



State of the System and Peer Systems Review

April 11, 2022

Draft v0.1



Table of Contents

Introduction	4
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State of the System	6
---------------------	---

1. History	8
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2. Infrastructure and Operations	24
----------------------------------	----

3. Connectivity	44
-----------------	----

4. Demand	64
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Peer Systems Review	74
---------------------	----

Next Steps	94
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Introduction

SEPTA Forward, SEPTA's strategic plan, envisions Regional Rail as part of a lifestyle network of frequent, all-day, and all-week services that connect people to a diversity of destinations across the region. The lifestyle network is one unified, equitable network serving all kinds of trips, no matter where you are or what mode you choose. The Regional Rail Master Plan effort, along with the Rail Transit Unification and the Bus Network Redesign, will help SEPTA build towards the future described in SEPTA Forward. Reimagining Regional Rail will create a vision of what that looks like and will identify the infrastructure, equipment, operations, investment, and policies needed to get there. The Regional Rail Master Plan will identify how investments in accessibility, service, and connections improve safety for our riders and all people in the region. We hypothesize that if Regional Rail operates more frequently, all-day, in both directions; is better connected with (and has integrated fares with) local transit; and is more accessible and easily navigable, then it will be useful to more riders; will increase access; create a more equitable transit network; and benefit the entire region.

Reimagining Regional Rail will test this hypothesis, by asking:

- Is the demand there (for more frequent all-day, bi-directional service)?
- Can we provide the service? (Is it possible? Is it something we can afford?)

In Reimagining Regional Rail, we are asking what the Regional Rail network could be:

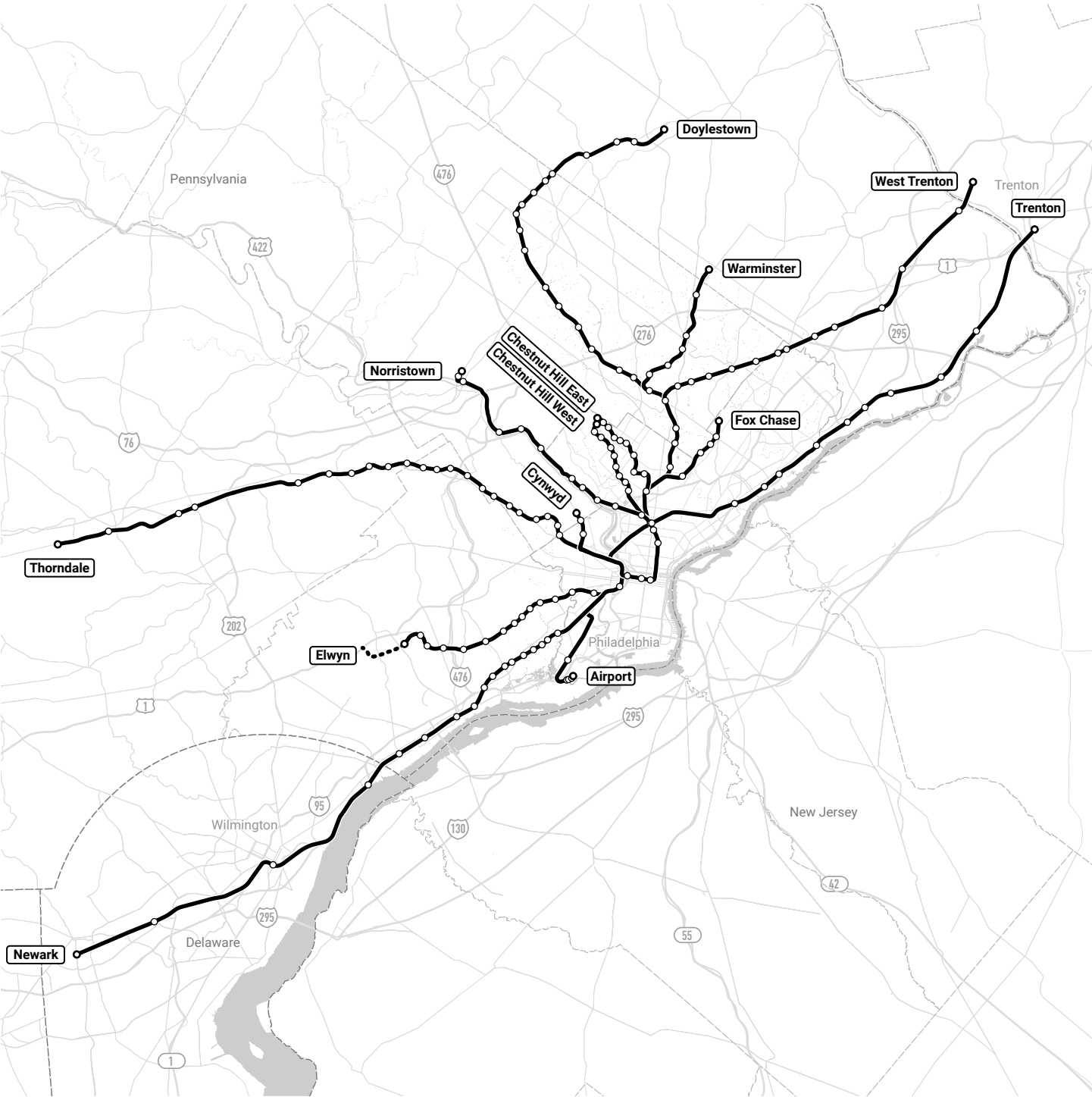
- How can we remove potential conflicts in the network to improve safety?
- How often should the trains run?
- What mix of express and local service should there be?
- What should stations be like?
- What should the trains be like?
- How should Regional Rail connect to rapid transit, trolleys, buses, and other rail service?
- How should fares be integrated with other transit services?

This Existing Conditions report provides the context for beginning to answer these questions by describing the system as it operates today (2021 infrastructure, 2019 ridership). By doing so, we explain what works well with Regional Rail today, what the opportunities are, and what the challenges are. It reviews the current state of the service, which includes: operations, the fleet, maintenance facilities, infrastructure, and interface with passenger and freight railroad service; a comprehensive analysis of ridership trends over time by station, by line, by time of day/day of week, and direction; ridership demographics; trip patterns; land use patterns, connectivity, and accessibility; and proposed service extensions.

The rest of this report is organized by a series of 14 foundational statements that fit into one of four categories:

1. History
2. Infrastructure and Operations
3. Connectivity
4. Demand

SEPTA Regional Rail System



— SEPTA Regional Rail lines

○ SEPTA Regional Rail station

1:500,000

0 5 10 20 miles

FRA



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Reimagining Regional Rail

1. History

2. Infrastructure and Operations

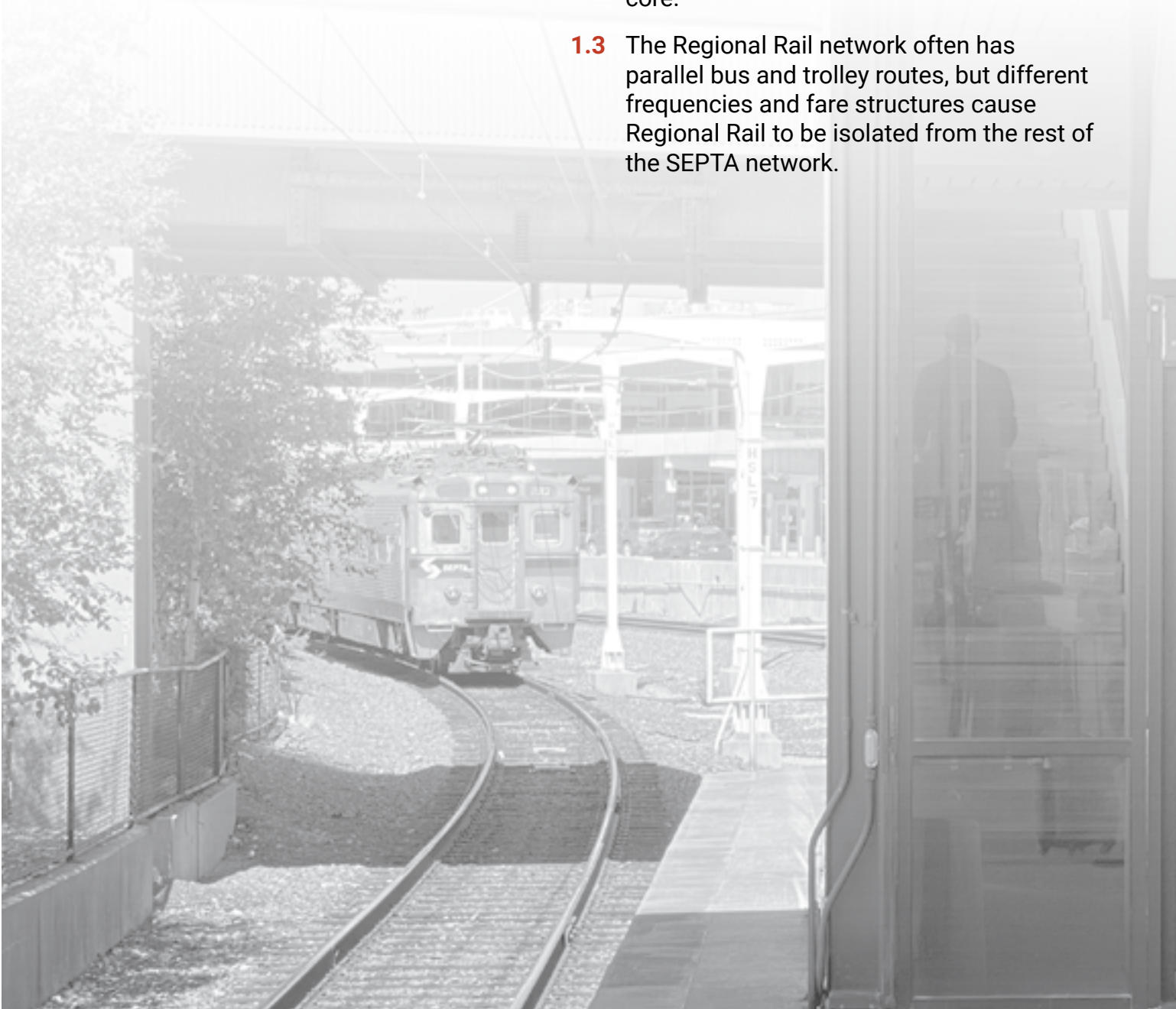
3. Connectivity

4. Demand

1.1 Philadelphia's Regional Rail network was created through a century of infrastructure investment and mergers.

1.2 Regional Rail has been designed to facilitate 9-to-5 suburban commuters even though Regional Rail also has stops in low-income communities of color in the urban core.

1.3 The Regional Rail network often has parallel bus and trolley routes, but different frequencies and fare structures cause Regional Rail to be isolated from the rest of the SEPTA network.





1.1

Philadelphia's commuter rail network was created through a century of infrastructure investment and mergers.

Today's regional rail network benefits from high quality infrastructure built over decades by two different railroads, the City of Philadelphia, and SEPTA. Unlike many of the commuter rail systems in the United States, SEPTA owns much of its track right-of-way, and for much of its system has full separation of passenger and freight rail traffic. This gives SEPTA better control over operations. The system is already fully electrified. Three of the lines have four tracks, with several others having at least two tracks running the entire length of the route. All of this existing infrastructure provides the capacity and flexibility to increase service today.

Most of today's SEPTA Regional Rail infrastructure is a legacy from the 1800s and early 1900s. Two different railroad companies built electric commuter rail lines across the Philadelphia region. The decisions they made continue to shape the function of the system today.

Pennsylvania Railroad owned and operated seven rail lines that served passenger trips into downtown Philadelphia. These rail lines were well established, with wide right-of-way, multiple tracks, and with established ridership, the Pennsylvania built very high capacity infrastructure, including largely double track lines, three lines that have 3 to 4 tracks, several fully grade separated junctions, and few grade crossings.

Reading Company owned and operated six rail lines, serving suburban neighborhoods north of Philadelphia and terminating at Reading Terminal. The Reading lines were generally built to lower standards than the Pennsylvania, with long segments of single track, many grade crossings, and no grade-separated junctions.

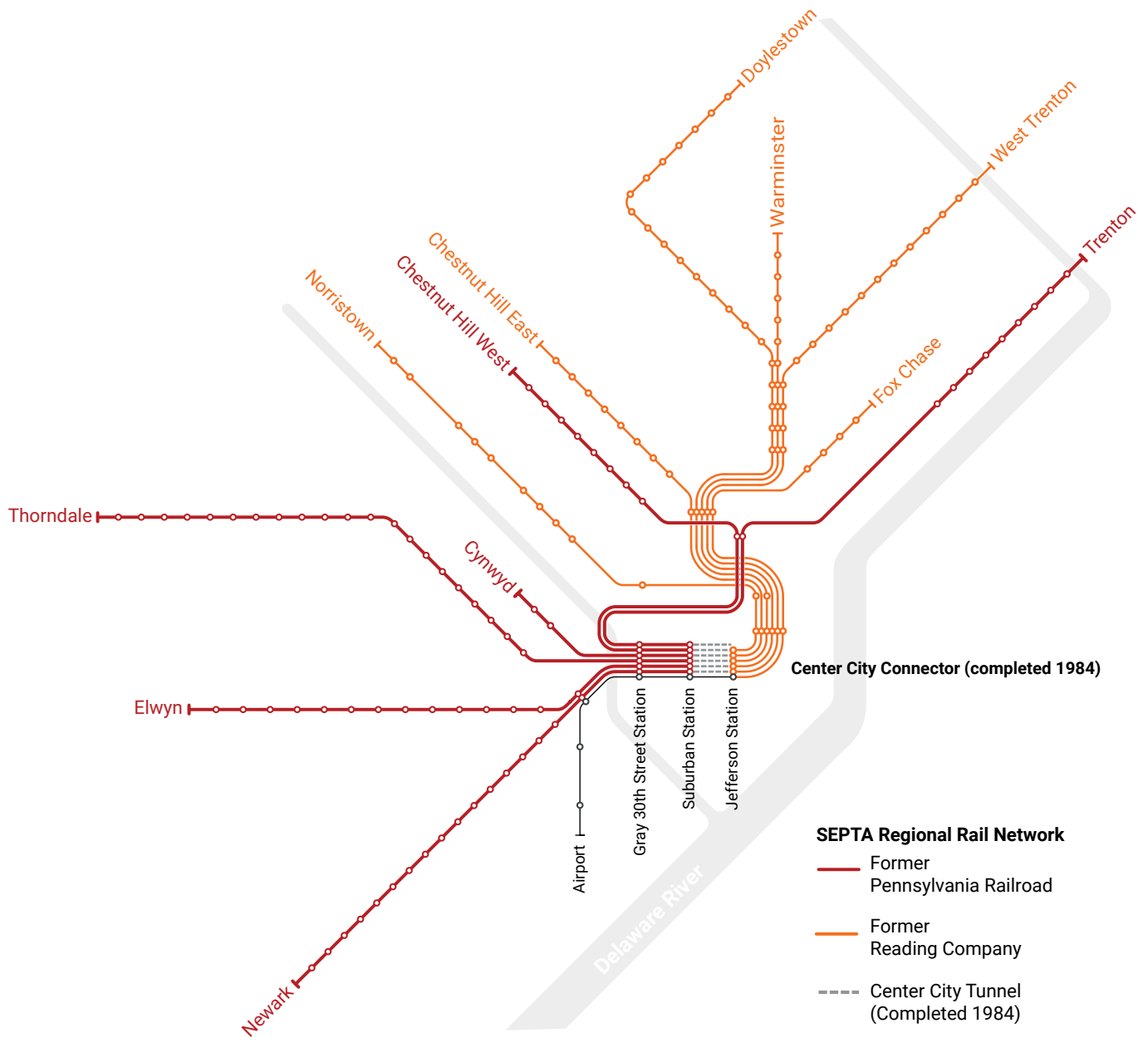
SEPTA took over ownership and operations of the rail service in 1983 and has been operating Regional Rail service ever since.

In 1984, SEPTA used the new Center City tunnel to connect the lines into one network. All trains provide service to 30th Street, Jefferson, and Suburban Stations through the rail tunnel under downtown Philadelphia.

In 1985, the Airport Line opened, creating a critical connection for the region.

SEPTA Regional Rail: By the Numbers

- 13 lines
- 155 stations
- 132,000 riders/day (pre-COVID)
- 280 track miles (one-way)
- 411 train vehicles, 348 is max in service
- 15% vehicle spare ratio
- 25,817 parking spaces





History

Philadelphia's commuter rail network was created through a century of infrastructure investment and mergers.

As a result of the lines it inherited, modernization programs, and the work of its maintenance teams, SEPTA has the best Regional Rail infrastructure in North America. This infrastructure is why the system is able to serve 132,000 riders a day.

SEPTA owns a lot of infrastructure – in addition to the tracks and vehicles, it owns stations, bridges, tunnels, electrical, communication and signal systems, and buildings. Some of these holdings were transfers from Penn Central, from Reading, from Conrail, or other entities – each with their own complexities and it has been a challenge to maintain an inventory of what is owned and how to approach development.

All this infrastructure – some of it dating back over 100 years – means a lot of maintenance responsibilities. SEPTA has an extensive backlog of state-of-good-repair maintenance needs, and finding, training, and retaining staff with the skills needed is a chronic challenge. Nevertheless, SEPTA's tracks are in very good condition, and

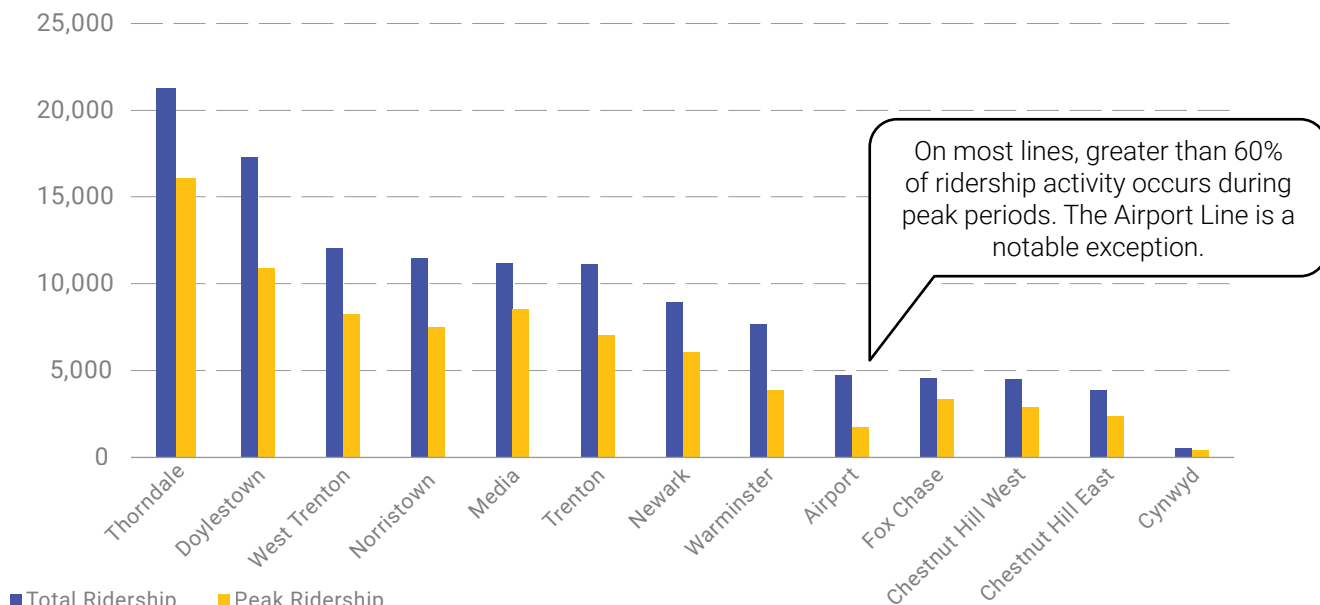
the agency's power system is impressively reliable, with a track record of having only two outages in the last 20 years.

All SEPTA functions are run through Centralized Traffic Control, unifying all dispatching from a central location as opposed to disparate local interlocking towers. Other systems like Amtrak and LIRR still operate with some towers, SEPTA fully converted to CTC dispatched centrally by 2005.

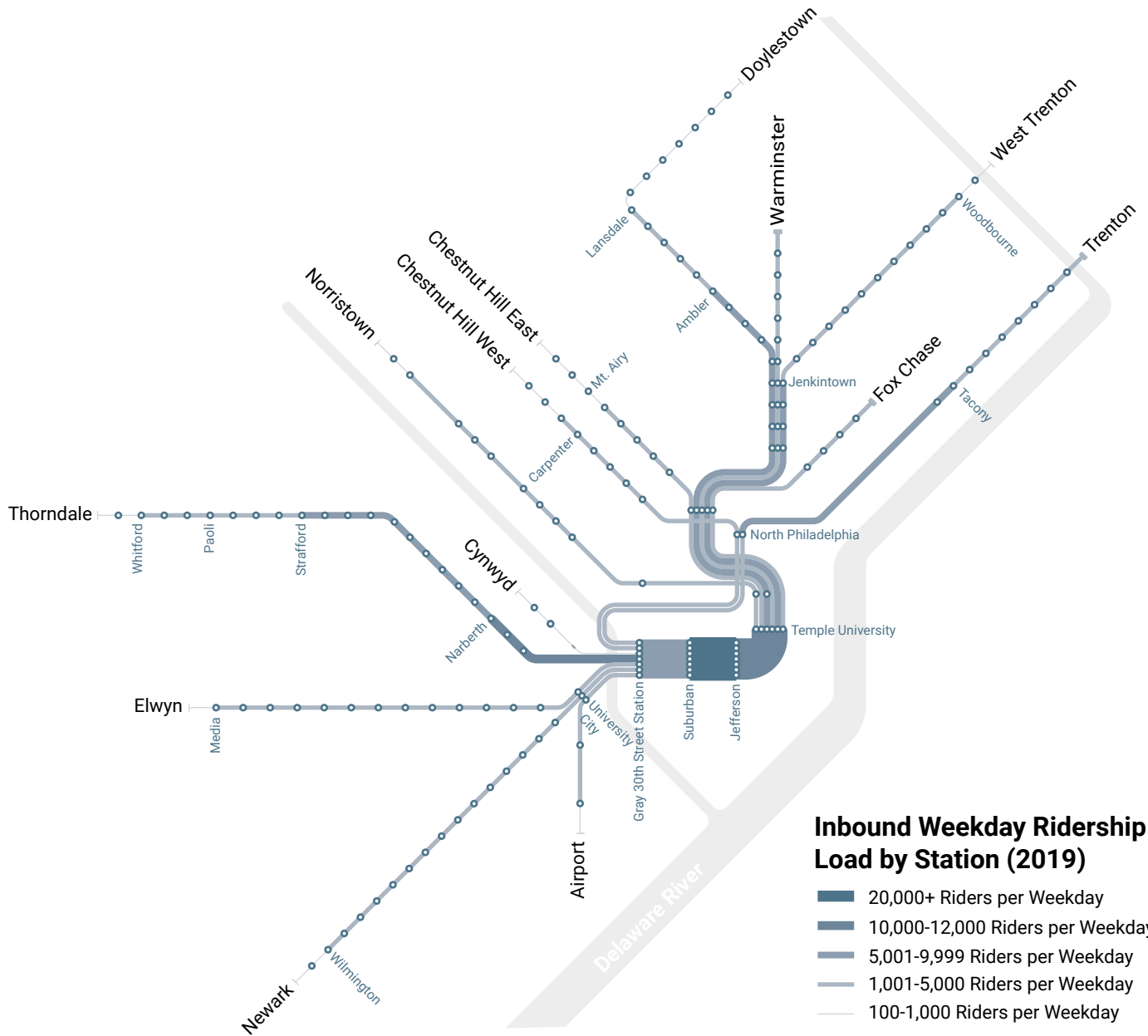
Today's ridership patterns reflect infrastructure and service decisions made decades ago. In 2019, 132,000 people rode every day, and the Thorndale line had the highest ridership.

This makes SEPTA Regional Rail the 5th highest pre-COVID ridership in the United States, behind only Long Island Railroad, NJ Transit, Metro-North Railroad, and Metra. Its ridership is similar to but slightly larger than MBTA in Boston.

Weekday ridership by line varies drastically, but the majority of ridership happens during peak hours



Data source: SEPTA 2019, showing boardings and alightings excluding Center City



1.2

Regional Rail has been designed to facilitate 9-to-5 suburban commuters even though Regional Rail also has stops in low-income communities of color in the urban core.

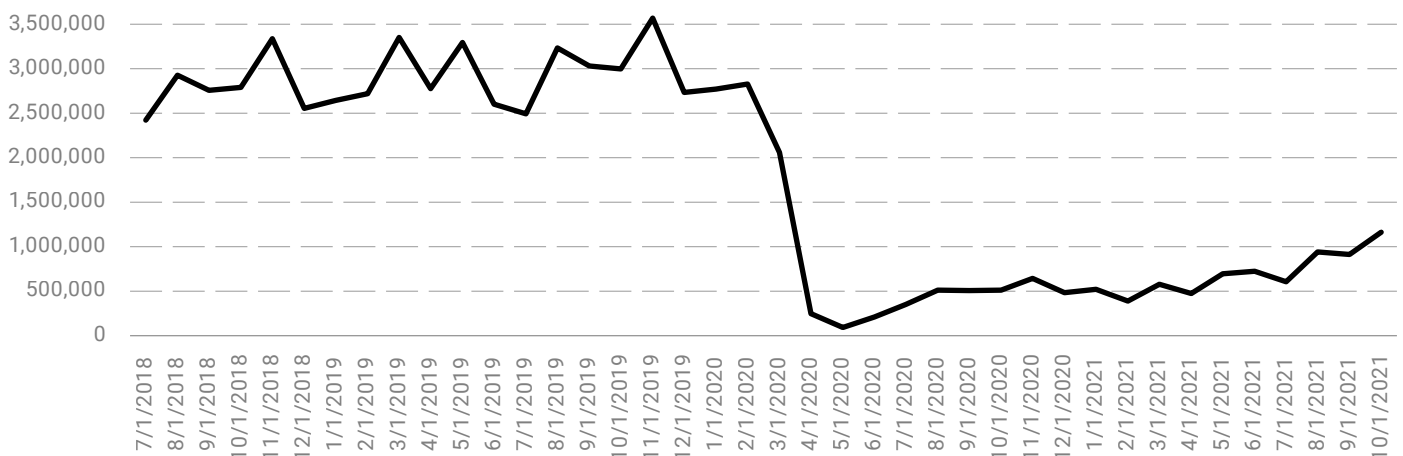
Regional Rail was developed soon after freight and inter-city rail services. Stops were located throughout the region's urban core and suburbs. Although at first glance Regional Rail could serve as a transit connection linking Philadelphia's suburbs to one another and facilitating intra-City travel, it primarily brings white collar workers from the suburbs. Low-income people and people of color, trips outside of peak periods, and non-work trips account for a small portion of overall Regional Rail ridership even though Regional Rail serves areas where there are many such trips happening. This is a result of past decisions to focus on suburban trips.

Given that white collar commuters currently have the possibility to work from home, Regional Rail ridership has seen the largest drop in ridership during the pandemic of the three SEPTA modes.

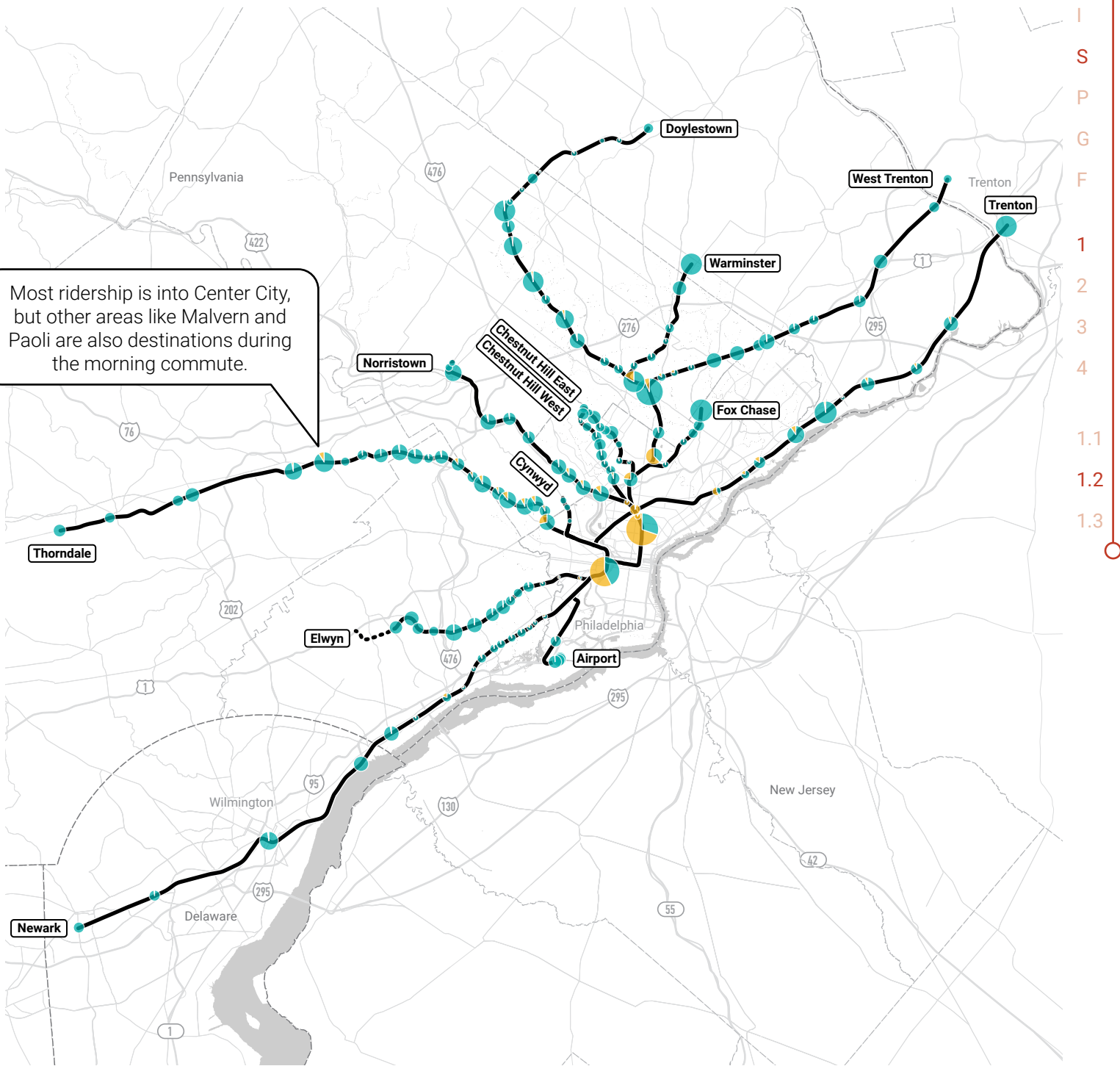
City bus ridership was down 44% from October 2019, while Regional Rail ridership was down 61% as of October 2021 during the same period.

SEPTA riders who mainly ride Regional Rail of the three SEPTA modes (bus, rail transit, Regional Rail) use it mostly for commuting, and are least likely to use any of the other two modes for any purpose. In addition, they are also the least likely SEPTA riders to use transit to travel to medical appointments, school, pleasure/entertainment, and personal business/appointments.

Regional Rail ridership is down 61% in Oct. 2021 compared to Oct. 2019, but has been trending upward for several months



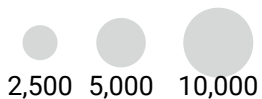
Data source: SEPTA



Regional Rail Ridership Activity - Inbound AM Peak

Ons Offs

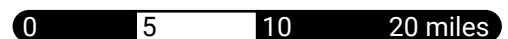
Total Inbound Ridership excluding Center City
(circles sized proportionally)



— SEPTA Regional Rail lines

1:500,000

SEPTA Passenger counts, fall 2019



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13



History

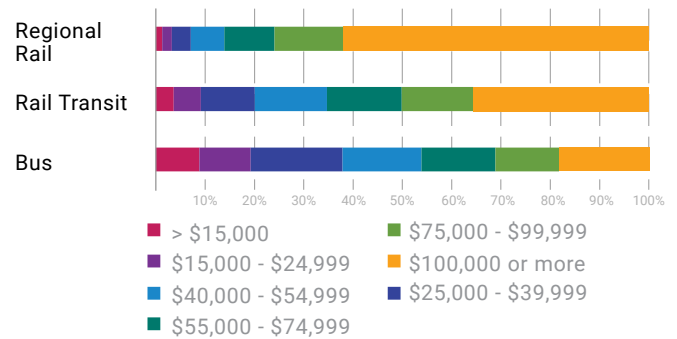
Regional Rail has been designed to facilitate 9-to-5 suburban commuters even though Regional Rail also has stops in low-income communities of color in the urban core.

The majority of Regional Rail riders are white, from households making more than \$100,000 a year, and from a household with more than one vehicle.

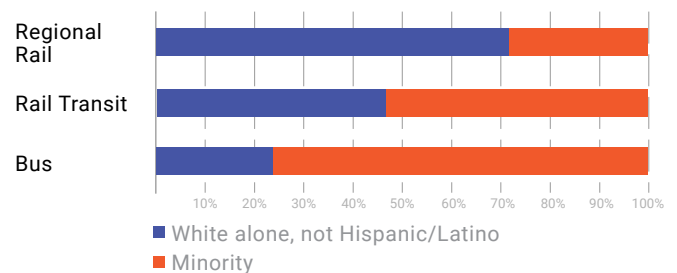
Over 90% of those using Regional Rail to commute to work had a vehicle in their household. A combination of high parking costs in Center City and heavy auto congestion makes Regional Rail an attractive alternative to driving for higher-income residents with other travel options. Although many stations are in low-density areas with park-and-ride stations, only 42% of surveyed Regional Rail riders access SEPTA by driving and parking or being dropped off by someone they know. Although this is still higher than the 13% for rail transit and 7% for bus, it is less than half of all Regional Rail riders.

In comparison, the majority of bus riders are minority, low-income, and from a household with zero or one vehicle.

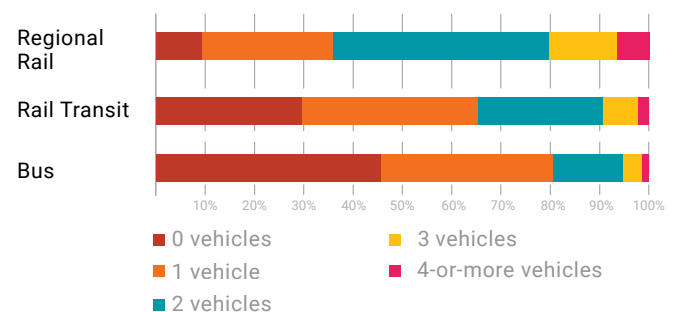
Most Regional Rail riders are high income



Most Regional Rail riders are white non-Hispanic/Latino

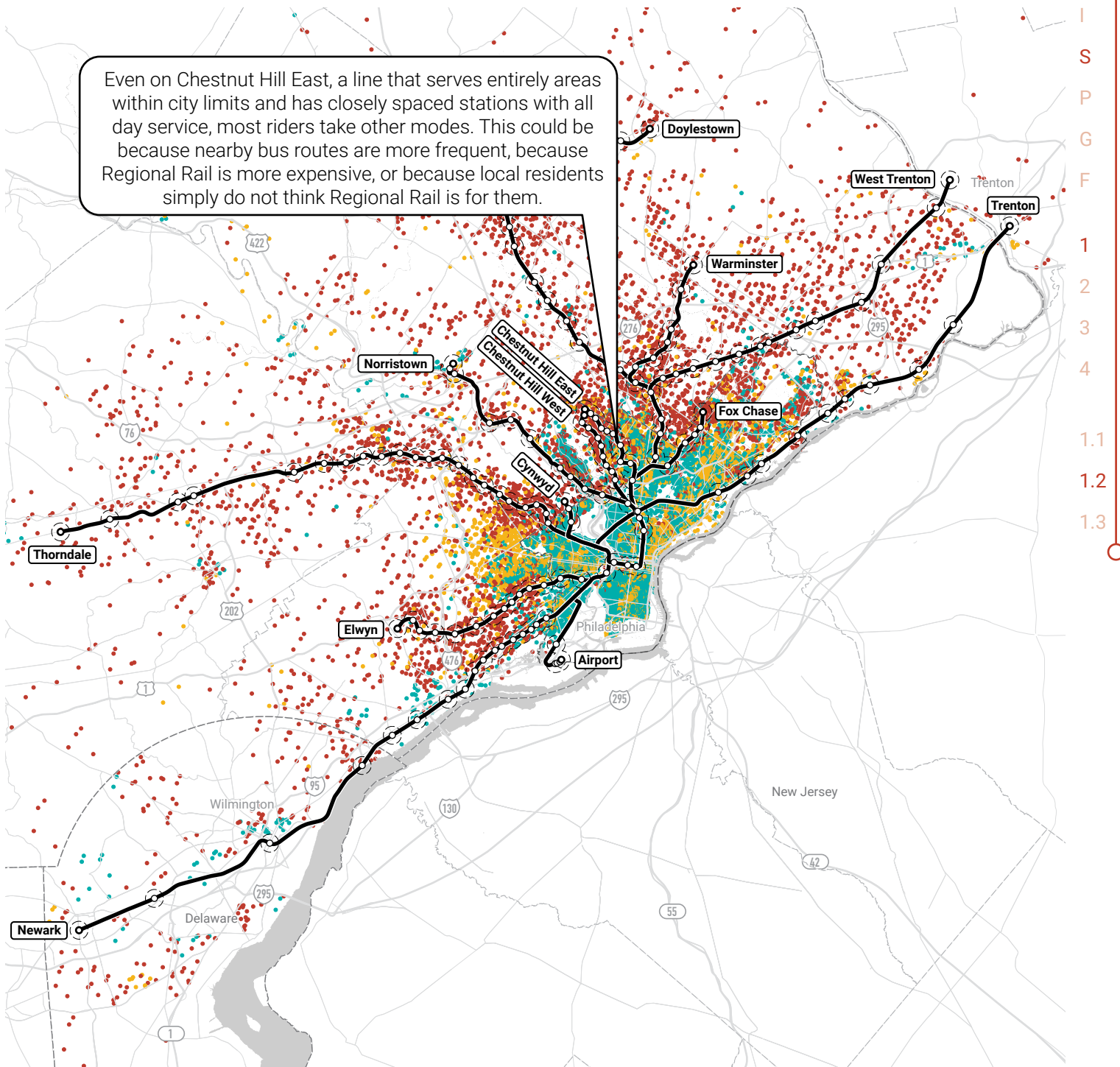


Most Regional Rail riders have access to a vehicle at home



Data source:

Census Transportation Planning Package (CTTP) 2016



Transit Commuter Density into Center City

Mode for Residents who take Transit to Work
1 Dot = 5 Residents

- Bus
- Rail Transit
- Regional Rail

— SEPTA Regional Rail lines

Center City is defined as roughly Spring Garden in the north to Washington and Christian in the south.

1:500,000

CTPP 2016

0 5 10 20 miles



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15



History

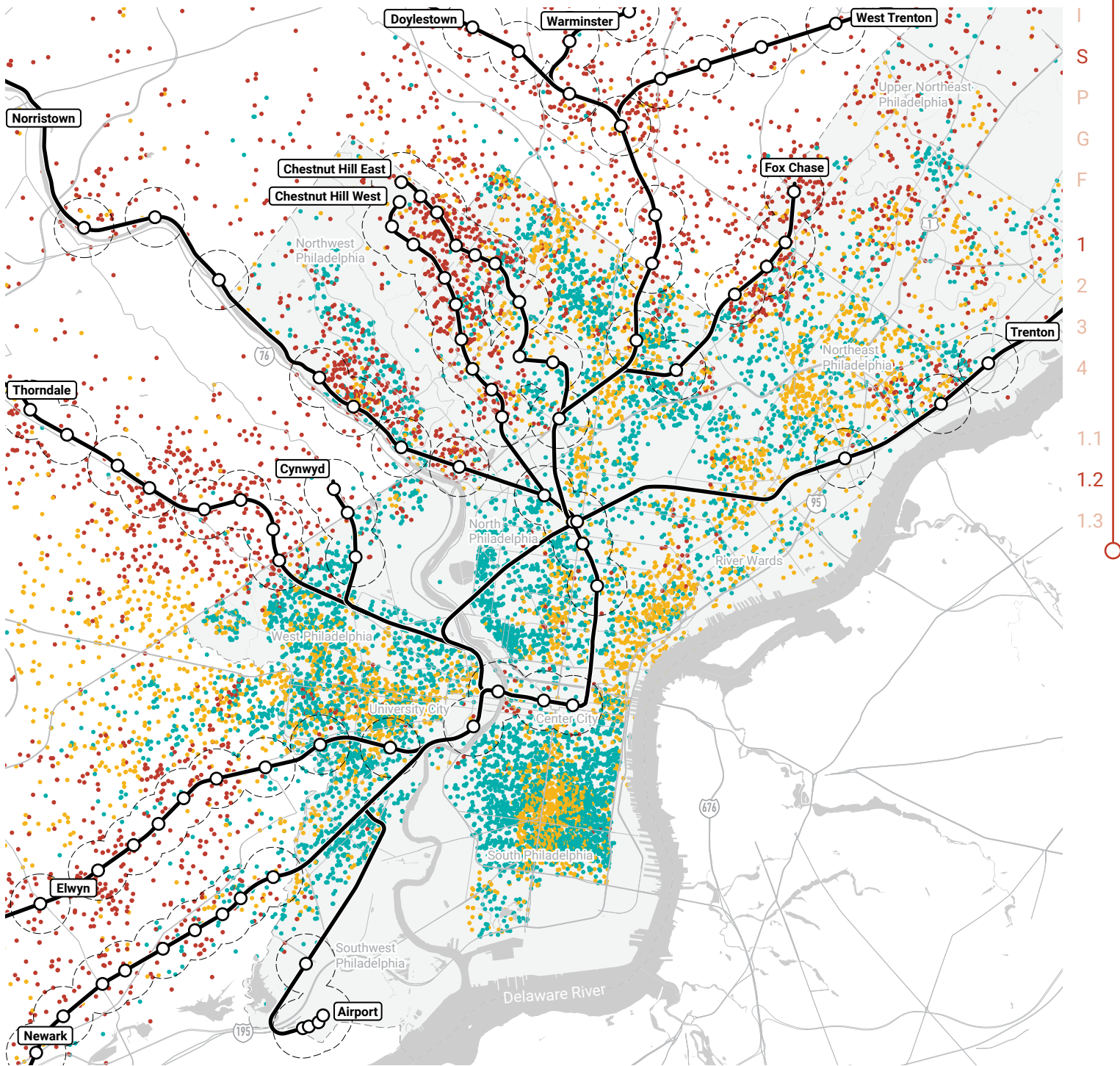
Regional Rail has been designed to facilitate 9-to-5 suburban commuters even though Regional Rail also has stops in low-income communities of color in the urban core.

Most areas with higher proportions of low-income, Black, and Hispanic/Latino residents compared to the regional average are within the City of Philadelphia.

Philadelphia residents working in Center City mostly take the bus or Rail Transit in their commute, even if they live along a Regional Rail line, with the exception of Chestnut Hill West and parts of Northeast Philadelphia that serve predominantly white neighborhoods.

Even outside the city, areas with high proportions of low-income, Black, and Hispanic/Latino residents, like Norristown and Chester, have low Regional Rail use.





Transit Commuter Density into Center City

Mode for Residents who take Transit to Work
1 Dot = 5 Residents

- Bus
- Rail Transit
- Regional Rail

- SEPTA Regional Rail lines
- SEPTA Regional Rail station

Center City is defined as roughly Spring Garden in the north to Washington and Christian in the south.

1:150,000

0 1 3 6 miles

CTPP



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17



History

Regional Rail has been designed to facilitate 9-to-5 suburban commuters even though Regional Rail also has stops in low-income communities of color in the urban core.

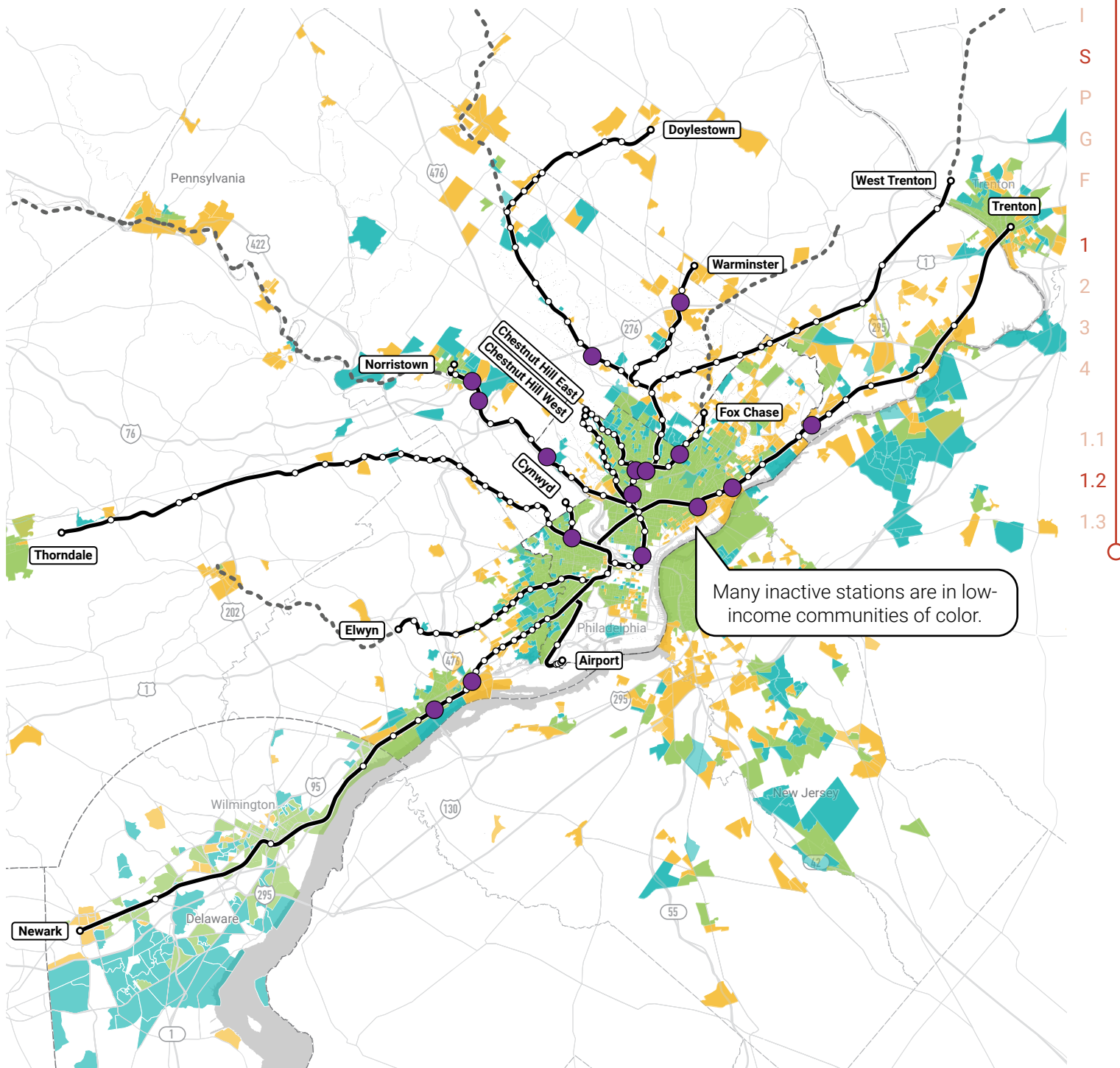
The majority of inactive stations on still-operating Regional Rail lines are within the City of Philadelphia. This indicates that SEPTA has disinvested in Regional Rail service to facilitate intra-City trips. And yet, Philadelphia still has more Regional Rail stations than any other one of the service counties.

Stations often lost service because they did not have the ridership to meet SEPTA service standards. However, low ridership was often a result of reduced service which made Regional Rail an inconvenient and unattractive option, and is not indicative of the actual underlying demand for Regional Rail. This could often lead to a spiraling decline: low ridership led to less service and less capital investment, which further discouraged people from using the station.

As many Regional Rail lines were full and standing room only during peak periods before the pandemic, SEPTA relied on bus and rail transit to move riders within the City.

Before the pandemic, even more stations within Philadelphia were considered for discontinued service because of their proximity to other types of transit. In addition to ridership and fares, funding and states of disrepair came into play for a lot of these stations.





Inactive SEPTA Stations and the Proportion of Minority & Low-Income Populations Compared to the Regional Average

● Inactive Station on a Current Line

Orange Minority Population Above Average

Teal Low-Income Population Above Average

Green Both Populations Above Average

— SEPTA Regional Rail lines

○ SEPTA Regional Rail station

--- Inactive SEPTA Regional Rail lines

1:500,000

2019 ACS 5-Year Surveys, SEPTA

0 5 10 20 miles



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19

1.3

The Regional Rail network often has parallel bus and trolley routes, but different frequencies and fare structures cause Regional Rail to be isolated from the rest of the SEPTA network.

The historical lineage of SEPTA bus and Regional Rail routes heavily impacts their respective ridership today. This history not only impacts routes, but also the fares and fare structure. Many bus routes closely parallel rail routes or connect into Rail Transit to bring riders into Center City. This is part of the legacy of the systems that SEPTA inherited. Before SEPTA, bus and rail transit were operated by three for-profit companies that competed with the railroads for passengers.

The Philadelphia Transportation Company (PTC), created in 1940 and operated the citywide bus system until it was acquired by SEPTA in 1968. SEPTA merged it with two other large bus and rail transit operators in the suburbs: Red Arrow Lines (Acquired 1970, now Victory Division) and Schuylkill Valley Lines (acquired 1976, now Frontier Division).

Many of the bus lines SEPTA inherited were previously trolleys. PTC was majority controlled by National City Lines, which had a record across the country for replacing trolleys with buses in the 1950s.

This system of buses and trolleys was in direct competition with the other rail services being provided in the greater Philadelphia region.

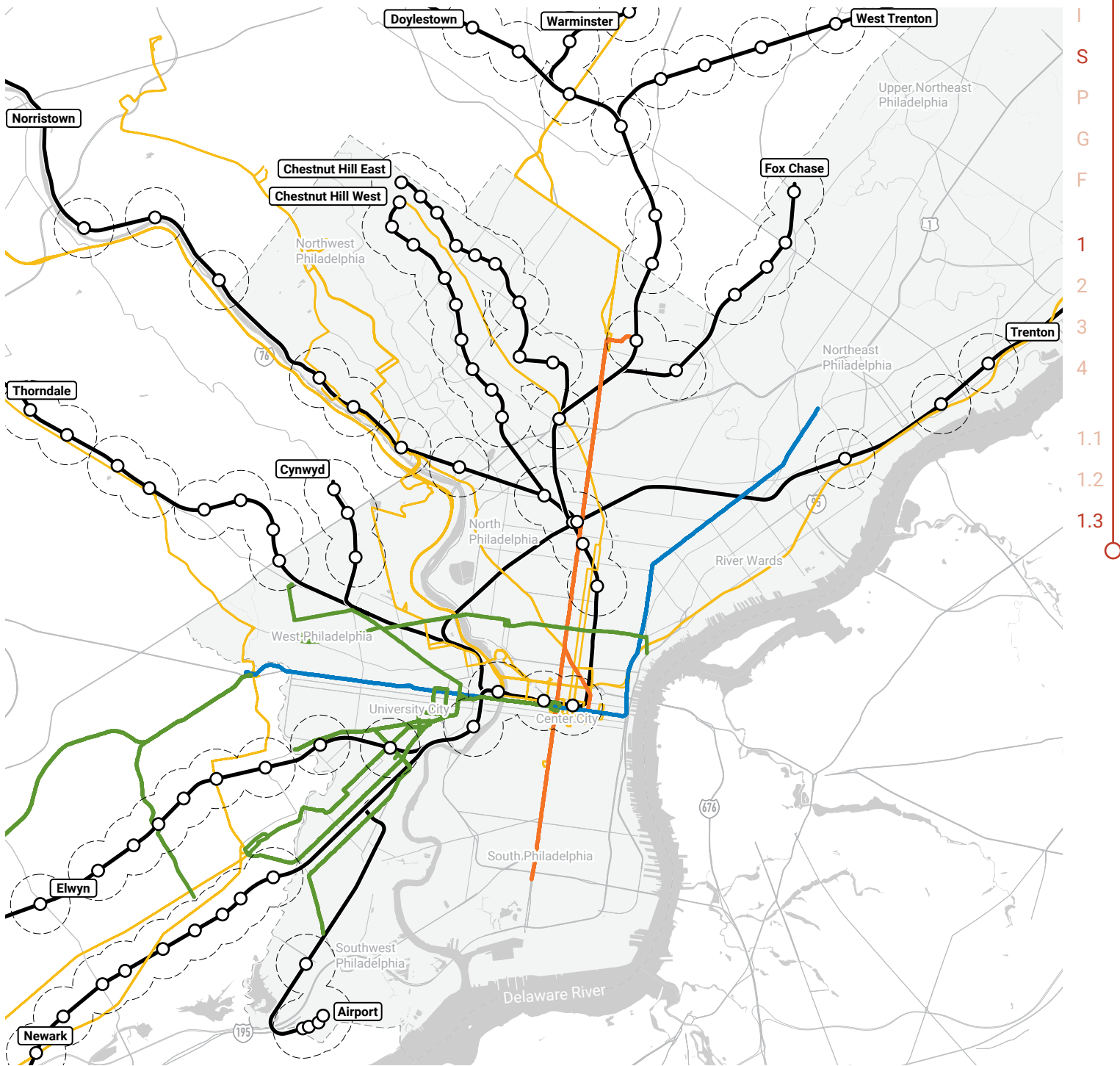
SEPTA currently runs 121 bus routes, many of which stem directly from the original PTC routes, creating redundancy in the overall combined network.

Today, many of those who use bus and rail transit services that parallel Regional Rail into Center City do so because the fare price is much lower, even though Regional Rail service is faster and more direct.



A PCC-type trolley and a Brill trackless trolley of Philadelphia Transportation Company - 1968.

By David Wilson from Oak Park, Illinois, USA - 19680623 21 PTC 2180 228 Snyder Ave. @ 7th St.



Parallel Service to Rail

— Bus Routes Parallel to Regional Rail

— Market-Frankford Line

— Broad Street Line

— SEPTA Trolley

— SEPTA Regional Rail lines

○ SEPTA Regional Rail station

○ 1/2 mile radius from rail station

1:150,000

0 1 3 6 miles

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SEPTA



21



History

The Regional Rail network often has parallel bus and trolley routes, but different frequencies and fare structures cause Regional Rail to be isolated from the rest of the SEPTA network.

Although bus, rail transit, and Regional Rail have all been part of SEPTA for many decades, the fare structures continue to reinforce their legacies and separate the inherited systems. This lack of mode integration, the substantial price difference between Regional Rail and all other modes, and the complicated fare structure perpetuate the long-standing division in the demographic makeup of riders by transit type.

The SEPTA fares for bus and rail transit are \$2.50 when paying cash and \$2 if paid with SEPTA Key.

The Regional Rail fare ranges from \$4 to \$10 depending on method of payment and distance from Center City as well as time of day, making a Regional Rail trip between 2 and 4 times as expensive as a bus or rail transit trip. Typically, Regional Rail commuters are traveling farther but at a faster pace to make the increased cost worthwhile, whereas taking a bus trip of roughly the same distance may be cheaper but will take far longer.

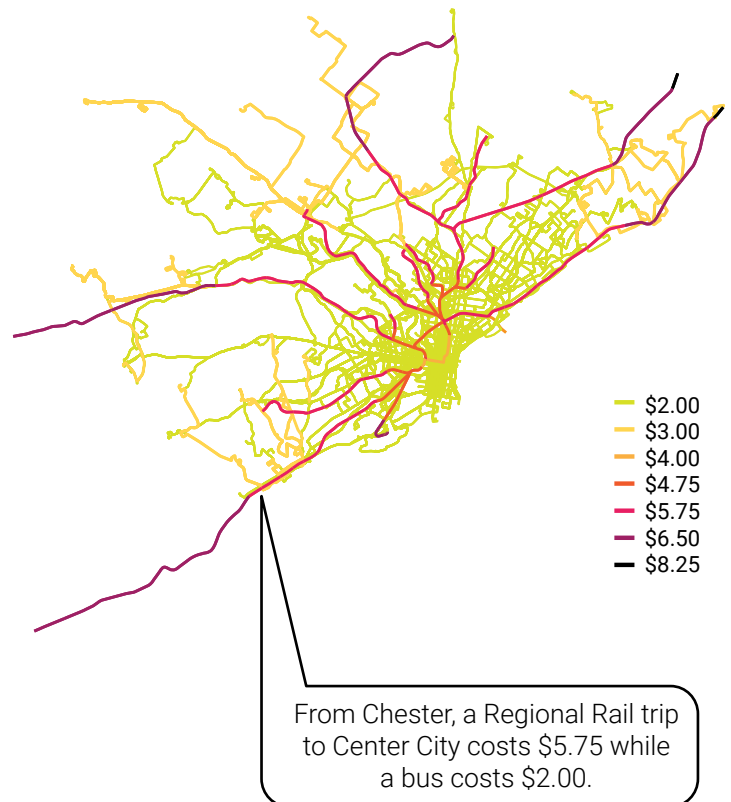
TrailPass is the SEPTA Key product for weekly or monthly passes, and buying the SEPTA fare this way reduces the price per trip. Regional Rail pass holders can transfer for free to other transit modes, but quick trip or pay-as-you-go Regional Rail customers do not get a free transfer to other modes. Pass holders also get anywhere travel on weekends. However, the up-front cost is prohibitive to low-income riders as it ranges from \$105 to \$204 at one time for a monthly pass. Many Regional Rail riders buy passes through their employers.

A Cross County Pass is less expensive and works between any zones, any mode, but it allows no Regional Rail access to or through Center City. Independence Passes have 1- and 3-day options.

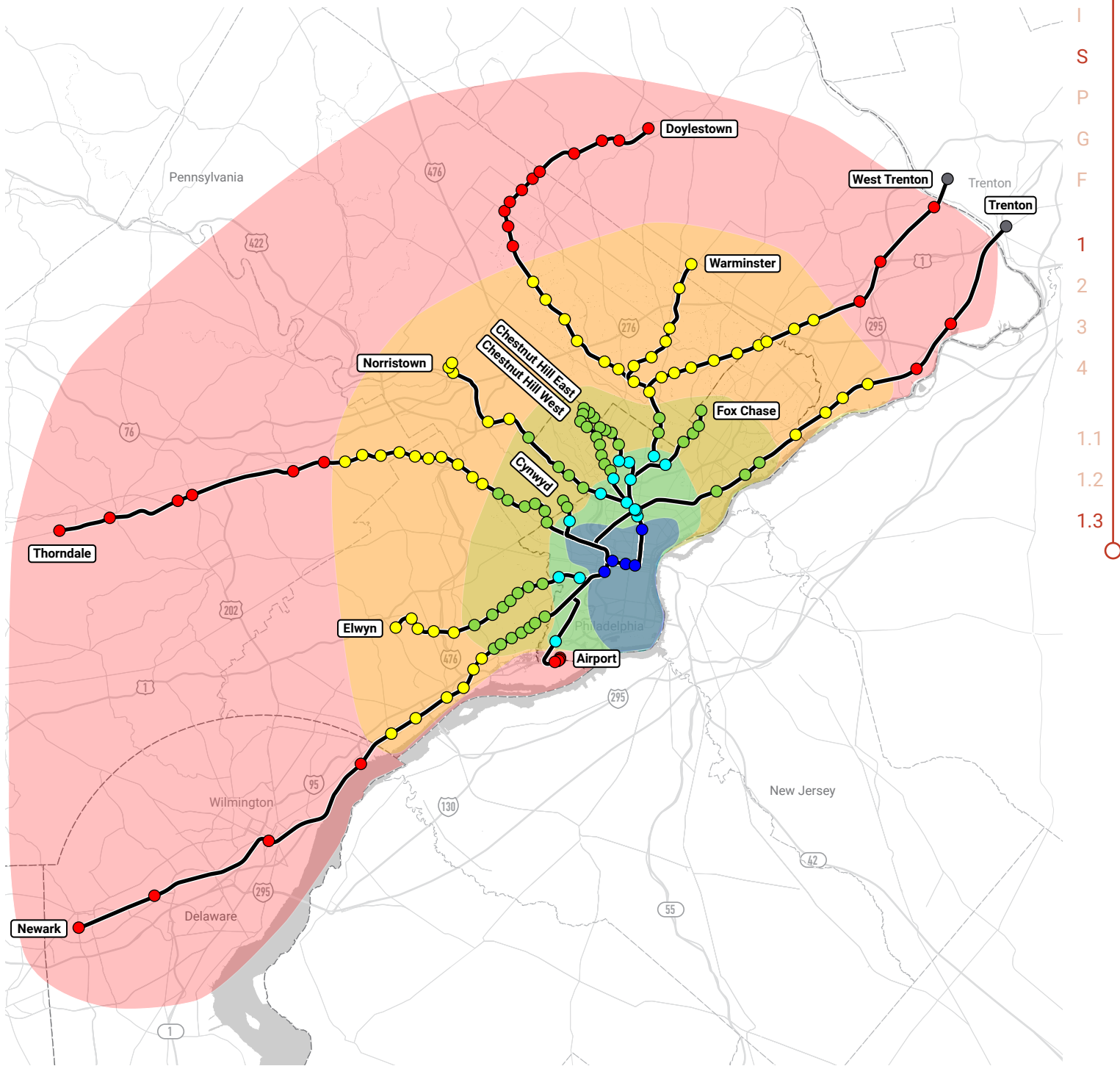
On Regional Rail, you do not need exact fares and train crews now accept credit cards. Mobile ticketing is starting on SEPTA Metro in Spring 2022, and on Regional Rail Winter 2022-23.

There are different fares based on time of day and day of the week that make it difficult to know how much a trip on Regional Rail will cost.

No matter where the journey starts, any trip on Regional Rail costs more than a trip on bus or rail transit



Fares displayed using SEPTA Key Travel Wallet.



Regional Rail Station Fare Zones & One-Way Ticket Price to Center City

CC	1	2	3	4	NJ	
\$4.00	\$4.00	\$4.75	\$5.75	\$6.50	\$8.25	Travel Wallet
\$6.00	\$6.00	\$6.00	\$7.00	\$8.00	\$10.00	Cash

— SEPTA Regional Rail lines

1:500,000

0 5 10 20 miles

SEPTA



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23

Reimagining Regional Rail

1. History

2. Infrastructure and Operations

3. Connectivity

4. Demand

2.1 The current infrastructure has the capacity for significantly more service, especially off-peak, but a few bottlenecks cap the capacity of the entire network.

2.2 The amenities and accessibility of stations vary widely.

2.3 The Regional Rail fleet is old; its replacement is an opportunity to improve the passenger experience and operating efficiency.

2.4 A dedicated staff keeps Regional Rail operating but staffing capacity is also a limitation to growth.







Infrastructure and Operations

2.1

The current infrastructure has the capacity for significantly more service, especially off-peak, but a few bottlenecks cap the capacity of the entire network.

SEPTA's Regional Rail network boasts many miles of double, triple, and quadruple track. This infrastructure capacity could allow for greater service levels if warranted by demand. However, bottlenecks in the system limit train operations.

Without junctions, a double track rail line is capable of handling a train every 5 minutes or better. Most of the network, though, sees only a train an hour off peak. The busiest part of the network, the Center City tunnel, had 44 trains per hour at in-peak in 2019, but only 18 trains per hour off-peak (March 2020).

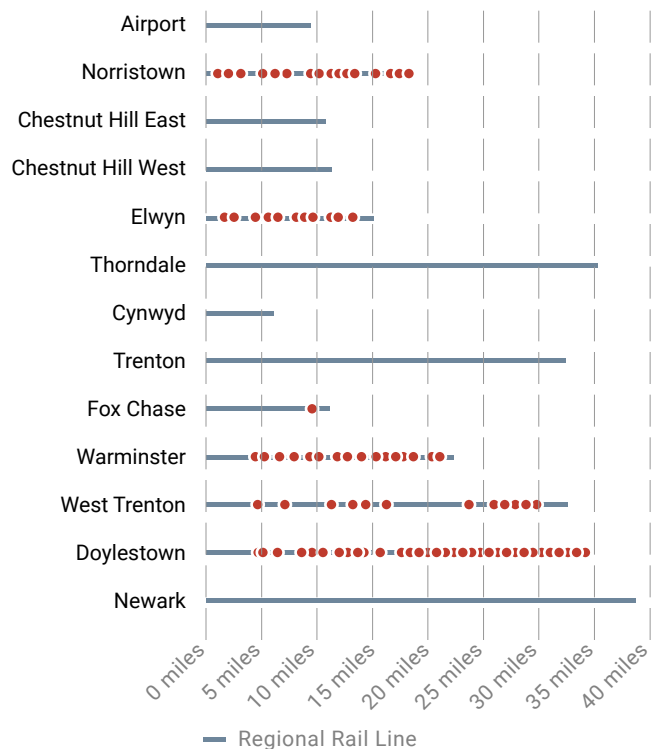
Single-track sections limit train frequency as only one train can operate on the track at a time. Other trains must wait at a passing siding or nearest section of double track for the first train to come through. Although it accounts for less than 10% of the total Regional Rail track mileage, there are 24.8 miles of single track within the Regional Rail system.

Track conflicts happen when there are multiple trains in the same physical space needing to make moves to different tracks and directions. These conflicts are exacerbated during peak periods when express and local services are operating in the peak direction. For example, near Jenkintown, SEPTA has trains serving Warminster, Doylestown, and West Trenton, inbound and outbound, all use the same two tracks. Trains need to maneuver over to their branch requiring coordination, which can lead to delay.

There are parts of the system where Regional Rail and Amtrak share track, but priority is often given to Amtrak trains in scheduling and dispatching, which can lead to delays or lack of capacity for Regional Rail during peak periods. In most instances, Amtrak has priority, which can cause schedule delays for Regional Rail.

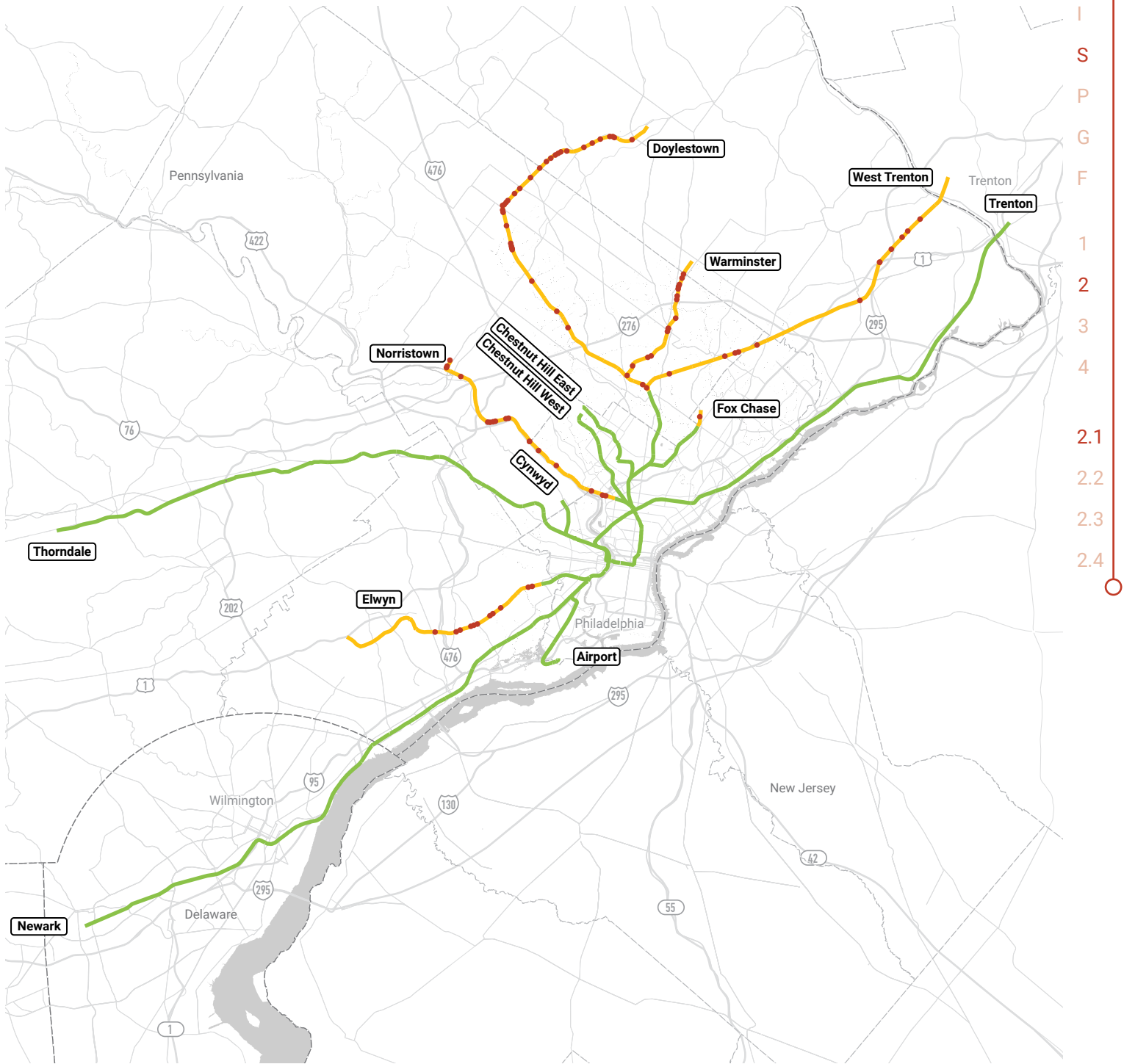
Most of the SEPTA Regional Rail network the rail service is completely grade-separated. In addition to service issues, at-grade crossings also cause vehicular traffic issues. For the lines that aren't grade-separated, this map shows the number and density of at-grade crossings between rail and roads—each of which introduces a potential to slow train service and introduce safety conflict.

Density of At-Grade Crossings by Regional Rail Line



Data source: FRA

The above shows approximate length of line in comparison with one another, and the existence and density of at-grade crossings.



I
S
P
G
F

1
2
3
4

2.1
2.2
2.3
2.4

Regional Rail At-Grade Crossings

- At-Grade Crossings
- Grade-separated track
- Track affected by at-grade crossing

1:500,000

0 5 10 20 miles

FRA



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27



Infrastructure and Operations

The current infrastructure has the capacity for significantly more service, especially off-peak, but a few bottlenecks cap the capacity of the entire network.

In an ideal world trains operate at regular, consistent speeds (see map on page 32), slowing down and stopping only to pick up and drop off passengers at stations. However in reality many issues can slow trains down on a regular or an irregular basis. These images illustrate several of the most common bottlenecks on the SEPTA Regional Rail network.



Single-track sections limit frequency, because only one train can operate at a time.



Amtrak trains take priority over Regional Rail, so the shared parts of the network create conflict.



At-grade crossings create a risk of collisions.



Track maintenance or seasonal events like fallen leaves can slow trains.

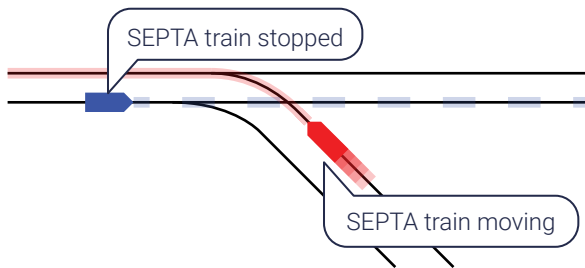


There is conflict through all the points in the system when trains from different branches come together.

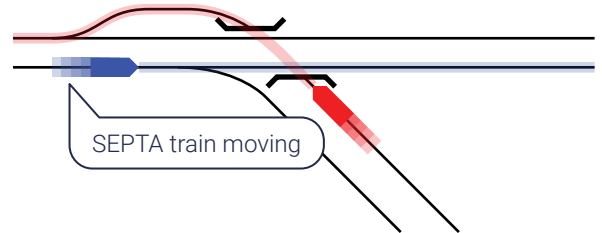


Interlockings make sure the path ahead is safe before trains proceed. They are critical to safety and yet also a constraint on the system.

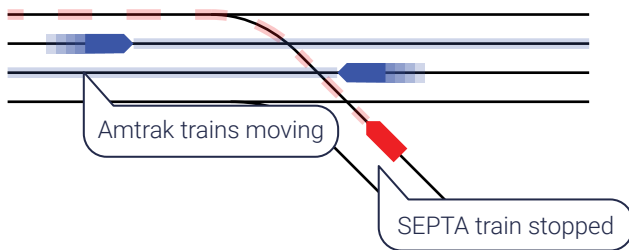
Bottleneck: At-grade junctions require other trains to stop for a train to cross over, slowing train speeds and introducing the potential for conflict



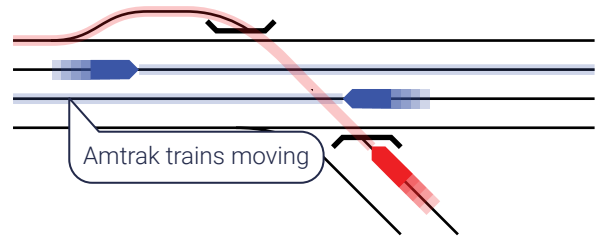
Not a Bottleneck: Grade separations allow trains to move under/over other tracks while all trains keep moving



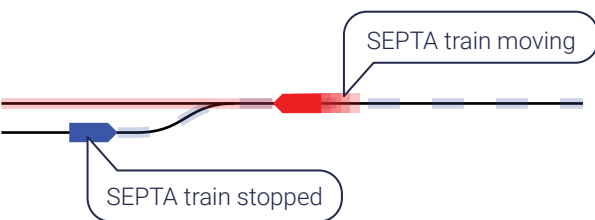
Bottleneck: This is a similar bottleneck to at-grade junctions with the additional delay to Regional Rail because Amtrak trains will take priority



Not a Bottleneck: At a flying junction all trains can keep moving



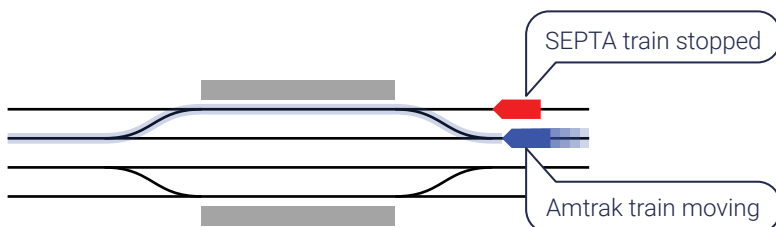
Bottleneck: Single-track sections of the network limit frequency, because only one train can operate at a time



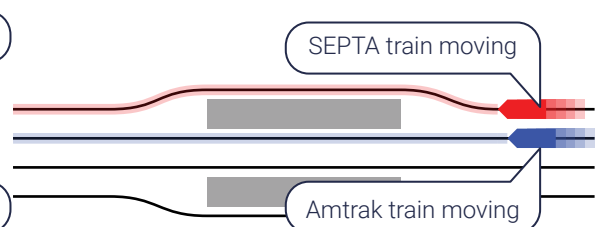
Not a Bottleneck: When operating on double track, trains can pass each other at speed, which provides flexibility to increase service frequency



Bottleneck: Stations with side (outside) platforms slow trains, because trains need to navigate to the outside tracks to serve the station



Not a Bottleneck: Stations with center-island platforms provide flexibility for trains to stay on any track to serve the station



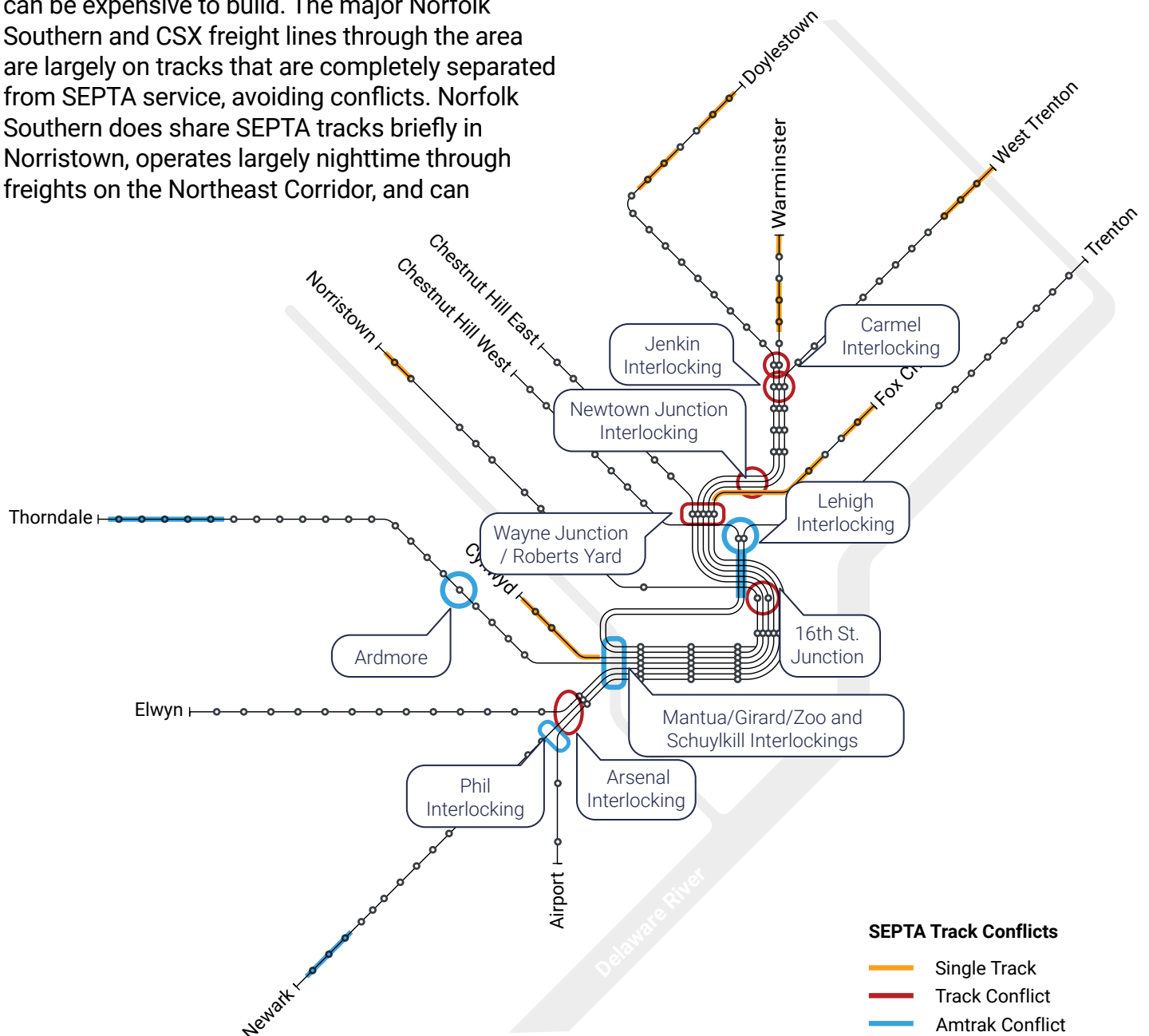


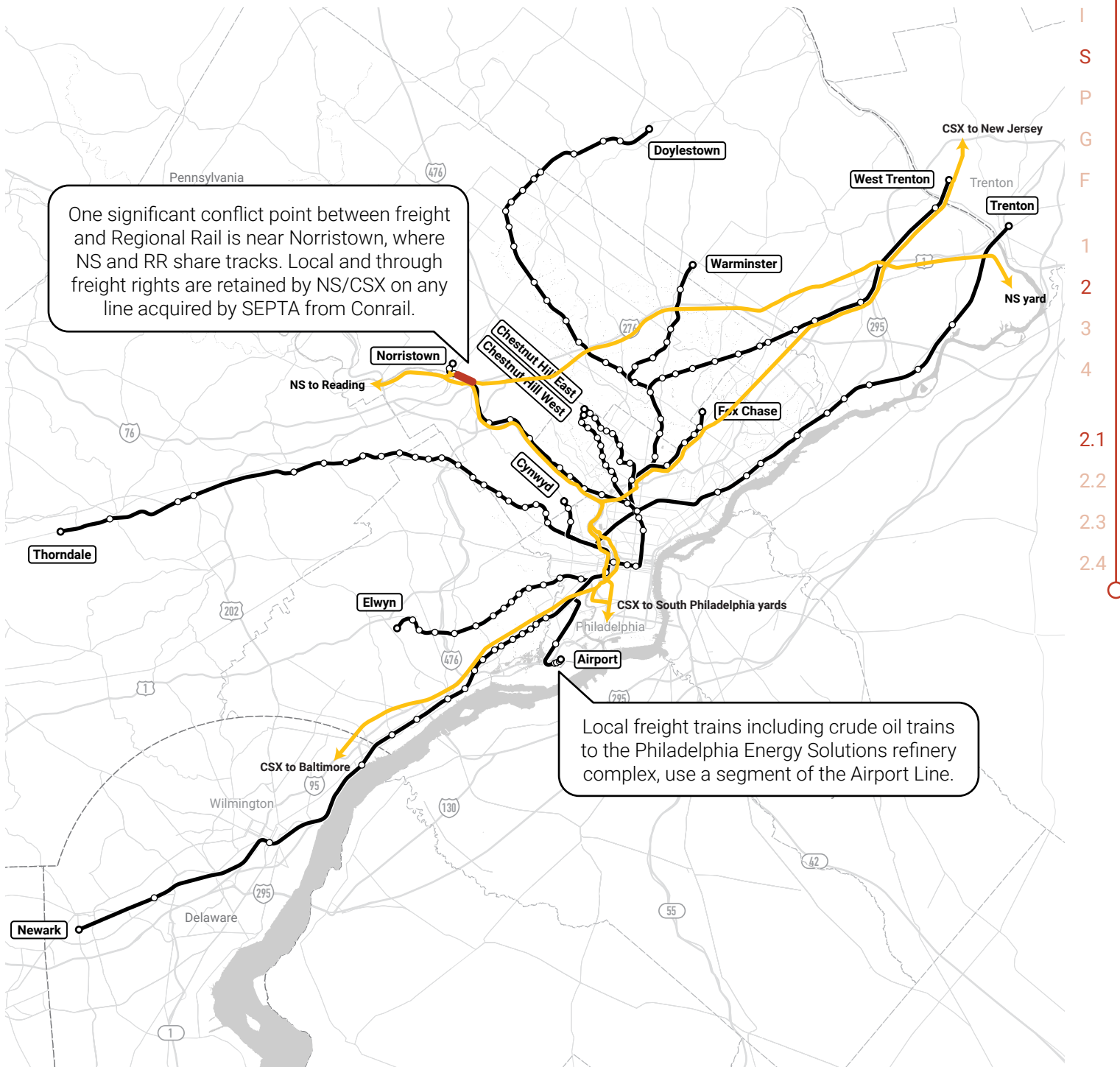
Infrastructure and Operations

The current infrastructure has the capacity for significantly more service, especially off-peak, but a few bottlenecks cap the capacity of the entire network.

Although SEPTA has very few overlaps with freight, there are major bottlenecks on the SEPTA Regional Rail network. These are caused by multiple train flows using the same track, or tracks that cross each other at grade. Each of these situations can cause trains to have to wait for other trains. These bottlenecks can be solved with infrastructure improvements, but those can be expensive to build. The major Norfolk Southern and CSX freight lines through the area are largely on tracks that are completely separated from SEPTA service, avoiding conflicts. Norfolk Southern does share SEPTA tracks briefly in Norristown, operates largely nighttime through freights on the Northeast Corridor, and can

operate on part of the Thorndale Line. There are additional areas where local freight trains use SEPTA tracks, including oil trains on the airport line and infrequent local freights on the Doylestown and West Trenton lines. Local and through freight rights are retained by NS/CSX on any line acquired by SEPTA by Conrail, but many of these are never used.





Regional Rail and Area Freight Movement

- Major Freight Lines
- Shared with Regional Rail

- SEPTA Regional Rail lines
- SEPTA Regional Rail station

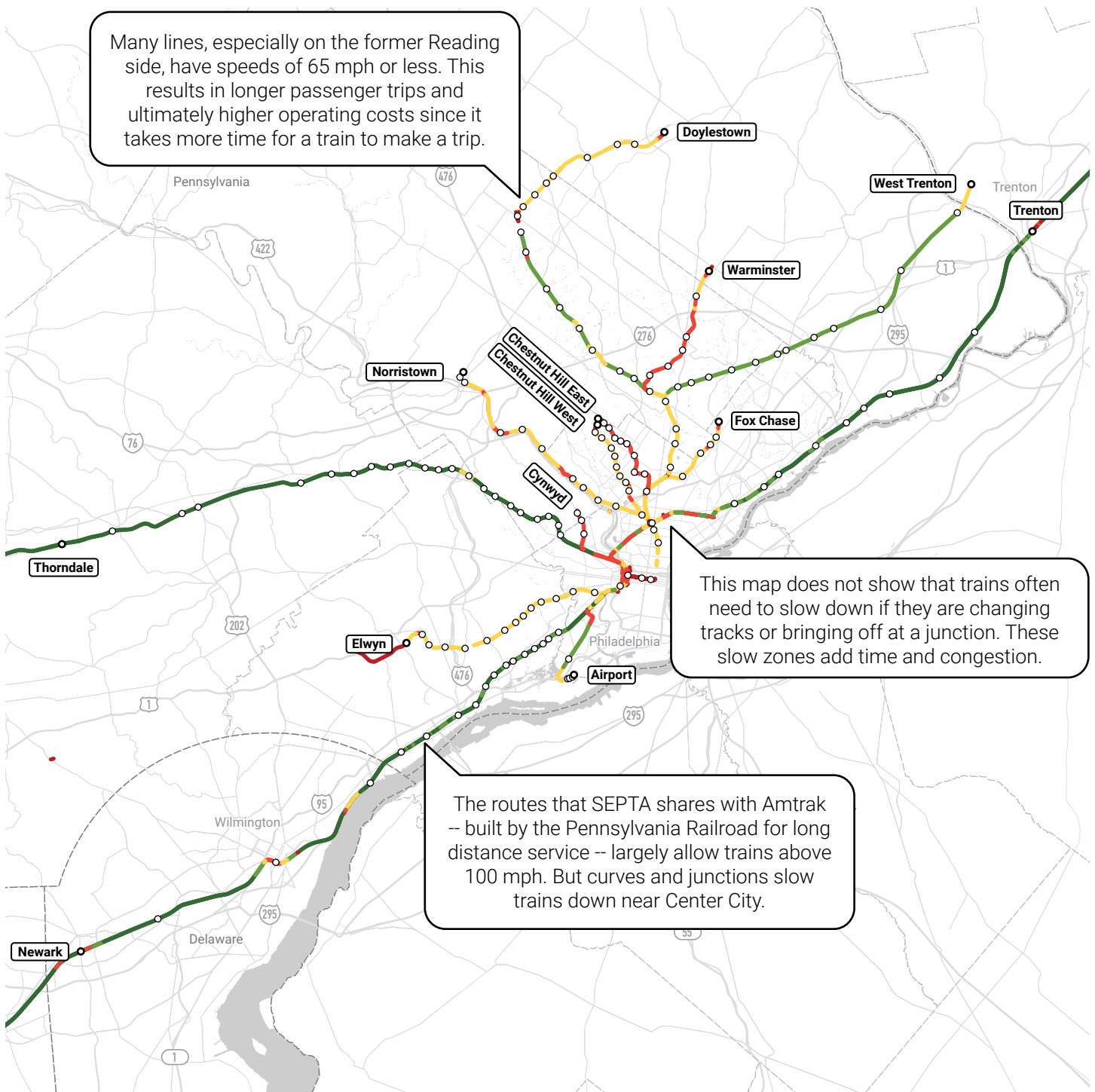
1:500,000

0 5 10 20 miles

FRA

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31



Regional Maximum Rail Speeds

- < 20 mph
- 21 - 40 mph
- 41 - 65 mph
- 66 - 90 mph
- 91 + mph

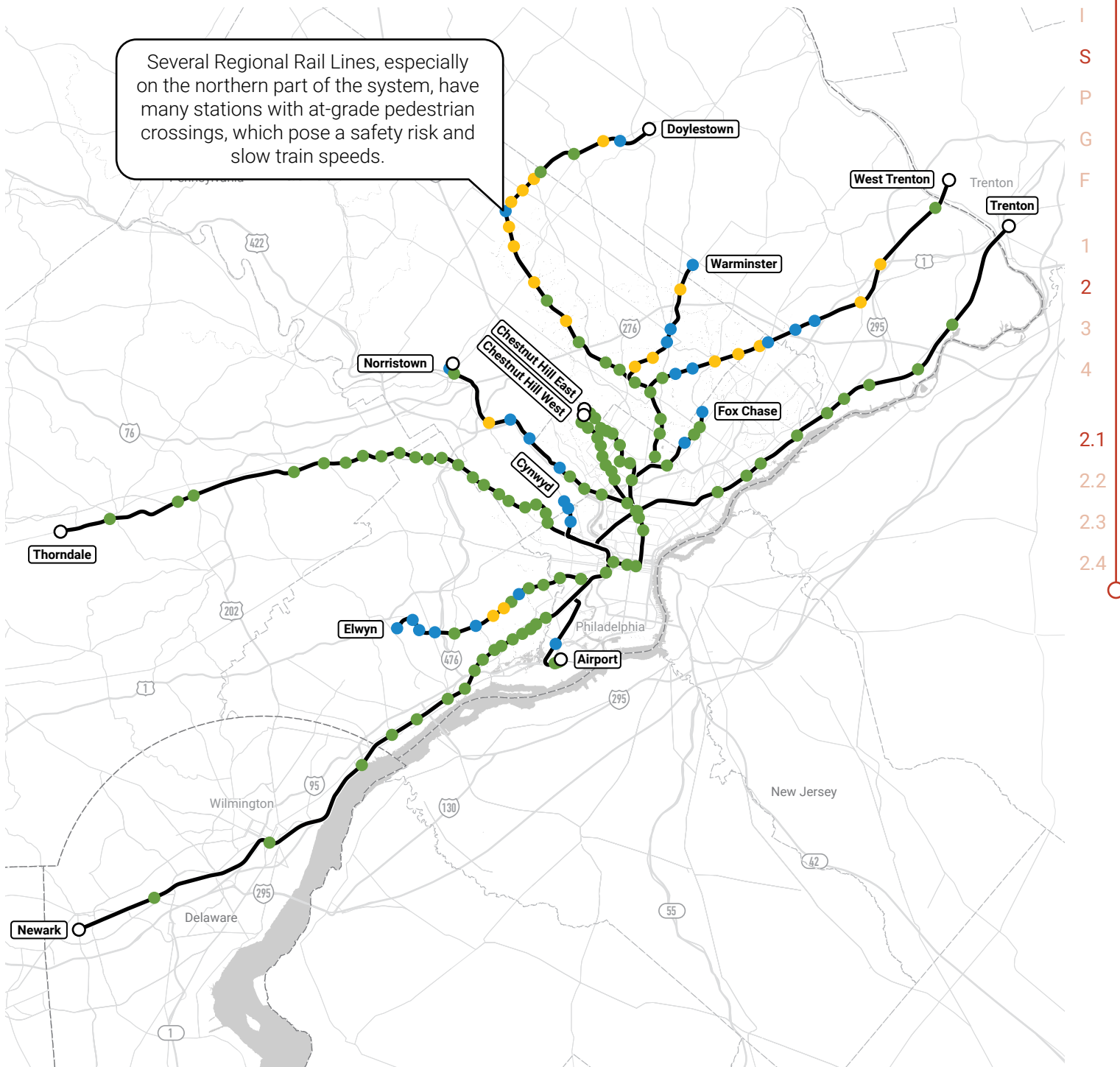
SEPTA Regional Rail station

1:500,000

OpenStreetMap

0 5

10 20 miles



Station Pedestrian Crossings

Type of crossing:

- At grade pedestrian only crossing at platforms
- At grade road crossing adjacent to station used for pedestrian access
- All pedestrian crossings at station are grade separated, or no crossings exist

— SEPTA Regional Rail lines

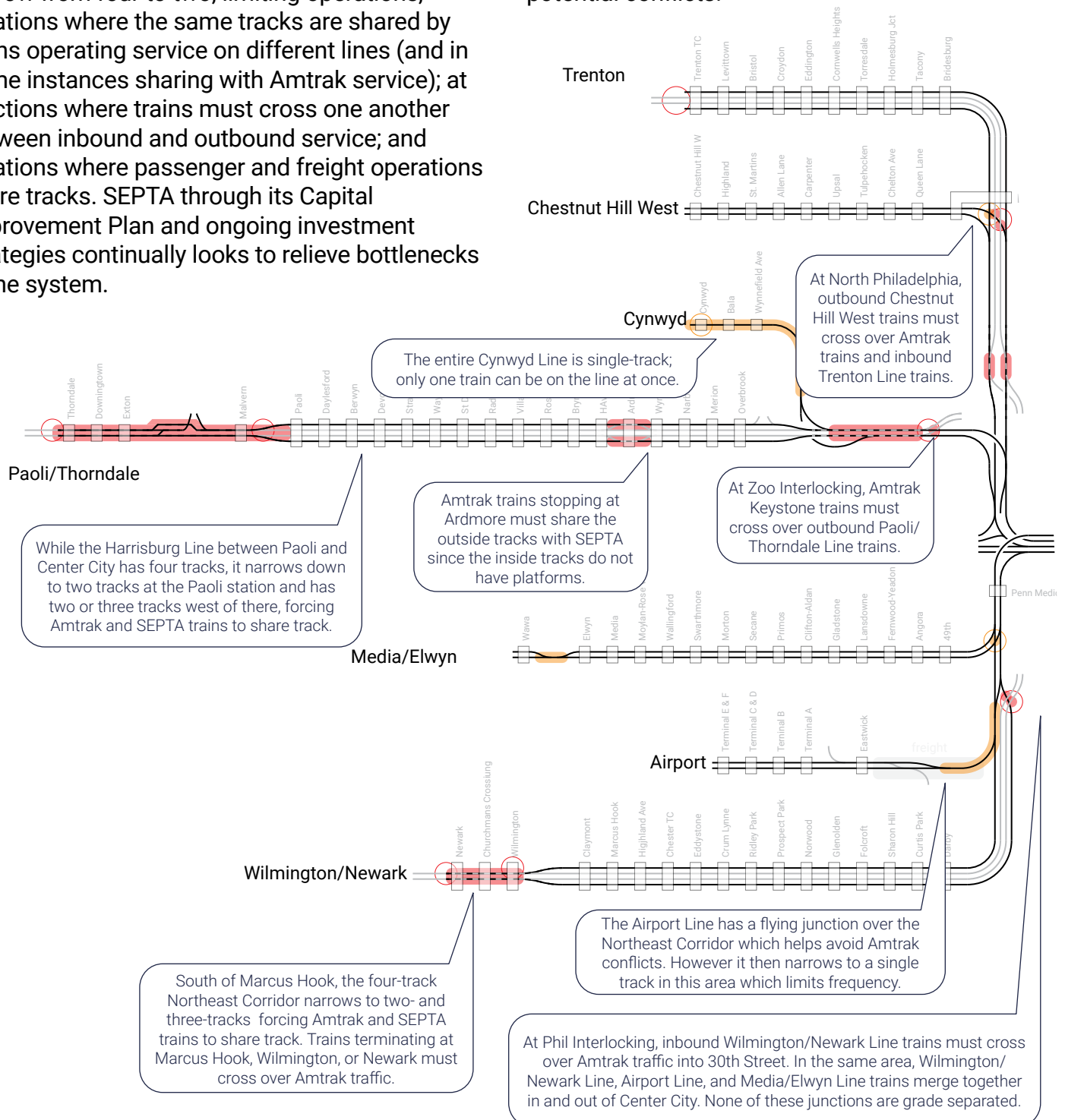


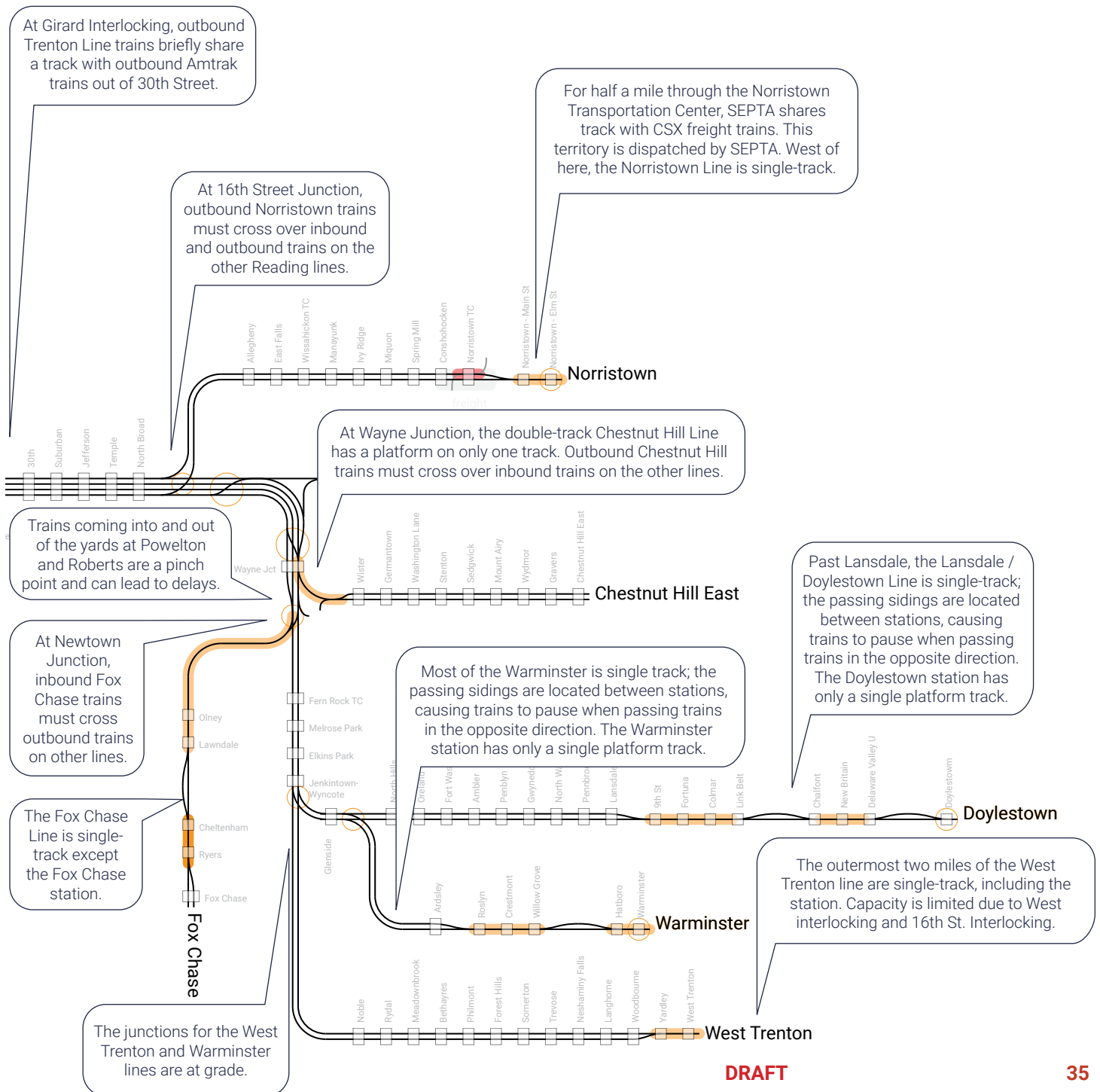
Infrastructure and Operations

The current infrastructure has the capacity for significantly more service, especially off-peak, but a few bottlenecks cap the capacity of the entire network.

There are a variety of operational challenges that exist on the SEPTA Regional Rail network today. These range by line and by location, and include areas where only one track exists, or where tracks narrow from four to two, limiting operations; locations where the same tracks are shared by trains operating service on different lines (and in some instances sharing with Amtrak service); at junctions where trains must cross one another between inbound and outbound service; and locations where passenger and freight operations share tracks. SEPTA through its Capital Improvement Plan and ongoing investment strategies continually looks to relieve bottlenecks in the system.

This diagram shows the flow of Amtrak (grey) and SEPTA (black) trains in both directions across the system; it does not show the full detail of track connections. Where lines overlap there are potential conflicts.







2.2

The amenities and accessibility of stations vary widely.

SEPTA's Regional Rail stations were inherited with the legacy of the two companies that previously owned them. This means that some stations have ample amenities while others are not accessible or are not hospitable for riders.

The Airport Line is the only Regional Rail line that is entirely accessible with high level boarding. Doylestown (from Lansdale up), Fox Chase, and Cynwyd are also accessible with high or mini-high level platforms.

Many stations have accessibility issues both in and around the station. Not all platforms allow for level boarding, and some stations make it difficult to get from one side of the track to the other.



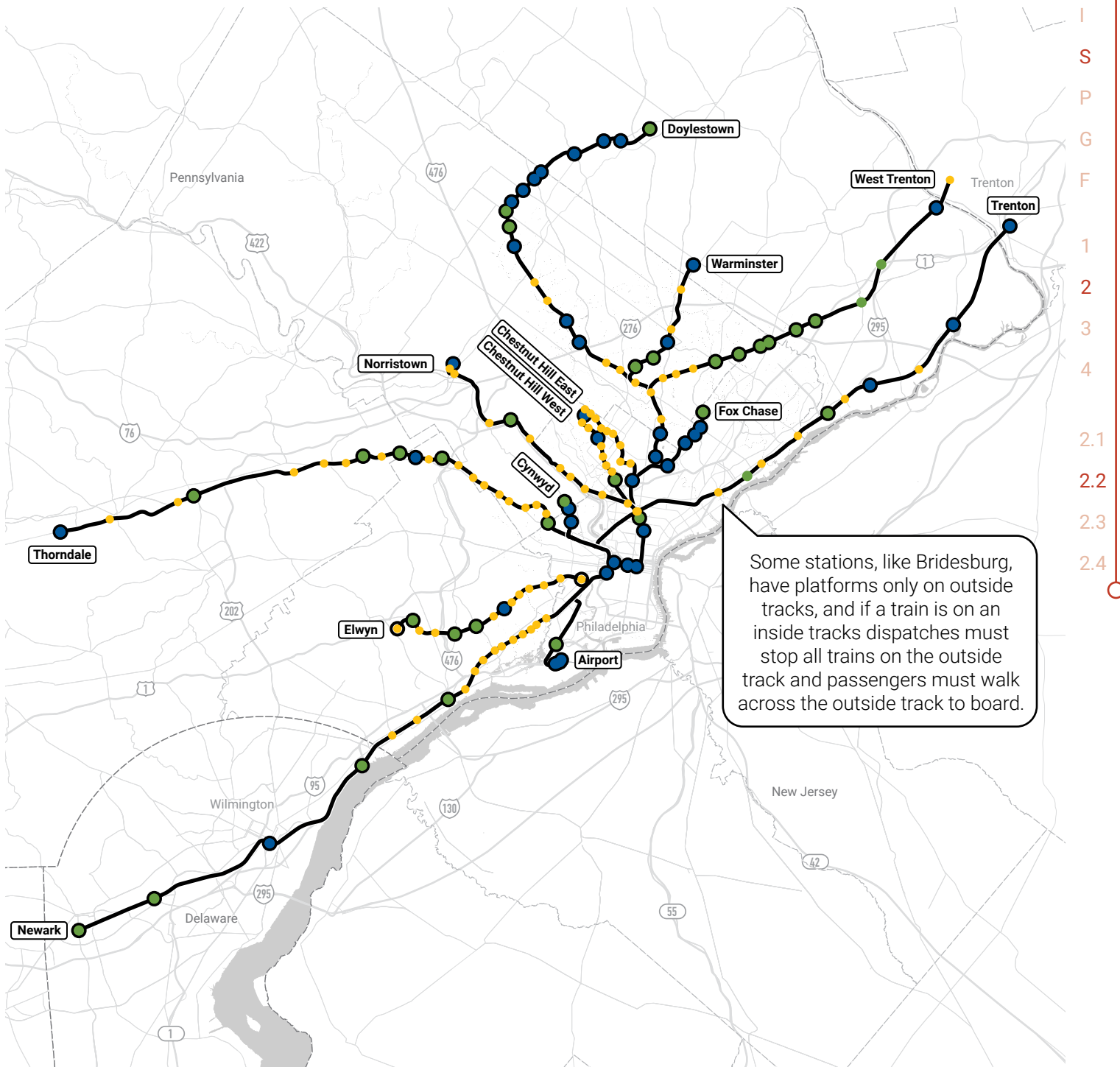
High Platform - The platform is level with the train door



Low Platform - The platform level is well below the train's door, and stairs must be used to board



Mini-high Platform - A ramp up to a single-door area for boarding from a low platform station. Current ADA standards require level boarding at all doors and allow the use of mini-highs only where there are freight operations.



Station Accessibility

Type of platform

- High Platform
- Low Platform
- Mini-high Platform
- Station is ADA Accessible

— SEPTA Regional Rail lines

1:500,000

SEPTA 2019

0 5 10 20 miles



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37



Infrastructure and Operations
The amenities and accessibility of stations vary widely.

The station amenities and placement of the fare collection devices range widely. Some stations are complete and well designed, others only have a basic shelter and a fare collection or validation device. These disparities also drive ridership and community ownership over stations. During the rollout of the new fare collection devices, their placement was driven by the existing electrical connections at the sites. The conditions of the area around stations also play a significant role in their ridership and usability.

The SEPTA Key system requires riders to tap on and off the trains at card riders at the stations. However, the locations of many fare collection devices do not make it obvious or intuitive, and a few stations (particularly those outside Pennsylvania) do not have readers. There are also no supportive signs at most stations directing people to the fare collection devices nor are there signs to inform the customer that they need to have their ticket to close out the trip.

Pedestrian access to stations varies. Some stations have safe and comfortable pedestrians paths. Others, even in generally walkable areas, have discontinuous paths or require riders to cross wide streets with fast traffic. Some stations that people often drive to and from are hard to walk or bike to due to the surrounding parking lots and access roads.

While some stations are easy to find, others don't have enough signage in the surrounding areas for people to know the station is there.



Regional Rail Turnstile



Regional Rail Fare Collection Device



Bridesburg Station on the Trenton Line and has minimal amenities



Jefferson Station serves many lines and has a lot of seating options and wayfinding



Infrastructure and Operations

2.3

The Regional Rail fleet is old; its replacement is an opportunity to improve the passenger experience and operating efficiency.

Rail vehicles respond to the infrastructure and shape the service a railroad provides. The cars that have defined SEPTA's Regional Rail system for decades will need to be replaced soon; 56% of SEPTA's fleet was built before 1976. SEPTA has a decision about how many and what kinds of vehicles to procure to replace them.

Platform size currently limits SEPTA's maximum consist numbers to six cars. Running seven car or more train lengths would require a "double stop" at most stations causing delays. Electric Traction restriction places consist limits on most branches at six cars for revenue trains.

Unlike most US commuter rail operators, SEPTA has a fleet that consists mostly of electric, self-propelled passenger cars ("Electric Multiple Units," or EMUs) rather than passenger cars pulled by locomotives. EMUs accelerate faster than locomotive-hauled trains, which makes them well-suited to lines with closely spaced stations. They also scale well, operating efficiently in train consists as little as one or two cars or as big as ten or more. Both of these characteristics suit SEPTA's system well. SEPTA's small fleet of locomotive-hauled cars is used primarily in services where those EMU advantages don't apply: long-distance limited-stop peak express trains.

All SEPTA equipment has no choice but to be designed for the current infrastructure, in particular, the many low-level platforms on the system. This requires cars to have built-in steps for boarding from a low-level platforms as well

as an arrangement (usually a trap door over those steps) for high-level platforms.

SEPTA has a contractual option to purchase multi-level EMU cars as part of a New Jersey Transit order. However, SEPTA has so far not exercised that option.

In 2018, the Federal Railroad Administration adopted a set of alternative crash-worthiness standards which permit designs long used in other parts of the world.



Steps on this Silverliner IV allow passengers to board from low platforms. A trap door – which the conductor is standing on – covers the steps for high-level boarding.



Image: SEPTA

The Silverliner V has some doors with steps and trap door, which can be used at all stations, (left door) and some without, which can only be used at high-level platforms (right door.) Similar cars used in Denver, where all station platforms are high, need only high-level doors.

Existing SEPTA Regional Rail Fleet



	Silverliner IV	Silverliner V	Push-Pull	Push-Pull
type	Electric Multiple Unit	Electric Multiple Unit	Electric locomotive + single level cars	Electric locomotive + multilevel cars
number in fleet	230 cars	120 cars	45 cars	45 cars + 15 locomotives
percentage of fleet	58%	30%	11%	not yet delivered
car length				
train length	1-6 cars	1-6 cars	1 locomotive + 1-7 cars	1 locomotive + 1-7 cars
built	1973-1976	2010-2013	1987, 1999 (cars) 2018 (locomotives)	2021-present (cars)
built by	General Electric / Avco for Reading Railroad and Pennsylvania Railroad	Hyundai Rotem for SEPTA	Bombardier for SEPTA (cars) Siemens for SEPTA (locomotives)	CRRC for SEPTA (cars)
seats	120 on 1 level	107 on 1 level	115-131 on 1 level	130 on 2 levels
wheelchair/bike space	1 space	2 spaces	0-2 spaces	2-4 spaces
doors	2 doors each side at ends of car, each with steps and trap door; portable wheelchair ramp	2 doors each side at quarter points, each with steps and trap door, plus 1 high level door with built in wheelchair ramp	2 doors each side at ends of car, each with steps and trap door; portable wheelchair ramp; some cars have additional high level door at center point	2 doors each side at ends of car, each with steps; 2 high level doors each side at quarter point
acceleration	2.2 mph/s	3 mph/s up to 30 mph		
top speed	100 mph	110 mph	125 mph	125 mph
restroom	no	no	no	no
on board announcements	conductor audio announcements	automated audio announcements, display screens	conductor audio announcements	automated audio announcements, display screens
crashworthiness standards	traditional FRA standards	traditional FRA standards	traditional FRA standards	traditional FRA standards



2.4

A dedicated staff keeps Regional Rail operating but staffing capacity is also a limitation to growth.

SEPTA is unusual as a public agency in the US in the amount of maintenance, construction, engineering, training, and overall system work it does in-house. Retirement and financial constraints play a major role in the quantity of people SEPTA can hire, train, and retain at a given time. The number of engineers, conductors, and maintenance staff drives service levels possible on the system.

The platform heights and number of doors, not fare collection, drive the number of crew members required to operate a Regional Rail train. A six-car train takes one engineer, one conductor, and two assistant conductors.

The FRA does not have any specific requirements around crew size, however, the system's operations have always been built around crews of at least 2 per train, which complies with FRA requirements when trains have manual trap doors. The type of vehicle becomes very important as the newer trains can be programmed to only open high-level or low-level doors at a given stop.

The safety plan for the operations of the fleet currently specifies the number of crew needed. Given the way the system operates today, the crew numbers currently used are needed.

Conductors and assistant conductors operate the door hatches at different height platforms. Each can do 1-2 adjacent doors per stop.

When discussing crew size with SEPTA staff, the current goal of 213 fully trained engineers does not provide any flexibility for training time, sick time, or any additional service. SEPTA currently (2021) has 194 trained engineers. Current hiring across positions does not outpace retirement and retention issues. Conductors and engineers are in training together for the first 7 months. The training department also trains for supervisors and routine on-the-job training.

There must be one engineer per train. With current equipment, there is also one conductor per every two adjacent doors that open at every stop due to the platform height difference at the stations.

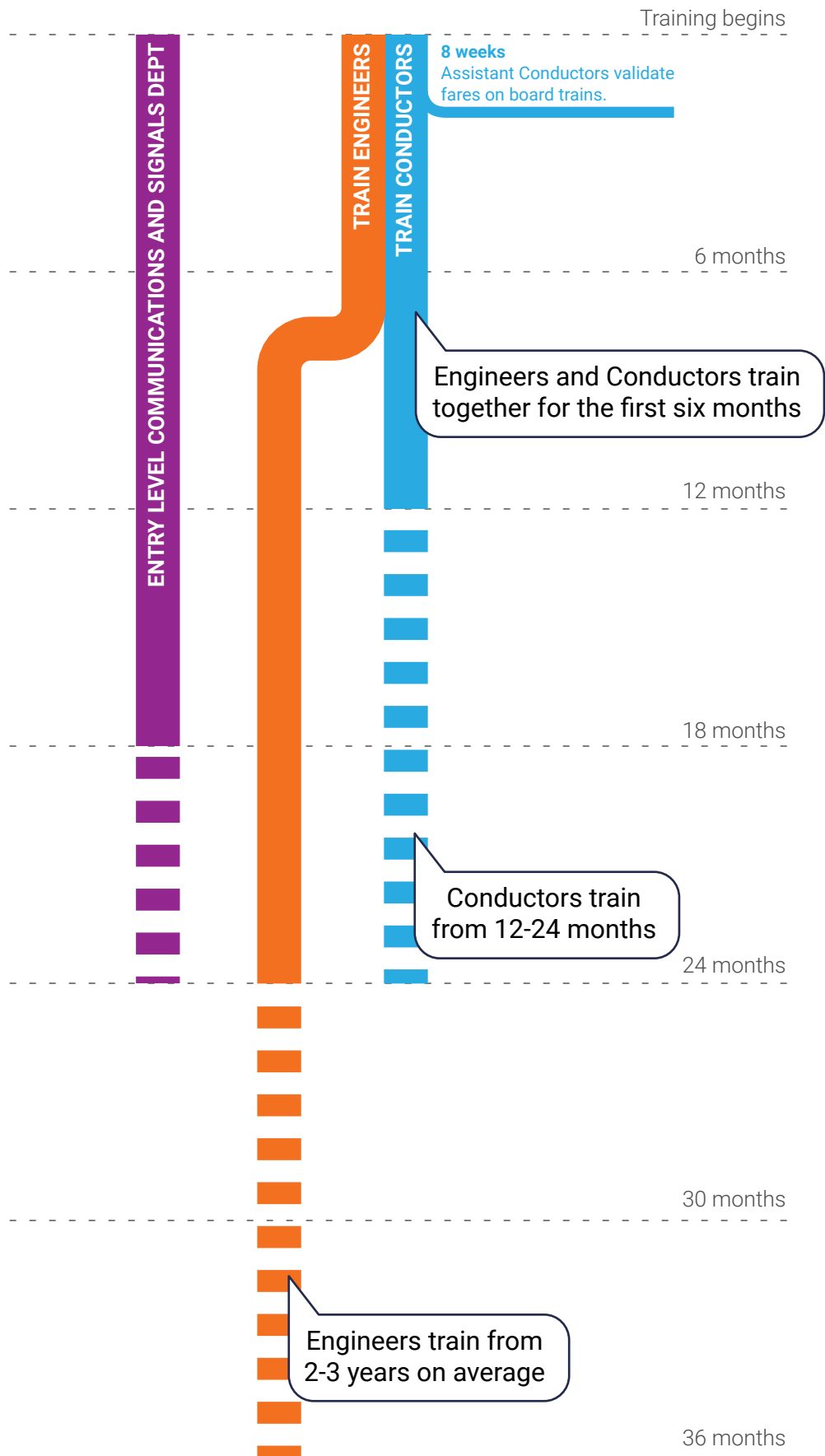
At low platform stations, the conductor must operate the door hatch to reveal the stairs in addition to their other tasks. The conductor is in charge of the safety of the train.

Many other departments require intensive training, especially in maintenance and infrastructure upkeep positions. Retirement and loss of institutional knowledge is not just an on-train issue. SEPTA does a huge proportion of the holistic maintenance work internally and risks losing some of the internal knowledge housed within the departments.

One engineer controls the train's movement.



Image: SEPTA



Data source: SEPTA HR Department

Reimagining Regional Rail

1. History

2. Infrastructure and Operations

3. Connectivity

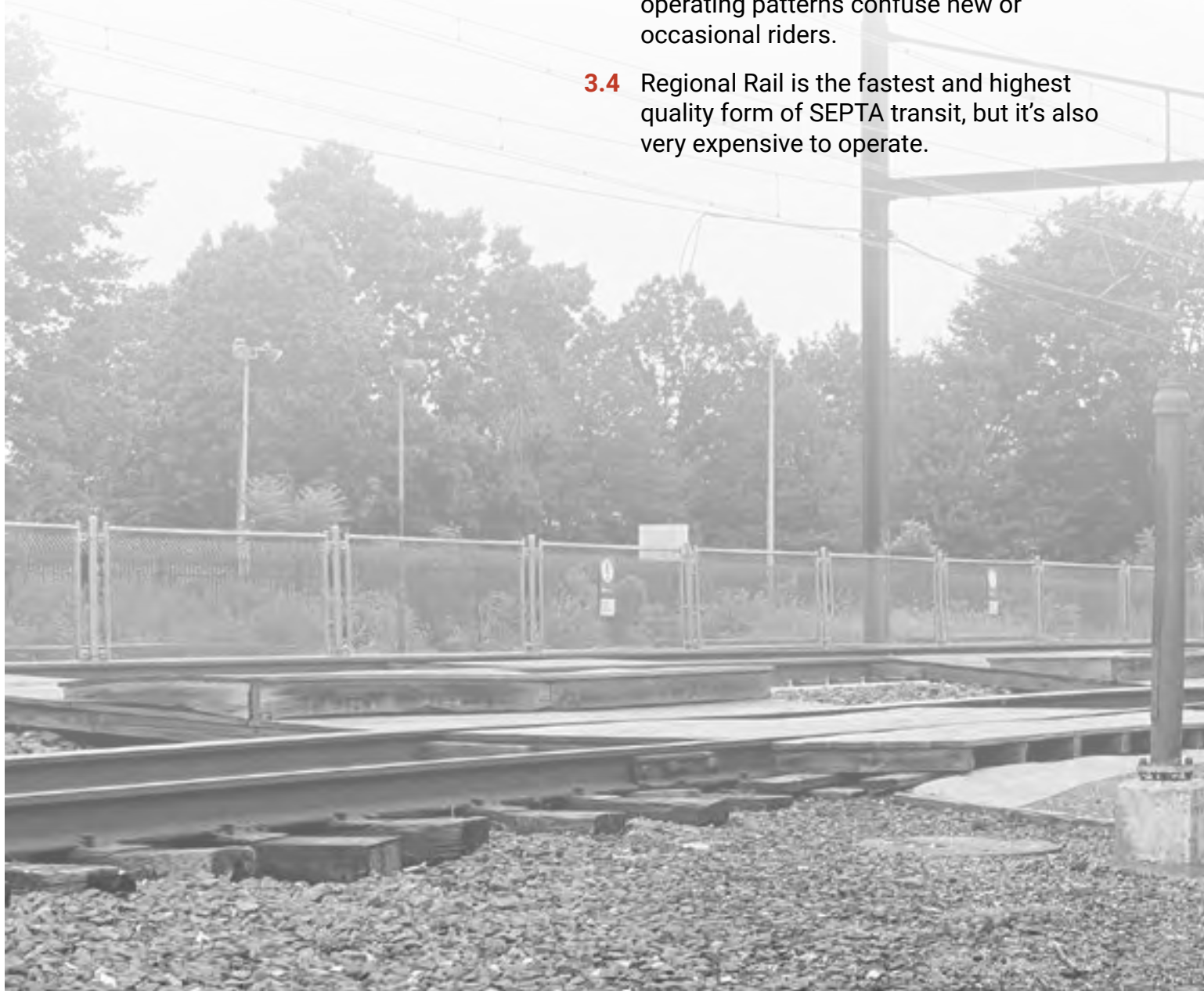
4. Demand

3.1 The Regional Rail network starts early and runs late, seven days a week, but frequency is low outside of peak hours.

3.2 Connection points are limited between Regional Rail and other modes, and those connections that exist are often awkward.

3.3 Regional Rail is tuned to the needs of frequent riders, but the resulting complex operating patterns confuse new or occasional riders.

3.4 Regional Rail is the fastest and highest quality form of SEPTA transit, but it's also very expensive to operate.







3.1

The Regional Rail network starts early and runs late, seven days a week, but frequency is low outside of peak hours.

Span and frequency are two of the most influential factors for the usability of a transit system.

Most stations have an exceptional span of service, almost all operating with 19 or more hours of service, except for stations along the Cynwyd Line.

Many stations have peak frequencies between 15 and 30 minutes.

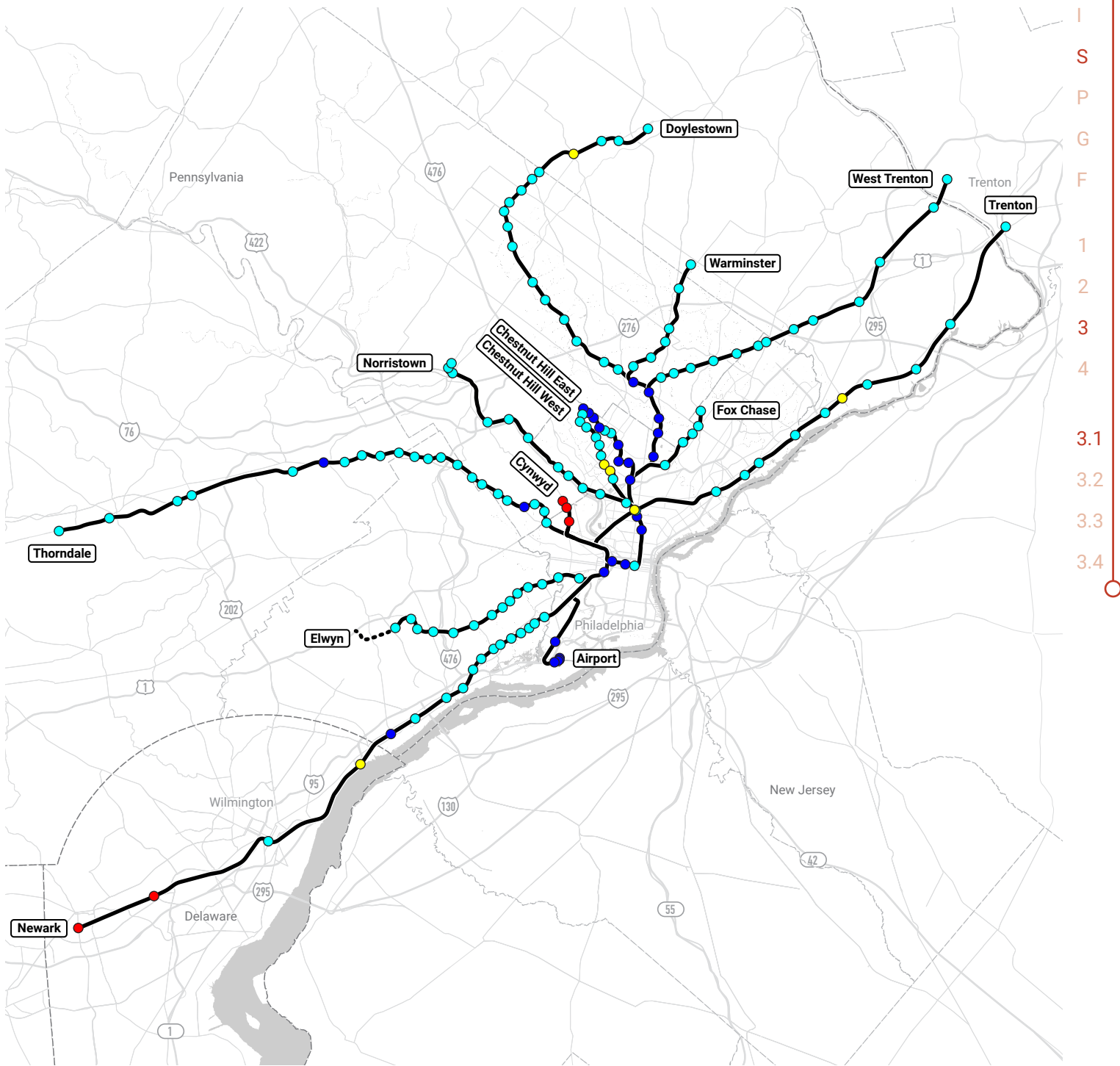
Some stations in and near the core have peak frequencies more often than 15 minutes.

Peak frequencies on outlying stations and lower ridership lines are lower.

All stations are less frequent at midday.

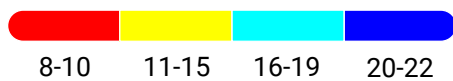
Most stations have service every 45-60 minutes during midday, which makes service much less convenient to use.





Regional Rail Span of Service - Inbound

Hours of Service



— SEPTA Regional Rail lines

1:500,000

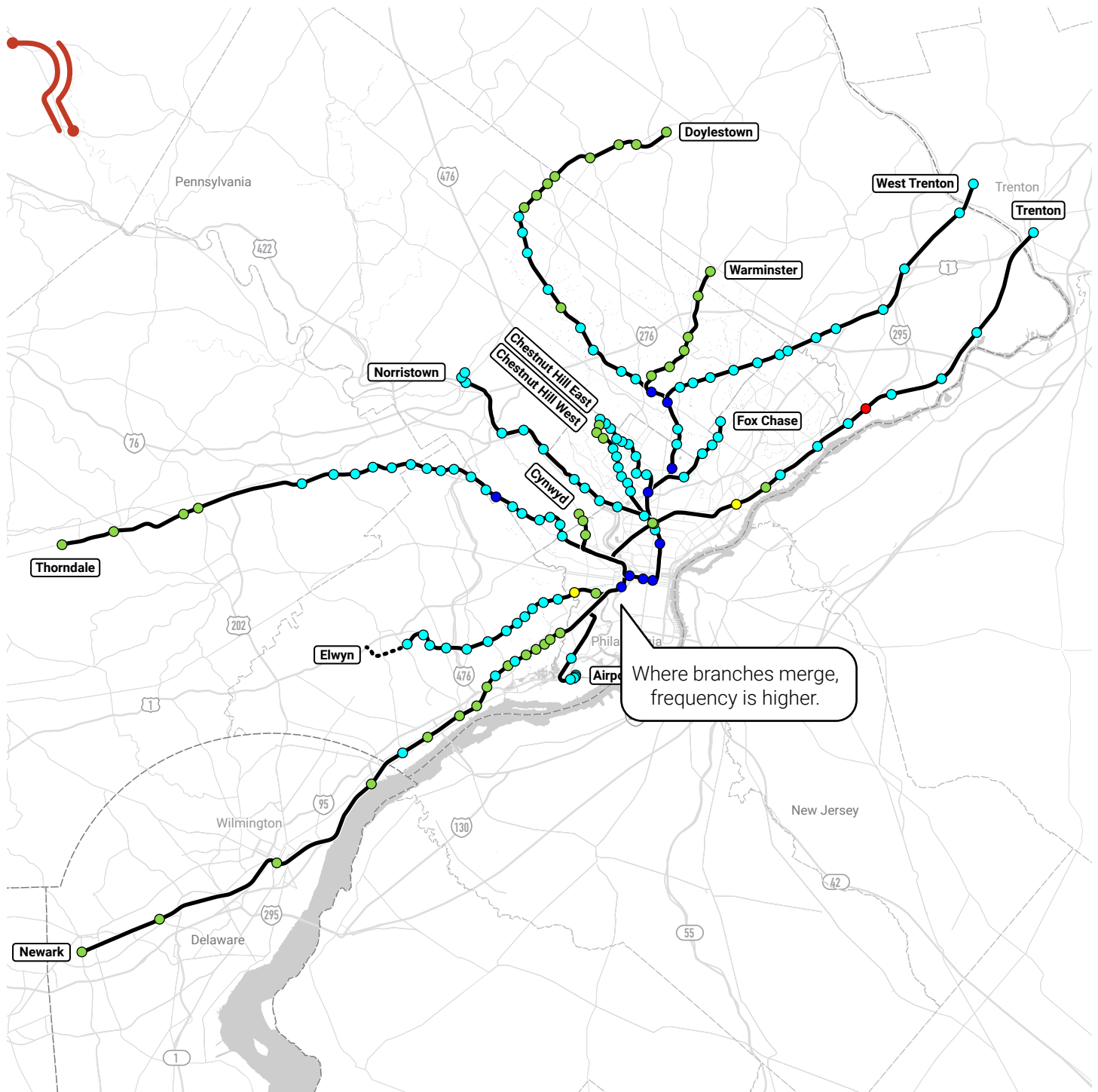
SEPTA 2019

0 5 10 20 miles



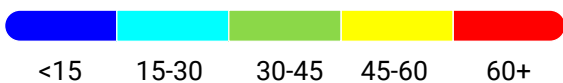
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47



Regional Rail Frequency - AM Peak Inbound

Frequency of Service (in minutes)



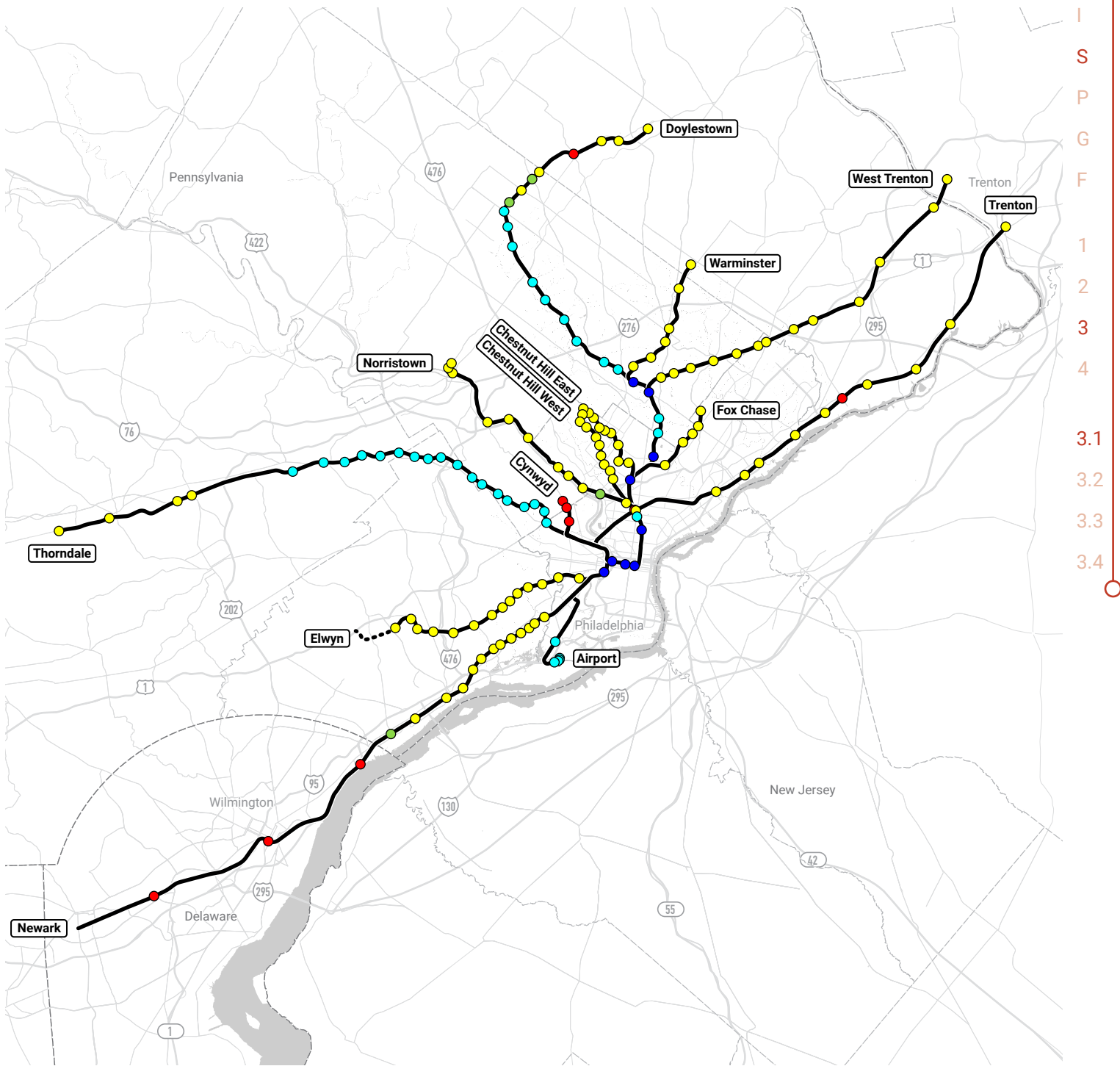
— SEPTA Regional Rail lines

1:500,000

SEPTA 2019

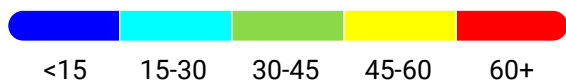
0 5 10 20 miles





Regional Rail Frequency - Midday Inbound

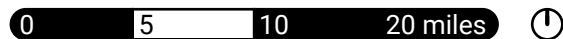
Frequency of Service (in minutes)



— SEPTA Regional Rail lines

1:500,000

SEPTA 2019



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49



Connectivity

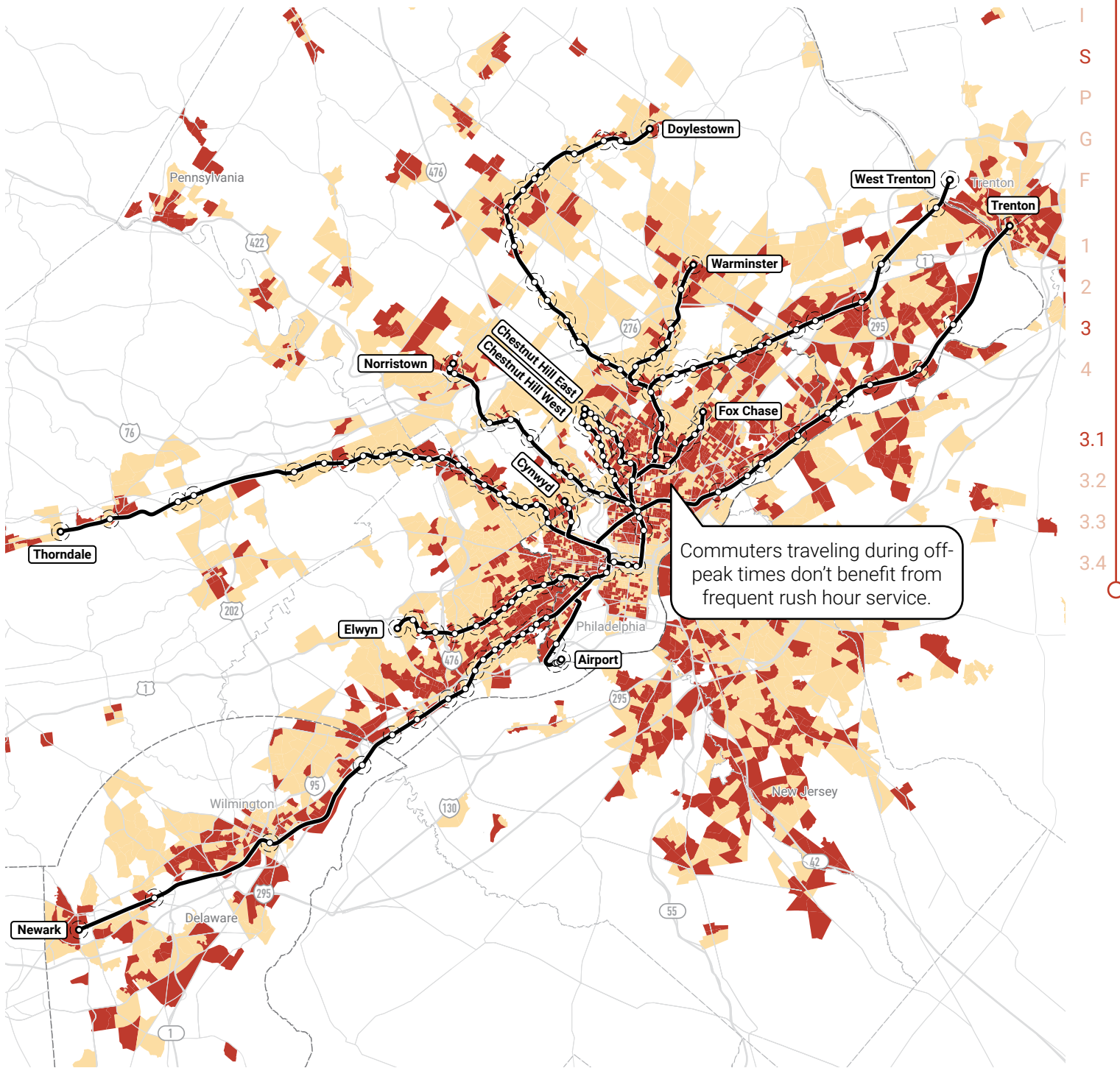
The Regional Rail network starts early and runs late, seven days a week, but frequency is low outside of peak hours.

Many areas served by Regional Rail have above-average proportions of non-traditional commuters (those who don't leave for work during the AM peak) as shown on the next page.

Frequent peak service doesn't benefit these commuters, who are also more likely to be service workers. These workers are also more likely to be women, low-income, Black, and/or Hispanic.

Infrequent off-peak service limits non-work trips which are more likely to happen during these periods. Those who use transit for non-work trips are also more likely to be women, low-income, minority, and with limited or no access to a vehicle.





Non-Traditional Commuters

Share of Commuters Leaving for Work Outside the AM Peak
(Before 6AM or After 9AM) - Regional Mean: 34%

— SEPTA Regional Rail lines

- Above average
- At or below average

1:500,000

2019 ACS 5-Year Surveys

0 5 10 20 miles



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51



3.2

There are limited connection points between Regional Rail and other modes, and those connections that exist are often awkward.

While there are a some high quality transfer opportunities where Regional Rail and rail transit or bus connect into the same station, there are many that are within a block without good signage or that are missed entirely. When there are very coordinated connections, they exist to serve very specific markets.

Several connections are very well coordinated. The 200 Bus Series provides reverse commute connections from Regional Rail to major employers and have integrated schedules. These routes have been advocated for by major employers, most of whose employees are white collar office workers.

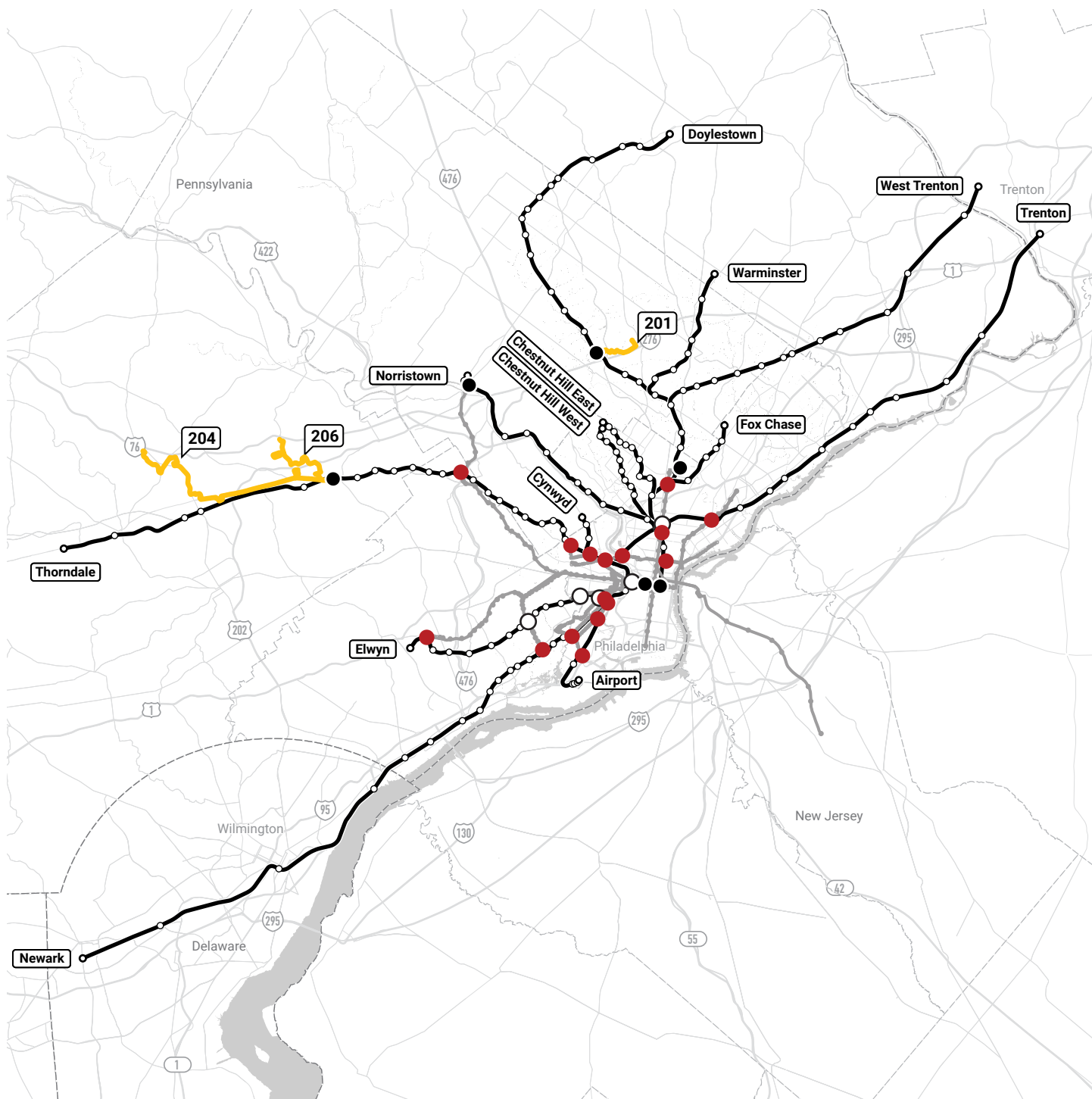
Norristown Station brings Regional Rail, the Norristown High Speed Line, and bus together in one place. However, frequencies on all the connecting modes are infrequent and schedules aren't coordinated. So while transfers are possible at one facility, long wait times make the transfer opportunities less valuable.

The number of missed connections between Regional Rail and rail transit where rail lines overlap or stations are close by reveals the intentional lack of capital investments in making these connections high quality and useful.

Transfer rates from 2019 reflect the lack of integration between Regional Rail and other modes. Less than 1% (0.84%) of all SEPTA trips involved a transfer with Regional Rail.

Of all SEPTA trips, 0.2% involved a transfer between Regional Rail and bus, 0.03% involved a transfer between two Regional Rail lines, and 0.5% involved a transfer between Regional Rail and rapid transit. As a point of comparison, 10% of all SEPTA trips involved a transfer from bus to bus, and 13% involved a transfer between a bus line and the Market Frankford Line or the Broad Street Line.





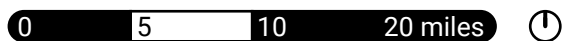
Connections between Regional Rail and Rail Transit

- Full Connection
- Within One Block Walking
- Services Cross with No Connection

- SEPTA Regional Rail lines
- Other Rail Transit
- 200 Bus Series Routes

1:500,000

SEPTA, US Census 2010





Connectivity

There are limited connection points between Regional Rail and other modes, and those connections that exist are often awkward.

Regional Rail is usually not designed for seamless connections to other forms of transit, or between Regional Rail lines themselves.

In North Philadelphia in particular, four Regional Rail lines and the Broad Street Line serve three stations in near proximity. The stations come within a few hundred feet of each other underground. However, moving between these stations requires walking up to ten minutes with limited wayfinding in order to connect.

Regional Rail stations in close proximity but without meaningful opportunities for connections highlight that Regional Rail's main function is to move people from outside of the city, through it, directly into Center City, without encouraging connectivity between modes and routes.

North Philadelphia has high concentrations of transit dependent riders who could greatly benefit from more transit options and connections.

North Philadelphia's Regional Rail and Broad Street Line stations are across a parking lot from one another but have very little signage or wayfinding to notate them as stations and guide people to them. Although the station footprints (right) are quite close to one another, the reality of making the connection between the two is quite difficult.

Clifton-Aldan and Wissahickon are additional examples of areas where more intentional transfers would serve riders better.

Norristown is a good example of a station where multiple transit lines are immediately next to each others and the physical transfer paths are short and easy to understand. However, the Regional Rail station here is not fully accessible.



Broad Street Line Station Entrance in North Philadelphia



Regional Rail Station Entrance in North Philadelphia

Regional Rail and bus connections are not easily accessible and require crossing heavy traffic and walking up a steep hill.



Regional Rail and Broad Street Line stations in North Philadelphia



Regional Rail and Trolley station at Clifton-Aldan



Regional Rail station and Transportation Center at Wissahickon



Regional Rail, Bus and High Speed Line stations at Norristown



Connectivity

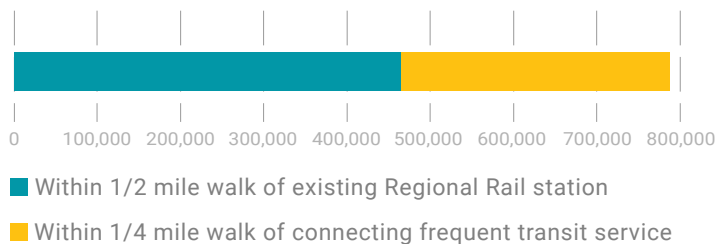
There are limited connection points between Regional Rail and other modes, and those connections that exist are often awkward.

Integration of schedule and fare between Regional Rail and rail transit and bus could provide significant increases in access to jobs and services.

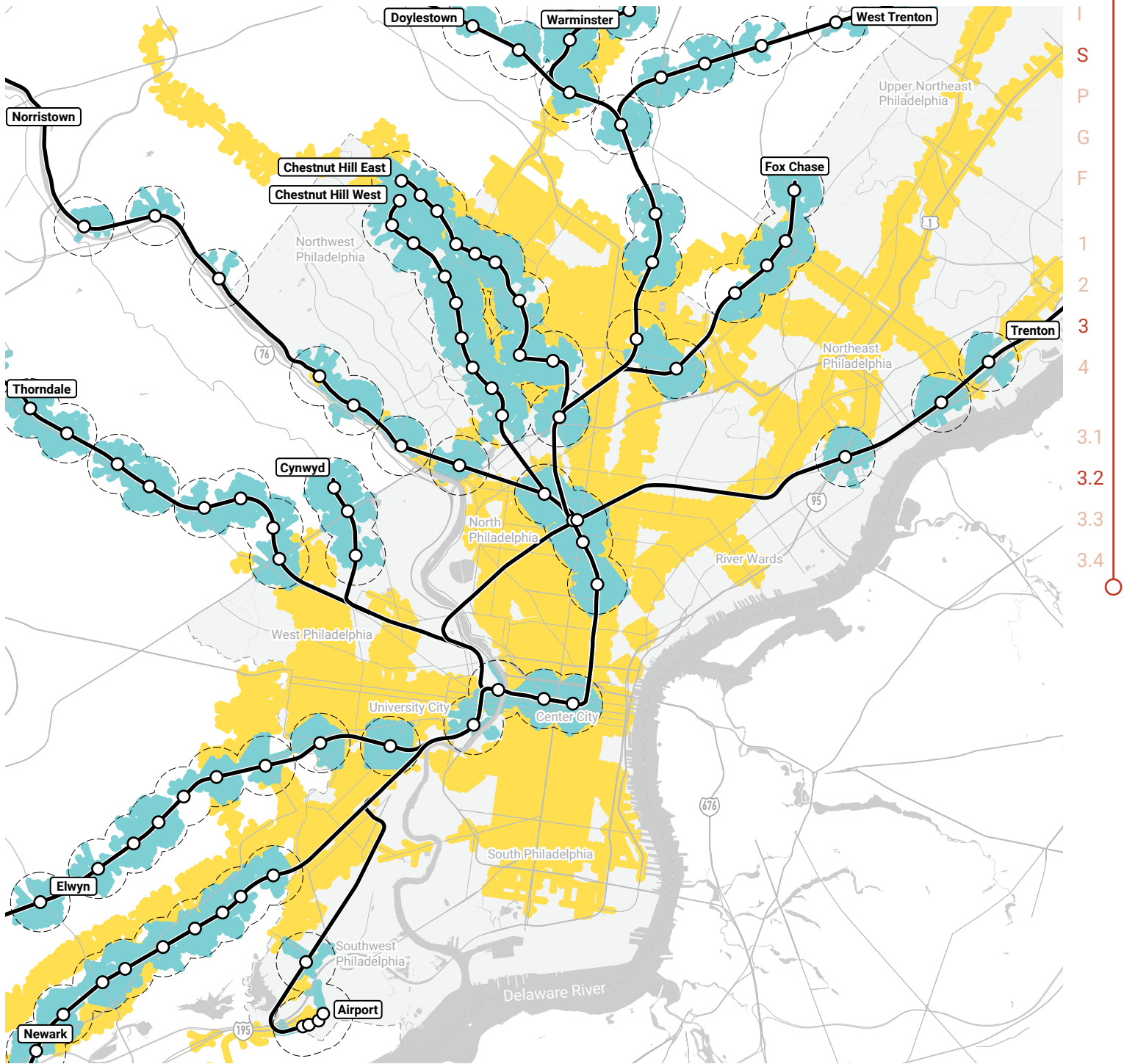
There are 458,000 jobs within a half-mile walk of existing Regional Rail stations. However, functionally those with access to a Regional Rail line only have access to the jobs along that line and not others. Allowing cheaper and more convenient transfers between Regional Rail lines could increase job access.

When considering jobs within a quarter-mile walk of connecting frequent service, this adds 334,000 (73%) more jobs. Much of the City of Philadelphia has frequent bus and rail transit that, if better integrated with Regional Rail, could allow residents to access more jobs and more services, using SEPTA as a fully integrated multimodal network rather than separate services.

Integrating Regional Rail and frequent transit would provide access to an additional 334,000 jobs



Data source: Calculation derived from DVRPC Data



Access to Regional Rail

- Half-Mile Walkshed to Regional Rail Station
- Quarter-Mile Walkshed to a Frequent Service (15 min. or less) that is One Transfer from Regional Rail

- SEPTA Regional Rail lines
- SEPTA Regional Rail station
- 1/2 mile radius from rail station

1:150,000

0 1 3 6 miles

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SEPTA



57

3.3

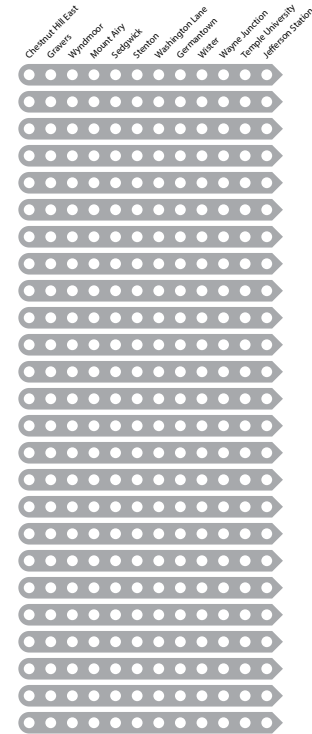
Regional Rail is tuned to the needs of frequent riders, but the resulting complex operating patterns confuse new or occasional riders.

Most rail transit systems have very simple operating patterns: the Market Frankford Line stops at every station; the Broad Street Line local trains stop at every station and express trains stop at the express stations. On Regional Rail, it's not that simple. Some local trains skip some stations. Some express trains stop at one set of stations; others at another set. For riders who take the same train every day, that doesn't matter. For new riders or riders whose trips vary, this can lead to confusion or finding themselves sitting on a train that skips their stop.

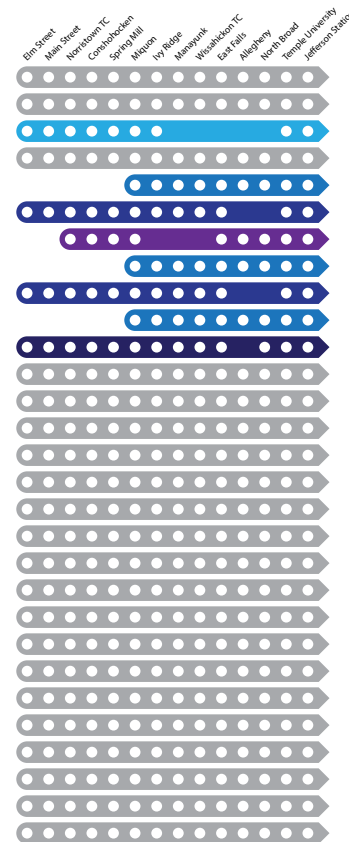
On several of the shorter lines, including Airport, Chestnut Hill East (see Figures), and Cynwyd, every train stops at every station.

On some lines, some trains skip some stops. On Chestnut Hill West, seven of the 22 inbound trains a day did not stop at North Philadelphia. On Norristown, several trains skipped Allegheny and North Broad, and three originated in Miquon instead of Norristown (see Figure). These schedules are for operational reasons: to better meet conflicting traffic at a junction or because a station has a platform on only one track. But it means some stations have less service at peak than off-peak.

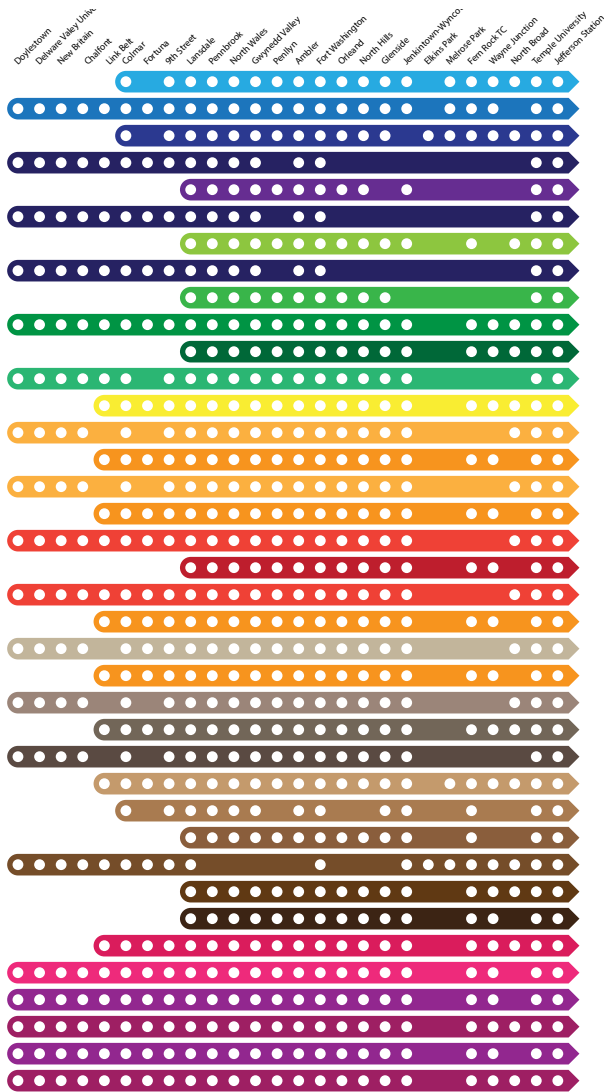
On longer lines, SEPTA operates express service. This can save passengers significant time – the “Great Valley Flyer” on the Paoli Thorndale Line gets passengers to Center City 17 minutes faster than a local. But that only works if passengers time their commute for that particular train.



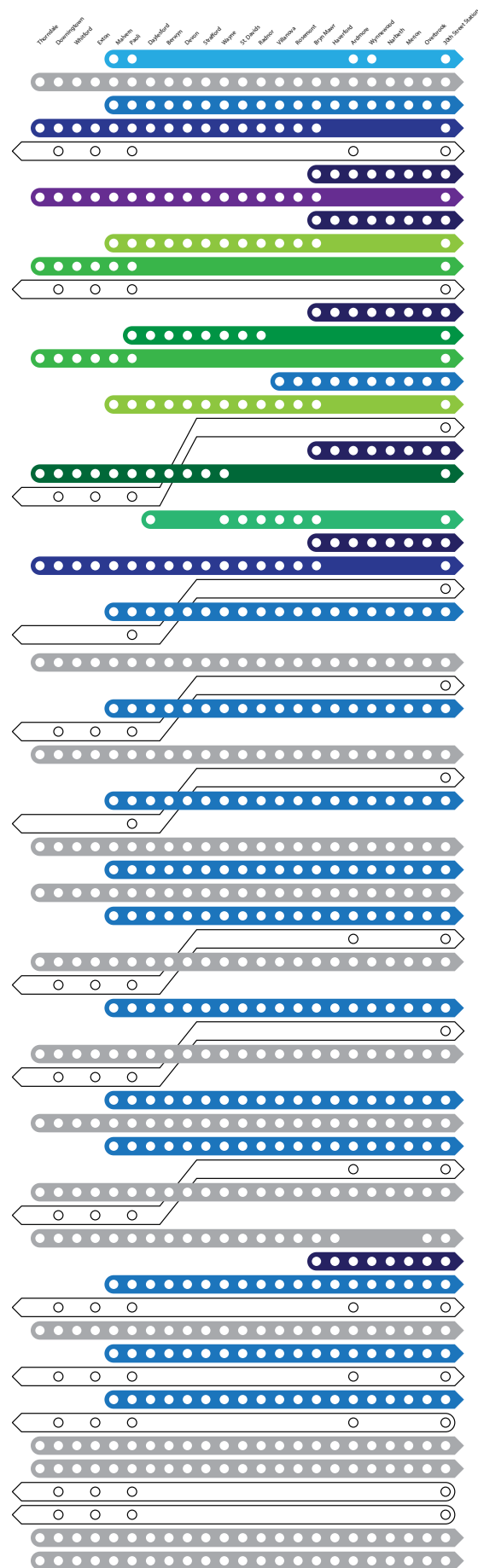
Chestnut Hill East Line
Weekday service to Center City
March 8, 2020 timetable
Each SEPTA service pattern shown in a different color



Norristown Line
Weekday service to Center City
March 8, 2020 timetable
Each SEPTA service pattern shown in a different color



Doylestown Line
Weekday service to Center City
March 8, 2020 timetable
Each SEPTA service pattern shown in a different color



Thorndale Line
Weekday service to Center City
March 8, 2020 timetable
Each SEPTA service pattern shown in a different color
Amtrak shown in grey

The Lansdale / Doylestown Line has an exceptionally complex service pattern. Every color represents a different set of stops. Even trains that have a similar purpose -- like the three semi-express morning trains from Lansdale -- are slightly different. The overall frequency on the line is regular across the day, but some stations get very little service; of the 38 daily Lansdale/Doylestown trains, only 2 stop at Elkins Park.

On the Paoli/Thorndale Line SEPTA service overlaps with Amtrak. Amtrak offers a faster express service; several Amtrak trains pass locals on their way in. But since SEPTA tickets aren't valid on Amtrak trains, SEPTA riders can't take advantage of that service, and SEPTA operates its express service with similar stopping patterns to the Amtrak trains.



Connectivity

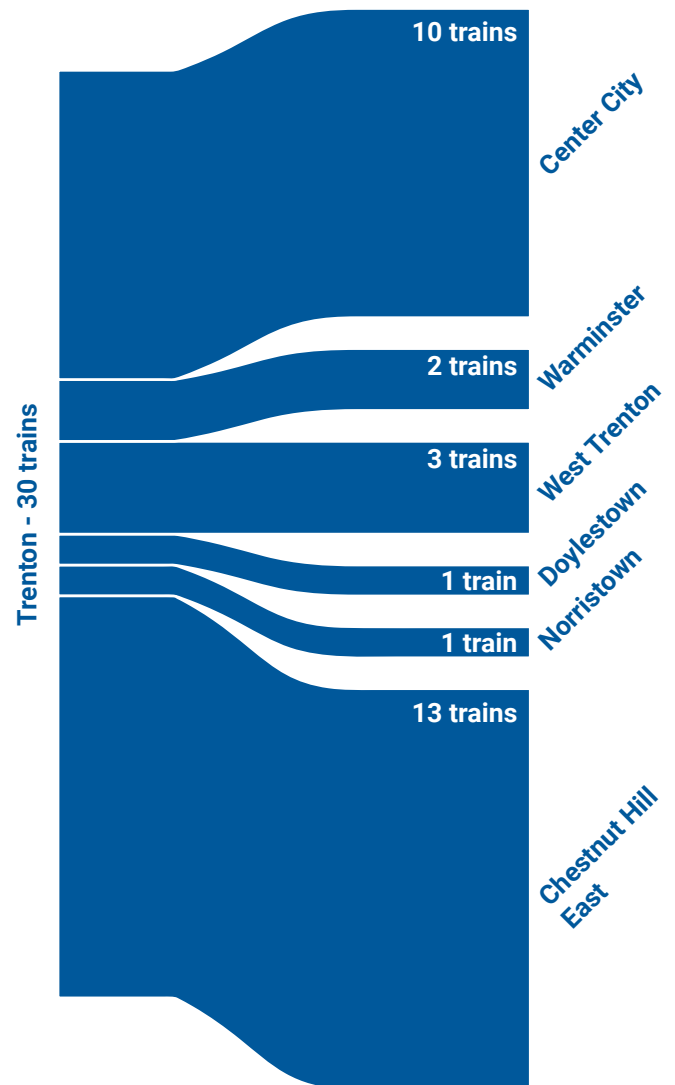
Regional Rail is tuned to the needs of frequent riders, but the resulting complex operating patterns confuse new or occasional riders.

When the Center City tunnel opened in 1984, SEPTA, guided by the ideas of Vukan Vuchic, public transport expert, implemented a new way of designating the new through-running service using the “R” numbers. Over time, the operating patterns became increasingly complex, and SEPTA stopped using the new numbers. Today, there is no systematic relationship between the lines on the two sides of the system, and trains are only designated by the names of the lines.

Under the original Regional Rail designations, each line on the Pennsylvania Railroad side was paired with a line on the Reading Railroad side. All Media-Elwyn trains, for example, continued to West Trenton, and all Chestnut Hill West trains continued to Fox Chase. Each of these pairs was assigned a number – R1 through R8, with R4 held for future restructuring. Because there are 7 lines on the Pennsylvania side and 6 on the Reading, the R1 terminated at Glenside.

Due to various operational complexities such as uneven demand on the two sides of the network, conflicts at junctions, and the locations of yards – SEPTA adjusted schedules over time to unpair some trains. Today, no line still operates only its original pairings. The Media-Elwyn Line, for example, now has some trains through-run to Warminster, West Trenton, Doylestown, and Norristown, and some trains terminating in Center City. These schedules make the most of the equipment and crews SEPTA has, allocating equipment at peak to minimize standees and getting trains to yards for midday, but they can be hard to understand, especially for passengers trying to take the train through Center City.

Inconsistently paired, through-running Regional Rail train patterns are difficult for riders to understand



Trains originating on the Trenton line end up on various lines throughout the day due to the complex through-running pattern. Data from March 2020 schedules.



In all center city stations, screens on the platforms show train time and destination (30th Street shown in image above). While signs indicate local (LOC) and express (EXP) service, the station stop patterns can vary, and passengers often need to look up that train number in a timetable or ask a conductor whether a train will make a specific stop.

SEPTA's Wayfinding Master Plan (image right) is proposing a uniform way of designating service patterns ("B" is the Broad Street Line, "B1" is the local, "B2" is the express) and a map that shows each pattern as a separate line. This would make it much easier for passengers to navigate the system -- but today's Regional Rail service patterns could not be shown that way because of how complex they are.



Image source: SEPTA Wayfinding Master Plan Proposal



3.4

Regional Rail is the fastest and highest quality form of SEPTA transit, but it's also very expensive to operate.

With long, direct routes, no car traffic, and widely spaced stops, Regional Rail offers riders fast trips. That, however, comes at a price: it costs SEPTA \$8.98 for each passenger trip, of which less than half (\$4.07) is covered by fares. That's significantly higher than the subway (\$2.21 cost per trip) or bus (\$4.22 per trip) costs. This is in large part to the travel patterns it serves; the cost to move a seat a mile on a regional rail train is actually lower than bus, but, over the course of the day, many of those seats are empty.

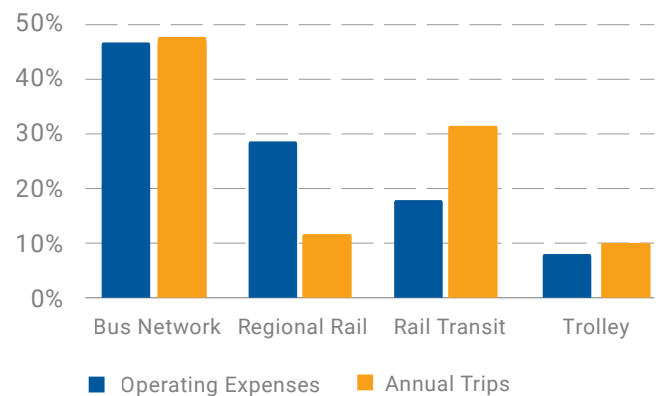
As a result, in 2019, one out of every 8 (12%) SEPTA riders used Regional Rail, but one out of every 4 (25%) dollars SEPTA spent in its Operating Budget was on Regional Rail. This gap has widened during the pandemic, meaning SEPTA's bus, trolley, and subway riders effectively cross-subsidize the cost of Regional Rail trips.

When comparing in-vehicle travel time, Regional Rail travels to Center City in considerably less time than bus and/or rail transit. From 61% of the Regional Rail stations, travel time to Center City is 75% or less of the travel time by bus or rail transit. The high cost to operate Regional Rail is based largely on how it is used: if the trains served more trips, spread out across the day, the cost per trip could be lower.

Regional Rail costs a third as much to operate per seat-mile as the bus, but because Regional Rail trips are longer and trips are concentrated during peak periods and in the peak direction, the cost per passenger is twice that of the bus. Over the course of a day, Regional Rail carries only 23 passenger miles per vehicle mile, only filling 19% of seats.

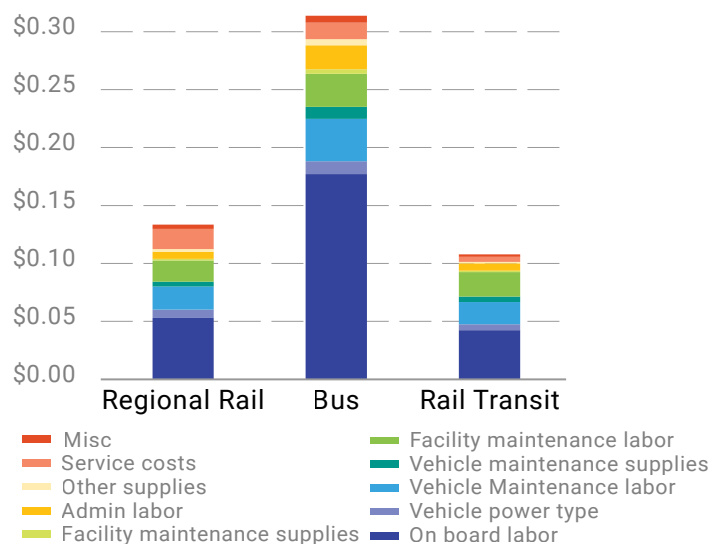
About 45% of the cost of Regional Rail is train operations; 18% is train maintenance and 15% is the track, overhead power, right of way, signal, and station maintenance. The largest single cost item is on-board crews, whose salaries and benefits account for 40% of total costs. The current equipment and infrastructure requires conductors and assistant conductors to operate doors at low floor stations.

Regional Rail carries 12% of SEPTA riders and uses 28% of SEPTA's operational resources to run

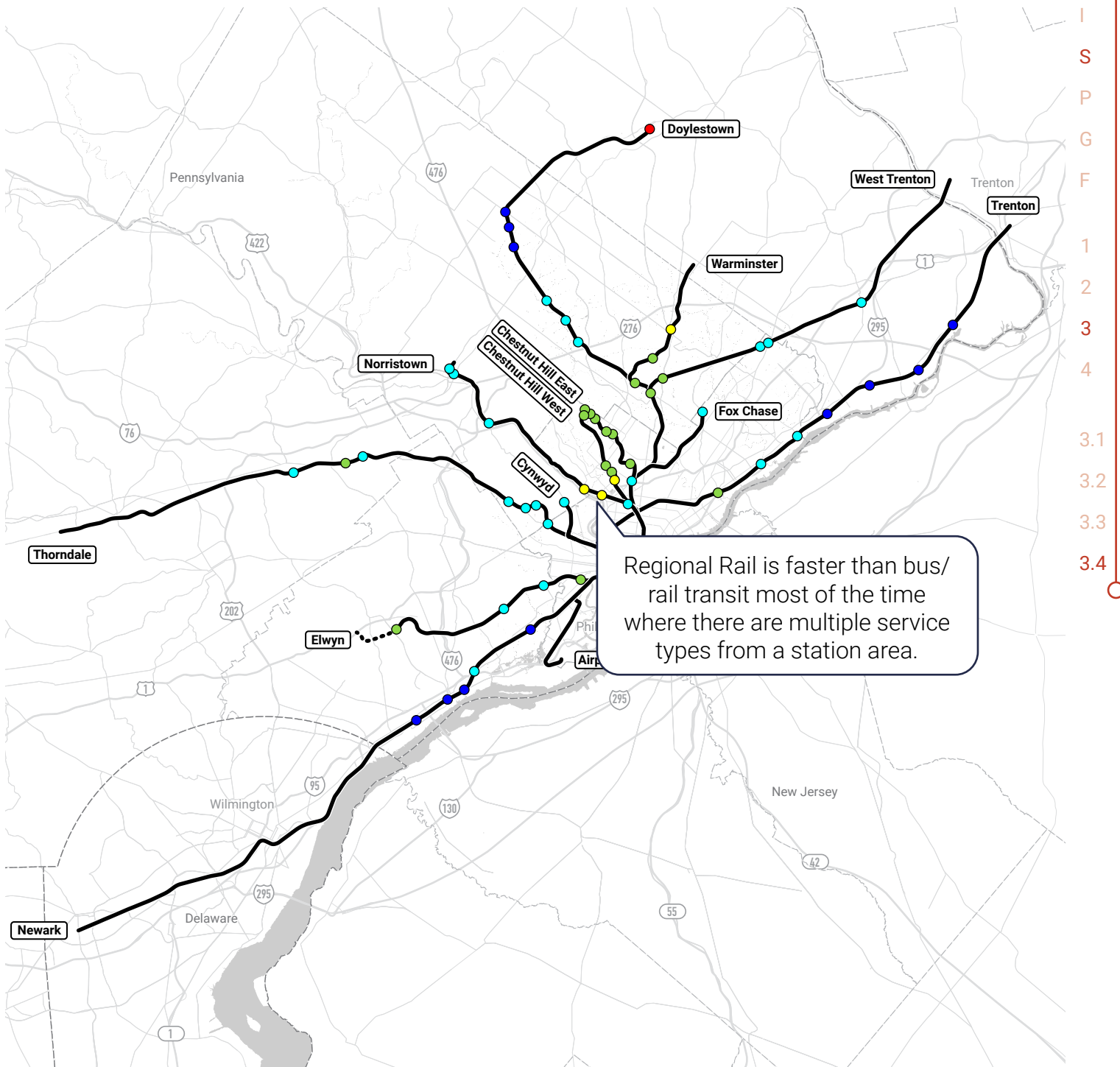


Data source: 2019-2020 SEPTA Operating Budget

However, Regional Rail is less expensive to operate than bus by cost per seat mile

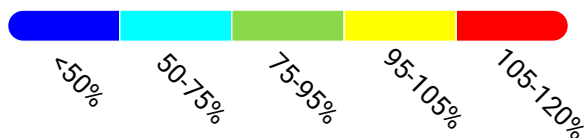


Data source: National Transit Database



Travel Time Comparison - Regional Rail vs Bus/Subway

Ratio of Travel Time to Center City on Regional Rail compared to Bus/Subway for Stations with both Service Options



— SEPTA Regional Rail lines

1:500,000

0 5 10 20 miles

SEPTA



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63

Reimagining Regional Rail

1. History
2. Infrastructure and Operations
3. Connectivity
4. Demand

- 4.1 Many Regional Rail stations are located in dense, walkable places.
- 4.2 While Regional Rail has traditionally focused on getting people to Center City at rush hour, there are other destinations like universities, hospitals, retail, and other employment centers across the network, many of which have all-day demand.
- 4.3 There have been many proposals for significant changes to the Regional Rail network such as expansions, infill stations, and additional service.







Demand

4.1

Many Regional Rail stations are located in dense, walkable places that have the underlying demand to support all-day frequent service.

The Regional Rail network has been designed to bring riders long distances into Center City. However, many of the stations within the City of Philadelphia and in dense areas across the region, have demand to support all-day frequent service that is much more similar to subway-style service. Most people access services like these within a short walk.

Population density, employment density, industry type, and socioeconomic levels combine to form very high demand throughout much of the City, high enough to support all day service that comes every 15 minutes or more frequently.

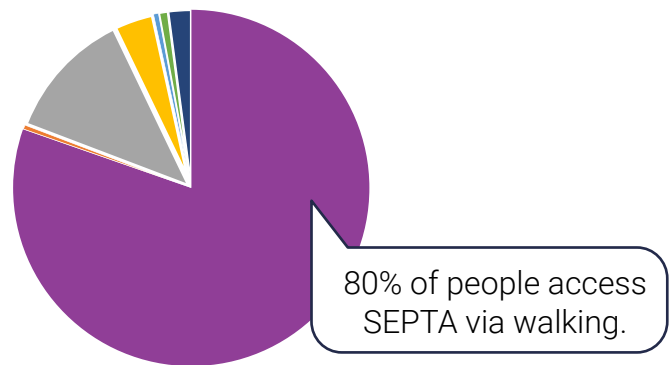
Station spacing along many of the lines within the City is close enough to facilitate shorter trips along the line, not just into Center City.

The vast majority of SEPTA riders walk to access transit. In the 2018 SEPTA Customer Satisfaction Survey, 80% of riders say they most frequently arrive at their SEPTA station or stop by walking. Even for riders survey respondents that reported making at least 5 trips on Regional Rail over the course of a week, that number is 54%. Pedestrian connections at and around stations greatly impact the overall transit experience. Although many neighborhoods served by Regional Rail are technically walkable, but the conditions around them do not encourage walking.

The underlying demand for SEPTA service is closely related to land use and is largely concentrated on and around existing and inactive rail lines in Philadelphia and the suburban counties (as shown in the adjacent map).

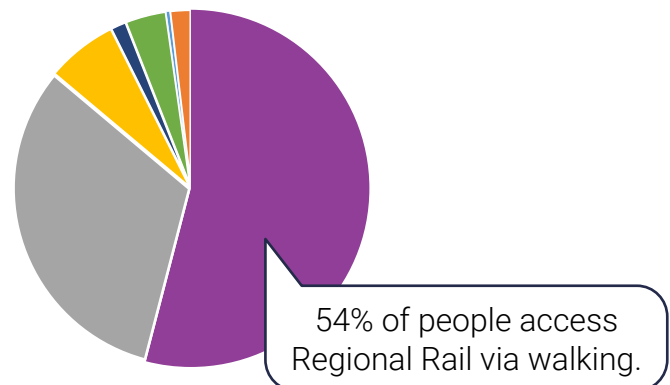
The majority of people walk to access SEPTA transportation

All SEPTA transportation access methods:



The majority of Regional Rail riders also walk to stations

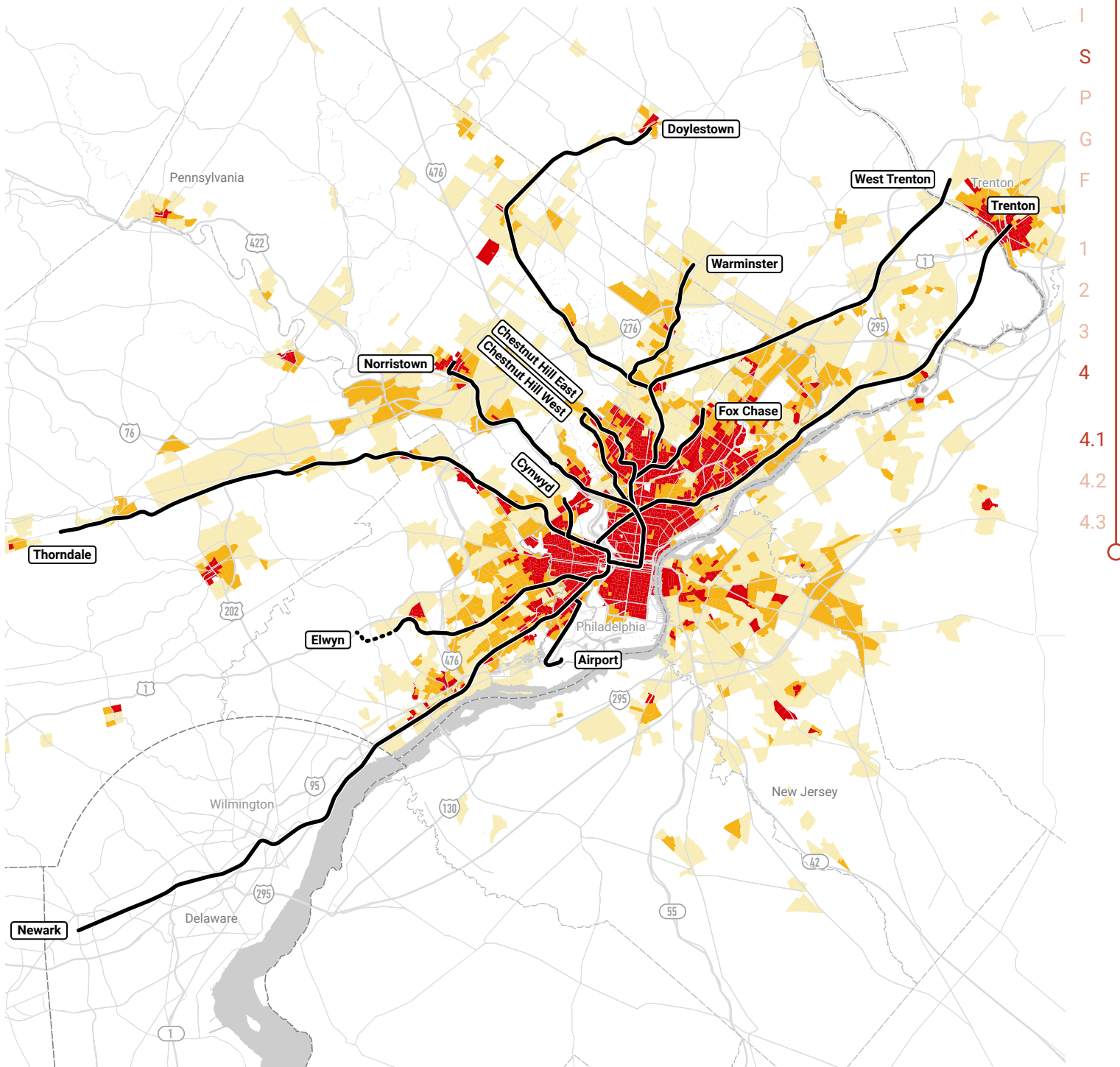
Regional Rail access method:



Access mode:

- | | |
|-----------------------------------|------------------------|
| ■ Walk | ■ TNC/taxi |
| ■ Drive a car and park | ■ Other transit system |
| ■ Dropped off by someone you know | ■ Carpool or vanpool |
| ■ Bike | |

Data source: SEPTA 2018 Customer Satisfaction Survey



Underlying Demand for Service

Potential Transit Demand based on Residents and Jobs per Acre

- 60 Min. Service
- 30-60 Min. Service
- All Day Frequent Service

SEPTA Regional Rail lines

1:500,000

2019 ACS 5-Year Surveys
CTPP, DVRPC

0 5 10 20 miles



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67



Demand

4.2

While Regional Rail has traditionally focused on getting people to Center City at rush hour, there are other destinations like universities, hospitals, retail, and other employment centers across the network, many of which have all-day demand.

Center City is the region's largest job center filled with office jobs that align with a 9-to-5 schedule. However, most residents' jobs are outside of Center City, many of which are in areas not distinguished as a major job center. Regional Rail serves certain commutes well, but leaves those trying to make other types of trips behind.

Most of the City of Philadelphia, not just in hyper dense areas like Center City and University City, has demand for all-day frequent transit service (see light red areas on the map on page 67).

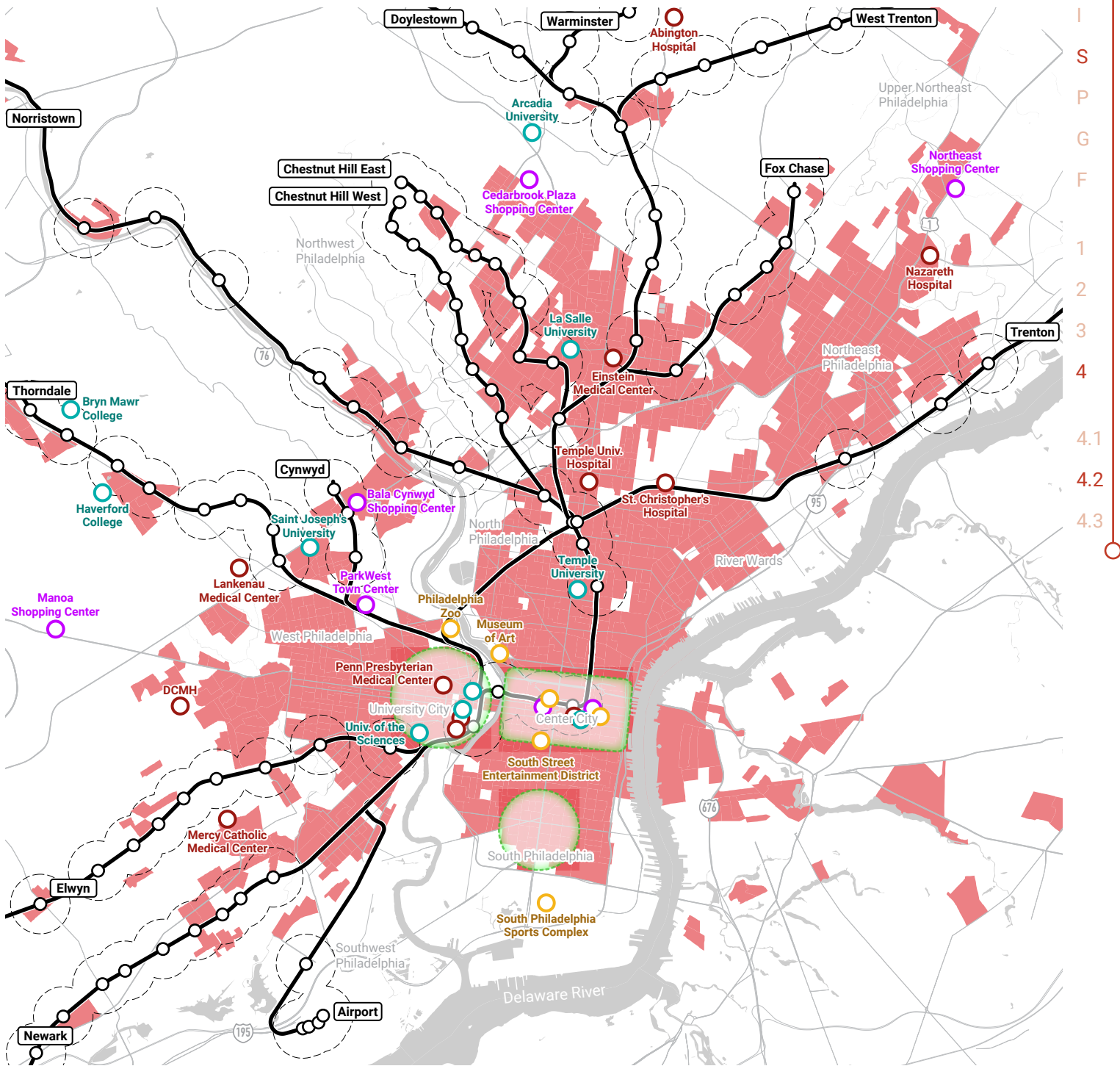
There are many major activity generators like higher education, hospitals, and major shopping that produce demand throughout the whole day, not just peak periods.

Of SEPTA riders, Regional Rail riders are most likely to take SEPTA to get to work, and least likely ride SEPTA for any other purpose. Trips other than working are more likely to take place during the midday or evening.

Trips other than work are also more likely to be short trips, while Regional Rail is currently designed for long distance trips.



Active Commercial Plaza near Ardmore Station, which is served by both Regional Rail and Amtrak



Major Activity Generators

- Higher Education
- Hospital
- Major Attraction
- Major Shopping
- Major Activity District

Potential All-Day Frequent Service Based on Underlying Transit Demand

- SEPTA Regional Rail lines
- SEPTA Regional Rail station

1:150,000

DVRPC

0 1 3 6 miles



DRAFT

69



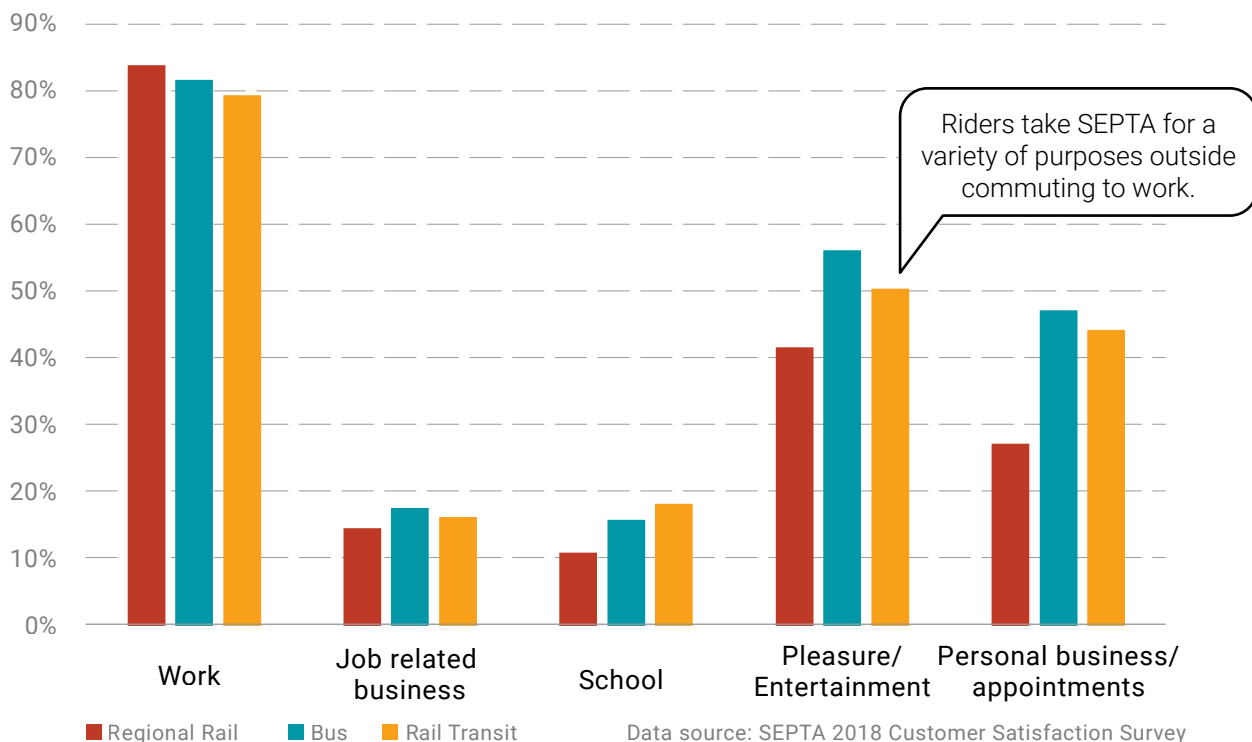
Demand

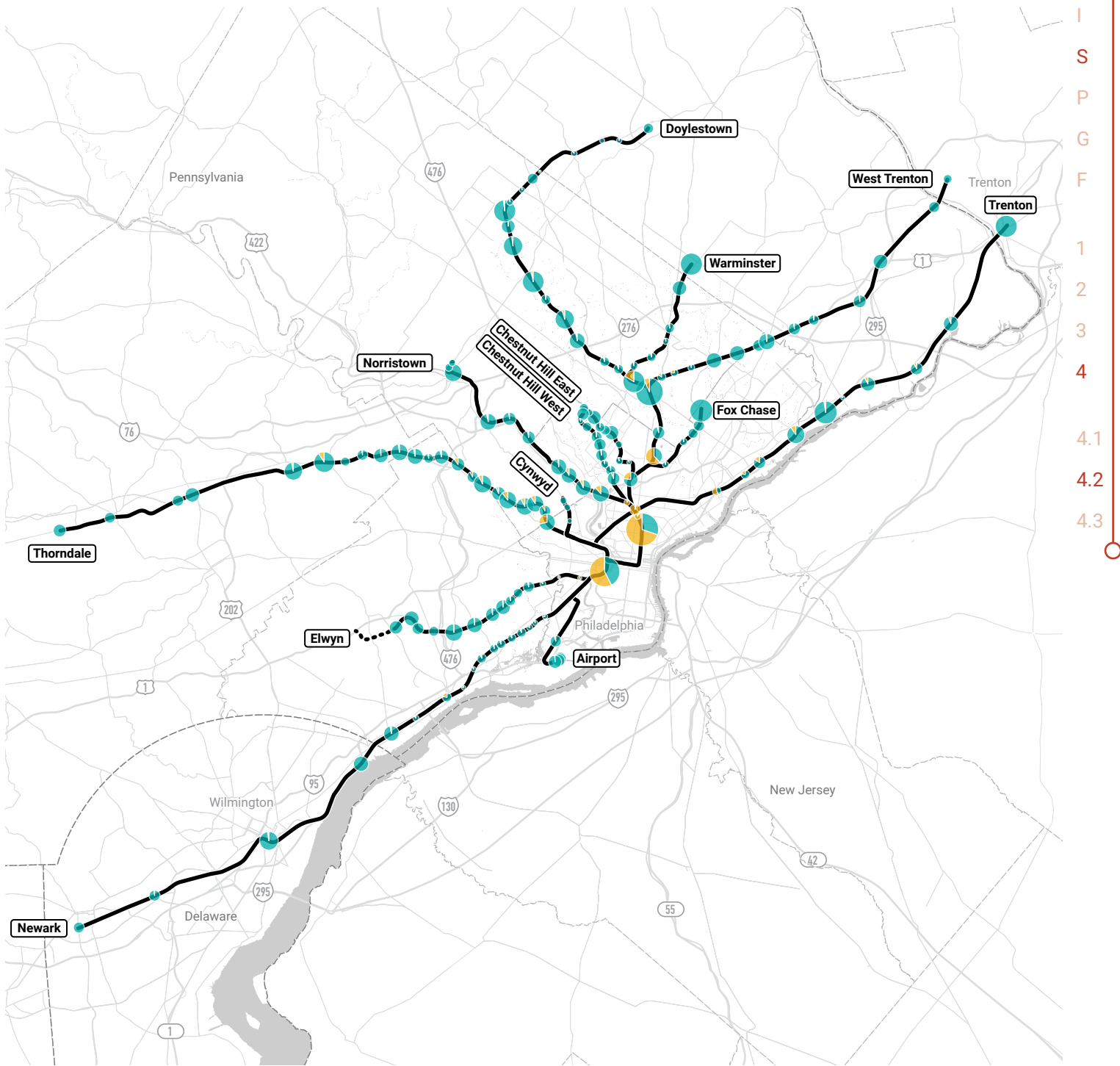
While Regional Rail has traditionally focused on getting people to Center City at rush hour, many of which have all-day demand.

While the majority of Regional Rail trips are suburban riders heading into Philadelphia, the system also serves many reverse commute trips. Travelers going outbound in the morning are most likely to alight along the Thorndale, Norristown, and Doylestown Lines. These lines serve universities, office parks, and other job centers outside the City.

While Regional Rail works well for some reverse commutes, those living outside of Center City may find it difficult to use SEPTA services to connect to jobs along Regional Rail lines. In addition, the lack of walkable land use or connections to other transit limit using Regional Rail to get anywhere other than walkable areas adjacent to the station.

SEPTA riders who primarily use Regional Rail are the most likely to use SEPTA for commuting and the least likely to use SEPTA for other purposes

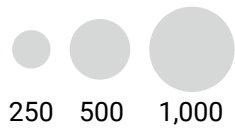




Regional Rail Ridership Activity - Outbound AM Peak

Ons Offs

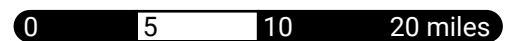
Total Outbound AM Peak Ridership excluding Center City
(circles sized proportionally)



— SEPTA Regional Rail lines

1:500,000

SEPTA Passenger counts, fall 2019



DRAFT

71

4.3

There have been many proposals for significant changes to the Regional Rail network such as expansions, infill stations, and additional service.

The Philadelphia commuter rail network was once significantly larger, with lines to West Chester, Reading, Allentown, Newtown, and Jersey City. There have been occasional proposals to reopen some of these lines, but other than two short extensions, no projects are committed or funded.

SEPTA abandoned nearly 150 miles of commuter rail service in the 1980s, much of it diesel-powered lines with infrequent services.

SEPTA owns the right of way on former lines: the Media/Elwyn Line to West Chester, the Fox Chase line to Newtown, and the line from Lansdale towards Bethlehem. While the track is still there, considerable reconstruction and new stations would be required to operate the service. The 3.5-mile extension to Wawa, with a new station, parking garage, and layover yard, is costing \$178 million.

The line to Reading via Pottstown is an active freight line, owned by Norfolk Southern, requiring agreement with that railroad and major upgrades to restore passenger service.

Extensions of the Thorndale Line to Coatsville and a “gap-filling” extension of the Wilmington/Newark Line to meet the MARC commuter rail service in Perryville would use existing Amtrak track, requiring only new stations.

Several stations in dense parts of the city have been abandoned since the 1950s, and there are opportunities for infill stations where Regional Rail intersects other SEPTA services.



Image: PennDOT Reading to Philadelphia Passenger Rail Analysis

A 2020 study concluded that operating nine weekday round trips between Philadelphia and Reading would attract 3,400 – 6,400 daily riders at a total capital cost of \$818 million and an operating cost of \$24.5 million/year. In 2021, Amtrak proposed to add 3 round trips on this line operating from New York to Reading via Philadelphia.

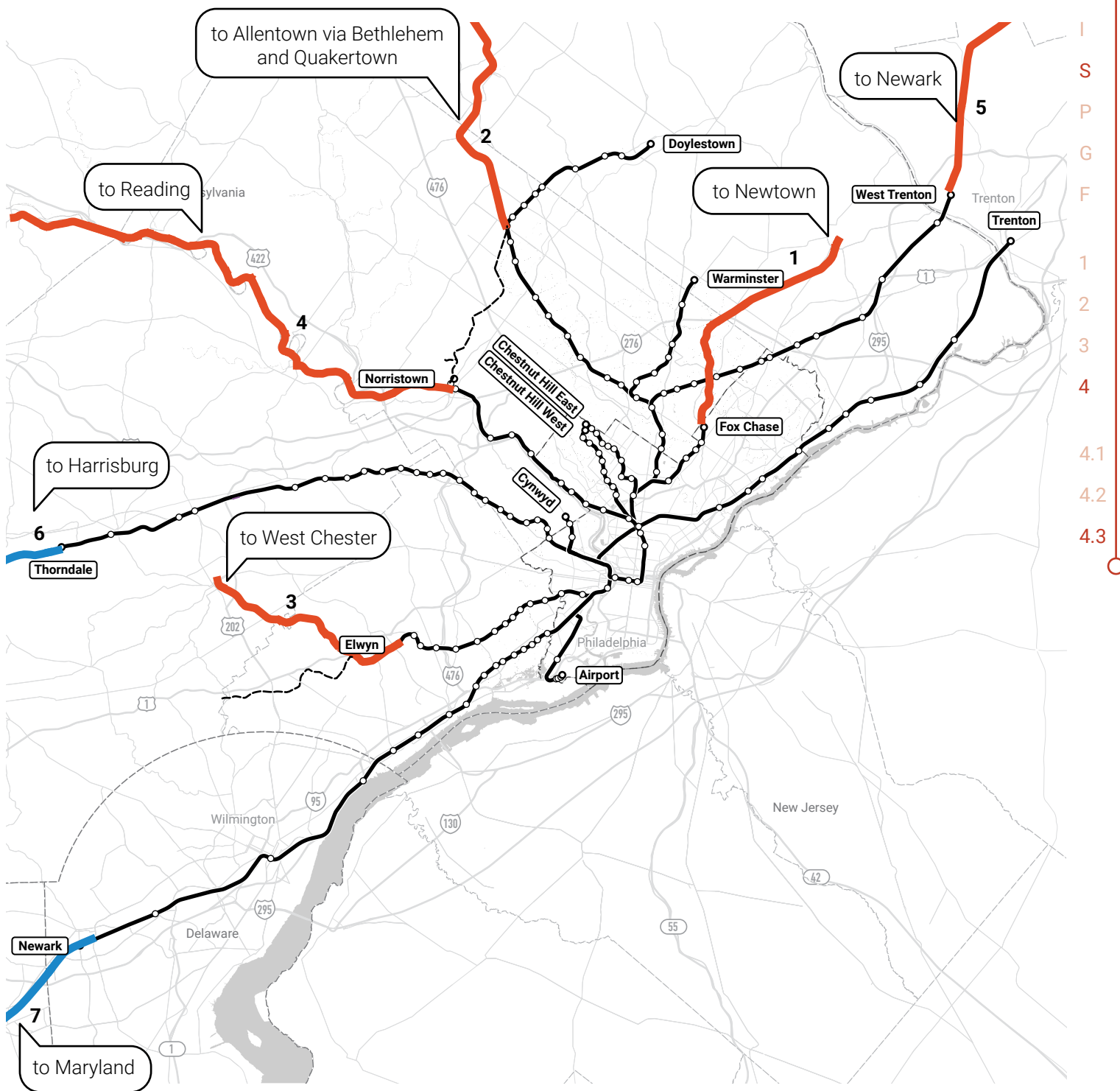


There have been proposals, including a 2020 resolution in the Pennsylvania House of Representatives, to transfer ownership of the Philadelphia-Harrisburg Keystone Corridor to the State of Pennsylvania. Such a change – or simply closer coordination – could enable integrated commuter rail and intercity rail service on this corridor.



Image: Philadelphia Transit Plan

The Philadelphia Transit Plan, adopted by the City of Philadelphia in 2021, proposes more frequent service across the core of the Regional Rail Network, starting with a “Silver Line” from Penn Medicine to Fern Rock.



Possible Regional Rail Expansion Projects

■ Potential Restorations

1. Fox Chase to Newtown
2. Lansdale to Allentown (via Bethlehem, Quakertown)
3. Elwyn to West Chester (Elwyn to Middletown is under construction)
4. Norristown to Reading
5. West Trenton into New Jersey

■ Potential Added Service on Active Amtrak Line

6. Thorndale to Harrisburg
(Thorndale to Coatesville is under consideration)
7. Newark to Maryland

— SEPTA Regional Rail lines

○ SEPTA Regional Rail station

--- Other SEPTA owned railroad lines

1:500,000

0 5 10 20 miles

SEPTA



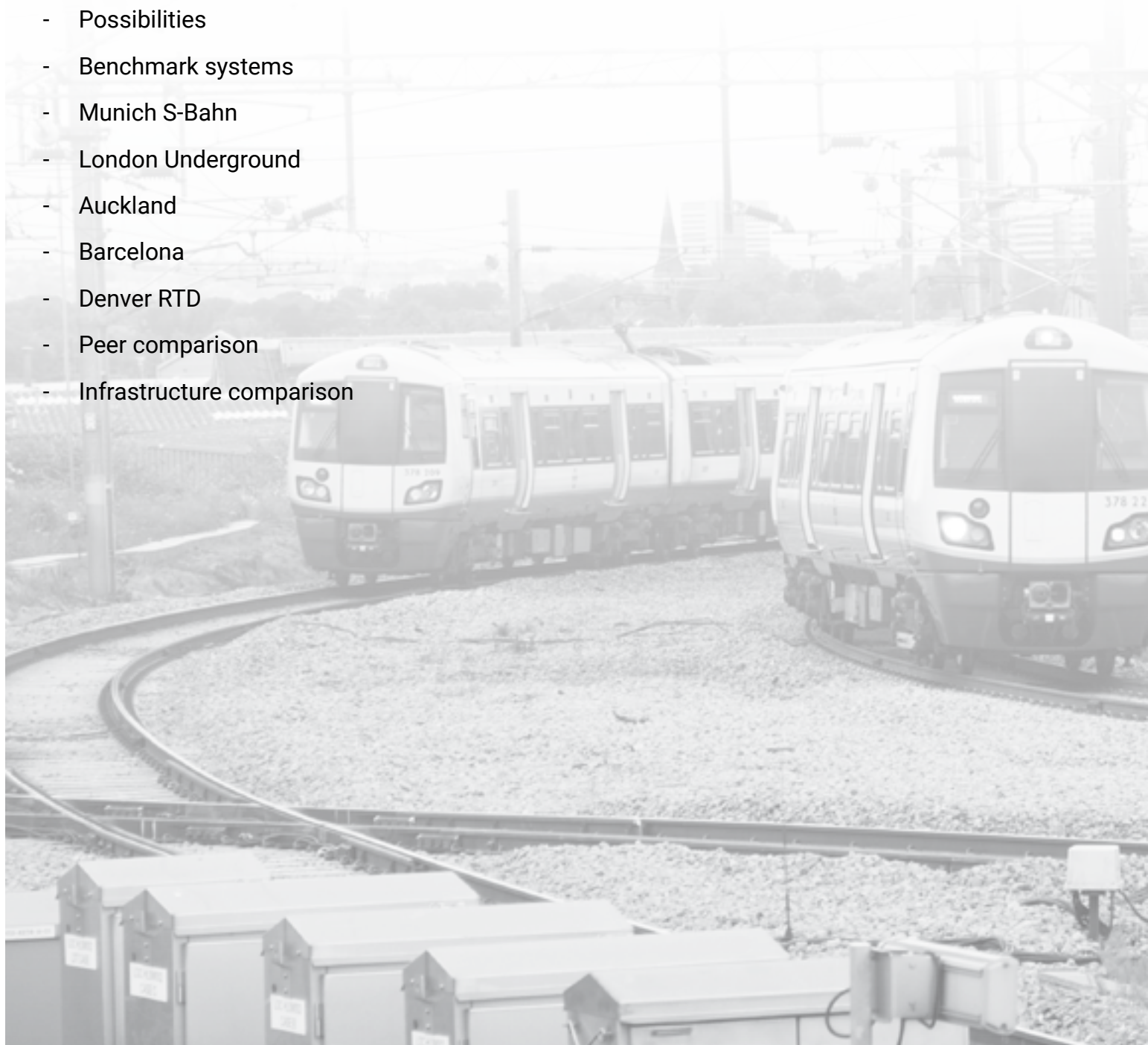
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73

Peer Systems Review

To imagine what is possible in the Philadelphia region, we can look around the United States at SEPTA's peers and around the world at other commuter rail systems.

- Possibilities
- Benchmark systems
- Munich S-Bahn
- London Underground
- Auckland
- Barcelona
- Denver RTD
- Peer comparison
- Infrastructure comparison







Possibilities

In the United States, the term “commuter rail” suggests a service operated primarily for 9-to-5 work trips from the suburbs to downtown. It also suggests a set of operating practices inherited from steam railroads and little changed since the 1950s, including fairly complex schedules, large crews, and a distinct separation from local transit.

In much of the rest of the world, commuter rail has been extensively modernized and reimagined to be more efficient to operate, easier to use, and useful for many more kinds of trips. These international examples show us the range of what is possible within the technology of commuter rail.

Other systems in North America have been looking to these examples. San Francisco’s Caltrain is electrifying and implementing frequent service. Toronto’s GO Transit is shifting from a peak-focused pattern to all day service. Boston is implementing clockface schedules. Dallas-Fort Worth has integrated rail and bus fares across the entire region. Metra in Chicago is piloting a \$6 all day pass, reduced from \$10.



Commuter rail can run at high frequency. Tokyo’s Yamanote Line operates 11-car EMUs every 2 minutes at peak and 4 minutes off-peak on a double track line.



Commuter rail can serve short trips. From 2001 to 2019 Ottawa’s Trillium Line was only 5 miles long, serving the Carleton University campus and connecting to BRT at both ends. With trains every 12 minutes, it carried 20,000 trips a day.



Commuter rail can be an essential transit for small towns. Bingen, Germany, population 25,000, is served by Regional Rail trains to the provincial capital of Mainz once an hour, seven days a week. All four of the town’s bus lines connect to the train station.



Commuter rail can serve many kinds of destinations. In Berlin, the S-Bahn serves shopping areas, universities, museums, and parks in addition to offices.



Commuter rail can be operated with one-person crews. About 30% of passenger services in the UK have only a driver and no conductors, using automatic doors and high platform stations. This includes many London suburban trains, like Southeastern and Southern at London Bridge.



Commuter rail can be integrated with intercity transit. In the Netherlands, all trains except for high speed rail have exactly the same fares and the same ticketing system, and many riders use intercity trains for daily commute trips.



Commuter rail can have simple schedules. In Switzerland, all passenger service is based on a clockface schedule: a train departs at the same time every hour all day, makes the same stops, and uses the same platforms. At major hubs, schedules are coordinated for easy connections.



Commuter rail can be fully integrated with local transit. In Vienna, rail stations are bus and streetcar hubs, and single tickets, daily passes, and monthly passes cover all modes of transit with free transfers.



Commuter rail can be accessible for everyone. All of Hong Kong's commuter rail stations are wheelchair accessible, and all stations provide visual and audio announcements as well as tactile paths and station maps.



Benchmark Systems

To imagine what SEPTA Regional Rail could be, we need to look beyond the practices historically associated with commuter rail in North America. In Europe, Japan, Australia, and elsewhere cities have transformed their legacy rail systems into all-day frequent transit that serves a variety of trips. Their systems and the practices they use offer lessons for Philadelphia. In the United States, new build systems, developed from the start as an integral part of the transit networks in their cities, also show what fresh thinking can offer.

The cities shown here are obviously not a comprehensive survey; they were chosen as interesting examples of ideas that may be relevant to SEPTA Regional Rail.

With the exception of Denver, all of these cities are “legacy” networks that have been continuously operating since the 1800s, and thus have dealt with the limitation of historic infrastructure. All share track with freight trains and intercity passenger train.

	SEPTA Regional Rail	Munich S-Bahn
<i>Metro area population</i>	7,209,620	2,929,000
<i>System length</i>	280 miles	270 miles
<i>Pre-covid daily ridership</i>	134,000	840,000
<i>Pre-covid ridership per mile</i>	481	3,111
<i>Number of stations</i>	153	150
<i>Downtown through-running?</i>	yes	yes
<i>Frequency</i>	hourly or less for most of the day	most lines 20 min or better all day
<i>Electrification</i>	100%	100%
<i>Equipment</i>	EMU, push-pull	3 to 9 car EMU
<i>Platforms</i>	mix of low and high	high
<i>Fare integration</i>	no	with all modes
<i>Fare system</i>	zones	zones
<i>Fare type</i>	smartcard with conductors	paper ticket proof of payment
<i>Faregates</i>	some	no
<i>Ticket Vending Machines</i>	some stations	every station
<i>Staffing</i>	1 operator and at least one conductor per train	1 operator per train plus roving fare enforcement
<i>Connections to other modes</i>	heavy rail, light rail, streetcar, bus	heavy rail, streetcar, bus

London Overground	Auckland	Barcelona Rodalies de Catalunya and FGC	Denver RTD
14,257,962	1,715,600	5,355,127	3.617.927
104 miles	58 miles	352 miles	310 miles
520,000	69,400	680,000	135,300
5,000	1,196	1,931	435
112	40	199	75
no	under construction	yes on some lines	no
most lines 15 min or better all day	most lines 20 min or better all day	6 min to 4 hours	most lines 15 min or better all day
100%	in progress	100%	100%
4 car EMU	1 to 2 3-car EMU sets	EMU	1 to 4 car EMU
high	high	mid-height	high
with other rail; partial with bus	with all modes	with all modes; discounted rail only tickets	with all modes
zones	zones	zones	zones
smartcard proof of payment	smartcard proof of payment	smartcard proof of payment, paper	smartcard proof of payment
some	some	some	no
every station	every station	every station	every station
1 operator per train plus roving fare enforcement	1 driver plus one train manager	1 driver plus 1 conductor	1 operator plus one conductor or security guard per train (commuter rail)
Heavy rail, light rail, bus	Bus	Heavy rail, light rail, streetcar, bus	Bus





Munich S-Bahn

Munich shows how Regional Rail can be integrated with local transit. A frequent commuter rail network with a through-running downtown tunnel is one of the spines of the transit network.

The Munich network has had full fare integration since the 1970s. A trip between point A and point B always costs the same, regardless of whether it requires a transfer or not, regardless of whether it is on bus, streetcar, subway, or Regional Rail, and regardless of which agency is operating the service. All modes are proof of payment and all tickets are sold through vending machines at stations or on board buses and streetcars.

The inner portion of the commuter rail network, extending 15-25 miles out, is the “S-Bahn,” which has a 7-day-a-week base frequency of 20 minutes, and 40 minute frequency on some outlying sections. Infrastructure is being built out to allow 10 minute all day frequency on several lines. The through-running downtown tunnel, with a frequency of better than 5 minutes, effectively serves as a subway line.

Beyond the S-Bahn, half hourly and hourly Regional Rail trains cover the rest of the region. These run express in S-Bahn areas.

The S-Bahn shares track with regional and intercity passenger trains as well as freight trains. The majority of the network is double track, but there are some outlying single track segments. In busy areas, the S-Bahn has its own tracks alongside other trains. All 7 radial lines share a two-track tunnel through Downtown, with 30 trains per hour on each track at peak.

The S-Bahn is closely integrated with other transit networks, not just in downtown but across the network. S-Bahn stations serve as the outer terminals of streetcar lines and as hubs for suburban bus service.

Metro area population

Munich
2,929,000
Philadelphia
7,209,620

Network size

Munich S-Bahn
270 miles
Philadelphia Regional Rail
280 miles

Average weekday ridership

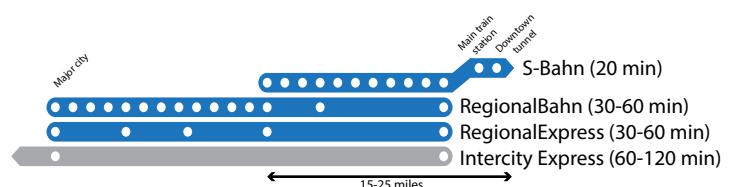
Munich S-Bahn
840,000
Philadelphia Regional Rail
134,000

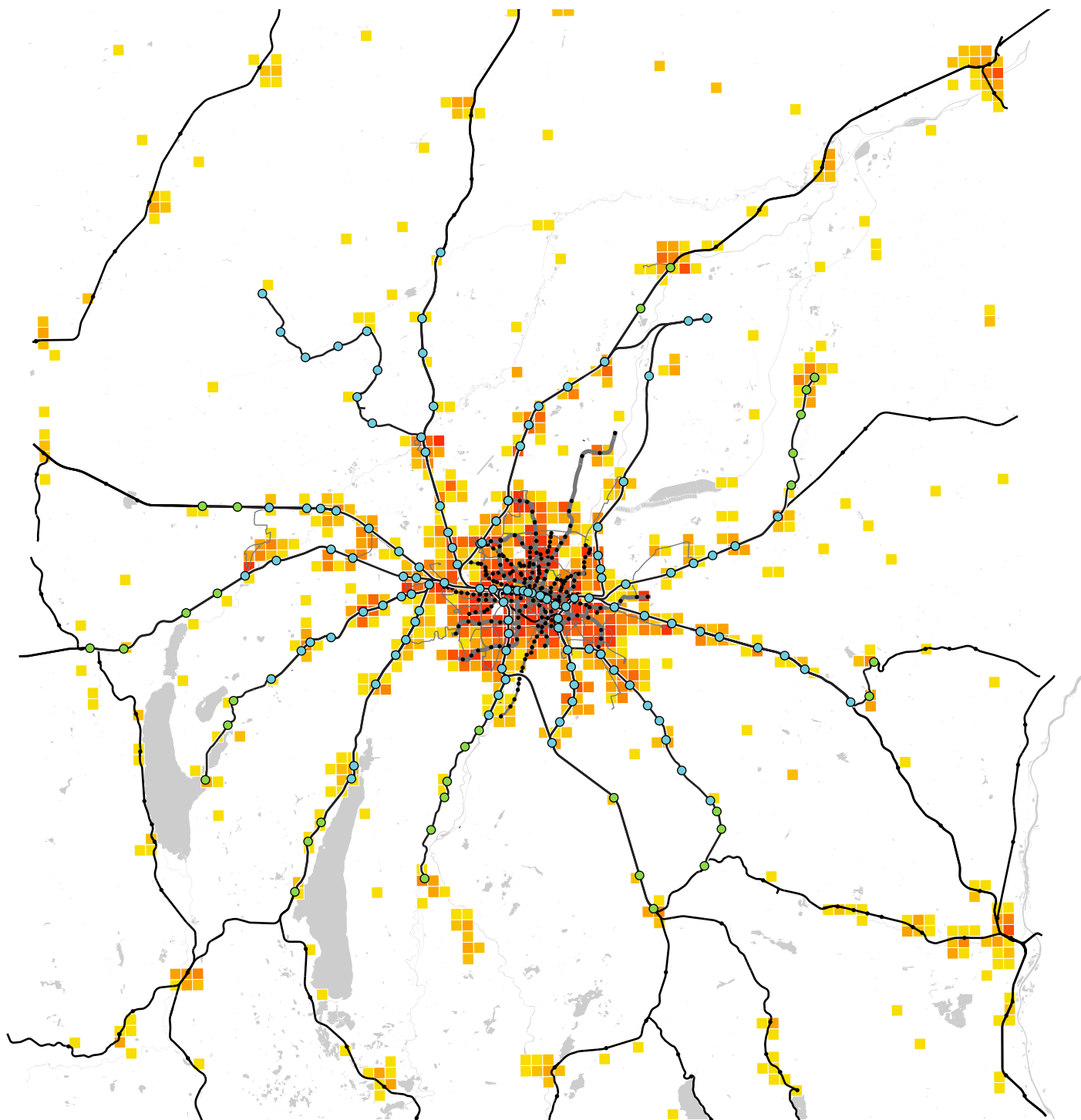


The S-Bahn is fully electrified and uses 3-, 6-, and 9-car EMU trains. When the system was opened in the 1970s, all stations were upgraded with full length platforms 8" below train floor so that passengers could board through any door without conductor assistance. 80% of stations have not been upgraded with platforms at floor height for accessibility.



S-Bahn stations are closely integrated with subway, streetcar, and bus. In the city center S-Bahn shares underground stations with the subway, and station entrances connect directly to bus and streetcar stops. In suburban areas, S-Bahn stations are the hubs of local bus networks, with schedules coordinated for easy transfers.



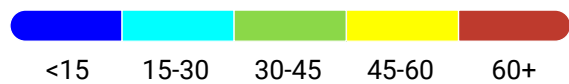


Munich Transportation Network

People per square mile



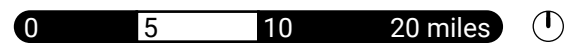
Frequency of Service (in minutes)



- S-Bahn
- RegionalBahn and RegionalExpress
- Subway
- Streetcar
- Frequent bus

1:500,000

Open Street Map



DRAFT



London Overground

London Overground shows how better service can dramatically increase ridership. It transformed low ridership urban commuter rail lines by increasing frequency and overall legibility.

In the 1980s and 1990s, most of the lines that are now London Overground were operated by British Rail, and some had as little as 1 train per hour. Transport for London took over starting in 2007, upgraded stations, introduced modern trains, and increased frequency to at least every 15 minutes from 6:00 am to midnight. Some segments have up to 16 trains per hour.

London Overground is shown alongside London Underground, Docklands Light Railway, and trams on the Tube Map. Station signage matches tube signage, and transfers have clear wayfinding from platform to platform.

The neighborhoods served by London Overground includes many low income areas that were not served well by London Underground. Only 36% of Black London residents report using the Underground at least once a week, compared to 43% of white residents. However, 15% of Black London resident report using Overground, compared to 12% of white residents.

London Overground uses the same tap on / tap off smartcards as all London transit, and fares are fully integrated with London Underground, including free transfers. London uses a zone system: an Overground and/or Underground trip costs between £2.40 for a trip within Zone 1 and £5.30 for a trip from Zone 6 to Zone 1.

Several key London Overground lines share track with freight. The relatively short freight trains typical of the British network are run in between passenger trains in scheduled slots. The Gospel Oak-Barking Line, for example, has capacity of 4 freight trains per hour in addition to a passenger train every 15 minutes.

Metro area population

London	14,257,962
Philadelphia	7,209,620

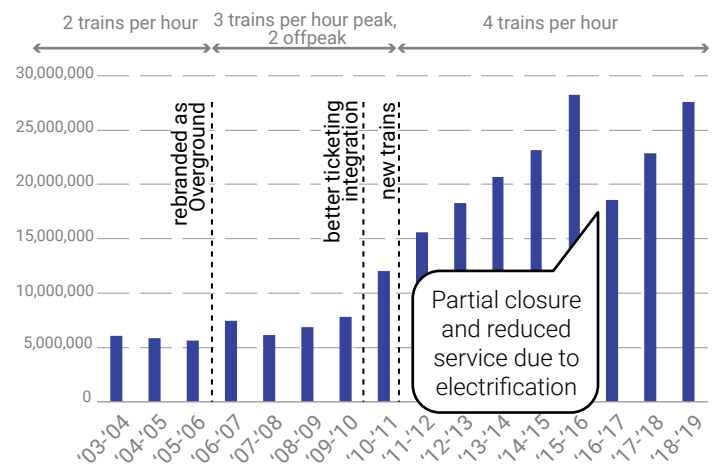
Network size

London Overground	104 miles
Philadelphia Regional Rail	280 miles

Average weekday ridership

London Overground	520,000
Philadelphia Regional Rail	134,000

Gospel-Barking Oak Line's Annual Ridership



The Gospel Oak-Barking Line, a circumferential line across the northern part of London, shows the ridership increases that were achieved by better integration, new equipment, and more service.



The Overground (right) is designed to operate as a seamless network with the Underground (left), with integrated fares and wayfinding.



While most of the Overground was an upgrade of existing lines, a short section of new line in Shoreditch created a new crosstown connection.



London Rail Network

People per square mile



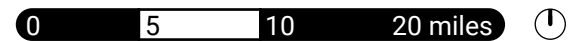
Frequency of Service (in minutes)



- Overground
- Other National Rail service
- Underground / Subway
- Tram

1:500,000

Open Street Map



DRAFT



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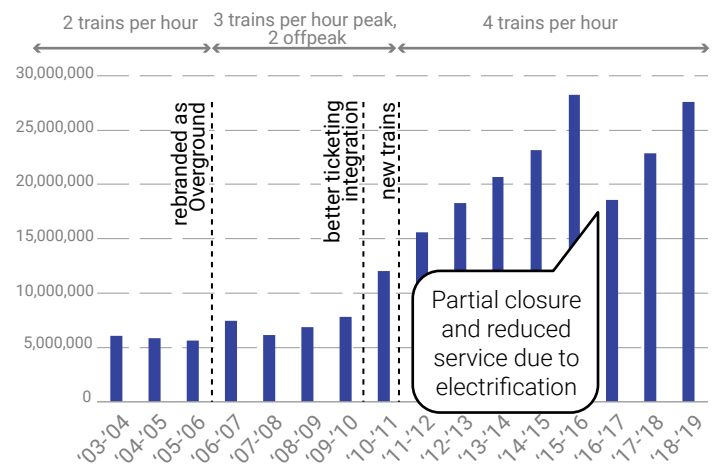
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London Rail Network

People per square mile



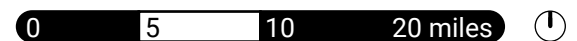
Frequency of Service (in minutes)



- Overground
- Other National Rail service
- Underground / Subway
- Tram

1:500,000

Open Street Map



DRAFT

85



Auckland AT Metro

Auckland shows how Regional Rail can be part of a transit network redesign. The city has extensively upgraded its public transit over the past 20 years. This includes a complete redesign of the bus network linked to a dramatic improvement in commuter rail service.

As of 2000, Auckland had three commuter rail lines, all operated by diesel trains. The service was peak-oriented, with only infrequent midday service and no Sunday service. Today, there are 4 lines, three of which have trains every 20 minutes all day seven days a week. As a result, ridership increased from 1 million boardings in 1994 to 22 million in 2019.

A series of infrastructure upgrades enabled much better service: double tracking, a new central station closer to the Downtown core in 2003, electrification in 2014, two new branches in 2010 and 2012, and reconstruction of key transfer stations.

In the 2010s, Auckland undertook a complete redesign of the bus network, focusing on more high frequency all-day service, better connections, and overall simplicity. The new network was implemented in sections from 2015 to 2019. The new rail lines were an integral part of the plan, with large sections of the network focused on rail-bus transfer hubs. From 2014 to 2019, total transit ridership increased by 36%, including a 30% increase in bus ridership and a 75% increase in rail ridership.

Bus and rail both use the same zone fare structure and the same tap-on, tap-off contactless payment card.

A new downtown tunnel is now under construction to allow through running and increase frequency.

Metro area population

Auckland

1,715,600

Philadelphia

7,209,620

Network size

Auckland AT Metro rail

58 miles

Philadelphia Regional Rail

280 miles

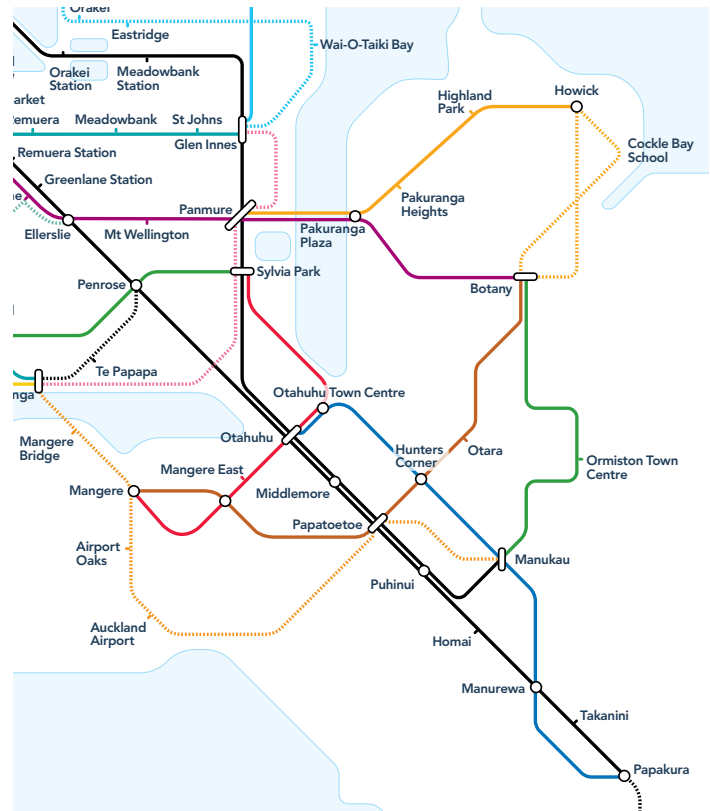
Average weekday ridership

Auckland AT Metro rail

69,400

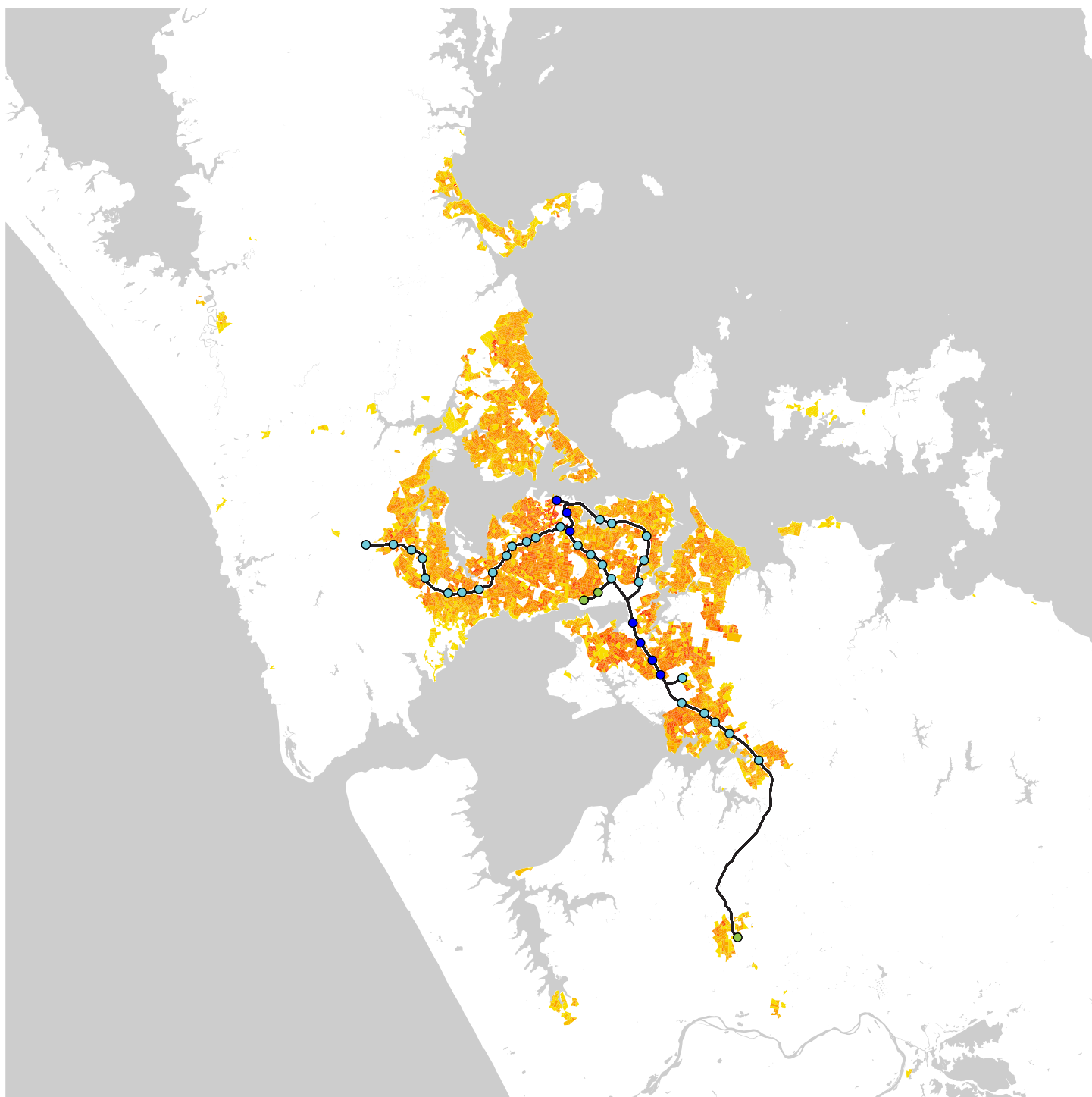
Philadelphia Regional Rail

134,000



The new frequent network (above) is made up of bus routes (in color) and rail lines and is designed to set up many connection points between the two. Some of these required physical upgrades; Puhinui Station (below), which has 6 trains an hour to Downtown all day, was rebuilt to allow buses to pull directly up to the front door of the station, improve accessability, and add restrooms.





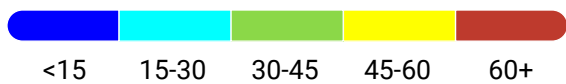
Auckland Commuter Rail Network

People per square mile



— Commuter Rail

Frequency of Service (in minutes)



1:500,000

Open Street Map



DRAFT



Barcelona Rodalies de Catalunya and FGC

Barcelona shows how Regional Rail service can vary based on different levels of demand. The city's two networks offer frequent service in the core and taper off outside the city.

The city has one of the most extensive transit networks in Europe, with two operators sharing Barcelona's commuter rail market: Rodalies de Catalunya operated by Red Nacional de los Ferrocarriles Españoles (Renfe) and Ferrocarrils de la Generalitat de Catalunya (FGC). Both cover most of the Barcelona Metro Area (over 5 million inhabitants) and are fare-integrated with the rest of the suburban and urban transit systems of Barcelona and other municipalities within this area, and they have become a competitive option to the private vehicle for trips to/from Barcelona. 2016 transit mode share of these trips was 50% versus 47% in private vehicle.

The main difference between the Renfe and FGC networks lies in their typology: lines that cross the entire city of Barcelona on the Renfe network, and lines with terminal stations in the city in the case of FGC. Most FGC lines are centered in Barcelona, with either Plaça Catalunya or Plaça Espanya stations as terminals, although some of them start or end at other key destinations outside the city, such as the Autonomous University, or are designed as feeder to intermediate stops.

The biggest investments of both systems occurred 30 years ago, with the construction of new tunnels, the modernization of its facilities, especially in stations, adapting them for all users and improving transfers to other modes, and the acquisition of new rolling stocks designed specifically for commuter services.

On both networks, train frequencies average 6-30 minutes within zones 1-3 but drop off dramatically on the outer zones. Express trains with fewer stops are offered for faster connections between key cities with Barcelona.

Metro area population

Barcelona Rodalies de Catalunya and FGC:

5,355,127

Philadelphia

7,209,620

Network size

Barcelona Rodalies de Catalunya and FGC:

352 miles

Philadelphia Regional Rail

280 miles

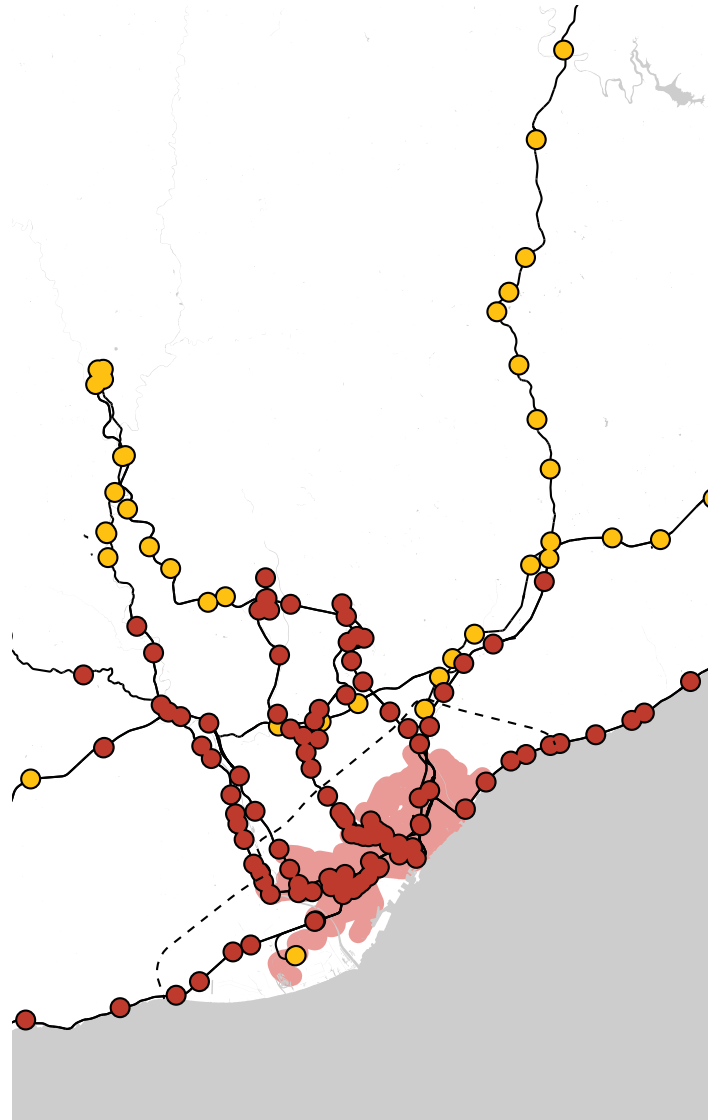
Average weekday ridership

Barcelona Rodalies de Catalunya and FGC:

680,000

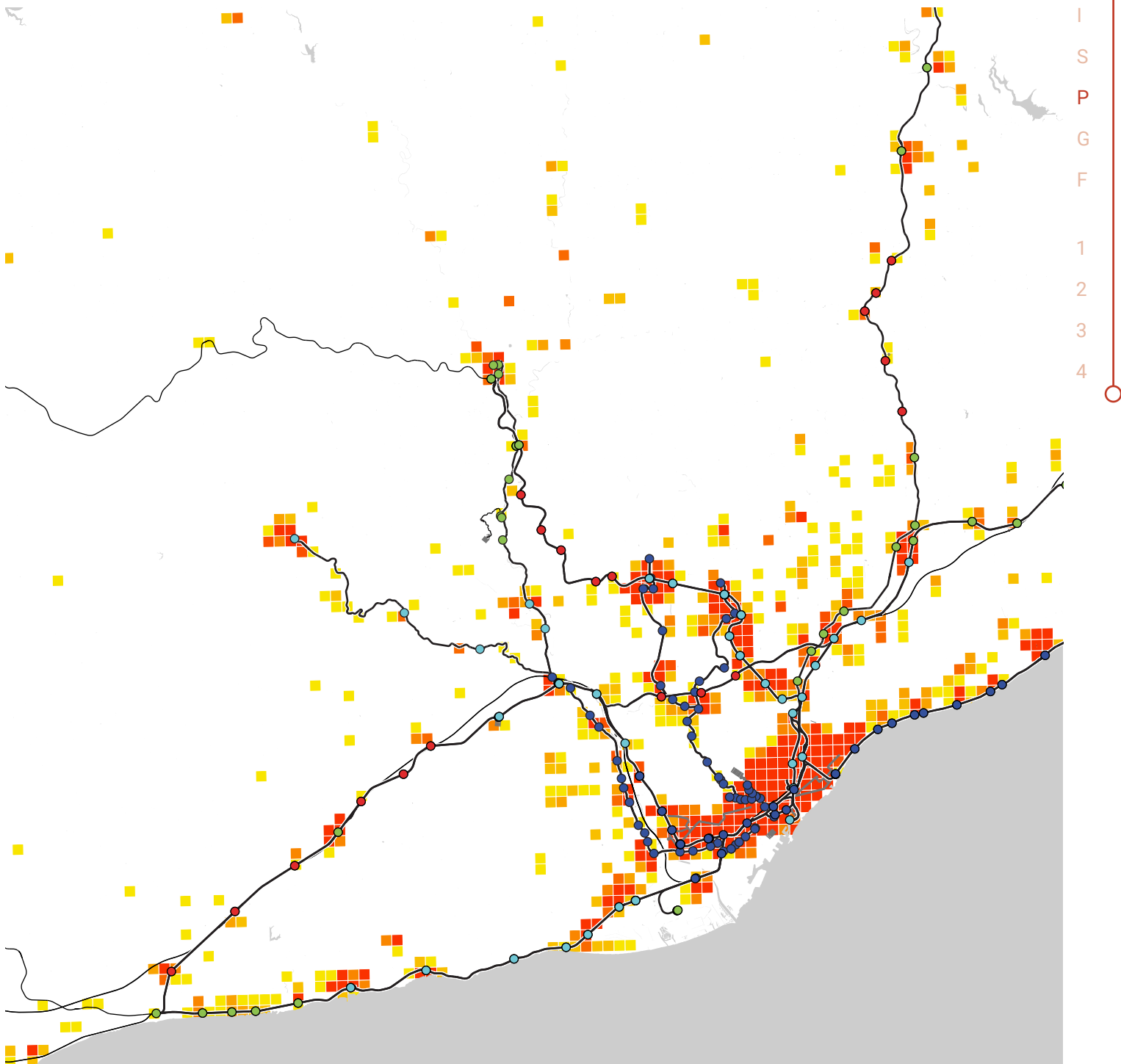
Philadelphia Regional Rail

134,000



The Metro and light rail offers frequent transit service within most of Barcelona and the other cities, defined for transit terms as "zone 1," shown as a dashed black line. The area in red without black outline is within walking distance of that network. The black outline areas are within walking distance of commuter rail; red is 20 minute or better frequency and yellow is lower frequency.

Renfe's 290 miles of tracks and 119 stations, carried an average weekday ridership of 385,000 in 2019, 74% of which was outside the first zone, shown with a black line. FGC's 62 miles of tracks and 80 stations carried average weekday ridership of 295,000, close to 50% in the first zone. Within the first zone, the Metro carries over a million boardings a day.

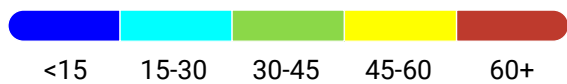


Barcelona Rail Network

People per square mile



Frequency of Service (in minutes)



- Rodalies de Catalunya and Ferrocarrils de la Generalitat de Catalunya
- Other commuter rail
- Metro
- Light rail

1:500,000

Open Street Map



DRAFT



Denver shows that frequent service can work in places with much lower density than the Philadelphia region. It has built out a combined light rail and commuter rail network that serves suburban densities with all day 15 minute or better service.

The RTD network uses two technologies -- commuter rail on the northern lines and light rail on the southern lines -- but both sides use largely railroad or freeway right of way, have widely spaced stations, and run trains of similar length.

Most of RTD's stations are in car-oriented suburban areas with low surrounding density. The system depends heavily on park-and-ride.

Of the eight lines radiating out from Downtown, six run at least every 15 minutes all day, including the commuter rail line to the airport. Another runs every 30 minutes; the last, a single station spur, runs every hour. Every train stops at every station.

While RTD's commuter rail lines use vehicles that are almost identical to SEPTA's Silverliner V fleet, the operations are quite different. Every station has high platforms, allowing all doors to open at every station. Every station has ticket vending machines, and the system operates as proof-of-payment, with conductors or security guards randomly checking tickets. While RTD has two people on board every commuter rail trained to meet FTA requirements, staffing does not need to be increased for longer trains or higher ridership.

Fares are completely integrated with bus.

Metro area population

Denver	3,617,927
Philadelphia	7,209,620

Network size

Denver RTD	110 miles
Philadelphia Regional Rail	280 miles

Average weekday ridership

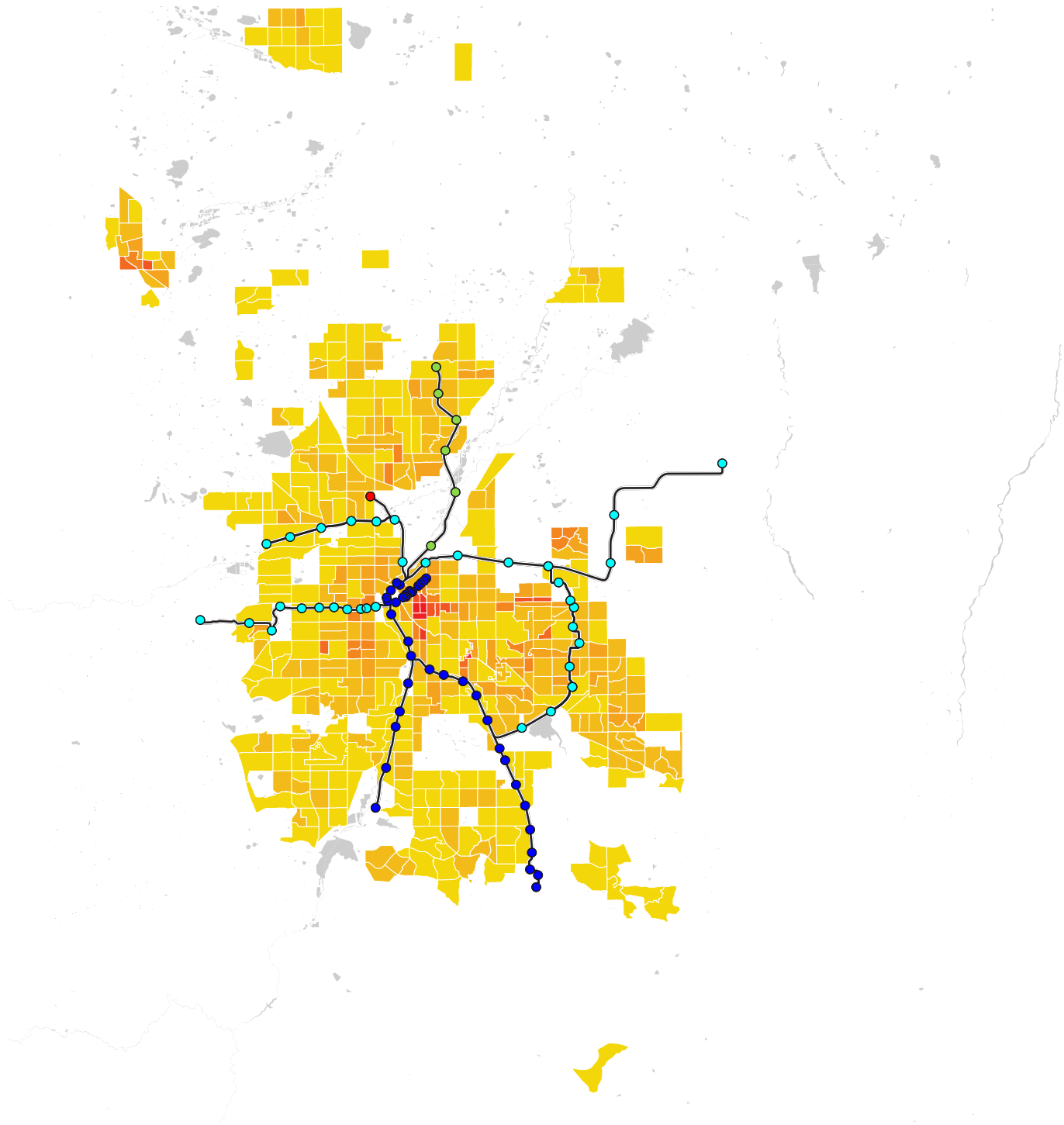
Denver RTD	135,300
Philadelphia Regional Rail	134,000



RTD commuter rail stations all have train-length high platforms for level boarding.



Denver's local bus network uses a flat fare, while the rail system uses zones. However, rail zones 1 and 2 match the coverage area of local bus, and a "local" ticket covers travel by any mode within that zone. Thus, bus and rail fares are completely integrated -- a trip between point A and B costs the same regardless of mode -- while still charging more for long rail trips.



Denver RTD Light Rail and Commuter Rail Network

People per square mile



Frequency of Service (in minutes)



— RTD rail lines





Peer Comparison

SEPTA is one of the 10 highest ridership commuter rail systems in the United States. These systems have much in common; notably, all but two date back to the 1800s. However, there are some notable differences.

	MTA Long Island Rail Road	MTA Metro-North Railroad	NJ Transit Rail	Metra
<i>Metro area</i>	New York	New York	New York	Chicago
<i>Average weekday boardings</i>	385,400	311,800	306,900	274,000
<i>Miles</i>	319	272	487	488
<i>Ridership/mile</i>	1,208	1,146	630	562

<i>Opened</i>	1834	1849	1839	1850
<i>Stations</i>	124	113	166	241
<i>Annual Passenger Miles</i>	3,929,859,957	2,034,489,613	2,006,197,776	1,365,137,921
<i>Annual Unlinked Trips</i>	114,241,364	91,433,762	89,562,931	61,456,663
<i>Annual Veh Revenue Miles</i>	67,942,021	67,938,044	58,567,859	44,605,656
<i>Annual Veh Revenue Hours</i>	2,207,645	2,129,670	1,797,179	1,507,232
<i>Vehicles Available for Maximum Service</i>	1,185	1,137	1,297	1,197
<i>Average fleet age in years</i>	17	17	21	27

<i>Avg trip length</i>	34 miles	22 miles	22 miles	22 miles
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<i>Pass mile/veh mile</i>	58	30	34	31
<i>Cost/veh mile</i>	\$683	\$591	\$570	\$519

<i>Cost/pass mile</i>	\$0.38	\$0.62	\$0.51	\$0.57
<i>Spare ratio</i>	0.2	0.0	0.4	0.1
<i>Farebox recovery</i>	51%	60%	55%	47%
<i>Average revenue speed</i>	30.78 mph	31.90 mph	32.59 mph	29.59 mph

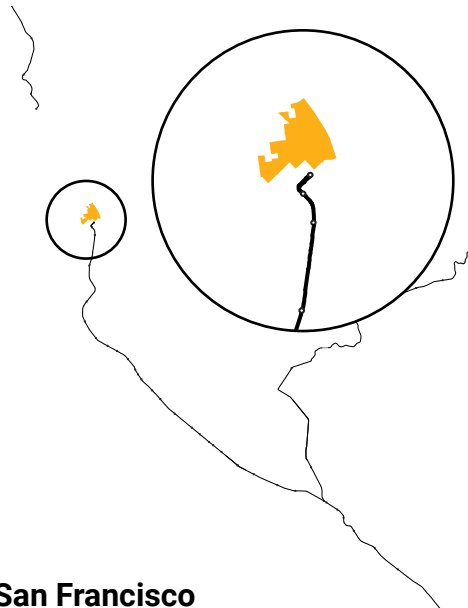


SEPTA Regional Rail	MBTA	Caltrain	Denver RTD A and B Lines	Metrolink	MARC Train
Philadelphia	Boston	San Francisco	Denver	Los Angeles	Washington DC
134,600	121,700	67,500	40,000	38,500	30,000
280	402	77	50	407	187
481	303	877	803	95	160
Unsurprisingly, SEPTA's rail lines have lower ridership per mile than the New York systems, which serve a bigger and more congested city. But they also lag behind Caltrain and Denver RTD, both of which have focused on service frequency.					
1832	1834	1863	2016	1992	1835
153	138	32	22	62	43
465,744,543	653,570,994	385,871,948	121,331,394	416,394,626	271,391,388
34,730,053	31,177,738	17,662,773	9,711,377	12,824,059	9,190,885
20,325,604	24,935,847	7,219,541	5,462,832	13,582,288	6,652,197
991,458	829,590	216,217	157,620	374,740	174,676
411	478	134	66	258	202
30	25	27	5	15	18
SEPTA's fleet is considerably older than most of its peers.					
13 miles	21 miles	22 miles	12 miles	32 miles	30 miles
SEPTA serves shorter trips than most of its peers, and the trains are not as full. This reflects the greater off-peak service.					
23	26	53	22	31	41
\$315	\$463	\$630	\$509	\$648	\$947
SEPTA's operating costs per vehicle mile are low, but the cost per passenger mile is high: the trains are cost-effective to operate, but there are many empty seats.					
\$0.67	\$0.59	\$0.35	\$0.66	\$0.58	\$0.61
0.2	0.1	0.2	0.5	0.3	0.4
45%	62%	75%	41%	34%	30%
20.50 mph	30.06 mph	33.39 mph	34.66 mph	36.24 mph	38.08 mph
SEPTA's lower speed reflects closer station spacing.					



Infrastructure Comparison

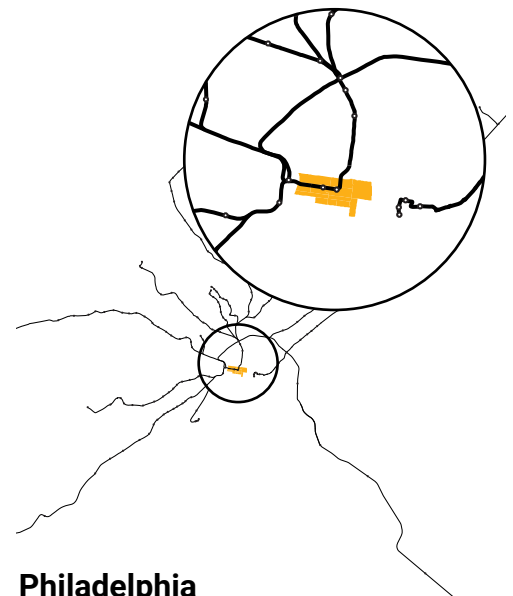
SEPTA has the best Regional Rail infrastructure in North America. No other system matches its comprehensiveness, high capacity, electrification, separation from freight, and convenient downtown station locations. Of course, what matters to passengers is service, not infrastructure, and Philadelphia does not have the best commuter rail service in North America; that distinction goes to Denver or Ottawa. But infrastructure enables service, and Philadelphia has infrastructure other cities envy.



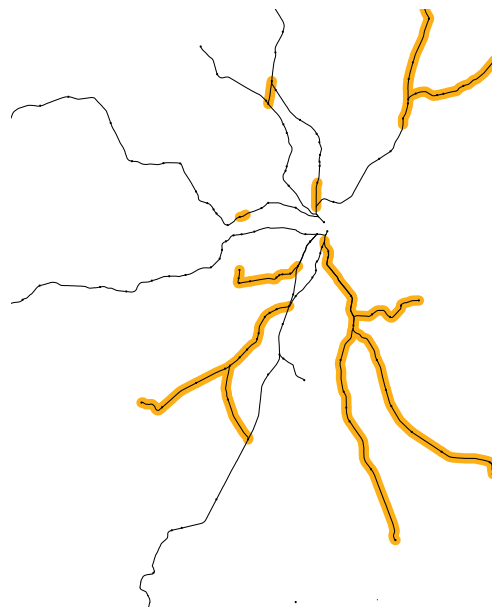
San Francisco's commuter rail station is over a mile from Downtown. SEPTA's stations are within a short walk of every Downtown Philadelphia office tower.

over 60,000 jobs/square mile

San Francisco



Philadelphia



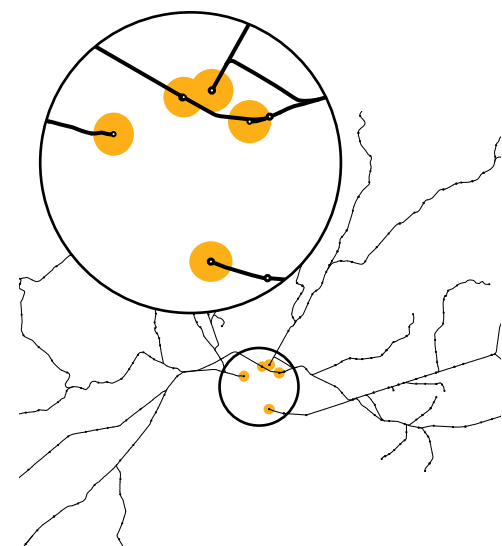
In Boston, over 40% of the network, including some trunk lines feeding into downtown, is single track. SEPTA has extensive double track, with single track only on outer branches.

single track

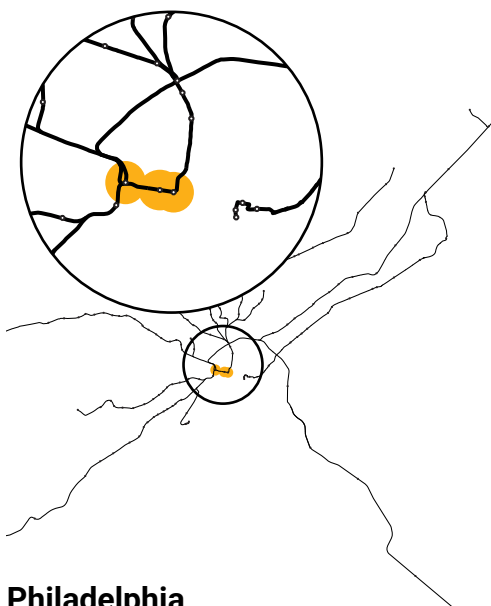
Boston



Philadelphia



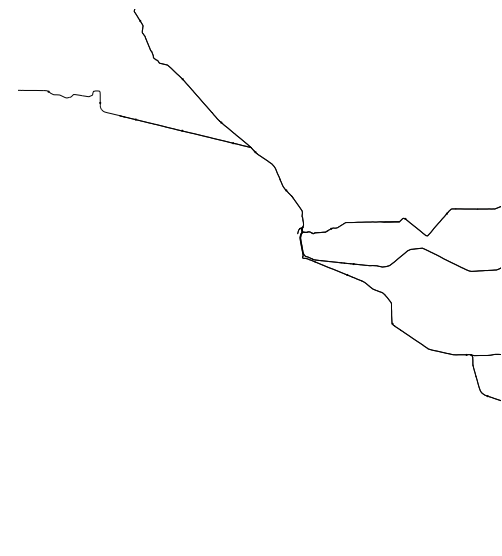
New York



Philadelphia

New York City has 5 terminal stations serving Manhattan (Penn Station, Grand Central, Hoboken, Atlantic Terminal, and Long Island City); every train running into the city serves only one of them. On SEPTA, every line feeds into the Central City tunnel, and the same train can stop at 3 stations serving different parts of Center City.

Downtown stations



Los Angeles



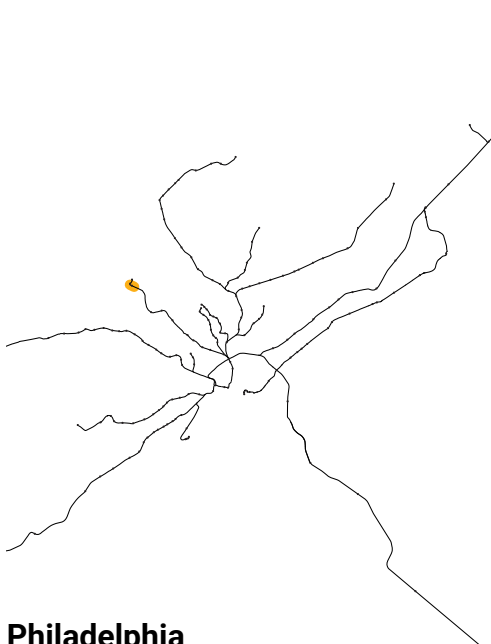
Philadelphia

The Los Angeles commuter rail network is operated entirely by diesel equipment. SEPTA's network is 100% electrified.

electrified



Chicago



Philadelphia

Many of Chicago's commuter rail lines are shared with transcontinental freight traffic. SEPTA shares tracks with Amtrak passenger trains but is largely separated from major freight movements.

18 MGT/year or more in 2000



Next Steps

The information in this Existing Conditions report serves as a basis for future efforts of the Reimagining Regional Rail Master Plan. The SEPTA-led project team will refer back to Existing Conditions for a variety of purposes. These can include references to ridership volumes, travel patterns, station accessibility, or bottlenecks. The Existing Conditions report provides a summary of challenges and opportunities that exist today. This is critical for serving as a basis for establishing possible recommendations because it gives the project team a sense of what issues the recommendations should resolve.



