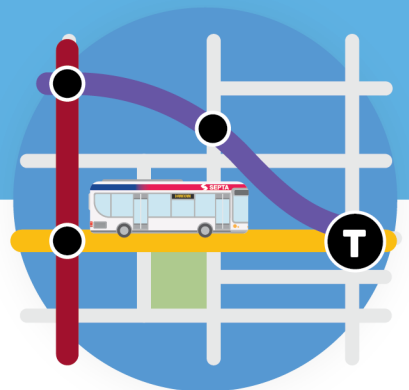


# SEPTA

# State of the Bus System

January 2022





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# 1 Introduction

## SEPTA FORWARD: BUS REVOLUTION

*The Bus Revolution project aims to make riding the bus an easier, faster, more reliable, and more competitive option for more people.*

### Why is SEPTA important?

Before the pandemic, over a half a million riders used SEPTA's bus services every weekday—to get to and from work, to shop, for medical appointments, to see friends, and to do all the other things that are important to our lives. Many riders use SEPTA because it is the travel option that works for them. For others, SEPTA provides a lifeline that connects them to daily needs that otherwise would be difficult to reach.

### How has transit been changing in Southeast Pennsylvania?

While SEPTA's bus ridership is high, even before the pandemic it was declining (Figure 1-1). This was occurring for many reasons. For example:

- Uber and Lyft provided people with a new travel choice that, while more expensive than SEPTA, was faster and more convenient.
- Increasing congestion has been making buses slower and less reliable over time.
- Bike ridership has been increasing rapidly over the past decades, as expanded bike lanes make biking a safer and more attractive option.<sup>1</sup>
- The Philadelphia region is changing. Some areas are growing quickly as new neighborhoods and activity centers emerge as new destinations that need service.

SEPTA has made some changes to its bus network, but it has not kept pace with changes in the region or technological advances, making other travel options more attractive.

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<sup>1</sup> Bike Commuting Data, League of American Bicyclists

In 2014, SEPTA buses carried over 177 million passenger trips. By 2019, annual ridership had **dropped by 13%** to 154 million passenger trips. This means that over SEPTA provided **23 million fewer passenger trips** in 2019 relative to 2014.<sup>2</sup>

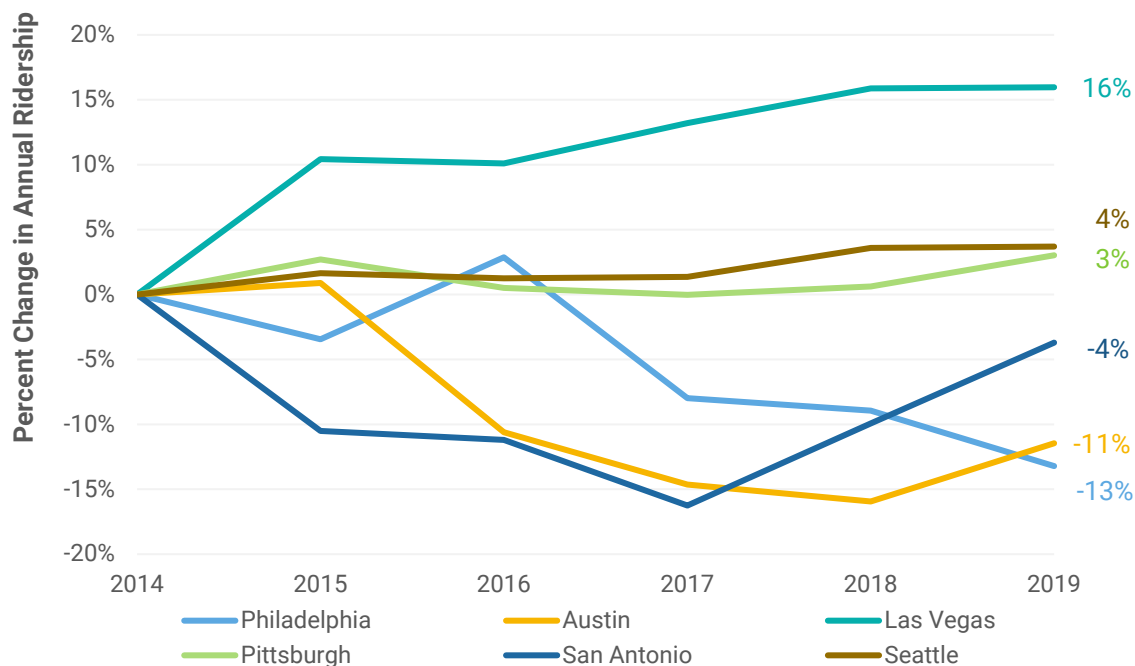
***A key goal of the Bus Revolution is to bring bus riders back to SEPTA.***

## Making transit work better

SEPTA's ridership was declining before the pandemic; a trend that was consistent with the experience of transit agencies across much of the United States. Some transit systems, however, have reversed or avoided ridership declines by making transit more competitive and attractive. Prior to the pandemic, transit agencies ranging from Seattle, Pittsburgh, Austin, San Antonio, and Las Vegas adjusted services and delivery models to increase ridership (Figure 1-1).

Over time, these transit systems grew ridership by investing in a variety of strategies, including redesigning their networks, creating networks of frequent bus routes, expanding bus service to new areas, and upgrading high ridership routes to premium services such as Bus Rapid Transit and Rapid Bus.

**Figure 1-1 Percent Change in Annual Bus Passenger Trips, 2014 to 2019**



Source: National Transit Database

<sup>2</sup> National Transit Database

SEPTA Forward, the agency's strategic plan, is designed to move the Southeast Pennsylvania region forward with safer, more reliable, and more accessible transportation designed to serve everyone. The Bus Revolution and its goal of improving SEPTA's bus network is a critical to this effort. Other SEPTA Forward initiatives include SEPTA's Trolley Modernization project and the Regional Rail Master Plan.

## COVID and Data

The State of the System report was written in the fall of 2021. At this time, the worst impacts of the COVID pandemic had passed, but the pandemic continued to affect people's travel patterns and use of public transit.



***As a result, data used to inform the State of the System was primarily drawn from SEPTA's ridership in the fall of 2019.***

We chose this time period as our baseline because it reflects a time of stable travel patterns (during school and no holidays) without impacts associated with COVID.

SEPTA's bus network has changed in the time period between 2019 and 2021, but most changes reflect minor adjustments to bus routes and schedules.

# STATE OF THE BUS SYSTEM REPORT

The State of the Bus System report describes SEPTA's bus network at a system level. It is designed to show how the network works today, highlight its strengths and weaknesses, and identify opportunities to strengthen the system and improve the quality of service in Southeast Pennsylvania. The State of the Bus System report has six main sections:

- Chapter 2: Transit Service Today
- Chapter 3: Existing Service Levels
- Chapter 4: Bus Ridership and Transit Equity
- Chapter 5: Transit Speed and Reliability
- Chapter 6: Issues and Opportunities
- Chapter 7: Next Steps

The State of the Bus System is one of three first steps in understanding existing conditions and needs:

- The **State of the Bus System** (this document) describes the SEPTA bus network.
- The **Market Analysis** examines the underlying demand for transit service, together with local and regional travel patterns.
- **Route Profiles** provide detailed route-by-route performance information.

Figure 1-2 The State of the Bus System and Other Existing Conditions Documents



## 2 Transit Service Today

SEPTA's transit network includes all SEPTA services working together: regional rail, rapid services, trolley lines, fixed-route buses, and ADA paratransit. Within this network, fixed route bus service constitutes the largest share of ridership and investment in the operating budget.

This chapter describes SEPTA's bus service, focusing on the overall network of bus routes and the system's strengths and weaknesses.

### OVERVIEW OF EXISTING SERVICES

SEPTA operates one of the largest transit systems in the United States, which includes:

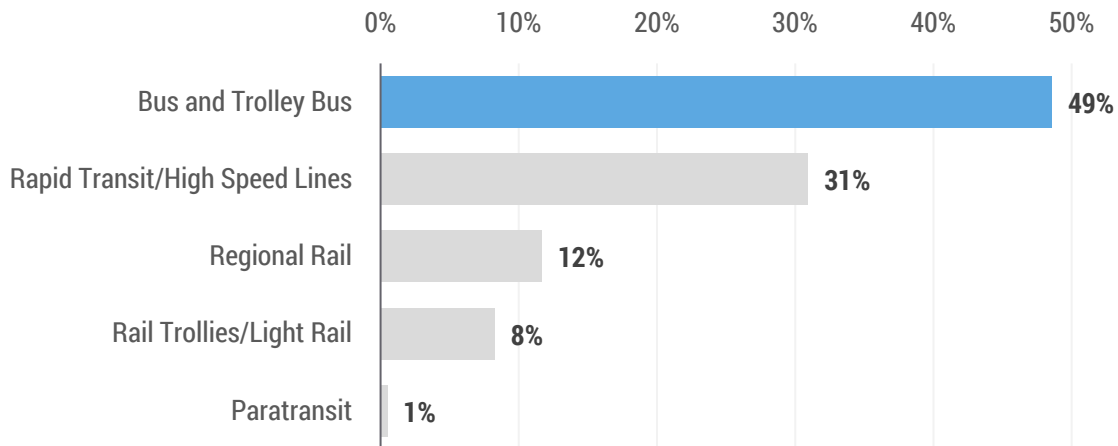
- Two rapid transit lines (Broad Street, Market-Frankford lines)
- A single interurban heavy rail line (Norristown High Speed Line)
- Eight rail trolley lines that provide a combination of surface and subway service
- 125 fixed route bus and three trackless trolley routes
- 13 Regional Rail lines
- Complementary ADA Paratransit service for individuals unable to use fixed route transit services due to a disability

Buses are the lifeblood of the SEPTA system. They are responsible for most of SEPTA's investment in terms of service hours and carry the most riders—nearly 50% of all SEPTA customers ride the bus (Figure 2-1).

The importance of bus services within the overall network was evident before the COVID-19 pandemic. This trend continues with the portion of SEPTA users riding the bus increasing during the pandemic; looking forward, ridership models suggest that bus riders will account for a larger share of SEPTA's riders in the future.

In 2019, nearly half of all SEPTA riders used fixed-route buses.

**Figure 2-1 Annual Ridership by Mode, 2019 (Percent)**



## BUS SERVICES

*SEPTA operates an extensive and well connected bus network.*

In total, SEPTA operates 125 bus plus three trackless trolley routes, which are broadly categorized into seven different types of service:

- City (64 routes)
- Arterial (14 routes)
- Suburban (23 routes)
- Expressway (6 routes)
- Trackless trolleys (3 routes)
- Other (14 routes)
- Subway Overnight (2 routes)

SEPTA's categories generally reflect where services operate, rather than the type of service being provided. Route categories are primarily used internally only, which means that differences in the way individual bus routes are designed—such as the frequency of service, or the length of time a bus route operates—are not communicated to riders. There are a handful of exceptions to this rule, including the Boulevard Direct, which is clearly communicated to external audiences about its design and purpose. The Boulevard Direct route operates on Roosevelt Boulevard and provides fast service with widely spaced stops. Other examples are the Expressway routes that operate on the Schuylkill Expressway (I-76) and the Pennsylvania Turnpike (I-276).



## Network Design

In Center City, North Philadelphia, South Philadelphia and much of West Philadelphia, where the road network is laid out as a grid, buses primarily operate in straight lines along north-south and east-west corridors and riders transfer between routes where roadways, bus routes and SEPTA rapid lines intersect. Outside of the urban core where the road network is more radial, SEPTA's bus routes operate according to more of a hub and spoke network. In these cases, SEPTA's transportation centers serve as hubs with bus routes radiating outward and providing connections. The nine main transportation centers are listed below.

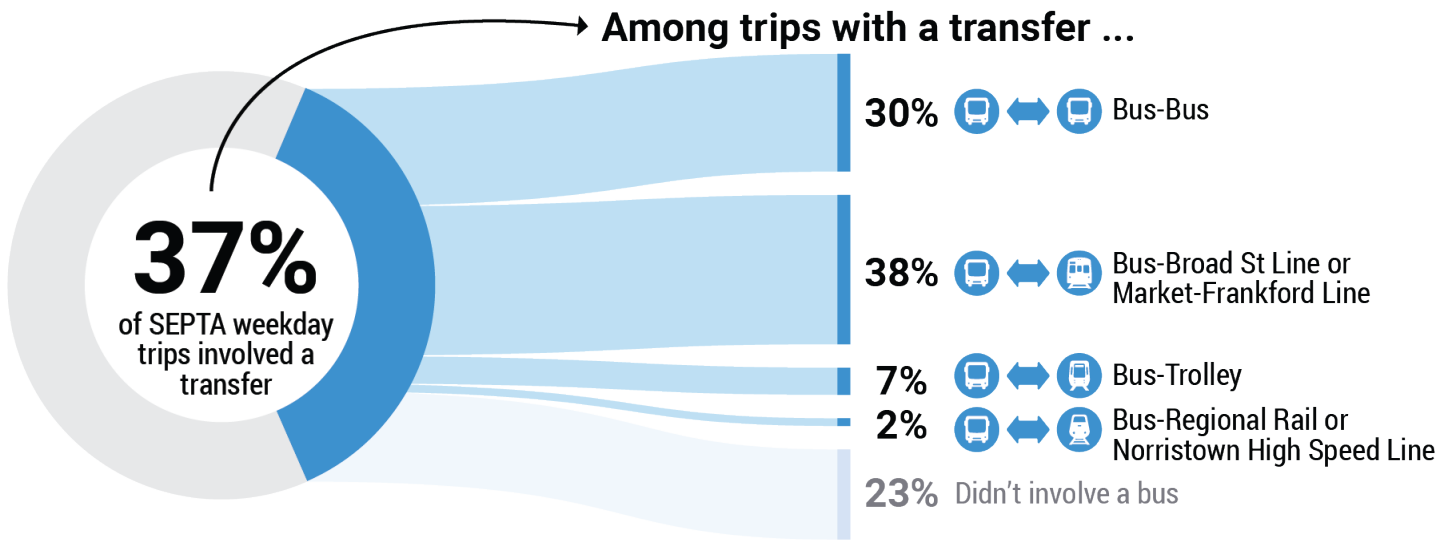
**Figure 2-2 SEPTA Transportation Centers**

Transportation Center	Number of Bus Routes	Multimodal Connections
69 <sup>th</sup> Street Transportation Center	19	<ul style="list-style-type: none"> <li>▪ Market-Frankford Line</li> <li>▪ Trolley Routes 101 and 102</li> <li>▪ Norristown High Speed Line</li> </ul>
Arrott Transportation Center	8	<ul style="list-style-type: none"> <li>▪ Market-Frankford Line</li> </ul>
Chester Transportation Center	7	<ul style="list-style-type: none"> <li>▪ Wilmington/Newark Regional Rail Line</li> </ul>
Darby Transportation Center	3	<ul style="list-style-type: none"> <li>▪ Bus Connections 113, 114, and 115</li> </ul>
Fern Rock Transportation Center	4	<ul style="list-style-type: none"> <li>▪ Broad Street Line</li> <li>▪ Lansdale/Doylestown Regional Rail Line</li> <li>▪ Warminster Regional Rail Line</li> <li>▪ West Trenton Regional Rail Line</li> </ul>
Frankford Transportation Center	19	<ul style="list-style-type: none"> <li>▪ Market-Frankford Line</li> </ul>
Norristown Transportation Center	8	<ul style="list-style-type: none"> <li>▪ Norristown High Speed Line</li> <li>▪ Manayunk/Norristown Regional Rail Line</li> </ul>
Olney Transportation Center	10	<ul style="list-style-type: none"> <li>▪ Broad Street Line</li> </ul>
Wissahickon Transportation Center	11	<ul style="list-style-type: none"> <li>▪ Manayunk/Norristown Regional Rail Line</li> </ul>

Overall, SEPTA's network functions as a true, integrated network with riders making connections between services, even when fares were charged for transfers. In 2019, an estimated 33% of weekday trips involved a transfer. Of those, 30% were connections between bus routes, 38% were connections between bus routes and the Broad Street and Market-Frankford Lines, and 7% were bus connections with rail trolley lines. There were fewer numbers of bus transfers to other services: 1% with Regional Rail, and 1% with the Norristown High Speed Line. The remaining 23% of transfers did not involve a bus<sup>1</sup>.

In July 2020, SEPTA removed charges for transfers, which is increasing transfer rates system wide.

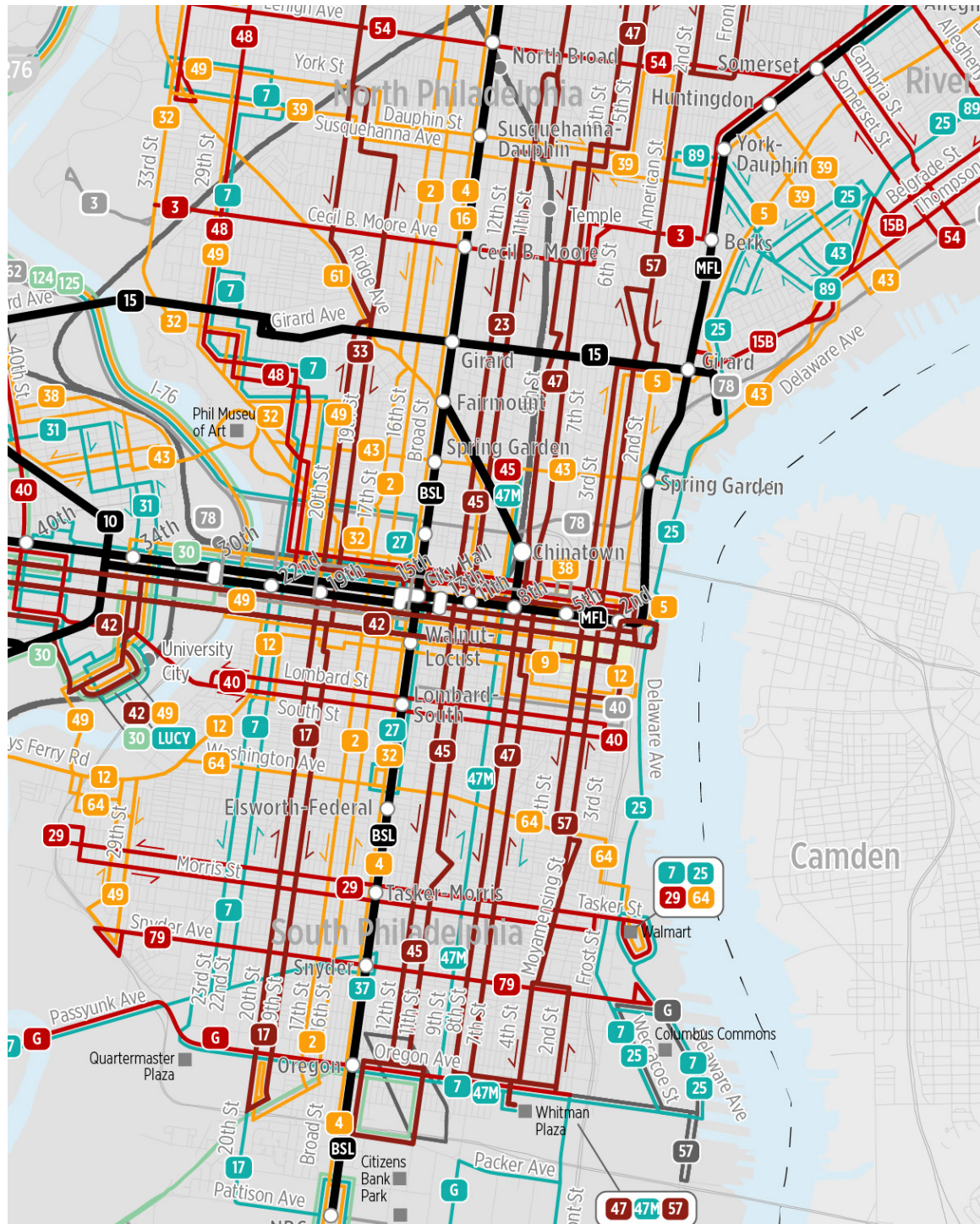
**Figure 2-3 Transit Transfers by Mode**



<sup>1</sup> 2019 SEPTA Key Card data.

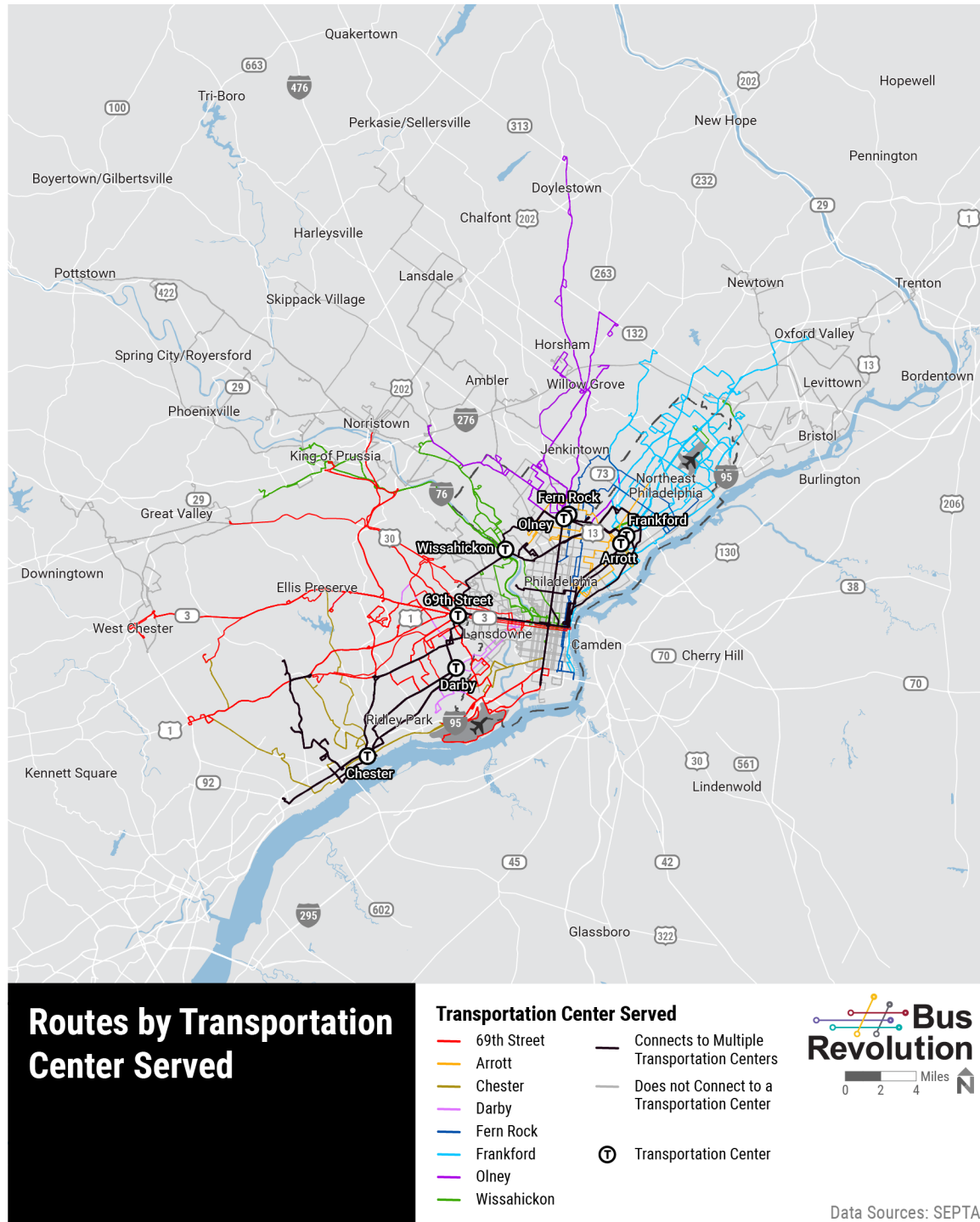
In North Philadelphia, Center City, and South Philadelphia, service operates as a grid.

**Figure 2-4 Transit Routes in North Philadelphia, Center City, and South Philadelphia**



In outer areas, service is organized as a hub and spoke model, with SEPTA's transportation centers serving as hubs.

**Figure 2-5 Transit Routes by Transportation Center Served**





## FREQUENT TRANSIT SERVICES

*Frequent bus routes serve most of the City of Philadelphia, forming a core network of bus service.*

SEPTA's transit network has a core set of rapid and frequent services. This network consists of two rapid transit lines, six rail trolley lines, and 22 bus routes.

### What does “frequent service” mean?

As defined by SEPTA, frequent service operates every 15 minutes or better from at least 6:00 AM to 9:00 PM on weekdays.

SEPTA's frequent services include:

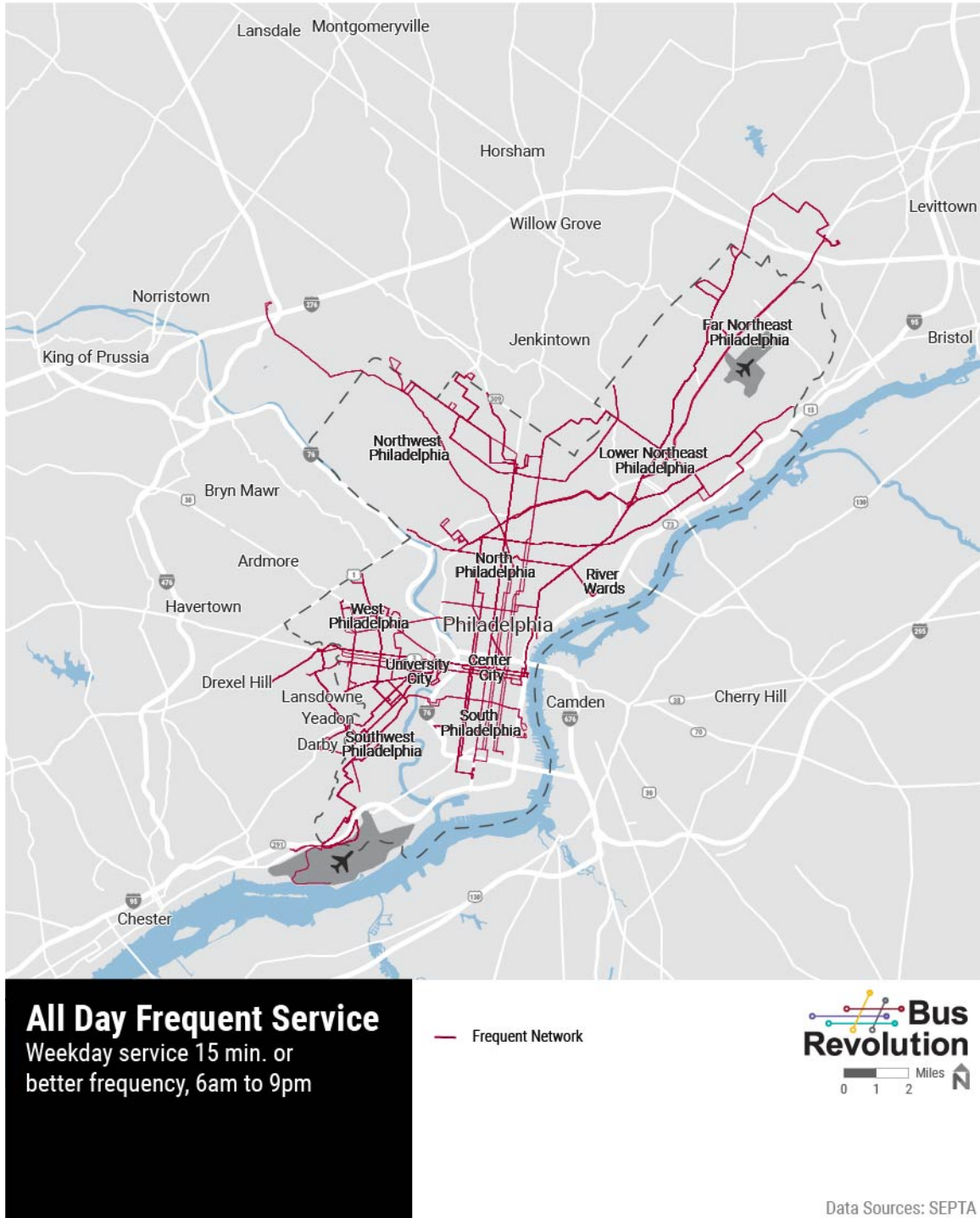
**Figure 2-6 Frequent Transit Services by Type**

Rapid Transit	Trolley Routes	Frequent Bus Routes
<ul style="list-style-type: none"> <li>▪ Broad Street Line</li> <li>▪ Market Frankford Line</li> </ul>	<ul style="list-style-type: none"> <li>▪ 10 13th-Market to 63rd-Malvern</li> <li>▪ 11 13th-Market to Darby Transportation Center</li> <li>▪ 13 13th-Market to Yeadon and Darby Transportation Center</li> <li>▪ 15 63rd-Girard to Richmond-Westmoreland</li> <li>▪ 34 13th-Market to 61st-Baltimore</li> <li>▪ 36 13th-Market to 80th-Eastwick</li> </ul>	<ul style="list-style-type: none"> <li>▪ 3 33rd-Cecil B. Moore to Frankford Transportation Center<sup>2</sup></li> <li>▪ 6 Cheltenham-Ogontz to Olney Transportation Center</li> <li>▪ 17 Penn's Landing to 20th-Johnston and Broad-Pattison</li> <li>▪ 18 Fox Chase to Cedarbrook Plaza</li> <li>▪ 21 Penn's Landing to 69th Street Transportation Center</li> <li>▪ 23 Center City to Chestnut Hill</li> <li>▪ 33 Penn's Landing to 23rd-Venango</li> <li>▪ 42 Penn's Landing to Wycombe or 61st-Pine</li> <li>▪ 45 Broad-Oregon to Center City</li> <li>▪ 46 58th-Baltimore to 63rd-Malvern</li> <li>▪ 47 Whitman Plaza to 5th-Godfrey</li> <li>▪ 52 49th-Woodland to 54th-City or 50th-Parkside</li> <li>▪ 56 23rd-Venango and Bakers Centre to Torresdale-Cottman</li> <li>▪ 58 Neshaminy Mall and Somerton to Frankford Transportation Center<sup>2</sup></li> <li>▪ 60 35th-Allegheny to Richmond-Westmoreland</li> <li>▪ 66 Trackless Trolley/Frankford-Knights to Frankford Transportation Center</li> <li>▪ 70 Frankford-Gregg and Torresdale-Cottman to Fern Rock Transportation Center<sup>2</sup></li> <li>▪ 79 Columbus Commons to 29th-Snyder</li> <li>▪ 108 Airport and Airport Business Center to 69th Street Transportation Center<sup>2</sup></li> <li>▪ Boulevard Direct</li> <li>▪ L Erdenheim or Plymouth Meeting Mall to Olney Transportation Center<sup>2</sup></li> <li>▪ R Henry-Midvale and Wissahickon Transportation Center to Frankford Transportation Center<sup>2</sup></li> </ul>

<sup>2</sup> A portion of the routes is included in the High Frequency Network.

Approximately 20% of SEPTA's bus routes provide frequent service from 6 AM to 9 PM.

**Figure 2-7 All Day Frequent Service, Weekdays, 6 AM – 9 PM**



SEPTA does not formally brand its frequent transit network, but it has loosely recognized several of the core bus routes as “15 Minutes MAX” routes<sup>3</sup>.

# 53%

of riders are within a 10-minute (1/2 mile) walk of all day frequent service

# 49%

of jobs are within a 10-minute (1/2 mile) walk of all day frequent service

In addition to the frequent network described above, several other SEPTA routes fall just shy of meeting SEPTA’s definition of frequent service. These routes either have service frequencies slightly longer than 15 minutes for a short time, or the span of frequent service falls just short of the full 15-hour 6 AM to 9 PM span.

## Key Opportunity

One relatively easy and straight-forward strategy would be to brand the rapid, trolley and frequent bus route as a core frequent transit network. In addition, minor investments to a handful of other bus routes could further expand the frequent transit network, creating a larger and more robust network.

## STOP SPACING

***Systemwide, SEPTA has more closely spaced bus stops than any other transit system in the United States.***

SEPTA buses serve over 13,000 stops with approximately 8,000 bus stops located in the City of Philadelphia. This means in most parts of the city, a bus stop is located at every block, with roughly 10 or more stops per mile. It also means there is SEPTA bus stop roughly every 500 feet, or about a two-minute walk apart.

SEPTA’s system of closely spaced bus stops prioritizes short walks to bus stops at the expense of bus speed and reliability and overall quality and usefulness of the bus network. Stopping buses so often makes the bus slower. It also makes bus service less reliable because not all buses stop at all stops; trips that stop less often run fast, while those that stop more often run slow.

Surveys conducted by Nelson\Nygaard nationally demonstrate a clear preference among transit riders for faster service, even if it means walking a little bit further to a bus stop. As part of the summer 2021 community engagement activities, the SEPTA Forward

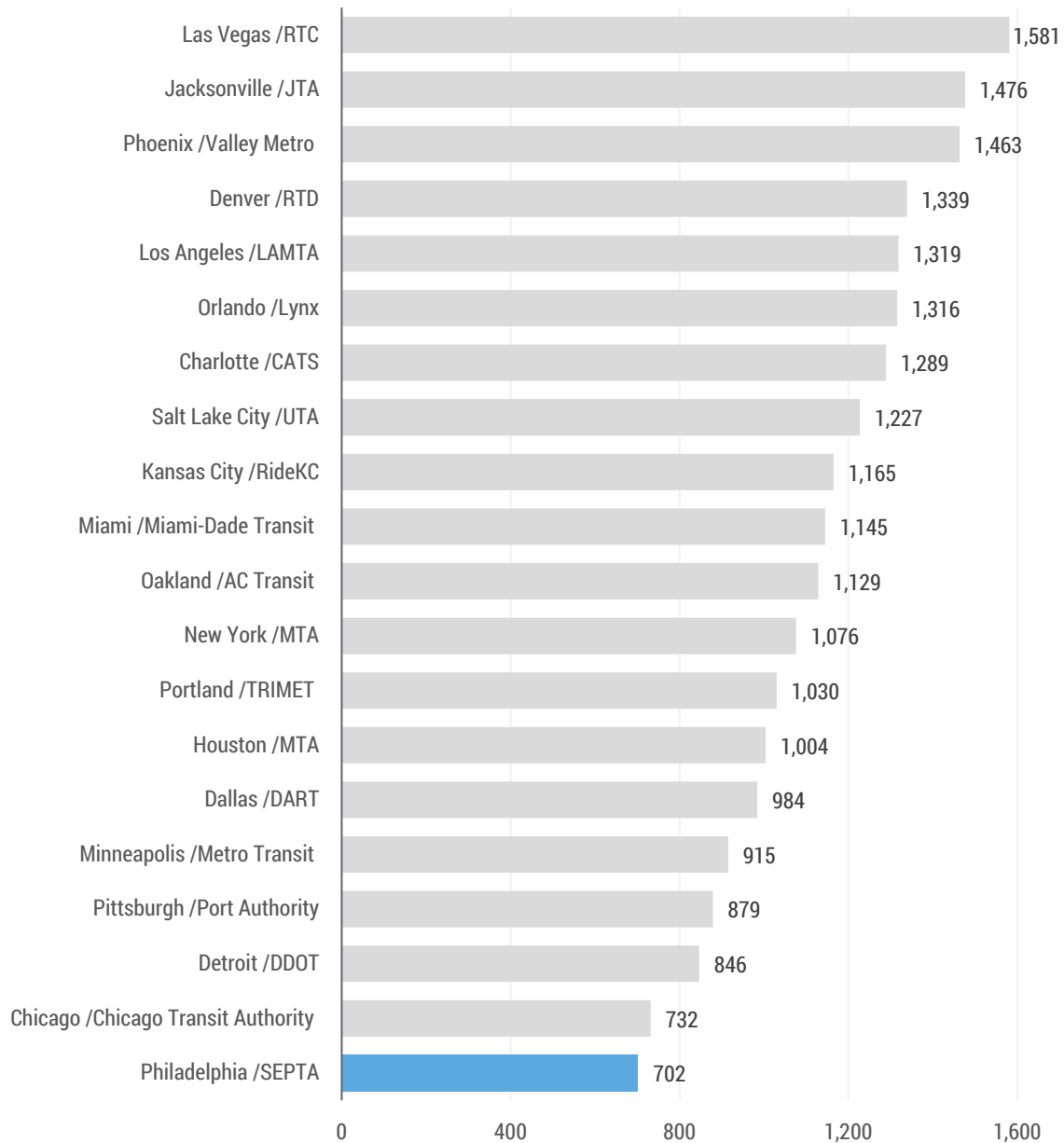
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<sup>3</sup> 15 Minutes MAX routes, as mentioned, are a loose categorization that includes most but not all of the bus and trackless trolley routes that qualify as frequent transit routes.

Bus Revolution team has been asking SEPTA riders and residents to weigh in on their preferences. To date, roughly 70% of individuals who participated in one of the Bus Revolution pop-up events said they are willing to walk slightly farther to a faster bus.

Relative to other transit agencies in the United States, SEPTA's bus stops are very tightly spaced (Figure 2-8).

**Figure 2-8 Mean Stop Spacing (Feet), SEPTA and Other Major Transit Providers**

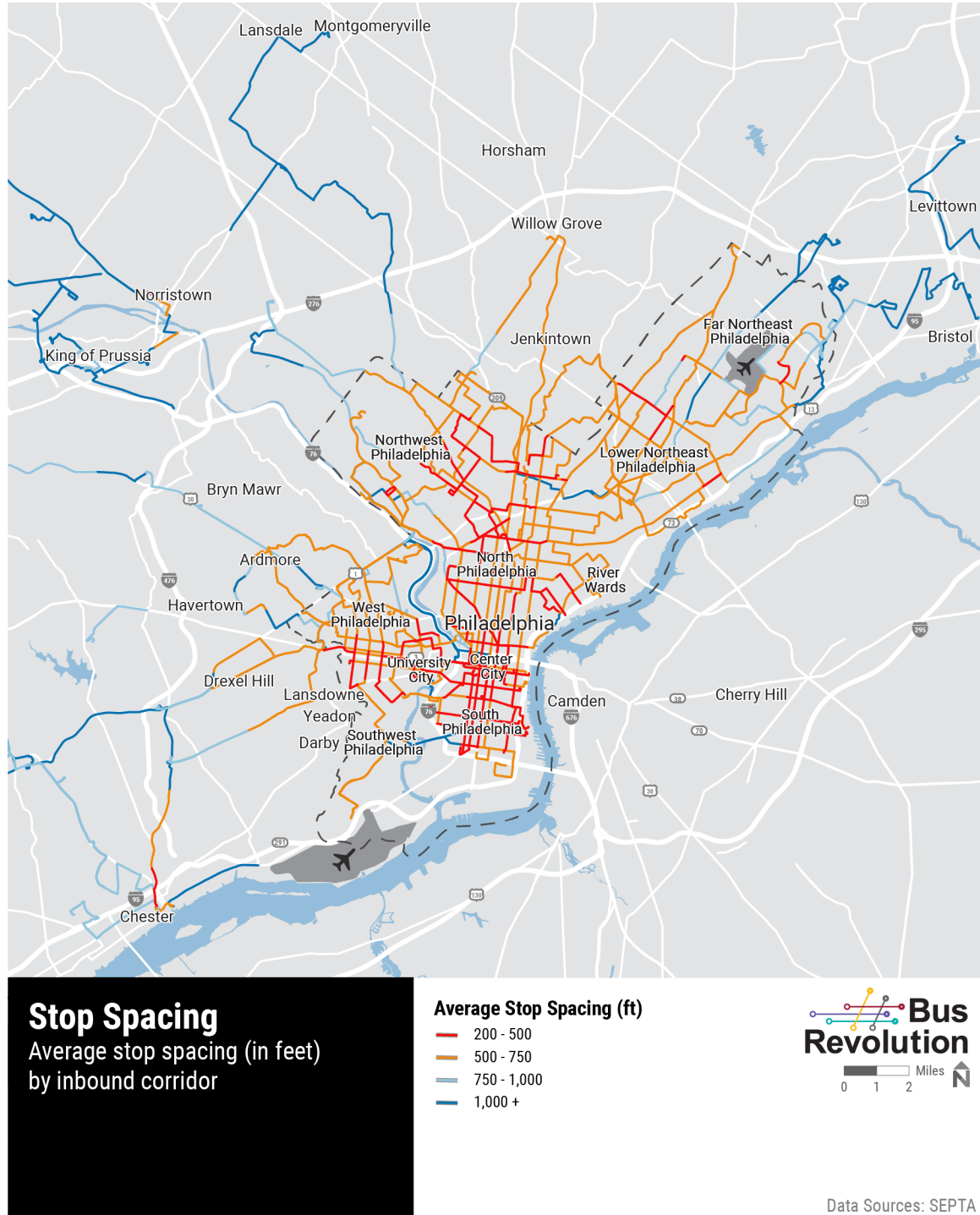


Source: Distributions of Bus Stop Spacings in the United States (2021), Ayush Pandey, Lewis Lehe, Dana Monzer, Civil and Environmental Engineering, University of Illinois Urbana-Champaign



In most parts of Philadelphia, bus stops are spaced roughly every 500 feet, or about a two-minute walk apart.

**Figure 2-9 Stop Spacing (Average Stop Spacing in Feet )**



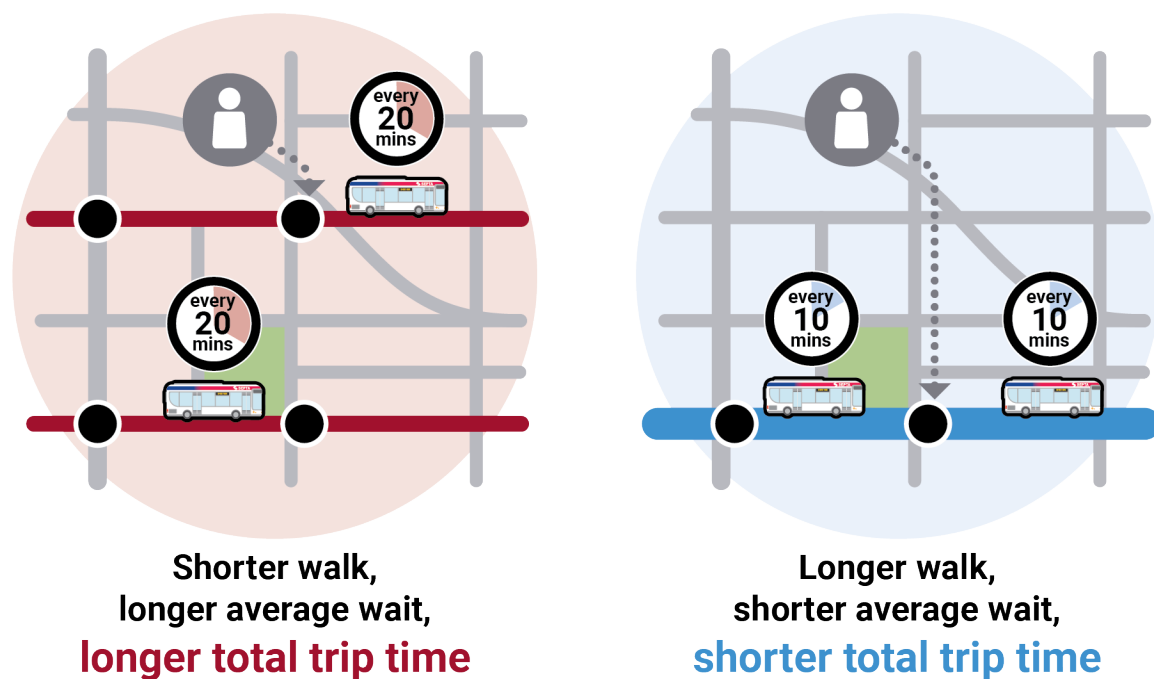
## ROUTE SPACING

*Many of SEPTA's bus routes, especially in the City of Philadelphia, are spaced closely together.*

In much of the City of Philadelphia, SEPTA bus routes operate on parallel corridors, with a bus route operating every three or four blocks. This approach of spreading service thinly means that many people can walk to a bus route in a few minutes. In addition, by operating bus routes on multiple parallel streets, SEPTA is not prioritizing individual bus routes or corridors.

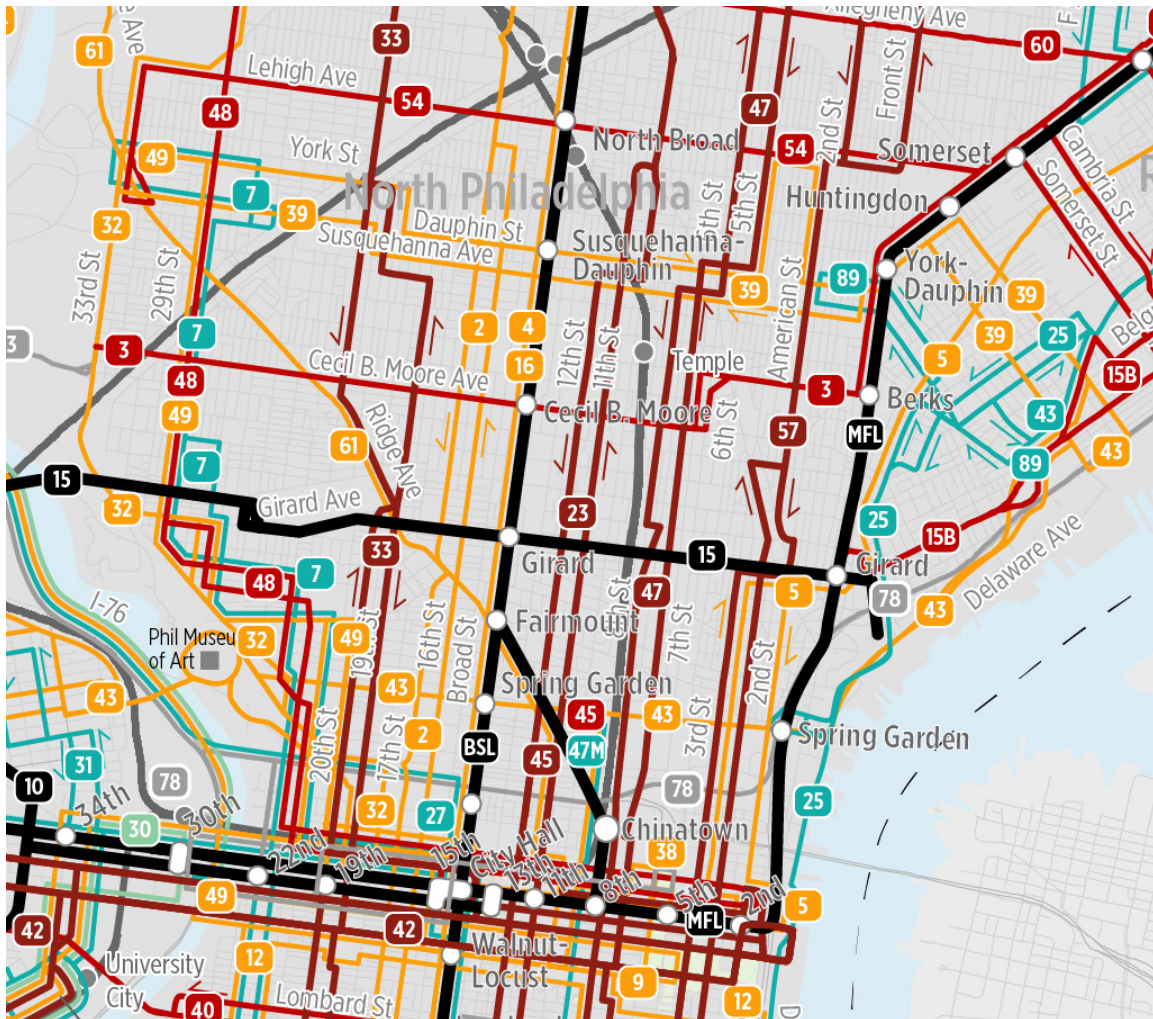
**If service is concentrated on fewer corridors, SEPTA could provide more frequent service, which would make service more useful for more riders.** For example, if two routes that provide service every 20 minutes were combined into a single route, the single route could provide service every 10 minutes. Even if riders walked an extra five minutes, they would still save time overall because they would have shorter wait times, faster transfers, and shorter overall trip times.

**Figure 2-10 Illustration of Route Concentration and Total Travel Time**



Many routes are spaced very closely together, especially in Center City.

**Figure 2-11 Transit Routes in North Philadelphia**





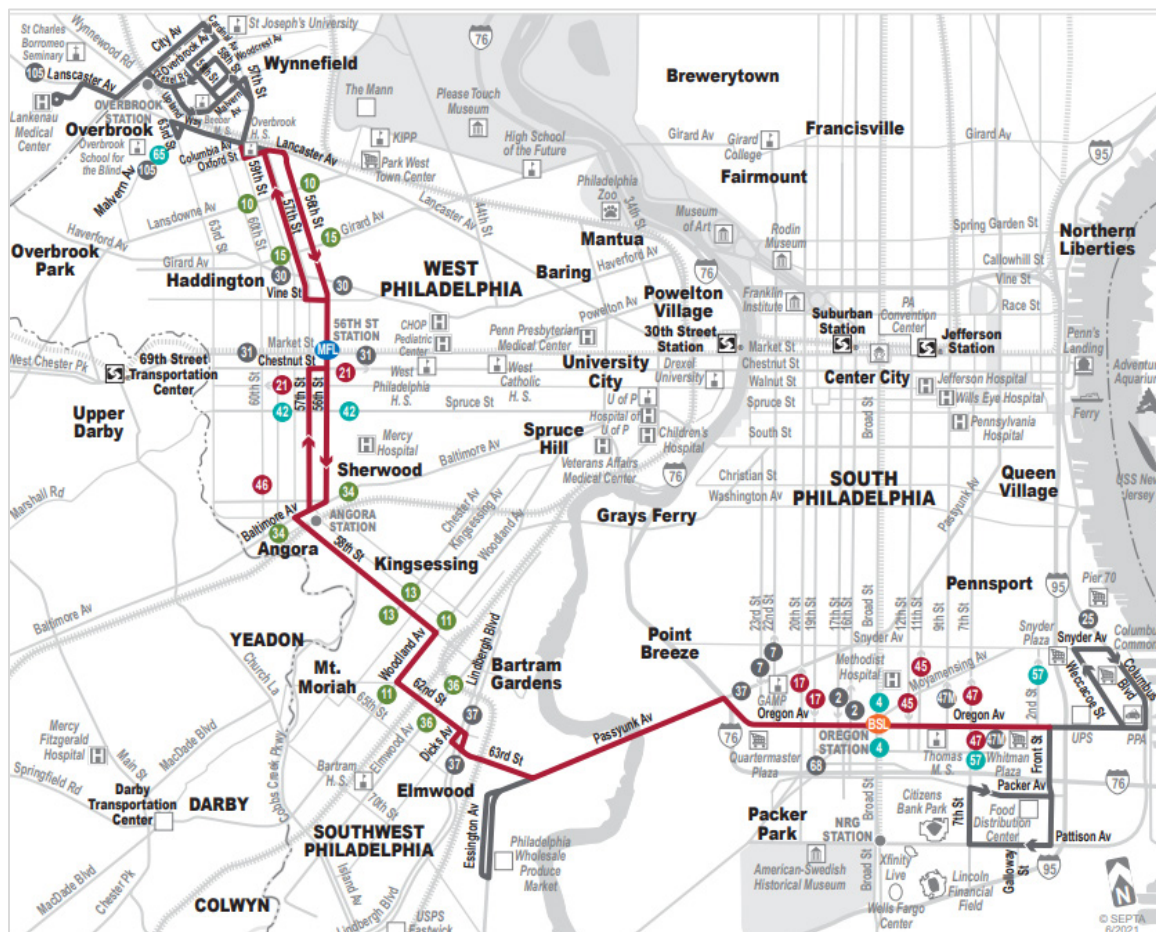
## SERVICE PATTERNS

*Many of SEPTA's bus routes have multiple service patterns, which makes service complex and difficult to understand.*

One route having multiple service patterns means that a single bus route may take several different paths depending on the times of the day or direction of travel. For example, Route G, which operates between Overbrook and South Philadelphia has 25 different weekday service patterns. In most cases, service patterns end or begin at different locations and/or travel on different roadways.

Route G has 25 different weekday service patterns (Primary pattern shown in red; alternative patterns in grey).

Figure 2-12 Route G Alignments

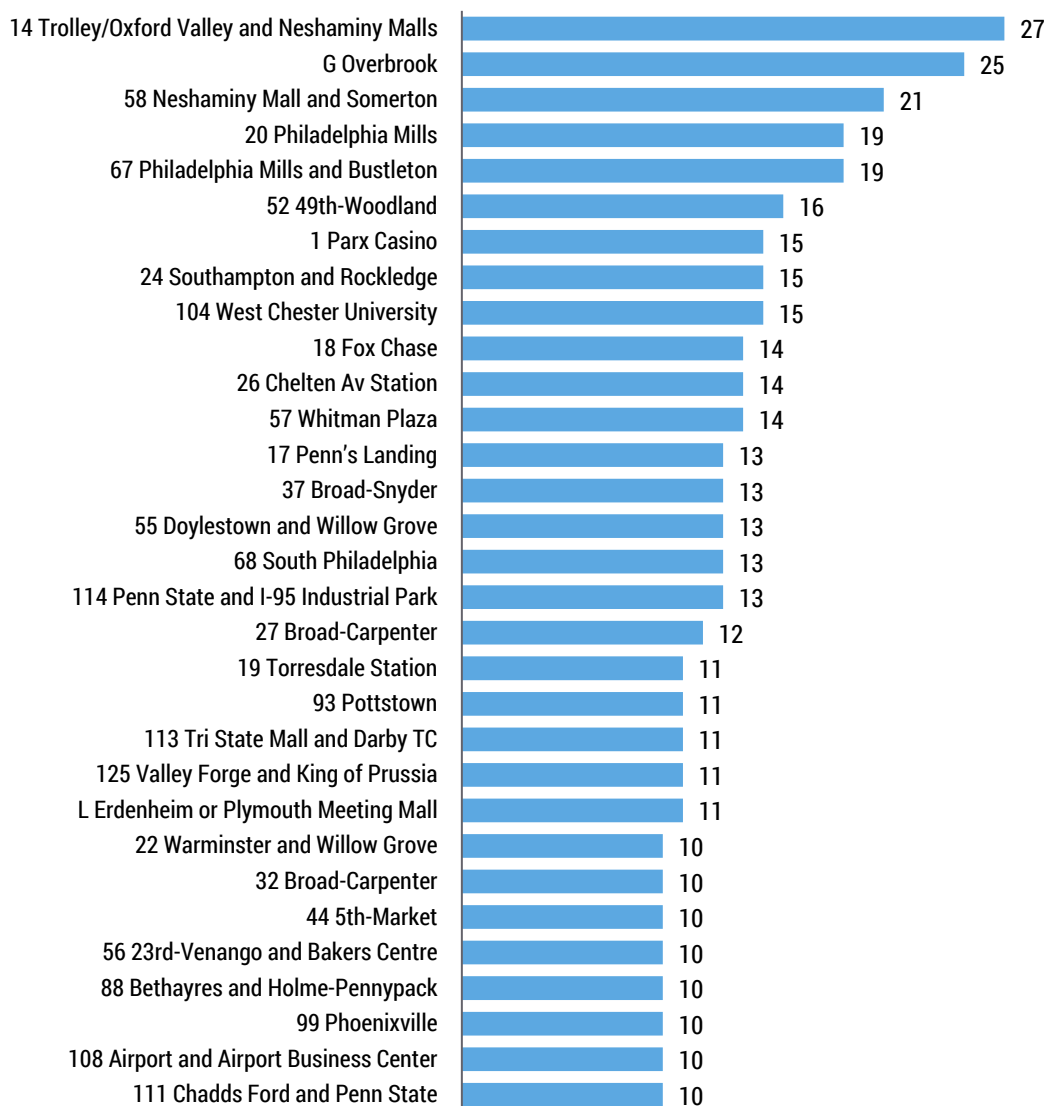


SEPTA uses service patterns for a variety of reasons. Sometimes it doesn't make sense for a bus to travel into a facility—like a shopping center or community college—that isn't open. Other service patterns, however, are designed to expand service coverage, provide lifeline service to a destination, or minimize walk distances.

While some service patterns are necessary, others weaken SEPTA's bus network. Patterns make service complex for riders by adding a layer of uncertainty to a bus route. Service patterns also impact bus schedules because different alignments may need more or less time to complete. These differences impact riders because some buses arrive closer together (say, every 15 minutes) while others arrive farther apart (say, every 25 minutes).

***Thirty-one routes have 10 or more service patterns. By reducing the number of service patterns, SEPTA could simplify service for riders and for its own internal operations.***

**Figure 2-13 Number of Weekday Service Patterns by Route**



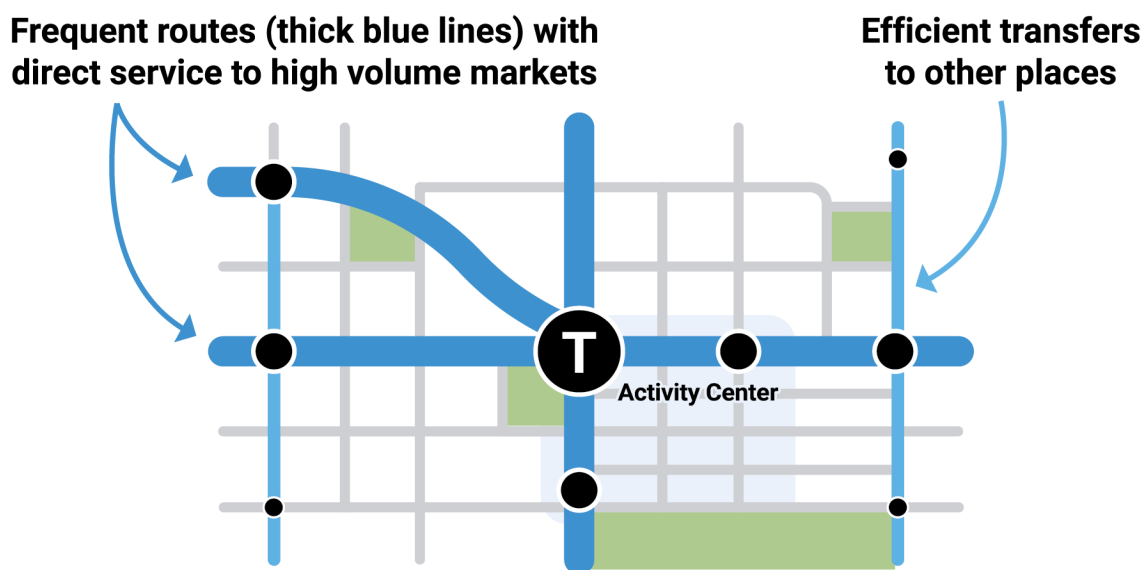
Source: Nelson\Nygaard with data provided by SEPTA. Note: Data shown represents service patterns as of Fall 2019

## SERVICE DUPLICATION

*Some of SEPTA's bus routes operate in the same or similar corridors, which means some services duplicate each other.*

The most efficient way to operate a large, comprehensive bus network is through a network of well-connected routes that provide direct bus service (or “one-seat rides”) to the region’s highest volume transit markets and offer efficient transfers between routes to lower volume destinations and markets. This type of network is effective and efficient. Indeed, much of SEPTA’s transit network is designed around this approach.

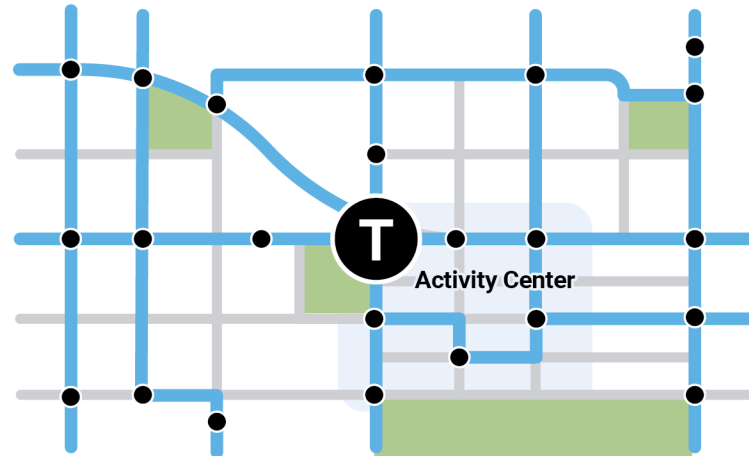
**Figure 2-14 Illustration of Direct Routes and Efficient Connections**



Over time, however, SEPTA has also developed bus routes that offer one-seat rides to places with lower demand. This practice duplicates parts of the network, dilutes the impact of the overall system and undermines the transfer-based network used by most riders. It also strengthens rider expectation for one-seat rides, even when bus routes travel along the same path or similar paths and could easily be reached with a single connection. Part of this practice reflects the fact that until 2020, SEPTA charged riders an additional \$1 to transfer between bus routes. The extra change strengthened the demand for one-seat rides.

**Figure 2-15 Illustration of a Duplicative Network**

**Duplicative routes (thin blue lines) provide one-seat rides to areas with lower demand for transit—on buses that are less direct and come less often**



An example of duplicative service is Route 20 (Philadelphia Mills to Frankford Transportation Center) and Route 50 (Parx Casino via Philadelphia Mills to Frankford Transportation Center). These two routes share the same alignment between the Frankford Transportation Center (FTC) and Holme Circle. At some times of the day, the routes are coordinated meaning they don't operate on the same corridor at the same time. At other times, however, Routes 20 and 50 travel on the same corridor at the same or similar times. In addition, there are other SEPTA routes (129 and 130) that operate provide similar services.

The Philadelphia Bus Network Choices Report estimated that 10% of bus service within Philadelphia is duplicative. A reduction in duplication would free up resources to provide more frequent service on the core network and to develop other more useful services.

Routes 20 and 50 provide very similar alignments and serve the same riders.

**Figure 2-16 Service Duplication on Routes 20 and 50**





## Bus Lanes

Bus lanes dedicate a portion of the roadway for buses. When implemented well, they enable buses to travel freely through congested areas. Bus lanes are being increasingly employed throughout the United States, either as standalone measures or as part of the development of Bus Rapid Transit (BRT) services. SEPTA currently has bus lanes in three locations:

- **Chestnut Street, in Center City**, has an eastbound bus lane that is narrow and often blocked by delivery trucks.
- **East Market Street, in Center City**, has curbside bus lanes between City Hall and 6th Street. To date, enforcement of the bus lanes (i.e., keeping them clear of other vehicles) has been inconsistent.
- **Market Street and JFK Boulevard, in Center City**, has new curbside bus lanes in each direction between 15<sup>th</sup> Street and 20<sup>th</sup> Street. These bus lanes were implemented as a pilot project in Fall 2021.

The eastbound bus lane on Chestnut Street is narrow and often blocked, which limits its benefits.



Photo Credit: Google Maps



Photo Credit: Google Maps

## INDIRECT ROUTES

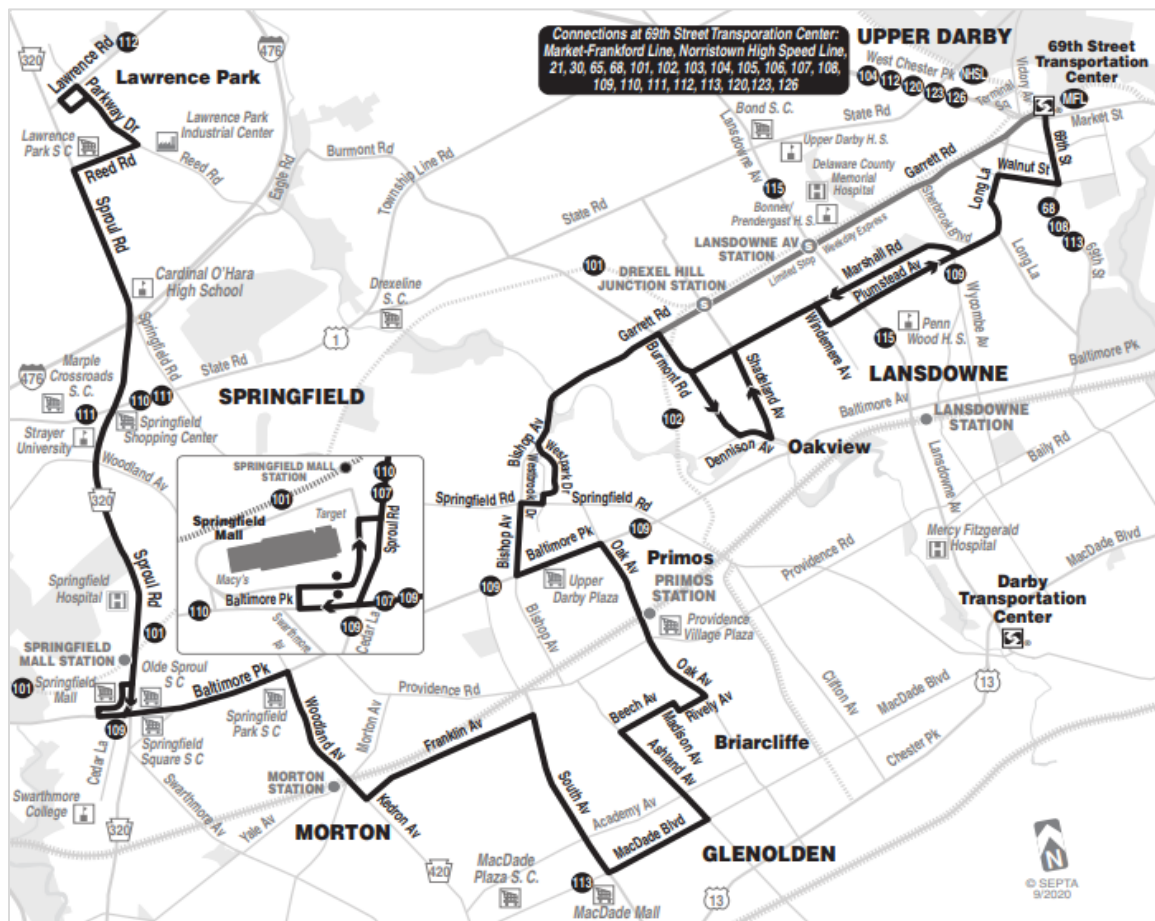
*Many SEPTA routes are circuitous, especially in the suburbs. Indirect routes expand service coverage but are inconvenient for many riders.*

SEPTA generally operates coverage-oriented service in suburban locations, where population and employment density—as well as overall transit demand—are low. In these areas, SEPTA prioritizes walk access to bus routes. Coverage-oriented routes do serve a larger area but are often slow because they travel off route to reach individual destinations, rather than operate straight along a corridor.

One example is Route 107, which operates between Lawrence Park and the 69th Street Transportation Center via Morton, Glenolden, and Lansdowne. The most direct driving route from Lawrence Park to the 69th Street Transportation Center is approximately five miles and takes roughly 13 minutes. By Route 107, it is 17.7 miles and often takes over an hour.

Route 107 travels 17.7 miles to cover the five-mile distance between Lawrence Park and the 69th Street Transportation Center.

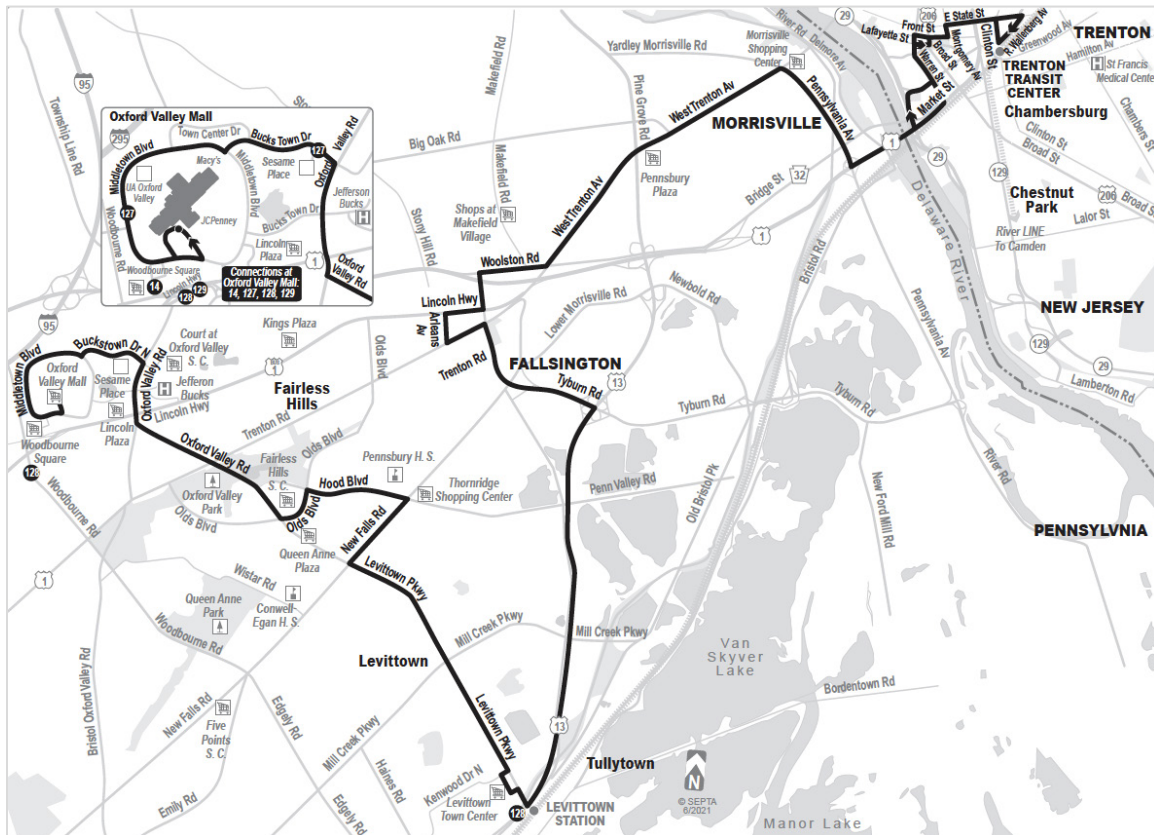
Figure 2-17 Route 107 Alignment



A second example is Route 127 Trenton Transit Center to Oxford Valley Mall. By the most direct driving route, the distance between the Oxford Valley Mall and the Trenton Transit Center is 7.9 miles and takes 15 minutes to drive. By Route 127 travel between these two destinations is 18.9 miles and requires nearly an hour.

Route 127 travels 18.9 miles to cover the 7.9-mile distance between the Oxford Valley Mall and the Trenton Transit Center.

**Figure 2-18 Route 127 Alignment**



Prioritizing coverage decreases the convenience and usefulness of service. Ridership on coverage-oriented bus routes is often low because the service is not competitive to other transportation options. Low ridership leads to infrequent service, making coverage-oriented routes even less convenient.



## TRANSIT PRIORITY TREATMENTS

*Transit systems throughout the country use transit priority treatments to make bus service faster and more reliable.*

Transit priority treatments (or measures) prioritize the movement of buses along roadways and through intersections. Commonly used measures include dedicated bus lanes, queue jump lanes, and transit signal priority (TSP). To date, SEPTA and its communities have not aggressively pursued transit priority. When they have, the efforts have been limited.

### Queue Jump Lanes

Queue jump lanes are short-bus lanes leading to congested intersections that allow buses to bypass queued traffic. Currently, there is one queue jump lane in SEPTA's service area, located in the City of Philadelphia on Market Street, just west of City Hall.



Photo credit: WHYY

## Transit Signal Priority

Transit signal priority (TSP) is a technology that programs traffic signals to either extend a green light until an approaching bus passes through the intersection or shorten a red light to reduce the time a bus waits at an intersection. The amount of priority given to buses can vary with longer or shorter advanced green and delayed reds, to the number of times an hour a bus will be given priority.

The City of Philadelphia's initial implementation of transit signal priority limited the amount of priority given to buses, and TSP was not viewed as effective. However, experience from other areas shows that more transit-oriented approaches can improve bus travel times by 5% to over 20%.

### Transit Priority Investments in Boston

In Greater Boston, the Massachusetts Bay Transportation Authority (MBTA) has worked with municipalities to introduce bus lanes in several key corridors of its service area. The agency established a Speed & Reliability Team, which works closely with communities to identify and introduce transit priority initiatives. Both pilot and permanent bus lanes are now located in several municipalities with more under development, and Transit Signal Priority (TSP) is currently being implemented at key locations across the MBTA's bus network.



Photo Credit: MBTA



# 3 Existing Service Levels

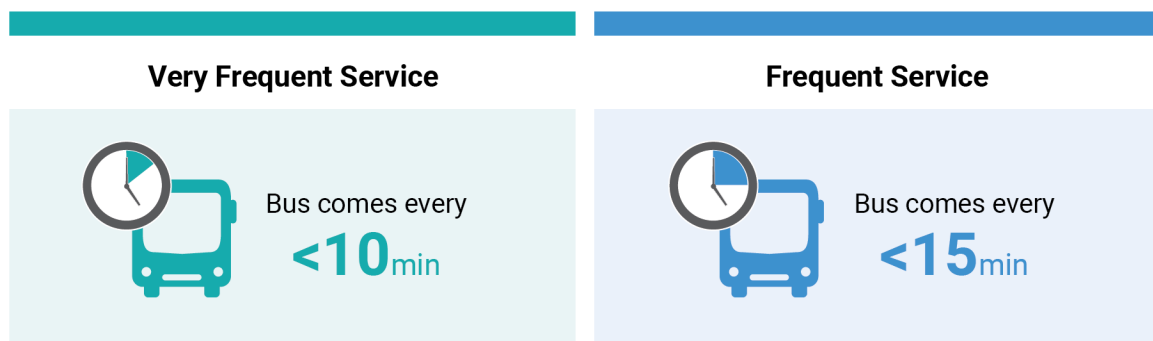
Transit systems typically define the level of service in terms of two attributes: (1) frequency of service, or how often a bus passes a bus stop; and (2) span of service, or how long bus service is available. These attributes also partially—but not entirely—reflect the quality and usefulness of transit service. This chapter describes the level of service provided by SEPTA’s existing bus network.

## SERVICE FREQUENCIES

*A large proportion of SEPTA’s bus network operates frequently. However, there are opportunities to strengthen the network of frequent and very frequent routes.*

One of the best ways to make bus service convenient is to make it frequent. The transit industry generally defines frequent service as when a bus arrives every 15 minutes or less. At this level of service, riders don’t need to time their arrival at a bus stop; instead, they can show up and be confident a bus will arrive in less than 15 minutes. For purposes of this analysis, “very frequent” bus service refers to buses that arrive every 10 minutes or less.

Figure 3-1 Frequent Service and Very Frequent Service



## Weekday Service

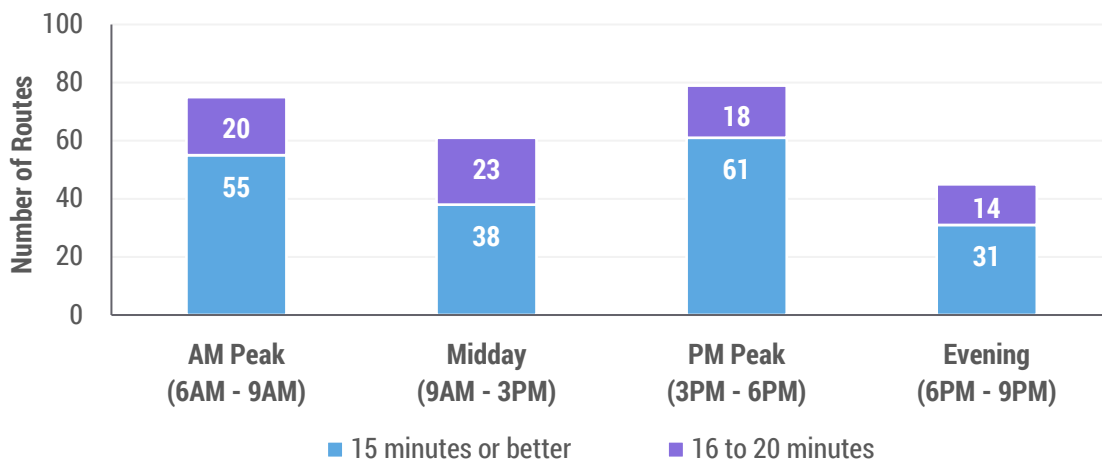
This section describes how frequently SEPTA service operates during weekdays, overall and by time of day.

In general, SEPTA's bus service frequencies are very good. For example:

- **Frequent service (15 minutes or better):** 22 routes operate every 15 minutes or better from 6 AM to 9 PM continuously. An additional 11 routes fall just shy of this threshold from 6 AM to 9 PM. Relatively modest service increases could upgrade these routes to frequent service.
- **Very frequent service (10 minutes or better):** Two routes operate every 10 minutes or better from 6 AM to 9 PM continuously. Another six routes operate every 10 minutes or better for 12 or more hours between 6 AM and 9 PM. Adjusting these six routes could be the starting point for a core network of very frequent service. In all cases the required service increases would be small, and for some they may be achievable through schedule adjustments alone.

Figure 3-1 presents the number of frequent and nearly frequent routes by time of day, for weekday service.

**Figure 3-2 Routes with Frequent and Almost-Frequent Service by Time of Day, 6 AM to 9 PM**



The remainder of this section covers weekday frequencies during the early AM (before 6 AM), AM peak (6 AM to 9 AM), midday (9 AM to 3 PM), PM peak (3 PM to 6 PM), evening (6 PM to 9 PM), and night (9 PM to midnight).

### EARLY AM FREQUENCIES: BEFORE 6 AM

Nearly all SEPTA bus routes—116—begin service before 6 AM:

- 10 provide very frequent service and 16 provide frequent service (26 total)
- 23 provide service every 16 to 20 minutes
- 65 provide less frequent service

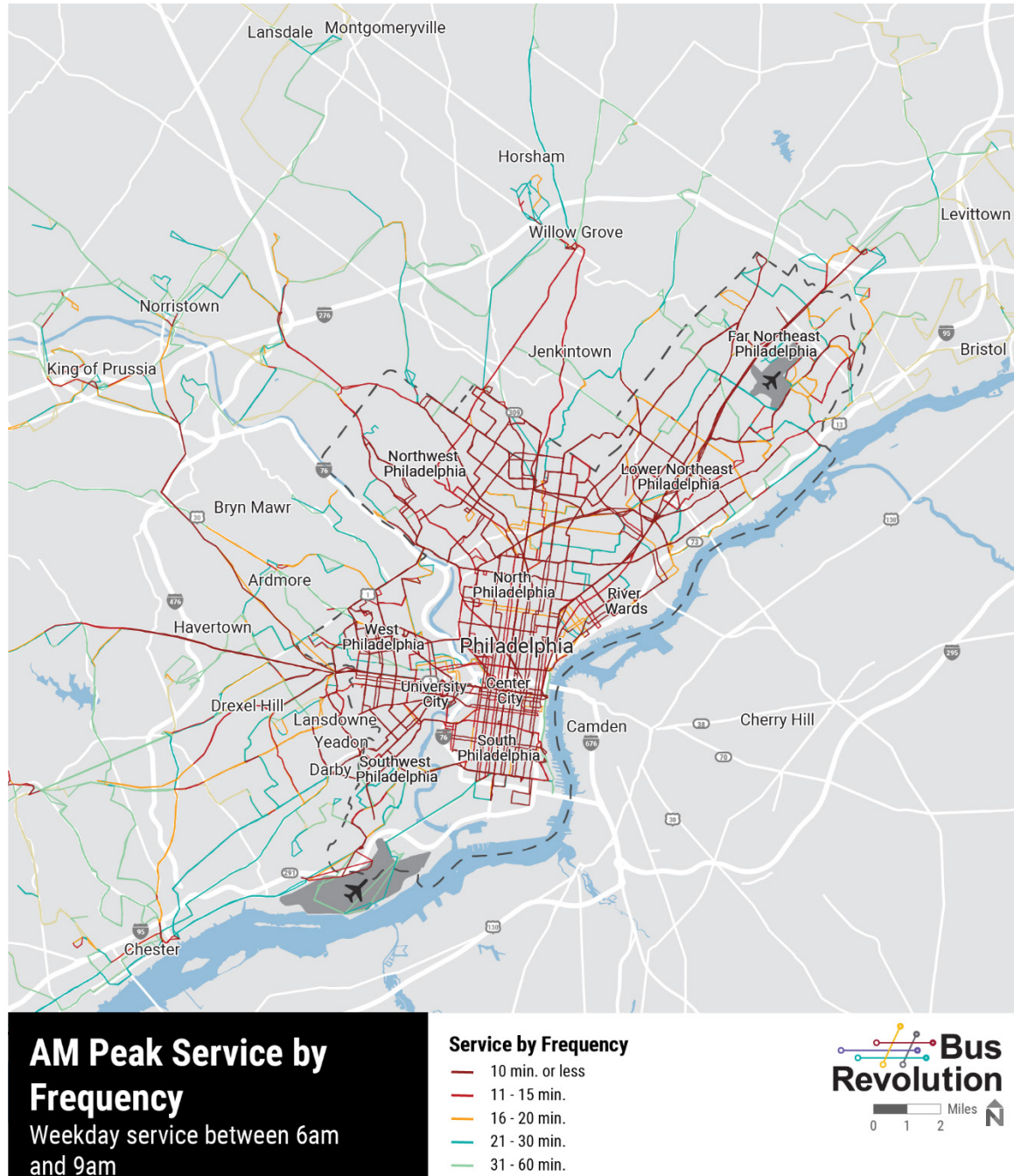


### AM PEAK FREQUENCIES: 6 AM – 9 AM

120 total routes in service:

- 22 provide very frequent service and 26 provide frequent service (48 total)
- 16 provide service every 16 to 20 minutes
- 56 provide less frequent service

**Figure 3-3 Routes with Weekday AM Peak Service by Frequency**

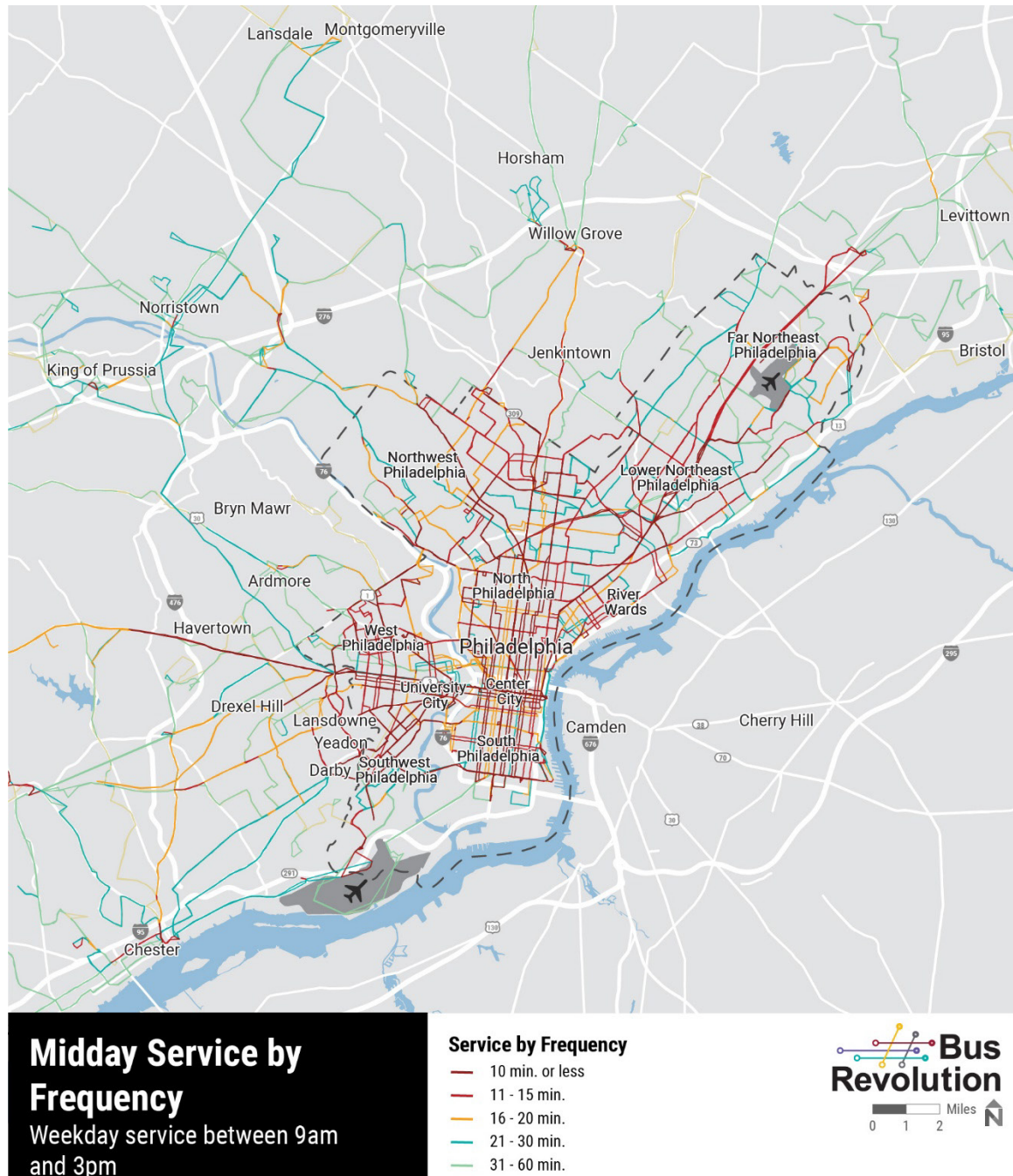


## MIDDAY FREQUENCIES: 9 AM – 3 AM

118 total routes in service:

- 6 provide very frequent service and 25 provide frequent service (31 total)
- 24 provide service every 16 to 20 minutes
- 63 provide less frequent service

**Figure 3-4 Routes with Weekday Midday Service by Frequency**



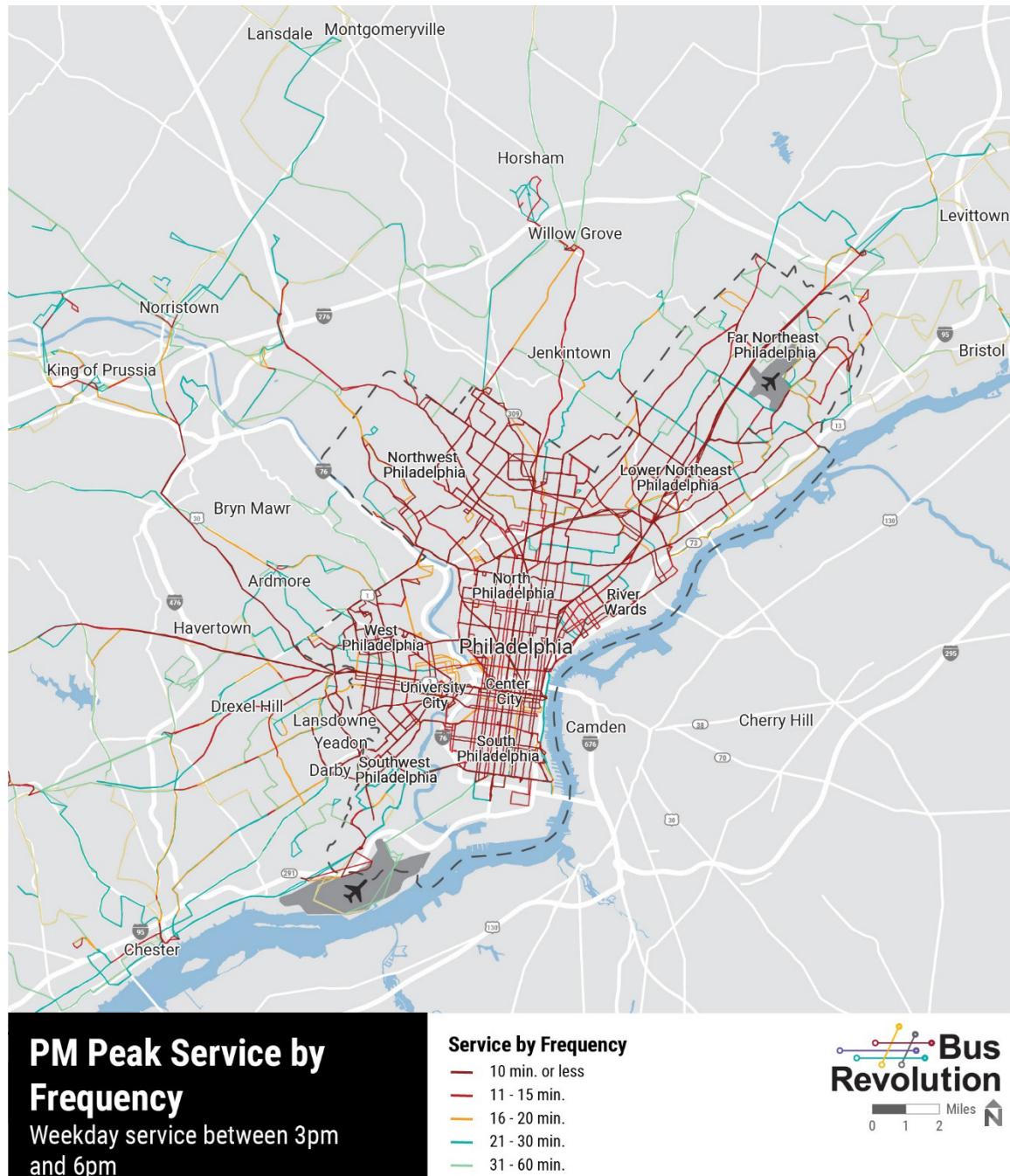


## PM PEAK FREQUENCIES: 3 PM – 6 PM

122 total routes in service:

- 23 provide very frequent service and 27 provide frequent service (50 total)
- 21 provide service every 16 to 20 minutes
- 51 provide less frequent service

**Figure 3-5 Routes with Weekday PM Peak Service by Frequency**

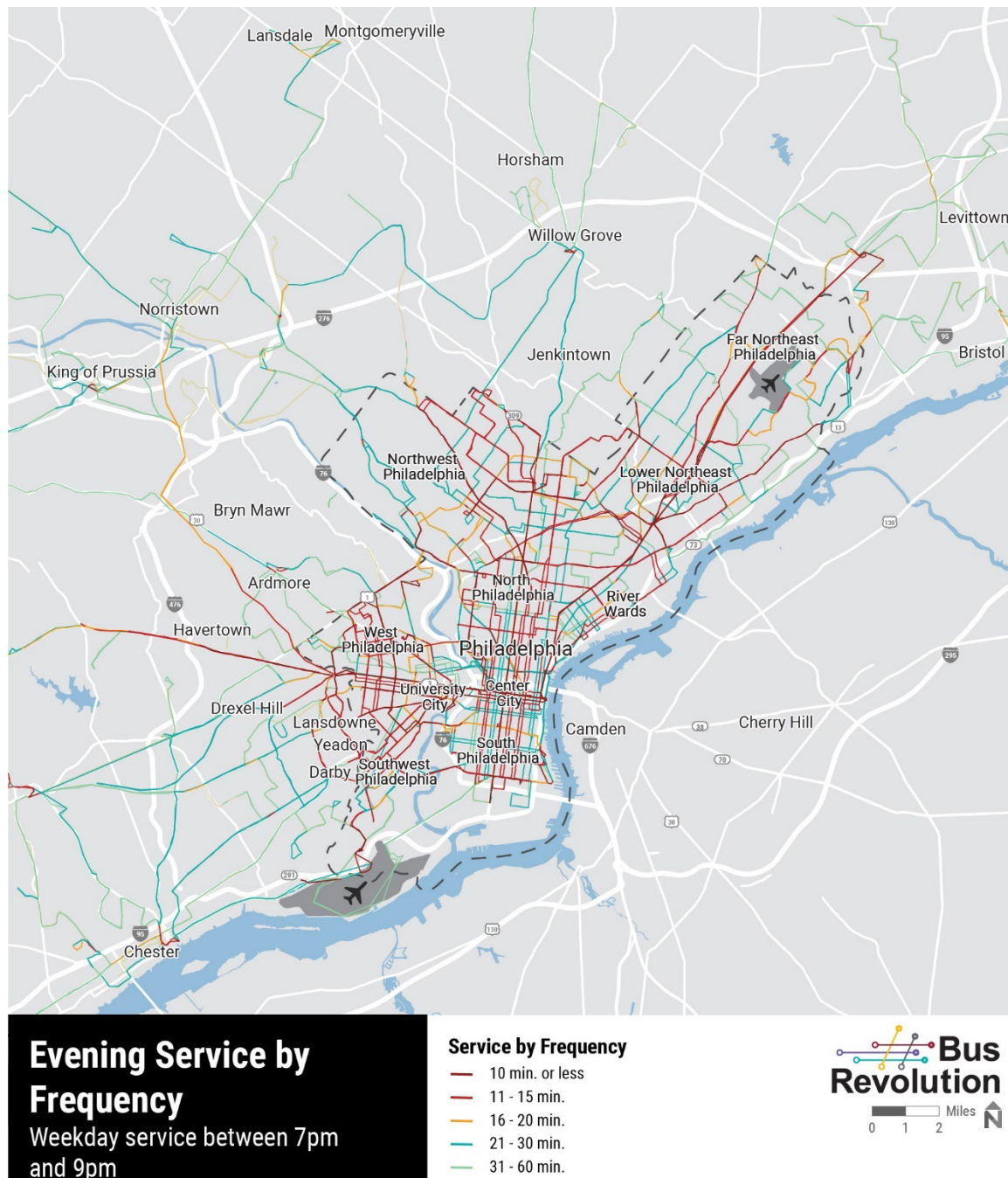


## EVENING FREQUENCIES: 6 PM – 9 PM

117 total routes in service:

- 3 provide very frequent service and 20 provide frequent service (23 total)
- 10 provide service every 16 to 20 minutes
- 84 provide less frequent service

**Figure 3-6 Routes with Weekday Evening Service by Frequency**



**NIGHT FREQUENCIES: 9 PM – MIDNIGHT**

98 total routes in service:

- 1 provides frequent service
- 2 provide service every 16 to 20 minutes
- 95 provide less frequent service

**Weekend Service**

This section describes frequencies for SEPTA's weekend bus service, focusing on the period between 8 AM and 6 PM.

On Saturdays, 116 of SEPTA's 125 bus routes operate. About 30% (31 routes) of the Saturday network provides frequent service between 8 AM and 6 PM.

On Sundays, 100 bus routes operate and 31 routes, or slightly over 30%, provide frequent service between 8 AM and 6 PM.

On Saturdays and Sundays, several bus routes fall just shy of frequent service. As with weekday service, relatively minor investments to these routes could expand and strengthen SEPTA's frequent transit network.



## SATURDAY FREQUENCIES: 8 AM – 6 PM

108 total routes in service:

- 5 provide very frequent service and 26 provide frequent service (31 total)
- 13 provide service every 16 to 20 minutes
- 77 provide less frequent service

**Figure 3-7 Routes with Saturday Service (8 AM – 6 PM) by Frequency**



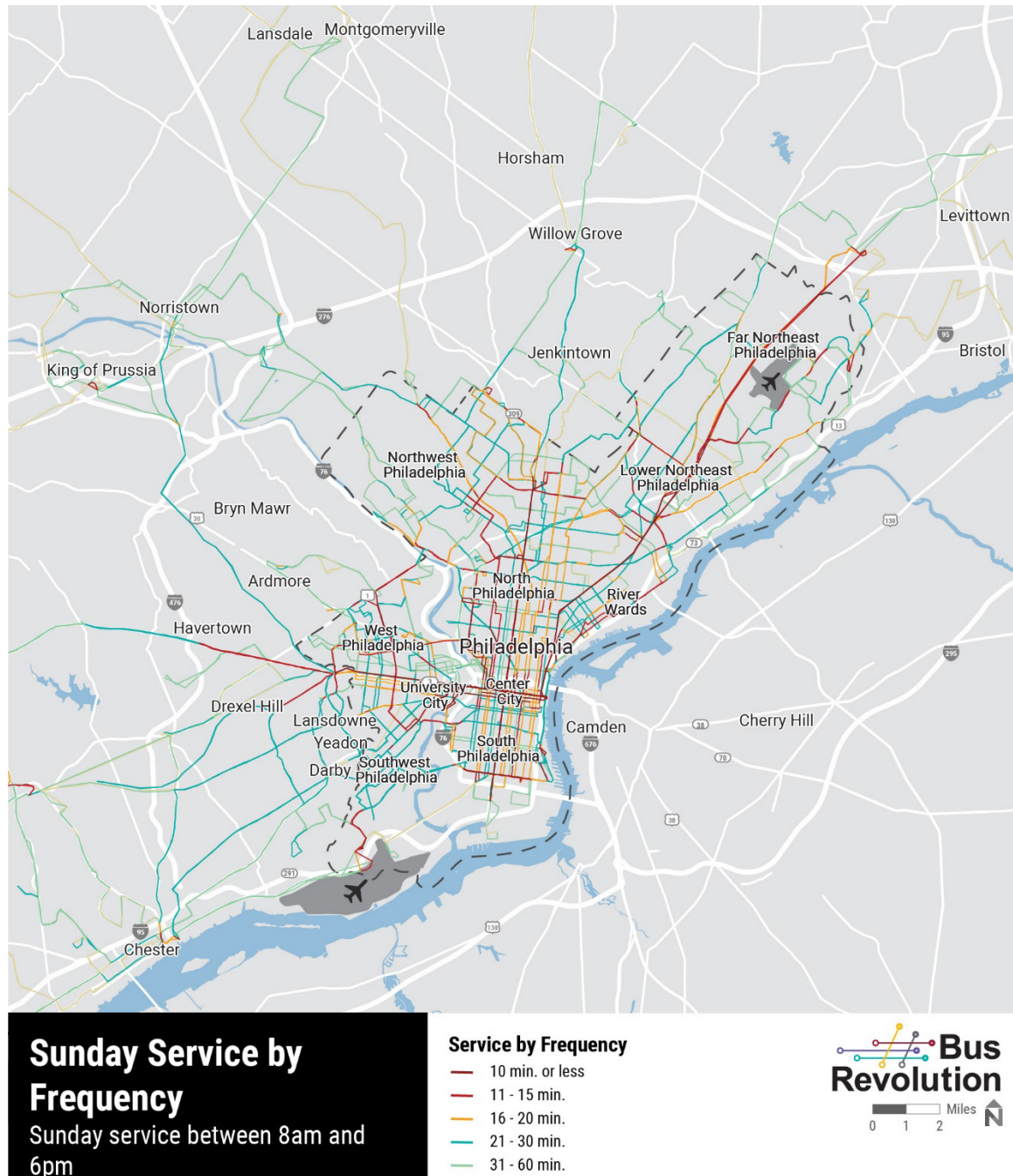


## SUNDAY FREQUENCIES: 8 AM – 6 PM

99 total routes in service

- 3 provide very frequent service and 15 provide frequent service (31 total)
- 14 provide service every 16 to 20 minutes
- 80 provide less frequent service

**Figure 3-8 Routes with Sunday Service (8 AM – 6 PM) by Frequency**



## HOURS OF SERVICE

In addition to frequency, an important characteristic of convenient bus service is the times when it is available, or hours of service. Longer hours of service make transit more useful, especially for people working outside of the traditional business hours or traveling before and after work.

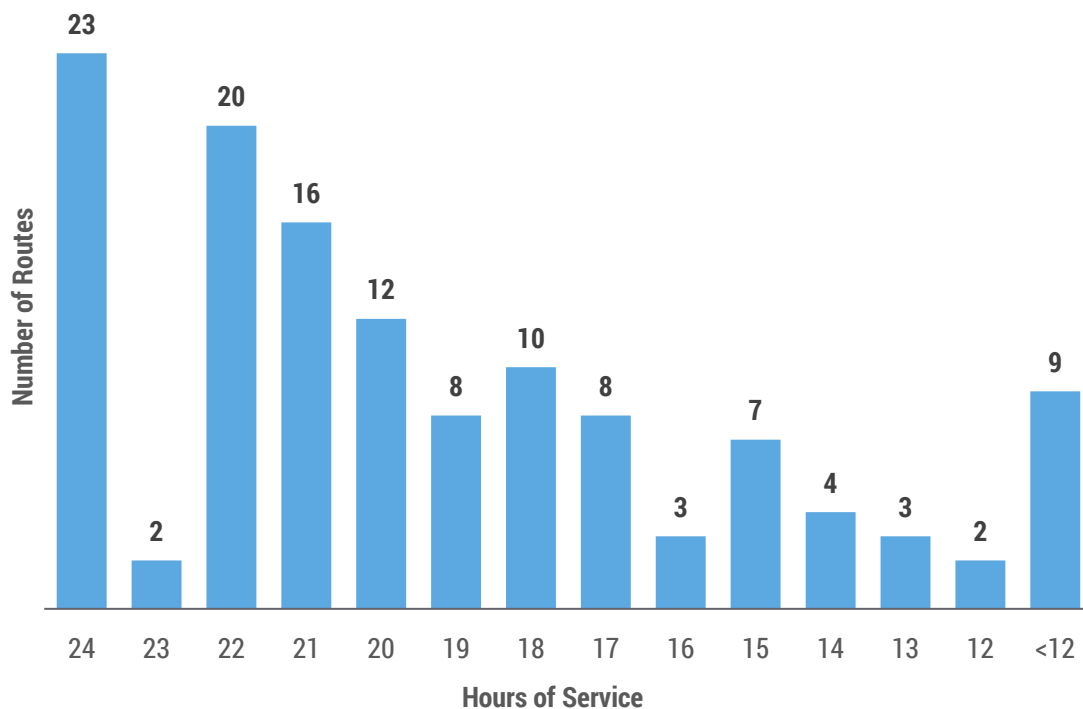
Overall, SEPTA provides a high level of service in terms of hours. Most routes operate for long hours, from early morning until late at night. Many operate 24 hours a day.

### Weekdays

On weekdays, 23 bus routes operate 24 hours a day and two others operate for 23 hours a day. Most of these routes are in Philadelphia, but bus routes with long operating hours extend into Bucks, Montgomery, and Delaware Counties.

[Most routes operate for long hours.](#)

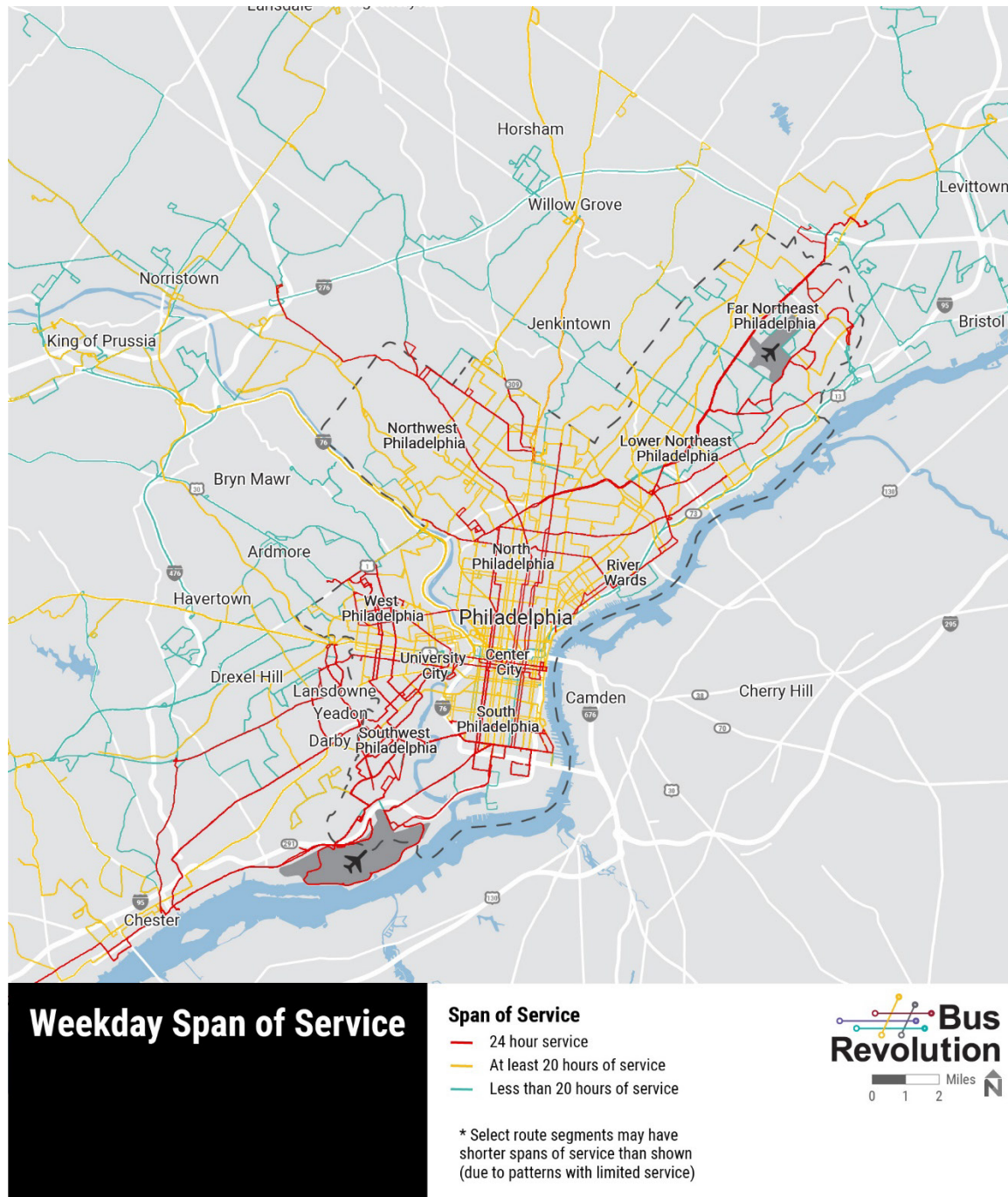
**Figure 3-9 Number of Routes by Hours of Service**



SEPTA's weekday bus network operates for long hours. A total of 73 routes, or 62% of all routes, operate at least 20 hours a day.

On weekdays, long hours of service are provided throughout much of the SEPTA system.

**Figure 3-10 Weekday Span of Service by Route**



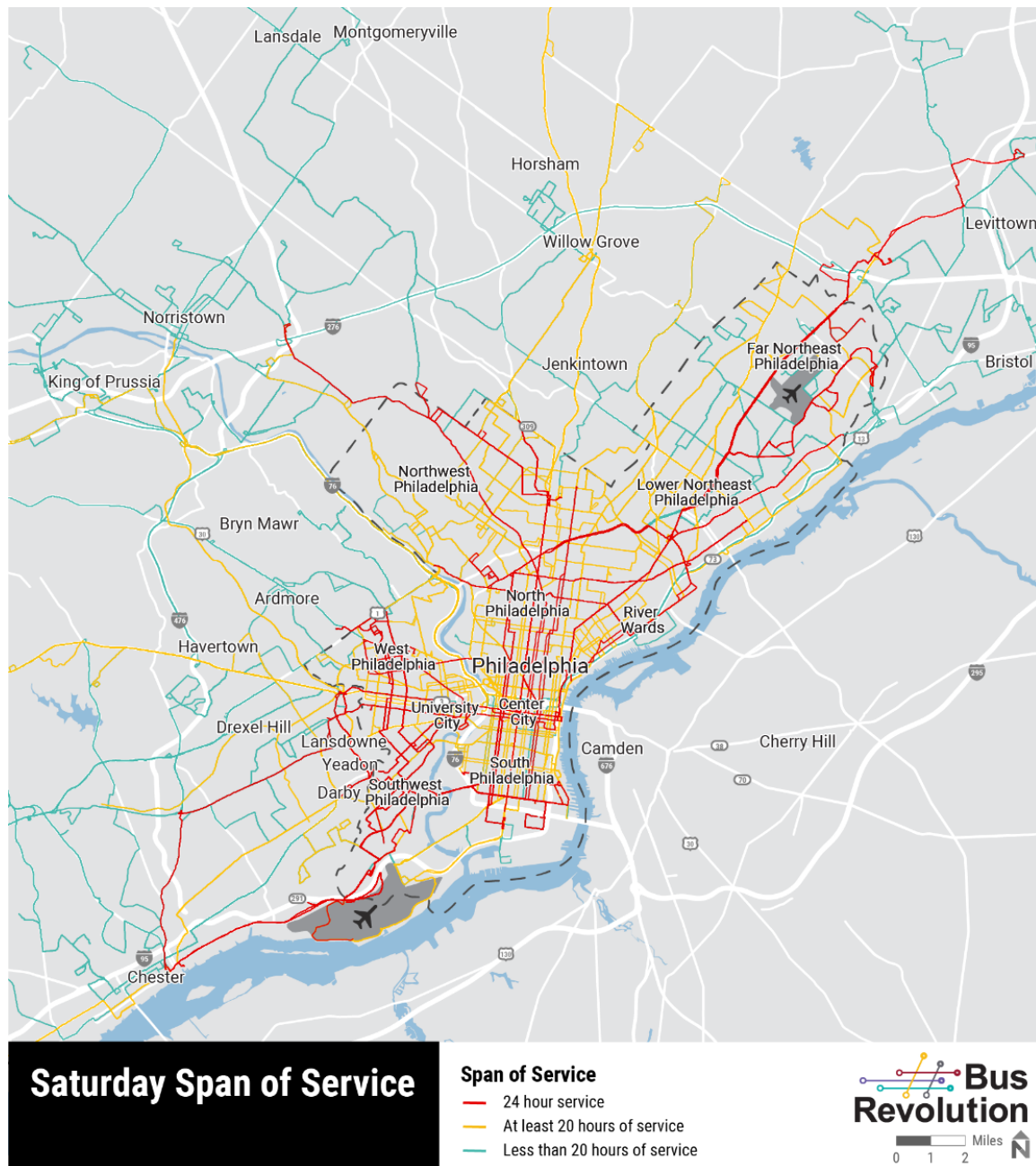


## Saturdays

Eighty-five percent of bus routes—108 of 125—run on Saturdays:

- 21 routes provide service for 23 to 24 hours
- 59 routes provide service for 20 or more hours a day (inclusive of the 21 routes operating 23 to 24 hours) 1
- 41 bus routes are in service before 5 AM and 23 routes before 4 AM

**Figure 3-11 Span of Service for Routes with Saturday Service**



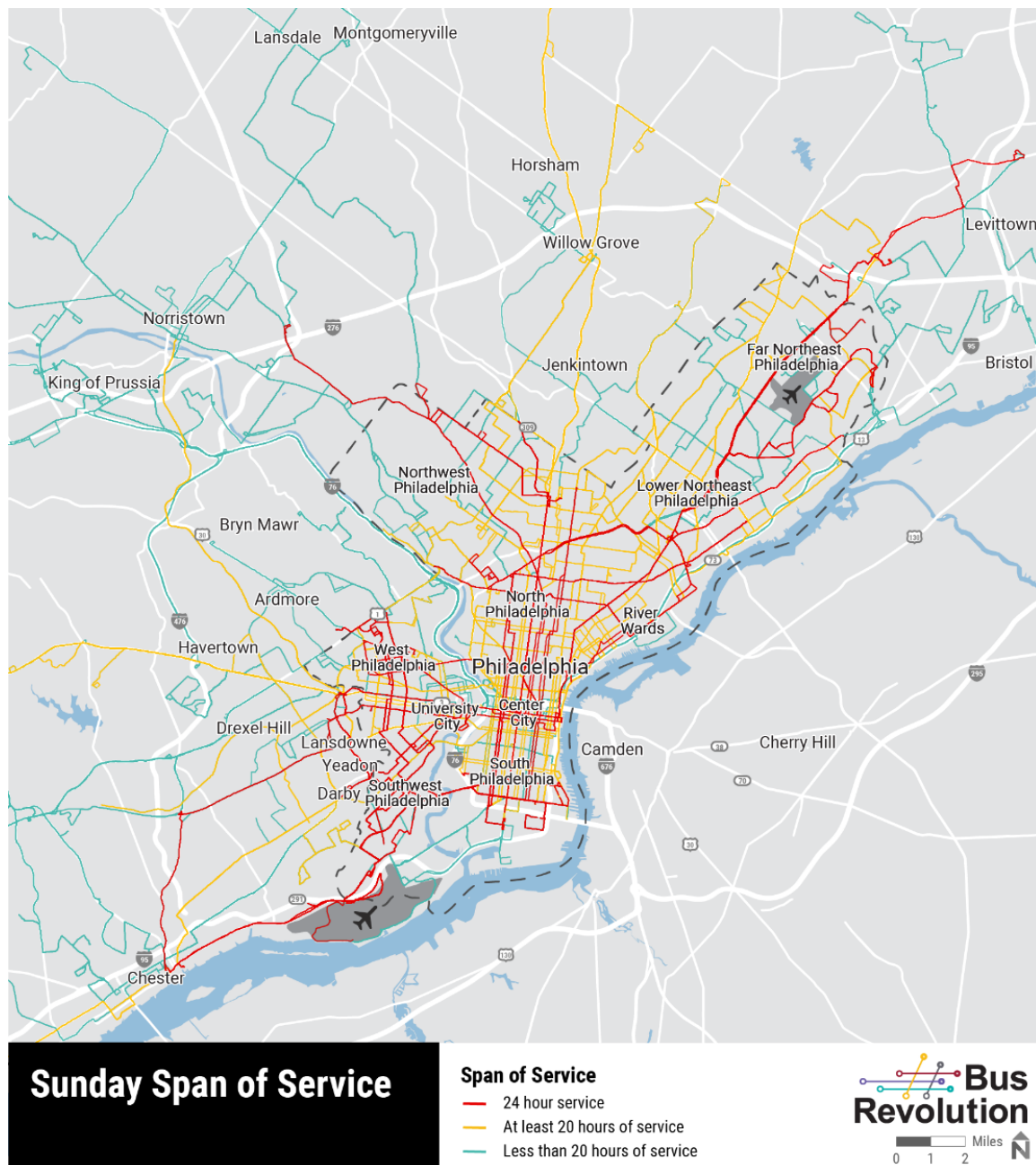
## Sundays

Nearly 80% of bus routes—99 of 125—run on Sundays:

- 20 bus routes provide service for 23 to 24 hours
- 52, including the 20 above, provide service for 20 or more hours a day
- 61 routes are in service before 5 AM and 34 before 4 AM

Spans are shorter on Sundays but still long.

**Figure 3-12 Span of Service for Routes with Sunday Service**







## 4 Bus Ridership and Transit Equity

Successful transit networks attract riders and give people equitable access to jobs, education, services, and other opportunities. This chapter discusses SEPTA's bus ridership, including trends before COVID to the present day. It also describes the equity impacts of SEPTA's bus network.

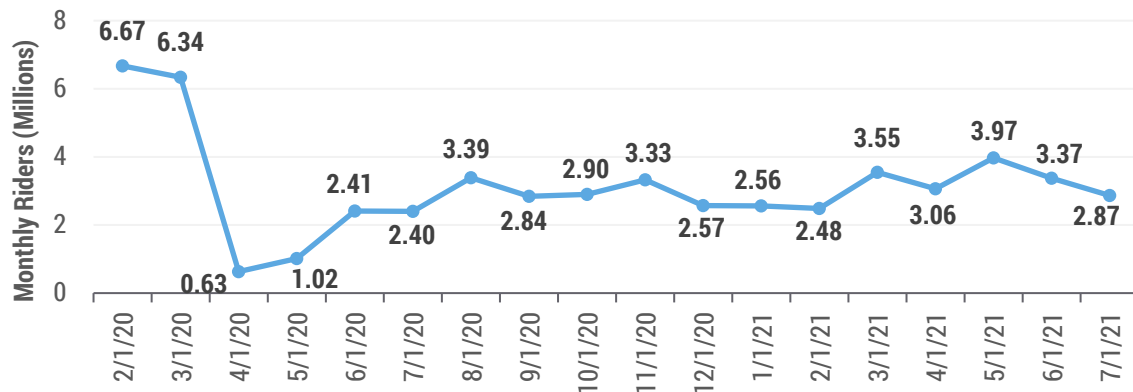
### BUS RIDERSHIP AND COVID-19

The COVID pandemic has had a significant impact on SEPTA's bus ridership. Before the pandemic, in the fall of 2019, SEPTA carried over 600,000 bus riders on an average weekday, 245,000 bus riders on an average Saturday, and nearly 200,000 riders on an average Sunday. COVID-19 caused large drops in ridership, especially in the early days of pandemic. After the initial impact of the pandemic subsided, some riders have returned to using SEPTA, albeit in smaller numbers and with different travel patterns.

By September 2020, monthly ridership was down by 58% from pre-pandemic levels. In the past year, ridership has since been increasing slowly but as the pandemic continues to arrive in waves, ridership has remained low. In July 2021, weekday ridership was still down by 48% relative to July 2019.

Ridership declined sharply due to the pandemic, but riders are starting to return.

Figure 4-1 Monthly Bus Ridership, February 2020 through July 2021



Source: SEPTA Pandemic Recovery Model

SEPTA has been analyzing the impact of COVID on ridership through rider surveys and forecasting tools, including scenario analysis. SEPTA's rider surveys show that bus services lost fewer riders than other SEPTA services, such as regional rail and the Norristown High Speed Line<sup>1</sup>. Surveys<sup>2</sup> also found that ridership losses are largely attributed to people traveling less overall. For example, survey data collected in May 2021, shows that 73% of pre-pandemic bus riders are traveling less overall and approximately 56% of employed riders were still working from home.

As the region recovers from the pandemic, it is not yet known how many former transit riders will return and how their use of transit may change. Ridership recovery modeling commissioned by SEPTA suggested that ridership would return to a "new normal" by late 2021 and early 2022. The new normal was loosely defined as ridership levels of about 85% of pre-pandemic levels. This modeling is consistent with similar efforts being undertaken by other transit systems. Ridership reductions reflect several factors, including that many will continue to work from home, at least part-time. In addition, based on current trends, many working hours will continue to be flexible, which will shift the hours that people travel. These changes will likely move demand away from traditional peak periods to the shoulders of the peaks rather than more dramatic changes such as from day to night.

Much of the analysis in this report uses fall 2019 as a base year, focusing on pre-pandemic travel patterns. Moving forward, the Bus Revolution will track ridership, and final service decisions take the most recent available data into account.

## Ridership by Time of Day

Before the pandemic (fall 2019), weekday ridership was most concentrated during traditional peak periods. Bus ridership during the AM and PM peaks was between 50% and 70% higher than during midday, and even higher than early morning, evening, and night ridership. By fall 2020, peak ridership was still higher than other periods, but to a much lesser degree. Indeed, peak ridership was only about 25% higher than midday ridership. The flattening of the travel peaks has been largely attributable to employees working from home. Workers are starting to return to offices. However, as of fall 2021, returning to in person work for many people has been slower than expected.

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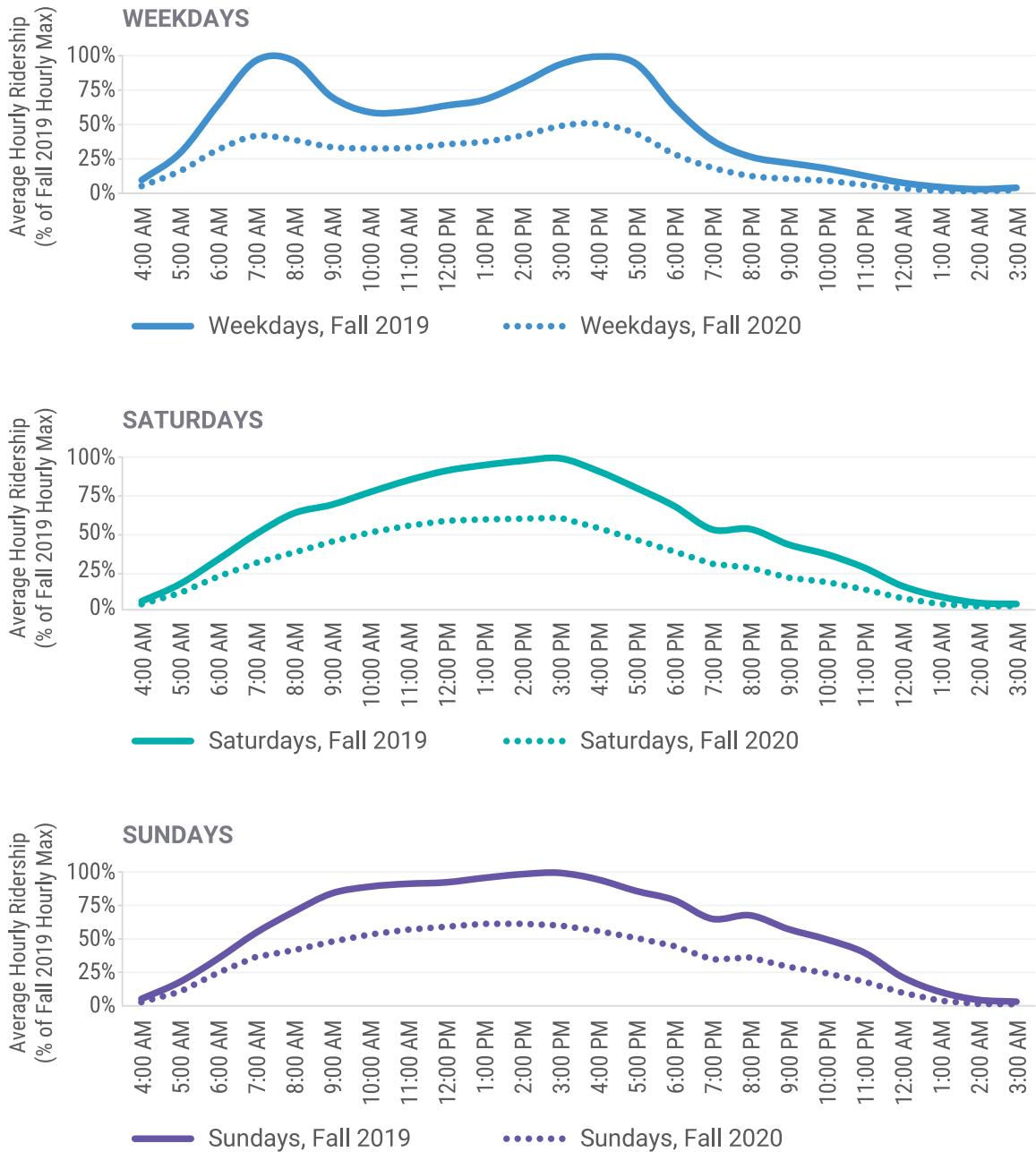
<sup>1</sup> SEPTA COVID-19 Travel Survey, August 19, 2020.

<sup>2</sup> COVID-19 Travel Survey: Winter 2021 (published in May 2021).

On Saturdays and Sundays, pre-pandemic transit ridership did not have the same peaking patterns as weekday service. Instead, ridership grew gradually from the start of service and peaked in late afternoon before gradually declined through the end of service. Throughout the pandemic, these patterns have held, but at lower ridership levels overall.

Pandemic-related ridership losses have been greatest during weekday peak periods.

**Figure 4-2 Bus Ridership per Hour, Weekdays, Saturdays, and Sundays, Fall 2019 versus Fall 2020**



## PRE-PANDEMIC (FALL 2019) RIDERSHIP

### Weekday Ridership

In the fall of 2019, SEPTA's bus services carried over 600,000 passengers per weekday. The highest ridership was in the City of Philadelphia, especially in the neighborhoods and communities surrounding and just outside of Center City.

Systemwide, the highest ridership locations are at major transfer points between rapid transit lines and other bus routes:

- The Frankford Transportation at the eastern end of the Market- Frankford Line
- The 69th Street Transportation Center at the western end of the Market-Frankford Line
- The Olney Transportation Center near the northern end of the Broad Street Line

Ridership is also very high to and from Center City but dispersed among many nearby stops rather than at a single location.

Ridership data shows that unlike in other U.S cities, no single corridor stands out as having particularly high ridership compared to others. Instead, there are 13 SEPTA bus routes that carry more than 10,000 bus riders a day traveling on several independent corridors, mostly through Center City—some of which are aligned closely together. High ridership routes demonstrate the importance of SEPTA's bus network in transporting people; the routes also underscore clear opportunities to improve service reliability and travel times for riders by prioritizing corridors and supporting them with transit priority treatments.

Outside Philadelphia, ridership is lower and more dispersed with notable clusters of ridership in King of Prussia, Norristown, and Chester and Willow Grove.

### Saturday and Sunday Ridership

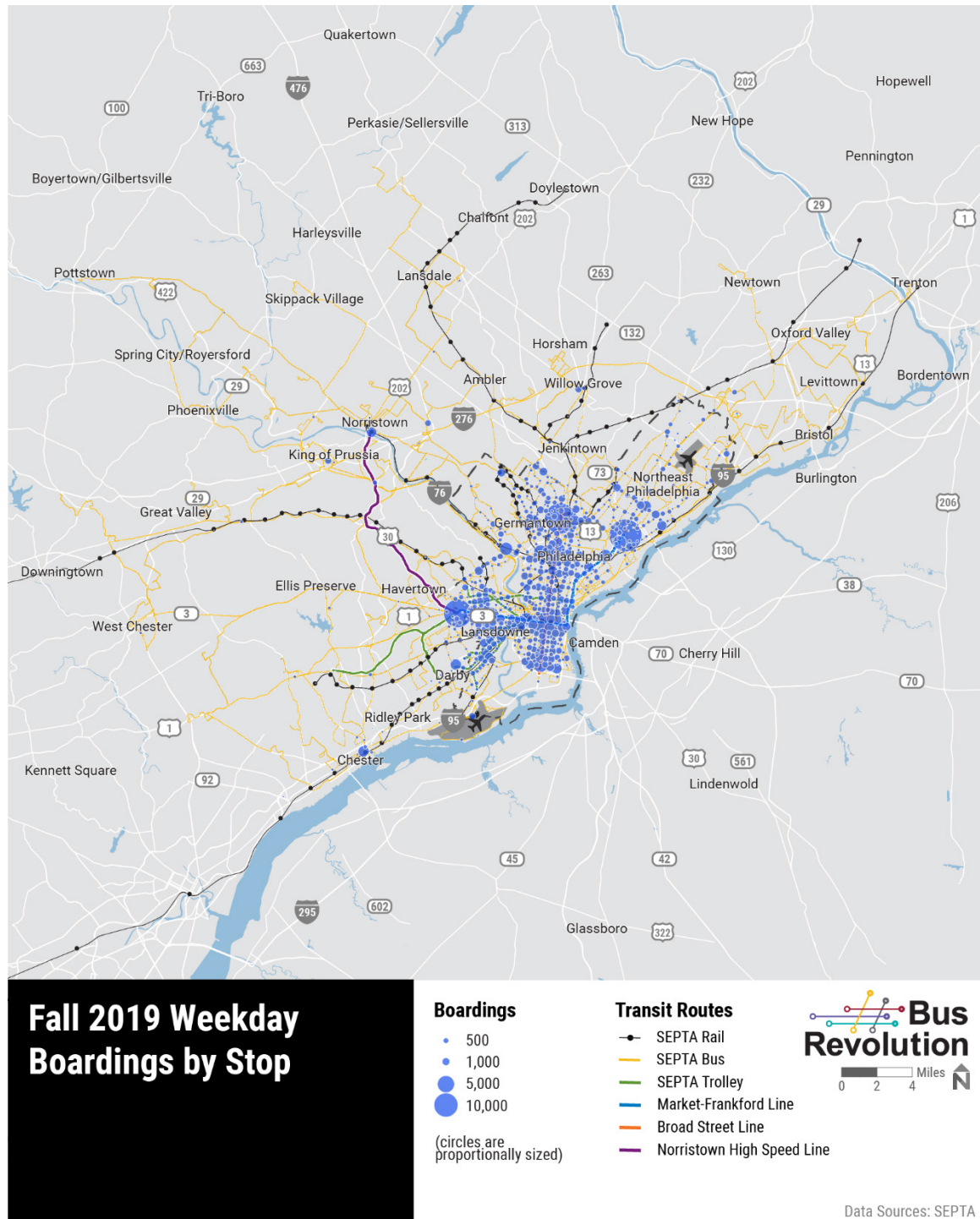
Average Saturday ridership was approximately 245,000, or 54% of weekday ridership, which is typical of many transit systems.

Sunday ridership averaged approximately 200,000, or 39% of weekday ridership. This is significantly higher than many other systems where Sunday ridership averages about 25% of weekday ridership.

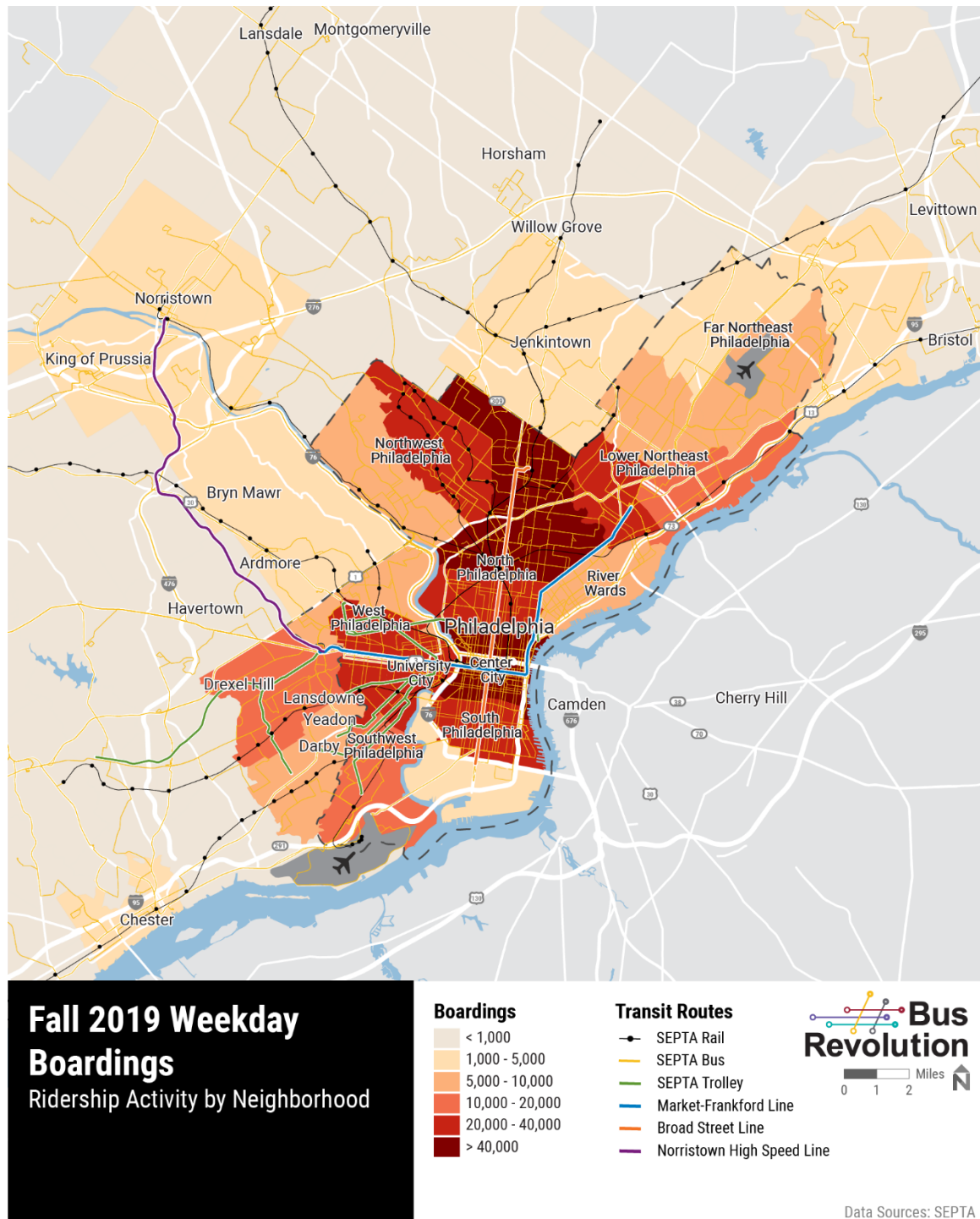
In terms of ridership by stop patterns, weekend daily ridership was similar to that of weekdays.

Ridership is much higher in Philadelphia than in outer areas.

**Figure 4-3 Weekday Boardings by Stop, Fall 2019**



**Figure 4-4 Weekday Ridership Activity by Neighborhood**





## Ridership by Route

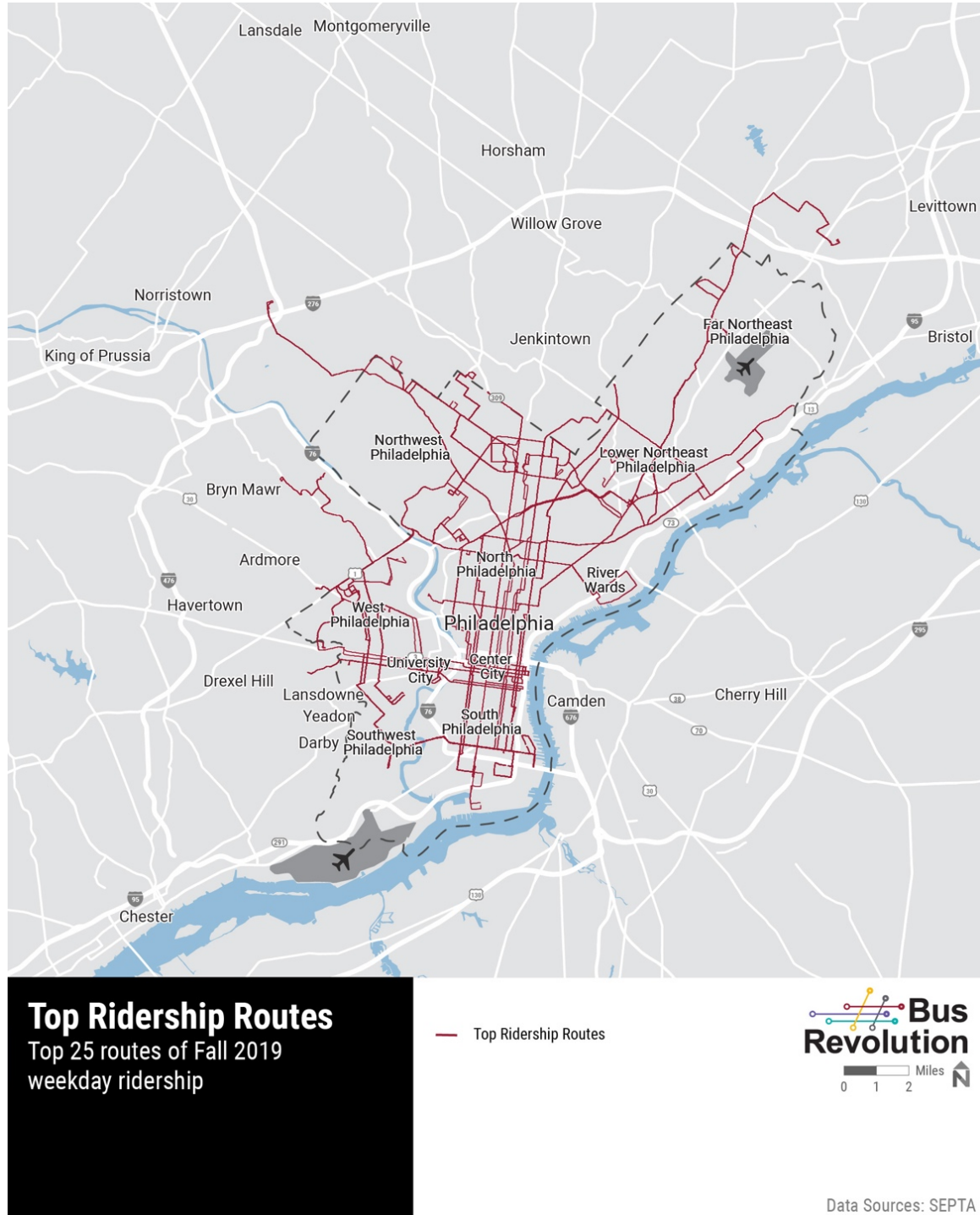
In the fall of 2019, ridership by route varied from a high of 17,800 on Route 47 Whitman Plaza to 5th-Godfrey to a low of 75 on Route 78 Express Cornwells Heights to Center City. These variations reflect different factors including the level of investment in the route (frequency and span of service) plus other factors, such as location and route design.

Twenty-five SEPTA bus routes carried approximately 50% of all bus riders; these 25 high ridership routes carry all or most of their riders within the City of Philadelphia.

In general, routes that carry the most riders also have the most frequent service, reflecting the greatest investment in the most productive bus routes.

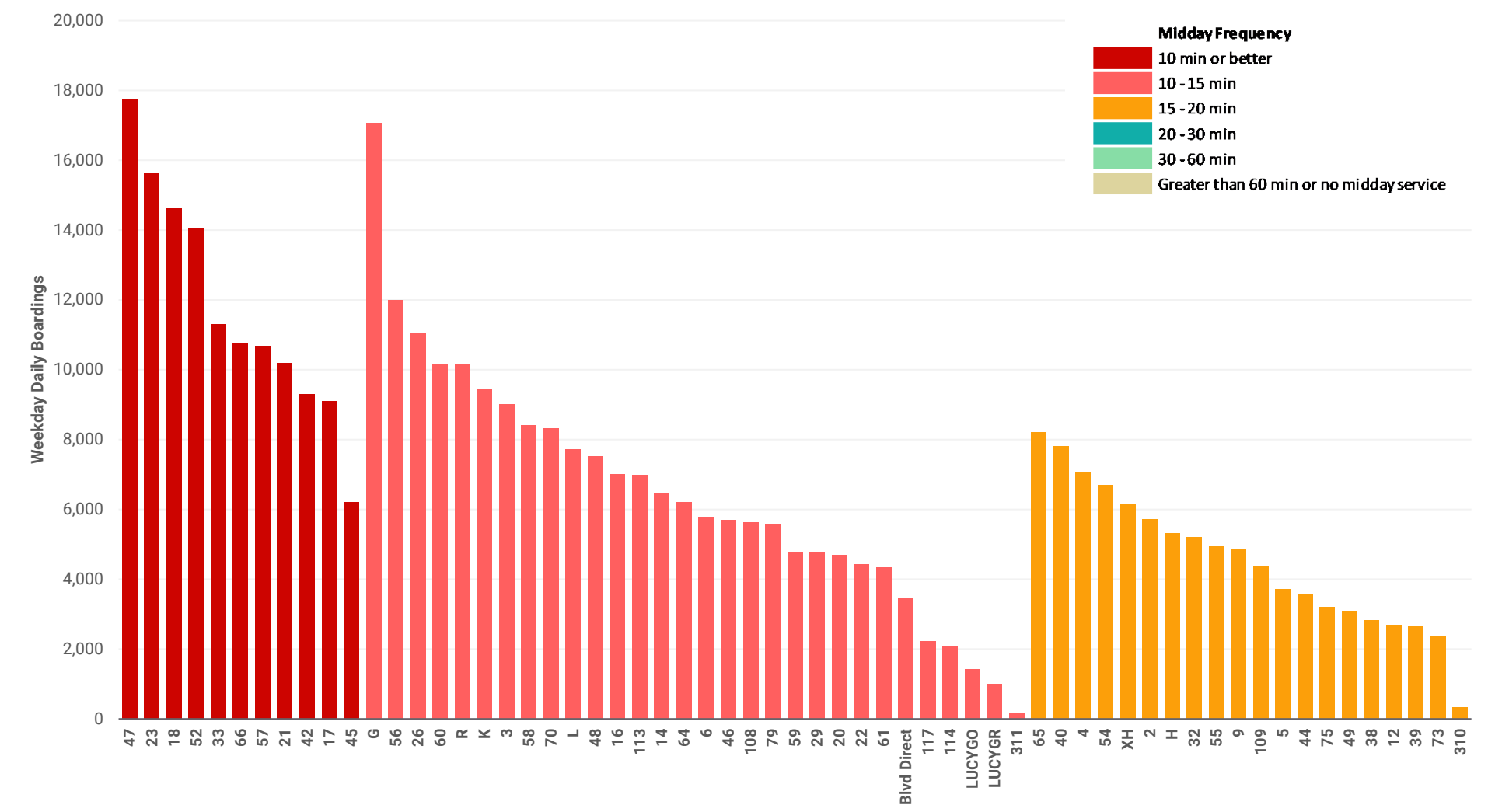
All of SEPTA's highest ridership routes operate in Philadelphia, with some service extending beyond.

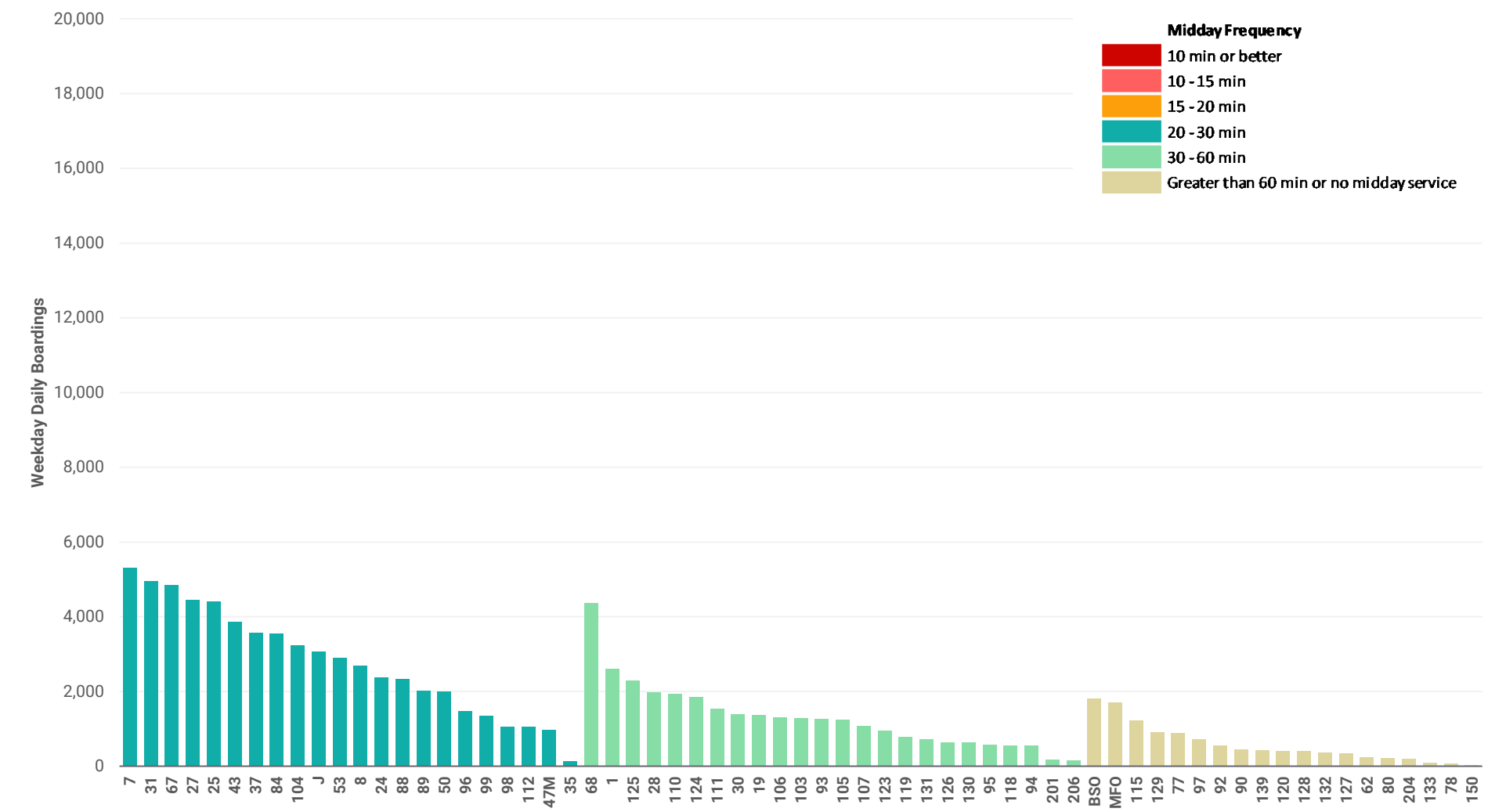
**Figure 4-5 Top 25 Routes by Weekday Ridership, Fall 2019**



Ridership levels and service frequencies generally match, but not always.

Figure 4-6 Weekday Daily Boardings by Route and Frequency, Fall 2019 (Continued on Next Page)





## Transfers

SEPTA's transit network allows people to transfer to reach a variety of locations. Transfers are made throughout Philadelphia and at key suburban locations.

As with ridership, transfer volumes are highest in Philadelphia, particularly along the Broad Street and Market-Frankford Lines. There are several other locations outside of Philadelphia with considerable transfer activity, including at the Norristown Transportation Center and bus stops in and around King of Prussia. Other important transfer stops include Chester and Darby Transportation Centers as well as bus stops at Willow Grove, and Bensalem.

In addition to the above rail stations, there are many other locations with very high volumes of bus-to-bus transfers (Figure 4-1).

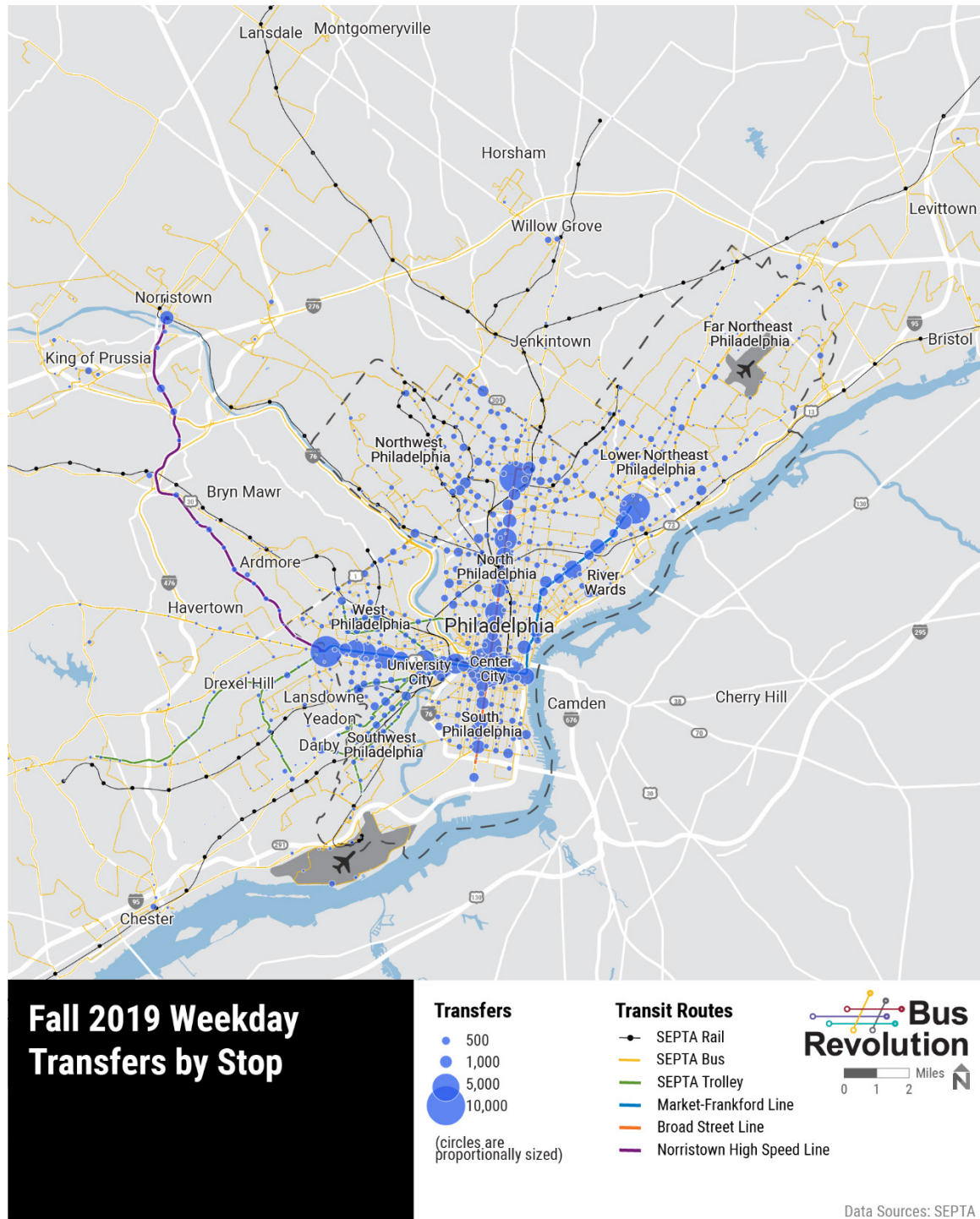
**Figure 4-7 Locations with High Bus-to-Bus Transfer Volumes**

Stop Location	Routes Served
5th Street at Olney Avenue	18, 26, 47
Chelten Avenue at Germantown Avenue	23, 26, 65, HRS, J, K
Chelten Avenue at Greene Street	26, 65, H, HRS, J, K, XH
Cheltenham Avenue at Ogontz Avenue	6, 16, 22, 80, H, XH
Frankford Avenue at Cottman Avenue	66, 70
Hunting Park Avenue at Wissahickon Avenue	1, 56, H, HRS, R, XH
JFK Boulevard & 15th Street	17, 27, 31, 32, 33, 38, 44, 62, 78, 124, 125, HRS
Oregon Avenue at 5th Street	7, 47, 47M, G
King of Prussia Transit Center	92, 99, 123, 124, 125, 139
Roosevelt Boulevard at Cottman Avenue	1, 14, 20, 50, 70, 77, AFL, BLVDDIR
Torresdale Avenue at Cottman Avenue	28, 56, 70, 84, 88S

Outside of Center City, stops where two or more routes connect and transfers occur are typically the highest ridership stops.

The largest numbers of bus transfers are made at Rapid Transit Stations.

**Figure 4-8 Weekday Transfers (All Modes) by Stop, Fall 2019**





## TRANSIT EQUITY

### *SEPTA's transit network provides equitable service, but slow service limits the network's impact.*

Public transit provides access to opportunities at a low cost and connects people to activity centers, regardless of car ownership. As a result, it helps make communities more inclusive and equitable. Transit Center<sup>3</sup>, a nonprofit research organization devoted to defines transit equity according to a handful of data points, three of which are relevant for the Bus Revolution:

- **Access to Destinations on Transit** looks at travel times for people in poverty and the amount of time it takes them to reach key destinations (colleges, hospitals, and grocery stores), including the differences in travel times between transit and other travel options, like driving.
- **Access to jobs** measures the number of jobs reachable in 45 minutes by transit.
- **Transit Service Intensity** refers to the number of hourly transit trips (on average) serving people near<sup>4</sup> their homes.

Transit Center calculated these measures for several major U.S. transit systems, including SEPTA, and found that “unlike most large regions, SEPTA (and Southeast Pennsylvania) offers greater access to opportunities for Black Indigenous People of Color (BIPOC) residents than for white residents.”<sup>5</sup> In summary, the Transit Center found that BIPOC residents were provided with higher levels of “transit intensity,” or the number of hourly transit trips nearby, the number of jobs accessible within 45 minutes and times to access groceries and hospitals.

However, the same report also found that SEPTA travel times to a variety of services take much longer than by car—to some over three times as long. In this sense, improvements that make service faster will also make it more equitable as time wasted in transit represents wasted opportunities—opportunities to do things that are more productive, more necessary, and more fun. Data shows that people with low incomes spend more time waiting for all types of services. Low-income neighborhoods often have fewer services and in cases where services exist, they often are more crowded and/or have fewer staff. Further, low-wage jobs often have rigid hours, which make it more difficult to run errands at off-peak times. In the United States, because income and race are so closely correlated, Black and brown people wait more than their white counterparts<sup>6</sup>.

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<sup>3</sup> TransitCenter (<https://transitcenter.org/>) is a nonprofit organization working to improve transit with the goal of making cities more just and environmentally sustainable.

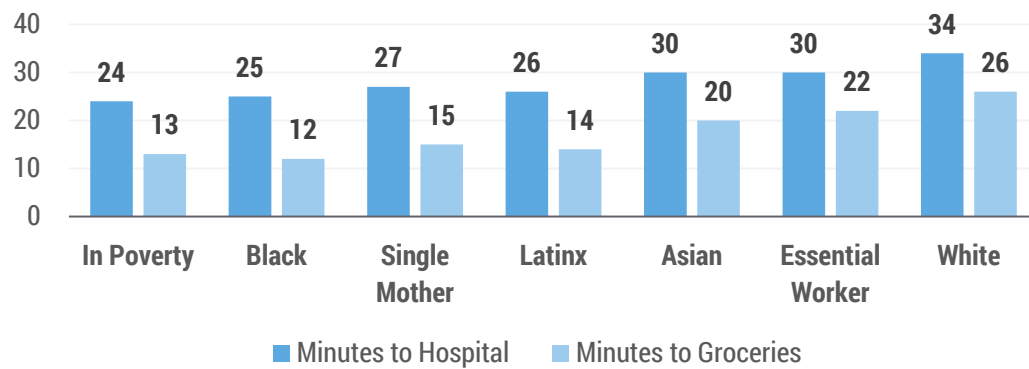
<sup>4</sup> Near refers to trips within a census block group.

<sup>5</sup> <https://dashboard.transitcenter.org>

<sup>6</sup> Black Americans spend more of the day being kept waiting, The Economist, May 8, 2021.

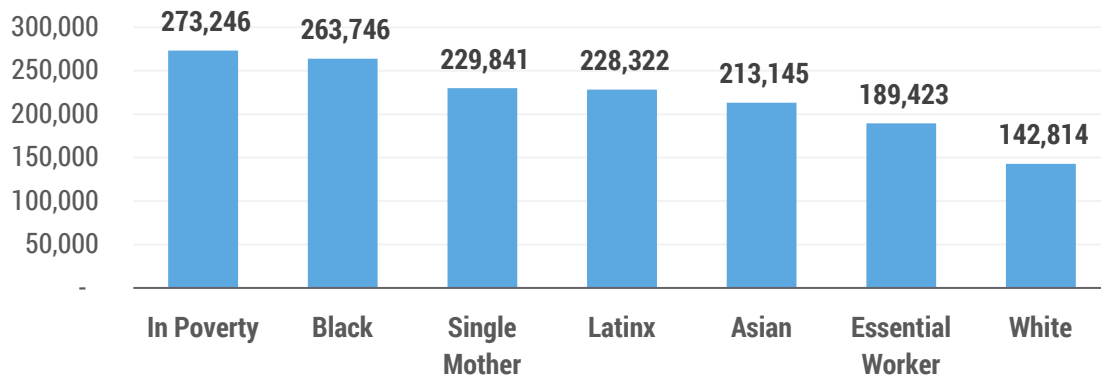
In this respect, faster services will provide access to more opportunities, which will be particularly important to Southeastern Pennsylvania's disadvantaged residents.

**Figure 4-9 Travel Time by SEPTA (in Minutes) to Essential Services by Demographic Group**



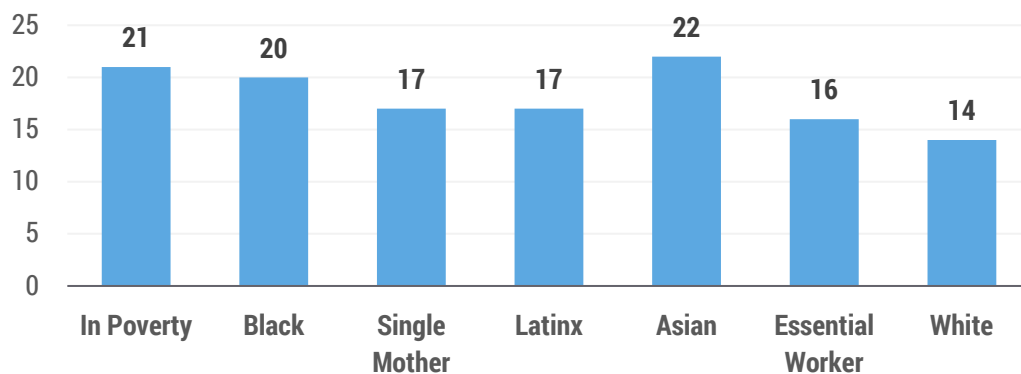
Source: Transit Center

**Figure 4-10 Jobs Accessible by SEPTA within 45 Minutes by Demographic Group**



Source: Transit Center

**Figure 4-11 SEPTA Transit Service Intensity/Hourly Transit Trips Serving People Near their Homes by Demographic Group**



Source: Transit Center

# 5 Transit Speed and Reliability

The ability to provide fast and reliable travel is fundamental to the success of SEPTA's bus system. This chapter assesses travel speeds, on-time performance, and other measures of reliability for SEPTA's bus network.

## OVERVIEW

*Speed and reliability improvements are critical to improving bus service.*

Along with the frequency and span of service, speed and reliability are important attributes of transit service. Bus riders want to know how long it will take for them to get to their destination so they can plan their trip and be assured they will arrive on time. Speed is important because bus riders want to reach their destination quickly.

Many factors delaying buses are outside SEPTA's control, such as traffic congestion and construction. Nonetheless, transit agencies can improve speed and reliability. The Bus Revolution focuses on understanding what is within SEPTA's control and identifies strategies to address these factors. In some cases, SEPTA will need to work with partners and local jurisdictions.

For SEPTA and the City of Philadelphia, many factors make buses slow and unpredictable.

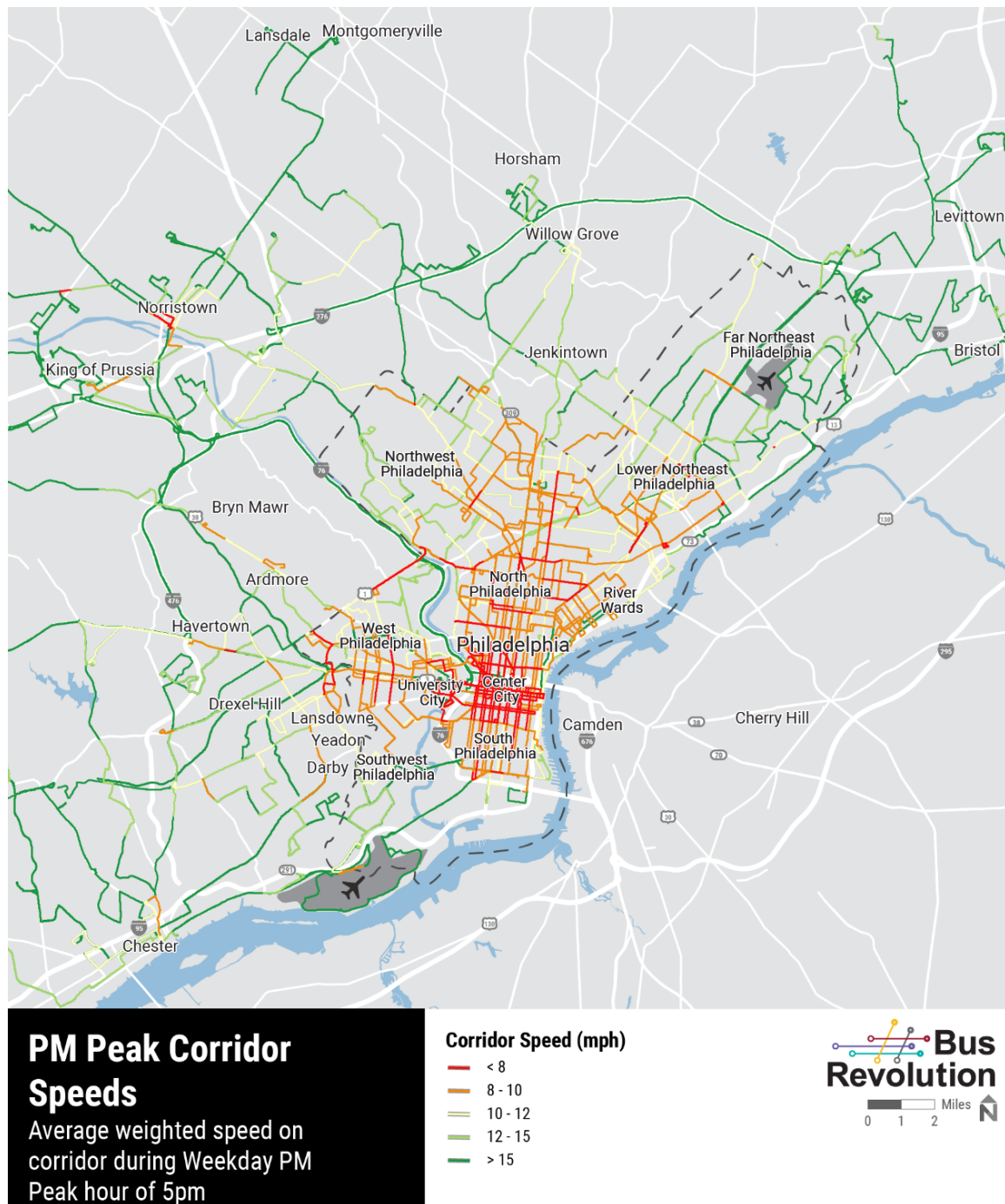
- **Philadelphia's narrow streets are difficult to navigate.** Roads are also often blocked by delivery trucks and double-parked cars.
- **Traffic congestion slows down buses and is unpredictable,** especially in Philadelphia. Traffic can be better or worse depending on the day and hour.
- **Bus stops that are too close together require buses to stop almost every block.** Closely spaced stops also produce irregular stopping patterns and bus bunching.
- **Many key bus routes operate on roadways that have four way stops or a traffic signal at every intersection, or almost every intersection** forcing buses to stop very frequently.
- **Southeastern Pennsylvania has lagged other regions in implementing transit priority measures** such as bus lanes, queue jump lanes, and transit signal priority.
- **Many routes are long,** increasing more opportunities for delays.
- **Many routes have circuitous alignments.** Bus routes that travel on smaller streets and make several turns result in trips that are longer and harder to keep on time.

## OPERATING SPEEDS

*Half of SEPTA's highest ridership routes operate at less than 10 mph.*

*Speeds are slowest in and around Center City.*

**Figure 5-1 Average Speed by Corridor, PM Peak**



Sources: SEPTA, Swiftly

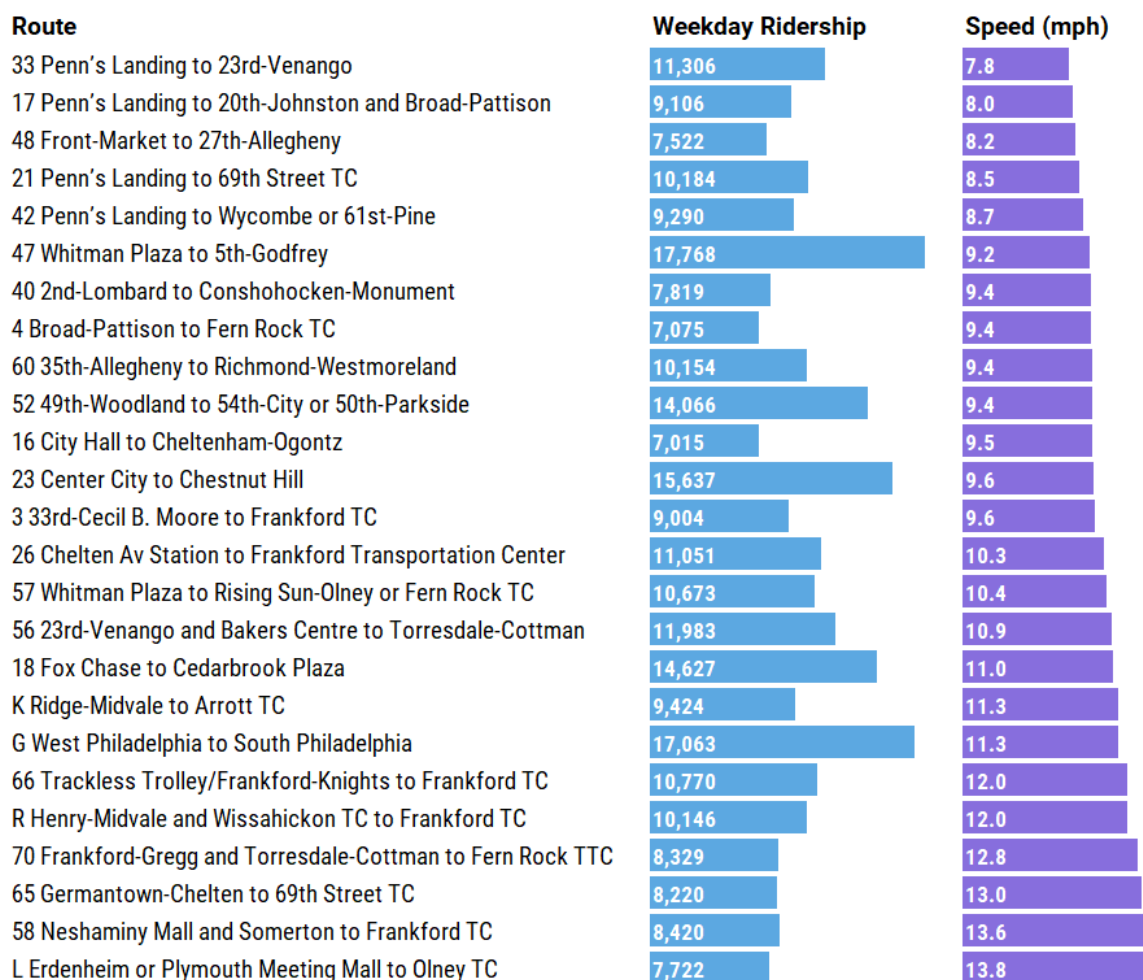
SEPTA's average operating speeds range from very slow to fast. The greatest number of routes have average travel speeds between 15 mph to 19 mph, which is good for local bus routes. However, the second largest number of routes average 10 to 12 mph, which is slow. Many buses average less than 10 mph, which is very slow.

Bus speeds are largely determined by the operating environment, including posted speed limits and local conditions. Bus speeds can also vary along different parts of a route with buses getting caught up at certain intersections or segments. Overall, speeds are slowest in Philadelphia, particularly in Center City and adjacent neighborhoods. On average, bus speeds are much faster in the suburban parts of SEPTA's service area.

Because SEPTA's bus speeds are slowest within the City of Philadelphia, slow speeds disproportionately affect the highest ridership routes. In the fall of 2019, bus routes that carried over 7,000 passengers—on average—moved at speeds ranging from 8.2 mph to 13.8 mph. Half of SEPTA's highest ridership routes operated with speeds of less than 10 mph.

Many of SEPTA's slowest bus routes are ones that riders use the most.

**Figure 5-2 Average Weekday Ridership and Speed by Route**





## SERVICE RELIABILITY

### On-Time Performance

One of the common transit industry measures of reliability is on-time performance. SEPTA set a goal that 80% of bus trips should be on-time. The following section explores SEPTA's on-time performance using the industry standard<sup>1</sup> for when a bus is on-time performance (between one minute early and up five minutes late) and SEPTA's expectation that 80% of buses should be on-time.

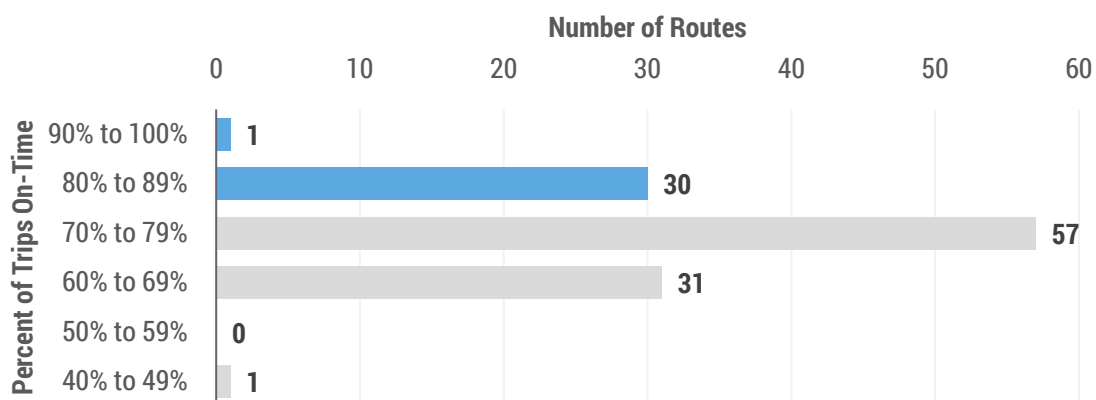
***Only one quarter of SEPTA bus routes meet the agency's 80% on-time performance standard.***

Like slow travel speeds, on-time performance is generally worst on routes that carry the most passengers. In the fall of 2019, SEPTA had 25 routes with 7,000 passengers or more per weekday. Combined, these 25 routes carried 50% of all SEPTA bus riders. On-time performance on these routes was generally between 65% and 75%, meaning more than half of SEPTA bus riders travel on routes with sub-standard on-time performance.

Improving bus speeds and service reliability is an important part of strengthening SEPTA's bus network. One step would be to adjust bus schedules and timetables to better reflect actual travel times. While this step does not make bus service faster, it would better communicate bus arrival times to riders, make service more reliable and improve on-time performance.

***In the fall of 2019, only 31 routes met SEPTA's 80% on-time performance standard.***

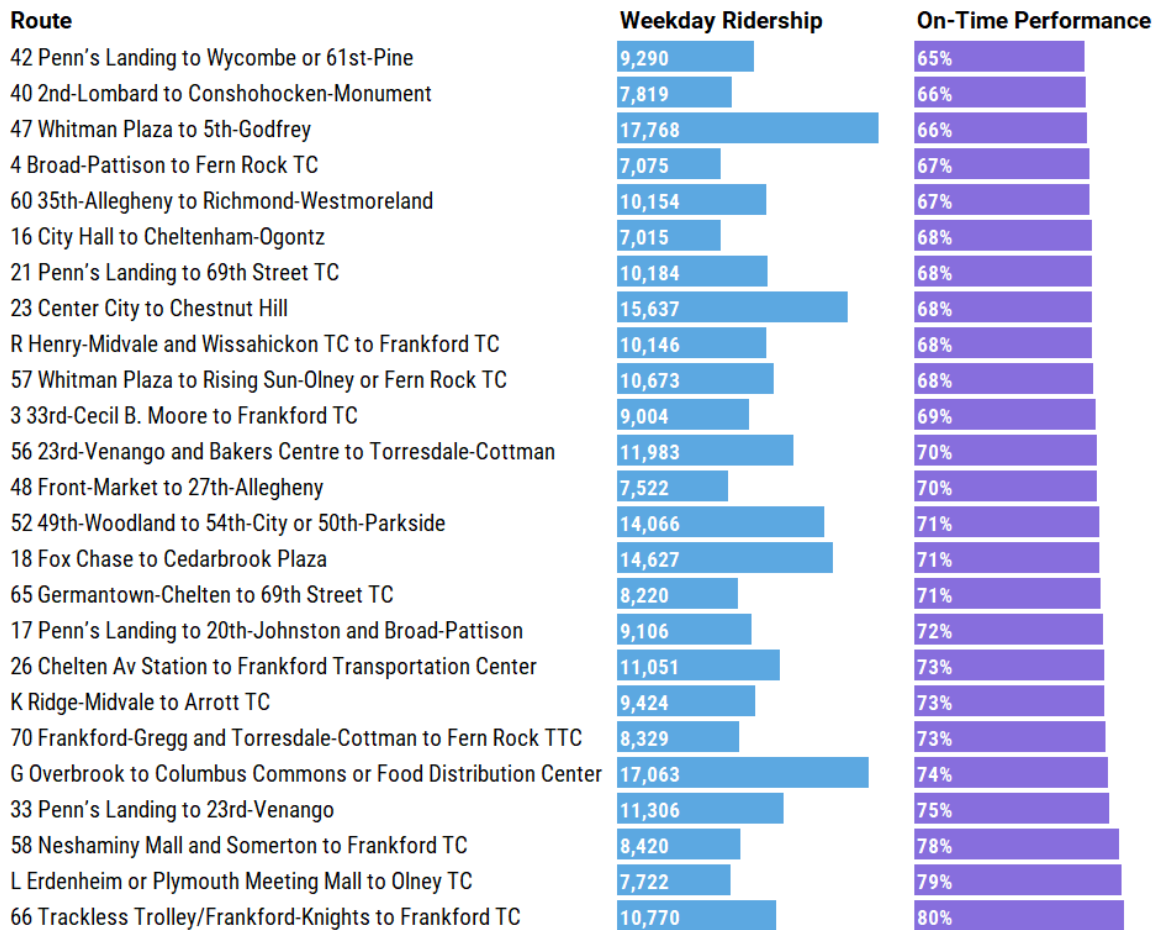
**Figure 5-3 Percent of Trips On-Time by Number of Routes**



<sup>1</sup> Transit agencies using the on-time performance standard of no more than one minute early and up to five minutes late for bus routes include (for example) Connecticut Transit (Hartford CT), King County Metro (Seattle, WA), TriMet (Portland, OR).

None of SEPTA's high ridership bus routes meet SEPTA's standard for on-time performance.

**Figure 5-4 Average Weekday Ridership and On-Time Performance by Route**



## Bus Bunching

Another indicator of service reliability is whether riders experience bus bunching. This occurs when riders wait longer than scheduled for their bus to arrive (gapping), only to then have several buses on the same route show up at once (bunching). Systemwide, SEPTA has almost as many early bus trips as late trips.

Bus bunching occurs for a variety of reasons, including traffic congestion as well as other operational challenges. SEPTA buses also bunch because of closely spaced stops and the number of traffic controls (stop signs, traffic signals) at roadway intersections. A bus that serves more stops and hits more red lights will run late, while those that serve fewer stops and hit more green lights will run early.

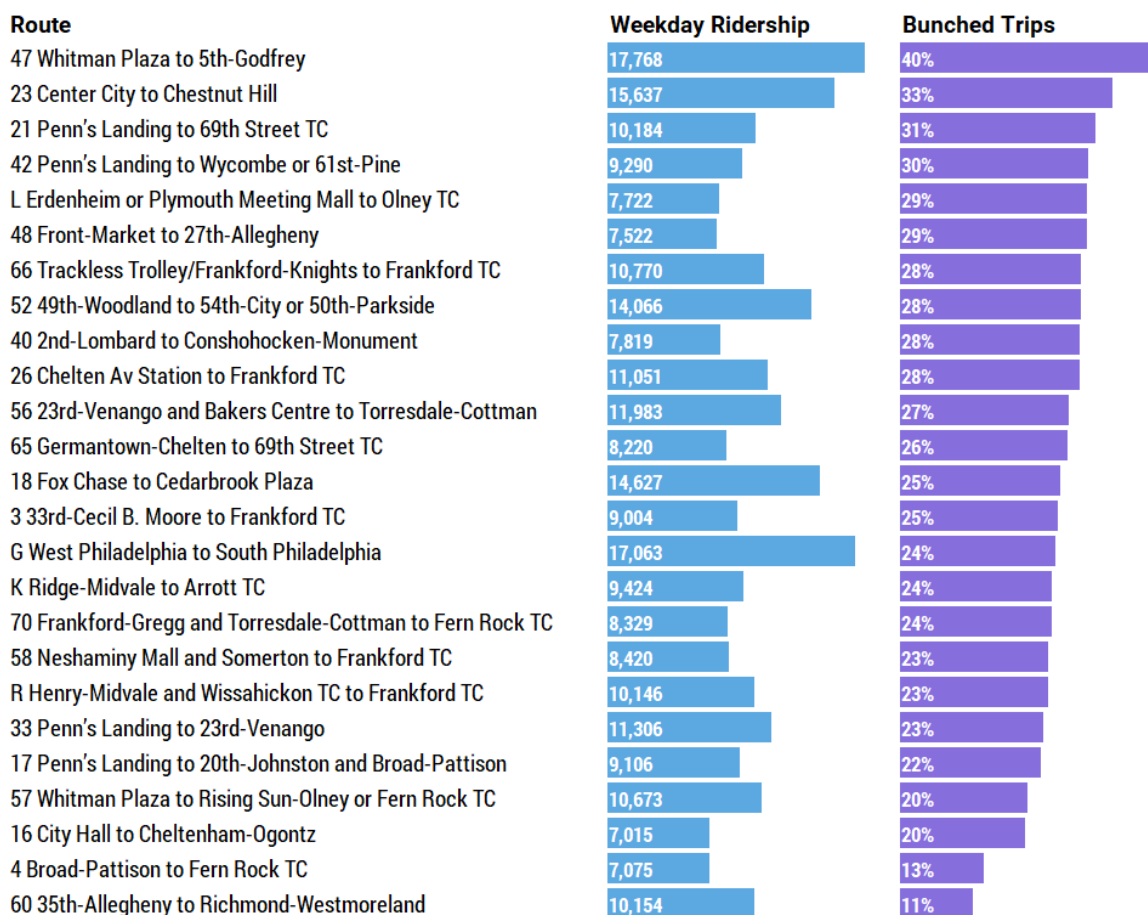
# 43%

of all weekday trips experienced bus bunching in the fall of 2019

# 60%

of bus trips are affected by bus bunching during the PM peak, when bunching is more severe

**Figure 5-5 Average Weekday Ridership and Bus Bunching by Route**



## Dropped Trips

Another factor impacting service reliability is “dropped trips”. SEPTA often does not have enough drivers to meet its daily service schedule. The lack of drivers reflects a shortage of qualified drivers nationally, as well as a variety of factors such as unscheduled operator absences. When there is a shortage of drivers, SEPTA dispatchers must reassign or drop trips to fill gaps created by a missing driver. In fall, 2019, dropped trips account for 2% of all SEPTA bus trips, significantly affecting service reliability and on-time performance across the system.

Dropped trips are often pulled from higher-frequency routes, assuming this will minimize the impacts on passengers since wait times for the next bus are shortest on frequent routes. However, the routes with the most frequent service are also often the most crowded and dropped trips can exacerbate conditions on these routes as more passengers try to crowd onto fewer buses. More passengers boarding a bus slows boarding times, which slows service and causes a cascade of delays along the route.





## 6 Issues and Opportunities

This report evaluates SEPTA's bus network from a system perspective. Previous chapters review the fundamental characteristics of the bus network—how it is designed and how it operates—and identifies system strengths and weaknesses. This chapter outlines opportunities to improve SEPTA's bus network focusing on strategies to strengthen the network overall.

### OVERVIEW

***SEPTA's bus network is impressive in many respects and there are opportunities to build on these strengths to create a more responsive and effective network.***

### Strengths

SEPTA's bus network has many strengths:

- Service is provided in nearly all places where there is demand, many routes provide frequent service.
- The network as a whole operates for long hours on most days of the week.
- SEPTA's bus services are also operated equitably—service is concentrated in the region's highest need neighborhoods and accessible to low-income residents.
- Through connections with rapid transit, the Norristown High Speed Line, trolleys, Regional Rail, and other bus routes, SEPTA riders can travel extensively throughout the region.

## Challenges

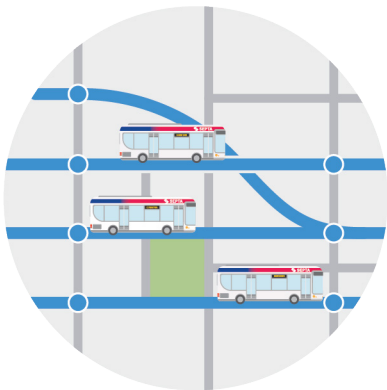
At the same time, SEPTA's bus network has significant challenges:



**SEPTA's bus network struggles with service speed and reliability.** Many of SEPTA's bus routes—especially in the City of Philadelphia and including some of the network's highest ridership routes—have very slow operating speeds and poor on-time performance. Some of the issues impacting service speed and reliability, such as traffic congestion and intersection controls are out of SEPTA's control. But other issues, like bus stop spacing and the way individual bus routes are designed and operated, are within SEPTA's control.



**SEPTA's bus network lacks a hierarchy or formal structure.** Too much of the network is operated as "regular" local bus service that doesn't prioritize routes with increased frequencies, better speeds, and more reliability. The lack of a network hierarchy makes it difficult for SEPTA to communicate the network to riders. It also makes it difficult for SEPTA to communicate with partners and other stakeholders about their priorities and needs for transit priority infrastructure.

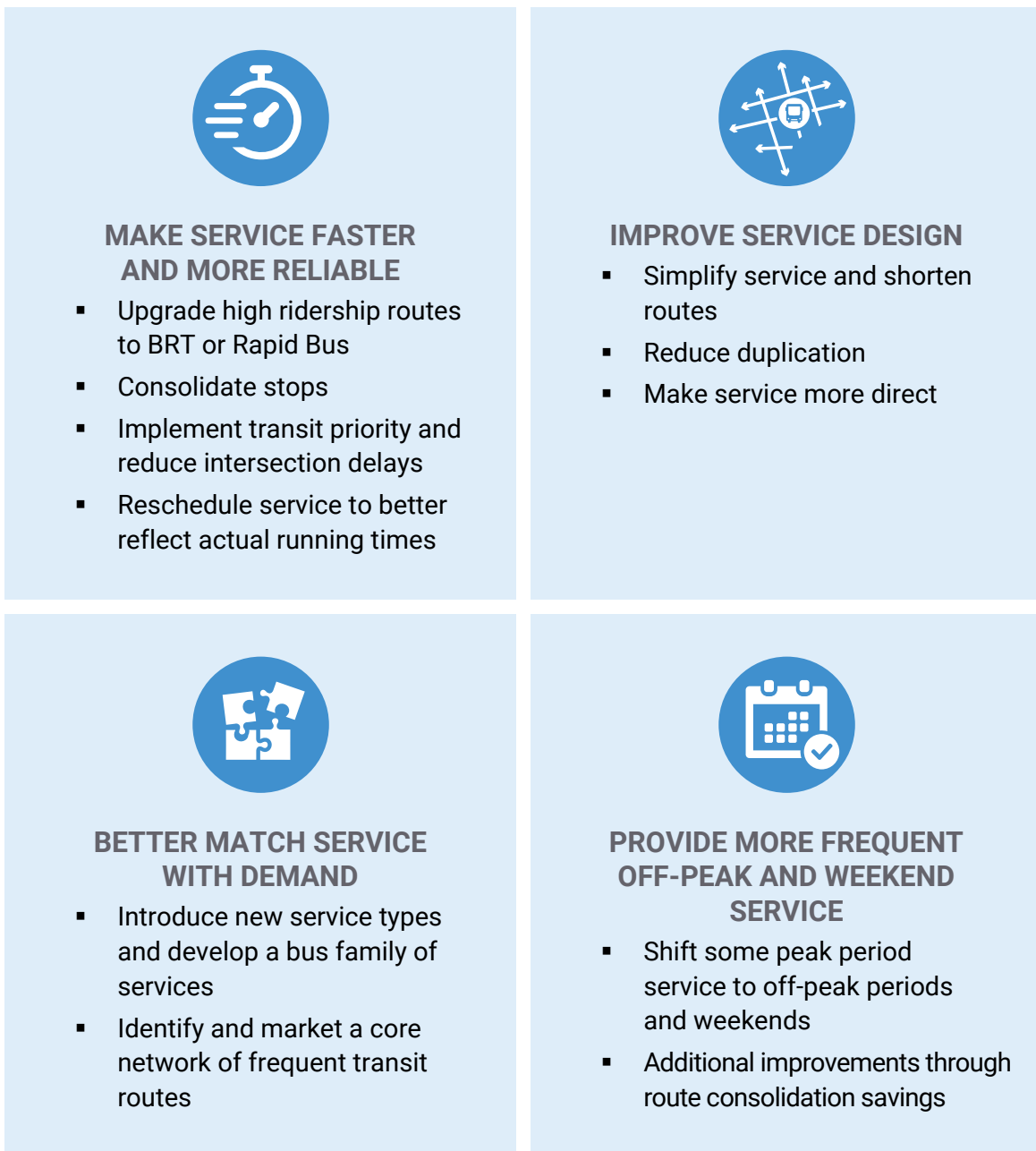


**SEPTA's bus network has a lot of duplication.** Some duplication results from implicit policies that prioritize short walks to a bus route over creating a network with structure and choice. As a result, many of SEPTA's local bus routes—especially in the City of Philadelphia—operate on parallel corridors that are only a handful of blocks apart. These routes offer similar services, compete for riders, and don't maximize SEPTA's investment. Route duplication also makes it difficult to prioritize investments in increased service levels and transit priority measures.

## Opportunities

A summary of opportunities is provided in Figure 6-1 with more detail in subsequent sections. Many of them are consistent with the recommendations identified in the City of Philadelphia's Transit Plan published in early 2021.

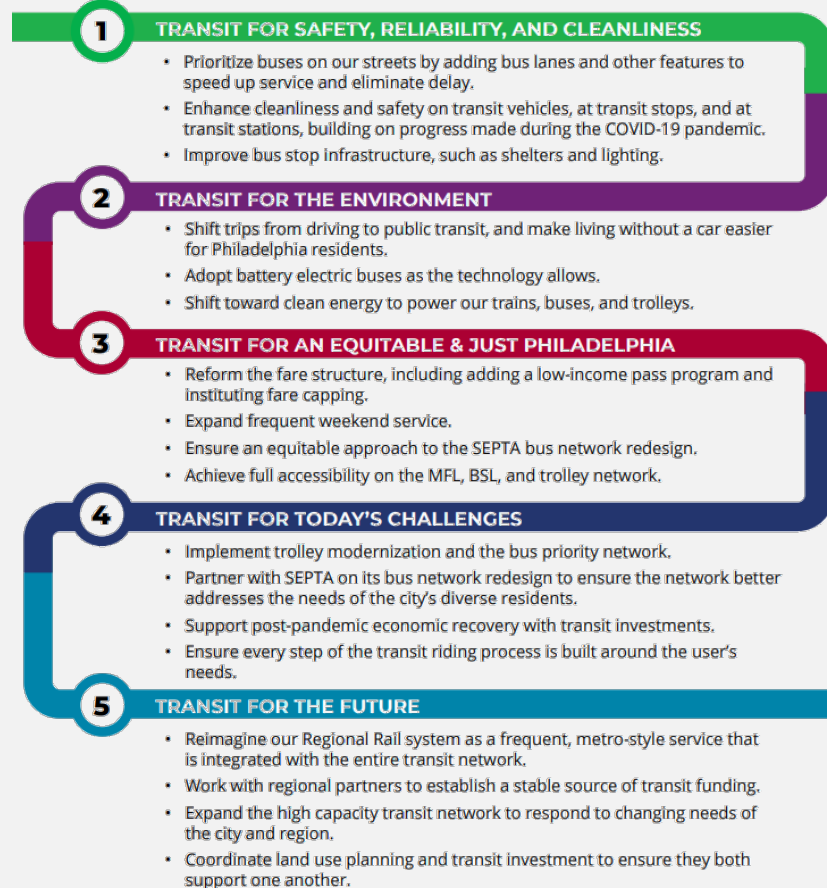
**Figure 6-1 Major Opportunities**



## Philadelphia Transit Plan

In February 2021, the City of Philadelphia released the Philadelphia Transit Plan. This plan was developed to “create a more equitable, safe, accessible, comfortable, affordable, and sustainable transit system to connect a recovered, reimagined Philadelphia.” The plan includes several goals and strategies:

### GOALS & STRATEGIES



The city also developed metrics to measure success, and bus-related measures are:

- Increase transit ridership in Philadelphia by 10% vs. the national trend
- Increase jobs accessible by transit within 30 minutes at noon by 10%
- Increase jobs accessible by transit within 30 minutes at noon for the average non-white resident by 15%
- Increase the number of residents living within 0.25 miles of frequent transit by 10%
- Increase average bus speeds by 10%

While specific goals and implementation metrics for the Bus Revolution have not yet been developed, it is clear that SEPTA and the city share a common vision, and by working together, the Bus Revolution should be able achieve the city's metrics.



## MAKE SERVICE FASTER AND MORE RELIABLE

*Speed and reliability improvements are critical to providing higher quality service.*

The most frequent complaints about SEPTA's bus service are that it is slow and unreliable. These complaints reflect both tangible systemic challenges and rider experiences: SEPTA's bus service is slow and on-time performance is poor.

Speed improvements are important for two reasons: (1) people want to get places faster, and (2) slower service means less access to opportunities and activities. When it takes too long to get somewhere by transit, people will use other modes or for many people, opportunities and activities are out of reach.

Speed and reliability often determine whether people will choose to use the bus or use another form of transportation. Improvements to make service faster and more reliable will improve the lives of existing riders and attract more people to transit.

### **What causes slow and unreliable service?**

Problems with slow and unreliable service have many causes:

- SEPTA buses operate in one of the most difficult operating environments in the United States with narrow streets that are difficult to navigate and often blocked.
- Congestion is not only challenging, but also varies from hour to hour and day to day, making running times highly variable.
- Bus stops are spaced close together. Closely spaced bus stops slow down bus service and irregular stopping patterns make buses unreliable.
- Many streets have four way stops or a traffic signal at nearly every intersection. This forces buses to stop very often, regardless of whether anyone is getting on or off.
- Southeastern Pennsylvania has lagged other regions in implementing transit priority measures such as bus lanes, queue jump lanes, and transit signal priority. Transit priority, when implemented well, is the best way to make service faster and more reliable, especially when the technology is used to prioritize person throughput rather than vehicles.
- Many routes are very long. Long routes mean more opportunities for delays. It is also difficult for buses to recover from delays on long routes.



### How can service be made faster and more reliable?

Just as there is no single reason that SEPTA's bus services are slow and unreliable, there are no easy fixes, and many different actions will be needed. These include:

- Investing in transit priority features on key corridors.
- Consolidating bus stops. If passengers are willing to travel an extra one-half block to bus stops, service can become faster and more reliable.
- Increasing the region's focus on transit priority to alleviate the impacts of congestion in areas served by high volume local bus routes:
  - The conversion of four-way stops to two-way or to signalized intersections
- Rescheduling bus service to better match current running times.

Also important, SEPTA cannot make bus service faster and more reliable alone. Instead, many of the opportunities to improve speed and reliability require help from the communities where buses operate, especially the City of Philadelphia and the Pennsylvania Department of Transportation (PennDOT). Indeed, the City of Philadelphia developed a bus prioritization toolkit as part of its Transit Plan. A key strategy to making bus service faster and more reliable will be stronger and closer partnerships.

**SEPTA will need help from the communities it serves to make service more reliable and faster.**

**Figure 6-2 Roles for Different Types of Transit Improvements**

Effort	SEPTA	Communities
Service upgrades to BRT and Rapid Bus	✓	✓
Development of transit priority	✓	✓
Stop consolidation	✓	
Bus bulbs/curb extensions	✓	✓
Intersection improvements	✓	✓
More direct alignments	✓	
Scheduling improvements	✓	

## Upgrade High Ridership Routes to BRT and Rapid Bus

***Upgrading SEPTA's highest ridership bus routes to BRT or Rapid Bus can dramatically improve speed and reliability.***

Since the late 1990s, cities around the world have developed BRT services, which create rail-like transit service, but with buses. BRT gained success because it provided a strategy to advance high capacity transit at a lower cost and typically in a shorter timeframe. Faster, more reliable transit service is achieved with investments like dedicated bus lanes, more comfortable and more visible bus stations with level boarding, off-board fare collection, and other features.











**Silver Line BRT (Boston, left) and Select Bus Rapid Bus (NYC, right).**







Photo Credit: Nelson\Nygaard

More recently, transit systems have begun developing Rapid Bus services, which are like BRT, but without dedicated bus lanes. This strategy captures much of BRT benefits in areas where dedicated lanes are not feasible and could be an attractive option in Philadelphia given the limited road space in much of the city. A local example of Rapid Bus is SEPTA's Direct Bus on Roosevelt Boulevard, which does not have dedicated travel lanes but achieves reliability and travel time savings through consolidated bus stops. Upgrading SEPTA's high ridership routes from regular local service to Rapid Bus is an important strategy for the Bus Revolution because these opportunities could improve speed and reliability and increase ridership.

**Figure 6-3 Differences Between Regular Bus, Rapid Bus, and Bus Rapid Transit (BRT)**

		 <b>Regular Bus</b>	 <b>Rapid Bus</b>	 <b>Bus Rapid Transit</b>
	<b>Service design</b>			
	Simple route design	Varies	✓	✓
	Less frequent stops		✓	✓
	Frequent service	Varies	 <15 min	 <10 min
	Early morning to late night	Varies	✓	✓
	<b>Branding</b>			
	Special branding		✓	✓
	<b>Transit priority</b>			
	Transit signal priority		✓	✓
	Queue jump lanes		✓	
	Exclusive bus lanes			✓
	<b>Stops</b>			
	Enhanced stops		✓	✓
	Real-time passenger information		✓	✓
	Off-board fare collection		✓	✓
	Level platform boarding			✓
	<b>Vehicles</b>			
	Unique vehicles		✓	✓
	High-capacity buses		✓	✓

 Typical features
  Other common features
 


## Consolidate Stops

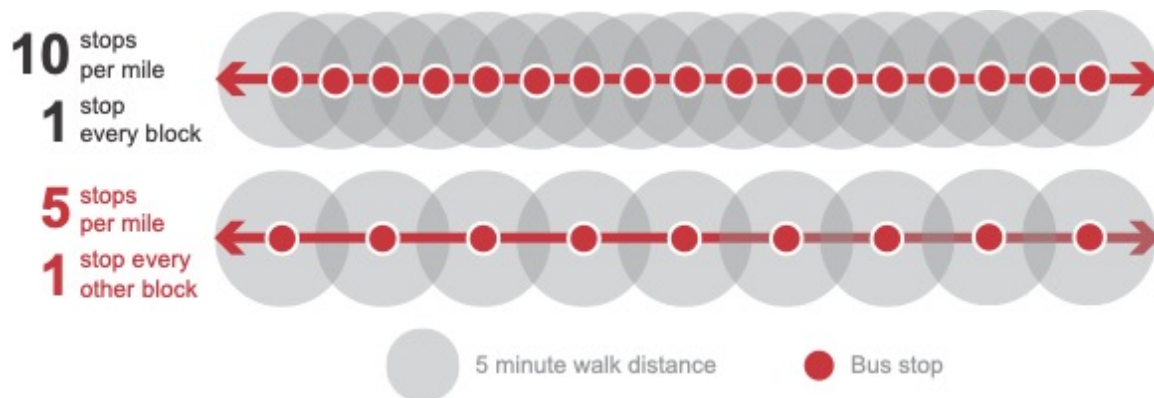
*Consolidating and balancing bus stops spacing will improve bus speed and reliability.*

Bus stop spacing impacts bus service speed because each time a bus stops, it slows it down. Bus stops spaced closely together also mean many stops are not well used, so buses don't always have to stop at each stop, creating a reliability issue. Given the existing number of bus stops and the spacing between them, SEPTA faces a choice between providing slow and unreliable service to many stops or providing faster and more reliable service to fewer stops.

Fewer bus stops, however, does not mean an inaccessible system. If done carefully, SEPTA can reduce the number of stops while maintaining a similar level of access. For example, if stop spacing changes from every block to every other block, most riders would continue to board at their existing stop and others would need to travel one additional block more, or approximately 450 feet.

*With stops every other block instead of every block, service would be faster and more reliable and walk distances to and from stops would continue to be very short.*

**Figure 6-4 Stop Consolidation Diagram**



Serving fewer bus stops would make it more practical for SEPTA and its municipal partners to improve existing stops and provide more waiting facilities and amenities—while making schedules more predictable at the same time.

## Implement Transit Priority and Reduce Intersection Delays

*Transit priority helps buses avoid congestion or minimize its impacts.*

Implementing transit priority treatments will help SEPTA realize similar benefits achieved by other rapid services and improve the quality and usefulness of SEPTA's highest ridership bus routes. The most common transit priority strategies include dedicated (or full-time) bus lanes, partially dedicated (part-time) bus lanes, shared bus lanes, and intersection priority.

The Philadelphia Transit Plan has identified 21 corridors for bus priority, and this project will likely identify more.

Figure 6-5 Philadelphia Transit Plan Priority Corridors

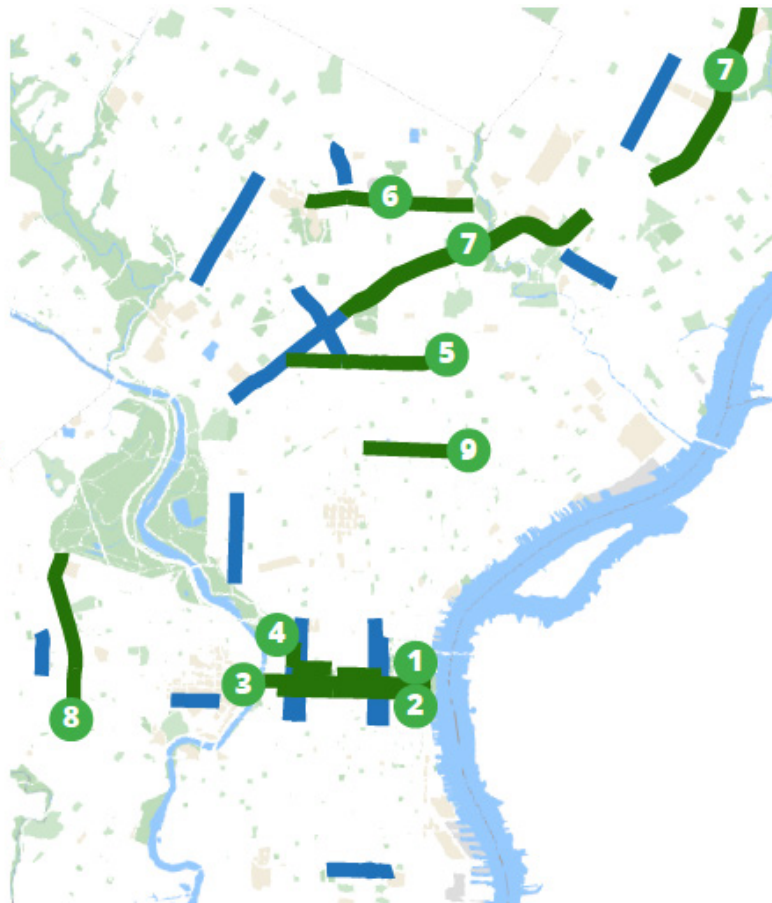
### Priority Corridors

#### Tier 1 corridors for near-term implementation:

1. East Market Street
2. Chestnut St / Walnut St
3. Market Street & JFK Boulevard
4. 20th Street
5. Erie Avenue
6. Olney Avenue
7. Roosevelt Boulevard
8. 52nd Street
9. Lehigh Avenue

#### Tier 2 corridors for longer-term implementation:

10. 19th Street
11. 7th/8th Street
12. Spruce Street (40th - 33rd)
13. 56th Street
14. 29th Street
15. Germantown Avenue
16. Cheltenham Avenue
17. Arrott Street
18. Old York Road
19. Oregon Avenue
20. Castor Avenue
21. Hunting Park Avenue





## DEDICATED LANES

There are several types of dedicated transit lanes: fully grade-separated, median, curbside, and offset. Over the length of a transit line, these options can be—and often are—used in combination. When implemented well, all are much better than operation in general traffic.

- **Fully grade-separated bus lanes** are difficult to implement in built urban areas like Philadelphia. Indeed, only a handful of grade-separated transit lanes exist in the United States. The City of Pittsburgh provides an example of grade-separated bus lanes built on abandoned rail lines and Connecticut Transit's Fastraks. They do, however, offer the greatest speed and reliability benefits.
- **Full-time median bus lanes** that operate in the center of the roadway, are the most effective because they are always available and offer less conflicts with other traffic or users (e.g., turning vehicles, parked cars). Full-time median lanes also have a greater impact on general purpose traffic and are the most difficult to implement.
- **Curbside lanes** are dedicated lanes along outer traffic lane. They provide speed and reliability benefits but have more friction with general purpose vehicles when vehicles turn in and out of properties along the road. Curbside lanes also work best when sidewalks are wide enough or have other protection to ensure pedestrians are comfortable.
- **Offset lanes**, which dedicate transit lanes alongside parking lanes can also be successful. These lanes also have friction with general purpose lanes as vehicles turn in and out of properties and vehicles pulling in and out of parking spaces.
- **Part-time bus lanes**, with curbside lanes are used as bus lanes during peak periods, are also an option. This approach provides better service to transit riders at times when demand and traffic is heaviest.

Median bus lanes are the most effective but the most difficult to implement.



Source: Nelson\Nygaard

Curbside bus lanes are easier to implement but there is more friction with other traffic.



Photo Credit: Nelson\Nygaard

Part-time bus lanes preserve parking during business hours.



Photo Credit: Nelson\Nygaard

## INTERSECTION PRIORITY

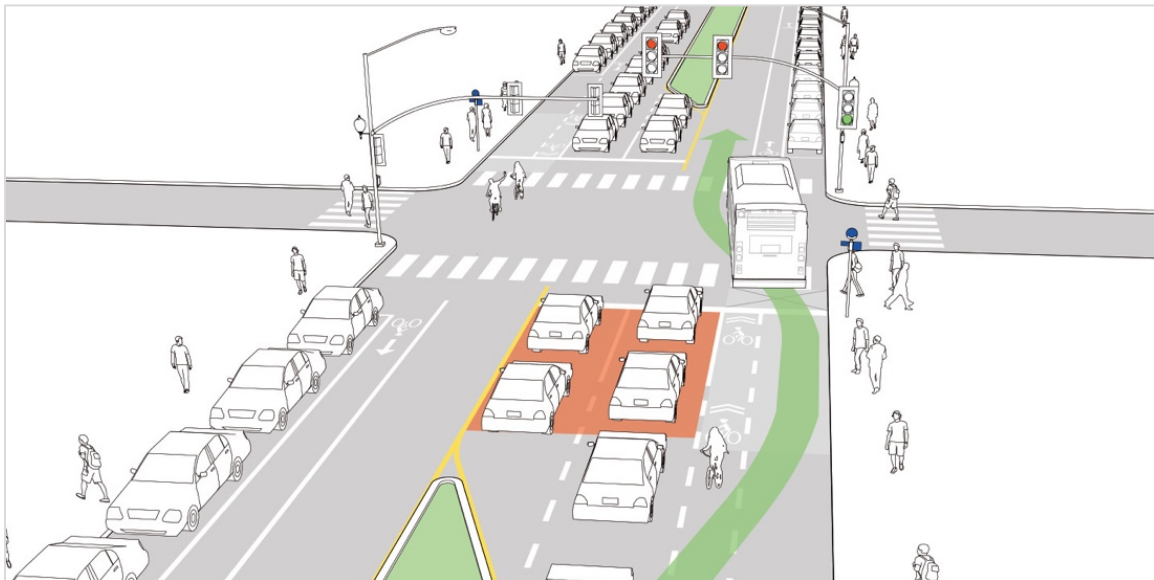
### Traffic Signal Priority

As described, SEPTA and the City of Philadelphia experimented with transit signal priority previously. A pilot project conducted with Route 66 Frankford-Knights to Frankford Transportation Center in 2015, was conservative in terms of how the technology was deployed and showed no net improvement in run time or service reliability due to the TSP. Outside of some light stop consolidation, no other changes were made. However, experience nationally shows that transit priority can improve bus travel times by 5% to over 20% and impact speed and reliability. There is potential to revisit how and where this technology is used, especially because time savings in the range of 5% to 20% would have a significant impact on speed and reliability on some of SEPTA's highest ridership corridors.

### Queue Jump Lanes

Queue jump lanes are a second intersection-related approach and are short transit-only lanes (or right-turn lanes shared with general traffic) that allow buses to bypass traffic at an intersection. To be effective, the length of these lanes needs to extend beyond the length of queued cars. These lanes are often combined with dedicated transit signals, which give buses a green light in advance of vehicles in other lanes. There is currently one queue jump lane in SEPTA's service area in the City of Philadelphia on Market Street, just west of City Hall.

Queue jump lanes allow buses to bypass backups at intersections.



Source: Nelson\Nygaard

## **CONVERT FOUR-WAY STOPS TO TWO-WAY STOPS**

A large proportion of Philadelphia streets, including those used by major bus routes, have four-way stops at intersections. Four-way intersections create safer pedestrian crossing, but force buses into stop-and-go operation even when no passengers are boarding or alighting. In the same manner that the city seeks to balance traffic flows with pedestrian safety on auto-oriented streets, it could take a similar approach on transit-oriented streets.





## IMPROVE SERVICE DESIGN

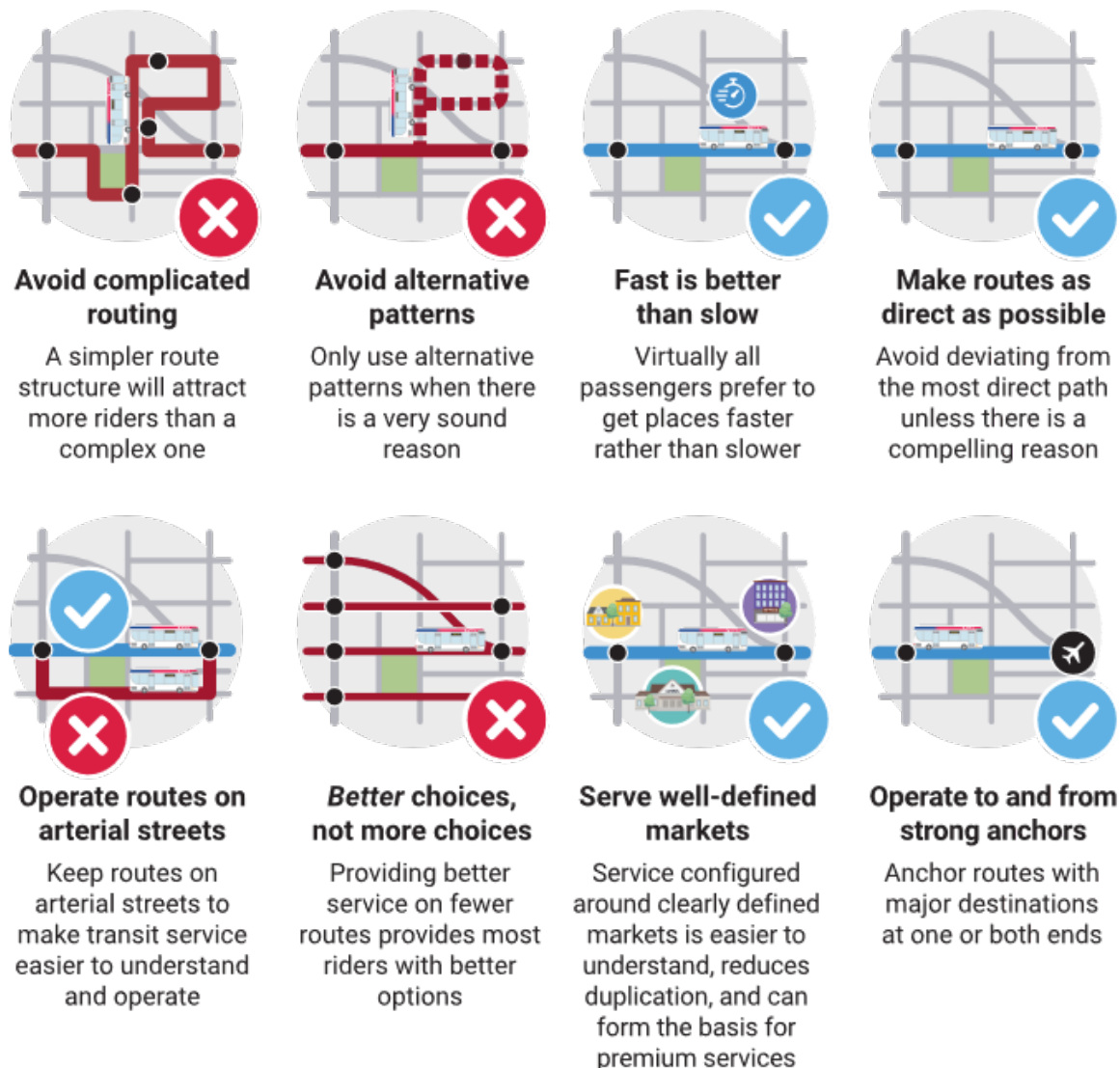
*SEPTA can improve bus services with a back-to-basics review of foundational transit service design principles.*

While SEPTA's bus network, overall, is strong, it also has some design weaknesses:

- An overly complicated system resulting from bus routes that have multiple service patterns.
- Service duplication where bus routes compete rather than complement each other.
- Circuitous alignments, which means that it takes riders a long time to get where they are going.

Figure 6-6 illustrates several principles of good transit service design.

**Figure 6-6 Service Design Principles**



## Simplify Service and Shorten Routes

SEPTA operates several very long routes, in part due to a legacy policy requiring riders to pay for transfers. With this policy eliminated for Key Card holders, splitting long routes would make them shorter and in turn reduce the impacts of delays.

One example of a long route is the 23.5-mile Route 99, which connects Phoenixville and Norristown Transit Center (NTC) via the King of Prussia (KOP) Mall. Most riders use either the eastern or western half of the route—traveling between Phoenixville and KOP, or between KOP and NTC—and demand is not equal on each half of the route. SEPTA could split the route, reduce the impacts of delays, and balance service levels.

## Reduce Route and Service Duplication

There is a lot of duplication in SEPTA's bus network, with routes that operate near one another and that serve very similar markets. By reducing this duplication, SEPTA could free up resources to, for example, make service more frequent or serve additional areas.

**Route duplication** refers to situations where there are multiple bus routes operating on identical or parallel corridors that are close to each other. Eliminating or reducing routes that operate on the same (or nearby) corridors would allow SEPTA to provide more frequent service on the remaining corridors and potentially invest in transit priority treatments. This would increase the quality of service overall and make service faster, more reliable, and more attractive to more riders. If done carefully, SEPTA could reduce duplication without significantly affecting access to transit.

**Service duplication** refers to specialized bus routes that connect small markets directly, rather than asking riders to use the network to make transfers and reach destinations. Direct connections between small markets almost always have more perceived value than actual value. These types of services tend to have low ridership—because they serve small markets—and consequently are infrequent, making them unattractive. Less duplication would provide resources for more frequent service on the core network, as well as more useful services.

## Make Service More Direct

SEPTA prioritizes service coverage over direct service, particularly in the suburbs. This approach means more people may have access to transit service, but service is slow and infrequent. There are opportunities throughout the SEPTA network to make bus routes shorter and more direct, which could make them more useful to more riders. Negative impacts to existing riders who rely on less direct service can be mitigated with different service design models, such as microtransit.





## BETTER MATCH SERVICE WITH DEMAND

*A family of services approach can help ensure that the most appropriate services are provided to different markets.*

One key to providing great transit service is to match the appropriate service model to its corresponding market. At one end of the spectrum, high-quality and high-capacity services such as rapid transit, trolleys and Bus Rapid Transit are effective at carrying large volumes of riders. At the other end, local circulators and microtransit services provide important first and last mile connections to smaller volumes of passengers. In between is an array of service types that meet the needs of different types of markets.

### Introduce New Service Types and Develop a Family of Services

A “family of services” is a framework for organizing bus routes and services. Most transit systems that use a family of services approach organize bus routes around the quality of service provided, such as:

- Service frequency
- Speed
- Capacity

Many large transit systems, including SEPTA, are built around a “backbone” of higher quality and higher speed services comprising Bus Rapid Transit, Rapid Bus, or in some cases frequent bus service. Other services provide connections to the frequent network and extend service coverage to lower demand areas.

While SEPTA does not have a formal family of services, it operates several different modes (or types of transit services) that create a framework for organizing services. This modal framework includes:

- Regional Rail
- Rapid Transit
- Trolley service
- Four categories of local bus service: City, Arterial, Fixed, and Other, which in a practical sense, vary little in terms of the service that is provided
- Expressway, which are routes that operate primarily along major expressways

One of the challenges with the way SEPTA organizes its transit network is that bus services, which is SEPTA’s largest category of service in terms of service hours or ridership, has only limited variations in how service is delivered. Further, while there are some variations among SEPTA’s bus routes in terms of how long service is available and how frequently buses arrive, these differences are not communicated to riders.

There are opportunities to upgrade SEPTA’s high ridership local bus routes and/or most important travel corridors to offer faster, more direct and more frequent bus service and

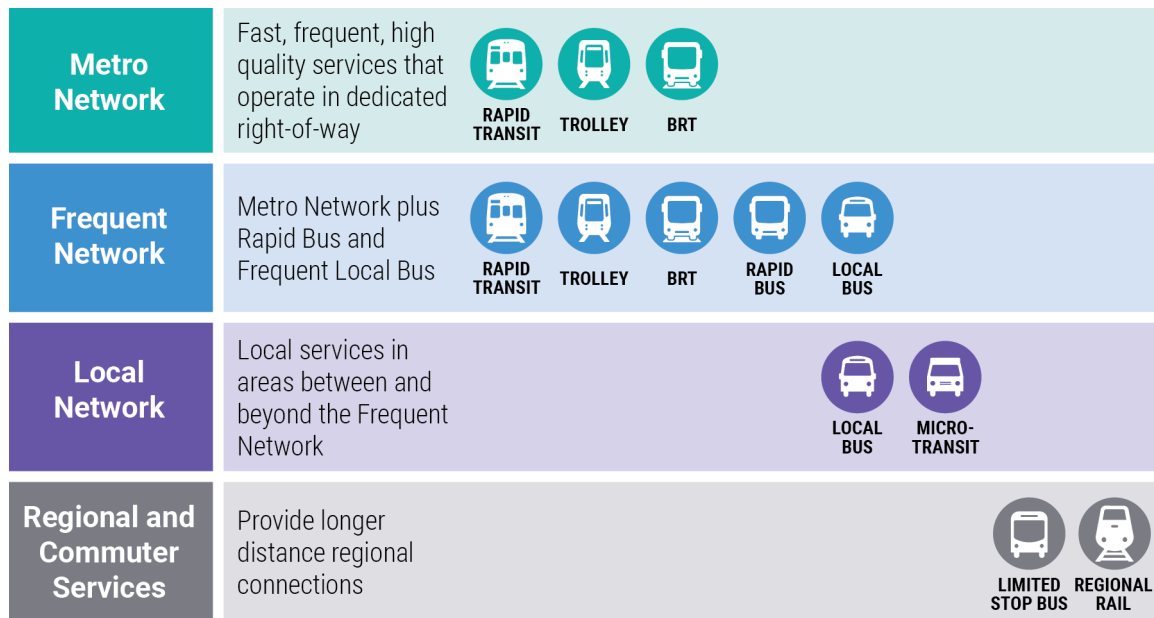
operate these routes for longer hours. These corridors could also be prioritized for transit priority treatments. It is also critical that SEPTA explain differences in bus routes to riders, so they can easily choose between their options. There are likely also opportunities to develop microtransit in more suburban areas to expand the network.

A potential family of systemwide services for SEPTA that includes a combination of modes and bus service types:

- **Regional Rail**, with specific service attributes as determined by SEPTA's Reimagining Regional Rail study.
- **Metro Network** that includes SEPTA's rapid transit lines (BSL, MFL, NHSL) and trolley lines, plus the potential addition of Bus Rapid Transit. Most of this network would operate at least every 10 minutes for most of the day and for very long hours, often 24 hours a day.
- **Rapid Bus Services** that are like BRT routes but without dedicated travel lanes. Rapid Bus also often typically operates with slightly lower frequencies, such as every 15 minutes (as opposed to every 10 minutes). Hours of operations, however, would be similar.
- **Frequent Bus Routes**, which would include local bus routes that would operate at least every 15 minutes for long hours. The combination of the Rapid Service Network and Frequent Bus routes would also produce a robust Frequent Transit Network.
- **Local Bus Routes**, which would include routes that operate less frequently than every 15 minutes and provide local service. There could also be subcategories of local routes, such as weekday only or commuter routes.
- **Expressway and Limited Stop Routes**, which would include routes that operate less frequently than every 15 minutes that are designed around commuter markets and emphasize fast, direct service.

This is an example of how a family of local services could be structured.

**Figure 6-7 Example Family of Services**



## Identify and Market a Core Network of Frequent Transit Routes

SEPTA already operates lots of frequent transit services, including rapid transit lines, rail trolley lines, and several bus routes. However, the core network of frequent transit services is not marketed or communicated to the public. In addition, the Bus Revolution will almost certainly identify new bus routes and corridors for frequent transit service.

SEPTA could create a subset of routes that operate very frequently—10 minutes or better—between 6 AM and 9 PM (potentially a 10-minute MAX network). While no routes currently meet this standard, 11 routes fall just short of this standard. These routes could be upgraded through relatively small schedule adjustments.

Eight other routes fall just shy of the definitions for frequent or very frequent service, especially with regard to providing that level of service over the full 15-hour span. A relatively small level of investment could bring these routes to the frequent standard, expanding the frequent network to at least 25% of SEPTA's bus routes.

These concepts could be implemented with or without a family of services. Much of the work has already been completed and requires updating definitions and formally communicating the core network to riders.



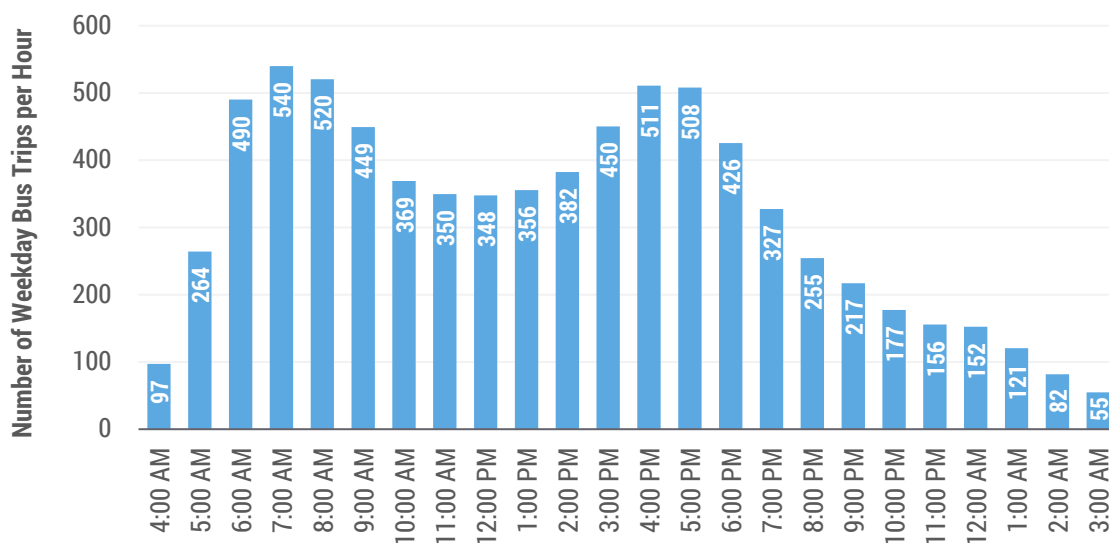
## PROVIDE MORE FREQUENT WEEKDAY OFF-PEAK AND WEEKEND SERVICE

*Changing work patterns in the wake of the COVID pandemic are changing the times and days when riders are looking for bus service.*

SEPTA provides much higher levels of bus service during peak periods to serve higher levels of ridership during those periods. While much is unknown about how ridership will recover post-pandemic, many people will work hybrid in-office/at-home schedules and work hours will become more flexible. Because most of the workers with more flexible hours and hybrid options will be office jobs with traditional daytime hours, proportionately fewer people will commute in the traditional peak periods.

Peak period demand is expected to be lower post-pandemic, which will allow some service to be shifted to improve off-peak and weekend service.

**Figure 6-8 Number of Weekday Bus Trips per Hour**



### Shift Peak Period Service to Off-Peak and Weekends

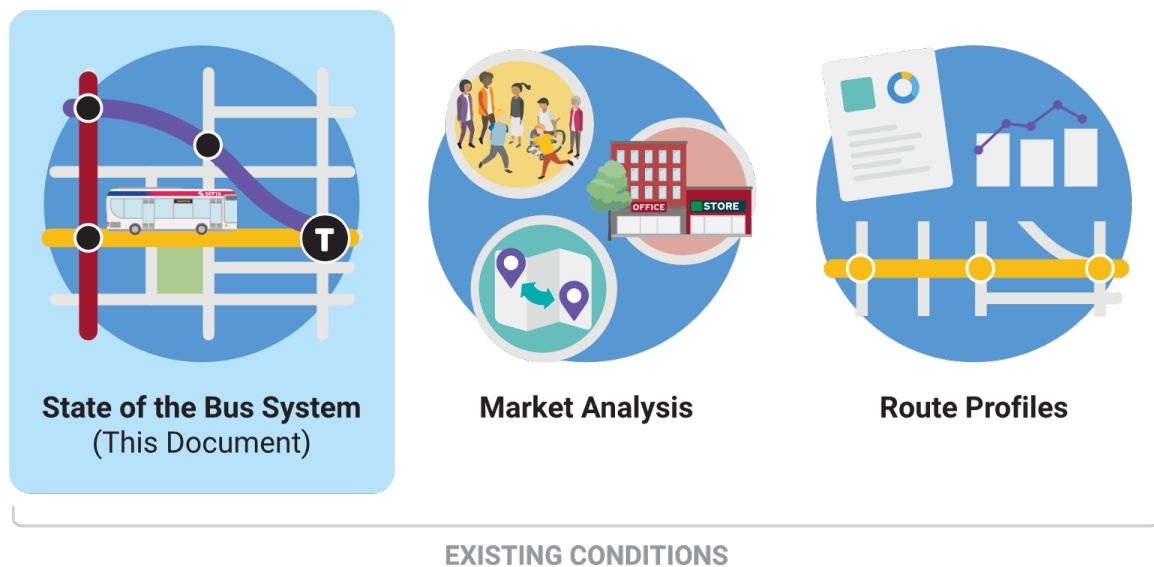
Changing work patterns creates an opportunity to shift some service from the peaks to the shoulders of the peaks, during the midday and on weekend days. Adjusting SEPTA's service frequency away from traditional peak times and towards midday, evening and weekend service will better match anticipated changes in work and travel patterns and be a more attractive option for people traveling at these times and for different purposes.

## 7 Next Steps

This state of the system report is one of three efforts currently underway to understand the strengths and weaknesses of SEPTA's bus services and to identify improvement opportunities. The other two are:

- **A market analysis** to assess the underlying demand for transit service throughout Southeastern Pennsylvania, how well existing services match that demand, and where changes should be considered.
- **Detailed profiles of each individual SEPTA bus route** that examine schedules, service patterns, ridership, speed and reliability, and other factors, and that identify initial improvement opportunities.

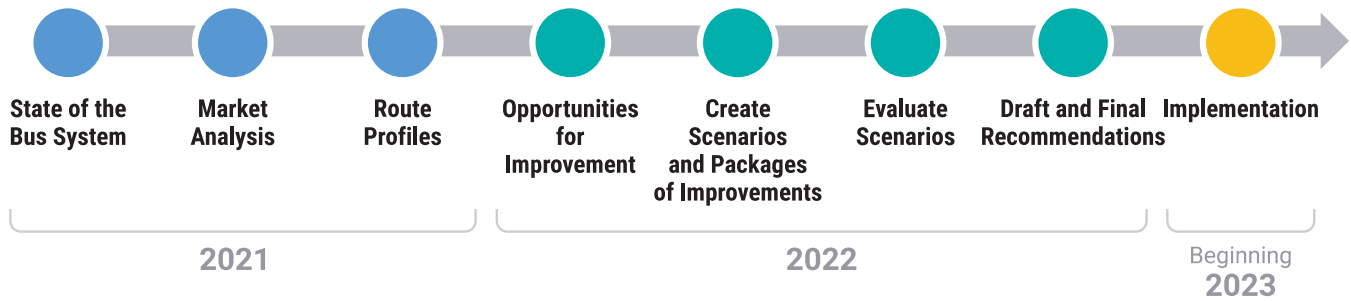
**Figure 7-1 The State of the Bus System and Other Existing Conditions Documents**



The Bus Revolution team also completed an initial round of stakeholder engagement, where the team talked with SEPTA bus riders, community stakeholders and SEPTA staff, including bus drivers. These initial conversations focused on understanding the community's core values regarding how bus services should be organized and structured. To date, the team has interacted with over 2,000 bus riders and received over 7,000 surveys.

The Bus Revolution team will combine the technical efforts with the findings from our engagement work to refine the improvement themes, so they reflect the full range of input while maximizing potential investments. Once this step is complete—towards the end of 2021—the Bus Revolution team will begin developing service improvement options, or scenarios, that will illustrate different combinations of changes. Following additional public and stakeholder input and a technical evaluation of those changes, recommendations will be developed with the first changes scheduled for implementation in 2023.

**Figure 7-2 SEPTA Forward: Bus Revolution Timeline**



## Join the Conversation

We want to hear from you. SEPTA's Bus Revolution will have lots of opportunities throughout its phases for people who live and work in the Philadelphia region to be involved, including surveys, virtual meetings, and ongoing outreach. Make sure your voice is heard and you stay informed throughout the project.

For the latest information on the work that we have done to date and ways to engage with us, please visit <https://www.septabusrevolution.com>.

