



**PORT AUTHORITY OF ALLEGHENY COUNTY**

# **Transit Service Guidelines**

November 2017

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## Executive Summary

The Port Authority of Allegheny County exists to provide public transportation options within Allegheny County, Pennsylvania. This document serves as a framework for focusing the Authority's actions to ensure that it is constantly striving to achieve its mission and continually improve its operations.

The Port Authority of Allegheny County (the Authority) serves the 775 square mile area within and immediately adjacent to Allegheny County. As of the writing of this document, the Authority provides public transit services via 97 fixed bus routes, 2 light rail lines (with 3 total routings), 2 inclined planes, and demand-response paratransit. Though the Authority oversees them, one of the inclined planes as well as the paratransit services are operated by other providers. Altogether, these services provide over sixty-one million rides annually in and around Allegheny County in southwestern Pennsylvania.

The Port Authority of Allegheny County strives to provide quality transit service in a manner that is efficient, effective and equitable. To do so, the Port Authority must make a number of decisions based on competing priorities about where demand is greatest, which types of service would work best and be most appropriate, and where limited resources can and should be used. These decisions should aim to be as fair, consistent, and transparent as possible, as the Authority is a public agency charged with using public dollars to serve a critical community need.

To do this, the Port Authority has developed this set of service guidelines that will be used to:

- Set service goals.
- Design service and determine appropriate service levels.
- Establish minimum service performance.
- Evaluate service performance.
- Prioritize future service changes and plans.

These service guidelines apply to all general public transit services provided by the Port Authority, with the exception of inclined plane service. These service guidelines will be applied in accordance with all applicable laws and regulations. They will be used to develop service change recommendations and will be used on an ongoing basis to evaluate, adjust, and improve services as demand and conditions change.

In most cases, the service guidelines define *minimum thresholds* that should be met, with most services exceeding these thresholds. However, the guidelines are also designed to - within limits - provide flexibility to respond to varied customer needs, a changing economy, and Allegheny County's often challenging geography. As such, these guidelines should not be considered binding rules, but rather general guides of the base level of service the Authority strives to provide to aid in the decision-making process around changes to service.

These guidelines may change over time, as planning is, by nature, fluid. As such, these guidelines will be adjusted or reapproved and reissued by the Authority at a minimum of every other fiscal year.

*\*Unless labeled 'Demand Response Paratransit', the following guidelines refer to fixed route transit services.*

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## **Service Goals**

### **Provide Efficient Transit Service**

Port Authority should strive to provide the highest amount of value to customers by using resources optimally to meet other goals. Through increased efficiencies, services should strive to maximize passenger trips per hour of service provided.

### **Provide Effective Transit Service**

Port Authority should strive to maximize the population's access to transit in order to grow ridership and promote long term sustainability for the organization. To promote access to transit, the Authority must endeavor to provide direct and varied pathways between origins and destinations within the service area. These pathways must be able to be accessed via stops and stations, be traversed in a timely and safe manner, and be easy to understand and navigate.

### **Provide Equitable Transit Service**

In order to foster widespread mobility, the Authority shall strive to provide targeted and representative service to populations within Allegheny County with a greater need for transit so as not to allow a disproportionate burden to fall upon these populations. Operations targeting these groups should at minimum provide a proportion of services equal or greater to that which the sub-population represents as a portion of the total population. Groups which are targeted for special attention include minority populations protected under Title VI, low income populations, senior citizens, persons without access to a vehicle, and persons with disabilities.

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## Service Overview

The Port Authority of Allegheny County provides a family of services that are designed to provide options to address a wide array of needs. These services include light rail and busway services, express bus services to downtown Pittsburgh and Oakland, and local buses. The provision of these different types of services is tailored toward serving different types of trips and needs. A list of current routes designated by type as of the writing of this document can be found in Appendix A.

### Types of Services

#### *Rapid Network*

Rapid Routes form the “backbone” of the Port Authority’s overall system. Rapid services include all modes of transit which have at least 75% of route miles along a fixed guideway, and consist of:

- **Light Rail Transit (LRT, the “T”)** that operates around Downtown Pittsburgh and extends south
- **Bus Rapid Transit (BRT)** routes that provide service on the East, West and South Busways
- Any future service to be implemented considered as **LRT or BRT**

#### *Express Network*

Express routes are designed primarily to serve commute trips to and from downtown Pittsburgh and Oakland, and reverse commute trips to suburban destinations such as shopping centers and Pittsburgh International Airport. These routes are designed to provide faster service than a local service route, either by way of only serving certain bus stops or by using a fixed guideway or highway for part of its journey. Most express routes only operate during commute hours, but others that serve unique commute patterns, such as hospitals or the airport, may run all day.

#### *Key Corridor Network*

The Key Corridor Network consists of bus routes that provide frequent service in high volume corridors that are not served by Rapid Routes. Key Corridor routes are defined as routes that serve more than 1,000,000 annual trips.

#### *Local Network*

The local service network comprises the majority of the Port Authority’s bus service. Local routes are defined as routes that serve fewer than 1,000,000 trips per year and do not use fixed guideway or other express guideways.

#### *Paratransit Network*

ACCESS is a coordinated, shared-ride paratransit system that has been providing door-to-door advanced reservation transportation to the general public but primarily for people with disabilities, seniors and clients of human service agencies in Allegheny County since February 1979.

ACCESS is open to the general public. Port Authority sponsors special discounts for the following groups of persons:

1. Persons with disabilities who are certified as ADA paratransit eligible. This service is sponsored by Port Authority of Allegheny County
  2. Persons age 65 or over who have registered for the ACCESS 65+ (PA Shared Ride) Program receive an 85% discount on fares. This subsidy is provided through the Pennsylvania Department of Transportation from State Lottery funds.
  3. For non-ADA eligible persons or trips, the Connection Program provides ACCESS service at an 85% discount on fares if there is no bus option available, or provides feeder service to and from the bus if fixed route service is available on at least one end of the trip. The Pennsylvania Department of Transportation assists with subsidies for these trips from Persons with Disabilities (PwD) and Section 5310 operating funds.
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### **Service Garages**

Port Authority's services are directly operated out of four bus garages and one light rail center. Each location serves a general section of Port Authority's overall service.

- North - Ross bus garage
- South – West Mifflin bus garage (Southeast), South Hills Village Rail Center (LRT)
- East – East Liberty bus garage
- West – Collier bus garage

### **Fixed Route Service Area**

It is important not only to define the types of services that the Authority provides, but also to define who is served by these various types of transit. For the purposes of this document, the Authority assumes anyone living within the following “catchment areas” has access to transit:

#### ***Bus Stops***

- Within ¼ mile (on road network) of residence via walking

#### ***Transit Stations (Rapid transit services)***

- Within ½ mile (on road network) of residence via walking

While biking and driving catchment areas are important considerations for network planning, the walkable catchment area will be used as the basic “service area”, since not all passengers have access to a bicycle or automobile.

### **Demand Response Paratransit Service Area**

- ACCESS provides service between any origin and destination within Allegheny County, as well as any destination up to 1.5 miles outside Allegheny County.
  - ADA eligible paratransit service is available anywhere within the defined ADA service area of 3/4 of an airline mile from Port Authority's non-commuter, fixed bus route or from any rail station operating on that day and at that time.
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## Service Design Guidelines

The Port Authority strives to serve as many of Allegheny County's residents, workers, and visitors as it can with the resources that it has available. At the same time it needs to serve a wide variety of riders, trip types, and demands, many of which conflict with each other. For example, most riders want fast service, but many also want many bus stops in order to minimize the distances that they have to walk, which actually reduces vehicle speeds. Thus, service elements that will attract one type of rider to transit can drive other riders away, and the Port Authority must balance these competing desires.

To serve as many riders as possible, and as described in the previous section, the Port Authority provides different types of service. These services are intended to meet the basic needs of residents in developed areas who cannot drive and to provide a compelling alternative for those who can drive. For both types of riders—and those in between—there are certain service design principles that will improve service for nearly all riders.

Each of the following factors for service design shall be reviewed annually or as major system changes occur to ensure that all service adheres to the guidelines to the best of the Authority's ability.

### Services Should Maximize Efficiency of Resources

#### *Fixed Route Transit*

Transit services should be designed and held to alignments which serve the greatest density of origins and destinations to as to maximize the number of potential riders while using the least amount of resources while still providing safe, effective and equitable service. Therefore the ultimate goal with designing a transit route is to choose an alignment which serves the greatest number of people in the most efficient way possible. Maximizing the number of passengers requires finding key areas in which those passengers originate and bring those passengers to their desired destinations. Origins include where passengers live, but also of key importance are origins where passengers can access transit via other transportation modes, such as through pedestrian and bike pathways, park and ride facilities, connections with regional public transit carriers, paratransit services, train stations, and airports. Destinations largely include access to the greatest number and density of jobs, as well as other types of destinations such as schools, universities, libraries, parks, art and cultural institutions, retail locations, health care facilities, entertainment and recreational areas, and community services.

Routes should operate along pathways that connect the greatest number of people to the greatest number of destinations, so as to carry out the mission of the Authority with the greatest effect.

#### *Demand Response Paratransit*

ACCESS is designed to be a highly coordinated system. Coordination creates economies of scale in the shared ride system and helps maintain an expansive level of service which is far greater than any single sponsor could afford.

Shifting riders from ACCESS to fixed route service whenever possible has been a major goal since the passage of the ADA as fixed route service has a lower cost and provides riders with more flexibility and freedom. Trip by trip eligibility, personalized service planning including mapping accessible paths of travel and paratransit feeder to fixed route service, have been effective tools and have helped to manage ADA paratransit demand.

### Service Should Be Straightforward

Transit services must be intuitive, logical, and easy to understand to ensure riders can use them effectively. Therefore, service should be designed so that it is easy to understand. This makes it easier for potential riders to learn about options that are available, and helps ensure that riders get where they want to go when they want to without experiencing confusion or substantial delay.

Routes should operate along as direct path as is feasible given Allegheny County's topography. The fewer directional changes a route makes, the easier it is to understand. Conversely, circuitous alignments are disorienting

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and difficult to remember. Routes should not deviate from the most direct alignment unless there is a compelling reason.

### **Route Deviations & Variants Should Be Minimized**

As described above, service should be relatively direct, and to make service direct, the use of route deviations—the deviation of service off of the most direct route—should be minimized.

However, there are many instances when the deviation of service off of the most direct route is appropriate, for example to provide service to major shopping centers, employment sites, schools, etc. In these cases, the benefits of operating the route off of the main route must be weighed against the inconvenience caused to passengers already on board.

1. Overall route productivity (in terms of passengers per revenue vehicle hour) would be equal to or better than without the deviation.
2. The deviation would not interfere with the provision of regular service frequencies and/or the provision of coordinated service with other routes operating in the same corridor.

In most cases where route deviations are provided, they should be provided on an all-day basis to keep the route simple for riders to use. Exceptions are during times when the sites that the route deviations serve have no activity—for example route deviations to shopping centers do not need to serve those locations early in the morning before employees start commuting to work.

### **Routes Should Be Symmetrical**

Routes should operate along the same alignment in both directions to make it easy for riders to know how to get back to where they came from. All routes should operate along the same alignment in both directions except in cases where such operation is not possible due to one-way streets or turn restrictions, or near route termini where vehicles need to turn around. In those cases, routes should be designed so that the opposite directions parallel each other as closely as possible.

### **Routes Should be Designed to Maximize the Transit Service Area**

To make service easy to understand and to eliminate service duplication, service should be developed to serve clearly defined markets. Ideally, major corridors should not be served by more than one route of each route type—for example, one local route and one express route, and not by multiple local routes and multiple express routes. By spreading out transit services, the Authority can maximize the area in which riders can access transit stops and stations. Exceptions include pathways into and out of Downtown, Oakland, and other major employment centers. Exceptions should also be made when multiple routes should logically operate through the same corridor because they serve unique destinations.

### **Service Should Be Consistent**

Routes should have optimal headways (times between trips) within key time periods (morning and evening rush hour, midday, early morning and evening) so as to maximize use of the Authority's resources while providing easy to understand services to its passengers. For example, if a bus route takes thirty minutes to complete an inbound and outbound trip, and then requires a five minute layover at the end of its trip, then a thirty-five minute or sixty-five minute headway would be optimal.

### **Services Should Be Well Coordinated**

In many areas, multiple routes operate through the same corridors but to different destinations (for example, between downtown Pittsburgh and Oakland). To avoid bunching of buses and to balance loads, major routes of the same route type (for example local or express) that serve the same corridor should be scheduled to operate at the same service frequencies and should alternate trips at even intervals.

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Also, most routes intersect with other routes at transfer centers, stations, and street intersections. At major transfer locations, schedules should be coordinated to the greatest extent possible to minimize connection times for the predominant transfer flows. This includes having the same time point locations (in written schedules) on routes that overlap or intersect to make it easier for riders to understand frequencies and transfers to routes within their area.

### Services Should be Designed with Adequate Running Time

#### *Fixed Route Transit*

Routes are broken into segments, and schedules are designed to give each route segment a specified running time within which the segment should be able to be traversed. Scheduled running times should be set so as to maximize the percentage of time a given route segment can be run in the allotted time while minimizing the need for additional resources. As on time performance is considered by the Authority to be arriving at the end of a route segment between one minute early and six minutes late, running time should be set to maximize the number of vehicles which will arrive 'on time' to a time point (the stop at the end of a route segment where on time performance is measured).

For fiscal year 2018, Port Authority aims for a system level on-time performance of 75%. This may be increased over time as the Authority continues to adopt technologies and softwares that better allow for adjustments based on field observations. This is further broken down by route type:

- Rapid:
  - BRT: 85%
  - LRT: 90%
- Local and Key Corridor: 75%
- Express: 73%

#### *Demand Response Paratransit*

ACCESS sets its goal for on time performance at 100%. Minimum standards are:

- 94% on-time pick ups
  - Pick ups are defined as on time between ten minutes prior to and twenty minutes past the scheduled pickup time
- 95% on-time arrivals for appointments
  - Appointment drop offs are defined as on time between 30 minutes early and zero minutes late
- ACCESS maintains a 100% guaranteed ride home policy for its customers.

Additionally, paratransit must meet requirements for appropriate travel time between points:

- For ADA eligible trips, travel time must not exceed the time it would take to make the same trip on the fixed route system, including walking to and from the stop, transferring and waiting
- For non-ADA eligible trips, the maximum travel time will be 30 minutes or up to twice the direct drive time at that time of day
- Maximum travel time must not exceed two hours
- A minimum of 95% of trips must have ride times within these standards

Finally, trips must be provided within a reasonable amount of time from when requests are made:

- 100% of ADA eligible trips must be provided within a useful hour of the request, with no trips denials
  - Average telephone hold time cannot exceed 60 seconds
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**Rapid and Express Routes Should Be Expeditious**

Routes designed to move people quickly through the service area, either by operating along a fixed guideway or by providing limited stop service, should be at least 25% faster (with a minimum of 5 minutes faster per trip) than their local bus route counterparts.

**Stop and Station Placement**

*Fixed Route Transit*

Transit stops are the access and egress points for transit services and should be conveniently located. However, too many transit stops make travel slow, which not only has an effect on ridership, but also affects the operating costs of transit and the ability to maximize services within the system. Most riders want service that balances convenience and speed and the number and location of stops is a key component of achieving that balance. Services that emphasize speed (for example, Rapid and Express routes) should have fewer stops, while local services that emphasize access should have more frequent stops. Geographical barriers, such as steep grades, sidewalk widths, intersections, rail lines, and highways shall be taken into consideration when determining stop placement.

The following table exhibits the Authority’s determination of appropriate guidelines for the average spacing between transit stops. Spacing guidelines are differentiated for the different types of service the Authority provides and at different levels of population density. Areas of higher population density (defined as greater than 5,000 persons and jobs per square mile) should generally have more frequent stops, whereas areas with lower population density (defined as less than 5,000 persons and jobs per square mile) should have fewer stops. Exceptions to these guidelines should only be made in cases where accessibility is particularly problematic or dangerous, or where there are significant topographical challenges.

Table 1: Stop Spacing (in feet)

	High Population Density		Low Population Density
	Minimum Spacing	Spacing Guideline	Spacing Guideline
<b>Rapid Routes</b>	1,000	2,600   ½ mile	2,600   ½ mile
<b>Express Routes</b>	650	1,300   ¼ mile	1,300   ¼ mile
<b>Key Corridor and Local Routes</b>	650	900   1/6 mile	1,300   ¼ mile

*Note: For purposes of these guidelines, high density is considered greater than or equal to 5,000 persons (jobs + residents) per square mile, and low density is considered less than 5,000 persons per square mile.*

*Demand Response Paratransit*

All ACCESS customers receive door to door assistance from drivers, including assistance up or down as many as four steps and into the lobby of public buildings, as long as the vehicle can access the curb in proximity to the location. This policy meets the origin to destination requirements of the Americans with Disabilities Act.

For individuals whose disability requires that they not be left alone, ACCESS offers hand to hand service. Drivers ensure that customers designated with this service level are handed off to responsible staff or family members at both the origin and destination, and ACCESS maintains an individual “safety-net” plan for each eligible customer in the event there is no one available to receive the individual. Service Design Should Maximize In-Service Time

*In-Service Time*

Service design can significantly impact schedule efficiency. Service should be designed to maximize in-service time and minimize out-of-service time. As such, the following guidelines will be used to ensure that schedules are efficiently designed based on route length, trip characteristics, and layover locations.

Table 2: Revenue Vehicle Hours as Percentage of Total Vehicle Hours

<b>Service Type</b>	<b>Percentage In-Service Time</b>
<b>Rapid Routes</b>	
LRT	80%
BRT	80%
<b>Express Routes</b>	50%
<b>Key Corridor &amp; Local Routes</b>	70%

*Note: Express routes use peak direction in service time only.*

**Service Levels should be Set Based on Service Guidelines.**

Service guidelines help ensure that the appropriate amount of service is provide on each route. For example, service guidelines should be set to determine minimum levels of service in terms of the number of trips, service frequencies, and/or passenger loadings. Service level guidelines are presented in the next section.

## Service Level Guidelines

Service level guidelines define when service should be provided and how often it should be provided. Four guidelines are used:

1. Minimum Span of Service
2. Minimum Service Frequencies
3. Maximum Loading
4. Minimum Productivity

These guidelines are used together to determine appropriate service levels for each route. At a minimum, service should be provided based on the minimum span of service and minimum service frequency guidelines. Beyond that, additional service should be added to meet passenger loading guidelines and in the morning and at night when minimum productivity guidelines can be met.

On an ongoing basis, service should be added when ridership increases to levels that exceed maximum loading guidelines. Conversely, service should also be reduced when loads fall below the passenger loading guidelines for a period of time. The process for ensuring this occurs will be outlined in the following section.

### Minimum Span of Service

#### Fixed Route Service

The minimum span of service guidelines define the minimum period of time that different types of service should operate, in terms of the latest that service should begin and the earliest that it should end. The “end” time for services in the following table indicates the time of the beginning of the final trip (as opposed to the end of the last trip). Based on demand, service may start earlier and end later; it is subject to the minimum performance guidelines presented in the next section. Higher ridership services will have long spans of service, while lower ridership services will have shorter spans of service. Minimum span of service guidelines are presented in Table 3.

Table 3: Minimum Span of Service Guidelines

	Rapid and Key Corridor Routes	Express Routes		Local Routes
		AM Peak	PM Peak	
<b>Weekdays</b>				
Begin	6:00am	6:30am	4:15pm	6:00am
End	11:30pm	7:30am	5:15pm	6:00pm
<b>Saturdays</b>				
Begin	6:30am	None	None	9:00am*
End	11:00pm			8:00pm*
<b>Sundays</b>				
Begin	7:00am	None	None	10:00am*
End	11:00pm			6:00pm*

*Note: The beginning span of service refers to the beginning of the first inbound trip, and the ending span of service refers to the end of the last outbound trip.*

*\*If the route has service on this day.*

Based on demand, service can start earlier and end later than these guidelines stipulate. However, service that starts earlier or ends later is subject to minimum performance levels.

**Demand Response Paratransit**

ACCESS provides service from 6:00a.m. - 12:00a.m.

ADA eligible paratransit service is additionally available prior to 6:00a.m. and after 12:00a.m. if both the trip origin and destination are within the ADA service area and the fixed transit route offers service before 6:00a.m. or after 12:00a.m.

**Minimum Service Frequencies**

The minimum service frequency guidelines define the minimum service frequencies at which each type of service should operate. Based on demand, many services would operate more frequently, and in these cases, the service frequencies would be based on ridership and loading levels (as described in the next section). Minimum service frequency guidelines are presented in Table 4. Note also that many corridors would be served by multiple routes, and in these cases, effective service frequencies would be more frequent than for individual routes. There are many cases where service frequencies may differ slightly from these guidelines due to total trip times and maintaining optimal spacing between trips. For example, it may be optimal for vehicle and operator resources to have 32 minutes between trips than 30 minutes due to the route’s characteristics. Situations like this where service frequencies are not exactly met for optimal scheduling purposes will be noted in the Annual Service Report.

Table 4: Minimum Service Frequency Guidelines (Minutes)

	<b>Rapid Routes</b>	<b>Express Routes</b>	<b>Key Corridor Routes</b>	<b>Local Routes</b>
<b>Weekdays</b>				
Early Morning	30	--	30	75
AM Peak	10	3 trips	20	60
Midday	20	--	30	75
PM Peak	10	3 trips	20	60
Evening/Night	30	--	30	75
Saturdays	30	--	45	90*
Sundays	30	--	45	90*

*\*If the route has service at this time of day/day of week.*

**Maximum Loading (Overcrowding)**

The Port Authority will strive to provide sufficient levels of service to accommodate all passengers on a given route. During peak periods, some passengers are expected to stand, but the number of standing passengers should be kept to reasonable levels whenever possible. Also, services will be designed so that when passengers do have to stand, they will not have to stand for long periods of time. On routes that operate for long distances on highways, and on all off-peak services, service will be scheduled to accommodate most passengers with a seat.

Two different techniques are used to keep passenger loads within acceptable levels. The first is to match vehicle types with ridership levels, and to use sixty foot articulated vehicles on higher ridership routes. The second method is to provide more frequent service, with service frequencies set to keep passenger loads within the limits presented in Table 5. These guidelines are presented in terms of maximum passenger loads as a percentage of seated capacity of the vehicle used to provide service (see Table 6). Where average maximum passenger loads on a given trip exceed these levels over a period of time, the Port Authority will deploy larger vehicles and/or increase service frequencies whenever possible within available budget.

Data will be analyzed to determine specific trips where average maximum loads exceed capacity. If multiple trips are often overcrowded for significant distances on a given route, resources shall be used if available to place additional trips on a route during periods of overcrowding.

Table 5: Maximum Passenger Loading (as a Percentage of Seating Capacity)

	Rapid Routes		Express Routes	Key Corridor and Local Routes
	LRT	BRT		
<b>Weekdays</b>				
Peak Hour	250%	140%	120%	120%
Off-Peak	140%	120%	100%	100%
<b>Saturdays</b>			-	
All Day	140%	120%		100%
<b>Sundays</b>				
All Day	140%	120%		100%

Table 6: Maximum Passenger Loads by Vehicle Type

Maximum Loads by Vehicle Type	Seats (Typical)	100% Capacity	120% Capacity	140% Capacity	250% Capacity
Light Rail Car	62	-	-	87	155
60' Articulated Transit Bus	60	60	72	84	-
40' Transit Bus	40	40	48	56	-
35' Transit Bus	35	35	42	49	-

**Minimum Productivity**

*Fixed Route Transit*

In order for the Port Authority to use its resources effectively, all routes should achieve a minimum level of productivity. These guidelines use “Passengers per Revenue Vehicle Hour” which is a measure of the average number of passengers each bus deployed on a given route carries for each hour that it is in-service, to measure productivity.

With limited exceptions, all routes should attract a minimum number of passengers for each hour that buses are in-service (revenue vehicle hours). These minimum productivity levels are presented in Table 7.

Table 7: Minimum Productivity Levels (Passengers per Revenue Vehicle Hour)

	Rapid Routes		Express Routes	Key Corridor Routes	Local Routes
	LRT	BRT			
<b>Weekdays</b>	80	50	25	30	20
<b>Saturdays</b>	50	40	-	20	15
<b>Sundays</b>	45	30	-	20	15

Notes:

- Productivity levels apply only to days of week which routes operate.
- LRT routes are at this point to be considered as one route with one overall performance of passengers per revenue vehicle hour calculated (due to limits on passenger counting by station, separating routes is infeasible as of the writing of this document). All other modes can easily be separated by route.

*Demand Response Paratransit*

ACCESS productivity is defined as the number of revenue passenger trips provided in a billable hour. ACCESS service providers are paid by the hour. To ensure the efficient use of resources, minimum productivity requirements are established. Port Authority sets productivity standards annually for the system, and the broker, in turn, sets minimum productivity standards for each of its service providers based on performance standards and trip characteristics including average trip length, percentage of trips taken by people who use wheelchairs, percentage of no shows and cancellations, and percentage of pre-grouped service.

## Monitoring and Evaluating Service

### Annual Service Report

All monitoring and evaluation of service will be summarized in an Annual Service Report, to be developed by the Planning and Evaluation Department at the beginning of each calendar year to summarize the prior year’s service. The report shall include the following sections outlined below.

### Overall Service Performance and System Equity

Service design and service level metrics will be quantified to give an understanding of how well the Authority is doing with adhering to its goals of efficiency, effectiveness, and equity. Key Performance Indicators will be compared against peer transit agencies where possible to determine priority areas for improvements in the upcoming service year. An overview of system service performance will include the following metrics:

Category	Attribute
General	Ridership
	Service Hours
Efficiency	Passengers per revenue vehicle hour
	Cost per passenger served
	Percent of time spent in revenue service
Effective	Walkable service area
	On-time performance
	Overcrowding
	Stop spacing
Equity	Persons with disabilities
	Senior citizens / persons over age 65
	Low income persons
	Persons of color / persons of a minority race or ethnicity
	Persons without access to a vehicle

Routes will be categorized as ‘high’ or ‘low’ equity routes, and average service design and level metrics above will be aggregated for these two groups to ensure significant disparities do not exist. Equity is determined by creating an index of the five above indicators by Census block. Beginning in 2018, low wage jobs may also be added to this index as Census-block level data is made available. All indices from each Census block a route passes through are then averaged to determine an overall equity score for each route. The top 50% of routes are categorized as high equity, and the bottom 50% of routes are categorized as low equity.

### Route Service Performance

Routes not meeting any of the guidelines will be identified in the Annual Service Report, with explanation regarding future changes to improve adherence or justification for not meeting service levels given if such changes would be in some manner prohibitive.

In cases where routes do not meet minimum productivity guidelines, changes should be made to improve route productivity. These changes could include any of a variety of measures;

- Reconfiguring the route alignment to attract more passengers
- Eliminating particularly unproductive segments
- Reducing or increasing service frequency
- Reducing or increasing span of service
- Changing the route from an all-day route to one which only runs during peak hours
- Targeted marketing to attract new riders
- Conducting a ridership survey to better understand the needs of the community around the route

- Working with community groups to better understand how the route can meet the community's needs

If no changes can be identified that can improve productivity without undue burden to the Authority, then the route could be a candidate for elimination. If the situation leading to reduced productivity is assumed to be changing in the near future, written documentation detailing why the route should not yet be adjusted will be provided in the Annual Service Report. After 24 months of not meeting productivity guidelines of a route, action is required to alter service on that particular route to ensure that the Authority uses its resources efficiently. Under no circumstances is a route to continue unaltered after 24 months of failing to meet minimum productivity guidelines.

#### *Implementation Updates*

All major service changes that have been implemented will receive an implementation update in the two subsequent Annual Service Reports after the changes are made. Implementation updates will summarize how the change has affected route performance (efficiency), as well as how many riders have been gained/lost (effectiveness) and how these changes are effecting subpopulations (equity) if data is available.

#### *Major Service Changes for Upcoming Service Year*

Based on evaluation of services from the previous sections, a list of priorities for service changes for the following year will be developed. These priorities will be outlined in the Annual Service Report as suggestions for the following year; analysis of these priorities will not appear in the Annual Service Report, but rather will follow the guidelines as set forth in the Service Change Process section.

#### *Budget for the following Fiscal Year*

The Annual Service Report shall also include a projection of changes to the operating budget for the year following the upcoming service year, so that the Authority and the public have an indication of future adjustments to service (for example, whether additional funding is available for increasing service, budget is remaining stable for no major changes to service, or whether budget is expected to decrease and reductions in service may be necessary).

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## Service Change Process for Fixed Route Service

### Overview

The Authority has a structured process for evaluating proposed changes to its existing system, both from within the Authority and from the Public.

Small changes are made throughout the year as issues arise such as traffic detours, but larger, service-enhancing or efficiency-seeking changes are done annually. As of this current document, major service changes are made in the fall (late August / early September) schedule changes. This process is comprised of the following key stages:

1. Development of the annual service budget
2. Collection of proposed service changes (both internal and external)
3. Evaluation of proposals for effectiveness, equity, and efficiency measures
4. Ranking of proposals given budgetary constraints
5. Presentation of major service changes to Senior Staff and the Board

Additions to service through major service changes are to be considered only when existing services are adequately meeting the aforementioned service guidelines. For example, a new route should not be added to a garage's work during peak hours if an existing route from that garage is experiencing significant overcrowding during those same hours; resources would first need to be used to address overcrowding to bring vehicle loadings into an acceptable range.

### Annual Service Budget

The annual service budget shall be determined by the Finance Department annually and released as a proposed budget in the spring of each year so that major service changes can be appropriately ranked and prioritized given resource constraints in the coming year.

### Categorization of Service Changes

Service changes shall be categorized so as to better understand which types of changes need to be evaluated internally. Changes are either considered to be minor or major, and are defined as:

#### *Minor Service Changes*

##### Running Time Adjustments

- Route segments which are consistently early or late
- Route segments which are consistently taking more or less running time than is scheduled

##### Out of Service Time

- Appropriate layover length given reliability of travel time on a given route
- Appropriate running time to and from the bus garage from the start or end of a route
- Appropriate cross country travel times between two route end points

##### Bus Stop Placement

- Using appropriate spacing guidelines as outlined in this framework

##### Detours

- Minor changes to bus routes due to street closures (less than 6 months)

##### Holiday or Special Event Service Adjustments

- Added service frequencies on holidays or special events days (such as sporting events)
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**Trips**

- Adding or removing trips to maximize efficiency and minimize overcrowding

**Major Service Changes**

- Addition or removal of a route
- Addition or removal of a service day for a route
- Service changes that constitute an addition or reduction of more than 30% of the weekly trips, service hours, or service miles on a given route
  - Or adding or removing more than 2,500 annual hours of service on a given route

**Process Timeline**

This timeline is based on the current quarterly service change schedule occurring in March, June, September, and November. The “Service Year” begins in September of each year and ends in August of the following year.

Month	S	O	N	D	J	F	M	A	M	J	J	A	S
<b>Minor Service Changes</b>													
Implementation													
<b>Annual Service Report</b>													
Analysis and Development													
Internal Release													
Public Release													
<b>Major Service Changes</b>													
Proposal Collection													
Proposal Screening and Aggregation													
Evaluation of Proposals													
Internal Review of Proposals													
Senior Staff Review													
Public Release													
Implementation													

**Collection of Proposed Service Changes**

**Internal Proposals for Major Service Changes**

**Amalgamated Transit Union Requests**

The Amalgamated Transit Union (ATU) shall gather and prioritize major service change requests throughout the year and provide these requests to the Director of Service Development and Evaluation by the November schedule changes (usually the Sunday before Thanksgiving) of each year. Requests MUST be prioritized so as to aid Service Development in the Evaluation of said requests. All minor service change requests shall continue to be made through quarterly Schedule Committee meetings.

**Other Internal Requests**

Through the process of developing the Annual Service Report, the Department of Service Development and Evaluation will likely need to develop its own requests for major service changes in order to ensure adherence to Service Guidelines. Many changes that should occur will be minor in nature and therefore can occur during any schedule change; however any major service changes needed, such as addition or elimination of a route, will need to be developed as a proposal for service change similar to any other proposal. These proposals must be developed by January of each year after year-end route data is made available.

### *External Proposals for Moderate and Major Service Changes*

#### Customer Service

The Customer Service department receives requests regarding various types of service changes on an ongoing basis. Upon receipt, such requests are recorded in a database shared among several departments. Requests are categorized as they are entered into the database, which ensures that they are channeled to the appropriate staff member. Planning and Evaluation and Service Development and Evaluation staff will be responsible for collecting requests submitted by Customer Service via the database and for determining whether they are minor or major.

#### Website

Port Authority's website will maintain an open survey for members of the public who wish to put forth a request for a major service change at any time throughout the year.

#### Public Relations

For the purpose of this document, "Public Relations" refers to the rider, stakeholder, and government relations functions of the agency located within the Communications Division of the Authority. Staff within communications responsible for these functions have occasion, through the normal course of their job responsibilities to receive requests for service changes. These requests will be accompanied by as much information as possible, which will often be gathered in meetings with the parties submitting the requests.

### **Evaluation of Proposals for Major Service Changes**

After proposals are collected semiannually, they will then be evaluated on several factors to determine feasibility of implementation by the Authority. **The Authority shall reserve the right to immediately dismiss any proposal it deems completely infeasible at any point in the near future in order to use staff time and resources efficiently to evaluate realistic and potentially feasible service proposals.**

Proposals will be evaluated in the three main categories with which the Authority uses as its goals for service; the efficiency of a proposal based on resources needed to carry it out, its effectiveness at increasing access to transit or transit use within the service area, and whether it changes the equity with which services are provided to those who have higher need.

In order for a proposal to be considered for the evaluation process, it must meet a base efficiency level based on ridership projections of  $\frac{1}{2}$  the service guideline for that service type and day.

For example, a request to add weekend service to a local route that does not currently have weekend service would need to show a ridership projection of at least 7.5 riders per hour of proposed added service ( $\frac{1}{2}$  of the service guideline of 15 passengers/hour for a local route on a weekend day).

Other constraints on service may also be in place in any given year which might render certain proposals infeasible.

One example of this is the availability of vehicles during peak hours – certain bus garages may not have additional capacity to add peak service, and therefore requests that would need to operate out of these garages during peak times may not be evaluated due to this constraint.

Once proposals have been filtered to those with an acceptable base level of efficiency per the above guideline and any other constraints which may exist in a given year, they will be evaluated and ranked based on the following criteria:

**Efficiency** of a service proposal will be evaluated using assumed costs/savings of the proposal against projected ridership growth/reduction and assumed fare revenue changes. The overall measure of efficiency will be the projected net cost / savings per passenger gained / lost.

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*Effectiveness* of a service proposal will be evaluated qualitatively using a range of factors, including changes to straightforwardness, symmetry, coordination, walkable service area, span of service, frequency of service, travel time, or on time performance of a route.

*Equity* of a service proposal will be evaluated based on the demographics of the population which the service serves (as defined by the walkshed surrounding stops / stations). Services are categorized as more equitable if they provide access to a population which has a higher percentage of a targeted subpopulation than the proportion of the total population that that subpopulation comprises within the overall service area. Targeted subpopulations include low income and minority populations protected under Title VI of the Civil Rights Act of 1964, senior citizens, persons without access to a vehicle, and riders with disabilities.

Table 8: Metrics for Evaluating Major Service Improvements and Reductions

MEASURE	METRICS	EVALUATION SCORE
<b><u>Efficiency</u></b>	- Expected passengers per service hour	<i>Improvements: Projected net cost per new passenger</i>
		<i>Reductions: Project net savings per passenger lost</i>
<b><u>Effectiveness</u></b>	- Walkable service area	<i>Vastly more effective</i>
	- Jobs in service area	<i>Moderately more effective</i>
	- Residents in service area	<i>No change in effectiveness</i>
	- Change in weekly trips	<i>Moderately less effective</i>
	- Travel time	<i>Vastly less effective</i>
- In service percentage		
<b><u>Equity</u></b>	- Low income households	<i>Vastly more equitable</i>
	- Persons of a minority race / persons of color	<i>Moderately more equitable</i>
	- Senior citizens	<i>No change in equity</i>
	- Persons with disabilities	<i>Moderately less equitable</i>
	- Persons without access to a vehicle	<i>Vastly less equitable</i>

Service *improvements* at no cost and at no detriment to operations should be implemented, even if scored as “No change” for effectiveness and equity, due simply to being able to more service at no cost to the Authority.

**Ranking of Proposals given Budgetary Constraints**

Proposals will be given an overall score for each of the three above categories. Those three scores will then be averaged into an overall score for the proposal, and proposals will be ranked in order of highest to lowest overall score. Each of the three category scores (efficiency, effectiveness, equity) will be given equal weight in the overall score.

**Release of Prioritized List of Major Service Changes for Upcoming Service Year**

After all viable proposals have been evaluated, ranked, and approved by Senior Staff; a list of major service changes will be released along with the Annual Service Report in May or June of each year for changes in the following fiscal year.

**Ongoing Evaluation of Implemented Service Changes**

After a major service change is implemented as part of the Service Request Evaluation process, changes should be monitored annually to ensure the changes are successful.

If changes were to an entire route, that route is expected to be operating within the efficiency guidelines set forth in this document within 24 months or the release of the third Annual Service Report after the change is made. If at this time the route is not meeting efficiency levels for that route type and day of week, changes should be made in accordance with these guidelines to better utilize resources effectively.

If changes were made to part of a route (for example, a route is extended to a new area), that route segment should be operating at half of the efficiency guidelines set forth in this document within 24 months or the release of the third Annual Service Report after the change is made. Once 24 months has passed (or the third Annual Service Report is released), the route shall be evaluated in accordance with the route guidelines set forth in this document.

An exception to this would be if the extension creates a situation whereby the route as a whole is no longer meeting efficiency guidelines, in which case it should follow strategies set forth in this document to better utilize resources effectively.

**Evaluation of Proposals to Alter Paratransit Service**

As part of its ADA Paratransit Plan, Port Authority worked closely with the community to identify areas in which its ADA eligible complementary paratransit ACCESS service exceeded the minimum requirements of the ADA. Should the cost of ACCESS service which exceeds the ADA minimums become greater than the available financial resources, the plan calls for implementation of the Contingency Plan developed by the community. The Contingency Plan calls for service reductions and fare increases to be implemented in the following order, subject to final review and approval by Port Authority:

- Increase ACCESS fares
  - Proportional increases in mid-range fares
  - Increase the minimum ACCESS for to two times the base fixed route fare
  - Premium fares outside the service area
- Eliminate the convenience fare and mandate use of fixed route when available and conditions permit
- Variations of reduced service area should be implemented in the following order:
  - Weekdays after 8 PM
  - Saturdays all day
  - Sundays and holidays all day

As each action is taken, the cost savings will be evaluated prior to implementing the next scheduled service reduction. Likewise, requests for service enhancements will be evaluated for feasibility of implementation.

With the change in funding and the implementation of the ADA minimum service area in 2012, there are new considerations for service reductions. In addition to using the three main categories for evaluation, Port Authority will use the ADA Contingency plan as its starting point in evaluating ACCESS service reductions or enhancements.

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## Appendix A: Route Designations, Fiscal Year 2016

Route Type	Routes
Rapid	G2, P1, P2, RED, BLLB, BLSV
Express	19L, 28X, 51L, 52L, 65, G3, G31, O1, O5, O12, P3, P10, P12, P13, P16, P17, P67, P69, P7, P71, P76, P78, Y1, Y45
Key Corridor	8, 16, 51, 82, 91, 61A, 61B, 61C, 61D, 71A, 71B, 71C, 71D
Local	1, 2, 4, 6, 7, 11, 12, 13, 14, 15, 17, 18, 20, 21, 22, 24, 26, 27, 29, 31, 36, 38, 39, 40, 41, 43, 44, 48, 53/53L*, 54**, 55, 56, 57, 58, 59, 60, 64, 67, 68/P68*, 69, 71, P71, 74, 75, 77, , 79, 81, 83, 86, 87, 88, 89, 93, Y46, Y47, Y49

\*As of the writing of this document, these routes are to be considered together as one local route.

\*\* Route 54 serves over 1,000,000 annual trips, but is considered a local route because it does not serve a corridor but acts as a compilation of very small corridors as a crosstown service.

## Appendix B: Data Sources and Explanations

### Automatic Passenger Counters

In order to analyze adherence to service levels and service design, the Authority has several sets of data that it uses. The most intricate of these data sources are automatic passenger counters (APCs) that the Authority has installed on the doors of all of its buses. These APCs count the number of passengers boarding (getting on) and alighting (getting off) each bus at every stop along the route, and then use that data to calculate the load (number of people) on the bus at any given time. These counts are time stamped, so data can be viewed by day of week, trip time, and direction of the vehicle. The Authority has measured the effectiveness of these passenger counters to be around 98.5% accurate when compared with actual observations.

Rail vehicles do not yet have the ability to count passenger loads and stop/station boardings and alightings, and as such, farebox payment data is used as a substitute for overall route ridership. Farebox data is not as accurate as APCs, and is only able to be viewed by trip (not by stop), so it is somewhat limited.

### Modeling and Projecting Ridership Changes

#### Service Improvements

When possible, previous similar situations will be used as base cases to look at percentage of population using transit as compared to percentage of population working in the destination area from Longitudinal Employer-Household Dynamics Origin-Destination Employment Statistics (LODES) data from the U.S. Census Bureau. This data provides representative samples of origins and destinations of the residents and workforce within a given geographic area. While this does not account for non-work trips, it gives a good baseline to extract data out from to project ridership changes in the near future.

#### Service Reductions

Service reduction effects will be determined by aggregating the stop boardings at stops which are to be eliminated and fall outside of the walkshed of ¼ mile along a street network from another stop. If several stops being considered for elimination are within ¼ mile of another route/group of stops (or ½ mile of a rapid route station/stop), then reasonable assumptions about which of these passengers will now have to walk farther than the walkshed are to be made, and these passengers should be considered to be outside of the remaining walkshed and will be assumed to no longer use the transit service.