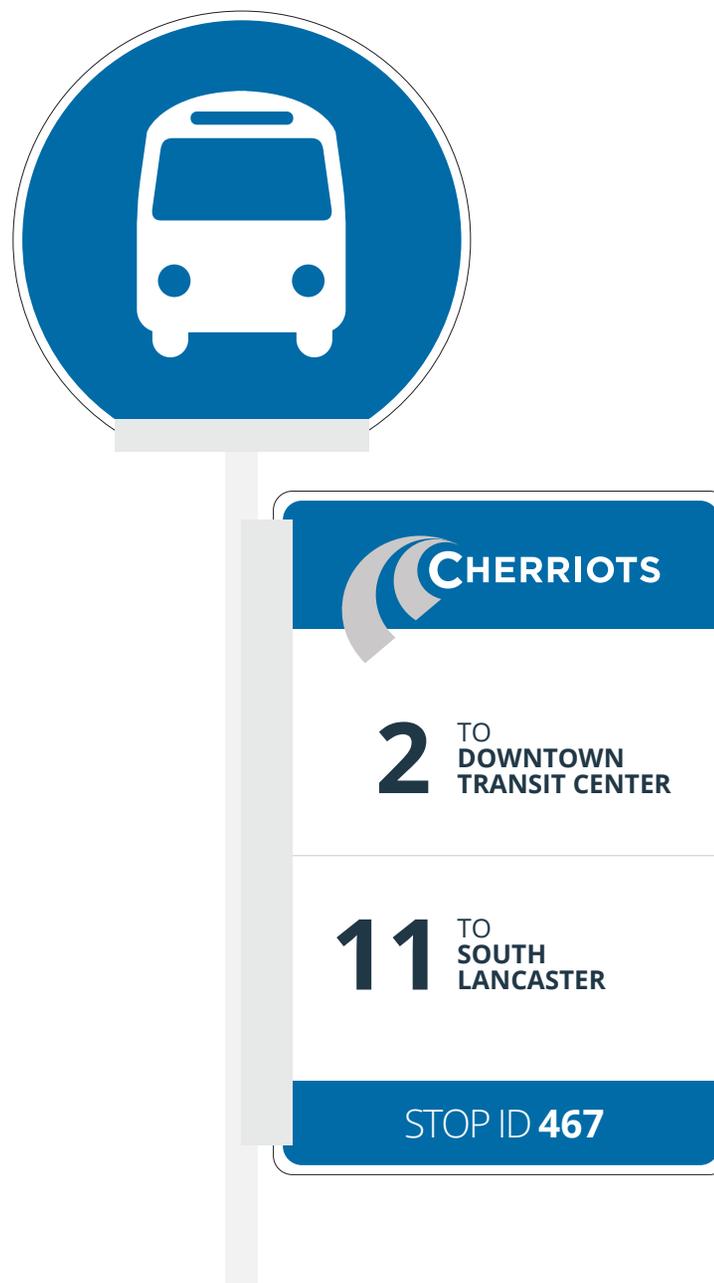
Market St Park and Ride

## Stop IDs

All bus stops are assigned unique stop IDs. These IDs are placed on bus stop signs, in a bus stop database, and on work orders. Stop IDs help riders confirm they are at the correct stop. They are also useful for facilities maintenance employees when adding, removing, modifying, or cleaning bus stops.

Whenever a new bus stop is added, that stop is assigned a stop ID. Stop IDs range between one and four digits and are never reused.

Stop ID **264**





117

17 0

Cherriot 1X  
Cherriot 2X  
Cherriot 3X  
Cherriot 4X  
Cherriot 5X  
Cherriot 10X  
Cherriot 15X  
Cherriot 20X  
Cherriot 30X  
Cherriot 40X  
Cherriot 50X  
Regional Map  
Cherriot 1X  
Cherriot 2X  
Cherriot 3X  
Cherriot 4X  
Cherriot 5X  
Cherriot 6X  
Cherriot 7X  
Cherriot 8,18  
Cherriot 9  
Cherriot 11  
Cherriot 12  
Cherriot 13  
Cherriot 14  
Cherriot 15X  
Cherriot 16  
Cherriot 17  
Cherriot 19  
Cherriot 21  
Cherriot 22  
Cherriot 23  
Cherriot 2  
Cherriot 3  
Cherriot 4,24  
Cherriot 5  
Cherriot 6  
Cherriot 7

CHERRIOT



# 6

## Public engagement

Once the service plan has been drafted, the next step is to bring that plan to the public for their input.

No matter how much thought and effort goes into developing the draft service plan, it is important to engage current riders and the greater community to ensure the plan best meets their needs. It is for them, after all, that Cherriots is creating this plan and delivering this service.

The primary benefit of the public engagement process is that it brings staff multiple perspectives on how the draft plan will impact real people. If done well, the process will identify and eliminate any significant issues with the plan. The end result should be a stronger plan that the public can support.

# 6.1 Materials for public

## Draft service plan

The draft service plan will give the public a comprehensive overview of what service changes are proposed and why those decisions were made. Information in the plan will be presented using text, tables, maps, and other graphics to give riders an easy-to-understand picture of what the new service would mean for them.

The plan will be presented both in print and on a webpage. The purpose of having both versions is to make it easier to conduct outreach in person and online. Both the print version of the plan and the webpage will be translated into Spanish.

## Feedback form

In order to gather meaningful input about the plan, a short feedback form will be developed by staff. This form typically asks riders what they think of the overall plan (Strongly Like, Somewhat Like, Neutral, Somewhat Dislike, Strongly Dislike, or Unsure), and give them an opportunity to make suggestions for making the plan work better for them.

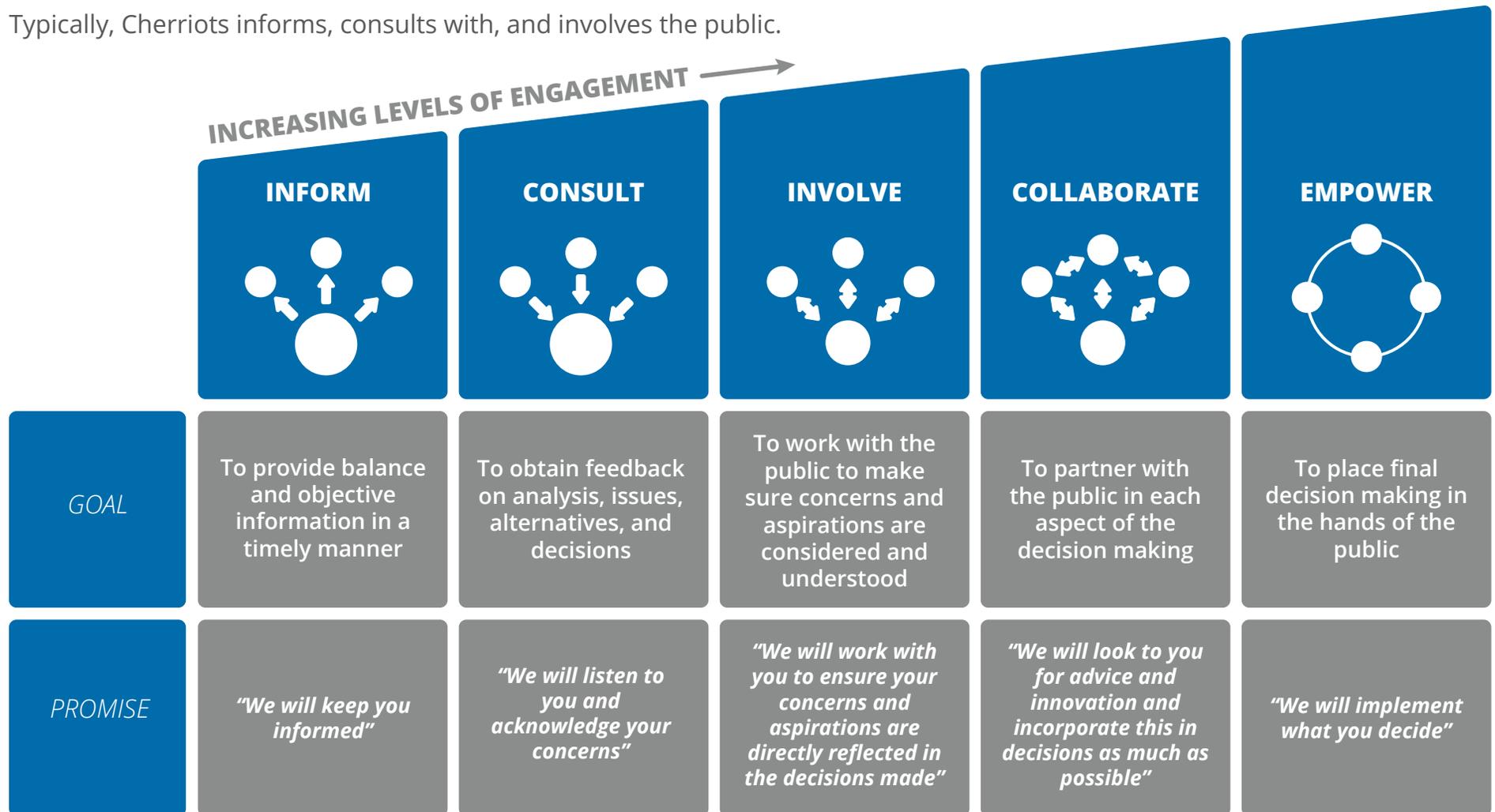
The feedback form will be developed in English and Spanish, and will be available in both a print and online version.



## 6.2 Levels of engagement

Once the draft service plan and feedback form are developed, the next step is to determine the level at which the public will be engaged. It is important to be upfront with the public about what their role will be in the process so their expectations are grounded in reality. Below are the five levels of engagement, as defined by the International Association of Public Participation (IAP2). Engagement levels range from simply informing to empowering the public to make decisions.

Typically, Cherriots informs, consults with, and involves the public.



**Source:** International Association of Public Participation (IAP2)

## 6.3 Audiences

During the public engagement period, there are multiple audiences with which staff engages. Working with these audiences allows Cherriots staff to hear a variety of perspectives on the draft service plan.

### Riders

Those who ride Cherriots buses know more than anyone what issues arise while riding transit. In order to gather their input, Cherriots conducts robust rider engagement.



### Frontline employees

Frontline employees are Cherriots employees who engage directly with riders. It is important to engage with frontline employees, both to get their perspectives on service as well as to learn more about the needs of riders.



### Partners

Partners are external organizations that work with Cherriots to help advance opportunities and conditions for travelers to use alternatives to driving alone. These partners can help get the draft service plan in the hands of more community members, which in turn helps Cherriots receive more input.



#### Civic groups

Organizations whose official goal is to improve neighborhoods through volunteer work by its members.



#### Education

Education foundations, school districts, middle and high schools, colleges, universities, and student associations.



#### Faith community

Community churches, houses of worship, and leadership foundations.



#### Government

Council of governments, counties, and city governments.



### **Latino and other minority groups**

Groups focused on promoting equity and inclusiveness, including business alliances, college officers, institutes, and associations.



### **Local business**

Small businesses, corporations, hospitals and clinics, business associations, and chambers of commerces.



### **Neighborhood associations**

All neighborhood associations in Salem, Keizer, and nearby areas.



### **News media and bloggers**

Newspapers, radio stations, and local blogs.



### **Social services and nonprofits**

Organizations that provide social services and other services to the community without making a profit.



### **Transit agencies**

Neighboring transit agencies that connect with Cherrriots service.



### **Tribes**

The local tribes in the area are The Confederated Tribes of Grand Ronde and The Confederated Tribes of Siletz Indians.

## 6.4 Committees and meetings

Cherriots brings service plans to one internal and three external committees. These committees inform and consult on service proposals, and staff informs them of all finalized service changes. Staff also attend a number of meetings in the community on a regular basis in order to learn about community needs and keep each group informed on the latest at Cherriots.

### Committees organized by Cherriots

#### **Citizens Advisory Committee (CAC)**

The mission of the Citizens Advisory Committee (CAC) is to act as an advisory committee to the Board of Directors on transportation-related issues. The CAC also makes suggestions for transit service improvements, and advocates for enhanced funding for public transportation.

#### **STF Advisory Committee (STFAC)**

The Special Transportation Fund Advisory Committee (STFAC) advises and assists the Board of Directors on how STF and Section 5310 grant funds will be spent and provides the Board with information about each community's special transportation needs.

#### **Employee Transportation Coordinators (ETC)**

Cherriots Trip Choice organizes a quarterly Employee Transportation Coordinator (ETC) luncheon, at which the ETCs can learn about Cherriots news and transportation options updates. It is also an opportunity for ETCs to network and exchange ideas.

#### **Service Excellence Team (SET)**

The Service Excellence Team (SET) is an internal group made up of members from many Cherriots departments, including transit operators. SET members discuss service performance, operator ideas, and riders requests for changes to service, stops, and shelters. The team also reviews service plan drafts.



## Meetings attended in the community

### **Community Partners of East Salem**

Facilitates community connections, supports children and families, and promotes a safe, healthy, clean environment.

### **Edgewater Partnership Meeting**

Increase community connections, cultivate a safe and healthy environment, and enhances neighborhood pride.

### **Emergency Housing Network**

Brings together advocates and agencies serving the homeless and at-risk populations of greater Salem.

### **Greeters**

Networking program organized both by the Salem Area Chamber of Commerce and Keizer Chamber of Commerce.

### **Keizer United**

Builds community involvement, which strengthens families and nurtures children.

### **Latino Business Alliance**

Empowers small businesses in financial growth while promoting engagement and visibility within the larger American economy.

### **North Neighbors**

Strengthens community by increasing neighborhood safety and creating projects that beautify common spaces.

### **Salem for Refugees**

Exists to bring people and resources together to empower refugees to thrive in Salem, Oregon.

### **Senior Lifestyles Meeting**

Attendees participate in information sharing as well as engage in networking opportunities.

### **Senior Service Networking**

Open meeting for those serving the needs of seniors in the Salem area.

### **Service Integration Teams**

Facilitates collaboration among community partners to provide coordinated resources and information for individuals and families. Teams include Woodburn, Dallas, Independence-Monmouth, Stayton-Sublimity, North Salem, and Silverton.

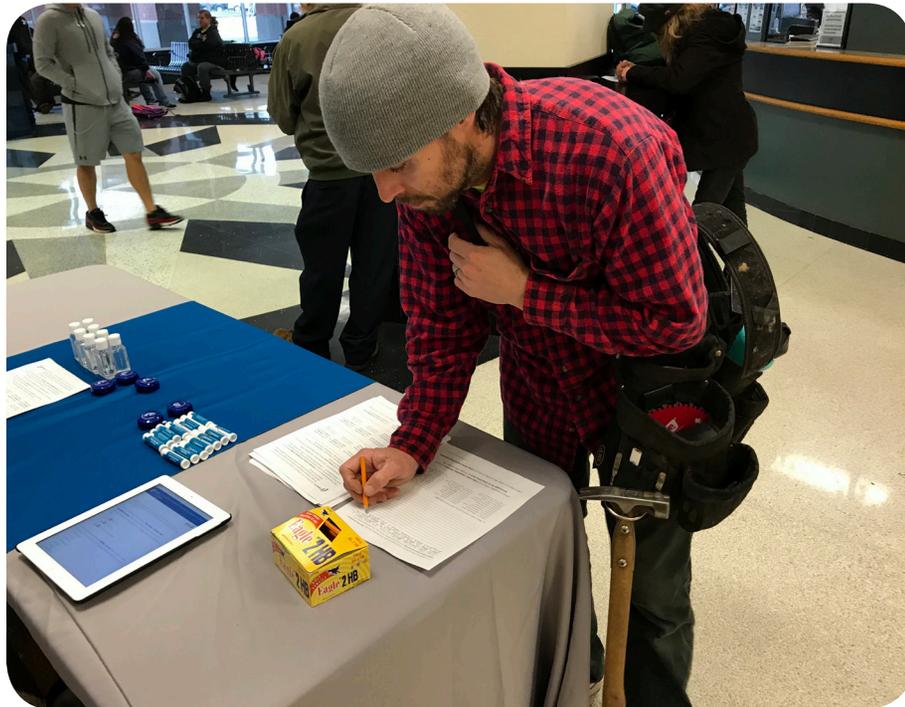
### **South Salem Connect**

Works to increase neighborhood livability for children, youth, and families through partnerships, projects, and programs.

## 6.5 Engagement strategies

Cherriots staff use a variety of strategies to engage the public during the public engagement period. It is not necessary to use every strategy for every outreach period. Instead, strategies are chosen depending on the nature of the service plan and the audiences staff wishes to reach.

Strategies are split into six categories: promoting online, promoting on buses, promoting at transit centers, promoting in the community, inviting the public to events, and going directly to the public.



### Promoting online

Email blast to all subscribers, posts on Facebook and Twitter, and a feature element on the Cherriots home page.



Email blasts



Social media posts



Homepage features



Project webpages

### Promoting on buses

Bus ads on the inside and outside of buses, onboard announcements informing riders of the proposal, and take-one fliers with details of the draft plan on the buses.



Header card ads



Exterior bus ads



Onboard announcements



Take-one fliers

## Promoting at transit centers

Posters on the walls of the customer service lobby, and sandwich boards and monitor ads at the transit centers.



Posters



Sandwich boards



Monitor ads

## Inviting the public to events

Organizing open houses, workshops, and focus groups, and inviting riders and other members of the public to attend.



Open houses



Workshops



Focus groups

## Promoting in the community

Fliers posted on neighborhood bulletin boards and at local businesses, notices on bus stops that could be impacted, press releases, and interviews with the media.



Fliers



Bus stop notices



Press releases



Media interviews

## Going directly to the public

Riding buses to talk directly to riders, setting up information tables at popular destinations in the community, and making presentations and announcements to community groups.



Ride alongs



Information tables



Presentations



In person announcements

## 6.6 Finalizing the service plan

### Public engagement report

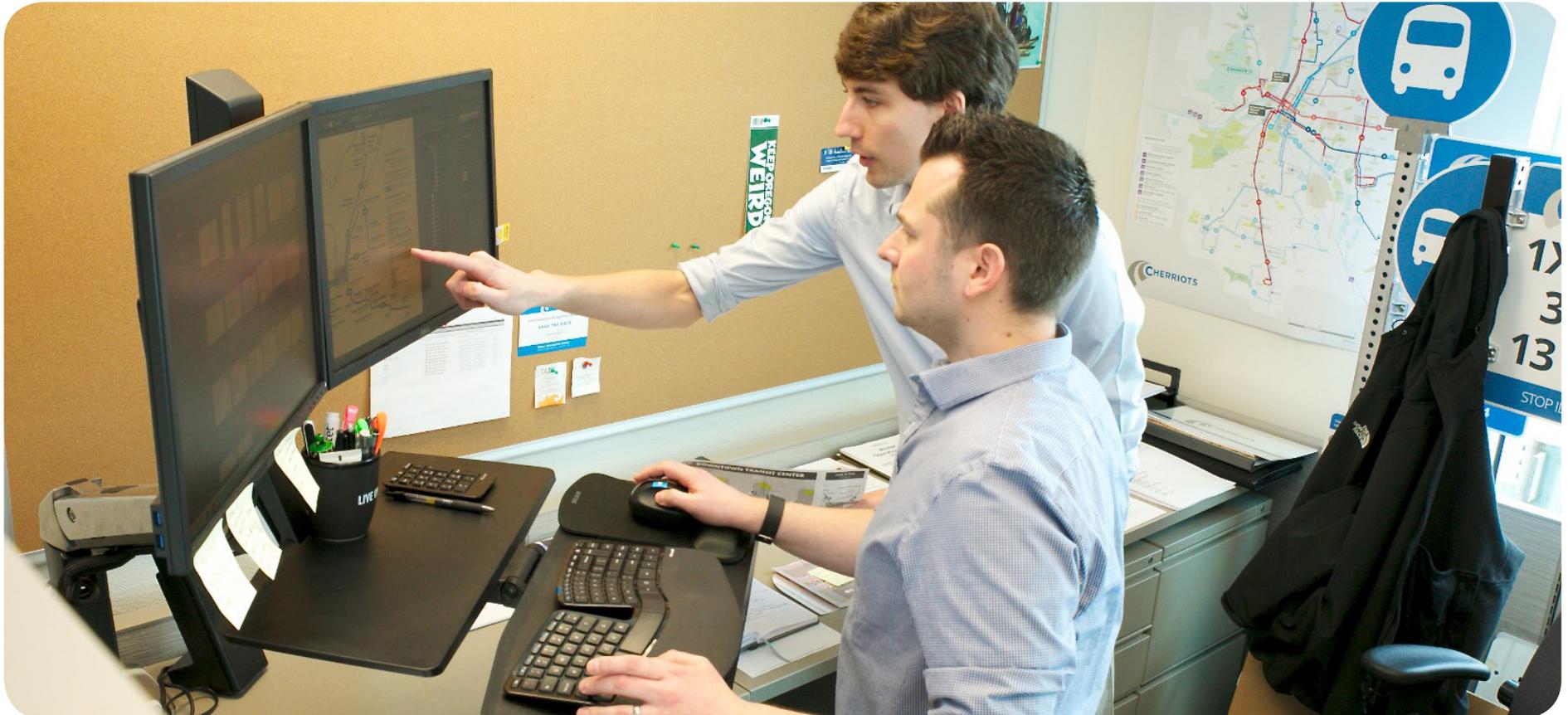
Once the engagement period has concluded, all input received will be considered by staff and the draft service plan will be modified to best address the ideas received.

Full results of the engagement will be published in a report and made available to the public.

### Equity analysis and final service plan

Once the service plan is modified, staff will update the equity analysis to ensure there are no new potential disparate impacts and disproportionate burdens.

The service plan will be finalized by the first Thursday in May and made available in both English and Spanish.

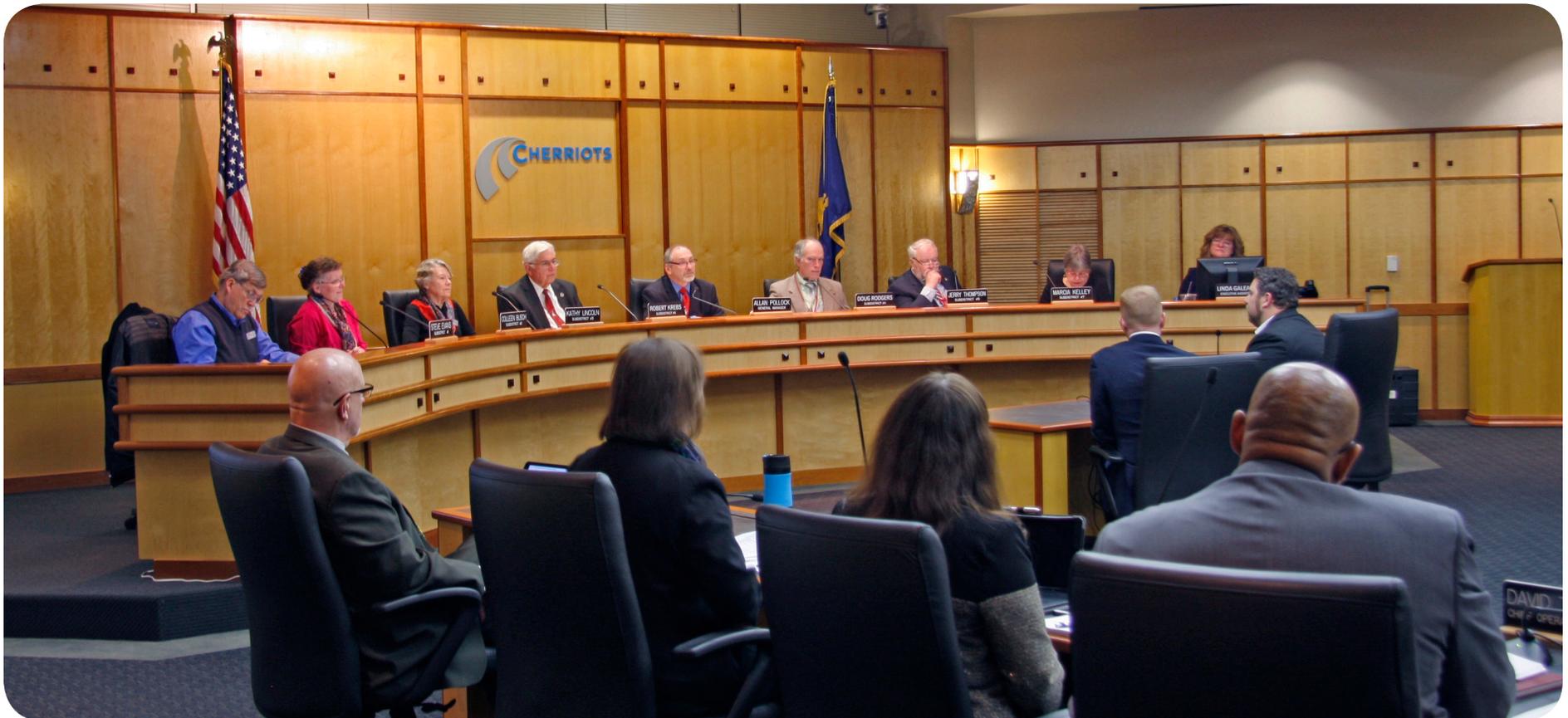


## 6.7 Board consideration

For any service plan that includes a change classified as a major service change, both the service plan and the equity analysis need to be approved by the Cherriots Board of Directors. If any of those major service changes result in a decrease in service, a public hearing is required. Staff must post a notice in local newspapers informing the public of the time and location of the hearing at least 30 days in advance.

*For the Annual Service Change, the board meeting (which typically includes a public hearing) takes place on the fourth Thursday in May.*

If the service plan is approved by the Board of Directors, the next step is for staff to begin the work necessary to successfully implement the new service.







# 7

## Implementation

Once the service plan is finalized and approved, the final stage of the service planning process is implementation. The key components of implementation are developing schedules and creating the operator bid; designing and producing public materials; notifying riders and the greater public; installing new bus stops and shelters, and removing old ones; updating technology platforms with new service data; and training customer service and transit ambassadors.

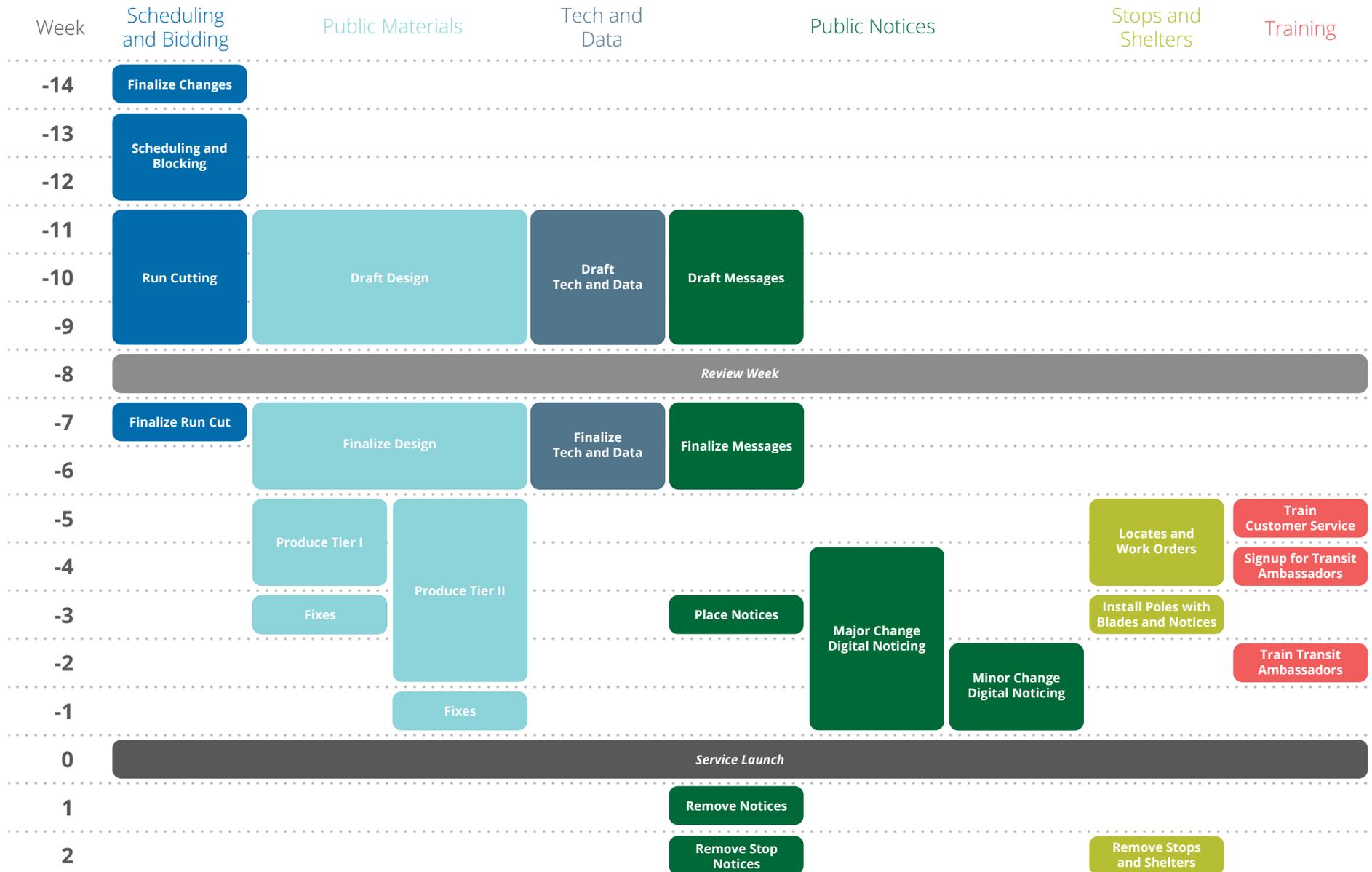
Service changes are implemented three times a year: January, May, and September. The largest changes happen in September as part of the annual service change process.

## 7.1 Overview

Cherriots has a detailed implementation process, broken up week by week leading up to implementation. The timeline gives staff enough time to create all materials and update all data. Once materials are drafted, they are reviewed internally to ensure their accuracy. Final materials are installed and set live the weekend before the first day of service. Once service goes live, staff focuses on making sure riders know how to get where they need to go.



# 7.2 Implementation process



## 7.2.1 Scheduling

### Overview

When developing a service plan, planners determine how frequent the bus will run and how long it will run throughout the day for each route. During the scheduling process planners take this one step further, determining the overall runtime each trip needs and how much time should be scheduled between time points. Once those details are determined, schedules are developed for each route in Trapeze, a scheduling software.

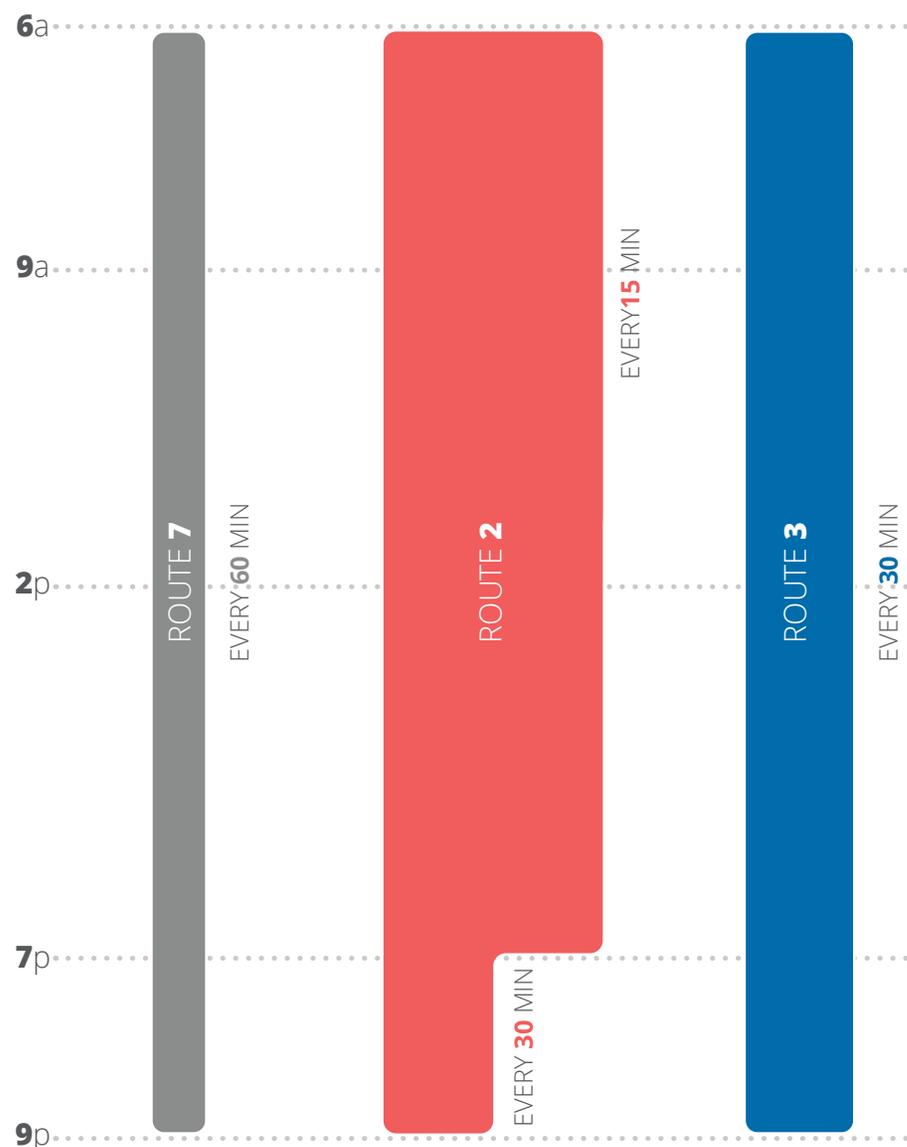
The next step is to create blocks. Blocks represent what each bus does out on the road. The number of blocks required for each route depends on the frequency of the route and the total runtime throughout the day. Sometimes blocks are split intentionally to help with on-time performance. Other times two or more routes are blocked together, known as interlining, to help with efficiency. A block is not directly tied to a particular bus, as a bus can be swapped due to a breakdown or planned maintenance. Every morning before service begins, a bus is assigned to each block by the dispatcher.

The final step in the scheduling process is to cut each block into smaller pieces and rearrange those pieces into runs. A run is another word for an operator's shift. It is likely each block will be tied to multiple runs. In other words, multiple operators will likely drive each bus throughout the day. In the diagrams on the right, you can see an overly simplified version of a run cut. In reality, planners must follow a number of rules agreed to by the union, including requirements regarding lunch breaks, percentage of split shifts, number of part-time operators, etc.

Once runs are cut, the next step is to develop bid materials.

### Developing schedules

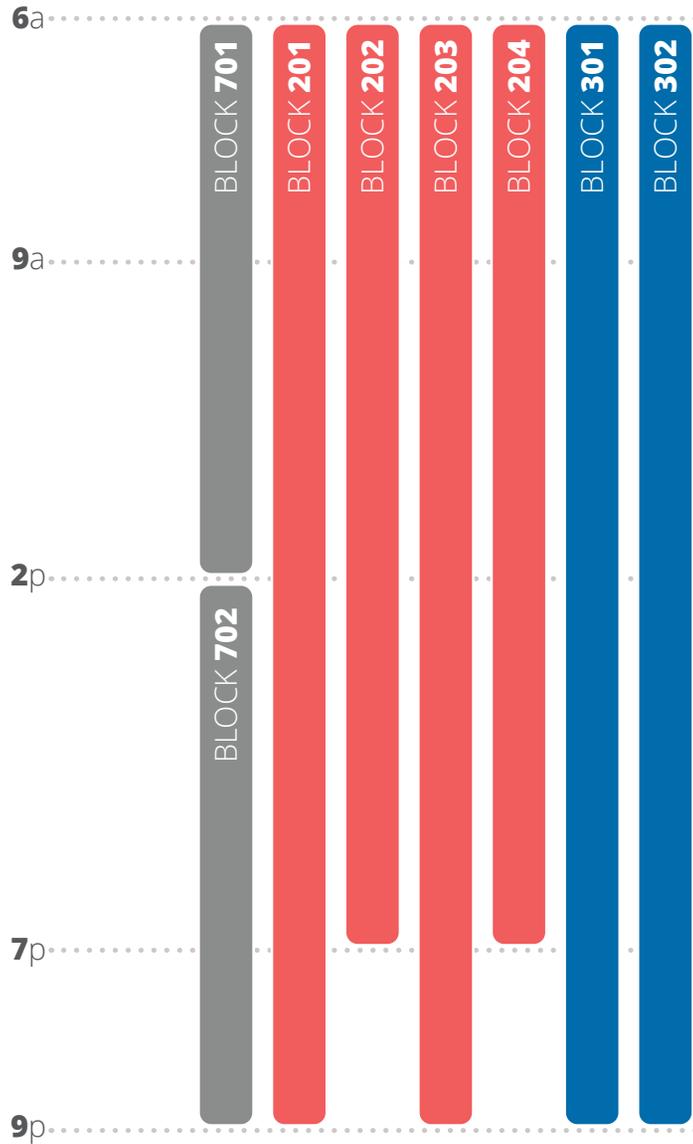
How long and often the route will run, and the round trip time.



Example assumes round trip time is 60 minutes

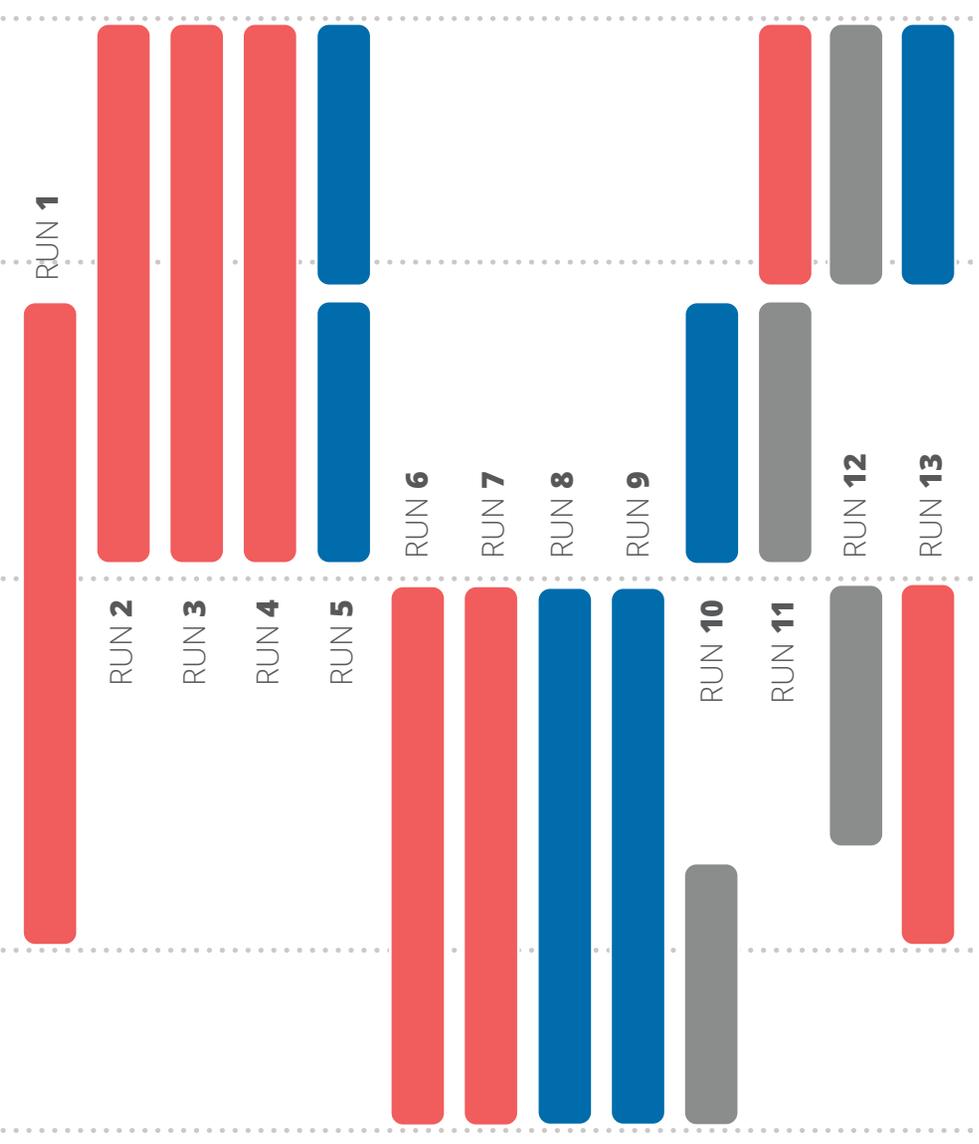
## Creating blocks

When each bus is on the road to make the schedules work.



## Cutting runs

Slicing blocks into pieces and reordering into operator shifts.



# 7.2.2 Bidding

With each new signup, transit operators bid on their runs. To help operators understand the details of the runs, staff provide a number of materials—some of which are featured below. These materials are also used by operators to help them learn the path of their assigned routes, as well as the scheduled departure times for each time point along those routes.

## Run guide

Overview of each operator shift, also known as a run.

Weekday Run Guide  
Signup: September 05, 2017

Run	Type	Line	Block	Piece On	From Node	Time	To Time	To Node	Piece Off	Piece Plat	Total Plat	Rept	Clear	Paid Standby	Travel Pay	Work Time	Ot Paid	Makup Time	Spread OT	Split Bonus	Total Pay	
101	Early 8	19	1904	6:30	Fcl_GAR	7:00	12:45	DTC	12:45	3h45	9h45	10	0	5	0	0	10h00	1h00	0	0	0	11h00
102	Early 8	21	2104	6:25	Fcl_GAR	6:35	10:45	DTC	10:45	4h10	9h10	10	0	0	0	15	9h35	48	0	0	0	10h23
103	Early 8	8/18	803	6:11	Fcl_GAR	6:21	9:00	DTC	9:00	2h39	8h39	10	0	0	0	15	9h04	32	0	0	0	9h36
104	Early 8	5/2	206	6:15	Fcl_GAR	6:25	12:15	DTC	12:15	5h50	8h39	10	0	0	0	15	9h04	32	0	0	0	9h36
105	Early 8	19	1903	13:15	DTC	13:15	16:03	KeizTran	16:03	2h48	8h53	10	0	0	0	15	9h03	32	0	0	0	9h35
106	Early 8	9	902	5:59	Fcl_GAR	6:09	10:00	DTC	10:00	3h51	8h34	10	0	5	0	0	8h49	25	0	0	0	9h14
106	Early 8 NON-SD	8/18	801	11:00	DTC	11:00	15:43	Fcl_GAR	15:43	4h43	8h34	10	0	0	0	0	8h41	21	0	0	0	9h02
107	Early 8	3	301	5:37	Fcl_GAR	5:47	9:30	DTC	9:30	3h43	8h31	10	0	0	0	15	8h41	21	0	0	0	9h02
108	Early 8	11	1103	5:46	Fcl_GAR	5:56	10:00	KeizTran	10:00	4h04	8h28	10	0	0	0	15	8h38	19	0	0	0	8h57
109	Early 8	19	1901	5:35	Fcl_GAR	5:45	8:54	KeizTran	8:54	3h09	8h24	10	0	0	0	15	8h34	17	0	0	0	8h51
110	Early 8	7	701	5:20	Fcl_GAR	5:30	10:30	DTC	10:30	5h00	8h00	10	0	0	0	15	8h25	13	0	0	0	8h38
111	Early 8	21	2101	5:27	Fcl_GAR	5:37	9:30	DTC	9:30	3h53	7h53	10	0	0	0	15	8h18	9	0	0	0	8h27
112	Early 8	5/2	201	5:30	Fcl_GAR	5:40	9:30	DTC	9:30	3h50	7h50	10	0	0	0	15	8h15	8	0	0	0	8h23
113	Early 8	5/2	204	5:45	Fcl_GAR	5:55	10:45	DTC	10:45	4h50	7h50	10	0	0	0	15	8h15	8	0	0	0	8h23
114	Early 8	2/5	202	5:34	Fcl_GAR	5:44	9:30	DTC	9:30	3h46	7h46	10	0	0	0	15	8h11	6	0	0	0	8h17
115	Early 8	2/5	205	6:05	Fcl_GAR	6:15	10:00	DTC	10:00	3h45	7h45	10	0	0	0	15	8h10	5	0	0	0	8h15
116	Early 8	19	1903	6:20	Fcl_GAR	6:30	9:15	DTC	9:15	2h45	7h45	10	0	0	0	15	8h10	5	0	0	0	8h15
117	Early 8	6/16	601	5:05	Fcl_GAR	5:15	9:00	DTC	9:00	3h45	7h55	10	0	0	0	15	8h05	3	0	0	0	8h08
118	Early 8	17	1703	5:29	Fcl_GAR	5:39	9:30	DTC	9:30	3h51	7h36	10	0	0	0	15	8h01	1	0	0	0	8h02
119	Early 8	24	2401	5:16	Fcl_GAR	5:26	9:30	DTC	9:30	4h04	7h09	10	0	5	0	0	7h24	0	36	0	0	8h00
120	Early 8	16/6	602	5:17	Fcl_GAR	5:27	10:00	DTC	10:00	4h33	7h33	10	0	0	0	15	7h58	0	2	0	0	8h00

## Shuttle schedules

Schedule for operator shuttles to get between the Del Webb Operations Center and Keizer Transit Center.

## Paddles

Operator shifts and details of routes and time points.

```

===== DRIVER PADDLE =====
RUN 106 -- Main -- SCENARIO: SD: 08-22-2017--- 7:51 Weekday EFFECTIVE: September 5, 2017
----- PAGE: 1 -----
BLOCK ON OFF BLOCK ON OFF
(902)-(5:59)-(1000) (801)-(1100)-(1548)
PLATFORM: 8h34 WORK TIME: 8h49 OVERTIME: 0h25 SPREAD OVERTIME: 0h00 PAY TIME: 9h14
P=0 -- LEAVE 6:09 FROM Facility -- ARRIVE 6:10 AT Out DelW --
LINE 09 << Downtown T ++ --Cherry / River Rd-- ++ Parkmeadow >>
RTE NOTE DTC Broa Broa Out In Rive Rive Park
Acad Colu DelW DelW Chem Chem Whea
++ -- -- 6:10 6:16 6:24 >>
<< 6:52 6:43 6:38 6:30 6:24 ++
++ 7:00 7:06 7:43 7:10 7:16 7:24 ++
<< 7:52 7:43 7:38 7:30 7:24 ++
++ 8:00 8:06 8:10 8:16 8:24 >>
<< 8:52 8:43 8:38 8:30 8:24 ++
++ 9:00 9:06 9:10 9:16 9:24 ++
<< 9:50 9:41 9:37 9:30 9:24 ++
++ (1000)1006 1010 1016 1024 >>
LINE 08 << Downtown T ++ --12th / Liberty-- ++ South Sale >>
RTE NOTE DTC 12th 13th Prin Prin Libe Libe Skyl Croi Boon Skyl Boon Barn
Rura Rura Madr Geor Cunn Frie Kueb Jose Cumb DrCl Cumb Comm
++ (1100)1108 1113 1122 1125 1132 1139 >>
<< 1220 1210 1206 1158 -- 1153 1146 1141 ++
LINE 18 << Downtown T ++ --12th / Liberty-- ++ South Sale >>
RTE NOTE DTC 12th 13th Prin Prin Libe Libe Skyl Boon Boon Sunn Sunn Barn
Rura Rura Madr Geor Cunn Frie Kueb Jose Cumb DrCl Cumb Comm
++ 1230 1238 1243 1252 1255 1259 1304 1309 >>
<< 1350 1340 1336 1328 1322 1319 1314 1311 ++
LINE 08 << Downtown T ++ --12th / Liberty-- ++ South Sale >>
RTE NOTE DTC 12th 13th Prin Prin Libe Libe Skyl Croi Boon Skyl Boon Barn
Rura Rura Madr Geor Cunn Frie Kueb Jose Cumb DrCl Cumb Comm
++ 1440 1409 1414 1424 1427 1434 1442 >>
SD << 1528 1519 1514 1505 1459 1455 1447 1442 ++
P-I -- LEAVE 1528 FROM DTC -- ARRIVE 1543 AT Facility --
SD-- This is a school day paddle
    
```

## Bid results

Inform operators which run they will be driving. *Vacation days are bid for on a separate schedule.*

**Note:** Some of the regional bus routes are contracted to MV Transportation and their bidding process and materials differ.

## Headway sheets

Time points for each block group by block.

PROCESSED: 9:27a 08-22-17 Headway Sheet  
 05 -- Center Street Lancaster Weekday Active Scenario: SD: 08-22-2017--- 7:51 EFFECTIVE DATE: September 5, 2017 REVISION DATE: Page: 1

Block	Run	Note	Gar-Out	D-H	DTC	Cent	Cent	Mark	D-H	Gar-In	Run
			Fr-Line		24th	Conc	Clay	To-Line			
203	163	F	5:50:00	02	6:00:00	6:06:00	6:11:00	6:17:00			163
202	114	F		02	6:30:00	6:36:00	6:41:00	6:47:00			114
204	113	F		02	6:45:00	6:51:00	6:56:00	7:02:00			113
205	115	F		02	7:00:00	7:06:00	7:11:00	7:17:00			115
206	104	F		02	7:15:00	7:21:00	7:26:00	7:32:00			104
201	112	F		02	7:30:00	7:36:00	7:41:00	7:47:00			112
208	162	F		02	7:45:00	7:51:00	7:56:00	8:02:00			162
203	163	F		02	8:00:00	8:06:00	8:11:00	8:17:00			163
207	169	F		02	8:15:00	8:21:00	8:26:00	8:32:00			169
202	114	F		02	8:30:00	8:36:00	8:41:00	8:47:00			114
204	113	F		02	8:45:00	8:51:00	8:56:00	9:02:00			113
205	115	F		02	9:00:00	9:06:00	9:11:00	9:17:00			115
206	104	F		02	9:15:00	9:21:00	9:26:00	9:32:00			104
201	112	F		02	9:30:00	9:36:00	9:41:00	9:47:00			112
208	162	F		02	9:45:00	9:51:00	9:56:00	10:02:00			162
203	163	F		02	10:00:00	10:06:00	10:11:00	10:17:00			163
207	169	F		02	10:15:00	10:21:00	10:26:00	10:32:00			169
202	180	F		02	10:30:00	10:36:00	10:41:00	10:47:00			180
204	113	F		02	10:45:00	10:51:00	10:56:00	11:02:00			113
205	112	F		02	11:00:00	11:06:00	11:11:00	11:17:00			112
206	104	F		02	11:15:00	11:21:00	11:26:00	11:32:00			104
201	176	F		02	11:30:00	11:36:00	11:41:00	11:47:00			176
208	162	F		02	11:45:00	11:51:00	11:56:00	12:02:00			113
203	110	F		02	12:00:00	12:06:00	12:11:00	12:17:00			110
207	102	F		02	12:15:00	12:21:00	12:26:00	12:32:00			102
202	180	F		02	12:30:00	12:36:00	12:41:00	12:47:00			180
204	115	F		02	12:45:00	12:51:00	12:56:00	13:02:00			115
205	112	F		02	13:00:00	13:06:00	13:11:00	13:17:00			112
206	132	F		02	13:15:00	13:21:00	13:26:00	13:32:00			132
201	176	F		02	13:30:00	13:36:00	13:41:00	13:47:00			139
208	113	F		02	13:45:00	13:51:00	13:56:00	14:02:00			113
203	110	F		02	14:00:00	14:06:00	14:11:00	14:17:00			142
207	102	F		02	14:15:00	14:21:00	14:26:00	14:32:00			102
202	140	F		02	14:30:00	14:36:00	14:41:00	14:47:00			140
204	115	F		02	14:45:00	14:51:00	14:56:00	15:02:00			126
205	169	F		02	15:00:00	15:06:00	15:11:00	15:17:00			169
206	132	F		02	15:15:00	15:21:00	15:26:00	15:32:00			144
201	139	F		02	15:30:00	15:36:00	15:41:00	15:47:00			139
208	122	F		02	15:45:00	15:51:00	15:56:00	16:02:00			122
203	142	F		02	16:00:00	16:06:00	16:11:00	16:17:00			142

## Block summary

An overview of each block, including revenue time, recovery time, and number of revenue trips.

## Route trees

Turn-by-turn directions and points of interest by route.

### ROUTE 19

#### OUTBOUND

#### Start @ DOWNTOWN TRANSIT CENTER

#### SOUTH LANE - BAY A

L @ CHURCH ST NE

L @ UNION ST NE

R @ HIGH ST NE

Cont. @ BROADWAY ST NE

Cont. @ RIVER RD N

R @ LOCKHAVEN DR NE

L @ KEIZER STATION BV NE

#### R @ KEIZER TRANSIT CENTER - BAY D

Arrive

#### INBOUND

#### Start @ KEIZER TRANSIT CENTER

R @ KEIZER STATION BV NE

L @ STADIUM DR NE

R @ ULALI DR NE

R @ KEIZER STATION BV NE

R @ LOCKHAVEN DR NE

L @ RIVER RD N

Cont. @ BROADWAY ST NE

Cont. @ HIGH ST NE

#### L @ DOWNTOWN TRANSIT CENTER

#### SOUTH LANE - BAY A

Arrive

## Pullins and pullouts

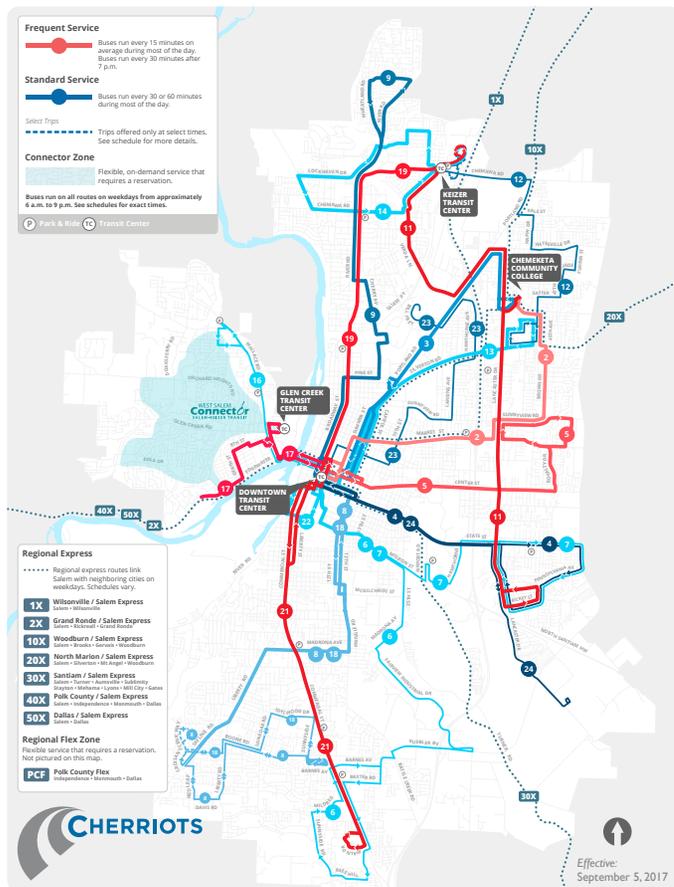
Used to calculate the number of peak vehicles and to determine the vehicle type, pull in time, and pull out time for each block.

# 7.2.3 Public materials

Cherriots produces maps and schedules in a variety of formats to help riders understand where routes go and when they go there. Materials are available at transit centers, on buses, and at partner locations throughout the community (including local colleges, libraries, and senior centers). Schedules are also posted at shelters to provide information catered to each location.

## Maps

Posted at transit centers and made available online and in a foldable format at transit centers.



## Foldable schedules

Schedules in a convenient format and available at transit centers, on buses, and at partner locations.

To Downtown Transit Center

	E	F	G	H	I
Cheneta CC - Midg 2 - Midg C					
5:55a	6:02a	6:06a	6:12a	6:20a	
6:26a	6:33a	6:37a	6:43a	6:51a	
6:55a	7:02a	7:06a	7:12a	7:20a	
7:11a	7:18a	7:22a	7:28a	7:36a	
7:25a	7:32a	7:36a	7:42a	7:50a	
7:40a	7:47a	7:51a	7:57a	8:05a	
7:55a	8:02a	8:06a	8:12a	8:20a	
8:10a	8:17a	8:21a	8:27a	8:35a	
8:25a	8:32a	8:36a	8:42a	8:50a	
8:40a	8:47a	8:51a	8:57a	9:05a	
8:55a	9:02a	9:06a	9:12a	9:20a	
9:11a	9:17a	9:21a	9:27a	9:35a	
9:26a	9:32a	9:36a	9:42a	9:50a	
9:41a	9:47a	9:51a	9:57a	10:05a	
9:56a	10:02a	10:06a	10:12a	10:20a	
10:11a	10:17a	10:21a	10:27a	10:35a	
10:26a	10:32a	10:36a	10:42a	10:50a	
10:41a	10:47a	10:51a	10:57a	11:05a	
10:56a	11:02a	11:06a	11:12a	11:20a	
11:11a	11:17a	11:21a	11:27a	11:35a	
11:26a	11:32a	11:36a	11:42a	11:50a	
11:41a	11:47a	11:51a	11:57a	12:05p	
11:56a	12:02p	12:06p	12:12p	12:20p	
12:11p	12:17p	12:21p	12:27p	12:35p	
12:26p	12:32p	12:36p	12:42p	12:50p	
12:41p	12:47p	12:51p	12:57p	1:05p	
12:56p	1:02p	1:06p	1:12p	1:20p	

FLIP PAGE FOR TIMES TO CHEMETA COMMUNITY COLLEGE

	E	F	G	H	I
Cheneta CC - Midg 2 - Midg C					
1:11p	1:17p	1:21p	1:27p	1:35p	
1:26p	1:32p	1:36p	1:42p	1:50p	
1:41p	1:47p	1:51p	1:57p	2:05p	
1:56p	2:02p	2:06p	2:12p	2:20p	
2:11p	2:17p	2:21p	2:27p	2:35p	
2:26p	2:32p	2:37p	2:43p	2:51p	
2:41p	2:47p	2:52p	2:58p	3:06p	
2:56p	3:02p	3:07p	3:13p	3:21p	
3:11p	3:17p	3:22p	3:28p	3:36p	
3:26p	3:32p	3:37p	3:43p	3:51p	
3:41p	3:47p	3:52p	3:58p	4:06p	
3:56p	4:02p	4:07p	4:13p	4:21p	
4:11p	4:17p	4:22p	4:28p	4:36p	
4:26p	4:32p	4:37p	4:43p	4:51p	
4:41p	4:47p	4:52p	4:58p	5:06p	
4:56p	5:02p	5:07p	5:13p	5:21p	
5:11p	5:17p	5:22p	5:28p	5:36p	
5:26p	5:32p	5:37p	5:43p	5:51p	
5:41p	5:47p	5:52p	5:58p	6:06p	
5:56p	6:02p	6:07p	6:13p	6:21p	
6:11p	6:17p	6:22p	6:28p	6:36p	
6:26p	6:32p	6:37p	6:43p	6:51p	
6:41p	6:47p	6:52p	6:58p	7:06p	
6:56p	7:02p	7:07p	7:13p	7:21p	
7:11p	7:17p	7:21p	7:27p	7:34p	
7:27p	7:33p	7:37p	7:43p	7:50p	
7:57p	8:03p	8:07p	8:13p	8:20p	
8:27p	8:33p	8:37p	8:43p	8:50p	

Buses run Monday through Friday. They do not operate on Saturday, Sunday or some holidays.

### Espanol

Cherriots.org/es o 503-588-2877

- Bus Fares**
- There are five easy ways to pay for your ride on a Cherriots bus:
    - One way cash fare
    - Day pass
    - 30-day pass
    - Monthly universal pass
    - Annual bus pass
- Purchase Bus Passes**
- Cherriots Customer Service
  - Chemeta College Bookstore
  - Rott's (Salem stores only)
  - Safeway (Salem stores only)

- Detours**
- Routes may go on detour due to weather or road construction. Check detour updates at:
- Cherriots.org/advisories
  - 503-588-2877
  - Twitter.com/Cherriots

- Reminders**
- Please have exact change if you're paying cash; drivers carry no change.
  - No eating on the bus.
  - No smoking or e-cigarettes on the bus.
  - Drinks are ok in a travel mug with a lid.
  - Use cell phones quietly and only as needed.
  - Please use headphones with electronic devices.
  - Offer your seat to a senior or person with disabilities.

Cherriots.org  
503.588.2877  
200 High St., NE  
Salem, OR 97301



**Market / Brown**

**15-MINUTE SERVICE**

30-MINUTE AFTER 7 PM

Effective **May 8, 2017**

# Printable schedules

Available online so riders can print their own schedules.

# Shelter schedules

Posted at most of the 120 shelters throughout the system.



To Chemeketa Community College

A	B	C	D	E	F
Downtown Transit Center BAY D	Capitol @ Market	Brooks @ Highland (Center 50+)	Portland Rd @ Northgate	Portland Rd @ Hayesville	Satter @ Cooley (CCC)
6:30a	6:35a	6:39a	6:43a	6:47a	6:57a
7:00a	7:05a	7:09a	7:13a	7:17a	7:27a
7:30a	7:35a	7:39a	7:43a	7:47a	7:57a
8:00a	8:05a	8:09a	8:13a	8:17a	8:27a
8:30a	8:35a	8:39a	8:43a	8:47a	8:57a
9:00a	9:05a	9:09a	9:13a	9:17a	9:27a
9:30a	9:35a	9:39a	9:43a	9:47a	9:57a
10:00a	10:05a	10:09a	10:13a	10:17a	10:27a
10:30a	10:35a	10:39a	10:43a	10:47a	10:57a
11:00a	11:05a	11:09a	11:13a	11:17a	11:27a
11:30a	11:35a	11:39a	11:43a	11:47a	11:57a
12:00p	12:05p	12:09p	12:13p	12:17p	12:27p
12:30p	12:35p	12:39p	12:43p	12:47p	12:57p
1:00p	1:05p	1:09p	1:13p	1:17p	1:27p
1:30p	1:35p	1:39p	1:43p	1:47p	1:57p
2:00p	2:05p	2:09p	2:13p	2:17p	2:27p
2:30p	2:35p	2:39p	2:43p	2:47p	2:57p
3:00p	3:05p	3:09p	3:13p	3:17p	3:27p
3:30p	3:35p	3:39p	3:43p	3:47p	3:57p
4:00p	4:05p	4:09p	4:13p	4:17p	4:27p
4:30p	4:35p	4:39p	4:43p	4:47p	4:57p
5:00p	5:05p	5:09p	5:13p	5:17p	5:27p
5:30p	5:35p	5:39p	5:43p	5:47p	5:57p
6:00p	6:05p	6:09p	6:13p	6:17p	6:27p
6:30p	6:35p	6:39p	6:43p	6:47p	6:57p
7:00p	7:05p	7:09p	7:13p	7:17p	7:27p
7:30p	7:35p	7:39p	7:43p	7:47p	7:57p
8:00p	8:05p	8:09p	8:13p	8:17p	8:27p
8:30p	8:35p	8:39p	8:43p	8:47p	8:57p
9:00p	9:05p	9:09p	9:13p	9:17p	9:27p

Buses run Monday through Friday. They do not operate on Saturday, Sunday or some holidays. | Effective May 8, 2017



### 9 Cherry / River Road

**To Downtown Transit Center**

Time	Cherry	River Rd	Claggett	Hayesville	Northgate	Highland	Market	Downtown
5:54a	6:05a	6:08a	6:13a	6:22a				
6:24a	6:35a	6:38a	6:43a	6:52a				
6:54a	7:05a	7:08a	7:13a	7:22a				
7:24a	7:35a	7:38a	7:43a	7:52a				
7:54a	8:05a	8:08a	8:13a	8:22a				
8:24a	8:35a	8:38a	8:43a	8:52a				
8:54a	9:05a	9:08a	9:13a	9:22a				
9:24a	9:35a	9:37a	9:41a	9:50a				
9:54a	10:05a	10:07a	10:11a	10:20a				
10:24a	10:35a	10:37a	10:41a	10:50a				
10:54a	11:05a	11:07a	11:11a	11:20a				
11:24a	11:35a	11:37a	11:41a	11:50a				
11:54a	12:05p	12:07p	12:11p	12:20p				
12:24p	12:35p	12:37p	12:41p	12:50p				
12:59p	1:00p	1:01p	1:10p	1:20p				
1:24p	1:30p	1:31p	1:40p	1:50p				
1:54p	2:00p	2:01p	2:10p	2:20p				
2:24p	2:30p	2:31p	2:40p	2:50p				
2:59p	3:00p	3:01p	3:10p	3:20p				
3:24p	3:30p	3:31p	3:40p	3:50p				
3:59p	4:00p	4:01p	4:10p	4:20p				
4:29p	4:30p	4:40p	4:45p	4:54p				
4:59p	5:00p	5:10p	5:15p	5:24p				
5:29p	5:30p	5:40p	5:45p	5:54p				
5:59p	6:00p	6:10p	6:15p	6:24p				
6:29p	6:30p	6:40p	6:45p	6:54p				
6:59p	7:00p	7:10p	7:15p	7:24p				
7:24p	7:30p	7:40p	7:45p	7:54p				
7:54p	8:00p	8:10p	8:15p	8:20p				
8:24p	8:30p	8:40p	8:45p	8:50p				
8:54p	9:00p	9:05p	—	—				
9:24p	9:30p	9:35p	—	—				

### 19 Broadway / River Road

**To Downtown Transit Center**

Time	Brooks	Highland	Market	Downtown
1:09p	1:16p	1:27p	1:39p	1:50p
1:34p	1:41p	1:52p	2:04p	2:15p
1:59p	2:06p	2:17p	2:29p	2:40p
2:24p	2:31p	2:42p	2:54p	3:05p
2:49p	2:56p	3:07p	3:19p	3:30p
3:14p	3:21p	3:32p	3:44p	3:55p
3:39p	3:46p	3:57p	4:09p	4:20p
4:04p	4:11p	4:22p	4:34p	4:45p
4:29p	4:36p	4:47p	4:59p	5:10p
4:54p	5:01p	5:12p	5:24p	5:35p
5:19p	5:26p	5:37p	5:49p	6:00p
5:44p	5:51p	6:02p	6:14p	6:25p
6:09p	6:16p	6:27p	6:39p	6:50p
6:34p	6:41p	6:52p	7:04p	7:15p
6:59p	7:06p	7:17p	7:29p	7:40p
7:24p	7:31p	7:42p	7:54p	8:05p
7:49p	7:56p	8:07p	8:19p	8:30p
8:14p	8:21p	8:32p	8:44p	8:55p
8:39p	8:46p	8:57p	9:09p	9:20p
9:14p	9:21p	9:32p	9:44p	9:55p

- Plan your trip on the go using your phone with Transit App. Download on iOS/Android for free. [transitapp.com](http://transitapp.com)
- Buses run Monday through Friday. They do not operate on Saturday, Sunday, or these holidays: New Year's Day, Presidents Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving, Christmas Eve, Christmas Day.
- In the event of snow or ice, some bus stops could be temporarily out of service. [Cherriots.org/advisories](http://Cherriots.org/advisories) + 503-588-2877

Effective September 8, 2017

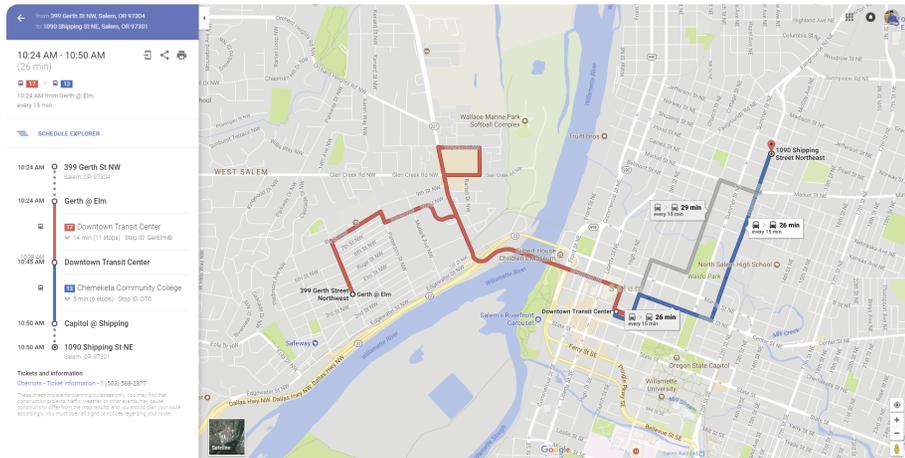


## 7.2.4 Technology and data

Data is updated across all platforms to ensure riders get the information they need to plan their trips. Cherriots produced a General Transit Feed Specification (GTFS) file with all service information, and most technology platforms read that feed.

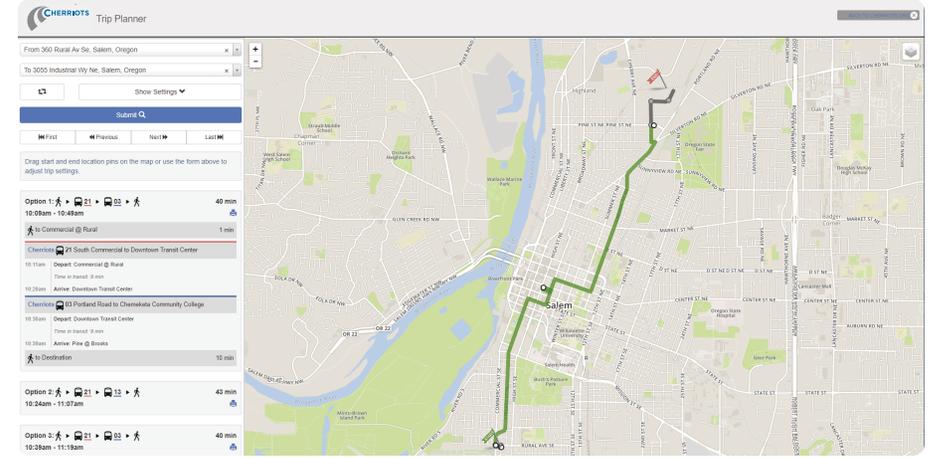
### Google Maps

Used by riders for planning trips on desktop or mobile.



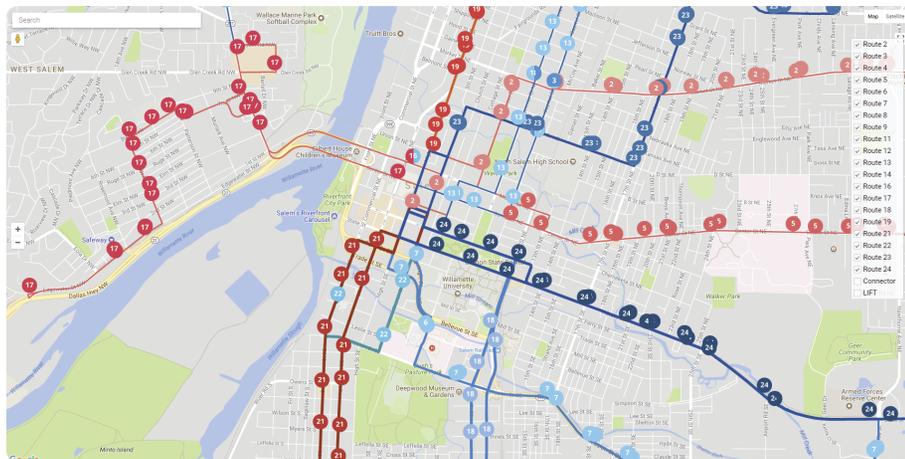
### Cherriots Trip Planner

Used by riders planning trips from Cherriots website.



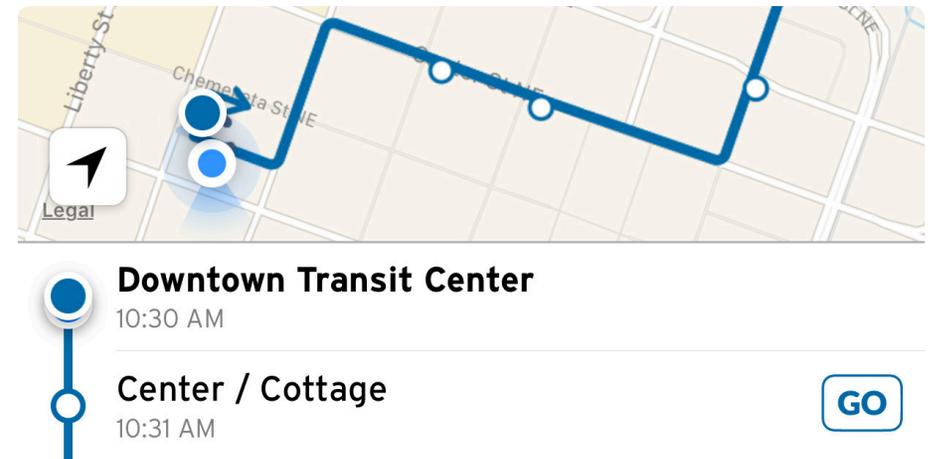
### eMap

Used by dispatchers and customer service to find stops.



### Transit App

Used by riders for planning trips on mobile.



## Departure screens

Lists departure times at transit centers.

Route	Destination	Time 1	Time 2
P 2	Market / Brown	10:00a	10:15a
D 3	Portland Road	10:00a	10:30a
H 4	State Street	10:00a	11:00a
M 5	Center Street	10:00a	10:15a
G 6	Mission / Fairview Ind.	10:00a	11:00a
G 7	Mission / Hawthorne	10:30a	11:30a
I 8	12th / Liberty via Red Leaf	10:00a	11:00a
Q 9	Cherry / River Road	10:00a	10:30a
D 13	Silverton Road	10:15a	10:45a
B 16	Wallace Road	10:25a	11:25a
O 17	Edgewater / Gerth	10:00a	10:15a
I 18	12th / Liberty via Lone Oak	10:30a	11:30a
A 19	Broadway / River Road	10:00a	10:15a
K 21	South Commercial	10:00a	10:15a
F 22	Library Loop	Now	10:23a
N 23	Lansing / Hawthorne	10:00a	11:00a
H 24	State / Lancaster	10:30a	11:30a
Regional			
R 1X	Wilsonville / Salem Express	3:35p	---
S 2X	Grand Ronde / Salem Express	1:30p	3:30p
L 10X	Woodburn / Salem Express	12:00p	2:00p
V 20XN	Marion Co. / Salem Express	10:00a	12:00p
U 30X	Santiam / Salem Express	10:30a	3:00p
T 40X	Polk County / Salem Express	12:30p	3:00p
S 50X	Dallas / Salem Express	5:00p	---

## Website timetables

Digital version of print schedules, showing all departure times.

Stop	Downtown Transit Center	Market @ 17th	Market @ Mason Road (Agree)	Brown @ Sun Francisco	Chemeketa College - Bldg 2
Downtown Transit Center	6:30 am	6:37 am	6:45 am	6:47 am	6:53 am
Union @ Winter (SW Corner)	7:00 am	7:07 am	7:12 am	7:17 am	7:23 am
Winer @ D St.	7:15 am	7:22 am	7:27 am	7:32 am	7:38 am
Winer @ Belmont	7:30 am	7:37 am	7:42 am	7:47 am	7:53 am
Market @ Capitol	7:45 am	7:52 am	7:57 am	8:02 am	8:08 am

## Destination signs and announcements

Tell riders on bus where they are and where they are going.



## Internal platforms

In addition to updating data on public-facing platforms, Cherrriots also has a number of internal tools that must be updated with each service change. They include: Bus Stop Inventory, Bus Stop Database, APCs, GFI (farebox), and RouteMatch (demand-responsive services).

## 7.2.5 Public notices

Staff use a variety of methods to inform riders of upcoming changes. A few examples are shown below in English, but often notices are posted in Spanish as well. For a list of all methods used by Cherriots to ensure riders are aware of all changes that might affect them, see *Chapter 6 - Public Engagement*.

### Bus stop notices

Posted on every bus stop being added, removed, or modified.

**Effective January 2, 2018**  
This stop will be served by:  
**Route 16**



Learn more at [Cherriots.org/changes](https://cherriots.org/changes)  
or contact Customer Service at **503-588-2877**



Stop ID 1823

### Sandwich boards

Placed at transit centers to inform riders of major changes to routes and schedules, as well as changes to where buses park.

**Effective January 2, 2018**

**Departing From Bay E**

Tillamook County Transportation District's  
**Route 60X** Coastal Connector

*To Lincoln City via Grand Ronde*

8:45a
2:35p
7:30p

7 days a week

---

Tillamook County Transportation District's  
**Route 70X** Grand Ronde Express

*To Grand Ronde via Rickreall Park and Ride*

7:00a
1:30p
4:15p
6:20p

Monday through Friday

Learn more at [Cherriots.org/changes](https://cherriots.org/changes)  
or call **503-588-2877** Español

## Header cards

Placed in all buses to inform of the upcoming changes and direct riders to customer service and the Cherriots website.



# Effective September 5, 2017

Minor Schedule or Stop  
Changes To Routes:

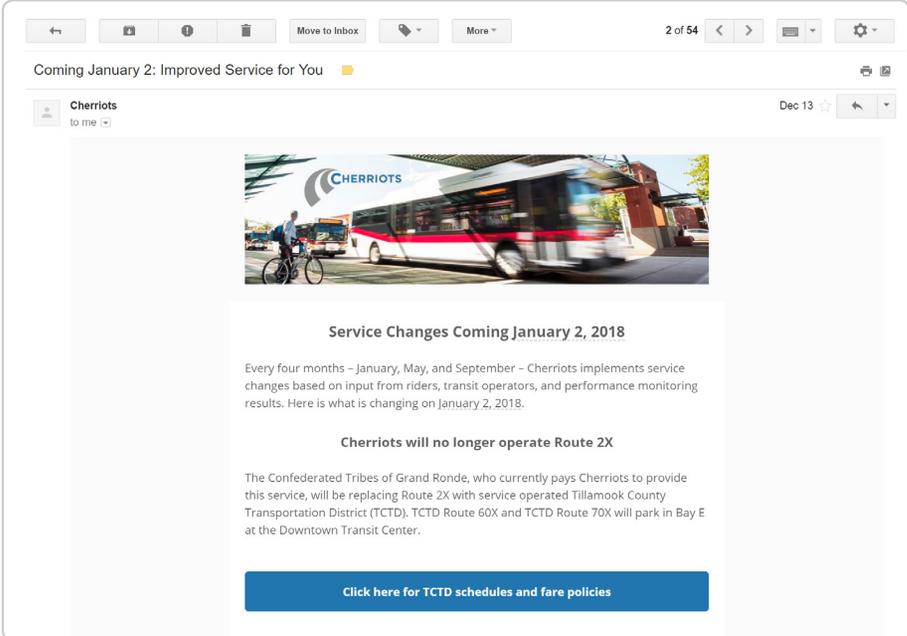
**1X, 2, 5, 9 and 17**

**Route 15X**  
will be discontinued

Learn more at [Cherriots.org/changes](http://Cherriots.org/changes) or call **503-588-2877**

## Email blasts

Sent to all riders signed up for the Cherriots mailing list.



The screenshot shows an email interface with a header bar containing navigation icons and the text "2 of 54". The main subject line is "Coming January 2: Improved Service for You". The sender is identified as "Cherriots" with a "to me" dropdown. The email content features a header image of a bus and a person on a bicycle. The main text is titled "Service Changes Coming January 2, 2018" and includes the following information:

Every four months – January, May, and September – Cherriots implements service changes based on input from riders, transit operators, and performance monitoring results. Here is what is changing on January 2, 2018.

**Cherriots will no longer operate Route 2X**

The Confederated Tribes of Grand Ronde, who currently pays Cherriots to provide this service, will be replacing Route 2X with service operated Tillamook County Transportation District (TCTD). TCTD Route 60X and TCTD Route 70X will park in Bay E at the Downtown Transit Center.

A blue button at the bottom of the email content reads: "Click here for TCTD schedules and fare policies".

## 7.2.6 Stops and shelters

New bus stops and shelters will be installed in the weeks leading up to the service change or during the weekend before implementation. Old stops and shelters will be removed during the weeks after the service change.

When stops are installed before a service change, notices will be posted on each pole to let riders know when buses will begin serving them. When stops are removed after a service change, notices will be posted in advance to indicate when the stops go out of service.



## 7.2.7 Training

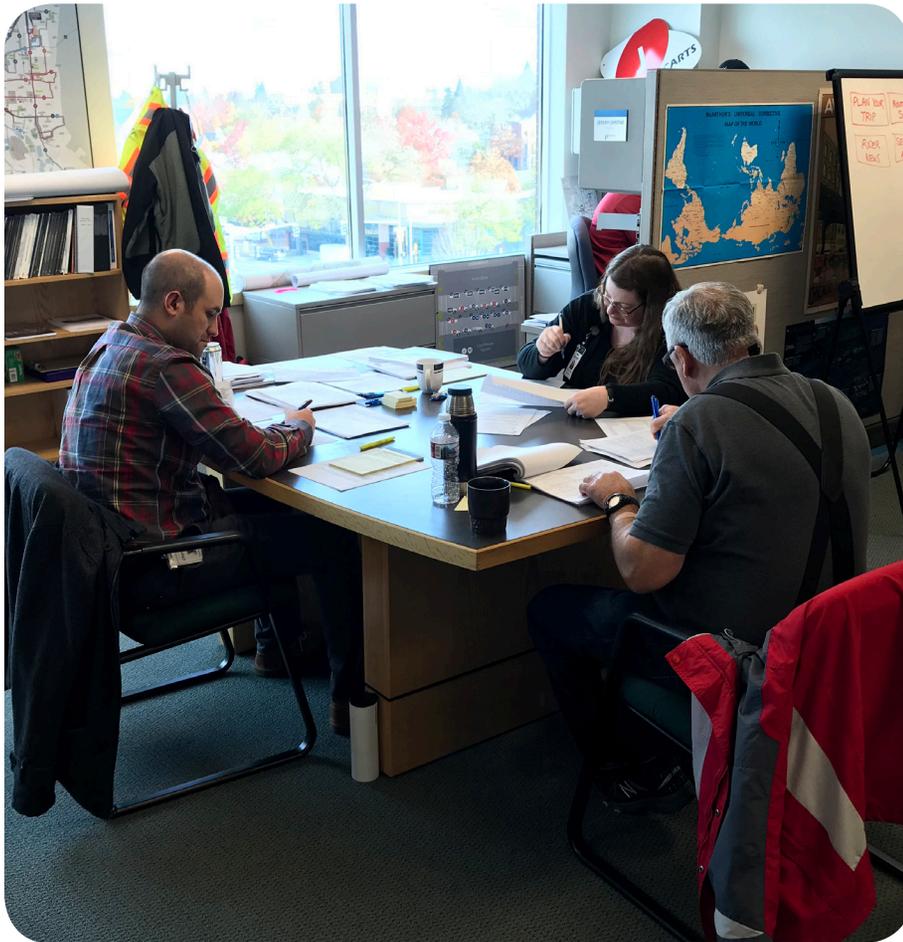
Planning staff train customer service representatives on the upcoming changes. It then becomes the responsibility of the customer service representatives to ensure all frontline employees are trained and ready to teach riders about the new service.

Frontline employees are those who directly interact with riders, including transit hosts, travel trainers, mobility coordinators, and security officers.



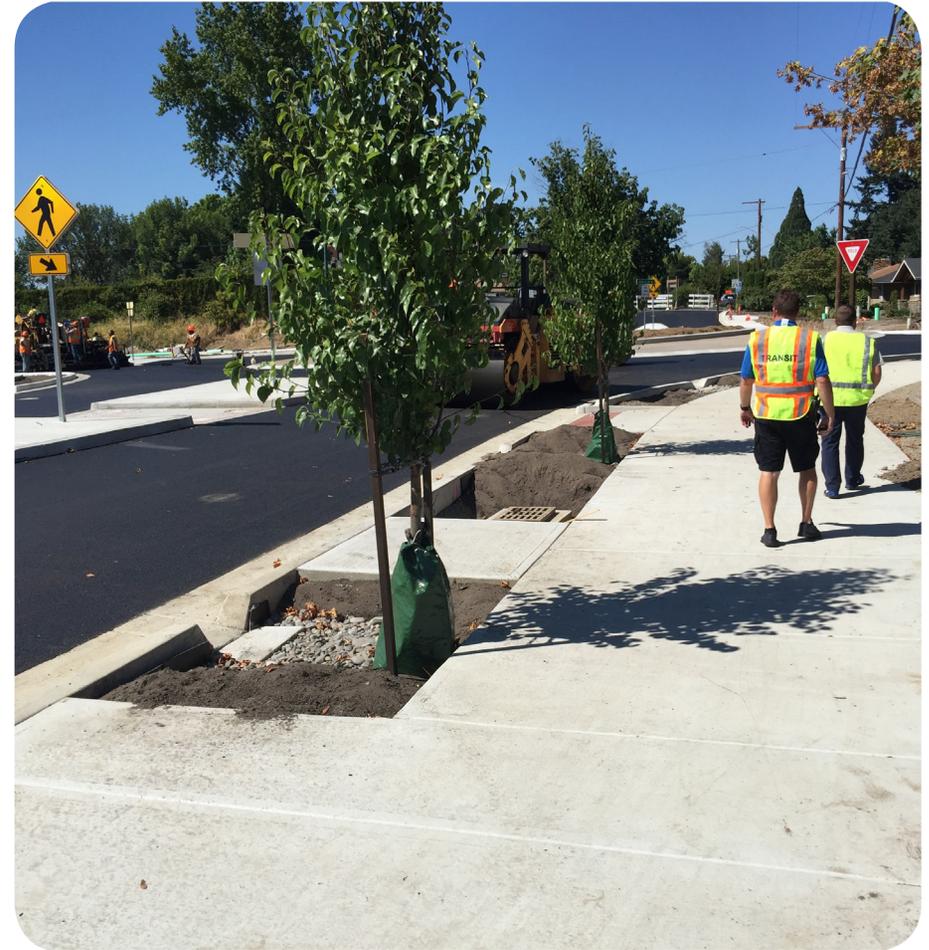
## 7.3 Review week

Once all materials are drafted—including the bid materials, public materials, and technology and data—those items are reviewed in detail during Review Week. Transit operators, operations supervisors, planning staff, marketing staff, and customer service representatives review each other's materials to ensure information is accurate for operators and riders.



## 7.4 Implementation weekend

During the weekend before a service change goes into effect, all finalized materials will be installed by maintenance staff and set live by communication staff. Materials include bus stop signs, shelter schedules, lobby maps, foldable schedules, the Cherrits website, bus destination signs and announcements, and all trip planners and other technology platforms.



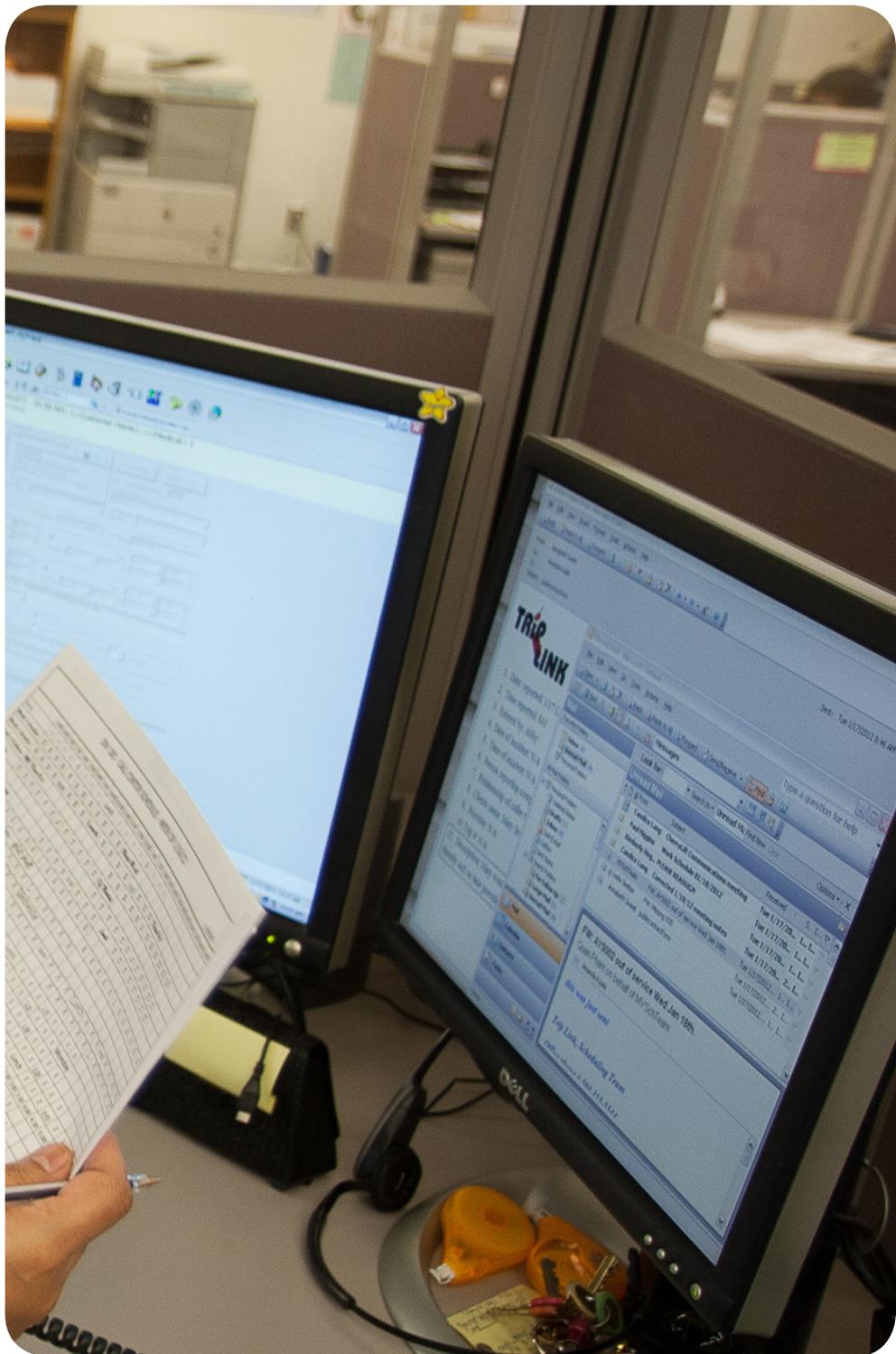
## 7.5 First day of service

On the day of implementation, all staff will be prepared to discuss and operate the new service. Public materials will be up-to-date and accurate, operators will be aware of their new runs, and customer service representatives will be on hand and ready to answer questions.

If the scale of the service change is large enough, customer service staff will also convene a group of transit ambassadors (made up of Cherriots staff) to help riders at the Downtown Transit Center and other key locations during the first few days of the new service to ensure riders get where they need to go.







# A

## Definitions

On the following pages are definitions for key terms used throughout the document.

**Activity centers:** Community hubs with a variety of shops, stores, and services.

**ADA:** Americans with Disabilities Act of 1990.

**Arterials:** A main street that is built for traffic to travel across town that feeds into highways or freeways.

**Audience:** Community members who Cherriots seeks to engage for feedback and perspective.

**Bay:** A designated area for buses to layover at transit centers.

**Bid:** Also known as a signup or shakeup, a bid represents all operator shifts for a given time period. For each bid, transit operators bid for their shifts based on seniority. This process takes place every fourth months, often coinciding with changes to service.

**Boarding:** See *Ride*.

**Branch:** When two routes share a path for a segment of their routing, the branch represents the part that is not shared. Also see *Trunk*.

**Cherriots LIFT:** See *Paratransit*.

**Cherriots Shop and Ride:** A shopper shuttle and dial-a-ride service for seniors and individuals with disabilities.

**Collector:** A street fed by neighborhood streets, which in turn feed into arterial streets.

**Collision:** A vehicle accident in which there is an impact of a transit vehicle with another transit vehicle, a non-transit vehicle, a fixed object, a person(s), an animal, or a rail vehicle.

**Core Network:** The Core Network is a set of transit corridors where Cherriots has committed to providing stable service with a focus on frequency and reliability. By establishing a sense of permanency and an expectation for high-quality service, the Core Network signals to riders, business owners, and developers where to locate and build if they wish to orient themselves and their businesses around transit.

**Corridor:** A major transit pathway that connects regional growth, manufacturing, industrial, and/or activity centers; park-and-rides and transit hubs; and major destinations throughout the region.

**Coverage:** Service that is focused on providing access to transit over building high ridership. Cherriots often provides coverage service using neighborhood shuttles. Within the urban growth boundary, 25% of resources are spent on coverage service.

**Crowding:** A transit trip that, on average, has more passengers than the acceptable passenger load, based on each bus type and service type. The acceptable rider load is based on the number of seats and whether the bus is traveling locally or regionally. Also referred to as overcrowding.

**Deadhead:** The time a transit vehicle spends getting from the base to the point where it goes into service. When a vehicle is deadheading, there is no expectation it will be carrying riders.

**Demand-responsive service:** Any non-fixed route system of transporting individuals that requires advanced scheduling, including services provided by public entities, non-profits, and private providers. An advance request for service is a key characteristic of demand response service.

**Deviation:** A bus traveling away from its primary path to serve a specific place.

**Disparate impacts:** Potential negative effects of a service change on minority riders or populations as compared to non-minority riders or populations.

**Disproportionate burdens:** Potential negative effects of a service change on low-income riders or populations, defined as riders or populations at or below 150% of the federal poverty level.

**Farebox recovery ratio:** The amount of revenue received by riders in relation to the total operating costs.

**Fixed-route service:** Scheduled transit service in which trips follow a specified path and passengers can access service from regular bus stops.

**Frequency:** The number of buses in a given time interval (e.g. 4 buses per hour). Also see *Headway*.

**Frontline employee:** Employees who engage directly with riders, including transit operators, customer service representatives, outreach representatives, travel trainers, transit ambassadors, mobility assessors, and security officers.

**Headway:** The time interval between buses traveling on the same route in the same direction (e.g. 15-minute service). Also see *Frequency*.

**Interline:** Where buses from more than one route are scheduled together. Interlining can reduce the number of required vehicles, improve on-time performance, and help riders avoid transferring.

**Lasso:** A one-way loop at the end of a route.

**Layover:** 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. Sometimes referred to as layover / recovery.

Layover can also be used to describe a designated location for a transit vehicle at or near the end of the route where the vehicle is out of service and takes its scheduled layover time.

**Load:** The number of passengers on the bus at a given time. This is a method of measuring the ridership demand on a bus trip at a given time.

**Load factor:** The measure of how many riders are on the bus compared to the number of available seats. The value is always expressed in decimal form.

**Loop:** Bus routing that may be necessary to turn a bus around along a given route.

**Low-income:** A household earning less than 150 percent of the federal poverty level.

**Maintained pullout:** When a bus successfully leaves the yard to complete its trip. Used as one measure to assess if bus service is reliable.

**Major service change:** A reduction or expansion in service of:

- 15 percent or more of the number of transit route miles based on the miles of an average round-trip of the route (this includes routing changes where route miles are neither increased nor reduced (i.e., re-routes)).
- 15 percent or more of a route's frequency of the service (defined as the average hourly frequency throughout one service day for local fixed routes and as daily round trips for regional express routes) on a daily basis for the day of the week for which a change is made.
- 15 percent in the span (hours) of a route's revenue service (defined as the time between the first served stop of the day and the last stop), on a daily basis for the day of the week for which a change is made;

**OR**

When a transit route is split where either of the new routes meet any of the above thresholds when compared to the corresponding piece of the former route.

**OR**

When a new transit route is established.

**Maximum load:** The highest number of riders on the bus at a given time, averaged on a per trip basis over the course of a service change. This is a method of measuring the highest demand for a specific bus trip.

**Minority persons:** All persons who identify as being part of a racial / ethnic group besides white, non-Hispanic.

**Minority route:** A route that has at least one third of its total revenue mileage in a block group with a percentage of minority population that exceeds the percentage of minority population in the transit service area.

**On time:** A departure from a time point that is no more than five minutes late relative to the scheduled departure time.

**Operating cost:** The expense associated with operating a given service.

**Operating cost per ride:** The amount of operating costs it takes to provide each ride.

**Operating subsidy per ride:** The average operating cost per ride minus the average amount of revenue received by riders.

**Operations center:** A site where buses are fueled, stored, and maintained. Operations centers include parking, maintenance bays, parts storage, fuel storage, cleaning facilities, and operation facilities. Operations centers also include facilities to support employees such as office space, driver lockers, and meeting rooms.

Cherriots service operates out of the Del Webb Operations Center on Del Webb Avenue.

**Overload trips:** Trips added to a route when or where overcrowding is occurring.

**Paratransit:** Dial-a-ride service provided to individuals with disabilities. The Cherriots paratransit solution, Cherriots LIFT, operates throughout the Salem-Keizer Urban Growth Boundary. Riders must be found eligible to use Cherriots LIFT service in advance of scheduling a trip.

**Park and ride:** A facility where riders may park their personal vehicles and catch a bus, train, vanpool or carpool to reach their final destination.

**Partner:** An external organization that works with Cherriots to help advance opportunities and conditions for travelers to use alternatives to driving alone.

**Productivity:** Cherriots uses the term productivity in two ways:

- **Service productivity:** The measure of how well a service is utilized. Often expressed as riders per revenue hour.
- **Productivity-focused:** Routes with a focus on increasing ridership, predominantly on high demand corridors.

**Pullout:** See *Turnout* and *Maintained pullout*.

**Pulse:** A timed transfer around a clock schedule that usually takes place at a transit center. The primary Cherriots pulse takes place at the Downtown Transit Center. Cherriots also maintains a pulse at the Keizer Transit Center.

**Recovery:** See *Layover*.

**Revenue efficiency:** A measure of how much revenue is collected in relation to the cost of operating that service. See *Farebox recovery ratio*.

**Revenue hour:** The time a transit vehicle travels while it is in revenue service, excluding deadhead hours but including recovery / layover time.

**Revenue mile:** The distance a transit vehicle travels while it is in revenue service.

**Revenue service:** The operation of a transit vehicle during the period which riders can board and ride on the vehicle.

**Ride:** Every time a passenger boards a bus. This can also be referred to as a boarding.

**Rider:** A passenger that utilizes any Cherriots service.

**Runtime:** The time assigned for the movement of a transit vehicle over a route, usually done on a route segment basis by time period.

**Service change:** A point at which changes are made to routes. Service changes take place in January, May, and September, and correspond with bid changes.

**Service levels:** For local service, Cherriots classifies service into three levels.

- **Frequent**—Runs every 15 minutes or better for most of the day. Service drops to 30-minute service after 7 p.m.
- **Standard**—Runs every 30 minutes throughout the day.
- **Basic**—Runs every 60 minutes throughout the day.

Regional express service is not split into classifications. Instead, service is expressed based on the number of round trips per day.

**Service types:** Categories of service based on chosen criteria. Current service types are local and regional express routes.

- **Local routes** serve local streets in the Salem-Keizer area, providing service within the urban growth boundary.
- **Regional express routes** provide express bus service between cities. Stops within cities are limited, as the primary purpose of these routes are to move people between cities, not within cities.

**Span:** The hours over which service is operated. Service span often varies by weekday. For example, a route's service span could be from 6 a.m. to 9 p.m.

**System cost:** The costs to operate and administer transit service.

**System cost per revenue hour:** The total system cost of each hour revenue vehicles are in service.

**Take-one:** A printed sheet of paper placed on buses and at transit centers to provide information to Cherriots riders.

**Through-route:** When a bus on one route reaches the end of its route and immediately begins service on another route without a layover. Passengers can remain on the bus and continue from one route to the other without transferring or paying another fare. This is one form of interlining.

**Time period:** An interval of time that identifies different rider travel patterns and service levels. Typical time periods include AM, midday, PM, and evening. Having multiple time periods allows schedules to change based on different conditions on the ground throughout the day.

**Time point:** A bus stop that has scheduled times to help riders know what time a bus will arrive. Transit operators will not leave a time point before the scheduled departure time.

**Title VI of the Civil Rights Act of 1964:** The Civil Rights Act of 1964 outlaws discrimination based on race, color, religion, sex, or national origin. Title VI prevents discrimination by government agencies that receive federal funds.

**Transfer:** When riders use more than one bus to reach their destination.

**Transit center:** A location designed to make it easy for riders to transfer between bus routes and other transportation services.

**Triannual:** Three times per year. Bids and service changes take place on a triannual basis (January, May, and September).

**Trip:** A single journey from one place to another. There are two types of trips: a person trip and a vehicle trip.

- **Person trip:** An individual's journey from an origin to a destination; can involve multiple rides and multiple modes.
- **Vehicle trip:** The scheduled movement of a transit vehicle from an origin (often a route start point) to a destination (often a route end point) at a particular time on a particular day.

**Trunk:** When two routes share a path for a segment of their routing, the trunk represents the part that is shared. Also see *Branch*.

**Turnback:** When a bus is scheduled to turn around before it completes its full path. Turnbacks are often used to provide less frequent coverage at the end of a route, while maintaining higher levels of frequency at the start of a route.

**Turnout:** Also known as a pullout, a turnout is a place where a bus can pull out of traffic. Turnouts are often located at bus stops on high-speed streets and allow the bus to safely pick up riders.

**Unmet transit need:** An expressed or identified need of the community for additional public transportation services to meet existing basic mobility needs which are not currently being met through the existing system of public transit services or private transportation services.

**Vanpool:** A carpool utilizing a van that can transport six to 15 passengers. Vanpools are organized and subsidized for those with similar travel patterns by Cherris Trip Choice.

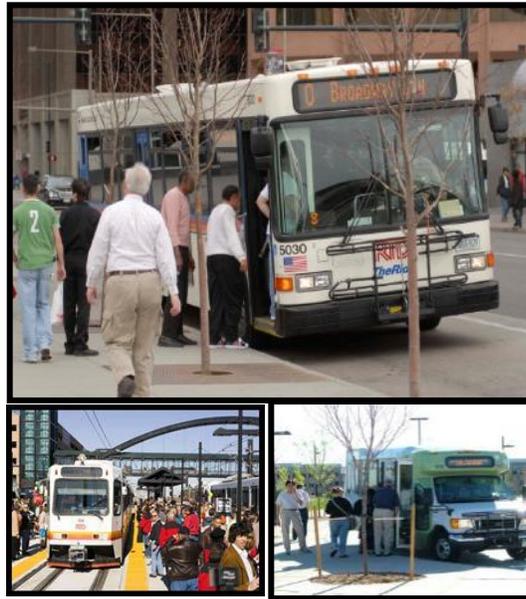
**Yard:** A site where buses are fueled, stored, and maintained. Part of an operations center. See *Operations center*.



# Transit Service Policies & Standards

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*Approved  
July 19, 2016*



Regional Transportation District

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## 1. Introduction

### 1.1 Overview

RTD continually receives requests for changes to existing service and for new service in growing areas of the District. Additionally, RTD may be operating some services that are not attracting enough riders to justify their cost. In order 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 District's resources, a set of service standards is maintained by RTD.

The specific standards, targets or minimum/maximum values for the standards, and a procedure for applying these standards, are presented in this document. Since service standards are intended to optimize usage of the District's resources, they are updated periodically to reflect changes in the District goals and resources. The procedure for updating the standards is described in Section 1.3.

### 1.2 Application of Service Standards

There are two primary applications for the ongoing use of the service standards. These are the use of standards to evaluate existing services, and use of standards to evaluate proposals for new service.

The application of standards to existing routes is a flexible process. The purpose of the standards is to help 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 where appropriate. Routes, which do not meet standards, are not automatically designated for elimination. Elimination of routes 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.

The standards for evaluation of existing routes are not intended to preclude changes to routes that meet these minimum standards. In many cases, it may be possible to improve the productivity of routes that meet the minimum standards by making changes to headways or trip times. Since the overall mission of RTD is *"To meet our constituents' present and future public transit needs by offering safe, clean, reliable, courteous, accessible and cost-effective service throughout the District,"* these standards should not be used to prevent changes to improve the efficiency of existing routes, as long as the changes meet the route design standards.

The availability of financial resources, represented by the annual budget, is the bottom line for these standards. Service expansion may occur when additional funds are available and contraction may occur otherwise. In any case, selection of which services to provide or curtail is based on these performance standards and no service is considered guaranteed

or beyond review. The RTD Board of Directors, with input from RTD staff and the public, is responsible for making decisions on service recommendations.

The evaluation of new service proposals will take place as proposals are received or needs identified. The most recent values of the standards for existing routes will be used to evaluate the proposed new services. Decisions regarding implementation of new routes will be made through the service planning process. New routes and services will be expected to meet all applicable design standards described in Sections 2, 3 and 54, but will not be expected to meet the productivity standards described in Section 2.3.2.1 until they have been in operation for at least six months. Demonstration, experimental, and cost sharing services are also handled in this manner.

### **1.3 Updating of Service Standards**

The service standards are intended to support the goals and objectives of the District. Since these objectives and the resources available to attain them can be expected to change over time, the standards will be revised periodically to reflect those changes.

The service standards will be reviewed on a bi-annual basis. At that time, experience with the service standards over the previous time period, as well as changes in the District's goals and objectives, will be used to determine whether any standards should be added or revised.

The numerical values of productivity standards will be updated each year, using ridership, revenue and cost figures for the most recent twelve-month period for which data are available. The rankings are based only on those routes that existed for the entire year. Routes which were eliminated during the year will not be included because they cannot be identified as candidates for revisions. Routes that were introduced during the year will not be included in determining the new standards since they are not required to meet the productivity standards until they have been in operation for at least six months. However, these routes will be evaluated separately, using the service standards contained in this document.

The updating procedure will compare the values of the productivity standards with those in effect for the previous year. Operating cost data for the previous year will be revised to account for system-wide increases or decreases in operating cost.

## **2. Performance Standards**

### **2.1 Derivation and Use of Standards**

The productivity standards are used to identify routes and services for appropriate marketing and possible revision or elimination. Separate standards are identified for each class of service. Routes are evaluated on ridership (either boardings per in-service hour or per trip, depending on the class of service) and on the economic measure of subsidy per passenger. These standards are based on the performance of the least productive 10 percent of the routes in each service class for either the ridership or economic measure, or

on the least productive 25 percent of routes in both measures. The basis for the standards will be reviewed in conjunction with the cost recovery standards in Section 9, and may be revised if necessary.

New services should meet the applicable standards for their class of service after six months of operation. All new services will be reviewed after six months of operation and routes that have not shown adequate progress toward meeting the standards will be targeted for cost-effective actions to increase productivity or for elimination.

To meet the RTD mission to provide *cost-effective service throughout the District*, RTD has developed different types or classes of service that serve specific markets and, therefore, have different performance expectations. Due to their different service characteristics Express, Regional and SkyRide were treated as separate classes. However, due to the deployment of rail, BRT and resulting service restructuring, these classes are reconfigured. The routes in these three are reassigned into a new, consolidated Regional class or the Local CBD class. Regional class includes routes providing high-speed service on limited access highways from suburban and outlying communities to downtown Denver, Denver International Airport and other metro, major employment centers, and provided at distances of approximately 6 miles or more. Local services have three sub-classifications: CBD—any route serving downtown Denver; Urban—35% or more of route length within a ¼ mile buffer has population + employment density of 12 per acre or greater; and Suburban—34% or less. Call-n-Ride and Access-a-Ride are separate classes. Enhanced bus and BRT routes may warrant future consideration regarding their operation with: dedicated right-of-way; partially dedicated ROW; limited or express mode; priority over other traffic; and various speeds appropriate to context. [Please see attachment A Service Classes for details on how these revisions affect current routes.]

The standards for evaluating portions of routes are intended for use in identifying needed service improvements, for making modifications to specific portions of existing routes, or for identifying low productivity segments of routes.

These standards could be used in situations such as isolating low productivity portions of otherwise productive routes or measuring options for bringing unproductive routes into compliance with the overall service standards. These standards may also be used to evaluate proposals for new route extensions or deviations on existing routes.

## 2.2 Ridership and Economic Measures

The RTD's approach is to develop a family of transit services suited to a variety of travel markets. All services are designed to match the level of service with demand, thus improving performance and sustainability. This results in multiple domains of acceptable performance for the various classes of service. Standards are best set by first determining measures of performance and objectives. The core objective is to maximize overall ridership, to the extent allowed by the available resources.

### 2.2.1 Performance Objective

Service allocation is driven by the RTD adopted mission statement: “To meet our constituents’ present and future public transit needs by offering safe, clean, *reliable*, courteous, accessible *cost-effective service throughout the District.*”

Performance Measures

- Passengers/hour (productivity)
- Passengers/trip (Regional class productivity)
- Subsidy/passenger (cost effectiveness)

The subsidy per passenger measure combines fare revenue and total cost impacts to produce a measure that comprehensively reflects the District’s allocation of resources. The effectiveness-productivity chart, Figure 1 - Effectiveness - Productivity Chart, presents economic effectiveness on the vertical axis, and productivity, or boardings per hour, on the horizontal axis. The chart offers a convenient comparative analysis of all classes of services, illustrating both absolute and relative performance. When standards and guidelines are applied, judgments can be made.

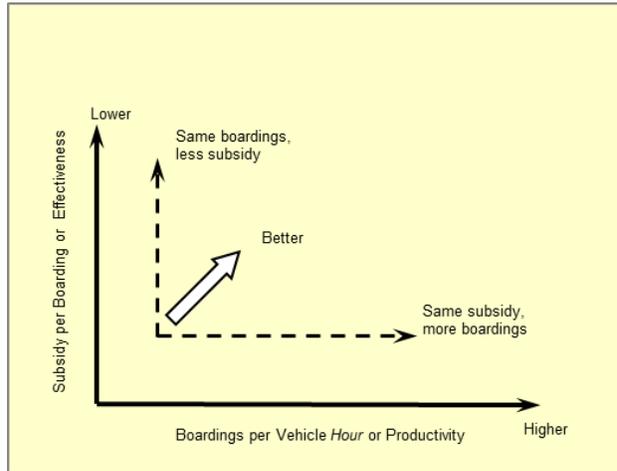


Figure 1 Effectiveness - Productivity Chart

### 2.3 Fixed Route Service Design and Evaluation Standards

#### 2.3.1 Minimum Service Frequency

New routes shall provide the minimum frequencies specified below. Existing services that cannot meet these minimum standards while adhering to the minimum passengers per hour or trip standards defined in Section 2.3.2 shall be identified as candidates for service changes or appropriate marketing promotion within available resources. These service changes may include providing service with longer headways if no other viable alternative exists. Elimination of the route may be considered if service changes and/or promotional efforts do not improve productivity.

These are “policy” service levels and represent a compromise between economic efficiency and the functionality of the system. To be sustained at these levels, a route must meet the minimum ridership performance standards discussed in Section 2.3.2.1 and annual calculated standards. Routes providing frequencies higher than the policy minimum must be justified by ridership demand as outlined in Section 2.3.4.

The following table indicates the minimum frequency standard for types of service and time of day by corridor (multiple routes sharing a segment).

Service Type	Span of Service	Minimum Frequency
Local – Peak period	Mon–Fri 6:00am to 9:00am and 3:00pm to 6:00pm	30 minutes
Local – Off peak below 25% boardings per hour	Weekday midday (9:00am – 3:00pm)	60 minutes
Local – Off peak above 25% boardings per hour	Weekday midday	30 minutes
Local	Evenings and weekends	60 minutes
Regional to CBD	3 peak trips, Mon – Fri. Trips should target 7:00, 7:30, 8:00 AM shift work start times and 4:00, 4:30, 5:00 PM shift end times.	
Rail & Enhanced Bus (BRT)	Weekday 6:00am – 6:00pm	15 minutes
Rail & Enhanced Bus (BRT)	Weekday evenings 6:00pm – 11:00pm and Saturday	30 minutes
Rail & Enhanced Bus (BRT)	Night after 11:00pm	60 minutes
Rail & Enhanced Bus (BRT)	Sunday and holidays	60 minutes
SkyRide	3:00am to 1:00am daily	60 minutes

Table 1 Minimum Service Frequency

### 2.3.2 Minimum Ridership Performance

This standard applies to routes operating at the minimum service frequency target. For **Local** and **Limited** routes, the standard is passengers per hour based upon the bottom 10% and 25% of routes in the respective class. For **Regional**, and **SkyRide** routes, the standard is passengers per trip.

These standards are derived from system averages by class of service. All routes must meet their applicable minimum standards. Those that do not meet these standards will need to be modified or marketed in some way in order to bring them up to the minimum standards. Those that are not brought up to the minimum standards are subject to cancellation. Routes that meet their applicable minimum ridership standards justify a service level at the minimum service frequencies outlined in Section 2.3.1. Higher frequencies must be justified by ridership as outlined in Section 2.3.4.

#### 2.3.2.1 Performance Standards

These measures and the effectiveness-productivity for all routes and services and the class 10% and 25% standards are calculated annually and are provided separately at <http://www.rtd-denver.com/ServiceDevelopment.shtml>, under Service Development Documents—Performance Reports.

#### 2.3.2.2 Specific Trips Ridership Standards

The standard for evaluating specific trips on a route varies by time of day as shown in the following table. For reference see the last column of Attachment C Regional Bus Service Performance. Trips must have boardings of at least the specified percentage of the minimum boardings standard for the time period of the trip, as defined in Table 2

- On Regional routes with more than three trips and which provide only peak period service, the first and last trips must have minimum boardings of one-half the average for the class if the overall route meets the minimum boarding standard. For other routes Table 2 applies.
- On rail, the first trip of the operating day in each direction, operated as the “Sweep Train” and pull-outs, is exempted from the minimum ridership standards.

Time of Day for Service Class	Percentage of Average Ridership
5:00 am - 6:00 am	75%
6:00 am - 8:00 pm	100%
8:00 pm - 11:00 pm	75%
11:00 pm - 5:00 am	50%
First or Last Trip	50%

Table 2 Specific Trips Ridership Standards

**2.3.3 Maximum Load (Crowding) Standard**

From the Transit Capacity and Quality of Service Manual: “From the passenger perspective, the passenger load on a transit vehicle affects the comfort of the on-board vehicle portion of a transit trip-both in terms of being able to find a seat and in overall crowding levels within the vehicle. From a transit operator's perspective, a poor quality of service may indicate the need to increase service frequency or vehicle size to reduce crowding and increase passenger comfort.”

RTD defines crowding as a seated load plus the standing passenger space, as calculated for each vehicle by subtracting the area occupied by seats and other objects from the gross interior floor area. The amount of crowding on a route is defined as the percent of total trips during a defined time period that exceed a comfort passenger level of 4.3–5.3 square feet per standee, generally having these characteristics (See page 5-24 of the Transit Capacity and Quality of Service Manual, 3<sup>rd</sup> Edition, [http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp\\_rpt\\_165ch-05.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_165ch-05.pdf)):

- Standing load without body contact
- Standees have similar amount of personal space as seated passengers
- Reasonably easy circulation within vehicle

The maximum number of standees can be computed for each vehicle by determining its standing passenger square footage and dividing by 4.3–5.3. For any service class during any defined period (e.g., AM early, AM peak, midday), when 10% or more of the directional trips exceed the computed maximum standees at the maximum load point, further investigation of potential remedies, such as changing the bus assignment or frequency of service, is warranted. For special events heavier loads are expected and acceptable, but when 10% or more of trips during the take-away have 4 or less square feet per standing passenger, further investigation of potential remedies is warranted. See Attachment D Crowding Report Examples for reference. The Percent of Total Trips chart (lower right) with level-of-service D or E would indicate crowding.

**2.3.4 Demand Based Service Frequency**

Service frequency in the RTD network is based on clock-pattern schedules. This pattern provides consistent and easy to understand schedules for our customers, and makes possible the provision of timed transfer connection hubs, whereby multiple routes are scheduled to meet at one location to facilitate connections. In general, routes are scheduled to operate in even increments of 30 minutes, or every 60, 30, 15, 10, 7.5, or 5 minutes. However, other frequencies may be provided depending upon passenger demand, or operational and scheduling needs.

For routes meeting the above frequency, ridership, and load standards, frequency better than every 30 minutes may be provided when and where justified by ridership. This standard applies equally to all service categories. In order to be sustainable, higher frequency service must meet the following criteria:

- Incremental frequency necessary to maintain the appropriate load standard during any 30 minute time period.
- Appropriate vehicle assignment as outlined in Section 2.3.5
- When a service exceeds the maximum load standard, higher frequency may be justified during that time period and/or route segment.
- If a service with better than the minimum frequency has passenger loads that can be accommodated with a lower frequency without violating the load standard, then frequency may be reduced.
- As a general guideline, a typical productivity by service frequency, for a whole route or a segment or time period is provided in Table 3 - Demand Based Service Frequency

Frequency	Boardings Per Hour	
	Route	Segment-Period
60 - 30 minutes	Minimum for Class	-
15 minutes	25 - 39	35 +
10 minutes	40 +	45 +

Table 3 Demand Based Service Frequency

**2.3.5 Vehicle Assignment Targets**

Equipment shall be assigned to specific routes and trips according to the following guidelines. These guidelines may be modified if operational and scheduling needs require.

- Small 27'-30' Bus: Appropriate for lower volume **Local** routes where ridership does not require a standard bus, or for routes where specific operating concerns preclude use of standard buses and for **Call-n-Ride**.
- Standard 40' Transit Bus: The standard equipment for **Local** and **Regional** services.
- Articulated 60' Bus: Appropriate for higher volume Limited and Regional services.
- Intercity Coach: Appropriate for Regional and SkyRide services.

### 2.3.6 Design and Evaluation of Portions of Routes

The standards for evaluating portions of routes cover two areas in which minor modifications may be made to routes without changing the overall structure of the route:

- midline segments or midline deviations
- branches or end segments

The governing standards for overall route productivity were presented earlier. Since trips provided during marginally productive hours of the day or trips over marginal segments often increase the attractiveness of the overall service, an otherwise productive route may be able to support some less productive trips or portions of the route. However, if a route cannot meet the overall service standards for its class of service, there may not be productive segments to enhance the unproductive segments. Therefore, specific segments, branches, or trips which meet the standards for portions of routes may still be modified in order to raise the productivity of the entire route, if the overall route does not meet the service standards for its class of service.

#### 2.3.6.1 Midline Segments and Midline Deviations

- A midline segment or deviation of a Local or Limited route should generate enough boardings per hour of service provided to meet the standard for its class of service (CBD, Urban and Suburban). Boardings in both directions will be counted.
- If a route is changed, the change shall not cause a reduction in the overall boardings per hour for the route.
- If a route is changed, the change shall not cause the route to violate any route design standards as defined in Section 2.3, or the overall productivity standards as defined in Section 2.

#### 2.3.6.2 Branches and End Segments

- A branch or end segment of a **Local** or **Limited** route should generate enough boardings to meet the ridership standard for its class of service (CBD, Urban and Suburban).
- Boardings generated along the branch are defined as all passengers boarding the bus along the branch or end portion of the route, and all outbound passengers alighting along this section.
- Local collector portions of **Regional** routes which meet the following maximum travel time standard shall meet the ridership productivity standard for the entire route. This maximum travel time is equal to 15 minutes or 50 percent of line haul travel time, whichever is less.
- For shorter segments, the minimum ridership standard is reduced by the ratio of actual travel time to the maximum allowable travel time. Thus, if the actual travel time along the collector is half of the maximum allowed, it must average half the number of boardings per trip specified in the minimum ridership productivity standard.
- A new extension to a route that does not meet the minimum ridership productivity standard must attract sufficient ridership for the entire route to meet the minimum ridership standard for its service class.

- A route extension will not be initiated if it violates any of the route design standards found in Section 2.3, or causes the route as a whole to fall below the minimum riders per unit of service or standards found earlier in Section 2.3.2.

## 2.4 Demand Response Service Design and Evaluation Standards

RTD continues to develop a family of transit services suited to a variety of travel markets. The goal of this approach is to match the type and level of service to the demand in a given service area, thus improving performance and sustainability. As such, a variety of non-fixed route services are provided by the RTD including the following.

### 2.4.1 Call-n-Ride

Rather than operating on a fixed route and schedule, demand responsive Call-n-Ride service is characterized as a shared ride within a defined geographic service area and the need for the passenger to arrange for pick-up in advance or be at a designated checkpoint at prescheduled times. A Call-n-Ride service area averages about 7 square miles or between about 2 to 30 square miles depending on its number of vehicles and service configuration—predominantly station feeder or community-based service. Call-n-Ride often provides first/last mile access to the broader RTD network of services through timed connections at transfer centers and Park-n-Rides. Population plus employment is 3 to 12 persons per acre. Call-n-Ride service is evaluated based on passenger boardings per revenue hour and subsidy per passenger boarding.

### 2.4.2 Access-A-Ride

Access-a-Ride provides ADA complementary paratransit in the District to individuals who cannot readily access the bus and rail system. As per US DOT requirements the passenger's trip origin and destination must be within  $\frac{3}{4}$  mile of RTD's non-commuter bus route system, during the same days and hours of their operation and within the District boundaries, and curb-to-curb service must be provided. However, RTD provides door-to-door service as a reasonable accommodation. Trips must be booked at least one day and up to 3 days in advance; however, RTD also offers subscriptions.

All applicants must qualify for certification under the guidelines established by the Americans with Disabilities Act of 1990, complete a functional evaluation in person, provide a physician's statements to verify disability and must meet one of the following criteria:

- Be unable to get to and from a bus stop or on and off a lift-equipped bus by yourself
- Have a cognitive disability that prohibits your understanding of how to complete bus trips

### 2.4.3 Vanpooling

Vanpooling is a public transportation option in which commuters, whose residences are geographically clustered, ride together to and from their work sites in a van that is driven by one of the vanpool participants. Typically vanpools make one roundtrip per day and

carry from 5 to 14 riders. Vanpooling offers greater opportunities for increased capacity compared to carpooling and offers a cost-effective alternative to conventional transit in areas of low employment density and longer commute distances. RTD contracts for this service with DRCOG to subsidize the portion of the commute trip within the District. Vanpool service is evaluated based on subsidy per passenger boarding.

#### 2.4.4 SeniorRide and Senior Shopper

SeniorRide Special Events transports groups to a variety of cultural, educational and entertainment events. The Schedule of events is published 3 times a year to the public. Service is available on a first come first served basis. A minimum of 10 passengers per trip is required. Scheduled events that do not generate reservations of at least 2 groups of 10 may be reconsidered as to whether or not to schedule such event(s) during the next 12 months.

SeniorShopper buses have established routes that provide trips to major grocery stores. Service is available Monday through Friday. A minimum of 10 passengers per trip is required.

## 2.5 Reliability

On-time for fixed-route service is defined as not more than 1 minute early to not more than 5 minutes late. RTD sets annual objectives for on-time performance by class of service and which are reported in the Quarterly Performance Report. [Improved methods for monitoring, identifying the causes and remedying unreliable service are currently in development.]

## 3. Geometric Design Standards

### 3.1 Directness of Route

Routes shall be designed to be as direct as possible and to provide maximum accessibility to transit.

- Deviations from a direct path from end-to-end of the route shall account for no more than one-quarter of the end-to-end travel time of the route.
- For a specific deviation, the total additional travel time for all through passengers should not exceed three minutes for each rider boarding or alighting along the deviation.

In mathematical terms, this means that the quantity

$$\frac{P_t * VTT}{P_d} < 3 \text{ minutes}$$

where:  $P_t$  = through passengers  
 $VTT$  = additional vehicle one-way travel time  
 $P_d$  = passengers served by deviation

## 3.2 Stop Spacing Standards

Bus routes shall adhere to the following stop spacing standards. Placement also considers: the balance between pedestrian access and route travel time; ADA requirements; adjacent land uses; streetscape conditions and property ownership.

### 3.2.1 Minimum

- **Local** and **Regional** collection, residential areas - 600' (8 stops/mile) Commercial areas - 500' (10 stops/mile)
- **Limited** service, limited-stop zone - 2500' (2 stops/mile)

### 3.2.2 Maximum

- **Local** service, residential and commercial areas – 1,250' (4 stops/mile)
- **Limited** service, residential and commercial areas – 1,250' (4 stops/mile)
- **Limited** service, limited stop zone – 8,000' (1 stop/1.5 miles)

## 3.3 Roadway Design Goal

New bus routes should *not* be operated along streets that do not meet minimum standards, such as for bus turning radius, pavement strength/loading, lane width, roadway grade, shoulder width on rural roads (for pedestrian waiting and safety) and overhead clearance. Refer to the RTD Bus Infrastructure Design Guidelines and Criteria Section 1 – Transit Access for specific details.

## 4. Shelters

The minimum warrant for the placement of a shelter is 40 boardings per day at the stop. Stops with the highest average of daily boardings will take top priority for shelter placement. [Revised standards are currently in development and will reference the RTD Bus Infrastructure Design Guidelines and Criteria.]

## 5. Area Coverage Standards

### 5.1 Purpose and Application

The purpose of these standards is to define a reasonable level of service to all areas of the District and to help RTD maintain this service level. Since the RTD service area includes many different types of development, and population densities and land use vary widely across the District, it would not be reasonable to expect all areas to support the same level of service. Moreover, different types of service may best meet the needs of different areas, and RTD's resources can be used in a more productive fashion if service can be tailored to the needs of particular areas. Area coverage standards provide guidelines for tailoring service to the needs of communities and help ensure that all areas receive a level of service that is commensurate with their needs.

Levels of service for specific areas also depend on the productivity of existing services. If existing or proposed services cannot meet the productivity standards outlined in Section 2, RTD may choose not to provide the minimum level of service. Financial constraints may also limit RTD's ability to meet the area coverage (or any other) standards.

## 5.2 Coverage Levels Outside the Denver CBD

The area coverage standards for areas outside the Denver Central Business District (CBD) are based on a combined density measure. This measure adds population and employment to determine potential demand for transportation to and from a particular area. [Attachment B shows the density classifications overlaid with RTD services for the entire District.]

The area coverage standards presented below deal with route spacing. Actual route spacing and service frequency will depend on demand and productivity of existing service in the area.

For use in this document, arterial roadways are defined as follows:

- Traffic flow controlled by traffic signals as opposed to stop signs
- Carry longer distance traffic flow
- Speed limit 30 mph or faster
- Road width two plus lanes in each direction

### 5.2.1 Minimum Service Levels

Areas with 3-12 residents and employees per acre

- Peak period Park-n-Ride service if either the travel time to the Denver CBD by Express bus or rail, or a bus/rail timed connection, exceeds 20 minutes.
- Call-n-Ride service.

Areas with 12 or more residents and employees per acre:

- Local service on major arterials with pedestrian access within 1/4 mile.
- Peak period, Limited, Express, or Regional service from Park-n-Rides if either the travel time to the Denver CBD by bus, or a bus/rail timed connection, exceeds 20 minutes.

### 5.2.2 Access-A-Ride - ADA Required Service Area Coverage

Within the District:

49 CFR 37.131 - Service criteria for complementary paratransit.

**“(1) Bus.**

(i) The entity shall provide complementary paratransit service to origins and destinations within corridors with a width of three-fourths of a mile on each side of each fixed route. The corridor shall include an area with a three-fourths of a mile radius at the ends of each fixed route.

(ii) Within the core service area, the entity also shall provide service to small areas not inside any of the corridors but which are surrounded by corridors.

(iii) Outside the core service area, the entity may designate corridors with widths from three-fourths of a mile up to one and one half miles on each side of a fixed route, based on local circumstances.

(iv) For purposes of this paragraph, the core service area is that area in which corridors with a width of three-fourths of a mile on each side of each fixed route merge together such that, with few and small exceptions, all origins and destinations within the area would be served.

**“(2) Rail.**

(i) For rail systems, the service area shall consist of a circle with a radius of 3/4 of a mile around each station.

(ii) At end stations and other stations in outlying areas, the entity may designate circles with radii of up to 1 1/2 miles as part of its service area, based on local circumstances.

**“(3) Jurisdictional boundaries.** Notwithstanding any other provision of this paragraph, an entity is not required to provide paratransit service in an area outside the boundaries of the jurisdiction(s) in which it operates, if the entity does not have legal authority to operate in that area. The entity shall take all practicable steps to provide paratransit service to any part of its service area.”

“Requirements for complementary paratransit do not apply to **commuter bus** ... fixed route bus service, characterized by service predominantly in one direction during peak periods, limited stops, use of multi-ride tickets, and routes of extended length, usually between the central business district and outlying suburbs.”  
[§37.121]

## 6. Transit Access

RTD has guidelines for access to its facilities for pedestrians, bus riders, bicyclists, passenger loading, and parking. The RTD Bus Infrastructure Design Guidelines and Criteria, included here by reference, is intended to be used by RTD in conjunction with local jurisdictions in planning transit access (including projects under construction).

## 7. Service Guidelines for Special Events and Special Services

### 7.1 Derivation of Standards

The following guidelines for provision of bus and/or train service to special events are based on prior RTD Board actions and on the public convenience and necessity to:

- Protect neighborhoods from the impact of events which are so large as to overwhelm the surrounding supply of parking, and
- Serve customers by offering adequate service for events which are predictably large enough to overload the normally available transit service, and
- Protect taxpayers by only serving those events that have a predictable level of transit demand great enough to justify the operation of special routes.

## 7.2 Standards for Events

RTD, within the limits of its budget, will operate special service:

- For events at Invesco Field at Mile High stadium with projected attendance of over 55,000, for which the crowd is expected to all be present at one time.
- For events at Coors Field with projected attendance of over 40,000, for which the crowd is expected to all be present at one time.
- At other venues where the ratio of projected attendance to available on-site parking is 6:1 and for which the crowd is expected to all be present at one time.

This service will not be provided when substantial numbers of the event patrons can be expected to arrive in privately operated or non-profit owned buses or regularly scheduled RTD service.

RTD will provide Express Shuttle service to Invesco Field and Coors Field from selected Park-n-Rides for events described in this section. The General Manager must specifically authorize Park-n-Ride service for other events.

## 8. Shuttles & Circulators

### 8.1 Characteristics

Shuttle and circulator routes are not defined as a separate class of service, but are typically proposed to serve specific, local, community-focused needs. Shuttle and circulator routes are generally defined by the following characteristics: short routes, usually less than 5 miles long; operate on local streets and arterials; connect major activity centers; and serve short passenger trip lengths within a single community. Fares must be set according to RTD Fare Policy.

### 8.2 Guidelines for Success

Several factors are critical to shuttle and circulator success. As a guideline to make informed decisions, the following characteristics must be present and considered.

- A sustained average population density of at least 10 people per acre along the length of the route is a minimum requirement; a critical mass of potential riders is needed to succeed.
- Connects community residences with major activity centers such as colleges, high schools, middle schools, shopping districts (but not auto-centric malls), medical centers, and downtowns that appeal to all market segments (youth, families, seniors) and can serve a variety of trip purposes.
- Transit friendly environment: pedestrian friendly, walkable streets are a minimum; mixed land uses; areas of clustered shopping or employment; public spaces; and bicycle parking/paths.

- To attract spontaneous walk up use, the headway needs to be 15 minutes or less for a service span for the intended markets, typically 6:00 – 18:00 or longer.
- Offers bi-directional service.
- Does not substantially duplicate a service of comparable utility.

## 9. System-Wide Cost Recovery Standard

The state required system-wide minimum cost recovery ratio is 30 percent. This ratio is calculated by the following formula:

$$\frac{[\text{Farebox Revenues} + \text{Advertising Revenues} + \text{Lease Revenues} + \text{FTA Operating Assistance} + \text{Other Non-Sales Tax Revenues}]}{[\text{Category Costs applied according to RTD Cost Model Memo, June 15, 2010, as updated (See summary below)}]}$$

### Cost Model Summary

With the exception of Private Carrier costs, all costs are allocated to routes by one of three methods: hours, miles or vehicles. The RTD Bus Cost Model has five cost categories: Variable/Direct, Variable/Indirect, Private Carrier, Retained Costs and Depreciation. Private Carrier costs are allocated to routes by the number of hours the contractor operates the route, multiplied by the average hourly rate billed for that particular contract, plus the average hourly cost for fuel.

The annual budget and six-year Strategic Budget Plan are evaluated using this cost recovery standard. If the standard is not met, several courses of action may be taken. The RTD Board has adopted a policy of evaluating the fare structure as part of the annual budget process; fares may be changed at that time to provide additional revenue. RTD may also choose to market its services more aggressively to attract more customers and their fares, or RTD may look for revenue from other sources. The productivity standards in Sections 2 and 3 may be used to reduce the costs of providing service while disrupting service to as few passengers as possible.

## 10. Title VI & Environmental Justice Compliance

RTD follows FTA Circular 4072.1B "Title VI Requirements and Guidelines for Federal Transit Administration Recipients," Chapter 4.4.

Title VI Protected Classes are race, color and national origin.

Environmental Justice Protected Classes are as follows:

1. Minority Populations:

- American Indian and Alaska Native, which refers to people having origins in any of the original peoples of North and South America (including Central America), and who maintain tribal affiliation or community attachment.
- Asian, which refers to people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent, including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam.
- Black or African American, which refers to people having origins in any of the Black racial groups of Africa.
- Hispanic or Latino, which includes persons of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.
- Native Hawaiian or Other Pacific Islander, which refers to people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

2. Low-Income Populations - 150% of Federal Poverty Guidelines.

## **11. Standard for Service for Transit Dependent Persons and To Social Service Destinations**

For purposes of these service standards, transit dependent riders are defined as riders who either live in a household which does not own a car or who have a physical or mental disability that prevents the transit patron from driving a car. Social Service destinations are those destinations that are provided as a public service that may not have consistently sufficient ridership to otherwise warrant the establishment or continuation of a route or route segment. Examples of social service destinations would include county court facilities, hospitals, schools, or public institutions which have been situated or constructed in isolated locations prior to the establishment of RTD or following review and comment by RTD of the proposed development plans of such institution or agency, by the appropriate jurisdiction.

### **11.1 Purpose of the Standard**

This standard is intended to provide for consideration of transit dependency in service decisions. This standard does not guarantee a minimum level of service to all transit-dependent riders. However, it will ensure that transit-dependent riders and/or the need to have access to social service destinations are identified and considered when decisions are made to reduce service levels in an area.

### **11.2 Determination of Transit Dependency**

Whenever RTD plans changes to an existing route where there is no alternative service available to meet the area coverage standards in Section 5 such as a change in routing or span of service, transit-dependent riders will be identified through on-board surveys. This survey will ask questions about riders' travel habits and demographics, and it will attempt to identify transit-dependent riders and their destinations.

### 11.3 Application of Transit Dependency Standard

The applicable minimum productivity standards for a route will be reduced by one-half the percentage of ridership that is defined as transit dependent. Thus, if 60 percent of the riders on a route are transit dependent, the route must achieve 70 percent [100 percent minus (60 percent divided by 2)] of the applicable productivity standards (ridership and economic) in order not to be considered a poor performer.

Applicable ridership standards for fixed route services may be found in Section 2.3, and for non-fixed route services, in Section 2.4.

If the on-board survey reveals that the route does not serve the destinations desired by transit-dependent riders, RTD may restructure the route to improve service and increase ridership. This could include changing the routing or schedule to serve passenger needs. RTD wishes to provide transit dependent riders with service that fits their needs and to provide service to social service destinations when there is even a modicum of recognized demand.

Another consideration to be given in whether or not to eliminate a route with some transit dependent passengers is the impact on required Access-A-Ride services. The Americans with Disabilities Act (ADA) requires that eligible persons with disabilities be provided with paratransit service if they have trip origins and destinations within a defined service area three-fourths of a mile from a non-commuter fixed route. If accessible fixed route service is considered for removal from a portion of the defined paratransit service area, an estimate of the demand for substitute Access-A-Ride service for persons with disabilities who require lift-equipped buses must be completed and a cost-benefit analysis performed for the alternatives (leaving fixed route versus providing Access-A-Ride service).

## 12. Service Change Process

The following is a description of the steps necessary in developing and implementing service changes, which are typically conducted each year in January, May and September—also called runboards—as required by Board policy and the Collective Bargaining Agreement.

Proposals are derived from a variety of inputs continuously throughout the year including: periodic customer, household and employer surveys; stakeholder meetings; service performance evaluation; and changing demographics and land uses. They are compiled for each runboard and evaluated based on a number of factors, including RTD annual budget, RTD Service Standards, effects on the transit network and on transit dependent markets (Title VI), cost-effective services throughout the District and responsiveness to changes in the communities within RTD. A Board paper is compiled and presented to the Board, stakeholders and public for consideration.

Staff then discusses the proposals with members of the Board, stakeholders and senior staff and coordinates with other staff including Marketing, Operations, Facilities and Finance. Modifications are made as warranted and then the proposals enter the public

engagement process: formally scheduled public hearings; informal presentations upon request; repository for customer input—[service.changes@rtd-denver](mailto:service.changes@rtd-denver); responses to General Manager and Board Member requests. Upon completion of public engagement, all previous input is compiled and evaluated and revisions to the proposals are made as warranted. A final Board report is prepared with a summary and details of proposed changes and a summary of public hearings and other public input for approval of the Board.

The approved changes then go into a comprehensive production process which includes: schedule creation; bus and operator requirements and assignments; compliance with privatization policy; runcutting and compliance with the Collective Bargaining Agreement; marketing promotions and public relations; bus stop and on-street changes; printed and electronic public information, including maps and timetables; and validation and distribution of all data within the Transit Information Exchange System (TIES).

## **13. Cost Sharing Policy**

### **13.1 Background**

On June 21, 1994, the RTD Board of Directors passed a resolution, Transit Service Cost-Sharing Policy, to provide guidance to RTD staff in responding to the increasing number of requests for new service. This policy authorized the General Manager to pursue cost sharing as a method of providing transit service using RTD revenues and other funds voluntarily pledged by private employers, businesses or local governments; this has resulted in a number of RTD partnerships in demonstrating new services. The following incorporates this experience and provides guidance on the application and limitations of cost-sharing arrangements.

### **13.2 Guidance**

#### **13.2.1 Financial Feasibility**

Financial feasibility depends not only on the availability of funds, but also on consideration of fares, cost/revenue allocation and equity.

- Net operating cost (subsidy) needs to be defined so that all partners are treated equitably. Net cost is the total operating cost less farebox revenue and other operating revenues and any grant revenues secured on behalf of the proposed service. The application of grant revenues prior to the net cost sharing allows all partners to participate in the benefits of grant funding.
- Cost-sharing projects need to adopt the RTD fare structure for similar services for reasons of equity. Furthermore, this places all projects on the same revenue basis for calculating net operating cost. Project sponsors may propose a fare that does not follow the RTD fare structure. For these projects the partner is required to fund the full difference in revenue between the comparable RTD fare and the project fare, based on

actual ridership. The adoption of any non-conforming (economically or technically) fare is always subject to Board approval.

- Costs associated with vehicles are addressed project by project. Vehicles can be purchased outright by project sponsors with grant funds or provided from the RTD inventory. Should new vehicles be required, grants should fund their acquisition and the local share split equally by the cost-sharing partners. If no grant funds are used, RTD will limit its share to 10%, half of the usual local share when grant funds are used. If the RTD operates the service and agrees to provide the vehicles from its inventory, capital costs need not be included as part of the project cost unless special accommodations are required.
- Cost-sharing projects are new or expanded transit services and RTD's share must be budgeted out of allocations for new services for the entire District. Thus any partner with expectations for RTD financial or operational participation must first obtain commitment from RTD before applying for project grants. In addition, each project will be subject to the appropriate RTD and DRCOG planning processes, especially as regards estimates of costs, ridership, revenue and other benefits.

### 13.2.2 Vehicle Availability

RTD may have, with some minor modifications, vehicles readily available to provide the proposed service. In some cases projects require a specialty or significantly modified vehicle that must be acquired, subject to RTD approval for fleet maintenance compatibility. Financing these vehicles is addressed above. Sometimes the availability of operators has been more critical.

### 13.2.3 Local and Community Support

Local and community entities (e.g., government, employers, businesses and associations) generally initiate cost-sharing transit projects concomitant with other plans and developments in the community. Thus the proposed transit project is designed to address a specific development or perceived need. To advance their project for implementation, an entity such as a city, will offer to share in the net costs of providing the service. RTD needs to be responsive to these requests, but keep them in the context of the needs of the entire District.

- Projects generally have substantial institutional support; however they are subject to the same public scrutiny, for example public hearings, as any other proposed service change. Implementation of any cost-sharing project will continue to be subject to RTD's public review process.
- RTD generally provides 50% of the local share of the net operating and/or capital cost of a project. This cost-sharing ratio may be adjusted in consideration of the District budget and policies.
- Cost-sharing arrangements for each project are of limited duration for which agreed upon performance milestones must be reached (see below). The purpose of the test period is to assess the sustainability of the service and decide RTD's and its partners continuing participation. The test period is typically set at one, two or three years, as appropriate to the project. Performance milestones must be set and evaluated and a recommendation regarding continuation made for each year of the project.

#### 13.2.4 Performance

Cost-sharing services will have clearly defined evaluative criteria agreed upon within the cost-sharing agreement and prior to implementation.

- At a minimum these criteria will include average daily ridership and RTD Service Standards within the appropriate class of service for passenger boardings per hour and subsidy per boarding. Additional criteria may also address issues related to project objectives, such as new riders. State mandated cost recovery may also be considered. Expectations of performance will be laid out in the form of milestones, such as a range or minimum attainment at the end of each year.
- During the first year performance will be assessed to determine if expectations have been met and if continuation of the service is warranted. Often an experimental service will need to be changed to improve performance. As warranted the same assessment will be made in each succeeding year during the test period. This assessment and recommendation regarding continuation will be reported to the RTD Board each year of the test period.
- If the cost-share service meets expectations and RTD Service Standards during the test period, RTD will consider extending the period of its participation and increasing its share of net cost; however, RTD is under no obligation to continuing any service beyond the cost-share agreement, even if it meets Service Standards. If the cost-share service does not perform up to expectations, RTD funding participation in such project will be reduced or discontinued. These decisions are subject to the customary financial and Board review.
- Should RTD decide to discontinue or reduce its funding of the project service, a sponsoring partner may choose to continue its funding by entering into a cost-sharing agreement with RTD. This agreement will specify the service to be provided and its cost, will be annually reviewed for potential renewal and will be subject to all RTD Service Standards, budgeting and public processes.

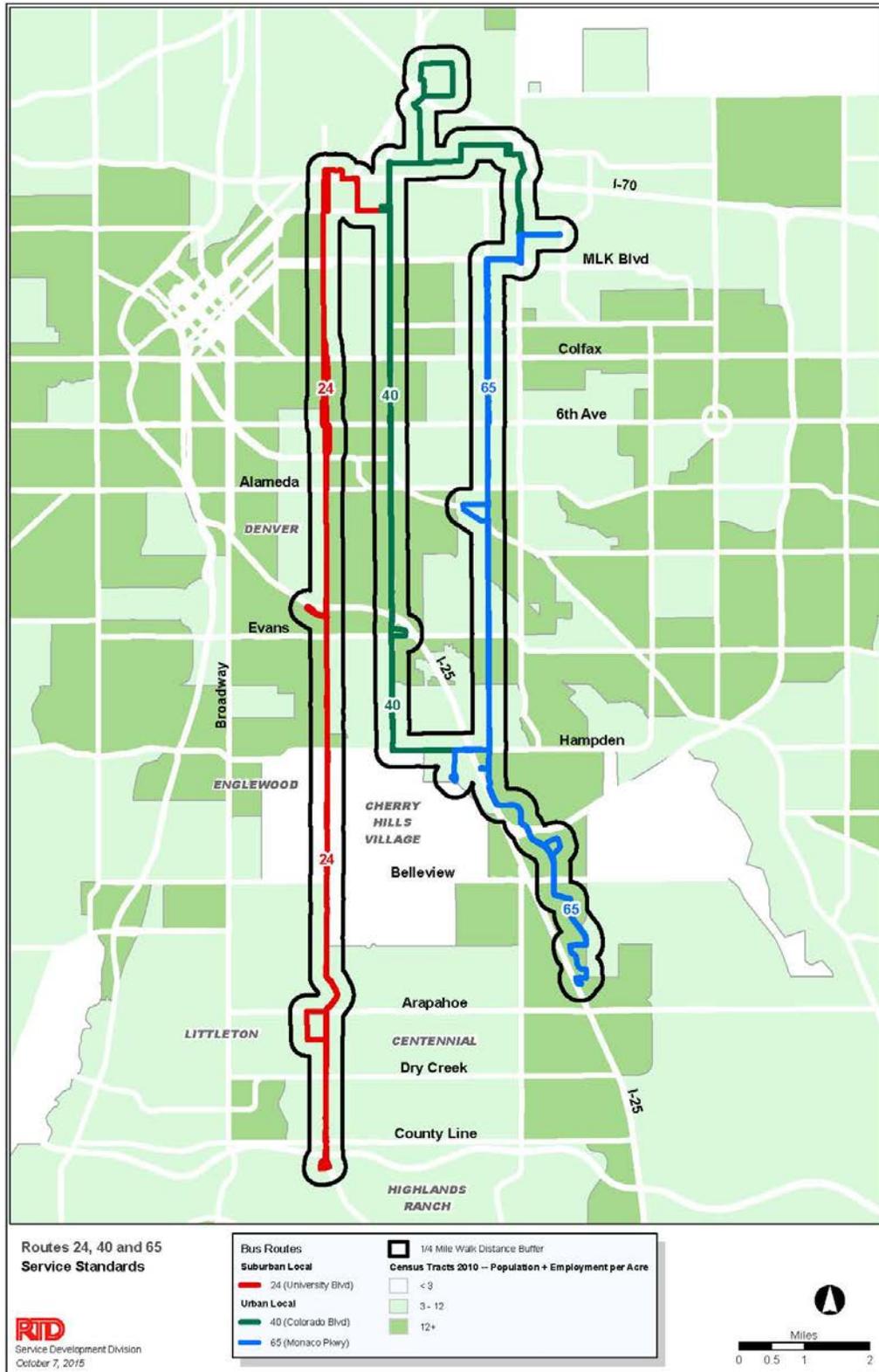
## Attachment A Service Classes

### Urban & Suburban Service Classes

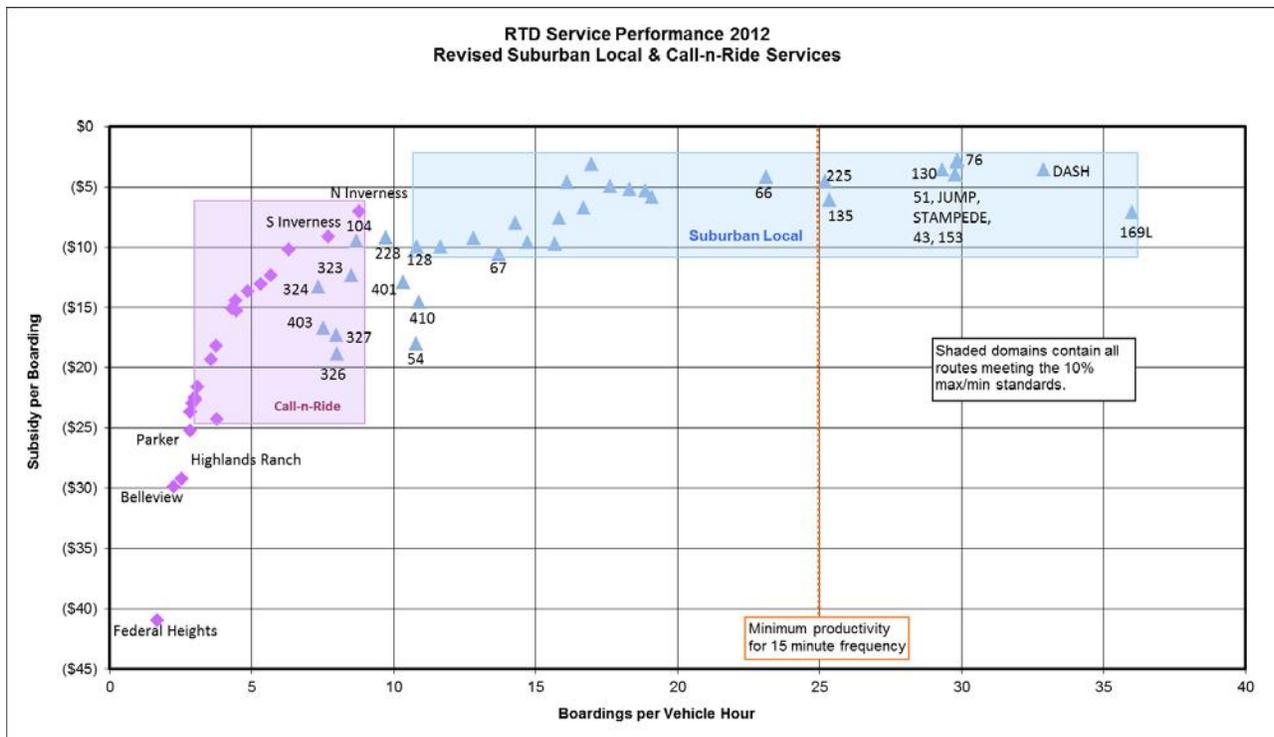
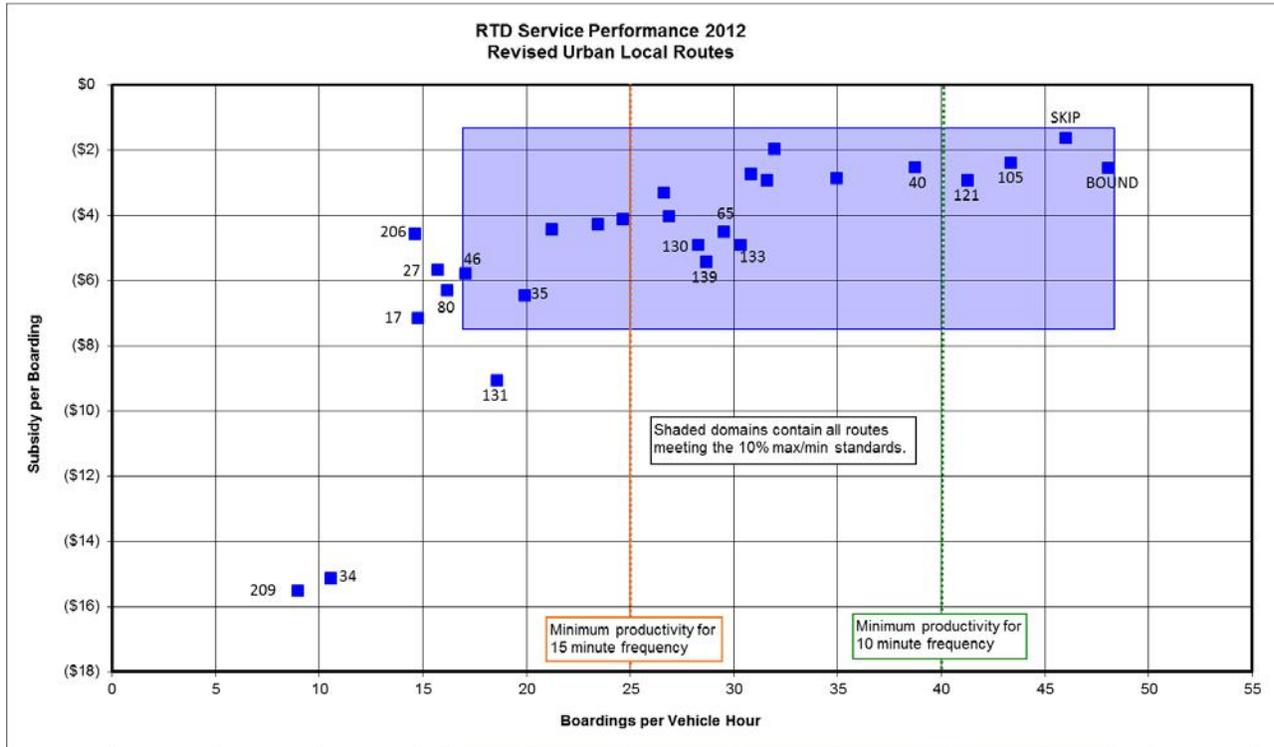
The following table is a GIS analysis of population + employment density per acre. The classifications are taken from the Service Coverage section of these Service Standards. It shows the percentage of route coverage (within ¼ mile buffer) for each classification for all Urban and Suburban routes operating in 2013 and a heavy line demarking the 35% line in the >12/acre column. Green highlight shows those Suburban routes that move into the Urban category and pink highlight shows those Urban routes that move into the Suburban category with this classification system.

Percentage of Route Length By Population + Employment Density (Per Acre)						
Sorted By % > 12, Then % 2 > 12						
ROUTE	NAME	TYPE	Class	% < 3	% 3 < 12	% > 12
34	Platte Industrial	Local	Urban Local	0	4	96
ROUND	30th Street	Local	Urban Local	4	12	84
209	CU / Thunderbird	Local	Urban Local	0	17	83
204	Table Mesa / Moorhead / North 19th	Local	Urban Local	6	16	79
46	South Dahlia	Local	Urban Local	0	25	75
27	Yale Avenue	Local	Urban Local	2	27	71
12	Downing / N Washington	Local	Urban Local	0	32	68
105	Havana Street	Local	Urban Local	1	33	66
11	Mississippi Avenue	Local	Urban Local	0	36	64
3	Alameda Avenue	Local	Urban Local	0	38	62
14	West Florida Avenue	Local	Urban Local	0	39	61
130	Yale / Buckley	Local	Suburban Local	2	37	61
73	Quebec Street	Local	Urban Local	2	37	61
131	East Cliff / Seven Hills	Local	Suburban Local	0	40	60
208	Iris / Valmont	Local	Urban Local	29	12	58
50	Lakes Crosstown	Local	Suburban Local	0	44	56
80	80th Avenue	Local	Suburban Local	0	45	55
21	Evans Avenue	Local	Urban Local	6	40	54
31	Federal Blvd	Local	Urban Local	0	49	51
121	Peoria Street	Local	Urban Local	12	36	51
17	Red Rocks College	Local	Suburban Local	1	53	46
206	Pearl / Eisenhower / Fairview H.S.	Local	Urban Local	13	42	45
35	Hampden Avenue	Local	Urban Local	15	42	43
SKIP	Broadway	Local	Urban Local	30	29	41
65	Monaco Parkway	Local	Urban Local	0	61	39
133	Hampden/Tower	Local	Suburban Local	0	62	38
139	Quincy Avenue	Local	Suburban Local	0	63	37
40	Colorado Boulevard	Local	Urban Local	1	63	36
STAMPEDE	CU East Campus	Local	Urban Local	0	66	34
326	Westside Crosstown	Local	Suburban Local	12	55	34
327	Eastside Crosstown	Local	Suburban Local	15	51	34
153	Chambers Road	Local	Urban Local	10	60	31
89	Stapleton/Anschutz Campus	Local	Suburban Local	0	70	30
51	Sheridan Blvd	Local	Urban Local	0	70	30
45	Montbello / Green Valley Ranch	Local	Urban Local	9	61	30
65	Arapahoe Road	Local	Suburban Local	0	72	28
43	MLK Blvd / Gateway	Local	Urban Local	9	63	28
88	Northglenn/Commerce City/Stapleton	Local	Suburban Local	15	56	28
76	Wadsworth Blvd	Local	Urban Local	6	68	27
205	28th St / Gunbarrel	Local	Urban Local	28	45	27
24	University Blvd	Local	Urban Local	12	63	26
403	Wildcat Crosstown	Local	Suburban Local	12	62	26
135	Smoky Hill Road	Local	Suburban Local	13	63	24
26	West 26th Avenue	Local	Suburban Local	0	77	23
92	92nd Avenue	Local	Suburban Local	1	76	23
67	Ridge Road	Local	Suburban Local	0	78	22
54	Montbello Industrial Park	Local	Urban Local	2	77	21
59	West Bowles	Local	Suburban Local	5	73	21
225	Boulder / Lafayette via Baseline	Local	Urban Local	37	43	21
104	West 104th Avenue	Local	Suburban Local	0	81	19
112	West 112th Avenue	Local	Suburban Local	0	81	19
402L	Highlands Ranch Parkway	LIM	Suburban Local	0	81	19
72	72nd Avenue	Local	Suburban Local	2	79	19
100	Kipling Street	Local	Suburban Local	3	80	17
169L	Buckley / Tower DIA Limited	LIM	Suburban Local	49	34	17
DASH	Boulder / Lafayette via Louisville	Local	Urban Local	35	48	16
JUMP	Boulder / Lafayette via Arapahoe	Local	Urban Local	69	17	14
324	Main Street	Local	Suburban Local	41	47	12
120	120th Avenue / Brighton	Local	Suburban Local	33	56	11
128	Broomfield / Wagon Road	Local	Suburban Local	0	90	10
116L	South Simms Limited	LIM	Suburban Local	32	58	10
401	Ranches Crosstown	Local	Suburban Local	9	83	8
410	Lincoln Ave / Parker	Local	Suburban Local	23	71	6
323	Skyline Crosstown	Local	Suburban Local	2	98	0
77	Ken Caryl Avenue	Local	Suburban Local	17	83	0
228	Louisville / Broomfield	Local	Suburban Local	22	78	0

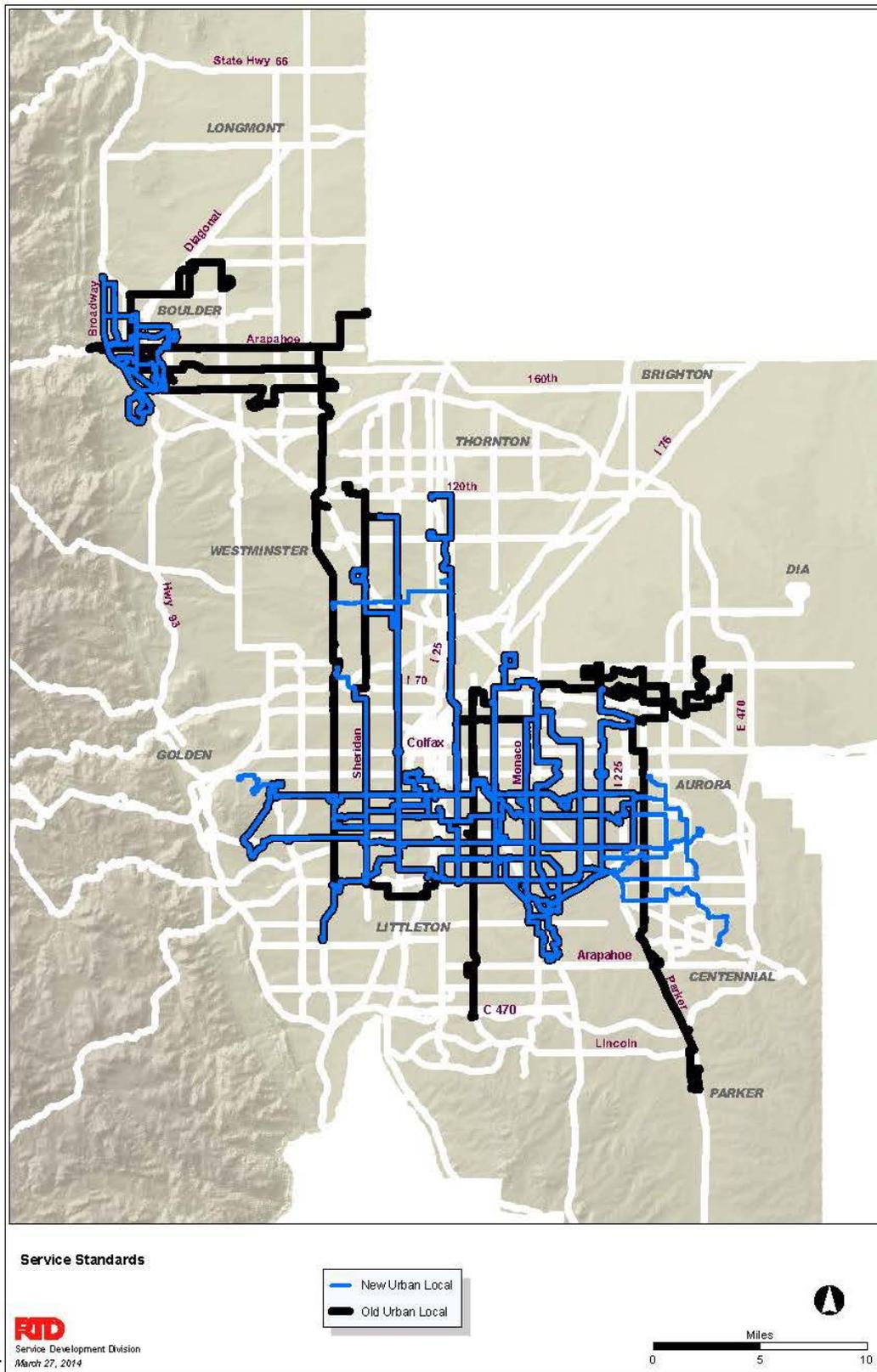
The following map illustrates the application of the density classification for Urban and Suburban routes.



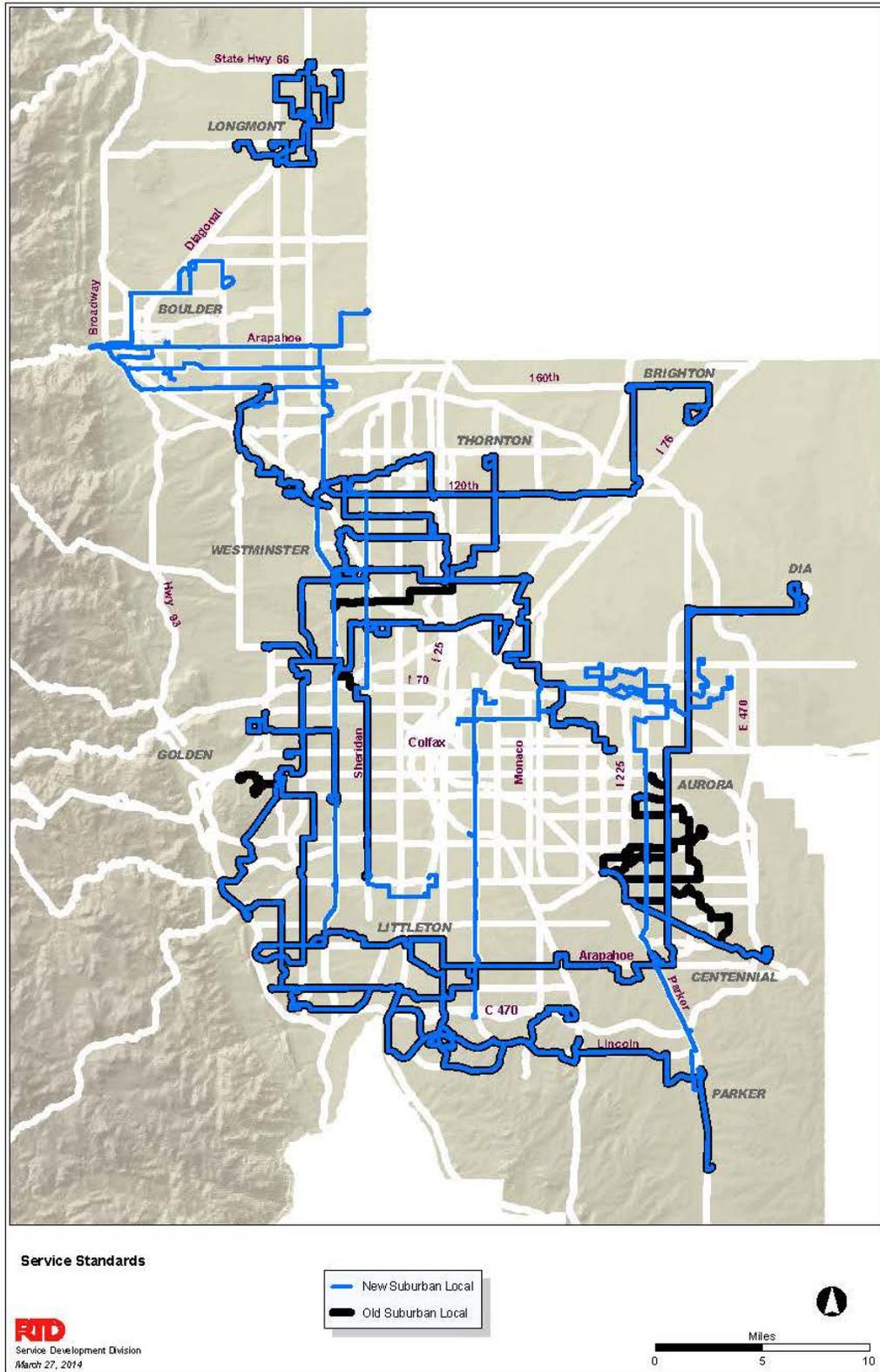
The following two charts depict the Urban and Suburban effectiveness-productivity performance charts with the revised classifications.



The following map depicts the revised Urban routes.

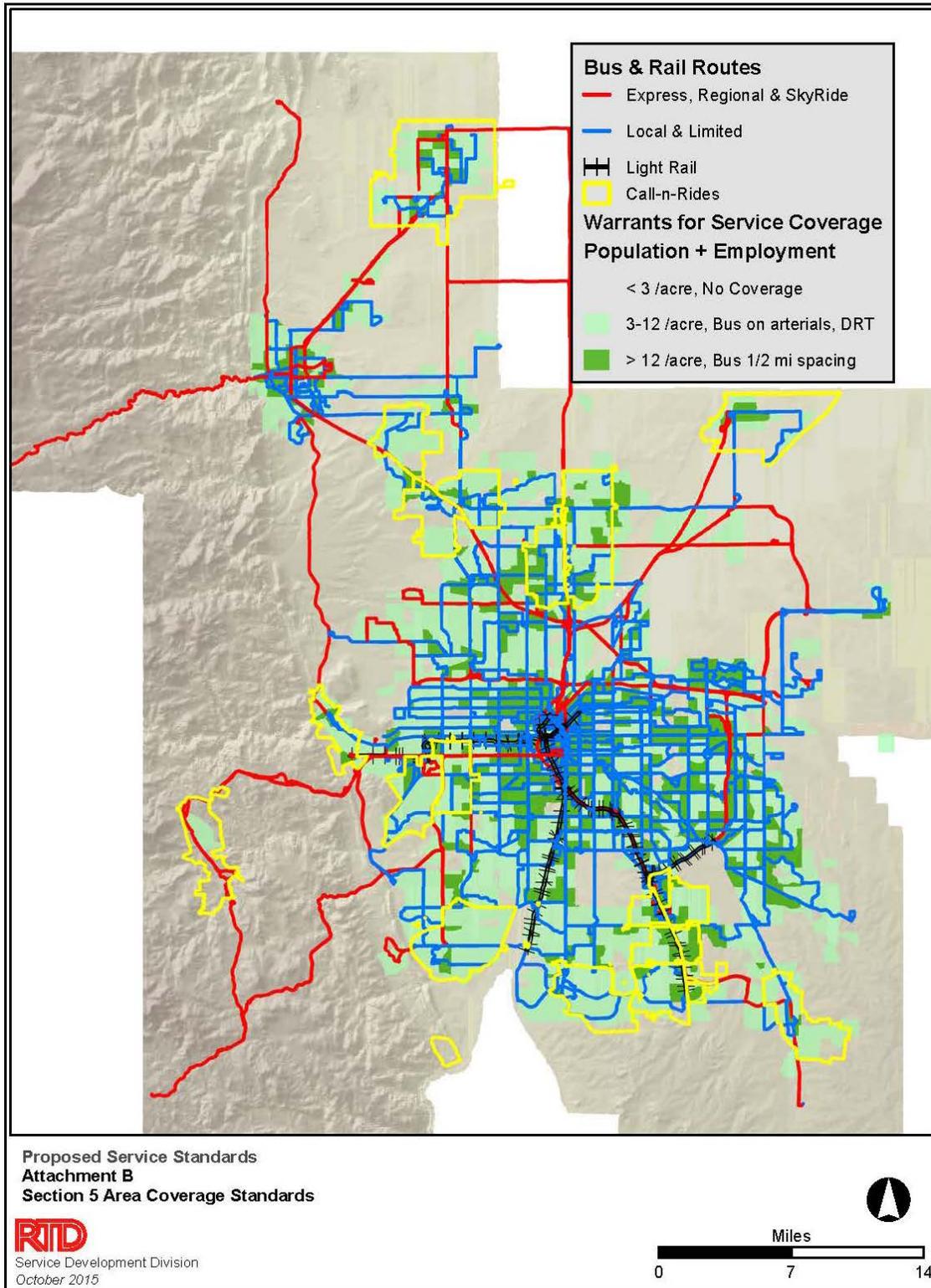


The following map depicts the revised Suburban routes.





Attachment B Service Coverage



Attachment C Regional Bus Service Performance

Proposed Regional Bus Services Performance 2012										
Route	Standards Class	Fare Revenue	Operating Costs	Total Boardings	In-Service Hours	Net Subsidy	Subsidy per Boarding	Boardings per Hour	O-W Bus Trips	Boardings per Trip
120X	Express	\$1,789,164	\$2,953,831	730,041	12,520	\$1,164,667	\$1.60	58.3	33,343	21.9
86X	Express	\$751,324	\$1,244,803	302,439	3,316	\$493,479	\$1.63	91.2	7,905	38.3
122X	Express	\$1,247,268	\$2,142,957	461,039	5,698	\$895,689	\$1.94	80.9	11,058	41.7
145X	Express	\$30,018	\$134,407	14,508	720	\$104,389	\$7.20	20.2	1,464	9.9
116X	Express	\$176,069	\$851,677	67,983	3,186	\$675,607	\$9.94	21.3	3,045	22.3
47X	Express	\$149,402	\$780,905	59,457	2,712	\$631,503	\$10.62	21.9	2,456	24.2
B/BV	Regional	\$6,414,673	\$10,817,925	1,769,616	54,652	\$4,403,251	\$2.49	32.4	57,874	30.6
BOLT	Regional	\$2,146,681	\$3,891,052	476,791	21,513	\$1,744,371	\$3.66	22.2	23,207	20.5
HX	Regional	\$537,968	\$1,211,900	142,780	4,399	\$673,932	\$4.72	32.5	4,255	33.6
S	Regional	\$281,310	\$611,317	62,924	2,292	\$330,007	\$5.24	27.5	1,813	34.7
N	Regional	\$431,050	\$1,200,009	135,102	6,405	\$768,959	\$5.69	21.1	8,732	15.5
Y	Regional	\$92,820	\$267,016	26,398	1,613	\$174,196	\$6.60	16.4	3,060	8.6
L	Regional	\$1,368,738	\$4,086,452	299,373	17,701	\$2,717,714	\$9.08	16.9	12,779	23.4
P	Regional	\$406,481	\$1,494,279	119,753	3,558	\$1,087,798	\$9.08	33.7	3,570	33.5
CV	Regional	\$580,353	\$1,845,872	135,833	5,908	\$1,265,518	\$9.32	23.0	5,114	26.6
GS	Regional	\$369,837	\$1,509,481	117,115	7,094	\$1,139,644	\$9.73	16.5	5,610	20.9
DM	Regional	\$255,173	\$1,079,129	83,016	4,569	\$823,955	\$9.93	18.2	3,032	27.4
EV	Regional	\$606,910	\$1,887,812	123,277	6,017	\$1,280,902	\$10.39	20.5	4,873	25.3
J	Regional	\$248,013	\$857,254	54,268	3,361	\$609,241	\$11.23	16.1	2,550	21.3
R	Regional	\$274,592	\$1,506,740	90,419	5,163	\$1,232,148	\$13.63	17.5	4,335	20.9
T	Regional	\$114,424	\$682,408	40,408	2,809	\$567,983	\$14.06	14.4	1,530	26.4
AT	skyRide	\$2,276,965	\$4,078,735	578,007	17,509	\$1,801,770	\$3.12	33.0	23,132	25.0
AB	skyRide	\$2,199,099	\$3,360,737	350,883	17,633	\$1,161,638	\$3.31	19.9	13,797	25.4
AS	skyRide	\$2,630,993	\$4,301,139	499,496	19,343	\$1,670,146	\$3.34	25.8	39,163	12.8
AF	skyRide	\$2,375,306	\$4,870,481	506,006	25,619	\$2,495,175	\$4.93	19.8	18,968	26.7
AA	skyRide	\$815,558	\$2,207,279	194,817	10,496	\$1,391,721	\$7.14	18.6	14,163	13.8
Subtotal	skyRide	\$28,570,190	\$59,875,595	7,441,749	265,807	\$31,305,405	\$4.21	28.0	310,828	23.9
Standard Deviation							\$3.72	19.2		8.2
Min/Max at 10% or better: Average ± 1.28 * Std Dev							\$8.97	3.4		13.5
Min/Max at 25% or better: Average ± .67 * Std Dev							\$6.70	15.1		18.5

Attachment D Crowding Report Examples

Regional Transportation District

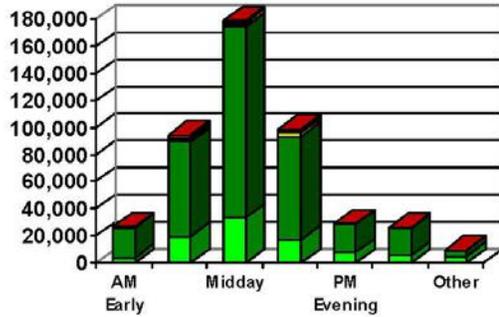
Ridecheck Plus

**LOS - Crowding by Time Period**

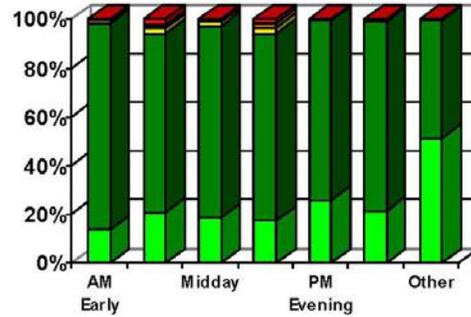
Rt 15L; Jan15 (Weekday); Crowding

Time Period	Level of Service, Passengers					Boardings	Level of Service, Trips					Trips	Per Trip	
	A	B	C	D	E		A	B	C	D	E		Seats	Standing Area (sq ft)
AM Early	3,586	22,427	305	38	63	26,419	184	538	50	2	2	776	55	91
AM Peak	19,524	69,690	1,867	1,144	2,368	94,593	1,021	1,541	277	61	77	2,977	55	91
Midday	33,344	141,183	2,839	1,048	689	179,103	1,744	3,330	454	57	24	5,609	55	91
PM Peak	17,242	76,206	2,524	1,934	1,289	99,195	914	1,705	355	101	44	3,119	55	91
PM Evening	7,452	21,460	184	0	0	29,096	370	544	32	0	0	946	55	91
PM Late	5,548	20,244	104	76	0	25,972	286	510	22	4	0	822	55	91
Other	4,857	4,601	4	18	0	9,480	249	119	1	1	0	370	55	90
<b>Total</b>	<b>91,553</b>	<b>355,811</b>	<b>7,827</b>	<b>4,258</b>	<b>4,409</b>	<b>463,858</b>	<b>4,768</b>	<b>8,287</b>	<b>1,191</b>	<b>226</b>	<b>147</b>	<b>14,619</b>	<b>55</b>	<b>91</b>
Standing	19.7%	76.7%	1.7%	0.9%	1.0%		32.6%	56.7%	8.1%	1.5%	1.0%		10.7%	

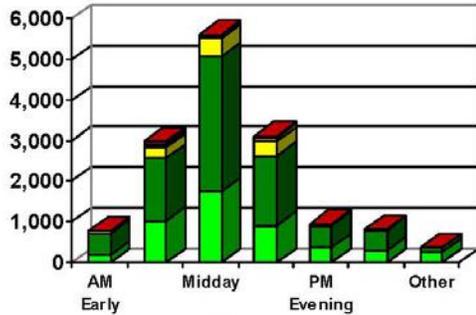
Passengers



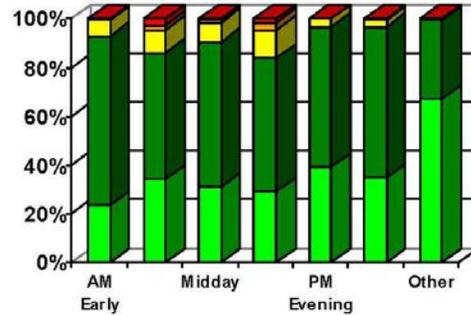
Passengers, % of Total



Trips



Trips, % of Total



■ A: Seated - next to empty seat  
■ B: Seated - next to occupied seat

■ C: Standing - light (> 6 sq ft per standee)  
■ D: Standing - medium (4 to 6 sq ft per standee)  
■ E: Standing - crush (< 4 sq ft per standee)

Crowding in accordance with TCRP Report 113, "Using Archived AVL-APC Data to Improve Transit Performance and Management"

Crowding determined at maximum load point

Attachment D continued

Regional Transportation District

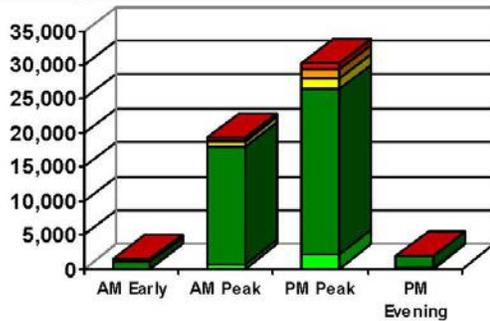
Ridecheck Plus

### LOS - Crowding by Time Period

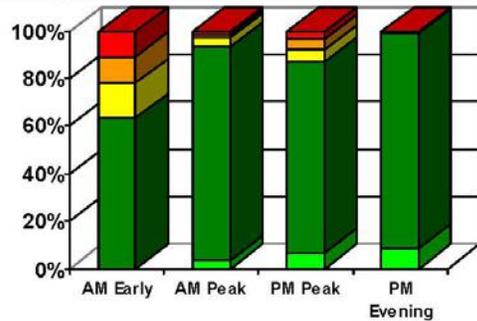
Rt 122X; Jan15 (Weekday); Crowding

Time Period	Level of Service, Passengers					Boardings	Level of Service, Trips					Trips	Per Trip	
	A	B	C	D	E		A	B	C	D	E		Seats	Standing Area (sq ft)
AM Early	0	924	222	160	158	1,464	0	8	21	8	6	43	56	89
AM Peak	670	17,233	816	242	253	19,214	35	358	132	13	9	547	55	89
PM Peak	2,066	24,326	1,519	1,362	1,009	30,282	110	455	215	72	34	886	55	90
PM Evening	161	1,686	19	0	0	1,866	9	40	3	0	0	52	55	91
<b>Total</b>	<b>2,897</b>	<b>44,169</b>	<b>2,576</b>	<b>1,764</b>	<b>1,420</b>	<b>52,826</b>	<b>154</b>	<b>861</b>	<b>371</b>	<b>93</b>	<b>49</b>	<b>1,528</b>	<b>55</b>	<b>90</b>
	5.5%	83.6%	4.9%	3.3%	2.7%		10.1%	56.3%	24.3%	6.1%	3.2%			
Standing	10.9%						33.6%							

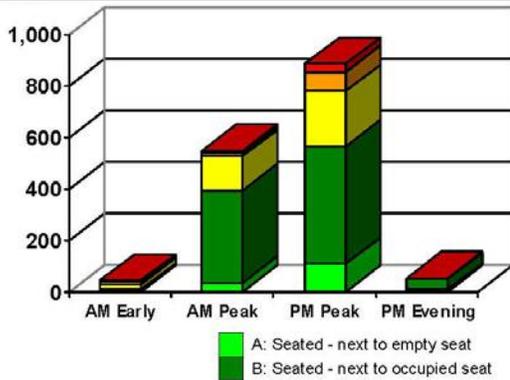
Passengers



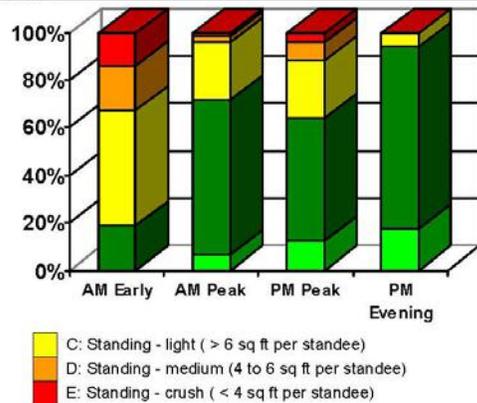
Passengers, % of Total



Trips



Trips, % of Total



Crowding in accordance with TCRP Report 113, "Using Archived AVL-APC Data to Improve Transit Performance and Management"

Crowding determined at maximum load point

## ECCTA Service Standards

<b>Standard</b>	<b>Current</b>	<b>Proposed</b>
<p>Vehicle Headways</p>	<p>All established routes shall operate on a minimum headway of one hour with the following exceptions:</p> <ol style="list-style-type: none"> <li>1. Commuter service (limited stop service that is limited to peak periods)</li> <li>2. Routes that do not meet the current productivity guidelines</li> <li>3. Routes that have more than 1.5 miles between stops due to ADA bus stop accessibility standards</li> </ol>	<p>All established routes shall operate on a minimum headway of at least one during the hour for the routes span of service with the following exceptions:</p> <ol style="list-style-type: none"> <li>1. Commuter service (limited stop service that is limited to peak periods)</li> <li>2. Routes that do not meet the current productivity guidelines</li> <li>3. Routes that had trips with less than 5 passengers per trip and the trip was discontinued</li> <li>4. Routes that have more than 1.5 miles between stops</li> <li>5. Routes that have more than 1.5 miles between stops due to ADA bus stop accessibility standards</li> <li>6. Routes that operate school days only</li> </ol>
<p>Transit Amenities</p>	<p>The distribution of transit amenities including benches, shelters, and trash cans should be no less than 2.65 amenities per directional route mile. The exceptions are commuter service routes and routes that have more than 1.5 miles between stops.</p>	<p>The distribution of transit amenities including benches, shelters, and trash cans should be no less than 1 amenity per directional route mile. The exceptions are commuter service routes, routes that have more than 1.5 miles between stops, and routes that are operated school days only.</p>
<p>Service Availability</p>	<ol style="list-style-type: none"> <li>1. 75% (39) of all census tracts shall have fixed route service that operates on a minimum of one hour headways</li> <li>2. 85% (44) of all census tracts shall have at least commuter service</li> <li>3. 50% (26) of all census tracts shall have fixed route service that operates on a minimum of thirty minute headways during peak periods</li> <li>4. 50% (26) of all census tracts shall have fixed route service with at least one hour headways on weekends/holidays</li> </ol>	<ol style="list-style-type: none"> <li>1. 40% of all census tracts shall have fixed route service that operates on a minimum of one hour headways as defined by Vehicle Headways</li> <li>2. 40% of all census tracts shall have fixed route service that operates on a minimum of thirty minute headways during peak periods as defined by Vehicle Headways</li> <li>3. 40% of all census tracts shall have fixed route service with at least one hour headways on weekends/holidays as defined by Vehicle Headways</li> </ol>

<b>Standard</b>	<b>Current</b>	<b>Proposed</b>
Vehicle Assignments	All revenue vehicles are assigned to routes on a rotating basis. Most routes are interlined so buses assigned to a block will be used on all routes. Buses are not assigned to a particular route therefore buses are evenly distributed throughout the entire service area on a random basis. 90% of all route blocks shall include at least two different routes	All revenue vehicles are assigned to routes on a rotating basis. Most routes are interlined so buses assigned to a block will be used on all routes. Buses are not assigned to a particular route therefore buses are evenly distributed throughout the entire service area on a random basis. 70% of all route blocks shall include at least two different routes.
Transit Security	All revenue vehicles are equipped with video surveillance and DriveCam® systems. Additionally, all buses are equipped with GPS and an emergency alarm notification system. ECCTA's dispatch office monitors vehicle location/status and is able to deploy local police forces to a specific location if necessary.	<i>No change:</i> All revenue vehicles are equipped with video surveillance and DriveCam® systems. Additionally, all buses are equipped with GPS and an emergency alarm notification system. ECCTA's dispatch office monitors vehicle location/status and is able to deploy local police forces to a specific location if necessary.
Amenity Placement	None	<p><b>All amenities in place as of May 27, 2015 shall be grandfathered into the service standards new placement shall follow the standards:</b></p> <ul style="list-style-type: none"> <li>• Shelters shall not be placed at stops with less than 41 average boardings/alightings per day or at locations that will not comply with ADA standards</li> <li>• Benches will not be placed at stops with less than 15 average boardings/alightings per day or at a locations that will not comply with ADA standards</li> <li>• Trash receptacles will not be placed at stops with less than 25 average boardings/alightings per day or at a locations that will not comply with ADA standards</li> </ul>

Adopted by the ECCTA Board of Directors June 24, 2015

# ECCTA Productivity Guidelines

July 2015

<u>Productivity Guidelines for Fixed Route</u>	<u>Red Flags</u>	<u>Current level</u>	<u>Goal</u>
Fixed Route Passenger per hour (all fixed routes)	Less than 18	19.4	20
Fixed Route Passenger per hour (established fixed route)	Less than 12	Route 200 (12.6) Route 201 (16.8) Route 300 (20.5) Route 379 (27.2) Route 380 (20.6) Route 383 (13.4) Route 385 (12.6) Route 386 (6.2) Route 387 (23.6) Route 388 (17.5) Route 389 (14.9) Route 390 (21.4) Route 391 (22.1) Route 392 (20.0) Route 393 (20.5) Route 394 (16.5) Route 395 (16.5)	16
Fixed Route Passenger per hour (new fixed route)	Less than 7.0	N/A	10
Fare Box Recovery (fixed route)	Less than 17%	18.0%	20%
Fixed Route Vehicle load factor (per peak period trip)	.100	.251	.750
Fixed Route late Trips (late 11-15 minutes)	More than 4%	4.03%	2.0%

<b><u>Productivity Guidelines for Fixed Route</u></b>	<b><u>Red Flags</u></b>	<b><u>Current level</u></b>	<b><u>Goal</u></b>
Fixed Route Miles between Preventable Accidents	Less than 100,000	146,000	166,000
Fixed Route Miles between Road Calls	Less than 20,000	25,000	30,000
Fixed Route Customer Complaints	More than .048%	.024%	.012%
Fixed Route Early Trips	More than 2%	1.05%	.4%
<b><u>Productivity Guidelines for Paratransit</u></b>	<b><u>Red Flags</u></b>	<b><u>Current level</u></b>	<b><u>Goal</u></b>
Paratransit Miles between Road calls	Less than 30,000	35,000	45,000
Paratransit Miles between Preventable Accidents	Less than 100,000	136,000	156,000
ADA Ride Refusals	More than 1 month	0 per month	0
Paratransit Passenger per hour (weekday)	Less than 1.5	2.1	2.5
Paratransit Late Trips (+15 minutes)	More than 7%	5%	2%
Paratransit Fare Box Recovery	Less than 8%	10%	12%
Paratransit Customer Complaints	More than .371%	.152%	.126%

<b><u>Productivity Guidelines for both Fixed Route and Paratransit</u></b>	<b><u>Red Flags</u></b>	<b><u>Current level</u></b>	<b><u>Goal</u></b>
On-Time Performance	Less than 90%	92.16%	96.1
Customer Calls received vs. recorded	More than 10	100%	100%
Preventative Maintenance Inspections	Less than 95%	96%	98%
Operator Uniform Infractions	More than 1 per month	2 infractions per year	0%
Operating Air Conditioners in buses	More than 1 inoperable per month	2 inoperable per year	1 per year
Lost Calls	More than 18%	22.8%	Less than 8%
Average time for Abandoned Calls	More than 2'20"	2'15"	Less than 1'30"
Lift/Ramp availability	More than 1	100%	100%

**FORT WORTH TRANSPORTATION AUTHORITY**  
**SERVICE STANDARDS**



**DECEMBER, 2013**

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## **Introduction**

This document is intended to outline Service Standards for service that is operated by the Fort Worth Transportation Authority (The T).

The T's mission is to provide quality public transportation service that respond innovatively to the diverse and changing mobility needs of our community. The Service Standards lay out a framework for achieving this mission; they also provide a framework for a consistent and fair evaluation of both existing and proposed services.

By constructing an evaluation framework, the T will be able to analyze the productivity of transit services. Service changes and requests can then be made based on data collected and reviewed according to established policy measures. These service standards are the performance goals and measures set by the T that defines where transit service is performing at inadequate, adequate, or superb levels. By comparing the performance of individual routes to appropriate service standards, T staff can determine if a route is performing adequately or inadequately in some dimension of the service. This document is organized into the following sections:

- Definition of Service Categories
  - Radial
  - Crosstown
  - Feeder
  - Lifeline
  - Express
  - Rider Request
  - Commuter Rail
- Service Availability
  - Transit Needs Index
  - Bus Stop Placement
- Distribution of Amenities Standards
  - Bench & Shelter Placement
- Service Quality:
  - Vehicle Load Standards
  - Vehicle Assignment
  - Service Frequency
  - On-time Performance
- Service Standards Monitoring Methods:
  - On-going Monitoring Procedures
  - Route Performance Index (RPI)
- Service Change Process
  - Major Service Change Policy
  - Disparate Impact Policy
  - Disproportionate Burden Policy

- Appendix A – Transit Needs Index calculation methodology

## **Definition of Service Categories**

T fixed route bus service includes local fixed route, express route, and rider request routes. T also operates commuter rail service.

Local fixed route service is oriented toward traditional transit users and/or transit dependent populations. It is defined as bus service that runs within shared public right of way along a specified path on a specified frequency. (The frequency varies from 15 minutes to 60 minutes.) Local fixed route service can also be classified into one of five categories.

- *Radial service* is oriented toward a common transfer point (usually the Intermodal Transportation Center in Downtown Fort Worth). The result is that several routes (spokes) connect at one point (hub).
- *Crosstown routes* are oriented toward providing a direct east-west connection between communities and employment centers. Although transfers are possible along these routes, they do not serve downtown.
- *Feeder Routes* are focused on transit centers and rail stations to facilitate transfers and to feed and distribute riders to/from other routes.
- *Circulator Routes* provide circulating service on a fixed weekday schedule. These routes usually provide access to niche/specific markets such as universities, shopping, entertainment, business parks, CBD population centers or other attractions and typically contain variable and flexible service based on demand.
- *“Lifeline” service* is defined as a fixed route that is the only service within 1/4 of a mile of one or more of the following: public housing, public social service facilities, public medical facilities or public post-secondary school for low income residents. These routes also provide the only access from transit dependent neighborhoods to essential shopping or medical facilities.

Additionally, the T provides express and rider request service on rubber-wheeled vehicles.

- *Express service* typically attracts riders who prefer the modal transit option to a daily commute by automobile. It provides service with a limited number of stops and generally operates to and from downtown.
- *Rider Request service* was developed to serve transit needs in areas that are new to the service area, or where the mobility needs do not warrant a fixed route service. Rider request areas are designated as special zones within the service area, where vehicles are made available to pick up and drop off passengers within that zone, at the rider's request. Trips are “booked” through phone calls made to the T customer service line.

The T jointly operates commuter rail service with Dallas Area Rapid Transit (DART) under

contract with Herzog. This service is known as Trinity Railway Express (TRE). Commuter rail is a mode of passenger transportation using vehicles with steel wheels on steel rails using tracks that are part of a general rail network.

## Service Standards

The standards for the level and quality of service is developed using the following key components:

- Service Availability & Distribution of Transit Amenities
  - Route Spacing
  - Bus Stop & Distribution of Transit Amenities Standards
- Service Quality
  - Vehicle load factors
  - Vehicle Assignment
  - Service Frequency

The following details how these components are put to use.

### SERVICE AVAILABILITY

Adequate service availability is determined by two important elements: access to bus routes and access to bus stops. Additionally, the items of comfort and convenience available to the general riding public such as benches and shelters must be conveniently and equally distributed.

#### Route Spacing

Route spacing is the average distance between parallel routes. Good accessibility to nearby routes will enhance the attractiveness of transit. Service should be designed to provide all segments of the population with reasonable accessibility from residential areas to employment shopping, medical, education, and recreation centers. A good measure of accessibility is the distance between transit routes or route spacing. Factors that affect route spacing include geographical conditions, population concentrations, and trip generators. Route performance is also considered when determining route spacing.

One reasonable way to estimate route spacing requirements is to use a **Transit Need Index (TNI)**. The TNI helps to identify areas most likely to have captive riders, or those who have no choice but to use transit and include a “minority persons” component to allow consideration of impacts on minority populations. The methodology for calculating the TNI is illustrated in [Appendix A](#).

When planning route spacing, the T considers both coverage-based goals and productivity-based goals. Coverage-based route spacing goals attempts to provide service to all areas however it may produce a low-quality service, especially in high transit demand areas. The additional use of productivity-based goals leads to more efficient use of resources. Productivity-based route planning will lead to higher levels of service to areas demonstrating the strongest demand. To assure that routes critical to transit dependent groups are not negatively impacted by productivity-based route planning, the use of “lifeline” route classification may be applied to protect the route from elimination.

The following are the T’s “coverage-based” goals for radial routes:

Very high transit need	80% of population within ¼ mile of bus route
High transit need	60% of population within ¼ mile of bus route

Average transit need     50% of population within ¼ mile of bus route  
 Low transit need         as demand indicates

The use of coverage-based route planning is a good first step when evaluating route spacing. Ultimately, the use of productivity-based measures—such as Route Performance Index—as described on [page 16](#), will also be used to determine route spacing.

If any bus service, regardless of frequency, is provided along a given street, then all residents within ¼ mile of that street are considered to have access to service.

**Bus Stop Spacing**

In general, bus stops should be located in the vicinity of demonstrated or potential ridership generators where this can be accomplished safely.

A requested location that has a projection of a minimum of 10 boardings per day should be considered as a candidate for a bus stop. This is determined by considering the land use of the area and/or identifying if there are key ridership generators.

To maintain an efficient flow of bus travel, spacing of bus stops is an important point to consider. In general, the land use development is the primary factor in determining the number of bus stops placed per given area. The following are general rules of thumb for spacing of bus stops:

<b>Environment</b>	<b>Spacing Range</b>	<b>Typical Spacing</b>
Central Core Areas of CBD's	300 to 1000 feet	600 feet
Urban Areas	500 to 1200 feet	750 feet
Suburban Areas	600 to 2500 feet	1000 feet

**Station spacing**

Station spacing is important for efficient running time of the commuter rail which, as opposed to light rail technology, has longer acceleration and deceleration times. The average spacing along the TRE Commuter Rail line is 3.6 miles apart. Currently, there are 10 stops along the line.

According to the RAILTRAN Corridor Planning and Implementation Study (Final Report, June 11, 1992), the historical placement of the stations were based upon base ridership projections, site's development suitability (high density, mixed use, industrial and low density), transit access and linkage potential, timing for joint development, availability and strength of joint venture partner and ridership increase from joint venture partner. Each proposed station was evaluated according to a rating and weighting system determined on these factors.

The following are the existing spacing between the stations:

No.	Stations	Distance between Stations (in miles)
1	T&P Building to ITC Terminal	0.75
2	ITC Terminal to Richland Hills	7.10
3	Richland Hills to Hurst-Bell	3.96
4	Hurst-Bell to Centerport	6.16
5	Centerport to West Irving	2.56
6	West Irving to South Irving	3.50
7	South Irving to Medical/Market Center	6.30
8	Medical/Market Center to Victory	0.94
9	Victory to Union Station	1.35
	Average Distance between Stations	<b>3.62</b>
	Total Distance on Tracks	<b>32.62</b>

## **DISTRIBUTION OF AMENITIES**

### **Bench Placement**

The T provides benches for the added convenience of its passengers. Benches are recommended at frequently used stops where the numbers of daily passenger boardings is generally higher than at locations with stand alone bus stops. An overall goal is to have benches placed strategically to allow equal availability throughout the system. In the initial assessment for bench placements, **ridership should be at a minimum of 25 boardings per day**. Other criteria such as the presence of “sensitive” facilities—such as adjacent hospitals, senior citizen housing, schools, social service facilities, or apartments—may be considered if the minimum boarding requirement is only partially met.

### **Shelter Placement**

Passenger shelters provide seating and protection from bad weather for customers and are particularly important to senior citizens, parents with small children, and persons with disabilities. Although shelters are a popular amenity option at bus stops, the associated cost of placement and maintenance allows only a limited amount of shelters possible throughout the service area. To identify locations and calculate a fair distribution method, a point system was established to prioritize and rank locations.

All shelter requests will be ranked using the following points scoring. The qualification factors and corresponding points are listed below.

<b>Qualification Categories</b>	<b>Points</b>
Accessibility (ADA)	
Boardings	1 point for each boarding, Minimum of 50 Boarding req.
Major activity/employment center	25
Hospital or Social Service Agency	25
Apartment complex	20
Local Community Request	20
Schools	20
Minor Activity Center	15
Transfer Point	15
Joint participation (public/private)	15
Customer Request	1 per request
Limited Headway (midday greater than 55 minutes)	10
Non-customer request	1 per request

All locations that generate a score of 80 or more points qualify for the placement of a shelter, pending a safe, specific site can be identified. In the initial assessment for shelter placements, **ridership should be at a minimum of 50 boardings per day**. Sties qualifying for a shelter shall be made ADA Accessible”.

**Park and Ride & Rail Facilities**

Stand alone Park-and-Ride and rail facilities are treated with similar passenger amenities including canopies, benches/seating and trash receptacles.

**Commuter Rail Facilities**

There are 10 rail stations along the single TRE commuter rail corridor. All stations have low-level boarding with high-blocks for mobility-impaired passengers. The stations at a minimum can accommodate four passenger cars. Other key features of stations are:

- Platform with 24 inch wide textured warning strip at edge;
- High-block platform with ramps at east end of each platform to permit high-level boarding by wheelchair users and mobility-impaired passenger;
- Ticket vending machines;
- Arched canopies;
- Pedestrian track crosswalks;
- Landscaping features such as planters and trees;
- Telephones;
- Kiss-and-ride facilities;
- Park-and-ride facilities at all stations excluding Downtown Fort Worth ITC and Medical Market stations which are “destination” locations.

**SERVICE QUALITY**

The T will evaluate the level of service and quality of service by analyzing vehicle loads, considering vehicle assignments and reviewing service frequencies. TRE service indicators are addressed in the Herzog Operations and Maintenance contract.

**Vehicle Loads**

The expectation of scheduled transit service is to operate buses with a full seated load of passengers (100% of vehicle seated capacity). During peak periods, when demand is greatest, it is acceptable to have standees. In such instances, the load factors (expressed as a percentage of seated capacity for a given bus) for fixed route service should not exceed the following guidelines:

<b>Route Type</b>	<b>Peak Hours</b>	<b>Off-Peak Hours</b>
Radial	125%	100%
Crosstown	125%	100%
Express	100%	100%
Circulator	125%	100%
Feeder	125%	100%
Rider Request	125%	100%
Commuter Rail <sup>1</sup>	100%	100%

**Vehicle Assignments -**

It is The T's policy to comply with 49 CFR Section 21.5(b)(2) and 49 CFR Section 21.5(b)(7), Appendix C to 49 CFR part 21 regarding Title VI compliancy in our assignment of vehicles. In that regard, The T considers the several factors when assigning vehicles or commuter rail to service. For fixed route buses it includes spare ratio, load factors, service frequency, type of service, and vehicle fuel capacity. There is no disparity regarding the amenities of T vehicles.

**Assignment of Fixed Route Buses:**

All buses are wheelchair equipped, CNG fueled and air-conditioning equipped. The size of the peak load in relation to frequency help to determine what size vehicle is assigned to the route. The vehicles are assigned using the following criteria as a general consideration:

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<sup>1</sup> According to the TRE ILA between The T and DART, the "goal" for commuter rail load capacity is a seat for every passenger. However, because of the physical car-length restrictions at the stations and capacity constraints on the operating corridor, standees are allowed for short durations during peak period trips and special event-type service. Service levels will be reviewed when individual trips exceed the standard loading factor for a period of greater than six consecutive months.

Frequency	Load Factor (Ave Pass per hour)	Vehicle Assignment
60 min	≤ 15	30'
60 min	>15	35'
45 min	≤ 15	30'
45 min	>15	35'
15-30 min	≤ 15	30'
15-30 min	>15, ≤20	35'
15-30 min	>20	40'
15 min	>30	60'

Other criteria impacting vehicle assignments:

- Spare Ratio (for all vehicle categories) – The T operates a fleet of six different categories of vehicles when considering size and style. The T utilizes a minimum of a 10% spare ratio of vehicles per category to ensure service continuity and passenger capacity. Scheduling must maintain the 10% minimum to ensure available spares within the category to maintain customer satisfaction.
- *Fuel Capacity* – The T operates a CNG fueled fleet that restricts range in some of the fleet. Bus assignment is governed by length of run, range of vehicle and refueling requirements. Vehicles are assigned as follows: runs of less than 8 hours; any vehicle based upon load factors. Runs of over 8 hours; 35'-40' buses based upon load factors. Runs of over 12 hours and load factors of > than 20 are assigned 40' buses.
- *Type of Service* - The type of service is another factor in determining assignments when load factor, frequency or fuel capacity is not issues in service delivery. Limited stop service, (express), flex route service, (demand), or circulator service utilize all types of vehicles available that does not compromise the availability of vehicles needed to accommodate load factors on other routes while maintaining the 10% minimum spare ratio per category. Service provided by rubber-wheeled trolley typically consists of fluctuating passenger loads. These routes are inspected by supervisors and are addressed by adding additional vehicles based on visual demand.

Assignment of Commuter Rail vehicles:

The T provides modern, reliable and comfortable coaches, equipped with full climate control, air-conditioning and other amenities for its commuter rail facility. All are accessible to passengers with disabilities.

Following are the description of the cars or coaches that are assigned and their key service standards:

- *Types of Cars* – There are two types of cars that are run on the commuter rail facility.
  - 13 Rail Diesel Cars (RDC), having 96 seats per car, built in 1954 and refurbished by DART in 1995-96. The maximum speed that these cars could attain is 60 miles per hour.
  - 17 Bi-Level cars, having a seating capacity of 120 to 142 seats per car. The built dates of these cars range from 1976 to 2000 and the average age of these cars is 15.76 years. The maximum speed that these cars could attain is 79 miles per hour.

Capacity is the primary determination of which type of car is utilized. The bulk of the operation relies on the Double Decker cars. The RDC cars are used when passenger load demand are low.

**Vehicle Headway**

Headway or time between buses on a given route should be developed to provide a sufficient number of vehicles at the maximum load point to accommodate the passenger demand. Minimum headways are recommended to allow baseline accessibility to service. Whenever possible, frequencies should be set at regular clock-face intervals such as every 15, 30, or 60 minutes to improve transfer movements.

Minimum and maximum service headways by route category are recommended as follows:

<b>Route Type</b>	<b>Peak Min/Max</b>	<b>Base Min/Max</b>	<b>Night Max</b>	<b>Saturday Min/Max</b>	<b>Sunday Max</b>
Radial	15/60	15/60	60	15/90	90
Crosstown	30/60	30/60	60	30/60	60
Feeder	30/60	30/60	60	30/60	60
Circulator	Demand	Demand	Demand	Demand	Demand
Express	Demand	Demand	Demand	Demand	Demand
Commuter Rail <sup>2</sup>	--/60	--/90	--/60	--/120	Demand

Operational Peak = 6-9am & 3-6pm  
 Base = 9am – 3pm  
 Night = 6pm until end of operation day

**Service Span**

The time between the first and last trip operated on a route is the span of service on that route. It is the T's goal to have a consistent span of service for all routes to maximize the opportunities for passengers to avail themselves of the connectivity of the T's bus service.

The standard for span of service for each type of T fixed-route service is illustrated by the following chart, which illustrates the recommended latest start time and earliest stop time:

<sup>2</sup> Excludes Victory Station which is a special events station.

<b>Route Type</b>	<b>Weekday First Trip/Last Trip (departures)</b>	<b>Saturday First Trip/Last Trip (departures)</b>	<b>Sunday First Trip/Last Trip (departures)</b>
Radial	5:40am to 10:15pm	7:15am to 7:15pm	8:15am to 6:15pm
Crosstown	4:35am to 8:00pm	5:35am to 7:00pm	6:31am to 6:00pm
Feeder	7am to 8pm	7am to 7pm	8am to 6pm
Circulator	Demand Based	Demand Based	Demand Based
Express	Demand Based	Demand Based	Demand Based
Rider Request	Demand Based	Demand Based	Demand Based
<b>Commuter Rail Service Span</b>			
<b>Route Directions</b>	<b>Weekday First Trip/Last Trip (departures)</b>	<b>Saturday First Trip/Last Trip (departures)</b>	<b>Sunday First Trip/Last Trip (departures)</b>
Westbound Trip from Union	5:30am/11:06pm	8:50am/11:05pm	Demand
Eastbound Trip from T&P	5:00am/9:42pm	8:50am/9:50pm	Demand

Service span maybe extend beyond our normal service period under special circumstances. Significant extensions would go through the public input process and be presented to the Board of Directors for approval prior to implementation.

**On-time Performance**

On-time performance (OTP) is a measure of runs completed as scheduled. The T’s definition of “on-time” is any bus that arrives within five-minutes of posted time point. Additionally, the TRE’s definition of “on-time” is any train arrival within five-minutes of the posted time on the schedule.

**Transit Security**

The Fort Worth Transportation Authority, The T, currently operates its transit security policy through the implementation of a **System Security and Emergency Preparedness Plan (SSEP)**. The SSEP outlines roles and responsibilities of all agency employees, as well as contracted security personnel. In addition to contracted physical security at the agency’s critical facilities, off-duty Fort Worth and Richland Hills police officers are hired to provide security at our transportation/transfer centers, on buses, and on the agency’s commuter rail line.

The agency also provides 24-hour video surveillance at all commuter rail stations and at The T’s administration building. Primary duties of off-duty police officers are to provide police presence, respond to criminal activity or disturbances as needed, and target areas with higher levels of criminal activity. Contracted physical security provided at certain facilities and is used as an on-site deterrent; respond to incidents as needed, monitor video surveillance system, as well as assisting passengers with transportation inquiries.

Security training programs have been implemented during new-hire orientations, as well as annual refresher training for all employees. Security awareness information is available to our

passengers on all fixed route buses, and at all major transportation facilities. The training programs and awareness information serves to educate all employees and passengers on observing, documenting, and reporting suspicious behavior or activity.

The T will comply with 49 CFR Section 21.5(b)(2) and 49 CFR Section 21.5(b)(7), Appendix C to 49 CFR part 21 to supply a transit policy leading to secure and safe transit system without regard to race, color, or national origin. Security deployment of Transit Security Officers (off-duty FW and R.H. police) generally details randomly riding the commuter rail line throughout operation, patrolling all transportation/transfer centers, and responding to calls for assistance - on buses or at bus stops- received through the bus operations communication center. Our deployment of these officers also entails addressing specific areas with higher levels of criminal activity. This is determined through incident reports received from bus operators and supervisors. Targeting specific areas will sometimes increase security presence at the intended area, while decreasing a presence at other areas with little or no activity.

Contracted security personnel are permanently assigned to two of our five commuter rail stations. The ITC and T&P stations provide an array of business amenities (public events, food services, other transportation needs, etc.) and, therefore, are more likely to be a greater terrorist risk than the other three stations which provide 'park-n-ride' only services. As a result, physical security at these locations are operated full time, 24-hours a day.

## **Service Standards Monitoring Methods**

The T's service standard policies are monitored using the following key components:

- On-going Service Standards Monitoring Procedures
- Route Performance Index

## **ON-GOING SERVICE STANDARDS MONITORING PROCEDURES**

Various T Departments and TRE Staff are responsible for monitoring and evaluating the quality and level of service on an on-going basis to assess adherence to documented service standards. These procedures will be undertaken by the following techniques:

### **Fixed Route Monitoring -**

#### **Performance Report**

A Monthly Performance Report will be generated by the Accounting department using data obtained from fare boxes and. This report identifies ridership levels for all modes and reports Key Performance Indicators (KPI), including Subsidy per Passenger, Passengers per Hour, Passengers per Mile and On-time Performance. T staff, including Planning, Operations and Accounting departments, review this information to help determine general route performance and to identify routes which are developing vehicle loading concerns in need of more thorough investigation.

#### **Customer Comments**

T customer service representatives will record and track comments and suggestions which will be forwarded to appropriate department for response or resolution. Title VI complaints will be forwarded to the Title VI compliance officer. Comments such as vehicle loading complaints or

on-time performance will be forwarded to the Operation department. Complaints regarding vehicle condition are to be forwarded to the Maintenance department. Route spacing, service frequencies or stop requests will be forwarded to the Planning department.

### **Field Checks**

The T's Ride Check Program encourages Management staff to become proactive in riding The T's buses. This Program helps key decision makers to interact with transit users and operators and therefore creating a better understanding of our customer's experiences and conditions. The Program also improves communications between management staff and operators. Each member of management staff is required to ride at least one route each quarter and provide a report of his or her observations.

As operational concerns surface—through information from the Performance Report, customer comments or visual inspections—a supervisor field check will be conducted. For example, if vehicle loads are being identified at excessive, an operations supervisor will be requested to conduct a load check and/or On-Time Performance to inspect the quality of operating service. Excessively over loaded routes will be relieved by placing a larger capacity bus on the route and eventually by increasing service frequency.

### **Boarding and Alighting Study**

A Boarding and Alighting Study will be periodically conducted by a private contractor which will provide a comprehensive and systematic review of the T's passenger loads and a stop-by-stop review of the T's system. The following information will be determined as part of Boarding and Alighting Study: Maximum load point, location of major alighting/boarding points and schedule adherence. Findings in any of these areas may warrant consideration of service changes or headway modifications as a general rule. Any recommended changes must be analyzed to determine the impacts on minority communities and minority transit users and must go through a public hearing process. Our goal is to complete this study every three (3) years.

### **Public Input**

The planning and marketing staff utilizes public outreach such as public meetings, community meetings, neighborhood association meetings and open forums to gather comments on the existing service or recommended improvements. The T also uses a public comment line where customers can leave messages providing recommendations or comment. Additionally, the T conducts periodic customer surveys to ascertain public input.

### **Commuter Rail -**

The TRE Commuter rail experiences continuous monitoring through the following methods:

- Daily on-time reports
- Daily ridership reports
- TRE management quality assurance inspections
- Contractor oversight of employees for quality service
- Customer comments
- General reports/comments from agency employees that use the service

## **ROUTE PERFORMANCE INDEX**

A Route Performance Index is calculated quarterly for the purpose of providing an objective, quantifiable method of measuring the performance of bus routes and identifying those poorly performing routes which should be addressed to improve performance or eliminated because of uncorrectable poor performance. The Route Performance Index can also be used as a straightforward method to conduct “before and after” comparisons of a route that has been physically changed or has had service level modifications. This will allow the evaluator to determine if a route modification was efficient and/or effective.

The T uses subsidy per passenger, passengers per hour and passengers per mile, among other variables, as part of its Key Performance Indicators (KPI). These measures provide the agency with detailed information relating to utilization of service capacity, utilization of resources and fiscal responsibility, however, sole use of the KPI does not allow individual routes to be evaluated in comparison to their peer routes.

Additionally, evaluating bus performance simply by reviewing total ridership does not provide a true measure of how well a route is performing if there have been changes in the level of resources used for the route, such as miles and hours increases or decreases.

The concept of an RPI will be used to objectively measure the performance of a route relative to other routes within the same service classification and will be used in conjunction with the T Board of Director approved KPI to internally evaluate bus routes.

The method of establishing the Route Performance Index includes the following:

- A standard for each performance measure in each route category (Radial, Crosstown and Express) is set based on the previous fiscal year’s resulting average subsidy per passenger, passengers per hour and passengers per mile.
- The performance measurement index for each route is calculated relative to the route category standard.
- Once the indices for each performance measure are calculated relative to each individual route, all values are normalized to a value of one (1).

### **Method for Calculating the Route Performance Index -**

The RPI value for the subsidy per passenger, passengers per hour and passengers per mile measures is a normalized number whereas the individual performance of route is divided by the set standard for its route category. The standard will be the past Fiscal Year’s average. The mathematical relationship for the subsidy per passenger measure is an inverse one: the lower the value the better the performance. Because of the inverse relationship, the index value for subsidy per passenger is calculated by dividing the standard by the individual route’s performance.

The mathematical explanation of the RPI calculation is as follows:

Route Performance Index =

$$\frac{\text{Index Passenger Per Mile} + \text{Index Passenger Per Hour} + \text{Index Subsidy Per Passenger}}{3}$$

where:

Index Passenger Per Mile =

$$\frac{\text{daily passengers per revenue mile}}{\text{previous FY passenger per mile average (standard)}}$$

Index Passenger Per Hour =

$$\frac{\text{daily passengers per revenue hour}}{\text{previous FY passenger per hour average (standard)}}$$

Index Subsidy Per Passenger =

$$\frac{\text{previous FY subsidy per passenger average (standard)}}{\text{daily subsidy per passenger}}$$

An index resulting in a value of “1” or greater states that a route is performing satisfactory or at standard. Routes with an index number between 0.4 and 0.9 meet the minimum expectations but will be monitored to assure trends are not negative. Routes with an index number of 0.3 or below need improvement and are candidates for immediate corrective action if they have been in existence greater than 18 months.

Calculating the standard deviation of RPIs in the established base year of 2002 identified the use of 0.4 as the minimum expectation threshold. Standard deviation is a measure of the range of values in a set of numbers (in this case, the RPI). It is a statistic used as a measure of the dispersion or variation in a distribution, equal to the square root of the arithmetic mean of the squares of the deviations from the arithmetic mean.

Those routes that perform below minimum expectations of 0.4 RPI will be targeted for action directed toward improving performance. A detailed improvement plan shall be developed and implemented.

#### **Route Improvement Plan**

The following are possible actions to be included in a Route Improvement Plan on targeted low performing routes:

- Targeted marketing
- Service frequency changes
- Service period and service day adjustments
- Rerouting
- Rescheduling
- Elimination nonproductive route segments
- Consolidation of segments into other routes

After implementation of a Route Improvement Plan, the route will be given twelve (12) months to move toward meeting minimal expectations. Any routes that do not achieve this performance

shall be targeted for additional curtailment or elimination. In some instances, positive ridership growth trends will be sufficient to classify the route as meeting improved performance requirements. The exception will be those routes classified as “Lifeline Routes”.

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## **SERVICE CHANGE PROCESS**

In order to comply with 49 CFR Section 21.5(b)(2), 49 CFR Section 21.5(b)(7) and Appendix C to 49 CFR part 21, The T shall evaluate significant system-wide service changes and proposed improvements at the planning and programming stages to determine whether those changes have a discriminatory impact.

In order to assure consistency and proper planning for changes within the service area, the following steps are utilized for fixed-route service changes at the T. Each service change takes approximately three months to complete.

- 1) Planning Review Proposals for Changes
  - a. Planning Dept. reviews input from operations, community, and customers throughout the year. At this stage of the process each request will be evaluated as to feasibility, efficiency, and necessity. In order to complete this analysis, demographic information will be considered along with field testing of the street infrastructure and trip generators.
- 2) Conduct evaluating the impacts of major service changes on compliance of Title VI (See *description of process below*)
- 3) Prepare Final Proposals
  - a. Planning Dept. finalizes maps and listing of initial proposals.
- 4) Prepare initial costing for changes
  - a. Planning completes initial analysis to provide rough costs for changes
- 5) Interdepartmental Staff Coordination Meeting
  - a. Operations, Planning, Scheduling, Graphics meet to review proposals
- 6) Senior Management Overview Meeting
  - a. Planning presents initial proposals with costing to senior management to receive input regarding final proposals.
- 7) Field Checks
  - a. Planning conducts safety checks on proposed routes to insure that all turns are feasible.
- 8) Hold Community and, or Public Hearings, if necessary
- 9) Board Approval, if necessary
- 10) Runtime Verification
  - a. Planning completed runtime verification according to the runtime verification process.
- 11) Finalize Schedules
  - a. Scheduling builds schedules in scheduling software.
- 12) Bus Stop Placement/Removal Procedures initiated
- 13) Operator Route Guides updated
- 14) Brief Operations of Changes
- 15) Operator Sign Up
  - a. This includes cutting runs, hanging runs, and signing runs. This process is completed over a six-week period.
- 16) Operator Training initiated
- 17) Route Implementation Orders distributed six weeks before implementation date
- 18) Communicate to the community
- 19) Brief Customer Service Representatives
- 20) Bus stop Blitz

- a. T Staff will distribute information to customers at key boarding locations Friday before service change and Monday following service change. Service Changes are generally implemented on Sunday
- 21) Implement Service Change
- 22) Supervisor Debriefing
  - a. Field Supervisors will relay safety concerns, customer comments or suggestions to planning and scheduling staff

**Major Service Change Policy**

This policy establishes a threshold for when a proposed service increase or decrease is “major,” and thus must be subject to a Title VI Equity Analysis. In addition, this threshold meets the requirements of the Memorandum of Understanding and Agreement effective on January 1, 2013 between the City of Fort Worth and The T<sup>3</sup>.

The T defines a major service change as:

1. An increase or decrease of 25% or more of the number of transit route miles of a transit route.
2. An increase or decrease of 25% or more of the number of transit revenue vehicle miles of a transit route, computed daily, for the day of the week for which the change is made.
3. The establishment of a new transit route.

**Disparate Impact Policy**

The Disparate Impact Policy establishes a threshold for determining whether proposed fare or major service changes have a disproportionately adverse effect on minority populations relative to non-minority populations on the basis of race, ethnicity or national origin.

The threshold is the difference between the burdens borne by, or benefits experienced by, minority populations compared to non-minority populations. Exceeding the threshold means either that a fare or major service change negatively impacts minority populations more than non-minority populations or that the change benefits non-minority populations more than minority populations. A change with disparate impacts that exceed the threshold can only be adopted (a) if there is substantial legitimate justification for the change, and (b) if no other alternatives exist that would serve the same legitimate objectives but with less disproportionate effects on the basis of race, color or national origin.

The T establishes that a fare change, major service change or other policy has a disparate impact if the minority populations will experience 20% more of the cumulative burden, or experience 20% less of the cumulative benefit, relative to the non-minority populations, unless (a) there is substantial legitimate justification for the change, and (b) no other alternatives exist that would serve the same legitimate objectives but with less disproportionate effects on the basis of race, color or national origin.

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<sup>3</sup> *The Memorandum of Understanding and Agreement effective on January 1, 2013 between the City of Fort Worth and The T regarding improved program assessments and transparency.*

**Disproportionate Burden Policy**

The Disproportionate Burden Policy establishes a threshold for determining whether proposed fare or major service changes have a disproportionately adverse effect on low-income populations relative to non-low-income populations.

The threshold is the difference between the burdens borne by, and benefits experienced by, low-income populations compared to non-low-income populations. Exceeding the threshold means either that a fare or service change negatively impacts low-income populations, or that the change benefits non-low-income populations more than low-income populations. If the threshold is exceeded, The T must avoid, minimize or mitigate impacts where practicable.

The T establishes that a fare change, major service change or other policy has a disproportionate burden if low-income populations will experience 20% more of the cumulative burden, or experience 20% less of the cumulative benefit, relative to non-low-income populations unless the disproportionate effects are mitigated.

**PUBLIC INPUT****BACKGROUND**

Public input is a requirement of the Federal Transit Administration (FTA) for all fare increases or major service reductions. Grantees must have a written process for how public comment is solicited and considered prior to raising fares or implementing major service reductions. This section shall serve as the written process for the Fort Worth Transportation Authority (The T).

**PROCESS**

The public will have the opportunity to make verbal or written comments anytime The T proposes a fare increase or major service reduction. Minimally, The T will hold one public hearing in order to meet this requirement. In addition to holding a hearing, The T will also notify the public of an address to which written comments may be submitted, along with other agency contact information, such as an e-mail address or phone number to be used for making a public comment. Public comment periods will commence at the time it is advertised and will be at least 15 days in length. Copies of public advertisements will be retained as part of a record of the public input process.

**PUBLIC HEARING<sup>4</sup>**

At 20 days before the date of a public hearing under the paragraph below, provide notice to the governing body of each municipality and the commissioners court of each county affected by the subject of the public hearing by depositing properly addressed notice in the United States mail with postage paid.

Hold a public hearing on (i) any fare change; (ii) a service change involving (A) 25 percent or more of the number of transit route miles of a transit route; or (B) 25 percent or more of the number of transit revenue miles of a transit route, computed daily, for the day of the week for which the change is made; or (iii) the establishment of a new transit route.

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<sup>4</sup> This process meets the requirements of the Memorandum of Understanding and Agreement effective on January 1, 2013 between the City of Fort Worth and The T

When the number of changes of a type described in the preceding paragraph in a fiscal year would equal the percentage applicable in that paragraph, the public hearing must be held before the change that would equal or exceed the percentage.

A public hearing must be advertised in a way that reaches the greatest number of affected parties, within reason. Examples would be postings on transit vehicles and transfer centers, mailers for services in which The T retains the addresses of users, and/or local newspaper advertisements.

For public hearings, the following procedures will be followed:

- The hearing will be recorded and transcribed by staff members of The T
- Participants will be greeted upon arrival and will be asked to provide name and contact information for the record
- The purpose of the meeting shall be stated at the beginning of the meeting
- Staff may supply further background on why the fare or service change is being considered
- Staff shall provide instructions on procedures for making a comment at the hearing as well as providing information on how comments will be provided to decision makers
- An adequate period shall be reserved to ensure participants a reasonable opportunity to make their comments heard
- Participants shall be reminded prior to the meeting conclusion on alternative means of commenting such as in writing or at other public hearings scheduled

### **CONSIDERATION**

Prior to the consideration of a proposed fare increase or major service reduction, applicable decision makers shall receive a document listing all public comments received, whether written comments or verbal comments. These comments shall be considered in making a decision on the proposed fare increase or major service reduction. Additionally, Board members should be encouraged, though not required, to be in attendance at all public hearings or other public meetings addressing the topic. Finally, staff recommendations for raising fares or implementing a major service reduction should consider public comment received and—if feasible, reasonable and viable—be amended as a result.

## **FARE CHANGE EVALUATION PROCESS**

In order to comply with 49 CFR Section 21.5(b)(2), 49 CFR Section 21.5(b)(7) and Appendix C to 49 CFR part 21, The T shall evaluate proposed fare changes at the planning and programming stages to determine whether those changes have a discriminatory impact.

In order to assure consistency and proper planning for changes within the service area, the following are the steps to be utilized for evaluating potential impacts to fare changes.

- 1) Describe the nature of the change, the bases or rationale for the change, the modes of service impacted, and the communities affected by the change.
- 2) Describe what are the impacts of the fare change on minority and/or low-income communities.

- 3) Describe what are the transit alternatives available for riders who would be impacted by proposed fare changes
- 4)
  - a. Describe what, if any, measures The T will take to avoid, minimize, or mitigate any adverse effects of the fare change on minority populations and/or low-income populations?
  - b. Describe what, if any, enhancements or offsetting benefits The T would implement in conjunction with the fare change
- 5) Determine if the proposed fare change will have a disproportionately high and adverse effect on minority populations and/or low-income populations.
- 6) Describe what steps The T will undertake to seek out and consider the viewpoints of minority and low-income populations in the course of conducting public outreach and involvement activities.
- 7) Determine if it is necessary to disseminate information on the fare increases that is accessible to Limited English Proficient persons. If so, describe what steps to provide information in languages other than English are proposed.

## **TITLE VI**

The T is committed to ensuring that no person is excluded or denied benefits of services based on race, color or nation origin and, as such, The T's service standards meet the requirements of 49 CFR Section 21.5.

*(DRAFT NOTE: The T's 'Title VI Program' is currently being developed).*

## **Appendix A**

### Transit Needs Index calculation methodology

To provide an assessment of transit needs within the T's service area, a transit needs assessment is performed. The key element in the assessment is the creation of a Transit Needs Index (TNI). The follow describes the methodology for calculating the TNI.

The TNI uses select U.S. Census data to develop a composite measure for the purpose of assessing transit needs. The items used included:

- Household income under \$15,000 annually,
- Occupied Housing Units with no private vehicle available,
- Persons with a Disability,
- Persons over 65 and between 10 and 19 years of age and
- Percentage of Minorities as percentage of total population.

The TNI helps to identify areas most likely to have captive riders, or those who have no choice but to use transit and includes a "minority persons" component to allow consideration of impacts on minority populations.

To construct the index, census demographic data is manipulated as needed. The index entries are assembled into tabular form by census tract level. Each entry is then ranked. The entry with the most preferable values for transit need receive a lower number and thus a higher rank value.

Higher ranks are given to tracts with lower household incomes, fewer private vehicles, greater percentages of disabled persons, and more people over 65, more people between 10 and 19 and with higher minority populations. Summing each ranked entry by census tract then creates a composite ranking. The median score of all composite rankings is then measured. The final transit index for the census tracts is then created by dividing the median score by each tract's composite ranking. Higher transit index scores indicate higher transit need.

**The formula for the Transit Needs Index is as follows:**

**Transit Needs Index (Census Tract) =**

**Median score of Sum of Ranks/ Sum of Ranks**

$$= \frac{Md_{\Sigma r}}{\Sigma r}$$

**Where:**

**Md= Median score**

**Σr= Sum of Ranks**

**r = Rank scores representing:**

**Household Income under \$15,000**

**Housing Units with No Vehicle Available**

**Persons with a Disability**

**Persons over 65 and between 10 and 19**

## Percentage of Minorities

# SERVICE & PERFORMANCE STANDARDS GOLDEN EMPIRE TRANSIT DISTRICT

## Introduction

Standards for service evaluation provide an objective basis to make the requisite decisions for sustained operation. Performance analysis is used to: 1) Guide the District in determining where service expansion would be most productive, 2) Make service adjustments when necessary, and 3) Develop the annual budget and budget management. Performance standards for fixed routes are discussed under the following three categories: 1) Service Design, 2) Operating Performance, and 3) Economic/Social/Environmental.

In December 2010 the GET Board of Directors adopted the following Vision Statement:

*“GET...doing our part to improve mobility and create livable communities by becoming every household's second car.”*

In addition to the Vision Statement, the Board also adopted a number of Planning Guidelines:

- Services should be designed in a manner which maximizes the seamless connectivity between all routes, modes and systems. In this context seamless means that the passenger should not be discouraged from making a trip because of perceived barriers related to: 1) physical connections, 2) timed transfers, 3) fare payment, or 4) information services.
- The system-wide transit operating speed (as measured by total Annual Revenue Miles divided by Total Annual Revenue Hours) should increase each year or at the very least should never drop below the 2010 baseline.
- Transit service should be designed in a manner that allows it to have a meaningful impact on regional air quality and support achievement toward greenhouse gas-reduction targets.
- Transit should be designed in a manner that supports healthy lifestyles by fostering a pedestrian and bicycle - friendly environment.
- Transit service should be financially sustainable over all time periods.
- Transit planning should be conducted in collaboration with cities and the County in order to integrate transit and land use planning decisions.

In the Short-Term, GET's fixed-route bus network – which had not been substantially altered in 25 years – was reconfigured to reflect population and employment growth since the 1980s and to improve customer service and cost-effectiveness. In the Medium and Long-Terms, it

will be revised yet again to accommodate projected growth and construction of a California High-Speed Rail station, additional changes would be made to Kern Regional Transit (KRT) intercity express bus service, and new modes of transit service including commuter rail would be introduced.

The Short-Term Plan (implemented on Oct. 7, 2012) called for a complete reconfiguration of GET's fixed-route network. Prominent features of the Plan include:

- A decreased emphasis on timed connections at transit centers.
- A new transit center at CSU Bakersfield.
- Increased service to CSU Bakersfield and Bakersfield College.
- Faster cross-town trips using:
  - New Express routes
  - New "Rapid" routes making only limited stops
  - More direct routes
  - Wider spacing of stops
  - A more straightforward and understandable route system

## **Service Design**

**Route Coverage:** One-mile spacings are required in built-up areas. This allows for 1/2 mile distance to a route. Spacings of one mile or more are acceptable for routes that serve less densely populated suburban areas. This standard ensures that routes do not overlap covered areas and that transit services are well distributed throughout the District's jurisdiction.

**Street Characteristics:** It is preferable for conventional fixed routes to operate on collector or arterial streets.

**Directness of Travel:** Routes should be designed to provide direct travel wherever possible. Deviations, branches, and one-way loops should be avoided if at all possible. An exception is for any future checkpoint deviation routes where the nature of this service is to deviate.

**Express and Limited Stop Service:** Express services, usually separate routes, are designed to move people as fast as possible from one area to a major activity center or Central Business District. These routes normally have a long segment of nonstop operation, usually on a freeway. The establishment of new express service is based on the following criteria:

- \* Travel time advantage of 15 minutes over local service.
- \* Minimum of three miles of nonstop operation.
- \* Potential demand to support off-peak as well as peak service.

Limited stop service will stop only at transfer points or major trip generators.

**Residential Density:** Small-lot single family housing of 5 dwelling units per acre can generally support local bus service and is therefore required for intermediate (30 min. headways) levels of service. Medium density residential between 7 to 15 dwelling units per acre can support more frequent service. For minimum level of service, there must be at least 5 dwelling units per acre. Services other than conventional fixed route (i.e. checkpoint deviation and dial-a-ride) should be considered for areas with 3.5 to 5 dwelling units per acre.

**Bus Stop Spacing:** Bus stops shall be placed at an average of two-thirds of a mile apart for rapid routes, one-sixth to one-quarter of a mile apart (850-1,300 feet) for crosstown routes, one-quarter of a mile apart for circulator routes, and for circulator/express routes one-quarter to one-third of a mile apart (1,300 to 1,750 feet) in circulator segments and only at major destinations in express segments.

**Bus Stop Siting:** The key practice for bus stop siting is to properly designate the length, signage, and enforcement of encroachments. Stops should be located at the far side of intersections so that transit vehicles do not impede traffic flow. This standard is to be followed with the exception of special cases where traffic conditions or other circumstances require other configurations. The District's *Transit Facilities Manual* shall be used for specifications.

**Loading Standard:** The objective of scheduled transit service is to provide a seat for every passenger. However, this may not be economically feasible in peak periods. Vehicle loading standards specify the acceptable average number of passengers per vehicle passing the peak load point of a given route during the hour of highest passenger loadings during the day. The standards, which are based on the practical capacities of the vehicles as defined by the equipment specifications, are designed to ensure safety, passenger comfort, and operating efficiency. "Load factor" is the number of passengers on board a vehicle divided by the vehicle's seating capacity. The maximum load factor shall not exceed 140% of vehicle seating capacity. For express service, the maximum load factor shall not exceed 100% at all times. Since the load factor is an average, individual trips may exceed the average during a particular operating period. Load factors greater than 100% on particular trips should not be tolerated for more than 20 minutes. When more than two consecutive trips on a route consistently exceed a seated load, service should be adjusted to reduce passenger crowding. Adjustments include adding a trip, adjusting trip times, or using larger or additional buses, depending on District resources.

**Headways:** Headways (the time between buses on a route) are based on population densities, major activity centers served, actual or potential route usage, schedule design considerations, timed transfer considerations, and District resources. Sixty minutes (weekdays) shall be the maximum amount of time between buses on all routes with the exception of express service. Clock headways (those divisible by 60 minutes) will be used

wherever feasible, since schedules are easier to understand and remember if buses leave at the same times each hour.

**Passenger Shelters:** Shelters should be installed at stop locations where: 1) passenger volumes exceed 40 boardings per day, 2) bus stops are located at major transfer points, or 3) bus stops are located adjacent to schools, shopping, medical facilities, senior citizen housing, community and recreation centers, and disabled residents. Shelters may also be installed at existing or proposed bus stops adjacent to specific developments by the developer/owner as a transit amenity and air quality mitigation measure. Such installations must be coordinated with GET.

**Benches:** Benches should be provided at bus stops where 20 or more passengers board per day. A bench should be provided where 10 or more senior citizens or disabled persons board per day.

**Transit Centers:** The following criteria will apply to a transit center:

- \* Transit centers will be strategically located to enhance the operation of a timed-transfer system. Priority will be given to placing centers at major traffic generator sites.

- \* Transit centers must be large enough to accommodate the maximum number of buses that may be there at one time. This is usually greater than the number of routes serving the center since it must account for buses going different directions on the same route and terminating routes where more than one bus may be laying over at the same time.

- \* The centers shall provide for shelter and sufficient space to allow passengers to board and transfer comfortably. Other desirable amenities include pay phones, and schedule and route information. Each transit center will be well lighted to ensure the safety of drivers and passengers.

- \* Transit centers at major commercial centers will be located as close to the entrance as feasible. Conflicts between buses, autos, and pedestrians shall be minimized.

**Vehicle Assignment Procedure:** Fixed route coaches in the active fleet are rotated on a monthly basis.

## **Operating Performance**

**Incidents:** Safety is the highest priority in all departments of the District. No operating requirement or other activity will take precedence. It is District policy that every incident involving vehicles, passengers, or District personnel be reported immediately. All incidents are analyzed to determine possible remedial and follow-up actions as necessary.

**On-Time Performance:** Schedules should be constructed so that sufficient time is available under normal traffic conditions to complete the trip on time. Where street traffic

varies by day of the week or hour of the day, schedules should be adjusted accordingly. In instances where schedule adherence becomes difficult in peaks by reason of general traffic congestion, schedules for that particular situation should be modified or traffic officials should be urged to remedy the problems causing the congestion. Eighty-five percent of all trips on each route shall run zero minutes early to five minutes late. Under no circumstances should buses run ahead of schedule.

**Missed Trips:** At least 99.25% of all scheduled trips should be completed.

**System Failures:** There should be at least 10,000 miles between calls due to system failures.

## **Economic/Social/Environmental**

**Passengers Per Revenue Vehicle Hour:** Each route shall perform at no less than 100% of the system average for rapid and express routes, 80% for crosstown routes, and 60% for circulator and circulator/express routes.

**Revenue/Cost:** The system should achieve a net revenue/cost ratio of at least 20%.

**Vehicle Cleanliness:** The complete interior of each bus shall be cleaned daily and the exterior shall be cleaned once a week to conserve water during the present drought.

**Heating/Cooling:** One hundred percent of the daily active fleet shall have functioning heaters when the temperature is less than 60 degrees Fahrenheit and functioning air conditioners when the temperature exceeds 85 degrees Fahrenheit.

## **Special Services**

Special services are those which do not conform to the characteristics of the regular services provided by the District and therefore require separate evaluation criteria. Included in this category are: 1) Existing service requiring additional vehicle hours in order to serve a special event or purpose; 2) Service that requires deviating from a regular route in order to serve a special event; and 3) Special purpose routes. Special services will be considered and evaluated based on the following criteria:

**Serving the Public Interest:** Certain community events require the movement of large groups of people during certain hours of the day. These are events that would otherwise seriously restrict traffic movement unless public transit took an expanded role. Historically, these have been annual events although one-time-only events of sufficient magnitude will be considered as well. A decision to provide such services will be based on an evaluation of available resources and the need for the service.

**Cost Effectiveness:** The special service must be evaluated on the basis of both operations and system cost, and on the availability of operators and equipment. Advertising trade-out and promotional benefits will be considered.

**Patronage Potential:** The special service must be evaluated on the basis of expected patronage on the service.

**Service That Could Be Provided By Others:** Service that could be provided by other transportation providers, such as charter providers, taxis, carpools, vanpools, or other dial-up services must be in compliance with federal charter regulations. Service that warrants alternative modes to buses based on cost, geographic limitations, and potential market penetration will be evaluated.

## **Performance Standards Applications to Existing Routes**

Correcting major service inadequacies within the current service area takes precedence over providing service to new areas. The public, as the primary customer and beneficiary of transit service, shall have input into the planning, design, and implementation of new service and the modification of existing service.

The major criterion for continuation/discontinuation of service should be productivity in terms of ridership. Each route in the transit system is judged as a separate entity. However, individual routes must be evaluated with the understanding that routes are interrelated with respect to transfer passengers and the success of the system as a whole. Therefore, a system average is established against which the performance of each route is measured.

Service standards are applied annually as part of the Annual Five-Year Plan Update, which also identifies potential service changes. Implementation of major service changes takes place semiannually concurrent with the issuance of new timetables/maps and the start of a new sign-up. Service changes are made only when there is a demonstrable benefit to the public or when it is necessary to reduce operating costs or solve a particular problem. Schedule changes of up to three minutes later and route alignments of no more than 2 blocks may be implemented as necessary between sign-ups and without the reprinting of public timetables/maps.

1) If passengers per hour falls between 80% and 90% of the system average, a review shall be conducted to determine if there are any segments or trips of the route for which corrective action should be taken.

2) If passengers per hour falls between 60% and 80% of the system average, a formal report will be prepared recommending possible courses of action to be taken to improve performance. The corrective actions will include:

a.) Improved Marketing and Information: Poor performance can be a function of inadequate public information. If a new effort is undertaken in this area, at least three months should be allowed before judging its effect.

b.) Needs Analysis: Staff should study the travel desires of the community and collect detailed information to identify ways of making the service more attractive. This may include realignment or schedule adjustments.

3) If passengers per hour falls below 60% of the system average, the following actions will be considered:

a.) A reduction in the service level. Frequency and service span adjustments are preferable to elimination of a route, though the requirements of timed transfers must be considered.

b.) Service alternatives other than conventional fixed route will be explored (i.e. demand-response, checkpoint deviation).

c.) If it is determined that the particular service requires relatively minimal resources and that the overall system can “carry” the substandard ridership, it might be continued on a six-month review basis by a directive of management.

d.) If continuation would require an unacceptable allocation of the system’s resources (i.e. 10% decrease in revenue/cost ratio ), and other alternatives are not feasible, the route should be terminated.

4.) If passengers per hour performs above the system average, the following actions shall be taken:

a.) Consider frequency improvements.

b.) Analyze weak and strong segments for any adjustments, such as headway improvements and deletion of weak segments.

## **Evaluation Standards for New Service & Extensions**

For new routes as well as trips added to existing routes, a period of 1-2 years should be provided during which less than normal ridership is to be expected. If new service fails to perform at 60% of the system average in passengers per hour after one year, a decision will be made to extend the trial period for up to one additional year, modify the service, or discontinue service. An exception to this rule is when a community or group is willing to participate in sharing the ongoing cost of the new service. However, a substantial need for the service would still have to be demonstrated because resources could be reallocated to other routes and areas which show a greater need.

## **Standards for Provision of Service to New Areas**

The provision of transit service to a development depends on: 1) the availability of resources to provide the service; 2) actual market demand; and 3) the design of the development. District staff will review tentative tract maps and site plans for input. This input will be used

to ensure adequate transit access to new facilities or to allow the District to take advantage of joint development opportunities.

New service to a development will be based on the following transit-friendly characteristics:

**Density and Compactness:** Higher densities and compact patterns of development lead to higher usage of transit (see prior discussion on residential densities). Transit cannot be efficient if origins and destinations are thinly spread throughout a region. Small-lot single family housing of 5 dwelling units per acre can generally support local bus service and is therefore required for intermediate (30 min. headways) levels of service. Medium density residential between 7 to 15 dwelling units can support more frequent service. For minimum level of service, there must be at least 5 dwelling units per acre. Services other than conventional fixed route (i.e. checkpoint deviation and dial-a-ride) should be considered for areas with 3.5 to 5 dwelling units per acre.

**Land Use Diversity:** Incorporate mixed, compatible land uses into all zoning districts. Permit the combining of complementary office, service, residential, and retail uses. Mixed land uses can reduce the need for and the number of auto trips, encourage walking between land uses, and encourage public transportation usage. Service will be provided to all major commercial centers, hospitals, and major employers. However, size alone may not be sufficient to justify service. The nature of the commercial activity, availability of free or low cost parking, and the distance of the facility from housing or other commercial centers are all important factors in determining the future success of transit services to any given site. Service to all other major activity centers will be provided if sufficient demand exists.

**Pedestrian Access:** Physical barriers, such as walls, berms, and landscaping between the development and bus stops should be avoided. Parking should be in the rear. Gridlike street patterns are encouraged instead of culs-de-sac and serpentine streets because they create circuitous walks and force buses to meander. Developments and facilities that are improperly designed will not be served.

**Site Access:** Facilities, such as turnouts, should be considered in the initial design of a road network. High occupancy vehicle lanes and preferential signals should be considered where necessary. Service cannot be provided to facilities which prevent safe and easy access to transit.

**Building Location:** Locate buildings as close to streets and bus stops as possible, arrange buildings on a site to reduce the walking distance between each building and the nearest transit facility, and cluster buildings around a central pedestrian space to reduce auto driving between buildings.

**Parking:** Reduce the amount of parking required by developing programs that encourage ridesharing, transit usage, and walking. Locate parking to the side and rear of buildings.

Bus stops should be located at major entrances to buildings instead of across parking lots. The Bakersfield Municipal Code includes the following transit credit:

Except for the “central district” and properties zoned C-B and C-C, which already receive a fifty percent reduction under Section 17.58.120, required parking may be reduced by ten percent if there exists a transit facility as defined in Section 17.04.624 within one thousand feet of the front or main customer door of the building that is linked with an improved and paved pedestrian way. (Ord. 4521 § 10, 2008) (Section 17.58.055)

Transit facility is defined as a covered structure (bus shelter).

**Passenger Amenities:** Provide shelters, benches, proper lighting, wheelchair accessibility, and information displays (see prior discussion on passenger shelters).

The District’s *Transit Facilities Manual* will be used to assist with the selection, design, and placement of various bus facilities and amenities in areas where new bus service is proposed as well as where modifications or improvements to existing service are necessary.



# MODIFIED SERVICE STANDARDS

June 2015

Metropolitan Transit Authority of Harris County, Texas

## BACKGROUND

- Provide guidelines to enable staff, Board to make informed decisions
- Provide structure, not absolutes for developing new and evaluating existing services
- Set expectations for customers

## JUSTIFICATION

- Current service standards last updated in April 2011
- System Reimagining redefines types of services (e.g. frequent, community connector) creating a need for new appropriate standards
- New methodology needed for evaluating service consistent with goals of System Reimagining

## JUSTIFICATION

- Define service **design** and **development** standards to initiate and revise services consistently and effectively
- Establish service performance **evaluation** system consistent with design standards and system goals

# JUSTIFICATION

- Define types of transit service
- Definitions based on service characteristics such as frequency, stop spacing, span, vehicles, and other things that define the market / customer experience

Mixed-Flow Fixed-Route	Suburban Express	Exclusive Right-of-Way	Demand Response
All-day frequent locals (red)	Park & Ride	Light rail	“On call” (community connector) routes
Standard (blue)	Midday corridor Park & Ride	Dedicated bus lanes	METROLift
Local coverage routes (green)	Express		Subsidized taxi
Quickline routes	METROStar Van		Guaranteed ride home
Express routes	RideShare		

# JUSTIFICATION

- Define factors for which standards will be set
- Standards can be divided into three types:
  - Design standards (network and schedule design factors)
  - Policy targets
  - Output targets

Design Standards		Policy Targets	Output Targets
Route spacing	Span of service	Resource allocation	Ridership
Route patterns	Service frequency	Schedule adherence (on time performance)	Passenger load factors
Directness of travel	Timed connections	Equipment assignments	Coverage
Bus stop spacing		Bus stop amenities	
Route connections		Park & Ride lots	
Route numbering		Transit centers	

# PROPOSED SERVICE DESIGN STANDARDS

	Route Spacing	Route Patterns	Stop Spacing (average)	Route Connections >=	Minimum Span of Service	Daytime AM / PM Peak Headway (in minutes)	Evening Headway (in minutes)
<b>Frequent</b>	1/2 mile	One	1,300' – 2,600'	Three	18 hours	15 minutes	15 minutes
<b>Standard</b>	1/2 mile	One	1,300' – 2,600'	Two	18 hours	30 minutes	30 minutes
<b>Quickline</b>	no standard	None	2,600'	Three	6 hours	15 minutes	N / A
<b>Coverage</b>	no standard	One	800' – 2,600'	One / Timed	14 hours	60 minutes	no standard
<b>“On call” (community connector)</b>	no standard	N / A	N / A	One / Timed	14 hours	60 minutes	no standard
<b>Park &amp; Ride</b>	10 miles	One	Every other block (distribution)	None	6 hours	20 minutes	30 minutes
<b>Express</b>	no standard	One	1,300' – 2,600' collection; every other block (distribution)	One	6 hours	20 minutes	30 minutes
<b>METRORail</b>	no standard	One	2,600'	Three	18 hours	6 - 12 minutes	20 - 24 minutes

# PROPOSED SERVICE DESIGN STANDARDS

## Directness of Travel

- Direct and straight as possible
- Mimic arterial street network where possible
- Coverage routes are exception where indirect routes better meet coverage goals

## Timed Connections

- Minimum of one pulse point per route
- Goal is timed connections for any route with service every 30 minutes or more (Blue, Green)

# PROPOSED POLICY TARGET STANDARDS

	Reliability (On time performance)	Equipment (Vehicle size)
<b>Frequent</b>	Annual goal	40' or 60' buses
<b>Standard</b>	Annual goal	40' buses
<b>Quickline</b>	Annual goal	40' or 60' buses
<b>Coverage</b>	Annual goal	24' or 40' buses
<b>“On call” (community connector)</b>	Annual goal	24' buses
<b>Park &amp; Ride</b>	Annual goal	45' buses
<b>Express</b>	Annual goal	40' buses
<b>METRORail</b>	Annual goal	LRT cars

## Resource Allocation

- 80% ridership / 20% coverage for local service resources only

# PROPOSED OUTPUT TARGET STANDARDS

	Loading Average Maximum Customer Load / Trip
Frequent	135%
Standard	135%
Quickline	135%
Coverage	115%
“On call” (community connector)	115%
Park & Ride	100%
Express (on freeway)	135% 100%
METRORail	250%

## Ridership

- Key standard
- Measurement / evaluation covered in Performance Evaluation System

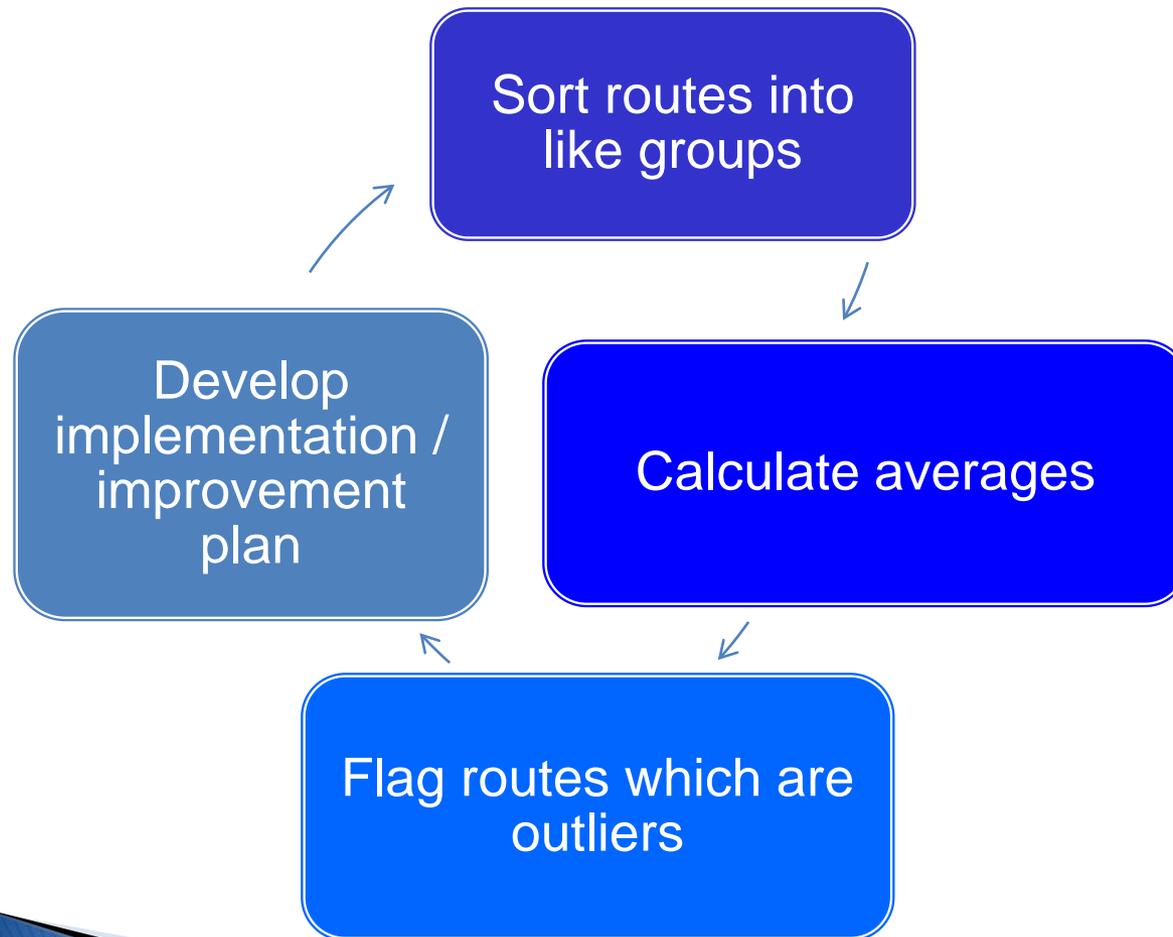
# PROPOSED OUTPUT TARGET STANDARDS INDIVIDUAL ROUTE LEVEL

Characteristics	Productivity Evaluation	Productivity Evaluation	Operational Evaluation	Operational Evaluation
Indicators	Boardings per Revenue Hour	Total Subsidy per Passenger Boarding	On time performance	Operating speed
Service Categories	Local Express Park & Ride Midday Park & Ride Coverage Light Rail	Local Express Park & Ride Midday Park & Ride Coverage Light Rail	Local Express Park & Ride - AM Park & Ride - PM Coverage Light Rail	Local Express Park & Ride Midday Park & Ride Coverage Light Rail

## Service Evaluation methodology

- Methodology tied to service standards
- Updated process will:
  - Be specific to service types (“apples to apples”)
  - Be simpler to understand and execute
  - Include both quantitative and qualitative measures

# SERVICE STANDARDS: PERFORMANCE EVALUATION



## Possible Outcomes

- Change service type (e.g. frequency)
- Change routing
- Change headway
- Change span of service
- Change schedule (e.g. increase / decrease running time to improve OTP)
- Eliminate service

# PROPOSED OUTPUT TARGET STANDARDS SYSTEM WIDE LEVEL

Characteristics	Productivity Evaluation	Productivity Evaluation	Operational Evaluation	Operational Evaluation	Operational Evaluation
Indicators	Jobs Within ½ Mile of Frequent Network	Population within 1/2 Mile of Frequent Network	Population within 30 minutes on METRO network to: 1. Downtown 2. Uptown 3. TMC 4. Greenway	Population within 45 minutes on METRO network to: 1. Downtown 2. Uptown 3. TMC 4. Greenway	Population within 60 minutes on METRO network to: 1. Downtown 2. Uptown 3. TMC 4. Greenway

## Service Evaluation methodology

- System wide evaluation data to be presented with each service change
- Variance from previous service change to be presented and explained
- Additional analyses for other activity centers can be included in addition to these four primary activity centers

# RECOMMENDATION

Steps	Time Frame
Briefed Board, received recommendations regarding concepts	March 2015
Revised draft service standards	April – May 2015
<b>Request Board approval</b>	<b>June 2015</b>



# MODIFIED SERVICE STANDARDS

June 2015

Metropolitan Transit Authority of Harris County, Texas

## BACKGROUND

- Provide guidelines to enable staff, Board to make informed decisions
- Provide structure, not absolutes for developing new and evaluating existing services
- Set expectations for customers

## JUSTIFICATION

- Current service standards last updated in April 2011
- System Reimagining redefines types of services (e.g. frequent, community connector) creating a need for new appropriate standards
- New methodology needed for evaluating service consistent with goals of System Reimagining

## JUSTIFICATION

- Define service **design** and **development** standards to initiate and revise services consistently and effectively
- Establish service performance **evaluation** system consistent with design standards and system goals

# JUSTIFICATION

- Define types of transit service
- Definitions based on service characteristics such as frequency, stop spacing, span, vehicles, and other things that define the market / customer experience

Mixed-Flow Fixed-Route	Suburban Express	Exclusive Right-of-Way	Demand Response
All-day frequent locals (red)	Park & Ride	Light rail	“On call” (community connector) routes
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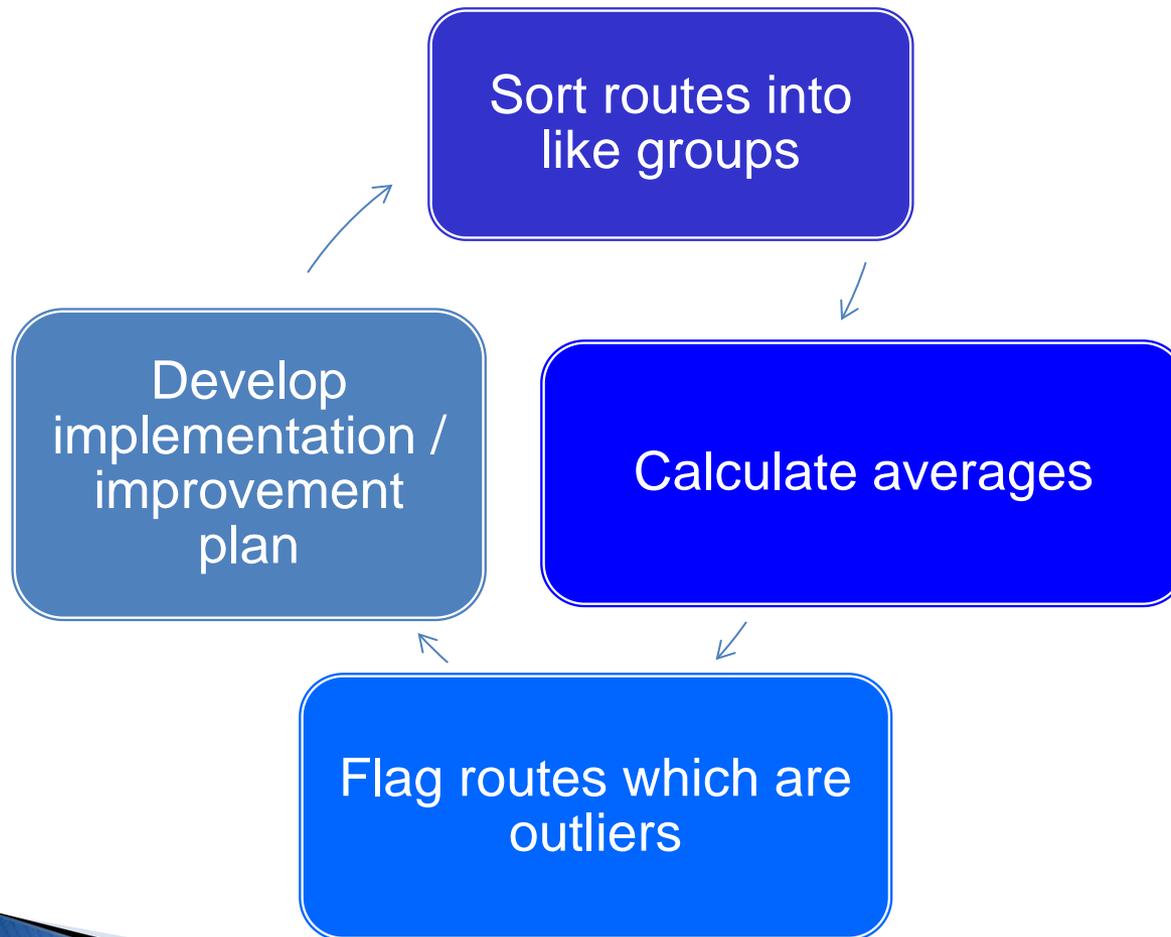
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# Service Standards

Metropolitan Transit Authority  
of Harris County, Texas

Service Design and Development's  
Service Planning Department  
April 28, 2011

# METRO SERVICE STANDARDS

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## **OVERVIEW**

The Metropolitan Transit Authority of Harris County (METRO) strives to provide high quality transit service in an effective and efficient manner. The application of service standards provides assistance in achieving a balance between quality and the cost-effective use of limited public resources.

METRO continually receives requests for changes to existing service and for new service in growing areas within the Authority's jurisdiction and beyond. Additionally, METRO could potentially be operating some services that are not attracting enough riders to justify their present level of service. In order to be consistent in the evaluation of service proposals and to ensure that the service being provided represents the most cost-effective use of labor, equipment and other resources, METRO has developed a set of service standards to apply to new and existing bus service.

The specific standards and the service evaluation process are presented in this document. Since service standards are intended to optimize usage of METRO's resources, they will be reviewed and updated every five years, or more frequently, in order to reflect substantive changes in Board policy, costs of service, and/or other changes.

### **Application of Service Standards**

There are two primary applications for the ongoing use of the service standards:

- The evaluation and management of existing services
- The evaluation and implementation of new services

The application of standards to existing routes is a multi-faceted process. The standards are used to identify routes which are most in need of service changes, such as restructuring the route to eliminate less productive segments or branches of the route, adjusting the service frequency to reflect the demand for service, or providing additional promotion of lower volume routes where appropriate. Routes that do not meet standards are not automatically designated for elimination. Alternative service delivery options and/or other adjustments can be explored in lieu of complete elimination. However, elimination of a route may be the best option, if it has been determined that no cost-effective actions are likely to improve the route's productivity or if the route does not serve valuable system connectivity or purpose.

The standards for existing routes are not intended to preclude changes to routes that meet these minimum standards. In many cases, it may be possible to improve the productivity of routes that meet the minimum standards by making minor changes to headways or trip times.

The evaluation of new service proposals will take place as proposals are received or needs are identified. New routes will be expected to meet all applicable route design standards, and will be expected to show a reasonable probability of meeting their productivity standards by the end of the first two years. If the route does not display a reasonable probability of meeting its productivity standards within its first two years, it will be advised to allow for discontinuation of the route.

## **METRO SERVICE AREA CHARACTERISTICS**

The need and demand for transit service vary throughout METRO's service area. For example, the demand for transit service in a low-density, auto-oriented, developing suburban area will vary considerably from the demand for transit service in a highly concentrated urban area, such as inside the IH 610 Loop. Each environment offers different challenges in providing effective, cost-efficient transit services. By identifying certain demographic characteristics of METRO's service area, standards can be established for the design and implementation of types and levels of transit services best suited to the different areas.

### **The Transit Market**

Past studies conducted in the U.S. and elsewhere have concluded that there are two primary indicators that are used to identify the transit market: population and employment density.

Briefly reflecting on the nature of mass transit, we can understand why these two factors are so critical. Transit is in the business of bringing together people to share rides. The more compact the geographic market of intended shared rides, the more effectively and efficiently transit is able to deliver its service. The more dispersed the pattern and location, the more penalties that are imposed on both the rider and the operators. For the rider, trips can become more circuitous, route spacing more diffused, and frequencies less attractive. For the operator, costs increase as it becomes necessary to travel greater distances to pick up riders. With varying markets in the region, it becomes necessary to develop strategies (i.e., park & rides, dial-a-rides, differing levels of service, etc.) which are tailored to these multiple markets.

In addition to population density and employment density, two other factors are acknowledged as determinants of transit usage; the number of trips people take and their dependency on transit. These four factors can be thought of as pieces of a puzzle which, when assembled, will distinguish different transit markets.

### **Population Density**

Figure 1 identifies the population density in persons per square mile by census block group based on a 2009 population estimate from the company Nielsen Claritas. The next update will be based on the 2010 Census. Four groupings have been made:

- Low density: 0-2,000 persons per square mile
- Medium density: 2,001-6,000 persons per square mile
- High density: 6,001-10,000 persons per square mile
- Very high density: 10,001+ persons per square mile

## **Employment Density**

Figure 2 identifies the employment density in jobs per square mile by traffic analysis zone (TAZ) based on 2005 estimates from the Houston-Galveston Area Council (H-GAC). As can be seen from the figure, the highest employment concentrations occur in the major activity centers of Downtown, Galleria/Uptown, Texas Medical Center, Greenway Plaza, Greenspoint, the Westchase District, and the Energy Corridor. These data will be updated when new data become available.

## **Number of Trips People Take**

The number of trips people take varies greatly throughout the METRO Service Area, and the process of estimating it takes several factors into consideration. Long-range plans usually base the number of trips people take on a computer-based model. METRO and H-GAC share a computer-based model, called a travel model, that uses mathematical representations of how travel occurs in the region today and how it will change in the future. Although this tool is used for many general planning purposes, METRO is keenly aware of the limitations of the methodology. Actual ridership projections for a specific project undergo closer scrutiny that not only combine data from H-GAC and METRO, but also take into account public input, demographics from the U.S. Census and other sources, as well as actual field visits in order to assess a project's feasibility and potential ridership impact in the short to mid-term horizons. METRO's Ridership Analysis and Service Evaluation (RASE) and Service Planning Departments closely evaluate past and present ridership information for existing services in order to develop accurate future ridership projections for potential services.

## **Dependency on Transit**

Figure 3 identifies the census block groups where the number of families living below poverty is above the average for the METRO Service Area based on a 2009 population estimate from the company Nielsen Claritas. Although low-income does not necessarily translate into transit dependency, more often than not, low income populations tend to have a higher dependency on transit when compared to mid to high income populations. Data on car availability per household from the Census also help determine potential transit dependent populations. However, no recent car availability data is currently available to METRO. The upcoming release of the 2010 Census data will make available current data for both poverty and car availability.

Figure 1

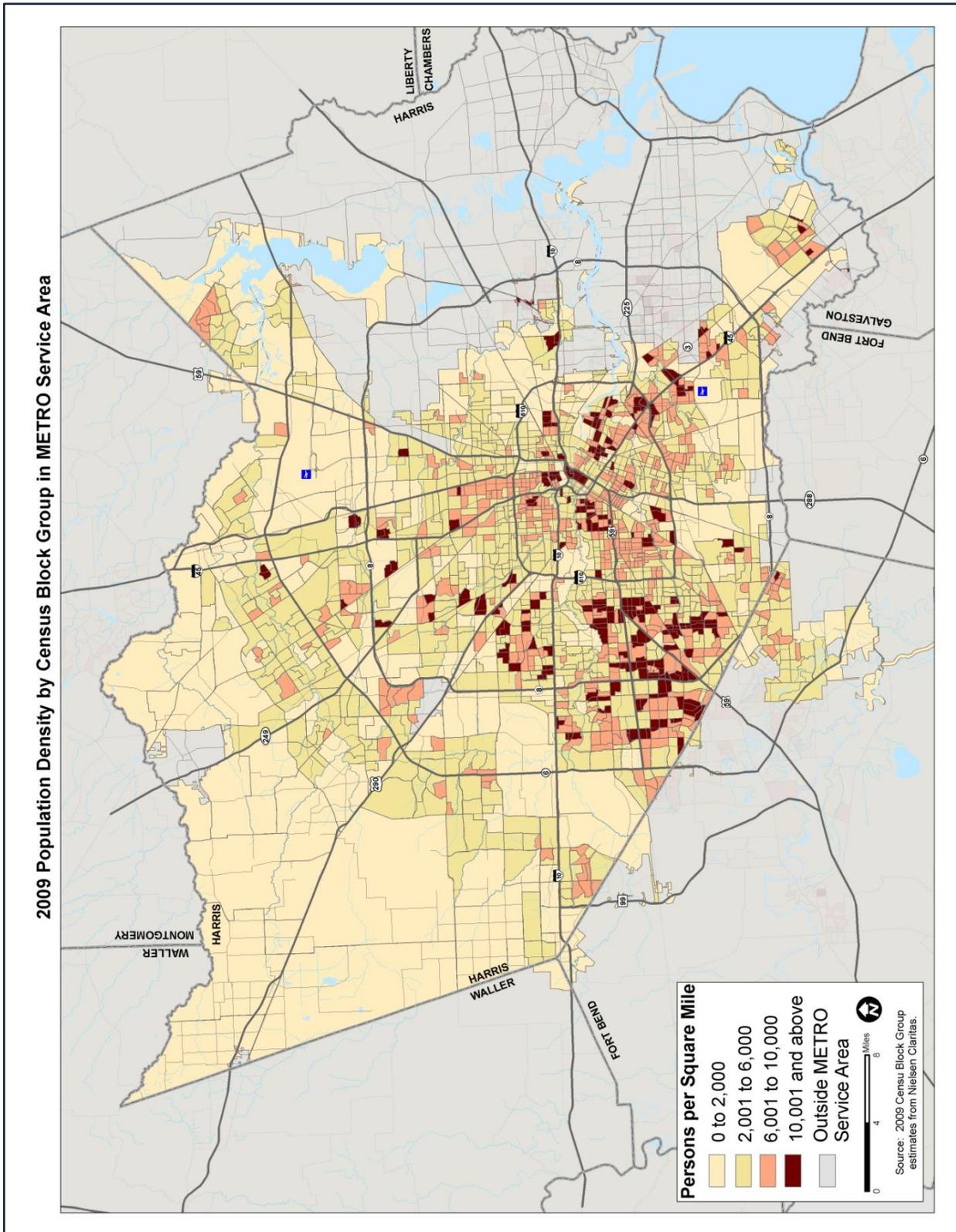
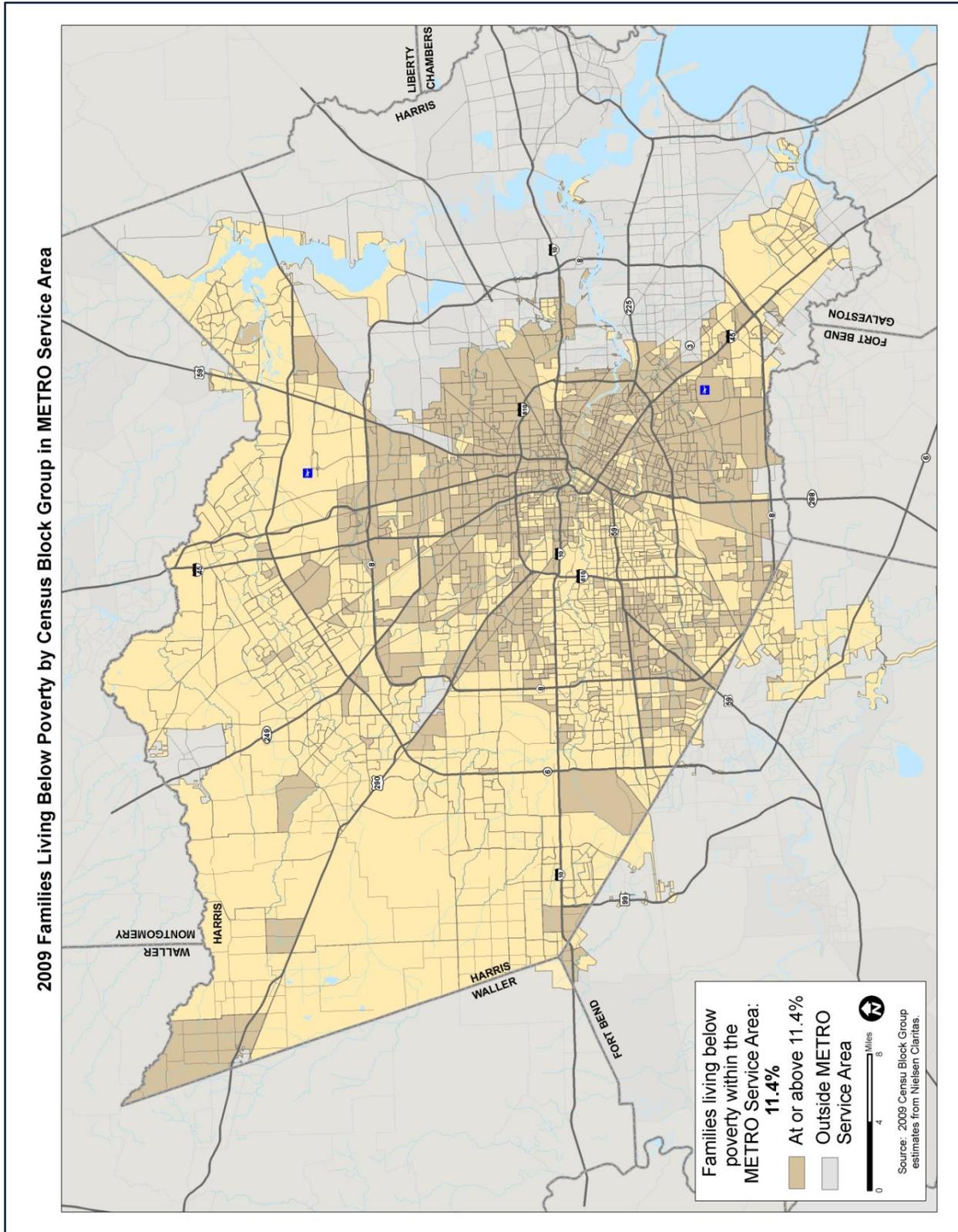




Figure 3



## **TYPES OF TRANSIT SERVICE**

This section describes the transit services and programs presently offered by METRO. There are two basic classifications of bus service, Fixed-Route Bus Service and Other Transportation Services. In addition, the light rail service known as METRORail is also described. The standards contained in this document focus on fixed-route service; however, some aspects of light rail service are also covered. Although infrequent, METRO may provide emergency/evacuation and charter services under certain circumstances; these are also covered in this section.

### **Fixed-Route Bus Service**

Fixed-route services operate on a predetermined, fixed-time schedule over a prescribed route using specified streets. The consistency of fixed-(or regular) route service allows the printing and distribution of timetables and route maps. Fixed-route service is operated by buses generally with 38 or more seats and constitutes the majority of METRO's bus service. Fixed-route service is further classified into two major types: Local Service and Commuter Service.

#### **Local Service**

Local bus service is transit service that picks up and discharges passengers all along the route and, consequently, operates at a relatively low average speed. Local service provides the greatest concentrated geographic coverage of the METRO Service Area.

#### **Signature Service**

This is local bus service that serves select limited stops that have high connectivity and ridership on existing local service routes. The service operates with reduced headways and higher speeds than the existing local service route. METRO currently operates two Signature Service routes branded as the 402 Quickline and the 426 Swiftline.

#### **Commuter Service**

Commuter Service is transit service that travels directly to or from a major employment activity center with single or limited passenger pickup locations. Commuter service is offered by METRO's Park & Ride Routes.

### **Other Transportation Services**

**METROLift** – METROLift is a complementary paratransit service, in accordance with the 1990 Americans with Disabilities Act (ADA). METROLift provides transportation for persons with disabilities who cannot board, ride or disembark from a regular METRO fixed-route bus, even if that bus is equipped with a wheelchair lift or ramp.

METROLift is a currently contracted service using METRO-owned vans with wheelchair lifts and contractor-owned, ramp-equipped minivans. Trips are scheduled one day in advance and provide curb-to-curb transportation for persons with disabilities, who have applied for and are eligible for ADA paratransit service.

In addition, METRO contracts with cab companies to provide same-day service, best provided by taxicabs using the METROLift Subsidy Program (MSP). MSP is taxi transportation for certified METROLift patrons who have same-day trip requirements that can't be provided by METROLift.

**Guaranteed RideHome** – A service that uses the MSP contract for taxi transportation providing users of METRO's commuter service with a free ride home in the middle of the workday, should they have an emergency and there is no midday bus service on their route. A taxi ride is arranged to pick up the passenger at their place of work within 20 minutes after contacting a METRO representative. Riders must be registered with METRO to utilize this service and must meet the emergency criteria of the program.

**METRO STAR** – A regional vanpool service offering hundreds of scheduled vanpool routes serving the 8-county Houston-Galveston Transportation Management Area, including the counties of Harris, Brazoria, Chambers, Fort Bend, Galveston, Liberty, Montgomery, and Waller. METRO sponsors the vanpool service for commuters who do not have access to convenient transit services. METRO STAR promotes vanpooling to the public, assists with the formation of vanpools, arranges vanpool vehicles, supports vanpool groups, and administers the service. Characteristics of the METRO STAR vanpool service include:

- Five to fifteen commuters share the ride and cost of commuting to-and-from work in a METRO STAR vanpool vehicle.
- Volunteer drivers operate the METRO STAR vanpools and are also counted as passengers. Drivers often pay a smaller share of the costs in exchange for coordinating the vanpool and assuming primary driving responsibility.
- Many area employers offer a transportation benefit to participating employees to defer some or all of the cost to participants.
- METRO STAR customers are eligible for an emergency ride home service, in the event of a qualifying mid-day emergency or unscheduled overtime.

METRO STAR also offers RideShare, a free service that assists commuters in matching with others who have a similar commute pattern through the web, over the telephone, and through outreach.

- METRO allows vanpoolers and carpoolers to park in many METRO Park and Ride lots to begin their trips.
- Vanpoolers and carpoolers are allowed to use METRO's High Occupancy Vehicle (HOV) lanes and managed lanes to reduce travel time.

### **Light Rail (METRORail)**

METRORail is a light rail line that is 7.5 miles in length with 16 accessible stations connecting the Central Business District, the Museum District, Texas Medical Center and Reliant Park. METRORail provides connections with many local and commuter service bus routes.

## **Charter Services**

Federal Regulations 49 CFR Part 604, Charter Service; 73 FR 2326 Final Rule 4/30/08 prohibits all public transit agencies from providing Charter Services unless certain exceptions are met. The Federal Transit Administration (FTA) requires METRO to provide a quarterly report for all transit service exceptions.

## **Emergency/Evacuation Services**

### Local Area Assistance

METRO has transportation services and other available resources that may be requested by the cities, counties, school districts, and organizations within METRO's service area or the Houston/Galveston region before, during, and after an emergency.

As a standard practice, METRO's resources should be used first to provide public transportation service for METRO passengers as "Top Priority." To the extent that resources become available, METRO will consider requests for assisting in programs that save lives, protect property or the environment, help stabilize an emergency, or restore services to any affected community.

METRO Emergency Management Plan provides general guidance to METRO management and employees who are responsible for the mitigation, preparation, response, and recovery from any disaster. The Plans developed for Local Area Assistance have been designed to support the intent of the Authority's Emergency Management Plan.

Four Local Area Assistance plans have been developed to support the community if the need for transit service is requested. Each plan is established with the Authority's normal level of daily service as the baseline operation. These Plans are:

- A. Early / Emergency Evacuation Transit Service
- B. City of Houston's 311 / METRO Emergency Evacuation Plan
- C. City of Houston / Harris County Evacuation Hub Plan
- D. City of Galveston / METRO Emergency Evacuation Plan

### Early / Emergency Evacuation Transit Service

The Early / Emergency Evacuation Transit Service Plan is designed to support an Early Transit Service, an Early/Emergency Transit Service, or a Total Evacuation Service.

**Early Transit Service** – Early Transit Service is normally required when employers of companies located in major activity centers are releasing their employees from work prior to their normal work hours for the holiday (e.g. day before a holiday, etc.) These days can be scheduled as additional hours to the regular operation on selected runs. This operation is classified as a normal operation with street and weather conditions clear. The execution of Early Transit Service is subject to budget approval every year.

Day of Operation	Day before Thanksgiving, Christmas, New Years
<u>Normal Operation</u>	
Span of Service:	12:00 noon – 3:30 p.m.
Headways:	30 minutes
Standard Materials Required and Updated Annually: Facility sign-up sheet and pull-out information; Buffalo Bayou pull-out sheet; schedules, operator paddles and operator maps; supervisor guides; equipment required to provide service.	

**Early / Emergency Transit Service** – Early Transit Service is desirable when employers of companies located in major activity centers are releasing their employees from work early when the National Weather Service has issued a flash flood warning, ice storm watch, ice storm warning, snow storm warning, hurricane watch or hurricane warning for a given day.

During these events, TranStar and Service Supervision shall continuously monitor the local and National Weather Service reports to provide the agency the required time to schedule Early / Emergency Transit Service. The monitoring of these reports will allow the decision-making process the required time for these days to be scheduled as an addition to the day to day operations. This operation is classified as a severe operation when street and weather conditions and traffic congestion will impair our ability to operate normal service.

Day of Operation:	As Requested
<u>Normal Operation</u>	
Span of Service:	12:00 noon – 3:30 p.m.
Headways:	15 minutes
Standard Materials Required and Updated Annually: Facility sign-up sheet and pull-out information; Buffalo Bayou pull-out sheet; schedules, operator paddles and operator maps; staging area corner guides; supervisor guides; equipment required to provide service.	

**Total Evacuation Service** – Total Evacuation Service for a major activity center is required when the agency is informed that the Houston area is subject to a major disaster. Employers of companies located in a major activity center are releasing their employees from work early due to a natural or man-made disaster or the knowledge of the occurrence of a disaster.

The agency must respond in a timely manner by dispatching buses to various predetermined staging locations to implement the required service. It is important that the decision-making process allows the required time to capture the maximum number of personnel and equipment to support the evacuation process. This operation is classified as a severe operation because street and weather conditions and traffic congestion are unknown and may impair our ability to operate normal service.

Day of Operation:	As Requested
<u>Severe Operation</u>	
Span of Service:	9:00 a.m. – 3:30 p.m.
Headways:	5 minutes
Standard Materials Required and Updated Annually: Facility sign-up sheet and pull-out information; Buffalo Bayou pull-out sheet; schedules, operator paddles and operator maps; staging area corner guides; supervisor guides.	

#### City of Houston's 311 / METRO Emergency Evacuation Plan

The City of Houston and METRO have established an Emergency Evacuation Operational Center to provide transportation for individuals in the community requiring assistance to evacuate the area. The Emergency Evacuation Operational Center is an extension of the City of Houston's 311 Service Helpline. The Operational Center is located on the 5<sup>th</sup> Floor of 611 Walker Street in the 311 Service Helpline training room and the Dispatch Section of the Operational Center is located on the 1<sup>st</sup> Floor of the same location. Individuals requiring transportation assistance during an evacuation will now have the option to call the City of Houston's 311 Service Helpline. The requests for transportation will be forwarded to METRO and equipment will be dispatched to evacuate those individuals. Equipment and staff assigned to this operation include:

- METRO buses
- METROLift vehicles
- Yellow Cab
- Super Shuttle

Day of Operation:	As Requested
<u>Severe Operation</u>	
Span of Service:	72 hours to 8 hours prior to landfall
Headways:	Dispatched upon request
Standard Materials Required and Updated Annually: George R. Brown Convention Center Operator Maps	

City of Houston / Harris County Evacuation Hub Plan

The George R. Brown (GRB) Convention Center is a large facility centrally located out of the storm surge risk area. This facility has been designated to serve as the hurricane evacuation hub for residents from both the City of Houston and Harris County.

This plan will be activated at approximately H-48 (48 hours prior to storm's predicted landfall) and is expected to continue to approximately H-12 to coordinate the evacuation of special needs individuals who reside within Harris County. At H-12 operations will shift focus, based on remaining resources, to move individuals from the evacuation hub to a refuge of last resort. The evacuation hub will be closed by H-6. The City of Houston's 311 Call Center will be established to receive calls from residents requiring assistance with transportation to evacuate. METRO will coordinate the transportation and deliver individuals to the GRB. METRO will also coordinate the delivery of State buses from Tully Stadium to Minute Maid Park Lot A.

Day of Operation:	As Requested
<u>Severe Operation</u>	
Span of Service:	72 hours to 6 hours prior to landfall
Headways (Tully Stadium):	Dispatched upon request
Standard Materials Required and Updated Annually:	Tully Stadium to George R. Brown Convention Center Operator Maps

City of Galveston / METRO Emergency Evacuation Plan

METRO has signed an Inter-Local Agreement or Memorandum of Understanding with the City of Galveston to provide and/or obtain additional transportation services or other resources during an emergency. Under an existing agreement with the City of Galveston, METRO may provide up to 30 emergency evacuation buses to the City of Galveston's Island Community Center and transport evacuees to designated evacuation shelters in the City of Austin.

Day of Operation:	As Requested
<u>Severe Operation</u>	
Span of Service:	72 hours to 24 hours prior to landfall
Headways:	Dispatched upon request
Standard Materials Required and Updated Annually:	Island Community Center to the City of Austin Operator Maps

## **ROUTE DESIGN GUIDELINES**

Bus Route Design Guidelines are established to ensure that METRO bus routes provide service to major activity centers or other passenger destinations with the highest level of accessibility and service coverage possible, while making the most efficient and productive use of METRO's available financial, physical and labor resources. Because of the variation in demand for transit services in the region, due to the existence of different transit markets, one set of standards is not adequate to design an effective and efficient system. Therefore, standards have been developed that take into account the differing needs of transit riders based on certain underlying service area characteristics, especially population density (persons per square mile).

It must be noted that providing any level of service to an area depends on the productivity of that service. If existing or proposed services cannot meet the appropriate productivity standards, then METRO may elect not to provide the minimum level of service identified in this section.

### **Area Coverage (Route Spacing)**

The distance between parallel routes is referred to as route spacing. To enhance the attractiveness of transit usage, service should provide all segments of the region with good access from residential areas to concentrations of employment, essential services and other passenger destinations. The distance people must walk to reach bus passenger loading areas is a good indicator of the area coverage provided by METRO. It must be noted that parallel routes that are operating too close together (generally within 1/2 mile of each other) have the potential to split the demand for service. In areas of low demand, this can result in multiple routes competing for the same passengers with no route generating sufficient demand to support a higher level of service. Thus, providing the appropriate route spacing to attain good area coverage requires a tradeoff between walking distance and frequency of service provided in the region.

For METRO's service area, the recommended route spacing standards are as follows. Please note that these are to be used only as general guidelines. Other factors such as passengers per trip and/or passengers per stop, street layout, natural or man-made barriers, and other factors should also be considered when determining route spacing.

- Very High and High Density Census Block Groups – In census block groups with 6,001 or more people per square mile, bus routes are recommended to be spaced at a maximum distance of 1/2 mile apart.
- Medium Density Block Groups – In census block groups with 2,001 to 6,000 people per square mile, bus routes are recommended to be spaced at a maximum distance of 1 mile apart.
- Low Density Census Block Groups – In census block groups with up to 2,000 people per square mile, Park & Ride facilities are recommended to be located so that the majority of the area's residents live within a 10-mile or a 20-minute drive of the facility.

## **Route Variations**

It is sometimes more efficient to provide service to a certain area with one route having several branches than to operate several different routes. In addition, some bus trips on a route may not go to the end of the line due to very low ridership in that area at a particular time of day. This is called a "turnback" trip. However, these actions can result in a system that is much more difficult for current, as well as potential, transit passengers to understand and utilize. Therefore, to provide a user-friendly service and to encourage maximum use of the system by all current and potential riders, the following standards for branches and turnbacks are strongly recommended:

- No new route should have more than two (2) distinct branches.
- No new route should have more than one (1) turnback location.
- Reducing the number of branches and/or turnbacks will be given consideration in the preparation of the Transit Service Plan.

Note: 1) Two routes serving different parts of the service area with both terminating in the Central Business District (CBD) may be joined together as one route in order to operate more cost-effectively. By reducing bus requirements and duplicative service, congestion in the CBD is lessened. The two routes involved are listed as a single route, and such routes are called "hooked" routes. Each end of a "hooked" route will be considered a separate route for the application of this standard. 2) It must be noted that some existing routes currently have more branches and/or turnbacks than what is recommended. Consideration will be given in future service plans in order to bring these routes within recommended parameters.

## **Directness of Travel**

METRO bus routes will be designed to operate as directly as possible to or from a major destination in order to minimize passenger travel time. Routes shall operate on major arterial streets as much as possible. However, there may be situations in which a route may deviate from the shortest, most direct routing. Such situations include a mid-route deviation to serve a particular trip generator or other high potential passenger area that does not have service, at the end of the line terminal loop, or for a route serving a small geographical area.

When a deviation exists or is being considered, 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. How the potential deviation would affect the route's safety, reliability, and operational integrity must also be considered.

## **Bus Stop Spacing and Positioning**

Bus stops are spaced according to two (2) main criteria: accessibility and travel speed. Close spacing of stops increases patron accessibility but increases transit trip time and may reduce carrying capacity. Therefore, a balance must be made between these two criteria.

Travel speed is considered the primary criterion for route segments that usually have heavy volumes of automobile and transit passenger traffic. Closely spaced stops tend to reduce transit speed and interrupt the traffic flow. Therefore, stops are usually placed only at major intersections, transfer points, and major passenger generators. Notwithstanding this, an attempt is made to maintain a maximum of 1,000 feet between stops.

Accessibility is considered the more important criterion for route segments in which closely-spaced stops would not adversely affect transit speed and/or traffic flow. Stops are spaced to reduce the passenger's walking distance to the stop. These stops are placed at most intersections, crosswalks, passenger generators and transfer points. The average spacing of stops on this type of route is about every two blocks. Two other important criteria that are examined are consistency in stop spacing and the impact on adjacent land use and development.

As a general rule, bus stops are located on the nearside of intersections. Many factors, notably safety, indicate the nearside stop as the most desirable in the majority of circumstances.

Quickline Signature stops will follow the same general guidelines as other bus stops, except that they will only be located at select high connectivity and/or high ridership locations along existing routes.

Detailed guidelines and further elaboration on bus stop spacing and positioning can be found in METRO's Criteria for Bus Stop Placement manual, which is currently used in the spacing and positioning of METRO's bus stops. The manual was last revised in February 2008 and is available from the Service Delivery Department.

### **Bus Stop Amenities**

Bus stop amenities, such as passenger shelters, benches and seats, curb cuts and wheelchair ramps, signs and posts, info panels and info posts along with maps, can increase the use of transit services by making the system safer and easier to use. Amenities can improve passengers' physical comfort by reducing the inconvenience of waiting at a stop, can put riders at ease about the availability of service by providing a schedule and other information and can add to a feeling of safety by being installed in well-lit locations. In addition, the presence of permanent, physical amenities conveys a sense of the stability of the system to both current and future riders.

METRO's Passenger Shelter Task Force is responsible for identifying new shelter sites throughout the service area. The Task Force is comprised of staff representatives from Planning, Engineering, Service Delivery, and Maintenance, and reviews ridership, site, cost estimates, and prioritizes new shelter installations. As a general guideline, bus stops within the METRO service area that have a minimum daily activity of 35 boardings are considered for a passenger shelter. This number was derived many years ago to provide an adequate list of candidate sites which have a higher than average number of passenger boardings.

Besides the 35 daily boardings, other criteria used for evaluation are transfer points, proximity to major activity centers, presence of elderly/physically challenged patrons, safety issues, and site feasibility. Shelter sites are also identified through public requests. METRO has at least four types of anodized shelters (IB, IIB, IVB, and VB) plus Midtown, Uptown, Greenspoint, Downtown, and Hobby Airport shelters to match the varying circumstances encountered in the service area. Shelter type descriptions can be found in METRO’s Facilities Manual, and is available from the Service Design & Development Department.

The following guidelines are used to prioritize the desirable installation of amenities at current and proposed bus stop locations, although some variation does exist due to site specific constraints:

<b>Daily Passenger Boardings</b>					
<b>Feature</b>	<b>≤35</b>	<b>36-100</b>	<b>101-200</b>	<b>201-300</b>	<b>&gt;300</b>
<b>Sign and Post</b>	S	S	S	S	S
<b>Seating (No Shelter)</b>	O	n/a	n/a	n/a	n/a
<b>Passenger Shelter</b>	O	S	S	S	S
<b>Trash Receptacle</b>	O	S	S	S	S

Key: S = Standard Feature, O = Optional Feature, n/a = not applicable

Although it may not always be practical or possible, it is METRO’s goal for all bus stops that have a shelter to have an info panel. In order to maintain accurate information, info panels shall be updated every time there is a schedule and/or route change that modifies the route information displayed.

Signs at Bus Stops – All bus stop signs shall have the route number, route name and METRO's information phone number, 713-635-4000, on the sign. All bus stop signs are also numbered for reference in case of an emergency.

Signature Service stops will have distinctive features compared to other bus stops. The 402 Quickline currently has a distinctive shelter design, distinctive landscaping and signage, and the presence of an electronic sign that displays the real time arrival information for the upcoming bus. These stops are referred to as “stations” because of the amenities present. The 426 Swiftline currently has distinctive signage.

## **Service Detours and Interruptions**

METRO's objective is to operate a safe, reliable and efficient multi-modal transportation network. This network includes, but is not limited to, the following components - METROBus, METRORail and METROLift. The integration of these transportation services will assist in accomplishing the region's clean air standards, alleviating traffic congestion and improving the overall quality of life in the METRO service area. Sometimes, however, circumstances arise that require detours and/or cause service interruptions.

For fixed-route service, all efforts shall be made to move routes to the closest adjacent street. If the affected area is in the CBD or another area with many one-way streets, then the detour shall be a maximum of two (2) blocks from the current routing, if possible.

Signs informing passengers of long-term detours shall be placed at all regular bus stops several days prior to scheduled events. These signs will be posted as soon as possible if the condition(s) requiring a long-term detour occurs with short notice. Temporary bus stop signage shall be installed at the new stop locations the day prior to the change. In the case of unplanned events; temporary signage shall be provided at the new stops as soon as possible if the detour is going to last more than 24-hours. All efforts shall be made to return service to the streets that are identified on the public timetables within 24-48 hours by the next day after the disruption is over or removed.

The following defines the three types of detours experienced by our fixed-route bus service. Also described is the general strategy for service interruption for bus and rail.

### Emergency/Temporary Bus Detours

Emergency/temporary bus detours result from unforeseen circumstances that prevent a bus from operating on its regular route. Examples of unforeseen circumstances which may cause an emergency or temporary bus detour are unplanned or unscheduled street repairs, fires, traffic accidents, blocked railroad crossings, temporary street closures for parades, or unplanned or unscheduled closure of high occupancy vehicle (HOV) lanes. These detours generally are in effect from one (1) or more hours up to one (1) week.

### Short-Term Bus Detours

Short-term bus detours result from planned changes to street conditions that prevent a bus from operating on its regular route. Planned changes to street conditions may be the result of utility work, street renovation or repairs, or other construction projects that cause the closure of a street section or an entire street. A department within a city, county, or state agency, or a utility company generally initiates the planned changes. These detours generally are in effect from more than one (1) week up to three (3) weeks.

### Long-Term Bus Detours

Long-term bus detours also result from planned changes to street conditions that prevent a bus from operating on its regular route. The causes for long-term bus detours are generally the same as those for short-term bus detours. Planned changes for long-term detours are initiated in generally the same manner as planned changes for short-term detours. These

detours generally are in effect from more than three (3) weeks up to six (6) months. A detour that is in effect longer than six (6) months will be considered a permanent change to the route.

### Service Interruptions

To maintain a seamless service, the Authority must establish a service recovery plan to assist with any scheduled or unscheduled service interruptions to the network. The operational strategy for service interruptions is to restore service as fast as possible and to maintain a seamless transition between bus and/or rail service. This operating strategy consists of the following:

- Develop and maintain bus and rail recovery procedures.
- Identify key personnel.
- Establish response times for all key personnel.
- Establish and implement a notification process.
- Establish an emergency contact list.
- Develop the required print materials to support a service interruption (maps, signage, etc). Post, update, and distribute print materials to inform customers and staff of the service interruption.
- Maintain a training program to address service interruptions.
- Establish and implement emergency announcements for our customers.
- Conduct announcements to inform our customers of their transportation options.
- Dispatch buses to all disabled vehicles to assist with the provision of service to our passengers.
- Establish a service interruption evaluation process.

### Rail Service Interruptions

The Authority must maintain an operational strategy for providing service for scheduled or unscheduled rail service interruptions. This strategy must consist of the use of a “single track rail operation,” bus bridge operation or existing fixed-route service. It is imperative that the standard operating procedures for rail service interruptions include the following areas:

- Incident Reporting Process
- Notification Process
- Staffing and Equipment Assessment
- Troubleshooting Evaluation
- Rail Service Interruption Status Review
- Required transit service in lieu of normal rail service
- Recovery Process

## **SCHEDULE DESIGN STANDARDS**

Schedule design standards are established to ensure that the level of service offered by METRO will be adequate to attract new riders to the system and to maintain present riders. Service reliability, measured as schedule adherence, is critical in keeping customers who must rely on METRO's service or who may not have alternate means of transportation. A standard for adherence to the printed schedules is necessary to ensure that this crucial aspect of our service is regularly reviewed and addressed.

It is also essential to establish criteria for the scheduled interval between buses, as well as the hours during which a route will operate. In addition, standards for the number of passengers on a bus and the type of bus on a route are vital in ensuring that these patrons have a comfortable trip that will encourage them to continue to utilize the service.

All METRO's buses are accessible to handicapped riders, and most buses are equipped with racks that hold up to two bicycles. Our standards for accessible service reflect our commitment to the citizens of Harris County who have mobility impairments, while our standards for bicycle racks reflect our support for various forms of mobility.

### **Schedule Adherence**

An important element of the success of the service METRO provides to its customers is the quality of that service. Service quality is directly related to customer satisfaction. On-time-performance (OTP) is a critical service quality issue. OTP will be reviewed annually as part of the development of the METRO Business Plan. At this time, a target percentage for OTP service for the upcoming fiscal year will be established so that an acceptable level of OTP reliability can be maintained and ensure that patronage is not discouraged by an unacceptable level of on time reliability. For FY 2011, the OTP goals are 67% for local service, 75% for Park & Ride service, and 69% for the weighted average.

#### **METRO Bus**

The current Integrated Vehicle Operations Management System (IVOMS) technology enables METRO to identify and quantify issues that compromise OTP, and to provide a method to implement corrective action. Weekly reports prepared by the Operations Management Analyst are compiled and used to identify low performing routes, blocks, patterns, and time-points. Reports from the IVOMS MOBILEstatistics system facilitate this process with granular detail by block, trip, and time point. Analysis of schedules and route performance utilizing reports from the IVOMS MOBILEstatistics system can help identify chronic variance from schedules, and facilitate investigating causative factors. Factors that can be addressed and identified when conducting investigations include, but are not limited to:

- Passenger loading factors
- Traffic or street conditions
- Travel time
- Scheduled cycle time relative to headway and coordination requirements
- Allocation of cycle time among route segments and recovery time
- Consistency of scheduled time among routes sharing common segments
- Location of time points relative to route length and transfer connection needs

- Variance of scheduled time versus actual time departures/arrivals
- Consistency of bus operation with traffic flow along route segments

Bus Operators encounter many situations that prevent precise schedule adherence at each and every time point. It is necessary to establish measurement standards that acknowledge this reality. The measurement standard is established for reporting on-time performance. The current measurement standards for on-time performance are as follows:

- Local Service – It is based on weekday and weekend scheduled trips. A departure parameter of no early departures/less than 6 minutes late is used, which is in compliance with the Texas Transportation Code. All time-points and every day of the month will be included in the calculation.
- AM Peak (5:00am to 8:59am) Commuter Service – This is calculated based on inbound trips, using only departures from Park & Ride stops. Any early departures within 5 minutes of the schedule are considered as load and go buses and, therefore, are considered on-time. (Load and go is defined as buses that are at capacity prior to scheduled departure, buses that depart early due to bus crunching, or under the direction of a supervisor). The calculation will be based on a sufficiently large sample size, generally one month of data.
- PM Peak (3:00pm to 6:59pm) Commuter Service – This is calculated based on outbound trips using downtown time-points prior to the bus entering the HOV lane or highway under the parameter of no early departures/less than 6 minutes late. This calculation will also be based on one month of data.
- Identified data anomalies will be excluded. These anomalies include those that have proven to be caused by short-term detours, construction delays, train delays, inclement weather, and other delays that exceed normal boundaries not accounted for in the schedules (i.e. flooding).

### METRORail

On-time performance for METRORail is measured according to the following standards:

- The time-points used to measure on-time performance are the two terminal stations, Fannin South and University of Houston.
- A rail OTP application retrieves arrival and departure times from the VICOS (Vehicle and Infrastructure Control and Operating System) computer system. The application also calculates the OTP.
- A late arrival occurs when the trip arrives +5 minutes past the scheduled time.
- A late departure occurs when the trip departs +5 minutes past the scheduled time.
- An early arrival is considered On-Time.
- An early departure occurs when the trip departs -1 or more minutes prior to the scheduled time.

### **Span of Service**

#### METRO Bus

The time between the start and the end trip operated on a route is the span of service on that route. Public transit must operate at times that riders will want or need to use the

services being offered. In order to maximize the opportunities for passengers to avail themselves of the connectivity of METRO's bus service, and to give them the confidence that direct and connecting service will be provided, a consistent span of service is needed. In order to develop span of service guidelines, the lengths of various service periods will be defined as follows:

A.M. Peak Period	6:00 a.m. – 8:30 a.m.
Midday Service	8:31 a.m. – 3:00 p.m.
P.M. Peak Period	3:01 p.m. – 6:30 p.m.
Late Night Service	6:31 p.m. – 6:00 a.m.
Saturday Service	6:00 a.m. – 6:00 p.m.
Sunday Service	6:30 a.m. – 5:30 p.m.

The recommended minimum span of service for each type of METRO fixed-route service is:

<u>Weekday</u>	
Local Service	6:00 a.m. – 6:30 p.m.
Commuter Service	6:00 a.m. – 6:30 p.m.
<u>Saturday</u>	
Local Service	6:00 a.m. – 6:00 p.m.
Commuter Service	Not applicable
<u>Sunday</u>	
Local Service	6:30 a.m. – 5:30 p.m.
Commuter Service	Not applicable

It is important to note that not all commuter service routes have midday service since they have to be adjusted by peak shift time and their travel distance to their major employment activity center.

If the average ridership on the first and/or last trip(s) on the schedule exceeds 65% of the seated capacity of the assigned bus, then extending the span of service on the route will be evaluated as part of the preparation of the Transit Service Plan. If this occurs, it is advisable to add the early/late trips as soon as possible since a peak bus would not be required.

### METRORail

The standard for span of service for METRORail service is as follows:

Monday – Thursday	4:30 a.m. – 11:40 p.m.
Friday	4:30 a.m. – 2:20 a.m.
Saturday	5:30 a.m. – 2:20 a.m.
Sunday	5:30 a.m. – 11:40 p.m.

### **Service Frequency**

#### METRO Bus

The frequency of service on a particular route (or the related measure of bus headways,

which is the time interval between vehicles) is normally determined by demonstrated or projected passenger demand. Some routes, however, operate during periods characterized by low passenger demand. In such cases, adherence to frequency standards based solely on vehicle loads would result in a very low frequency of service, with excessively wide headways between trips. Therefore, minimum standards for service frequency are needed to ensure that a reasonable and attractive level of transit activity is available on all routes.

Typically, 30 minutes between bus arrivals during the peak service period is the minimum frequency at which transit provides an adequate level of basic mobility in a dense urban area. Service headways beyond 30 minutes are generally not attractive enough to develop a solid, consistent base of ridership.

The minimum standards for METRO service frequency, as expressed in minutes between buses or headways, shall be as follows:

Local and Commuter Service

<u>Time Period</u>	<u>Local</u>	<u>Commuter</u>
Weekdays – Peak	30 minutes	20 minutes
Weekdays – Midday	45 minutes	60 minutes
Weekdays – Evening	60 minutes	30 minutes
Saturday	45 minutes	Not applicable
Sunday	60 minutes	Not applicable

Note: These are minimum service standards that will be adjusted to ensure an efficient and/or functional schedule. Many local routes do not operate service on Saturdays and/or Sundays. These standards apply only to existing or proposed service and do not require METRO to operate service on all routes on Saturdays and/or Sundays.

METRORail

METRORail’s travel time from end-to-end is 30 minutes. The standards for METRORail service frequency, as expressed in minutes between trains or headways, are as follows:

<u>Time Period</u>	<u>Minutes Between Trains</u>
Monday – Thursday	
4:30 a.m. – 7:30 p.m.	6 minutes
7:30 p.m. – 9:00 p.m.	12 minutes
9:00 p.m. – 11:40 p.m.	20 minutes
Friday	
4:30 a.m. – 7:30 p.m.	6 minutes
7:30 p.m. – 9:00 p.m.	12 minutes
9:00 p.m. – 2:20 a.m.	20 minutes
Saturday	
5:30 a.m. – 10:00 a.m.	15 minutes
10:00 a.m. – 9:00 p.m.	12 minutes
9:00 p.m. – 2:20 a.m.	20 minutes
Sunday	
5:30 a.m. – 10:00 a.m.	15 minutes

10:00 a.m. – 9:00 p.m.	12 minutes
9:00 p.m. – 11:40 p.m.	20 minutes

### Passenger Load Factors

The intent of passenger load standards is to balance passenger comfort and safety with operating costs. These standards define maximum passenger loads at different times of day, to ensure acceptable levels of rider comfort and safety, while providing METRO good operating efficiencies.

The values shown represent the total number of riders as a percent of the number of seats on the bus. The following passenger load standards shall be in force for METRO's transit service:

<u>Service</u>	<u>Load</u>
Local Service	135%
Local Service (on Freeway)	100%
Commuter Service	100%

Actions shall be taken to reduce the standing load on bus trips with load factors that are consistently greater than the values indicated above. Change in service will be targeted for the following service change. Earlier action will be taken if equipment and operators are available, and/or if the overcrowding is particularly severe.

It is important to note that loads consistently greater than the values indicated above will not require a change if: 1) Headways during the period of the trip in question are 10 minutes or less, and 2) the previous or following trip, in combination with the trip in question, both consistently have enough capacity to accommodate loads below the values indicated above. In these cases, it will be determined that the passenger(s) elect(s) to stand.

### Equipment Assignments

METRO owns two types of buses: 40-foot (standard length) buses and 45-foot over-the-road buses.

Local service will be typically assigned 40-foot (standard length) buses. Commuter service will be typically assigned 45-foot over-the-road buses. All buses should be equipped with operating destination signs that display both route number and route name.

METRO owns eighteen (18) light rail car vehicles that are used exclusively for the 7.5 mile long METRORail line. These cars are deployed either as a single-car train or as a double-car train. During peak times and other periods of high demand, it is recommended that single and double-car trains alternate every other trip in order to maximize capacity.

METRO is in the process of increasing its light rail car vehicle fleet, as well as increasing its light rail service coverage. The Service Standards will be updated when these changes occur.

## CAPITAL FACILITY STANDARDS

METRO has invested a substantial amount of resources into the construction, operation and maintenance of facilities that provide multiple benefits to our riders. As of May 2010, there are twenty-nine (29) Park & Ride lots and twenty (20) transit centers in operation. The Park & Ride lots provide a place for patrons to park their cars and to board a bus, carpool or METRO STAR vanpool in a convenient, weather-protected environment. METRO Park & Ride buses, some local buses, METRO STAR vanpools, and carpools can travel nonstop on High Occupancy Vehicle (HOV) lanes in six freeway corridors to work destinations in the CBD and other major employment centers.

In addition, METRO serves the riders of the local bus system by operating transit centers, which are sheltered waiting areas, strategically located where two or more weekday bus routes converge. These facilities serve as efficient hubs to allow bus riders from various locations to assemble at central points where express trips or other route-to-route transfers can easily occur. Transit centers are designed to provide a comfortable, weather-protected facility where bus patrons have a wider selection of destinations through greater transfer opportunities.

<b>Park &amp; Ride Lots</b>	<b>Park &amp; Ride Lots</b>
Addicks	West Belfort
Bay Area	West Loop
Baytown	Westchase
Cypress	Westwood
Eastex	<b>Transit Centers</b>
Fannin South (Rail)	Acres Homes
Fuqua	Bellaire
Gessner	Denver Harbor / Fifth Ward
Grand Parkway	Downtown (Rail)
Kingsland	Eastwood
Kingwood	Greenspoint
Kuykendahl	Gulfgate
Maxey Road	Heights
Mission Bend	Hillcroft
Missouri City	Hiram Clarke
Monroe	Hobby
North Shepherd	Kashmere
Northwest Station	Magnolia
Pasadena	Mesa
Pinemont	Northline
Seton Lakes	Northwest
South Point	Southeast
Spring	Texas Medical Center (TMC) (Rail)
Townsen	Tidwell
West Little York	Wheeler (Rail)

Standards for the location, sizing and expansion of these facilities are used to address ongoing changes in METRO's ridership levels or passenger trip patterns. Detailed information on capital facilities can be found in METRO Facilities Reference Book, which is available from the Service Design & Development Department.

### **Park & Ride Lots**

At the present time, METRO operates bus service from 29 Park & Ride lots owned by, or accessible to, the Authority. One Park & Pool lot at I-45 is also served by Gulf Freeway routes. Fannin South, Mission Bend, and North Shepherd are also considered Park & Ride lots; however, they do not serve any Park & Ride routes.

Average daily boardings on the primary route at each lot range from 40 on the Pasadena portion of the 244 Monroe route to nearly 2,800 on the West Belfort routes. Vehicle parking capacity ranges from 100 spaces at the Pasadena lot to 2,361 spaces at the Northwest Station lot.

#### Methodology and Criteria for Park & Ride Lots

METRO utilizes standard transit practices and procedures and a tiered process for the selection of potential Park & Ride locations. The tiered process consists of a first level screening and the rating of each potential site against a criterion to develop a total point value for each site. The sites are then ranked according to the point's value; the sites with the highest point's value are considered the most desirable and are ranked accordingly. Measures were developed to assign ratings of 3= *Good*, 2= *Fair*, 1= *Poor* for each criterion. No priority or weighting has been established per individual criterion. Sites are selected and reviewed based on a set of criteria that include, but is not limited to, capacity, land use compatibility, visibility, and customer convenience.

Once the sites are ranked and "short listed," the highest ranking sites are considered the highest performing sites and undergo further analysis utilizing a set of characteristics that complement and contribute to the criterion. The contributing characteristics assist in narrowing down the highest performing sites to a set of candidate sites. The candidate sites are put forth for detailed analysis, such as environmental, design, community input, etc.

#### Criteria

- **Bus operations** – Assessment of the travel demand and ridership to best determine the number of bus trips to serve the Park & Ride. This criterion is rated based on road access and signalized intersections.
- **Capacity** – Aerial photography and fieldwork are used to identify specific sites that meet the size requirements for Park & Ride lots (typically at least 14 acres to accommodate detention requirements). Vacant and undeveloped properties are normally chosen with enough space for platforms, bus bays, transit lanes, parking, environmental mitigations, etc. This criterion is rated based on acreage.
- **Customer Convenience** – Sites should be close enough to residential areas to provide a cone of opportunity for ridership and travel time purposes, but maintain the appropriate distance for environmental purposes; i.e. noise, air quality, etc. This criterion is based on the service (access to the Park & Ride) provided.

- **HOV Access/Managed Lanes** – Availability of HOV/Managed lanes between the freeway interchange nearest to the site and major employment destinations.
- **Land Use Compatibility** – Assessment of surrounding land use such as residential, industrial, commercial, mixed-use, etc. and its compatibility with transit.
- **Lot Location Prior to a Critical Congestion Point** - Potential sites in relation to freeway congestion; i.e., whether the site is located prior to, in the midst of, or beyond the point of freeway congestion.
- **Travel times** – Assessment of bus travel times to ensure a better bus to auto travel time ratio. Sometimes the travel time for bus and auto may be the same due to no HOV or Diamond Lanes; however it is useful in determining patronage.
- **Visibility** - Assessment of how visible the lot would be from the nearest freeway or major street (arterial), and assessment of the attractiveness of the location from a ridership standpoint. This criterion is rated based on distance from the corridor.

### Contributing Characteristics

Based on the first level screening and ranking, the “short listed” sites are evaluated against contributing characteristics. As previously stated, the contributing characteristics are designed to complement the criteria, but they may also offset a missing element of the established criteria. The contributing characteristics assist in the selection of candidate sites which will undergo detailed analysis. The contributing characteristics are as follows:

- **Customer Input/Opposition** – Assessment of strong community input or opposition.
- **No Competing METRO Service** - Potential sites should also assess the proximity and utilization of any other METRO services; i.e. the nearest Park & Ride(s), Transit Center(s), local service, rail, etc.
- **Direct Ramp to a HOV** – Assessment of the availability of HOV ramps at or near the proposed site.
- **Joint Development Opportunities** - Assessment of joint development opportunities that are considered to be cost-effective and a significant benefit to the proposed Park & Ride.
- **Size** – Based on the assessment, the needs of the market to be served, and the employment destination. To determine if the site has sufficient developable acreage to meet current and projected demand for the target market.

### Operating Standards

When parking conditions at a Park & Ride facility consistently approach or exceed 80% of its vehicle capacity, remedial action will be evaluated to alleviate such overloads. Remedial action may include:

- Site expansion
- Acquisition of interim Park & Ride facilities
- Establishment of parking restrictions
- Development of a new Park & Ride facility

## **Transit Centers**

At the present time, METRO operates bus service from 20 Transit Centers owned by the Authority. METRO has established the following standards to locate transit centers that are intended to control operating costs, minimize travel time impacts to existing riders, serve a high number of riders, expand opportunities to reach a broader market and provide METRO a greater presence in a community:

- Existing routes shall have a minimum level of deviation to access the facility.
- Provide transfer opportunities between at least two (2) routes.
- The routes at the facility must serve more than one activity center.
- Transit centers should be located in areas where future services can be easily integrated with existing services.

## **EVALUATION OF ROUTE PERFORMANCE**

METRO performs two different analyses on all existing routes and on proposed new routes. The first analysis is a route performance evaluation comparing all services, while the second evaluates routes that are classified as poorly performing routes. These analyses provide key information on the relative performance of existing and proposed new routes.

### **Comparative Evaluation (Route Ranking) Model**

A comparative evaluation is conducted by Ridership Analysis and Service Evaluation (RASE) to identify which routes are top performers and which routes are performing below standards. The Route Ranking Model can also be used to determine whether a proposed route will likely be a high or low performer.

The general steps in the process are described below with examples of the specific methodology outlined.

- Develop average daily ridership (boardings), fare revenue, and service levels for each route. If a route is operated on weekday, Saturday, and Sunday, each service day is evaluated individually.
- Develop estimated annual ridership, fare revenue, service levels, and costs for each route. Three separate costs are derived: 1) variable cost; 2) operating cost; and 3) total cost. Total cost is used to calculate the total subsidy per boarding indicator, while operating cost is used to calculate the operating ratio. Variable cost provides a measure of the out-of-pocket cost of the service.
- Evaluate all existing routes across key productivity measures and rank the services from most productive to least productive. The comparative evaluation process utilizes four key performance factors to provide a balanced analysis between effectiveness and efficiency measures. The routes are sorted by this composite score, from the best to the worst.
- Identify “Maturing” routes (routes that have been in operation less than 2 years) for possible exclusion from the classification of Poorly Performing Routes. “Maturing” routes can be granted an exception for up to the first two years of operation to allow for adequate marketing and public information efforts to promote the route to potential riders.
- Identify Poorly Performing Routes. Poorly Performing Routes are routes with total subsidies per boarding in excess of 100% above the average total subsidy per boarding for the respective service category. These routes are subject to productivity review up to and including proposed discontinuation during the upcoming year.

## Performance Indicators

The comparative evaluation for the existing and proposed new routes is composed of four performance indicators:

- Passenger Boardings / Revenue Mile;
- Passenger Boardings / Revenue Hour;
- Total Subsidy / Passenger Boarding; and
- Operating Ratio

These four factors provide a balanced weighting between effectiveness measures (the first two factors), and efficiency measures (the last two factors). Equal weight is therefore given to usage-related indicators and cost-related indicators. The four factors also provide a balance among the different types of services since a factor that favors one type of service (e.g. operating ratio favors Park & Ride routes due to the higher fares paid on Park & Ride routes relative to Local routes), is off-set by another factor that favors a different type (e.g. passenger trips / revenue mile favors local routes due to the turnover associated with multiple stops on local routes relative to Park & Ride routes).

The development of these four factors requires the calculation of several pieces of data on a route level basis. The specific definitions for each indicator are:

- **Passenger Boardings / Revenue Mile.** The number of average daily boardings per route divided by the daily number of revenue miles of service supplied on the route (total miles less “deadhead” miles, or the miles to and from the garage).
- **Passenger Boardings / Revenue Hour.** The same information as the previous indicator except using revenue service hours instead of miles.
- **Total Subsidy / Passenger Boarding.** The net cost (total cost less revenue) of operating a route divided by the number of passengers. At METRO, total cost is determined by allocating all service-related expenses over three cost factors:
  - 1) *Total miles* – Revenue miles plus deadhead miles.
  - 2) *Total hours* – Revenue hours plus deadhead hours.
  - 3) *Peak vehicles* – The number of peak weekday vehicles required on the route. The number of buses required to operate weekday service far exceeds weekend services resulting in bus procurements to meet weekday demand. Since buses are already available for use on weekends, no peak vehicle costs are allocated to weekend services.
- **Operating Ratio.** The operating ratio calculates the percentage of operating costs covered by that route’s revenue.

## Special Route Classifications

In the course of applying the service standards and the comparative evaluation model, METRO has developed definitions for certain routes that are either exempt from or are targeted for the application of the analyses. “Maturing” routes can be exempt from the analyses while routes that have significantly higher subsidies per boarding are classified as “Poorly Performing” routes and are subject to increased scrutiny.

**Maturing Routes.** Maturing routes are recently implemented routes that have not been in place long enough to have reached the full level of ridership projected for the route. Maturing routes can be granted an exemption for up to two years of operation to allow for adequate marketing and public information to promote the route to potential riders. For FY2011, the following routes would be classified as “maturing:”

Route	Date Started
32 Renwick	June 2009
402 Bellaire Quickline	June 2009
426 TMC Swiftline	August 2009
75 Energy Corridor Connector	January 2010
352 Swingle Shuttle	June 2010

**Poorly Performing Routes.** Poorly performing routes are routes with total subsidies per boarding in excess of 75% above the average total subsidy per boarding for a service category. These routes are subject to intense productivity review including modification of service mode and/or reduction in service levels up to and including discontinuation. For FY2011, the following routes would be classified as “poorly performing:”

Route	Route	Route
3 Langley – Weekday	59 Aldine Mail – Weekday	286 West Little York – NWTC / Uptown – Greenway – Weekday
32 Renwick – Weekday <i>Maturing</i>	60 Hardy – Weekday	313 Allen Parkway – Weekday
35 Fairview – Weekday	64 Lincoln City – Weekday	402 Bellaire Quickline – Weekday <i>Maturing</i>
38 Manchester Docks – Weekday	70 Memorial – Weekday	426 TMC Swiftline – Weekday <i>Maturing</i>
39 Parker Road – Weekday	75 Energy Corridor – Weekday <i>Maturing</i>	500 Airport Direct – Weekday
48 Navigation – Weekday	77 Liberty – Weekday	500 Airport Direct – Saturday
48 Navigation – Sunday	131 Memorial – Weekday	500 Airport Direct – Sunday
49 Chimney Rock – Weekday		

## Route Ranking Process

The application of the comparative evaluation process described in the previous section provides a ranking of all routes in the system. The model sorts the routes from the most productive to the least productive based upon the four indicators identified above. The routes will be divided into quartiles such that the 1<sup>st</sup> quartile represents the top 25% of all routes while the 4<sup>th</sup> quartile represents the bottom 25% of all routes.

However, an absolute value to measure route productivity is needed to establish an acceptable level of performance. METRO uses the total subsidy per passenger boarding as discussed previously. The greater the individual route performance variance from the average performance within the local or Park & Ride service type, the more significant the corrective action required. METRO's guidelines for the total subsidy per passenger boarding analysis are:

- If a route's total subsidy per boarding is 51 – 75% higher than the average subsidy for the service type, METRO will monitor the route and consider minor modifications to improve route performance.
- If a route's total subsidy per boarding is 76% or higher than the average subsidy for the service type, METRO will consider major restructuring or elimination of the service.

## **GLOSSARY OF TERMS**

**Activity Center** – An area with a high concentration of activities that generate a large number of trips such as shopping centers, business or industrial parks, recreational facilities, etc. The major activity centers in the METRO Service Area include Downtown, Galleria/Uptown, Texas Medical Center, Greenway Plaza, Greenspoint, the Westchase District, and the Energy Corridor.

**Block** – A series of trips conducted by one bus (it may be either in the morning or evening time periods).

**Commuter Service** – Bus service that travels directly to a central activity center with single or limited passenger pickup locations. Commuter service is offered by METRO's Park & Ride routes.

**Deadhead** – The miles or hours when a bus is being driven to its first scheduled time point or returning to the garage from its last scheduled time point.

**45-Foot Bus** – A bus used in Park & Ride service with 49-57 seats.

**Frequency** – How many buses pass by a point in a given time period.

**Headways** – The time between buses in the schedule: 5 minutes would be a very short headway; 60 minutes would be a long headway.

**Hooked Routes** – Two routes that generally serve different areas of the city, but are connected in the CBD to operate as one route in order to save equipment, reduce duplicative service and thereby reduce congestion in the CBD.

**HOV Lane** – A barrier-separated road for buses and for cars with more than one occupant that provides faster trips than freeway mainlanes and that has limited access points (not always barrier-separated in other cities).

**Layover** – Time built into a schedule to allow a break for the operator and to allow "catch-up" if traffic conditions cause service delays.

**Local Route** – Bus service that picks up and discharges passengers all along the route.

**METRORail** – Accessible light rail service line that is 7.5 miles in length with 16 accessible stations connecting the Central Business District, the Museum District, Texas Medical Center and Reliant Park.

**Park & Ride Route** – Commuter service that operates from a single or minimal number of pickup points and travels directly to the activity center with no interim stops.

**Park & Ride Lot** – A facility comprising of a parking area and a passenger boarding area with a covered shelter and other amenities where commuters can park their cars and catch the bus to work.

**Passenger Boardings** – The number of times all passengers get on any bus or train in the system.

**Passenger Trips** – The number of "journeys" made by all passengers in a given time period. A passenger transferring to a second bus to complete his trip would count as two boardings but only one trip.

**Quickline Bus Service** – A local bus service that serves select stops that have high connectivity and ridership on existing local service routes. Service is characterized by reduced headways, higher speeds, and distinctive buses and stops, when compared to regular local service. Also known as Signature Bus Service.

**Revenue Service** – The miles or hours operated by a bus when it is scheduled to be picking up or discharging passengers.

**Run Cut** – The process of setting up the operator work assignments for all the service that will be provided at the next service change.

**Run** – A bus operator's daily assignment. It may be eight hours straight or it may comprise two or more pieces of work on different routes.

**Running Time** – The time allowed on the schedule between two points.

**Signature Bus Service** – A local bus service that serves select stops that have high connectivity and ridership on existing local service routes. Service is characterized by reduced headways, higher speeds, and distinctive buses and stops, when compared to regular local service. Also known as Quickline and Swiftline bus service.

**Time Point** – A location on a route associated with the time that a bus is scheduled to depart as it operates on the route. A selection of these points (not all) is listed on the published public timetables.

**Transit Center** – A facility usually comprised of a passenger boarding area with little or no long-term parking, where passengers can transfer from one bus to another in a sheltered environment without having to go to downtown.

**Trippler** – A work assignment that includes only one revenue trip before it returns to the garage. METRO provides service at a level to meet demand. Since demand on most routes is highest in the a.m. and p.m. peak periods, it is necessary to operate additional equipment in these periods to handle the increased ridership. Most buses go out of service during the midday period when ridership falls to much lower numbers.

# IndyGo Service Standards 2007



The graphic is a composite of two shapes: a green semi-circle on the left and a blue rounded rectangle on the right. The green semi-circle contains the 'IndyGo' logo in white script, a white silhouette of a bus with a wheelchair icon on its side, a white silhouette of a person walking, and the phone number '635-3344' and website 'www.indygo.net' in white. The blue rounded rectangle contains the word 'ROUTES' in white, followed by three route entries: '5' in a yellow circle with 'E. 25th St / N. Harding', '15' in a yellow circle with 'Riverside Dr', and '30' in a yellow circle with '30th St Crosstown'.

**IndyGo**

635-3344  
www.indygo.net

ROUTES

**5**  
E. 25th St /  
N. Harding

**15**  
Riverside  
Dr

**30**  
30th St  
Crosstown

## Exhibit 2

## Performance Monitoring Indicators

### Route & Schedule Design Standards

#### *Service Categories*

IndyGo presently operates 27 fixed local bus routes; twenty-five of the routes connect to downtown Indianapolis and the other two routes provide crosstown service. As required by the Americans with Disabilities Act (ADA), IndyGo provides complementary ADA paratransit service, called Open Door, in the fixed route, local service area. IndyGo presently operates demand response service called IndyFLEX in some suburban service areas and for customers needing late night service after fixed route service ends.

Prior to June 27, 2004, IndyGo also operated several express and circulator routes. As part of the *Comprehensive Operational Analysis*, the agency is interested in evaluating new express route service (including new park-ride facilities), new circulator/shuttle services, and outlying transit centers that will facilitate passenger transfers between all service categories offered by IndyGo.

The differentiation between the service categories is functional:

#### Existing Service Classes

- **Local** routes (25 weekday routes) operate between downtown Indianapolis and various neighborhoods within Indianapolis and Marion County. Service frequencies of 30 minutes (5 of the 25 weekday local routes operate at 15-20 minute peak frequencies) are generally operated on weekdays during the AM and PM peaks. Early morning, midday and evening service frequencies on weekdays are generally 30-60 minutes. Saturday service generally operates 30-60 minute frequencies (19 of the 22 local routes) and Sunday service operates 30-120 minute frequencies (11 of the 15 local routes). The operational span of service is shorter for Saturdays and Sundays as compared to weekdays. The full, cash fare for riders on local routes is \$1.50.
- **Crosstown** routes (two weekday routes) currently are operated by IndyGo. The #26, Keystone Crosstown, operates at 40 minute peak and 70 minute off-peak frequencies on weekdays and 65 minute frequencies all day on Saturdays. The #30, 30<sup>th</sup> Street Crosstown, operates at 20-30 minute peak and 45-60 minute off-peak frequencies on weekdays. The operational span of service for the #26 is shorter for Saturdays as compared to weekdays. The full, cash fare for riders on crosstown routes is \$1.50.

The Local and Crosstown service classes described above are complemented with ADA paratransit service, called **Open Door**, in the fixed route, local service area and operates according to ADA and USDOT regulations. The full, cash fare for the Open Door service is \$3.00.

- **IndyFLEX** is demand response, or Dial-A-Ride, service offered in three service areas and as a Late Night service. The North Side Dial-A-Ride serves the 86<sup>th</sup> street corridor between Park 100 and Keystone at the Crossing and operates weekdays from 6AM to 8PM. The Airport Area Dial-A-Ride serves passengers traveling within the Indianapolis International Airport area and operates weekdays and Saturdays from 5:45-6AM to 6PM. The Southeast Dial-A-Ride provides transit between downtown and the southeast side of Indianapolis and operates weekdays from 7PM to 10:30PM. Dial-A-Ride passengers must call at least 24 hours in advance to make a reservation for these services.

The IndyFLEX Late Night provides outbound service from downtown to the northwest, northeast, and southeast quadrants of the city and operates without prior reservation between 10PM and 10:20PM on weekdays/Saturdays and between 8PM and 10:30PM on Sundays. At 11PM, regular IndyFLEX Late Night service begins and continues until 6AM on weekdays and Sundays where passengers must call at least 24 hours in advance to make a reservation for the service.

The full, cash fare for riders on IndyFLEX routes is \$3.00.

#### New Service Classes

- **Express** routes are used to provide fast line-haul service for commuters from suburban residential areas and park-ride facilities to major employment areas such as downtown. Service is usually operated only on weekdays in the peak periods (AM and PM) in the peak direction of travel. However, some routes serve “reverse commute” markets and operate in the non-peak direction of travel (for example, in the AM from downtown to outlying employers). Between downtown Indianapolis and the outlying segments of the route, most buses operate with “closed doors” (that is, no stops). As ridership builds, some express routes also offer limited midday service as a convenience to customers. The full, cash fare for riders on express routes is generally higher than fares charged for local service.
- **Circulator** and Shuttle routes are generally operated in downtowns and in suburban activity centers. For example, the #90 Blue Line operates primarily for visitors as a downtown circulator to major attractions and points of interest. Circulator routes are generally short routes that are intended to serve short, non-work trips or serve as feeders to local/express routes. The cash fare for riders on circulator routes is generally the same or less than fares charged for local service.

These service categories should continue to form the basis for the Route and Schedule Design Standards and the Route Performance Evaluation process.

#### *Route Directness*

IndyGo bus routes shall be designed to operate as directly as possible between major destinations in order to minimize passenger travel time. Routes shall operate on major arterial streets as much as possible. However, there may be situations in which a route

may deviate from the shortest, most direct routing. Such situations include a mid-route deviation to serve a particular trip generator or an end-of-line terminal loop. Circulator and shuttle routes, which are designed to collect and distribute people in a specified service area, are exempt from this standard.

When a deviation exists or is being considered, 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. The following standards shall be applied to all route deviations and/or terminal loops:

1. To the extent possible, two-way service shall be provided on the same street.
2. Express service shall be routed in the most direct manner possible.
3. Deviations from the basis route alignment to serve activity centers will be made only when they have the potential to attract new riders equal to or exceeding the route performance evaluation standard (riders per hour) for the corresponding route category.
4. Additional time to operate route deviations should not exceed five minutes (one-way) or ten percent of the one-way run time, whichever is less.
5. No mid-route loops shall be operated.
6. Terminal loops shall not exceed 25% of a route's total length.

#### *Route Variations*

It is sometimes more efficient to provide service to a certain area with one route having several branches than to operate several different routes. In addition, some bus trips on a route may not go to the end of the line due to very low ridership in that area at a particular time of day (that is, "turnback"). However, these actions can result in a system that is much more difficult for current, as well as potential, transit passengers to understand and utilize. Therefore, to provide a user-friendly service and to encourage maximum use of the system by all current and potential riders, the following standards for branches and turnbacks shall apply:

- No route shall have more than two (2) distinct branches.
- No route shall have more than one (1) turnback.

When two routes are interlined (for example, #38 Lafayette Square & #39 East 38<sup>th</sup> Street), each route shall be treated as a separate route for the application of this standard.

### *Span of Service*

The time between the first and last trip operated on a route is the span of service. In order to maximize the opportunities for passengers to connect with other routes, a consistent span of service is desirable. The typical proposed span of service for each fixed route Service Category that is reflected in this COA is as follows:

#### Weekday

Local	Tier 1 routes: 20 hours (4:30AM to 12:30AM) Tier 2 routes: 18 hours (5:00AM to 11:00PM) Tier 3 routes: 16 hours (6:00AM to 10:00PM)
Crosstown	17 hours (5:00AM to 10:00PM)
Express	Peak: 6 hours (6 to 9:00AM and 4 to 7PM) Midday on selected routes: 3 hours (11AM to 2PM)
Circulator	-- varies by route --

#### Saturday

Local	All Tier 1 & 2 routes and selected Tier 3 routes: 16 hours (6:00AM to 10:00PM)
Crosstown	15 hours (7:00AM to 10:00PM)
Express	Not operated
Circulator	-- varies by route --

#### Sunday & Holidays

Local	Tier 1 & 2 routes: 14 hours (7:00AM to 9:00PM) Tier 3 routes: Not operated
Crosstown	Not operated
Express	Not operated
Circulator	-- varies by route --

It should be recognized that due to differences in ridership levels, some variation in days operated and start/end times among routes is expected. For this reason, the proposed spans of service are intended as guidelines rather than standards.

### *Service Frequency*

The frequency of service on a particular route (that is, headway, or time interval between successive buses) will be based on the existing or projected ridership and load standards (that is, maximum number of passengers onboard a bus). However, on some routes, during certain periods of low ridership, determining frequency based on ridership demand may lead to very infrequent service. So infrequent, in fact, that the service is no longer viewed by passengers as a reliable means of travel. Therefore, minimum standards of service frequency may be applied to assure that a reliable, attractive level of service is available throughout the day. The peak hours are identified as the periods from 6AM until 9AM and from 3PM until 6PM. Midday hours are from 9AM until 3PM. Early hours are from 4:30AM to 6AM. Evening

hours are from 6PM and 12:30 AM. Following are minimum standards for IndyGo service frequency for each Service Category:

<u>Time Period</u>	<u>Local</u>	<u>Crosstown</u>	<u>Express</u>	<u>Circulator</u>
Weekday				
AM, PM peak	30 min.	30 min.	30 min.	15 min.
Midday	60 min.	60 min.	60 min.	30 min.
Early & Evening	60 min.	60 min.	N/A	60 min.
Saturday	60 min.	60 min.	N/A	30 min.
Sunday	60 min.	N/A	N/A	60 min.

Clock headways (for example, service frequency intervals of 10, 15, 20, 30 and 60 minutes) should be maintained whenever possible. This helps to make the service easier to understand and more predictable to riders, which is particularly important during periods when the service is infrequent (that is, more than 30 minutes).

### *Load Standards*

The intent of load standards is to balance passenger comfort and safety with operating costs. These standards define maximum passenger loads at different times of day to ensure acceptable levels of rider comfort and safety, while providing IndyGo good operating efficiencies. The load standards shown below represent the total number of riders as a percent of the number of seats on the bus.

<u>Time Period</u>	<u>Local</u>	<u>Crosstown</u>	<u>Express</u>	<u>Circulator</u>
Weekday				
AM, PM peak	125%	125%	100%	125%
Midday	100%	100%	100%	100%
Evening	100%	100%	N/A	100%
Saturday	100%	100%	N/A	100%
Sunday	100%	N/A	N/A	100%

These load standards should be applied to the average ridership and number of seats per bus for a period of 60 minutes. Passenger loading on individual bus trips may exceed the standard. If the load standard is exceeded for any 60-minute period, IndyGo should evaluate the potential for improving the service frequency (that is, reducing the headway or interval between buses). If the standard is exceeded for particular trips, but not for a sustained 60-minute period, IndyGo should evaluate the possibility of adjusting schedule times to focus more service before and after the overloaded trip(s). The maximum time that an individual passenger should be expected to stand on a given trip is 15 minutes.

### *On-Time Performance*

To ensure that transit riders have confidence that the service will perform reliably in accord with the public timetables prepared and distributed by IndyGo, on-time performance standards have been established. A vehicle is considered “on-time” when

its arrival is from zero to five minutes after the scheduled time. A vehicle is considered “late” when it arrives more than five minutes after the scheduled time. No vehicles should arrive before the scheduled time, or “early”.

It is impossible to achieve and maintain 100% on-time performance due to varying traffic and weather conditions, construction activity, detours, accidents and other service interruptions. Nevertheless, every effort should be made to ensure that all IndyGo buses operate on-time. The following on time performance standards shall apply: 90% of all buses should arrive at scheduled time points “on-time”. If a route or individual trip(s) is consistently running late, then a review of the schedule will be conducted and remedial actions (for example, schedule and/or run modification if needed, improved on-street supervision, etc.) taken at the earliest opportunity.

### *Missed Trips*

IndyGo, like all other transit agencies, occasionally fails to operate scheduled trips due to a shortage of drivers, mechanical problems or accidents. The percentage of trips operated is defined as the ratio of trips actually operated divided by the scheduled number of trips. The annual objective shall be to operate a minimum of 99% of scheduled trips (that is, no more than 1% trips not operated or “missed”).

### **Route Performance Evaluation Process**

IndyGo will periodically receive requests for changes to existing service and for new service in growing areas of Indianapolis. Additionally, IndyGo may be operating some services that are not attracting enough riders to justify their cost. In order to be consistent in the evaluation of service proposals, and to ensure that the service being operated represents the most cost-effective use of available resources, the following Route Performance Evaluation Process has been proposed.

The Route Performance Evaluation Process relies on the analysis and ranking of existing and proposed routes based on two productivity standards – ridership productivity (riders per hour of revenue service or passengers per revenue trip) and economic productivity (average operating subsidy per passenger). The process follows the following steps:

1. Develop productivity standards for each Service Category,
2. Calculate performance measures for all proposed and existing routes,
3. Identify “substandard” services,
4. Evaluate service modifications,
5. Obtain approval from appropriate decision-makers,
6. Implement the modifications and
7. Monitor route performance.

The application of productivity standards to existing routes is a flexible process. The purpose of the standards is to help identify routes that are most in need of service modifications, 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 low ridership routes. Elimination of routes is only intended as a last resort, when it has been determined that no cost-effective actions are able to improve the productivity of the route.

In addition, the evaluation of existing routes is not intended to preclude changes to routes that meet the minimum standards. In many cases, it may be possible to improve the productivity of routes that meet or exceed the standards by making minor changes to service frequency, span of service or trip times.

The productivity of existing routes will be reported quarterly. The evaluation of possible service modifications and approval and implementation of recommended modifications will be conducted annually. Additionally, the productivity standards will be reviewed annually, using ridership, operations, revenue and cost data for the previous 12-month period for which data is available.

### *Productivity Standards*

Two productivity measures are proposed – ridership productivity, which is measured in terms of riders per revenue hour of service and economic productivity, which is measured in terms of operating subsidy per passenger. Routes within each Service Category will be ranked according to the productivity measures and compared to the minimum standards identified for each Service Category. A net productivity rating will then be calculated for each route and a corresponding list of actions (for example, marketing promotions, service modifications, elimination) will be identified for further evaluation.

New routes should meet the applicable standards for the Service Category after one year of operation. All new routes will be reviewed each quarter and routes that have not shown adequate progress toward meeting the standards will be targeted for marketing promotions or possible service modifications to increase productivity.

The ridership and economic standards are calculated as follows:

- Passenger boardings per revenue hour – The number of quarterly weekday boardings per route (as reported by IndyGo’s farebox data) divided by the quarterly weekday revenue hours of service. We recommend using this measure for all Service Categories. Some agencies (for example, COTA) use Passenger Boardings per Revenue Trip as the ridership measure for express routes. However, many agencies (for example, Denver and Charlotte) use the same measure across all classes to simplify data collection and understanding by decision-makers. The standard is calculated as the average of all routes in each Service Category.
- Operating subsidy per passenger boarding – The quarterly weekday direct operating cost of a route less quarterly weekday cash passenger revenue divided by number of passenger boardings. This economic productivity measure also would apply to all

Service Categories. The standard is calculated as the average of all routes in each Service Category.

- The ridership and economic productivity measures for each route then are ranked and their productivity rating will be calculated as a percentage of the productivity standards:

$$\text{Ridership productivity rating} = 1 + \frac{(\text{Route riders per hour} - \text{Standard riders per hour})}{\text{Standard riders per hour}}$$

or

$$\text{Ridership productivity rating} = 1 + \frac{(\text{Route riders per trip} - \text{Standard riders per trip})}{\text{Standard riders per trip}}$$

and

$$\text{Economic productivity rating} = 1 + \frac{(\text{Standard oper. subsidy} - \text{Route oper. subsidy})}{\text{Standard oper. subsidy}}$$

(Note that the numerators of the formulae for ridership and economic productivity are reversed, since “higher” riders per hour and a “lower” subsidy per rider are “better” than the standards.)

As an example of applying the evaluation process, Table 2-1 summarizes 2004 annual weekday productivity standards for the IndyGo Local routes. At this time, the two Crosstown routes are also included in the Local route summary; the #90 Blue line circulator was not included in the analysis. In the future, IndyGo staff would summarize and evaluate the route performance quarterly. As additional Crosstown, and new Express and Circulator routes, are implemented, separate performance tables would be developed for each Service Category. If desired, performance tables could be developed for Saturday and Sunday operations data as well. As calculated in Table 2-1, the *estimated* Year 2004 Annual Weekday Standards for Passenger Boardings per Revenue Hour is 20.5 and for Operating Subsidy per Passenger Boarding is \$2.62.

**Table 2-1  
Local Route Productivity Standards (Annual Weekday)**

Route	Ann. Weekday Operating & Cost Inputs				Productivity Standards				
	Revenue Hours	Direct Cost	Riders	Cash Revenue	Riders per Hour	Ridership Productivity	Subsidy per Rider	Economic Productivity	Overall Rating
8 - Washington	27,457	\$1,800,597	954,218	\$506,427	34.8	170%	\$1.36	148%	159%
39 - E. 38th St.	20,486	\$1,343,472	660,028	\$414,524	32.2	157%	\$1.41	146%	152%
10 - 10th	29,866	\$1,958,593	808,601	\$438,627	27.1	132%	\$1.88	128%	130%
38 - Lafayette Sq.	11,730	\$769,227	301,200	\$140,089	25.7	125%	\$2.09	120%	123%
37 - Park 100	13,473	\$883,566	336,709	\$171,474	25.0	122%	\$2.11	119%	121%
3 - Michigan	10,859	\$712,133	259,224	\$156,137	23.9	117%	\$2.14	118%	117%
17 - College	14,890	\$976,460	334,412	\$198,930	22.5	110%	\$2.33	111%	111%
5 - E. 25th/N. Harding	16,971	\$1,112,925	339,893	\$204,983	20.0	98%	\$2.67	98%	98%
4 - Ft. Harrison	11,353	\$744,536	216,085	\$130,180	19.0	93%	\$2.84	92%	92%
15 - Riverside	12,517	\$820,832	229,161	\$166,356	18.3	89%	\$2.86	91%	90%
25 - W. 16th St.	9,278	\$608,432	170,701	\$105,049	18.4	90%	\$2.95	88%	89%
34 - Michigan Rd.	10,421	\$683,435	188,440	\$116,562	18.1	88%	\$3.01	85%	87%
19 - Castleton	15,338	\$1,005,846	275,768	\$167,484	18.0	88%	\$3.04	84%	86%
18 - Nora	9,200	\$603,349	164,505	\$89,637	17.9	87%	\$3.12	81%	84%
2 - E. 34 St.	14,257	\$934,961	250,389	\$145,941	17.6	86%	\$3.15	80%	83%
31 - Greenwood	11,214	\$735,394	191,421	\$129,018	17.1	83%	\$3.17	79%	81%
14 - Prospect	5,367	\$351,981	87,961	\$50,241	16.4	80%	\$3.43	69%	75%
21 - E. 21 St.	8,433	\$553,049	109,984	\$73,294	13.0	64%	\$4.36	34%	49%
12 - Beechcrest	5,609	\$367,812	73,739	\$44,843	13.1	64%	\$4.38	33%	49%
28 - St. Vincent	10,171	\$666,995	133,253	\$77,105	13.1	64%	\$4.43	31%	48%
11 - E. 16th	6,596	\$432,579	75,540	\$43,453	11.5	56%	\$5.15	4%	30%
26 - Keystone	12,000	\$786,940	135,109	\$82,910	11.3	55%	\$5.21	1%	28%
55 - English	6,916	\$453,538	75,361	\$48,979	10.9	53%	\$5.37	0%	27%
16 - Beech Grove	6,391	\$419,102	66,315	\$41,254	10.4	51%	\$5.70	0%	25%
30 - 30th St. Crosstown	11,295	\$740,733	114,830	\$76,536	10.2	50%	\$5.78	0%	25%
24 - Mars Hill	7,730	\$506,947	68,449	\$36,517	8.9	43%	\$6.87	0%	22%
22 - Shelby	6,398	\$419,548	53,752	\$32,564	8.4	41%	\$7.20	0%	21%
<b>Totals</b>	<b>326,212</b>	<b>\$21,392,983</b>	<b>6,675,048</b>	<b>\$3,889,114</b>	<b>20.5</b>	<b>100%</b>	<b>\$2.62</b>	<b>100%</b>	<b>100%</b>

(1) FY 03 NTD direct cost = \$65.58 per revenue hour.  
(2) Ridership and revenue is from GFI farebox data (2004).

*Potential Actions*

The potential actions that may be evaluated, recommended and ultimately implemented for each route will be determined by its net productivity rating. A net productivity rating greater than 100% (that is, better than average performance), may indicate a need to increase service on the route in order to better serve unmet transit demands or reduce passenger loads (passengers per seat). On the other hand, a net productivity rating less than 100% (that is, worse than average performance) may indicate a need for actions to increase ridership or reduce service levels.

For any route that has a net productivity value less than 50%, an in-depth analysis of that route's performance should be conducted. That analysis should assess the comparative productivity of each scheduled trip and route segment (for weekdays, Saturdays and Sundays) with the objective of identifying unproductive services. Potential actions designed to increase ridership and/or reduce service levels include marketing promotions, reducing the span of service (that is, eliminating early morning or night trips), decreasing

the service frequency, changing the route alignment and, as a last resort, eliminating the route. IndyGo may also elect to hold informal public meetings to elicit comments from existing and potential riders regarding ways to improve service.

Similarly, an in-depth analysis should be conducted for any route that has a net productivity value greater than 150%. Potential actions may include increasing the service frequency, adding a new route, or increasing the span of service (for example, adding early morning or night trips, implementing new Saturday or Sunday service).

Less detailed analyses should be conducted for the remaining routes that have net productivity values greater than 50% and less than 150%. Table 2-2 lists potential actions that can be evaluated for varying levels of new productivity ratings.

**Table 2-2  
Potential Actions for Net Productivity Ratings**

<b>Potential Actions</b>	<b>0- 25%</b>	<b>25- 50%</b>	<b>50- 75%</b>	<b>75- 100%</b>	<b>100- 150%</b>	<b>150+ %</b>
<u>Reduce Service/Increase Productivity</u>						
1. Marketing Promotions	Yes	Yes	Yes	Yes	No	No
2. Reduce Span of Service	Yes	Yes	Yes	Yes	No	No
3. Decrease Service Frequency	Yes	Yes	Yes	Yes	No	No
4. Change Route Alignment	Yes	Yes	Yes	Yes	No	No
5. Eliminate Route	Yes	Yes	No	No	No	No
<u>Increase Service/Decrease Productivity</u>						
1. Increase Span of Service	No	No	No	No	Yes	Yes
2. Increase Service Frequency	No	No	No	No	Yes	Yes
3. Add New Route	No	No	No	No	No	Yes

*Implementation Process*

The Route Performance Evaluation Process described above should be conducted annually. For remedial actions that constitute a nonsubstantial change in service (less than 25% of daily revenue hours or route miles), IndyGo’s Service Development staff should make recommendations to the Marketing & Service Development Department Director and the President/CEO for approval and implementation.

For major actions (more than 25% of daily revenue hours or route miles), the Service Development staff should present its recommendations to a staff committee comprised of all appropriate departments (Marketing & Service Development, Operations & Service Delivery, etc.). After concurrence by this committee, recommendations should be advanced to Senior Staff (appropriate Department Directors, the CFO, etc.), the President/CEO and the IndyGo Board for approval and implementation. Major actions may also require conducting public hearings prior to implementation.

### *Other Considerations*

In the course of applying the Route Performance Evaluation Process, IndyGo has recognized that there are special circumstances that should also be considered in addition to the two technical measures described above – ridership and economic productivity. For certain routes, a quantitative evaluation alone may not accurately portray the benefits that are derived to both riders and non-riders. Following are four categories of routes that may be exempt from the Route Performance Evaluation Process.

- “Lifeline” routes serve disadvantaged constituents, primarily low-income riders. Without the existence of bus service, the users or residents would not be able to obtain key services. Lifeline locations include the following four categories: subsidized housing, publicly-operated social service facilities, publicly-operated hospitals, and public post-secondary schools. A Lifeline route uniquely serves one or more of the above locations (no other local route operates within 1/4 –mile of the location).
- Newly implemented routes are exempt from the Route Performance Evaluation Process for a period of one year from the start-up date. During this period, route performance should be monitored and reported each quarter and minor revisions can be made to improve performance. However, major revisions to the newly implemented routes should not be made until the end of the one-year “break-in” period. This exception can also be applied to poorly performing routes that have a major service revision within the past year.
- Certain IndyGo routes may be implemented as demonstration services intended to address a particular function (for example, a long-haul, commuter express route) for a specified time period. These routes may be exempt from the Route Performance Evaluation Process if the service has regional or local significance.

A portion of operating expenses for certain routes may be subsidized by other public agencies, government programs or private businesses (for example, FTA Job Access & Reverse Commute Grants, IUPUI, Indiana Convention and Visitors Association). IndyGo may elect to exempt these routes from the Route Performance Evaluation Process, or add the subsidy contribution to the passenger revenue in the economic productivity criteria.

***1. The public transit system should effectively serve the existing land use pattern and support the implementation of planned land uses, meeting the demand and need for transit services, and particularly the needs of the transit-dependent population***

#### **SERVICE DESIGN AND OPERATING STANDARDS**

1. The public transit system should serve travel demand generated within contiguous areas of urban development in the urbanized area and should be designed to provide for a higher degree of accessibility to areas of high density (7.0-17.9 dwelling units per net residential acre), and medium density (2.2-6.9 dwelling units per net residential acre) urban development than to areas of low-density development or which should be protected from development
2. Public transit services should be provided that address the varied travel and mobility needs of the County population and offer access to the major activity centers in the urbanized area. The transit services provided should include:
  - a. **Rapid and express service** designed to reduce travel times for the longest trips made between component parts of the transit service area and to connect areas of high and medium density urban development to the Milwaukee central business district and the largest major activity centers
  - b. **Local service** designed to provide transit within and between residential areas, to link residential areas with nearby major activity centers, and to provide for transfer connections with rapid, express, and other local services
  - c. **Local shuttle services** designed to connect with rapid, express, and local services serving major activity centers
  - d. Paratransit service designed to meet the needs of people with disabilities who are unable to use accessible mainline bus service.
3. The public transit system should serve and connect major activity centers in the urbanized area that currently generate, or have the potential to generate, significant ridership including:
  - a. Housing facilities serving transit-dependent persons who are living independently including elderly persons, people with disabilities, and low-income individuals
  - b. Principal hospitals and medical centers
  - c. Major retail shopping malls
  - d. Principal colleges and universities
  - e. Major Federal, State, and local governmental offices and institutions
  - f. Major employers with more than 500 employees at one site
  - g. Major industrial and office parks
  - h. Major passenger terminals for intercity bus, passenger rail, and airline carriers
  - i. Major public and private recreational centers hosting high attendance events

#### **SERVICE PERFORMANCE STANDARDS**

1. The population served should be maximized, particularly those who are transit-dependent. The population shall be considered as served when it resides within the following distances of transit service:

Maximum Distance from a Bus Stop:

Service Type	Walking	Driving
Rapid	1/2 Mile	3 Miles
Express	1/2 Mile	
Local	1/4 Mile	

2. The major activity centers and jobs served should be maximized. Major activity centers and jobs shall be considered as served when located within the following distance of transit service:

Service Type	Maximum Walking Distance from a Bus Stop
Rapid	1/2 Mile
Express	1/2 Mile
Local	1/4 Mile

3. The transit supportive land area served should be maximized. To be considered transit supportive, an area should have a density of at least 4 dwelling units per net residential acre, or at least 4 jobs per gross acre.
4. The public transit system should provide service within the urbanized area that maximizes the population that is:
  - a. Within 45 minutes overall transit travel time of 40 percent of the jobs in the total population represented the urbanized area
  - b. Within 35 minutes overall transit travel time of a major shopping mall
  - c. Within 40 minutes overall transit travel time of a major college or university
  - d. Within 30 minutes overall transit travel time of a major hospital or medical center
  - e. Within 40 minutes overall transit travel time of a major Federal, State, or local governmental office or public institutional center
  - f. Within 60 minutes overall transit travel time of a major passenger terminal for an intercity bus, passenger rail, or airline carrier
  - g. Within 60 minutes overall transit travel time of a major public or private recreational center hosting high attendance events

***2. The transit system should promote effective utilization of transit service and operate service that is reliable and provides for user convenience and comfort.***

**SERVICE DESIGN AND OPERATING STANDARDS**

1. Public transit routes should have direct alignments with a limited number of turns, and should be arranged to minimize duplication of service and unnecessary transfers which would otherwise discourage transit use.
2. Rapid and express transit routes should be extended as needed to perform a collection-distribution function at the ends of the route
3. Public transit service that does not meet service performance standards may be warranted in special instances if it improves total system continuity and/or provides significant feeder service or transfer opportunities to other routes
4. Bus stops should be clearly marked by easily recognized bus stop signs and located so as to minimize the walking distance to and from residential areas and major activity centers over an accessible path for all users including people with disabilities, and to facilitate connections with other transit services where appropriate. The suggested locations and spacing for stops are as follows:

Service Type	Stop Locations and Spacing
Rapid	At terminal areas and one-mile or more on line-haul sections
Express	At terminal areas, intersecting transit routes, signalized intersections with arterial streets, and major activity centers
Local	600 to 1,200 feet (two to three blocks) apart

5 The public transit system should be designed and operated so as to achieve the following minimum overall travel speeds by area based on average weekday conditions:

Travel Speed (miles per hour)			
		Central	Outlying
Service Type	CBD	City	Areas
Rapid	5-10	15-30	40-55
Express	5-10	15-20	25-35
Local	5-10	12-15	18-25

6. The hours of service operation for the public transit system should serve the demand generated by the land use activities served by, and the function of, each route. Service periods should also accommodate the travel needs of those who depend on the transit system as their primary travel mode. The transit system should, therefore, strive to operate routes with service hours as follows:

	<u>Desirable Service Hours</u>		
Type	Weekdays	Saturdays	Sundays - Holidays
Rapid	6:00 a.m. - 10:00 p.m.	6:00 a.m. - 10:00 p.m.	6:00 a.m. - 10:00 p.m.
Express	5:00 a.m. - 11:00 p.m.	5:00 a.m. - 11:00 p.m.	5:00 a.m. - 11:00 p.m.
Local	5:00 a.m. - 1:00 a.m.	5:00 a.m. - 1:00 a.m.	5:00a.m. - 1:00 a.m.

7. The availability of weekend and holiday service enhances the attractiveness of weekday service and positively affects system ridership by providing that regular weekday riders need not seek alternative travel modes. Therefore, a reasonable level of service should also be maintained on weekends and holidays.

8. Operating headways for public transit fixed-route service should be capable of accommodating passenger demand at the recommended load standards, and should also provide for a convenient service so as to encourage transit use. The desirable headways presented below represent a frequency of transit service that would be desirable to provide a service of high quality and to promote transit ridership. Lower headways may be provided in the core service area for the system and high density corridors of heavy travel demand, while only higher headways may be feasible in areas of low and medium density.

	Desirable Headway (minutes)		
	Weekday		Weekend
Service	Peak	Off-Peak	Periods/
Type	Period	Period	Holidays
Rapid	10	20	30
Express	10	20	30
Local	10	20	30

8. (continued)

Operating headways should not exceed the following maximum headways throughout the service area when service is offered:

Service Type	Maximum Headway (minutes)		
	Weekday		Weekend
	Peak Periods	Off-Peak Periods	Periods/ Holidays
Rapid	30	60	60
Express	30	60	60
Local	30	60	60

9. All transit vehicles should be equipped with padded seats, heating/air conditioning units, and wheelchair lifts/ramps that are in good working condition. Window treatments should maintain outward visibility for passengers. Vehicle interiors and exteriors should be cleaned and inspected daily with needed equipment repairs made on a timely basis

10. Consideration should be given to rehabilitating or replacing each public transit vehicle at the end of its normal service life, which shall be defined as follows:

Vehicle Type	Length (feet)	Normal Service Life	
		Years	Mileage
Heavy-duty bus	35 or more	12	500,000
Heavy-duty bus	25-30	10	350,000
Medium-duty bus	25-30	7	200,000
Light-duty bus	25-30	5	150,000

11. Consideration should be given to providing passenger shelters of an attractive design at all bus stops where warranted by existing conditions including: boarding passenger counts, passenger waiting time, bus stop situation, exposure to weather conditions, and the facility or land use being served. Access to shelters for people with disabilities should be maintained.

12. Park-ride facilities should be provided at appropriate stops on rapid and express services to serve transit users from medium and low density residential areas. Sufficient off-street automobile parking should be provided at park-ride facilities to accommodate the total parking demand generated by transit users and carpoolers.

13. Provisions for transporting bicycles on transit vehicles should be considered.

### **SERVICE PERFORMANCE STANDARDS**

1. Ridership on the transit system and the overall effectiveness of the services provided should be maximized.

2. Ridership and service levels on each transit route should be monitored and service levels adjusted to be appropriate for demand levels unless special circumstances warrant otherwise. A reasonable period should be allowed for ridership to develop and stabilize before evaluating the performance of new transit services to determine if the service should be continued, modified, or eliminated.

Months of Operation    Ave. Performance Levels

6 Months	40%
9 Months	60%
1 Year	80%

The period for services that are funded through Federal or state transit demonstration grants may be extended to coincide with the period for the demonstration grant.

3. The minimum service effectiveness levels to warrant continued service operation shall be as specified below, unless special circumstances warrant otherwise

Service Period	Total Boarding Passengers Per Revenue Vehicle Hour
Weekdays	22e
Saturdays	15e
Sundays/Holidays	10e

4. The average maximum load factor, measured as the ratio of passengers to bus seats at that point on a route where passenger loads are highest, should not exceed the following during any one-hour period:

Service Type	Average Maximum Load Factor	
	Peak Periods	All Other Times
Rapid	1.00	1.00
Express	1.33	1.00
Local	1.33	1.00

5. The transit system should be designed and operated to maximize schedule adherence and be "on-time" at least 90 percent of the time. On-time is defined as schedule adherence within the ranges of one minute early and three minutes late.

6. Travel for public transit passengers should be reasonable in comparison to travel by private automobile for trips made between component parts of the service area. Transit travel distances and times should not be more than 1.5 times longer than with the automobile travel for comparable trips.

7. Preventative maintenance policies and practices should be established to maximize the reliability of revenue vehicles so that: a. All of the vehicles required to operate peak service are available daily. The number of breakdowns requiring a maintenance road call do not exceed one per 6,000 vehicle miles of service.

**3. The transit system should promote the safety and security of its passengers, operating equipment and facilities, and personnel and project a positive image to the general public.**

### **Service Design and Operating Standards**

1. Public transit service should not be operated over streets that exhibit conditions that may be hazardous for transit operations including steep grades, narrow traffic lanes, uncontrolled intersections, poor pavement conditions, or habitual problems with illegal parking

2. Nearside bus stops facilitate passenger use of crosswalks and convenience in transferring between routes, provide for adequate sight considerations for vehicle operators, and allow transit vehicles to

utilize the intersection to merge into traffic. The use of nearside locations for bus stops on a consistent basis is also favored by people with disabilities. Therefore, bus stops should generally be located at the nearside of intersections to promote passenger safety and the safe operation of transit vehicles. Stops may be located elsewhere if warranted by special circumstances

3. Bus stops should not be located in areas without adequate pedestrian facilities such as sidewalks or adequately maintained roadway shoulders that provide for a safe and accessible travel path for all users including people with disabilities.

4. The public transit system should promote the use of appropriate security equipment and practices--such as mobile radios, automatic vehicle location (AVL) hardware, cameras, passenger information kiosks with security call boxes, and security personnel--to enhance the security of passengers and transit system equipment, facilities, and personnel.

#### **Service Performance Standards**

1. The number of accidents on the public transit system should be minimized.
2. The number of security incidences on transit property should be minimized.

**4. *The public transit system should promote efficiency in the total transportation system.***

#### **SERVICE PERFORMANCE STANDARDS**

1. The total amount of energy and the total amount of energy per passenger mile consumed in operating the total transportation system of which the public transit system is an integral part, particularly petroleum-based fuels, should be minimized.

2. The amount of highway system capacity which must be provided to serve travel demand should be minimized.

**5. *The public transit system should be economical and efficient, meeting all other objectives at the lowest possible cost.***

#### **SERVICE DESIGN AND OPERATING STANDARDS**

1. The total operating and capital investment for the public transit system should be minimized and reflect efficient utilization of resources.

2. The fare policy for the public transit system should provide for premium fares for premium transit services, as well as special or discounted fares for priority population groups and frequent transit riders.

3. Periodic increases in passenger fares should be considered to maintain the financial stability of the public transit system when:

- a. The farebox recovery rate for the transit system goes below levels determined to be acceptable by local officials
- b. Operating expenses for the transit system have increased by 10 to 15 percent since fares were last raised
- c. Projected levels of Federal and State operating assistance funds would require an increase in projected local operating assistance levels above that determined to be acceptable by local officials

4. Public transit service should not be extended to communities or major activity centers located outside the County at the direct expense of County taxpayers. The net local costs total costs minus passenger

revenues and Federal and/or state assistance funds of such transit service shall be provided through sources other than County tax dollars unless special circumstances warrant otherwise

**SERVICE PERFORMANCE STANDARDS**

1. The operating expense per unit of transit service, the operating expense per passenger, and the total operating assistance per passenger should be minimized for the public transit system as a whole. Annual increases in such costs should not exceed the average percentage increase experienced by comparable transit systems
2. Public transit system operating revenues generated from passenger fares and private sources should be maximized.
3. The total operating expense per passenger and total operating assistance per passenger should be minimized for the public transit system as a whole. Annual increases in such costs should not exceed the average percentage increase experienced by comparable transit systems
4. Cost effectiveness levels on each transit route should be monitored and service levels adjusted to be appropriate for demand levels or the route eliminated unless special circumstances warrant otherwise. Cost effectiveness levels shall be measured using the total boarding passengers per revenue vehicle hour for each route.

# Appendix G: Regional Transit Design Guidelines and Performance Standards

## Transit Market Areas

Demand for transit service varies across the region. This applies to the time of day that transit is used, the number of trips taken, and the purpose of trips taken on transit. While this variation in transit demand is driven by a number of factors, it is primarily due to differences in development density, urban form, and demographics. To account for these differences in the planning and evaluation of transit service, the region is divided into five distinct Transit Market Areas representing different levels of potential transit demand.

Transit Market Areas are a tool used to guide transit planning decisions. They help ensure that the types and levels of transit service provided, in particular fixed-route bus service, match the expected demand in a given area. For example, transit service in a suburban community where the automobile is the most convenient mode for the majority of trips might focus on the work commute, providing express bus service to downtown. Transit service in a dense urban core neighborhood might need to accommodate a broader variety of transit service needs that can be met by providing frequent, all-day service to a variety of destinations.

## Transit Market Index

Transit Market Areas are determined using a Transit Market Index which in turn is based on a combination of measures of density, urban form, and automobile availability.

## Population and Employment Density

Population and employment density are strong indicators of transit demand. Higher density areas generate more transit demand for the simple reason that they have more people living and working within the fixed area within walking distance of any transit stop. Additionally, people living and working in high density areas are more likely to take transit than those living in low density areas. This is because automobile use is often inconvenient because of congestion and parking costs and because residents typically have less need for a car since there are more destinations within walking distance.

In the Transit Market Index, population and employment densities are calculated separately by dividing the total population and total jobs in a census block group by the developed land area of the block group.

## Intersection Density

Block size and urban form are important factors in transit demand. Areas with smaller blocks tend to have more traditional street-grids and provide a more walkable environment for pedestrians. The Transit Market Index measures urban form using intersection density; it is the total number of three-, four-, and five-way intersections in a block group divided by the total developed area. Intersections are weighted by the number of intersecting roads, such that a five-way intersection has more weight than a three-way intersection.

## Automobile Availability

For any number of reasons transit is the only means of mobility for many people in the region. Areas with a more people who rely on transit will tend to generate greater demand for transit. The Transit Market Index measures reliance on transit by calculating the availability of automobiles by block group. Automobile availability is calculated by subtracting the total number of automobiles available in a census block group from the total population aged 16 or over. This value then divided by the total developed land area of the block group.

## Calculating the Transit Market Index

The four measures included in the Transit Market Index were found to have a strong relationship to existing transit demand in our region. Their respective weights in the Transit Market index formula are determined based on their relative impact on transit demand. The Transit Market Index (TMI) is calculated for each block group as follows:

$$\begin{aligned} \text{TMI} &= 0.64 * (\text{Population Density}) \\ &+ 0.23 * (\text{Intersection Density}) \\ &+ 0.20 * (\text{Employment Density}) \\ &+ 0.11 * (\text{Automobile Availability}) \end{aligned}$$

Block groups are separated into the five Transit Market Areas based on Transit Market Index values. See Table G-1 for the index value ranges for each market area. Block groups with the highest Transit Market Index values are assigned to Market Area I while those with the lowest index value are assigned to Market Area V.

## Data Sources

Table G-1 shows the data sources used to calculate the Transit Market Index measures for each block group.

**Table G-1:** Transit Market Index Data Sources

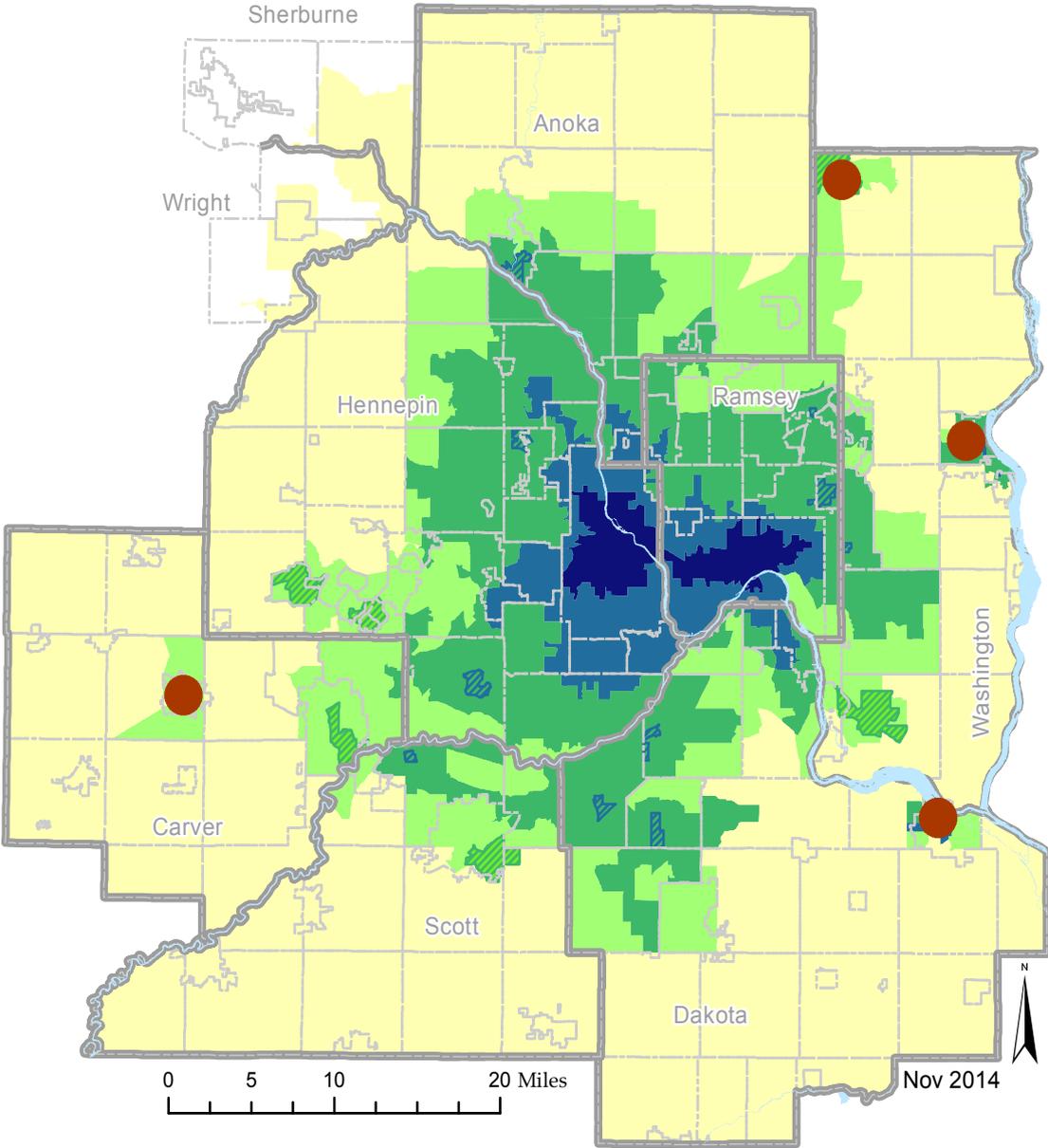
Measure	Data Source
Population	U.S. Census Bureau; Census 2010
Employment	U.S. Census Bureau; Longitudinal-Employer Household Dynamics Program; LODES Data
Automobile Availability	U.S. Census Bureau; American Community Survey, 2012 ACS 5-Year Estimates
Intersection Density	NCompass Technologies; Street Centerline Data
Developed Acres (used to calculate density)	Metropolitan Council; 2010 Generalized Land Use Survey

### Adjacency and Connectivity

While the Transit Market Index is calculated at the block-group level, individual block groups do not exist in isolation. Transit demand in any block group is influenced by the characteristics of neighboring block groups. Another way of looking at this is that connected areas of transit demand will have higher overall ridership potential than similar areas that are disconnected. To account for this effect, the Transit Market Area of each block group takes into account the index values of neighboring block groups.

Figure G-1: Transit Market Areas

### Transit Market Areas



- Market Area I
- Market Area II
- Emerging Market Area II
- Market Area III
- Emerging Market Area III
- Market Area IV
- Market Area V
- Freestanding Town Center

## Transit Market Area Characteristics

### Transit Market Area I

Transit Market Area I has the highest density of population, employment, and lowest automobile availability. These are typically Urban Center communities and have a more traditional urban form with a street network laid out in grid form. Market Area I has the potential transit ridership necessary to support the most intensive fixed-route transit service, typically providing higher frequencies, longer hours, and more options available outside of peak periods.

### Transit Market Area II

Transit Market Area II has high to moderately high population and employment densities and typically has a traditional street grid comparable to Market Area I. Much of Market Area II is also categorized as an Urban Center and it can support many of the same types of fixed-route transit as Market Area I, although usually at lower frequencies or shorter service spans.

### Transit Market Area III

Transit Market Area III has moderate density but tends to have a less traditional street grid that can limit the effectiveness of transit. It is typically Urban with large portions of Suburban and Suburban Edge communities. Transit service in this area is primarily commuter express bus service with some fixed-route local service providing basic coverage. General public dial-a-ride services are available where fixed-route service is not viable.

### Transit Market Area IV

Transit Market Area IV has lower concentrations of population and employment and a higher rate of auto ownership. It is primarily composed of Suburban Edge and Emerging Suburban Edge communities. This market can support peak-period express bus services if a sufficient concentration of commuters likely to use transit service is located along a corridor. The low-density development and suburban form of development presents challenges to fixed-route transit. General public dial-a-ride services are appropriate in Market Area IV.

### Transit Market Area V

Transit Market Area V has very low population and employment densities and tends to be primarily Rural communities and Agricultural uses. General public dial-a-ride service may be appropriate here, but due to the very low-intensity land uses these areas are not well-suited for fixed-route transit service.

## Non-contiguous Market Areas:

### Emerging Market Overlay

The Emerging Market Overlay identifies locations within Transit Market Areas III and IV that have a higher potential for transit usage than the rest of the market areas surrounding them. These areas are currently too small or non-contiguous to support a higher level of transit service. Focusing growth in and around these areas to connect to other areas of higher potential transit use will present good opportunities for future transit improvement.

### Freestanding Town Centers

Freestanding Town Centers are areas that historically grew independently of Minneapolis and St. Paul and are still separated from the urban and suburban areas of the metro by rural land. Because of their concentrated downtowns laid out in a traditional urban form, these areas have a Transit Market Index value that would indicate Market Area III or higher. However, their relatively small population and land area, as well as their distance from other transit-supportive land uses, limits the potential for local fixed-route transit.

## Typical Transit Service Types

Table G-2 shows the typical transit service types and levels that are most appropriate for the different transit market areas. The service types listed here are general descriptions for each market area; specific implementation of transit service will depend on available resources, specific analysis of local transit demand and existing ridership, complementary and competing services, and other factors. Detailed analysis of specific communities and locations may determine that other types and levels of service are more appropriate.

**Table G-2: Transit Market Area Transit Demand and Typical Services**

Transit Market Area	Transit Market Index Range	Propensity to Use Transit	Typical Transit Service
Market Area I	TMI greater than 256.0	Highest potential for transit ridership	Dense network of local routes with highest levels of service accommodating a wide variety of trip purposes. Limited stop service supplements local routes where appropriate.
Market Area II	TMI between 128.0 and 256.0	Approximately 1/2 ridership potential of Market Area I	Similar network structure to Market Area I with reduced level of service as demand warrants. Limited stop services are appropriate to connect major destinations.
Market Area III	TMI between 64.0 and 128	Approximately 1/2 ridership potential of Market Area II	Primary emphasis is on commuter express bus service. Suburban local routes providing basic coverage. General public dial-a-ride complements fixed route in some cases.
Market Area IV	TMI between 32.0 and 64.0	Approximately 1/2 ridership potential of Market Area III	Peak period express service is appropriate as local demand warrants. General public dial-a-ride services are appropriate.
Market Area V	TMI less than 32.0	Lowest potential for transit ridership	Not well-suited for fixed-route service. Primary emphasis is on general public dial-a-ride services.
Emerging Market Overlay	Varies.	Varies. Typically matches surrounding Market Area.	Varies. Typically matches surrounding Market Area.
Freestanding Town Center	TMI at least 64.0	Varies. Typically matches surrounding Market Area.	Varies. Potential for local community circulator as demand warrants. Some peak period commuter express service may be appropriate

## Transitways

Transitways are unique transportation corridors with specific, detailed planning processes that result in appropriate levels of service for specific corridors. The detailed planning work on transitway corridors leads to unique applications of transit service design standards and specific types of service unique to each corridor. See the *Regional Transitway Guidelines* for more information about planning Arterial Bus Rapid Transit (BRT), Highway BRT, Light Rail Transit (LRT) and Commuter Rail

## General Public Dial-a-Ride

General public dial-a-ride service is provided by the Metropolitan Council through Transit Link. Transit Link service is open to the general public and operates where regular-route transit service is not available. It is intended to augment the regular-route network and is only available for trips that cannot be accomplished on regular routes alone. Transit Link trips may drop-off passengers at major transfer points to complete their trip on the regular-route network.

## ADA Paratransit Services

ADA paratransit service is public transportation for certified riders who are unable to use the regular fixed-route bus due to a disability or health condition. In the Twin Cities region, the Metropolitan Council oversees all ADA paratransit services. Metro Mobility contracts with ADA paratransit service providers, who provide customers with “first-door-through-first-door” transportation.

## ADA Eligibility

Eligibility for ADA services is determined using federal guidelines established by the Americans with Disabilities Act (ADA). A person may be eligible for ADA Paratransit Service if any of the following conditions apply:

- The individual is unable to independently navigate the fixed-route transit system because of a health condition or disability (OR)
- The individual is unable to independently board or exit fixed-route vehicles due to a health condition or disability (OR)
- The individual is unable to propel to or from a bus stop within the fixed-route service area due to a health condition or disability.

## ADA Service Span and Coverage

The ADA paratransit service coverage area and hours of service are determined by several factors including Federal and State requirements. Per the Federal requirements, ADA paratransit service must operate within a minimum of 3/4 mile of the local fixed-route network and for the same hours of the day that the fixed-route network operates.

To meet this requirement, Metro Mobility matches the fixed-route hours of service delivery for Weekday, Saturday, and Sunday/Holiday service in each community where fixed-route service is available.

In addition to Federal requirements, the State of Minnesota requires Metro Mobility to provide service to all communities within the transit capital levy district. Metro Mobility is available to eligible residents living in these areas by providing 12 hours of service on Weekdays, and on an as-space-is-available bases on Saturdays and Sundays/Holidays.

## Route Types

For the purposes of the Regional Transit Design Guidelines and Performance Standards, routes in the regional transit network are classified based on their mode and role within the overall network. All of the routes classified below are fixed-route service operating along an established path with a published schedule and designated stops.

### Core Local Bus

Core Local routes typically serve the denser urban areas of Market Areas I and II, usually providing access to a downtown or major activity center along important commercial corridors. They form the base of the core bus network and are typically some of the most productive routes in the system.

Some Core Local Bus routes are supplemented with a limited stop route designed to serve customers wishing to travel farther distances along the corridor. Limited stop routes make fewer stops and provide faster service than the Core Local routes.

### Supporting Local Bus

Supporting Local routes are typically designed to provide crosstown connections within Market Areas I and II. Typically these routes do not serve a downtown but play an important role connecting to Core Local routes and ensuring transit access for those not traveling downtown.

### Suburban Local Bus

Suburban Local routes typically operate in Market Areas II and III in a suburban context and are often less productive than Core Local routes. These routes serve an important role in providing a basic-level of transit coverage throughout the region.

## Commuter and Express Bus

Commuter and Express Bus routes primarily operate during peak periods to serve commuters to downtown or a major employment center. These routes typically operate non-stop on highways for portions of the route between picking up passengers in residential areas or at park-and-ride facilities and dropping them off at a major destination.

## Arterial Bus Rapid Transit

Arterial bus rapid transit (BRT) lines operate in high demand urban arterial corridors with service, facility, and technology improvements that enable faster travel speeds, greater frequency, an improved passenger experience, and better reliability. Design guidelines for arterial BRT can be found in the *Regional Transitway Guidelines*.

## Highway Bus Rapid Transit

Highway bus rapid transit (BRT) lines operate in high demand highway corridors with service, facility, and technology improvements providing faster travel speeds, all-day service, greater frequency, an improved passenger experience, and better reliability. Design guidelines for highway BRT can be found in the *Regional Transitway Guidelines*.

## Dedicated Bus Rapid Transit

Dedicated bus rapid transit (BRT) lines operate in dedicated right-of-way for the exclusive use of buses in high demand corridors. Service, facility and technology improvements are similar to light rail. It provides faster travel speeds, all-day service, greater frequency, an improved passenger experience, and better reliability. Design guidelines for dedicated BRT have not yet been developed. An update to the *Regional Transitway Guidelines* is identified as a work program item and will consider addressing dedicated BRT.

## Light Rail

Light rail operates using electrically-powered passenger rail cars operating on fixed rails in dedicated right-of-way. It provides frequent, all-day service stopping at stations with high levels of customer amenities and waiting facilities. Design guidelines for light rail can be found in the *Regional Transitway Guidelines*.

## Commuter Rail

Commuter rail operates using diesel-power locomotives and passenger coaches on traditional railroad track. These trains typically only operate during the morning and evening peak period to serve work commuters. Design guidelines for commuter rail can be found in the *Regional Transitway Guidelines*.

## Transit Design Guidelines

Transit Design Guidelines are intended to guide the appropriate allocation of transit resources and ensure regional coordination and consistency. The design guidelines are organized by Transit Market Area and/or Route Type. These guidelines are representative of the general types of transit service that are appropriate to implement, however exceptions often exist based on specific local circumstances and available funding.

### Stop Spacing

Stop spacing guidelines must balance between providing greater access to service with faster travel speeds. More stops spaced closer together reduce walk distances to transit but also increase travel times. In general, the average distance people are willing to walk to access transit services is  $\frac{1}{4}$  mile for local bus service and  $\frac{1}{2}$  mile for limited stop bus service and transitway service. Table G-3 shows the recommended stop spacing guidelines that seek to balance between access and speed.

**Table G-3: Stop Spacing**

Route Type	Typical Stop Spacing:
Core Local Bus*	1/8 to 1/4 mile
Supporting Local Bus	1/8 to 1/4 mile
Suburban Local Bus	1/8 to 1/4 mile
Arterial BRT	1/4 to 1/2 mile
Highway BRT	1/2 to 2 miles
Light Rail	1/2 to 1 mile
Commuter Express Bus	Market Specific**
Commuter Rail	5 to 7 miles

\* Local routes with limited stop service will have a typical stop spacing of 1/4 to 1/2 mile.

\*\*In downtowns and local pickup areas, stop spacing will follow the standards for local routes. Along limited stop or non-stop portions of the route, stop spacing will be much greater.

An allowable exception to standards may be central business districts and major traffic generators. These guidelines are goals, not a minimum or maximum.

### Route Spacing

Route spacing refers to the distance between two parallel routes. Route spacing guidelines seek to balance service coverage with route productivity and transit demand. Routes that are spaced too close together will have overlapping service areas and compete for riders, reducing the productivity of both routes. Routes spaced too far apart will lead to coverage gaps. Generally areas with lower transit demand will have routes spaced farther apart. Table G-4 shows the route spacing guidelines by route type and market area. Commuter Express bus and transitway routes are determined on a case by case basis according to specific transit market conditions. Please see the *Regional Transitway Guidelines* for more details about transitway planning.

**Table G-4:** Route Spacing

Route Type	Market Area				
	Area I	Area II	Area III	Area IV	Area V
Core Local Bus*	1/2 mile	1 mile	Specific**	NA	NA
Supporting Local Bus	1 mile	1-2 miles	Specific**	NA	NA
Suburban Local Bus	NA	2 miles	Specific**	Specific**	NA

\*Local limited stop routes do not follow a route spacing guideline. They will be located in high demand corridors.

\*\* Specific means that route structure will be adapted to the demographics, geography and land use of a specific area.

## Span of Service

Span of service refers to the periods of the day that transit is in service. Service span guidelines are typically based on the role a route type plays in the overall transit network. Route types designed to primarily serve commuters generally operate only in peak periods, while route types that serve a broader set of trip purposes generally have a longer span of service. Table G-5 shows the recommended hours of service by route type.

**Table G-5:** Span of Service

Route Type	Weekday				Weekend	
	Peak	Midday	Evening	Owl	Saturday	Sunday
Core Local Bus*	●	●	●	○	●	●
Supporting Local Bus	●	●	●	○	◐	◐
Suburban Local Bus	●	●	◐	○	○	○
Arterial BRT	●	●	●	○	●	●
Highway BRT	●	●	●	○	●	●
Light Rail	●	●	●	○	●	●
Commuter Express Bus	●	○	○	○	○	○
Commuter Rail	●	○	○	○	○	○

Service Provided ●; Service Typically Provided ◐; Service As Demand Warrants ○

Peak - 6:00am to 9:00am and 3:00pm to 6:30pm; Midday - 9:00am to 3:00pm; Evening - 6:30pm to 1:30am; Owl - 1:30am to 5:00am; Saturday - Saturday Service; Sunday - Sunday/Holiday Service

\*Local limited stop routes will operate primarily in the peak period.

## Minimum Frequency

Minimum frequency refers to the average number of minutes between transit vehicles on a given route or line traveling in the same direction. Routes serving areas of higher transit demand will tend to have higher frequencies. Table G-6 shows the recommended minimum frequency by route type and market area.

**Table G-6:** Minimum Frequency

Route Type	Market Area				
	Area I	Area II	Area III	Area IV	Area V
Core Local Bus	15" Peak 30" Offpeak 30" Weekend	30" Peak	60" Peak	NA	NA
Supporting Local Bus	30" Peak 30" Offpeak 30" Weekend	60" Offpeak 60" Weekend	60" Offpeak 60" Weekend	NA	NA
Suburban Local Bus	NA			NA	NA
Arterial BRT	15" Peak			NA	NA
Highway BRT	15" Offpeak			NA	NA
Light Rail	15" Weekend			NA	NA
Commuter Express Bus	30" Peak		3 Trips each peak		NA
Commuter Rail	NA		30" Peak		

Additional service may be added as demand warrants and these guidelines apply primarily to the peak direction.

## Accessibility

Accessibility refers to how well the transit network is meeting the travel needs of its users and potential users. People use transit to reach destinations they wish to visit, e.g. work, school, shopping, among many others. Accessibility measures how easily or difficult transit users can reach desired destinations using the transit network. This is related to, but distinct from mobility, which measures the overall distance people are able to travel on the network. By taking into account the destinations that people are able to access via that network, measures of accessibility can provide a more complete measure of the overall usefulness of the network to its users.

The Metropolitan Council views accessibility as an important tool to measure and evaluate the regional transit network and land use patterns. Efforts to develop and implement appropriate measures of accessibility are ongoing.

## Passenger Amenities

Regional transit providers offer a range of amenities at bus stops and other passenger facilities to improve the customer experience. Passenger amenities include shelters, shelter lighting or heat, trash receptacles, seating, security cameras, good pedestrian access, bicycle parking and storage, and signage both static and real-time, indicating route, schedule, frequency and other information.

Passenger amenities create a more comfortable, accessible and attractive waiting environment for transit customers. Features such as shelter lighting and good pedestrian access enhance passenger safety. Transit travel may be completed more easily with access to transit service information or secure bike parking. Passenger amenities can also benefit the surrounding

neighborhood by making transit a more attractive travel option for nearby land uses and by contributing to the overall character of the streetscape.

Table G-7 identifies the standard amenities that are included with various facility types. Some amenities are always provided and others are occasionally provided depending on the size, location, or use of the facility.

**Table G-8: Passenger Amenities**

Facility Type	Shelter	Light	Heater	Trash Receptacle	Stand Alone Bench	Security Cameras	Pedestrian access	Bike parking	Secure bike storage	Customer information	Real-time Customer Information
Transit Centers	●	●	●	●	●	◐	●	◐	◐	●	◐
Park-and-rides	●	●	◐	◐	◐	◐	◐	◐	◐	●	◐
Rail Stations	●	●	●	●	●	●	●	●	◐	●	●
Bus Stop	◐	◐	◐	○	○	○	●	◐	◐	◐	◐

Always Provided ●; Occasionally Provided ◐; Not Provided ○

In some cases transit providers lease park-and-rides and some shelters are owned and maintained by other entities. In such cases, providers may not offer all the customer amenities identified above.

In addition to these standard amenities, transit providers occasionally provide - or partner with other organizations to provide - more unique amenities including custom shelters, landscaping, and public art. These amenity options are generally considered where they are integrated into a larger initiative such as a transitway, Transit Center, downtown bus stop, Transit Oriented Development project, or park-and-ride owned and maintained by a regional transit provider. The design of custom shelters, landscaping and public art should address ease of maintenance, repair and replacement.

## Bus Stop Shelters

Bus stop shelters provide seating and protection from bad weather for customers and are particularly important to senior citizens, parents with small children, and persons with disabilities. The costs of shelter placement and ongoing maintenance limit the number of bus stops that can include shelters. Metro Transit considers the following factors to prioritize the bus stops where shelters are placed:

- High number of total passenger boardings, typically 40 or more boardings per day at bus stops located in Minneapolis and St. Paul and 25 or more boardings per day at bus stops located in suburban communities. This factor prioritizes shelter placement at bus stops where the most passengers are waiting, relative to the amount of transit service generally available in the community.

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- High number of limited mobility boardings, to ensure that people vulnerable to inclement weather are protected.
- Stop location relative to minority and low-income census block groups to ensure regional equity goals are achieved.
- High number of transit transfers, to provide shelter where it is more likely that passengers are including a wait time in their transit trip.

Further, bus stop locations must be capable of supporting transit shelters. Factors such as sidewalk and right-of-way space, topography, land use compatibility and proximity to bus boarding locations are considered. Transit providers may consider locating shelters where ADA improvements are scheduled to maximize capital improvement investments. Requests from the community to place or remove shelters are considered in context of the quantitative analysis used to prioritize shelter locations.

## Customer Information

Customer information at passenger facilities, including basic signage, maps, and schedules and real-time information, is an important component of transit service. Transit information can provide customers with basic route information such as a map of the route and the destinations along the route, a schedule, and real-time information about when the next bus will arrive. This type of information increases customer satisfaction and reassures them that they can depend on transit. New technologies play an important role in the deployment of customer information, and the Council will continue to expand a network of customer information systems using proven and cost-efficient technology at key locations, such as transit stations and centers, online and on mobile devices.

## Transit Performance Standards

Performance standards are used to evaluate the relative productivity and efficiency of the services provided. To be responsible and dynamic, a transit system must consistently measure and adjust service in unproductive routes and address insufficient service in productive areas. These standards serve as indicators of route performance and call attention to routes that may need to be adjusted. The use of multiple performance standards provides better insight into the operational and financial performance of individual services and allows transit providers to balance the cost and ridership of each route with its role in the regional transit network.

## Productivity

Productivity is measured as the number of Passengers per In-Service Hour. It is the total number of passengers carried divided by the in-service time. A high number of passengers per in service hour means a route is serving more people with the resources provided. The passengers per in-service hour standard establishes a minimum threshold of route performance. It is calculated at both the route and trip level. Table G-8 shows the minimum passengers per in-service hour by route type.

**Table G-9:** Passengers per In-Service Hour

Route Type	Route Average*	Minimum per Trip**
Core Local Bus	≥ 20	≥ 15
Supporting Local Bus	≥ 15	≥ 10
Suburban Local Bus	≥ 10	≥ 5
Arterial BRT	≥ 25	≥ 5
Highway BRT	≥ 25	≥ 5
Light Rail	≥ 70	≥ 50
Commuter Express Bus	Peak ≥ 20; Off-peak ≥ 10	Peak ≥ 15; Off-peak ≥ 5
Commuter Rail	≥ 70	≥ 50
General Public Dial-a-Ride	≥ 2	N/A

\*Route average represents the average passengers per in service hour over the entire day. Individual hours may fall below standard.

\*\*Minimum per trip represents the minimum passengers per in service hour for individual trips on a route. Multivehicle trips, such as three-car trains, will be treated as a single trip.

Routes and trips that do not meet these minimum standards should be reviewed for potential changes to increase ridership or reduce service. Very poor performing routes may be considered for elimination.

## Cost Effectiveness

The cost effectiveness of a route is measured by the subsidy required to operate the route per passenger. Subsidy is calculated as the difference between the total cost of providing service minus revenue from passenger fares. Since different types of routes are expected to have different levels of performance, each route's subsidy is compared to the average subsidy of its peers. This standard identifies routes that are not operating within the range of peer routes and focuses corrective action for those services. Subsidy thresholds are determined by calculating the non-weighted subsidy per passenger average within each route type. Table G-9 shows the subsidy thresholds and possible corrective action.

**Table G-10:** Subsidy per Passenger

Threshold Level	Subsidy per Passenger	Monitoring Goal	Possible Action
1	20 to 35 percent over peer route average	For quick review	Minor modifications to route
2	35 to 60 percent over peer route average	For intense review	Major changes to route
3	Greater than 60 percent over peer route average	For significant change	Restructure or eliminate route



### Transit Day Periods

Period Code	Period Type	Start	End	Start MPM	End MPM
1	Early AM	3:30 AM	5:59 AM	210	359
2	AM Rush	6:00 AM	8:59 AM	360	539
3	Midday	9:00 AM	3:29 PM	540	929
4	PM Rush	3:30 PM	6:29 PM	930	1109
5	Evening	6:30 PM	9:59 PM	1110	1319
6	Night	10:00 PM	3:29 AM	1320	1649

ROUTE	ROUTE / VARIANT NAME
1	Dundas
1C	Dundas-Collegeway
3	Bloor
4	Sherway Gardens
5	Dixie
6	Credit Woodlands
7	Airport
8	Cawthra
9	Rathburn-Millers Grove
10	Bristol-Britannia
11	Westwood
11A	Westwood-Dundas
11B	Westwood-Nashua
12	Rexdale
13	Glen Erin
14	Lorne Park
14A	Lorne Park-Industrial
15	Drew
16	Malton
16A	Malton
19	Hurontario
19A	Hurontario-Britannia
19B	Hurontario-Cantay
19C	Hurontario-Heartland
20	Rathburn
21	Explorer
22	Finch
23	Lakeshore
24	Northwest
25	Traders Loop
26	Burnhamthorpe
28	Confederation
29	Park Royal
29B	Park Royal-Homelands
30	Woodbine
31	Folkway-Homelands
32	Lisgar GO
34	Credit Valley
35	Eglinton
35A	Eglinton-Ninth Line
36	Colonial Loop
37	Creditview-Erindale GO
38	Creditview
38A	Creditview-Argentia
39	Britannia
41	Thomas
41A	Thomas-Streetsville GO
42	Derry
43	Matheson-Argentia
44	Mississauga Road
45	Winston Churchill
45A	Winston Churchill-Speakman
46	Tenth Line
47	Ridgeway Loop
48	Erin Mills
49	McDowell
49A	McDowell-Thomas
51	Tomken
52	Shawson Loop
53	Kennedy
55	Meyerside Loop
57	Courtneypark
59	Airport Infield
61	Mavis
61A	Mavis-Sheridan
62	Cooksville GO
64	Meadowvale GO
65	Barondale Loop
66	McLaughlin
67	Streetsville GO
68	Windsor Hill Loop
70	Keaton
71	Sheridan-Subway
72	Timberlea
73	Kamato
76	City Centre-Subway
87	Meadowvale-Skymark
90	Terragar-Copenhagen Loop
91	Hillcrest
101	Dundas Express
101A	Dundas Express
103	Hurontario Express
107	Malton Express
108	Meadowvale Business Express
109	Meadowvale Express
110	University Express
185	Dixie Express
302	Philip Pocock-Bloor West
304	Father Goetz-Mississauga Valley
305	Streetsville Secondary-Falconer
306	Streetsville Secondary-Terry Fox
307	Philip Pocock-Bloor East
308	St. Joseph-Eglinton
309	St. Joseph-Rathburn
310	Clarkson Secondary-Winston Churchill

312	Gordon Graydon-City Centre
314	Rick Hansen-Donway
315	Rick Hansen-City Centre
321	Stephen Lewis-St.Joan of Arc
334	St. Joseph-City Centre
335	Allan A. Martin
347	Loyola-South Common

WEEKDAY		2015 & 2016 PARTIAL BOARDING COUNTS COMBINED (PER PERIOD)						DAILY TOTAL	YEAR COUNTED
ROUTE	DESIGNATION	PERIOD							
		1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas	347	1,065	2,270	1,312	736	447	6,177	2015
1C	Dundas-Collegeway	131	1,157	2,386	1,707	980	269	6,630	2015
3	Bloor	173	1,697	2,646	2,009	1,015	241	7,781	2015
4	Sherway Gardens	37	308	583	261	133	10	1,332	2015
5	Dixie	484	1,670	2,369	1,708	622	210	7,063	2016
6	Credit Woodlands	68	523	986	595	365	82	2,619	2016
7	Airport	119	608	1,169	698	395	290	3,279	2015
8	Cawthra	49	580	894	576	152	20	2,271	2015
9	Rathburn-Millers Grove	49	357	748	461	266	76	1,957	2015
10	Bristol-Britannia	101	734	1,305	743	387	126	3,396	2015
11	Westwood	47	365	827	446	131	33	1,849	2015
11A	Westwood-Dundas	50	192	84	207	226	124	883	2015
11B	Westwood-Nashua	15	131	30	111			287	2015
12	Rexdale		139	64	135	19		357	2015
13	Glen Erin	86	875	1,564	860	349	109	3,843	2016
14	Lorne Park	3	91	278	57	37	2	468	2015
14A	Lorne Park-Industrial	10	100	10	68			188	2015
15	Drew	31	253	150	215	73	35	757	2015
16	Malton	33	123	173	72	22		423	2015
16A	Malton		105	120	137	81	12	455	2015
19	Hurontario	373	1,858	3,507	2,152	1,534	667	10,091	2016
19A	Hurontario-Britannia	145	721	1,755	1,201	255		4,077	2016
19B	Hurontario-Cantay	56	366	540	334	97		1,393	2016
20	Rathburn	165	951	1,251	900	460	172	3,899	2016
21	Explorer	18	271	105	267	30		691	2016
22	Finch	82	366	701	471	349	105	2,074	2015
23	Lakeshore	143	829	1,393	1,027	395	136	3,923	2015
24	Northwest	35	129	69	95	14		342	2015
25	Traders Loop		68	19	57			144	2016
26	Burnhamthorpe	191	1,250	2,196	1,394	619	246	5,896	2016
28	Confederation	42	597	1,265	582	352	61	2,899	2016
29	Park Royal	110	467	947	515	216	80	2,335	2016
30	Woodbine			194		50	8	252	2015
31	Folkway-Homelands	11	164	328	268	111	23	905	2015
32	Lisgar GO		35		23	18		76	2015
34	Credit Valley	28	292	885	420	324	92	2,041	2015
35	Eglinton	259	1,317	1,858	958	708	203	5,303	2016
35A	Eglinton-Ninth Line	102	742	525	823	75		2,267	2016
36	Colonial Loop	56	355	673	398	214	51	1,747	2015
37	Creditview-Erindale GO		116		134	34		284	2015
38	Creditview	98	676	1,049	662	254	59	2,798	2016
39	Britannia	35	609	912	649	270	80	2,555	2016
41	Thomas		28	325	67	22	10	452	2015
41A	Thomas-Streetsville GO		217		135	59		411	2015
42	Derry	404	1,588	2,231	1,868	626	297	7,014	2015
43	Matheson-Argentia	22	270	112	250	5		659	2016
44	Mississauga Road	25	641	919	836	306	49	2,776	2016
45	Winston Churchill	70	386	568	328	194	11	1,557	2016
45A	Winston Churchill-Speakman	8	358	117	298			781	2016
46	Tenth Line	1	104	12	105	17		239	2015
47	Ridgeway Loop		116	55	90	9		270	2015
48	Erin Mills	11	225	737	286	174	46	1,479	2015
49	McDowell	6	32	167	61	44	11	321	2015
49A	McDowell-Thomas	3	178		147	38		366	2015
51	Tomken	60	1,320	1,038	806	184	61	3,469	2015
52	Shawson Loop		27	9	11			47	2015
53	Kennedy	66	488	348	381	93	33	1,409	2016
55	Meyerside Loop	4	24		13			41	2015
57	Courtneypark	90	457	237	350	24		1,158	2015
59	Airport Infield		10					10	2015
61	Mavis	67	430	869	595	399	178	2,538	2015
61A	Mavis-Sheridan	119	456	877	555	268		2,275	2015
62	Cooksville GO		38		26			64	2015
64	Meadowvale GO		40		36	12		88	2015
65	Barondale Loop		77	134	90	34	1	336	2015
66	McLaughlin	4	1,111	1,941	1,293	539	248	5,136	2015
67	Streetsville GO		55		42	16		113	2015
68	Windsor Hill Loop	18	133	178	86	83	19	517	2016
70	Keaton		343	41	297			681	2016
71	Sheridan-Subway		39		35			74	2016
72	Timberlea	3	71	5	60			139	2015
73	Kamato	2	46	33	84	2		167	2016
76	City Centre-Subway	33	656	974	805	303	49	2,820	2016
87	Meadowvale-SkyMark	90	245	13	167	48		563	2016
90	Terragar-Copenhagen Loop	17	126	254	122	98	4	621	2015
91	Hillcrest	21	186	156	202	70	25	660	2016
101	Dundas Express	159	1,124	2,646	1,018	180		5,127	2016
101A	Dundas Express	96	852	430	1,010	172		2,560	2016
103	Hurontario Express	191	2,293	3,610	2,221	910	82	9,307	2016
107	Malton Express	160	1,340	2,125	1,481	574	32	5,712	2016
108	Meadowvale Business Express	7	279	34	239	39		598	2016
109	Meadowvale Express	227	1,805	2,552	2,178	655	34	7,451	2016
110	University Express	128	1,268	3,118	1,932	869	89	7,404	2016
185	Dixie Express	28	307	115	323	11		784	2016
302	Philip Pocock-Bloor West			13				13	2016
304	Father Goetz-Mississauga Valley			28				28	2016
305	Streetsville Secondary-Falconer		6	31				37	2016
306	Streetsville Secondary-Terry Fox		8	10				18	2016
307	Philip Pocock-Bloor East			24				24	2016
308	St. Joseph-Eglinton		15	17				32	2016
309	St. Joseph-Rathburn			15				15	2016
310	Clarkson Secondary-Winston Churchill			43				43	2016
312	Gordon Graydon-City Centre			89				89	2016
314	Rick Hansen-Donway			21				21	2016
315	Rick Hansen-City Centre		11	32				43	2016
321	Stephen Lewis-St. Joan of Arc		48	129				177	2016
334	St. Joseph-City Centre			39				39	2016
335	Allan A. Martin			31				31	2016
347	Loyola-South Common		24	66				90	2016

Total Boarding Counts by Period	5,919	43,150	66,393	46,636	19,445	5,349	186,901
% Percentage	3.2%	23.1%	35.5%	25.0%	10.4%	2.9%	

SATURDAY		2015 & 2016 PARTIAL BOARDING COUNTS COMBINED (PER PERIOD)						DAILY TOTAL	YEAR COUNTED
ROUTE	DESIGNATION	PERIOD							
		1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas	162	804	2,563	1,347	621	287	5,784	2015
1C	Dundas-Collegeway		306	2,043	861	607	203	4,020	2015
3	Bloor	27	451	1,824	778	638	231	3,949	2015
4	Sherway Gardens		83	384	195	116	1	779	2015
5	Dixie	50	498	1,712	767	243	36	3,306	2016
6	Credit Woodlands	11	89	563	289	212	36	1,200	2016
7	Airport	20	280	733	415	181	149	1,778	2015
8	Cawthra-Indian Road	3	61	238	101	70	13	486	2015
9	Rathburn-Miller's Grove		95	529	274	158	86	1,142	2015
10	Bristol-Britannia		232	719	391	303		1,645	2015
11	Westwood		138	379	205	185	26	933	2015
11A	Westwood-Dundas		58	162	62	27	55	364	2015
13	Glen Erin	27	198	568	219	130	57	1,199	2016
16	Malton		45	35				80	2015
16A	Malton			90	79	70	7	246	2015
19	Hurontario	134	862	2,976	1,317	1,039	605	6,933	2016
19C	Hurontario-Heartland			2,021	973	388		3,382	2016
20	Rathburn		242	536	215	217	72	1,282	2016
22	Finch		127	485	276	142		1,030	2015
23	Lakeshore	20	196	1,069	408	236	106	2,035	2015
26	Burnhamthorpe	18	394	1,463	1,024	665	297	3,861	2016
28	Confederation		77	688	292	252	30	1,339	2016
29B	Park Royal	15	101	349	122	114	50	751	2016
30	Woodbine		19	260	166	74	4	523	2015
34	Credit Valley	4	172	588	331	242	92	1,429	2015
35	Eglinton-Tenth Line	21	465	968	591	340	74	2,459	2016
36	Colonial Loop	15	85	393	203	166	48	910	2015
38A	Creditview-Argentia		162	557	314	173	13	1,219	2016
39	Britannia		140	499	258	138		1,035	2016
41	Thomas		13	98	61	18		190	2015
42	Derry	103	397	883	318	212		1,913	2015
44	Mississauga Road		40	229	114	56	6	445	2016
45	Winston Churchill	12	71	143	93	46		365	2016
48	Erin Mills	14	59	380	148	108	28	737	2015
51	Tomken		79	163	54	4		300	2015
61	Mavis		201	905	499	315	159	2,079	2015
66	McLaughlin		94	865	470	325	79	1,833	2015
68	Windsor Hill Loop		15	76	31	23	8	153	2016
90	Terragar-Copenhagen Loop	4	21	93	59	32		209	2015
103	Hurontario EXPRESS	29	683	1,436	513	315	52	3,028	2016
107	Malton Express		141	647	310	203		1,301	2016
109	Meadowvale Express		181	1,335	694	449	26	2,685	2016
110	University EXPRESS		212	898	540	412	40	2,102	2016
Total Boarding Counts by Period		689	8,587	33,545	16,377	10,265	2,976	72,439	
% Percentage		1.0%	11.9%	46.3%	22.6%	14.2%	4.1%		

SUNDAY		2015 & 2016 PARTIAL BOARDING COUNTS COMBINED (PER PERIOD)							
ROUTE	DESIGNATION	PERIOD						DAILY TOTAL	YEAR COUNTED
		1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas		299	1,669	786	774	288	3,816	2015
1C	Dundas-Collegeway		332	1,685	649	274		2,940	2015
3	Bloor		130	1,289	739	545	106	2,809	2015
4	Sherway Gardens		28	304	136	47		515	2015
5	Dixie		128	1,176	591	200		2,095	2016
6	Credit Woodlands		22	398	249	55		724	2016
7	Airport		176	924	432	332	58	1,922	2015
9	Rathburn-Miller's Grove		34	565	262	249	31	1,141	2015
10	Bristol-Britannia		90	562	289	198		1,139	2015
11	Westwood		88	395	210	166	63	922	2015
13	Glen Erin		154	603	305	158	85	1,305	2016
16A	Malton			63	34			97	2015
19	Hurontario		688	3,840	1,774	1,175	293	7,770	2016
20	Rathburn		104	711	286	161		1,262	2016
22	Finch		46	256	134	134	6	576	2015
23	Lakeshore			745	338	247		1,330	2015
26	Burnhamthorpe		187	1,414	774	519	218	3,112	2016
28	Confederation		31	548	190	65		834	2016
29B	Park Royal-Homelands		58	294	142	71	14	579	2016
34	Credit Valley		30	629	358	172	46	1,235	2015
36	Colonial Loop		36	246	135	77	7	501	2015
38A	Creditview-Argentia		60	406	132	91		689	2016
39	Britannia		61	370	292	111		834	2016
41	Thomas			77	48	7		132	2015
42	Derry		81	630	267	226		1,204	2015
45	Winston Churchill		14	221	106	77		418	2016
48	Erin Mills		20	257	144	67	6	494	2015
61	Mavis		41	686	403	244		1,374	2015
66	McLaughlin			628	307	226		1,161	2015
110	University EXPRESS			850	425	384	24	1,683	2016
<b>Total Boarding Counts by Period</b>		<b>0</b>	<b>2,938</b>	<b>22,441</b>	<b>10,937</b>	<b>7,052</b>	<b>1,245</b>	<b>44,613</b>	
<b>% Percentage</b>		<b>0.0%</b>	<b>6.6%</b>	<b>50.3%</b>	<b>24.5%</b>	<b>15.8%</b>	<b>2.8%</b>		

WEEKDAY		2015 & 2016 COMBINED SERVICE HOURS PER PERIOD						TOTAL SERVICE HOURS	YEAR
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas	15.1	21.1	35.6	20.7	15.8	21.0	129	2015
1C	Dundas-Collegeway	5.8	22.8	36.5	23.2	17.3	7.6	113	2015
3	Bloor	5.6	32.2	54.6	33.6	20.3	11.0	157	2015
4	Sherway Gardens	4.1	12.0	21.7	11.8	8.5	2.3	60	2015
5	Dixie	12.3	37.8	48.3	36.6	21.3	13.4	170	2016
6	Credit Woodlands	3.9	15.2	28.9	14.6	13.4	6.7	83	2016
7	Airport	4.5	21.5	36.5	20.1	19.3	15.0	117	2015
8	Cawthra	2.2	15.7	26.5	14.6	9.3	2.5	71	2015
9	Rathburn-Millers Grove	2.1	13.5	22.1	14.9	10.8	7.8	71	2015
10	Bristol-Britannia	3.9	17.1	29.5	18.9	14.3	7.3	91	2015
11	Westwood	1.4	9.4	20.6	10.0	4.0	3.0	48	2015
11A	Westwood-Dundas	1.0	5.7	1.9	6.2	6.8	5.5	27	2015
11B	Westwood-Nashua	0.5	5.0	1.8	4.9			12	2015
12	Rexdale		5.7	3.8	5.3	1.4		16	2015
13	Glen Erin	5.5	19.0	30.0	18.5	12.9	11.9	98	2016
14	Lorne Park	0.7	2.6	8.0	2.3	4.1	0.8	18	2015
14A	Lorne Park-Industrial	1.3	3.9	0.7	3.7			10	2015
15	Drew	1.8	9.2	7.6	9.4	8.0	5.1	41	2015
16	Malton	0.8	3.5	6.8	2.9	1.2		15	2015
16A	Malton		2.9	6.8	3.5	3.9	1.7	19	2015
19	Hurontario	11.1	35.7	61.4	34.8	32.6	23.1	199	2016
19A	Hurontario-Britannia	5.0	16.5	32.2	20.6	5.1		79	2016
19B	Hurontario-Cantay	1.9	7.0	12.4	6.6	1.6		30	2016
20	Rathburn	5.3	20.5	28.1	24.0	20.0	11.2	109	2016
21	Explorer	2.0	8.5	5.4	9.0	3.0		28	2016
22	Finch	1.1	5.5	13.0	6.0	5.9	2.9	34	2015
23	Lakeshore	6.4	17.8	27.9	18.2	11.6	7.7	90	2015
24	Northwest	2.3	8.9	5.3	8.8	3.0		28	2015
25	Traders Loop		2.5	0.5	2.4			5	2016
26	Burnhamthorpe	8.1	31.2	62.8	29.8	28.8	23.6	184	2016
28	Confederation	1.0	9.3	13.9	9.1	7.3	4.4	45	2016
29	Park Royal	3.9	12.7	26.9	11.9	10.7	10.9	77	2016
30	Woodbine			9.7		4.4	1.5	16	2015
31	Folkway-Homelands	1.5	7.9	14.4	8.8	6.6	3.0	42	2015
32	Lisgar GO		1.4		1.4	1.1		4	2015
34	Credit Valley	3.8	12.5	26.2	12.1	11.0	10.1	76	2015
35	Eglinton	10.9	29.3	48.1	29.2	32.2	8.3	158	2016
35A	Eglinton-Ninth Line	3.8	22.8	17.5	25.1	3.0		72	2016
36	Colonial Loop	5.2	9.1	14.6	9.2	6.2	4.5	49	2015
37	Creditview-Erindale GO		4.7		4.5	1.4		11	2015
38	Creditview	6.3	22.2	31.9	21.3	13.5	7.0	102	2016
39	Britannia	1.7	12.6	20.9	11.7	11.4	5.1	63	2016
41	Thomas		0.8	7.7	2.7	3.0	1.5	16	2015
41A	Thomas-Streetsville GO		6.2		3.9	1.4		12	2015
42	Derry	10.6	41.8	55.3	41.1	16.2	9.2	174	2015
43	Matheson-Argentia	1.0	9.0	6.0	9.6	2.0		28	2016
44	Mississauga Road	2.8	18.4	20.5	18.4	13.3	7.0	80	2016
45	Winston Churchill	2.5	9.0	19.9	10.4	9.3	0.7	52	2016
45A	Winston Churchill-Speakman	0.7	9.3	3.5	8.0			21	2016
46	Tenth Line	0.4	5.1	0.4	6.5	2.4		15	2015
47	Ridgeway Loop		3.4	1.7	2.9	0.5		9	2015
48	Erin Mills	1.7	11.7	21.7	11.9	11.4	7.6	66	2015
49	McDowell	0.3	1.5	7.3	2.6	3.0	1.1	16	2015
49A	McDowell-Thomas	0.3	5.9		3.8	1.4		11	2015
51	Tomken	1.4	21.8	30.0	20.1	10.2	5.8	89	2015
52	Shawson Loop		2.8	0.6	1.8			5	2015
53	Kennedy	2.0	12.1	16.5	11.6	7.8	2.7	53	2016
55	Meyerside Loop	0.3	3.0		1.9			5	2015
57	Courtneypark	2.4	14.2	11.7	14.5	2.4		45	2015
59	Airport Infield		0.5					1	2015
61	Mavis	2.8	9.4	13.9	9.1	8.3	6.8	50	2015
61A	Mavis-Sheridan	4.1	8.8	14.0	9.2	5.9		42	2015
62	Cooksville GO		1.4		1.0	0.5		3	2015
64	Meadowvale GO		1.6		1.7	0.9		4	2015
65	Barondale Loop		3.2	6.0	3.3	3.3	0.7	17	2015
66	McLaughlin	0.6	14.8	30.2	17.6	9.7	5.1	78	2015
67	Streetsville GO		2.2		2.4	1.3		6	2015
68	Windsor Hill Loop	1.0	3.6	6.4	3.6	4.0	2.3	21	2016
70	Keaton		8.4	3.8	10.1			22	2016
71	Sheridan-Subway		1.6		2.1			4	2016
72	Timberlea	0.4	7.3	0.6	8.6	0.3		17	2015
73	Kamato	0.3	5.6	1.5	5.7	1.3		14	2016
76	City Centre-Subway	3.2	18.3	33.7	18.9	18.3	3.5	96	2016
87	Meadowvale-Skymark	3.2	9.0	1.0	7.9	4.4		26	2016
90	Terragar-Copenhagen Loop	1.1	5.7	8.1	5.9	5.3	0.9	27	2015
91	Hillcrest	1.8	5.4	7.4	5.4	4.5	2.9	27	2016
101	Dundas Express	6.0	21.6	53.1	18.5	5.7		105	2016
101A	Dundas Express	4.3	16.9	9.0	19.8	3.7		54	2016
103	Hurontario Express	2.6	32.9	72.2	36.1	24.9	2.9	172	2016
107	Malton Express	5.2	31.2	58.1	33.1	20.7	2.6	151	2016
108	Meadowvale Business Express	0.7	9.1	2.3	8.3	2.9		23	2016
109	Meadowvale Express	10.0	35.7	68.1	42.5	24.8	2.0	183	2016
110	University Express	4.9	22.1	35.6	26.7	17.3	4.1	111	2016
185	Dixie Express	1.7	9.0	5.5	9.0	2.2		27	2016
302	Philip Pocock-Bloor West			0.5				1	2016
304	Father Goetz-Mississauga Valley		0.3	0.4				1	2016
305	Streetsville Secondary-Falconer		0.5	0.6				1	2016
306	Streetsville Secondary-Terry Fox		0.3	0.4				1	2016
307	Philip Pocock-Bloor East			0.6				1	2016
308	St. Joseph-Eglinton		0.3	0.2				1	2016
309	St. Joseph-Rathburn			0.3				0	2016
310	Clarkson Secondary-Winston Churchill			0.3				0	2016
312	Gordon Graydon-City Centre			1.0				1	2016
314	Rick Hansen-Donway		0.5	0.5				1	2016
315	Rick Hansen-City Centre		0.3	0.7				1	2016
321	Stephen Lewis-St.Joan of Arc		0.5	1.2				2	2016
334	St. Joseph-City Centre			0.5				1	2016
335	Allan A. Martin			0.6				1	2016
347	Loyola-South Common		0.3	0.5				1	2016

Total Service Hours by Period	234	1,038	1,543	1,058	668	315	4,855
% Percentage	4.8%	21.4%	31.8%	21.8%	13.8%	6.5%	

SATURDAY		2015 & 2016 COMBINED SERVICE HOURS PER PERIOD							
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT	TOTAL SERVICE HOURS	YEAR
1	Dundas	6.4	14.2	39.2	19.9	14.0	11.5	105	2015
1C	Dundas-Collegeway		5.5	31.3	15.2	13.3	7.5	73	2015
3	Bloor	1.4	14.6	32.3	15.0	18.0	12.0	93	2015
4	Sherway Gardens		8.2	18.9	9.1	10.7	0.8	48	2015
5	Dixie	1.5	12.1	32.8	15.2	15.2	6.9	84	2016
6	Credit Woodlands	0.5	4.4	13.5	6.4	6.4	1.2	32	2016
7	Airport	0.8	6.9	23.5	11.6	6.9	6.0	56	2015
8	Cawthra-Indian Road	0.6	3.8	8.4	3.9	4.6	2.0	23	2015
9	Rathburn-Miller's Grove		6.4	19.6	9.0	10.5	6.0	51	2015
10	Bristol-Britannia		8.8	26.3	11.1	13.1		59	2015
11	Westwood		4.0	8.7	4.1	5.2	2.3	24	2015
11A	Westwood-Dundas		1.3	3.9	2.0	2.0	1.9	11	2015
13	Glen Erin	3.1	9.1	19.8	8.3	10.7	9.3	60	2016
16	Malton		2.9	3.0				6	2015
16A	Malton			3.5	3.1	3.5	0.6	11	2015
19	Hurontario	3.3	15.5	51.6	22.8	23.9	12.8	130	2016
19C	Hurontario-Heartland			36.3	17.2	10.0		64	2016
20	Rathburn		10.0	26.1	12.1	13.7	5.2	67	2016
22	Finch		2.6	6.4	3.4	3.5		16	2015
23	Lakeshore	1.8	9.0	25.6	11.4	11.0	8.3	67	2015
26	Burnhamthorpe	2.5	22.4	44.3	21.0	25.0	22.8	138	2016
28	Confederation		2.6	13.3	5.6	7.2	1.2	30	2016
29B	Park Royal	2.1	8.9	19.8	9.1	9.9	9.9	60	2016
30	Woodbine		2.4	12.9	6.0	5.5	1.0	28	2015
34	Credit Valley	0.6	8.8	19.5	9.0	10.5	6.7	55	2015
35	Eglinton-Tenth Line	1.0	11.1	25.3	11.5	14.2	4.1	67	2016
36	Colonial Loop	1.8	6.0	12.7	6.0	7.3	8.0	42	2015
38A	Creditview-Argentia		9.2	23.6	12.3	11.2	1.0	57	2016
39	Britannia		5.6	20.5	10.1	6.8		43	2016
41	Thomas		0.8	6.8	3.0	1.1		12	2015
42	Derry	2.1	7.2	19.6	9.4	9.2		47	2015
44	Mississauga Road		3.8	12.7	6.0	6.7	0.7	30	2016
45	Winston Churchill	0.6	5.8	12.1	6.0	3.6		28	2016
48	Erin Mills	2.0	5.5	13.2	5.5	7.7	5.0	39	2015
51	Tomken		2.5	6.5	3.0	1.0		13	2015
61	Mavis		6.0	19.6	8.4	9.2	5.6	49	2015
66	McLaughlin		2.4	13.0	6.0	7.0	3.0	31	2015
68	Windsor Hill Loop		1.2	4.1	1.8	1.8	1.8	11	2016
90	Terragar-Copenhagen Loop	0.6	3.0	6.3	3.0	3.0		16	2015
103	Hurontario EXPRESS	1.2	11.3	26.3	12.3	13.5	2.8	67	2016
107	Malton Express		6.7	26.4	11.7	12.9		58	2016
109	Meadowvale Express		5.9	38.6	17.4	19.8	1.1	83	2016
110	University EXPRESS		7.7	19.4	8.7	10.2	1.3	47	2016
<b>Total Service Hours by Period</b>		<b>34</b>	<b>286</b>	<b>847</b>	<b>393</b>	<b>400</b>	<b>170</b>	<b>2,130</b>	
<b>% Percentage</b>		<b>1.6%</b>	<b>13.4%</b>	<b>39.8%</b>	<b>18.5%</b>	<b>18.8%</b>	<b>8.0%</b>		

SUNDAY		2015 & 2016 COMBINED SERVICE HOURS PER PERIOD							
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT	TOTAL SERVICE HOURS	YEAR
1	Dundas		7.4	25.9	12.8	14.2	12.1	72	2015
1C	Dundas-Collegeway		6.7	26.0	10.7	4.8		48	2015
3	Bloor		2.8	25.1	11.9	13.4	4.6	58	2015
4	Sherway Gardens		2.8	13.5	6.0	2.3		25	2015
5	Dixie		2.9	25.6	13.2	9.5		51	2016
6	Credit Woodlands		1.0	12.8	6.4	1.7		22	2016
7	Airport		5.3	19.8	8.9	10.7	2.9	48	2015
9	Rathburn-Miller's Grove		2.2	18.6	9.0	8.8	2.1	41	2015
10	Bristol-Britannia		3.2	20.0	8.9	6.2		38	2015
11	Westwood		2.8	12.8	5.8	6.7	3.5	32	2015
13	Glen Erin		5.6	19.0	9.1	10.0	10.4	54	2016
16A	Malton			4.5	2.0			6	2015
19	Hurontario		13.4	58.1	26.9	20.0	7.3	126	2016
20	Rathburn		4.0	19.6	9.3	5.9		39	2016
22	Finch		1.1	5.2	2.4	3.2	0.3	12	2015
23	Lakeshore			19.5	8.7	9.8		38	2015
26	Burnhamthorpe		6.1	26.3	13.2	13.3	11.2	70	2016
28	Confederation		1.8	13.3	5.6	2.0		23	2016
29B	Park Royal-Homelands		4.7	13.3	5.7	7.4	4.1	35	2016
34	Credit Valley		0.6	12.8	7.2	5.7	2.2	28	2015
36	Colonial Loop		1.2	6.3	3.2	3.8	1.9	16	2015
38A	Creditview-Argentia		2.6	19.1	7.4	5.3		34	2016
39	Britannia		2.5	13.7	6.5	5.6		28	2016
41	Thomas			6.1	3.0	1.1		10	2015
42	Derry		2.2	14.8	6.5	5.6		29	2015
45	Winston Churchill		0.7	11.8	6.0	5.3		24	2016
48	Erin Mills		2.0	13.2	6.1	7.1	1.1	30	2015
61	Mavis		1.0	13.3	6.3	6.1		27	2015
66	McLaughlin			10.9	6.0	5.5		22	2015
110	University EXPRESS			18.8	9.0	10.5	1.2	39	2016
<b>Total Service Hours by Period</b>		<b>0</b>	<b>86</b>	<b>520</b>	<b>243</b>	<b>211</b>	<b>65</b>	<b>1,125</b>	
<b>% Percentage</b>		<b>0.0%</b>	<b>7.7%</b>	<b>46.2%</b>	<b>21.6%</b>	<b>18.8%</b>	<b>5.8%</b>		



	2012 CUTA	2013 CUTA	2014 CUTA	2015 CUTA	2016 CUTA
<b>OPERATING EXPENSES</b>					
Transportation Operating Expenses	\$ 87,107,035.00	\$90,332,968	\$95,736,680	\$100,151,350	\$104,876,469
Fuel/Energy Exp. For Vehicles	\$ 17,607,404.00	\$18,417,106	\$19,488,500	\$16,245,824	\$14,378,825
Vehicle Maintenance	\$ 20,663,210.00	\$20,925,646	\$21,184,969	\$23,571,723	\$25,370,014
<b>Total without overhead</b>	<b>\$ 125,377,649.00</b>	<b>\$ 129,675,720.00</b>	<b>\$ 136,410,149.00</b>	<b>\$ 139,968,897.00</b>	<b>\$ 144,625,308.00</b>
<b>VEHICLE KILOMETRES AND HOURS</b>					
Total Vehicle Kilometres	29,814,128.00	30,669,590.00	30,998,549.00	31,479,928	33,322,866
Revenue Vehicle Hours	1,266,102.00	1,295,937.00	1,317,272.00	1,385,965	1,413,964
<b>Total Vehicle Hours</b>	<b>1,353,552.00</b>	<b>1,386,971.00</b>	<b>1,409,583.00</b>	<b>1,481,609</b>	<b>1,509,194</b>
<b>Cost per Service Hour</b>	<b>\$ 92.63</b>	<b>\$ 93.50</b>	<b>\$ 96.77</b>	<b>\$ 94.47</b>	<b>\$ 95.83</b>
Boardings	50,434,994.00	50,894,501.00	52,034,555.00	53,252,716	54,858,926
Revenue Ridership	34,761,489.00	35,789,013.00	36,607,859.00	37,463,426	38,597,356
Regular Serv. Pass. Revenues	\$ 68,970,470.00	\$ 71,316,687.00	\$ 74,267,486.00	\$ 75,337,696.00	\$77,502,349
<b>Average Revenue/Boarding</b>	<b>\$ 1.37</b>	<b>\$ 1.40</b>	<b>\$ 1.43</b>	<b>\$ 1.41</b>	<b>\$ 1.41</b>

**Subsidy/Boarding= ((Serv Hours \* Cost/Serv Hour)-(Boardings\*Average Revenue/Boarding))/Boarding**

Note:

Boardings and Revenue Ridership are based on the Ridership Reporting Model data

WEEKDAY		BOARDINGS PER SERVICE HOURS PER PERIOD						TOTAL DAILY YEAR	
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas	23	51	64	63	47	21	48	2015
1C	Dundas-Collegeway	23	51	65	74	57	36	59	2015
3	Bloor	31	53	48	60	50	22	49	2015
4	Sherway Gardens	9	26	27	22	16	4	22	2015
5	Dixie	39	44	49	47	29	16	42	2016
6	Credit Woodlands	17	34	34	41	27	12	32	2016
7	Airport	27	28	32	35	20	19	28	2015
8	Cawthra	22	37	34	39	16	8	32	2015
9	Rathburn-Millers Grove	23	26	34	31	25	10	27	2015
10	Bristol-Britannia	26	43	44	39	27	17	37	2015
11	Westwood	34	39	40	45	33	11	38	2015
11A	Westwood-Dundas	53	34	44	33	33	22	33	2015
11B	Westwood-Nashua	31	26	17	23			24	2015
12	Rexdale		24	17	26	13		22	2015
13	Glen Erin	16	46	52	46	27	9	39	2016
14	Lorne Park	4	35	35	25	9	3	25	2015
14A	Lorne Park-Industrial	8	26	14	18			20	2015
15	Drew	17	28	20	23	9	7	18	2015
16	Malton	42	35	26	25	19		28	2015
16A	Malton		37	18	39	21	7	24	2015
19	Hurontario	34	52	57	62	47	29	51	2016
19A	Hurontario-Britannia	29	44	54	58	50		51	2016
19B	Hurontario-Cantay	29	52	44	51	61		47	2016
20	Rathburn	31	47	45	37	23	15	36	2016
21	Explorer	9	32	20	30	10		25	2016
22	Finch	78	66	54	79	59	37	60	2015
23	Lakeshore	22	46	50	57	34	18	44	2015
24	Northwest	15	14	13	11	5		12	2015
25	Traders Loop		27	42	24			27	2016
26	Burnhamthorpe	24	40	35	47	22	10	32	2016
28	Confederation	43	64	91	64	49	14	65	2016
29	Park Royal	28	37	35	43	20	7	30	2016
30	Woodbine			20		11	5	16	2015
31	Folkway-Homelands	7	21	23	31	17	8	21	2015
32	Lisgar GO		24		16	17		19	2015
34	Credit Valley	7	23	34	35	29	9	27	2015
35	Eglinton	24	45	39	33	22	25	34	2016
35A	Eglinton-Ninth Line	27	33	30	33	25		31	2016
36	Colonial Loop	11	39	46	43	35	11	36	2015
37	Creditview-Erindale GO		25		30	25		27	2015
38	Creditview	16	30	33	31	19	8	27	2016
39	Britannia	21	48	44	55	24	16	40	2016
41	Thomas		37	42	25	7	7	29	2015
41A	Thomas-Streetsville GO		35		35	41		36	2015
42	Derry	38	38	40	45	39	32	40	2015
43	Matheson-Argentia	22	30	19	26	3		24	2016
44	Mississauga Road	9	35	45	45	23	7	35	2016
45	Winston Churchill	28	43	29	32	21	16	30	2016
45A	Winston Churchill-Speakman	11	38	34	37			36	2016
46	Tenth Line	2	20	28	16	7		16	2015
47	Ridgeway Loop		34	32	31	17		32	2015
48	Erin Mills	7	19	34	24	15	6	22	2015
49	McDowell	19	22	23	23	15	10	20	2015
49A	McDowell-Thomas	10	30		39	27		32	2015
51	Tomken	44	60	35	40	18	11	39	2015
52	Shawson Loop		10	15	6			9	2015
53	Kennedy	33	40	21	33	12	12	27	2016
55	Meyerside Loop	14	8		7			8	2015
57	Courtneypark	38	32	20	24	10		26	2015
59	Airport Infield		19					19	2015
61	Mavis	24	46	62	65	48	26	50	2015
61A	Mavis-Sheridan	29	52	63	60	45		54	2015
62	Cooksville GO		28		26	0		22	2015
64	Meadowvale GO		25		21	13		21	2015
65	Barondale Loop		24	22	27	10	1	20	2015
66	McLaughlin	7	75	64	73	56	49	66	2015
67	Streetsville GO		25		17	12		19	2015
68	Windsor Hill Loop	18	37	28	24	21	8	25	2016
70	Keaton		41	11	29			31	2016
71	Sheridan-Subway		24		17			20	2016
72	Timberlea	8	10	8	7	0		8	2015
73	Kamato	7	8	22	15	2		12	2016
76	City Centre-Subway	10	36	29	43	17	14	29	2016
87	Meadowvale-Skymark	28	27	13	21	11		22	2016
90	Terragar-Copenhagen Loop	15	22	31	21	19	5	23	2015
91	Hillcrest	12	34	21	37	16	9	24	2016
101	Dundas Express	27	52	50	55	32		49	2016
101A	Dundas Express	22	50	48	51	46		48	2016
103	Hurontario Express	73	70	50	62	37	28	54	2016
107	Malton Express	31	43	37	45	28	12	38	2016
108	Meadowvale Business Express	10	31	15	29	13		26	2016
109	Meadowvale Express	23	51	37	51	26	17	41	2016
110	University Express	26	57	88	72	50	22	67	2016
185	Dixie Express	16	34	21	36	5		29	2016
302	Philip Pocock-Bloor West			26				26	2016
304	Father Goetz-Mississauga Valley		0	70				40	2016
305	Streetsville Secondary-Falconer		12	52				34	2016
306	Streetsville Secondary-Terry Fox		27	25				26	2016
307	Philip Pocock-Bloor East			40				40	2016
308	St. Joseph-Eglinton		50	85				64	2016
309	St. Joseph-Rathburn			50				50	2016
310	Clarkson Secondary-Winston Churchill			143				143	2016
312	Gordon Graydon-City Centre			89				89	2016
314	Rick Hansen-Donway		0	42				21	2016
315	Rick Hansen-City Centre		37	46				43	2016
321	Stephen Lewis-St.Joan of Arc		96	108				104	2016
334	St. Joseph-City Centre			78				78	2016
335	Allan A. Martin			52				52	2016
347	Loyola-South Common		80	132				113	2016

System Average	25	42	43	44	29	17	38
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SATURDAY		BOARDINGS PER SERVICE HOURS PER PERIOD							
ROUTE	DESIGNATION	PERIOD						TOTAL DAILY	YEAR
		1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas	25	57	65	68	44	25	55	2015
1C	Dundas-Collegeway		56	65	57	46	27	55	2015
3	Bloor	20	31	57	52	35	19	42	2015
4	Sherway Gardens		10	20	21	11	1	16	2015
5	Dixie	34	41	52	51	16	5	40	2016
6	Credit Woodlands	23	20	42	45	33	31	37	2016
7	Airport	26	41	31	36	26	25	32	2015
8	Cawthra-Indian Road	5	16	28	26	15	7	21	2015
9	Rathburn-Miller's Grove		15	27	31	15	14	22	2015
10	Bristol-Britannia		26	27	35	23		28	2015
11	Westwood		35	44	50	36		39	2015
11A	Westwood-Dundas		45	42	31	14	29	33	2015
13	Glen Erin	9	22	29	27	12	6	20	2016
16	Malton		16	12				14	2015
16A	Malton			26	25	20	13	23	2015
19	Hurontario	41	56	58	58	44	47	53	2016
19C	Hurontario-Heartland			56	57	39		53	2016
20	Rathburn		24	21	18	16	14	19	2016
22	Finch		49	76	80	41		65	2015
23	Lakeshore	11	22	42	36	21	13	30	2015
26	Burnhamthorpe	7	18	33	49	27	13	28	2016
28	Confederation		30	52	52	35	26	45	2016
29B	Park Royal	7	11	18	13	12	5	13	2016
30	Woodbine		8	20	28	13	4	19	2015
34	Credit Valley	7	20	30	37	23	14	26	2015
35	Eglinton-Tenth Line	22	42	38	51	24	18	37	2016
36	Colonial Loop	8	14	31	34	23	6	22	2015
38A	Creditview-Argentia		18	24	26	15	13	21	2016
39	Britannia		25	24	25	20		24	2016
41	Thomas		16	15	20	17		16	2015
42	Derry	49	55	45	34	23		40	2015
44	Mississauga Road		11	18	19	8	9	15	2016
45	Winston Churchill	19	12	12	16	13		13	2016
48	Erin Mills	7	11	29	27	14	6	19	2015
51	Tomken		32	25	18	4		23	2015
61	Mavis		34	46	59	34	29	43	2015
66	McLaughlin		39	67	78	46	26	58	2015
68	Windsor Hill Loop		13	19	18	13	5	15	2016
90	Terragar-Copenhagen Loop	6	7	15	19	11		13	2015
103	Hurontario EXPRESS	25	60	55	42	23	19	45	2016
107	Malton Express		21	25	26	16		23	2016
109	Meadowvale Express		31	35	40	23	24	32	2016
110	University EXPRESS		28	46	62	41	31	45	2016
<b>System Average</b>		<b>20</b>	<b>30</b>	<b>40</b>	<b>42</b>	<b>26</b>	<b>18</b>	<b>34</b>	

SUNDAY		BOARDINGS PER SERVICE HOURS PER PERIOD							
ROUTE	DESIGNATION	PERIOD						TOTAL DAILY	YEAR
		1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT		
1	Dundas		41	64	62	55	24	53	2015
1C	Dundas-Collegeway		50	65	61	57		61	2015
3	Bloor		47	51	62	41	23	49	2015
4	Sherway Gardens		10	23	23	21		21	2015
5	Dixie		44	46	45	21		41	2016
6	Credit Woodlands		22	31	39	32		33	2016
7	Airport		33	47	49	31	20	40	2015
9	Rathburn-Miller's Grove		16	30	29	28	15	28	2015
10	Bristol-Britannia		29	28	33	32		30	2015
11	Westwood		31	31	36	25	18	29	2015
13	Glen Erin		28	32	34	16	8	24	2016
16A	Malton			14	17			15	2015
19	Hurontario		52	66	66	59	40	62	2016
20	Rathburn		26	36	31	27		33	2016
22	Finch		41	49	55	42	24	47	2015
23	Lakeshore			38	39	25		35	2015
26	Burnhamthorpe		31	54	59	39	19	44	2016
28	Confederation		17	41	34	33		37	2016
29B	Park Royal-Homelands		12	22	25	10	3	16	2016
34	Credit Valley		50	49	50	30	21	43	2015
36	Colonial Loop		30	39	43	20	4	31	2015
38A	Creditview-Argentia		23	21	18	17		20	2016
39	Britannia		24	27	45	20		29	2016
41	Thomas			13	16	7		13	2015
42	Derry		38	43	41	41		42	2015
45	Winston Churchill		22	19	18	14		18	2016
48	Erin Mills		10	19	24	9	5	17	2015
61	Mavis		43	52	64	40		52	2015
66	McLaughlin			58	51	41		52	2015
110	University EXPRESS			45	47	37	20	43	2016
System Average			0	34	43	45	33	19	40

WEEKDAY		SUBSIDY PER BOARDING							
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT	TOTAL	YEAR
1	Dundas	\$2.77	\$0.48	\$0.09	\$0.10	\$0.65	\$3.09	\$0.59	2015
1C	Dundas-Collegeway	\$2.83	\$0.47	\$0.05	-\$0.11	\$0.28	\$1.28	\$0.22	2015
3	Bloor	\$1.70	\$0.41	\$0.56	\$0.19	\$0.50	\$2.95	\$0.52	2015
4	Sherway Gardens	\$9.26	\$2.31	\$2.15	\$2.90	\$4.73	\$20.15	\$2.92	2015
5	Dixie	\$1.02	\$0.76	\$0.54	\$0.64	\$1.87	\$4.70	\$0.89	2016
6	Credit Woodlands	\$4.08	\$1.37	\$1.40	\$0.94	\$2.11	\$6.42	\$1.61	2016
7	Airport	\$2.19	\$1.97	\$1.58	\$1.35	\$3.28	\$3.54	\$2.00	2015
8	Cawthra	\$2.95	\$1.17	\$1.43	\$1.02	\$4.44	\$10.57	\$1.57	2015
9	Rathburn-Millers Grove	\$2.75	\$2.22	\$1.42	\$1.69	\$2.47	\$8.45	\$2.08	2015
10	Bristol-Britannia	\$2.27	\$0.82	\$0.75	\$1.02	\$2.13	\$4.14	\$1.15	2015
11	Westwood	\$1.38	\$1.06	\$0.98	\$0.73	\$1.49	\$7.30	\$1.09	2015
11A	Westwood-Dundas	\$0.41	\$1.42	\$0.79	\$1.47	\$1.46	\$2.85	\$1.53	2015
11B	Westwood-Nashua	\$1.65	\$2.27	\$4.34	\$2.82			\$2.66	2015
12	Rexdale		\$2.53	\$4.31	\$2.33	\$5.75		\$2.94	2015
13	Glen Erin	\$4.72	\$0.67	\$0.43	\$0.65	\$2.13	\$9.05	\$1.03	2016
14	Lorne Park	\$20.95	\$1.33	\$1.36	\$2.42	\$9.28	\$34.52	\$2.37	2015
14A	Lorne Park-Industrial	\$11.05	\$2.31	\$5.58	\$3.83			\$3.50	2015
15	Drew	\$4.09	\$2.05	\$3.46	\$2.78	\$9.09	\$12.63	\$3.79	2015
16	Malton	\$0.85	\$1.30	\$2.34	\$2.45	\$3.60		\$2.00	2015
16A	Malton		\$1.19	\$4.04	\$1.01	\$3.20	\$11.76	\$2.53	2015
19	Hurontario	\$1.45	\$0.43	\$0.27	\$0.14	\$0.63	\$1.90	\$0.47	2016
19A	Hurontario-Britannia	\$1.86	\$0.78	\$0.35	\$0.23	\$0.51		\$0.45	2016
19B	Hurontario-Cantay	\$1.84	\$0.43	\$0.78	\$0.48	\$0.17		\$0.62	2016
20	Rathburn	\$1.64	\$0.65	\$0.74	\$1.14	\$2.75	\$4.80	\$1.26	2016
21	Explorer	\$9.39	\$1.60	\$3.47	\$1.81	\$8.11		\$2.45	2016
22	Finch	-\$0.19	\$0.04	\$0.37	-\$0.20	\$0.21	\$1.21	\$0.18	2015
23	Lakeshore	\$2.88	\$0.65	\$0.51	\$0.28	\$1.40	\$4.03	\$0.78	2015
24	Northwest	\$4.94	\$5.22	\$5.95	\$7.44	\$19.12		\$6.53	2015
25	Traders Loop		\$2.11	\$0.86	\$2.62			\$2.15	2016
26	Burnhamthorpe	\$2.63	\$0.98	\$1.33	\$0.63	\$3.04	\$7.77	\$1.58	2016
28	Confederation	\$0.82	\$0.08	-\$0.36	\$0.08	\$0.56	\$5.50	\$0.07	2016
29	Park Royal	\$2.01	\$1.20	\$1.31	\$0.81	\$3.35	\$11.68	\$1.75	2016
30	Woodbine			\$3.38		\$7.06	\$16.20	\$4.52	2015
31	Folkway-Homelands	\$11.83	\$3.22	\$2.80	\$1.72	\$4.30	\$11.09	\$3.06	2015
32	Lisgar GO		\$2.50		\$4.55	\$4.34		\$3.56	2015
34	Credit Valley	\$11.49	\$2.69	\$1.42	\$1.34	\$1.85	\$9.09	\$2.14	2015
35	Eglinton	\$2.63	\$0.72	\$1.07	\$1.51	\$2.95	\$2.48	\$1.44	2016
35A	Eglinton-Ninth Line	\$2.19	\$1.53	\$1.78	\$1.51	\$2.45		\$1.64	2016
36	Colonial Loop	\$7.54	\$1.04	\$0.66	\$0.79	\$1.35	\$6.95	\$1.26	2015
37	Creditview-Erindale GO		\$2.47		\$1.82	\$2.45		\$2.16	2015
38	Creditview	\$4.70	\$1.73	\$1.50	\$1.66	\$3.67	\$9.96	\$2.08	2016
39	Britannia	\$3.24	\$0.57	\$0.78	\$0.31	\$2.63	\$4.70	\$0.97	2016
41	Thomas		\$1.15	\$0.87	\$2.41	\$11.44	\$12.96	\$1.89	2015
41A	Thomas-Streetsville GO		\$1.34		\$1.34	\$0.91		\$1.28	2015
42	Derry	\$1.10	\$1.11	\$0.96	\$0.70	\$1.07	\$1.57	\$0.97	2015
43	Matheson-Argentia	\$2.94	\$1.78	\$3.72	\$2.27	\$36.92		\$2.60	2016
44	Mississauga Road	\$9.32	\$1.34	\$0.72	\$0.70	\$2.75	\$12.28	\$1.36	2016
45	Winston Churchill	\$2.01	\$0.83	\$1.94	\$1.62	\$3.19	\$4.51	\$1.77	2016
45A	Winston Churchill-Speakman	\$6.97	\$1.08	\$1.44	\$1.16			\$1.22	2016
46	Tenth Line	\$38.84	\$3.31	\$2.02	\$4.47	\$12.29		\$4.54	2015
47	Ridgeway Loop		\$1.42	\$1.60	\$1.64	\$4.23		\$1.63	2015
48	Erin Mills	\$12.96	\$3.57	\$1.41	\$2.56	\$4.84	\$14.38	\$2.85	2015
49	McDowell	\$3.70	\$3.02	\$2.75	\$2.70	\$5.12	\$7.73	\$3.28	2015
49A	McDowell-Thomas	\$8.17	\$1.77		\$1.04	\$2.12		\$1.57	2015
51	Tomken	\$0.74	\$0.17	\$1.36	\$0.98	\$3.92	\$7.62	\$1.05	2015
52	Shawson Loop		\$8.35	\$4.98	\$14.53			\$9.15	2015
53	Kennedy	\$1.49	\$0.96	\$3.13	\$1.50	\$6.62	\$6.43	\$2.17	2016
55	Meyerside Loop	\$5.30	\$10.37		\$12.74			\$10.62	2015
57	Courtneypark	\$1.12	\$1.56	\$3.33	\$2.56	\$8.25		\$2.33	2015
59	Airport Infield		\$3.57					\$3.57	2015
61	Mavis	\$2.55	\$0.68	\$0.12	\$0.06	\$0.59	\$2.24	\$0.49	2015
61A	Mavis-Sheridan	\$1.89	\$0.44	\$0.12	\$0.17	\$0.70		\$0.36	2015
62	Cooksville GO		\$2.04		\$2.27			\$2.88	2015
64	Meadowvale GO		\$2.35		\$3.19	\$5.93		\$3.18	2015
65	Barondale Loop		\$2.61	\$2.88	\$2.13	\$7.97	\$68.54	\$3.33	2015
66	McLaughlin	\$11.76	-\$0.14	\$0.08	-\$0.11	\$0.31	\$0.56	\$0.04	2015
67	Streetsville GO		\$2.37		\$4.13	\$6.37		\$3.59	2015
68	Windsor Hill Loop	\$3.91	\$1.18	\$2.03	\$2.60	\$3.21	\$10.19	\$2.46	2016
70	Keaton		\$0.93	\$7.47	\$1.85			\$1.73	2016
71	Sheridan-Subway		\$2.52		\$4.34			\$3.38	2016
72	Timberlea	\$11.36	\$8.40	\$10.09	\$12.37			\$10.45	2015
73	Kamato	\$12.96	\$10.25	\$2.94	\$5.09	\$60.88		\$6.85	2016
76	City Centre-Subway	\$7.88	\$1.26	\$1.90	\$0.84	\$4.37	\$5.43	\$1.85	2016
87	Meadowvale-Skymark	\$1.99	\$2.11	\$5.96	\$3.12	\$7.37		\$2.93	2016
90	Terragar-Copenhagen Loop	\$4.96	\$2.90	\$1.64	\$3.21	\$3.72	\$19.67	\$2.74	2015
91	Hillcrest	\$6.80	\$1.37	\$3.13	\$1.15	\$4.75	\$9.70	\$2.57	2016
101	Dundas Express	\$2.20	\$0.43	\$0.51	\$0.33	\$1.62		\$0.55	2016
101A	Dundas Express	\$2.88	\$0.49	\$0.59	\$0.47	\$0.65		\$0.60	2016
103	Hurontario Express	-\$0.11	-\$0.04	\$0.50	\$0.14	\$1.21	\$1.98	\$0.35	2016
107	Malton Express	\$1.70	\$0.82	\$1.21	\$0.73	\$2.04	\$6.37	\$1.12	2016
108	Meadowvale Business Express	\$8.17	\$1.71	\$5.07	\$1.92	\$5.71		\$2.32	2016
109	Meadowvale Express	\$2.81	\$0.48	\$1.14	\$0.46	\$2.22	\$4.22	\$0.94	2016
110	University Express	\$2.26	\$0.26	-\$0.32	-\$0.09	\$0.50	\$3.00	\$0.02	2016
185	Dixie Express	\$4.41	\$1.40	\$3.17	\$1.26	\$17.75		\$1.94	2016
302	Philip Pocock-Bloor West			\$2.27				\$2.27	2016
304	Father Goetz-Mississauga Valley			-\$0.04				\$0.98	2016
305	Streetsville Secondary-Falconer		\$6.57	\$0.44				\$1.44	2016
306	Streetsville Secondary-Terry Fox		\$2.18	\$2.42				\$2.31	2016
307	Philip Pocock-Bloor East			\$0.98				\$0.98	2016
308	St. Joseph-Eglinton		\$0.50	-\$0.29				\$0.08	2016
309	St. Joseph-Rathburn			\$0.50				\$0.50	2016
310	Clarkson Secondary-Winston Churchill			-\$0.74				-\$0.74	2016
312	Gordon Graydon-City Centre			-\$0.34				-\$0.34	2016
314	Rick Hansen-Donway			\$0.87				\$3.15	2016
315	Rick Hansen-City Centre		\$1.20	\$0.68				\$0.82	2016
321	Stephen Lewis-St.Joan of Arc		-\$0.41	-\$0.52				-\$0.49	2016
334	St. Joseph-City Centre			-\$0.18				-\$0.18	2016
335	Allan A. Martin			\$0.44				\$0.44	2016
347	Loyola-South Common		-\$0.21	-\$0.69				-\$0.56	2016
System Average		\$2.37	\$0.89	\$0.81	\$0.76	\$1.88	\$4.73	\$1.08	

System Average	\$2.97	\$0.89	\$0.81	\$0.70	\$1.00	\$1.23	\$1.00
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Note: Subsidy per boarding figures are based on 2016 CUTA Values

SATURDAY		SUBSIDY PER BOARDING							
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT	TOTAL DAILY	YEAR
1	Dundas	\$2.39	\$0.27	\$0.05	\$0.00	\$0.74	\$2.41	\$0.33	2015
1C	Dundas-Collegeway		\$0.30	\$0.05	\$0.27	\$0.69	\$2.12	\$0.32	2015
3	Bloor	\$3.38	\$1.70	\$0.28	\$0.43	\$1.29	\$3.54	\$0.85	2015
4	Sherway Gardens		\$8.09	\$3.31	\$3.07	\$7.41	\$73.33	\$4.46	2015
5	Dixie	\$1.40	\$0.92	\$0.42	\$0.48	\$4.58	\$17.03	\$1.01	2016
6	Credit Woodlands	\$2.77	\$3.36	\$0.89	\$0.71	\$1.49	\$1.73	\$1.18	2016
7	Airport	\$2.28	\$0.94	\$1.66	\$1.27	\$2.21	\$2.45	\$1.59	2015
8	Cawthra-Indian Road	\$16.79	\$4.60	\$1.98	\$2.29	\$4.82	\$12.96	\$3.17	2015
9	Rathburn-Miller's Grove		\$5.06	\$2.13	\$1.72	\$4.93	\$5.25	\$2.90	2015
10	Bristol-Britannia		\$2.22	\$2.09	\$1.32	\$2.73		\$2.04	2015
11	Westwood		\$1.36	\$0.78	\$0.49	\$1.28	\$6.88	\$1.07	2015
11A	Westwood-Dundas		\$0.70	\$0.86	\$1.68	\$5.69	\$1.90	\$1.49	2015
13	Glen Erin	\$9.59	\$2.99	\$1.93	\$2.20	\$6.47	\$14.22	\$3.40	2016
16	Malton		\$4.72	\$6.80				\$5.63	2015
16A	Malton			\$2.31	\$2.38	\$3.38	\$6.12	\$2.75	2015
19	Hurontario	\$0.95	\$0.31	\$0.25	\$0.25	\$0.79	\$0.62	\$0.38	2016
19C	Hurontario-Heartland			\$0.31	\$0.28	\$1.06		\$0.39	2016
20	Rathburn		\$2.56	\$3.25	\$3.99	\$4.63	\$5.47	\$3.60	2016
22	Finch		\$0.53	-\$0.14	-\$0.22	\$0.93		\$0.07	2015
23	Lakeshore	\$7.21	\$2.97	\$0.88	\$1.26	\$3.05	\$6.12	\$1.75	2015
26	Burnhamthorpe	\$12.00	\$4.03	\$1.49	\$0.55	\$2.19	\$5.94	\$2.01	2016
28	Confederation		\$1.82	\$0.43	\$0.43	\$1.33	\$2.26	\$0.72	2016
29B	Park Royal	\$12.20	\$7.05	\$4.02	\$5.70	\$6.91	\$17.56	\$6.21	2016
30	Woodbine		\$10.84	\$3.35	\$2.05	\$5.71	\$22.54	\$3.69	2015
34	Credit Valley	\$12.48	\$3.47	\$1.77	\$1.19	\$2.73	\$5.57	\$2.28	2015
35	Eglinton-Tenth Line		\$0.88	\$1.09	\$0.45	\$2.60	\$3.94	\$1.21	2016
36	Colonial Loop	\$10.09	\$5.35	\$1.68	\$1.42	\$2.82	\$14.56	\$2.99	2015
38A	Creditview-Argentia		\$4.00	\$2.65	\$2.34	\$4.80		\$3.09	2016
39	Britannia		\$2.45	\$2.52	\$2.35	\$3.29		\$2.57	2016
41	Thomas		\$4.71	\$5.19	\$3.30	\$4.28		\$4.46	2015
42	Derry	\$0.56	\$0.32	\$0.71	\$1.42	\$2.73		\$0.96	2015
44	Mississauga Road		\$7.64	\$3.89	\$3.63	\$10.00		\$5.00	2016
45	Winston Churchill	\$3.62	\$6.46	\$6.71	\$4.72	\$6.15		\$5.98	2016
48	Erin Mills	\$12.48	\$7.52	\$1.92	\$2.15	\$5.42	\$15.60	\$3.65	2015
51	Tomken		\$1.56	\$2.43	\$3.91	\$22.54		\$2.73	2015
61	Mavis		\$1.42	\$0.66	\$0.21	\$1.40	\$1.93	\$0.83	2015
66	McLaughlin		\$1.01	\$0.03	-\$0.19	\$0.65	\$2.23	\$0.23	2015
68	Windsor Hill Loop		\$6.06	\$3.73	\$4.00	\$5.88	\$19.55	\$5.16	2016
90	Terragar-Copenhagen Loop	\$13.44	\$12.41	\$5.08	\$3.51	\$7.63		\$5.92	2015
103	Hurontario EXPRESS	\$2.45	\$0.18	\$0.34	\$0.88	\$2.69	\$3.75	\$0.72	2016
107	Malton Express		\$3.12	\$2.49	\$2.21	\$4.66		\$2.83	2016
109	Meadowvale Express		\$1.72	\$1.36	\$0.98	\$2.81		\$1.54	2016
110	University EXPRESS		\$2.06	\$0.65	\$0.13	\$0.95	\$1.65	\$0.74	2016
<b>System Average</b>		\$3.29	\$1.78	\$1.01	\$0.89	\$2.32	\$4.05	\$1.40	

Note: Subsidy per boarding figures are based on 2016 CUTA Values

SUNDAY		SUBSIDY PER BOARDING							
		PERIOD							
ROUTE	DESIGNATION	1 EARLY MORNING	2 AM PEAK	3 MIDDAY	4 PM PEAK	5 EVENING	6 NIGHT	TOTAL DAILY	YEAR
1	Dundas		\$0.94	\$0.08	\$0.14	\$0.34	\$2.62	\$0.40	2015
1C	Dundas-Collegeway		\$0.51	\$0.07	\$0.16	\$0.26		\$0.16	2015
3	Bloor		\$0.64	\$0.45	\$0.13	\$0.95	\$2.77	\$0.56	2015
4	Sherway Gardens		\$8.10	\$2.84	\$2.82	\$3.17		\$3.15	2015
5	Dixie		\$0.76	\$0.67	\$0.73	\$3.15		\$0.93	2016
6	Credit Woodlands			\$1.66	\$1.03			\$1.48	2016
7	Airport		\$1.47	\$0.64	\$0.55	\$1.68	\$3.33	\$0.96	2015
9	Rathburn-Miller's Grove		\$4.73	\$1.75	\$1.89	\$1.99	\$5.02	\$2.01	2015
10	Bristol-Britannia		\$1.94	\$1.99	\$1.53	\$1.60		\$1.80	2015
11	Westwood		\$1.66	\$1.70	\$1.25	\$2.44	\$3.91	\$1.88	2015
13	Glen Erin		\$2.06	\$1.61	\$1.43	\$4.62	\$10.29	\$2.55	2016
16A	Malton			\$5.39	\$4.22			\$4.98	2015
19	Hurontario		\$0.45	\$0.04	\$0.04	\$0.22	\$0.96	\$0.14	2016
20	Rathburn		\$2.29	\$1.23	\$1.70	\$2.10		\$1.53	2016
22	Finch		\$0.92	\$0.53	\$0.32	\$0.86	\$2.58	\$0.61	2015
23	Lakeshore			\$1.10	\$1.05	\$2.40		\$1.33	2015
26	Burnhamthorpe		\$1.70	\$0.37	\$0.22	\$1.04	\$3.51	\$0.74	2016
28	Confederation		\$4.15	\$0.90	\$1.41	\$1.46		\$1.18	2016
29B	Park Royal-Homelands		\$6.39	\$2.93	\$2.43	\$8.53	\$26.79	\$4.42	2016
34	Credit Valley		\$0.50	\$0.54	\$0.51	\$1.77	\$3.13	\$0.80	2015
36	Colonial Loop		\$1.78	\$1.05	\$0.84	\$3.32	\$24.60	\$1.72	2015
38A	Creditview-Argentia		\$2.74	\$3.08	\$3.94	\$4.19		\$3.36	2016
39	Britannia		\$2.51	\$2.14	\$0.73	\$3.40		\$1.84	2016
41	Thomas			\$6.15	\$4.58	\$13.24		\$5.96	2015
42	Derry		\$1.13	\$0.83	\$0.91	\$0.95		\$0.89	2015
45	Winston Churchill		\$3.04	\$3.70	\$4.01	\$5.21		\$4.03	2016
48	Erin Mills		\$8.31	\$3.51	\$2.63	\$8.77	\$16.48	\$4.32	2015
61	Mavis		\$0.81	\$0.44	\$0.09	\$0.97		\$0.44	2015
66	McLaughlin			\$0.25	\$0.46	\$0.91		\$0.43	2015
110	University EXPRESS			\$0.71	\$0.61	\$1.20	\$3.38	\$0.83	2016
<b>System Average</b>		<b>\$0.00</b>	<b>\$1.40</b>	<b>\$0.81</b>	<b>\$0.72</b>	<b>\$1.46</b>	<b>\$3.58</b>	<b>\$1.00</b>	

Note: Subsidy per boarding figures are based on 2016 CUTA Values

**Ranking by Boardings**

WEEKDAY			
Route Ranking by Boardings			186901
RANKING	ROUTE	DESIGNATION	DAILY TOTAL
1	19	Hurontario	10,091
2	103	Hurontario Express	9,307
3	3	Bloor	7,781
4	109	Meadowvale Express	7,451
5	110	University Express	7,404
6	5	Dixie	7,063
7	42	Derry	7,014
8	1C	Dundas-Collegeway	6,630
9	1	Dundas	6,177
10	26	Burnhamthorpe	5,896
11	107	Malton Express	5,712
12	35	Eglinton	5,303
13	66	McLaughlin	5,136
14	101	Dundas Express	5,127
15	19A	Hurontario-Britannia	4,077
16	23	Lakeshore	3,923
17	20	Rathburn	3,899
18	13	Glen Erin	3,843
19	51	Tomken	3,469
20	10	Bristol-Britannia	3,396
21	7	Airport	3,279
22	28	Confederation	2,899
23	76	City Centre-Subway	2,820
24	38	Creditview	2,798
25	44	Mississauga Road	2,776
26	6	Credit Woodlands	2,619
27	101A	Dundas Express	2,560
28	39	Britannia	2,555
29	61	Mavis	2,538
30	29	Park Royal	2,335
31	61A	Mavis-Sheridan	2,275
32	8	Cawthra	2,271
33	35A	Eglinton-Ninth Line	2,267
34	22	Finch	2,074
35	34	Credit Valley	2,041
36	9	Rathburn-Millers Grove	1,957
37	11	Westwood	1,849
38	36	Colonial Loop	1,747
39	45	Winston Churchill	1,557

SATURDAY			
Route Ranking by Boardings			72439
RANKING	ROUTE	DESIGNATION	DAILY TOTAL
1	19	Hurontario	6,933
2	1	Dundas	5,784
3	1C	Dundas-Collegeway	4,020
4	3	Bloor	3,949
5	26	Burnhamthorpe	3,861
6	19C	Hurontario-Heartland	3,382
7	5	Dixie	3,306
8	103	Hurontario EXPRESS	3,028
9	109	Meadowvale Express	2,685
10	35	Eglinton-Tenth Line	2,459
11	110	University EXPRESS	2,102
12	61	Mavis	2,079
13	23	Lakeshore	2,035
14	42	Derry	1,913
15	66	McLaughlin	1,833
16	7	Airport	1,778
17	10	Bristol-Britannia	1,645
18	34	Credit Valley	1,429
19	28	Confederation	1,339
20	107	Malton Express	1,301
21	20	Rathburn	1,282
22	38A	Creditview-Argentia	1,219
23	6	Credit Woodlands	1,200
24	13	Glen Erin	1,199
25	9	Rathburn-Miller's Grove	1,142
26	39	Britannia	1,035
27	22	Finch	1,030
28	11	Westwood	933
29	36	Colonial Loop	910
30	4	Sherway Gardens	779
31	29B	Park Royal	751
32	48	Erin Mills	737
33	30	Woodbine	523
34	8	Cawthra-Indian Road	486
35	44	Mississauga Road	445
36	45	Winston Churchill	365
37	11A	Westwood-Dundas	364
38	51	Tomken	300
39	16A	Malton	246

SUNDAY			
Route Ranking by Boardings			44613
RANKING	ROUTE	DESIGNATION	DAILY TOTAL
1	19	Hurontario	7,770
2	1	Dundas	3,816
3	26	Burnhamthorpe	3,112
4	1C	Dundas-Collegeway	2,940
5	3	Bloor	2,809
6	5	Dixie	2,095
7	7	Airport	1,922
8	110	University EXPRESS	1,683
9	61	Mavis	1,374
10	23	Lakeshore	1,330
11	13	Glen Erin	1,305
12	20	Rathburn	1,262
13	34	Credit Valley	1,235
14	42	Derry	1,204
15	66	McLaughlin	1,161
16	9	Rathburn-Miller's Grove	1,141
17	10	Bristol-Britannia	1,139
18	11	Westwood	922
19	28	Confederation	834
20	39	Britannia	834
21	6	Credit Woodlands	724
22	38A	Creditview-Argentia	689
23	29B	Park Royal-Homelands	579
24	22	Finch	576
25	4	Sherway Gardens	515
26	36	Colonial Loop	501
27	48	Erin Mills	494
28	45	Winston Churchill	418
29	41	Thomas	132
30	16A	Malton	97

**Ranking by Boardings**

WEEKDAY			
Route Ranking by Boardings			186901
RANKING	ROUTE	DESIGNATION	DAILY TOTAL
40	48	Erin Mills	1,479
41	53	Kennedy	1,409
42	19B	Hurontario-Cantay	1,393
43	4	Sherway Gardens	1,332
44	57	Courtneypark	1,158
45	31	Folkway-Homelands	905
46	11A	Westwood-Dundas	883
47	185	Dixie Express	784
48	45A	Winston Churchill-Speakman	781
49	15	Drew	757
50	21	Explorer	691
51	70	Keaton	681
52	91	Hillcrest	660
53	43	Matheson-Argentia	659
54	90	Terragar-Copenhagen Loop	621
55	108	Meadowvale Business Express	598
56	87	Meadowvale-Skymark	563
57	68	Windsor Hill Loop	517
58	14	Lorne Park	468
59	16A	Malton	455
60	41	Thomas	452
61	16	Malton	423
62	41A	Thomas-Streetsville GO	411
63	49A	McDowell-Thomas	366
64	12	Rexdale	357
65	24	Northwest	342
66	65	Barondale Loop	336
67	49	McDowell	321
68	11B	Westwood-Nashua	287
69	37	Creditview-Erindale GO	284
70	47	Ridgeway Loop	270
71	30	Woodbine	252
72	46	Tenth Line	239
73	14A	Lorne Park-Industrial	188
74	73	Kamato	167
75	25	Traders Loop	144
76	72	Timberlea	139
77	67	Streetsville GO	113
78	64	Meadowvale GO	88

SATURDAY			
Route Ranking by Boardings			72439
RANKING	ROUTE	DESIGNATION	DAILY TOTAL
40	90	Terragar-Copenhagen Loop	209
41	41	Thomas	190
42	68	Windsor Hill Loop	153
43	16	Malton	80

SUNDAY			
Route Ranking by Boardings			44613
RANKING	ROUTE	DESIGNATION	DAILY TOTAL



**Ranking by Boardings**

WEEKDAY			
Route Ranking by Boardings			186901
RANKING	ROUTE	DESIGNATION	DAILY TOTAL
79	32	Lisgar GO	76
80	71	Sheridan-Subway	74
81	62	Cooksville GO	64
82	52	Shawson Loop	47
83	55	Meyerside Loop	41
84	59	Airport Infield	10
3xx		School routes	700

Note: School Routes not included

SATURDAY			
Route Ranking by Boardings			72439
RANKING	ROUTE	DESIGNATION	DAILY TOTAL

SUNDAY			
Route Ranking by Boardings			44613
RANKING	ROUTE	DESIGNATION	DAILY TOTAL

Ranking by Boardings per Hour

WEEKDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
1	110	University Express	67
2	66	McLaughlin	66
3	28	Confederation	65
4	22	Finch	60
5	1C	Dundas-Collegeway	59
6	103	Hurontario Express	54
7	61A	Mavis-Sheridan	54
8	19A	Hurontario-Britannia	51
9	19	Hurontario	51
10	61	Mavis	50
11	3	Bloor	49
12	101	Dundas Express	49
13	1	Dundas	48
14	101A	Dundas Express	48
15	19B	Hurontario-Cantay	47
16	23	Lakeshore	44
17	5	Dixie	42
18	109	Meadowvale Express	41
19	39	Britannia	40
20	42	Derry	40
21	13	Glen Erin	39
22	51	Tomken	39
23	11	Westwood	38
24	107	Malton Express	38
25	10	Bristol-Britannia	37
26	45A	Winston Churchill-Speakman	36
27	36	Colonial Loop	36
28	20	Rathburn	36
29	41A	Thomas-Streetsville GO	36
30	44	Mississauga Road	35
31	35	Eglinton	34
32	11A	Westwood-Dundas	33
33	49A	McDowell-Thomas	32
34	8	Cawthra	32
35	26	Burnhamthorpe	32
36	6	Credit Woodlands	32
37	47	Ridgeway Loop	32
38	35A	Eglinton-Ninth Line	31
39	70	Keaton	31

SATURDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
1	22	Finch	65
2	66	McLaughlin	58
3	1C	Dundas-Collegeway	55
4	1	Dundas	55
5	19	Hurontario	53
6	19C	Hurontario-Heartland	53
7	28	Confederation	45
8	103	Hurontario EXPRESS	45
9	110	University EXPRESS	45
10	61	Mavis	43
11	3	Bloor	42
12	42	Derry	40
13	5	Dixie	40
14	11	Westwood	39
15	6	Credit Woodlands	37
16	35	Eglinton-Tenth Line	37
17	11A	Westwood-Dundas	33
18	109	Meadowvale Express	32
19	7	Airport	32
20	23	Lakeshore	30
21	26	Burnhamthorpe	28
22	10	Bristol-Britannia	28
23	34	Credit Valley	26
24	39	Britannia	24
25	51	Tomken	23
26	16A	Malton	23
27	107	Malton Express	23
28	9	Rathburn-Miller's Grove	22
29	36	Colonial Loop	22
30	38A	Creditview-Argentia	21
31	8	Cawthra-Indian Road	21
32	13	Glen Erin	20
33	20	Rathburn	19
34	48	Erin Mills	19
35	30	Woodbine	19
36	4	Sherway Gardens	16
37	41	Thomas	16
38	44	Mississauga Road	15
39	68	Windsor Hill Loop	15

SUNDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
1	19	Hurontario	62
2	1C	Dundas-Collegeway	61
3	1	Dundas	53
4	66	McLaughlin	52
5	61	Mavis	52
6	3	Bloor	49
7	22	Finch	47
8	26	Burnhamthorpe	44
9	34	Credit Valley	43
10	110	University EXPRESS	43
11	42	Derry	42
12	5	Dixie	41
13	7	Airport	40
14	28	Confederation	37
15	23	Lakeshore	35
16	6	Credit Woodlands	33
17	20	Rathburn	33
18	36	Colonial Loop	31
19	10	Bristol-Britannia	30
20	39	Britannia	29
21	11	Westwood	29
22	9	Rathburn-Miller's Grove	28
23	13	Glen Erin	24
24	4	Sherway Gardens	21
25	38A	Creditview-Argentia	20
26	45	Winston Churchill	18
27	48	Erin Mills	17
28	29B	Park Royal-Homelands	16
29	16A	Malton	15
30	41	Thomas	13

**Ranking by Boardings per Hour**

WEEKDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
40	29	Park Royal	30
41	45	Winston Churchill	30
42	76	City Centre-Subway	29
43	41	Thomas	29
44	185	Dixie Express	29
45	7	Airport	28
46	16	Malton	28
47	9	Rathburn-Millers Grove	27
48	38	Creditview	27
49	34	Credit Valley	27
50	25	Traders Loop	27
51	37	Creditview-Erindale GO	27
52	53	Kennedy	27
53	108	Meadowvale Business Express	26
54	57	Courtneypark	26
55	14	Lorne Park	25
56	21	Explorer	25
57	68	Windsor Hill Loop	25
58	16A	Malton	24
59	91	Hillcrest	24
60	43	Matheson-Argentia	24
61	11B	Westwood-Nashua	24
62	90	Terragar-Copenhagen Loop	23
63	48	Erin Mills	22
64	62	Cooksville GO	22
65	4	Sherway Gardens	22
66	87	Meadowvale-Skymark	22
67	12	Rexdale	22
68	31	Folkway-Homelands	21
69	64	Meadowvale GO	21
70	49	McDowell	20
71	65	Barondale Loop	20
72	71	Sheridan-Subway	20
73	14A	Lorne Park-Industrial	20
74	32	Lisgar GO	19
75	59	Airport Infield	19
76	67	Streetsville GO	19
77	15	Drew	18
78	30	Woodbine	16

SATURDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
40	16	Malton	14
41	90	Terragar-Copenhagen Loop	13
42	45	Winston Churchill	13
43	29B	Park Royal	13

SUNDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY



**Ranking by Boardings per Hour**

WEEKDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
79	46	Tenth Line	16
80	24	Northwest	12
81	73	Kamato	12
82	52	Shawson Loop	9
83	72	Timberlea	8
84	55	Meyerside Loop	8

SATURDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY

SUNDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY

Ranking by Subsidy per Boarding

WEEKDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
1	110	University Express	\$0.02
2	66	McLaughlin	\$0.04
3	28	Confederation	\$0.07
4	22	Finch	\$0.18
5	1C	Dundas-Collegeway	\$0.22
6	103	Hurontario Express	\$0.35
7	61A	Mavis-Sheridan	\$0.36
8	19A	Hurontario-Britannia	\$0.45
9	19	Hurontario	\$0.47
10	61	Mavis	\$0.49
11	3	Bloor	\$0.52
12	101	Dundas Express	\$0.55
13	1	Dundas	\$0.59
14	101A	Dundas Express	\$0.60
15	19B	Hurontario-Cantay	\$0.62
16	23	Lakeshore	\$0.78
17	5	Dixie	\$0.89
18	109	Meadowvale Express	\$0.94
19	39	Britannia	\$0.97
20	42	Derry	\$0.97
21	13	Glen Erin	\$1.03
22	51	Tomken	\$1.05
23	11	Westwood	\$1.09
24	107	Malton Express	\$1.12
25	10	Bristol-Britannia	\$1.15
26	45A	Winston Churchill-Speakman	\$1.22
27	36	Colonial Loop	\$1.26
28	20	Rathburn	\$1.26
29	41A	Thomas-Streetsville GO	\$1.28
30	44	Mississauga Road	\$1.36
31	35	Eglinton	\$1.44
32	11A	Westwood-Dundas	\$1.53
33	49A	McDowell-Thomas	\$1.57
34	8	Cawthra	\$1.57
35	26	Burnhamthorpe	\$1.58
36	6	Credit Woodlands	\$1.61
37	47	Ridgeway Loop	\$1.63
38	35A	Eglinton-Ninth Line	\$1.64
39	70	Keaton	\$1.73

SATURDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
1	22	Finch	\$0.07
2	66	McLaughlin	\$0.23
3	1C	Dundas-Collegeway	\$0.32
4	1	Dundas	\$0.33
5	19	Hurontario	\$0.38
6	19C	Hurontario-Heartland	\$0.39
7	28	Confederation	\$0.72
8	103	Hurontario EXPRESS	\$0.72
9	110	University EXPRESS	\$0.74
10	61	Mavis	\$0.83
11	3	Bloor	\$0.85
12	42	Derry	\$0.96
13	5	Dixie	\$1.01
14	11	Westwood	\$1.07
15	6	Credit Woodlands	\$1.18
16	35	Eglinton-Tenth Line	\$1.21
17	11A	Westwood-Dundas	\$1.49
18	109	Meadowvale Express	\$1.54
19	7	Airport	\$1.59
20	23	Lakeshore	\$1.75
21	26	Burnhamthorpe	\$2.01
22	10	Bristol-Britannia	\$2.04
23	34	Credit Valley	\$2.28
24	39	Britannia	\$2.57
25	51	Tomken	\$2.73
26	16A	Malton	\$2.75
27	107	Malton Express	\$2.83
28	9	Rathburn-Miller's Grove	\$2.90
29	36	Colonial Loop	\$2.99
30	38A	Creditview-Argentia	\$3.09
31	8	Cawthra-Indian Road	\$3.17
32	13	Glen Erin	\$3.40
33	20	Rathburn	\$3.60
34	48	Erin Mills	\$3.65
35	30	Woodbine	\$3.69
36	4	Sherway Gardens	\$4.46
37	41	Thomas	\$4.46
38	44	Mississauga Road	\$5.00
39	68	Windsor Hill Loop	\$5.16

SUNDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
1	19	Hurontario	\$0.14
2	1C	Dundas-Collegeway	\$0.16
3	1	Dundas	\$0.40
4	66	McLaughlin	\$0.43
5	61	Mavis	\$0.44
6	3	Bloor	\$0.56
7	22	Finch	\$0.61
8	26	Burnhamthorpe	\$0.74
9	34	Credit Valley	\$0.80
10	110	University EXPRESS	\$0.83
11	42	Derry	\$0.89
12	5	Dixie	\$0.93
13	7	Airport	\$0.96
14	28	Confederation	\$1.18
15	23	Lakeshore	\$1.33
16	6	Credit Woodlands	\$1.48
17	20	Rathburn	\$1.53
18	36	Colonial Loop	\$1.72
19	10	Bristol-Britannia	\$1.80
20	39	Britannia	\$1.84
21	11	Westwood	\$1.88
22	9	Rathburn-Miller's Grove	\$2.01
23	13	Glen Erin	\$2.55
24	4	Sherway Gardens	\$3.15
25	38A	Creditview-Argentia	\$3.36
26	45	Winston Churchill	\$4.03
27	48	Erin Mills	\$4.32
28	29B	Park Royal-Homelands	\$4.42
29	16A	Malton	\$4.98
30	41	Thomas	\$5.96



Ranking by Subsidy per Boarding

WEEKDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
40	29	Park Royal	\$1.75
41	45	Winston Churchill	\$1.77
42	76	City Centre-Subway	\$1.85
43	41	Thomas	\$1.89
44	185	Dixie Express	\$1.94
45	7	Airport	\$2.00
46	16	Malton	\$2.00
47	9	Rathburn-Millers Grove	\$2.08
48	38	Creditview	\$2.08
49	34	Credit Valley	\$2.14
50	25	Traders Loop	\$2.15
51	37	Creditview-Erindale GO	\$2.16
52	53	Kennedy	\$2.17
53	108	Meadowvale Business Express	\$2.32
54	57	Courtneypark	\$2.33
55	14	Lorne Park	\$2.37
56	21	Explorer	\$2.45
57	68	Windsor Hill Loop	\$2.46
58	16A	Malton	\$2.53
59	91	Hillcrest	\$2.57
60	43	Matheson-Argentia	\$2.60
61	11B	Westwood-Nashua	\$2.66
62	90	Terragar-Copenhagen Loop	\$2.74
63	48	Erin Mills	\$2.85
64	62	Cooksville GO	\$2.88
65	4	Sherway Gardens	\$2.92
66	87	Meadowvale-Skymark	\$2.93
67	12	Rexdale	\$2.94
68	31	Folkway-Homelands	\$3.06
69	64	Meadowvale GO	\$3.18
70	49	McDowell	\$3.28
71	65	Barondale Loop	\$3.33
72	71	Sheridan-Subway	\$3.38
73	14A	Lorne Park-Industrial	\$3.50
74	32	Lisgar GO	\$3.56
75	59	Airport Infield	\$3.57
76	67	Streetsville GO	\$3.59
77	15	Drew	\$3.79
78	30	Woodbine	\$4.52

SATURDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
40	16	Malton	\$5.63
41	90	Terragar-Copenhagen Loop	\$5.92
42	45	Winston Churchill	\$5.98
43	29B	Park Royal	\$6.21

SUNDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY



Ranking by Subsidy per Boarding

WEEKDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY
79	46	Tenth Line	\$4.54
80	24	Northwest	\$6.53
81	73	Kamato	\$6.85
82	52	Shawson Loop	\$9.15
83	72	Timberlea	\$10.45
84	55	Meyerside Loop	\$10.62

SATURDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY

SUNDAY			
Route Ranking by Boardings per Hour			
RANKING	ROUTE	DESIGNATION	DAILY



## FALL RIDERSHIP COUNT BASED ON THE SEPTEMBER SIGNUP

TOTAL DAILY BOARDINGS							
SERVICE	2015 & 2016 Combo	2015	2014	2012	1 YR VARIANCE	2 YR VARIANCE	3 YR VARIANCE
WEEKDAY	186,901	187,707	190,094	183,309	-0.4%	-1.7%	2.0%
SATURDAY	72,439	74,106	77,362	76,106	-2.2%	-6.4%	-4.8%
SUNDAY	44,613	45,683	46,457	46,251	-2.3%	-4.0%	-3.5%

SERVICE HOURS							
SERVICE		2015	2014	2012	1 YR VARIANCE	2 YR VARIANCE	2 YR VARIANCE
WEEKDAY	4,855	4,758	4,555	4,277	2.0%	6.6%	13.5%
SATURDAY	2,130	2,119	1,973	1,948	0.5%	8.0%	9.3%
SUNDAY	1,125	1,112	1,074	1,041	1.2%	4.8%	8.1%

BOARDINGS PER HOUR							
SERVICE		2015	2014	2012	1 YR VARIANCE	2 YR VARIANCE	2 YR VARIANCE
WEEKDAY	38	39	42	43	-1.3%	-8.3%	-10.5%
SATURDAY	34	35	39	39	-2.8%	-12.8%	-12.8%
SUNDAY	40	41	43	44	-3.3%	-7.8%	-9.9%

SUBSIDY PER BOARDING							
SERVICE		2015	2014	2012	1 YR VARIANCE	2 YR VARIANCE	2 YR VARIANCE
WEEKDAY	\$1.08	\$0.98	\$0.89	\$0.79	9.9%	21.0%	36.3%
SATURDAY	\$1.40	\$1.29	\$1.04	\$1.00	8.9%	35.1%	40.5%
SUNDAY	\$1.00	\$0.89	\$0.81	\$0.71	12.9%	24.0%	41.5%



REVENUE RIDERSHIP MODEL

MONTHLY REVENUE RIDERSHIP SUMMARY							
MONTH	2016	2015	2014	2013	2012	1 YR VARIANCE	2 YR VARIANCE
January	2,997,569	3,010,028	3,041,157	3,043,890	2,914,557	-0.4%	-1.4%
February	2,954,989	2,712,242	2,631,004	2,574,608	2,654,400	9.0%	12.3%
March	3,200,228	3,216,260	3,024,198	2,941,577	3,058,366	-0.5%	5.8%
April	3,165,563	3,139,079	2,981,774	3,019,012	2,730,913	0.8%	6.2%
May	3,214,842	3,012,587	3,166,850	3,131,927	3,010,244	6.7%	1.5%
June	3,249,316	3,160,241	2,985,975	2,811,396	2,800,063	2.8%	8.8%
July	3,066,362	3,177,589	3,074,859	2,941,222	2,779,481	-3.5%	-0.3%
August	3,166,612	2,972,832	2,942,352	2,889,415	2,798,612	6.5%	7.6%
September	3,538,844	3,429,488	3,355,429	3,199,895	3,078,302	3.2%	5.5%
October	3,446,834	3,414,062	3,503,625	3,417,988	3,179,794	1.0%	-1.6%
November	3,553,900	3,299,832	3,151,709	3,173,706	3,145,387	7.7%	12.8%
December	3,042,297	2,919,186	2,748,927	2,644,377	2,611,370	4.2%	10.7%
<b>TOTAL</b>	<b>38,597,356</b>	<b>37,463,426</b>	<b>36,607,859</b>	<b>35,789,013</b>	<b>34,761,489</b>	<b>3.0%</b>	<b>5.4%</b>

MONTHLY BOARDINGS SUMMARY							
MONTH	2016	2015	2014	2013	2012	1 YR VARIANCE	2 YR VARIANCE
January	4,337,730	4,351,196	4,432,372	4,412,005	4,287,923	-0.3%	-2.1%
February	4,251,636	3,889,915	3,768,603	3,704,605	3,905,996	9.3%	12.8%
March	4,625,883	4,605,088	4,333,755	4,226,567	4,466,386	0.5%	6.7%
April	4,488,641	4,474,543	4,267,808	4,323,455	3,995,657	0.3%	5.2%
May	4,489,224	4,245,053	4,510,151	4,456,076	4,378,984	5.8%	-0.5%
June	4,543,740	4,443,755	4,228,124	3,983,133	4,027,623	2.3%	7.5%
July	4,264,743	4,413,755	4,322,936	4,136,675	3,995,607	-3.4%	-1.3%
August	4,404,552	4,148,686	4,130,630	4,053,215	3,997,781	6.2%	6.6%
September	5,072,227	4,913,127	4,739,604	4,517,181	4,449,839	3.2%	7.0%
October	4,941,608	4,917,002	4,973,865	4,851,574	4,620,039	0.5%	-0.6%
November	5,123,722	4,739,495	4,467,629	4,506,204	4,560,662	8.1%	14.7%
December	4,315,220	4,111,101	3,859,078	3,723,811	3,748,497	5.0%	11.8%
<b>TOTAL</b>	<b>54,858,926</b>	<b>53,252,716</b>	<b>52,034,555</b>	<b>50,894,501</b>	<b>50,434,994</b>	<b>3.0%</b>	<b>5.4%</b>

Policies

	<b>Policy</b>	<b>Measurement Method</b>
1	Transit routes will achieve 90% on-time performance.	Determined by route departure from all scheduled time points.
2	All routes will have a scheduled 10% recovery time, with a minimum of 5 minutes, per trip.	Determined from route schedule
3	Individual routes must meet 18% farebox recovery	Measured each month
4	Individual routes must meet an average of 20 passengers per hour minimum	Measured each month
5	The standard headway for weekday service is 30 minutes during the entire service day, though 15 minutes is preferable	Determined from route schedule
6	Standard headway for weekend service is 60 minutes	Determined from route schedule
7	Route information to be displayed at every bus stop	Bus Stop Inventory data
8	Bus stop amenities will be constructed at stops with high ridership, availability of space, physical capabilities of passengers and distribution of boardings	Ridership data and land availability
9	Less than 20 complaints/100,000 trips	Customer comments
10	Less than 10 valid complaints/100,000 trips	Customer comments
11	90% of households that meet the following criteria will be within ¼ mile walking distance of a bus stop: <ul style="list-style-type: none"> <li>- Low Income (under \$30k) – over 3,000 people per square mile</li> <li>- Zero car households – over 1,200 people per square mile</li> <li>- Young and Old Population (0-18, 65+) – over 4,000 people per square mile</li> </ul>	Census data

**ORANGE COUNTY TRANSPORTATION AUTHORITY  
SYSTEMWIDE BUS SERVICE STANDARDS AND POLICIES**

<b>TARGET SERVICE STANDARDS</b>	<b>LOCAL ROUTES (1-99 series)</b>	<b>BUS RAPID TRANSIT LIMITED (500-series)</b>	<b>COMMUNITY ROUTES (100-199 series)</b>	<b>EXPRESS ROUTES (200, 700-series)</b>	<b>RAIL FEEDER ROUTES (400-series)</b>	<b>SPECIAL EVENTS (600-series)</b>
<b>SPAN OF SERVICE:</b>						
WEEKDAY:	5:30 A.M. - 8:30 P.M.	5:30 A.M. - 8:30 P.M. (1)	5:30 A.M. - 8:30 P.M. (1)	(1)	(1)	N/A
WEEKENDS & HOLIDAYS	7:00 A.M. - 7:00 P.M.	7:00 A.M. - 7:00 P.M.	7:00 A.M. - 7:00 P.M.	N/A	N/A	N/A
<b>Span is defined as the first and last trips departing the terminal of origin.</b>						
<i>(1) Based on Demand</i>						
<b>PERFORMANCE STANDARDS:</b>						
BOARDINGS/REVENUE VEHICLE HOUR						
SEAT OCCUPANCY ROUTE:	N/A	N/A	N/A	50%	N/A	N/A

**TITLE VI SERVICE STANDARDS AND POLICIES**

**TIME PERIOD DEFINITIONS:**

**WEEKDAY PEAK PERIODS:** 6 A.M. - 9 A.M. AND 3 P.M. - 6 P.M.

**OFF-PEAK:** WEEKDAYS OFF-PEAK ARE THE PERIODS PRECEDING OR FOLLOWING THE DEFINED A.M. AND P.M. PEAK PERIODS, AND ALL-DAY ON WEEKENDS AND ALL-DAY ON WEEKENDS AND HOLIDAYS

**LOADING STANDARDS:**

*Policy: The average of all loads during the weekday peak periods should not exceed achievable vehicle capacity which is 20 to 26 passengers for intermediate size buses; 44 to 49 passengers for low floor 40-foot buses; and 83 passengers for 60-foot buses.*

<u>Vehicle Type</u>	<u>Average Passenger Capacities</u>				
	<u>Seated</u>	<u>Standing</u>	<u>Total</u>	<u>Maximum Load Factor</u>	<u>Maximum Load Factor %</u>
26' Cut-Away Bus	20	N/A	20	1.0	100%
31' Cut-Away Bus	26	N/A	26	1.0	100%
40' Standard Bus*	34	10	44	1.3	130%
40' Standard Bus*	36	10	46	1.3	130%
40' Standard Bus*	37	11	48	1.3	130%
40' Standard Bus*	38	11	49	1.3	130%
60' Articulated Bus	64	19	83	1.3	130%

\*OCTA standard 40-foot buses vary in seats provided, from 34-seats on buses used for freeway express service to 38-seats on LNG buses.

**ORANGE COUNTY TRANSPORTATION AUTHORITY**  
**SYSTEMWIDE BUS SERVICE STANDARDS AND POLICIES**

<b>TARGET LOAD STANDARDS BY SERVICE TYPE:</b>	<b>LOCAL ROUTES (1-99 series)</b>	<b>BUS RAPID TRANSIT LIMITED (500-series)</b>	<b>COMMUNITY ROUTES (100-199 series)</b>	<b>EXPRESS ROUTES (200, 700-series)</b>	<b>RAIL FEEDER ROUTES (400-series)</b>	<b>SPECIAL EVENTS (600-series)</b>
WEEKDAY PEAK PERIOD(% SEATS):	130%	130%	130%	100%	130%	N/A
OFF-PEAK/WEEKEND (% SEATS):	100%	100%	100%	N/A	N/A	N/A

**HEADWAYS:**

*Policy: Service operates on Local Routes (1-99 series) and Bus Rapid Transit/Limited Stop Routes (500-series) every 30-minutes or better during weekdays and weekends.  
Service operates on Community Routes (100-199 series) every 60-minutes or better during weekdays and weekends.  
Service operates on Express Routes (200-series and 700-series), and Rail Feeder Routes (400-series) weekdays only with a minimum of two trips scheduled in the morning and afternoon commute periods.  
Service operates on Special Event Routes (600-series) for a limited period of time with service scheduled to meet the needs of the event.*

<b>TARGET HEADWAY STANDARDS:</b>	<b>LOCAL ROUTES (1-99 series)</b>	<b>BUS RAPID TRANSIT LIMITED (500-series)</b>	<b>COMMUNITY ROUTES (100-199 series)</b>	<b>EXPRESS ROUTES (200, 700-series)</b>	<b>RAIL FEEDER ROUTES (400-series)</b>	<b>SPECIAL EVENTS (600-series)</b>
PEAK WEEKDAY PERIOD (6-9 A.M., 3-6 P.M.):	30 MIN	30 MIN	60 MIN	(2)	(2)	N/A
OFF-PEAK/WEEKENDS:	30 MIN	30 MIN	60 MIN	N/A	N/A	N/A

(2) Minimum two one-way trips per peak weekday period.

**ON-TIME PERFORMANCE STANDARDS**

*Defined: Measured at the timepoint, a trip is on-time as long as it does not leave the timepoint ahead of the scheduled departure time, and no more than 5-minutes later than the scheduled departure time.*

*Standard :* Change to 85% at the line level as reliable On-Time Performance measuring system becomes available.

*Exclusions:* Early departure times at timepoints located within Free Running time route segments will be considered to be On-Time.

*Stationlink routes OTP is measured for trips scheduled to arrive at Metrolink Stations in the P.M.*

**TARGET ACCESSIBILITY STANDARDS**

% OF SERVICE AREA POPULATION & JOBS WITHIN 1/2 MILE OF A BUS ROUTE: 90% OR HIGHER



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# PERFORMANCE REPORT DECEMBER 2017

***Mission:***

To provide access to opportunity for everyone; safely, efficiently and courteously.



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# INTRODUCTION/BACKGROUND

In June of 2016, the Center for Urban Transportation (CUTR) was commissioned to analyze Palm Tran's performance measures and benchmark peer agencies. CUTR provided a detailed review of Palm Tran's performance metrics and made three (3) presentations to the Executive Leadership Team and the Palm Tran Service Board (PTSB). As a result of CUTR's benchmarking Palm Tran against nine (9) peer agencies; metrics, targets and goals were recommended. These recommendations serve as the basis for the creation of Palm Tran's performance monitoring and improvement process. The Performance Management Office (PMO) was launched in October 2016 as part of Palm Tran's reorganization. The PMO is responsible for producing monthly reports using the Balanced Scorecard Approach, which reviews and analyzes key performance indicators across both fixed route and paratransit operations.

Each metric on the balance scorecards, referred to as "dashboards," is represented as a trend analysis comparing month to month. It also compares current performance to the prior fiscal year. These metrics reflect Palm Tran's commitment to monitor progress towards fulfilling its Vision, Mission, and Core Values. The report provides an annual comparison, and is utilized by the Executive Leadership Team (ELT) and the Palm Tran Statistics (PT-STAT) teams to monitor performance and recommend future improvement initiatives. This process culminates at the monthly PT-STAT Forum where recommendations are presented to the Executive Leadership Team (ELT) for approval and implementation.

### FIXED ROUTE DASHBOARD DECEMBER 2017

Safety	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Preventable Collisions per 100k Miles	1.6	1.3	0.8	● 0.43	● 0.60	● 0.45									
Non-Preventable Collisions per 100k Miles	2.63	2.1	2.0	● 2.44	● 2.71	● 1.96									
Mobility	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Total System Ridership	800,000	850,000	1M	● 816,452	● 777,558	● 754,100									
Riders Per Revenue Hour	19.4	19.9	25.0	● 21.4	● 21.4	● 20.9									
Customer Satisfaction	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
On-Time Performance	73%	75%	77%	● 70.5%	● 71.6%	● 70.8%									
Mean Distance Between Road Calls	4,000	5,000	6,000	● 4,832	● 6,364	● 5,290									
All Customer Commendations per 10,000 Boardings	0.2	0.5	1.0	● 0.04	● 0.12	● 0.23									
	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
All Customer Concerns per 10,000 Boardings	3.5	3.0	2.5	● 3.3	● 2.6	● 2.2									

- The Minimum/Maximum has not been met
- The metric is at or above/below the Minimum/Maximum, but not at the Target
- The Target has been met or exceeded
- ★ The Goal has been exceeded.

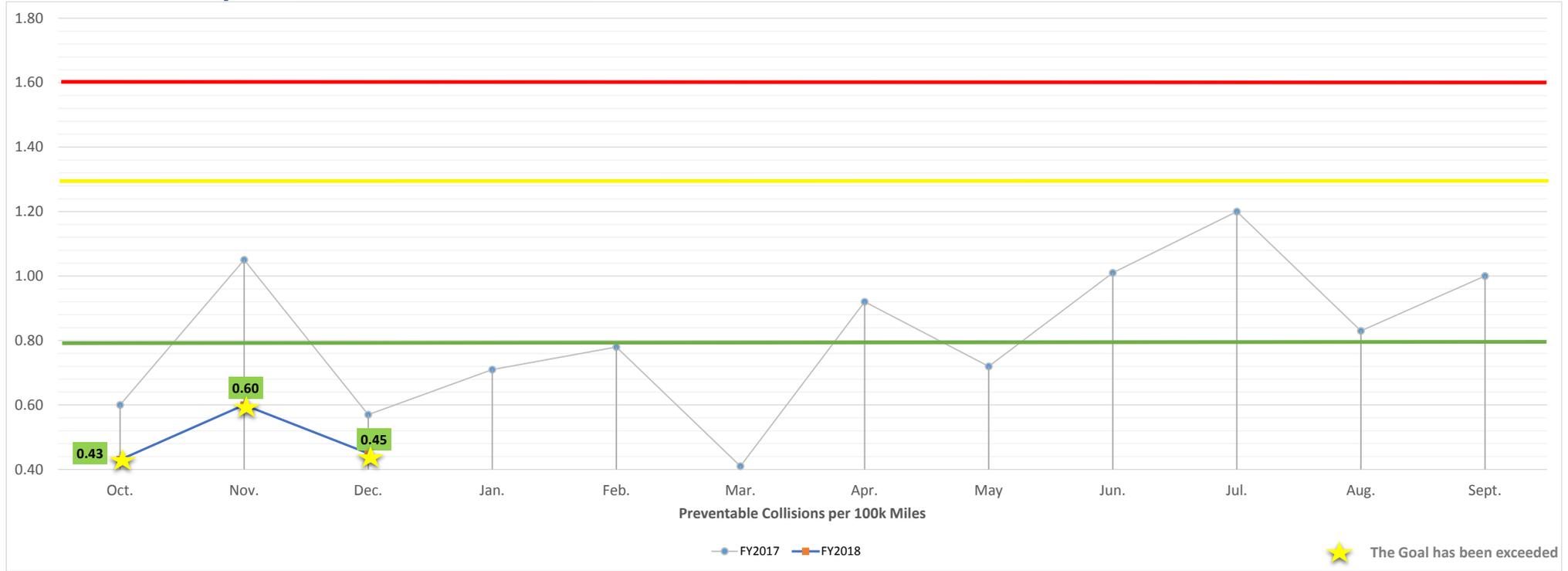


-The Farebox Recovery Ratio Metric has been removed. A new financial stability metric will be proposed through the Budget/Expense PT-Stat team. The farebox recovery metric is no longer being made a part of the monthly performance reporting mainly because the basis of the matrix, which is fixed route operating expenditures and farebox revenues generated as a direct result of those expenditures that are budgeted, based on annualized revenues and expenditures and not month over month. As a result, the month over month comparison does not provide a precise and accurate farebox recovery due to how expenditures are recorded.

-New Fixed Route Customer Commendations per 10,000 Boardings implemented for fiscal year 2018.

## FIXED ROUTE - Preventable Collisions per 100k Miles

Safety	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Preventable Collisions per 100k Miles	2017	1.8	1.5	1.0	● 0.60	● 1.05	● 0.57	● 0.71	● 0.78	● 0.41	● 0.92	● 0.72	● 1.01	● 1.20	● 0.83	● 1.00
	2018	1.6	1.3	0.8	● 0.43	● 0.60	● 0.45									



Metric	Metric Calculation	Metric Description
Preventable Collisions per 100k Miles	$(\text{Total Preventable Collisions}) / (\text{Total Vehicle Miles}) * 100K$	The average number of vehicle collisions determined to be preventable for every 100K miles driven.

**Narrative**

Palm Tran is proud to report a third consecutive month of exceeding the goal for Preventable Collisions. During the month of December, Palm Tran experienced three (3) Preventable Collisions compared to four (4) during the month of November. This is due to no mirror strikes during the month of December compared to one (1) mirror strike in November. Preventable Collisions during the month of December consisted of two (2) rear-ends, and one (1) contact on the right.

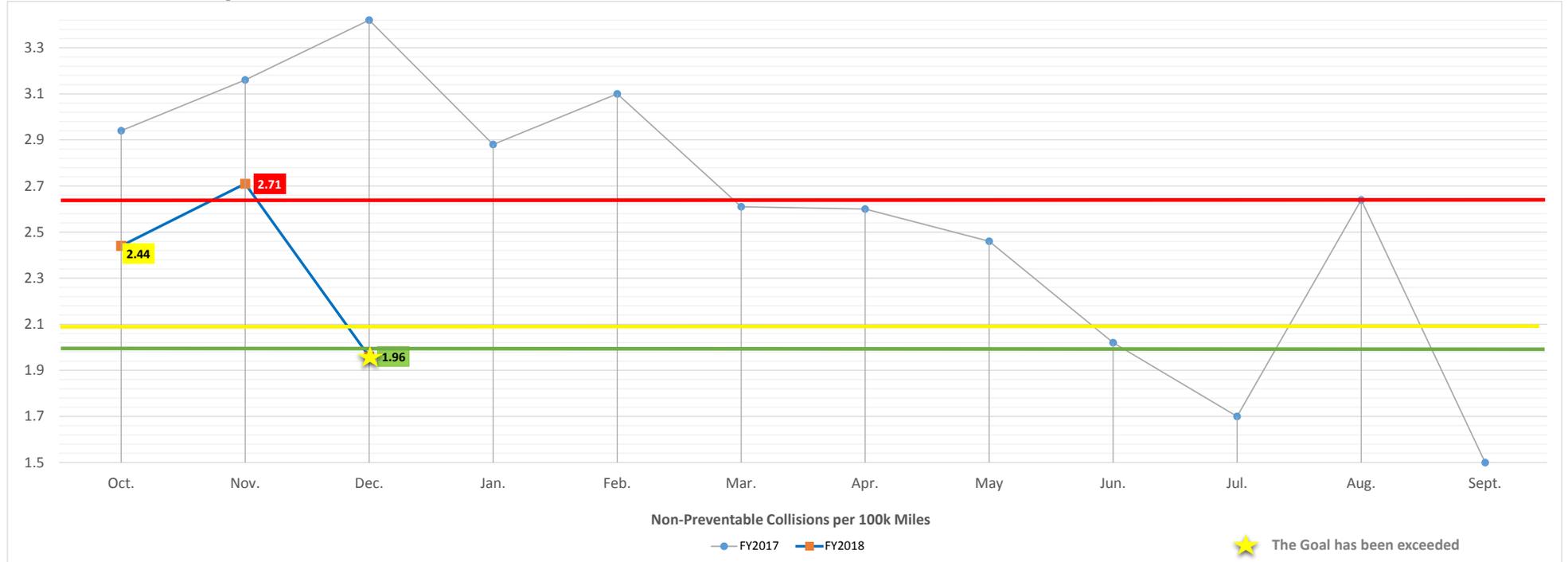


- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

## FIXED ROUTE - Non-Preventable Collisions per 100k Miles

Safety	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Non-Preventable Collisions per 100k Miles	2017	2.65	2.5	2.2	<span style="color: red;">●</span> 2.94	<span style="color: red;">●</span> 3.16	<span style="color: red;">●</span> 3.42	<span style="color: red;">●</span> 2.88	<span style="color: red;">●</span> 3.10	<span style="color: yellow;">●</span> 2.61	<span style="color: yellow;">●</span> 2.60	<span style="color: green;">●</span> 2.46	<span style="color: green;">●</span> 2.02	<span style="color: green;">●</span> 1.70	<span style="color: yellow;">●</span> 2.64	<span style="color: green;">●</span> 1.50
	2018	2.63	2.1	2.0	<span style="color: yellow;">●</span> 2.44	<span style="color: red;">●</span> 2.71	<span style="color: green;">●</span> 1.96									



Metric	Metric Calculation	Metric Description
Non-Preventable Collisions per 100K Miles	$\frac{\text{(Total Non-Preventable Collisions)}}{\text{(Total Vehicle Miles)} \times 100K}$	The average number of vehicle collisions determined to be non-preventable for every 100K miles driven.

### Narrative

Palm Tran is glad to report a sharp improvement in this metric during the month of December that exceeds the goal during the typically most challenging month. This is attributed to the rear "Flashing Lights Project" which has contributed to reduced rear-end collisions from six (6) in December Fiscal Year 2017, to two (2) in December Fiscal Year 2018. During the month of December, thirteen (13) collisions occurred, compared to eighteen (18) in the month of November. This is due to a reduction of collisions categorized as contacts from the left and contacts from the right. December Non-Preventable Collisions consisted of six (6) contacts on the left, four (4) contacts on the right, two (2) rear-ends, and one (1) mirror strike. The Safety and Accident Reduction PT-STAT team is actively pursuing initiatives to address contacts on the side of the vehicle.

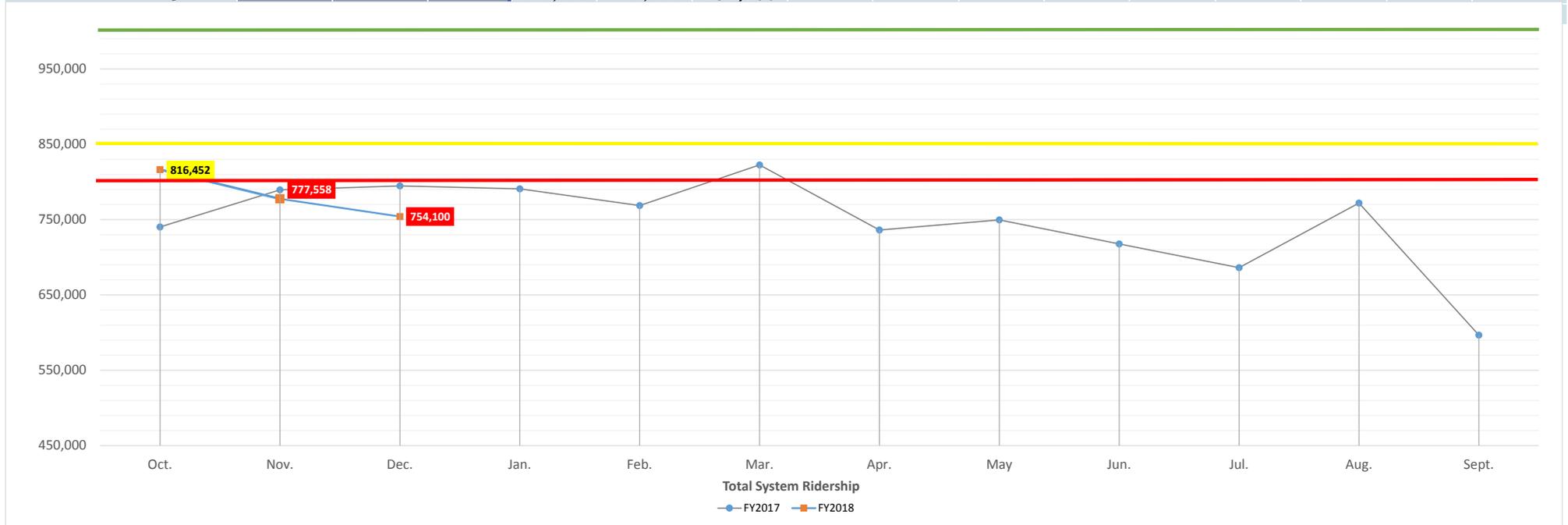


- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

### FIXED ROUTE - Total System Ridership

Mobility	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Total System Ridership	2017	775,000	850,000	1M	●	●	●	●	●	●	●	●	●	●	●	●
	2018	800,000	850,000	1M	●	●	●									
					740,293	789,517	794,859	790,894	768,598	822,635	736,236	749,676	717,715	686,132	772,042	596,664
					816,452	777,558	754,100									



Metric	Metric Calculation	Metric Description
Total System Ridership	Total Count of Passenger Boardings	The aggregate number of Fixed Route customer boardings. <i>Note: Palm Tran ridership is being captured with the FTA certified APC (Automated Passenger Counter) System.</i>

**Narrative**

December ridership was 754,100 which is a decrease of approximately 5.1% compared to December of last fiscal year, and a 3% reduction compared to the prior month of November. This was due to no Palm Tran service during "Christmas Day" which translated into one less week day of service which averages 35,000 riders, compared to one less day of Sunday service last year which averages 7,000 riders. Also, according to the the American Public Transportation Association (APTA), National fixed route ridership experienced a reduction of 4.17% for fiscal year 2017. The Ridership PT-STAT team is working on outreach efforts to support the recently extended Route 4 and communicate the service enhancement to possible new Route 4 riders.

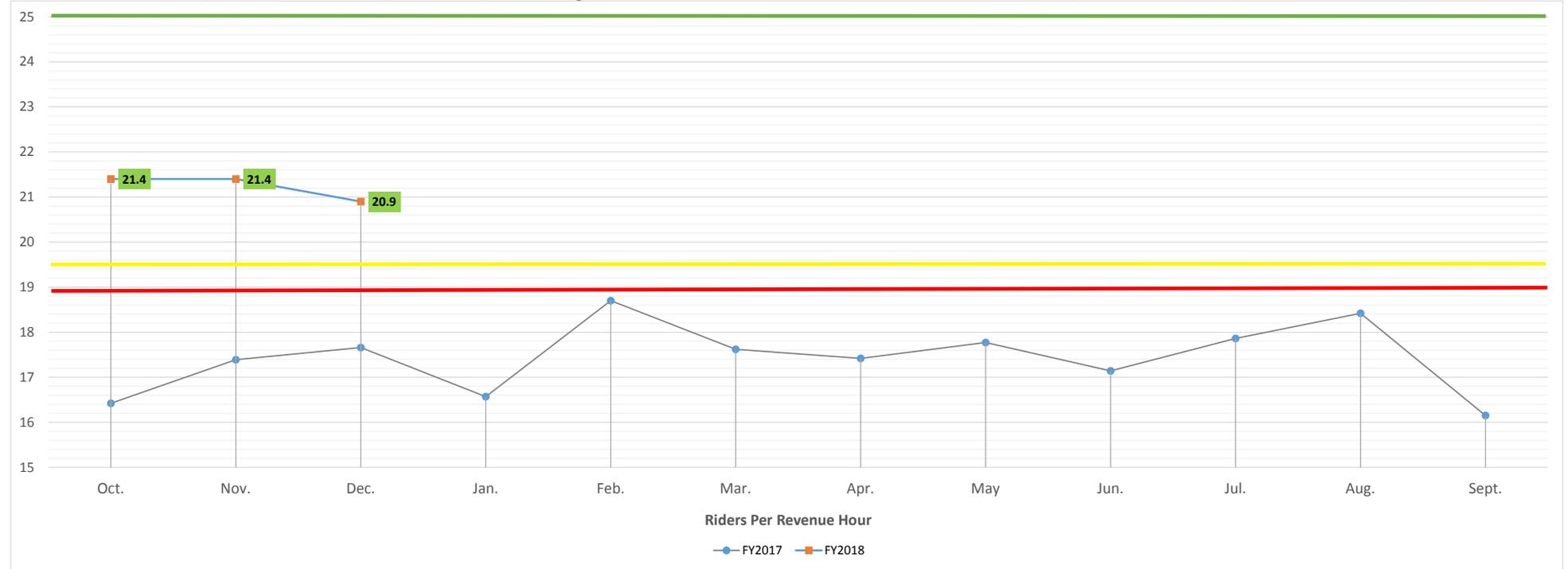


- The Minimum/Maximum has not been met
- The metric is at or above the Minimum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

### FIXED ROUTE - Riders Per Revenue Hour

Mobility	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Riders Per Revenue Hour	2017	19.4	19.9	25.0	● 16.42	● 17.39	● 17.66	● 16.57	● 18.70	● 17.62	● 17.42	● 17.77	● 17.14	● 17.86	● 18.42	● 16.15
	2018	19.4	19.9	25.0	● 21.4	● 21.4	● 20.9									



Metric	Metric Calculation	Metric Description
Riders Per Revenue Hour	Total Fixed Route Boardings / Total Fixed Route Revenue Hours	The aggregate average number of Fixed Route customer boardings occurring in each revenue hour.

**Narrative**

During the month of December, Riders Per Revenue Hour experienced a slight reduction to 20.9 passengers per hour. This is due to Total Revenue Hours decreasing from 36,380 in November, to 36,042 in December combined with a ridership reduction during the month of December. Palm Tran's productivity continues to indicate efficient operation during the month of December.

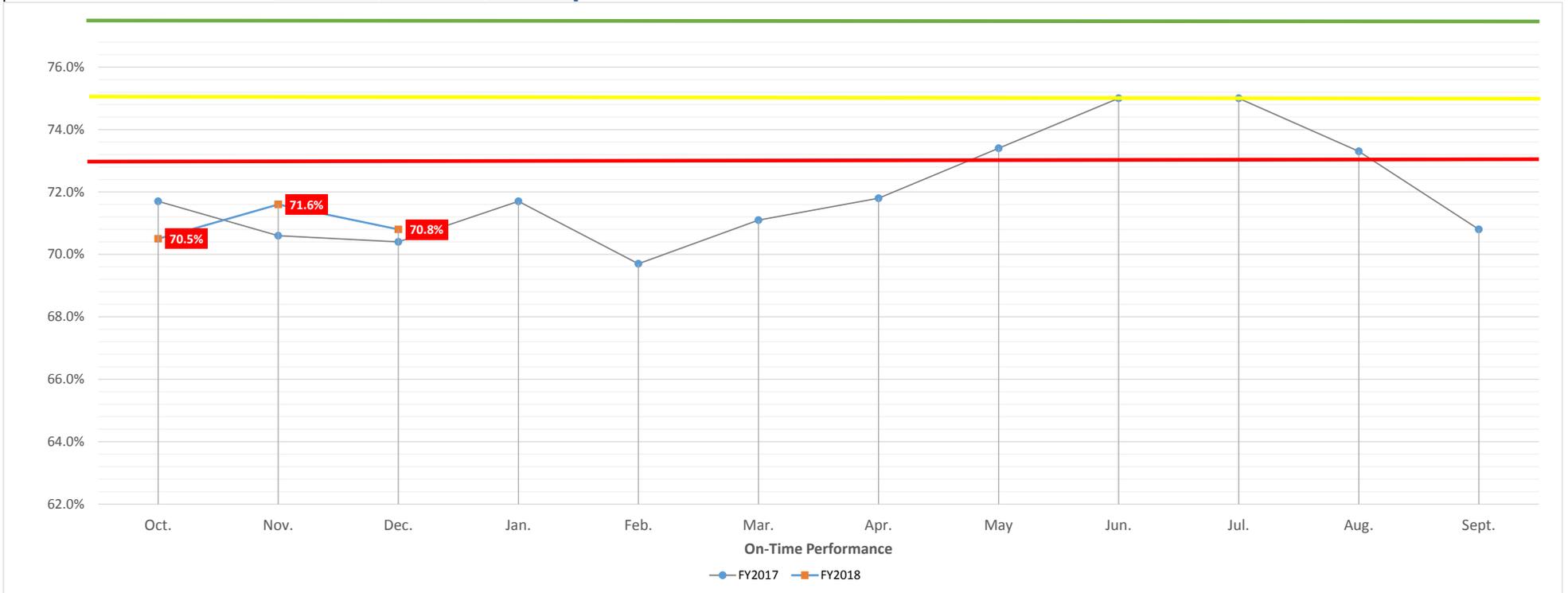


Palm Tran Performance Management Office

- The Minimum/Maximum has not been met
- The metric is at or above the Minimum but not at the Target
- The Target has been met or exceeded

## FIXED ROUTE - On-Time Performance

Customer Satisfaction	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
On-Time Performance	2017	73%	75%	77%	71.7%	70.6%	70.4%	71.7%	69.7%	71.1%	71.8%	73.4%	75.0%	75.0%	73.3%	70.8%
	2018	73%	75%	77%	70.5%	71.6%	70.8%									



Metric	Metric Calculation	Metric Description
On-Time Performance	(Number of On-Time Fixed Route Time Point Encounters)/(Total Number of Fixed Route Time Point Encounters)	<b>New standard</b> – OTP Standard is 0 minutes early to 5 minutes late. No early departures allowed. <b>Former standard</b> – Beginning October 2016, OTP Standard was no more than 3 minutes early, and no more than 7 minutes late.

### Narrative

During the month of December, On-Time Performance continues to be consistent with the previous three months. On-Time Performance dropped from 71.6% in November to 70.8% in December, which is 0.8 percentile points lower. This slight reduction is attributed to increased traffic congestions during the Holiday season. The On-Time Performance PT-STAT team is reviewing possible time point improvements in an effort to reduce early trips that are currently affecting the On-Time Performance.

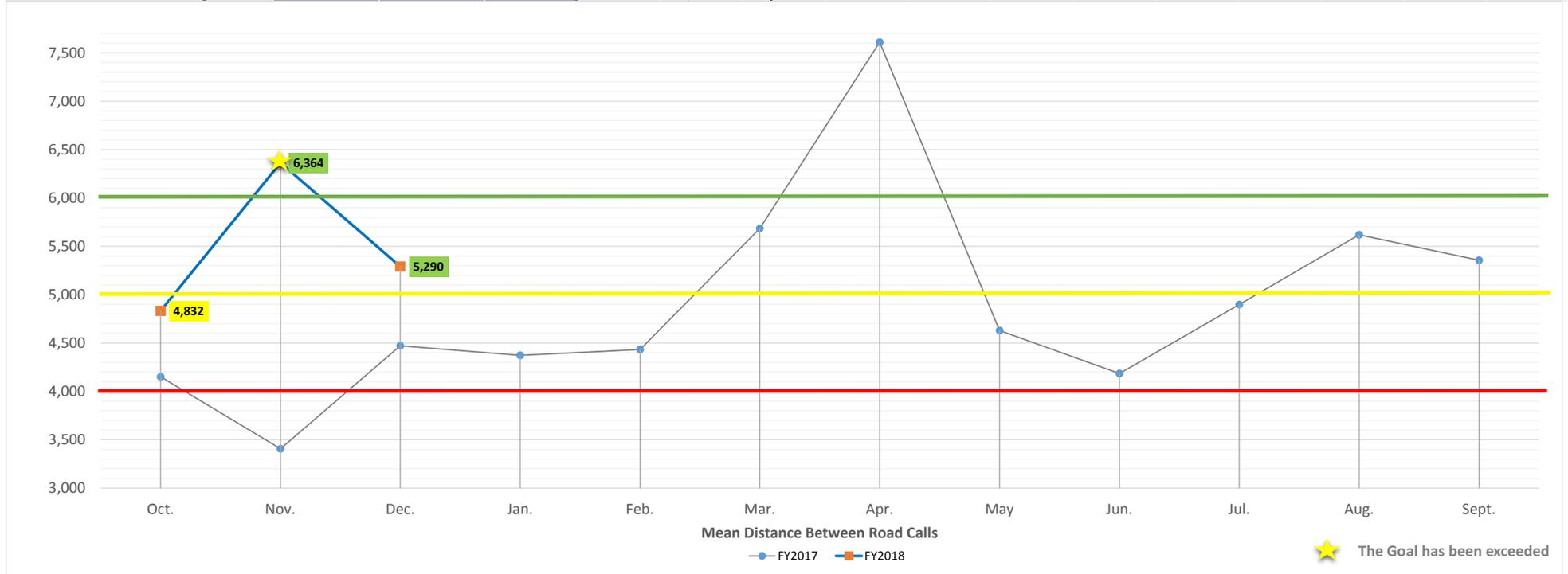
- The Minimum/Maximum has not been met
- The metric is at or above the Minimum but not at the Target
- The Target has been met or exceeded



Palm Tran Performance Management Office

### FIXED ROUTE - Mean Distance Between Road Calls

Customer Satisfaction	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Mean Distance Between Road Calls	2017	3,010	4,010	4,500	● 4,151	● 3,407	● 4,472	● 4,373	● 4,433	● 5,684	● 7,610	● 4,629	● 4,185	● 4,898	● 5,619	● 5,355
	2018	4,000	5,000	6,000	● 4,832	● 6,364	● 5,290									



Metric	Metric Calculation	Metric Description
Mean Distance Between Road Calls	(Total Fixed Route Vehicle Miles)/(Fixed Route Major and Minor Mechanical Failures.	The average number of miles driven by Fixed Route Revenue vehicles before experiencing a NTD-reportable major or minor mechanical failure.

**Narrative**

During the month of December, Palm Tran experienced 125 road calls. This is an increase of 21 road calls compared to the prior month of November. Palm Tran Road Calls during the month of December increased due to additional engine overheating and tire related road calls. Palm Tran Mean Distance Between Road Calls metric remains above the target for the month of December.

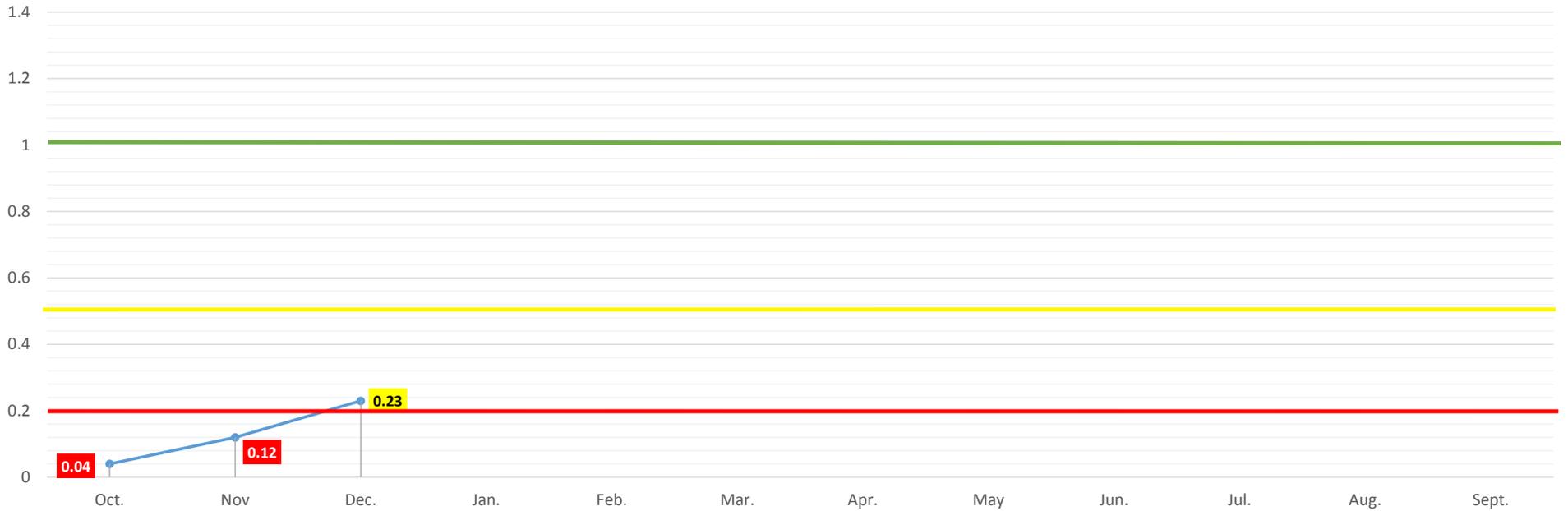


- The Minimum/Maximum has not been met
- The metric is at or above the Minimum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

## FIXED ROUTE - All Customer Commendations per 10,000 Boardings

Customer Satisfaction	Min	Target	Goal	Oct.	Nov	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
All Customer Commendations per 10,000 Boardings	0.2	0.5	1.0	● 0.04	● 0.12	● 0.23									



All Customer Concerns per 10,000 Boardings

Metric	Metric Calculation	Metric Description
All Customer Commendations per 10,000 Boardings	$(\text{Total Fixed Route Commendations} / \text{Total Riders}) * 10,000$	Customer Commendations per 10,000 boardings.

### Narrative

The customer commendation ratio has improved for a second month in a row. Although Fixed Route Customer Commendations are still not at the target, Palm Tran is happy to report seventeen (17) commendations in December compared to nine (9) commendations in November and only three (3) commendations in October. Commendations included courteous bus operators and reliable service. In addition, fewer customer concerns and the opportunity for increased commendations will take place as Palm Tran continues to improve system reliability, customer service and implementation of a new route redesign.

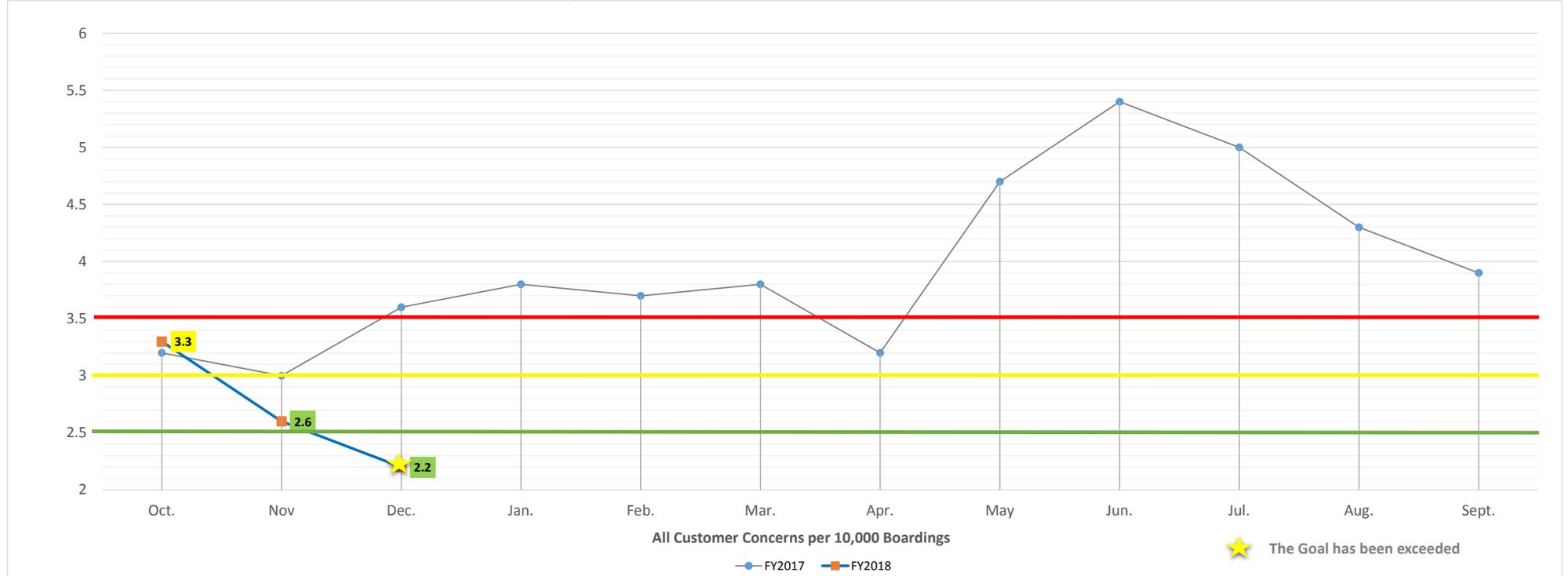


- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

## FIXED ROUTE - All Customer Concerns per 10,000 Boardings

Customer Satisfaction	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
All Customer Concerns per 10,000 Boardings	2017	3.5	3.0	2.5	● 3.2	● 3.0	● 3.6	● 3.8	● 3.7	● 3.8	● 3.2	● 4.7	● 5.4	● 5.0	● 4.3	● 3.9
	2018	3.5	3.0	2.5	● 3.3	● 2.6	● 2.2									



Metric	Metric Calculation	Metric Description
All Customer Concerns per 10,000 Boardings	$(\text{Total Fixed Route Concerns} / \text{Total Riders}) * 10,000$	Customer concerns per 10,000 boardings.

**Narrative**

Palm Tran is pleased to report that Customer Concerns have decreased for the second month in a row. In December, total logged concerns were 183 compared to 215 in November. This metric exceeded the goal and continues to trend in the right direction. The top category of fixed route customer concerns for the month of December is "pass ups," which reduced from thirty-eight (38) in November to only twenty-five (25) in December. This is primarily due to increased communication with Bus Operators and ongoing public outreach efforts.



- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

### CONNECTION DASHBOARD DECEMBER 2017

Safety	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Preventable Collisions per 100k Miles	2.0	1.0	0.7	● 1.11	● 1.09	● 0.46									
Non-Preventable Collisions per 100k Miles	2.5	2.2	2.0	● 2.12	● 1.75	● 2.87									
Mobility	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Riders Per Revenue Hour	1.5	1.8	2.0	● 1.51	● 1.49	● 1.45									
Customer Satisfaction	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
On-Time Performance	85%	90%	92%	● 71.0%	● 74.0%	● 76.0%									
Mean Distance Between Road Calls	28,000	31,000	35,000	● 31,898	● 19,028	● 39,551									
All Customer Commendations per 1,000 Trips	0.7	1.0	1.3	● 1.0	● 0.9	● 0.9									
	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Customer Concerns per 1,000 Trips	3.0	2.0	1.5	● 5.6	● 4.1	● 3.5									
Reservations Call Hold Time	4:00	3:00	2:00	● 4:42	● 2:51	● 1:51									
Where Is My Ride Hold Time	4:00	3:00	2:00	● 3:38	● 2:26	● 2:40									

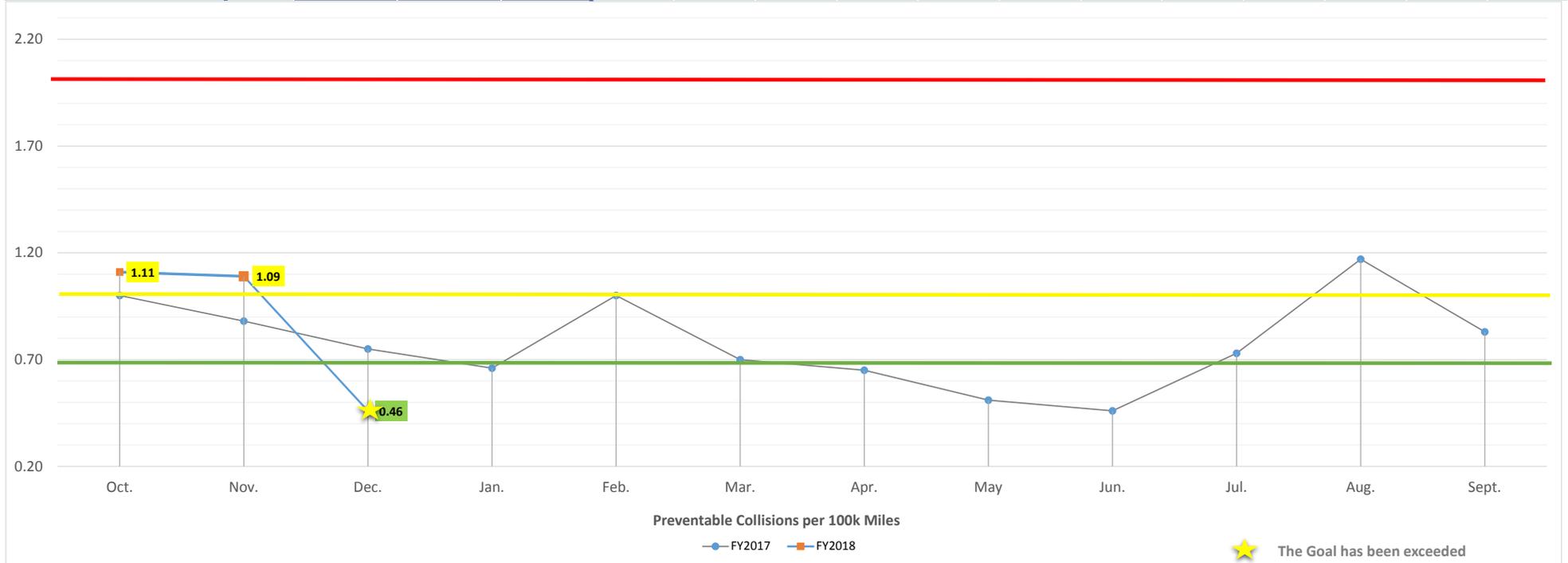
- The Minimum/Maximum has not been met
- The metric is at or above/below the Minimum/Maximum, but not at the Target
- The Target has been met or exceeded
- ★ The Goal has been exceeded.

New Connection Customer Commendations per 1,000 Trips implemented for fiscal year 2018.



### CONNECTION - Preventable Collisions per 100k Miles

Safety	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Preventable Collisions per 100k Miles	2017	2.0	1.0	0.7	● 1.00	● 0.88	● 0.75	● 0.66	● 1.0	● 0.70	● 0.65	● 0.51	● 0.46	● 0.73	● 1.17	● 0.83
	2018	2.0	1.0	0.7	● 1.11	● 1.09	● 0.46									



Metric	Metric Calculation	Metric Description
Preventable Collisions per 100,000 Miles	$(\text{Total Preventable Collisions}) / (\text{Total Vehicle Miles}) * 100K$	The average number of vehicle collisions determined to be preventable for every 100K miles driven.

**Narrative**

Palm Tran Connection is pleased to report a sharp decline of Preventable Collisions from 1.09 during the month of November to 0.46 during the month of December. This reduction is due to four (4) at fault accidents for the month of December compared to ten (10) at fault accidents for the month of November. These included two (2) front-end damages, one (1) backed-into a parked vehicle, and one (1) side swipe. The Connection PT-STAT team continues to focus on initiatives to mitigate Preventable Collisions that will contribute to exceeding the target for this metric.

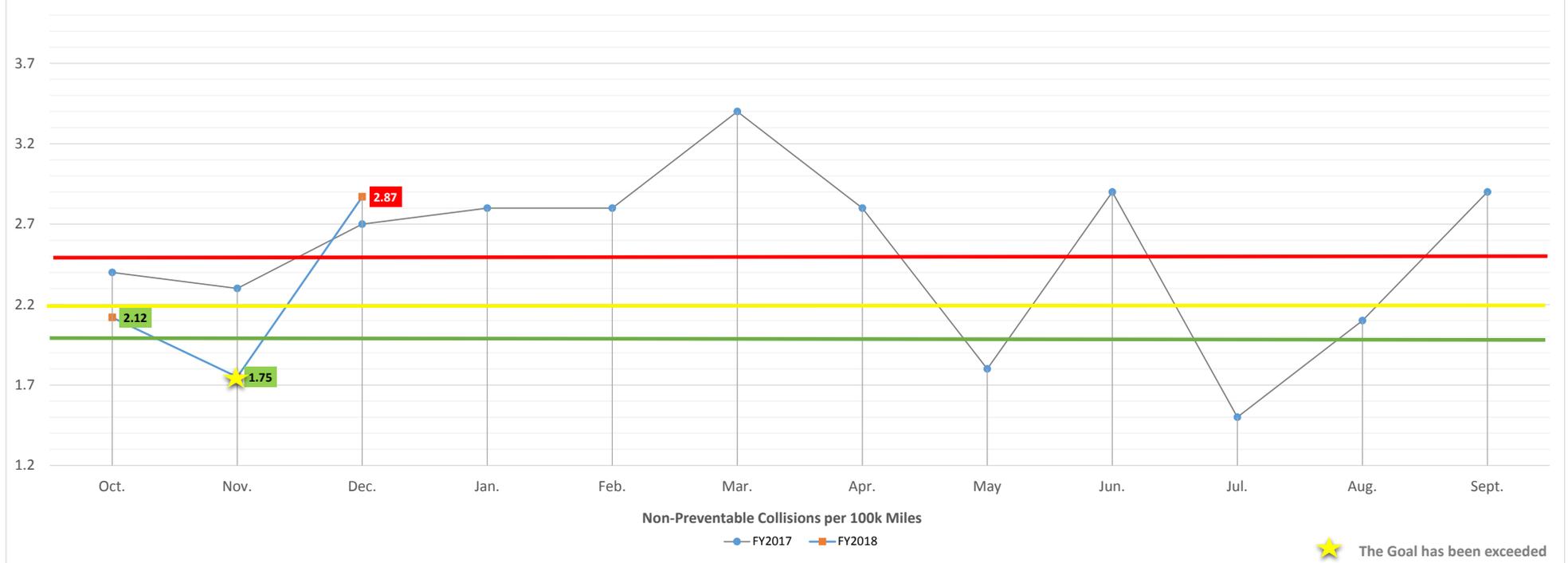


Palm Tran Performance Management Office

- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

## CONNECTION - Non-Preventable Collisions per 100k Miles

Safety	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Non-Preventable Collisions per 100k Miles	2017	2.5	2.2	2.0	● 2.4	● 2.3	● 2.7	● 2.8	● 2.8	● 3.4	● 2.8	● 1.8	● 2.9	● 1.5	● 2.1	● 2.9
	2018	2.5	2.2	2.0	● 2.12	● 1.75	● 2.87									



Metric	Metric Calculation	Metric Description
Non-Preventable Collisions per 100K Miles	$(\text{Total Non-Preventable Collisions}) / (\text{Total Vehicle Miles}) * 100K$	The average number of vehicle collisions determined to be non-preventable for every 100K miles driven.

**Narrative**

During the month of December, Non-Preventable Collisions increased from 1.75 to 2.87 collisions. This is due to an increase in side-swipe collisions during the month of December. Palm Tran experienced twenty-five (25) Non-Preventable Collisions for the month of December, compared to sixteen (16) Non-Preventable Collisions for the month of November. The top three categories in the month of December were defined as side-swipes, backed-into, and rear-ends. The Connection Safety and Accident Reduction PT-STAT team is implementing a "Back To The Basics" training program with the goal of reminding the drivers of defensive driving techniques that could potentially mitigate future Non-Preventable Collisions.



- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

## CONNECTION - Riders Per Revenue Hour

Mobility	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Riders Per Revenue Hour	2017	1.5	1.8	2.0	<span style="color: red;">●</span> 1.4	<span style="color: yellow;">●</span> 1.5	<span style="color: red;">●</span> 1.4	<span style="color: yellow;">●</span> 1.5	<span style="color: red;">●</span> 1.4							
	2018	1.5	1.8	2.0	<span style="color: yellow;">●</span> 1.51	<span style="color: red;">●</span> 1.49	<span style="color: red;">●</span> 1.45									



Metric	Metric Calculation	Metric Description
Riders Per Revenue Hour	Total Connections Passenger trips / Total Connection Revenue Hours.	The aggregate average number of Connection customer boardings occurring in each revenue hour.

### Narrative

During the month of December, Riders per revenue hour decreased slightly from 1.49 to 1.45, which is a 0.04 decrease from the previous month. In December, many of the group trips were cancelled due to agencies closing for the holidays, which decreased productivity. The Connection On-Time Performance PT-STAT team continues to look at ways to better group and schedule trips to reduce the number of revenue hours needed while working to increase On Time Performance. In addition, for fiscal year 2018 Palm Tran added an extra decimal place to this metric to be able to observe the fluctuations month to month in detail.

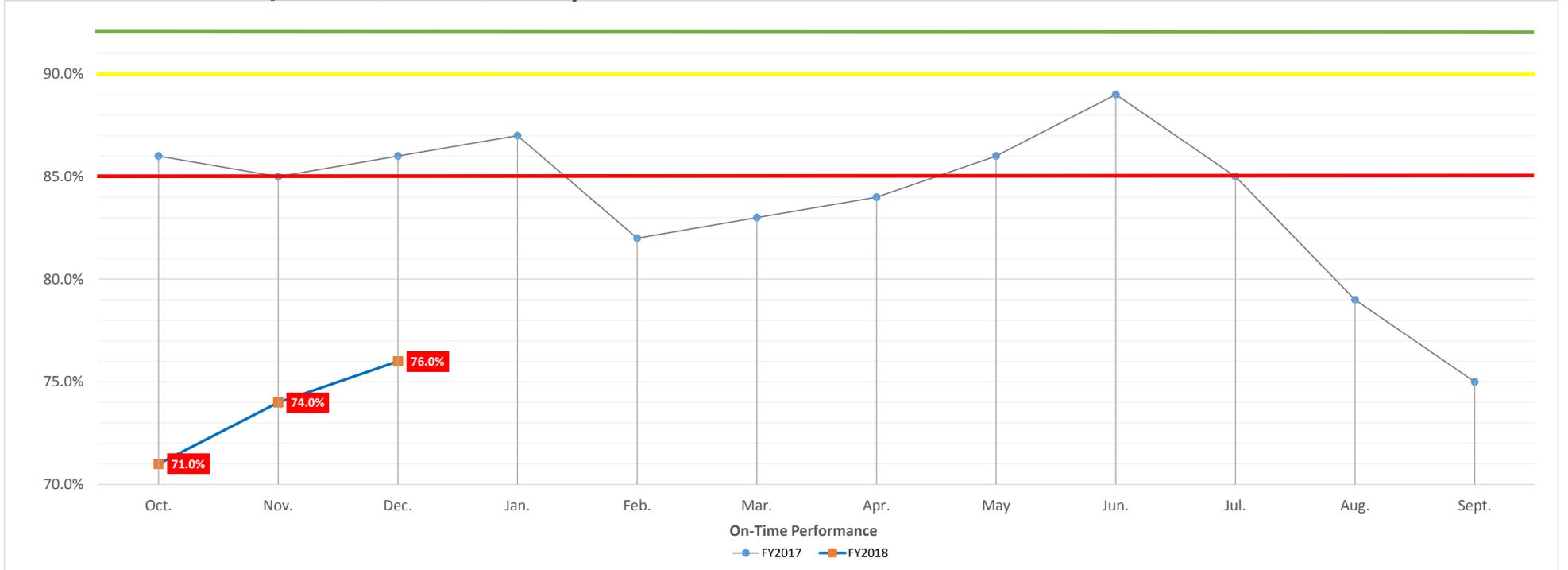


- The Minimum/Maximum has not been met
- The metric is at or above the Minimum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

## CONNECTION - On-Time Performance

Customer Satisfaction	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
On-Time Performance	2017	85%	90%	92%	● 86.0%	● 85.0%	● 86.0%	● 87.0%	● 82.0%	● 83.0%	● 84.0%	● 86.0%	● 89.0%	● 85.0%	● 79.0%	● 75.0%
	2018	85%	90%	92%	● 71.0%	● 74.0%	● 76.0%									



Metric	Metric Calculation	Metric Description
On-Time Performance	Actual pick-up time within +/- 15 minutes of scheduled pick-up time window. Trip is on-time when vehicle arrives to the location within the window.	<b>Former Standard:</b> Pick-up on-time performance was calculated as follows: 15 minutes +/- on either side of the scheduled pick-up window. Drop off on-tims was calculated as follows: the customer must arrive to the drop off location at or prior to their scheduled drop off time. The presented number to the PTSB took the monthly pick-up and monthly drop-off OTP and averaged those number together to present a combined percentage for month OTP. <b>New Standard</b> Beginning October 2016, Palm Tran will track both pick-up OTP and drop-off OTP separately and report the pick-up OTP only, consistent with most of the industry.



### Narrative

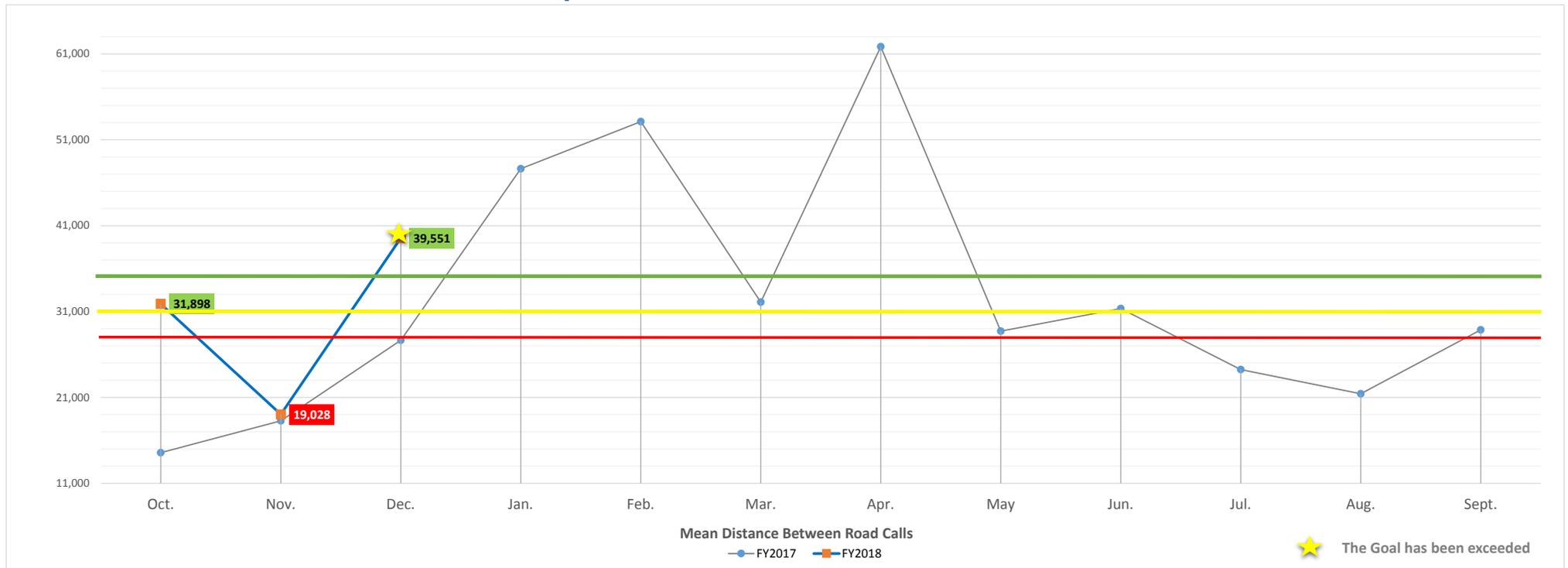
During the month of December, Palm Tran Connection has seen an increase of two (2) percentile points in On-Time Performance over the prior month of November. This is due to the decrease in total completed passenger trips by 4,411 (5.78%) compared to the prior month of November. However, in December, Palm Tran Connection completed less trips compared to the prior year, due to having one less weekday of service than the year before. In addition, this "Christmas Day" fell on a Monday, further reducing ridership. On non-holiday weekdays, Connection's ridership increased by 160 trips per day over the previous month. As Connection was closed on Monday for Christmas, Sunday ridership was unusually high which caused capacity issues that are reflected in an OTP of 57% for that day. Connection had technology issues on December 16th and 18th which lead to low OTP of 66% and 60% respectively. The On-Time Performance PT-STAT team is proposing options for addressing capacity constraints during peak times.

- **The Minimum/Maximum has not been met**
- **The metric is at or above the Minimum but not at the Target**
- **The Target has been met or exceeded**

Palm Tran Performance Management Office

## CONNECTION - Mean Distance Between Road Calls

Customer Satisfaction	FY	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Mean Distance Between Road Calls	2017	11,000	11,800	12,300	●	●	●	●	●	●	●	●	●	●	●	●
	2018	28,000	31,000	35,000	●	●	●									
					14,561	18,283	27,652	47,640	53,122	32,098	61,838	28,727	31,346	24,239	21,418	28,877
					31,898	19,028	39,551									



Metric	Metric Calculation	Metric Description
Mean Distance Between Road Calls	(Total Connection Vehicle Miles) / Connection Major and Minor Mechanical Failures	The average number of miles driven by Connection vehicles before experiencing a mechanical failure.

### Narrative

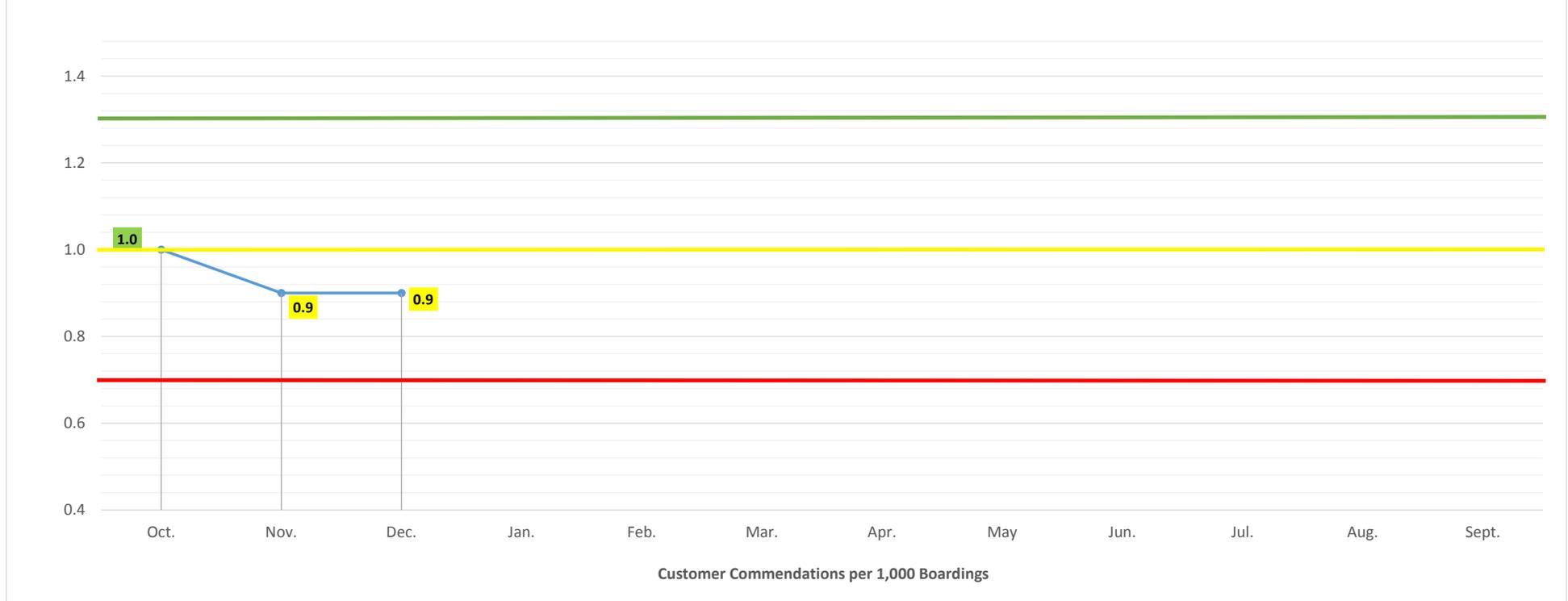
Palm Tran Connection is glad to report a sharp increase of miles between road calls during the month of December which exceeded the established goal. During the month of December, Palm Tran Connection experienced twenty-two (22) Road Calls compared to forty-eight (48) Road Calls for the month of November. This is a reduction of twenty-six (26) Road Calls compared to the prior month of November and is due primarily to a reduction of tire issues from sixteen (16) in November to six (6) in December, and reduction of A/C malfunctions Road Calls. The top Road Calls categories in December were as follows: tire issues, vehicles that would not re-start, and transmission malfunctions. The Connection Safety and Accident Reduction PT-STAT team is evaluating initiatives that could potentially mitigate Road Calls.



- The Minimum/Maximum has not been met
- The metric is at or above the Minimum but not at the Target
- The Target has been met or exceeded

## CONNECTION - Customer Commendations per 1,000 Trips

Customer Satisfaction	Min	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Customer Commendations per 1,000 Trips	0.7	1.0	1.3	● 1.0	● 0.9	● 0.9									



Metric	Metric Calculation	Metric Description
Customer Commendations per 1,000 Boardings	$(\text{Total Connection Commendations} / \text{Total completed passenger trips}) * 1,000$	Customer Commendations per 1,000 riders.

**Narrative**

During the month of December, Palm Tran Connection received fifty-nine (59) commendations compared to sixty-four (64) during the month of November. Although commendations declined slightly, this metric remains at 0.9 for the month of December due to a reduction of completed passenger trips. December customer commendations recognized a higher level of customer service by drivers, reservations staff, dispatch, customer service representatives, and administration staff. The Connection Customer Service PT-STAT team continues to stress the importance of providing superior customer service.

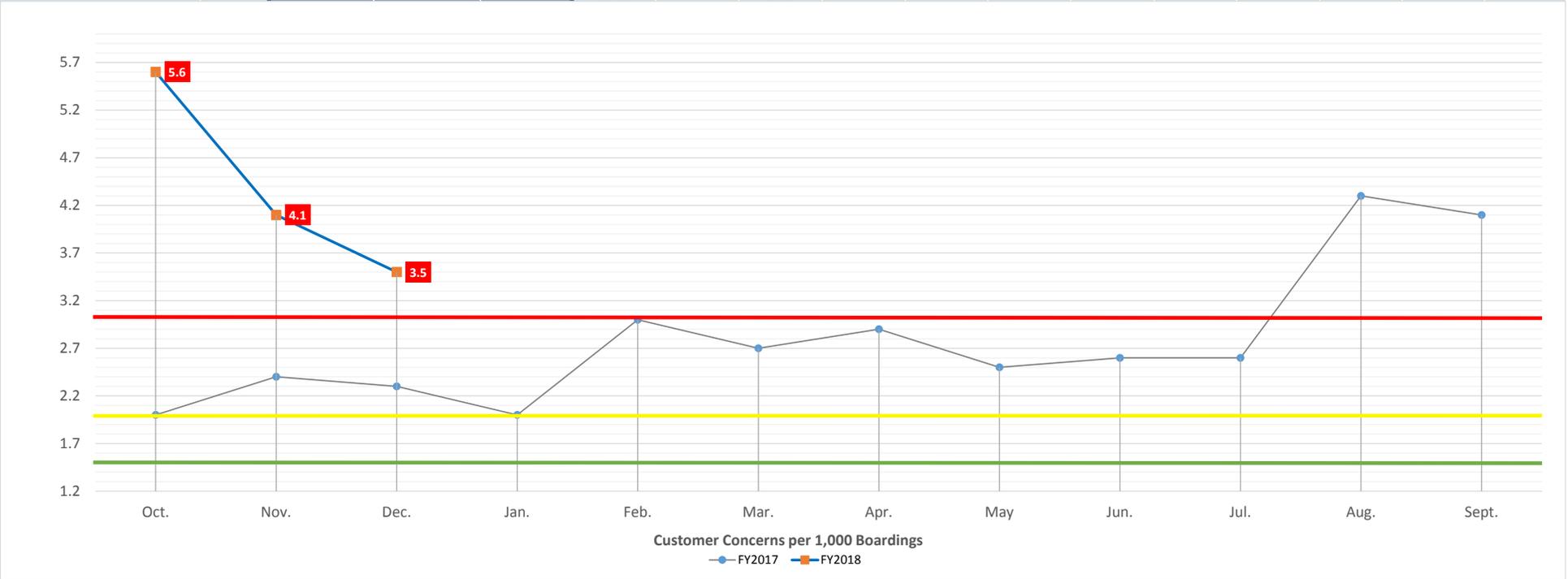


- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office

### CONNECTION - Customer Concerns per 1,000 Trips

Customer Satisfaction	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Customer Concerns per 1,000 Trips	2017	3.0	2.0	1.5	● 2.0	● 2.4	● 2.3	● 2.0	● 3.0	● 2.7	● 2.9	● 2.5	● 2.6	● 2.6	● 4.3	● 4.1
	2018	3.0	2.0	1.5	● 5.6	● 4.1	● 3.5									



Metric	Metric Calculation	Metric Description
Customer Concerns per 1,000 Boardings	$(\text{Total Connection Concerns} / \text{Total Riders}) * 1,000$	Customer concerns per 1,000 riders.

**Narrative**

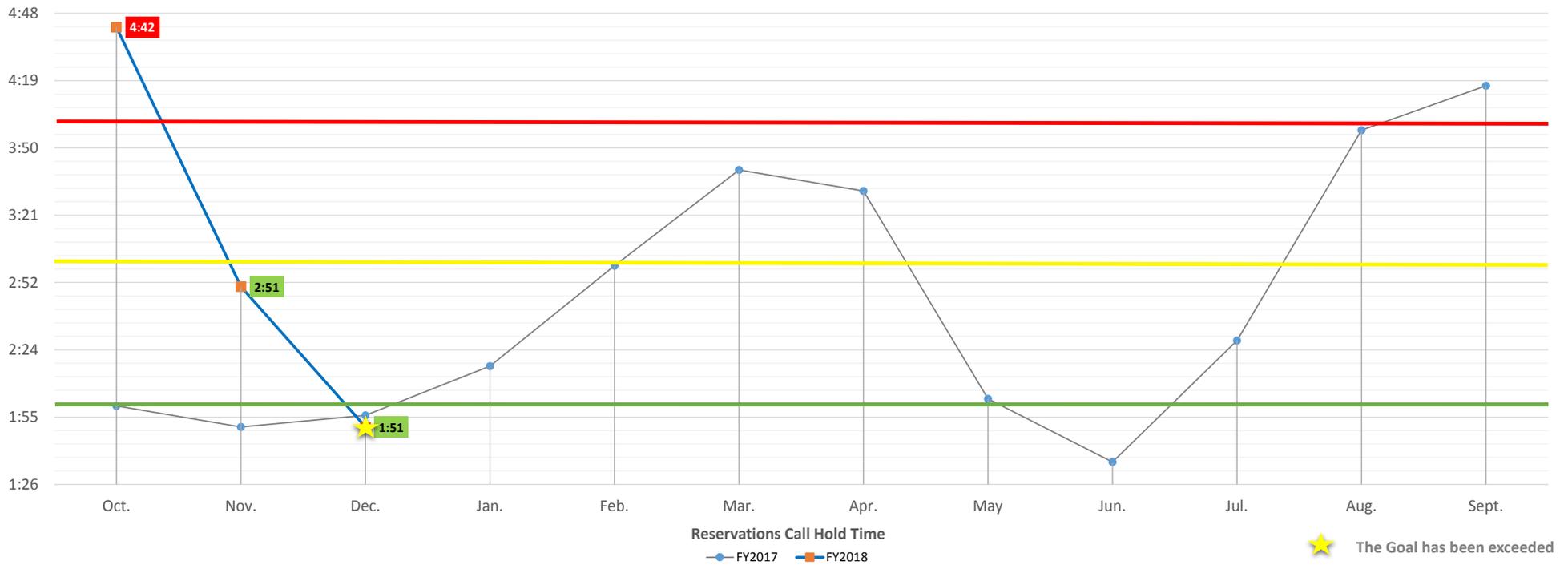
During the month of December, there were 233 complaints filed compared to 282 concerns in November. The majority of the concerns focus on late pick-ups. The dispatch and scheduling team are working together to increase awareness of the driver starting times to mitigate late pick-ups during the day. In addition, the Connection Customer Service PT-STAT team is implementing an initiative to educate customers on being ready and prepared with their fares when drivers arrive to help minimize boarding time.

- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded



## CONNECTION - Reservations Call Hold Time

Customer Satisfaction	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Reservations Call Hold Time	2017	4:00	3:00	2:00	● 2:00	● 1:51	● 1:56	● 2:17	● 3:00	● 3:41	● 3:32	● 2:03	● 1:36	● 2:28	● 3:58	● 4:17
	2018	4:00	3:00	2:00	● 4:42	● 2:51	● 1:51									



Metric	Metric Calculation	Metric Description
Reservations Call Hold Time	Summary of daily average Reservations Hold Times/Number of Operational days for the Month.	Average Reservations Hold Time for the Month. Customer calls related to making reservations.

### Narrative

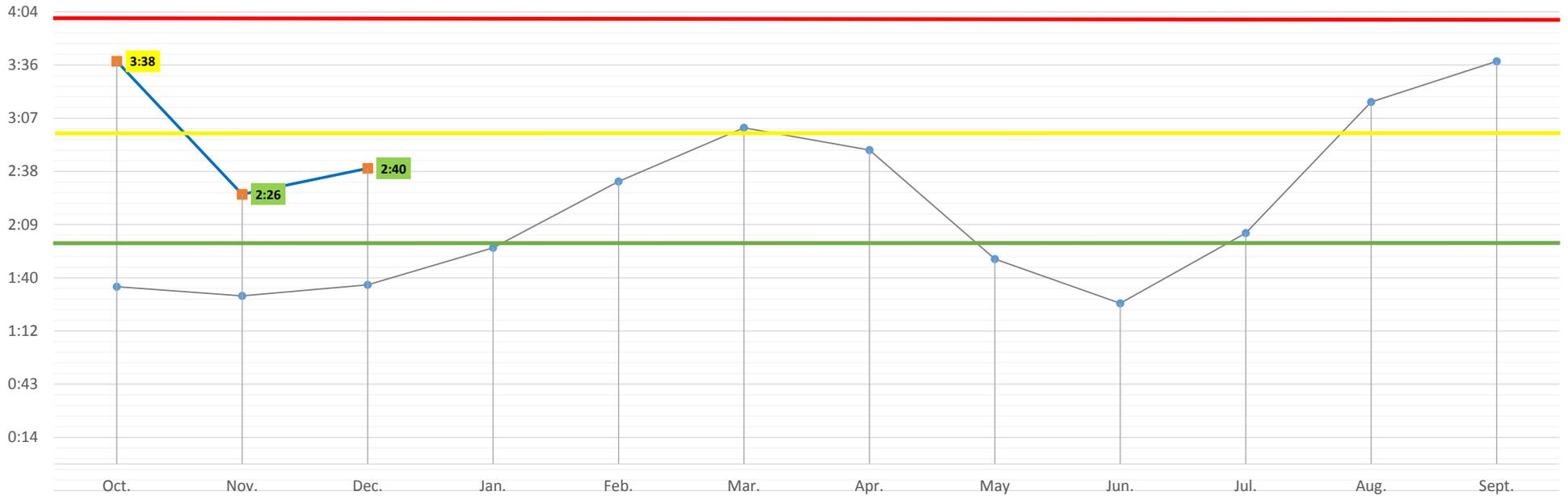
Palm Tran Connection is glad to report that December's reservations hold time decreased 1 minute compared to the prior month of November exceeding this metric goal. This improvement is attributed to the new phone system implemented on November 3rd, which is routing calls more efficiently and continues to improve the customer service experience. Palm Tran Connection will continue to explore opportunities to maximize the new phone system so that hold times continue to improve.

- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded



## CONNECTION - Where Is My Ride Hold Time

Customer Satisfaction	FY	Max	Target	Goal	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.
Where is my ride Hold Time	2017	4:00	3:00	2:00	● 1:36	● 1:31	● 1:37	● 1:57	● 2:33	● 3:02	● 2:50	● 1:51	● 1:27	● 2:05	● 3:16	● 3:38
	2018	4:00	3:00	2:00	● 3:38	● 2:26	● 2:40									



Customer Service Hold Time

● FY2017    ■ FY2018

★ The Goal has been exceeded

Metric	Metric Calculation	Metric Description
Where Is My Ride Hold Time	Summary of daily average Where Is My Ride Hold Times/Number of Operational days for the Month.	Average Where Is My Ride Hold Time for the Month. Customer calls related to the location of their vehicle.

### Narrative

During the month of December "Where Is My Ride" hold time increased by 14 seconds compared to the month of November. The amount of incoming calls for ETAs (estimated time of arrival) have increased due to the decrease in On-Time Performance during this month. In addition, on December 16th and the 18th the Mobil Data Terminals in the vehicles and the phone system experienced an outage for a large majority of the day. This outage contributed to the increase in ETA calls. Nevertheless, this metric continues to exceed the target during the month of December.



- The Minimum/Maximum has not been met
- The metric is at or below the Maximum but not at the Target
- The Target has been met or exceeded

Palm Tran Performance Management Office



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To: FTA Triennial File

From: Planning Department

Date: November 2015

Subject: 5I: Service Standards/Policies (200,000 or more) (Title VI)

RTA's Service Standards and Warrants were included in the 2013 Title VI Program. See sections Service Standards, Service Policies, & Standards For New Service, Demonstration Service And Extensions (pages 20 to 26) and Appendix N Service Standards & Warrants Guidelines (pages 294 to 309) of the report.

## SERVICE STANDARDS

Service standards are resourceful for the planning and operation of a transit agency as it provides the foundation for route design and resource management. RTA recognizes the importance of evaluating its services and has conducted an extensive study on how its own service standards will be used through the use of reports and studies conducted by leading transportation research programs and other transit agencies. Appendix N, includes the full text of the RTA Service Standards & Warrants Guidelines document

Per FTA Circular 4702.1B, the following service standards are required:

### Service Standards and Policies

- Vehicle Load
- Vehicle Headways
- On-Time Performance
- Service Availability

### Vehicle Load

The maximum vehicle loadings refer to the maximum number of passengers per bus, including standees. Depending on the bus, the maximum number of passengers should not exceed 150% of the seating capacity or the legal weight limit of the bus.

Load factors are based on the type of vehicle and service route classification type. The Agency’s fixed route fleet consists of seven types of vehicles each having varying seating and standee limitations. The only service which should not exceed seated capacity is DAR vehicles.<sup>7</sup>

Table 2: Load Factors

Bus Size/Route Classification	Max. Seated Capacity	Max. Standees
40-ft. (NABI)	40	29
32-ft. (Aero Elite)	28	0
30-ft. (Thomas)	27	18
29-ft. (Type VII)	24	7
27-ft. (E-Lo)	21	4
27-ft. (Trolley)	26/27	12/19
24-ft. (Type II)	12	5

<sup>7</sup> Riverside Transit Agency, Service Standards & Warrants Guidelines, 2012

## Vehicle Headways

Headway, also known as frequency, is the maximum interval between each scheduled fixed route bus (i.e. bus travels by a stop every 30 minutes). Headways are essential to the quality of service. Studies such as the 2007 COA have found that higher frequency headways correlate to higher ridership. However, this conventional theory is true if demand is supported by high density. Within the system, current headways range from every 20 minutes to every 120 minutes, depending on the density and demand for service. As services are routed away from urbanized areas, maximum intervals are higher to match ridership demand.

Clock-faced schedules are an attribute of consistent headways and are intervals of 20 minute increments for the purpose of this analysis. The COA study recommended that headways on most routes in urban areas be at intervals of at least 15 minutes. Based on financial and resource constraints, staff finds a closer match for headways to be at intervals of 20/40/60 minutes for Local route service. This means that all route schedules would operate at 20, 40, or 60 minutes. Regional service headways currently expand to every 100 minutes. Clock-face schedules can be a powerful marketing tool as the customer can depend on service coming at specific time intervals. Effort is given to timing transfers based on headway intervals.<sup>7</sup>

Table 3: Headways

Route Class	Freq in 20 min increments	Target
Local - Direct	40/60	40-70
Local - Contract	40/60	60-90
Regional	20/40/60	20-100
Rural	60-120	60-120
Express	Varies	Varies
Trolley/Special	Varies	Varies
BRT	10-15	N/A
Dial-A-Ride	N/A	N/A

## On-Time Performance

On-time performance, also known as schedule adherence reporting, is the deviation of actual arrival and departure time from the timetable or schedule. On-time performance standards vary in the industry depending on the size of the transit operator, generally the larger the size of operations the more stringent the standard (Transit Cooperative Research Program, 1995). Other factors such as density and route distances are also considered in setting an on-time performance standard.

The Agency is considered a medium size operator and requires that no bus shall leave a time point early, and should arrive at a time point no later than six minutes after the scheduled arrival time. This six minute window is appropriate for the Agency’s service area due to the average distance traveled by each route and the combined rural and urban areas.

Transit agencies typically set a standard in percentages of on-time arrivals that they desire to achieve as a measure of good service quality. Among medium size transit systems, the typical desired level of system-wide on-time performance is between 80 to 95%.

One theory in setting standards is to set targets. A desired standard may not be achievable within the first year or so given the starting point of the current conditions. An example is if on-time performance is 62%, achieving a standard of 90% may be difficult within 12 months of operations without significant investment of resources. Setting a target below the standard, such as 80%, would act as a way to benchmark service improvements over the course of a 12 month period. To make gains towards improving on-time performance, agencies establish targets that demonstrate continuous improvements as they work toward standards.<sup>8</sup>

Table 4: On-Time Performance

On-Time Performance Target	
On-Time	0 to 6 minutes
Standard	90%
Target	85%

With the use of Intelligent Transportation System (ITS) software, on-time performance is collected daily and measured monthly for all directly operated routes. Contracted service on-time performance is measured by supervisor surveys randomly completed each week. The average number of observations is 28.5 per day.

Given the two different ways of collecting on-time performance data and blending the two types of operations, a standard of 85% or above is considered achievable. Using the theory of setting targets to reach a goal, the standard of 90% could be set with a first year target of achieving over 85% schedule adherence. Should the on-time performance of a specific route fall below the target of 85%, a schedule adherence analysis will be conducted to improve the running time.<sup>8</sup>

### Service Availability

In the interest of balancing bus service coverage throughout the RTA service area, population density, bus stop spacing, and productivity vs. coverage targets are analyzed cohesively for service availability and efficiency. These service characteristics are included in the Board approved Service Standards & Warrants Guidelines in Appendix N.

### Population Density

The level of service to provide is determined by the number of people to serve in a particular area. Population density can be measured in miles, by zip code, census zone, neighborhoods or

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<sup>8</sup> Riverside Transit Agency, Service Standards & Warrants Guidelines, 2012

any number of logical factors. Typically density is measured in the number of people per square mile since FTA recognizes coverage based on distance from service in miles. Density is determined in two fundamental ways: number people housed per square mile, or the number of employees per square mile. RTA staff works with city and county planners to estimate current and future density to properly plan for future public transportation access.

A typical standard of route design is such that 85% of all residences, places of work, secondary and post-secondary schools, shopping centers, and public facilities in the RTA urban transit service area are within a walking distance of 1,500 feet (ft.) of a bus stop during the daytime Monday through Saturday. In non-urban areas, the walking distance to a bus stop is undefined because environmental and infrastructure conditions vary greatly.

When evaluating the density of an area the demand for service is also considered. Some areas have significant density but have little service demand. Automobile centric and higher income communities are but a few examples of areas that may have sufficient density with little demand for public transit. A population density target along with bus stop spacing criteria is used to measure the level of service availability.

### Bus Stop Spacing

Route coverage refers to the spacing distance between adjoining routes. This criterion is used to guide spacing between bus stops to maximize patron accessibility to transit service within the resources available. Depending on the population density, bus stop spacing in the Agency's urbanized areas usually averages about 1,500 ft. (.28 miles) to 2,500 ft. (.47 miles). As service approaches more suburban and rural areas, bus stop spacing may be limited to locations with accessible curb and gutters and sidewalks suitable for ADA compliance. For express routes that travel longer distances, the number of bus stops will be limited and are located in cities and communities that will attract the greatest number of commuters traveling in the same direction.

Table 5: Bus Stop Spacing

Density Characteristics	Bus Stop Spacing
<b>Very High:</b> Over 5,000 persons per sq. mile (e.g., activity centers such as hospitals, colleges, and universities) Density = >15 units/acre	Every 1/8 mile to ¼ mile
<b>High:</b> 4,000 to 5,000 persons per sq. mile (e.g., apartments, senior housing, offices, and commercial centers) Density = 8-15 units/acre	Every ¼ mile
<b>Medium:</b> 2,000 to 4,000 persons per sq. mile Density = 5-7 units/acre	Every ¼ mile to ½ mile
<b>Low or Rural:</b> Less than 2,000 persons per sq. mile Density = 1-4 units/acre	Every ¼ mile to 1 mile or more if outside development area

Bus stop spacing has an impact on average speed of service. The more stops a bus makes along a route, the lower the average speed of travel.<sup>9</sup>

Productivity vs. Coverage Target

In order to meet productivity requirements while continuing to provide coverage to areas that would not be serviced if performance were the only factor, agencies such as RTA have adopted standards requiring that a percentage of its fixed route service meet productivity factors while other fixed route service operate to provide coverage to meet transit needs. Under this directive, 60% to 80% of fixed route service must attain productivity measures while 20% to 40% of fixed route services operate as coverage routes to meet transit-dependent needs. This productivity vs. coverage initiative enables the Agency to maintain highly productive service and still comply with requirements of the Title VI Civil Rights Act of 1964.

Currently, overall RTA service attains an approximate 60/40 (productive/coverage) ratio, using the productivity measurement of farebox recovery. This is based on an arrangement wherein the more service the Agency operates that maintains or exceeds performance standards, the more effective and efficient those operations become. Service that is productive provides the opportunity for a limited amount of lifeline service to those who need it. Given RTA’s diverse service area, there are places the Agency is obligated to serve, based on the need to provide coverage.

## SERVICE POLICIES

Service policies described below are a means for RTA to further ensure that amenities are being distributed with equality throughout the RTA service area. Per FTA Circular 4702.1B, the following service policies are required:

- Transit Amenities
- Vehicle Assignment

### Transit Amenities

Transit amenities such as bus shelters, benches, kiosks, trash receptacles, and illuminated lighting devices will be distributed equitably throughout the service area based on boarding levels, proximity to major landmarks such as commercial or employment centers, population need (i.e. senior communities), and geographic location.<sup>9</sup>

### Vehicle Assignment

All RTA buses in revenue service are 100% handicap accessible. The fleet consists of heavy and medium duty CNG and conventionally fueled buses used for fixed and commuter express routes. In addition, CNG trolleys are used for circulator routes. All vehicles have air conditioning units, and have either wheelchair ramps or wheelchair lifts. All vehicles are cleaned and maintained as specified in the maintenance and operations Agency guidelines.

Every driver providing directly-operated service for RTA must be familiar with, and able to drive, every bus suitable for service, regardless of age, make, model or manufacturer. Three times a year, drivers request operating preferences (or bids) for the next period's operating assignments, and are assigned by driver seniority. On a daily basis, RTA drivers are randomly assigned a bus by the dispatch office at the Hemet and Riverside yards.

The contract-operated vehicles include medium and light duty vehicles. Contractors are required to dispatch equipment as noted above. Since there are several dispatching offices in the outlying service area, these dispatch facilities, although somewhat smaller-scale than directly-operated services, also randomly assign vehicles.

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<sup>9</sup> Riverside Transit Agency, Service Standards & Warrants Guidelines, 2012

## **STANDARDS FOR NEW SERVICE, DEMONSTRATION SERVICE AND EXTENSIONS**

New services, including entire routes, segments of routes, days of operation, and demonstration projects should adhere to the Agency's *Sustainable Funding Source Policy* approved in September 2010. The policy was created to avoid a predicament when temporary funding sources are used to establish new services and decisions regarding the future of the service are in jeopardy when the temporary funding ends or is depleted.

The goal is for new or expanded service to demonstrate that it is warranted by meeting productivity standards over an established period of time and is supported by market data that indicates the service can become self-sustaining. Such standards include the State's Transportation Development Act (TDA) farebox recovery requirements, RCTC's PIP, and the Agency's Service Standards & Warrants.

The policy states how temporary operating funds may be used for sustaining service and how an analysis of productivity and service standards must be analyzed. See Appendix P for the Sustainable Funding Source Policy.

## **ANALYSIS OF CONSTRUCTION PROJECTS**

RTA has not constructed any new facilities during this Title VI reporting period.

## APPENDIX N

# SERVICE STANDARDS & WARRANTS GUIDELINES

RIVERSIDE TRANSIT AGENCY  
Board of Directors  
Minutes of Meeting No. 2012-6A  
Regular Meeting  
June 28, 2012

**1. CALL TO ORDER**

Chairman Doug McAllister called the regular meeting of the Riverside Transit Agency Board of Directors to order at 2:08 p.m., on Thursday, June 28, 2012, in the Riverside County Board of Supervisors Chambers, 4080 Lemon Street, Riverside, CA.

**2. ROLL CALL**

Present:

1. Don Robinson, City of Banning
2. Jeff Fox, City of Beaumont
3. Ella Zanowic, City of Calimesa
4. Barry Talbot, City of Canyon Lake
5. Ike Bootsma, City of Eastvale
6. Jerry Franchville, City of Hemet
7. Frank Johnston, City of Jurupa Valley
8. Daryl Hickman, City of Lake Elsinore
9. Wallace Edgerton, City of Menifee
10. Jesse Molina, City of Moreno Valley
11. Doug McAllister, City of Murrieta
12. Harvey Sullivan, City of Norco
13. Joanne Evans, City of Perris
14. Andrew Kotyuk, City of San Jacinto
15. Jeff Comerchero, City of Temecula
16. <sup>1</sup>Marsha Swanson, City of Wildomar
17. Bob Buster, County of Riverside, District I
18. <sup>2</sup>Donna Johnston, County of Riverside, District II
19. <sup>3</sup>Ron Roberts, County of Riverside, District III
20. Marion Ashley, County of Riverside, District V

Absent:

1. Jason Scott, City of Corona
2. Andy Melendrez, City of Riverside

**3. FLAG SALUTE**

Director Johnston led the attendees in the flag salute.

Director Franchville arrived at the meeting after the flag salute.

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<sup>1</sup>Alternate for Director Bridgette Moore, City of Wildomar

<sup>2</sup>Alternate for Director John Tavaglione, County of Riverside, District II

<sup>3</sup>Alternate for Director Jeff Stone, County of Riverside, District III

10. **APPROVE THE REVISION OF THE SERVICE STANDARDS AND WARRANTS GUIDELINES FOR EXISTING AND NEW TRANSIT SERVICES**

M/S/C (ZANOWIC/DIRECTORJOHNSTON) as to the following:

- Approve the revision of the Agency's Service Standards and Warrants Guidelines for existing and new transit services as provided.

The motion carried unanimously.

# **SERVICE STANDARDS & WARRANTS GUIDELINES**

Adopted January 2009

Revised June 2012

## I. Purpose

Service standards are resourceful for the planning and operation of a transit agency as it provides the foundation for route design and resource management. The Riverside Transit Agency (Agency) recognizes the importance of evaluating its services and has conducted an extensive study on how its own service standards will be used through the use of reports and studies conducted by leading transportation research programs and other transit agencies.

One of the most prominent transportation research bodies is the Transit Research Board (TRB). The TRB is a leader of transportation research and innovation. It is one of six major divisions of the National Research Council which is a private, nonprofit institution that is the principal operating agency of the National Academies in providing services to the government, the public, and the scientific and engineering communities. Among the many research programs that TRB administers are those funded by the Federal Transit Administration (FTA) such as the Transit Cooperative Research Program (TCRP). FTA provides TCRP approximately \$8 million annually to study operating problems and address them with approaches to help meet the demands placed on public transit systems. The results of this program have produced numerous studies and findings that are highly regarded and used in the transit industry, and are incorporated into the Agency's Service Standards and Warrants Guidelines.

In June 2007, the Board accepted the Comprehensive Operational Analysis (COA) as a guiding document for service enhancements over the course of the next five to ten years. Among the strategies and recommendations included in the COA's Service Improvement Plan are "Service Standards" (Section 4.5). The service standards provided in the COA outline the recommended minimum levels of providing public transit with respect to design characteristics such as route structure, coverage, span of service, and on-time performance.

Since the acceptance of the COA, service has been measured against the standards and was formerly adopted by the Agency's Board in January 2009. The service standards in the COA are based primarily on peer comparisons and stakeholder consultation along with the experiences of professional staff. However, while most standards are applicable others needed to be modified to reflect the demographics and characteristics of western Riverside County.

As the Agency operates transit services within the second largest service area in the nation, it is necessary to have standards and warrants that reflect western Riverside County's demographic and geographic diversity, namely the differences in service levels for Regional, Local, Rural, Express, and Trolley or Special service types which are unique to the region.

Service standards are also used to evaluate numerous requests and proposals for service modifications that are received from a variety of sources including customers, employees, transit professionals, and technical resources. With standards in place, a criterion is used to measure how and when service modifications will take effect. New service warrants are also

necessary for the design and implementation of new routes because it provides a rationale by which new services can be justified.

Service standards and warrants, sometimes known as service design standards and guidelines at other transit agencies, is different and independent of the Riverside County Transportation Commission’s (RCTC) Productivity Improvement Program (PIP). While PIP is an effective tool in the measurement of performance, its primary purpose is to determine financial viability of service.

There are eight measures in the PIP, but there are two performance indicators that are more closely monitored, which are Farebox Recovery and Passengers per Revenue Hour. These are the primary measurements for determining service performance based on the PIP standards. Farebox recovery is the only mandatory target. For the other targets, the Agency must meet or exceed four of the remaining seven to continue receiving Transportation Development Act (TDA) funding as an RCTC requirement.

The mandatory target, farebox recovery, is mandated by the State of California and requires that a transit agency maintain a minimum threshold to continue receipt of Transportation Development Act (TDA) funds. The farebox recovery ratio is a blended percentage based on a requirement for urbanized transit service to maintain a farebox recovery of 20 percent and rural transit service to maintain a farebox recovery of 10 percent. Each PIP target is updated annually with the Agency’s Short Range Transit Plan.

In addition to these factors, service change recommendations are based on analysis inclusive of public comments, ridership data, and operational characteristics.

<b>Productivity Improvement Program</b>	
1. Farebox Recovery Ratio	<i>Mandatory</i>
1. Operating Cost Per Revenue Hour	<i>Meet 4 out of 7</i>
2. Subsidy Per Passenger	
3. Subsidy Per Passenger Mile	
4. Subsidy Per Hour	
5. Subsidy Per Mile	
6. Passengers Per Revenue Hour	
7. Passengers Per Revenue Mile	

## II. Service Standards

There are several factors that are typically considered when objectively measuring service performance. These factors in addition to the PIP help in the determination of whether service is effective at meeting the common needs of the community.

### A. Population Density

The level of service is determined by the number of people to serve in a particular area. Population density can be measured in miles, by zip code, census tract, neighborhoods, or any number of logical factors. Typically density is measured in the number of people per square mile since FTA recognizes coverage based on distance from service in miles. Density is determined in two fundamental ways - number of people housed per square mile or the number of employees per square mile. Agency staff works with city, county, and regional planners to estimate current and future density to properly plan for future public transportation access.

A typical standard of route design is such that 85% of all residences, places of work, secondary and post-secondary schools, shopping centers, and public facilities in the Agency’s urban transit service area are within a walking distance of 1,500 ft. of a bus stop during the daytime Monday through Saturday.

Area	% of Fixed Route	Distance
Urban	85%	1,500-ft
Non-Urban	100%	Undefined

Based on U.S. Census Bureau 2010 decennial census data, western Riverside County is comprised of a highly diverse transit market. However, less than two percent of the 1.7 million service area population comprises the ridership of the Agency. Further, 94.7% percent of the population in RTA’s service area lives within an Urbanized Area, or “UZA.” A large UZA consists of a population over 200,000 and in the Agency’s service area, the greater Riverside and Temecula-Murrieta areas both qualify. All small UZA’s consist of a population between 50,000 and 200,000. The Hemet/San Jacinto area qualifies as a small UZA.

When evaluating the density of an area the demand for service is also considered. Some areas have significant density but have little service demand. Automobile centric and higher income communities are but a few examples of areas that may have sufficient density with little demand for public transit.

## B. Route Classifications

Route classifications help define the type of service to operate based on the density of the area in which the service is routed. The Agency's fixed route services can be classified into five categories – Regional, Local, Rural, Express, and Trolley or Special. Complementary to the fixed route service is paratransit service, also known as Dial-A-Ride (DAR).

- A Regional route service is the backbone of the network as it operates between metropolitan areas on primary corridors and may utilize the freeway system to travel between communities. It is not uncommon for regional service to travel through non-urban areas to link two urban areas. Within a metropolitan area, stops are spaced at urban intervals (based on the ¼ mile walking distance of determining stop locations under section "D. Bus Stop Spacing"), in which these routes serve a secondary purpose of transporting passengers locally.
- Local routes supplement Regional routes by circulating through various neighborhoods and serving secondary corridors. A Local route also serves as feeder routes to Regional and Express routes and transports customers within a community on shorter trips. Bus stop spacing is at urban service intervals.
- An exclusive Rural route serves as lifeline service that feeds regional service. Given the growth of western Riverside County, rural route service is primarily limited to portions of Regional route service and areas between cities.
- Express routes provide limited stop service designed to transport commuters to and from employment sites and provide connections to service outside western Riverside County. Labeled as CommuterLink, these buses use the freeway system to provide faster service.
- Trolley routes or Special service are designed to meet the needs of a specific market or community and often are designed as a circulator to serve a targeted group with common travel patterns.
- DAR paratransit service complements fixed route service for customers who are physically challenged and are unable to navigate their way to a bus stop. DAR service is offered curb to curb within three-quarters of a mile of fixed route service, excluding express routes. DAR service coincides with the hours of fixed route service. Passengers eligible for the service are seniors and those qualified under the Americans with Disabilities Act (ADA) of 1990.

When used effectively route classifications provide the community with a balanced service structure. The following table highlights the classification of each of the Agency's fixed route services:

Directly Operated Routes		Contract Operated Routes	
1	Regional	3	Local
10	Local	7	Local
11	Local	8	Local
12	Local	21 <sup>2</sup>	Local
13	Local	23	Local
14	Regional	24	Local
15	Local	30	Local
16	Local	31 <sup>1</sup>	Rural <sup>1</sup>
18	Local	32	Local
19	Regional	33	Local
20	Regional	35	Regional
21 <sup>2</sup>	Local	40	Local
22	Regional	41 <sup>3</sup>	Regional
27	Regional	42	Local
29	Regional	50	Trolley
41 <sup>3</sup>	Regional	51	Trolley
49	Regional	55	Trolley
54	Local	61	Regional
204	Express	74	Regional
206	Express	79	Regional
208 <sup>3</sup>	Express	202	Express
216	Express	208 <sup>3</sup>	Express
		210	Express
		212	Express
		217	Express

<sup>1</sup> Rural areas are defined as less than 50,000 in population.

<sup>2</sup> Effective September 9, 2012 with the September 2012 service change, Route split between Directly Operated and Contract Operated service based on ridership demand.

<sup>3</sup> Route split between Directly Operated and Contract Operated service based on ridership demand.

### C. Span of Service

The span of service, the hours of operation, refers to the start and end time of a route. Depending on the route structure (e.g. Regional, Local, Rural, Express, Trolley or Special), the span of service will vary depending on the demand in the community. In urbanized areas, bus service is expected to start earlier and end later in the day; whereas, for Local and Rural routes, the demand for earlier and later service may not be present. The days of operation also contribute to when bus service will be provided.

In the Agency’s transit system, all fixed routes are proposed to operate weekdays from at least 7:00 a.m. to 6:00 p.m. and, depending on ridership and land use patterns, can start as early as 4:00 a.m. and stay in service until 10:30 p.m. on weekdays under ideal financial times.

Under the current economic conditions and resources, and to continue to provide customers with adequate service, the revenue service hours for the Agency are described below:

Route Classification	Weekday		Saturday		Sunday	
	Start Range	End Range	Start Range	End Range	Start Range	End Range
Local - Direct	4:30 AM - 6:30 AM	8:00 PM - 10:00 PM	5:30 AM - 7:30 AM	7:00 PM - 9:00 PM	6:30 AM - 8:30 AM	6:00 PM - 8:00 PM
Local - Contract	5:30 AM - 7:30 AM	6:30 PM - 8:30 PM	6:30 AM - 8:30 AM	6:00 PM - 8:00 PM	6:30 AM - 8:30 AM	5:30 PM - 7:30 PM
Regional - Direct	4:00 AM - 6:00 AM	8:30 PM - 10:30 PM	5:00 AM - 7:00 AM	7:30 PM - 9:30 PM	6:00 AM - 8:00 AM	6:30 PM - 8:30 PM
Regional - Contract	5:00 AM - 7:00 AM	7:00 PM - 9:00 PM	6:00 AM - 8:00 AM	6:30 PM - 8:30 PM	6:00 AM - 8:00 AM	6:00 PM - 8:00 PM
Rural	6:00 AM - 8:00 AM	6:00 PM - 8:00 PM	6:00 AM - 8:00 AM	6:00 PM - 8:00 PM	6:00 AM - 8:00 AM	6:00 PM - 8:00 PM
Express <sup>1</sup>	Peak Hours		Route 216 Only		Route 216 Only	
Trolley or Special	Varies based on targeted market or community					
BRT	4:00 AM	10:00 PM	5:00 AM	9:00 PM	5:00 AM	9:00 PM
Dial-A-Ride	Based on hours of fixed-routes, excluding Express services					

<sup>1</sup> Express services mainly operate on weekdays except Route 216 which operates on weekdays, Saturdays, and Sundays

Ridership on weekdays accounts for the majority of boarding activities and is mainly attributed to riders who utilize public transit for employment and educational purposes. On weekends, the hours of service is reduced as demand is lower resulting from most people having a traditional weekday work and school schedule.

Express routes mainly operate weekdays during peak hours in the morning and evening to accommodate commuters. The hours of operation are adjusted based on peak direction commute patterns to meet commuter trains and regional employment and education centers start and end times. Ridership can necessitate modifications to the peak hours in order to accommodate additional service demand, such as seasonal weekday and weekend trips or overflow capacities.

Trolley or Special routes operate based on the customer market base, whether it is aimed at transporting commuters or students and its days of operation may also vary depending on whether the demand for service is seasonal.

DAR paratransit service coincides with the hours of fixed route service.

#### D. Bus Stop Spacing

Route coverage refers to the spacing distance between adjoining routes. This criterion is used to guide spacing between bus stops to maximize patron accessibility to transit service within the resources available. Depending on the population density, bus stop spacing in the Agency’s urbanized areas usually averages about 1,500 ft. (.28 miles) to 2,500 ft. (.47 miles). As service approaches more suburban and rural areas, bus stop spacing may be limited to locations with accessible curb and gutters and sidewalks suitable for ADA compliance. For Express routes that travel longer distances, the number of bus stops will be limited and are located in cities and communities that will attract the greatest number of commuters traveling in the same direction.

Density Characteristics	Bus Stop Spacing
<b>Very High:</b> Over 5,000 persons per sq. mile (e.g., activity centers such as hospitals, colleges, and universities) Density = >15 units/acre	Every 1/8 mile to 1/4 mile
<b>High:</b> 4,000 to 5,000 persons per sq. mile (e.g., apartments, senior housing, offices, and commercial centers) Density = 8-15 units/acre	Every 1/4 mile
<b>Medium:</b> 2,000 to 4,000 persons per sq. mile Density = 5-7 units/acre	Every 1/4 mile to 1/2 mile
<b>Low or Rural:</b> Less than 2,000 persons per sq. mile Density = 1-4 units/acre	Every 1/4 mile to 1 mile or more if outside development area

Bus stop spacing has an impact on average speed of service. The more stops a bus makes along a route, the lower the average speed of travel.

#### E. On-Time Performance

On-time performance, also known as schedule adherence reporting, is the deviation of actual arrival and departure time from the timetable or schedule. On-time performance standards vary in the industry depending on the size of the transit operator, generally the larger the size of operations the more stringent the standard (TCRP, 1995). Other factors such as density and route distances are also considered in setting an on-time standard.

The Agency is considered a medium size operator and requires that no bus shall leave a time point early, and should arrive at a time point no later than 6 minutes after the scheduled arrival time. This 6 minute window is appropriate for the Agency’s service area due to the average distance traveled by each route and the combined rural and urban areas.

Transit agencies typically set a standard in percentages of on-time arrivals that they desire to achieve as a measure of good service quality. Among medium size transit systems, the typical desired level of system-wide on-time performance is between 80 to 95 percent.

One theory in setting standards is to set targets. A desired standard may not be achievable within the first year or so given the starting point of the current conditions. An example is if on-time performance is 62 percent, achieving a standard of 90 percent may be difficult within 12 months of operations without significant investment of resources. Setting a target below the standard, such as 80 percent, would act as a way to benchmark service improvements over the course of a 12 month period. To make gains towards improving on-time performance, agencies establish targets that demonstrate continuous improvements as they work toward standards.

On-Time Performance Target	
On-Time	0 to 6 minutes
Standard	90%
Target	85%

With the use of ITS software, on-time performance is collected daily and measured monthly for all directly operated routes. Contracted service on-time performance is measured by supervisor surveys randomly completed each week. The average number of observations is 28.5 per day.

Given the two different ways of collecting on-time performance data and blending the two types of operations, a standard of 85 percent or above is considered achievable. Using the theory of setting targets to reach a goal, the standard of 90 percent could be set with a first year target of achieving over 85 percent schedule adherence. Should the on-time performance of a specific route fall below the target of 85%, a schedule adherence analysis will be conducted to improve the running time.

**F. Headways**

Headway, also known as frequency, is the maximum interval between each scheduled fixed route bus (i.e. bus travels every 30 minutes). Headways are essential to the quality of service. Studies such as the COA have found that higher frequency headways correlate to higher ridership. However, this conventional theory is true if demand is supported by high density. Within the system, current headways range from every 20

minutes to every 120 minutes, depending on the density and demand for service. As services are routed away from urbanized areas, maximum intervals are higher to match ridership demand.

Clock-face schedules are an attribute of consistent headways and are intervals of 20 minute increments for the purpose of this analysis. The COA study recommended that headways on most routes in urban areas be at intervals of at least 15 minutes. Based on financial and resource constraints, staff finds a closer match for headways to be at intervals of 20/40/60 minutes for Local route service. This means that all route schedules would operate at 20, 40, or 60 minutes. Regional service headways currently expand to every 100 minutes. Clock-face schedules can be a powerful marketing tool as the customer can depend on service coming at specific time intervals. Effort is given to timing transfers based on headway intervals.

Route Class	Freq in 20 min increments	Target
Local - Direct	40/60	40-70
Local - Contract	40/60	60-90
Regional	20/40/60	20-100
Rural	60-120	60-120
Express	Varies	Varies
Trolley/Special	Varies	Varies
BRT	10-15	N/A
Dial-A-Ride	N/A	N/A

**G. Transfer Wait Time**

Transfer wait time is the time a customer has to wait for another bus route to arrive at a transfer point. The COA proposed that at timed transfer points, buses should be scheduled so that the wait time is not longer than 5 minutes for arriving buses or Metrolink trains. However, to more closely match the geographic and demographic demands of the system, timed transfers can vary depending on the distance and frequency of a route.

In more urbanized areas such as downtown Riverside, transfer wait times will not be longer than approximately 20 minutes. However, in smaller urbanized and even in rural areas, the transfer wait time can reach 30 to 45 minutes depending on the frequencies of the routes in the area.

For a Regional route, the Agency expects that transfer wait times should not exceed 20 minutes. For Local and Rural routes, transfer wait times should not exceed 30 to 45 minutes. For an Express route, which is usually timed to train transfers, transfer wait time should not exceed 20 to 30 minutes.

**H. Load Factor**

The maximum vehicle loadings refer to the maximum number of passengers per bus, including standees. Depending on the bus, the maximum number of passengers should not exceed 150% of the seating capacity or the legal weight limit of the bus.

Load factors are based on the type of vehicle and service route classification type. The Agency’s fixed route fleet consists of seven types of vehicles each having varying seating and standee limitations. The only service which should not exceed seated capacity is DAR vehicles.

Bus Size/Route Classification	Max. Seated Capacity	Max. Standees
40-ft. (NABI)	40	29
32-ft. (Aero Elite)	28	0
30-ft. (Thomas)	27	18
29-ft. (Type VII)	24	7
27-ft. (E-Lo)	21	4
27-ft. (Trolley)	26/27	12/19
24-ft. (Type II)	12	5

**III. Distribution of Transit Amenities**

Transit amenities such as shelters, benches, kiosks, trash receptacles, and illuminated lighting devices will be distributed equitably throughout the service area based on boarding levels, proximity to major landmarks such as commercial or employment centers, population need (i.e. senior communities), and geographic location.

**IV. Productivity vs. Coverage Target**

To help improve effectiveness and efficiency it is prudent to set a target for the productivity level of service to operate. In order to meet productivity requirements while continuing to provide coverage to areas that would not be serviced if performance were the only factor, peer agencies have adopted standards requiring 60 to 80 percent of their fixed route service to perform up to productivity factors and 20 to 40 percent of fixed route service operated as coverage routes to meet the standards. Currently overall Agency service is about 50/50 (productive/coverage). The service that exceeds performance standards enables the Agency to provide more effective and efficient operations in areas of need that do not meet performance standards.

Given the Agency’s diverse service area, there are places that are being served based on the need to provide coverage. To maximize cost efficiency, a higher percentage of service should

be designed to improve productivity and a smaller percentage of service designed based on coverage. With a greater percentage of service being productive, this allows the Agency the flexibility to sustain service based on coverage. The approved criterion for all new and existing service is 60 percent to be productive and 40 percent to be based on coverage. This establishes the benchmark for productive service to meet mandatory farebox recovery. However, it also allows for new service to be implemented following TDA guidelines for exemption of inclusion and exclusion based on performance standards within the year the service was implemented and the following two fiscal years.

This objective enables transit operators to maintain highly productive service and still meet the requirements of the Title VI Civil Rights Act of 1964 (Title VI). It is the policy of the Agency to ensure compliance with Title VI so that no person shall be excluded from participation in, denied the benefits of or be subjected to discrimination on the basis of race, color or national origin under any program or activity receiving federal financial assistance.

## **V. New Service Warrants**

The service standards described herein are used as a measurement for the implementation and performance monitoring of existing and new services. PIP targets are updated annually and new service can be exempted from meeting the required criteria for up to two years. The performance of new service is evaluated during this initial period on whether or not it meets the Productivity or Coverage target. If a route fails to perform up to standards, it may be discontinued.

New services should adhere to the Agency's Sustainable Funding Source Policy approved in September 2010. The enactment of the policy provides a framework which assures that funding sources, particularly temporary financial assistance or "seed" money are utilized only on service that has a significant potential to be productive and financially sustainable when funding expires or is depleted. This encourages the use of new or expanded service to demonstrate that it is warranted by meeting productivity standards over an established period of time.

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## Policies and Procedures

No. 42

Board Approval: 9/15/16

### SUBJECT:

TRANSIT SERVICE EVALUATION AND ADJUSTMENT

### PURPOSE:

To establish:

- (1) a process for evaluating and adjusting existing transit services to improve performance; and
- (2) procedures for implementing service changes.

### BACKGROUND:

On June 23, 2005, the MTS Board of Directors approved the following vision for MTS services.

#### A Vision for MTS Services

- Develop a **Customer-Focused** System: Provide services that reflect the travel needs and priorities of our customers.
- Develop a **Competitive** System: Provide services that are competitive with other travel options by meeting market segment expectations.
- Develop an **Integrated** System: Develop transit services as part of an integrated network rather than a collection of individual routes.
- Develop a **Sustainable** System: Provide appropriate types and levels of service that are consistent with market demands and are maintainable under current financial conditions.



This policy establishes a process for evaluating existing transit services based on these vision statements. In addition, the policy outlines procedures for implementing minor and major service adjustments.

## POLICY:

### 42.1 Categories of Transit Service

To ensure that transit services are evaluated against other similar services, routes are designated into eight service categories based on route characteristics. These categories include: Premium Express, Express, Light Rail, Urban Frequent, Urban Standard, Circulator, Rural, and Demand-Responsive, as defined below. These categories also ensure that fares are consistent with the type and characteristics of the service. Attachment A specifies the services within each category.

#### ***Fixed-Route Services***

Premium Express – High-speed, point-to-point service geared towards commute markets. Service provided during weekday peak periods only and scheduled to meet primary work shift times. May use over-the-road coaches for maximum comfort and highway operations.

Express – High-speed service geared toward linking major subregional residential, employment, and activity centers. Service is generally provided throughout the weekday and possibly on weekends. Operates primarily on highways and major arterials.

Light Rail – High-frequency service (15 minutes or better during the base weekday) operating on exclusive railroad right-of-way. Serves multiple trip purposes and generally experiences high turnover along the line.

Rapid – High-frequency bus service (15 minutes or better during the base weekday) operating in a combination of HOV lanes, mixed-traffic lanes, and/or exclusive right-of-way. Serves multiple trip purposes and generally experiences high turnover along the line. Offers Traffic Signal Priority, enhanced station stops, and “Rapid” or other distinct branding. Service is subsidized by TransNet.

Urban Frequent – High-frequency service (15 minutes or better during the base weekday) primarily operated along major arterials in denser urban areas. Serves multiple trip purposes and generally experiences high turnover along the route. May be operated as regular (all stops) or limited (stopping only at major transfer points and activity centers).

Urban Standard – Basic transit service with base weekday frequencies generally between 30 and 60 minutes. Operates in less dense urban and suburban areas. Serves multiple trip purposes and provides access to all stops.

Circulator – Neighborhood feeder/distributor to transfer stations or shuttle service to local destinations. Operates on arterials and local streets to provide access to residences, businesses, activity, and transfer centers.

**Figure 1**  
**Characteristics of Fixed-Route Services**

	Trip Distance	Speed	Stop Spacing	Streamlined Routing	Fares
	<i>Longer</i>	<i>Faster</i>	<i>Greater</i>	<i>More</i>	<i>Higher</i>
Premium Express	↑	↑	↑	↑	↑
Express	↑	↑	↑	↑	↑
Light Rail	↑	↑	↑	↑	↑
Rapid Bus	↑	↑	↑	↑	↑
Urban Frequent	↓	↓	↓	↓	↓
Urban Standard	↓	↓	↓	↓	↓
Circulator	↓	↓	↓	↓	↓
	<i>Shorter</i>	<i>Slower</i>	<i>Lesser</i>	<i>Less</i>	<i>Lower</i>

***Specialized Services***

Rural – Lifeline service that provides a link between rural communities and the San Diego urban core. Very limited service levels; generally a few round-trips operating a few days per week given limited demand.

Demand-Responsive - Paratransit services that complement fixed-route services in accordance with the Americans with Disabilities Act (ADA), as well as services that provide transit access to areas difficult to serve by conventional fixed-routes (e.g., due to terrain, discontinuous street patterns, and extremely low densities).

42.2 Performance Indicators

The following performance indicators, summarized in Figure 2, ensure that the service evaluation is consistent with the vision statements established for MTS services.

**Figure 2  
Transit Service Performance Indicators**

CUSTOMER FOCUSED / COMPETITIVE						INTEGRATED			SUSTAINABLE										
PRODUCTIVITY			QUALITY			CONNECTIVITY			RESOURCES			EFFICIENCY							
Total Passengers	Average Weekday Passengers	Passengers/Revenue Hour	<b>Passengers/In Service Hour</b>	Passenger Load Factor	On-Time Performance	Mean Distance between Failures	Accidents/100,000 Miles	Comments/100,000 Passengers	Route Headway	Span of Service Consistency	Service Availability	In-Service Miles	In-Service Hours	Peak Vehicle Requirement	In-Service Speeds	In-Service/Total Miles	In-Service/Total Hours	Farebox Recovery Ratio	<b>Subsidy/Passenger</b>

**Bold** – Key indicators used for ranking route performance.

**Total Passengers** – Total number of unlinked boardings.

**Average Weekday Passengers** – Average of weekday unlinked boardings excluding abnormal weekday boardings due to unusual circumstances, such as inclement weather, special events, and other unusual impacts to daily ridership levels.

**Passengers per Revenue Hour** – Total number of unlinked boardings divided by the sum of in-service and layover (including recovery) hours. Does not include pull and deadhead hours. Consistent with National Transit Database (NTD) definitions, this indicator is generally used to compare the productivity of MTS services with other agencies.

**Passengers per In Service Hour** – Total number of unlinked boardings divided by in-service hours. Does not include layover, recovery, pull, and deadhead hours. This indicator is a more accurate measure of service performance because it only includes scheduled hours available for loading, unloading, and transporting passengers.

**Passenger Load Factor** – Percent of trips exceeding the passenger load target.

**On-Time Performance** – Percent of service that is within zero minutes zero seconds (00m:00s) early and four minutes fifty nine seconds (04m:59s) late.

**Mean Distance between Failures** – Average distance (measured in total miles) between major mechanical failures.

**Accidents per 100,000 Miles** – Average number of collision accidents (preventable and nonpreventable) for every 100,000 miles operated (measured in total miles).

**Comments per 100,000 Passengers** – Average number of passenger comments for every 100,000 unlinked boardings.

**Route Headway** – Base weekday frequency of route.

**Span of Service Consistency** – Indication of consistency in service span for route groups that experience high levels of transfers between the services.

**Service Availability** – A general measure of the geographic distribution of service within the MTS service area.

**In Service Miles** – Scheduled miles of service available for loading, unloading, and transporting passengers (measured as scheduled miles between departure from the first stop and arrival to the last stop of a trip).

**In-Service Hours** – Scheduled hours of service available for loading, unloading, and transporting passengers (measured as scheduled hours between departure from the first stop and arrival to the last stop of a trip).

**Peak Vehicle Requirement** – Maximum number of vehicles available to provide scheduled service during the heaviest service period of the week.

**In-Service Speed** – Average scheduled speed of transit service between departure from the first stop and arrival to the last stop of a trip.

**In-Service Miles/Total Miles** – Percent of total miles operated that are attributed to service available for loading, unloading, and transporting passengers.

**In-Service Hours/Total Hours** – Percent of total hours operated that are attributed to service available for loading, unloading, and transporting passengers.

**Farebox Recovery Ratio** – Percent of total operating cost recovered through fare revenue.

**Subsidy/Passenger** – The amount of public subsidy required to provide service for each unlinked boarding (measured as total operating cost minus fare revenue divided by total passengers).

### 42.3 Performance Targets

Performance targets represent aggressive yet realistic service expectations based on service design, route characteristics, and operating environments. In addition to setting service expectations, targets are also used to flag and evaluate negative impacts that may occur when balancing an improvement in one aspect of performance at the expense of another aspect. Therefore, using targets ensures that service is designed to achieve the overall goals of the system through a balanced approach.

To ensure that targets are stable, yet reflect changes to market and operating conditions, they will be reviewed and adjusted, if needed, on a three-year basis. In addition to evaluating performance indicators against their targets, tracking the performance trend of each indicator will help ensure that no aspect of performance is unduly impacted over time as a result of overemphasizing other performance priorities. Attachment B presents the performance targets for each indicator.

### 42.4 Performance-Monitoring Process

**Annual Service Evaluation** - The MTS operating budget is adopted annually by the Board of Directors prior to the start of the fiscal year (July 1). This budget is developed around initial assumptions of service levels to be provided in the upcoming year, including anticipated service changes as well as expected performance in achieving the vision for MTS services.

The annual service evaluation will be conducted at the conclusion of each fiscal year to compare actual performance of the system with the targets outlined in Attachment B and to identify opportunities for adjustments and improvements based on this analysis.

Key indicators for flagging low-performing routes are passengers per revenue hour and subsidy per passenger. Routes on the bottom quartile of each route group for both of these indicators will be identified for further analysis on a segment basis (temporal and geographic) as well as closer look at other aspects of the route's performance.

**Service Change Evaluation** – The triannual service evaluation will be conducted at the conclusion of each regularly scheduled service change period. This evaluation will present initial results of service changes and provide an early indication of significant trends. The analysis also provides a basis for tracking the progress of performance throughout the year.

Attachment B identifies the key performance indicators that will be used for analysis during the triannual and annual service evaluations.

## 42.5 Service Changes

Changes to MTS bus and trolley services are implemented three times a year in the fall, winter, and summer. These regularly scheduled service changes provide an opportunity to: (1) improve the routing, operation, and schedules of the transit system consistent with service evaluation and customer comments, (2) implement changes as a result of service plans, including the implementation of new services, (3) optimize service according to the MTS service vision, and (4) adjust service levels according to budget constraints. Service changes can be classified into minor and major changes.

42.5a Minor Service Changes. Minor service changes generally include schedule adjustments for routes that are chronically late or to improve scheduling efficiencies or trip-level adjustments to address overcrowding and productivity improvements. Minor service changes can also include slight routing adjustments to serve a new trip generator, eliminate unproductive segments, or to streamline and optimize service.

Since minor service changes address service maintenance issues, it is important that they are implemented expeditiously. To streamline the process, these changes should not result in a significant impact to ridership. To ensure that impacts are minimized, minor service changes will not represent more than a 25 percent change in a route's weekly in-service miles or hours. Therefore, no action will be required of the MTS Board for approval and implementation of these changes, unless a Title VI report requires Board action as specified in Section 42.6.

42.5b Major Service Changes. Major service changes represent a change that is greater than 25 percent of a route's weekly in-service miles or hours. These changes are generally a result of in-depth research and analyses to address a significant change in a route's demand, operating environment, or performance. Changes may include significant route realignment, changes in scheduled headways, or subarea restructuring.

Although these changes are strategically designed to maximize public benefit and minimize negative impacts, they often result in tradeoffs or reduction in benefits for some riders. Due to the significance and potential negative impacts, approval of these changes is contingent on a properly noticed public hearing.

42.5c New Service Implementation. All new services will be implemented on a trial basis for one year. New service can include new routes, increased frequency during a significant part of the service day, new days of operation, or a significant route extension. These services should perform to equal or better than the system average for passenger per revenue hour and subsidy per passenger within the first year of operation. For a new service to be continued beyond 12 months, a Title VI analysis must be completed and presented to the MTS Board of Directors, which must take action to approve the new service as regular service.

## 42.6 Title VI

MTS is committed to ensuring that no person is excluded from participation in, or denied the benefits of its services on the basis of race, color, or national origin as protected by Title VI of the Civil Rights Act of 1964, as amended. This includes the planning and scheduling of routes and services.

42.6a Analysis: Except as provided in Section 42.5c, any of the following changes would require that a Title VI analysis be presented to the MTS Board of Directors before a final implementation decision is made:

- A change that is greater than 25 percent of a route's weekly in-service miles or hours.
- An increase or reduction in the average weekly span-of service of more than 25 percent.
- The implementation of a new route or the discontinuation of an existing route.
- A routing change that affects more than 25% of a route's Directional Route Miles and more than 25% of the route's bus stops.

42.6b Disparate Impacts and Disproportionate Burdens: MTS' Title VI analysis for a Major Service Change will include a determination of whether or not disparate impacts to minority populations or disproportionate burdens to low-income populations would result from the change.

- A disparate impact is found when there is a difference in adverse effects between minority and non-minority populations such that: the adversely affected population is 10 percent or greater minority by percentage of total population than the total MTS service area average; or, the benefitting population is 10 percent or more non-minority (by percentage of total MTS service area population) than the total MTS service area average. *For example, if the total MTS service area average is 55% minority, then a proposed service change that adversely affects a population that is 65% minority or greater would be defined as a disparate impact.* If MTS chooses to implement a proposed major service change despite a finding of a disparate impact, MTS may only do so if there is a substantial justification for the change, and there are no alternatives that would have a less disparate impact and still accomplish the goals of the change.
- A disproportionate burden is found when there is a difference in adverse effects between low-income and non-low-income populations such that: the adversely affected population is 10 percent or more "low-income" (by percentage of total MTS service area population) than the total MTS service area average; or, the benefitting population is 10 percent or greater "non-low-income" by percentage of total population than the total MTS service area average. *For example, if the total MTS service area average is 20% "low-income," then a proposed service*

*change that benefits a population that is 90% or greater “non-low-income” would be defined as a disproportionate burden.* If MTS chooses to implement a proposed change despite a finding of disproportionate burden, MTS may only do so if steps are taken to avoid or minimize impacts where practicable, and MTS provides a description of alternatives available to affected low-income populations.

42.6c Complaints: Persons alleging violations of Title VI by MTS would follow the procedures outlined in MTS Policy No. 48.

- Attachments: A. Service Categories  
B. FY 2016 – FY 2020 Performance Targets

Original Policy Accepted on 4/8/93.  
Policy Revised on 12/8/94.  
Policy Repealed and Readopted on 1/13/00.  
Policy Revised on 10/26/00.  
Policy Revised on 12/14/00.  
Policy Revised on 4/25/02.  
Policy Revised on 4/29/04.  
Policy Revised on 6/14/07.  
Policy Revised on 9/20/12.  
Policy Revised on 6/20/13.  
Policy Revised on 9/15/16.

**Attachment A**  
**Service Categories/Modes & Service Standards**

<b>Category/Mode</b>	<b>Routes</b> (subject to change)	<b>On-Time Performance Standard</b>	<b>Headway Standard (base wkdy)</b>	<b>Vehicle Load Factor (Standard = No more than 20% of trips exceed factor)</b>
<b>Premium Express</b> – High-speed, point-to-point service geared toward commute markets. Service provided during weekday peak periods only and scheduled to meet primary work shift times. May use over-the-road coaches for maximum comfort and highway operations.	280, 290	90%	30 min.	1.0
<b>Express</b> – High-speed service geared toward linking major subregional residential, employment, and activity centers. Service is generally provided throughout the weekday and possibly on weekends. Operates primarily on highways and major arterials.	20, 50, 60, 110, 150, , 870, 950	90%	30 min.	1.5*
<b>Light Rail</b> – High-frequency service operating on exclusive railroad right-of-way. Serves multiple-trip purposes and generally experiences high turnover along the line.	Blue Line, Orange Line, Green Line, Silver Line	90%	15 min.	3.0
<b>Rapid</b> – High-frequency service primarily operated along major arterials in denser urban areas. Serves multiple-trip purposes and generally experiences high turnover along the route. May be operated as regular (all stops) or limited (stopping only at major transfer points and activity centers).	201/202, 204, 215, 235, 237, 225 (future South Bay Rapid 225)	85%	15 min.	1.5*
<b>Urban Frequent</b> – High-frequency service primarily operated along major arterials in denser urban areas. Serves multiple-trip purposes and generally experiences high turnover along the route. May be operated as regular (all stops) or limited (stopping only at major transfer points and activity centers).	1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 13, 30, 41, 44, 120, 701, 709, 712, 901, 906/907, 929, 932, 933/934, 955, 961, 992	85%	15 min.	1.5*

<p><b>Urban Standard</b> – Basic transit service along major arterials throughout the MTS service area. Operates in less dense urban and suburban areas. Serves multiple-trip purposes and provides access to all stops.</p>	<p>4, 27, 28, 31, 35, 105, 115, 703, 704, 705, 707, 815, 816, 832, 833, 834, 848, 854, 855, 856, 864, 871/872, 874/875, 904, 905, 916/917, 921, 923, 928, 936, 944, 945, 962, 963, 967, 968</p>	<p>90%</p>	<p>30 min.</p>	<p>1.5*</p>
<p><b>Circulator</b> – Neighborhood feeder/distributor to transfer stations or shuttle service to local destinations. Operates on arterials and local streets to provide access to residences, businesses, activity, and transfer centers.</p>	<p>14, 18, 25, 83, 84, 88, 851, 964, 965, 972, 973, 978, 979</p>	<p>90%</p>	<p>60 min.</p>	<p>1.5*</p>
<p><b>Rural</b> – Lifeline service that provides a link between rural communities and the San Diego urban core. Very limited service levels; generally a few round-trips operating a few days per week given limited demand.</p>	<p>888, 891, 892, 894</p>	<p>No specific goal</p>	<p>No specific goal</p>	<p>No specific goal</p>
<p><b>Demand-Responsive</b> - Paratransit services that complement fixed-route services in accordance with the Americans with Disabilities Act (ADA) as well as services that provide transit access to areas difficult to serve by conventional fixed-routes (e.g., due to terrain, discontinuous street patterns, and extremely low densities).</p>	<p>MTS Access (ADA Paratransit)</p>	<p>No specific goal</p>	<p>n/a</p>	<p>No specific goal</p>

\*Load standard is 1.0 for routes operated with a minibus

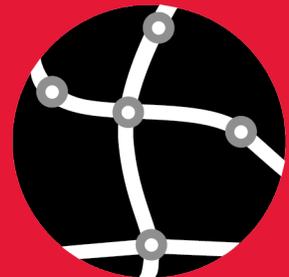
**Attachment B  
FY 2016 – FY 2020 Performance Targets**

		Performance Indicator	Level of Analysis	Freq	Target
CUSTOMER FOCUSED/COMPETITIVE	PRODUCTIVITY	Total Passengers	Sys, Cat, Rt	A,Q	<ul style="list-style-type: none"> <li>Year-over-year improvement by route, category, and system</li> </ul>
		Average Weekday Passengers	Sys, Cat, Rt	A, Q	<ul style="list-style-type: none"> <li>Year-over-year improvement by route, category, and system</li> </ul>
		Passengers/Revenue Hour	Sys, Cat, Rt	A, Q	<ul style="list-style-type: none"> <li>Improve route category average</li> </ul>
		Passengers/In-Service Hour	Sys, Cat, Rt	A, Q	<ul style="list-style-type: none"> <li>Improve route category average</li> </ul>
	QUALITY	Passenger Load Factor	Rt	A	<ul style="list-style-type: none"> <li>No more than 20% of trips exceed vehicle load factor</li> </ul>
		On-Time Performance	Sys, Cat, Rt	A, Q	<ul style="list-style-type: none"> <li>85% for Urban Frequent and Rapid, and 90% for all other route categories</li> </ul>
		Mean Distance between Failures	Op	A	<ul style="list-style-type: none"> <li>Improve operator average</li> </ul>
		Accidents/100,000 Miles	Op	A	<ul style="list-style-type: none"> <li>Improve operator average</li> </ul>
		Comments/100,000 Passengers	Op	A	<ul style="list-style-type: none"> <li>Improve operator average</li> </ul>
INTEGRATED	CONNECTIVITY	Route Headway	Rt	A, Q	<ul style="list-style-type: none"> <li>Meet the target headway in each route's classification.</li> </ul>
		Span of Service Consistency	Sys	Q+	<ul style="list-style-type: none"> <li>Improve for routes that share common transfers</li> </ul>
		Service Availability	Sys	Q+	<ul style="list-style-type: none"> <li>80% of residents or jobs within ½ mile of a bus stop or rail station in urban areas.</li> <li>100% of suburban residences within 5 miles of a bus stop or rail station.</li> <li>One return trip at least 2 days/week to destinations from rural villages</li> </ul>
SUSTAINABLE	RESOURCES	In-Service Miles	Op	Q, A	<ul style="list-style-type: none"> <li>Not to exceed budget</li> </ul>
		In-Service Hours	Op	Q, A	<ul style="list-style-type: none"> <li>Not to exceed budget</li> </ul>
		Peak Vehicle Requirement	Op	Q, A	<ul style="list-style-type: none"> <li>Not to exceed budget</li> </ul>
	EFFICIENCY	In-Service Speeds	Op	Q, A	<ul style="list-style-type: none"> <li>Improve operator average</li> </ul>
		In-Service/Total Miles	Op	Q, A	<ul style="list-style-type: none"> <li>Improve operator average</li> </ul>
		In-Service/Total Hours	Op	Q, A	<ul style="list-style-type: none"> <li>Improve operator average</li> </ul>
		Farebox Recovery Ratio	Sys, Cat, Rt	A	<ul style="list-style-type: none"> <li>TDA requirement of 31.9 percent system wide for fixed-route (excluding regional routes that have a 20 percent requirement)</li> </ul>
Subsidy/Passenger	Sys, Cat, Rt	A	<ul style="list-style-type: none"> <li>Improve route category average</li> </ul>		

Level of Analysis: Sys=System, Op=Operator, Cat=Route Category Rt=Route; Frequency: A=Annually, Q=Quarterly/Triannually  
+ Staff analysis/Not included in Board report. **BOLD** indicates analysis level for the target.

KING COUNTY METRO

# Service Guidelines



2015 UPDATE

April 27, 2016



*We'll Get You There*

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# Introduction

Metro uses service guidelines to evaluate, design and modify transit services to meet changing needs and to deliver efficient, high-quality service. The guidelines help us make sure that our decision-making and recommendations to policy makers are objective, transparent, and aligned with the region's goals for public transportation. Use of the guidelines fulfills Metro's Strategic Plan Strategy 6.1.1, "Manage the transit system through service guidelines and performance measures."

The service guidelines establish criteria and processes that Metro uses to analyze and plan changes to the transit system. They provide direction in the following areas:

## Evaluating and Reporting on the Existing Network



### SETTING TARGET SERVICE LEVELS

Define a process for assessing the market potential of corridors in Metro's bus network using factors of corridor productivity, social equity, and geographic value, and determining the appropriate level of service for each corridor.



### EVALUATING AND MANAGING SYSTEM PERFORMANCE

Establish measures for evaluating route productivity, passenger loads, and schedule reliability for every route based on service type (urban, suburban, DART/community shuttles) to identify where changes may be needed to improve efficiency, effectiveness and quality.

## Planning and Designing Service and Service Changes



### DESIGNING SERVICE

Provide qualitative and quantitative guidelines for designing specific transit routes and the overall transit network.



### RESTRUCTURING SERVICE

Define the circumstances that should prompt Metro to restructure multiple routes along a corridor or within a larger area and how restructures should be done.



### PLANNING ALTERNATIVE SERVICES

Help Metro plan, implement and manage the Alternative Services Program.



### WORKING WITH PARTNERS

Describe how Metro can form partnerships to complement and expand service.



### PLANNING AND COMMUNITY ENGAGEMENT

Guide the public engagement process that is part of Metro's service planning.

## Adding, Reducing and Changing Service



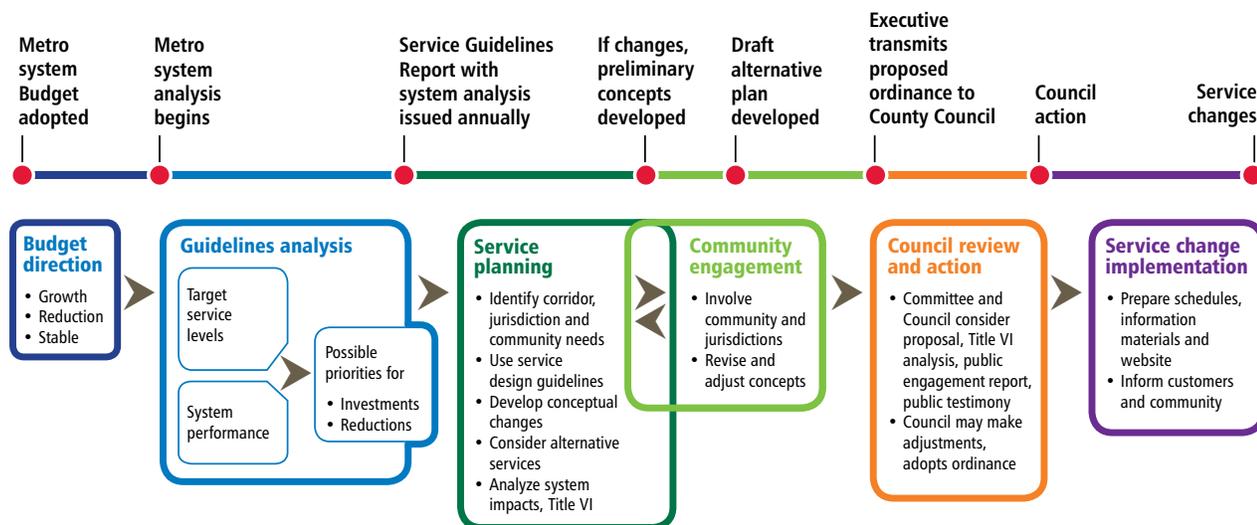
### ADDING, REDUCING AND CHANGING SERVICE

Establish the priority order in which the guidelines will be considered as Metro makes recommendations about adding, reducing, or adjusting service and describe how Metro will report on the performance of individual bus routes and the Metro system as a whole.

## How the guidelines are used

Every year, Metro uses the service guidelines to analyze the corridors and bus routes in the transit system. The results are published in an annual Service Guidelines Report that is transmitted to the King County Council and made available to the public.

Metro uses the results of this analysis, as well as guidelines concerning service design and alternative services, to develop service change proposals. The guidelines analysis is one step in a planning process that starts with the adoption of Metro’s budget and results in changes to transit service (see chart below).



## Why the guidelines were created and how they have changed

Metro’s original service guidelines resulted from the work of the 2010 Regional Transit Task Force (RTTF). King County formed the RTTF to consider a policy framework to guide service investments or—if necessary—reduction of the Metro Transit system.

The RTTF recommended that Metro adopt transparent, performance-based guidelines for planning service that emphasize productivity, social equity, and geographic value.

In the four years after the service guidelines were adopted, Metro completed five Service Guidelines Reports that evaluated system performance and identified countywide service needs, and adjusted service using the results 12 times. The County made revisions to the Service Guidelines in 2012 and 2013.

The County formed a Service Guidelines Task Force (SGTF) in 2015 to consider further refinements to the guidelines based on the experience using them. The SGTF used the solid foundation developed in the 2010 effort to further analyze how transit service is allocated and measured across the region. The success of the RTTF was due in part to collaboration among King County, partner cities, regional decision makers, and diverse stakeholders. This same approach helped the SGTF develop recommendations for improving King County’s transit system.

This 2015 update of the service guidelines incorporates the recommendations of the Service Guidelines Task Force. We also revised the explanation of the guidelines to make them clearer and easier to understand. The update includes the following changes:

- Modifies the way Metro evaluates corridors to better reflect productivity, social equity and geographic value.

- Changes the definition of “low income” used in setting target service levels from 100 percent to 200 percent of the federal poverty level, in line with Metro’s ORCA LIFT program.
- Establishes a minimum target service level of every 60 minutes for corridors and routes.
- Provides greater protection for peak-only services in the event of major service reductions.
- Modifies Metro’s service types so that comparable services are measured against one another.
- Expands the description of Metro’s planning and public engagement process and how the agency engages and works with the community.
- Expands the description of the Alternative Services Program as a way to meet diverse needs.
- Expands the descriptions of how Metro will partner with communities and with private partners to build the best transit network possible.
- Expands the description of the different factors Metro considers when making investments.
- Gives more consideration to the relative impacts in all parts of the county when making service reductions.

### **Future guidelines**

From the beginning, policymakers and Metro intended the service guidelines to be a living document; regular updates were required by the ordinance approving the guidelines. Updates to the guidelines will continue to be considered along with updates to the Strategic Plan for Public Transportation 2011-2021.

In 2016, Metro expects to transmit a long-range plan to the King County Council for consideration and adoption. This long range plan establishes a future network for transit that Metro will work toward and hopes to complete in 2040. It will include new transit corridors and connections between centers to meet the growing demand. The network will include fixed-route service as well as a variety of Alternative Services products and ADA Paratransit, depending on the diverse travel needs of the local community. This network will reflect local jurisdictions’ planning efforts.

In future updates to the guidelines, Metro will respond to near-term issues and will seek to align the guidelines with the network defined in the long-range plan. In turn, the long-range plan will reflect the productivity, social equity and geographic value principles defined in the strategic plan and service guidelines.



# Evaluating and Reporting on the Existing Network



## SETTING TARGET SERVICE LEVELS

A major function of the service guidelines is to assess and set target service levels for the corridors that make up Metro's All-Day and Peak-Only Network.

This network is a set of corridors that connect designated regional growth centers, manufacturing/industrial centers, and transit activity centers. All-day service is two-way service designed to meet a variety of travel needs and trip purposes throughout the day. The network also includes peak-only service that tends to travel in one direction and provides faster travel times, accommodates high demand for travel to and from major employment centers, and serves park-and-ride lots that are collection points for transit users.

For Metro's service guidelines, **corridors** are defined as major transit pathways that connect regional growth centers, manufacturing/industrial centers, activity centers, park-and-rides and transit hubs, and major destinations throughout King County. **Routes** are the actual bus services provided. Service within a single corridor might be provided by multiple bus routes. Almost all corridors have at least one route that operates on it, but not all routes in Metro's network operate on a corridor.

Target service levels are set by corridor rather than by route because a corridor could be served by a single route or by multiple routes.

As the region changes and corridors are added to the network, a similar evaluation process is used to set target service levels for the new corridors.



### Productivity

Productivity is a primary value for transit service in King County. It means making the most efficient use of resources and targeting transit service to the areas of the county with the most potential for use. Metro uses the term productivity in two important ways in the service guidelines:

1. **Corridor productivity** is the *potential* market for transit based on the number of households, jobs, students, and park-and-rides along the corridor. Higher concentrations of people support higher use of transit.
2. **Route productivity** is the *actual* use of transit, determined using two performance measures of ridership—rides per platform hour and passenger miles per platform mile.

## Corridor analysis

Metro establishes target service levels for the corridors in the All-Day and Peak-Only Network using a three-step process. Service levels are very frequent, frequent, local, or hourly (see chart on p. 11).

### STEP 1

**Step one sets target service levels for each corridor based on measurable indicators of corridor productivity, social equity, and geographic value.** Indicators of productivity make up 50 percent of the total score, while geographic value and social equity indicators each comprise 25 percent of the total score in this step.

The use of measures related to social equity and geographic value is consistent with Metro's Strategic Plan. The use of social equity factors helps Metro plan transit service that provides travel opportunities for historically disadvantaged populations (Strategy 2.1.2). Factors concerning transit activity centers and geographic value guide service to areas of concentrated activity (Strategy 3.4.1) and ensure that services provide value in all areas of King County. The use of productivity factors helps Metro plan and deliver productive service throughout King County (Objective 6.1).

- **Corridor productivity** indicators demonstrate the potential demand for transit in a corridor using land-use factors: the number of households, jobs, enrolled students<sup>1</sup>, and park-and-ride stalls<sup>2</sup> located within a quarter-mile walk to a bus stop. These factors are used because areas where many people live, work, or go to school have high potential transit use. The quarter-mile calculation considers how well streets are connected; only those areas that have an actual path to a bus stop are considered to have access to transit. This is an important distinction in areas that have a limited street grid or barriers to direct access, such as lakes or freeways. Park-and-rides are included because many people who access the transit system live outside of the quarter-mile draw area.
- **Social equity** indicators show how well a corridor serves any areas where there are concentrations of minority and low-income populations along the corridor. This is done by comparing boardings in these areas against the systemwide average of all corridor boardings within minority and low-income census tracts.<sup>3</sup> Metro assigns the highest value to corridors with concentrations of boardings in low-income or minority census tracts that are higher than the system average. Those close to the system average, but just below, are also awarded value in this process.
- **Geographic value** indicators establish how well a corridor supports connections and service to transit activity centers, regional growth centers, and manufacturing/industrial centers<sup>4</sup> throughout King County. All connections between centers are important and are given value in this process. Corridors that are the primary connections between centers, based on ridership and travel time, receive higher value in this process. King County centers are described on p. 15 of the strategic plan and are listed in Appendix 1 of this document.

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<sup>1</sup> An enrolled student is one who attends classes in a degree-conferring institution.

<sup>2</sup> Park-and-ride stalls are added at a factor of 1.1 to account for carpool usage. According to the Washington State Department of Transportation (WSDOT), the average occupancy of a parked car is very near 1 with the highest being 1.102 passengers per parked car. See WSDOT's report: *How Can We Maximize Efficiency and Increase Person Occupancy at Overcrowded Park and Rides?*

<sup>3</sup> Low-income tracts are those where a greater percentage of the population than the countywide average has low incomes (less than 200% of the federal poverty level depending on household size), based on current American Community Survey data. Minority tracts are defined as tracts where a greater percentage of the population than the countywide average is minority (all groups except White, non-Hispanic), based on current census data.

<sup>4</sup> "Centers" are areas that are important for Metro to serve. Transit activity centers, identified by Metro, are areas with relatively high transit use. Regional growth centers and manufacturing/industrial centers, designated by the Puget Sound Regional Council, are areas with dense population, employment, and manufacturing and industrial activity.

**Scoring:** The following table shows the measures of corridor productivity, social equity and geographic value and the points that would be assigned (out of a total 40) to determine the corridor’s preliminary score in the corridor analysis.

## THRESHOLDS AND POINTS USED TO SET SERVICE LEVELS

Factor	Measure	Threshold	Points
Corridor productivity	Households and park-and-ride stalls (with a factor of 1.1 to include carpools) within ¼ mile of stops per corridor mile	>3,000 Households & park-and-ride stalls/Corridor mile	10
		>2,400 Households & park-and-ride stalls/Corridor mile	8
		>1,800 Households & park-and-ride stalls/Corridor mile	6
		>1,200 Households & park-and-ride stalls/Corridor mile	4
		>600 Households & park-and-ride stalls/Corridor mile	2
	Jobs and student enrollment at universities and colleges within ¼ mile of stops per corridor mile	>10,250 Jobs & students/Corridor mile	10
		>5,500 Jobs & students/Corridor mile	8
		>3,000 Jobs & students/Corridor mile	6
		>1,400 Jobs & students/Corridor mile	4
		>500 Jobs & students/Corridor mile	2
Social equity	Percent of boardings in low-income census tracts	Above system average	5
		Just below system average (.5 standard deviations <sup>5</sup> )	3
		Below system average	0
	Percent of boardings in minority census tracts	Above system average	5
		Just below system average (.5 standard deviations <sup>5</sup> )	3
		Below system average	0
Geographic value	Primary connection between regional growth, manufacturing/industrial centers	Yes	10
	Primary connections between transit activity center and regional growth, manufacturing/industrial centers	Yes	7
	Primary connection between transit activity centers	Yes	5
	Other connection to any center	Yes	2

<sup>5</sup> Standard deviation is a measure of how spread out the numbers are. It is a statistic that describes the average difference between the values in the dataset and the average value of that dataset.

The table below shows the initial target service level that would be assigned to a corridor based on the number of points awarded for the corridor productivity, social equity and geographic value factors of that corridor. Service levels are very frequent, frequent, local, or hourly.

### SCORES USED TO SET INITIAL SERVICE LEVELS (STEP 1)

Scoring Range	Minimum Peak Service Frequency (minutes)	Minimum Off-Peak Service Frequency (minutes)	Minimum Night Service Frequency (minutes)	Service Level Assigned
25-40	15	15	30	Very frequent
19-24	15	30	30	Frequent
10-18	30	30	--*	Local
0-9	60	60	--	Hourly

\*Night service on local corridors is determined by ridership and connections.

## Step 2

**Step two adjusts the target service level assigned in step one to accommodate actual ridership.** Metro increases a corridor’s target service level if service at the level established under step one would not accommodate existing riders, would be inconsistent with policy-based service levels set for RapidRide, or would result in an incomplete network of night service<sup>6</sup>. Adjustments are only made to assign a higher service level to a corridor; service levels are not adjusted downward in this step.

The table below shows how Metro adjusts the target service levels set in step one to ensure that the All-Day and Peak-Only Network accommodates current riders or to preserve a complete network of night service.

<sup>6</sup> Night service includes any trips between 7 p.m. and 5 a.m., seven days a week. Please refer to the Summary of Typical Service Levels table for target night service levels (p. 13). An incomplete network of night service is defined as a network in which night service is not provided on a primary connection between regional growth centers or on a corridor with frequent peak service. Provision of night service on such corridors is important to ensure system integrity and social equity during all times of day.

### THRESHOLDS USED TO ADJUST SERVICE LEVELS (STEP 2)

Factor	Measure	Threshold	Adjustment to Warranted Frequency		
			Service Level Adjustment	Step 1 Frequency (minutes)	Adjusted Frequency (minutes)
Ridership (Load)	Estimated ratio of maximum load to the established passenger load threshold <sup>7</sup> by time of day – if existing riders were served by step-one service levels	> 110% of the established passenger load threshold	Increase two service levels	15 or 30	15 or more frequent
				≥ 60	15
		> 55% of the established passenger load threshold	Increase one service level	15	15 or more frequent
				30	15
		≥ 60	30		
Service span <sup>8</sup>	Connection at night	Primary connection between regional growth centers	Add night service	--	≥ 60
		Frequent peak service	Add night service	--	30

<sup>7</sup> This ratio is calculated by dividing the maximum load along a route by the passenger load threshold. The passenger load threshold is equal to the number of seats on the bus, plus an allowance of four square feet per standing passenger.

<sup>8</sup> Service span: The span of hours over which service is operated. Service span often varies by day of the week. For example, a route’s service span could be from 5 a.m. to 9 p.m.

Metro also adjusts service levels on existing and planned RapidRide corridors to ensure that assigned target service frequencies are consistent with policy-based service frequencies for the RapidRide program: more frequent than 15 minutes during peak periods, 15 minutes or more frequent during off-peak periods, and 15 to 30 minutes at night. Where policy-based service frequencies are higher than service frequencies established in step two, frequencies are improved to the minimum specified by policy.

The combined outcome of steps one and two is a set of corridors with all-day service levels that reflect factors concerning productivity, social equity, geographic value, and actual ridership. These corridors are divided into service levels based on the frequency of service, as described in the “Service Levels” section that follows. Corridors with the highest frequency would have the longest span of service.

## Step 3

**Step three evaluates peak-only service to determine the value it provides in addition to other service provided on corridors in the network.** Peak-only service operates only during peak travel periods (5-9 a.m. and 3-7 p.m. weekdays), primarily in one direction. Peak-only service typically brings riders from residential areas to job centers in the morning with return service from the job centers in the afternoon.

All-day routes also offer service during peak periods, but are not included in the peak-only analysis.

Peak service thresholds ensure that peak-only service has higher ridership and/or faster travel times than provided in the network of all-day service. Service levels on peak-only routes are established separately from the all-day network because of this specialized function within the transit network.

### THRESHOLDS FOR PEAK SERVICE

Factor	Measure	Threshold
Travel time	Travel time relative to all-day service provided during peak periods	Travel time should be at least 20% faster than the all-day service, as measured during peak periods
Ridership	Rides per trip	Rides per trip should be 90% or greater compared to the all-day service provided during peak periods

Peak-only service is provided for a limited span compared to all-day service. Peak-only service generally has a minimum of eight trips per day on weekdays only (morning trips travel from residential areas to job centers, and afternoon trips take riders from the job centers back to the residential areas). The exact span and number of trips for each peak-only route are determined by the level of demand for service that meets the travel time and ridership criteria.

Because of the value that peak-only service provides in the network, it is protected in any potential reduction scenario. Peak-only service is lower priority for reduction if it is in the bottom 25 percent, but passes one or both of the travel time and ridership criteria described above. If peak-only service does not meet the load and travel-time thresholds but serves an area that has no other service, Metro may consider preserving service or providing service in a new or different way, such as connecting an area to a different destination or providing alternatives to fixed-route transit service, consistent with strategic plan Strategy 6.2.3.

## Service levels

All-day services are categorized by level of service into four levels, plus peak-only and alternative services. Service levels are primarily defined by the frequency and span of service they provide. The table below shows the typical characteristics of each level. Some services may fall outside the typical frequencies, depending on specific conditions in the corridor served.

### SUMMARY OF TYPICAL SERVICE LEVELS

Service Level	Service Level: Frequency (minutes) and Time Period			Days of Service	Hours of Service
	Peak	Off-peak	Night		
Very frequent	15 or more frequent	15 or more frequent	30 or more frequent	7 days	16-24 hours
Frequent	15 or more frequent	30	30	7 days	16-24 hours
Local	30	30 - 60	--*	5-7 days	12-16 hours
Hourly	60	60	--	5 days	8-12 hours
Peak-only	8 trips/day minimum	--	--	5 days	Peak
Alternative Services	Determined by demand and community collaboration process				

\*Night service on local corridors is determined by ridership and connections.

- **Very frequent** services provide the highest levels of all-day service. Very frequent corridors serve very large employment and transit activity centers and very dense residential areas.
- **Frequent** services provide high levels of all-day service. Frequent corridors generally serve major employment and transit activity centers and very dense residential areas.
- **Local** services provide a moderate level of all-day service. Local corridors generally serve regional growth centers and residential areas with low to medium density.
- **Hourly** services provide all-day service at 60 minute frequencies. Corridors generally connect low-density residential areas to regional growth centers.
- **Peak-only** services provide specialized service in the periods of highest demand for travel. Peak services generally provide service to a major employment center in the morning and away from a major employment center in the afternoon.
- **Alternative** service is any non-fixed-route service directly provided or supported by Metro. These are further described in the "Planning Alternative Services" section, p. 23.

## Target service level comparison

The corridors in the All-Day and Peak-Only Network are analyzed annually in Metro’s Service Guidelines Report. The report compares the target service levels set through the corridor analysis with existing levels of service. A corridor is determined to be either “below,” “at” or “above” its target service level. This process is called the target service-level comparison, and is used to inform potential changes to bus routes. For example, in simple terms, a corridor below its target service level would be a candidate for investment and a corridor above its target service level could be a candidate for reduction. This target service level comparison is a factor in both the investment and reduction priorities, as described in the “Adding, Reducing and Changing Service” section. Using the results of the annual corridor analysis and as resources allow, Metro adjusts service levels to better meet the public transportation needs of King County. The corridor analysis process is summarized in the chart below.

## CORRIDOR ANALYSIS SUMMARY

STEP 1 SET INITIAL TARGET SERVICE LEVELS	
Factor	Purpose
Corridor productivity	Support areas of higher employment and household density
	Support areas with high student enrollment
	Support function of park-and-rides in the transit network
Social equity and geographic value	Serve historically disadvantaged communities
	Provide appropriate service levels throughout King County for connections between all centers

STEP 2 ADJUST TARGET SERVICE LEVELS	
Factor	Purpose
Ridership (Loads)	Provide sufficient capacity for existing transit demand
Service span	Provide adequate levels of service throughout the day to meet demand

STEP 3 EVALUATE PEAK-ONLY SERVICE	
Factor	Purpose
Travel time	Ensure that peak-only service provides a travel time advantage compared to other service alternatives
Ridership	Ensure that peak-only service is well utilized compared to other service alternatives

<b>OUTCOME: ALL-DAY AND PEAK-ONLY NETWORK</b>
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## Evaluating new service

Metro's long-range plan will respond to King County growth by defining a future transit network and service levels that are based on the current network with additional corridors. Metro will use the service guidelines, along with extensive input from cities and community members, to identify and evaluate service corridors in the long-range plan. As the region continues to grow, new services and service corridors can be added to future long-range plan updates through a planning process guided by the principles in the service guidelines.

### Centers in King County

The list of centers associated with the All-Day and Peak-Only Network is adopted by the King County Council as part of the service guidelines. The region's growth and travel needs change over time, and centers may be added to the list in future updates of the service guidelines as follows:

#### Regional Growth Centers and Manufacturing/Industrial Centers

Additions to and deletions from the regional growth and manufacturing/industrial centers lists should be based on changes approved by the Puget Sound Regional Council and defined in the region's growth plan, Vision 2040, or subsequent regional plans.

#### Transit Activity Centers

Additions to the list of transit activity centers will be nominated by the local jurisdictions and must meet one or more of the following criteria:

- Is located in an area of mixed-use development that includes concentrated housing, employment, and commercial activity.
- Includes a major regional hospital, medical center or institution of higher education located outside of a designated regional growth center.
- Is located outside other designated regional growth centers at a transit hub served by three or more all-day routes.

In addition to meeting at least one of the criteria above, a transit activity center must meet the following criteria:

- Pathways through the transit activity centers must be located on arterial roadways that are appropriately constructed for transit use.
- Identification of a transit activity center must result in a new primary connection between two or more regional or transit activity centers in the transit network, either on an existing corridor on the All-Day and Peak-Only Network or as an expansion to the network to serve an area of projected all-day transit demand.
- When a corridor is added to the network, step one of the All-Day and Peak-Only Network analysis must result in an assignment of a 30-minute target service level or better.

The size of transit activity centers varies, but all transit activity centers represent concentrations of activity in comparison to the surrounding area.

- Additional centers and corridors may be established by Metro's long-range plan network, under development with the community and local jurisdictions.



## EVALUATING AND MANAGING SYSTEM PERFORMANCE

Metro manages the performance of bus routes to improve the efficiency, effectiveness and quality of the transit system. Performance management guidelines are applied to individual routes to identify high and low performance, areas where investment is needed, and areas where resources are not being used efficiently and effectively.

### Service types and route productivity

When comparing the productivity of individual bus routes, Metro classifies them by service type, which indicates the primary market served as well as other characteristics of service described below. These service types allow Metro to measure the performance of routes against similar services.

- **Urban** routes primarily serve the densest parts of the county: the PSRC-designated Regional Growth Centers of Seattle Downtown, First Hill/Capitol Hill, South Lake Union, the University Community, and Uptown.
- **Suburban** routes primarily serve passengers in suburban and rural areas in Seattle and King County.
- **Dial-A-Ride Transit and shuttles** are those that provide flexible, community-based service that has different characteristics than the fixed-route system. These services are held to different standards than those outlined for the fixed-route network below. These standards are under development and will be included in Metro's annual service guidelines reports. These services are described in more detail in the "Planning Alternative Services" section, p. 23.

High and low performance thresholds differ for routes that serve urban areas and those that serve suburban areas. Regional growth centers in the Seattle core and the University District have the highest job and residential densities in the county. Because the potential market for transit is so high, routes serving these areas are expected to perform at a higher level. These routes comprise the Urban category and are given higher performance thresholds compared to other routes. The other routes, which make up the Suburban category, meet important transit needs of areas that generally have lower job and residential densities. Performance thresholds are lower for these routes because they are different from markets served in other areas of King County. Service types are based on these two primary market types, as well as other characteristics of service, to ensure that like services are compared.

The performance management analysis uses route productivity measures to identify fixed-route service where performance is strong or weak as candidates for addition, reduction, or restructuring for each service type.

The measures for evaluating fixed-route service productivity are **rides per platform hour** and **passenger miles per platform mile**.

- **Rides per platform hour** is a measure of the number of riders who board a transit vehicle relative to the total number of hours that a vehicle operates (from leaving the base until it returns).
- **Passenger miles per platform mile** is a measure of the total miles riders travel on a route relative to the total miles that a vehicle operates (from leaving the base until it returns).

Two measures are used to reflect the different values that services provide in the transit system. Routes with a higher number of riders getting on and off relative to the time in operation perform well on the rides-per-platform-hour

measure; an example is a route that goes through the urban core with lots of riders taking short trips. Routes with full and even loading along the route perform well on the passenger-miles-per-platform-mile measure; an example is a route that fills up at a park-and-ride and is full until reaching its destination.

Low performance is defined as route productivity that ranks in the bottom 25 percent of all routes within a service type and time period; high performance is defined as route productivity in the top 25 percent. Fixed-route services in the bottom 25 percent on both route productivity measures are identified as the first candidates for potential reduction if service must be reduced. However, reduction of these routes is not automatic; other factors are considered as well. For more information, see p. 30.

Thresholds for the top 25 percent and the bottom 25 percent are identified for peak, off-peak, and night time periods and Urban and Suburban destinations for each of the two performance measures.

## Passenger loads

Passenger loads are measured to identify overcrowded services as candidates for increased investment. Overcrowding is a problem because buses may pass up riders waiting at stops, riders may choose not to ride if other transportation options are available, and overcrowded buses often run late because it takes longer for riders to board and to get off at stops.

Passenger loads are averaged on a per trip basis using counts from an entire service change period (about six months). Trips must have average maximum loads higher than the thresholds for the entire service change period to be identified as overcrowded. Two metrics are used to measure passenger loads: crowding and the amount of time the bus has a standing load (standing load time).

Overcrowding occurs when the average maximum load of a trip exceeds its passenger load threshold. A passenger load threshold is calculated for each trip, based on the characteristics of the bus type scheduled for the trip. This threshold is determined by:

- The number of seats on the bus, plus
- The number of standing people that can fit on the bus, when each standing person is given no less than 4 square feet of floor space.

A trip's standing load time is determined by measuring the amount of time that the number of passengers on the bus exceeds the number of seats.

- No trip on a route should have a standing load for more than 20 minutes.

Routes with overcrowded trips or standing loads for more than 20 minutes are identified as candidates for investment. These candidates are analyzed in detail to determine appropriate actions to alleviate overcrowding, including:

- Assigning a larger vehicle to the trip, if available
- Adjusting the spacing of trips within a 20-minute period
- Adding trips.

## Schedule reliability

Metro measures schedule reliability to identify routes that are candidates for investment because they provide poor quality service.

Schedule reliability is measured for all Metro transit service. Service should adhere to published schedules, within reasonable variance based on time of day and travel conditions. "On time" is defined as an arrival at designated points along a route<sup>9</sup> that is no more than five minutes late or one minute early relative to the scheduled arrival time. When identifying candidates for remedial action, Metro focuses on routes that are regularly running late.

To do this, Metro identifies trips that exceed the lateness thresholds (shown below). If a trip experiences lateness that exceeds the thresholds, it can be identified for investment. Investment can include improvements in route design, schedule, or traffic operations. Schedule reliability can also be improved through speed and reliability improvements, such as business access and transit lanes, queue jumps, transit signal priority and other transit priority treatments.

Time Period	Lateness Threshold
Weekday average	> 20%
Weekday PM peak average	> 35%
Weekend average	> 20%

Metro allows for a higher lateness threshold in the PM peak period to account for increased passenger demand and higher levels of roadway congestion experienced during this time period.

Metro actively manages the headways of RapidRide service, primarily in peak periods, with a goal of providing riders with a high-frequency service where they do not rely on paper timetables. High frequencies and real-time information are intended to give riders a reliable service. When actual service has gaps that are three minutes more than the intended headway, service is considered late. With that difference in mind, "lateness" on RapidRide service uses the same thresholds as shown above.

Routes that operate with a headway that is less frequent than every 10 minutes that do not meet performance thresholds will be given priority for schedule adjustment or investment. Routes that operate with a headway of every 10 minutes or more frequent that do not meet performance thresholds will be given priority for speed and reliability investments to improve traffic operations. It may not be possible to improve through-routed routes<sup>10</sup> that do not meet performance thresholds because of the high cost and complication of separating routes.

Other considerations: External factors affecting reliability

Action alternatives:

- Adjust schedules/add run time
- Adjust routing
- Invest in speed and reliability improvements.

<sup>9</sup> Metro measures schedule reliability based on the arrival time of a given coach at designated points along a route. At the time the Strategic Plan and Service Guidelines were transmitted to the King County Council, Metro calculated this measure using the coach's arrival at time points. As Metro transitions with the Stop-Based Scheduling project, Metro will calculate this measure based on the coach's arrival at stops along a route, providing Metro with more data and improved accuracy for measuring schedule reliability.

<sup>10</sup> Through-routed services are routes that arrive at the end of one route and continue on as a different route. For example, Route 5 between Shoreline and Downtown Seattle continues on as Route 21 between downtown Seattle and Westwood Village.

# Planning and Designing Service and Service Changes



## DESIGNING SERVICE

Metro uses the following service design guidelines to develop transit routes and the overall transit network. Based on industry best practices for designing service, these guidelines help us enhance transit operations and improve the rider experience. The guidelines include both qualitative considerations and quantitative standards for comparing and measuring specific factors.

### 1 Network connections

Routes should be designed in the context of the entire transportation system, which includes local and regional bus routes, light-rail lines, commuter rail lines and other modes. When designing a network of services, Metro should consider locations where transfer opportunities could be provided for the convenience of customers and to improve the efficiency of the transit network. Where many transfers are expected to occur between services of different frequencies, timed transfers should be maintained to reduce customer wait times.

### 2 Multiple purposes and destinations

Routes are more efficient when designed to serve multiple purposes and destinations rather than specialized travel demands. Routes that serve many rider groups rather than a single group appeal to more potential riders and are more likely to be successful. Specialized service should be considered when there is sizable and demonstrated demand that cannot be adequately met by more generalized service.

### 3 Easy to understand, appropriate service

A simple transit network is easier for riders to understand and use than a complex network. Routes should have predictable and direct routings, and the frequency and span of service should be appropriate to the market served. As budget allows, routes should be targeted for a minimum service level of at least every 60 minutes. If a route cannot support this frequency level, it should be a candidate for alternative services as funding allows and the service meets the allocation criteria. Routes should serve connection points where riders can transfer to frequent services, opening up the widest possible range of travel options.

### 4 Route spacing and duplication

Routes should be designed to avoid competing for the same riders. Studies indicate that people are willing to walk 1/4 mile on average to access transit, so in general routes should be no closer together than 1/2 mile. Services may overlap where urban and physical geography makes it necessary, where services in a common segment serve different destinations, or where routes converge to serve regional growth centers. Where services do overlap, they should be scheduled together, if possible, to provide effective service along the common routing.

Routes are defined as duplicative in the following circumstances:

- Two or more parallel routes operate less than 1/2 mile apart for at least one mile, excluding operations within a regional growth center or approaching a transit center where pathways are limited.
- A rider can choose between multiple modes or routes connecting the same origin and destination at the same time of day.
- Routes heading to a common destination are not spaced evenly (except for operations within regional growth centers).

### 5 Route directness

A route that operates directly between two locations is faster and more attractive to riders than one that takes a long, circuitous path. Circulators or looping routes do not have competitive travel times compared to walking or other modes of travel, so they tend to have low ridership and poor performance. Some small loops may be necessary to turn the bus around at the end of routes and to provide supplemental coverage, but such extensions should not diminish the overall cost-effectiveness of the route. Directness should be considered in relation to the market for the service.

Route deviations are places where a route travels away from its major path to serve a specific destination. For individual route deviations, the delay to riders on board the bus should be considered in relation to the ridership gained on a deviation. New deviations may be considered when the delay is less than 10 passenger-minutes per person boarding or exiting the bus along the deviation.

$$\frac{\text{Riders traveling through} \times \text{Minutes of deviation}}{\text{Boardings and exitings along deviation}} \leq 10 \text{ minutes}$$

### 6 Bus stop spacing

Bus stops should be spaced to balance the benefit of increased access to a route against the delay that an additional stop would create for all other riders. While close stop-spacing reduces walk time, it may increase total travel time and reduce reliability, since buses must slow down and stop more frequently.

Service	Average Stop Spacing
RapidRide	½ mile
All other services	¼ mile

Portions of routes that operate in areas where riders cannot access service, such as along freeways or limited-access roads, should be excluded when calculating average stop spacing. Additional considerations for bus stop spacing include the pedestrian facilities, the geography of the area around a bus stop, passenger amenities, and major destinations.

### 7 Route length and neighborhood route segments

A bus route should be long enough to provide useful connections for riders and to be more attractive than other travel modes. A route that is too short will not attract many riders, since the travel time combined with the wait for the bus is not competitive compared to the time it would take to walk. Longer routes offer the opportunity to make more trips without a transfer, resulting in increased ridership and efficiency. However, longer routes may

also have poor reliability because travel time can vary significantly from day to day over a long distance. Where many routes converge, such as in regional growth centers, they may be through-routed to increase efficiency, reduce the number of buses providing overlapping service, and reduce the need for layover space in congested areas.

In some places, routes extend beyond regional growth centers and transit activity centers to serve less dense residential neighborhoods. Where routes operate beyond centers, ridership should be weighed against the time spent serving neighborhood segments, to ensure that the service level is appropriate to the level of demand. The percent of time spent serving a neighborhood segment, which are defined as  $\leq 20\%$  of the total mileage length of a route, should be considered in relation to the percent of riders boarding and exiting on that segment.

$$\frac{\text{Percent of time spent serving neighborhood segment}}{\text{Percent of riders boarding/exiting on neighborhood segment}} \leq 1.2^{11}$$

## 8 Operating paths and appropriate vehicles

Buses are large, heavy vehicles and cannot operate safely on all streets. Services should operate with vehicles that are an appropriate size to permit safe operation while accommodating demand. Buses should be routed primarily on arterial streets and freeways, except where routing on local or collector streets is necessary to reach layover areas or needed to ensure that facilities and fleet used in all communities is equivalent in age and quality. Appropriate vehicles should be assigned to routes throughout the county to avoid concentrating older vehicles in one area, to the extent possible given different fleet sizes, technologies and maintenance requirements.

Bus routes should also be designed to avoid places where traffic congestion and delay regularly occur, if it is possible to avoid such areas while continuing to meet riders' needs. Bus routes should be routed, where possible, to avoid congested intersections or interchanges unless the alternative would be more time-consuming or would miss an important transfer point or destination.

## 9 Route terminals

The location where a bus route ends and the buses wait before starting the next trip must be carefully selected. Priority should be given to maintaining existing layover spaces at route terminals to support continued and future service. People who live or work next to a route end may regard parked buses as undesirable, so new route terminals should be placed where parked buses have the least impact on adjoining properties, if possible. Routes that terminate at a destination can accommodate demand for travel in two directions, resulting in increased ridership and efficiency. Terminals should be located in areas where restroom facilities are available for operators, taking into account the times of day when the service operates and facilities would be needed. Off-street transit centers should be designed to incorporate layover space.

## 10 Fixed and variable routing

Bus routes should operate as fixed routes in order to provide a predictable and reliable service for a wide range of potential riders. However, in low-density areas where demand is dispersed, demand-responsive service may be used to provide more effective service over a larger area than could be provided with a fixed route. Demand-responsive service may be considered where fixed-route service is unlikely to be successful or where unique conditions exist that can be met more effectively through flexible service.

<sup>11</sup> The value of the service extended into neighborhoods beyond major transit activity centers should be approximately equal to the investment made to warrant the service. A 1:1 ratio was determined to be too strict, thus this ratio was adjusted to 1.2.

## 11 Bus stop amenities and bus shelters

Bus stop amenities should be installed based on ridership in order to benefit the largest number of riders. Bus stop amenities include such things as bus shelters, seating, waste receptacles, lighting, information signs, maps, and schedules. In addition to ridership, special consideration may be given to areas where:

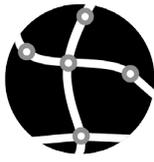
- high numbers of transfers are expected
- waiting times for riders may be longer
- stops are close to facilities such as schools, medical centers, or senior centers
- the physical constraints of bus stop sites, preferences of adjacent property owners, and construction costs could require variance from standards.

Major infrastructure such as elevators and escalators will be provided where required by local, state, and federal regulations.

### RIDERSHIP GUIDELINES FOR BUS STOP AMENITIES

RapidRide Routes	
Level of amenity	Weekday Boardings
Station	150+
Enhanced stop	50-149
Standard stop	Less than 50

All Other Metro Routes		
Location	Level of amenity	Weekday Boardings
City of Seattle	Standard shelter and bench	50
Outside Seattle	Standard shelter and bench	25



## RESTRUCTURING SERVICE

Service restructures are changes to multiple routes along a corridor or within a large area consistent with the service design criteria in this document. Restructures may be prompted by a variety of circumstances, and in general are made to improve the efficiency and effectiveness of transit service as a whole, to better integrate with the regional transit network, or to reduce Metro's operating costs because of budget constraints. When planning for service restructures, factors other than route performance are taken into account, such as large-scale service and capital infrastructure enhancements. Restructures may result in the modification, addition, and deletion of corridors that align with future corridors in the long-range plan. These changes must be approved by council as part of a service change package.

- Under all circumstances, whether adding, reducing or maintaining service hours, service restructures will have the goals of focusing frequent service on the service segments with the highest ridership and route productivity, creating convenient opportunities for transfer connections between services, and matching capacity to ridership demand to improve the productivity and cost-effectiveness of service.
- Service restructures to manage the transit system will have a goal of increasing ridership.
- Under service reduction conditions, service restructures will have an added goal of an overall net reduction of service hours invested.
- Under service addition conditions, service restructures will have the added goals of increasing service levels and ridership.

When one or more circumstances trigger consideration of restructures, Metro specifically analyzes:

- Impacts on current and future travel patterns served by similarly aligned transit services.
- Passenger capacity of the candidate primary route(s) relative to projected consolidated ridership.
- The cost of added service in the primary corridor to meet projected ridership demand relative to cost savings from reductions of other services.

Restructures will be designed to reflect the following:

- Service levels should accommodate a projected minimum of 80 percent of the expected passenger loads per the established loading guidelines.
- When transfers are required as a result of restructures, the resulting service will be designed for convenient transfers. Travel time penalties for transfers should be minimized.
- A maximum walk distance goal of 1/4 mile in corridors where service is not primarily oriented to freeway or limited-access roadways. Consideration may be given to exceeding this maximum distance where the walking environment supports pedestrians or at transfer locations between very frequent services.

Based on these guidelines, Metro will recommend specific restructures that have compatibility of trips, have capacity on the consolidated services to meet anticipated demand, and can achieve measurable savings relative to the magnitude of necessary or desired change.

After a service restructure, Metro will regularly evaluate the resulting transit services and respond to chronically late performance and passenger loads that exceed the performance management guidelines as part of the ongoing management of Metro's transit system.

Key reasons that will trigger consideration of restructures include:

**Sound Transit or Metro service investments**

- Extension or service enhancements to Link light rail, Sounder commuter rail, and Regional Express bus services.
- Expansion of Metro's RapidRide network, investment of partner or grant resources, or other significant introductions of new Metro service.

**Corridors above or below the All-Day and Peak-Only Network target service level**

- Locations where the transit network does not reflect current travel patterns and transit demand due to changes in travel patterns, demographics, or other factors.

**Services compete for the same riders**

- Locations where multiple transit services overlap, in whole or in part, or provide similar connections.

**Mismatch between service and ridership**

- Situations where a route serves multiple areas with varying demand characteristics or situations where ridership has increased or decreased significantly even though the underlying service has not changed.
- Opportunities to consolidate or otherwise reorganize service so that higher ridership demand can be served with improved service frequency and fewer route patterns.

**Major transportation network changes**

- Major projects such as SR-520 construction and tolling and the Alaskan Way Viaduct replacement; the opening of new transit centers, park-and-rides, or transit priority pathways.

**Major development or land use changes**

- Construction of a large-scale development, new institutions such as colleges or medical centers, or significant changes in the overall development of an area.



## PLANNING ALTERNATIVE SERVICES

King County is a diverse county with different travel demands in different parts of the county. The King County Metro Alternative Services Program brings a range of mobility services to parts of King County that do not have the infrastructure, population density, or land use to support traditional fixed-route bus service.

### Prioritization criteria

The Alternative Services Program aims to right-size and complement existing fixed-route and Dial-A-Ride Transit (DART) service. Right-sizing may include restructuring underperforming fixed-route bus services and mitigating the impact of lost or reduced fixed-route service. Complementary alternative services may address: the need to serve rural communities, the need to seed emerging markets, and gaps in time-of-day service or geographic coverage of existing fixed-route services. These time-based or geographic coverage gaps might include areas with a concentration of shift jobs, industrial locations, or areas of potential transit activity that are geographically isolated. By employing Alternative Services products like TripPool or Community Vans to fill service gaps, right-size services, or complement existing services, Metro will enhance mobility options for residents while making optimal use of finite transit dollars. The diagram below shows the current range of alternative services. As new potential alternative services products, such as Trip Pool, become available, Metro will explore how best to implement these products and consider how subsidies, fares and promotional efforts can expand these programs and ensure their success.

 <p><b>Existing Alternative Services</b></p> <p>VanShare VanPool Rideshare Matching DART and CAT</p>	 <p><b>Community Shuttle</b></p> <p>Metro route with a Flexible Service Area, provided through community partnerships.</p>	 <p><b>Community Van</b></p> <p>A fleet of Metro vans for local group trips that are scheduled by a local transportation coordinator to meet locally identified transportation needs.</p>	 <p><b>Real-Time Rideshare</b></p> <p>Leveraging mobile applications to enable private carpool ridesharing to take place in real-time.</p>	 <p><b>TripPool</b></p> <p>Real-time ridesharing between home neighborhood and a transit center. Uses Metro Vans and ORCA fares.</p>
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Alternative service projects may be initiated by Metro identifying communities that meet one or more of the prioritization criteria listed below or by a competitive process involving a letter of interest by local jurisdictions or community organizations, evaluated against the prioritization criteria listed below. When considering where to implement alternative service projects, Metro will give special consideration to communities with high proportions of low-income or minority populations who depend on public transportation. Prioritization criteria for alternative service efforts in communities include:

- 1 Fixed-route transit service performs below service guidelines performance standards (measured in rides/platform hour, and passenger miles/platform mile)

- 2 Time-based service gaps
- 3 Geographic coverage service gaps
- 4 Rural communities or emerging transit markets (as identified through land-use targets, designated growth areas, demonstration of local transportation needs, and Metro's Long-Range Public Transportation Plan)
- 5 Market potential, considering jobs, student enrollment, household density, park-and-rides, high concentrations of low-income or minority populations, and proximity to centers, the regional transit network, and major institutions
- 6 Partnership opportunities for service or infrastructure with jurisdictions or communities as described in the "Working with Partners" section, p. 25.

Metro will use the Alternative Services Program's community planning process to better identify the needs of transit riders and potential riders, including traditionally isolated or disadvantaged communities, such as those with limited English proficiency, low-income and homeless populations, minorities, people with disabilities and Access users, youth, elderly people, and those who are currently unserved or underserved by transit (within the context of applicable federal laws, such as Americans with Disabilities Act and others). This community planning process will consider needs identified by riders and potential riders for access to social service agencies, health care facilities, jobs, education, and other destinations.

### Community partnerships

Demonstrated partner participation is a key component of a successful alternative services project. A local partner organization, such as a municipality or nonprofit organization, must be actively engaged and contributing to the development and implementation of the project. Partnerships may include sharing the cost or staffing of community engagement, planning, equipment, contracted services, promotions, or other project elements and may involve either cash or in-kind contributions from the partner organization. Local jurisdictional partners may also enact transit-supportive land-use policy or may make infrastructure investments that support transit. Types of partnership are further described in the partnership section, p 25.

### Performance evaluation

The Alternative Services Program conducts demonstration projects that are intended to identify new service offerings. These may include a range of transportation options that cannot be compared directly with each other or with fixed-route service. Each service needs to be evaluated independently. Given the experimental nature of the different projects under the Alternative Services umbrella, performance evaluation efforts will focus on product testing and continuous service improvement.

Metro will identify performance measures that reflect the unique nature of each service and different performance measures may be used to evaluate different types of services. Performance will be measured against the market potential for each project area. The market potential will be estimated prior to project launch based on the project's stated goals and the community's market characteristics, including population and demographic, land-use, and employment statistics. Past transit performance will also be factored into the development of market potential goals.

Metro will monitor and evaluate performance of all alternative service projects to ensure that service quality, customer satisfaction, and cost effectiveness objectives are being met. Performance measures may include usage/ridership rates and cost per boarding/ride. To the extent possible, performance of alternative services will be measured against similar services.

### Conversion to fixed route

Communities with successful alternative service partnerships could transition to fixed-route bus service under certain circumstances. If funding is available, the partner jurisdiction or community is supportive, the alternative service is regularly over capacity, the density has increased, and the cost per boarding justifies a greater investment in transit, then Metro can consider converting an alternative service into fixed-route bus service.



## WORKING WITH PARTNERS

A partnership is a relationship in which Metro and an external organization work together to help advance opportunities and conditions for travelers to use alternatives to driving alone. Partnerships enable Metro to leverage public and private resources to design and deliver services, facilities, access, policies, program/product design and incentives. Partners have included local, regional and state agencies; employers, institutions, schools, community and human service organizations, other transit providers, property owners or managers, and other businesses and entities.

Metro forms a variety of partnerships with local jurisdictions, community organizations, and other stakeholders. These partnerships are mainly related to service and infrastructure. The guidelines for partnerships are described in more detail below. When a proposed or changed partnership agreement addresses specific routes, services or infrastructure, Metro shall ensure that the proposal incorporates adequate public outreach to the affected communities.

### Service partnerships

Metro seeks to actively collaborate with cities, communities and private companies to explore service partnerships that:

- Are mutually beneficial to the agency and customers
- Extend service in complementary ways to current fixed-route bus service
- Extend mobility benefits to communities that have corridors below their target service level
- Enable more service hours, or extend service efficiencies
- Support transit options for low-income workers.

Services provided via a partnership may reflect the needs identified by the partner and may be implemented in a variety of ways, including alternative services. More information about alternative services partnerships can be found in the Planning Alternative Services section.

For fixed-route service, Metro is open to forming partnerships with cities, communities and private companies that would fully or partially fund transit service. The “Adding, Reducing and Changing Service” section establishes investment priorities for new Metro resources: Priority 1, Passenger loads (crowding); Priority 2, Schedule reliability; Priority 3, All-Day and Peak-Only Network (corridors connecting centers); and Priority 4, Route productivity. Metro will use new Metro resources to address priorities 1 and 2 first; Metro encourages partners to do the same.

Metro will make exceptions to these investment priorities to leverage partner funding according to the following:

- 1 Service funded fully by Metro’s partners generally will be implemented at the next feasible service change subject to operational infrastructure constraints and contract terms<sup>†</sup>.

<sup>†</sup> Operational infrastructure constraints include but are not limited to bus fleet availability to run new service (including potential maintenance downtime requirements), base capacity limitations, and operator availability.

- 2 On corridors identified for priority 3 investments (as below their target service levels in the All-Day and Peak-Only Network), Metro will direct new Metro resources remaining after addressing priority 1 and 2 needs—subject to operational infrastructure constraints—to those corridors for which partners agree to fund at least one-third of investments to help meet target service levels, regardless of these corridors' positions in the prioritized investment list (as published in the annual Service Guidelines Report).

### Infrastructure partnerships

Local jurisdictional partners may also enact transit-supportive land-use policy or may make infrastructure investments that support transit. These partnerships can include:

- Zoning measures that support increased density and mixed-uses within Urban Growth Areas
- Investments in cycling and pedestrian facilities that significantly enhance access to transit service
- Parking management programs that provide new sources of park-and-ride spaces or transit layover or make more efficient use of off-street parking to support transit ridership and /or operations
- Urban design guidelines that support transit and active transportation
- In-fill over greenfield development prioritization
- Street network connectivity improvements
- Other land-use measures that contribute to higher concentrations of potential transit riders.



## PLANNING AND COMMUNITY ENGAGEMENT

For each major service change, Metro will undertake a significant planning process that includes outreach to involve the public in shaping the change. Through the outreach, Metro planners will better understand community mobility needs, where people are traveling and when, and how to provide the best service possible. During the planning process, Metro typically will engage with the community through several phases of outreach, and will complete a comprehensive community engagement report at the end that summarizes the results of this work and how public input was used to shape a final recommendation for change.

Each outreach effort will be guided by several goals:

- Transit planners are informed by members of the public who are reflective of those who may be affected by the change.
- Metro's outreach process is transparent, accessible, welcoming and understandable. Participants understand what is being considered, the timeline and how decisions are made, and that their input is valuable and welcome.
- The outreach process is meaningful. Regardless of how participants feel about the final result, they can see how public input shaped what is being considered and the final result.

Outreach should be scaled relative to the magnitude of the change being considered as well as the potential impacts of the change on riders.

For each outreach effort, Metro should identify the demographics of those who may be affected by the change being considered. Then, outreach strategies should be designed to inform and solicit input from these populations, creatively seeking to engage those who would not otherwise learn about our process via mainstream communication channels.

These outreach strategies should include, but not be limited to, the following:

- posting of information at bus stops or onboard buses and at community gathering places such as libraries, schools, and community centers
- conversations with people on the bus and at stops, community events, and information tables
- public meetings
- questionnaires
- conversations with community or stakeholder groups
- online and/or mailed information, social media, news releases, and advertisements
- community advisory groups or sounding boards
- outreach to community groups in the Community Service Areas of unincorporated King County
- translation and distribution of materials in accessible formats and/or provision of interpretation for populations with limited or no English proficiency and people with disabilities

- work with community partners that serve transit riders, such as those with limited English proficiency, low-income and homeless populations, youth, minorities, people with disabilities, elderly people, and those who are currently unserved or underserved by transit, to engage these populations in formats, locations and at times that work best for them.

For service changes that affect multiple routes or large areas, Metro may convene a community-based sounding board composed of people who may be affected by the change. Sounding board members attend public meetings, offer advice about public outreach, and provide feedback about what changes to bus service would be best for the local communities. Metro should consider both sounding board recommendations and public feedback in developing recommendations.

Proposed changes may require County Council approval. The Council holds a public hearing before making a final decision on changes.

Through the planning and outreach process, Metro should strive to:

- Understand and address potential issues regarding major travel origins and destinations
- Engage with key stakeholders including community-based organizations and the general public to understand the needs of transit riders and potential riders, such as those with limited English proficiency, low-income and homeless populations, youth, minorities, people with disabilities and Access users, elderly people, and those who are currently unserved or underserved by transit
- Match community needs with service provided. Metro may identify potential alternative services projects through the planning and outreach process.



## ADDING, REDUCING, AND CHANGING SERVICE

Metro uses the following guidelines when adding or reducing service as well as in the ongoing development and management of transit service.

### GUIDELINES FOR ADDING OR REDUCING SERVICE

Guideline	Measures
Passenger loads	Passenger load thresholds (see p. 15)
Schedule reliability	On-time performance (see p. 16) Schedule reliability (see Appendix 3: Glossary) Lateness (see p. 16)
All-Day Network	Current service relative to All-Day Network (see p. 12)
Peak-only service	Travel time or ridership advantage (see p. 10)
Route productivity	Rides per platform hour (see p. 14) Passenger miles per platform mile (see p. 14)

### Adding service: investment priorities

Metro invests in service by using guidelines in the following order:

- 1 Passenger loads
- 2 Schedule reliability
- 3 All-Day and Peak-Only Network
- 4 Route productivity

When prioritizing investments in the transit network, Metro considers local and regional planning efforts, including Metro's future long-range plan; changes to the transportation network; operational considerations; productivity, geographic value and social equity impacts; service quality needs; and corridor score.

## Passenger loads and schedule reliability

Metro's first investments are based on the passenger load and schedule reliability guidelines used to assess service quality. Routes that do not meet the standards are considered to have low-quality service that has a negative impact on riders and could discourage them from using transit. These routes are the highest priority candidates for investment. Routes that are through-routed but suffer from poor reliability may be candidates for investment, but because of the size and complexity of changes to through-routes, they would not be automatically given top priority.

## All-Day and Peak-Only Network

Metro next uses the All-Day and Peak-Only Network guidelines and the target service level comparison (as described on p. 14) to determine if corridors are below their target levels. If a corridor is below the target service level, it is an investment priority. Metro uses the list of All-Day and Peak-Only Network investments which, are ordered for implementation in the service guidelines report by their geographic value score, followed by the corridor productivity score, then the social equity score.

## Route productivity

The fourth and final guideline Metro uses to determine if additional service is needed is the route productivity rank. Routes with productivity in the top 25 percent perform well in relation to other routes; investment in these services would improve service where it is most efficient.

## Reducing service

When Metro must reduce service, these guidelines help identify the services to be reduced. While the guidelines form the basis for identifying services for reduction, Metro also considers other factors. These include community input, opportunities to achieve system efficiencies and to simplify the network through restructures, and the potential for offering alternative services. Once the long-range plan is complete, we will also consider the long-range service network and priorities, particularly when reducing service through restructures. The use of these other factors means that some routes may not be reduced in the priority order stated below. Some factors that Metro considers when reducing service include:

- **The relative impacts to all areas of the county in order to minimize or mitigate significant impacts in any one area.** Metro seeks to balance reductions throughout the county so that no one area experiences significant negative impacts beyond what other areas experience.
- **Ways to minimize impacts through the type of reduction, particularly through restructuring service.** Reduction of service can range from deleting a single trip to eliminating an entire route. Metro will also consider restructuring service in an area to make it more efficient or will consider alternative services. By consolidating service to eliminate duplication, and by closely matching service with demand, Metro may be able to provide needed trips at reduced cost and minimize impacts on riders. Service consolidation may lead to increased frequency of service on some routes to accommodate projected loads, even though the overall result of the restructure is a reduction in service hours.
- **The identified investment need on corridors.** While no route or area would be exempt from change during a large-scale system reduction, Metro will try to maintain the target level of service on corridors in the All-Day and Peak-Only Network levels, and will seek to avoid reducing service on corridors that are already below their target service levels.
- **Preservation of last connections.** Metro serves some urbanized areas of east and south King County adjacent to or surrounded by rural land. Elimination of all service in these areas would result in significant reduction in the coverage that Metro provides. To ensure that Metro continues to address mobility needs, ensure social equity and provide geographic value to people throughout King County, connections to these areas would be preserved when making service reductions, regardless of route productivity.

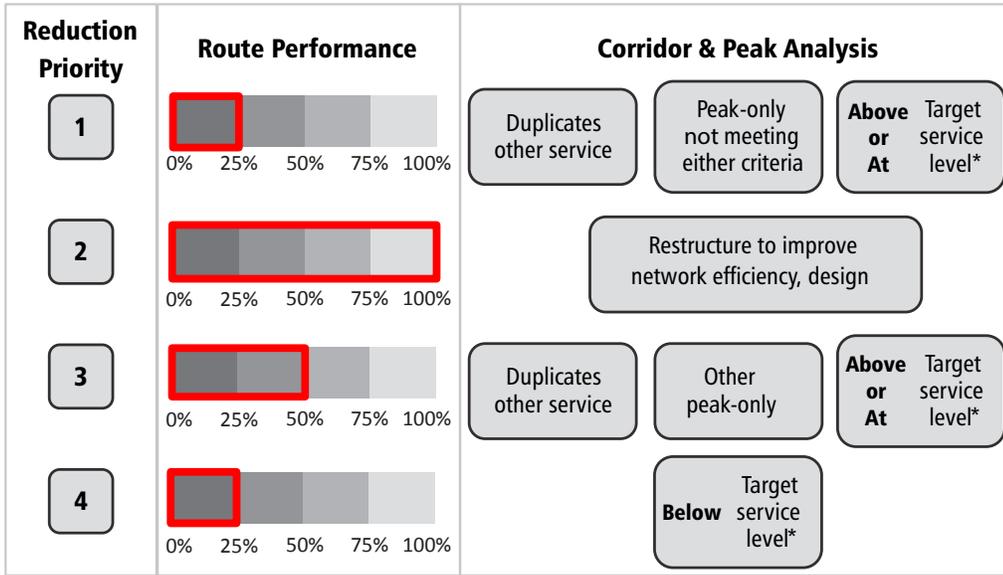
- **Applicability of alternative services.** In many areas of King County, and especially in urbanized areas adjacent to or surrounded by rural land, Metro may provide cost-effective alternatives to fixed-route transit service. These alternatives could avoid a significant reduction in the coverage Metro provides while better meeting community needs (Strategy 6.2.3). During service reductions Metro will consider the use of alternative services that can reduce costs on corridors with routes that are in the bottom 25 percent in one or both productivity measures. Alternative services will be evaluated differently than the fixed-route system, according to the measures and performance thresholds developed through the Alternative Services Program.

## Reduction priorities

Priorities for reduction are listed below. Within all of the priorities, Metro ensures that social equity is a primary consideration in any reduction proposal, complying with all state and federal regulations.

- 1 Reduce service on routes that are below the 25 percent productivity threshold for a given time period. Routes that are below the 25 percent productivity threshold on both measures are considered for reduction before routes that are below the 25 percent productivity threshold for only one measure in the following order:
  1. Routes that duplicate or overlap with other routes on corridors on the All-Day and Peak-Only Network.
  2. Peak-only routes that do not have a travel time or ridership advantage.
  3. All-day routes that operate on corridors that are above their target service levels.
  4. All-day routes that operate on corridors that are at their target service levels. Reductions or deletions of these routes would worsen the deficiency between existing service levels and target service levels.
- 2 Restructure service to improve efficiency of service.
- 3 Reduce service on routes that are above the 25 percent productivity threshold for a given time period. Routes that are between the 25 and 50 percent productivity threshold on both measures are considered for reduction before routes that are above the 50 percent productivity threshold for either measure, in the following order:
  1. Routes that duplicate or overlap with other routes on corridors on the All-Day and Peak-Only Network.
  2. Any other peak-only route that was not considered as part of priority 1.2.
  3. All-day routes that operate on corridors that are above their target service levels.
  4. All-day routes that operate on corridors that are at their target service levels. Reductions or deletions of these routes would worsen the deficiency between existing service levels and target service levels.
- 4 Reduce services on routes that are below the 25 percent productivity threshold for a given time period on corridors identified as below their target service levels. Routes that are below the 25 percent productivity threshold on both measures are considered for reduction before routes that are below the 25 percent productivity threshold for only one measure. This worsens the deficiency between existing service levels and target service levels.

The chart below summarizes how service is reduced.



\*Target service level is based on demographics and demand between connections served by transit

## Implementation

Metro revises service twice a year—in spring and fall. In rare cases of emergency or time-critical construction projects, Metro may make changes at times other than the two regularly scheduled service changes. However, such situations are kept to a minimum because of the high level of disruption and difficulty they create. Many alternative service projects can be implemented at any time and do not need to follow the same schedule as fixed-route service.

Proposed route changes are subject to approval by the Metropolitan King County Council except as follows (per King County code 28.94.020):

- Any single change or cumulative changes in a service schedule which affect the established weekly service hours for a route by 25 percent or less.
- Any change in route location which does not move the location of any route stop by more than 1/2 mile.
- Any changes in route numbers.

Each year, Metro publishes a Service Guidelines report that outlines the analysis of target service levels and route performance management. The annual report will include a comprehensive list of the prior years' service changes and will identify and discuss service changes that address performance-related issues. Metro works to provide transparency in Metro's process and help jurisdictions plan for the future by conducting regular outreach throughout the county about the results of the Service Guidelines Report.

### Adverse effect of a major service change

An adverse effect of a major service change is defined as a reduction of 25 percent or more of the transit trips serving a census tract, or 25 percent or more of the service hours on a route. Title VI of the Civil Rights Act of 1964 requires all transit agencies to evaluate major service change impacts on minority and low-income populations; the King County Strategic Plan and the County's Equity and Social Justice ordinance reflect similar commitments to addressing these impacts.

### **Disparate impact threshold**

A disparate impact occurs when a major service change results in adverse effects that are significantly greater for minority populations than for non-minority populations. Metro's threshold for determining adverse effects is when the percentage of routes or tracts adversely affected by a major service change and classified as minority is 10 or more percentage points higher than the percentage of routes or tracts classified as minority in the system as a whole. Should Metro find a disparate impact, consideration will be given to modifying the proposed changes in order to avoid, minimize or mitigate the disparate impacts of the proposed changes.

Metro will measure disparate impacts by comparing changes in the number of trips serving minority or non-minority census tracts, or by comparing changes in the number of service hours on minority or non-minority routes. Metro defines a minority census tract as one in which the minority population percentage is greater than that of the county as a whole. For regular fixed-route service, Metro defines a minority route as one for which the percentage of inbound weekday boardings in minority census tracts is greater than the average percentage of inbound weekday boardings in minority census tracts for all Metro routes.

### **Disproportionate burden threshold**

A disproportionate burden occurs when a major service change results in adverse effects that are significantly greater for low-income populations than for non-low-income populations. Metro's threshold for determining adverse effects is when the percentage of routes or tracts adversely affected by a major service change and classified as low-income is 10 or more percentage points higher than the percentage of routes or tracts classified as low-income in the system as a whole. Should Metro find a disproportionate burden, consideration will be given to modifying the proposed changes in order to avoid, minimize or mitigate the disproportionate burden of the proposed changes.

Metro will measure disproportionate burden by comparing changes in the number of trips serving low-income or non-low-income census tracts, or by comparing changes in the number of service hours on low-income or non-low-income routes. Metro defines a low-income census tract as one in which the percentage of low-income population is greater than that of the county as a whole. For regular fixed-route service, Metro defines a low-income route as one for which the percentage of inbound weekday boardings in low-income census tracts is greater than the average percentage of inbound weekday boardings in low-income census tracts for all Metro routes.

# APPENDIX 1: CENTERS IN KING COUNTY

The list of centers associated with the All-Day and Peak-Only Network is adopted by the King County Council as part of the service guidelines. To plan its service, Metro utilizes the 18 Regional Growth Centers, four Manufacturing/Industrial Centers, and 64 Transit Activity Centers.

## Regional Growth and Manufacturing/Industrial Centers

The Puget Sound Regional Council designates regional growth centers and manufacturing/industrial centers as places that will receive a significant proportion of population and employment growth compared to the rest of the urban area.

### Regional Growth Centers

Auburn	Redmond
Bellevue Downtown	Renton
Burien	SeaTac
Federal Way	Seattle Downtown
First Hill/Capitol Hill	South Lake Union
Issaquah	Totem Lake
Kent	Tukwila
Northgate	University Community
Overlake	Uptown

### Manufacturing/Industrial Centers

Ballard/Interbay
Duwamish
Kent
North Tukwila

## Transit Activity Centers

Each transit activity center identified below meets one or more of the following criteria:

- Is located in an area of mixed-use development that includes concentrated housing, employment, and commercial activity
- Includes a major regional hospital, medical center or institution of higher education located outside of a designated regional growth centers
- Is located outside other designated regional growth centers at a transit hub served by three or more all-day routes.

The size of these transit activity centers varies, but all transit activity centers represent concentrations of activity in comparison to the surrounding area. Transit activity centers are listed below:

Alaska Junction	Columbia City Station	Factoria
Aurora Village Transit Center	Covington	(Factoria Blvd SE/SE Eastgate Wy)
Ballard	(172nd Ave SE/SE 272nd St)	Fairwood
(Ballard Ave NW/NW Market St)	Crossroads	(140th Ave SE/SE Petrovitsky Rd)
Beacon Hill Station	(156th Ave NE/NE 8th St)	Maple Valley
Black Diamond	Crown Hill	(Four Corners, SR-169/Kent-Kangley Rd)
Bothell (UW Bothell/Cascadia Community College)	(15th Ave NW/NW 85th St)	Fremont
Carnation	Des Moines	(Fremont Ave N/N 34th St)
Central District	(Marine View Dr/S 223rd St)	Georgetown
(23rd Ave E/E Jefferson St)	Duvall	(13th Ave S/S Bailey St)
Children’s Hospital	Eastgate (Bellevue College)	Green River Community College
	Enumclaw	

Greenwood  
(Greenwood Ave N/N 85th St)  
Harborview Medical Center  
Highline College  
Issaquah Highlands  
Issaquah  
(Issaquah Transit Center)  
Juanita  
(98th Ave NE/NE 116th St)  
Kenmore  
(Kenmore Park and Ride)  
Kent East Hill  
(104th Ave SE/SE 240th St)  
Kirkland (Kirkland Transit Center)  
Kirkland (South Kirkland Park and  
Ride)  
Lake City  
Lake Forest Park  
Lake Washington Institute of  
Technology  
Madison Park  
(42nd Ave E/E Madison St)  
Magnolia  
(34th Ave W/W McGraw St)  
Mercer Island  
Mount Baker Station  
Newcastle  
North Bend  
North City (15th Ave NE/NE 175th St)  
Oaktree (Aurora Ave N/N 105th St)  
Othello Station  
Rainier Beach Station  
Renton Highlands  
(NE Sunset Blvd/NE 12th St)  
Renton Technical College

Roosevelt  
(12th Ave NE/NE 65th St)  
Sammamish  
(228th Ave NE/NE 8th St)  
Sand Point  
(Sand Point Way/NE 70th St)  
Shoreline  
(Shoreline Community College)  
Snoqualmie  
SODO  
(SODO Busway/Lander St)  
South Mercer Island  
South Park  
(14th Ave S/S Cloverdale St)  
South Seattle College  
Tukwila International Blvd Station  
Twin Lakes  
(21st Ave SW/SW 336th St)  
Valley Medical Center  
Vashon  
Wallingford  
(Wallingford Ave N/N 45th St)  
Westwood Village  
Woodinville  
(Woodinville Park and Ride)

## APPENDIX 2: CORRIDORS EVALUATED FOR ALL-DAY AND PEAK NETWORK

**Note:** Shaded corridors do not currently have service on them.

Connections		
Between	And	Via
Admiral District	Southcenter	California Ave SW, Military Rd, TIBS
Alki	SODO Station	Alaska Junction
Auburn	Burien	Kent, SeaTac
Auburn	Pacific	Algona
Auburn/GRCC	Federal Way	15th St SW, Lea Hill Rd
Aurora Village	Northgate	Meridian Ave N
Aurora Village	Seattle CBD	Aurora Ave N
Avondale	Kirkland	NE 85th St, Redmond Way, Avondale Rd NE
Ballard	Northgate	Holman Road
Ballard	Seattle CBD	15th Ave W
Ballard	Seattle CBD	Fremont, South Lake Union
Ballard	University District	Green Lake, Greenwood
Ballard	University District	Wallingford (N 45th St)
Beacon Hill	Seattle CBD	Beacon Ave
Bellevue	Eastgate	Lake Hills Connector
Bellevue	Redmond	NE 8th St, 156th Ave NE
Bellevue	Renton	Newcastle, Factoria
Burien	Seattle CBD	1st Ave S, South Park
Burien	Seattle CBD	Delridge, Ambaum
Burien	Seattle CBD	Des Moines Mem Dr S, South Park
Capitol Hill	Seattle CBD	15th Ave E
Capitol Hill	Seattle CBD	Madison St
Capitol Hill	White Center	South Park, Georgetown, Beacon Hill, First Hill
Central District	Seattle CBD	E Jefferson St
Colman Park	Seattle CBD	Leschi, Yesler Way
Discovery Park	Seattle CBD	Gilman Ave W, 22nd Ave W, Thorndyke Ave W
Eastgate	Bellevue	Newport Way , S. Bellevue, Beaux Arts
Eastgate	Bellevue	Somerset, Factoria, Woodridge
Eastgate	Overlake	Phantom Lake
Enumclaw	Auburn	Auburn Way S, SR 164
Fairwood	Renton	S Puget Dr, Royal Hills
Federal Way	Kent	Military Road S
Federal Way	SeaTac	SR-99
Fremont	Broadview	8th Ave NW
Fremont	Seattle CBD	Dexter Ave N
Fremont	University District	N 40th St
Green River CC	Kent	132nd Ave SE
Greenwood	Seattle CBD	Greenwood Ave N
High Point	Seattle CBD	35th Ave SW
Issaquah	Eastgate	SE Newport Way
Issaquah	North Bend	Fall City, Snoqualmie



Connections		
Between	And	Via
Issaquah	Overlake	Sammamish, Bear Creek
Kenmore	Kirkland	Juanita
Kenmore	Shoreline	Lake Forest Park, Aurora Village TC
Kenmore	Totem Lake	Finn Hill, Juanita
Kennydale	Renton	Edmonds Ave NE
Kent	Burien	Kent-DM Rd, S. 240th St, 1st Ave S
Kent	Maple Valley	SE Kent-Kangley Road
Kent	Renton	84th Ave S, Lind Ave SW
Kent	Renton	Kent East Hill
Kent	Seattle CBD	Tukwila
Kirkland	Bellevue	South Kirkland
Kirkland	Factoria	Overlake, Crossroads, Eastgate
Lake City	Seattle CBD	NE 125th St, Northgate, I-5
Lake City	University District	35th Ave NE
Lake City	University District	Lake City, Sand Point
Laurelhurst	University District	NE 41st St
Madison Park	Seattle CBD	Madison St
Madrona	Seattle CBD	Union St
Magnolia	Seattle CBD	34th Ave W, 28th Ave W
Mercer Island	S Mercer Island	Island Crest Way
Mirror Lake	Federal Way	S 312th St
Mount Baker	Seattle CBD	31st Ave S, S Jackson St
Mount Baker	University District	23rd Ave E
Mount Baker Transit Ctr	Seattle Center	Martin Luther King Jr Way, E John St, Denny Way
Mountlake Terrace	Northgate	15th Ave NE, 5th Ave NE
Northeast Tacoma	Federal Way	SW 356th St, 9th Ave S
Northgate	Seattle CBD	Green Lake, Wallingford
Northgate	University District	Roosevelt Way NE
Othello Station	SODO	Columbia City Station
Overlake	Bellevue	Bell-Red Road
Overlake	Bellevue	Sammamish Viewpoint, Northup Way
Queen Anne	Seattle CBD	Queen Anne Ave N
Queen Anne	Seattle CBD	Taylor Ave N
Rainier Beach	Capitol Hill	Rainier Ave S
Rainier Beach	Mount Baker Transit Ctr	Martin Luther King Jr Way S
Rainier Beach	Seattle CBD	Rainier Ave S
Redmond	Duvall	Avondale Rd NE
Redmond	Eastgate	148th Ave, Crossroads, Bellevue College
Redmond	Totem Lake	Willows Road
Renton	Burien	S 154th St
Renton	Enumclaw	Maple Valley, Black Diamond
Renton	Rainier Beach	West Hill, Rainier View
Renton	Renton Highlands	NE 4th St, Union Ave NE
Renton	Seattle CBD	Martin Luther King Jr Way S, I-5
Renton	Seattle CBD	Skyway, S. Beacon Hill
Renton Highlands	Renton	NE 7th St, Edmonds Ave NE
Richmond Beach	Northgate	Richmond Beach Rd, 15th Ave NE
Roosevelt	UW	University Way



Connections		
Between	And	Via
Sand Point	Cowen Park	View Ridge, NE 65th St
Sand Point	University District	NE 55th St
Shoreline	University District	Jackson Park, 15th Ave NE
Shoreline CC	Greenwood	Greenwood Ave N
Shoreline CC	Lake City	N 155th St, Jackson Park
Shoreline CC	Northgate	N 130th St, Meridian Ave N
Totem Lake	Seattle CBD	Kirkland, SR-520
Tukwila	Des Moines	McMicken Heights, Sea-Tac
Tukwila	Fairwood	S 180th St, Carr Road
Tukwila	Seattle CBD	Pacific Hwy S, 4th Ave S
Twin Lakes	Federal Way	S 320th St
Twin Lakes	Federal Way	SW Campus Dr, 1st Ave S
University District	Bellevue	SR-520
University District	Seattle CBD	Broadway
University District	Seattle CBD	Eastlake, Fairview
UW Bothell	Redmond	Woodinville, Cottage Lake
UW Bothell	University District	Kenmore, Lake Forest Park, Lake City
UW Bothell/CCC	Kirkland	132nd Ave NE, Lake Washington Tech
Vashon	Tahlequah	Valley Center
West Seattle	Seattle CBD	Fauntleroy, Alaska Junction
White Center	Seattle CBD	16th Ave SW, South Seattle College
Woodinville	Kirkland	Kingsgate

## APPENDIX 3: GLOSSARY

**Access service:** See *Paratransit (Access) service*.

**ADA:** Americans with Disabilities Act of 1990: Civil rights legislation that provides a national mandate for the elimination of discrimination against individuals with disabilities with specific requirements for public transit agencies. ADA requires the provision of demand response transportation service for individuals with disabilities who are unable to use fixed route transportation systems.

**All-day service:** Routes that operate in two directions throughout the majority of the day. These routes are the basis of Metro's network and account for the most service resources. All-day services operate during the peak, off-peak, and night time periods on weekdays and weekends.

**Alternative services:** Transportation services tailored to community needs that Metro plans and provides with partners throughout King County. Often, these communities lack the infrastructure, density or land use to support traditional, fixed-route bus service. Metro's alternative services include VanPool, VanShare, Community Access Transportation (CAT), Dial-A-Ride Transit (DART), Community Shuttles, Community Hub, TripPool, Community Van, and Real Time Rideshare. Additional alternative services will be developed as market conditions and technology evolves.

**Base:** A site where buses are fueled, stored, and maintained. Bases include parking, maintenance bays, parts storage, fuel storage, cleaning facilities, and operation facilities. Bases also include facilities to support employees such as office space, driver lockers, and meeting rooms.

**Boarding:** See *Ride*.

**Centers:** Activity nodes throughout King County that form the basis for the countywide transit network. See Manufacturing/Industrial center, Regional growth center and Transit activity center.

**Community Access Transportation (CAT):** A program that complements paratransit (Access) service by filling service gaps in partnership with nonprofit agencies, such as those serving seniors or people with disabilities.

**Community Shuttle:** A route that Metro provides through a community partnership; these shuttles can have flexible service areas if it meets the community needs.

**Corridor:** A major transit pathway that connects regional growth, manufacturing/industrial, and/or activity centers; park-and-rides and transit hubs; and major destinations throughout King County.

**Crowding:** A transit trip that, on average, has more passengers than the acceptable passenger load, based on each type of bus. The acceptable passenger load calculation is based on the number of seats and an allowance of four square feet of floor space per standing passenger. A transit trip is considered crowded when, on average, it has a passenger load over the acceptable passenger load. Trips with standing loads for 20 minutes or longer are also considered to be crowded. This can also be referred to as "overcrowding" or "passenger crowding."

**Dial-A-Ride Transit (DART) service:** Scheduled transit routes in which individual trips may deviate from the fixed route to pick up or drop off a passenger closer to their origin or destination. All current DART routes include a fixed route portion in which passengers can access service from regular bus stops. DART routes can also be referred to as Demand Area Response Transit routes.

**Equity and Social Justice (ESJ):** King County's Equity and Social Justice work is grounded in the 2010 "fair and just" ordinance (Ordinance 16948), which requires King County to intentionally consider equity and integrate it into our decisions and policies, county practices and engagement with the organization as well as communities. Equity is defined as all people having full and equal access to opportunities that enable them to attain their full potential. Social justice is defined as all aspects of justice, including legal, political and economic, and requires the fair distribution of public goods, institutional resources and life opportunities for all people.

**Fixed-route service:** Scheduled transit service in which trips follow a specified path and passengers can access service from regular bus stops.

**Geographic value:** Providing public transportation products and services throughout King County, connecting centers, and facilitating access to jobs, education and other destinations for as many people as possible. Metro provides services that are appropriate to the land use, employment and housing densities and transit demand in various communities.

**Headway:** The time interval between buses traveling on the same route in the same direction. This can also be referred to as “frequency.”

**Layover:** 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. Layover can also be used to describe a designated location for a transit vehicle at or near the end of the route where the vehicle operates out of service and takes its scheduled layover time.

**Load:** The number of passengers on the bus at a given time. This is a method of measuring the ridership demand on a bus trip at a given time.

**Long-range plan:** The King County Metro Long Range Public Transportation Plan is a 25-year service, capital and financial plan for transit services operated, or planned by King County Metro. Along with the near-term needs identified through the service guidelines, the long-range plan guides future service and capital investments and forecasted financial needs.

**Low income:** A household earning less than 200 percent of the federal poverty level.

**Low-income census tract:** A census tract in which the percentage of the population that is low-income is greater than that of the county as a whole.

**Low-income corridor:** A corridor in which the percentage of inbound weekday boardings in low-income census tracts is greater than the average percentage of inbound weekday boardings in low-income census tracts for the county.

**Low-income route:** A route in which the percentage of inbound weekday boardings in low-income census tracts is greater than the average percentage of inbound weekday boardings in low-income census tracts for the county.

**Manufacturing/industrial center:** As defined in Puget Sound Regional Council’s (PSRC) Vision 2040 plan, an area of intensive manufacturing and/or industrial activity. PSRC expects these centers to accommodate a significant share of the region’s manufacturing industrial employment growth.

**Maximum (Max) load:** The highest number of passengers on the bus at a given time, averaged on a per trip basis over the course of a service change. This is a method of measuring the highest demand for a specific bus trip.

**Minority census tract:** A census tract in which the minority population percentage is greater than that of the county as a whole.

**Minority corridor:** A corridor in which the percentage of inbound weekday boardings in minority census tracts is greater than the average percentage of inbound weekday boardings in minority census tracts for the county.

**Minority route:** A route in which the percentage of inbound weekday boardings in minority census tracts is greater than the average percentage of inbound weekday boardings in minority census tracts for the county.

**Night:** *See Time period.*

**Off-peak:** *See Time period.*

**On-time:** An arrival at a timepoint that is no more than five minutes late or one minute early relative to the scheduled arrival time.

**Overcrowding:** *See Crowding.*

**Paratransit (Access) service:** King County Metro’s ADA service, which is a primarily van-operated, demand responsive service with variable routes and schedules. Access provides trips to eligible people with disabilities who are unable to use Metro’s fixed-route or DART service. Passengers must apply and be found eligible to use Access service in advance of making a trip.

**Park-and-ride:** A facility where transit passengers may park their personal vehicles and catch a bus, train, vanpool or carpool to reach their final destination. Park-and-ride lots are built, owned, leased, and maintained by a number of different agencies.

**Partner:** Any organization external to King County Metro that shares resources with Metro to help advance opportunities and conditions for using alternatives to driving alone. Metro has worked with partners to design and deliver services, facilities, access, policies, program/product design, and incentives. Partners have included local, regional and state agencies; employers, institutions and schools; community and human service organizations; other transit providers, property owners or managers; and other businesses and entities.

**Partnership:** A relationship in which King County Metro and an external organization work together to help advance opportunities and conditions for travelers to use alternatives to driving alone. Partnerships enable Metro to leverage public and private resources to design and deliver services, facilities, access, policies, program/product design and incentives. Partners have included local, regional and state agencies; employers, institutions and schools; community and human service organizations; other transit providers, property owners or managers; and other businesses and entities. Partnerships as described in the Service Guidelines do not indicate a legal relationship and are not the same as vendor or contractor relationships.

**Passenger miles per platform mile:** Total miles traveled by all passengers divided by the total miles the bus operates from the time it leaves its base until it returns. One of two measures Metro uses to assess the service performance of each route. *See also, Base and Rides per platform hour.*

**Passenger-minutes:** The total number of minutes traveled by all passengers on the bus.

**Passenger crowding:** *See Crowding.*

**Peak-only service:** Routes that operate primarily during peak travel periods on weekdays from 5:00-9:00 a.m. and 3:00-7:00 p.m., primarily in one direction. Peak-only service connects passengers between residential areas and job centers and back.

**Productivity:** Making the most efficient use of resources and targeting transit service to the areas of the county with the most potential for use. Metro uses the term productivity in two important ways in the service guidelines:

1. **Corridor productivity:** The potential market for transit based on the number of households, park-and-ride stalls, jobs and students along the corridor. Higher concentrations of people support higher use of transit.
2. **Route productivity:** The actual use of transit, determined using two performance measures of ridership—rides per platform hour and passenger miles per platform mile.

**Real-Time Rideshare:** An on-demand carpool program using mobile and web-based applications to match up drivers with passengers who want to share a ride. Riders pay a small fare through the app, and drivers earn a per-mile fee. The program is being piloted in Southeast Redmond and Willows Road. This is one of Metro's alternative services.

**Regional growth center:** As defined in PSRC's Vision 2040 plan, a defined focal area within a city or community that has a mix of housing, employment, retail, services and entertainment uses, and that is pedestrian-oriented. PSRC expects these centers to receive a significant portion of the region's growth in population and jobs.

**Ride:** Every time a passenger boards a bus. This can also be referred to as a "boarding."

**Ridership:** Sum of rides over a specified time period. For purposes of the Service Guidelines corridor analysis, ridership is accounted for by measuring passenger loads. *See Load.*

**Rides per platform hour:** Total number of rides divided by the total hours a bus travels from the time it leaves its base until it returns. One of two measures Metro uses to assess the service performance of each route. *See also, Base and Passenger miles per platform mile.*

**Route:** A single path of travel, with identified stops and scheduled service. Routes are typically identified with numbers, such as Route 1.

**Schedule adherence:** *See Schedule reliability.*

**Schedule reliability:** A measure used to determine how often a route is late, measured as the percentage of trips that, on average, arrive more than 5 minutes late. This threshold allows for variations in travel time, congestion and ridership.

**Service restructure:** Changes to multiple Metro routes along a corridor or within a large area consistent with the service design criteria in the Service Guidelines. Restructures may be prompted by a variety of circumstances, and in general are made to improve the efficiency and effectiveness of transit service as a whole, to better integrate with the regional transit network, or to reduce Metro's operating costs because of budget constraints.

**Service types:** Categories of service based on chosen criteria. Metro's current service types are Urban and Suburban.

- **Urban** routes primarily serve the densest parts of the county, including Seattle Downtown, First Hill/Capitol Hill, South Lake Union, the University Community, or Uptown
- **Suburban** routes primarily serve passengers in suburban and rural areas in Seattle and King County

- **Dial-a-Ride Transit and shuttles** are those that provide flexible, community-based service that has different characteristics than the fixed-route system. These services are held to different standards than those outlined for the fixed-route network below. These standards are under development and will be included in Metro's annual service guidelines reports. These services are described in more detail in the Alternative Services section of the guidelines on page 25.

**Service span:** The span of hours over which service is operated. Service span often varies by weekday. For example, a route's service span could be from 5 a.m. to 9 p.m.

**Social equity:** All people having full and equal access to opportunities that enable them to attain their full potential. As applied to transit, social equity involves ensuring there are travel opportunities for historically disadvantaged populations, such as people of low-income, students, youth, seniors, minorities, people with disabilities, and others with limited transportation options. Metro measures social equity in a quantitative way using low-income and minority populations, in accordance with federal law.

**Span:** See *Service span*.

**Standing load time:** The number of consecutive minutes where there are more people on the bus than the number of seats provided.

**Target service level:** A goal amount of service Metro assigns each corridor in the All-Day and Peak-Only Network, based on measures of productivity, social equity and geographic value. The All-Day and Peak-Only Network analysis compares the target service levels to existing service to determine whether a corridor is below, at, or above the target levels. Target service levels are Very Frequent, Frequent, Local, Hourly, Peak-only, and Alternative Services (defined below). If a corridor is below its target service level, it is identified for investment need. See also, *Productivity, Social Equity and Geographic Value*.

- **Very frequent** corridors serve very large employment and transit activity centers and very dense residential areas.
- **Frequent** corridors generally serve major employment and transit activity centers and very dense residential areas.

- **Local** corridors generally serve regional growth centers and residential areas with low- to medium-density.
- **Hourly** corridors generally connect low-density residential areas to regional growth centers.
- **Peak-only** services provide specialized service in the periods of highest demand for travel. Peak-only services generally provide service to a major employment center in the morning and away from a major employment center in the afternoon.
- **Alternative Services** (see entry on p.41)

**Title VI of the Civil Rights Act of 1964:** The Civil Rights Act of 1964 outlaws discrimination based on race, color, religion, sex, or national origin. Title VI prevents discrimination by government agencies that received federal funds.

**Transit priority treatment:** Any operational practice or infrastructure element that helps buses move more quickly along a street or along their route, with more consistent travel times. Within this definition there are four categories of strategies—bus operations, traffic control, infrastructure and bus lanes.

**TripPool:** Real-time ridesharing in which neighbors share a ride to the Park-and-Ride in a Metro van using a smartphone app to coordinate rides. TripPool vans get reserved parking at Park-and-Rides.

**Through-route:** When a bus on one route reaches the end of its route and immediately begins service on another route within a layover. Passengers can remain on the bus and continue from one route to the other without transferring or paying another fare.

**Time period:** An interval of time that identifies different passenger travel patterns and service levels. Metro has three time periods: Peak, Off-Peak, and Night (defined below).

- **Peak** period is from 5-9 a.m. and 3-7 p.m. on weekdays. This is the highest demand time period for the road network and transit service.
- **Off-Peak** period is from 9 a.m.-3 p.m. on weekdays and 5 am-7 pm on weekends.
- **Night** period is from 7 p.m.-5 a.m. every day of the week.

**Trip:** A single journey from one place to another. There are two types of trips that Metro considers: a person trip and a vehicle trip.

- **Person trip:** An individual's journey from an origin to a destination; can involve multiple rides and multiple modes.
- **Vehicle trip:** The scheduled movement of a transit vehicle from an origin (often a route start point) to a destination (often a route end point) at a particular time on a particular day (weekday, Saturday, or Sunday).

**Transit activity centers:** Areas of activity that include major destinations and transit attractions, such as large employment sites, significant healthcare institutions and major social service agencies. Transit activity centers form the basis for an interconnected transit network throughout the urban growth area and support geographic value in the distribution of the network. See p. 34 for a list of Metro-defined transit activity centers.

**VanPool:** A high-occupancy transportation mode in which groups of five or more commuters share a ride to work, using a Metro-supplied van.

**VanShare:** A high-occupancy transportation mode in which groups of five or more commuters share the ride between home or work and a public transit link or transit hub.



DRAFT

SERVICE STANDARDS AND  
PERFORMANCE MEASURES  
2010 EDITION

June 2010



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# **SERVICE STANDARDS AND PERFORMANCE MEASURES 2010 EDITION**

## **INTRODUCTION**

### **PURPOSE**

Service standards are a set of guidelines that are used to design, evaluate and modify transit service. Because funding available for Sound Transit service is limited, there is a need to obtain optimum efficiency and effectiveness out of each component of the system while maintaining or improving the quality of service. In addition, the planning and day-to-day management of transit service should be based on criteria that is explicit and yet flexible in interpretation and application. These Service Standards are intended not as rigid planning rules but as a tool to assist Sound Transit staff and Board members in making decisions about service.

### **BACKGROUND**

Since 1998, Sound Transit has used the *Service Standards and Performance Measures* to help plan and manage Sound Transit service. The standards provide guidelines for the service evaluation and service change process. The ST Express section also includes detailed guidelines for service design to ensure that Sound Transit bus routes reflect the characteristics of a high speed, limited-stop regional system. The original 1998 standards were amended by the Sound Transit Board in 2006 to include sections on Sounder commuter rail and Tacoma Link light rail. The 2010 edition includes a new section on service standards and performance measures for Central Link light rail, together with updates of the ST Express bus standards.

## ST EXPRESS BUS SERVICE STANDARDS

### A. ST EXPRESS SERVICE CONCEPT

*Sound Move*, Sound Transit's Phase I master plan, includes this description of the Regional Express bus system (now called by the brand name "ST Express"):

Regional express bus services are high-speed routes that operate in both directions throughout the day. These routes would operate primarily on existing, heavily traveled state and federal Interstate corridors using HOV lanes and major arterials with necessary improvements to maintain travel speeds and reliability consistent with *Sound Move*. These corridors would provide substantially higher passenger capacity, speed and service frequency than existing service. The routes would be provided in corridors without rail service or in corridors where rail is planned (to help build a strong transit market before the rail line is in place). When the rail system is extended along corridors served by regional bus, the bus route may be eliminated to avoid duplicating service.

—*Sound Move*, Appendix D, Page D-4.

*Sound Move* also listed these specific characteristics of ST Express routes:

- Serves a major travel corridor directly
- Operates all day, every day
- Runs frequently, generally with 15 minute two-way service
- Operates at reasonably high speeds, generally averaging 18 to 20 m.p.h. with stops, using HOV lanes and other systems giving priority to transit such as signal preemption when available
- Connects two or more of the designated urban centers in the Puget Sound Regional Council *Vision 2020* plan
- Crosses city or county boundaries and carries a significant portion of passengers traveling between jurisdictions
- Provides connections to commuter rail, light rail, ferries, other express buses and local service networks.

## B. ST EXPRESS SERVICE DESIGN GUIDELINES

The direction provided by *Sound Move* has resulted in a unique type of transit service in the Central Puget Sound region. ST Express routes are designed to provide fast, point-to-point public transportation using direct paths between major activity centers. The activity centers served by ST Express function both as trip destinations and as connection points to other bus and rail lines. ST Express routes respond to a dispersed regional development pattern that requires faster, more competitive travel times and convenient connections to access the region's multiple activity centers.

Transit bus service can take many forms. These service design guidelines were developed so that Sound Transit express bus service reflects the operating parameters and service characteristics described in *Sound Move*. They also provide service design continuity so that the system is more easily understood and communicated to the public. The guidelines are indications of general policy and are not intended to be a set of rigid design standards. They should be applied on a case-by-case basis with consideration of the many factors that determine the optimum service design.

### ***Changes to Service Design Guidelines since the 1999 Edition***

*All-day, two-way service:* Since the first edition of the Service Standards was approved, all of the planned *Sound Move* bus routes have been implemented. In general, the system reflects the regional express service characteristics described in the original *Sound Move* plan. However, in some corridors, the objective of two-way, all-day service has not been achieved due to limited demand or lack of resources. In other corridors, peak period demand has been higher than expected, so resources originally intended for off-peak service have instead been used to address peak period commuter needs.

To reflect these realities, the Service Design section of the Service Standards no longer requires existing ST Express routes to provide all day, two-way, seven-day-a-week service. Peak directional routes and routes with limited spans of service will be evaluated using the same performance indicators and rating system as other ST Express routes.

*“Direct Express” and “Local Express”:* the original Service Standards described two tiers of ST Express service: “Direct Express” routes and “Local Express” routes. “Direct Express” routes were defined as routes that stop at a very limited number of locations to provide fast, direct trips during peak demand times or between locations where a high level of demand exists. “Local Express” routes were defined as routes that stop at all or nearly all primary and secondary transit centers along its path. The “Locals” were intended to provide service to lower demand locations and during low demand time periods.

In practice, routes were implemented that had both “Direct Express” and “Local Express” characteristics, making it impossible to classify individual routes. In addition, the term “Local Express” appears contradictory and could result in confusion over the role of ST Express in the regional transit network. As a result, these categorizations have been deleted in the Service Standards.

*Changes to Guidelines for Route Deviations:* The formula used to evaluate proposed mid-route deviations has been changed to provide more flexibility. Deviations of up to 10 minutes will be

considered if the number of boardings and alightings along the deviation equals 50 percent or more of the through passengers. Deviations of less than 10 minutes will require proportionately fewer boardings to meet the criteria (see Section 6, Deviations).

## ***Service Design Guidelines***

### **1. Routing on Streets and Highways**

ST Express routes should use High Occupancy Vehicle (HOV) lanes wherever possible in order to minimize travel times and improve on-time performance. Other improvements such as special HOV ramps connecting limited access highways with transit centers and park-and-ride lots should also be utilized where available. When operating in mixed traffic, ST Express routes should use designated state route limited access highways and major regional arterials. Operation on secondary arterials and collector/distributor streets should be avoided except when needed to access transit/HOV facilities, significant travel destinations, or turnaround loops.

### **2. Key Transfer Points**

Vital to the success of the ST Express is the ability for passengers to access these routes from the other transit systems in the Sound Transit service area. At key transit centers, connections between ST Express routes and local routes will be coordinated to the maximum extent feasible. Dwell time standards will be used for mid-route transfer points (see Section 11, Schedule Efficiency). Schedules for ST Express routes should be designed to minimize connection times at the key transfer points where significant numbers of transferring passengers access ST Express service. Where more than one such location exists on an ST Express route, it may not be possible to provide direct timed transfers at all locations. A number of techniques should be explored to minimize waiting times in these situations, including:

- Prioritizing each location based on actual or projected number of boardings and alightings.
- Offsetting the ST Express route schedule to equalize the transfer waiting times at multiple transfer locations.
- Providing more frequent service, such as 15-minute headways or better, at key times when transfer volumes are greatest.
- Other types of schedule coordination.

If these or other scheduling techniques are not feasible, then as a last resort the possibility of modifying the transit center pulse times should be explored with the local operator. This would normally be a consideration when all, or nearly all, of the schedules serving the transit center in question are based solely on the transit center pulse times.

### **3. Service Span**

The service span, or the hours of operation of an individual route, should be based on demand and relate to the operating times of the activity centers being served and the service span of the connecting local transit system. Some routes may operate only during weekday peak periods while others may operate all day, seven days a week. Other routes may operate all day on weekdays but provide no weekend service. As a general guide, three levels of service are defined for different operating time periods:

- *Peak service* is generally between the hours of 6:00 a.m. and 9:00 a.m., and between 3:00 p.m. and 6:00 p.m.
- *Base service* is provided in the early morning from 5:00 a.m. and 6:00 a.m., in the mid-day period between 9:00 a.m. and 3:00 p.m., and in the early evening period between 6:00 p.m. and 8:00 p.m. on weekdays, and between 6:00 a.m. and 6:00 p.m. on Saturdays.
- *Reduced service* is between 8:00 p.m. and midnight on weekdays, from 6:00 p.m. to midnight on Saturdays and from 6:00 a.m. to midnight on Sundays. Reduced service is also operated on some holidays.

Service may be provided outside of these hours if there is a reasonable probability that expected ridership will maintain or increase overall route productivity, using the performance indicators described in the “Service Evaluation and Adjustment Process.”

#### 4. Route Headways

Headways are the time intervals in minutes between scheduled trips. Both policy and demand determine a route’s headways. Since ST Express is a high capacity “core” network of regional routes, the use of maximum policy headways helps to preserve system integrity. A route is generally not attractive to a large part of its potential market if headways are too infrequent, and a 30-minute headway or better is highly desirable to keep transfer waiting times reasonable for potential connections at key transfer points. Maximum policy headways are listed below:

Period of Service		
Peak	Base	Reduced
30 minutes	60 minutes	60 minutes

Generally, 60 minutes is the maximum headway that should be operated. However, there may be isolated situations where less frequent service may be appropriate due to financial constraints or when trips are needed to serve travel demand outside of regular service hours.

Headways should conform to regularly recurring clock intervals and should therefore be a multiple of 60, i.e., 15, 20, 30, or 60. This will assist in the scheduling of regular timed transfers between ST Express routes, and between ST Express routes and local routes.

Once service is in place, headways may be reduced (more frequent service provided) if route productivity consistently exceeds the system average or if passenger loads exceed ST Express loading standards. (See Section C, Service Evaluation and Adjustment Process)

#### 5. Directness of Travel

One of the unique aspects of ST Express is that it provides relatively fast service between major origins and destinations throughout the three-county service area. At certain times and in some locations where HOV lanes are provided, travel times between consecutive stops are less than that of a single-occupant automobile. However, most ST Express routes will have stops between major generators that will tend to increase end-to-end travel times. Therefore, it cannot be expected that all routes provide non-stop direct service between major generators with travel times equal to or better than an automobile. In order to increase average transit speeds, the Washington State Department of Transportation and local jurisdictions are encouraged to provide priority treatments for high occupancy vehicles whenever possible.

The “Coefficient of Directness” is computed by dividing the travel time by transit between two major generators by the travel time by automobile between the same two locations. This should not exceed 1.33 for ST Express routes.

## **6. Deviations**

Mid-route deviations that cause a route to backtrack, or significantly deviate from the most direct route between major travel generators, should be avoided. In some instances, a deviation is warranted because of potential ridership gains. In evaluating a proposed deviation it should be determined that the total additional travel time for all through passengers should not exceed 10 minutes for each boarding and alighting along the deviation. This is expressed in the following formula:

$$(P_t * T) / P_d \leq 10 \text{ minutes}$$

P<sub>t</sub> = Number of through passengers

T = Addition vehicle travel time

P<sub>d</sub> = Number of boardings and alightings on the deviation

## **7. Short Turns**

Routes that experience a significant drop in demand at a certain point should be considered for short turns. Short turns are selected trips scheduled to turn around before reaching the end of the route, thus providing more capacity on the segment of the route with the greatest demand. Since the objective for employing a short turn on a route is a more efficient utilization of resources, it should not result in excessive layover.

## **8. Duplication of Service**

Outside of major activity centers, operation of more than one route on the same street or a closely parallel street should be avoided except where there is a high level of demand or HOV lane or special transit priority treatment. Schedules of routes operating on the same street should be coordinated to optimize service headways where feasible.

## **9. Route Anchors**

Major trip generators located at the end of a route have a positive effect on ridership and can “anchor” the route’s terminal at a logical location. Routes should be scheduled to serve peak passenger demand at these locations.

## **10. Route Terminals and Layover Areas**

Identifying a satisfactory bus layover location at a route terminal can be the most challenging aspect of designing a new ST Express route or modifying an existing one. Capacity for layover should always be evaluated when considering service changes that affect route terminals. Existing off-street layover facilities should be identified and used to the greatest extent possible, and bus layover needs should be addressed during the design process for new transit capital projects such as transit centers, rail stations and park-and-ride lots.

## **11. Schedule Efficiency**

When developing schedules, the amount of time allocated for layover should be a minimum of 15 percent of the total cycle time. A reasonable amount of additional layover time may be provided as necessary to achieve clock headways. If it results in a lower vehicle requirement and does not compromise schedule adherence, layover time can be reduced to between 10 and 15 percent of total cycle time. Layover should be avoided at locations where through passengers are expected.

Dwell time at intermediate stops should be kept to the minimum time needed for passengers to board and alight. Scheduled waiting should occur only for major pulse times at major transit centers if five minutes or less. Local operators should be encouraged to schedule routes to minimize dwell times at mid-route transfer locations. The predominant directional orientation of passengers should be considered in efforts to minimize mid-route dwell time.

## **12. Rail-Bus Integration**

ST Express routes should connect with commuter rail and light rail lines when there is a benefit to passengers in terms of travel time, reliability and/or improved multi-destinational transfer connections.

While Sound Transit is not responsible for planning local bus service, it strongly urges partner transit agencies to develop bus route networks that optimize connections with Sounder commuter rail and Link light rail, especially when such changes improve system productivity and provide a net benefit to passengers in terms of travel time, frequency of service, transfer connections and reliability.

## **13. Bus Stop Spacing**

By definition, express routes make limited stops compared with local transit routes. Passenger stops for ST Express routes should be limited to transit centers, major transfer points and park-and-ride lots. Other stop locations may be considered on a case-by-case basis, but at a minimum, each stop should have at least 25 daily boardings. In downtown Seattle and similar activity centers with very high demand, there can be several closely-spaced stops to avoid sidewalk overcrowding and provide increased geographic coverage.

The selection of ST Express stops should also take into consideration the availability of local transit service on the corridor, the presence of major trip generators along the express route, the location of transfer points with local routes, and the availability of transit-only or HOV lanes, or other facilities that have the potential to increase operating speeds. Since a relatively small portion of the bus stops that exist in the Sound Transit service area will be used for ST Express routes, these stops should be clearly marked as locations where passengers may access this system.

#### **14. Minimum Passenger Amenities**

Since ST Express routes provide connections with local bus systems, it is expected that many passengers will be transferring. Also, the relatively high passenger volumes at ST Express stops make them strong candidates for passenger amenities. At a minimum, all stops in the peak boarding direction should have bus shelters or other means of weather protection for passengers where feasible. Schedule information for ST Express routes should be displayed at all stops in the peak boarding direction.

## C. ST EXPRESS SERVICE EVALUATION AND ADJUSTMENT PROCESS

### ***Changes to Service Evaluation and Adjustment Process since the 1999 Edition***

*Trial Period for New Routes:* Ridership on new routes should reach 100 percent of projections after a two-year trial period, rather than 60 percent (see Section 8, Trial Period for New Routes).

*On-Time Performance Review:* The performance benchmarks for on-time performance have been expanded to include departure times from the start of the route, departure times from mid-route time points (except estimated time points), and arrival times at outer route terminals (see Section 11, On-Time Performance Review).

*New productivity indicator:* The route level performance ratings in the first edition of the Service Standards used three productivity indicators: Boardings per revenue hour, boardings per trip, and fare revenue/operating cost (O&M) ratio. In practice, the fare revenue/O&M cost ratio measure has not been used in the service evaluation process because accurate fare revenue data is not available at the route level. Only the boardings/hour and boardings/trip indicators have been used to rate individual routes. The fare revenue/O&M cost measure is replaced with another indicator, purchased transportation cost per boarding (see Section 12, System Productivity and Effectiveness).

*Title VI Evaluation:* As part of the annual Service Implementation Plan, Sound Transit will assess the impact of major service changes on minority communities and populations in accordance with Federal Transit Administration Title VI requirements (see Section 2, Title VI Evaluation).

### ***Changes to Service Evaluation and Adjustment Process since the 2006 Edition***

*Special Bus Service:* Section 15 has been revised to be consistent with Federal Transit Administration regulations regarding charter bus service. The new standards make it clear that Sound Transit does not operate charter bus service, while allowing unscheduled bus trips that are required in the course of regular transit agency business.

#### **1. Service Changes**

Changes to ST Express service generally occur in one of two ways:

***Service Implementation Plan:*** The annual Service Implementation Plan (SIP), contains staff recommendations for major service changes to be implemented during the upcoming calendar year. Changes at the SIP level may have significant customer and budget impacts, and the SIP is developed on a set schedule in lockstep with the agency budget. SIP recommendations are based on the completion of new transit facilities, major changes in passenger demand patterns, and the performance of individual routes as defined in the Service Standards. Feedback from board members, local jurisdictions, other transit agencies or stakeholder groups may be incorporated into the final SIP recommendations. The SIP requires Sound Transit Board approval for implementation.

***Administrative Service Changes:*** Minor service changes may be approved and implemented at the staff administrative level. Changes that can be made administratively include:

- Any single change, or cumulative changes, in a service schedule that affects the established weekly service hours for a route by 25 percent or less.
- Any change in route location that does not move the location of a stop by more than a half mile.
- In the presence of an emergency that requires change to established routes or schedules or classes of service not meeting the above criteria, the Chief Executive Officer may implement such change for the necessary period of time or until the Sound Transit Board can establish a timeframe.
- Other services, such as tripper service, limited, special and other types of transit routes, may be established by the Chief Executive Officer, consistent with annual budget appropriations and Section 15, Special Bus Service.

Typically, administrative service changes are implemented to address a near-term operational issue, such as passenger overloads, on-time performance, transfer connections or traffic revisions that affect routing. Feedback from customers, local jurisdictions, other transit agencies or stakeholder groups may result in service changes that are implemented administratively. Administrative changes are generally implemented at a regular tri-annual service change date when drivers change assignments, and timetables are reprinted; however, they may be implemented at other times depending on individual circumstances.

## **2. Title VI Evaluation**

Pursuant to Title VI of the Civil Rights Act of 1964 and applicable state and local laws, no person shall be subjected to discrimination on the basis of race, color or national origin in any program or activity performed by or provided for Sound Transit. As part of its annual Draft SIP, Sound Transit will assess the impacts of proposed major service changes on minority transit users and communities using methodology approved by the Federal Transit Administration.

## **3. Service Implementation Plan**

The annual SIP is the cornerstone of the ST Express system's on-going service adjustment process. It identifies recommended service modifications for the upcoming year based on changes in travel patterns, route performance and the application of the Service Standards. It includes a route-by-route report on the status of the system, an evaluation of the services provided, recommended changes to the current routes, and performance objectives in the upcoming year, including ridership and productivity targets. The types of changes proposed will range from minor alignment or schedule adjustments to new or restructured routes. The initial version of each year's SIP will be issued as a draft. Changes may be incorporated during the Sound Transit Board review process. Sound Transit Board approval is required for implementation of the service changes included in the SIP.

## **4. Comprehensive Operational Analysis**

At least every five years, Sound Transit will conduct a Comprehensive Operational Analysis (COA) of the ST Express system. This will involve a detailed analysis of ridership patterns and system operations. It will include on/off passenger counts of every trip on each route separately for weekdays, Saturdays, and Sundays. A running time analysis and schedule adherence check will also be performed. Five-year ridership trends will be reviewed on a systemwide and individual route basis. The COA may include other market research activities as appropriate such as on-board passenger surveys, telephone household surveys, and demographic analysis.

## **5. Ongoing Analysis and Evolution**

In addition to the COA process, an ongoing analysis of schedule efficiency and ridership will be conducted. This evaluation may result in minor adjustments to schedules, elimination or addition of individual trips based on demand, schedule interlining changes, and other minor changes identified by drivers, schedulers and other operations personnel. In general, changes at this scale can be implemented administratively without Sound Transit Board action (see Section 1, Service Changes).

## **6. Evaluation of Service Requests**

Requests for new service and service changes will be evaluated in a systematic way to ensure compliance with the Service Standards. If it appears that a proposal is consistent with the Service Standards, it will move to the Comparative Evaluation phase (see Section 7, Comparative Evaluation).

## **7. Comparative Evaluation**

In conjunction with the annual SIP, a comparative evaluation of proposed new routes, service additions or deletions, and proposed route changes will be conducted to determine the optimum use of available resources. In this phase of the service evaluation process, it is determined whether the resources used for poorly performing routes would be better utilized to improve service on routes exceeding passenger load standards, those with high ridership levels, or others that are not achieving the on-time performance standard. Proposed new routes, service requests and other service modifications will also be considered in the comparative evaluation phase of the process. Proposals that score well in this process will be candidates for inclusion in the Draft SIP.

## **8. Trial Period for New Routes**

The trial period for new routes is 24 months in duration. At 24 months, a new route should reach 100 percent of the ridership levels projected at the beginning of the trial. New routes will then be evaluated using the same performance measures as established routes. In conducting this evaluation for new routes that fall in the poor performing categories for two or more measures, ridership trends will also be considered.

## **9. Percentage of Scheduled Trips Operated**

Systemwide, an average of 99.8 percent or more scheduled trips should be operated as shown on the published timetable during each quarter and calendar year.

## **10. Passenger Load Guidelines**

Ideally, a seat should be available for every ST Express passenger during all periods of operation. However, this is not always possible because of funding constraints or limited vehicle or driver availability. The purpose of load guidelines is to ensure that most passengers will have a seat for at least the majority of their trip. The maximum average load factor is calculated by dividing the total number of passengers passing the maximum load point by the number of seats passing the maximum load point during the operating period being considered. As a guideline, the average load factor during the operating period should not exceed 1.0. Since this is an average, individual trips may exceed the guideline. For individual trips, load factors greater than 1.0 should not be exceeded for time periods greater than 15 minutes or for more than two consecutive stops, whichever is longer.

These guidelines may be relaxed during temporary surges in demand or for special event service.

## **11. On-Time Performance Review**

A key success factor for ST Express is providing convenient and reliable transfers together with schedules the public can depend on. In order to identify routes with serious on-time performance issues, Sound Transit will conduct an annual comprehensive assessment of on-time performance using automatic passenger count data samples together with spot on-street monitoring. The assessment will be based on data collected over at least one service change period. The results of the assessment will allow Sound Transit to rate each route for on-time performance and prioritize where schedule maintenance hours and other actions that improve on-time performance should be focused. Guidelines for on-time performance are listed below. The routes with performance below the levels shown will be candidates for corrective action.

### *On-Time Performance Guidelines:*

- 90 percent of bus trips on each route should depart the route terminus not more than three minutes late and never early.
- 85 percent of bus trips on each route should depart each mid-route scheduled time point not more than five minutes late and never early, except for estimated time points, where buses are allowed to depart early.
- 90 percent of bus trips on each route should arrive at the route terminus not more than seven minutes late.

*Note:* These guidelines may be different from the standards included in the current service agreements with the partner transit agencies. They are intended to assist Sound Transit in prioritizing schedule maintenance efforts. They do not change the on-time performance reporting requirements called for in the agreements.

## **12. System Productivity and Effectiveness**

As part of the annual SIP and Sound Transit budget process, goals are established for ST Express ridership, productivity and effectiveness each calendar year. The Operations Department's *Service Delivery Quarterly Performance Report to the CEO*, available at [www.soundtransit.org](http://www.soundtransit.org), provides a regular "snapshot" of Sound Transit's progress in meeting these goals.

## **13. Route-Level Productivity Ratings**

The route-level productivity and effectiveness review is intended as a planning tool to rate individual ST Express routes. Routes are rated by comparing their performance in three key areas with the performance of the ST Express system as a whole. The objective is a quantitative, first level screening process to flag service that may be reducing system productivity and that may require remedial actions. Routes consistently performing well below average could be subject to a number of actions, including frequency reduction, service span revision, realignment, rescheduling, route consolidation or other restructuring, extensive marketing efforts, or deletion. Conversely, routes with a consistent above-average performance may be candidates for additional trips or other actions that increase service levels and capacity.

It should be emphasized that the route effectiveness ratings are only one of several tools used in the service evaluation process. Other factors, such as system integration, the length of time service has been operating and service to transit-dependent populations may be considered by Sound Transit staff and board members in making decisions about service.

***a. Performance Indicators***

For purposes of the SIP route rating process, productivity and cost effectiveness will be assessed using these three performance indicators:

- Boardings per revenue hour
- Boardings per trip
- Purchased transportation cost per boarding.

*Boardings per revenue hour* is the number of passengers boarding a vehicle during one hour of scheduled revenue service, not including vehicle deadhead or layover time.

*Boardings per trip* are the number of passengers boarding each scheduled one-way trip.

*Purchased transportation cost per boarding* is the cost Sound Transit pays the partner transit agencies for bus operations and maintenance, divided by the number of boardings. The purchased transportation cost is not the full cost of the service, but it represents about 88 percent of the total and is the only major cost that can be allocated accurately at the route level. The purchased transportation cost represents the combined rate of the three partner transit agencies weighted for the percentage of service each agency operates.

***b. Frequency of Route-Level Review***

All ST Express routes will be rated for productivity and effectiveness at least once a year, and the results will be included in the annual SIP. Data from at least one full quarter will be used to calculate system performance and the performance of individual routes. Routes will be rated more frequently if ridership trends are consistently negative, special requests for service are received, or other special circumstances are noted.

***c. Ratings by Time Period***

Ratings will be calculated for each of the following time periods:

- All periods of route operation combined
- Weekday only
- Saturday only
- Sunday/Holiday only

***d. Productivity Ratings***

There are four productivity and effectiveness ratings for ST Express routes:

*Good*

- Service performs at 125 percent or more of the system average in passengers per trip and passengers per revenue hour.

- Service performs at 75 percent or less of the system average in purchased transportation cost per boarding.

*Satisfactory*

- Service performs at 100-125 percent of the system average in passengers per trip and passengers per revenue hour.
- Service performs at 75-100 percent of the system average in purchased transportation cost per boarding.

*Marginal*

- Service performs at 75-100 percent of the system average in passengers per trip and passengers per revenue hour.
- Service performs at 100-125 percent of the system average in purchased transportation cost per boarding.

*Unsatisfactory*

- Service performs at less than 75 percent of the system average in passengers per trip and passengers per revenue hour.
- Service performs at 125 percent or over the system average in purchased transportation cost per boarding.

***e. Methodology***

Each performance rating is assigned a number:

- **1** for Good
- **2** for Satisfactory
- **3** for Marginal
- **4** for Unsatisfactory

These numbers are used to calculate the performance score for individual routes in a process similar to that used for calculating academic grade point averages.

The following steps are used to calculate the combined performance rating of individual routes: A route’s performance in each of the three indicators is compared with the system average and given a numerical score. As an example, compared with the system average, Route 599 has “Good” performance in rides/revenue hour (1), “Good” performance in rides/trip (1) and “Marginal” performance in purchased transportation cost/boarding (3). The scores are added together for a total of 5. This number is divided by 3 (the number of performance indicators) to produce a final numerical score, 1.67, a “Satisfactory” rating. The lower the number the better the overall performance, as shown in the following table:

<b>Performance Rating</b>	<b>Numerical Score</b>
<b>Good</b>	1.0-1.5
<b>Satisfactory</b>	1.5-2.5
<b>Marginal</b>	2.5-3.5
<b>Unsatisfactory</b>	3.5 or above

#### *f. Secondary Screening*

Following the initial ratings, routes with “Marginal” or “Unsatisfactory” performance will undergo a more detailed service evaluation that includes an assessment of productivity and effectiveness by time of day, at the trip level and by route segment.

Routes that rate “Marginal” or “Unsatisfactory” for a period of two years or more may be candidates for actions to improve productivity and cost effectiveness. Types of actions that could be considered include marketing/promotion programs, selective deletion of unproductive route segments or trips, complete restructuring or complete discontinuance of the route.

Routes that rate “Good” or “Satisfactory” for a period of two years or more will be candidates for service enhancements if resources are available, particularly if performance has shown a consistent upward trend.

### **14. Other Productivity Considerations**

In some instances, it may be in the public interest to maintain a poorly performing route or route segment in order to meet a special objective for the system. For example, an ST Express route may provide the only transit access to a vital social service facility. Also, new development or transit facilities that are likely to generate ridership can also be considered. This could include new shopping centers, offices or other employment sites, park-and-ride lots, and HOV lanes or ramps.

### **15. Special Bus Service**

A key Sound Transit objective is improving regional mobility for a variety of trip purposes (Regional Transit System Plan, page 10). If special service helps to achieve a significant transit mode share at a major event, the service provides a public benefit by relieving pressure on major highways and parking facilities near the event venue.

“Special service” is distinct from “extra service,” which is bus service added to regular routes to prevent overloads due to major surges in ridership. Extra service is needed when ridership is expected to temporarily exceed the capacity of regularly-scheduled service due to major events, service disruptions or other temporary circumstances. Sound Transit’s transit agency partners work with ST Express staff to decide whether extra service should be operated based on traffic conditions, the scale of the event or service disruption and previous operational experience. The cost of the extra service is included in the agency budget for ST Express.

“Special” bus service is an infrequent service not using regular ST Express routing and stops. Charter service, defined as demand-response passenger bus service provided at the request of an outside party at a negotiated price, is one kind of special service. As an agency policy, Sound Transit does not provide charter service. However, other kinds of special bus service operation are needed from time to time in the course of regular transit agency business including:

- Field trips to survey routes and schedules of existing or planned ST Express routes or to survey route safety assessments and accident investigations.
- Road tests in the course of everyday vehicle maintenance activities.
- Transportation of Sound Transit employees, other transit agency employees, transit management officials, transit contractors and bidders, government officials and their

official guests to or from facilities or projects within the Sound Transit service area for the purpose of conducting oversight functions such as inspection, evaluation, or review, or for the purpose of emergency preparedness planning and training. Service of this nature is limited to 80 vehicle hours per calendar year.

- “Bus bridge” service necessary during rail service disruptions.
- Bus transportation required during emergencies.

## **SOUNDER COMMUTER RAIL SERVICE STANDARDS**

### **A. SOUNDER SERVICE CONCEPT**

In September 2000, Sound Transit introduced commuter rail as a new mode of public transportation in the Central Puget Sound region. Commuter rail utilizes existing railroad lines to provide high-capacity rail passenger service during peak travel demand times. Quoting from *Sound Move*, “Commuter rail builds on a railroad network already in place, increasing the transportation system’s people-moving capacity and, by making necessary track and signal improvements, improving the capacity of those lines for other passenger and freight trains as well.” Commuter rail provides dependable, on-time service since the tracks it uses have a high degree of grade separation and fully-protected, at-grade road crossings with signals and crossing gates. In many cases, commuter rail provides a faster, more direct route between communities than parallel highway corridors.

Commuter rail trains have the ability to move large volumes of people. One car has seats for at least 145 passengers, and a seven-car train can carry over 1,000 passengers. Thus, each new train trip adds significant capacity to the system.

Using the brand name “Sounder,” Sound Transit commuter rail service is provided on two lines: The **North Line** between Seattle and Everett, with intermediate stations at Edmonds and Mukilteo, and the **South Line** between Seattle and Tacoma, with intermediate stations at Tukwila, Kent, Auburn, Sumner and Puyallup. The South Line will be extended from Tacoma to Lakewood with an intermediate station at South Tacoma. Sounder currently operates on railroad tracks owned by BNSF Railway and Tacoma Rail. The extension from Tacoma to Lakewood will operate on tracks purchased by Sound Transit from BNSF and includes about a mile of new track.

The focal point of the two Sounder lines is the King Street Station at the south end of downtown Seattle. The only Sounder station in Seattle, King Street Station, has very frequent connecting bus service to other parts of the downtown area and express bus connections to points throughout the region. Connections are also made at King Street with numerous employer shuttles and Amtrak intercity trains. Sounder passengers can also connect with Central Link light rail trains one block away at the International District Station.

At outlying stations, commuter rail depends heavily on park-and-ride lots to provide customer access to the service. Park-and-ride facilities are provided at all Sounder stations except King Street. All stations are also served by connecting bus routes and have bus loading and layover facilities.

## B. SOUNDER SERVICE DESIGN

Compared with ST Express, the service design for Sounder commuter rail was largely defined in *Sound Move* and subsequent agreements with the host railroads. Relatively little flexibility exists to restructure the Sounder route network or significantly change the total number of trains operated. The large investment in infrastructure, together with operating agreements with the host railroads, largely define the routes, stops and the level of service that can be provided.

## C. SOUNDER SERVICE EVALUATION AND ADJUSTMENT PROCESS

### 1. Service Changes

Changes to Sounder service generally occur in one of two ways:

***Service Implementation Plan:*** The annual Service Implementation Plan (SIP), contains staff recommendations for major service changes to be implemented during the upcoming calendar year. Examples of changes at the SIP level are the addition or deletion of individual Sounder train trips or stations. SIP changes generally have a financial impact, and the SIP is developed on a set schedule in lockstep with the agency budget. SIP recommendations related to Sounder service are generally driven by the completion of new stations and progress on track and signal improvements. Feedback from board members, local jurisdictions, other transit agencies or stakeholder groups may be incorporated into the final SIP recommendations. The SIP requires Sound Transit Board approval for implementation.

***Administrative Service Changes:*** Minor schedule adjustments and changes to train consists (lengths) may be implemented at the staff administrative level.

### 2. Title VI Evaluation

Pursuant to Title VI of the Civil Rights Act of 1964 and applicable state and local laws, no person shall be subjected to discrimination on the basis of race, color or national origin in any program or activity performed by or provided for Sound Transit. As part of its annual Draft SIP, Sound Transit will assess the impacts of proposed major service changes on minority transit users and communities using methodology approved by the Federal Transit Administration.

### 3. System Performance Report

The Operations Department of Sound Transit publishes the quarterly *Service Delivery Quarterly Performance Report to the CEO*, which tracks progress in meeting the key Sounder service standard performance indicators described below. The report is available on-line at [www.soundtransit.org](http://www.soundtransit.org).

### 4. Percentage of Scheduled Trips Operated

Systemwide, an average of 99.5 percent of all scheduled trips should be operated as shown in the published timetable during each quarter and calendar year.

### 5. On-Time Performance

Systemwide, an average of 95.0 percent of all scheduled trips should arrive at route terminals within seven minutes of the time shown in the published timetable, as recorded each calendar month.

### 6. Passenger Load Guidelines

Ideally, a seat should be provided for every Sounder passenger on all regularly scheduled Sounder trains. This is not always possible because of funding constraints or other factors limiting the ability to add capacity. The purpose of load guidelines is to ensure that most passengers will have a seat for at least a majority of their trip, consistent with the guidelines for ST Express and other express bus operators in the region. For Sounder, the guideline is to

provide seats for all passengers traveling longer than 20 minutes. The following factors quantify these guidelines:

**a. Peak Primary Load Factor:** 0.9 passengers per seat weekly average of all trains passing the maximum load point in the peak direction in the peak hour.

**b. Peak Secondary Load Factor:** 1.0 passengers per seat weekly average on any single train passing the maximum load point in the peak direction in the peak hour except between station pairs less than 20 minutes apart.

These guidelines may be relaxed during temporary surges in demand or for special event trains.

## **7. System Ridership and Productivity**

As part of the annual SIP and agency budget process, goals are established for Sounder system ridership and productivity each calendar year. The Operations Department's *Service Delivery Quarterly Performance Report to the CEO*, described in Section 3 above, lists the ridership and productivity goals for the current year.

## **8. Trip-Level Ridership and Productivity**

The Sounder service standards provide a process for objectively evaluating the productivity of individual Sounder train trips to better understand when remedial actions may be needed. Several potential actions could result from this evaluation. Train trips with consistent low productivity may be candidates for increased marketing, small scheduling adjustments to improve customer convenience, promotional fare discounts or other actions aimed at increasing ridership and productivity. Train lengths (consists) may also be reduced to decrease operating costs. Train trips with high average productivity and/or overcrowding may be candidates for a longer consist, small scheduling adjustments to spread demand or the implementation of a supplemental trip if feasible.

Since each Sounder train trip represents a large increment of both operating costs and passenger capacity, productivity ratings for Sounder focus on the *performance of each trip compared with the route average*. Each of the two Sounder lines has very different service areas, operating characteristics and service history; thus, a different approach is taken to evaluate the productivity of individual train trips on each line.

### **a. North Line Approach**

Trip-level productivity will be evaluated when the full level of service (four weekday round trips) has been in service for at least two years. An evaluation process specific to the North Line will be developed at that time.

### **b. South Line Approach**

- Using the performance criteria and rating system described below, trip-level productivity evaluation for the South Line will start with the 2011 SIP, or whenever all nine planned weekday round trips will have been in operation for at least two years. Line performance at this point in time will be considered the baseline for evaluating individual train trips.

- Establish lower performance criteria for shoulder, midday and reverse-commute trips, recognizing that those trips will have lower ridership and productivity than core peak-direction services and that in some cases they are necessary to position trains for peak-direction service.

**c. South Line Trip-Level Productivity Evaluation**

Three productivity criteria will be used to evaluate individual trips on the South Line when the trip-level evaluation process begins (as stated in above). These criteria are similar to those used for ST Express:

- Boardings per one-way train trip
- Boardings per revenue train hour
- Purchased transportation cost per boarding.

The performance of individual train trips will be compared with the average overall performance of the South Line. The rating categories and performance range for the first two criteria, boardings per one-way trip and boardings per revenue train hour, are shown in the following table:

<b>Rating</b>	<b>Peak direction trip (% of line average)</b>	<b>Shoulder trip (% of line average)</b>	<b>Off-peak direction trip (% of line average)</b>	<b>Midday trip (% of line average)</b>
<i>Good</i>	+125%	100-125%	+40%	+40%
<i>Satisfactory</i>	100-125%	75-100%	25-40%	25-40%
<i>Marginal</i>	75-100%	50-75%	10-25%	10-25%
<i>Unsatisfactory</i>	<75%	<50%	<10%	<10%

This table shows the rating categories and performance range for the purchased transportation cost per boarding criteria:

<b>Rating</b>	<b>Peak direction trip (% of line average)</b>	<b>Shoulder trip (% of line average)</b>	<b>Off-peak direction trip (% of line average)</b>	<b>Midday trip (% of line average)</b>
<i>Good</i>	<75%	75-100%	100-125%	100-125%
<i>Satisfactory</i>	75-100%	100-125%	125-150%	125-150%
<i>Marginal</i>	100-125%	125-150%	150-175%	150-175%
<i>Unsatisfactory</i>	>125%	>150%	>175%	>175%

**d. Frequency of Review**

All Sounder trips will be rated for productivity in the annual SIP beginning two years after all planned *Sound Move* round trip trains are in operation. At a minimum, data from at least one full quarter but not more than one full year will be used to calculate line performance.

**f. Methodology for Calculating Overall Ratings**

Each performance rating is assigned a number:

- 1 for Good
- 2 for Satisfactory
- 3 for Marginal
- 4 for Unsatisfactory

These numbers are used to calculate the performance score in a process similar to that used for calculating academic grade point averages. Here is a hypothetical example: During the most recent quarter, the South Line achieved a “Good” rating in boardings per revenue hour (score 1), a “Good” rating in boardings per trip (score 1), and a “Marginal” rating in purchased transportation cost per boarding (score 3). The scores are added together for a total of 5. This number is divided by 3 (the number of performance indicators) to produce a final numerical score, 1.67, an overall “Satisfactory” rating. The lower the number the better the overall performance, as shown in the following table:

<b>Performance Rating</b>	<b>Numerical Score</b>
Good	1.0-1.5
Satisfactory	1.5-2.5
Marginal	2.5-3.5
Unsatisfactory	3.5 or above

**9. Special Train Service**

A key Sound Transit objective is improving regional mobility for a variety of trip purposes. If special service helps to achieve a significant transit mode share at a major event, the service provides a public benefit by relieving pressure on major highways and parking facilities near the event venue.

Special train service is a one-time or infrequent service designed to transport a large number of passengers directly to an event venue and operates only during the specific time periods when the event is generating demand. Provisions in Sound Transit’s agreements with the operating railroads allow special trains to be operated on a limited basis, subject to crew availability and freight traffic constraints.

Special event trains, while having the ability to move large numbers of people efficiently, are expensive to operate and require a large operating, maintenance and security staff. To be considered for special train service, events must meet the essential criteria listed below. Any consideration of special train service is subject to the availability of budgetary resources; meeting all the criteria does not guarantee that Sound Transit will provide special service.

- The event must be open to the general public.

- The event venue must be located adjacent to a Sounder station or in downtown Seattle, where high-capacity transit connections are available between the King Street Station and the downtown area.
- The event service must carry at least 400 passengers per train trip.
- The event service must be authorized by the operating railroads.
- The event service must have adequate operating, maintenance and security staffing.

In addition to the essential criteria above, events with the following characteristics will be given preference for consideration:

- The event has definite start/finish times when the majority of attendees arrive and depart the venue.
- The event service covers a significant portion of its direct cost through fares, subsidies from outside parties, in-kind services, promotional trades or a combination of these sources.
- The event service mitigates congestion on regional highways and reduces parking requirements in the vicinity of the event venue.
- The event service reduces passenger overloads on regular Sound Transit train and bus service.
- The event service attracts new customers, promotes Sound Transit, generates positive media coverage and community goodwill.

## **TACOMA LINK LIGHT RAIL SERVICE STANDARDS**

### **A. TACOMA LINK SERVICE CONCEPT**

In the Regional Transit Long-Range Plan, Tacoma Link is envisioned as the downtown Tacoma segment of a future Seattle-Tacoma light rail corridor. The current 1.6-mile stand-alone light rail line provides many present-day benefits for downtown Tacoma—connecting five downtown neighborhoods with each other and with regional transportation services at the Tacoma Dome Station including Sounder commuter rail, ST Express buses and intercity buses. Tacoma Link also connects public parking throughout downtown including 2,400 spaces at the Tacoma Dome Station parking garage.

Tacoma Link operations are characterized by fast, efficient service, excellent on-time performance and frequent headways. Low-floor light rail cars allow level platform boarding, reducing dwell time at stations and facilitating access for passengers using wheelchairs. Cars have a large total capacity (56 passengers), but have only 30 seats due to the short trip length. Signal preemption and partial separation from other traffic makes it possible for Tacoma Link cars to complete the trip from one end to the other in only seven to eight minutes. Since the line is short, about half of its length (between Union Station/S.19th and Tacoma Dome Station) is single track to reduce construction costs and right-of-way impact. Signal systems prevent two trains from occupying the single track section simultaneously.

## B. TACOMA LINK SERVICE DESIGN

The service design for Tacoma Link was largely defined during the systems design process. There are five stations: Theater District/S. 9th; Convention Center/ S. 15th; Union Station/S. 19th; S. 25th Street; and Tacoma Dome Station. Compared with ST Express bus, there are few options for adjusting service levels or capacity. Stations require street right-of-way and are difficult and costly to add or relocate. Cars are single units that cannot be coupled together with other cars to form trains, and the single track section effectively limits the system to no more than two cars in operation at any one time. A 10-minute headway can be operated with two cars, while one car can provide a 20-minute headway during periods of lower demand. Thus, there are two options to change service levels: 1) adjust headways, and 2) adjust span of service (the time period that service operates).

## C. TACOMA LINK SERVICE EVALUATION AND ADJUSTMENT PROCESS

### 1. The Service Change Process

Changes to Tacoma Link service generally occur in one of two ways:

***Service Implementation Plan:*** The annual Service Implementation Plan (SIP), contains staff recommendations for major service changes to be implemented during the upcoming calendar year. Changes at the SIP level may have significant customer and budget impacts, and the SIP is developed on a set schedule in lockstep with the agency budget. Examples of potential Tacoma Link SIP changes include any single change or cumulative change in schedules that affect more than 25 percent of weekly service hours and any permanent or long-term closure of a station or line segment. Feedback from board members, local jurisdictions, other transit agencies or stakeholder groups may be incorporated into the final SIP recommendations. The SIP requires Sound Transit Board approval for implementation.

***Administrative Service Changes:*** Minor service changes may be approved and implemented at the staff administrative level. Changes that can be made administratively include:

- Any single change or cumulative change in schedules that affects the established weekly service hours by 25 percent or less. This would include minor changes in trip times and partnerships with outside parties to extend the span of service for special events.
- Temporary closure of stations or line segments made necessary by construction, parades, emergencies or other situations expected to be short-term. Buses may substitute for light rail service during the closure.

### 2. Title VI Evaluation

Pursuant to Title VI of the Civil Rights Act of 1964 and applicable state and local laws, no person shall be subjected to discrimination on the basis of race, color or national origin in any program or activity performed by or provided for Sound Transit. As part of its annual Draft SIP, Sound Transit will assess the impacts of proposed major service changes on minority transit users and communities using methodology approved by the Federal Transit Administration.

### 3. System Performance Report

The Operations Department of Sound Transit publishes the quarterly *Service Delivery Quarterly Performance Report to the CEO*, which tracks progress in meeting the key Tacoma Link service standard performance indicators described below. The report is available on-line at [www.soundtransit.org](http://www.soundtransit.org).

### 4. Percentage of Scheduled Trips Operated

Systemwide, an average of 98.5 percent of all scheduled trips should be operated as shown in the published timetable during each quarter and calendar year.

### 5. On-Time Performance

Systemwide, an average of 98.5 percent of all scheduled trips should operate on schedule as shown in the published timetable during each quarter and calendar year. A trip is late if it either departs a terminal station more than three minutes late or arrives at a terminal station three or more minutes late and is unable to make its subsequent departure time.

## **6. Passenger Load Guidelines**

Since one-way trip time is only seven to eight minutes, standees are permitted, up to the maximum car capacity of 56 passengers (30 seated plus 26 standee passengers). If standees regularly occur on five or more consecutive trips when 20-minute headways are scheduled, this will trigger a review of the existing schedule and available budgetary resources to determine if adjustments are necessary.

## **7. System Ridership and Productivity**

The *Service Delivery Quarterly Performance Report to the CEO*, described in Section 2, includes the Tacoma Link ridership and productivity goals established in the Sound Transit budget for the upcoming calendar year.

## **8. Span of Service and Productivity by Time Period**

As a planning tool to evaluate ridership and productivity, Tacoma Link service is segmented into time periods by time of day and day of the week. The productivity of the different time periods is compared against the system average and then rated according to specific performance criteria. The objective is a quantitative, first level screening process to flag service that may be reducing system productivity and that may require remedial actions. Time periods that consistently perform well below the system average could be subject to a number of actions including increased marketing, small schedule adjustments to improve customer convenience or service reductions (reduced span of service and/or 20-minute headways). Actions could also include a review of alternative services available to passengers during the time period and comparisons with bus service in the vicinity, reflecting both existing and potential new schedules. Conversely, time periods with high average productivity and/or overcrowding may be candidates for a longer span of service and/or 10-minute headways. The service span, or hours of operation, should be based on demand and relate to the operating times of the activity centers being served and the service span of the connecting transit systems.

### ***a. Time Periods***

For purposes of the SIP rating process, the following operating time periods are used:

- *Weekday Peak:* From 6:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 6:00 p.m.
- *Weekday Midday:* From 9:00 a.m. to 3:00 p.m.
- *Saturday/Sunday:* From start of service to 6:00 p.m.
- *Early Morning/Evening:* Before 6 a.m. weekdays and after 6:00 p.m. any day
- *Holiday:* From 10:00 a.m. to 6:00 p.m.

### ***b. Productivity Indicators***

For purposes of the SIP rating process, productivity and cost effectiveness will be assessed using these three performance indicators:

- Boardings per revenue hour
- Boardings per trip
- O&M cost per boarding.

**c. Productivity Ratings**

There are four productivity and effectiveness ratings for Tacoma Link time periods. The rating categories and performance ranges for the first two criteria are listed in this section; boardings per revenue hour and boardings per trip are shown in this table:

<b>Rating</b>	<b>Wkdy Peak (% of system av.)</b>	<b>Wkdy Mid (% of system av.)</b>	<b>Sat/Sun (% of system av.)</b>	<b>Early AM &amp; Evening (% of system av.)</b>	<b>Holiday</b>
<i>Good</i>	+150%	125-150%	100-125%	75-100%	75-100%
<i>Satisfactory</i>	125-150%	100-125%	75-100%	50-75%	50-75%
<i>Marginal</i>	100-125%	75-100%	50-75%	25-50%	25-50%
<i>Unsatisfactory</i>	<100%	<75%	<50%	<25%	<25%

This table shows the rating categories and performance ranges for the O&M cost per boarding criteria:

<b>Rating</b>	<b>Wkdy Peak (% of system av.)</b>	<b>Wkdy Mid (% of system av.)</b>	<b>Sat/Sun (% of system av.)</b>	<b>Early AM &amp; Evening (% of system av.)</b>	<b>Holiday</b>
<i>Good</i>	50-75%	75-100%	100-125%	125-150%	125-150%
<i>Satisfactory</i>	75-100%	100-125%	125-150%	150-175%	150-175%
<i>Marginal</i>	100-125%	125-150%	150-175%	175-200%	175-200%
<i>Unsatisfactory</i>	>125%	>150%	>175%	>200%	>200%

**d. Frequency of Review**

Tacoma Link will be rated for productivity by time period at least once per year, and the results will be included in the annual SIP. At a minimum, data from at least one full quarter but not more than one full year will be used to calculate time period performance.

**e. Methodology for Calculating Overall Ratings**

Each performance rating is assigned a number:

- **1** for Good
- **2** for Satisfactory
- **3** for Marginal
- **4** for Unsatisfactory

These numbers are used to calculate the performance score in a process similar to that used for calculating academic grade point averages. Here is a hypothetical example: During the most recent quarter, the weekday midday time period achieved a “Good” rating in boardings per revenue hour (score 1), a “Good” rating in boardings per trip (score 1), and a “Marginal” rating in O&M cost per boarding (score 3). The scores are added together for a total of 5. This number is divided by 3 (the number of performance indicators) to produce a final numerical score of

1.67, an overall “Satisfactory” rating. The lower the number the better the overall performance as shown in the following table:

<b>Performance Rating</b>	<b>Numerical Score</b>
Good	1.0-1.5
Satisfactory	1.5-2.5
Marginal	2.5-3.5
Unsatisfactory	3.5 or above

## **9. Special Service**

A key Sound Transit objective is improving regional mobility for a variety of trip purposes (Regional Transit System Plan, page 10). If special service helps to achieve a significant transit mode share at a major event, the service provides a public benefit by relieving pressure on major highways and parking facilities near the event venue (Sound Move, Appendix C, page C-12).

“Special service” is distinct from “extra service,” which is service added during regular hours of operation to prevent overloads. Extra service is needed when an event is expected to generate so much demand that more trips are needed to supplement regular service. For example, a second Tacoma Link car may be placed in service when normally only one car is scheduled improving headways from every 20 minutes to every 10 minutes. Sound Transit is generally aware of the time periods when extra service is likely to be needed and budgets for it accordingly.

“Special service” in the context used here is a one-time or irregular service designed to transport passengers to and from an event venue outside of regular Tacoma Link service hours. For example, a large convention may be taking place jointly at the Tacoma Convention Center and the Tacoma Dome with activities scheduled for both venues until 11:00 p.m. Special Tacoma Link trips may be added after the regular service ends at 8:00 p.m. extending service until 11:00 p.m. or later.

Service outside of regular hours, while having the ability to move large numbers of people, is expensive to operate and requires longer hours for operating, maintenance and security staff, often working at overtime rates. To be considered for special service outside regular hours, events must meet the following essential criteria. Any consideration of special service is subject to the availability of budgetary resources; meeting all the criteria does not guarantee that Sound Transit will provide the service.

- The event service must be open to the general public.
- The event venue(s) must be located close to a Tacoma Link station.
- Productivity of the event service is expected to be equal to or better than the system average.
- The event service must have adequate operating, maintenance and security staffing.

In addition to these essential criteria, events with the following characteristics will be given preference for special service:

- A significant portion of the extended service cost is covered by direct payments from outside parties, promotional trades or a combination of these resources.

- The event service mitigates congestion on regional highways and reduces parking requirements in the vicinity of the event venue.
- The event service reduces passenger overloads on regular Sound Transit train and bus service.
- The event service attracts new customers, promotes Sound Transit, generates positive media coverage and community goodwill.

## **CENTRAL LINK LIGHT RAIL SERVICE STANDARDS**

### **A. CENTRAL LINK SERVICE CONCEPT**

Central Link added a new form of high-capacity transit to the Central Puget Sound region when it opened in July 2009. Using a mix of underground tunnels, elevated structures and reserved surface right-of-way, electric-powered Central Link trains serve the region's highest ridership transit corridor with frequent seven-day-a-week service. The initial Westlake Station–Tukwila International Boulevard segment opened with 12 stations. In December 2009, service was extended 1.7 miles from Tukwila to SeaTac/Airport Station, bringing the alignment to 15.6 miles and 13 stations. Sea-Tac Airport is one of the top five activity centers in the region with over 15,000 employees. An additional 3.15 mile underground extension from Westlake to the University of Washington is under construction and scheduled to open in 2016. When completed, the U Link extension will serve the second largest activity center in the region (the University District), and the neighborhood with the highest residential density in the state (Capitol Hill). With voter approval of the "ST2" program in 2008, planning and design work is underway on Link extensions north to Lynnwood, south to Redondo Beach/Star Lake, and east to Bellevue and Overlake.

Central Link is clearly a high-capacity transit mode, with 95-foot long light rail cars capable of accommodating up to 148 passengers (roughly 50/50 seated and standing). Individual cars can be coupled together to form two-car, three-car or four-car trains with a maximum train capacity of almost 600 passengers. Car floors are level with station platforms, permitting efficient, unhindered loading and unloading and unparalleled accessibility for people with disabilities. Travel time and efficiency is also enhanced through the use of a proof-of-payment fare system, requiring that all passengers purchase their ticket or pass before riding. Link trains can accelerate rapidly and reach speeds of over 55 MPH.

Complementing the ease of boarding and deboarding is a light rail right-of-way designed to provide fast, dependable service. Segments of the alignment running through tunnels and on elevated structures are completely separated from other traffic (except in the downtown Seattle tunnel, where buses share the right-of-way with trains). Trains operating on the three-mile arterial median segment in Rainier Valley have partial signal priority at intersections. Curves and grades along the alignment are designed for relatively high average speeds.

Central Link represents the largest single transit project in the region's history. The Service Standards provide guidelines and analytical tools to help manage Central Link service and make the most effective use of this major public investment.

## B. CENTRAL LINK SERVICE EVALUATION AND ADJUSTMENT PROCESS

Central Link is designed to provide dependable, high-frequency transit service along the region's heaviest transit corridor. Development of the current alignment required many years of analysis, community outreach and cooperation between multiple jurisdictions. While the alignment and stations are fixed, the capacity and operating cost of Central Link service can be adjusted and managed through changes in headway (frequency of service), train consists (one-, two-, three- or four-car trains), and changes in the span of service.

Two documents have guided the operations planning for Central Link: The *Central Link Rail Fleet Management Plan* and the *Central Link Operations Plan—Initial Segment and Airport Link*. These documents are updated as new extensions are developed and as experience is gained with existing operations.

### ***Peak Period Service Levels***

Peak period passenger flows are the key driver in planning system capacity and service levels. System capacity parameters for the University-to-Airport segment of Central Link, including ultimate train lengths, fleet size and peak headways, were developed based on 2030 peak period ridership projections. During the initial phase of operations planning, two-car trains operating a six-minute peak headway were assumed for the Westlake-to-Airport segment, but experience with Link pre-testing in 2009 showed that a seven- to eight-minute peak headway was optimum based on the need for more familiarity with joint bus-rail operations in the downtown Seattle transit tunnel. A decision to transition to a six-minute peak headway on this segment will be considered over the next few years based on operating experience.

The *Central Link Rail Fleet Management Plan* set the desired upper limit of passenger load standards during peak periods. It defined the maximum scheduled peak period load as 148 passengers per car (roughly 50/50 seated and standing). This is the equivalent to 4.4 square feet per standing passenger and is considered to be a “comfortable standing load” in the *Transit Capacity and Quality of Service Manual* (2<sup>nd</sup> edition) published by the Transportation Research Board. This load standard is used as a planning and evaluation tool for Central Link.

### ***Off-Peak Service Levels***

In contrast with the detailed strategies for planning peak period capacity, plans for off-peak service levels on Central Link were driven more by policy and the regional goal of serving many different kinds of travel needs. By local standards, Link trains operate frequently during all hours of operation, running from early in the morning until late at night to attract new riders who otherwise would not use public transportation. Except for surges in ridership caused by major events, off-peak service levels on Central Link should be more than ample to meet demand. To provide a relative performance comparison, the Service Standards will illustrate the differences between peak period productivity, off-peak productivity and average system productivity as a whole.

## **1. Service Changes**

Changes to Central Link service can occur in one of two ways:

***a. Service Implementation Plan:*** The annual Service Implementation Plan (SIP) may include major service changes recommended to the Sound Transit Board for implementation during the

upcoming calendar year. If circumstances require more immediate implementation of a major service change, a separate motion may be presented to the Board outside of the annual SIP process. Major service changes may have significant customer and budget impacts. SIP service change recommendations are based on the completion of new Central Link extensions and stations, changes in passenger demand patterns and the productivity of the service as defined in the Service Standards. Input from board members, local jurisdictions, transit agencies and other stakeholder groups may be incorporated into the final SIP recommendations. The SIP requires Sound Transit Board approval for implementation.

***b. Administrative Service Changes:*** Minor service changes may be approved and implemented at the staff administrative level as long as they are affordable within annual budget appropriations. Changes intended to be permanent are implemented at regular service change dates that occur three times per year (fall, spring and summer). Changes that are intended to be temporary may be implemented at any time.

*Permanent changes that can be implemented administratively at regular service change dates:*

- Scheduled headway adjustments of up to three minutes during specified times of the day (time periods Section 4, Other Performance Measures).
- Scheduled span of service time adjustments of up to 10 minutes (first train/last train times).
- The addition of up to six daily one-way trips to address overcrowding.
- The deletion of up to six daily one-way trips to address low ridership/productivity.

*Temporary changes that can be implemented administratively at any time:*

- Changes in train consists (the number of cars in each train).
- Implementation of extra service needed for special events or service disruptions requiring additional capacity for temporary periods.
- Temporary headway adjustments and/or bus service substitutions required for construction, maintenance, repairs, accidents or emergencies.

## **2. Title VI Evaluation**

Pursuant to Title VI of the Civil Rights Act of 1964 and applicable state and local laws, no person shall be subjected to discrimination on the basis of race, color or national origin in any program or activity performed by or provided by Sound Transit. As part of its annual Draft SIP, Sound Transit will assess the impacts of major service changes on minority transit users and communities using methodology approved by the Federal Transit Administration.

## **3. System Performance Metrics**

Sound Transit's annual budget document sets specific service performance targets for each transit mode. For consistency with other transit systems, performance metrics follow standard National Transit Database (NTD) terminology and definitions. The annual targets for Central Link service cover the following performance areas:

### *Ridership*

- Total annual boardings

- Average weekday boardings

#### *Productivity*

- Boardings/Revenue Vehicle Hour
- Boardings/Trip

#### *Cost-Effectiveness*

- Cost/Boarding
- Cost/Revenue Vehicle Hour
- Cost/Revenue Vehicle Mile

#### *Service Availability*

- Percentage of scheduled trips operated

#### *Service Reliability*

- On-time performance and headway performance

#### *Customer Service*

- Customer complaints

#### *Safety*

- Preventable accidents

### **Ridership**

Ridership is one of the most important indicators of transit effectiveness and is measured by counting the total number of passenger boardings (sometimes called “unlinked passenger trips”) for a given time period. A boarding is counted towards the ridership total each time a passenger steps aboard a light rail vehicle. Ridership data is needed to calculate other important performance metrics, such as cost per boarding. For Central Link, *Total* boardings are reported for each month, quarter and year, as are *Average Weekday Boardings*, an important indicator of commuting trends. The annual budget will set a performance target for each of these ridership indicators.

### **Productivity**

Productivity measures indicate how efficiently transit services are being used. *Boardings per Revenue Vehicle Hour* and *Boardings per Trip* are common productivity measures used throughout the transit industry. The annual budget will set a performance target for each of these indicators.

### **Cost-Effectiveness**

Cost-effectiveness measures indicate how well a system controls its costs for providing specific units of transit output. *Cost per Boarding*, *Cost per Revenue Vehicle Hour* and *Cost per Revenue Vehicle Mile* are often used in the transit industry for this purpose. The annual budget will set a performance target for each of these indicators.

### **Service Availability**

Central Link service availability is measured by tracking the percentage of trips actually operated during a given time period compared with the number of scheduled (intended) trips. Rather than set annually as part of the budget process, this metric has an ongoing performance target—98.5 percent of all scheduled trips should be operated during each quarter and calendar year.

### **Service Reliability**

Several factors pose challenges in achieving dependable on-time performance on Central Link. Unique among light rail systems worldwide, Central Link trains share a common right-of-way with large volumes of buses in the Downtown Seattle Transit Tunnel (DSTT)—up to 60 buses per hour, per direction during peak times. When bus service is disrupted in the DSTT, rail service is generally disrupted as well. Buses and trains are separated by signal blocks in the DSTT, a very important safety feature, but this necessarily delays service recovery when disruptions occur. On any part of the system, sections of track may be shut down periodically for planned construction, maintenance or repairs, forcing trains to use a single track for both directions of travel. Opposing trains then have to use the single track one at a time until the next crossover track is reached and signals are cleared. These factors and others, taken together with the “learning curve” associated with any major light rail system start-up, suggest that a different approach is needed to measure on-time performance—an approach that looks at both the traditional schedule adherence measure and the ability to maintain advertised headways (time intervals between trips).

#### *Schedule Adherence*

A Central Link train is considered late if it a.) Departs a terminal station more than one minute late, or b.) Arrives at a terminal station three or more minutes late and is unable to make its scheduled departure time for the next trip. The number of late trips will be tracked. The target performance level, developed as part of the annual budget, will be expressed as the percentage of trips operated on-time compared with the total number of trips operated.

#### *Headway Adherence*

Headways are the time intervals between train trips. During most hours of the day, Central Link provides frequent scheduled headways of every 10 minutes or less. For most customers, maintaining regular headways is more important than schedule adherence as relatively few people are trying to catch a particular train in the schedule. Headway adherence is also important during peak periods when very frequent service is provided and even spacing of trips is needed to balance loads and avoid signal delays.

Headway adherence is defined as the percentage of time that the scheduled headway is maintained or a more frequent headway than scheduled is maintained (up to three minutes). It is not the same as schedule adherence as individual trains may be off schedule, but service may be running at regular intervals that are as frequent as or better than the intended headway. A target performance level for headway adherence will be developed during future annual budget processes as more operating experience is gained.

## **Customer Service**

Customer service issues and the effectiveness of transit agencies in addressing them is an important performance area. Central Link performance is expressed as the number of complaints received per 100,000 passenger boardings, with the target level set in the annual budget.

## **Safety**

A commonly used metric for tracking safety performance is the number of preventable accidents for a given number of miles operated. A “preventable” accident is one where the operating employee(s) failed to do everything reasonable to prevent an accident. The standard for Central Link is defined as the number of preventable accidents per 100,000 miles.

Progress in achieving these performance targets is tracked in the following regular system reports:

- The *Sound Transit Monthly Ridership Summary*, showing total ridership by mode for each calendar month, together with a comparison of ridership from the same month a year earlier and total year-to-date ridership.
- The *Service Delivery Quarterly Performance Report to the CEO* tracks progress on all of the service performance targets in the annual budget. Comparisons are made with the same quarter a year earlier and with the year-to-date budget targets. The 4<sup>th</sup> Quarter report summarizes the year-to-date performance compared with the previous year.
- The annual *Sound Transit Service Implementation Plan (SIP)* includes a detailed ridership and productivity analysis of Central Link. The SIP also includes updated ridership forecasts for the coming year that are used to develop the agency budget.

These reports are available on-line at [www.soundtransit.org](http://www.soundtransit.org).

## **4. Other Performance Measures**

### **Passenger Load Guidelines**

The characteristics of light rail make it possible to comfortably and efficiently accommodate standing passengers. Compared with buses, light rail has relatively fewer stops, wider doors and aisles, and a smoother, steadier ride. The average light rail trip distance is relatively short, so when passengers have to stand it generally is for brief periods of time. Accordingly, Central Link trains can routinely accommodate standees while still providing quality service. The general guidelines below are intended to help in making short-term decisions on the passenger capacity needed during different times of the day and week:

- Standees are permitted during weekday peak periods, up to a maximum of 200 percent of seated capacity per car (approximately 148 passengers total). This is the equivalent to 4.4 square feet per standing passenger and is considered to be a “comfortable standing load” in the *Transit Capacity and Quality of Service Manual* (2<sup>nd</sup> Edition) published by the Transportation Research Board.
- Passengers should not have to stand for more than 20 minutes under typical day-to-day circumstances.
- During off-peak periods, schedules and consists should be designed to provide enough seats for all passengers except when major events are scheduled, when construction or

maintenance work results in longer headways, or when service is disrupted due to circumstances beyond Sound Transit's control.

Load conditions will be monitored on a regular basis using a combination of automatic passenger counter (APC) data, customer reports, and observations by Central Link operating personnel and Sound Transit staff. Trip-level APC data will be evaluated for overload conditions during each tri-annual service change period.

### **Productivity by Time Period**

Each year, the annual Service Implementation Plan will include an analysis of Central Link productivity by time period of the day and day of the week. Productivity ratings for each time period will be based on how much each period differs from the *average* system productivity, which changes from year to year. Time periods that consistently perform well below the system average could be subject to a number of potential actions including increased marketing, improvements to bus integration or schedule adjustments to improve customer convenience; also, train length (consists) may be reduced if this results in cost savings. Major service reductions should be considered only if other actions are ineffective or if budgetary conditions require significant cuts. Conversely, time periods with high productivity and/or overcrowding may be candidates for a longer span of service, additional train trips, more frequent headways, or longer trains if budget allows.

### ***Time Periods***

For purposes of the SIP rating process, Central Link service is divided into the following time periods:

#### **WEEKDAY**

*Early Morning:* Before 6:00 a.m.

*Peak:* From 6:00 a.m. to 9:00 a.m. and from 3:00 p.m. to 6:00 p.m.

*Midday:* From 9:00 a.m. to 3:00 p.m.

*Evening:* From 6:00 p.m. to 10:00 p.m.

*Night:* After 10:00 p.m.

#### **SATURDAY**

*Early Morning:* Before 6:00 a.m.

*Daytime:* From 6:00 a.m. to 6:00 p.m.

*Evening:* From 6:00 p.m. to 10:00 p.m.

*Night:* After 10:00 p.m.

#### **SUNDAY/HOLIDAY**

*Daytime:* From 6:00 a.m. to 6:00 p.m.

*Evening:* From 6:00 p.m. to 10:00 p.m.

*Night:* After 10:00 p.m.

### ***Productivity Indicators***

Productivity and cost effectiveness will be assessed using these three basic performance indicators:

- Boardings per revenue hour
- Boardings per trip
- O&M cost per boarding

### ***Productivity Ratings***

There are four possible productivity ratings for each time period: **Good, Satisfactory, Marginal, or Unsatisfactory**. Tables 1, 3 and 5 below show the ratings for boardings per revenue hour and boardings per trip by time period when these metrics are compared against the system average. A number above 100 percent means boardings/hour and boardings/trip are higher than average. Tables 2, 4 and 6 show the range of performance when the cost per boarding is compared against the system average; here, a number below 100 percent is more desirable since that indicates a lower cost per boarding than average.

**Table 1: WEEKDAY- Boardings/Hour and Boardings/Trip- % of System Average**

<b>Performance Rating</b>	<b>Weekday Before 6 a.m.</b>	<b>Weekday Peak</b>	<b>Weekday Midday</b>	<b>Weekday Evening</b>	<b>Weekday Night</b>
<i>Good</i>	75-100%	>150%	125-150%	100-125%	75-100%
<i>Satisfactory</i>	50-75%	125-150%	100-125%	75-100%	50-75%
<i>Marginal</i>	25-50%	100-125%	75-100%	50-75%	25-50%
<i>Unsatisfactory</i>	<25%	75%-100%	50-75%	25-50%	<25%

**Table 2: WEEKDAY- Cost per Boarding- % of System Average**

<b>Performance Rating</b>	<b>Weekday Before 6 a.m.</b>	<b>Weekday Peak</b>	<b>Weekday Midday</b>	<b>Weekday Evening</b>	<b>Weekday Night</b>
<i>Good</i>	125-150%	50-75%	75-100%	100-125%	125-150%
<i>Satisfactory</i>	150-175%	75-100%	100-125%	125-150%	150-175%
<i>Marginal</i>	175-200%	100-125%	125-150%	150-175%	175-200%
<i>Unsatisfactory</i>	>200%	>125%	>150%	>175%	>200%

**Table 3: SATURDAY- Boardings/Hour and Boardings/Trip % of System Average**

<b>Performance Rating</b>	<b>Saturday Before 6 a.m.</b>	<b>Saturday Daytime</b>	<b>Saturday Evening</b>	<b>Saturday Night</b>
<i>Good</i>	75-100%	100-125%	100-125%	75-100%
<i>Satisfactory</i>	50-75%	75-100%	75-100%	50-75%
<i>Marginal</i>	25-50%	50-75%	50-75%	25-50%
<i>Unsatisfactory</i>	<25%	<50%	<50%	<25%

**Table 4: SATURDAY- Cost per boarding- % of System Average**

<b>Performance Rating</b>	<b>Saturday Before 6 a.m.</b>	<b>Saturday Daytime</b>	<b>Saturday Evening</b>	<b>Saturday Night</b>
<i>Good</i>	125-150%	100-125%	100-125%	125-150%
<i>Satisfactory</i>	150-175%	125-150%	125-150%	150-175%
<i>Marginal</i>	175-200%	150-175%	150-175%	175-200%
<i>Unsatisfactory</i>	>200%	>175%	>175%	>200%

**Table 5: SUNDAY- Boardings/Hour and Boardings/Trip- % of System Average**

<b>Performance Rating</b>	<b>Sunday Daytime</b>	<b>Sunday Evening</b>	<b>Sunday Night</b>
<i>Good</i>	100-125%	75-100%	75-100%
<i>Satisfactory</i>	75-100%	50-75%	50-75%
<i>Marginal</i>	50-75%	25-50%	25-50%
<i>Unsatisfactory</i>	<50%	<25%	<25%

**Table 6: SUNDAY- Cost per boarding- % of System Average**

<b>Performance Rating</b>	<b>Sunday Daytime</b>	<b>Sunday Evening</b>	<b>Sunday Night</b>
<i>Good</i>	100-125%	125%-150%	125-150%
<i>Satisfactory</i>	125-150%	150%-175%	150-175%
<i>Marginal</i>	150-175%	175%-200%	175-200%
<i>Unsatisfactory</i>	>175%	>200%	>200%

### ***Calculating Overall Ratings***

Each performance rating is assigned a number:

- 1 for Good
- 2 for Satisfactory
- 3 for Marginal
- 4 for Unsatisfactory

The performance score is calculated using a process similar to calculating academic grade point averages. Here is a hypothetical example:

During the most recent calendar year, the weekday midday time period achieved a “Good” rating in boardings per revenue hour (score 1), a “Good” rating in boardings per trip (score 1), and a “Marginal” rating in cost per boarding (score 3). The scores are added together for a total of 5. This is divided by 3 (the number of performance indicators) to produce a numerical score of 1.67, an overall “Satisfactory” rating. The lower the number the better the overall performance, as shown in the following table:

<b>Performance Rating</b>	<b>Numerical Score</b>
Good	1.0-1.5
Satisfactory	1.5-2.5
Marginal	2.5-3.5
Unsatisfactory	3.5 or above

### ***Frequency of Review***

Average systemwide boardings per trip, boardings per revenue hour and cost per boarding will be calculated and reported for each calendar month. Quarterly results will be reported in the *Service Delivery Quarterly Performance Report*.

Productivity ratings by time period (day of week, time of day) will be prepared once per year as part of the annual SIP, in coordination with the development of any service change recommendations requiring Board action.

## **5. Peer Comparisons**

To provide additional productivity benchmarks, each year the SIP will compare Central Link productivity with a group of peer light rail systems, using information from the National Transit Database (NTD). These comparisons will illustrate both differences in productivity between systems at any given time together with differences in trends. NTD peer agency data is generally available in August for statistics recorded during the previous calendar year. The peer system productivity indicators to be compared are:

- Cost per revenue hour
- Cost per boarding
- Boardings per revenue hour

Peer comparisons will be made with the Hiawatha Line in Minneapolis, the MetroLink line in St. Louis, the Hudson-Bergen line in New Jersey, the MAX line in Portland, Denver's LRT system and the Valley Metro light rail line in San Jose.

## **6. Extra and Special Service**

One of Sound Transit's key objectives is improving regional mobility for a variety of trip purposes. Major events, such as major league football games, generate large volumes of traffic and parking demand. If Central Link service helps to achieve a significant transit mode share at a major event, it provides a public benefit by relieving pressure on major highways and parking facilities.

*"Extra Service vs. Special Service"*: "Extra service" is trains added to supplement regular service. Extra service is needed when an event or activity generates so much demand that more trains are needed to prevent overloads. Sound Transit is generally aware of when extra service is likely to be needed and plans and budgets for it accordingly.

"Special service" in the context here is an overlay of service on top of regular Central Link schedules that is sponsored by an outside party. It may operate outside of regular Central Link service hours (for example, between 1:00 a.m. and 5:00 a.m.). To be considered, special service must meet the following essential criteria:

- The service must have adequate operating, maintenance and security staffing available.
- The cost of the special service is fully covered by direct payments from outside parties, promotional trades, or a combination of these resources.

In addition to these essential criteria, special service with the following characteristics will be given preference:

- The service mitigates congestion on regional highways and reduces parking requirements in the vicinity of the event.
- The service reduces passenger overloads on other transit service.
- The service attracts new customers, promotes Sound Transit, and generates positive media coverage and community goodwill.

## Appendix B: Unitrans Performance Indicators, FY2017

Line/Description	Subsidy Per One-Way Passenger-Trip	Ridership Recovery Ratio	Passenger Trips Per Revenue Vehicle Hour	Passenger Trips Per Revenue Vehicle Mile
A-Line: Downtown / Fifth St. / Alhambra (Silo Terminal)	\$0.91	45%	41	4.1
B-Line: Sycamore/ Drake (MU Terminal)	\$0.52	59%	54	5.5
C-Line: Sycamore / Wake Forest (Silo Terminal)	\$0.44	63%	57	7.6
D-Line: Lake Blvd. / Arlington (Silo Terminal)	\$0.38	66%	60	4.7
E-Line: Downtown / F Street / J Street (MU Terminal)	\$0.81	48%	44	5.1
F-Line: Oak / E. Alvarado / Anderson (MU Terminal)	\$0.87	47%	42	3.4
G-Line: Anderson / Alvarado / N. Sycamore (MU Terminal)	\$0.24	76%	68	7.1
J-Line: Anderson / Alvarado / N. Sycamore (Silo Terminal)	\$0.05	94%	85	8.4
K-Line: Lake Blvd. / Arlington (MU Terminal)	\$0.71	52%	47	4.4
L-Line: E. 8th St. / Pole Line / Moore / Loyola (Silo Terminal)	\$1.63	32%	29	3.2
M-Line: B St / Cowell / Drew (MU Terminal)	\$0.74	51%	46	4.7
P-Line: Davis Perimeter Via South Davis (MU Terminal)	\$1.69	31%	28	2.1
Q-Line: Davis Perimeter Via West Davis (MU Terminal)	\$1.52	33%	30	2.2
T-Line: Davis High	\$2.63	22%	20	1.6
V-Line: West Village (Silo Terminal)	\$0.07	90%	91	10.8
W-Line: Cowell/Lillard/Drummond (Silo Terminal)	\$0.18	81%	73	8.2
Weekend O-Line	\$2.44	24%	21	2.0
Amtrak Shuttle and Undesignated Trippers	\$0.67	53%	48	4.9
<b>Overall Total</b>	<b>\$0.54</b>	<b>55%</b>	<b>50</b>	<b>4.8</b>
<i>Standard from City of Davis Short Range Transit Plan</i>	<i>N/A</i>	<i>60% systemwide; consider changes if &lt;20%</i>	<i>45 systemwide; consider changes if &lt;20</i>	<i>N/A</i>

**Appendix C: Unitrans Goals, Objectives, Performance Measures, and Standards Based on the City of Davis Short-Range Transit Plan**

Goal	Objective	Performance Measure	Standard	FY2016-17 Performance	Met?
Effectiveness	Convenience	% of student dwelling units within 1/4 mile of transit stop	90%	Over 95% of all Davis residents are within 1/4 mile	Yes
		% of major activity centers within 1/8 of transit stop	90%	94%	Yes
		Peak-hour service frequencies for routes >=60 pass/hour	15-minute service	D, J, V, W are >60; all have 15" frequency	Yes
	Reliability	% within 5" of scheduled time	90%	92%	Yes
		Number of missed trips	<1/day	N/A	No
		Vehicle miles between road calls	20,000	FY17: 17,260 FY16: 15,914	No but Improved
	Safety	Miles between preventable major accidents	100,000	103,560	Yes
		Injuries per 100,000 boardings	<=1	< 1	Yes
		Safety meetings	Quarterly	Yes, quarterly meetings	Yes
	Attractiveness	Annual ridership growth	>= population growth	FY16 to 17: Ridership -3% Student population +3% City of Davis population <1%	No
		Provide accurate and timely information	Schedules stocked on vehicles and thru community	Yes	Yes
Efficiency	Cost Efficiency	Change in Op cost / rev hour	<= CPI	FY16 to 17: Cost/hr +19% CPI +2.5%	No
	Productivity	Passengers per rev veh hr	40	50	Yes
		Individual route productivity	Consider changes if less than 15	All lines above 15	Yes
	Maintenance	% of PMs completed w/in 500 miles of scheduled	100%	100%	Yes
		Wash exterior and sweep interior	Ext. wash 2/week Interior: Daily	Yes, Exterior – 1/week; Interiors - Daily	Yes
	Cost Recovery	% of annual cost from fares	60%	55%	No
Integration/ Coordination	Shared Facilities	Study feasibility of timed transfer terminal	Upgrade Silo and MU Terminals	Completed	Yes
	Coordinate service and fares	Waiting times between buses at transfer locations	Local <=10" Regional <= 20"	Yes. Waiting times within standard; fares fully integrated	Yes
	Paratransit coordination	Coordinate Unitrans service with ADA services	Ongoing coordination	Regular meetings with DCT and YCTD for coordination	Yes

Goal	Objective	Performance Measure	Standard	FY2016-17 Performance	Met?
	Inclusion of transit w/general plans	Transit service considered in plans and development review	Ongoing coordination	Close coordination with City of Davis, UCD ORMP, and SACOG	Yes
Accessibility	Wheelchair lifts	% vehicles with lifts or ramps	100% of single-deck buses	100% of single-deck buses; 97% of trips; 97% of miles	Yes
	Special needs	% known concentrations of senior and disabled residents with transit service	100%	Yes	Yes
	Capacity	Peak loading conditions not to exceed 150% of seats	95% of bus trips. 90% of bus riders on trips <60	96.5% of bus trips 90.6% of bus riders	Yes
	Identify gaps	Meet w/ interest groups and respond to comments	Respond to requests; resolve w/in 6 months	Yes, requests also gathered at Unitrans Adv Comm and Unmet needs hearings	Yes



**Safety and Service Delivery Committee**

**Information Item III-A**

**February 8, 2018**

**Metro Performance Report**

Washington Metropolitan Area Transit Authority  
**Board Action/Information Summary**

Action  Information

MEAD Number:  
201953

Resolution:  
 Yes  No

**TITLE:**

Metro Performance Report – Q2/FY18 Report

**PRESENTATION SUMMARY:**

The Metro Performance Report communicates Metro’s system-wide performance in the areas of quality service, safety, security and financial responsibility.

**PURPOSE:**

The Metro Performance Report informs the Safety and Service Delivery Committee on Metro's performance for a key set of measures to track progress toward Authority strategic goals. Further, this public report communicates key actions and results to Metro's customers to support transparency and accountability.

**DESCRIPTION:**

**Key Highlights:**

The Metro Performance report compares performance fiscal year-to-date to targets that Metro aims to achieve, or where applicable, to previous fiscal year-to-date performance. As of Q2/FY18:

13 measures were at or above target, or better than last fiscal year

5 measures were near target

9 measures were not met, or worse than last fiscal year

**Background and History:**

In 2013, the Board of Directors adopted Metro’s mission, vision and four strategic goals for building a transit system that supports a competitive region:

- Build and maintain a premier safety culture and system
- Meet or exceed expectations by consistently delivering quality service
- Improve regional mobility and connect communities
- Ensure financial stability and invest in our people and assets

Previously presented separately to the Safety Committee (Safety Report) and the Customer Service, Operations and Security Committee (Vital Signs Report), this comprehensive quarterly Metro Performance report provides Board members and customers with data and information to track progress toward these strategic goals, and supports Metro's efforts to be transparent and accountable to its customers.

Within Metro, this data is used on an ongoing basis to inform decision-making. The Department of Safety and Environmental Management (SAFE) utilizes multiple datasets to monitor safety activities that impact employees and the riding public. SAFE conducts a daily review of incidents, systematic inspections of facilities and regulatory programs and employee/contractor training to ensure a safer workplace and environment for our passengers. Within Operations, these measures are actively tracked by staff through a series of "Stat" performance review meetings that encourage data-driven analysis and decision-making. Departments develop fiscal year business plans with these and other measures and key actions that demonstrate departmental contribution to Metro's mission. These activities all contribute toward Metro's performance-based planning and programming approach.

Quarterly reporting of safety measures is required by the Board of Directors system safety policy statement as part of the approved System Safety Program Plan (SSPP). The SSPP is required under FTA Final Rule Code of Federal Regulations 49, part 659, Rail Fixed Guideway Systems: State Safety Oversight.

## **Discussion:**

### **QUALITY SERVICE AND SECURITY FOCUS**

#### ***Service reliability improving and crime best in a decade***

#### **MyTripTime**

Rail customer OTP improved to 87 percent during the first half of FY18, thanks in large part to the implementation of a realistic schedule and the addition of new 7000 trains. Railcar delays remain the most frequent type of delay but are down almost 20 percent thanks to changes in the fleet composition and improved maintenance procedures. While Metro's rail infrastructure renewal program lowers on-time performance by about 2-3 percentage points in the short-run as service is reduced at nights and on weekends, overall rail infrastructure reliability is showing signs of improvement. The number of speed restrictions resulting from track inspections is down 40 percent, as are delays related to track defects. Bringing—and keeping—the system into a State of Good Repair, however, requires constant maintenance and renewal. To reflect Metro's commitment to

providing quality service, Metro's rush-hour promise refunds registered SmarTrip® customer trips that are more than 15 minutes late.

### **Rail Fleet Reliability**

Railcar performance is the best reported in eight years, reaching over 87,000 miles between delays—equivalent to about 2 weeks of travel. For customers, this has resulted in 47 percent fewer offloads. Better performance was primarily driven by the addition of new 7000 series railcars to the fleet. As of the end of December 2017, the 7000 series trains represented over 40 percent of the available fleet and traveled over 121,000 miles between delays. Metro's second largest fleet, the 2000/3000 series also saw performance improvements of 9 percent compared to fiscal year to date 2017. The 5000 series cars are currently the poorest performers, and are slated for retirement in calendar year 2018.

### **Rail Infrastructure**

In mid-August, Metro put in place a 35 mile per hour speed restriction covering almost 23 miles of track through the downtown core of the system to reduce trains' traction power draw while Metro analyzes power optimization used to propel trains. Because most trains do not travel above 35 miles per hour on these segments, these restrictions had a minimal impact on customer on-time performance. Metro is wrapping up the study of the power draw and expects to lift the speed restriction in the downtown core next quarter (in FY18-Q3). In addition, for about two months each Fall Metro places safety-related speed restrictions at upwards of 10 outdoor approaches to stations where falling leaves can lead to slippery rails. These restrictions add a few seconds to each trip, but do not significantly delay customers.

Infrastructure Availability – On average this fiscal year, about 95 percent of track has been available during revenue hours. The speed restrictions related to power consumption and fall leaves reduced availability by 3.1 percent. Unplanned single-tracking and other condition-related speed restrictions further reduced availability by 0.2 percent. Planned maintenance work during evenings and weekends, including extended shutdowns on the Red and Green lines to replace interlockings and crossovers, reduced availability by 1.7 percent. By 10 p.m. almost every weeknight, up to three Metro crews have begun working on the track to address tunnel leaks, renew rail infrastructure, and conduct preventive maintenance to ensure safe and reliable operations for customers. Metro's aggressive rail infrastructure renewal, inspection and preventive maintenance program aims to reduce unplanned single-tracking events and speed restrictions.

FTA Reportable Speed Restrictions – On average this fiscal year, about 8 percent of track was under speed restriction during the FTA-mandated period of 9 AM the first Wednesday of each month. The majority of this was related to speed restrictions aimed at reducing power consumption in the system core. Not counting these speed restrictions, the measure falls to 1.7 percent of track under speed restriction, below Metro's target of 2.2 percent.

### **Bus On-Time Performance**

FYTD through December, 78 percent of buses were on-time, a three percent improvement from the same period last year. OTP improved across all days of the week and during all service periods with three percent more on-time buses during the weekday and 2 percent more on-time buses during the weekend. Overall improvement was primarily driven by a decrease in buses running late during peak period service – AM Peak (6AM-9AM) and PM Peak (3PM-7PM) – with these rush service periods improving the most. Improvements in OTP have been driven by schedule adjustments of low-performing routes, with the schedule adjustments implemented in June improving performance one percent compared to this same time last year.

### **Bus Fleet Reliability**

FYTD through December, buses on average traveled 7,504 miles between service interruption, a seven percent decline from the same period last year with buses traveling six percent fewer miles and experiencing one percent more service interruptions. While all fleet technology types declined compared to the same period last year, fleet reliability of the fleets that provide the most service – Hybrid and CNG – declined at a slower rate compared to the performance of the older Clean Diesel and Diesel fleets. Overall bus fleet reliability performance was impacted by increased use of older, less reliable buses due to the 105 model year 2014 8000-series Hybrid buses being removed from service on September 28 along with increased service interruptions due to coolant sensor failures on the newest CNG fleet.

### **MetroAccess OTP**

MetroAccess OTP improved to 92 percent FTYD compared to 87 percent through the same period last year. This improvement is particularly significant given that 92 percent OTP is the contractually-enforced service level agreement for OTP between WMATA and its paratransit service providers. FYTD performance is currently buoyed by strong performance this quarter – 93 percent OTP was delivered in October and November, and 94 percent in December. Improved performance is largely attributed to an operator staffing level increase to allay a previous operator shortage, and these new operators adjusting to their roles. Last year, operator staffing levels hemorrhaged due to

increased marketplace competitiveness. However, WMATA provided an adjustment to its paratransit contractors to enable them to be more competitive in the market, thus rectifying the issue.

### **Elevator/Escalator Availability**

FYTD elevator availability is at 97 percent, equaling performance through the same period last year as well as FYTD 2016. Preventive Maintenance Compliance (PM Compliance) is a key driver of escalator availability; it should be noted that 100 percent PM compliance was achieved for elevators system-wide in October 2017. The Office of Elevators and Escalators (ELES) is currently undergoing a process wherein PM procedures are being tailored to address each unique asset model.

FYTD escalator availability is at 94 percent, an uptick from 93 percent escalator availability compared to the same period last year. At least 94 percent escalator availability has been achieved for each month in this fiscal year. Similar to elevator availability, PM Compliance is a key driver of escalator availability. For Q2/FY2018, an average of 97 percent PM Monthly Compliance was achieved. Metro's aggressive and expansive plan to replace a significant number of escalators across the system remains on track. Metro's Office of Elevators and Escalators (ELES) has completed 12 escalator replacements for the first half of FY18 with 16 units remaining to be complete. Total units completed under this project to date are 84.

### **Crime**

The FYTD Part I crime rate decreased 19 percent compared to the same period last year. Crimes against property, accounting for 71 percent of Part I crimes, decreased 20 percent, and crimes against persons, accounting for 29 percent of Part I crimes, decreased 15 percent. The combined crime rate of 4.4 crimes per million passenger trips represents the lowest rate in recent years.

### **SAFETY FOCUS**

#### ***Rail improving, bus an area of focus***

#### **Red Signal Overruns**

Train and Equipment Operators had 70 percent fewer red signal overruns than during the first six months of FY17, with three reported incidents between July and December. When comparing calendar years, 2017 had the lowest monthly average of red signal overruns since 2012, with 0.7 violations per month. Two of the three FYTD18 violations occurred during a turnback move in single-tracking areas. Turnback operations are special moves that

can involve “double-ending” a train with a second operator in the trailing car and require additional levels of communication and coordination between the two operators and the Rail Operations Control Center (ROCC). SAFE is developing corrective actions to reduce the probability of these events.

### **Fire Incidents**

In the first half of the fiscal year, fire incidents increased by nine percent, from 47 in FYTD17 to 51 incidents through December 2017. Of the FYTD18 fire incidents, forty-one percent were related to arcing insulators, which included a monthly high of nine in July, and a low of zero in November and December. Debris-related fires decreased by eight percent over the same time period. There were two incidents related to arcing track components (i.e., not insulators) in FYTD18 that occurred at the Shady Grove Rail Yard, and were due to a stray current issue that has since been resolved.

### **Rail Collisions**

Operational rail collisions decreased by 50 percent compared to 2017 FYTD. Of the four collisions in FYTD18, three occurred in rail yards and included contact with a bump post, striking a rail car while moving in the rail car shop, and striking a maintenance facility’s shop door. The one mainline collision involved improperly stored material on a Roadway Maintenance Machine (RMM) striking a component of the tunnel infrastructure.

### **Derailments**

Through December 2017, there have been six derailments reported. This represents a 45 percent reduction from the same period of FYTD17. All six incidents involved RMMs, including three that were hi-rail contractor pickup trucks. There were no derailments in October and November 2017. Four of the six derailments occurred in rail yards at low speeds.

### **Bus Collisions**

Despite incurring 76 fewer collisions, the bus collision rate increased by less than one percent compared to the first six months of FYTD17. This is primarily due to a six percent decrease in mileage, which resulted in a four percent increase in the preventable collision rate. Over half of the collisions were classified as sideswipes, hit while stopped, and fixed or moving object collisions.

### **Bus Pedestrian Strikes**

Compared to FYTD17, two fewer pedestrians were struck and transported from the scene during FYTD18 through December. Of the seven incidents in

FYTD18, two involved bicyclists and three occurred while the bus was attempting to make a turn. There was no correlation between routes or bus divisions, as all seven incidents occurred on different routes. Four of the seven incidents occurred at an intersection.

### **Rail Customer Injuries**

One-hundred nine Rail passengers were injured during the first six months of FY18. This resulted in a Customer Injury Rate (CIR) of 1.25 injuries per million passenger trips, which is a nearly eight percent decrease compared to FYTD17. The injuries were primarily driven by slips/trips/falls on escalators and station platforms. Primary causal factors that were identified included customer inattention and intoxication.

The most common locations of customer injuries were Gallery Place (13) and Metro Center (five); followed by Potomac Avenue, DuPont Circle, Southern Avenue, and Union Station (four each).

### **Bus Customer Injuries**

On Metrobus, 162 customers have been injured in FYTD18, a 29 percent increase from FYTD17. One-hundred customers were injured as a result of collisions, an increase of six compared to FYTD17. Seventy-nine of the 100 collision-related injuries were the result of non-preventable collisions. An additional 44 customers were injured as a result of slips/trips/falls. These injuries occurred primarily during hard braking or while the bus was in motion (e.g., turning, leaving a stop, stopping in traffic).

### **MetroAccess Customer Injuries**

MetroAccess continued to demonstrate a decrease in customer injuries through the second quarter of FY18, resulting in a customer injury rate of 1.97 injuries per hundred thousand passenger trips. Twenty-three MetroAccess customers experienced an injury through December, compared to 34 in the same period of FY17. The reduction in customer injuries correlates with an overall reduction in preventable and non-preventable collisions. Customer slips, trips and falls were also reduced over this period.

### **Overall Employee Injury**

Through the second quarter of FY18, 384 WMATA employees experienced an OSHA-recordable injury, which are those injuries that result in lost time, medical treatment beyond first aid, or other significant injuries. The Employee Injury Rate (EIR) of nearly seven injuries per hundred full-time employees, which is above the target of 5.1. Through the same time period of FY17, 335 employees were injured (approximately six injuries per hundred employees).

For FYTD, the most common injuries were related to vehicle collisions (93 injuries), ergonomics (65 injuries), slips/trips/falls and stress/assault (64 injuries each). Ergonomic injuries involve lifting, pushing/pulling as well as repetitive motions, such as operating a bus or train.

### **Rail Employee Injuries**

The Rail EIR decreased by two percent when compared to the first six months of FY17, primarily due to decreases in injuries by the Railcar Maintenance, Traction Power Maintenance, Automatic Train Control Maintenance, and Plant Maintenance groups. While these groups performed better than last year, several other departments experienced increases in employee injuries. These include Rail Station and Train Operations (+5), Elevator and Escalator (+1), Systems Maintenance (+2), Supply Chain (+2), and Information Technology (+2). The most common injury types were slips/trips/falls, followed by ergonomic-related injuries struck by/against injuries.

### **Bus Employee Injuries**

Through the first two quarters of FY18, the BUS EIR is nearly 40 percent higher than the same period as FY17. Bus Transportation's EIR increase is primarily driven by increases in preventable collision-, ergonomic- and stress/assault-related injuries, while Bus Maintenance experienced an increase in struck by/against injuries. Fifty-two percent of Bus injuries were non-preventable.

## **FISCAL RESPONSIBILITY FOCUS**

### ***Balancing budget through expense management, as ridership and fare revenues lower than projected***

#### **Ridership**

Total FYTD ridership of 145.2 million is three percent below the budget forecast of 149.5 million. Rail ridership has stabilized at levels similar to last year while bus ridership has continued to decline.

- Rail ridership was 87 million, 2.1 percent below forecast. Weekday ridership averaged 604,000, a 1.8 percent increase over last year while daily weekend ridership averaged 202,000, an 0.1 percent decrease from last year.
- Bus ridership was 57 million, 4.1 percent below forecast. Weekday ridership averaged 385,000, a 7.6 percent decrease compared to last year while daily weekend ridership averaged 166,000, an 8.1

percent decrease from last year.

- MetroAccess ridership was 1.2 million, 3.5 percent below forecast, averaging 8,000 trips per weekday.

### **Operating Budget Management**

Below budget expenses exceeded revenue shortfalls, resulting in projected balanced budget.

- Expenses under budget by \$31 million, primarily due to vacant positions and lower spending on services
- Revenue below budget by \$10 million, primarily due to ridership below forecast
- Subsidy – the budget had a favorable \$21 million year-to-date; the year-end forecast projects a balanced budget

### **Capital Funds Invested**

Forty percent of capital funds invested FYTD; forecasted pace of investment to increase in Q3 and Q4

### **FUNDING IMPACT:**

The initiatives are funded in the FY18 budget	
Project Manager:	Patrick Lavin and Joseph Leader
Project Department/Office:	Offices of System Safety and Environmental Management and Chief Operating Officer

### **TIMELINE:**

<b>Previous Actions</b>	October 2017 – Quarterly Safety Report November 2017 – Q1/FY18 Vital Signs Report
<b>Anticipated actions after presentation</b>	May 2018 – Q3/FY18 Metro Performance Report



Washington Metropolitan Area Transit Authority

Q2

**Metro  
Performance  
Report**

**Safety and Service Delivery Committee**

February 8, 2018



# Q2

## FY2018

# Metro Performance Report

Fiscal-Year-to-Date Performance  
July - December 2017



### QUALITY SERVICE

#### MY TRIP TIME - RAIL ●

**87%** of customers arrived on-time

● Target ≥ 88% on-time

#### BUS ON-TIME PERFORMANCE ●

**78%** of buses arrived on-time

● Target ≥ 79% on-time

#### METROACCESS ON-TIME PERFORMANCE ●

**92%** of vehicles arrived on-time

● Target ≥ 92% on-time



### SAFETY & SECURITY

#### RED SIGNAL OVERRUNS ●

**3** red signal overrun incidents

● FYTD Prior Year 10

#### BUS COLLISIONS ●

**60.2** collisions per million miles

● FYTD Prior Year 59.8

#### PART I CRIME ●

**639** 4.4 per million passengers

● FYTD Target ≤ 875 Part I Crimes



### FINANCIAL RESPONSIBILITY

#### RIDERSHIP ●

**145.2** million passengers

● Budget Forecast 149.5 million passengers

#### BUDGET MANAGEMENT ●

**2%** favorable

● Target 0 to 2% favorable

#### CAPITAL FUNDS INVESTED ●

**40%** of capital budget invested

● FYTD Forecast ≥ 46%

#### KEY

● MET OR ABOVE TARGET

● NEAR TARGET

● TARGET NOT MET

#### NOTE:

Percentages rounded to the nearest whole number



# Quality Service & Security Focus



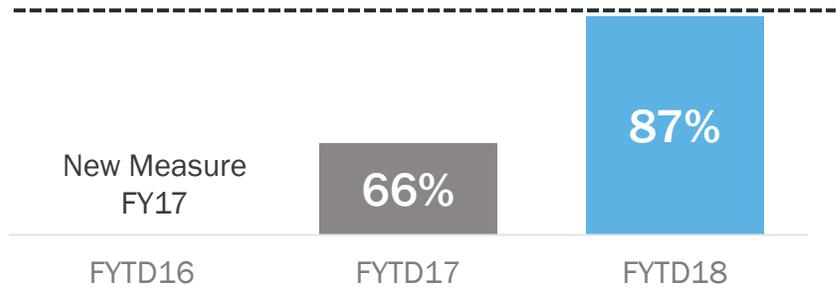
Service reliability improving and crime best in a decade

## MyTripTime – Rail

● Near target

Target 88%

Desired Direction



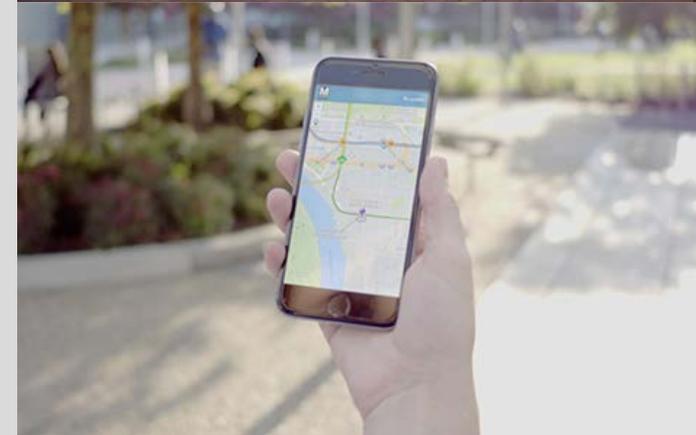
### 12-Month Trend



**OTP improved thanks to fewer railcar delays and fewer extended maintenance disruptions**

### Key Actions:

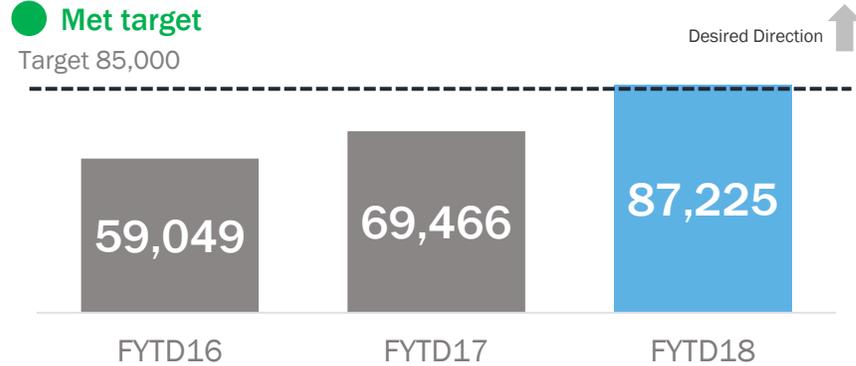
- Aggressive rail infrastructure renewal, inspection and preventive maintenance program
- Acceptance of 7K trains
- Begin retirement of 5000 series fleet CY2018
- Repair escalators, elevators and fare gates





# Rail Fleet Reliability

## Rail Fleet Reliability [mean distance between delay]



## Offloads [due to railcar problems]



## Reliability surpassed target, reaching eight-year high

### Key Actions:

- Acceptance of 7K trains
- Continue to adjust inspection schedules and procedures for legacy fleet
- Begin retirement of 5000 series fleet CY2018



## Infrastructure Availability

Pilot KPI

Desired Direction ↑

95%

New Measure Q3/FY17

FYTD16

FYTD17

FYTD18

## FTA Reportable Speed Restrictions

● Target not met

Target 2.2%

Desired Direction ↓

8%

5%

New Measure FY17

FYTD16

FYTD17

FYTD18

Speed restrictions in downtown core and related to fall weather reduced availability but had limited impact on OTP

### Key Actions:

- Preventive maintenance and capital programs
- Expand pilot waterproofing technique in Red Line tunnels
- Track inspections to identify and fix degraded conditions

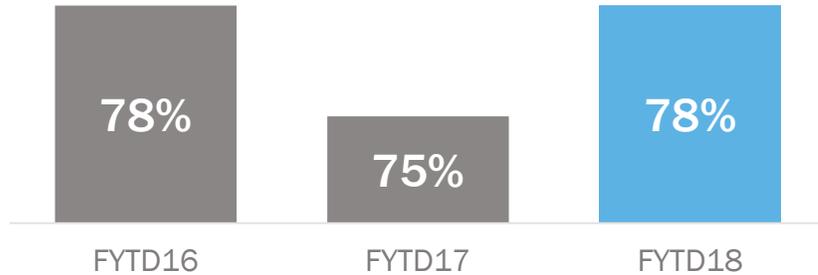


## Bus On-Time Performance

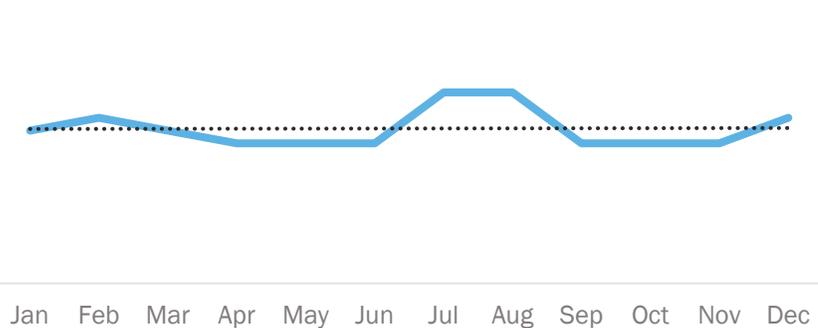
● Near target

Target 79%

Desired Direction



### 12-Month Trend



OTP improved across all days of the week and all service periods

### Key Actions:

- Actively manage headway routes through dedicated field supervisors and control center specialists
- Implement technology upgrades for real-time tracking of buses
- Utilize articulated and strategic buses on high-frequency routes to reduce crowding and improve reliability
- Continue to implement schedule adjustments on low-performing routes

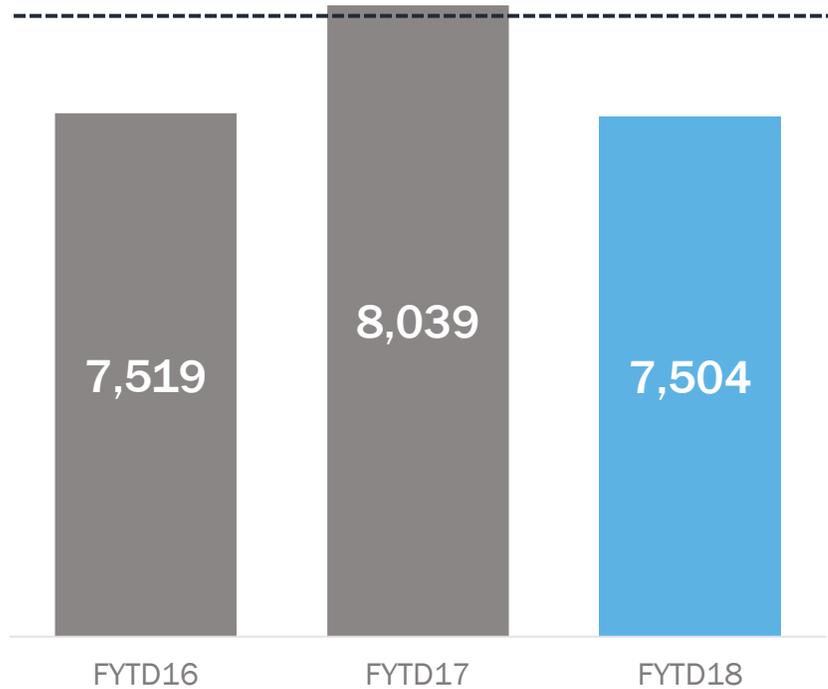


## Bus Fleet Reliability

● Target not met

Target 8,000

Desired Direction ↑



Impacted by increased use of older, less reliable buses due to out of service 8000-series buses

### Key Actions:

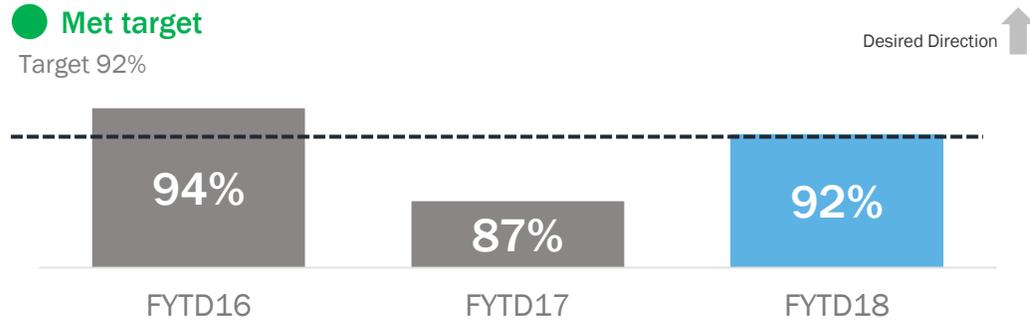
- Return 8000-series buses to service
- Work with manufacturer on developing alternative coolant level sensor
- Continue evaluation of new products and adjust preventive maintenance cycles
- Midlife overhaul and preventive maintenance programs
- Sustain bus procurements





# MetroAccess On-Time Performance

## MetroAccess On-Time Performance



## OTP met target

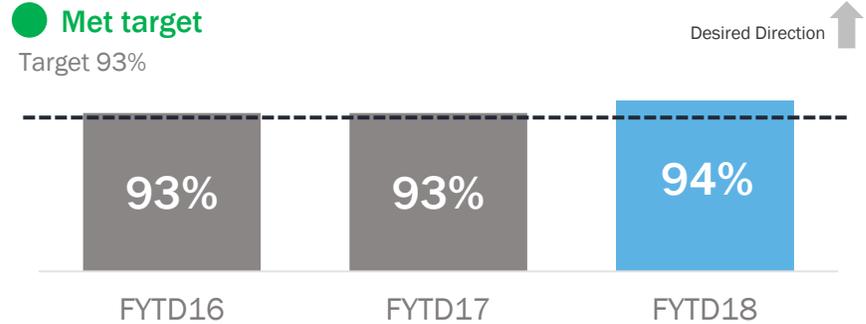
### Key Actions:

- Abilities-Ride program has ramped up incrementally and is on track for expanded promotion and growth in 2018
- Overall, staffing levels remain adequate

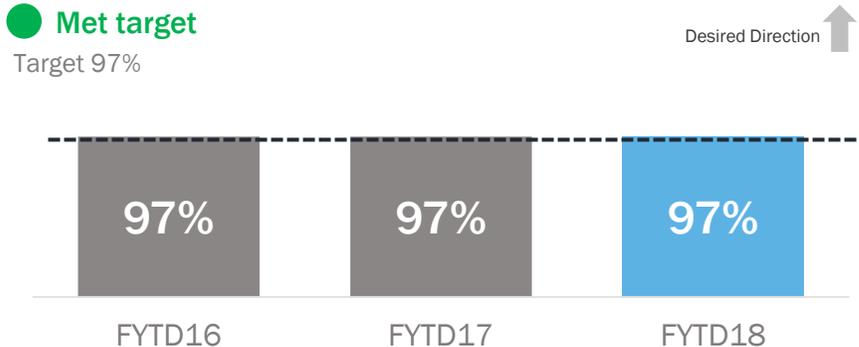


# Escalator & Elevator Availability

## Escalator Availability



## Elevator Availability



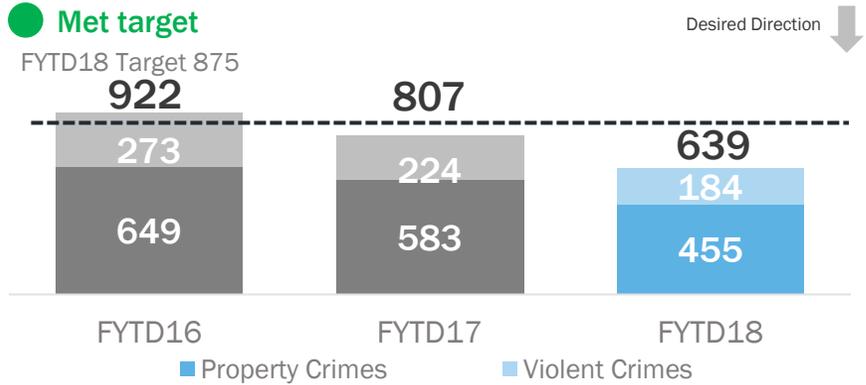
Both met target with escalator availability surpassing target

### Key Actions:

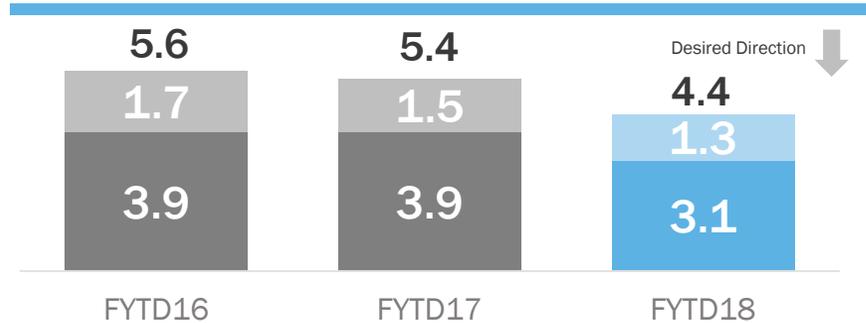
- Continue aggressive replacement and rehab efforts
- Continue updating preventive maintenance procedures tailored to each escalator/elevator model
- Establish contract with manufacturer for escalator steps to ensure steady supply



## Part I Crime



## Part I Crime, per million passengers



The Part I crime rate decreased 19% compared to last year, best in a decade

### Key Actions:

- Continue investment in closed circuit television (CCTV) and real-time monitoring
- Adjust tactics and officer deployments based on crime data analysis
- Sustain fare evasion initiative





# Safety Focus



Rail improving, bus an area of focus



# Red Signal Overruns

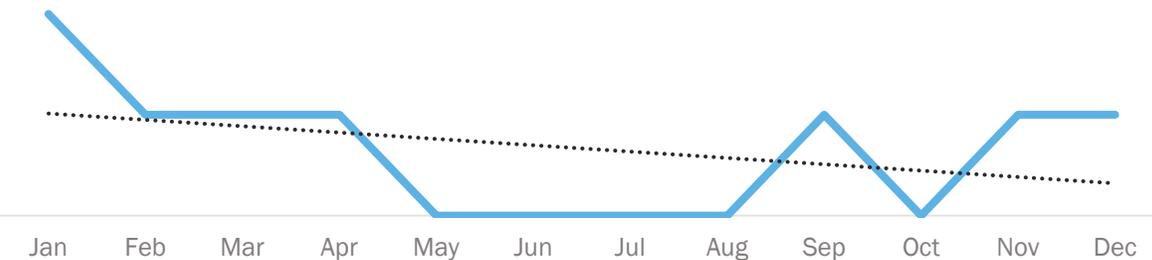
## Red Signal Overruns

Desired Direction ↓

● Decreased compared to prior year



### 12-Month Trend



## 70% decrease in Red Signal Overruns

### Key Actions:

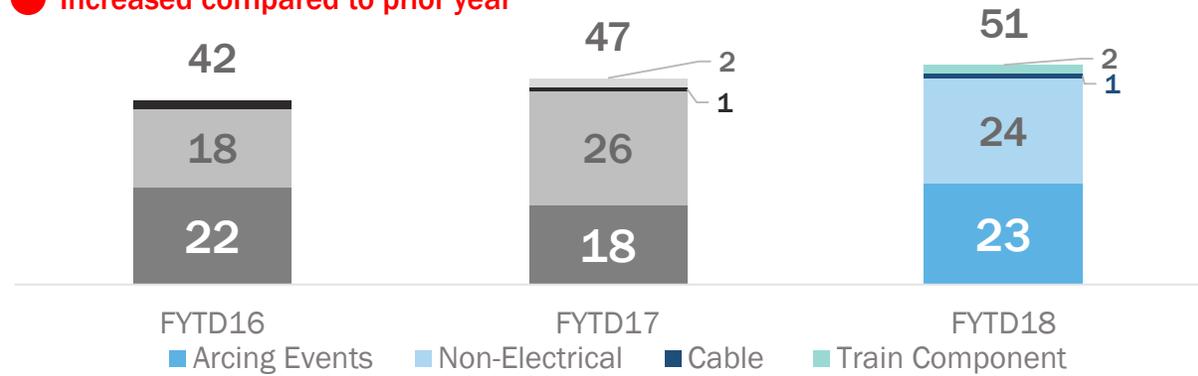
- Sign maintenance (cleaning, replacement)
- Yard safety briefing on each shift by Interlocking Operator
- Signal Head upgrades (LEDs/Lenses/Name Plates)
- "Stop and Proceed Operating Mode" solution
- Right-side signal configuration
- Diverging route signal consistency
- Line familiarization training for train and equipment operators
- Improved communications for Roadway Maintenance Machines (headsets)

# Fire Incidents

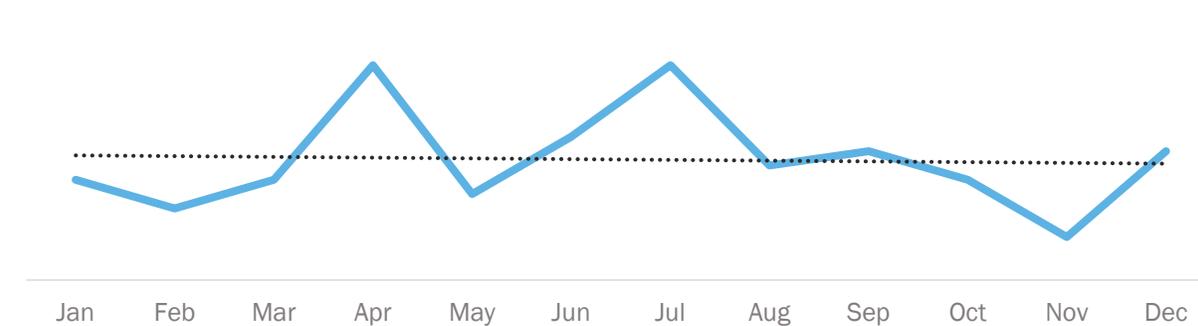
## Fire Incidents

Desired Direction ↓

● Increased compared to prior year



## 12-Month Trend



**Increase in fire incidents driven by high rainfall in July, which led to a spike in arcing insulators; no arcing insulators in November or December**

## Key Actions:

- Tunnel leak mitigation project
- Expanded cleaning programs
- Replaced insulators
- Additional inspections (e.g., stray current testing)
- Completed Cable Connector Refurbishment on mainline
- Completed cable securement project in all tunnel sections

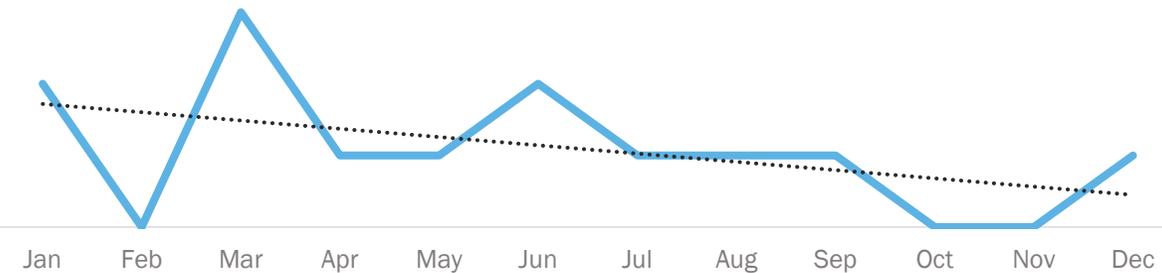
## Rail Collisions

Desired Direction ↓

● Decreased compared to prior year



### 12-Month Trend



**Four total collisions since July; one in the last three months of 2018**

### Key Actions:

- Operator training on safe train movement in yard
- Efficiency testing
  - Speed compliance
  - Yard safety stops
  - Shop/yard moves
- Improved Roadway Maintenance Machine communication procedures
- Revitalized Line familiarization training for Train and Equipment Operators
- Deployed new training program for Flagman and any personnel who may perform this task (e.g. Equipment Operators, Track Repairers)



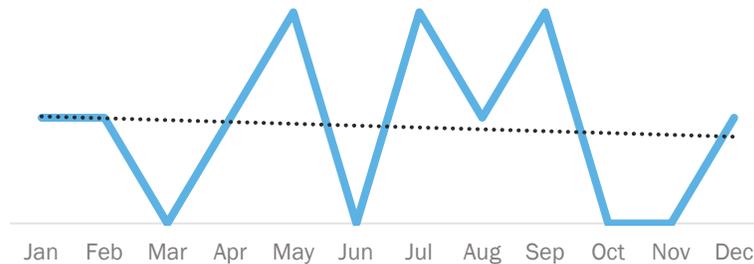
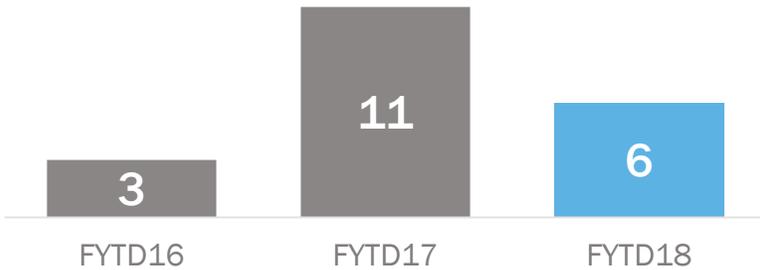
# Derailments

## Derailments

Desired Direction ↓

● Decreased compared to prior year

12-Month Trend

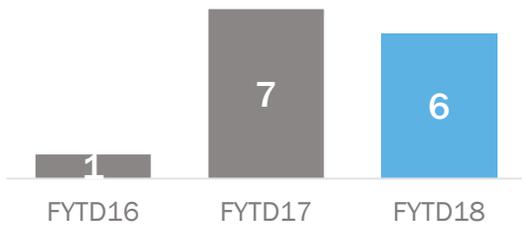


### 45% reduction in derailments compared to FYTD 2017

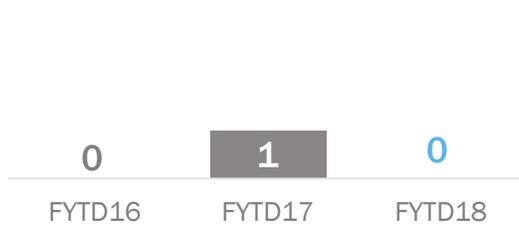
#### Key Actions:

- Hi-rail vehicle inspection and approval process
- Associated FTA/TOC CAP closed
- Tie scanning
- Base of rail scanning
- Lateral load testing
- HD Cameras

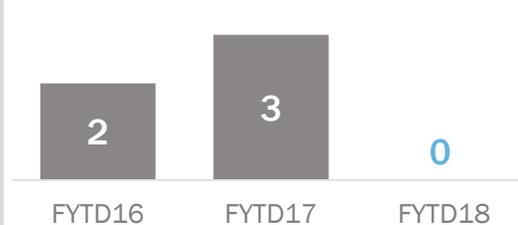
#### Roadway Maintenance Machines



#### Trains Carrying Customers



#### Trains with No Customers





# Bus Collisions

## Bus Collisions, per million miles

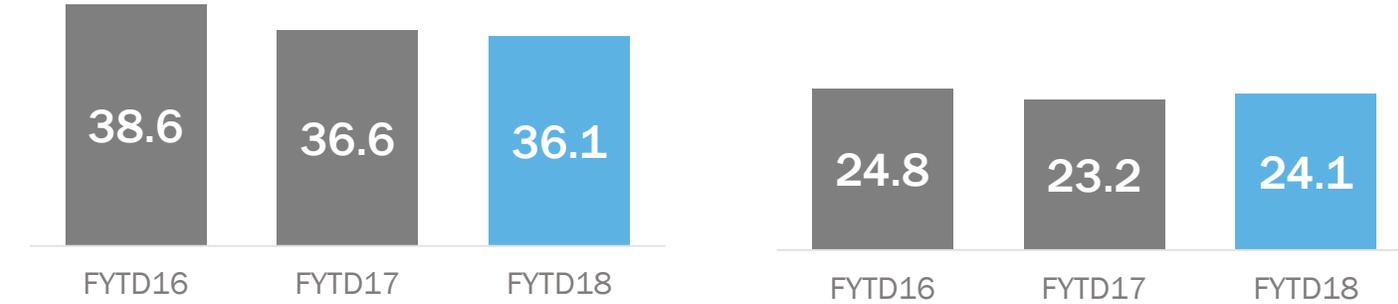
### Non-Preventable

### Preventable

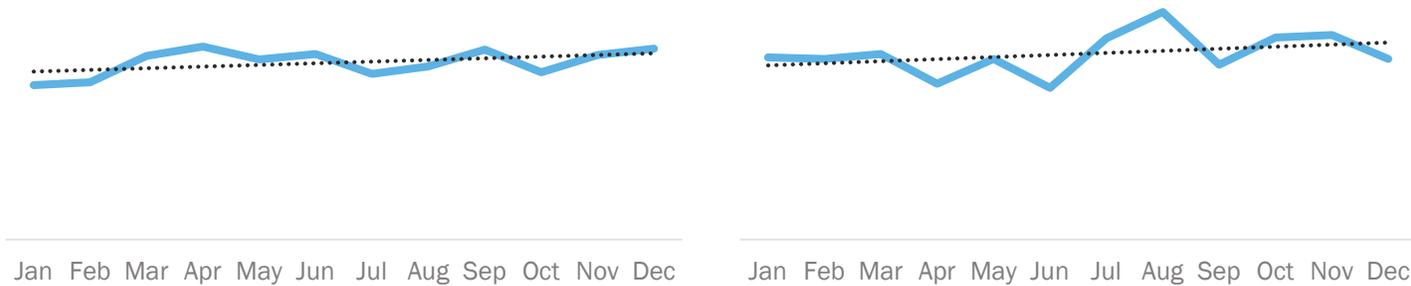
Desired Direction ↓

● Decreased compared to prior year

● Increased compared to prior year



### 12-Month Trend



## Bus Collision Rate increased slightly compared to FYTD 2017

### Key Actions:

- Line observations by BTRA and SAFE personnel
- Deceleration light and strobe installation
- Mirror adjustments/lowering
- Additional ride-alongs by supervision
- Review of collision reports and data analysis



# Bus Pedestrian Strikes

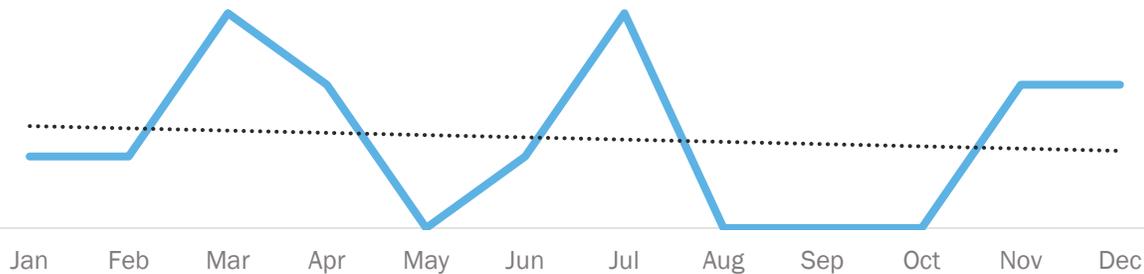
## Bus Pedestrian Strikes

Desired Direction ↓

● Decreased compared to prior year



### 12-Month Trend



22% decrease compared to FYTD 2017

### Key Actions:

- Front strobe/marker light installation
- Line observations by BTRA and SAFE personnel
- Ride-alongs by supervisory staff
- Review of DriveCam Incidents
- Mirror lowering/adjustment
- Electronic messaging at the Divisions to reinforce safe operations



# Rail Customer Injuries

## Rail Customer Injuries, per million passengers

Non-Preventable

Preventable

Desired Direction ↓

● Met target

Target 1.75

0.00

0.00

0.00

1.07

1.36

1.25

FYTD16

FYTD17

FYTD18

FYTD16

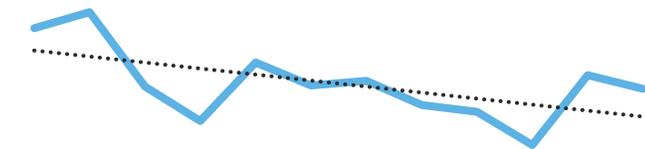
FYTD17

FYTD18

### 12-Month Trend

All Rail Customer Injuries were preventable

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec



Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

## 8% decrease compared to FYTD 2017

### Key Actions:

- Improved lighting at stations and on platforms
- Continued installation of optimal boarding location signage for ADA
- Installation of platform cameras at Train Operator's position at Silver Spring and Brookland-CUA stations to assist with platform observations
- Automated escalator announcements pilot implemented with additional location planned



# Bus Customer Injuries

## Bus Customer Injuries, per million passengers

Non-Preventable

Preventable

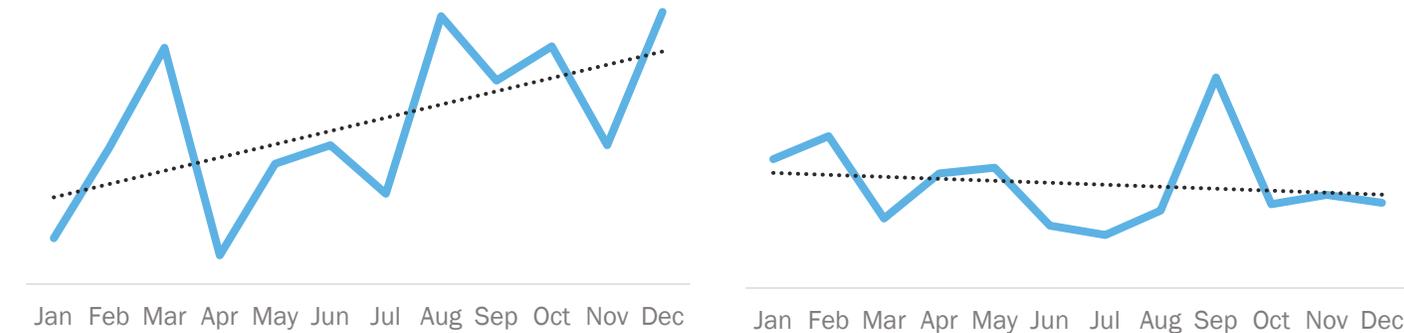
Desired Direction ↓

● Target not met

Target 2.45



### 12-Month Trend



## Primary cause of bus customer injuries continues to be motor vehicle collisions

### Key Actions:

- 8000-series hazard mitigation campaign
- Line observations by BTRA and SAFE personnel
- Deceleration strobe installation
- Emphasis on proper approach angle and berthing position at bus stops
- Installation of on-board video monitors on all new buses



# MetroAccess Customer Injuries

## MetroAccess Customer Injuries, per 100,000 passengers

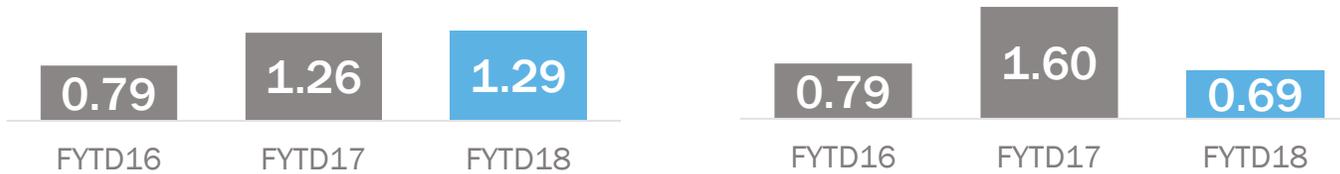
Non-Preventable

Preventable

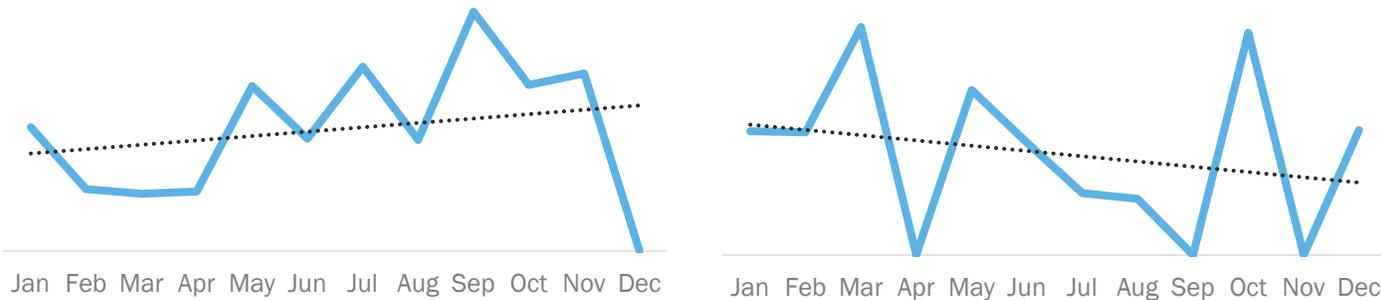
Desired Direction ↓

● Met target

Target 3.00



### 12-Month Trend



**31% decrease in customer injuries compared to FYTD 2017**

### Key Actions:

- Operator training
- Occupational therapist
- Acquisition of new vehicles with improved design
- Vehicle modifications based on customer feedback



# Rail Employee Injuries

## Rail Employee Injuries, per 100 employees

Non-Preventable

Preventable

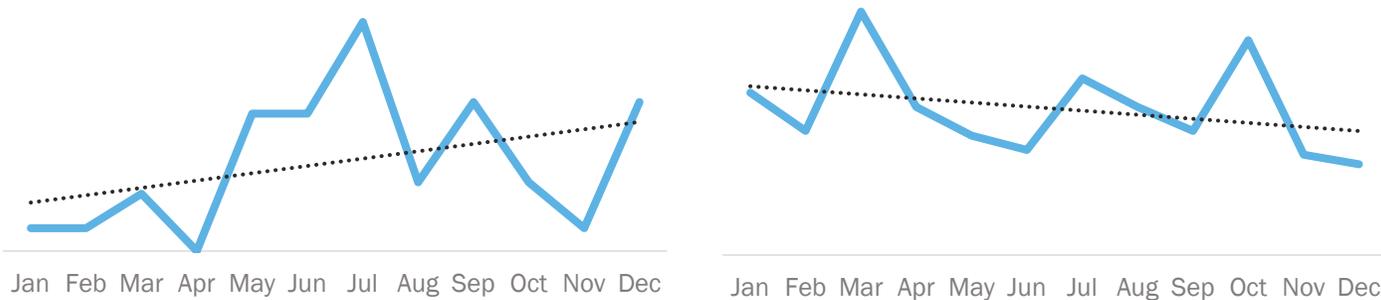
Desired Direction ↓

● Met target

Target 5.1



### 12-Month Trend



## Rail employee injury rate decreased compared FYTD 2017

### Key Actions:

- Job Hazard Analyses (45 in review)
- Increased observation and SAFE support during overnight maintenance
- Personal Protective Equipment
  - Electrical Protection Mats
  - Helmets



# Bus Employee Injuries

## Bus Employee Injuries, per 100 employees

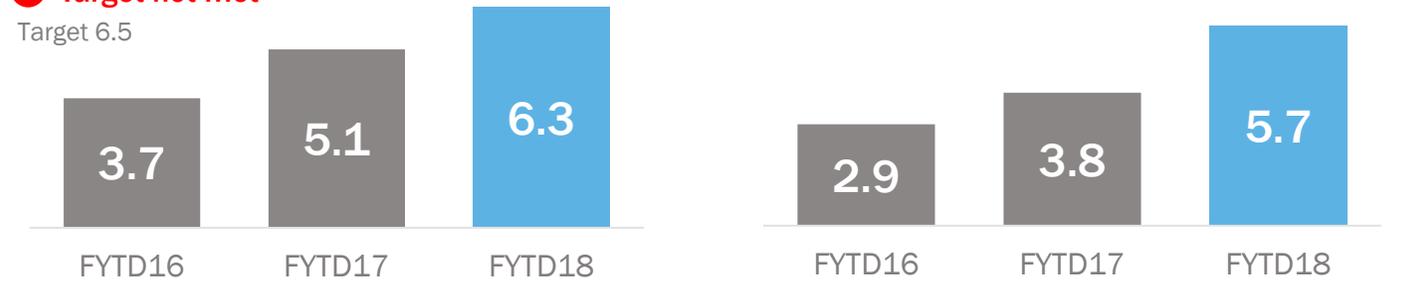
Non-Preventable

Preventable

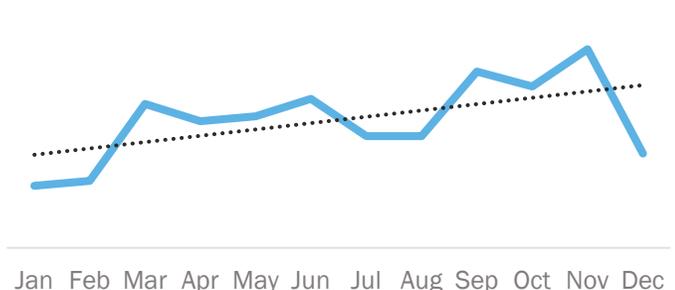
Desired Direction ↓

● Target not met

Target 6.5



### 12-Month Trend



## Bus employee injury rate increased compared to FYTD 2017

### Key Actions:

- MTPD partnering with Bus to support late night service
- APTA Peer Review
- Job Hazard Analyses for Bus Maintenance activities
- Assault Prevention Actions
  - Operator Shield installation
  - Scenario-based training for operators
  - Operator Humanizing Campaign
  - Automated Fare Announcement



# Fiscal Responsibility Focus



Balancing budget through expense management, as ridership and fare revenues lower than projected



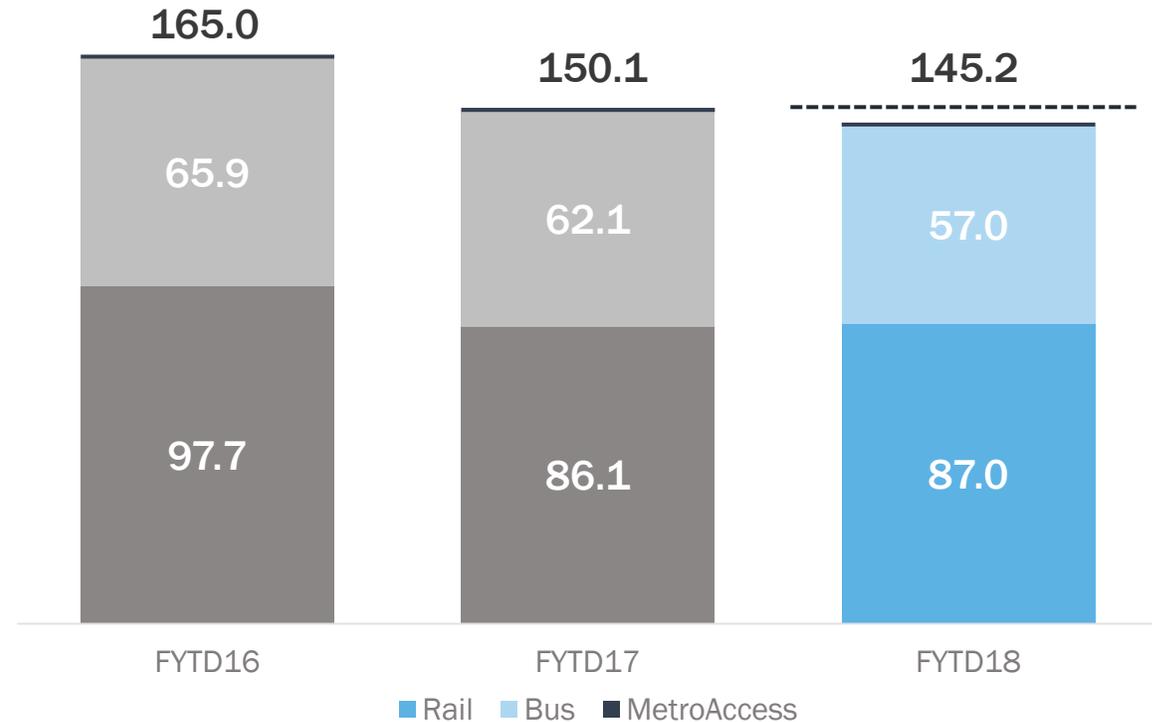
# Ridership

## Ridership by Mode, millions

● Near forecast

FYTD18 Budget Forecast 149.5

Desired Direction ↑



**Rail ridership has stabilized; Bus ridership has continued to decline, in part driven by the fare increase**

### Key Actions:

- Sustain improvements in bus and rail on-time performance
- Promote monthly SelectPass and weekly bus pass products and encourage more customers to register SmarTrip® cards and use online offerings such as auto-reload
- Launch Rush Hour Promise, crediting riders experiencing delays of 15 minutes or more during rush hour periods
- Strengthen SmartBenefits and regional employer relationships

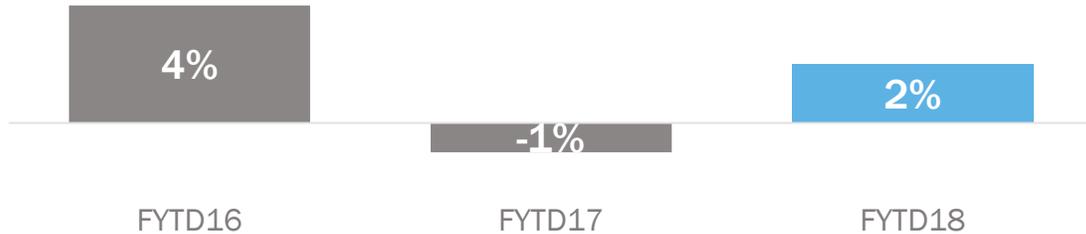


# Operating Budget Management

## Operating Budget Management

● **Met target**  
Target 0 to 2% favorable

Desired Direction ↑



FYTD18	Budget	Actual	Favorable (Unfavorable)
<b>Expenses</b>	<b>\$907M</b>	<b>\$876M</b>	<b>\$31M</b>
<b>Revenues</b>	<b>\$907M</b>	<b>\$897M</b>	<b>(\$10M)</b>
<i>Operating Rev.</i>	<i>\$419M</i>	<i>\$410M</i>	<i>(\$10M)</i>
<i>Net Subsidy</i>	<i>\$487M</i>	<i>\$487M</i>	-
<b>Net Position</b>	<b>0</b>	<b>\$21M</b>	<b>\$21M</b>

## Below budget expenses exceeded revenue shortfalls, resulting in projected balanced budget

- Expenses were under budget by \$31 million, primarily due to vacant positions and lower spending on services
- Revenue was below budget by \$10 million, primarily due to ridership below forecast
- The net operating position is \$21 million favorable year-to-date; the year-end forecast projects a balanced budget with a \$5 million favorable position (0.2%)



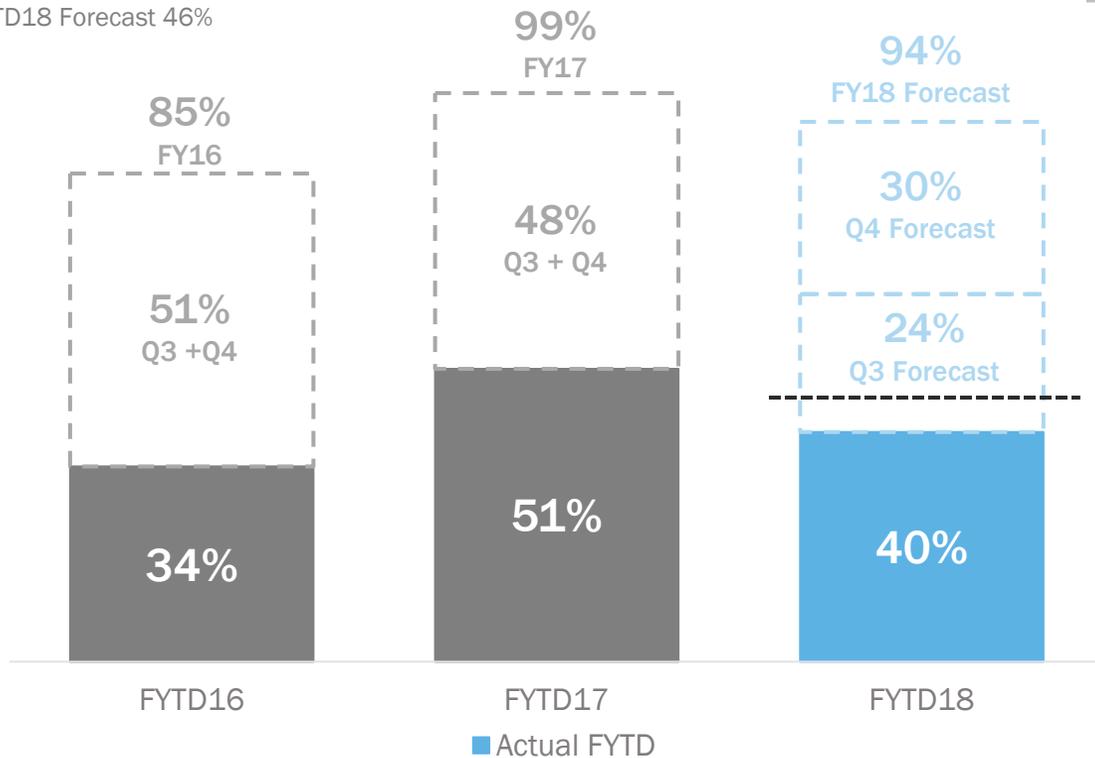
# Capital Funds Invested

## Capital Funds Invested

● Forecast not met

FYTD18 Forecast 46%

Desired Direction ↑



40% of capital funds invested FYTD; forecasted pace of investment to increase in Q3 and Q4

### Railcar

- Continued delivery of 7000 series railcars

### Rail Systems

- Radio and cell service projects

### Track & Structure

- Red Line Water Mitigation Pilot

### Station & Passenger Facilities

- Station Lighting program
- Replaced escalators and rehabilitated elevators

### Bus & Paratransit

- Rehabilitated buses; delayed delivery of new buses
- Building new Andrews Federal Center bus garage



# Q2

# FY2018

# Metro Performance Report

Fiscal-Year-To-Date  
July - December 2017



## QUALITY SERVICE

### MY TRIP TIME - RAIL ●

**87%** of customers arrived on-time

● Target ≥ 88% on-time

### BUS ON-TIME PERFORMANCE ●

**78%** of buses arrived on-time

● Target ≥ 79% on-time

### METROACCESS ON-TIME PERFORMANCE ●

**92%** of vehicles arrived on-time

● Target ≥ 92% on-time



## SAFETY & SECURITY

### RED SIGNAL OVERRUNS ●

**3** red signal overrun incidents

● FYTD Prior Year 10

### BUS COLLISIONS ●

**60.2** collisions per million miles

● FYTD Prior Year 59.8

### PART I CRIME ●

**639** 4.4 per million passengers

● FYTD Target ≤ 875 Part I Crimes



## FINANCIAL RESPONSIBILITY

### RIDERSHIP ●

**145.2** million passengers

● Budget Forecast 149.5 million passengers

### BUDGET MANAGEMENT ●

**2%** favorable

● Target 0 to 2% favorable

### CAPITAL FUNDS INVESTED ●

**40%** of capital budget invested

● FYTD Forecast ≥ 46%



**KPI: METRORAIL CUSTOMER ON-TIME PERFORMANCE [TARGET 88%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016							70%	72%	78%	80%	69%	71%	N/A
FY 2017	71%	69%	64%	65%	61%	63%	66%	71%	70%	75%	76%	79%	66%
FY 2018	86%	89%	87%	88%	87%	86%							87%

**KPI: METRORAIL CUSTOMER ON-TIME PERFORMANCE BY LINE**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Red Line	87%	88%	89%	88%	84%	80%							86%
Blue Line	82%	87%	81%	84%	85%	86%							84%
Orange Line	83%	87%	79%	86%	85%	87%							84%
Green Line	92%	93%	94%	94%	92%	95%							93%
Yellow Line	85%	92%	91%	90%	88%	91%							89%
Silver Line	82%	88%	81%	86%	86%	88%							85%

**KPI: METRORAIL CUSTOMER ON-TIME PERFORMANCE BY TIME PERIOD**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
AM Rush (5AM-9:30AM)	87%	92%	90%	91%	88%	86%							89%
Mid-day (9:30AM-3PM)	90%	90%	89%	90%	89%	88%							89%
PM Rush (3PM-7PM)	89%	88%	87%	90%	88%	87%							88%
Evening (7PM-9:30PM)	92%	92%	93%	92%	92%	92%							92%
Late Night (9:30PM-12AM)	90%	92%	93%	89%	88%	90%							90%
Weekend	72%	79%	77%	76%	72%	81%							76%

continued

**KPI: RAIL INFRASTRUCTURE AVAILABILITY [PILOT KPI]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017							98%	97%	96%	96%	96%	95%	N/A
FY 2018	98%	95%	94%	95%	93%	94%							95%

**KPI: FTA REPORTABLE SPEED RESTRICTIONS [TARGET 2.2%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	3%	2%	4%	6%	6%	6%	1%	0%	4%	2%	2%	5%	5%
FY 2018	0%	3%	10%	10%	12%	14%							8%

**TRAIN ON-TIME PERFORMANCE (HEADWAY ADHERENCE) [TARGET 91%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	84%	83%	79%	76%	80%	82%	78%	82%	86%	87%	80%	80%	81%
FY 2017	78%	76%	78%	80%	74%	76%	76%	82%	80%	84%	83%	82%	77%
FY 2018	90%	92%	89%	92%	89%	88%							90%

**TRAIN ON-TIME PERFORMANCE BY LINE (HEADWAY ADHERENCE)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Red Line	91%	92%	92%	93%	87%	81%							90%
Blue Line	86%	89%	85%	89%	88%	88%							88%
Orange Line	89%	90%	87%	90%	90%	90%							89%
Green Line	93%	95%	96%	96%	94%	95%							95%
Yellow Line	91%	94%	93%	94%	93%	93%							93%
Silver Line	88%	91%	86%	89%	89%	89%							89%

**TRAIN ON-TIME PERFORMANCE BY TIME PERIOD (HEADWAY ADHERENCE)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
AM Rush	85%	89%	86%	89%	85%	84%							86%
Mid-day	94%	95%	93%	95%	94%	92%							94%
PM Rush	88%	89%	87%	90%	88%	86%							88%
Evening	94%	93%	96%	91%	90%	94%							93%

continued

**RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN DELAYS) [TARGET 85,000 MILES]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	56,446	59,196	60,872	65,900	63,564	51,599	39,657	47,239	59,131	80,943	81,278	85,389	59,049
FY 2017	55,850	73,246	65,416	86,174	66,697	76,244	79,105	85,489	80,348	118,958	101,585	104,461	69,466
FY 2018	92,927	83,133	83,890	99,876	80,687	85,310							87,225

**RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN DELAYS BY RAILCAR SERIES)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
2000/3000 series	115,528	69,136	108,413	85,808	67,832	67,537							82,371
5000 series	43,257	48,454	38,808	51,192	67,836	48,036							48,230
6000 series	75,405	132,930	102,604	73,596	92,913	77,281							88,645
7000 series	147,371	116,557	87,191	199,484	95,131	134,596							121,689

**RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN FAILURE) [TARGET 7,500 MILES]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4,576	4,802	4,738	5,326	4,970	5,693	5,020	4,813	5,336	5,307	5,596	5,259	4,994
FY 2017	4,333	4,606	5,538	6,321	6,355	6,819	6,787	7,723	6,878	7,902	8,425	8,215	5,502
FY 2018	7,438	8,218	9,666	10,437	10,376	10,496							9,271

**RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN FAILURE BY RAILCAR SERIES)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
2000/3000 series	8,169	7,731	10,325	9,453	9,912	8,903							8,965
5000 series	2,809	3,230	3,234	4,143	5,088	4,367							3,609
6000 series	8,062	12,085	11,954	8,873	9,369	8,587							9,606
7000 series	14,936	16,229	17,315	21,527	16,925	20,366							17,828

**TRAINS IN SERVICE [TARGET 98%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017			94%	96%	92%	99%	94%	98%	97%	97%	96%	97%	95%
FY 2018	98%	98%	98%	100%	98%	98%							99%

continued

**RAIL LOADING [OPTIMAL PASSENGERS PER CAR (PPC) OF 100, WITH MINIMUM OF 80 AND MAXIMUM OF 120 PPC]**

AM Rush Max Load Points		Jul-16	Aug-16	Sep-16	Oct-16	Jul-17	Aug-17	Sep-17	Oct-17
Gallery Place	Red	<b>117</b>	82	88	88	96	91	<b>110</b>	<b>104</b>
Dupont Circle		<b>118</b>	81	91	87	95	85	93	93
Pentagon	Blue	72	93	94	86	77	72	77	86
Rosslyn		81	85	100	85	69	60	63	68
L'Enfant Plaza		60	57	63	68	49	44	52	44
Court House	Orange	<b>102</b>	85	96	81	82	74	97	<b>101</b>
L'Enfant Plaza		66	64	69	68	75	74	63	76
Pentagon	Yellow	78	65	82	84	<b>117</b>	<b>124</b>	<b>117</b>	<b>126</b>
Waterfront	Green	74	86	90	93	98	90	100	94
Shaw-Howard		76	67	76	76	<b>118</b>	<b>113</b>	<b>109</b>	<b>119</b>
Rosslyn	Silver	<b>101</b>	70	<b>105</b>	90	96	94	98	<b>104</b>
L'Enfant Plaza		59	58	71	56	54	51	65	58
PM Rush Max Load Points									
Metro Center	Red	88	95	92	91	95	88	<b>101</b>	98
Farragut North		90	92	82	<b>103</b>	80	87	86	87
Rosslyn	Blue	95	<b>103</b>	<b>110</b>	91	85	76	84	91
Foggy Bottom-GWU		87	<b>109</b>	<b>101</b>	91	89	84	78	98
Smithsonian		50	44	73	39	56	49	50	49
Foggy Bottom-GWU	Orange	<b>116</b>	98	83	78	97	85	89	90
Smithsonian		74	57	73	69	67	72	61	68
L'Enfant Plaza	Yellow	82	74	72	74	<b>120</b>	<b>124</b>	<b>114</b>	<b>123</b>
L'Enfant Plaza	Green	80	73	<b>103</b>	85	<b>106</b>	<b>116</b>	96	<b>103</b>
Mt. Vernon Square		62	63	63	69	<b>120</b>	<b>108</b>	<b>104</b>	<b>103</b>
Foggy Bottom-GWU	Silver	<b>107</b>	90	85	72	76	62	64	70
L'Enfant Plaza		81	59	73	69	58	48	50	55

continued

<b>KPI: METROBUS ON-TIME PERFORMANCE [TARGET 79%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	79%	80%	76%	76%	77%	78%	77%	78%	78%	77%	77%	75%	78%
FY 2017	77%	77%	72%	73%	73%	76%	77%	78%	77%	76%	76%	76%	75%
FY 2018	80%	80%	76%	76%	76%	78%							78%

<b>KPI: METROBUS ON-TIME PERFORMANCE BY TIME PERIOD</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
AM Early (4AM-6AM)	89%	90%	89%	89%	87%	88%							89%
AM Peak (6AM-9AM)	84%	84%	79%	80%	80%	82%							81%
Mid Day (9AM-3PM)	79%	79%	77%	78%	77%	79%							78%
PM Peak (3PM-7PM)	75%	75%	69%	68%	67%	71%							71%
Early Night (7PM-11PM)	80%	80%	78%	78%	79%	81%							79%
Late Night (11PM-4AM)	77%	79%	78%	78%	80%	81%							79%

<b>BUS FLEET RELIABILITY (BUS MEAN DISTANCE BETWEEN FAILURES) [TARGET 8,000 MILES]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	6,518	7,352	7,542	7,307	9,185	7,893	8,422	8,332	8,359	9,138	8,711	7,736	7,519
FY 2017	7,540	7,425	8,428	8,378	8,262	8,421	7,962	9,881	9,254	8,499	7,784	8,350	8,039
FY 2018	7,555	7,764	7,571	6,923	7,492	7,776							7,504

<b>BUS FLEET RELIABILITY (BUS MEAN DISTANCE BETWEEN FAILURE BY FLEET TYPE)</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
CNG Average Age 8.4	7,633	8,270	6,636	6,673	7,020	6,312							7,092
Hybrid Average Age 6.2	8,201	8,483	8,940	7,949	9,015	9,466							8,634
Clean Diesel Average Age 10.3	5,072	4,111	4,981	4,014	4,662	7,212							4,823
All Other Average Age 17.5	3,058	6,673	3,643	3,464	3,050	2,493							3,398

continued

**BUS LOADING - Q2/FY 2018 TOP 10 ROUTES BY JURISDICTION**

Service Code	Line Name	Route Name	Time Period	Highest Passenger Load	Max Load Factor
DC	Georgia Ave - 7th Street	79	AM Peak	78	<b>2.0</b>
	14th Street	52	AM Peak	79	<b>2.0</b>
	Wisconsin Avenue	33	PM Peak	79	<b>2.0</b>
	Georgia Ave - 7th Street	79	PM Peak	78	<b>2.0</b>
	Deanwood - Alabama Avenue	W4	AM Peak	91	<b>2.0</b>
	14th Street	53	PM Peak	79	<b>2.0</b>
	Friendship Heights - Southeast	30S	PM Peak	79	<b>2.0</b>
	Georgia Ave - 7th Street	70	PM Peak	111	<b>2.0</b>
	14th Street	54	PM Peak	79	<b>2.0</b>
	Deanwood - Alabama Avenue	W4	PM Peak	83	<b>2.0</b>
MD	New Carrollton - Silver Spring	F4	PM Peak	78	<b>2.0</b>
	New Hampshire Ave - Maryland	K6	PM Peak	77	<b>1.9</b>
	Viers Mill Road	Q4	PM Peak	75	<b>1.9</b>
	New Hampshire Ave - Maryland	K6	Midday	76	<b>1.9</b>
	Greenbelt-Twinbrook	C4	Midday	75	<b>1.9</b>
	Georgia Avenue - Maryland	Y7	PM Peak	75	<b>1.9</b>
	Greenbelt-Twinbrook	C2	PM Peak	74	<b>1.9</b>
	New Carrollton - Silver Spring	F4	Midday	74	<b>1.9</b>
	Greenbelt-Twinbrook	C2	Midday	73	<b>1.8</b>
	Georgia Avenue - Maryland	Y8	Midday	73	<b>1.8</b>
VA	Leesburg Pike	28A	PM Peak	71	<b>1.8</b>
	Columbia Pike - Farragut Square	16Y	AM Peak	71	<b>1.7</b>
	Leesburg Pike	28A	AM Peak	67	<b>1.7</b>
	Leesburg Pike	28A	Midday	66	<b>1.7</b>
	Burke Center	18P	PM Peak	64	<b>1.6</b>
	Lincolnia - North Fairlington	7Y	PM Peak	65	<b>1.6</b>
	Columbia Pike - Farragut Square	16Y	PM Peak	64	<b>1.6</b>
	Ballston - Farragut Square	38B	PM Peak	62	<b>1.5</b>
	Richmond Highway Express	REX	PM Peak	60	<b>1.5</b>
	Lincolnia - North Fairlington	7Y	AM Peak	61	<b>1.5</b>

Performance Threshold	Max Load Factor
Below Threshold	< 0.3
Standards Compliant	0.3 - 0.5
Occasional Crowding	0.6 - 0.7
Recurring Crowding	0.8 - 0.9
Regular Crowding	1.0 - 1.3
Continuous Crowding	> 1.3

Highest passenger load = the average of all the highest max loads recorded by route, trip and time period

Passenger Loads:

40' Bus (standard size) accommodates 40 sitting and 69 with standing

60' Bus (articulated) accommodates 61 sitting and 112 with standing

\* Route has articulated buses, allowing for passenger load above 100

Load Factor = highest passenger load divided by actual bus seats used

continued

**KPI: METROACCESS ON-TIME PERFORMANCE [TARGET 92%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	95%	95%	94%	93%	93%	94%	94%	93%	93%	93%	93%	92%	94%
FY 2017	92%	91%	84%	83%	84%	87%	88%	87%	85%	88%	87%	92%	87%
FY 2018	89%	91%	90%	93%	93%	94%							92%

**ESCALATOR SYSTEM AVAILABILITY [TARGET 93%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	93%	93%	93%	93%	93%	93%	94%	93%	94%	94%	93%	93%	93%
FY 2017	93%	92%	93%	94%	94%	94%	95%	95%	96%	96%	96%	95%	93%
FY 2018	95%	94%	95%	94%	94%	94%							94%

**ELEVATOR SYSTEM AVAILABILITY [TARGET 97%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	97%	97%	96%	96%	96%	97%	97%	97%	97%	97%	97%	97%	97%
FY 2017	96%	97%	97%	97%	97%	97%	96%	97%	97%	97%	98%	97%	97%
FY 2018	97%	97%	97%	97%	97%	98%							97%

**KPI: METROBUS CUSTOMER SATISFACTION RATING**

	Q1	Q2	Q3	Q4	FYTD
FY 2016	82%	81%	74%	78%	81%
FY 2017	78%	79%	74%	76%	79%
FY 2018	76%	N/A			N/A

**KPI: METRORAIL CUSTOMER SATISFACTION RATING**

	Q1	Q2	Q3	Q4	FYTD
FY 2016	67%	69%	68%	66%	69%
FY 2017	66%	66%	69%	72%	66%
FY 2018	74%	N/A			N/A

continued



RED SIGNAL OVERRUNS													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	4	2	1	1	1	1	2	1	1	1	0	0	10
FY 2018	0	0	1	0	1	1							3

FIRE AND SMOKE INCIDENTS													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	4	15	9	8	3	8	7	5	7	15	6	10	47
Non-Electrical	3	9	6	3	1	4	3	2	1	4	2	3	26
Cable	0	0	1	0	0	0	0	0	1	0	0	0	1
Arcing Insulator	1	6	2	5	2	2	4	3	5	11	4	7	18
Train Component	0	0	0	0	0	2	0	0	0	0	0	0	2
FY 2018	15	8	9	7	3	9							51
Non-Electrical	4	2	4	3	3	7							23
Cable	1	1	0	2	0	0							4
Arcing Insulator	9	5	5	2	0	0							21
Train Component	1	0	0	0	0	2							3

RAIL COLLISIONS													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	1	1	1	2	3	0	2	0	3	1	1	2	8
FY 2018	1	1	1	0	0	1							4

continued

DERAILMENTS													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	4	0	3	2	2	0	1	1	0	1	2	0	11
Trains Carrying Customers	1	0	0	0	0	0	0	0	0	0	0	0	1
Trains with No Customers	2	0	1	0	0	0	0	0	0	1	0	0	3
Roadway Maintenance Machines	1	0	2	2	2	0	1	1	0	0	2	0	7
FY 2018	2	1	2	0	0	1							6
Trains Carrying Customers	0	0	0	0	0	0							0
Trains with No Customers	0	0	0	0	0	0							0
Roadway Maintenance Machines	2	1	2	0	0	1							6

BUS COLLISION RATE [PER MILLION VEHICLE MILES]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	52.9	59.7	60.2	68.4	56.5	61.4	53.2	53.7	59.6	57.9	58.3	55.9	59.8
Non-Preventable	30.4	35.6	35.6	44.7	34.2	39.3	31.2	31.8	37.1	39.0	36.4	37.5	36.6
Preventable	22.5	24.1	24.5	23.8	22.4	22.0	22.1	21.9	22.5	18.9	21.9	18.4	23.1
FY 2018	57.9	62.7	59.6	58.3	62.0	60.6							60.2
Non-Preventable	33.5	35.0	38.4	33.8	37.3	38.6							36.1
Preventable	24.4	27.6	21.2	24.5	24.8	21.9							24.1

BUS PEDESTRIAN STRIKES [PEDESTRIAN / CYCLIST STRIKES]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	1	1	3	3	0	1	1	1	3	2	0	1	9
FY 2018	3	0	0	0	2	2							7

continued

**CUSTOMER INJURY RATE (PER MILLION PASSENGERS) [TARGET ≤ 1.75]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	0.81	2.53	1.70	2.05	1.37	1.35	3.29	2.22	1.75	2.13	1.91	2.15	1.63
FY 2017	1.78	1.79	2.01	1.73	1.68	2.63	2.14	2.59	2.17	1.41	2.19	1.71	1.92
FY 2018	1.57	2.03	2.61	1.87	1.92	2.15							2.02

\* Includes Metrobus, Metrorail, rail transit facilities (stations, escalators and parking facilities) and MetroAccess customer injuries

**RAIL CUSTOMER INJURY RATE (PER MILLION PASSENGERS)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	0.58	1.23	1.49	1.05	1.45	0.75	2.25	1.96	1.05	1.13	1.46	1.36	1.07
Non-Preventable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Preventable	0.58	1.23	1.49	1.05	1.45	0.75	2.25	1.96	1.05	1.13	1.46	1.36	1.07
FY 2017	0.79	1.13	1.62	1.07	1.36	2.33	1.91	2.05	1.40	1.10	1.61	1.41	1.36
Non-Preventable	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Preventable	0.79	1.13	1.62	1.07	1.36	2.33	1.91	2.05	1.40	1.10	1.61	1.41	1.36
FY 2018	1.45	1.24	1.18	0.82	1.50	1.37							1.25
Non-Preventable	0.00	0.00	0.00	0.00	0.00	0.00							0.00
Preventable	1.45	1.24	1.18	0.82	1.50	1.37							1.25

**BUS CUSTOMER INJURY RATE (PER MILLION PASSENGERS)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	0.85	4.01	1.86	3.31	1.17	1.96	4.35	2.14	2.69	3.21	1.67	3.07	2.21
Non-Preventable	0.68	2.14	0.80	1.48	0.88	0.78	1.93	0.61	1.70	1.13	0.46	1.72	1.13
Preventable	1.17	1.87	0.97	1.66	0.49	1.17	2.41	1.53	0.99	2.26	1.21	1.44	1.06
FY 2017	2.28	2.35	2.22	2.22	1.56	2.56	2.11	3.07	2.62	1.80	2.52	1.84	2.19
Non-Preventable	0.85	1.27	1.85	0.74	0.78	0.53	0.32	0.95	1.65	0.20	0.84	0.97	1.02
Preventable	1.42	1.09	0.37	1.48	0.88	1.92	1.80	2.12	0.97	1.60	1.68	0.87	1.18
FY 2018	1.37	2.96	4.36	2.84	2.27	3.09							2.82
Non-Preventable	0.63	1.87	1.42	1.66	0.97	1.90							1.41
Preventable	0.74	1.08	2.94	1.17	1.30	1.19							1.41

continued

**METROACCESS CUSTOMER INJURY RATE (PER 100,000 PASSENGERS)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	2.06	2.64	1.05	1.50	0.55	1.58	3.37	2.73	0.96	3.06	5.08	1.49	1.57
Non-Preventable	1.55	0.00	0.52	1.50	0.55	0.53	1.35	2.19	0.48	2.04	2.03	0.99	0.79
Preventable	0.52	2.64	0.52	0.00	0.00	1.05	2.02	0.55	0.48	1.02	3.05	0.50	0.79
FY 2017	5.26	1.90	2.00	2.49	3.09	2.60	2.15	1.61	2.98	0.52	2.88	1.95	2.86
Non-Preventable	2.11	0.95	1.00	1.49	1.03	1.04	1.08	0.54	0.50	0.52	1.44	0.98	1.26
Preventable	3.16	0.95	1.00	0.99	2.06	1.56	1.08	1.07	1.99	0.00	1.44	0.98	1.60
FY 2018	2.14	1.46	2.09	3.39	1.55	1.09							1.97
Non-Preventable	1.61	0.97	2.09	1.45	1.55	0.00							1.29
Preventable	0.54	0.49	0.00	1.94	0.00	1.09							0.69

continued

**EMPLOYEE INJURY RATE (PER 200,000 HOURS) [TARGET ≤ 5.1]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	5.1	6.0	3.7	4.8	4.3	3.7	6.2	5.4	4.4	5.7	5.0	4.9	4.6
FY 2017	5.9	5.3	6.0	5.7	4.1	6.5	4.6	4.0	7.9	7.1	6.3	6.6	5.6
FY 2018	7.3	6.0	8.1	8.3	6.5	5.3							6.9

**RAIL EMPLOYEE INJURY RATE (PER 100 EMPLOYEES)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4.7	3.4	2.7	3.4	3.9	2.4	4.7	4.2	2.8	4.2	3.9	3.7	3.4
Non-Preventable	1.0	0.4	1.0	0.4	0.8	0.0	0.2	0.2	0.7	1.4	0.9	1.3	0.6
Preventable	3.7	3.0	1.7	3.0	3.1	2.4	4.5	4.0	2.1	2.8	3.0	2.4	2.8
FY 2017	5.5	4.8	3.8	3.8	2.9	3.9	3.6	2.8	5.7	3.1	3.7	3.4	4.1
Non-Preventable	0.6	1.3	0.4	0.8	0.6	0.4	0.2	0.2	0.5	0.0	1.2	1.2	0.7
Preventable	4.9	3.5	3.4	3.1	2.3	3.5	3.4	2.6	5.1	3.1	2.5	2.2	3.5
FY 2018	5.7	3.7	3.9	5.1	2.4	3.2							4.0
Non-Preventable	2.0	0.6	1.3	0.6	0.2	1.3							1.0
Preventable	3.7	3.1	2.6	4.5	2.1	1.9							3.0

**BUS EMPLOYEE INJURY RATE (PER 100 EMPLOYEES)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	7.4	10.6	4.6	7.3	5.1	4.4	9.4	9.8	7.2	8.7	6.7	8.3	6.6
Non-Preventable	4.7	4.9	2.8	4.4	2.5	3.0	4.1	4.7	3.7	5.3	3.9	6.2	3.7
Preventable	2.7	5.8	1.8	2.9	2.5	1.5	5.3	5.0	3.5	3.4	2.7	2.1	2.9
FY 2017	7.0	8.3	9.0	11.5	7.0	7.3	6.9	6.7	12.2	14.4	10.9	12.7	8.9
Non-Preventable	4.3	4.9	5.7	6.1	5.2	4.6	4.4	4.0	6.4	9.3	5.6	6.7	5.1
Preventable	2.7	3.5	3.3	5.5	1.8	6.1	2.5	2.7	5.8	5.1	5.3	6.0	3.8
FY 2018	11.0	10.2	14.6	14.0	14.2	8.3							12.0
Non-Preventable	6.5	5.7	7.5	7.5	6.1	4.5							6.3
Preventable	4.5	4.5	7.1	6.5	8.0	3.8							5.7

continued

KPI: PART I CRIME RATE [PER MILLION PASSENGERS]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4.7	5.5	6.2	6.9	5.4	4.7	6.1	4.4	4.3	4.1	6.1	5.0	5.6
FY 2017	6.3	6.2	5.4	4.9	4.5	4.9	4.5	3.8	3.5	4.2	4.6	4.5	5.4
FY 2018	4.6	4.8	5.2	4.1	3.9	3.8							4.4

KPI: PART I CRIMES [TARGET ≤ 1,750 PART I CRIMES]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	144	153	172	199	135	119	129	109	122	114	161	137	922
FY 2017	160	163	140	126	107	111	110	87	92	107	120	119	807
FY 2018	113	122	127	108	90	79							639

PART I CRIMES BY TYPE													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Property Crime	69	85	98	77	68	58							455
Larceny (Snatch/ Pickpocket)	12	21	11	11	19	22							96
Larceny (Other)	51	59	83	62	47	31							333
Burglary	0	0	0	0	0	0							0
Motor Vehicle Theft	6	4	3	3	2	4							22
Attempted M V Theft	0	1	1	1	0	1							4
Arson	0	0	0	0	0	0							0
Violent Crime	44	37	29	31	22	21							184
Aggravated Assault	13	11	10	9	6	6							55
Rape	1	1	0	0	0	0							2
Robbery	30	25	19	22	16	15							127
FY 2018 Part I Crimes	113	122	127	108	90	79							639
FY 2018 Homicides	0	0	0	0	0	0							0

\* Homicides that occur on WMATA property are investigated by other law enforcement agencies. These cases are shown for public information; however, the cases are reported by the outside agency and are not included in MTPD crime statistics.

continued



**KPI: RIDERSHIP BY MODE [BUDGET FORECAST 341.5 MILLION]**

		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Rail	Forecast	15,529,935	15,886,945	14,994,420	15,708,440	13,566,380	13,209,370							88,895,490
	Actual	15,195,047	15,291,378	14,446,237	15,760,054	13,957,496	12,382,372							87,032,584
Bus	Forecast	9,942,000	10,481,000	10,060,100	10,503,000	9,346,000	9,076,000							59,408,000
	Actual	9,375,256	10,042,871	9,798,585	10,182,688	9,171,025	8,384,448							56,954,873
Access	Forecast	195,000	210,000	201,000	214,000	192,000	197,000							1,209,000
	Actual	186,699	206,014	191,051	206,407	193,974	182,911							1,167,055
Total	Forecast	25,666,935	26,577,945	25,255,420	26,425,440	23,104,380	22,482,370							149,512,490
	Actual	24,757,002	25,540,263	24,435,872	26,149,149	23,322,495	20,949,731							145,154,512

**KPI: BUDGET MANAGEMENT [TARGET 0-2 % FAVORABLE]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Expense Variance (\$)	(\$7)	(\$25)	(\$27)	(\$31)	(\$32)	(\$31)							(\$31)
Revenue Variance (\$)	(\$2)	(\$5)	(\$9)	(\$10)	(\$9)	(\$10)							(\$10)
Net Subsidy Variance (\$)	(\$5)	(\$20)	(\$19)	(\$22)	(\$23)	(\$21)							(\$21)
Expense Variance (%)	-5%	-8%	-6%	-5%	-4%	-3%							-3%
Revenue Variance (%)	-2%	-4%	-4%	-3%	-2%	-2%							-2%
Net Subsidy Variance (%)	-6%	-13%	-8%	-7%	-6%	-4%							-4%
Favorable (+) / Unfavorable (-)	4%	7%	4%	4%	3%	2%							2%

continued

**KPI: CAPITAL FUNDS INVESTED [TARGET 95% OF CAPITAL BUDGET]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	1%	6%	16%	17%	25%	34%	38%	44%	55%	58%	66%	85%	34%
FY 2017	5%	14%	25%	33%	41%	51%	59%	66%	74%	82%	89%	99%	51%
FY 2018	5%	12%	18%	26%	33%	40%							40%

\*FY2017 includes capital budget amendment (\$1.175 billion)

**VACANCY RATE [TARGET 5%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	7%	6%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
FY 2017	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	6%	7%	5%
FY 2018	7%	7%	7%	6%	7%	6%							6%

**OPERATIONS CRITICAL VACANCY RATE [TARGET 9%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016							11%	11%	12%	12%	10%	11%	N/A
FY 2017	10%	10%	10%	8%	8%	8%	7%	7%	7%	8%	8%	11%	8%
FY 2018	13%	12%	13%	12%	12%	12%							12%

continued

WATER USAGE (GALLONS PER VEHICLE MILE) [TARGET 0.84]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	1.21	1.30	1.47	0.97	0.57	0.52	0.70	0.73	0.60	0.69	0.64	0.94	1.01
FY 2017	1.37	1.29	1.56	1.05	0.61	0.50	0.69	0.52	0.64	0.66	0.67	1.13	1.06
FY 2018	1.25	1.39	1.39	N/A	N/A	N/A							N/A

ENERGY USAGE (BTU/VEHICLE MILE) [TARGET 39,399]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	40,193	41,349	39,798	39,262	37,639	42,240	47,371	43,640	37,952	38,660	37,365	39,565	40,108
FY 2017	42,404	39,734	44,477	37,665	38,352	40,112	45,493	42,813	39,927	40,877	36,782	41,244	40,437
FY 2018	41,548	38,877	40,337	36,266	38,773	40,066							39,284

GREENHOUSE GAS EMISSIONS PER VEHICLE MILE [TARGET 4.00]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4.15	4.18	4.18	4.06	3.79	4.31	4.47	4.14	3.56	3.75	3.57	3.79	4.12
FY 2017	4.11	3.80	4.34	3.63	3.66	3.81	4.54	4.34	3.95	4.22	3.77	4.29	4.15
FY 2018	4.34	4.03	4.22	3.78	4.08	4.02							4.19

## Definitions

KPI	How is it measured?	What does this mean and why is it key to our strategy?
<b>QUALITY SERVICE</b>		
Metrorail Customer On-Time Performance	<p>Percentage of customer journeys completed on time</p> $\frac{\text{Number of journeys completed on time}}{\text{Total number of journeys}}$	<p>Rail Customer On-Time Performance (OTP) communicates the reliability of rail service, which is a key driver of customer satisfaction. OTP measures the percentage of customers who complete their journey within the maximum amount of time it should take per WMATA service standards. The maximum time is equal to the train run-time + a headway (scheduled train frequency) + several minutes to walk between the fare gates and platform. These standards vary by line, time of day, and day of the week. Actual journey time is calculated from the time a customer taps a SmarTrip® card to enter the system, to the time when the SmarTrip® card is tapped to exit.</p> <p>Factors that can effect OTP include: railcar availability, fare gate availability, elevator and escalator availability, infrastructure conditions, speed restrictions, single-tracking around scheduled track work, railcar delays (e.g., doors), or delays caused by sick passengers.</p>
Rail Infrastructure Availability	<p>Percentage of track available for customer travel during operating hours</p>	<p>Rail Infrastructure Availability is a key driver of customer on-time performance. Planned and unplanned maintenance of track, signaling, and traction power can result in single-tracking and/or speed restrictions that slow customer travel throughout the system. This measure includes both the duration and distance of restrictions. Single-tracking events reduce availability to zero for the portion of track impacted. Slow speed restrictions reduce availability of affected track segments by 85%, while medium restrictions reduce availability by 40%.</p>
FTA Reportable Speed Restrictions <small>(Federal Transit Administration Transit Asset Management Performance Measure)</small>	<p>Percentage of track segments with performance restrictions at 9:00 AM the first Wednesday of every month</p> $\frac{\text{Number of track miles with performance restrictions}}{234 \text{ total miles}}$	<p>In 2016, the Federal Transit Administration (FTA) issued its Final Rule on Transit Asset Management, which requires transit properties to set targets and report performance on a variety of measures, including guideway condition. Guideway includes track, signals and systems.</p> <p>A performance restriction occurs when there is a speed restriction: the maximum train speed is set below the guideway design speed. Performance restrictions may result from a variety of causes, including defects, signaling issues, construction zones, and maintenance causes. FTA considers performance restrictions to be a proxy for both track condition and the underlying guideway condition.</p>
Train On-Time Performance	<p>Number of station stops delivered within the scheduled headway plus 2 minutes during rush (AM/PM) service ÷ Total station stops delivered</p> $\frac{\text{Number of station stops delivered up to 150\% of the scheduled headway during non-rush (midday and evening)}}{\text{Total station stops delivered}}$	<p>Train on-time performance measures the adherence to weekday headways, or the time customers wait between trains. Factors that can effect on-time performance include: infrastructure conditions, missed dispatches, railcar delays (e.g., doors), or delays caused by sick passengers. Station stops are tracked system-wide, with the exception of terminal and turn-back stations.</p>

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Rail Fleet Reliability	<p>Mean Distance Between Delays (MDBD)</p> $\frac{\text{Total railcar revenue miles}}{\text{Number of failures during revenue service resulting in delays of four or more minutes}}$	<p>The number of miles traveled before a railcar experiences a failure. Some car failures result in inconvenience or discomfort, but do not always result in a delay of service (such as hot cars). Mean Distance Between Delay includes those failures that had an impact on customer on-time performance.</p> <p>Mean Distance Between Failure and Mean Distance Between Delay communicate the effectiveness of Metro’s railcar maintenance and engineering program. Factors that influence railcar reliability are the age and design of the railcars, the amount the railcars are used, the frequency and quality of preventive maintenance, and the interaction between railcars and the track.</p>
	<p>Mean Distance Between Failure (MDBF)</p> $\frac{\text{Total railcar revenue miles}}{\text{Total number of failures occurring during revenue service}}$	
Trains in Service	<p>Percentage of required trains that are in service at 8:15 AM and 5:00PM</p> $\frac{\text{Number of Trains in service}}{\text{Total required trains}}$	<p>Trains in Service is a key driver of customer on-time performance and supports the ability to meet the Board standard for crowding. WMATA’s base rail schedule requires 140 trains during rush periods. Fewer trains than required results in missed dispatches, which leads to longer wait times for customers and more crowded conditions. Key drivers of train availability include the size of the total fleet and the number of “spares”, railcar reliability and average time to repair, operator availability, and balancing cars across rail yards to ensure that the right cars are in the right place at the right time.</p>
Rail Loading	<p>Number of rail passengers per car</p> <p>Total passengers observed on-board trains passing through a station during a rush hour ÷ Actual number of cars passing through the same station during the rush hour</p> <p>Trained Metro observers are strategically placed around the system during its busiest times to monitor and report on crowding.</p> <p>Counts are taken at select stations where passenger loads are the highest and in the predominant flow direction of travel on one to two dates each month (from 6 AM to 10 AM and from 3 PM to 7 PM). In order to represent an average day, counts are normalized with rush ridership.</p>	<p>The Board of Directors has established Board standards of rail passengers per car to measure railcar crowding. Car crowding informs decision making regarding asset investments and scheduling.</p> <p>Additional Board standards have been set for:</p> <ul style="list-style-type: none"> <li>▲ Hours of service—the Metrorail system is open to service customers</li> <li>▲ Headway—scheduled time interval between trains during normal weekday service</li> </ul>
Metrobus On-Time Performance	<p>Adherence to Schedule</p> $\frac{\text{Number of time points that arrived on time by route based on a window of 2 minutes early and 7 minutes late}}{\text{Total number of time points scheduled (by route)}}$	<p>This indicator illustrates how closely Metrobus adheres to published route schedules on a system-wide basis. Factors that effect on-time performance are traffic congestion, inclement weather, scheduling, vehicle reliability, and operational behavior. Bus on-time performance is essential to delivering quality service to the customer.</p>
Bus Fleet Reliability	<p>Mean Distance Between Failures (MDBF)</p> <p>The number of total miles traveled before a mechanical breakdown requiring the bus to be removed from service or deviate from the schedule</p>	<p>Mean Distance Between Failures is used to monitor trends in vehicle breakdowns that cause buses to go out of service and to plan corrective actions. Factors that influence bus fleet reliability include vehicle age, quality of maintenance program, original vehicle quality, and road conditions affected by inclement weather and road construction.</p>

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Bus Loading	Ratio of bus seats filled  Top load recorded on a route during a time period ÷ actual bus seat capacity	Bus crowding is a factor of bus customer satisfaction. This measure can inform decision making regarding bus service plans.
MetroAccess On-Time Performance	Adherence to Schedule  Number of vehicle arrivals at the pick-up location within the 30 minute on-time widow ÷ Total trips delivered	This indicator illustrates how closely MetroAccess adheres to customer pick-up windows on a system-wide basis. Factors that effect on-time performance are traffic congestion, inclement weather, scheduling, vehicle reliability, and operational behavior. MetroAccess on-time performance is essential to delivering quality service to the customer.
Elevator and Escalator Availability	In-service percentage  Hours in service ÷ Operating hours  Hours in service = Operating hours – Hours out of service  Operating hours = Operating hours per unit × number of units	Escalator/elevator availability is a key component of customer satisfaction with Metrorail service. This measure communicates system-wide escalator and elevator performance (at all stations over the course of the day) and will vary from an individual customer’s experience.  Availability is the percentage of time that Metrorail escalators or elevators in stations and parking garages are in service during operating hours.  Customers access Metrorail stations via escalators to the train platform, while elevators provide an accessible path of travel for persons with disabilities, seniors, customers with strollers, and travelers carrying luggage. An out-of-service escalator requires walking up or down a stopped escalator, which can add to travel time and may make stations inaccessible to some customers. When an elevator is out of service, Metro is required to provide alternative services which may include shuttle bus service to another station.
Customer Satisfaction	Survey respondent rating  Number of survey respondents with high satisfaction ÷ Total number of survey respondents	Surveying customers about the quality of Metro’s service delivery provides a mechanism to continually identify those areas of the operation where actions to improve the service can maximize rider satisfaction.  Customer satisfaction is defined as the percent of survey respondents who rated their last trip on Metrobus or Metrorail as “very satisfactory” or “satisfactory.” The survey is conducted via phone with approximately 400 bus and 400 rail customers who have ridden Metro in the past 30 days. Results are summarized by quarter (e.g., January–March).

**SAFETY AND SECURITY**

Customer Injury Rate	Customer injury rate:  Number of injuries ÷ (Number of passengers ÷ 1,000,000)	The customer injury rate is based on National Transit Database (NTD) Reporting criteria. It includes injury to any customer caused by some aspect of Metro’s operation that requires immediate medical attention away from the scene of the injury.  Customer safety is the highest priority for Metro and a key measure of quality service. Customers expect a safe and reliable ride each day. The customer injury rate is an indicator of how well the service is meeting this safety objective.
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KPI	How is it measured?	What does this mean and why is it key to our strategy?
Employee Injury Rate	Employee injury rate: Number of injuries ÷ (Total work hours ÷ 200,000)	An employee injury is recorded when the injury is (a) work related; and, (b) one or more of the following happens to the employee: 1) receives medical treatment above first aid, 2) loses consciousness, 3) takes off days away from work, 4) is restricted in their ability to do their job, 5) is transferred to another job, 6) death.  OSHA recordable injuries are a key indicator of how safe employees are in the workplace.
Crime	Reported Part I Crimes	Part I crimes reported to Metro Transit Police Department for Metrobus (on buses), Metrorail (on trains and in rail stations), or at Metro-owned parking lots in relation to Metro's monthly passenger trips.  This measure provides an indicator of the perception of safety and security customers experience when traveling the Metro system. Increases or decreases in crime statistics can have a direct effect on whether customers feel safe in the system.

## PEOPLE AND ASSETS

Ridership	Total Metro ridership Metrorail passenger trips + Metrobus passenger boardings + MetroAccess passenger trips	Ridership is a measure of total service consumed and an indicator of value to the region. Drivers of this indicator include service quality and accessibility.  Passenger trips are defined as follows: <ul style="list-style-type: none"> <li>▲ Metrorail reports passenger trips. A passenger trip is counted when a customer enters through a faregate. In an example where a customer transfers between two trains to complete their travel one trip is counted.</li> <li>▲ Metrobus reports passenger boardings. A passenger boarding is counted at the farebox when a customer boards a Metrobus. In an example where a customer transfers between two Metrobuses to complete their travel two trips are counted.</li> <li>▲ MetroAccess reports passenger trips. A fare paying passenger traveling from an origin to a destination is counted as one passenger trip.</li> </ul> <p>*For performance measures and target setting, Metro uses total ridership numbers including passengers on bus shuttles to more fully reflect total passengers served. Metro does not include bus shuttle passenger trips in its budget or published ridership forecasts.</p>
Operating Budget Management	Percentage surplus or deficit comparing actual revenues and subsidy to actual expenses  (actual revenues + subsidy – actual expenses) ÷ actual expenses	This indicator tracks Metro's progress managing its operating revenues and expenses.

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Capital Funds Invested	<p>Percentage of capital budget spend</p> <p>Cumulative monthly capital expenditures ÷ fiscal year capital budget, including actual rollover from previous fiscal year</p>	This indicator tracks spending progress of the Metro Capital Improvement Program.
Vacancy Rate	<p>Percentage of budgeted positions that are vacant</p> <p>(Number of budgeted positions – number of employees in budgeted positions) ÷ number of budgeted positions</p>	This measure indicates how well Metro is managing its human capital strategy to recruit new employees in a timely manner, in particular operations-critical positions. Factors influencing vacancy rate ca recruitment activities, training schedules, availability of talent, promotions, retirements, among other factors.
Water Usage	<p>Rate of gallons of water consumed per vehicle mile</p> <p>Total gallons of water consumed ÷ Total vehicle miles</p>	This measure reflects the level of water consumption Metro uses to run its operations. Water consumption is a key area of Metro’s Sustainability Initiative, which brings focus to Metro’s efforts to provide stewardship of the environmental systems that support the region.
Energy Usage	<p>Rate of British Thermal Units (BTUs) consumed per vehicle mile</p> <p>MBTU(Gasoline + Natural Gas + Compressed Natural Gas + Traction Electricity + Facility Electricity) × 1000 ÷ Total vehicles miles</p>	This measure reflects the level of various types of energy Metro uses to power its operations. Energy consumption is a key area of Metro’s Sustainability Initiative, which brings focus to Metro’s efforts to provide stewardship of the environmental systems that support the region.
Greenhouse Gas Emissions	<p>Rate of metric tons of CO<sub>2</sub> emitted per vehicle mile</p> <p>(CO<sub>2</sub> metric tons generated from gas, CNG and diesel used by Metro revenue and non-revenue vehicles + CO<sub>2</sub> metric tons generated from electricity and natural gas used by facilities and rail services) ÷ Total vehicle miles</p>	Greenhouse Gas emissions reflect how Metro sources its energy used to power its operations, as well as the amount of energy it uses. Reducing Greenhouse Gas emissions is a key area of Metro’s Sustainability Initiative, which brings focus to Metro’s efforts to provide stewardship of the environmental systems that support the region.



# Vital Signs

July-September 2017

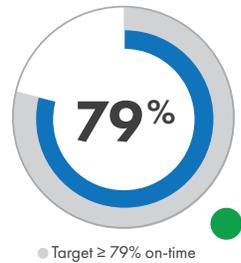
Published: November 2017

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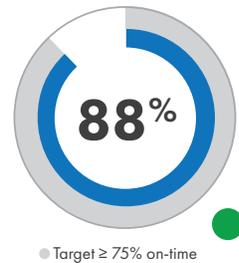
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## Key Performance Indicators

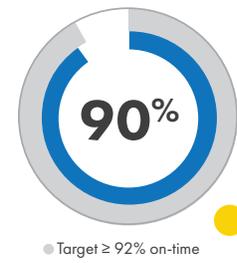
Bus On-Time Performance



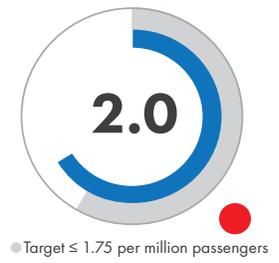
Rail On-Time Performance



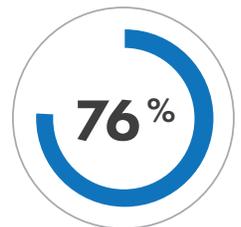
MetroAccess On-Time Performance



Customer Injuries



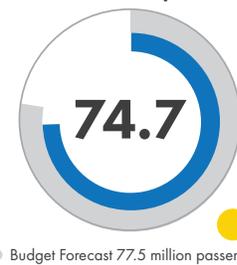
Customer Satisfaction – Bus



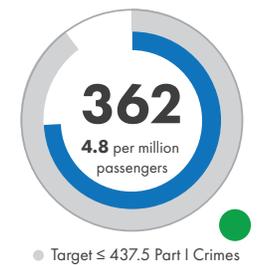
Customer Satisfaction – Rail



Ridership

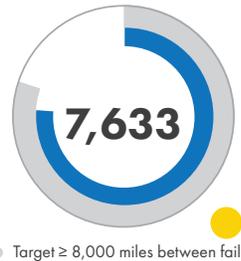


Crime

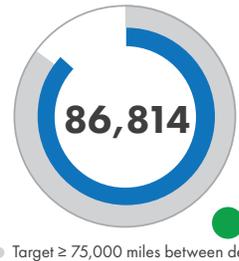


## Key Drivers

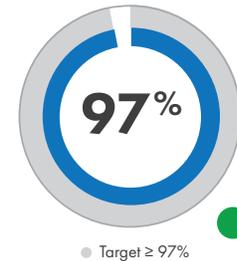
Bus Fleet Reliability



Rail Fleet Reliability



Elevator Availability



Escalator Availability



KEY

- TARGET
- ACTUAL
- MET OR ABOVE TARGET
- NEAR TARGET
- UNACCEPTABLE RESULT

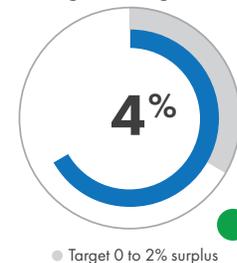
NOTE

Percentages rounded to the nearest whole number

Rail Infrastructure Availability



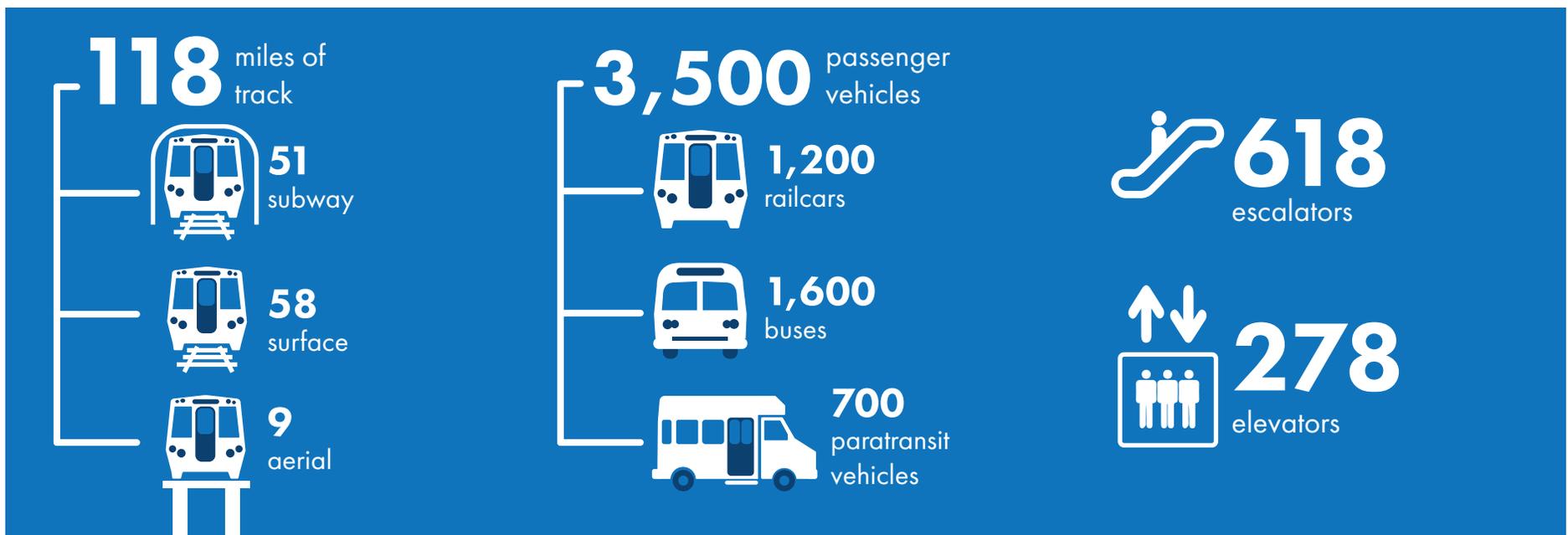
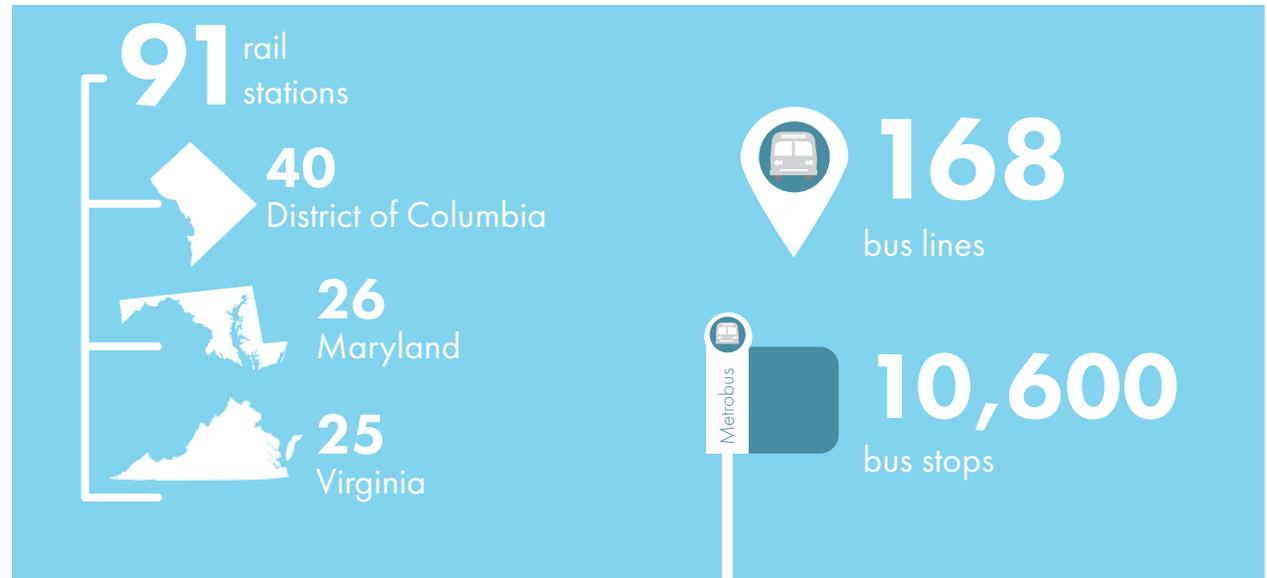
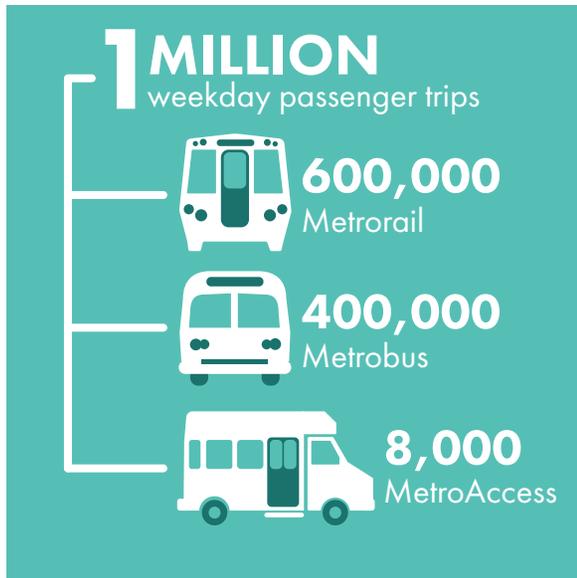
Budget Management



Capital Funds Invested



## About Metro



# Path to Improved Performance



**Communicate**  
system performance  
quarterly and annually



**Balanced scorecard**  
approach, but focus is  
Metro's core business of  
quality service delivery



What gets measured gets  
managed, leading to  
**improved performance**

Vital Signs communicates the transit system's performance to the Board of Directors on a quarterly and annual basis.

The public and other stakeholders are invited to monitor Metro's performance using a web-based scorecard at [wmata.com](http://wmata.com).

Metro's managers measure what matters and hold themselves accountable to stakeholders via a focused set of Key Performance Indicators (KPIs) reported publicly in Vital Signs.

**Answer  
three  
questions...**



**What** actions are  
being taken to improve?



**Why** did performance  
change?



Is Metro achieving its  
**four strategic goals?**



Utilizing systematic,  
**data-driven**  
analysis



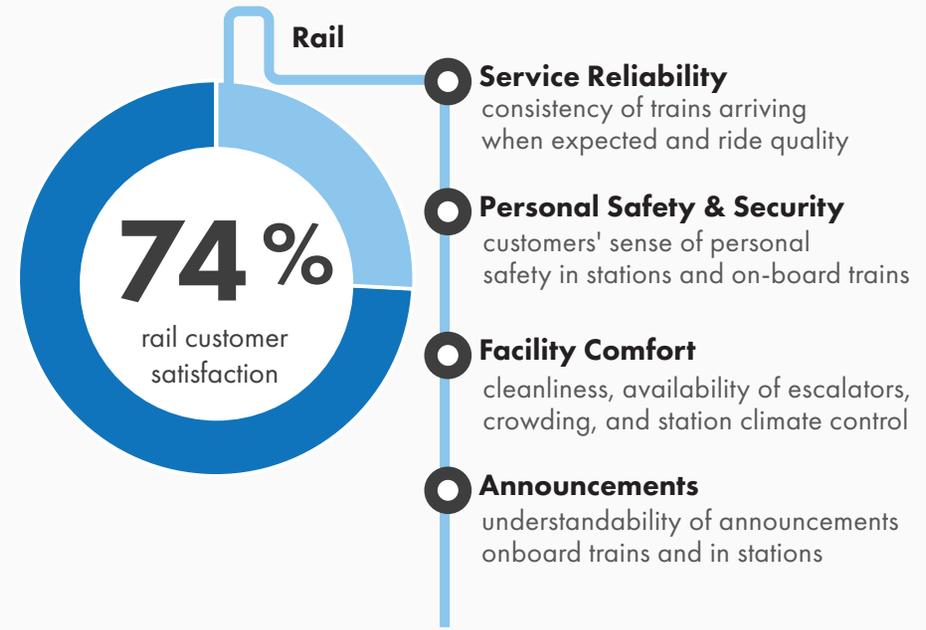
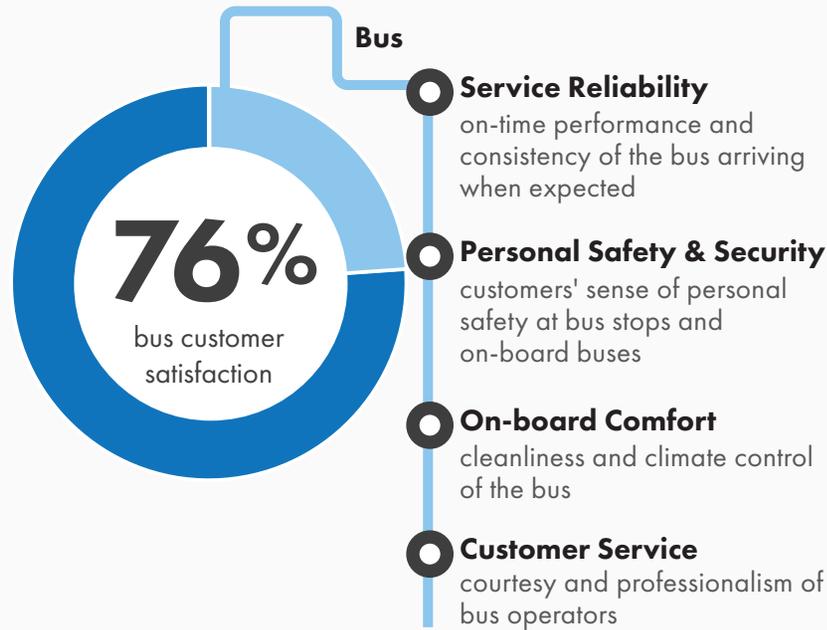
**Targeting** that  
gauges progress and  
identifies success

# KPI: Customer Satisfaction



Bus customer satisfaction remained steady, statistically unchanged with the previous year; rail customer satisfaction is improving with the number of customers that feel Metro is getting better more than doubling this same time last year

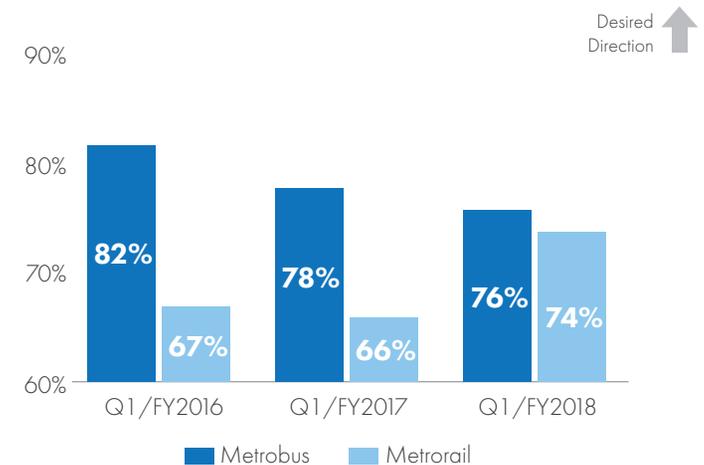
## What caused customers to not be satisfied?



## Key actions to improve performance

- ▶ Sustain improvements in rail and bus on-time performance, including:
  - » Implement active service management on headway-managed bus routes
  - » Execute railcar "get well" program, including continued acceptance of 7K trains
  - » Implement new, aggressive preventive maintenance and capital programs that will cut unplanned delays by half by July 2019
  - » Minimize customer impact of planned track outages by taking advantage of longer evening and weekend work windows and "piggy-backing" work
- ▶ Improve station management and make stations cleaner and brighter to better serve customers

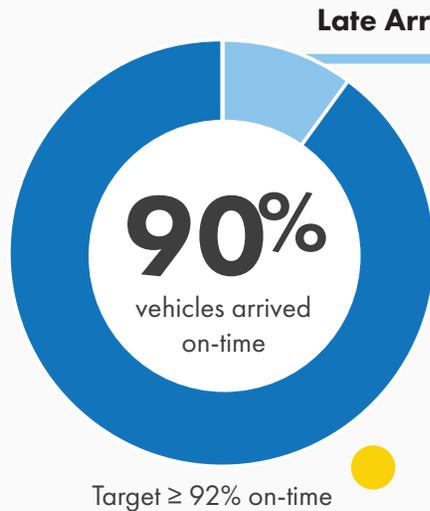
3-YEAR TREND IN PERFORMANCE





While more MetroAccess vehicles arrived within the on-time window compared to Q1 /FY2017, results fell short of target, as newly hired operators adjusted to their roles

What caused vehicles to not arrive on-time?



Late Arrivals

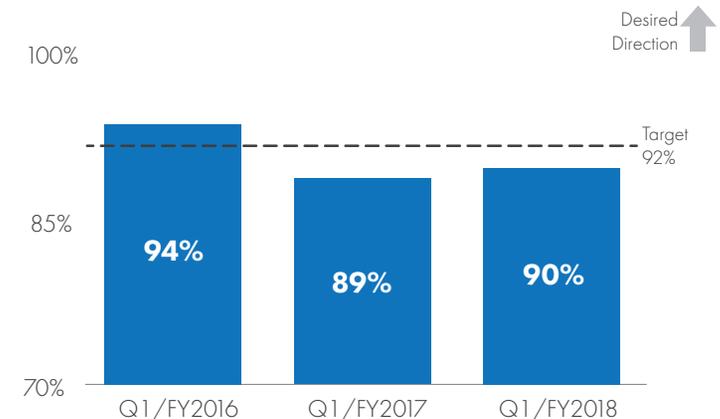
Operations-Related Delays

» With abatement of driver shortage, a substantial number of newly hired operators experienced a learning curve

Key actions to improve performance

- ▶ Award contracts for paratransit service providers
- ▶ Monitor performance of Abilities-Ride pilot program
- ▶ Fleet modernization effort – retiring portion of legacy paratransit vans and adding 207 new paratransit vans – will help enable MetroAccess to better meet strong service demand stemming from high ridership levels
- ▶ Review route management practices by call center operators

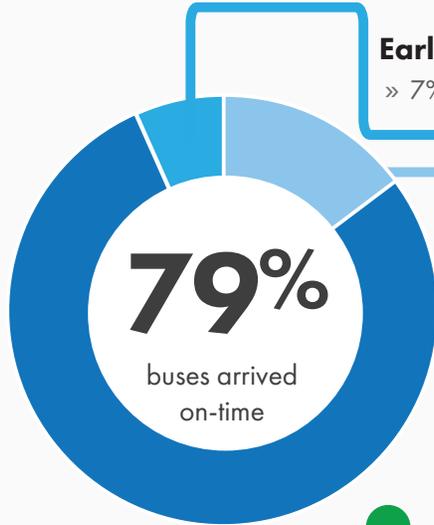
3-YEAR TREND IN PERFORMANCE





**Metrobus on-time performance of 79% improved 3% compared to Q1/FY2017 and is the best first quarter result since the Vital Signs Report began in 2010**

**What caused buses to not arrive on-time?**



Target ≥ 79% on-time  
Performance Band 77%–81%

**Early Arrivals** buses arriving at stops greater than 2 minutes ahead of schedule

» 7% of buses arrived early, a 1% improvement compared to Q1/FY2017, with fewer buses arriving early across all service periods

**Late Arrivals** buses arriving at stops more than 7 minutes behind schedule

» 15% of buses arrived late, a 2% improvement compared to Q1/FY2017

» Even with September's seasonal road congestion, late arrivals decreased 3% during AM Peak period service (6AM-9AM) with 82% of buses arriving on-time; late arrivals also decreased 3% during PM Peak period service (3PM-7PM) with 73% of buses arriving on-time

» On-time arrival improvements driven by schedule adjustments of low-performing routes; schedule adjustments implemented in July improved Q1/FY2018 on-time performance 1% compared to this same time last year

**Bus Fleet Reliability**

» Fleet reliability performed 5% below target due to summer seasonal weather impact in Q1/FY2018, with buses traveling 7,633 miles on average between breakdown

» The fleets that provide the most service – Hybrid and CNG – experienced 3% improved reliability compared to last year despite impacts from the summer heat due to a number of mitigating and proactive actions implemented

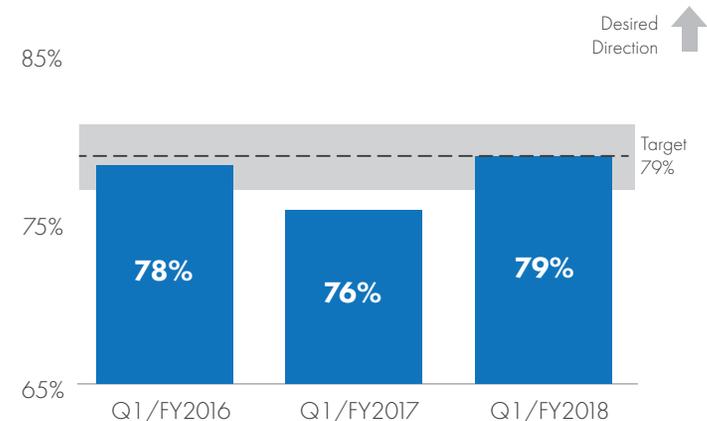
**Operator-Related** » Operator availability-related delays increased due to bus operator vacancies

**Collisions** » Metrobus collisions per million miles decreased 2% compared to Q1/FY2017 with 16 fewer collisions

**Key actions to improve performance**

- ▶ Upgrade Street Supervisor technology to allow for real-time tracking of buses
- ▶ Implement active service management on headway-managed routes in support of providing reliable, evenly-spaced service
- ▶ Utilize SmartYard division management tool for ensuring on-time departures from the garage, the first step in delivering on-time service
- ▶ Continue to identify routes with low on-time performance and implement schedule adjustments to allow for adequate run-time resulting in more realistic schedules for customers and operators
- ▶ Continue to retire less-reliable, older buses, and complete mid-life overhauls annually

3-YEAR TREND IN PERFORMANCE





**Metrorail on-time performance improved in the first quarter to 88%, thanks to a more realistic rail schedule and fewer railcar-related delays**

**What caused customers to not be on-time?**



**Planned Delays**

» Accounted for about 2% of customer trips; crews executed an intensive schedule of rebuilding and maintenance work over weekends and late night weekdays to keep infrastructure in a state of good repair

**Unplanned Delays**

» Accounted for about 10% of customer trips, a 15% improvement relative to Q1/FY2017

**Railcar Reliability**

- » Railcar-related delays down over 35% compared to Q1/FY2017
- » Retired all 378 of the oldest and worst performing railcars by June 2017, six months ahead of schedule and added 56 new 7000 series cars this quarter
- » Better railcar performance resulted in 46% fewer offloads and 80% fewer missed dispatches; Metro ran 98% of scheduled trains during its peak periods each weekday

**Rail Infrastructure**

- » Improved track condition resulted in 18% fewer speed restrictions identified by inspectors
- » Over 200 trains were held for an average of 5 minutes based on new safety measures put in place to protect track workers
- » Fire and Smoke events were up 14% – while WMATA’s efforts to keep track beds free from debris reduced these types of fires by 39%, insulator incidents more than doubled due to about twice as much rainfall

**Police, Customer**

» Up 50% as more trains were held due for customers needing medical attention and for police activity

**Operator-Related**

» Unplanned breaks down 50% as the new schedule allotted sufficient time for operators to complete runs

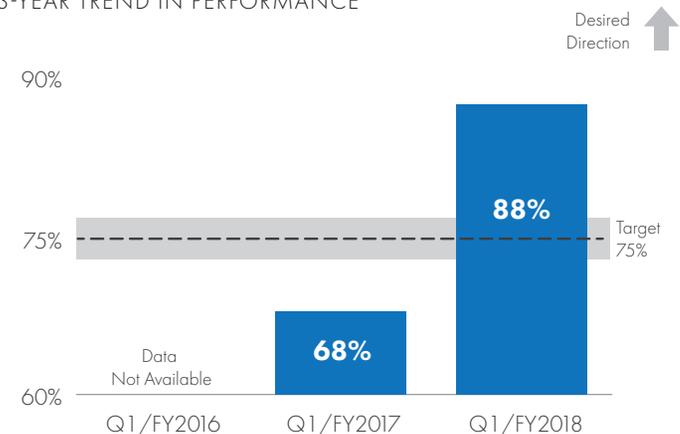
**Other**

» On average, 95% of escalators and 97% of elevators were available, beating target and Q1/FY2017

**Key actions to improve performance**

- ▶ Implement railcar “get well” program, including continued acceptance of 7K trains
- ▶ Begin retirement of the 5000 series fleet in calendar year 2018
- ▶ Implement new railcar maintenance strategy and rail fleet plan
- ▶ Execute rail preventive maintenance and capital renewal programs designed to cut infrastructure-related delays in half by July 2019
- ▶ Repair escalators, elevators and fare gates to enable smooth flow of passengers through station

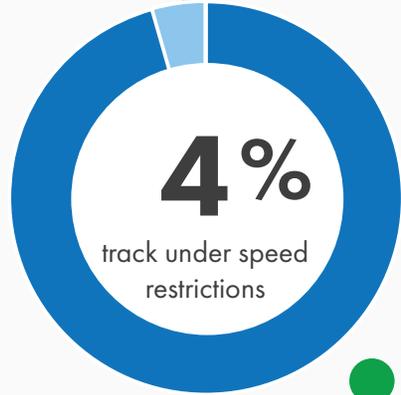
3-YEAR TREND IN PERFORMANCE





**Speed restriction through the downtown core of the system reduced availability but had limited impact on customer on-time performance**

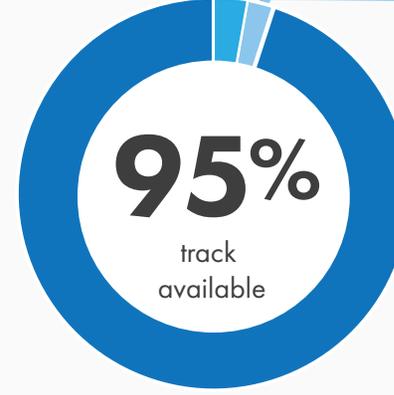
**What caused rail infrastructure to not be available?**



Target < 5% under speed restriction  
The Federal Transit Agency (FTA) requires all transit providers to report the percentage of track segments with performance restrictions at 9AM the first Wednesday of every month

**Speed Restrictions**

- » On average this quarter, 4.4% of track, or about 10.4 of 239 miles, was under speed restriction at 9AM the first Wednesday of every month
- » In mid-August, Metro put in place a 35 mile per hour speed restriction covering almost 23 miles of track through the downtown core of the system to reduce trains' traction power draw while Metro completes an analysis to optimize the power system used to propel trains. It has a minimal impact on customer on-time performance as most trains do not travel above 35 miles per hour on these segments.



Pilot KPI  
WMATA has also begun measuring track availability during all revenue hours not just 9AM the first Wednesday of the month

**Planned 2%**

- » Crews executed an aggressive track work program to keep the system in a state of good repair, with at least two major work efforts each weekend that resulted in around-the-clock single tracking or shutdown portions of the system

**Unplanned 3%**

**Speed Restrictions**

- » A 35 mile per hour speed restriction covering most of the downtown area reduced availability by 1%
- » All other speed restrictions were resolved on average within 36 hours thanks to improved overall track condition

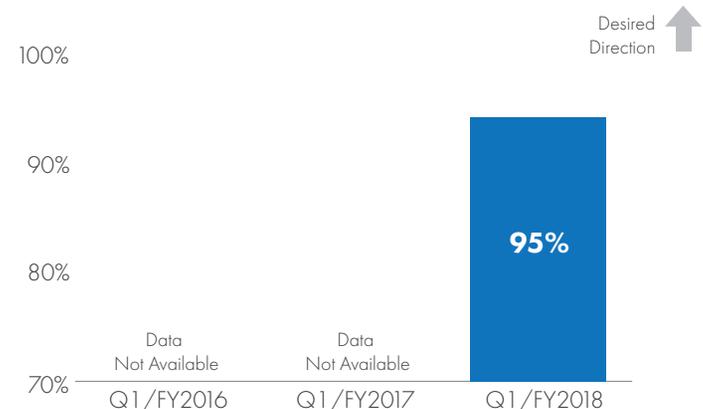
**Single-Tracking Events**

- » There averaged 27 single-track events per month, most resolved in under an hour

**Key actions to improve performance**

- ▶ Implement new, aggressive preventive maintenance and capital programs that will cut unplanned delays by half by July 2019
- ▶ Minimize customer impact of planned track outages by taking advantage of longer evening and weekend work windows and "piggy-backing" work
- ▶ Continue rigorous track inspection program to identify and fix degraded conditions before they become safety hazards and implement a new comprehensive track inspector training program
- ▶ Conduct more analysis of Track Geometry Vehicle inspection data to inform maintenance program and schedules
- ▶ Expand waterproofing technique in Red Line tunnels most affected by leaks, with aim to reduce arcing insulators and other smoke/fire events caused by water

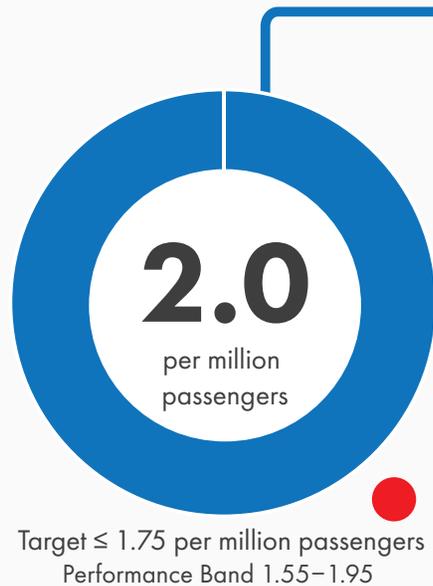
3-YEAR TREND IN PERFORMANCE





**While customer injuries were higher than the same period last year driven by non-preventable bus collision-related injuries, there was a noticeable reduction in MetroAccess customer injuries**

## What injuries occurred?



### Metrobus

- » Q1/FY2018 bus customer injuries accounted for 55% of total customer injuries, and the rate increased 22% compared to Q1/FY2017
- » Collision-related injuries continue to be the leading cause of bus customer injuries

### Metrorail

- » Q1/FY2018 rail customer injuries accounted for 38% of the total customer injuries, and the rate increased 6% compared to Q1/FY2017
- » Slips, trips, or falls, in stations (20%) or on escalators (16%) were the leading cause of rail customer injuries

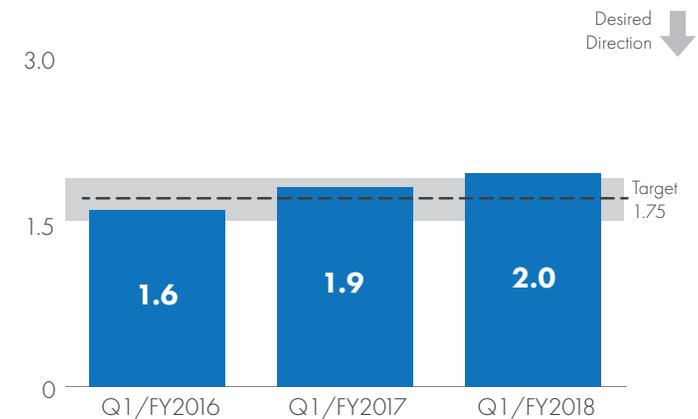
### MetroAccess

- » Q1/FY2018 MetroAccess customer injuries accounted for 7% of the total customer injuries, and the rate decreased 37% compared to Q1/FY2017
- » Collision-related injuries were the leading cause of MetroAccess injuries

## Key actions to improve performance

- ▶ Deploy deceleration lights on the back on buses and employ DriveCam reviews in defensive driving curriculum for bus operators
- ▶ Improve lighting and target safety messages to customers in rail stations
- ▶ Conduct station inspections to identify uneven surfaces and other hazards
- ▶ Continue revised MetroAccess operator training, facilitated by an occupational therapist, with better methods to assist customers who have difficulty maintaining balance

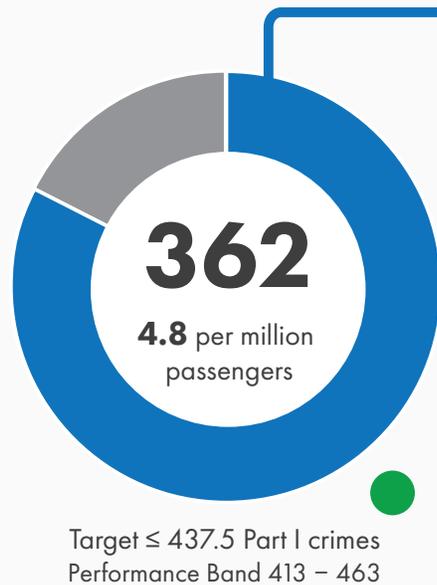
3-YEAR TREND IN PERFORMANCE





**Part I crimes decreased 19% compared to the same period last year with decreases in both crimes against persons and crimes against property**

**What crimes occurred?**



**Crimes Against Property**

» The rate of crimes against property, accounting for 70% of Part I crimes, declined 25% compared to Q1/FY2018 driven by a decrease in larcenies

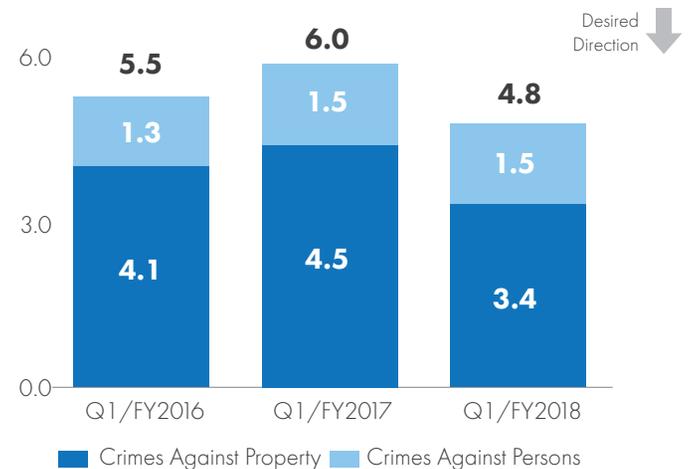
**Crimes Against Persons**

» The rate of crimes against persons, accounting for 30% of Part I crimes, declined 1% overall compared to Q1/FY2018

**Key actions to improve performance**

- ▶ Enhance safety features
  - » Install public safety radio systems and cabling for cellphone service in tunnels
  - » Improve station lighting
- ▶ Surge deployments of uniformed officers during high crime periods for increased visibility to deter aggravated assaults and other crimes in rail stations
- ▶ Continually adjust tactics and resource allocation to address changing crime hotspots
- ▶ Sustain the fare evasion initiative on rail and bus and continue the collaboration with bus operators and managers to reduce bus crime and operator assaults

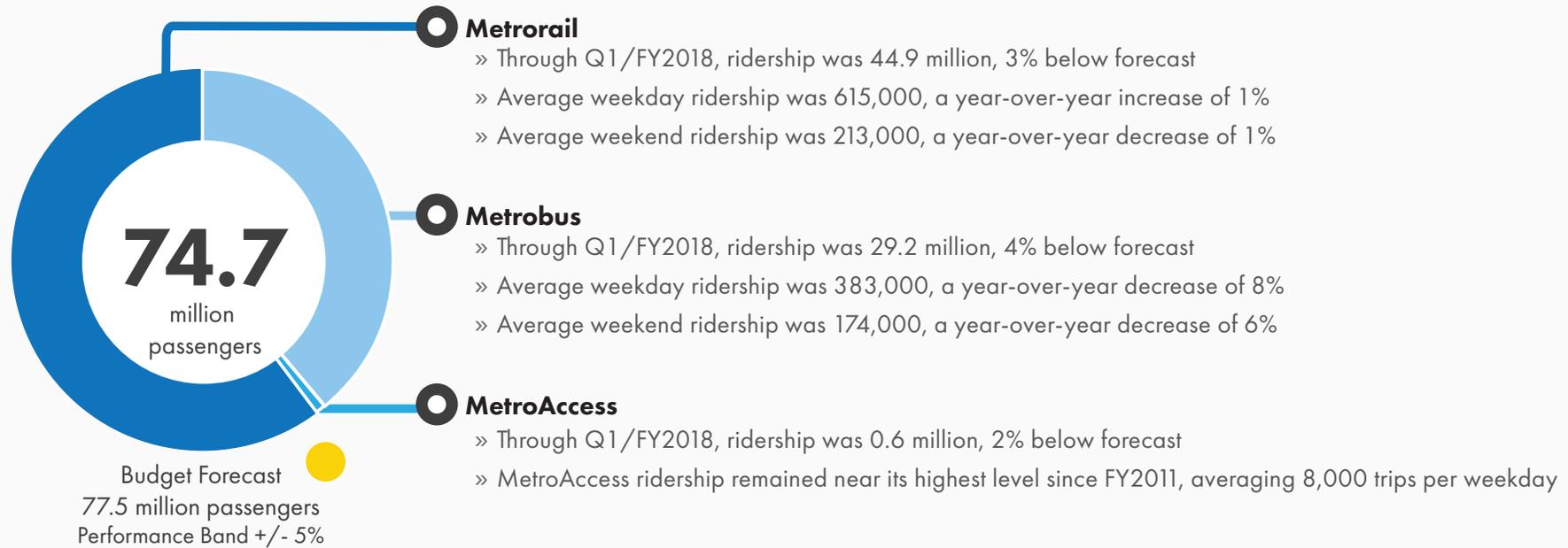
3-YEAR TREND IN PERFORMANCE





Through Q1/FY2018, total ridership was 74.7 million, 3% below forecasted ridership of 77.5 million

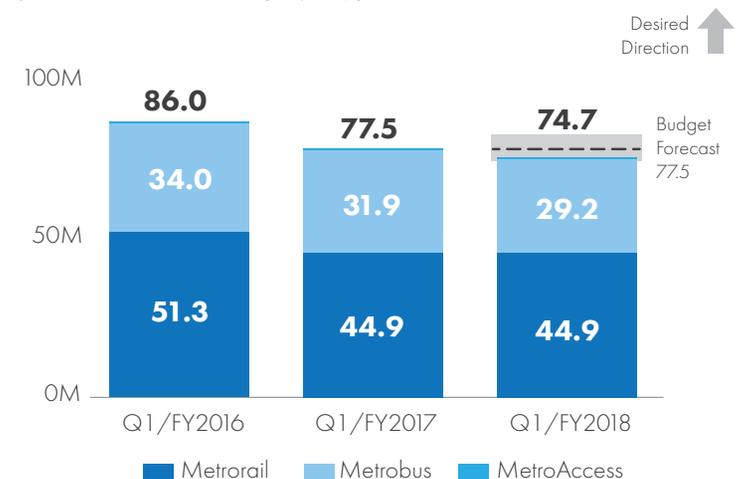
How much service was consumed?



Key actions to improve performance

- ▶ Sustain improvements in rail and bus on-time performance
- ▶ Promote pass products, auto-reload, and other fare products through tailored marketing
- ▶ Strengthen SmartBenefits and regional employer relationships
- ▶ Encourage off-peak ridership
- ▶ Improve ability to forecast ridership with new model
- ▶ Partner with local jurisdictions to promote transit-oriented development

3-YEAR TREND IN PERFORMANCE

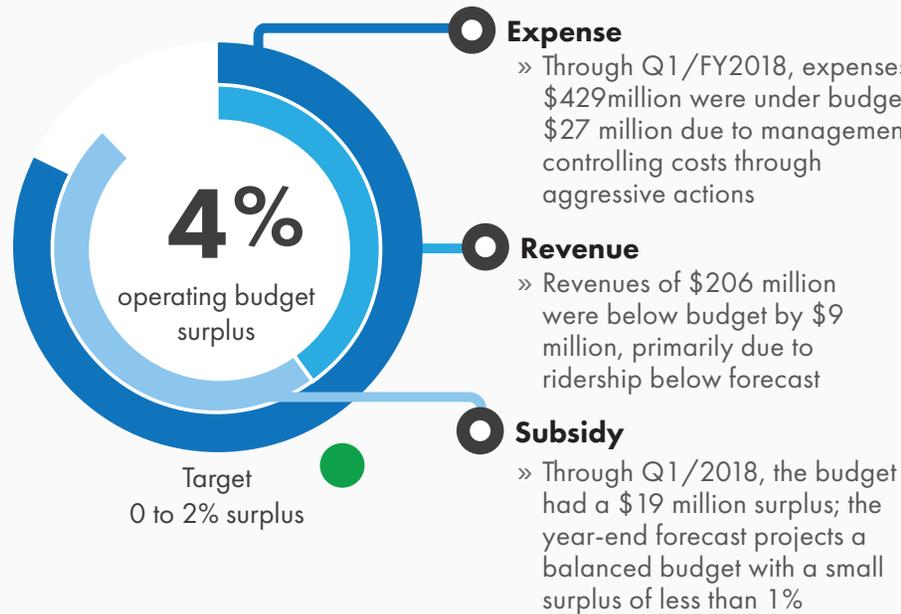


# KPI: Budget Management and Capital Funds Invested

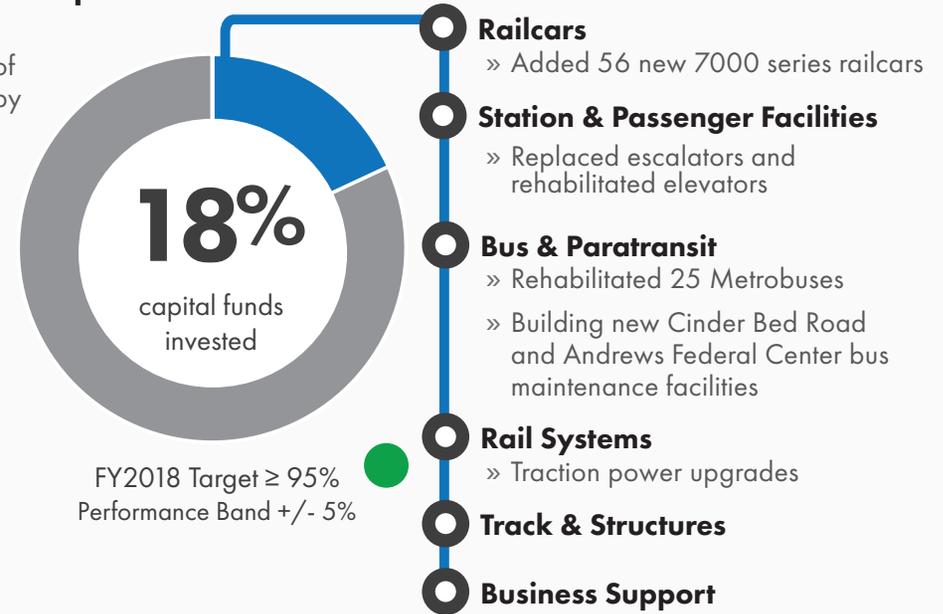


Through Q1/FY2018, the operating budget had a 4% surplus due to expense reductions exceeding revenue shortfalls; 18% of the total \$1.25 billion FY2018 capital budget was invested, \$228 million of \$231 million budgeted Q1

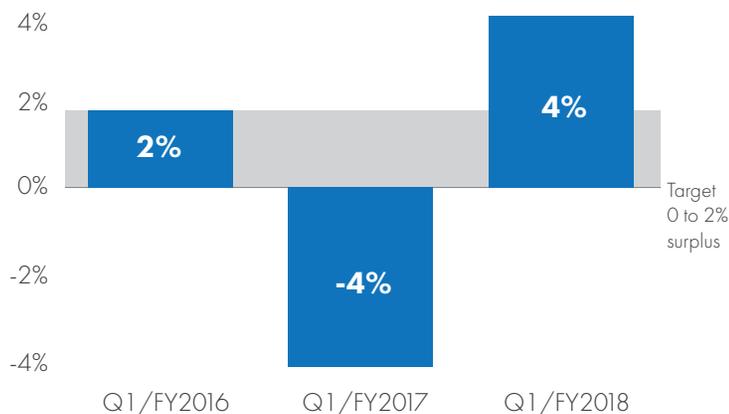
## Budget Management



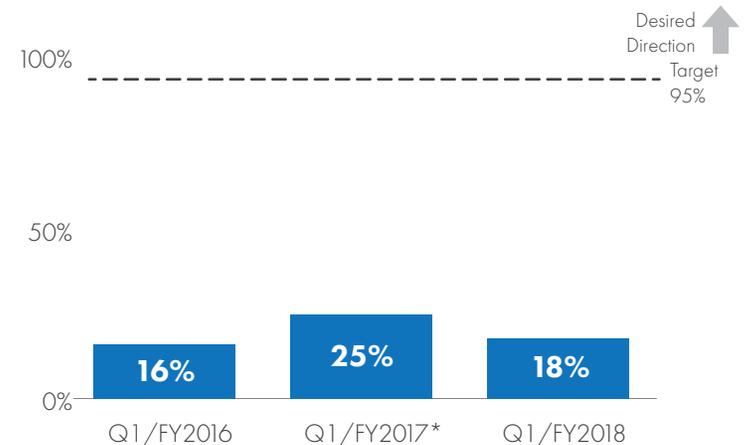
## Capital Funds Invested



BUDGET MANAGEMENT, 3-YEAR TREND IN PERFORMANCE



CAPITAL FUNDS INVESTED, 3-YEAR TREND IN PERFORMANCE



\* Share of FY2017 capital budget including amendments (\$1.175 billion)

## Performance Data

FY2018

KPI: METROBUS CUSTOMER SATISFACTION RATING					
	Q1	Q2	Q3	Q4	FYTD
FY 2016	82%	81%	74%	78%	82%
FY 2017	78%	79%	74%	76%	78%
FY 2018	76%				76%

KPI: METRORAIL CUSTOMER SATISFACTION RATING					
	Q1	Q2	Q3	Q4	FYTD
FY 2016	67%	69%	68%	66%	67%
FY 2017	66%	66%	69%	72%	66%
FY 2018	74%				74%

KPI: METROACCESS ON-TIME PERFORMANCE [TARGET 92%]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	95%	95%	94%	93%	93%	94%	94%	93%	93%	93%	93%	92%	94%
FY 2017	92%	91%	84%	83%	84%	87%	88%	87%	85%	88%	87%	92%	89%
FY 2018	89%	91%	90%										90%

continued

<b>KPI: METROBUS ON-TIME PERFORMANCE [TARGET 79%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	79%	80%	76%	76%	77%	78%	77%	78%	78%	77%	77%	75%	78%
FY 2017	77%	77%	72%	73%	73%	76%	77%	78%	77%	76%	76%	76%	76%
FY 2018	80%	80%	76%										79%

<b>KPI: METROBUS ON-TIME PERFORMANCE BY TIME PERIOD [TARGET 79%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
AM Early (4AM-6AM)	89%	90%	89%										89%
AM Peak (6AM-9AM)	84%	84%	79%										82%
Mid Day (9AM-3PM)	79%	79%	77%										79%
PM Peak (3PM-7PM)	75%	75%	69%										73%
Early Night (7PM-11PM)	80%	80%	78%										79%
Late Night (11PM-4AM)	77%	79%	78%										78%

<b>BUS FLEET RELIABILITY (BUS MEAN DISTANCE BETWEEN FAILURES) [TARGET 8,000 MILES]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	6,518	7,352	7,542	7,307	9,185	7,893	8,422	8,332	8,359	9,138	8,711	7,736	7,096
FY 2017	7,540	7,425	8,428	8,378	8,262	8,421	7,962	9,881	9,254	8,499	7,784	8,350	7,760
FY 2018	7,555	7,764	7,571										7,633

<b>BUS FLEET RELIABILITY (BUS MEAN DISTANCE BETWEEN FAILURE BY FLEET TYPE)</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
CNG Average Age 8.4	7,633	8,270	6,636										7,472
Hybrid Average Age 6.2	8,201	8,483	8,940										8,526
Clean Diesel Average Age 10.3	5,072	4,111	4,981										4,652
All Other Average Age 17.5	3,058	6,673	3,643										4,085

continued

**Q1 /FY 2018 TOP 10 MOST CROWDED ROUTES BY JURISDICTION**

Service Code	Line Name	Route Name	Time Period	Highest Passenger Load	Load Factor
DC	16th Street	S4 *	AM Peak	119	<b>2.0</b>
	16th Street	S1 *	AM Peak	110	<b>2.0</b>
	16th Street	S2 *	AM Peak	106	<b>2.0</b>
	Georgia Ave - 7th Street	70 *	Midday	101	<b>2.0</b>
	Benning Road - H Street	X2 *	AM Peak	98	<b>2.0</b>
	Deanwood - Alabama Avenue	W4	Midday	80	<b>2.0</b>
	14th Street	52	AM Peak	79	<b>2.0</b>
	14th Street	54	AM Peak	79	<b>2.0</b>
	Friendship Heights - Southeast	30N	PM Peak	79	<b>2.0</b>
	14th Street	54	PM Peak	79	<b>2.0</b>
MD	New Carrollton - Silver Spring	F4	PM Peak	78	<b>1.9</b>
	Calverton - Westfarm	Z6	Midday	76	<b>1.9</b>
	Greenbelt-Twinbrook	C4	PM Peak	76	<b>1.9</b>
	Greenbelt-Twinbrook	C4	Midday	76	<b>1.9</b>
	Eastover - Addison Road	P12	PM Peak	76	<b>1.9</b>
	Georgia Avenue - Maryland	Y8	Midday	76	<b>1.9</b>
	New Hampshire Ave - Maryland	K6	PM Peak	75	<b>1.9</b>
	Georgia Avenue - Maryland	Y2	PM Peak	75	<b>1.9</b>
	Georgia Avenue - Maryland	Y2	Midday	75	<b>1.9</b>
	New Carrollton - Silver Spring	F4	Midday	74	<b>1.9</b>
VA	Leesburg Pike	28A	AM Peak	71	<b>1.8</b>
	Leesburg Pike	28A	PM Peak	71	<b>1.8</b>
	Lee Highway - Farragut Square	3Y	AM Peak	68	<b>1.7</b>
	Columbia Pike - Farragut Square	16Y	AM Peak	68	<b>1.7</b>
	Ballston - Farragut Square	38B	PM Peak	67	<b>1.7</b>
	Lincolnia - North Fairlington	7Y	PM Peak	67	<b>1.6</b>
	Columbia Pike - Farragut Square	16Y	PM Peak	66	<b>1.6</b>
	Columbia Pike	16B	AM Peak	64	<b>1.6</b>
	Richmond Highway Express	REX	PM Peak	63	<b>1.6</b>
	Richmond Highway Express	REX	AM Peak	62	<b>1.6</b>

Performance Threshold	Max Load Factor
-----------------------	-----------------

Below Threshold	< 0.3
Standards Compliant	0.3 - 0.5
Occasional Crowding	0.6 - 0.7
Recurring Crowding	0.8 - 0.9
Regular Crowding	1.0 - 1.3
Continuous Crowding	> 1.3

Highest passenger load = the average of all the highest max loads recorded by route, trip and time period

Passenger Loads:

40' Bus (standard size) accommodates 40 sitting and 69 with standing

60' Bus (articulated) accommodates 61 sitting and 112 with standing

\* Route has articulated buses, allowing for passenger load above 100

Load Factor = highest passenger load divided by actual bus seats used

continued

**KPI: METRORAIL CUSTOMER ON-TIME PERFORMANCE [TARGET 75%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016							70%	72%	78%	80%	69%	71%	N/A
FY 2017	71%	69%	64%	65%	61%	63%	66%	71%	70%	75%	76%	79%	68%
FY 2018	86%	89%	87%										88%

**KPI: METRORAIL CUSTOMER ON-TIME PERFORMANCE BY LINE**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Red Line	87%	88%	89%										88%
Blue Line	82%	87%	81%										83%
Orange Line	83%	87%	79%										83%
Green Line	92%	93%	94%										93%
Yellow Line	85%	92%	91%										89%
Silver Line	82%	88%	81%										84%

**KPI: METRORAIL CUSTOMER ON-TIME PERFORMANCE BY TIME PERIOD**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
AM Rush (5AM-9:30AM)	87%	92%	90%										90%
Mid-day (9:30AM-3PM)	90%	90%	89%										89%
PM Rush (3PM-7PM)	89%	88%	87%										88%
Evening (7PM-9:30PM)	92%	92%	93%										92%
Late Night (9:30PM-12AM)	90%	92%	93%										92%
Weekend	72%	79%	77%										76%

**KPI: RAIL INFRASTRUCTURE AVAILABILITY [PILOT KPI]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017							98%	97%	96%	96%	96%	95%	N/A
FY 2018	98%	95%	90%										95%

continued

**KPI: GUIDEWAY CONDITION [TARGET 5%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	3%	2%	4%	6%	6%	6%	1%	0%	4%	2%	2%	5%	3%
FY 2018	0%	3%	10%										4%

**TRAIN ON-TIME PERFORMANCE (HEADWAY ADHERENCE) [TARGET 91%]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	84%	83%	79%	76%	80%	82%	78%	82%	86%	87%	80%	80%	82%
FY 2017	78%	76%	78%	80%	74%	76%	76%	82%	80%	84%	83%	82%	77%
FY 2018	90%	92%	89%										90%

**TRAIN ON-TIME PERFORMANCE BY LINE (HEADWAY ADHERENCE)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Red Line	91%	92%	92%										92%
Blue Line	86%	89%	85%										87%
Orange Line	89%	90%	87%										89%
Green Line	93%	95%	96%										95%
Yellow Line	91%	94%	93%										93%
Silver Line	88%	91%	86%										89%

**TRAIN ON-TIME PERFORMANCE BY TIME PERIOD (HEADWAY ADHERENCE)**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
AM Rush	85%	89%	86%										87%
Mid-day	94%	95%	93%										94%
PM Rush	88%	89%	87%										88%
Evening	94%	93%	96%										94%

**RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN DELAYS) [TARGET 75,000 MILES]**

	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	56,446	59,196	60,872	65,900	63,564	51,599	39,657	47,239	59,131	80,943	81,278	85,389	58,687
FY 2017	55,850	73,246	65,416	86,174	66,697	76,244	79,105	85,489	80,348	118,958	101,585	104,461	64,081
FY 2018	92,927	83,133	85,212										86,814

continued

RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN DELAYS BY RAILCAR SERIES)													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
2000/3000 series	115,528	69,136	109,844										93,108
5000 series	43,257	48,454	44,038										45,270
6000 series	75,405	132,930	100,630										96,995
7000 series	147,371	116,557	87,191										111,018

RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN FAILURE) [TARGET 6,500 MILES]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4,576	4,802	4,738	5,326	4,970	5,693	5,020	4,813	5,336	5,307	5,596	5,259	4,699
FY 2017	4,333	4,606	5,538	6,321	6,355	6,819	6,787	7,723	6,878	7,902	8,425	8,215	4,762
FY 2018	7,438	8,218	9,818										8,384

RAIL FLEET RELIABILITY (RAIL MEAN DISTANCE BETWEEN FAILURE BY RAILCAR SERIES)													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
2000/3000 series	8,169	7,731	10,461										8,635
5000 series	2,809	3,230	3,670										3,195
6000 series	8,062	12,085	11,724										10,210
7000 series	14,936	16,229	17,315										16,144

TRAINS IN SERVICE [TARGET 95%]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017			94%	96%	92%	99%	94%	98%	97%	97%	96%	97%	94%
FY 2018	98%	98%	98%										98%

continued

**RAIL CROWDING [OPTIMAL PASSENGERS PER CAR (PPC) OF 100, WITH MINIMUM OF 80 AND MAXIMUM OF 120 PPC]**

AM Rush Max Load Points		May-16	Jun-16	May-17	May-17
Gallery Place	Red	80	94	84	93
Dupont Circle		79	88	76	86
Pentagon	Blue	<b>101</b>	73	96	81
Rosslyn		92	94	<b>101</b>	98
L'Enfant Plaza	Orange	60	62	56	61
Court House		99	92	97	<b>108</b>
L'Enfant Plaza		67	69	56	64
Pentagon	Yellow	79	93	93	84
Waterfront	Green	81	78	82	79
Shaw-Howard		72	68	87	74
Rosslyn	Silver	85	<b>100</b>	<b>103</b>	<b>103</b>
L'Enfant Plaza		70	67	51	68
PM Rush Max Load Points					
Metro Center	Red	82	78	72	89
Farragut North		<b>113</b>	93	80	84
Rosslyn	Blue	100	<b>103</b>	100	98
Foggy Bottom-GWU		49	57	<b>117</b>	99
Smithsonian	Orange	81	90	46	59
Foggy Bottom-GWU		65	61	95	<b>102</b>
Smithsonian		79	87	68	70
L'Enfant Plaza	Yellow	89	73	91	89
L'Enfant Plaza	Green	59	64	86	81
Mt. Vernon Square		81	91	76	69
Foggy Bottom-GWU	Silver	61	68	90	<b>107</b>
L'Enfant Plaza		67	63	55	66

continued

<b>ESCALATOR SYSTEM AVAILABILITY [TARGET 93%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	93%	93%	93%	93%	93%	93%	94%	93%	94%	94%	93%	93%	93%
FY 2017	93%	92%	93%	94%	94%	94%	95%	95%	96%	96%	96%	95%	93%
FY 2018	95%	94%	95%										95%

<b>ELEVATOR SYSTEM AVAILABILITY [TARGET 97%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	97%	97%	96%	96%	96%	97%	97%	97%	97%	97%	97%	97%	97%
FY 2017	96%	97%	97%	97%	97%	97%	96%	97%	97%	97%	98%	97%	96%
FY 2018	97%	97%	97%										97%

<b>KPI: CUSTOMER INJURY RATE (PER MILLION PASSENGERS) [TARGET ≤ 1.75]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	0.81	2.53	1.70	2.05	1.37	1.35	3.29	2.22	1.75	2.13	1.91	2.15	1.65
FY 2017	1.78	1.79	2.01	1.73	1.68	2.63	2.14	2.59	2.17	1.41	2.19	1.71	1.86
FY 2018	1.61	1.87	2.49										1.99

\*Includes Metrobus, Metrorail, rail transit facilities (stations, escalators and parking facilities) and MetroAccess customer injuries

<b>FIRE AND SMOKE INCIDENTS</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	2	8	4	8	3	8	7	5	7	15	6	10	14
Non-Electrical	1	2	2	3	1	6	3	2	1	4	2	3	5
Cable	0	0	1	0	0	0	0	0	1	0	0	0	1
Arcing Insulator	1	6	1	5	2	2	4	3	5	11	4	7	8
FY 2018	15	8	9										32
Non-Electrical	5	2	4										11
Cable	1	1	0										2
Arcing Insulator	9	5	5										19

continued

<b>RED SIGNAL OVERRUNS</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	4	2	1	1	1	1	2	1	1	1	0	0	7
FY 2018	0	0	1										1

<b>BUS PEDESTRIAN STRIKES [PEDESTRIAN / CYCLIST STRIKES]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	1	1	3	3	0	1	1	1	3	2	0	1	5
FY 2018	3	0	0										3

<b>BUS COLLISION RATE [PER MILLION VEHICLE MILES]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2017	52	60	61	69	56	61	53	54	60	58	58	55	60
FY 2018	58	63	57										59

<b>KPI: CRIME RATE</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4.7	5.5	6.2	6.9	5.4	4.7	6.1	4.4	4.3	4.1	6.1	5.0	5.5
FY 2017	6.3	6.2	5.4	4.9	4.5	4.9	4.5	3.8	3.5	4.2	4.6	4.5	6.0
FY 2018	4.6	4.8	5.2										4.8

<b>KPI: PART I CRIMES [TARGET ≤ 1,750 PART I CRIMES]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	144	153	172	199	135	119	129	109	122	114	161	137	469
FY 2017	160	163	140	126	107	111	110	87	92	107	120	119	463
FY 2018	113	122	127										362

continued

PART I CRIMES BY TYPE													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Crimes Against Property	69	85	98										252
Larceny (Snatch/ Pickpocket)	12	21	11										44
Larceny (Other)	51	59	83										193
Burglary	0	0	0										0
Motor Vehicle Theft	6	4	3										13
Attempted M V Theft	0	1	1										2
Arson	0	0	0										0
Crimes Against Persons	44	37	29										110
Aggravated Assault	13	11	10										34
Rape	1	1	0										2
Robbery	30	25	19										74
FY 2018 Part1 Crimes	113	122	127										362
FY 2018 Homicides	0	0	0										0

\* Homicides that occur on WMATA property are investigated by other law enforcement agencies. These cases are shown for public information; however, the cases are reported by the outside agency and are not included in MTPD crime statistics.

EMPLOYEE INJURY RATE (PER 200,000 HOURS) [TARGET ≤ 5.1]													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	5.1	6.1	3.7	4.9	4.3	3.7	6.2	5.4	4.4	5.7	5.1	4.9	5.0
FY 2017	6.2	5.3	6.1	5.7	4.3	6.0	4.5	4.4	7.7	7.1	6.6	7.0	5.8
FY 2018	7.3	6.6	7.7										7.2

continued

<b>KPI: RIDERSHIP BY MODE [BUDGET FORECAST 341.5 MILLION]</b>														
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Rail	Forecast	15,529,935	15,886,945	14,994,420										46,411,300
	Actual	15,195,047	15,291,378	14,446,237										44,932,662
Bus	Forecast	9,942,000	10,481,000	10,060,100										30,483,000
	Actual	9,375,256	10,042,871	9,766,326										29,184,453
Access	Forecast	195,000	210,000	201,000										606,000
	Actual	186,699	206,014	191,051										583,764
Total	Forecast	25,666,935	26,577,945	25,255,420										77,500,300
	Actual	24,757,002	25,540,263	24,403,614										74,700,879

<b>KPI: BUDGET MANAGEMENT [TARGET 0-2 % SURPLUS]</b>														
FY2018		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
Expense Variance (\$)		(\$7)	(\$25)	(\$27)										(\$27)
Revenue Variance (\$)		(\$2)	(\$5)	(\$9)										(\$9)
Net Subsidy Variance (\$)		(\$5)	(\$20)	(\$19)										(\$19)
Expense Variance (%)		-5%	-8%	-6%										-6%
Revenue Variance (%)		-2%	-4%	-4%										-4%
Net Subsidy Variance (%)		-6%	-13%	-8%										-8%
Surplus (+) / Deficit (-)		4%	7%	4%										4%

<b>KPI: CAPITAL FUNDS INVESTED [TARGET 95% OF CAPITAL BUDGET]</b>														
		Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016		1%	6%	16%	17%	25%	34%	38%	44%	55%	58%	66%	85%	16%
FY 2017		5%	14%	25%	33%	41%	51%	59%	66%	74%	82%	89%	99%	25%
FY 2018		5%	12%	18%										18%

\*FY2017 includes capital budget amendment (\$1.175 billion)

continued

<b>VACANCY RATE [TARGET 5%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	7%	6%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%	7%
FY 2017	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%	6%	7%	5%
FY 2018	7%	8%	8%										8%

<b>OPERATIONS CRITICAL VACANCY RATE [TARGET 9%]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016							11%	11%	12%	12%	10%	11%	N/A
FY 2017	10%	10%	10%	8%	8%	8%	7%	7%	7%	8%	8%	11%	10%
FY 2018	13%	12%	13%										13%

<b>WATER USAGE (GALLONS PER VEHICLE MILE) [TARGET 0.84]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	1.21	1.30	1.47	0.97	0.57	0.52	0.70	0.73	0.60	0.69	0.64	0.94	1.32
FY 2017	1.37	1.29	1.56	1.05	0.61	0.50	0.69	0.52	0.64	0.66	0.67	1.13	1.40
FY 2018	1.25	1.39	1.39										1.35

<b>ENERGY USAGE (BTU/VEHICLE MILE) [TARGET 39,399]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	40,193	41,349	39,798	39,262	37,639	42,240	47,371	43,640	37,952	38,660	37,365	39,565	40,449
FY 2017	42,404	39,734	44,477	37,665	38,352	40,112	45,493	42,813	39,927	40,877	36,782	41,244	42,148
FY 2018	41,548	38,877	39,939										40,097

<b>GREENHOUSE GAS EMISSIONS PER VEHICLE MILE [TARGET 4.00]</b>													
	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	FYTD
FY 2016	4.15	4.18	4.18	4.06	3.79	4.31	4.47	4.14	3.56	3.75	3.57	3.79	4.12
FY 2017	4.11	3.80	4.34	3.63	3.66	3.81	4.54	4.34	3.95	4.22	3.77	4.29	4.15
FY 2018	4.34	4.03	4.22										

continued

**DBE AWARDS/COMMITMENTS FOR FFY17, PERIOD 1 (OCT 1, 2016 – MAR. 31 2017)**

	Total Dollars	Total Number	Total Dollars to DBEs	Total Number to DBEs	Total Dollars to DBEs/Race Conscious	Total Number to DBEs/Race Conscious	Total Dollars to DBEs/Race Neutral	Total Number to DBEs/Race Neutral	Percentage of Total Dollars to DBEs
Prime Contracts Awarded	\$177,879,050	18	\$2,340,175	4	\$0	0	\$2,340,175	4	1.32%
Subcontracts Awarded/Committed	\$13,557,898	8	\$13,545,528	7	\$13,545,528	7	\$0	0	99.91%
Total			\$15,885,703	11	\$13,545,528	7	\$2,340,175	4	8.93%

## Key Performance Indicator (KPI) & Key Driver Definitions

KPI	How is it measured?	What does this mean and why is it key to our strategy?
<b>QUALITY SERVICE</b>		
Customer Satisfaction	<p>Survey respondent rating</p> $\frac{\text{Number of survey respondents with high satisfaction}}{\text{Total number of survey respondents}}$	<p>Surveying customers about the quality of Metro’s service delivery provides a mechanism to continually identify those areas of the operation where actions to improve the service can maximize rider satisfaction.</p> <p>Customer satisfaction is defined as the percent of survey respondents who rated their last trip on Metrobus or Metrorail as “very satisfactory” or “satisfactory.” The survey is conducted via phone with approximately 400 bus and 400 rail customers who have ridden Metro in the past 30 days. Results are summarized by quarter (e.g., January–March).</p>
MetroAccess On-Time Performance	<p>Adherence to Schedule</p> $\frac{\text{Number of vehicle arrivals at the pick-up location within the 30 minute on-time widow}}{\text{Total trips delivered}}$	<p>This indicator illustrates how closely MetroAccess adheres to customer pick-up windows on a system-wide basis. Factors that effect on-time performance are traffic congestion, inclement weather, scheduling, vehicle reliability, and operational behavior. MetroAccess on-time performance is essential to delivering quality service to the customer.</p>
Metrobus On-Time Performance	<p>Adherence to Schedule</p> $\frac{\text{Number of time points that arrived on time by route based on a window of 2 minutes early and 7 minutes late}}{\text{Total number of time points scheduled (by route)}}$	<p>This indicator illustrates how closely Metrobus adheres to published route schedules on a system-wide basis. Factors that effect on-time performance are traffic congestion, inclement weather, scheduling, vehicle reliability, and operational behavior. Bus on-time performance is essential to delivering quality service to the customer.</p>
Bus Fleet Reliability	<p>Mean Distance Between Failures (MDBF)</p> <p>The number of total miles traveled before a mechanical breakdown requiring the bus to be removed from service or deviate from the schedule</p>	<p>Mean Distance Between Failures is used to monitor trends in vehicle breakdowns that cause buses to go out of service and to plan corrective actions. Factors that influence bus fleet reliability include vehicle age, quality of maintenance program, original vehicle quality, and road conditions affected by inclement weather and road construction.</p>
Bus Crowding	<p>Ratio of bus seats filled</p> $\frac{\text{Top load recorded on a route during a time period}}{\text{actual bus seat capacity}}$	<p>Bus crowding is a factor of bus customer satisfaction. This measure can inform decision making regarding bus service plans.</p>
Metrorail Customer On-Time Performance	<p>Percentage of customer journeys completed on time</p> $\frac{\text{Number of journeys completed on time}}{\text{Total number of journeys}}$	<p>Rail Customer On-Time Performance (OTP) communicates the reliability of rail service, which is a key driver of customer satisfaction. OTP measures the percentage of customers who complete their journey within the maximum amount of time it should take per WMATA service standards. The maximum time is equal to the train run-time + a headway (scheduled train frequency) + several minutes to walk between the fare gates and platform. These standards vary by line, time of day, and day of the week. Actual journey time is calculated from the time a customer taps a SmarTrip® card to enter the system, to the time when the SmarTrip® card is tapped to exit.</p> <p>Factors that can effect OTP include: railcar availability, fare gate availability, elevator and escalator availability, infrastructure conditions, speed restrictions, single-tracking around scheduled track work, railcar delays (e.g., doors), or delays caused by sick passengers.</p>

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Rail Infrastructure Availability	Percentage of track available for customer travel during operating hours	Rail Infrastructure Availability is a key driver of customer on-time performance. Planned and unplanned maintenance of track, signaling, and traction power can result in single-tracking and/or speed restrictions that slow customer travel throughout the system. This measure includes both the duration and distance of restrictions. Single-tracking events reduce availability to zero for the portion of track impacted. Slow speed restrictions reduce availability of affected track segments by 85%, while medium restrictions reduce availability by 40%.
Guideway Condition (Federal Transit Administration Transit Asset Management Performance Measure)	Percentage of track segments with performance restrictions at 9:00 AM the first Wednesday of every month  Number of track miles with performance restrictions ÷ 234 total miles	In 2016, the Federal Transit Administration (FTA) issued its Final Rule on Transit Asset Management, which requires transit properties to set targets and report performance on a variety of measures, including guideway condition. Guideway includes track, signals and systems.  A performance restriction occurs when there is a speed restriction: the maximum train speed is set below the guideway design speed. Performance restrictions may result from a variety of causes, including defects, signaling issues, construction zones, and maintenance causes. FTA considers performance restrictions to be a proxy for both track condition and the underlying guideway condition.
Train On-Time Performance	Number of station stops delivered within the scheduled headway plus 2 minutes during rush (AM/PM) service ÷ Total station stops delivered  Number of station stops delivered up to 150% of the scheduled headway during non-rush (midday and evening) ÷ Total station stops delivered	Train on-time performance measures the adherence to weekday headways, or the time customers wait between trains. Factors that can effect on-time performance include: infrastructure conditions, missed dispatches, railcar delays (e.g., doors), or delays caused by sick passengers. Station stops are tracked system-wide, with the exception of terminal and turn-back stations.
Rail Fleet Reliability	Mean Distance Between Delays (MDBD)  Total railcar revenue miles ÷ Number of failures during revenue service resulting in delays of four or more minutes  Mean Distance Between Failure (MDBF)  Total railcar revenue miles ÷ Total number of failures occurring during revenue service	The number of miles traveled before a railcar experiences a failure. Some car failures result in inconvenience or discomfort, but do not always result in a delay of service (such as hot cars). Mean Distance Between Delay includes those failures that had an impact on customer on-time performance.  Mean Distance Between Failure and Mean Distance Between Delay communicate the effectiveness of Metro’s railcar maintenance and engineering program. Factors that influence railcar reliability are the age and design of the railcars, the amount the railcars are used, the frequency and quality of preventive maintenance, and the interaction between railcars and the track.
Trains in Service	Percentage of required trains that are in service at 8:15 AM and 5:00PM  Number of Trains in service ÷ Total required trains	Trains in Service is a key driver of customer on-time performance and supports the ability to meet the Board standard for crowding. WMATA’s base rail schedule requires 140 trains during rush periods. Fewer trains than required results in missed dispatches, which leads to longer wait times for customers and more crowded conditions. Key drivers of train availability include the size of the total fleet and the number of “spares”, railcar reliability and average time to repair, operator availability, and balancing cars across rail yards to ensure that the right cars are in the right place at the right time.

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Rail Crowding	<p>Number of rail passengers per car</p> <p>Total passengers observed on-board trains passing through a station during a rush hour ÷ Actual number of cars passing through the same station during the rush hour</p> <p>Trained Metro observers are strategically placed around the system during its busiest times to monitor and report on crowding.</p> <p>Counts are taken at select stations where passenger loads are the highest and in the predominant flow direction of travel on one to two dates each month (from 6 AM to 10 AM and from 3 PM to 7 PM). In order to represent an average day, counts are normalized with rush ridership.</p>	<p>The Board of Directors has established Board standards of rail passengers per car to measure railcar crowding. Car crowding informs decision making regarding asset investments and scheduling.</p> <p>Additional Board standards have been set for:</p> <ul style="list-style-type: none"> <li>▲ Hours of service—the Metrorail system is open to service customers</li> <li>▲ Headway—scheduled time interval between trains during normal weekday service</li> </ul>
Elevator and Escalator Availability	<p>In-service percentage</p> <p>Hours in service ÷ Operating hours</p> <p>Hours in service = Operating hours – Hours out of service</p> <p>Operating hours = Operating hours per unit × number of units</p>	<p>Escalator/elevator availability is a key component of customer satisfaction with Metrorail service. This measure communicates system-wide escalator and elevator performance (at all stations over the course of the day) and will vary from an individual customer’s experience.</p> <p>Availability is the percentage of time that Metrorail escalators or elevators in stations and parking garages are in service during operating hours.</p> <p>Customers access Metrorail stations via escalators to the train platform, while elevators provide an accessible path of travel for persons with disabilities, seniors, customers with strollers, and travelers carrying luggage. An out-of-service escalator requires walking up or down a stopped escalator, which can add to travel time and may make stations inaccessible to some customers. When an elevator is out of service, Metro is required to provide alternative services which may include shuttle bus service to another station.</p>

**SAFETY AND SECURITY**

Customer Injury Rate	<p>Customer injury rate:</p> <p>Number of injuries ÷ (Number of passengers ÷ 1,000,000)</p>	<p>The customer injury rate is based on National Transit Database (NTD) Reporting criteria. It includes injury to any customer caused by some aspect of Metro’s operation that requires immediate medical attention away from the scene of the injury.</p> <p>Customer safety is the highest priority for Metro and a key measure of quality service. Customers expect a safe and reliable ride each day. The customer injury rate is an indicator of how well the service is meeting this safety objective.</p>
Crime	<p>Reported Part I Crimes</p>	<p>Part I crimes reported to Metro Transit Police Department for Metrobus (on buses), Metrorail (on trains and in rail stations), or at Metro-owned parking lots in relation to Metro’s monthly passenger trips.</p> <p>This measure provides an indicator of the perception of safety and security customers experience when traveling the Metro system. Increases or decreases in crime statistics can have a direct effect on whether customers feel safe in the system.</p>

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Employee Injury Rate	Employee injury rate: $\text{Number of injuries} \div (\text{Total work hours} \div 200,000)$	An employee injury is recorded when the injury is (a) work related; and, (b) one or more of the following happens to the employee: 1) receives medical treatment above first aid, 2) loses consciousness, 3) takes off days away from work, 4) is restricted in their ability to do their job, 5) is transferred to another job, 6) death.  OSHA recordable injuries are a key indicator of how safe employees are in the workplace.

## PEOPLE AND ASSETS

Ridership	Total Metro ridership Metrorail passenger trips + Metrobus passenger boardings + MetroAccess passenger trips	Ridership is a measure of total service consumed and an indicator of value to the region. Drivers of this indicator include service quality and accessibility.  Passenger trips are defined as follows: <ul style="list-style-type: none"> <li>▲ Metrorail reports passenger trips. A passenger trip is counted when a customer enters through a faregate. In an example where a customer transfers between two trains to complete their travel one trip is counted.</li> <li>▲ Metrobus reports passenger boardings. A passenger boarding is counted at the farebox when a customer boards a Metrobus. In an example where a customer transfers between two Metrobuses to complete their travel two trips are counted.</li> <li>▲ MetroAccess reports passenger trips. A fare paying passenger traveling from an origin to a destination is counted as one passenger trip.</li> </ul> *For performance measures and target setting, Metro uses total ridership numbers including passengers on bus shuttles to more fully reflect total passengers served. Metro does not include bus shuttle passenger trips in its budget or published ridership forecasts.
Budget Management	Percentage surplus or deficit comparing actual revenues and subsidy to actual expenses $(\text{actual revenues} + \text{subsidy} - \text{actual expenses}) \div \text{actual expenses}$	This indicator tracks Metro's progress managing its operating revenues and expenses.
Capital Funds Invested	Percentage of capital budget spend $\text{Cumulative monthly capital expenditures} \div \text{fiscal year capital budget, including actual rollover from previous fiscal year}$	This indicator tracks spending progress of the Metro Capital Improvement Program.
Vacancy Rate	Percentage of budgeted positions that are vacant $(\text{Number of budgeted positions} - \text{number of employees in budgeted positions}) \div \text{number of budgeted positions}$	This measure indicates how well Metro is managing its human capital strategy to recruit new employees in a timely manner, in particular operations-critical positions. Factors influencing vacancy rate can include: recruitment activities, training schedules, availability of talent, promotions, retirements, among other factors.

KPI	How is it measured?	What does this mean and why is it key to our strategy?
Water Usage	Rate of gallons of water consumed per vehicle mile $\frac{\text{Total gallons of water consumed}}{\text{Total vehicle miles}}$	This measure reflects the level of water consumption Metro uses to run its operations. Water consumption is a key area of Metro's Sustainability Initiative, which brings focus to Metro's efforts to provide stewardship of the environmental systems that support the region.
Energy Usage	Rate of British Thermal Units (BTUs) consumed per vehicle mile $\frac{\text{MBTU}(\text{Gasoline} + \text{Natural Gas} + \text{Compressed Natural Gas} + \text{Traction Electricity} + \text{Facility Electricity}) \times 1000}{\text{Total vehicles miles}}$	This measure reflects the level of various types of energy Metro uses to power its operations. Energy consumption is a key area of Metro's Sustainability Initiative, which brings focus to Metro's efforts to provide stewardship of the environmental systems that support the region.
Greenhouse Gas Emissions	Rate of metric tons of CO <sub>2</sub> emitted per vehicle mile $\frac{(\text{CO}_2 \text{ metric tons generated from gas, CNG and diesel used by Metro revenue and non-revenue vehicles} + \text{CO}_2 \text{ metric tons generated from electricity and natural gas used by facilities and rail services})}{\text{Total vehicle miles}}$	Greenhouse Gas emissions reflect how Metro sources its energy used to power its operations, as well as the amount of energy it uses. Reducing Greenhouse Gas emissions is a key area of Metro's Sustainability Initiative, which brings focus to Metro's efforts to provide stewardship of the environmental systems that support the region.
Disadvantage Business Enterprise (DBE) Contracts	DBE Participation Rate (only considers federally-funded contracts): $\frac{\text{Total contract dollars committed to DBEs}}{\text{Total contract dollars awarded to all Vendors (DBEs and Non-DBEs)}}$	FTA DOT's DBE Program seeks to ensure nondiscrimination in the award and administration of DOT-assisted contracts.  DBE Participation Rate provides visibility into how well WMATA is doing to ensure that DBEs are awarded a specified percentage (target) of contracted work at WMATA. Transit vehicle purchases may not be considered in the calculation.

# WESTCHESTER COUNTY DEPARTMENT OF TRANSPORTATION

## Service Policies and Performance Review

### OVERVIEW

The Operations Planning Group has developed the following recommendations on Service Policies and Performance Review for services provided through the Westchester County Department of Transportation (WCDOT) in conjunction with the Transit into the 21st Century long-range planning effort and WCDOT's on-going strategic planning process. Taken together, these recommendations constitute an analytical framework through which existing services and potential service adjustments can be analyzed with regard to their financial, operational, usage, customer service and strategic implications.

### SERVICE POLICIES

Proposed service adjustments (i.e., requests for new service, modifications to existing service) shall be analyzed within the following framework as a basis for decision-making. Guidelines described for the various criteria relate to service categories defined in WCDOT's Performance Report, which appears as Attachment A of this report.

The Performance Report is based on geographic service classifications, through which each route in the Bee-Line System is classified according to its individual geographic and service characteristics. These classifications account for differences in population and employment density, as well as service factors, which impact route performance. Each route's performance is based on the calculation of standard scores and percentile rankings for fiscal and operating statistics and performance indicators relative to all other routes in its classification.

- **Investment Criteria** - Does the adjustment and the route or service unit it impacts meet or maintain the minimum guidelines for investment?
  - **Return on Investment** - Standard scores will be calculated (per the methodology used in the Performance Report) for the specific service adjustment and the route or service unit impacted by the adjustment to judge -return on investment. The standard scores of the adjustment for ridership and revenue should be equal to or greater than the standard score for variable cost. The relationship between these scores for the route or service unit should be maintained or improved.
  - **Efficiency and Effectiveness** - Performance ratios will be calculated for both the adjustment and the route/service unit (per the methodology used in the Performance Report). These ratios should not fall greater than one Standard Deviation below the relevant category average for the adjustment (i.e., have standard scores less than -1.00). The relevant ratios of the route/service unit should not decrease to more than one Standard Deviation below the category average, unless they were greater than or approaching one Standard Deviation below the average before the adjustment was considered.

- **Service Criteria** - Does the adjustment and the route or service unit which it impacts meet or improve on minimum guidelines for level of service ?
- **Vehicle Headway** - The specific service adjustment and route/service unit it impacts should adhere to guidelines for service frequency.

***Thirty minutes maximum headway for all service categories during peak travel periods.***

***One hour maximum headway during off-peak periods for all service categories.***

***Operation in excess of these guidelines will be allowed when development densities and/or the absence of major-trip generators are such that minimum headways become impractical.***

- **Hours of Service** - The specific service adjustment and route/service unit it impacts should adhere to guidelines for span of service.

***Local services shall maintain minimum service spans of 6AM to 8PM on weekdays, 8AM to 6PM on Saturdays, and 10AM to 6PM on Sundays.***

***Designated core services shall maintain minimum service spans of 6AM to 10PM on weekdays and 8AM to 8PM on Saturdays.***

***Feeder services shall maintain minimum service spans of 6AM to 9AM during the weekday morning peak and 4PM to 7.30PM during the weekday afternoon peak, with adjustments to match schedule patterns for connecting rail services during those hours.***

***Express services shall maintain minimum service spans which cover 8AM, 8:30AM, and 9AM morning work starts, as well as 4PM, 4:30PM, and 5PM afternoon work departures at major employ- centers served.***

- **Passenger Loading** - The specific service adjustment and route/service unit it impacts should adhere to guidelines for passenger loading.

***Passenger loading on local services shall not exceed 120% of seated capacity and/or any number of standees for more than 15 continuous minutes of running time during any peak period trip.***

***Passenger loading on local services shall not exceed a seated load during any off-peak trip.***

***Passenger loading on express or feeder services shall not exceed a seated load during any period.***

***Operation in excess of these guidelines will be allowed so long as the incidence is not chronic (i.e., has not occurred on at least 20% of scheduled weekday trips or 25% of scheduled weekend trips during the period in question over the most recent four week period).***

- **On-Time Performance** - The service adjustment and the route/service unit it impacts shall adhere to guidelines for timeliness.

***No early arrivals shall be allowed for any service at any scheduled timepoint. Late arrivals at any scheduled timepoint shall not exceed five minutes for any service.***

***Operation in excess of the lateness standard will be allowed so long as the incidence is not chronic (i.e., has not occurred on more than 20% of scheduled trips past any timepoint during the most recent four week period) or is related to weather, emergency detours, or construction activity. Poor on-time performance related to driver performance shall be treated as a disciplinary procedure within the company/union agreement.***

Service adjustments will be judged as warranted so long as all guidelines defined above are met for both the specific adjustment and for the route/service unit it impacts. Additional weight may be placed on adjustments provided they meet additional guidelines/warrants as defined in *Transit into the 21st Century* (see Attachment B). The application of any or all guidelines or warrants may be administratively waived by the Commissioner.

## **PERFORMANCE REVIEW**

All current services should be reviewed annually for performance within the above framework using the Planning Division's periodic *Performance Reports* and the Fiscal Affairs Division's monthly *Management Reports*.

Performance reviews should be undertaken in order to set investment priorities and recommend service adjustments. Performance reviews should also take strategic actions, land use trends and long-range plans into account.