South Philadelphia Transportation Center

April 2019

DELAWARE VALLEY
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REGIONAL
PLANNING COMMISSION

The Delaware Valley Regional Planning Commission is the federally designated Metropolitan Planning Organization for a diverse nine-county region in two states: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

DVRPC's vision for the Greater Philadelphia Region is a prosperous, innovative, equitable, resilient, and sustainable region that increases mobility choices by investing in a safe and modern transportation system; that protects and preserves our natural resources while creating healthy communities; and that fosters greater opportunities for all.

DVRPC's mission is to achieve this vision by convening the widest array of partners to inform and facilitate data-driven decision-making. We are engaged across the region, and strive to be leaders and innovators, exploring new ideas and creating best practices.

DVRPC is funded through a variety of funding sources including federal grants from the U.S. Department of Transportation's Federal Highway Administration (FHWA) and Federal Transit Administration (FTA), the Pennsylvania and New Jersey departments of transportation, as well as by DVRPC's state and local member governments. The authors, however, are solely responsible for the findings and conclusions herein, which may not represent the official views or policies of the funding agencies.

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Executive Summary

Currently, Southeastern Pennsylvania Transportation Authority (SEPTA) bus Routes G, 7, 25, 29, 47, 47M, 57, 64, and 79 lay over on private property or on street in the southeast corner of South Philadelphia (the study area for this project), where there is little guarantee that SEPTA operations can continue either for the long term or short term. The study area is a geographic "dead end" that naturally leads to the need for a terminus or "end-of-line" facility. However, there is no SEPTA-owned or controlled property where the vehicles can lay over. The purpose of this project was to identify where and how one or more new layover facilities could enhance SEPTA bus operations in this dense service area.

SEPTA is interested in consolidating end-of-line operations or layovers in the study area with a new transit facility. Ideally, a SEPTA-owned location would provide opportunities for customers to transfer easily between routes, amenities for customers with improved pedestrian elements, layover areas for operators to take required breaks and vehicles to recover (which enables operators to better keep to schedules), and bathrooms for the operators. Additionally, the project identified route changes that could create monetary savings, allowing for service to be reallocated where needed in SEPTA's bus network.

The report is organized around three guiding questions the team deemed necessary to developing the final recommendations:

1. What is the best location for a new SEPTA facility in the study area?
2. How does one dictate which routes should use this new facility?
3. How does the new facility function?

Chapter One of the report looks at the existing conditions of the study area and focuses on demographics, major destinations, and the transportation network. This section outlines the findings of a customer survey hosted on SEPTA's website that asked about the destination and purpose of bus trips made in the study area.

Chapter Two discusses the Delaware Valley Regional Planning Commission's (DVRPC's) methodology for its parcel analysis, which was used to locate potential sites for a transportation center. This section also highlights best practices in transportation center design and existing layover facilities within SEPTA's network that informed the conceptual design work.

DVRPC worked with stakeholders and identified three potential locations for a new facility:

- an underused parking lot at the Columbus Commons shopping center, owned by **IKEA;**
- an underused surface parking lot off of **Pier 70** Boulevard; and
- a cul-de-sac on **South 3rd Street** one block south of Oregon Avenue.

Chapter Three is the detailed bus operations analysis. The chapter highlights the advantages and disadvantages of each proposed facility, followed by best practice principles in bus operations design. The principles were used as a guide to simplify and improve the existing service. Lastly, the chapter provides detailed overviews for each bus route with operations modifications that include cost or savings calculated for each proposed facility. DVRPC worked closely with SEPTA to narrow the potential options and SEPTA staff thoroughly reviewed and confirmed DVRPC's cost operations analysis.

Chapter Four focuses on recommendations and design and offers two options for new layover facilities: Pier 70 or IKEA in combination with a turn-around at 3rd Street. A single facility was considered but ultimately not recommended due to the estimated high costs it would have added to some of the route modifications. The Pier 70 and 3rd Street combination was more desirable to the stakeholder committee because of the limited space and high ridership at the shopping center. The team developed conceptual designs that varied in size, access, and persons using the facility, as well as renderings.

Chapter Five describes the next steps that together SEPTA and City of Philadelphia agencies should take to build a new layover facility and determine the operational changes to each of the nine routes analyzed in this study.

SEPTA Bus Layover Location at Pier 70

Source: DVRPC (2018)

Chapter 1: Introduction

Currently, there is no SEPTA-owned or controlled property to serve as a transportation center for the numerous bus routes that end trips in South Philadelphia. A transportation center provides opportunities for customers to transfer easily between routes, amenities for customers (shelters, benches, and SEPTA Key vending kiosks), layover areas for buses to recover (which enables operators to better keep to schedules), and bathrooms for SEPTA operators.

Bus Routes G, 7, 25, 29, 47, 47M, 57, 64, and 79 lay over on private property or on street, where there is little guarantee that SEPTA operations can continue either for the long term or short term. The Philadelphia City Planning Commission's (PCPC's) South District Plan recommends creating a new transportation center in South Philadelphia. This recommendation is supported by SEPTA.[1]

Project Purpose

The purpose of this project was to evaluate the feasibility of creating a new transportation center in the vicinity of Pier 70/Whitman Plaza or near Columbus Boulevard. This study investigated potential locations, available parcels, and necessary square footage to implement a South Philadelphia Transportation Center. In addition, research and analysis was completed to assess the impacts to existing SEPTA routes and the potential for new routes and/or realigned routes based upon residential and employment forecasts.

Steering Committee

A steering committee consisting of the Office of Transportation and Infrastructure and Sustainability (oTIS), Philadelphia Streets Department, SEPTA, PCPC, Philadelphia Water Department (PWD), Delaware River Waterfront Corporation (DRWC), Office of Councilman Mark Squilla, and Pennsylvania Department of Transportation (PennDOT). Members were asked to attend meetings and provide feedback on DRAFT recommendations to the DVRPC project team.

Photos of a stakeholder steering committee meeting are shown in Figure 1.

Study Area

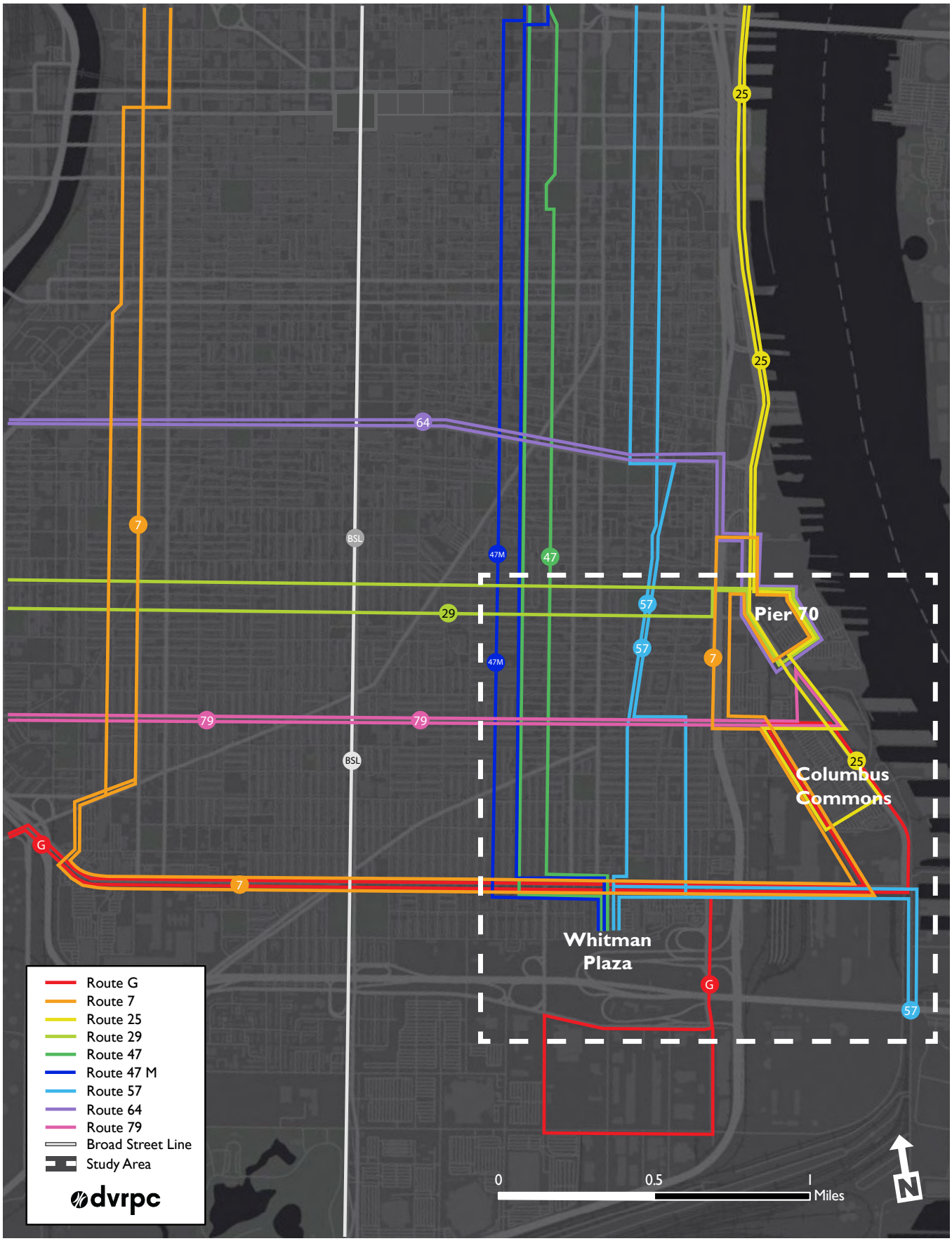
The study area for this project is a subsection of South Philadelphia (shown in Figure 2), east of 8th Street, north of Packer Avenue, west of Delaware Avenue and the Delaware River, and South of Tasker Avenue. The study team analyzed the area for potential locations for a future transportation center and operations of the SEPTA network which include the termini of nine bus routes.

Figure 1 | Stakeholder Committee Meeting Participants

Source: DVRPC (2018)

[1] Philadelphia City Planning Commission, South District Plan (2015).

Figure 2 | Project Study Area



Related Plans

This section highlights the plans that were considered while DVRPC was working on the South Philadelphia Transportation Center study.

South District Plan[2]

DVRPC's South Philadelphia Transportation Center project study area overlaps with a portion of PCPC's South District Plan (see Figure 3). DVRPC's work further analyzed a recommendation from the South District Plan that SEPTA work with the Philadelphia Commerce Department to construct and operate a bus transportation center, including operator and passenger amenities. The suggested location is in the vicinity of Pier 70 to improve bus service and reliability and provide easier transfers for customers.

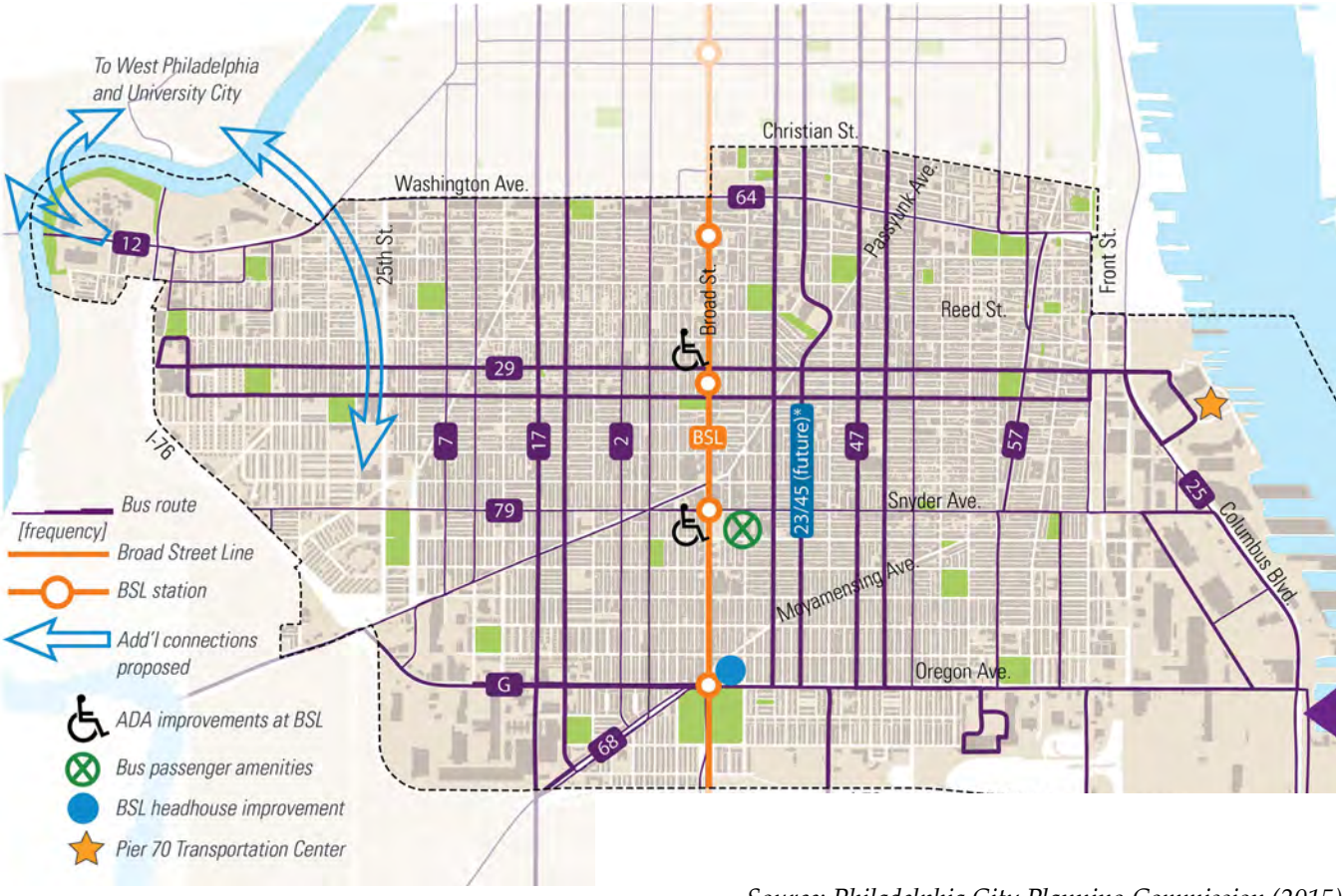
[2] Philadelphia City Planning Commission, South District Plan (2015).

Waiting areas for bus customers are currently crowded and often unsheltered. There are limited pedestrian amenities and there is no place for SEPTA buses to layover or drivers to rest in the area. Having a bus layover area is important to allow for bus drivers to take breaks, stay on schedule, and provide reliable service.

A dedicated bus layover and passenger amenity facility would greatly enhance service to the shopping centers in this part of Philadelphia.

PCPC holds three public meetings for each District Plan, and relies on community organizations, block captains, and elected officials to help generate consensus and support for the plan's recommendations. Every district plan has a steering committee that includes community organizations, city council offices, major landowners, implementing agencies, and other stakeholders who actively participate in the plan. A dedicated transit facility at Pier 70 was therefore approved by the local stakeholders.

Figure 3 | South District Plan SEPTA Routes and Proposed Additions



Source: Philadelphia City Planning Commission (2015)

DRWC Master Plan for the Central Delaware[3]

The *Master Plan for the Central Delaware* is the guiding document for DRWC and the City of Philadelphia to reclaim its Delaware River waterfront. The plan seeks to foster mixed-use development and multi-modal, public access to and along the waterfront. The plan was the result of public input, and it was adopted by PCPC in March 2012. The Delaware River Trail (shown in Figure 4) is part of the master plan; it overlaps with the South Philadelphia Transportation Center study area.

In addition to a network of parks, trails, and open space, the *Master Plan for the Central Delaware* anticipates primarily low- and medium-rise with periodic high-rise mixed-use development. With this change in development, employment and population along the Delaware River are expected to increase, and new transportation connections need to be considered for these new residents, employers, and visitors. Without a reliable and convenient transit option in place, these developments risk being built with a heavy dependence on automobile travel as the primary mode, conflicting with a key goal of the master plan to reduce auto dependency along the waterfront.

DRWC Transit Study (Foursquare)

DRWC is working on a comprehensive long-term transit study and action plan to increase access and improve the experience of getting to and from the Delaware River waterfront, and the many new parks, trails, destinations, and developments that are drawing more and more people every day.

The plan will focus on short-term improvements to transit service along the waterfront, enhancing the public realm surrounding transit stops, and other initiatives aimed at supporting transit use and transforming Delaware Avenue / Columbus Boulevard from a heavily traveled auto-centric corridor to a walkable, urban street that offers a pleasant experience for those arriving on foot, by bicycle, and by public transportation.

[3] DRWC, Master Plan for the Central Delaware (2011).

Figure 4 | Photos of Delaware River Trail

Source: DVRPC (2018)

Transit on Delaware Avenue

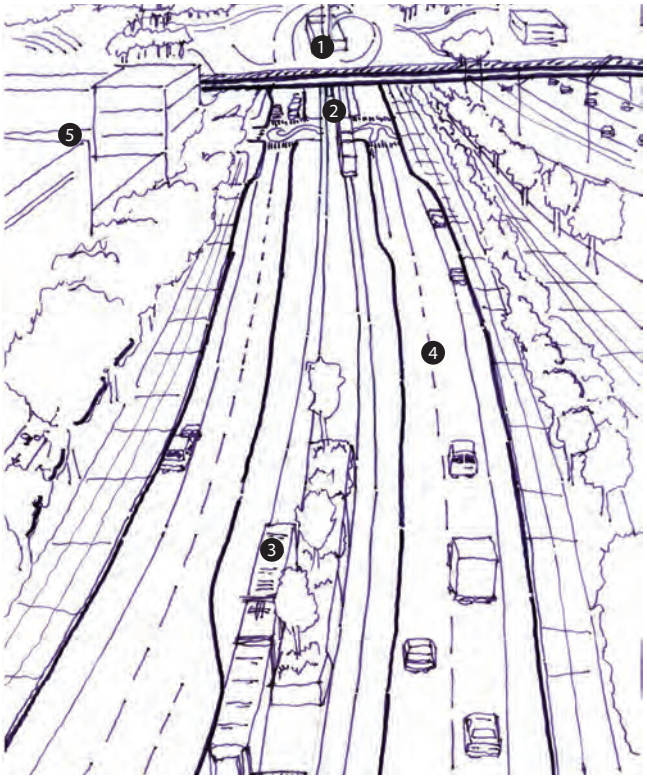
DVRPC recently conducted a phased approach for improved transit along Delaware Avenue/ Columbus Boulevard ("Delaware Avenue") in Philadelphia. It is widely accepted that Philadelphia's premier waterfront cannot develop as envisioned without high-quality, high-capacity transit. As DRWC works to bring the *Master Plan for the Central Delaware* to fruition, new development, parks, and trails are coming to life.

Therefore, SEPTA and the City of Philadelphia asked DVRPC to take a fresh and focused look at the feasibility of extending transit service along Delaware Avenue. The process concluded that a surgical and phased approach to improving transit now via bus operations and passenger comfort, then improving the intensity of those services as demand increases—either through buses or future trolley—is the approach around which stakeholders should convene. See Figure 5 for a sketch from this plan.

Philadelphia Bus Network Choices Report

In recent years, SEPTA bus ridership in the City of Philadelphia has decreased. In an effort to quell this trend, SEPTA hired Jarrett Walker and Associates, (JWA) who put together a report explaining and suggesting the network inefficiencies and policy choices. This is the first step in exploring an overhaul of SEPTA's bus network. The main principles include simplifying routes, minimizing multiple buses using the same corridors, instituting free or very low-cost transfers, and increasing frequency along key corridors as a means to create a high-frequency bus network that is easy for customers to understand and use.

Figure 5 | Transit on Delaware Avenue Transit Plan



Source: DVRPC (2017)

Existing Conditions

Within the study area there is a large residential population confined by Oregon and Delaware avenues to the south and east, respectively. Local and regional commercial destinations and some freight and industrial uses make up the land uses outside of the residential area along these same arterial roadways.

Residents living in the study area are well connected to SEPTA bus service, as well as to the Broad Street Line (BSL). There are a variety of choices as to how to make work and non-work trips other than a single occupancy vehicle. While this transportation network is vast, it is not simple, consistently frequent, or standardized in a way that all people who want to use it can easily do so. Figure 6 summarizes the commute mode share of the South District residents.

Waiting areas for bus customers are crowded and often unsheltered; there are few pedestrian amenities. In addition, in the east corner of South Philadelphia there is no place for SEPTA buses to lay over or drivers to rest in the area.

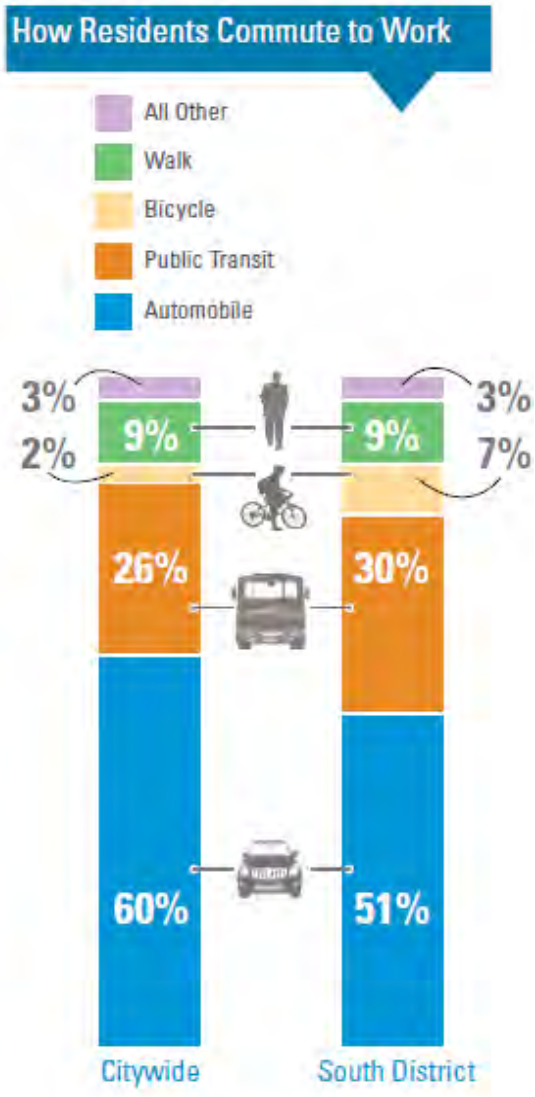
Figure 7 identifies the current routing of nine bus routes (G, 7, 25, 29, 47, 47M, 57, 64, and 79) that service the area, as well as each route's existing layover location. Each layover includes the total number of vehicles using those locations on weekdays (WD), Saturdays (SAT), and Sundays (SUN). The largest convergence of end of lines is at Whitman Plaza and Pier 70. Figure 8 shows the end-of-line stop and one layover location at Whitman Plaza. The patterns for Routes 7, 47, 47M, and 57 lay over here, and there are approximately 1,075 ons and offs at the various stops in the shopping center. Figure 9 shows the end-of-line stop and layover location at Pier 70. Patterns for Routes 7, 25, 29, and 64 lay over here, and there are approximately 600 ons and offs at the stops here (all ridership numbers are from SEPTA's 2016 Automated Passenger Ccounts). There is no SEPTA-owned or leased space for passenger or operator use.

Figure 7 highlights variations in trip patterns by route by the dispersion of bus layovers along a single route.

For example, Route 7 has four different locations in the study area where the bus layover and last stop on the route are different. Simplifying and clarifying existing route patterns and layover locations will likely accommodate passenger and operator needs better. One way to do this is to identify locations suitable to create transportation centers or layover spaces for operators and passengers.

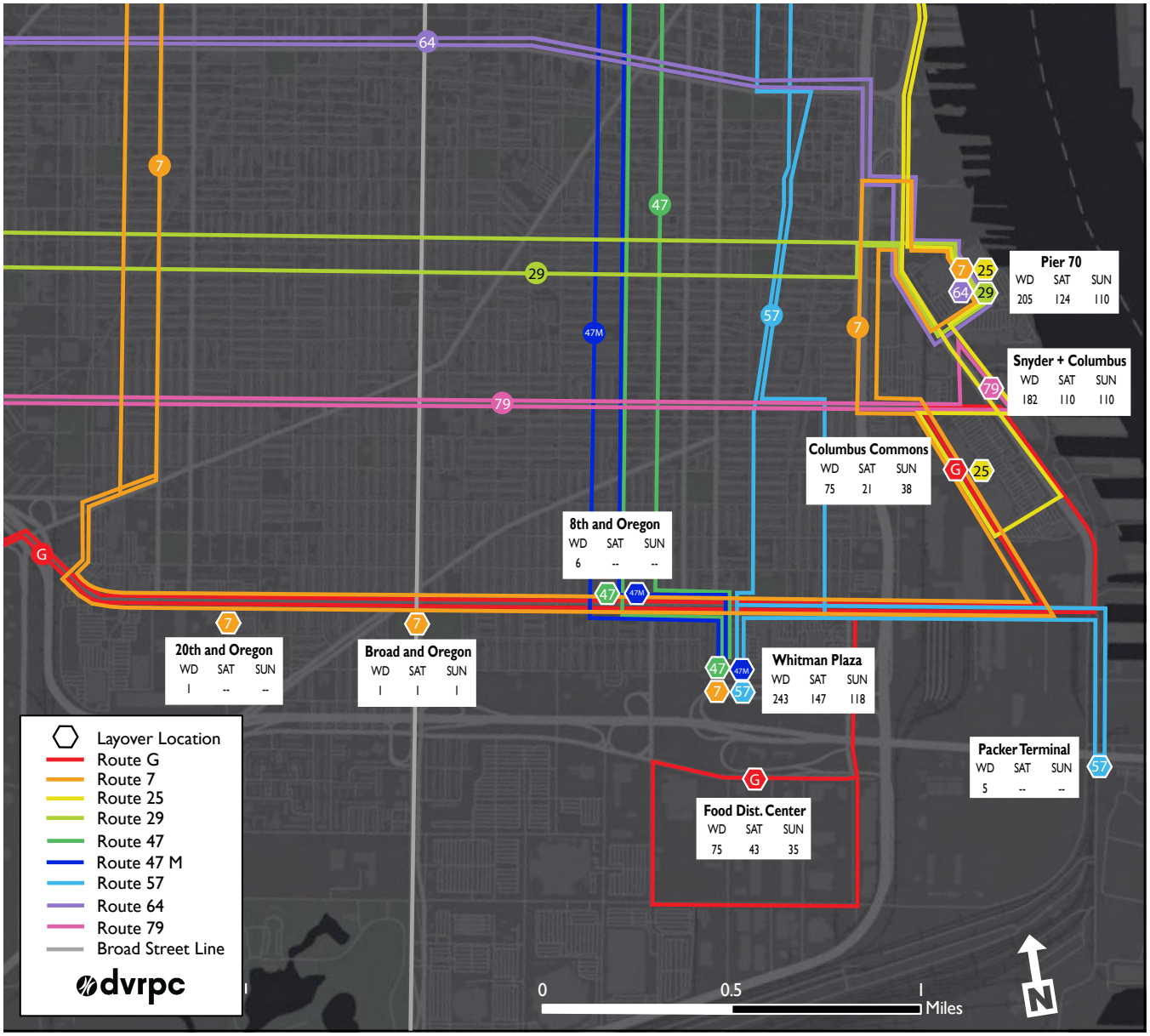
Specific information and background about each of the nine bus routes can be found in Chapter 3, which discusses the bus operations analysis completed for this report.

Figure 6 | South District Residents Commuting Mode Share



Source: PCPC (2015)

Figure 7 | Existing SEPTA Route Patterns and Layover Locations



Sources: DVRPC and SEPTA (2018)

Figure 8 | Existing Stop and Layover at Whitman Plaza

Source: DVRPC (2017)

Figure 9 | Existing Stop and Layover at Pier 70

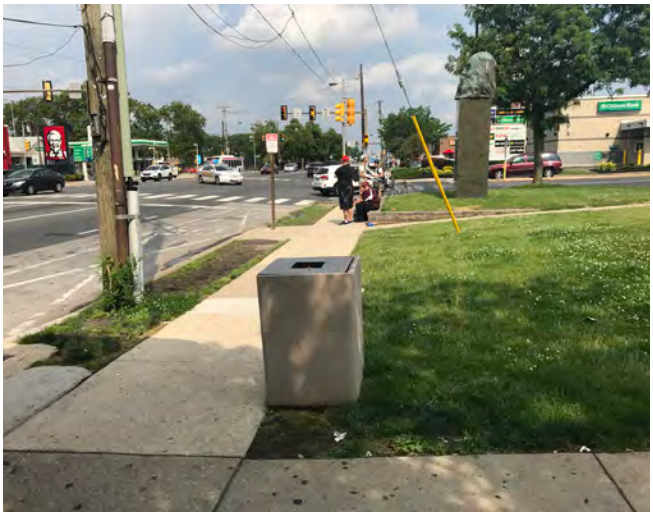
Source: DVRPC (2017)

Accessing Major Destinations of Activity

To understand if and how and what changes could come with a new transportation center, it was important for the study team to understand how the bus routes in the area were being used.

The vast majority of the study area is dense, residential, and developed. There are commercial land uses on neighborhood corners, as well as dedicated corridors. Many of the retailers in the study area are regional activity generators, which generate shopping and work trips. These types of retailers are commonly known as big box stores and generate many more trips because of their size and variation in prices and goods. A lot of these generators are concentrated in three locations that are relevant for this study: Whitman Plaza, Columbus Commons (back of IKEA), and Pier 70. Figure 10 shows existing bus stops at all three locations. Figure 11 highlights activity generators in the study area.

Figure 10 | Photos of Bus Stops and Shelters at Pier 70, IKEA, and Whitman Plaza



Source: DVRPC (2018)

Figure 11 | Activity Generators and Land Use

Source: DVRPC (2015 Land Use), SEPTA (2017); aerial imagery: City of Philadelphia (2017)

SEPTA Passenger Survey

SEPTA hosted an online survey targeting riders and non-riders who live or work in the study area. The intended goal was to learn more about how the respondents could use the nine routes being studied and what if any, modifications could improve transit trips for them. The survey was open for a total of eight months from September 2017 through May 2018. There were also advertisements for it throughout SEPTA's network (see Figure 12). The total number of surveys completed was 1,908: 1,659 existing riders and 249 non-riders responded (see Table 1). Feedback from both groups helped to determine the types of trips people are making in the study area and informed the modifications recommended in Chapters 4.

Figure 12 | Advertisement for SEPTA Survey on a Bus Shelter

Source: DVRPC (2018)

Table 1 | Top Ranking Responses to: "What is the most common reason for your travel on your route in South Philadelphia?"*

Route	Going to Work	Shopping	Running Errands
All Study Area Routes Combined	52.7%	47.2%	30.1%
G: Overbrook and Lankenau Medical Center to Columbus Commons	48.0%	59.7%	28.7%
7: Pier 70 to 33rd and Dauphin	44.6%	57.8%	36.8%
25: Frankford Transportation Center to Columbus Commons	37.6%	69.4%	21.4%
29: Pier 70 to 33rd and Dickinson	58.4%	52.5%	36.6%
47: Whitman Plaza to 5th and Godfrey	59.9%	35.2%	30.1%
47M: Whitman Plaza to 7th and Spring Garden via 9th Street	57.9%	31.6%	42.1%
57: Whitman Plaza to Rising Sun-Olney or Fern Rock Transportation Center	68.6%	28.4%	25.7%
64: 50th Street and Parkside to Pier 70	29.3%	56.5%	29.8%
79: Columbus Commons to 29th and Snyder Avenue	52.0%	49.0%	33.0%

Source: SEPTA Survey (2017–2018)
**Only the three top-ranking choices are shown in Table 1.*

Rider Responses

The survey data was one method used to answer the primary questions to inform the recommendations for this project. These are listed below.

- Why were riders making the trip, what hours, and what days were they doing so?
- Do the existing route patterns still meet the needs of these riders?
- What was the most suitable location for a potential transportation center?

To answer these questions, the team looked more closely at what the survey results yielded. The most valuable results are summarized in this section.

Table 1 shows the answers given to the question,

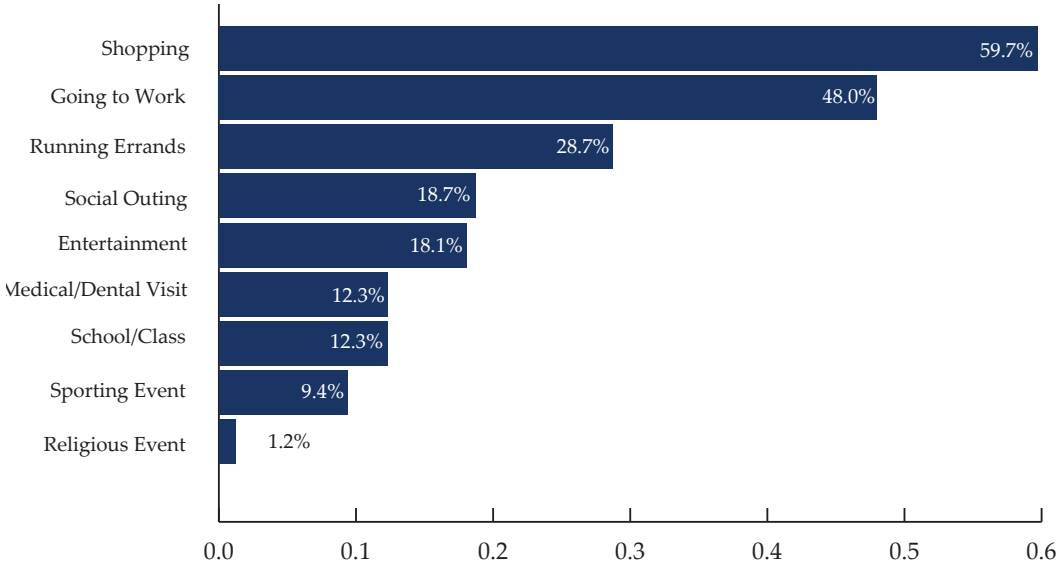
> "*What is the most common reason for your travel on your route in South Philadelphia*?"

The top-ranking responses were: going to work, shopping, and running errands. Aggregated survey responses found that people who are using the bus routes are riding them to complete work trips but also non-work trips. In fact, for Routes 7, 25, 64, shopping ranked more highly than any other purpose for using the route, including commuting to work.
Figure 13 shows the detailed results of Route G, where respondents said shopping at an even higher overall response rate than going to work.

There were also questions asking about the time of week and time of day that passengers use the bus routes. Respondents said they rode buses during the typical work week (Monday through Friday), but another popular answer was that their trips "varied" throughout the week. Riders also said they are using the bus routes at different times based on the day of the week. For example, during the typical work week passengers are riding the bus from what is considered morning peak 6:00am to night 9:59pm. However, on the weekends people responded that they are more likely to start using the bus routes in late morning (9:00 AM–11:59 AM).

In the study area, SEPTA provides high-frequency service during typical commuting, morning and evening peak periods, Monday through Friday. However, outside of these periods, frequency is less consistent and reliable. The survey results indicate that adding frequency to typically off-peak commuting periods such as midday and evening, as well as on the weekends, may be of value for the existing passengers in the study area.

Figure 13 | Route G Responses to Survey Question: "What is the most common reason for your travel on the G in South Philadelphia?"*



** Responses are only from surveys of people who answered that they live or work within the study area.*

Source: SEPTA Survey (2017–2018)

Non-Rider Responses

Nearly 15 percent of the survey respondents answered that they do not use the bus when they travel in South Philadelphia. To understand how this group of respondents could be better served, they were asked a different set of questions from those who said they were existing passengers. The following questions, and responses to them, provided unique information about non-riders. The first in the series was,

> *"You previously stated that you do not take the bus when you travel in South Philadelphia. Why is that?"*

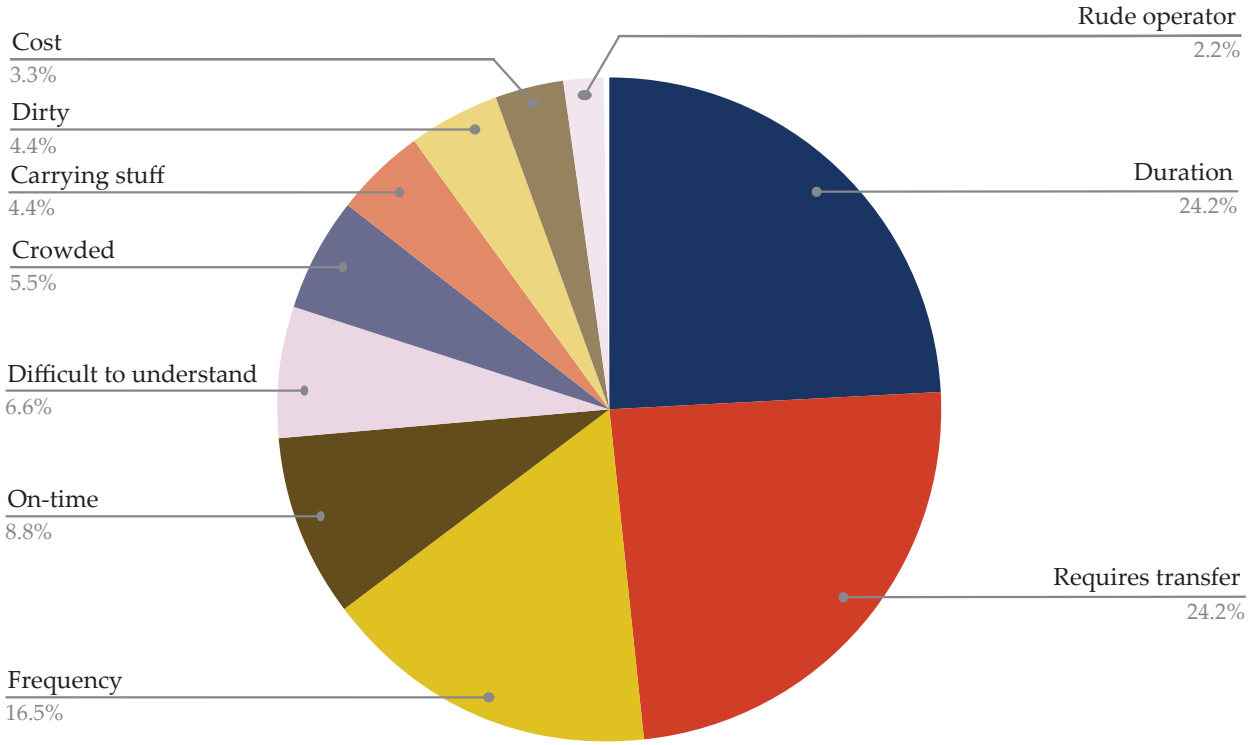
Respondents', answers to this question varied, but there were commonalities in the language they used. In order to summarize them, some interpretation was required. The two most common words used were "inconvenient" and "unreliable." These two words have multiple meanings when given in an answer.

"Inconvenient" can mean that the trip duration is too long, the buses do not come often enough, one or more transfers is required, too much walking is required on either or both ends of the trip, or it is difficult to use the bus when carrying items.

"Unreliable" can mean that the bus does not come at the scheduled time, does not come often enough, or that the trip takes longer than expected.

Based on the summarization technique described, the two most common answers to this open-ended question were that the trips take too long, which was categorized as *duration* (24 percent) and that the respondent's destination requires one or more transfers, categorized as *requires transfer* (also 24 percent). Figure 14 shows the frequency of a given response. One common thread between these two is the lack of ease of use.

Figure 14 | Survey Response: "Why do you not take the bus?"



Source: SEPTA Survey (2017–2018)

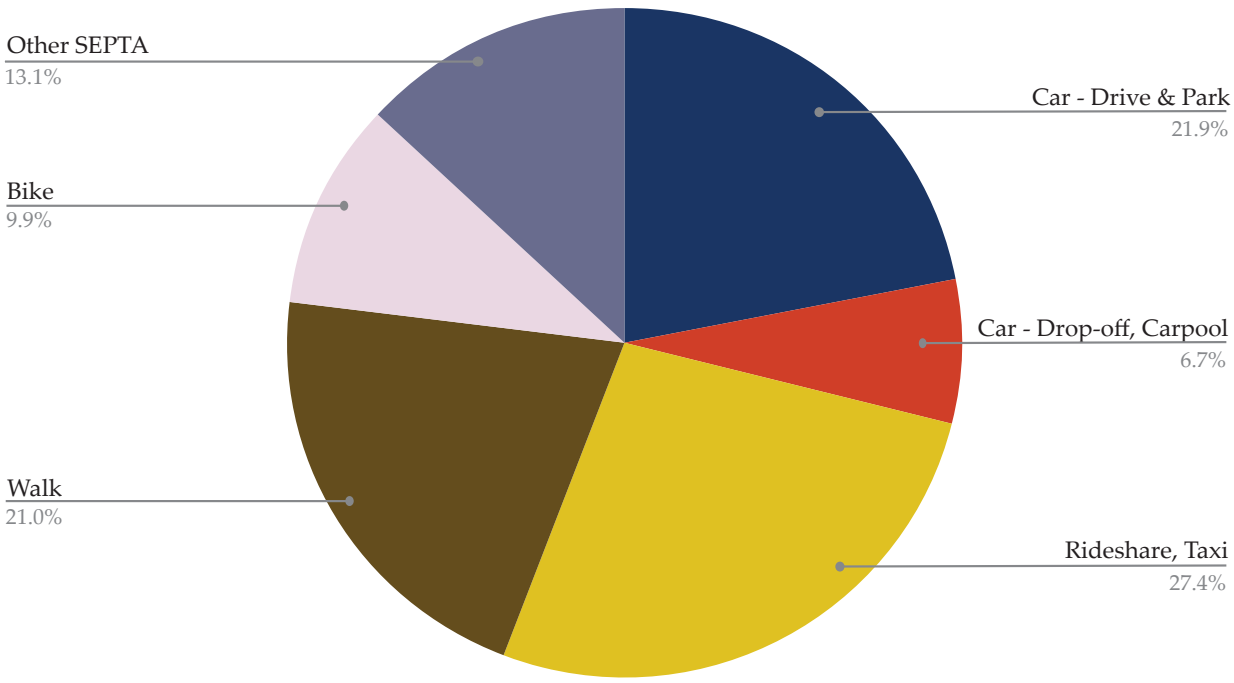
The third most common answer was about frequency of service, more specifically on weekends when people are using these routes to shop. This also relates to convenience and, to some extent, the reliability; a quick trip to the store can end up taking half a day when one has to wait an hour for the next bus.

Another question asked was how respondents travel in South Philadelphia, acknowledging from the previous question that they are not using one of these nine SEPTA bus routes. Respondents had the option to pick multiple modes. Figure 15 shows the frequency of a given response. The most common answer was some form of rideshare (such as Uber or Lyft) or taxi (27%), followed by driving and parking (22%), and then walking (21%).

Since the rideshare and taxi group makes up over one-quarter of non-bus users, this may be the group of responses it would be best to focus on. One could assume that all these respondents would prefer to pay less and take transit, but from the responses given it is not reliable or convenient enough. One respondent summarized their feelings by saying,

> *"I used to take SEPTA when I didn't have other options, but I'm happy to say I found a better way to get around the city: Uber and Lyft…It costs me about a couple of dollars more to take Lyft and Uber, but it's worth it."*

Figure 15 | Survey Response: "How do you travel in South Philadelphia?"



Source: SEPTA Survey (2017–2018)

SEPTA Layover Location on Columbus Boulevard

Source: DVRPC (2018)

Chapter 2: Finding the Best Location

To locate and design a new dedicated SEPTA facility, the project team needed to understand how a successful model functions in SEPTA's network. The following are questions that were researched to identify requirements and amenities. The answers influenced how the team found potential sites and created designs for a future SEPTA facility.

- What are the definitions and differences between a transportation center, layover facility, and enhanced stop?
- What does a transportation center or layover facility need to be successful?
- Where should a new facility be located within the study area and why?

The study team researched the advantages and disadvantages of a transportation center versus a layover location. To do this, the team used three examples of SEPTA facilities to determine elements and amenities that make a facility in the network successful. Finally, the team completed a parcel analysis to pinpoint a location for a new facility based on the existing bus routing in the study area.

Transit Facilities

At the outset of the project, SEPTA staff were open to creating a combination of transit facilities that made the most sense to better facilitate bus operations in the study area. The term *transit facility* in this report is referring both to transportation centers and bus-only loops and/or layovers. Transit facilities must include restrooms for operators. Typically, these facilities exist at the end of line and are a turn-around point for the bus route. For the purposes of this project, the primary difference between a transportation center and dedicated layover location are the permitted uses and users.

Transportation Center

A transportation center can be defined as a location that includes designated areas for passengers to board, alight, and transfer between transit services, and access transit from other motorized and non-motorized modes. In addition, transportation centers are designed to create efficiency for SEPTA vehicles and operators.

Passengers and operators should feel safe and comfortable accessing the facility and waiting there in any weather and at all hours when the service is in operation. Due to the additional design considerations, a transportation center likely requires more space than a dedicated layover facility.

Bus-Only Loop and/or Layover

Operators and SEPTA vehicles are solely authorized to enter into dedicated layover facilities. This type of facility is not proposed as a place for passengers to board and alight. The space is built to accommodate vehicles without using on-street facilities and has a restroom for operators.

Due to the density of the study area, there is limited space for transit-dedicated facilities. Therefore, a combination of a transportation center and layover facilities was considered. However, the lack of passenger facilities at a proposed layover is not optimal for the end-of-line location. The team found that a combination of a close-by enhanced bus stop (in both directions) with a layover location may be appropriate. Enhanced stops are defined as areas where scale-appropriate shelters and landscaping should be built according to ridership. Passengers should feel safe and comfortable to wait, board, and alight.

Examples of Bus Facilities in the SEPTA Network

Using resources such as SEPTA staff knowledge, aerial imagery, and fieldwork, the project team learned what makes an efficient transportation center and layover location. Specific elements are listed below.

- adequate number of berths for vehicles (based on number of routes and frequency of each route that will be using the facility);
- concrete bus pads where buses can lay over or turn around;
- sufficient turning radii for operators to maneuver vehicles into parking stalls and into and out of the facility;
- high-quality access and waiting areas for passengers;
- green stormwater infrastructure;
- flexible space that could be used for additional vehicles being repaired or taking a longer break or for expansion of the facility;
- minimum of 20,000 square feet; and
- operator restroom facilities.

Darby Transportation Center (bus only), Norristown Transportation Center (NTC), and 50th and Parkside Loop were the three most useful examples within SEPTA's network in creating the final designs recommended in Chapter 4.

Darby Transportation Center

Darby Transportation Center is a unique SEPTA asset because of a one-way, exclusive linear facility. The egress and ingress for SEPTA vehicles are separated. Vehicles enter via Main Street to the east, park, unload, load, and lay over, and exit via MacDade Boulevard. Together these elements create an environment where there are fewer conflicts between vehicles and passengers. There are new crosswalks and sidewalks, as well as improved lighting and directional signage. Another uncommon aspect of this facility is the proximity to a linear pathway called John M. Drew Park, as well as a larger open space called Buttonwood Park, creating a better atmosphere and access for passengers. More details about amenities at Darby Transportation Center can be found in Table 2 below.

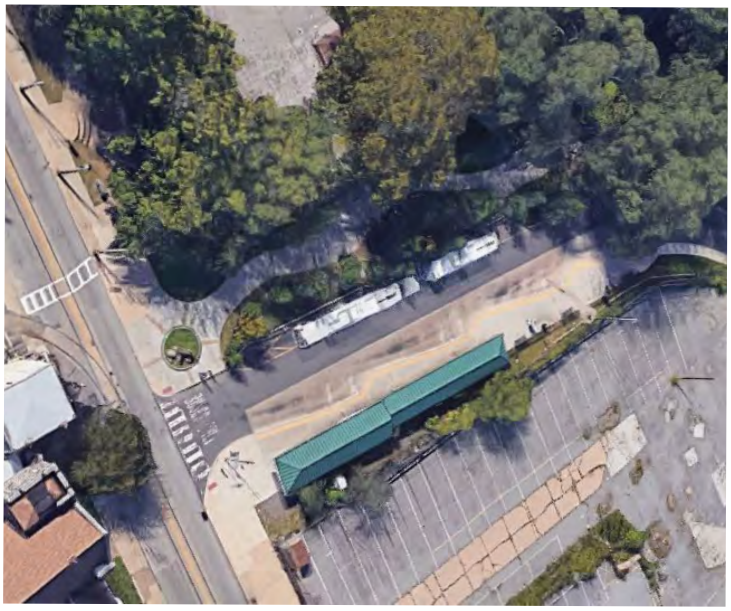
Table 2 | Summary of Darby Transportation Center Amenities

Vehicle Berths	Three SEPTA bus routes use this facility: 113, 114, and 115. There are four bus bays adjacent to the shelter, providing the Route 113 with two boarding and alighting locations (see Figure 16).
Concrete Pads	Concrete paving
Turning Radii	The area is well connected with sidewalks. There is a crosswalk connecting the bus to the trolley layover area, creating a safe way to transfer between the two modes. The shelter has a canopy and enclosed passenger waiting shelter with radiant heating. There is also lighting and signage.
Green Stormwater Infrastructure	Unknown; there is on-site landscaping.
Flexible Space	Three bus layover spaces

Sources: DVRPC and SEPTA (2018)

Figure 16 | Photos of Darby Transportation Center

Source: Google (2018)



Source: Google (2018)

Norristown Transportation Center (NTC)

NTC is a multi-modal facility with connections between Regional Rail, the Norristown High Speed Line (NHSL), SEPTA bus, intercity bus, corporate bus, pedestrians, and bicyclists. Operators have the capability to coordinate between eight SEPTA bus routes that serve NTC's bus loop: Routes 90, 91, 93, 96, 97, 98, 99, and 131. Buses are scheduled to arrive within close timing of each other as they converge at NTC. This is called "pulsing" and makes it so that passengers can transfer quickly. More details about amenities at NTC can be found in Table 3 below.

Table 3 | Summary of NTC Amenities

Vehicle Berths	In total, there are nine berths that form a saw tooth and circular structure. This creates a central location for passengers to transfer between the NHSL, Regional Rail, trail, and buses (see Figure 17).
Concrete Pads	Bus loop in its entirety
Access and Waiting area for Passengers	The passengers waiting area is inside the loop. There are trash receptacles, bike racks, and high-quality sidewalks. Crosswalks are faded.
Green Stormwater Infrastructure	Unknown
Flexible Space	One additional layover location
Operator Facility	There are facilities for passengers and operators in the station.

Sources: DVRPC and SEPTA (2018)

Figure 17 | Photos of NTC

Source: Google (2018)

Source: Google (2018)

50th and Parkside Loop

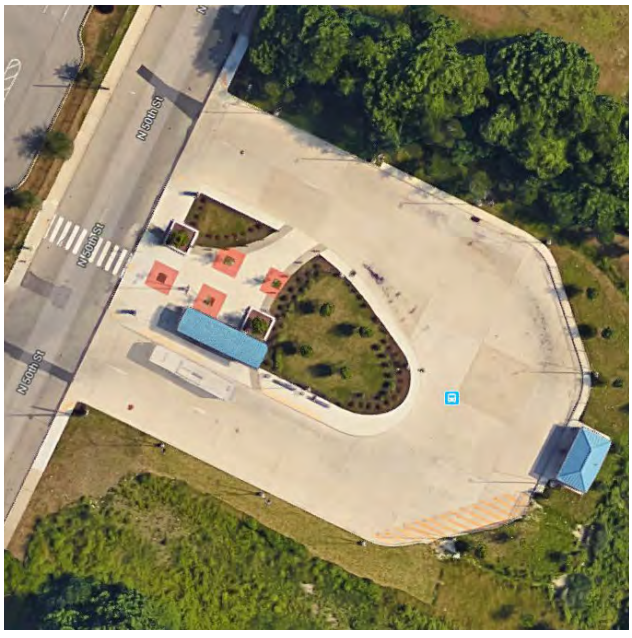
The 50th and Parkside Loop is the terminus point for bus Route 40, 43, 52, and 64. The layover location was rebuilt and relocated in 2011. The bus loop is exclusive and one way. The width of the loop allows for three vehicles to fit, creating an inner and outer waiting area and then a lane for buses to pass each other in the center. More details about amenities at the 50th and Parkside Loop can be found in Table 4 below.

Table 4 | Summary of 50th and Parkside Loop Amenities

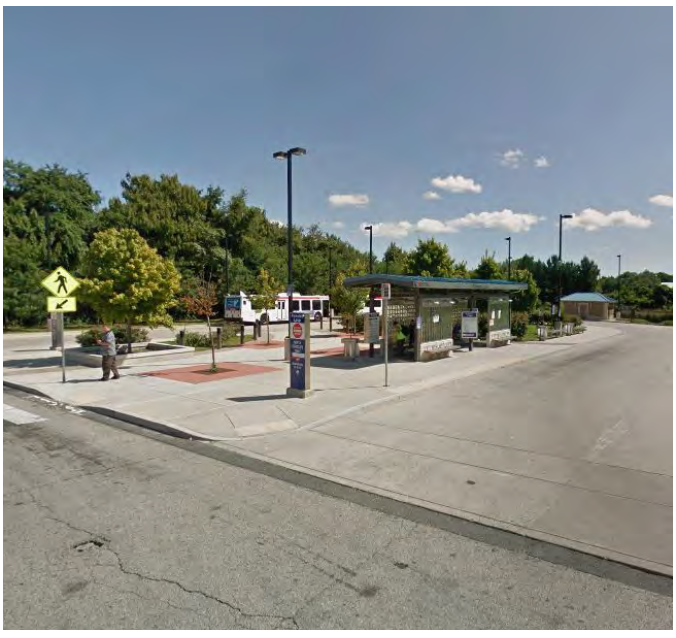
Vehicle Berths	No designated berth for each vehicle (see Figure 18)
Concrete Pads	Bus loop in its entirety
Access and Waiting Area for Passengers	An open-air bus shelter, created from recyclable materials and glass block wind screens; and new site landscaping with drought-resistant plantings
Green Stormwater Infrastructure	A modern stormwater management system that includes grass swales and a bio-retention basin
Flex Space	Yes, on the outer ring of the bus loop
Operator Facility	Bus operator facility building
Lighting	Improved energy-efficient lighting controlled by photocell

Sources: DVRPC and SEPTA (2018)

Figure 18 | Photos of 50th and Parkside Loop



Source: Google (2018)



Source: Google (2018)

Finding a Site for the Facility: Parcel Analysis

The project team developed a scoring system as a methodology for comparing parcels within the local study area to determine those most suitable for a potential transportation center or layover facility. The scoring system was not intended to eliminate parcels from consideration; rather, the parcel scores were considered as one factor to support a particular site and guided the analysis toward certain "hot spots" (explained in greater detail below).

Each parcel in the study area was scored on three primary criteria: land use, proximity to high-ridership bus stops, and adjacency to low-congestion arterials. In addition, the project team analyzed the size of comparable bus transfer centers and determined that a parcel must be a minimum of 20,000 square feet to be considered for the transportation center.

Table 5 shows a template of each criterion that was used to score each parcel. Parcels were scored in GIS using the rules also outlined in Table 5. Depending on the category, parcels were given a score of 0 or 1 if they met or did not meet the rule. The result of this analysis is shown in Figure 19. "Hot spots" generated by the parcel analysis concentrate around the major activity generators in the study area. These areas correspond to the parcels in red and orange in the parcel analysis. They include the Pier 70 shopping center toward the northern end of the study area; Snyder Plaza and Columbus Commons to the north and south of Snyder Avenue, respectively; and Whitman Plaza in the southwest corner. Their existing high ridership and large parking facilities are likely why these areas scored highly. In addition, there is not consistent congestion along adjacent roads to significantly hinder bus operations.

Conclusion

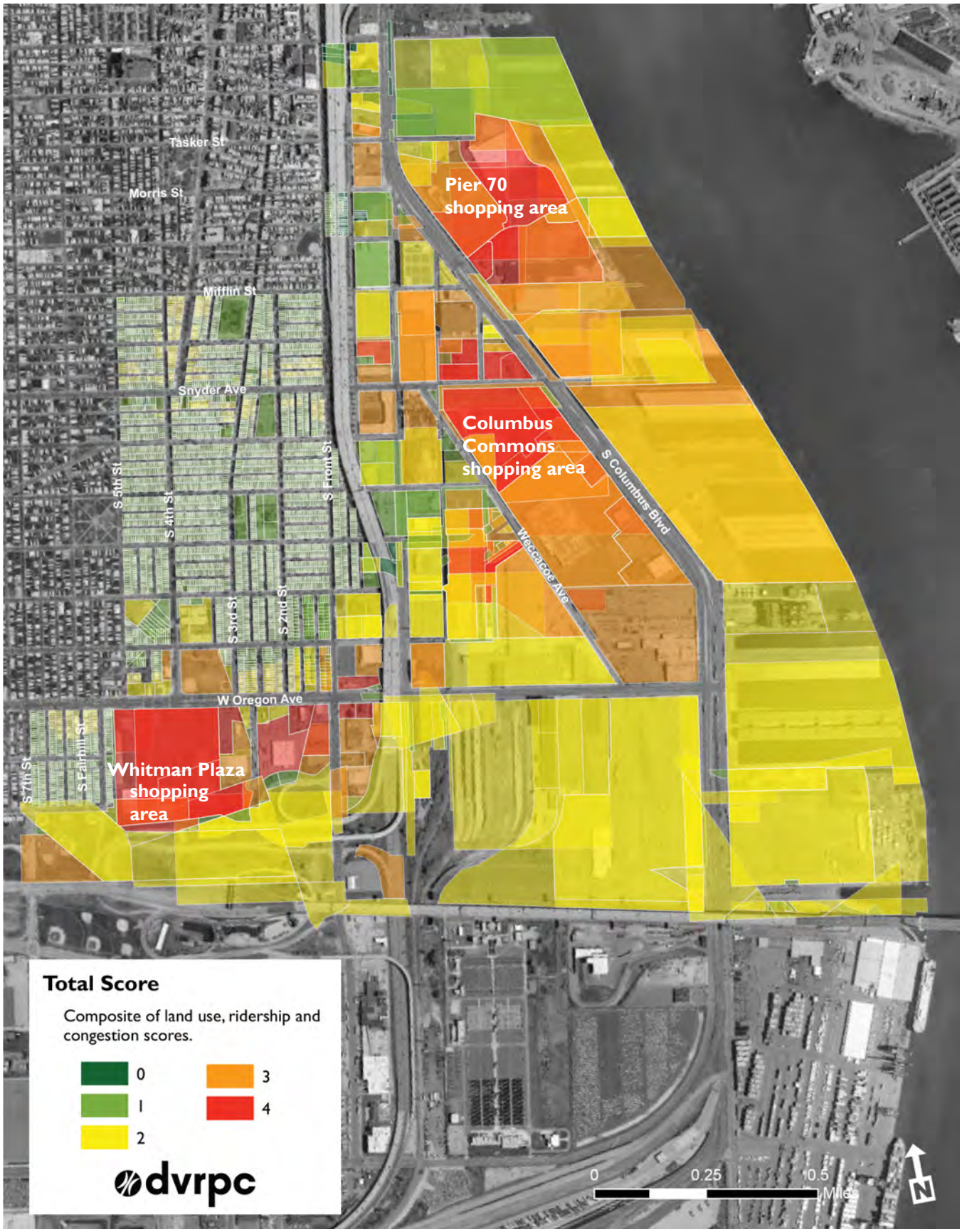
This analysis was presented to the stakeholder committee. One of the "hot spots," Pier 70, was confirmed as an ideal location. This data and analysis were used as a basis for a more qualitative analysis of likely candidates for the transportation center based on factors like site geometry and ownership. Following this second step, two additional sites were considered ideal locations: the IKEA parking lot and 3rd Street south of Oregon Avenue. Many parcels that scored highly in the parcel analysis were not desirable due to the limited safe pedestrian facilities and access and the existing owners.

Table 5 | Parcel Score Criteria

Criteria		Rule	Proximity	Scoring Scale
Land Use	Residential and Civic	Parcels that do not have a civic or residential land use	N/A	0 or 1
	Parking	Parcels with non-residential parking land use	N/A	0 or 1
Congestion		Parcels not adjacent to streets with a volume-to-capacity ratio over 0.6	100 feet or more	0 or 1
Transit Ridership		Parcels near intersections with over 100 weekday riders per day	100 feet or less	0 or 1

Source: DVRPC (2017)

Figure 19 | Results of Parcel Analysis



Sources: DVRPC (2018); aerial imagery: City of Philadelphia (2017)

SEPTA Bus Turning onto Pier 70 Boulevard

Source: DVRPC (2018)

Chapter 3: Understanding Operations

The purpose of this project was to identify where and how new layover facilities could improve SEPTA operations. Figure 20 shows the existing service of the nine routes that were analyzed.

This chapter is a detailed bus operations analysis and describes the process, inputs, and outputs used to ultimately make the final recommendations in Chapter 4.

The chapter highlights the advantages and disadvantages of each proposed facility, followed by best practice principles in bus operations design, using SEPTA's existing facilities.

There is an explanation of the operations principles that were adapted from a literature review and used as a guide to simplify and improve the existing service. These are listed in Table 6, as well as in the summary table of each route modification.

Lastly, this chapter provides detailed overviews for each bus route with operations modifications that include cost or savings calculated for each proposed facility. DVRPC worked closely with SEPTA to narrow the potential options, and SEPTA staff thoroughly reviewed and confirmed DVRPC's cost operations analysis.

Table 6 | Summary of Operations Principles

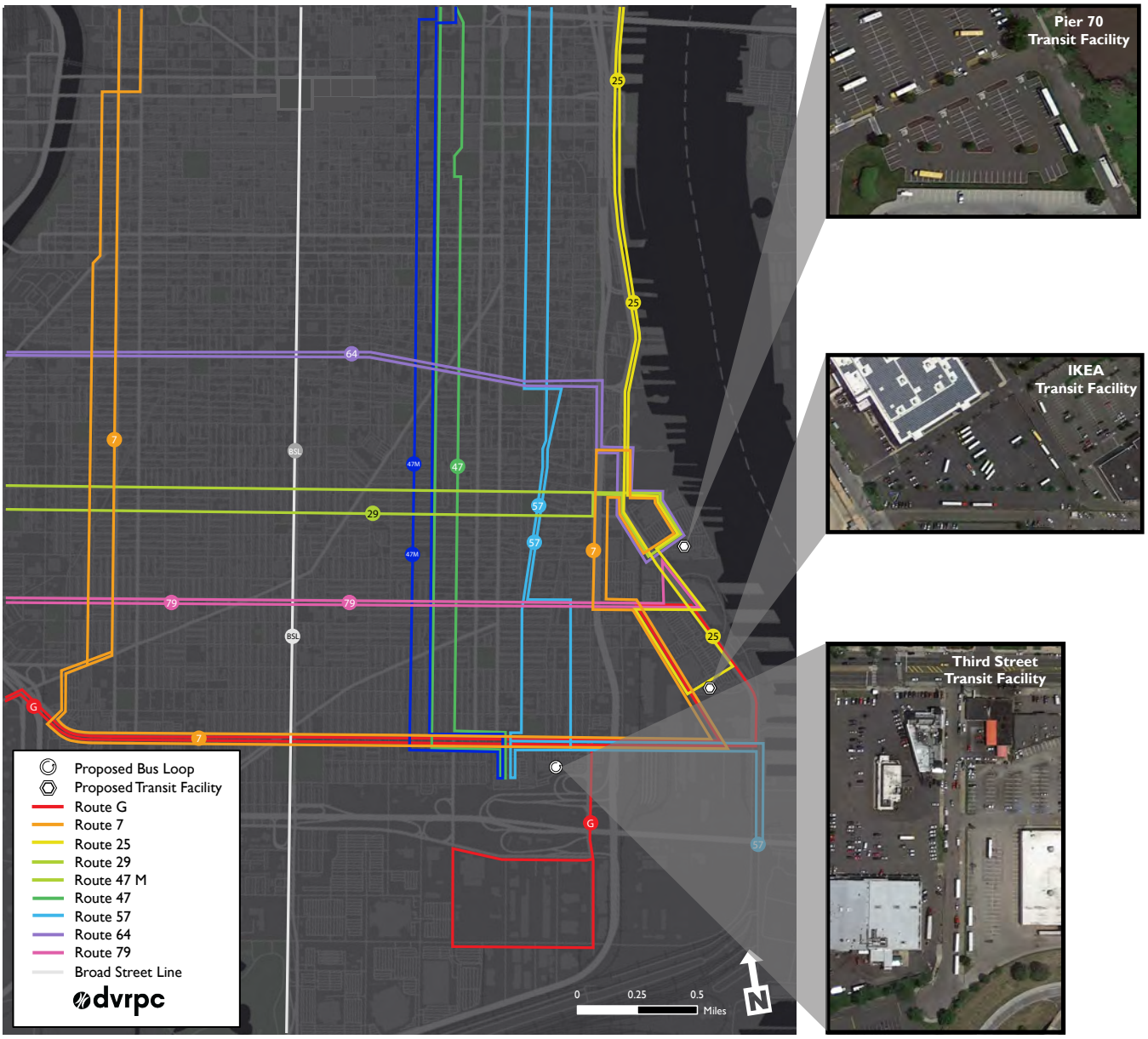
1	Minimize multiple routes serving the same corridor.
2	Assume transfers will be free or very low cost for the customers.
3	Simplify routing, turn-around locations, and layovers for both customers and operators.
4	Avoid deadheading or backtracking.
5	Consider shift changes at employment centers to provide equitable service throughout the area.
6	Acknowledge other ongoing planning projects in the study area.
7	Maintain and/or create a grid of bus service.

Sources: DVRPC and SEPTA (2018)

Candidate Locations

Following a quantitative parcel analysis and a qualitative assessment of the sites with the stakeholder committee, three facilities were deemed appropriate for further investigation for SEPTA's permanent use. These three locations (see Figure 20) are an underused parking area along Pier 70 Boulevard (further referred to as Pier 70), an underused parking area at the Columbus Commons shopping center owned by IKEA (further referred to as IKEA), and South 3rd Street where it terminates one block south of Oregon Avenue (further referred to as 3rd Street). Each potential layover location has advantages and disadvantages due to the surrounding land uses and roadway alignment.

Figure 20 | Candidate Transit Facilities with Existing SEPTA Bus Routes



Sources: DVRPC and SEPTA (2018)

Advantages and Disadvantages of Pier 70

The first location being considered for a new layover facility is in an underused parking area off of Pier 70 Boulevard. Table 7 highlights the advantages and disadvantages of a new facility at this location.

Figure 21 shows photos of the underused parking facility, with the existing access into the parking area. Figure 22 highlights the existing crossing facility that can be used by passengers. Currently, the bus Routes 7, 29, and 64 lay over at this location.

Table 7 | Advantages and Disadvantages for a New Transit Facility at Pier 70

Advantages	High ridership at existing stops for routes that currently serve Pier 70
	Major shopping destination in Philadelphia
	Recent investment was made at this shopping area
	New mixed-use development planned adjacent to shopping center that has the potential to generate more passengers for SEPTA services
	Connection to the Delaware River Trail
Disadvantages	Circuitous routing to go inside the shopping center in its existing form
	Lack of pedestrian connections inside the shopping center, and across Columbus Boulevard.
	Limited space to expand the facility if needed

Sources: DVRPC and SEPTA (2018)

Figure 21 | Existing Conditions at Pier 70 in the Underused Parking Lot

Source: DVRPC (2017)

Figure 22 | Existing Pedestrian Facilities on Pier 70 Boulevard with Access to Walmart

Source: DVRPC (2017)

Advantages and Disadvantages of IKEA

The second location being considered for a new layover facility is in an underused parking area in Columbus Commons shopping center, owned by IKEA. Table 8 highlights the advantages and disadvantages of a new facility at this location.

Figure 23 shows where buses currently stop on Weccacoe Avenue to pick up and drop off passengers. This location is also used as a layover for Route 25. Figure 24 shows the area where a layover location would be ideal. Bus Routes 7 and G also serve this location but do not lay over here.

Table 8 | Advantages and Disadvantages for a New Transit Facility at IKEA

Advantages	SEPTA has an ongoing relationship with IKEA management.
	Ample space to build a facility and expand if needed in the future
	Opportunities for endorsements at stops, such as IKEA furniture
Disadvantages	Lower ridership generator than Pier 70 shopping area
	Columbus Avenue egress is right in and right out, forcing the majority of bus operations onto Weccacoe rather than a major arterial.

Sources: DVRPC and SEPTA (2018)

Figure 23 | Existing Conditions at SEPTA Stop on Weccacoe Avenue Adjacent to IKEA

Figure 24 | Existing Conditions at Underused IKEA Parking Lot

Sources: DVRPC (2017), Google (2015)

Advantages and Disadvantages of 3rd Street

The final location being considered for a new layover facility is the end of 3rd Street south of Oregon Avenue and north I-76 on-ramps. Table 9 highlights the advantages and disadvantages of a new facility at this location.

Adjacent to 3rd Street is a former Toys "R" Us building and parking lot; this retailer is now closed nationwide. This space could provide an opportunity to expand SEPTA facilities, without displacing property owners. Just a fraction of the parking lot would create space for bus routes to lay over.

One of the adjacent commercial entities is Whitman Plaza, which is a major trip generator for Routes G, 7, 47, 47M, and 57. An area within the shopping center and a parking lot in the back of Whitman Plaza (shown in Figure 25) serves as layover locations for these same bus routes.

Figure 25 | Existing Layover Location at Whitman Plaza

Source: DVRPC (2017)

Table 9 | Advantages and Disadvantages for a New Transit Facility at 3rd Street

Advantages	Toys "R" Us is closed nationwide. This space could provide an opportunity to expand facilities into their parking lot, creating more space for bus routes to lay over.
	Existing space is not well used for public purposes.
	3rd Street is owned by the City of Philadelphia.
	Adjacent to high-ridership commercial destinations on Oregon Avenue
	Would not require bus vehicles to deviate far from existing service
Disadvantages	New signal needed at 3rd Street and Oregon Avenue to facilitate two-way bus operations
	Possible vehicle conflicts with retail deliveries and driveways

Sources: DVRPC and SEPTA (2018)

The intersection of 3rd Street and Oregon does not have a dedicated traffic signal; however, only a few hundred feet away there is one at the entrance to Whitman Plaza (see Figure 26). Currently, this area is being used for trash dumping, a truck rest stop, and access into and out of the adjacent commercial facilities. Figure 27 shows the existing trash dumping that occurs. Trash is deposited in the middle of the street on a regular basis. Figure 28 shows the trucks parked on either side of the cartway.

Figure 26 | Distance from Intersection of 3rd Street to Existing Signal at Whitman Plaza

Source: DVRPC (2017)

Figure 27 | Trash Dumping at the Turn-Around of 3rd Street Just North of I-76 On-Ramps

Source: DVRPC (2017)

Figure 28 | 3rd Street Terminus Facing North with Ancillary Trucks Parked Along Each Side

Source: DVRPC (2017)

Figure 29 | Enhanced Bus Plaza Designs for Welsh Road and Roosevelt Boulevard

Sources: City of Philadelphia, oTIS, and DIGSAU (2018)

Enhanced Stops or Plazas

The City of Philadelphia has built a number of enhanced stops or plazas to accommodate high ridership and transfer locations along Roosevelt Boulevard (see Figure 29 and 30). The accommodations create a better environment for passengers waiting for the bus and have information about SEPTA's network. Throughout this report, enhanced stops are proposed for a number of high-ridership locations. Better amenities at stops create a more comfortable and informed wait time.

Figure 30 | Direct Bus Stop Design

Sources: City of Philadelphia, oTIS, and DIGSAU (2018)

Operations Principles

Once three potential locations for a new facility were selected, it was essential to find the bus routes that could and should serve each one. To figure out the combination that made the most sense, the team evaluated the cost or savings of each of the nine routes going to the three potential facilities. A starting point was coming up with a series of principles to ensure the goals of the analysis stayed intact. The principles were used as a guide to simplify and improve the existing service. **The seven principles are:**

1. Minimize multiple routes serving the same corridor.
2. Assume transfers will be free or very low cost for the customers.
3. Simplify routing, turn-around locations, and layovers for both customers and operators.
4. Avoid deadheading or backtracking.
5. Consider shift changes at employment centers to provide equitable service throughout the area.
6. Acknowledge other ongoing planning projects in the study area.
7. Maintain and/or create a grid of bus service.

The Transit Cooperative Research Program's *Traveler Response to Transportation System Changes* report suggests:

> *Restructurings where operating efficiencies and ridership growth have been achieved in tandem include at least a majority of the following: emphasis on high service level core routes, consistency in scheduling, enhancement of direct travel and ease of transferring, service design based on quantitative investigation of travel patterns, and favorable ambient economic conditions.*

The *Philadelphia Bus Network Choices Report* (hereafter *Choices Report*), prepared for SEPTA by Jarrett Walker and Associates, echoes the importance of these concepts. The first principle is to **minimize multiple routes serving the same corridor**.

Duplicative service exists as a result of passenger requests to SEPTA to create more convenient service, such as one-seat rides, due to the perceived inconvenience of transferring. These passenger requests result in either single-route or limited-scope analyses; rarely are larger areas examined as a whole. In addition, many routes exist as a result of history, such as old trolley routes, and need to be re-examined for their usefulness. There is significant duplication of service along Oregon Avenue, with Routes G, 7, 57, and, for a short portion, 47 and 47M, all providing service along the same corridor.

In order to reduce the route duplication, the second strategy, **assuming transfers will be free or very low cost for the customers**, is important. With the elimination of duplication, many more riders will need to transfer, and these riders should not be penalized with additional costs. Higher frequency of key corridors is also important in order to not penalize riders transferring with a long wait time. Part of the increase in frequency, especially at off-peak hours, is enabled through reducing peak service where it is underutilized and spreading the resources out during off-peak hours.

Along with eliminating duplication, the third strategy, **simplifying routing, turn-around locations, and layovers for both customers and operators**, will help to make the system easier to understand and operate. Currently, Routes G, 7, 25, and 57 involve complicated routing patterns, loops, branches, doubling back, and multiple patterns. Simplifying routes into straight lines makes it easier for passengers to remember them. Co-locating turn-arounds and layovers at dedicated transit facilities not only provides an easier connection between more routes, but can also make waiting for the bus more comfortable for riders and operators through the addition of benches, shelters, and restrooms.

Consolidating multiple routes' layovers at one location also makes financial sense in that it **avoids deadheading** or backtracking, the fourth strategy, which can add significant route miles and time to a route.

In eliminating duplicative service and simplifying routes, it is important to consider the fifth strategy: longer-term changes in employment, as well as shorter-term implications of varying employee shifts (daytime versus evening or night), to **provide equitable service throughout the service area**. The benefit of buses is that routes can be modified over time to serve new housing and employment centers.

It is also important to ensure that the population, particularly disadvantaged areas, is being served equitably. The *Choices Report* mentioned previously discusses the trade-offs between maximizing ridership and maximizing coverage. If the goal of a system is to maximize coverage, then more people will be served by transit but generally at the expense of lower frequency, which makes the service less useful for the majority. Maximizing ridership, on the other hand, focuses on higher frequency on fewer, more popular routes, which means that some people will have longer walking distances or will not be served at all.

When restructuring routes in an area, it is necessary to a**cknowledge the other ongoing planning projects in the study area** so there are not conflicting recommendations. SEPTA is currently examining a complete bus network redesign, as explained in the *Choices Report*. With this in mind, any route changes should generally follow the recommendations outlined in this report. DVRPC re-examinined ways to improve transit along Delaware Avenue, including the possibility of higher-frequency and limited-stop transit service. DRWC's *Master Plan for the Central Delaware* outlines the increase in housing and employment density along the waterfront, as well as the need for increased multi-modal access. This report does not make recommendations that might preclude any major recommendations that come from these previous studies.

Finally, **ensuring a grid of bus service is maintained or created** is important. Providing a grid establishes connections for existing passengers even if existing route patterns are altered.

Operations Analysis

To produce the operations analysis, the DVRPC team worked closely with SEPTA's City Service Planning team. SEPTA shared their tools and resources and helped narrow the route modification options down significantly to what is included in this section of the report. In addition, SEPTA staff thoroughly reviewed DVRPC's cost operations analysis. This operations analysis will help to establish permanent end-of-line facilities in this service area for SEPTA. All costs or savings are estimates. Until schedules are developed, precise costs are subject to change. This section explains the process of the analysis and results.

Detailed Operations Analysis Process

There were nine routes being considered for modifications in this analysis: G, 7, 25, 29, 47, 47M, 57, 64, and 79. To develop the operations costs or savings shown in the subsequent pages for each route, inputs were needed. This included the total change in miles, average vehicle speed, total change in minutes, daily trips by day, and unit costs per mile and per hour. To calculate the cost for each modification, SEPTA provided a spreadsheet tool for DVRPC's use. Tables 10 and 11 show the headings of the inputs needed to find the change in annualized cost or savings based on the proposed changes.

Total change in miles was found for all nine routes to turn-around at all three proposed locations (Pier 70, IKEA, and 3rd Street). The team used aerial imagery and field visits to find the change in miles. All variations of the route (or patterns) were included. Refer to Figure 7 in Chapter 1 for more information about trip patterns in the study area.

The average speed for SEPTA vehicles in the study area, assumed for this analysis, is 7.5 miles per hour. The methodology describing how this speed was determined is below.

- The average speed from all nine routes in the analysis was found. This was calculated using SEPTA's 2017 Annual Service Plan. This is the vehicle miles divided by the vehicle hours of the same nine routes.
- The average speed of SEPTA city bus routes was also calculated using the 2017 Annual Service Plan. This is the vehicle miles divided by vehicle hours for all these routes.
- The average speed using these two methodologies was nine miles per hour. A decision was made to use 7.5 miles per hour because no additional time was added for proposed new stops along each route.

Using the total change in miles and average speed, the total change in minutes was calculated. SEPTA shared with the DVRPC team the daily trips by route by pattern.

Table 10 | Inputs Needed for Operations Cost Assessment

Analysis Inputs			Daily Trips from SEPTA		
Total Change in (Miles)	Average Speed (Miles Per Hour)	Total Change in Time (Minutes)	Weekday	Saturday	Sunday

Table 11 | Annualized Costs Calculated for Operations Cost Assessment

Annualized Changes						Unit Costs		Annualized Costs or Savings		
Weekday (*255)		Saturday *(52)		Sunday *(58)		$/Mile	$/Hour	Vehicle Miles	Vehicle Hours	Total Annual Costs or Savings
Miles	Hours	Miles	Hours	Miles	Hours					

Sources: DVRPC and SEPTA (2018)

Once all of these inputs were known, the next step was to find the total annual costs or savings by route for every option. Table 11 shows the inputs and calculations needed to find this summation. SEPTA shared with the team the operating unit costs (which are subject to change annually), and the annualized changes were calculated.

Operations Analysis Results

The next part of this chapter is a series of maps and proposed modifications by route produced by the operations analysis. The recommendations can be found in Chapter 4.

The team paired each route modification with a proposed transit layover location using:

- the results from the SEPTA survey;
- the seven operations principles (shown in each of the summary tables by route);
- the cost or savings calculations found in the operations analysis; and
- an effort to find a balance between adding distance and operating cost and truncating a route, removing stops, and possibly displacing passengers.

The results of the analysis are shown in spreads by route in a repetitive form. Each of the nine spreads consists of a set of existing conditions maps and statistics, and a set of modifications (up to two depending on the route). Additionally, each spread shows whether or not the modification is an operational cost or savings, and identifies relevant principles from the list of seven key principles listed on page 36.

Route G Overview

Overbrook and Lankenau Medical Center to Columbus Commons

Passengers can use Route G to travel between Wynnewood in Lower Merion Township through West Philadelphia and University City along Oregon Avenue, concluding service at Columbus Commons. Figures 31 and 32 show the Route G path, terminus, and ridership in the study area. Table 12 gives background route statistics about Route G.

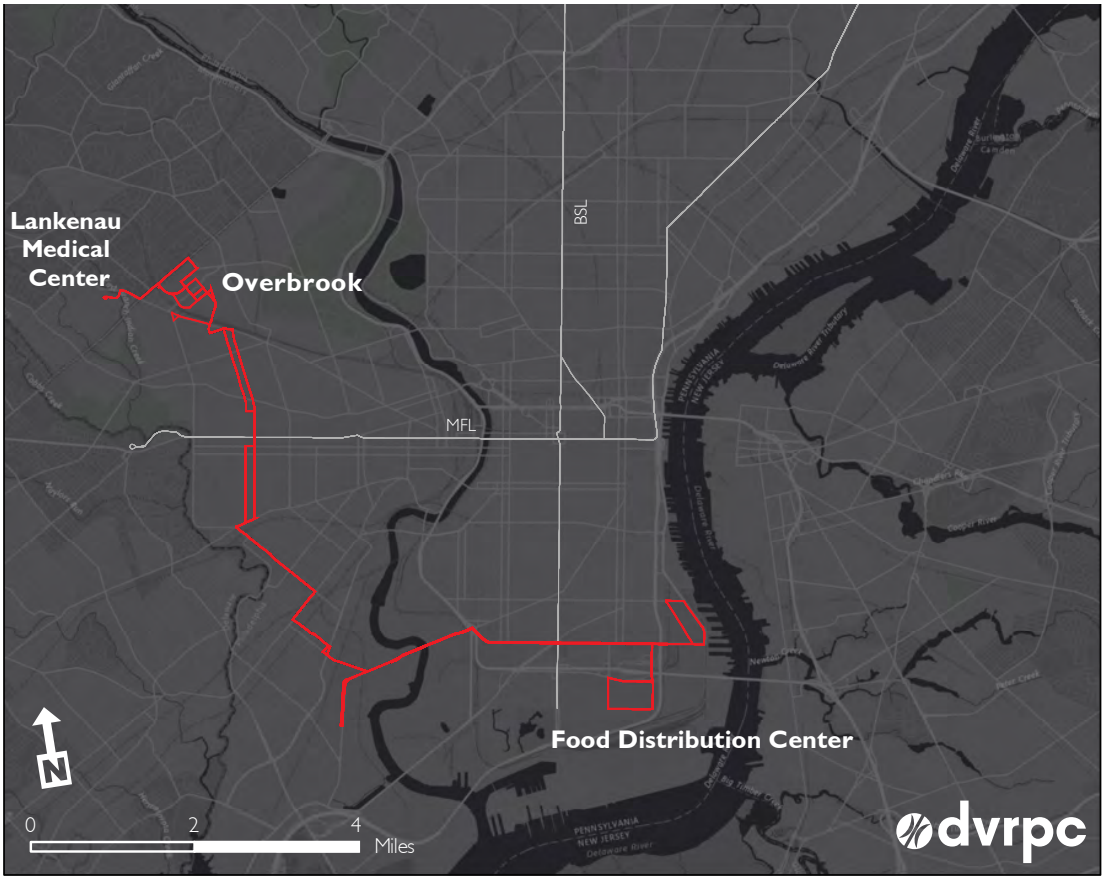
Figure 32 illustrates the range in ridership at relevant locations along this route. The majority of these stops are along Oregon Avenue, which is the primary corridor of Route G in the study area. Route G also has numerous trip-end combinations.

Table 12 | Route G Statistics

Peak Frequency (AM/PM)	6/6 min
Base Frequency	12 min
Saturday Base Frequency	15 min
Sunday Base Frequency	20 min
Average Daily Boards	15,011 (6th)
Route Mileage (One Way)	14.3
Operating Ratio	32% (35th)
On-Time Performance	76%
Total Route Patterns	34
Depot	Southern

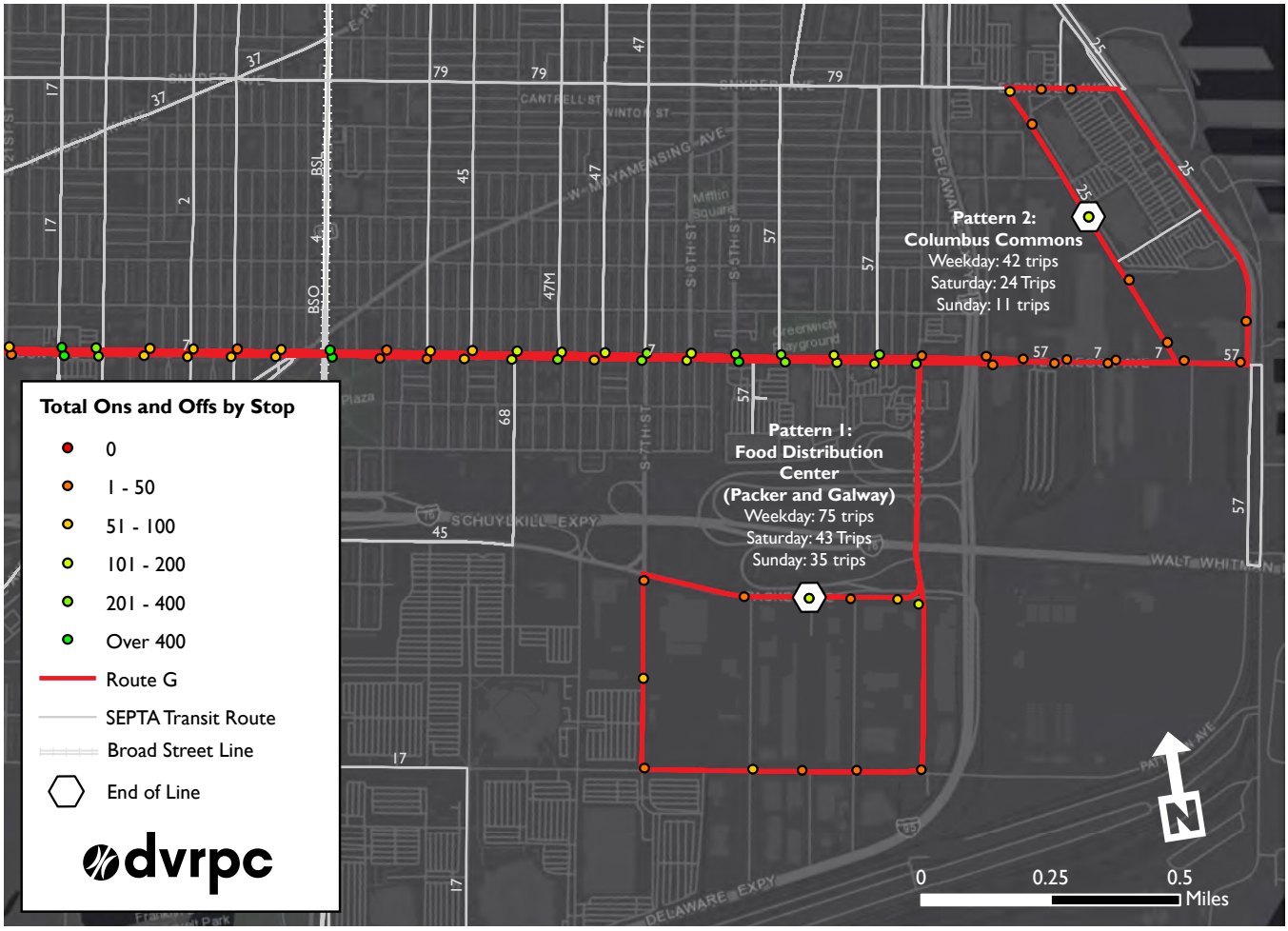
Source: SEPTA (2017)

Figure 31 | Route G Overview



Source: SEPTA (2017)

Figure 32 | Route G Patterns and Ridership by Stop



Source: SEPTA (2017)

There are a number of locations where passengers can transfer along Route G, including 18 different bus routes, six trolley lines, and the Broad Street Line (BSL).

Routes 7 and G stop at many of the same locations along Oregon Avenue east of 22nd and 23rd streets and Columbus Commons shopping center, making the routes interchangeable for passengers traveling east or west along Oregon Avenue between these two destinations. Due to the frequency of the bus routes during peak period, bus bunching occurs.

Figure 33 is a photo of Route G at Broad and Oregon Avenue, a major transfer location between bus routes and the BSL.

Figure 33 | Route G along Oregon Avenue

Source: DVRPC (2017)

Route G Modifications

Route G Modification to Pier 70

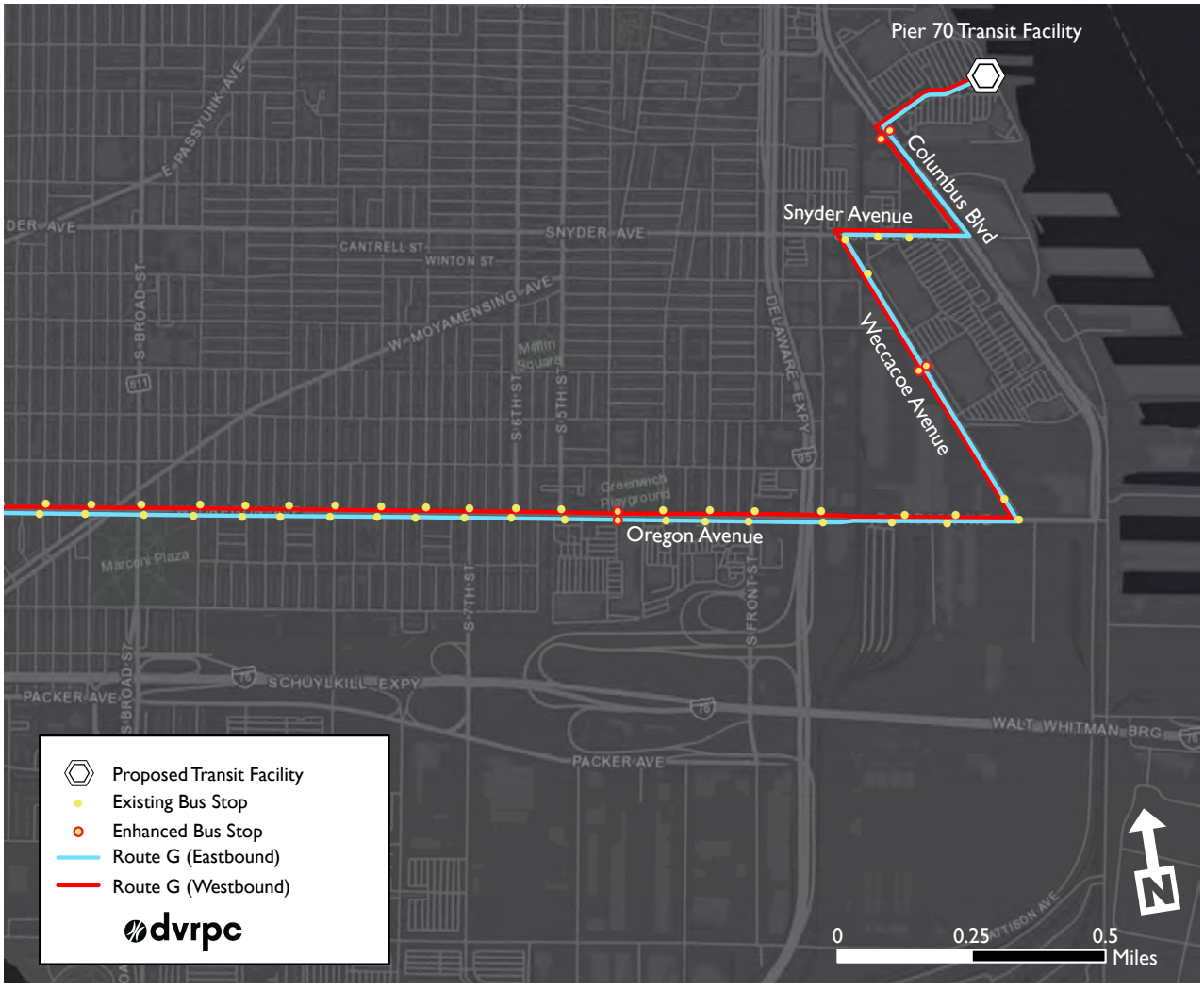
Figure 34 shows the proposed routing modification for Route G with a new transit facility at Pier 70. If there is a new transit facility at this location, it would accommodate layovers for vehicles and operators, as well as a final stop for passengers to board, alight, and transfer between routes. In this scenario, Route G vehicles would travel on Oregon Avenue to Columbus Boulevard, eliminating the loop at the Food Distribution Center (FDC), which is a circuitous pattern where there are primarily low-ridership stops. New enhanced stops are proposed at the high-ridership locations on Oregon Avenue adjacent to and across from Whitman Plaza. In this route modification, routes will no longer be going into the shopping plaza to serve it or to lay over there, minimizing stops and thus total travel time. Route G will continue onto the Pier 70 layover via Weccacoe Avenue, Snyder Avenue, and Columbus Boulevard. Extending the route creates more transfer points between Route G and north/south routes on Columbus Boulevard. Table 13 acknowledges the cost of this routing change.

Table 13 | Route G Modification Option Pier 70

Additional Round-Trip Mileage Pattern 1 (FDC)	Additional Round-Trip Mileage Pattern 2 (Columbus Commons)	Additional Annual Operating Cost	Principles
+.79 miles	+.9 miles	$656,400	1, 2, 3, 5, 7

Source: DVRPC (2017)

Figure 34 | Route G to Pier 70 Transit Facility



Route G Modification to IKEA

Figure 35 shows the proposed routing modification for Route G with a new layover facility in a parking area adjacent to IKEA. If there is a new transit facility at this location, it would accommodate layovers for vehicles and operators, as well as a final stop for passengers to board, alight, and transfer between routes. In this scenario, Route G vehicles would travel on Oregon Avenue to Weccacoe Avenue, eliminating the loop at the FDC, which is a circuitous pattern where there are primarily low-ridership stops.

Although the FDC trips are shown as eliminated in this modification, SEPTA will still provide service there, in some form, in the future. Ridership is high enough to warrant service.

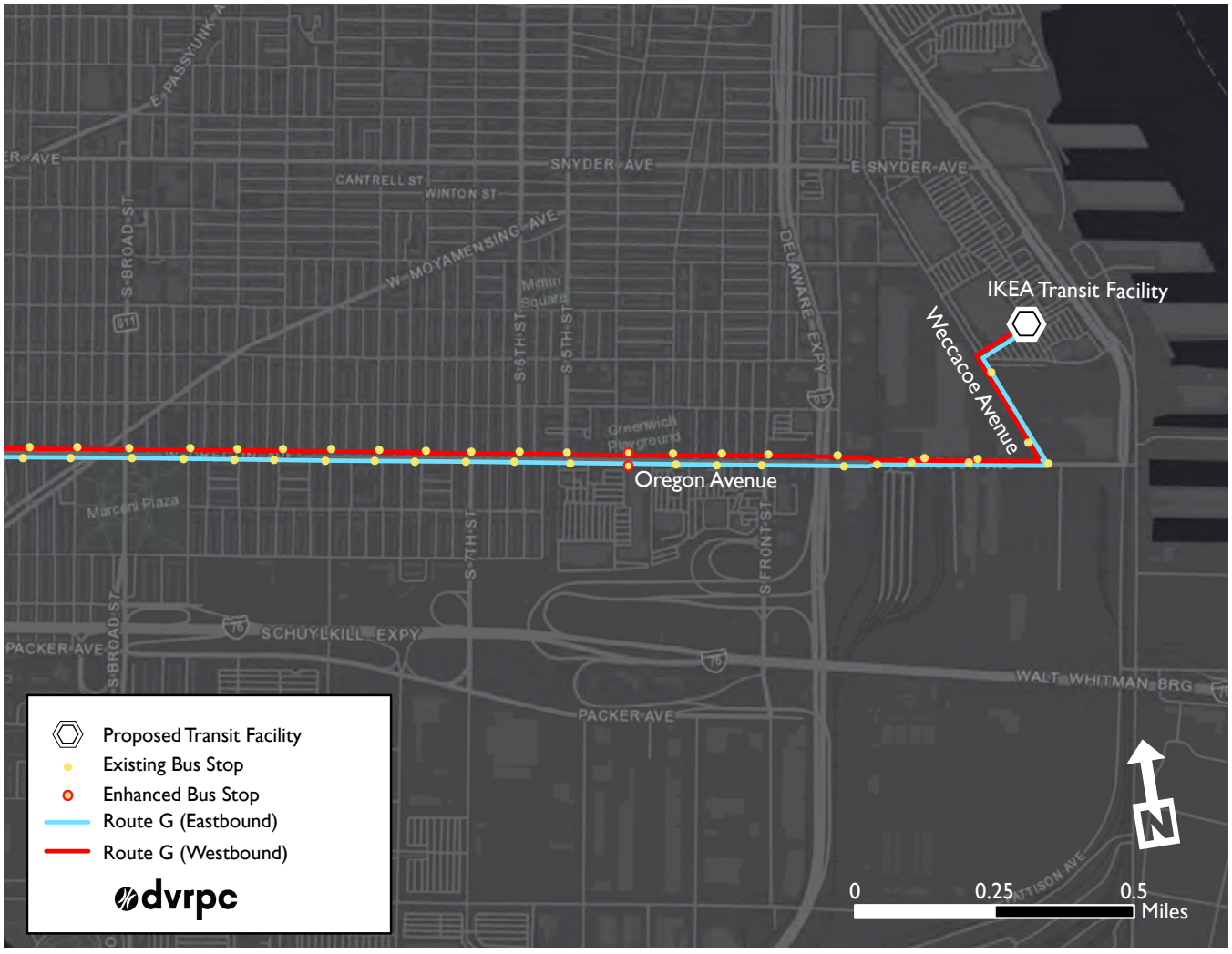
In addition, new enhanced stops are proposed at the high-ridership locations on Oregon Avenue adjacent to and across from Whitman Plaza. In this route modification, routes would no longer be going into the shopping plaza to serve it or to lay over there, minimizing stops and thus total travel time. Table 14 acknowledges the savings of this routing change.

Table 14 | Route G Modification Option IKEA

Decrease in Round-Trip Mileage Pattern 1 (FDC)	Decrease in Round-Trip Mileage Trip Pattern 2 (Columbus Commons)	Annual Operating Savings	Principles
-1.06 miles	-.91 miles	$775,400	1, 2, 3, 5, 7

Source: DVRPC (2017)

Figure 35 | Route G to IKEA Transit Facility



Route 7 Overview

Pier 70 to 33rd and Dauphin

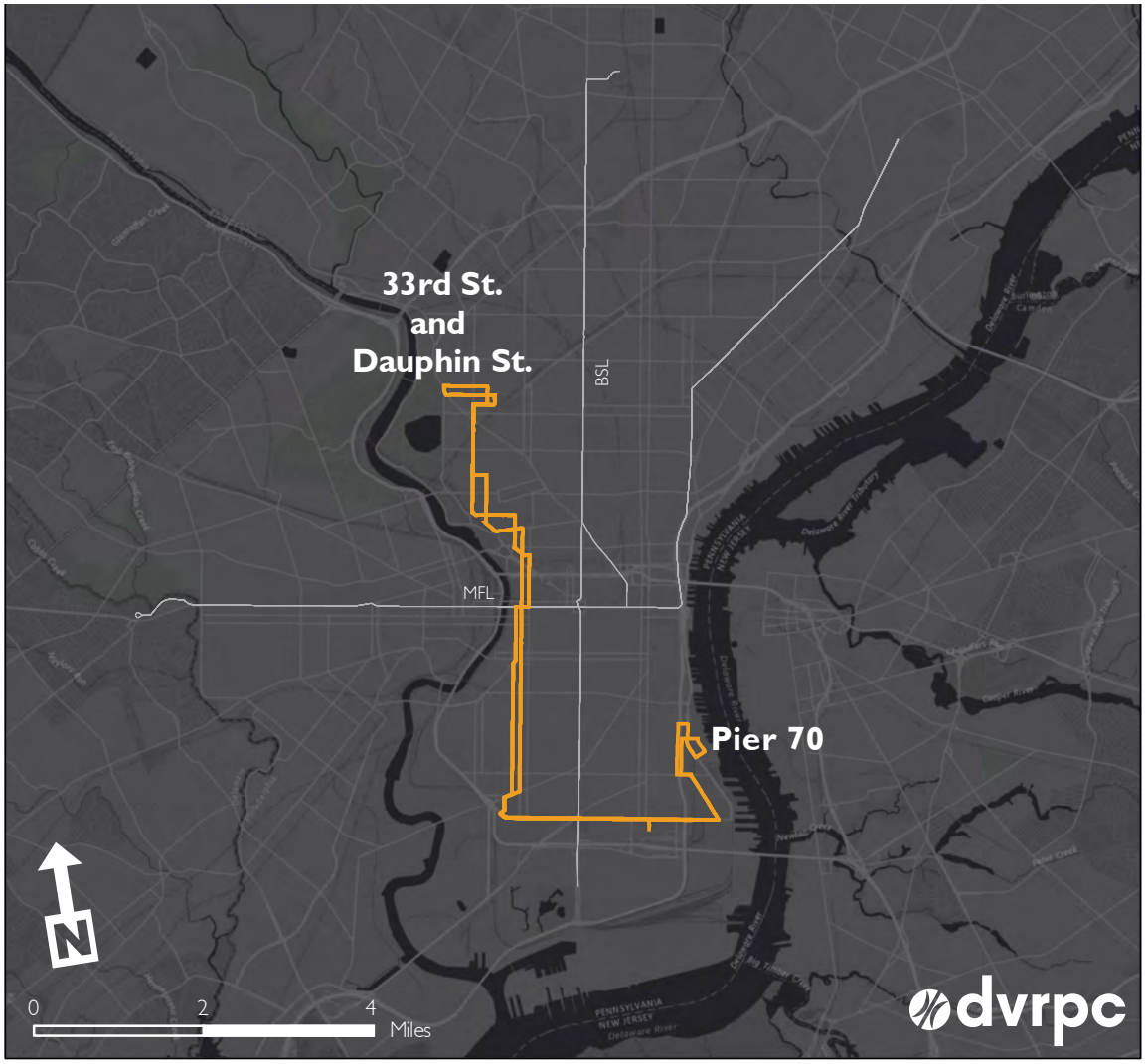
Route 7 traverses the City of Philadelphia from Strawberry Mansion through Brewerytown and Spring Garden, serving Center City, turning onto Oregon Avenue, and ending service at Pier 70. Figures 36 and 37 show route patterns and relevant ridership. In Table 15 the route statistics for Route 7 are summarized.

Table 15 | Route 7 Statistics

Peak Frequency (AM/PM)	20/15
Base Frequency	25
Saturday Base Frequency	20
Sunday Base Frequency	20
Average Daily Boards	5,408 (42nd)
Route Mileage (One Way)	11
Operating Ratio	27% (45th)
On-Time Performance	75%
Total Route Patterns	8
Depot	Southern

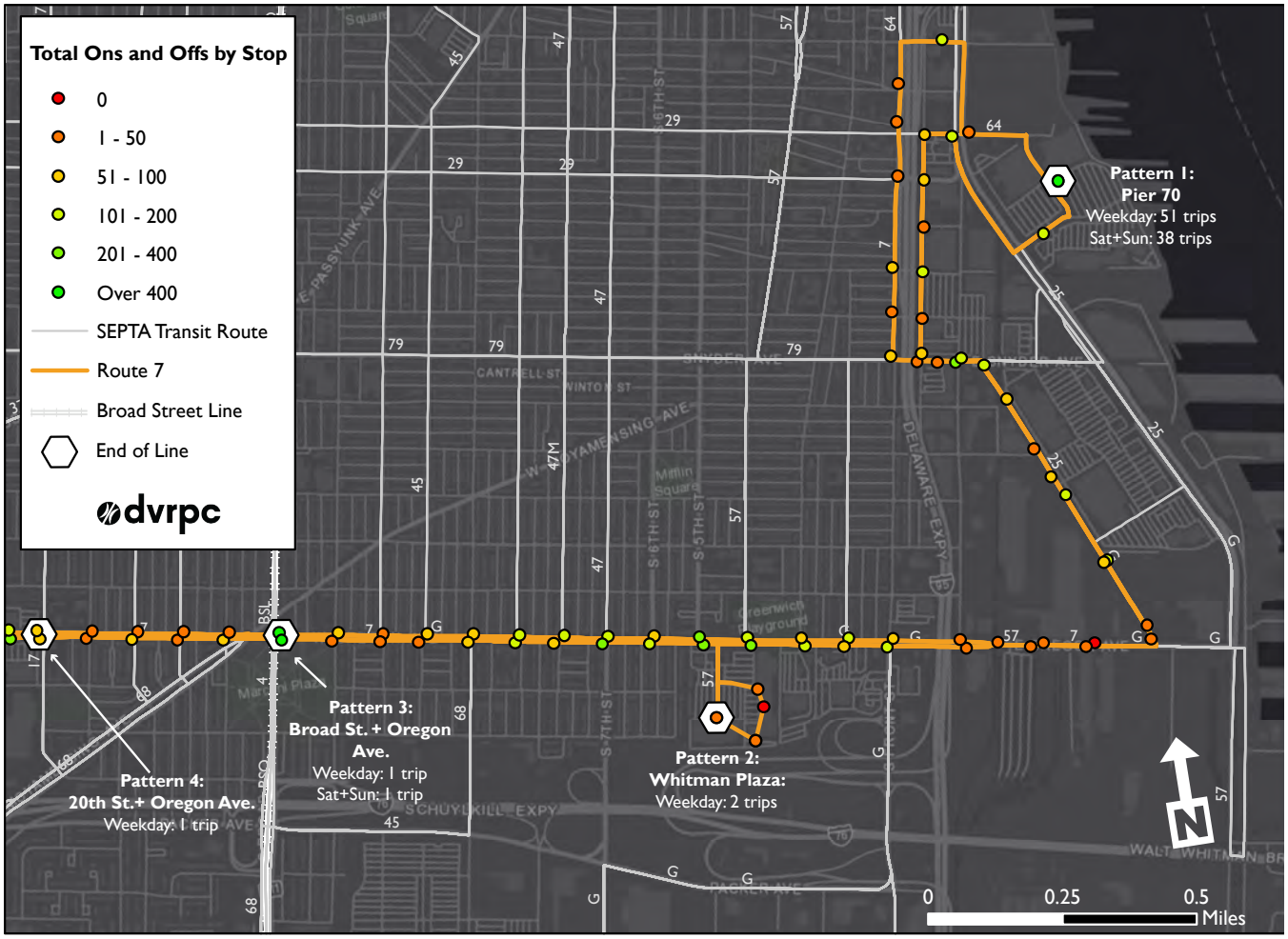
Source: SEPTA (2017)

Figure 36 | Route 7 Overview



Source: SEPTA (2017)

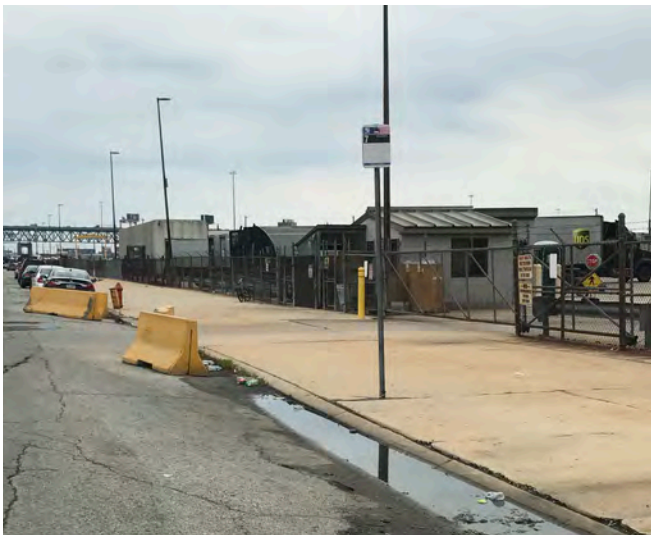
Figure 37 | Route 7 Patterns and Ridership by Stop



Source: SEPTA (2017)

Figure 37 illustrates the range in ridership at relevant locations along this route. Oregon Avenue service is duplicative with Route G, and the two routes share many of the same stops. Route 7 intersects with many of the densest SEPTA services for their bus, trolley, and subway network. Therefore, the transfers between this route and the rest of the network are vast. Figure 38 shows a bus stop along Route 7.

Figure 38 | Route 7 Stop on Weccacoe Avenue



Source: DVRPC (2017)

Route 7 Modification

Route 7 Modification to 20th and Oregon

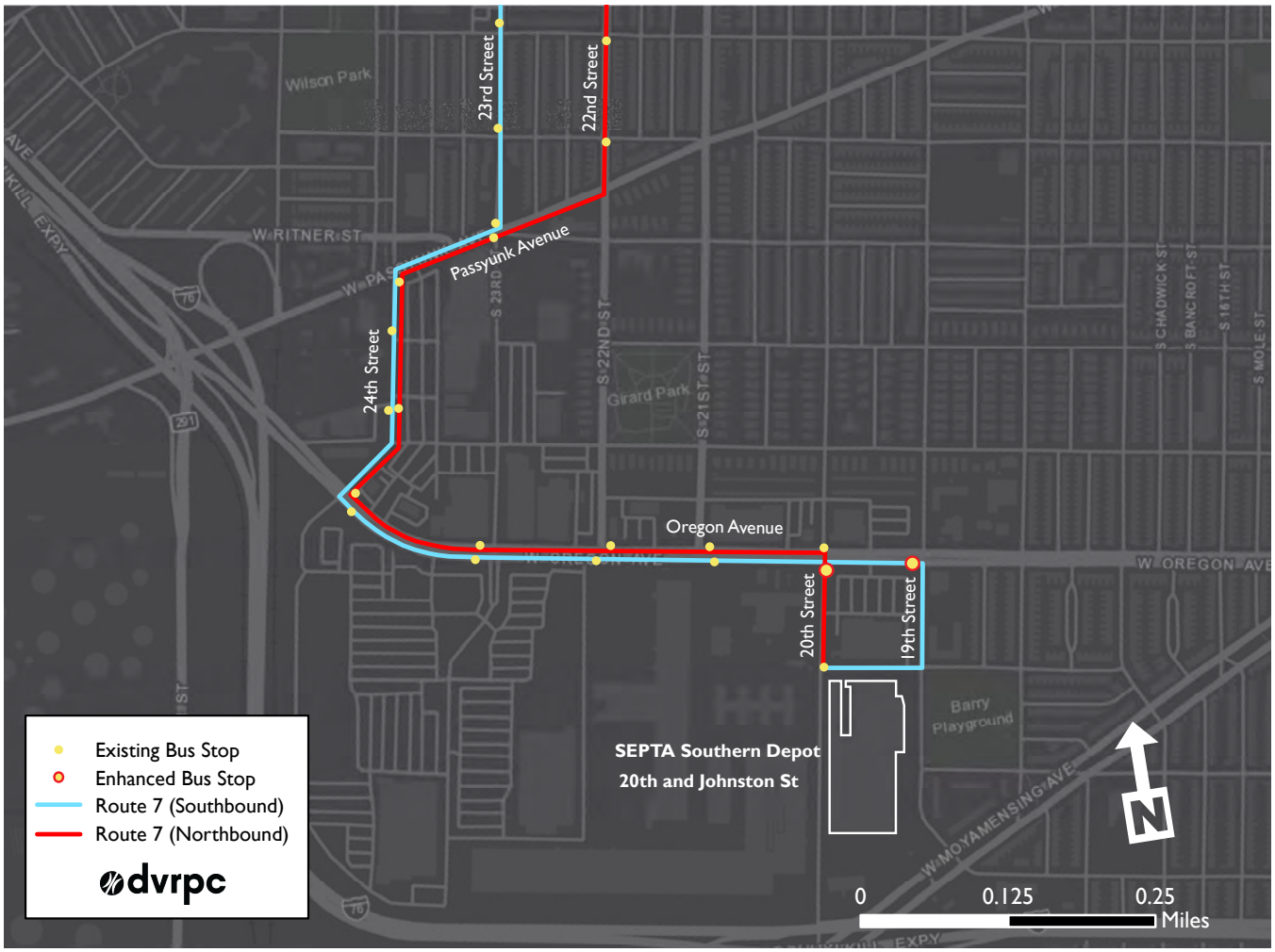
Figure 39 shows the proposed routing for Route 7. In this modification, Route 7 would not go to any of the proposed transportation facilities, but instead vehicles will short turn at 19th and 20th streets and Oregon Avenue. In this scenario, vehicles heading eastbound would stop at 19th and Oregon, and loop back to Oregon Avenue via Johnston and 20th streets. There are stops but no shelters on the southeast corner of 20th Street nor the southwest corner of Oregon and 19th Street. Table 16 shows the cost savings of this proposed route modification.

Table 16 | Route 7 Modification Option 20th and Oregon

Decrease in Round-Trip Mileage for Pattern 1 (Pier 70)	Decrease in Mileage for Pattern 2 (Whitman Plaza)	Decrease in Mileage for Pattern 3 (Broad and Oregon)	Annual Operating Savings	Principles
-7.85 Miles	-3.39 Miles	-1.01 Miles	$4,443,800	1, 2, 3, 4, 7

Source: DVRPC (2017)

Figure 39 | Route 7 to 20th and Oregon



Source: SEPTA (2017)

A new enhanced plaza is suggested for 19th Street and Oregon Avenue due to potential high passenger loads because the route would have a new terminus here.

Routes 7 and G stop at many of the same locations along Oregon Avenue east of 22nd and 23rd streets and Columbus Commons shopping center, making the routes interchangeable and creating duplicative service along this corridor for passengers traveling east or west along Oregon Avenue between these two destinations. Due to the frequency of the bus routes during peak period, bus bunching occurs (shown in Figure 40).

SEPTA's Southern Depot is located just south of Johnston Street (See Figure 39). Ending the route adjacent to Southern Depot will cut down on deadhead mileage.

Figure 40 | Bus Bunching on Oregon Avenue between Routes G and 7

Source: DVRPC (2018)

Route 25 Overview

Frankford Transportation Center to Columbus Commons

Route 25 provides a connection between Frankford Transportation Center in Northeast Philadelphia to Columbus Commons. The route travels along Columbus Boulevard through Center City and then traverses the River Wards along Frankford Avenue, Aramingo Avenue, and Richmond Street.

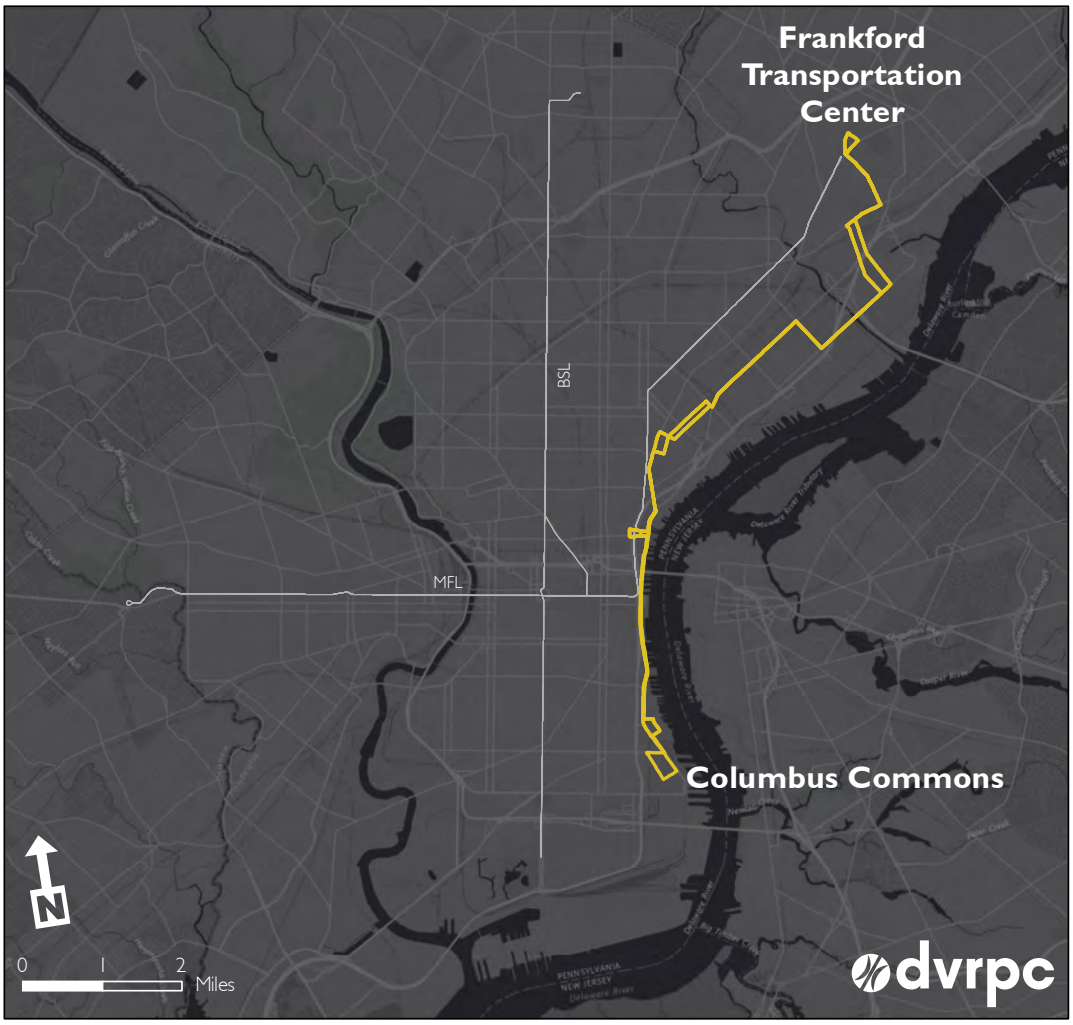
Figures 41 and 42 show the Route 25 path, terminus, and ridership in the study area. Table 17 gives the background route statistics for Route 25.

Table 17 | Route 25 Statistics

Peak Frequency (AM/PM)	15/12
Base Frequency	30
Saturday Base Frequency	30
Sunday Base Frequency	30
Average Daily Boards	4,466 (52nd)
Route Mileage (One Way)	12.3
Operating Ratio	25% (56th)
On-Time Performance	70%
Total Route Patterns	6
Depot	Frankford

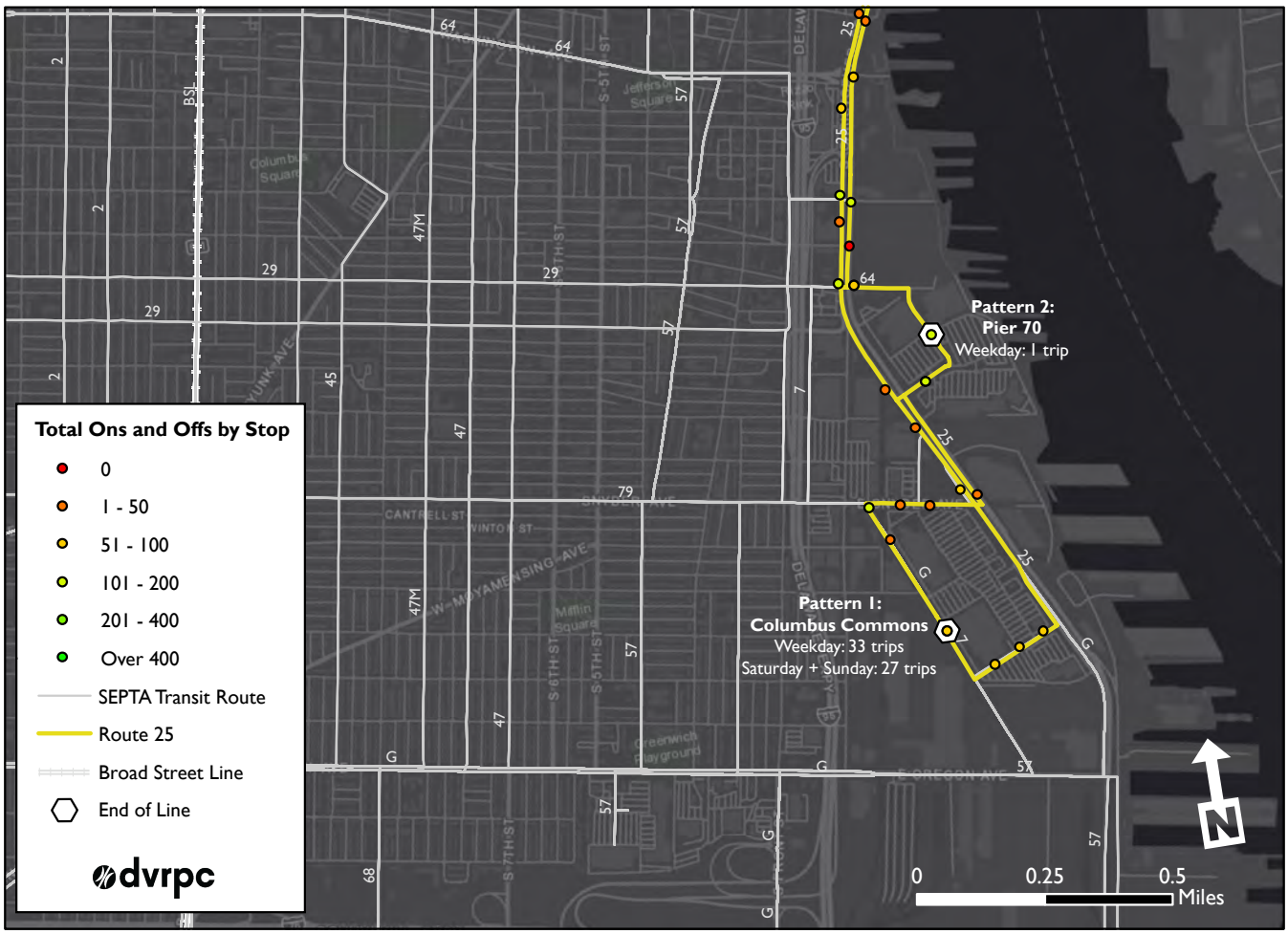
Source: SEPTA (2017)

Figure 41 | Route 25 Overview



Source: SEPTA (2017)

Figure 42 | Route 25 Patterns and Ridership by Stop



Source: SEPTA (2017)

Route 25 provides connections to the Market-Frankford Line at Spring Garden Street and Frankford Transportation Center, the Route 15 trolley at Girard Avenue, and numerous bus routes along its path. Route 25 also has numerous trip-end combinations, two of which are shown in Figure 42.

Figure 42 also illustrates the range in ridership at relevant stop locations along this route. The majority of these stops are along Columbus Boulevard, which is the primary corridor of Route 25 in the study area. Figure 43 is a photo of one terminus at the back of Columbus Commons on Weccacoe Avenue.

Figure 43 | Route 25 Bus Stop on Weccacoe Avenue (back of IKEA)

Source: DVRPC (2017)

Route 25 Modification

Route 25 Modification to 3rd Street Loop

Figure 44 shows a routing modification for Route 25 with a new turn-around and layover at 3rd Street. This layover location would serve vhicles and operators only. In this scenario, southbound vehicles would turn onto Snyder Avenue from Delaware Avenue, turn left onto Weccacoe Avenue, turn right onto Oregon Avenue, and then turn left at the new 3rd Street Loop.

There are two options shown for serving Pier 70: one that goes into the shopping center (shown in Figure 44 with dashed lines) and another that stops along Columbus Boulevard only. At this time, the intersection of Pier 70 and Columbus Boulevard is not an ideal location for heavy passenger loading and unloading or crossing because of the consistent heavy traffic and cartway width (Figure 45). The walk is lengthy and not comfortable for passengers accessing the shopping plaza.

Table 18 | Route 25 Modification Option 3rd Street Transit Facility

Additional Round-Trip Mileage Pattern 1 (Columbus Commons)	Additional in Round-Trip Mileage Pattern 2 (Pier 70)	Additional Annual Operating Cost	Principles
1.938 miles	3.533 miles	$1,798,000	2, 3, 5, 6, 7

Source: DVRPC (2017)

Figure 44 | Route 25 to 3rd Street Transit Facility

Source: DVRPC (2017)

Table 18 acknowledges the cost of the route modifications that are symbolized in Figure 44 with solid red and blue lines. The proposed modified Route 25 is unique because it will continue to serve both Pier 70 and Columbus Commons due to the high ridership at both locations and the feedback from the SEPTA passenger survey that people are using the route both to travel to and from work and to shop throughout the day.

However, Route 25 is proposed to lay over at the 3rd Street facility. This is unique and was decided in order to create a single, consistent, simplified turn-around location for all routes traveling north to south in the service area.

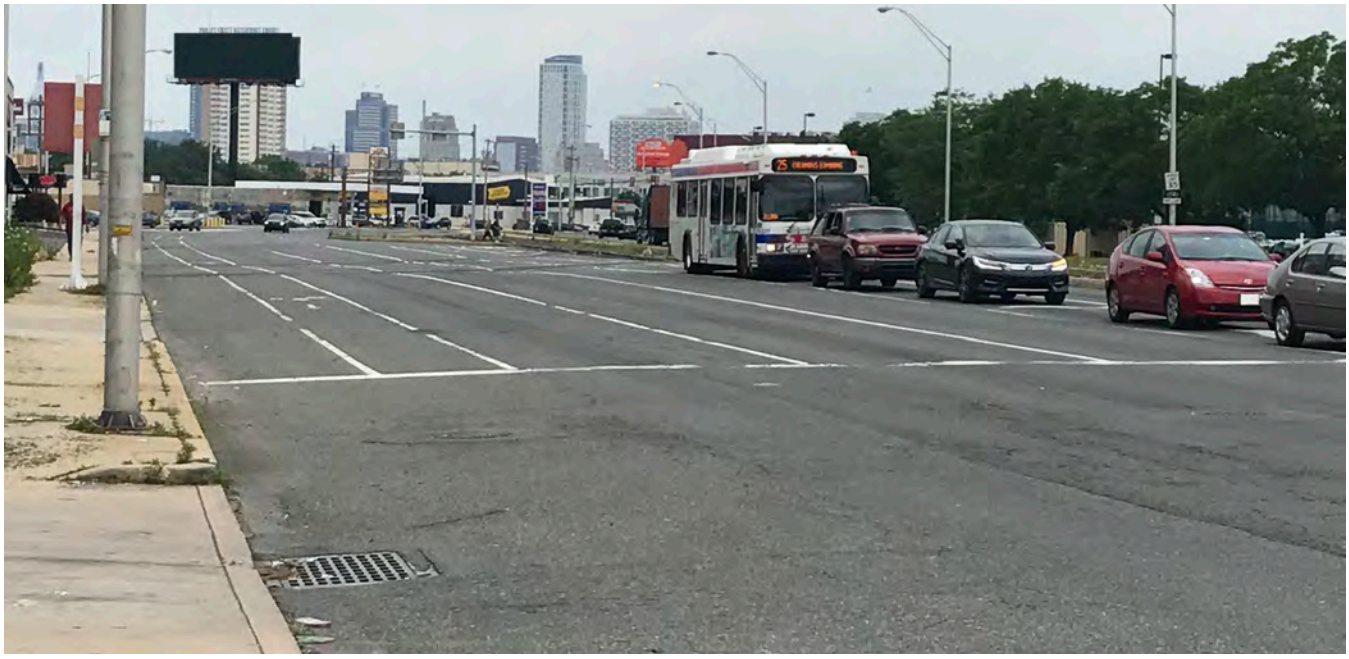
If enhanced bus plazas are built at the intersection of Columbus Boulevard and Pier 70, and the crossing is improved for pedestrians, it is suggested that the route bypass the shopping center (see Figure 44), and stop only along Columbus Boulevard. This will cut down on total route travel time.

In addition, new enhanced stops are proposed on Oregon Avenue adjacent to and across from Whitman Plaza. In this route modification, routes will no longer be going into the shopping plaza to serve it or to lay over there.

At this time the intersection of 3rd Street and Oregon Avenue does not have a traffic signal; therefore, one is proposed to ensure SEPTA vehicles can maneuver in and out of the new layover facility without delay (shown in Figure 44).

Any possible modifications to the route are also subject to ongoing proposed changes to transit service along Delaware Avenue.

Figure 45 | Route 25 in Service along Columbus Boulevard



Source: DVRPC (2018)

Route 29 Overview

Pier 70 to 33rd and Dickinson

Route 29 provides crosstown service from 33rd Street in Gray's Ferry to the Pier 70 shopping center. The route runs eastbound along Morris Street and westbound along Tasker Street. Figures 46 and 47 show the Route 29 path, patterns, and ridership in the study area. Table 19 shows the route statistics for Route 29.

Route 29 provides connections to the Broad Street Line at Tasker-Morris, as well as 12 bus routes.

Table 19 | Route 29 Statistics

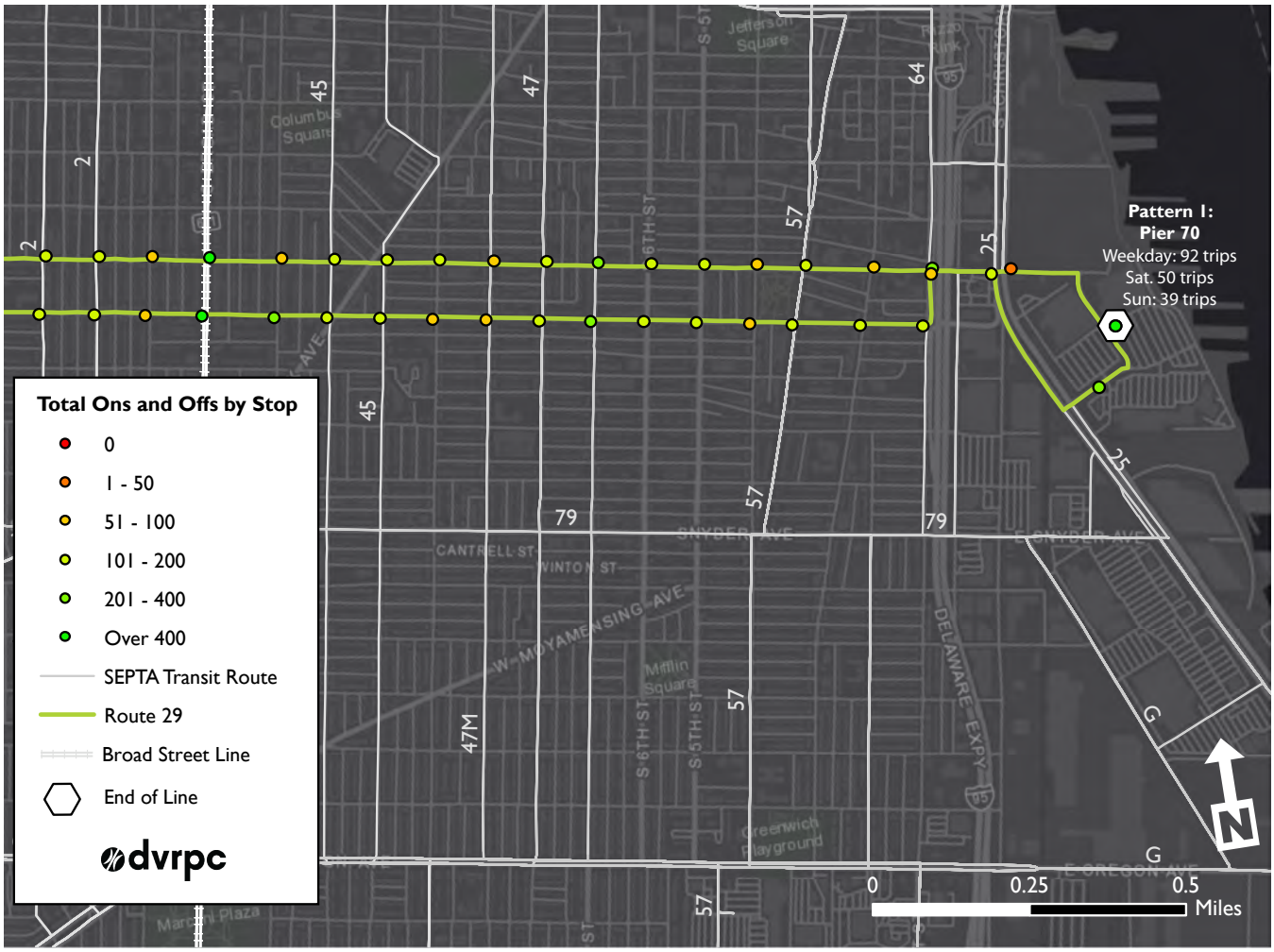
Peak Frequency (AM/PM)	6/12
Base Frequency	17
Saturday Base Frequency	20
Sunday Base Frequency	20
Average Daily Boards	4,225 (55th)
Route Mileage (One Way)	3.5
Operating Ratio	32% (37th)
On-Time Performance	86%
Total Route Patterns	2
Depot	Southern

Source: SEPTA (2017)

Figure 46 | Route 29 Overview

Source: SEPTA (2017)

Figure 47 | Route 29 Patterns and Ridership by Stop



Source: SEPTA (2017)

Figure 47 illustrates the range in ridership at relevant stop locations along this route. The majority of these stops are along Tasker and Morris streets, which are the primary corridors of Route 29. Figure 48 shows the existing layover location for SEPTA vehicles in the Pier 70 shopping center.

Figure 48 | Route 29 at Pier 70

Source: DVRPC (2017)

Route 29 Modifications

Route 29 Modification to Pier 70

Figure 49 shows the proposed routing modification for Route 29 with a new layover facility at Pier 70. The new location would provide layover facilities for vehicles and operators as well as a final stop for passengers to board and alight.

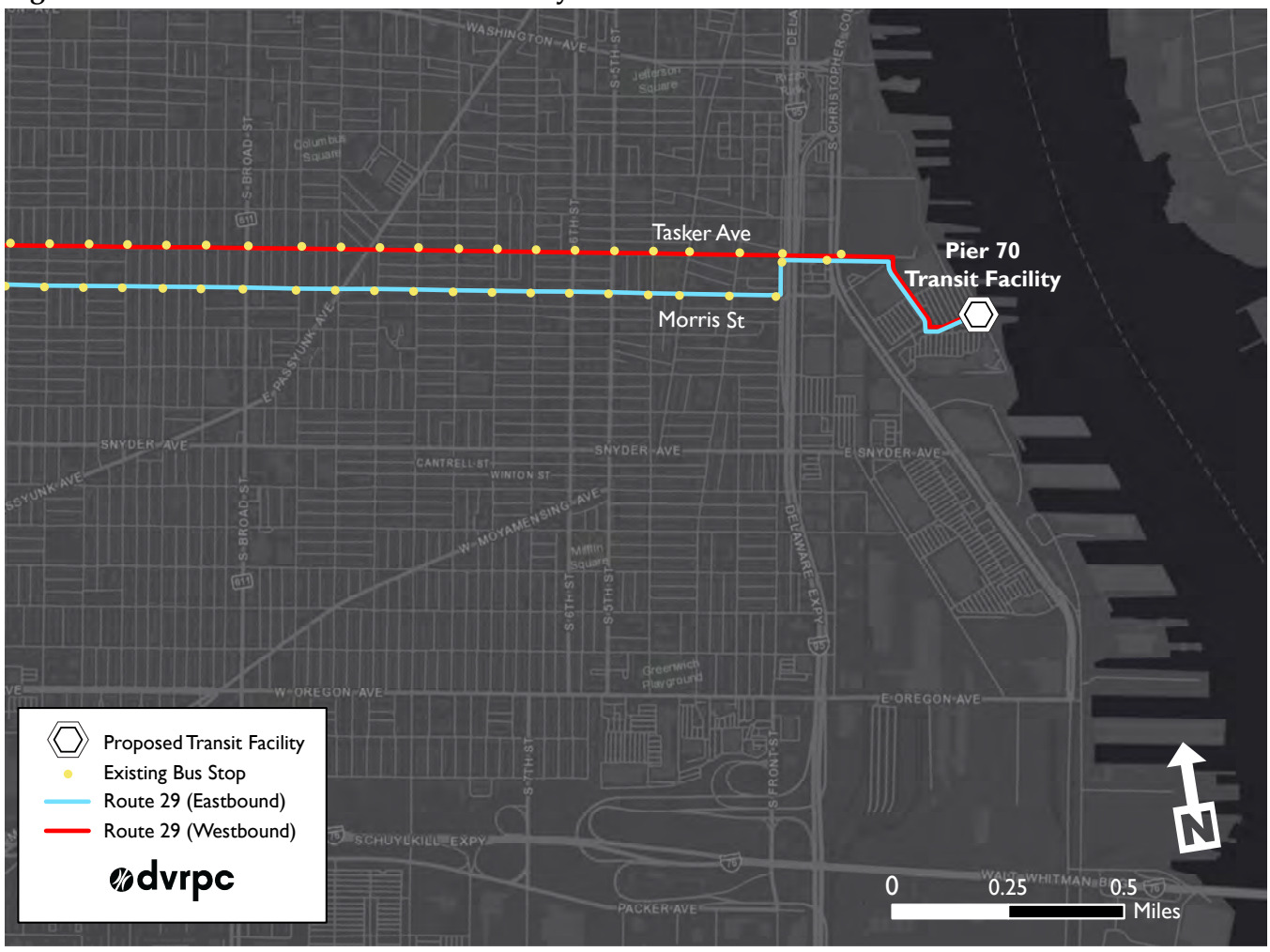
The route is slightly shorter as a result of the simplified routing in and out of Pier 70. Table 20 acknowledges the minor cost savings of this routing change.

Table 20 | Route 29 Modification Option Pier 70

Decrease in Round-Trip Mileage Pattern 1 (Pier 70)	Annual Operating Savings	**Principles**
-.086 miles	$38,200	**3, 4**

Source: DVRPC (2017)

Figure 49 | Route 29 to Pier 70 Transit Facility



Source: SEPTA (2017)

Route 29 Modification to IKEA

Figure 50 shows a proposed routing modification for Route 29 with a new layover facility at IKEA. The new location would provide layover facilities for vehicles and operators, as well as a final stop for passengers to board and alight. In this scenario, Route 29 would continue on Columbus Boulevard, stopping in Columbus Commons at the new facility, and looping around back to Columbus Boulevard using Weccacoe and Snyder avenues.

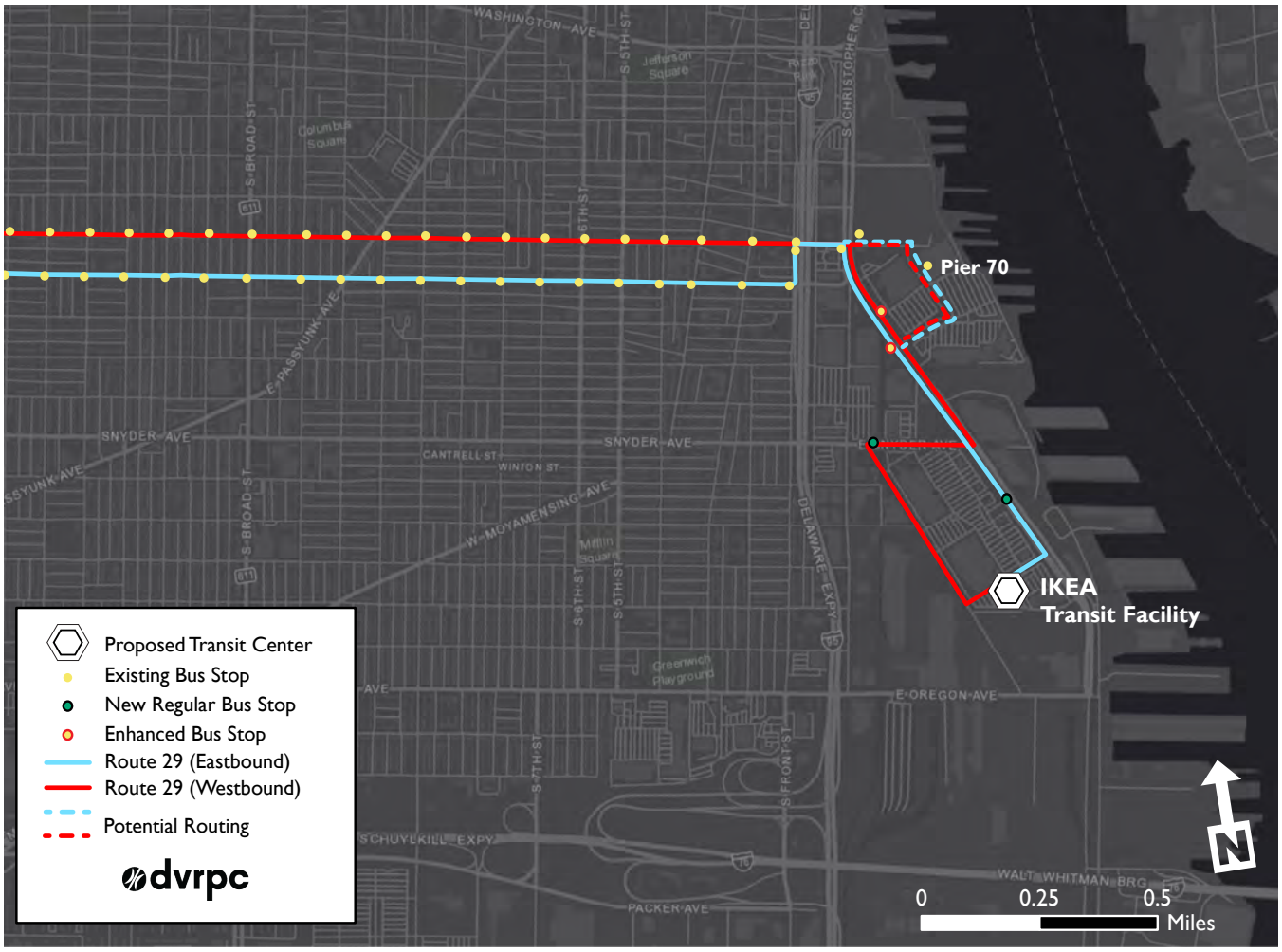
Table 21 acknowledges the cost of the route modifications that are symbolized in Figure 50 with solid red and blue lines. Like the Route 25 modification, there are two options shown for serving Pier 70: one that goes into the shopping center and another that stops along Columbus Boulevard only. If new enhanced bus plazas are built and the crossing is improved for pedestrians at the intersection of Columbus Boulevard and Pier 70, it is suggested that the route only stop outside of the shopping center and not enter it to serve it. This could cut down on total route travel time.

Table 21 | Route 29 Modification Option IKEA

Additional Round-Trip Mileage Pattern 1 (Pier 70)	Additional Annual Operating Cost	**Principle**
+1.97 miles	$853,150	3

Source: DVRPC (2017)

Figure 50 | Route 29 to IKEA Transit Facility



Source: SEPTA (2017)

Route 47 Overview

Whitman Plaza to 5th and Godfrey

Route 47 provides north-south service from 5th Street and Godfrey Avenue in Olney to Whitman Plaza. The route travels along 5th and 6th streets north of Temple University and 7th and 8th streets south of Temple University and through Center City and South Philadelphia. Figures 51 and 52 show the Route 47 patterns and ridership in the study area. Table 22 shows route statistics about Route 47. Route 47 has highest service frequency throughout the day and the week of all nine routes in this analysis. It is also ranked highest in terms of ridership of the nine routes included in this study.

Table 22 | Route 47 Statistics

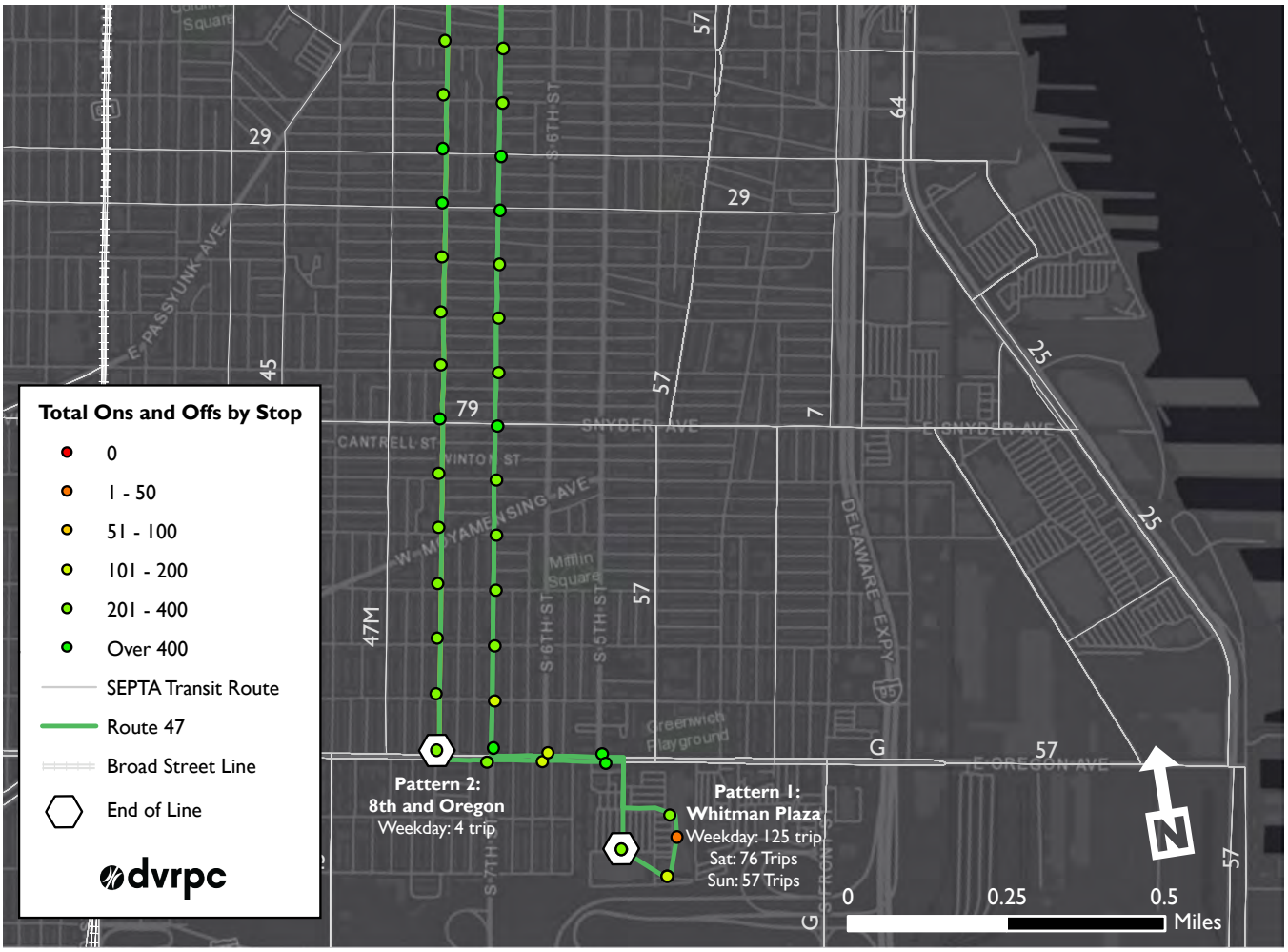
Peak Frequency (AM/PM)	6/6
Base Frequency	10
Saturday Base Frequency	12
Sunday Base Frequency	15
Average Daily Boards	16,299 (5th)
Route Mileage (One Way)	10.2
Operating Ratio	34% (29th)
On-Time Performance	73%
Total Route Patterns	4
Depot	Southern

Source: SEPTA (2017)

Figure 51 | Route 47 Overview

Source: SEPTA (2017)

Figure 52 | Route 47 Patterns and Ridership by Stop

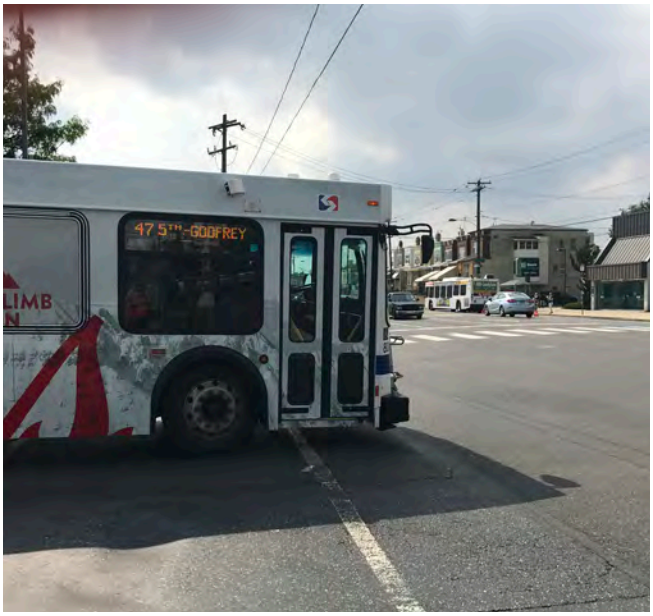


Source: SEPTA (2017)

The route connects with the Market-Frankford Line on Market Street, the Route 15 trolley at Girard Avenue, and with 28 bus routes along its path.

Figure 52 illustrates the similarity in ridership at stop locations in south Philadelphia. The majority of these stops are along 7th and 8th streets, which are the primary corridors of Route 47 in the study area. Figure 53 shows the Route 47 bus waiting to turn onto Oregon Avenue out of Whitman Plaza, its primary existing layover and turn-around location.

Figure 53 | Route 47 along Oregon Avenue



Source: DVRPC (2017)

Route 47 Modification

Route 47 Modification to 3rd Street Transit Facility

Figure 54 shows the proposed routing modification for Route 47 to the new layover facility at 3rd Street. This loop would not be designed for passenger use but would serve vehicles and operators only. In this scenario, the Route 47 vehicles would skip the Whitman Plaza loop, and instead passengers would use proposed enhanced bus stops on Oregon Avenue, creating a safe transfer point for passengers.

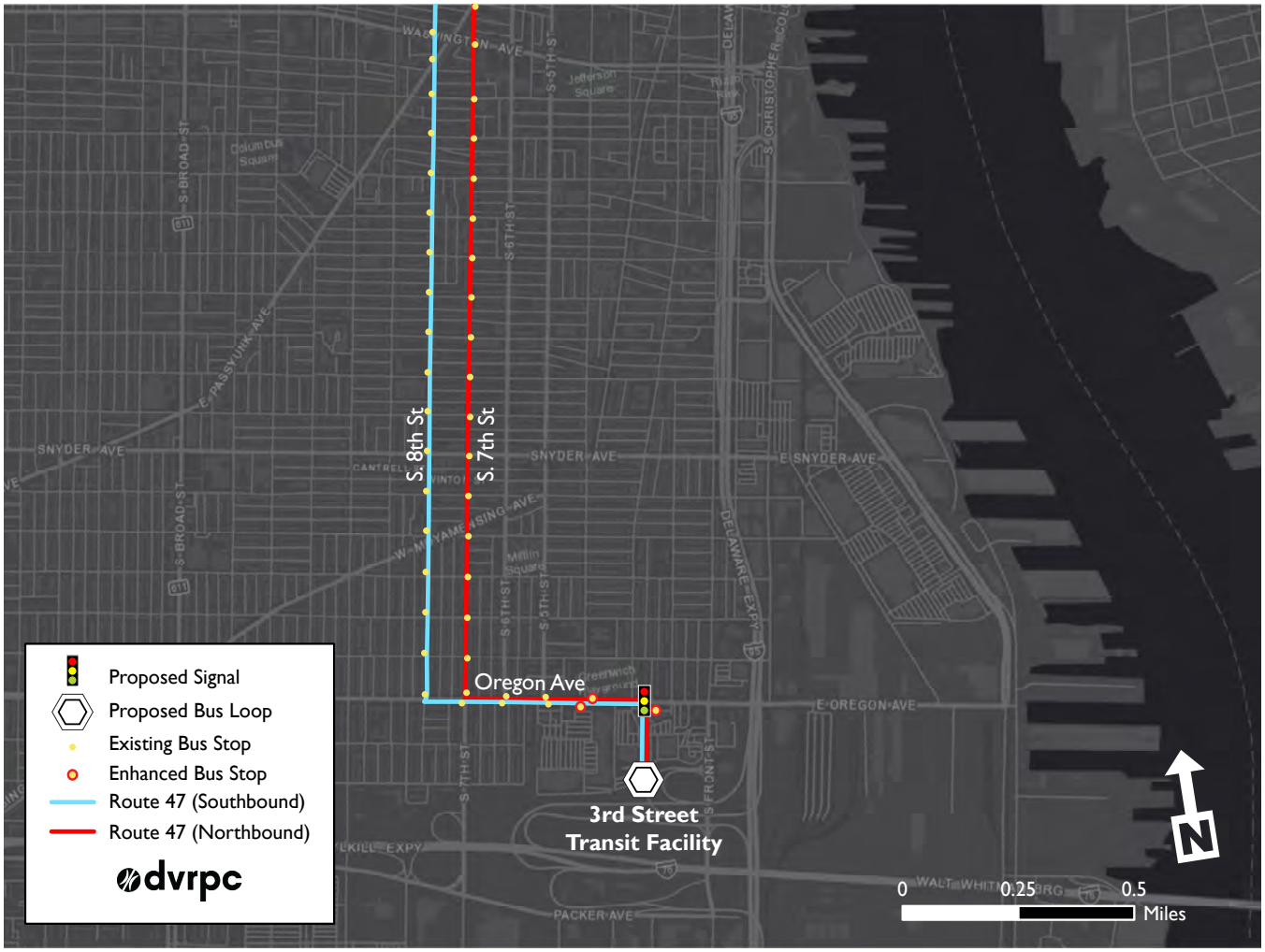
In this modification, routes would no longer be going into the shopping plaza to serve it or to lay over there, but instead use a single dedicated SEPTA location on 3rd Street for all routes that travel from north to south in this service area. Table 23 acknowledges the cost of this routing change.

Table 23 | Route 47 Modification Option 3rd Street Transit Facility

Decrease in Round-Trip Mileage Pattern 1 (Whitman Plaza)	Additional Round-Trip Mileage Pattern 2 (8th and Oregon)	Additional Annual Operating Cost	**Principles**
-.06 miles	+.52 miles	$131,000	**1, 2, 3, 4, 7**

Source: DVRPC (2017)

Figure 54 | Route 47 to 3rd Street Transit Facility



Source: SEPTA (2017)

A signal is proposed (see Figure 54) at the intersection of 3rd Street and Oregon Avenue to ensure SEPTA vehicles can maneuver in and out of the new layover facility without delay. Figures 55 and 56 illustrate the bus in the limited right-of-way bus on street and crowding on Route 47 during peak periods.

Due to these constraints and the high ridership on this bus route, SEPTA previously pilot tested skip-stop spacing. This intervention did not yield an abundance of travel time savings by trip and therefore was not implemented permanently.

Modifications for Route 47 with end-of-line transit facilities at Pier 70 and IKEA were considered but eliminated due to the travel time and cost.

Figure 55 | AM Peak Route 47 on Street

Figure 56 | Route 47 Crowding on Bus

Source: DVRPC (2018)

Route 47M Overview

Whitman Plaza to 7th and Spring Garden via 9th Street

Route 47M provides northbound-only service from Whitman Plaza along 9th Street to Center City and ending at Spring Garden Street (see Figure 57). The "M" in the name comes from the fact that the route serves the Italian Market. Table 24 gives background route statistics about Route 47M.

The route connects with the Market-Frankford Line on Market Street and with 13 bus routes along its path.

Table 24 | Route 47M Statistics

Peak Frequency (AM/PM)	N/A
Base Frequency	20
Saturday Base Frequency	30
Sunday Base Frequency	35
Average Daily Boards	2,223 (74th)
Route Mileage (One Way)	3.8
Operating Ratio	45% (11th)
On-Time Performance	68%
Total Route Patterns	4
Depot	Southern

Source: SEPTA (2017)

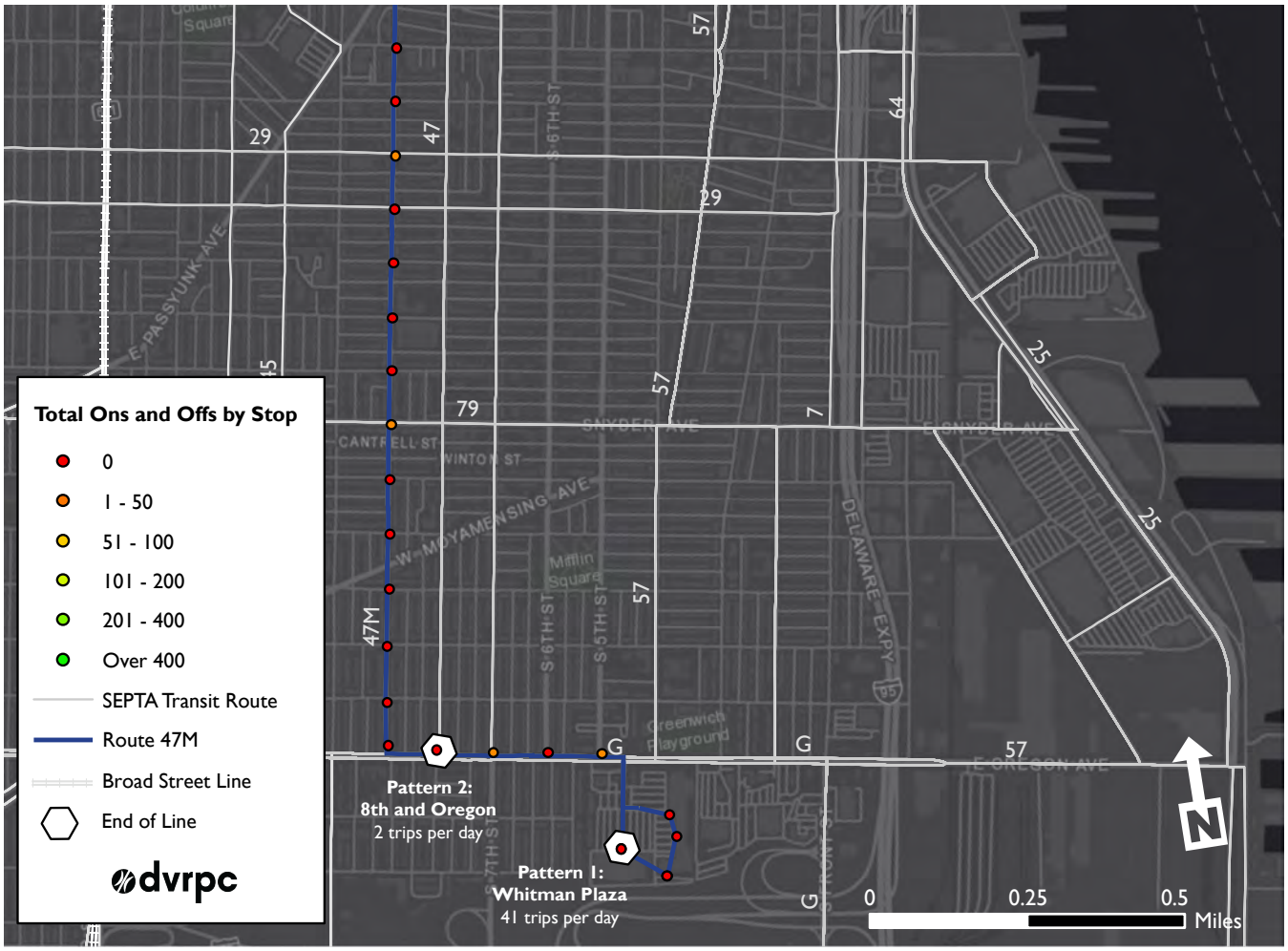
Figure 57 | Route 47M Overview

Source: SEPTA (2017)

Figure 58 illustrates the range in ridership at stop locations in South Philadelphia. The majority of Route 47M stops are along 9th Street. SEPTA's Surface Transportation Department conveyed that this route is detoured approximately 50 percent of the time and is rerouted to 7th Street, which is Route 47's primary corridor. In addition, it is difficult for SEPTA buses to maneuver through the Italian Market due to the limited right-of-way due to competing issues such as vendors, truck deliveries, and pedestrians.

SEPTA staff recommend that this route be eliminated due to reliability issues and redundancy with Route 47. The grid of service is still maintained even with this route removed. The associated savings are detailed in Table 25. Savings could be reallocated to other routes in the service area as needed.

Figure 58 | Route 47M Patterns and Ridership by Stop



Source: SEPTA (2017)

Table 25 | Route 47M Potential Elimination

Difference in Round-Trip Mileage Pattern 1 (Whitman Plaza)	Annual Operating Cost Savings	**Principles**
-7.6 miles	**$1,648,000**	**1, 7**

Source: DVRPC (2017)

Route 57 Overview

Whitman Plaza to Rising Sun-Olney or Fern Rock Transportation Center

Route 57 provides north-south service from Fern Rock Transportation Center or Rising Sun Avenue in North Philadelphia to Whitman Plaza with a limited service loop to the Packer Marine Terminal. The route travels along a variety of north-south streets along its path, all east of 4th streets, until it heads west along Godfrey Ave to Fern Rock Transportation Center. Figures 59 and 60 show the route patterns and ridership in the study area. Table 26 gives background route statistics about Route 57.

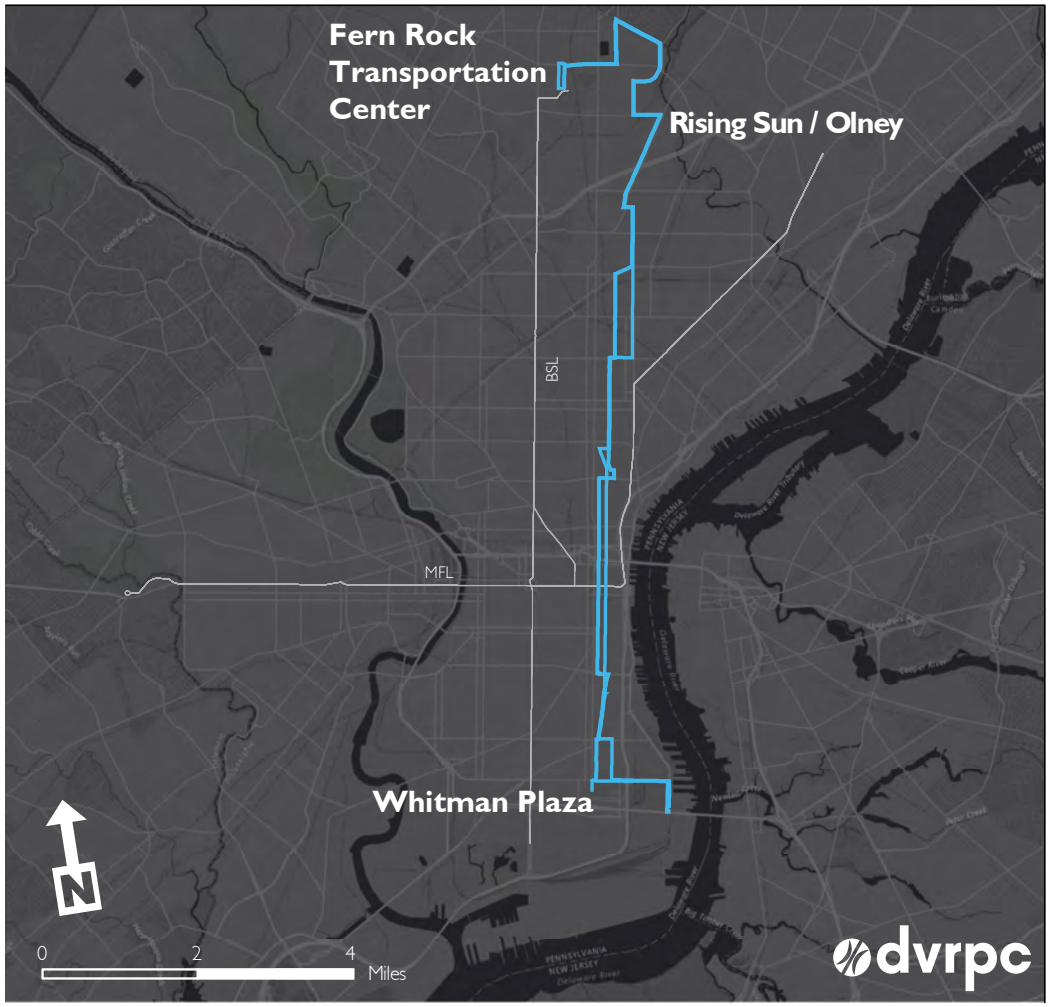
The route connects with the Market-Frankford Line on Market Street, the Broad Street Line at Fern Rock Transportation Center, the Route 15 trolley at Girard Avenue, and with 35 bus routes along its path.

Table 26 | Route 57 Statistics

Peak Frequency (AM/PM)	5/6
Base Frequency	12
Saturday Base Frequency	20
Sunday Base Frequency	20
Average Daily Boards	10,634 (21st)
Route Mileage (One Way)	13.6
Operating Ratio	25%
On-Time Performance	72%
Total Route Patterns	14
Depot	Southern

Source: SEPTA (2017)

Figure 59 | Route 57 Overview



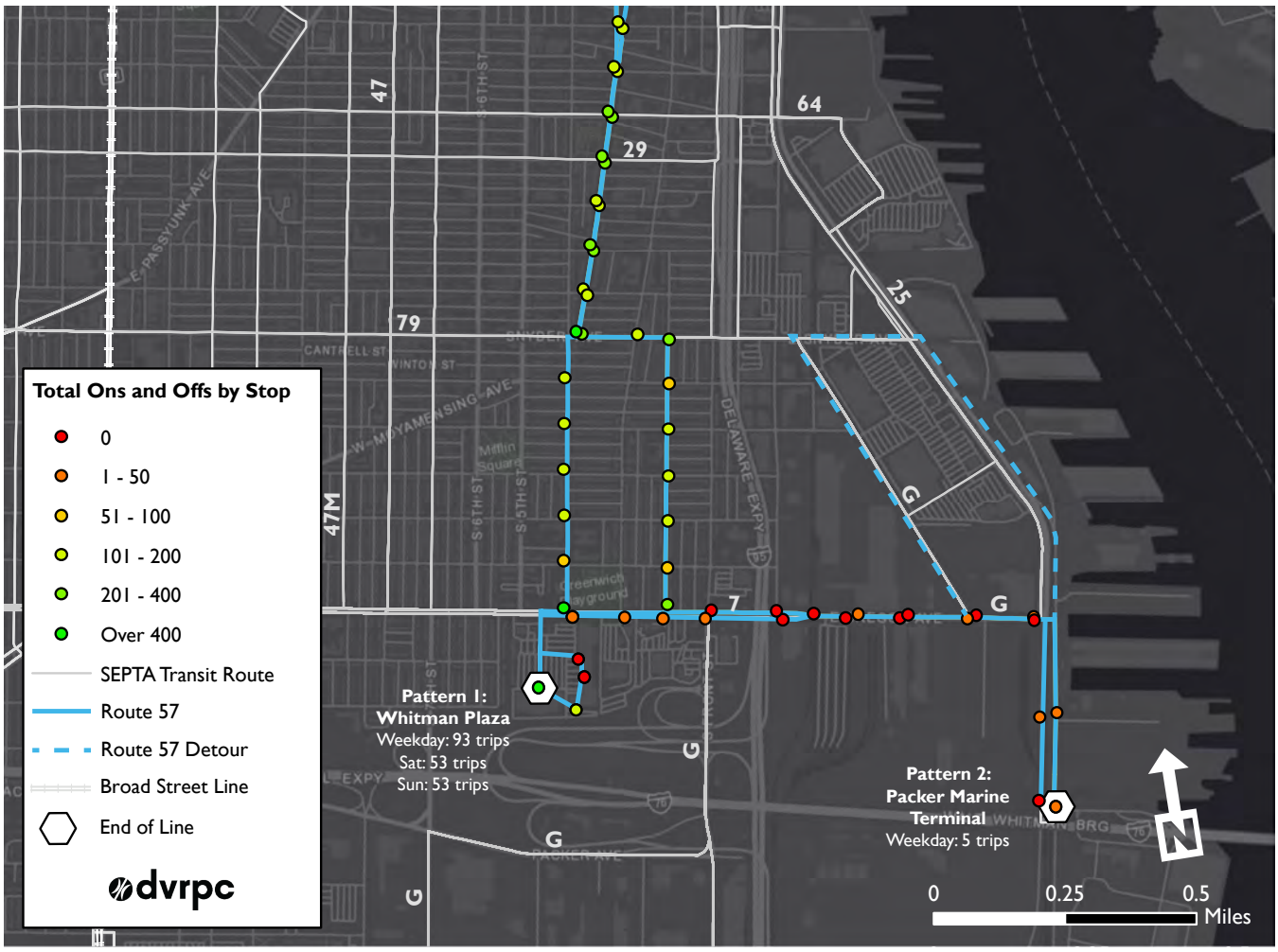
Source: SEPTA (2017)

Figure 60 illustrates the range in ridership at relevant stop locations along this route and multiple route patterns. The majority of the stops with high ridership are along 2nd and 4th Street as well as Moyamensing Avenue, which are the primary corridors of Route 57 in the study area. Two of the route patterns for Route 57 are shown in Figure 60.

Figure 60 shows one of the on-street layover locations in South Philadelphia. At the time this report was published, the Route 57 pattern to the Packer Marine Terminal was on a continuous detour (shown by the dashed line in Figure 60) due to ongoing construction work in the area.

There continues to be ongoing discussion about potentially closing Columbus Boulevard between Oregon Avenue and the Packer Marine Terminal to all public traffic, and allowing the Packer Marine Terminal to have private access to the right-of-way. This would allow a greater amount of goods movement in the area. The last recorded ridership counts in this area are low; however, this is subject to fluctuation depending on the growth in this area.

Figure 60 | Route 57 Patterns and Ridership by Stop



Source: SEPTA (2017)

Route 57 Modification

Route 57 Modification to 3rd Street Transit Facility

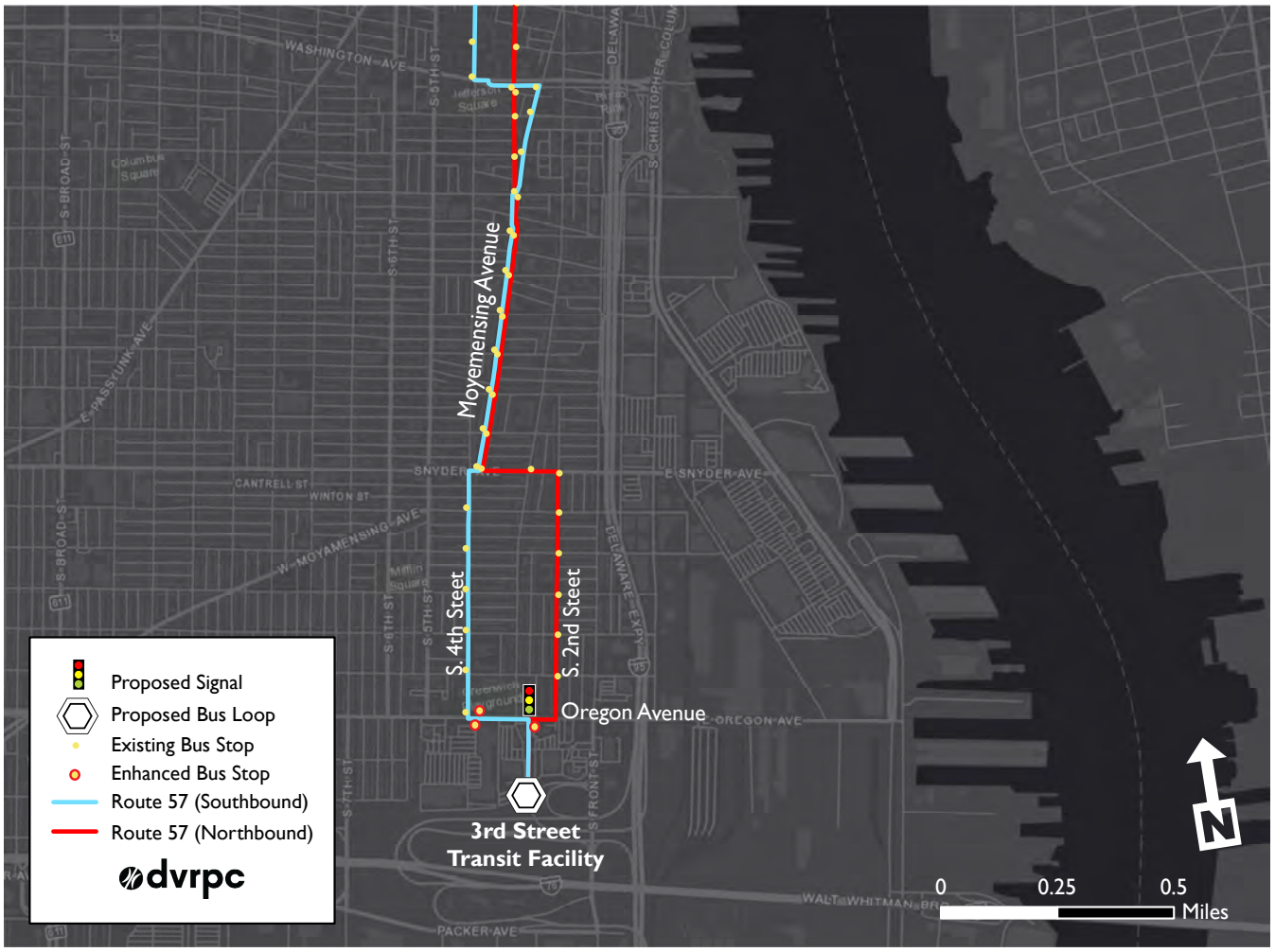
Figure 61 shows the proposed routing modification for Route 57 to include a new layover facility at 3rd Street. This facility is not meant as a passenger stop and would serve vehicles and operators only. In this scenario, the Route 57 vehicles would skip the Whitman Plaza loop and instead use a single dedicated SEPTA location on 3rd Street for all routes that travel from north to south in this service area. New enhanced stops are proposed adjacent to and across from Whitman Plaza on Oregon Avenue for passenger boards and alights.

Table 27 | Route 57 Modification Option 3rd Street Transit Facility

Difference in Round-Trip Mileage Pattern 1 (Whitman Plaza)	Difference in Round-Trip Mileage Pattern 2 (Marine Terminal)	Annual Operating Savings	Principles
-.17 miles	**-1.98 miles**	**$691,385**	**1, 2, 3, 4, 7**

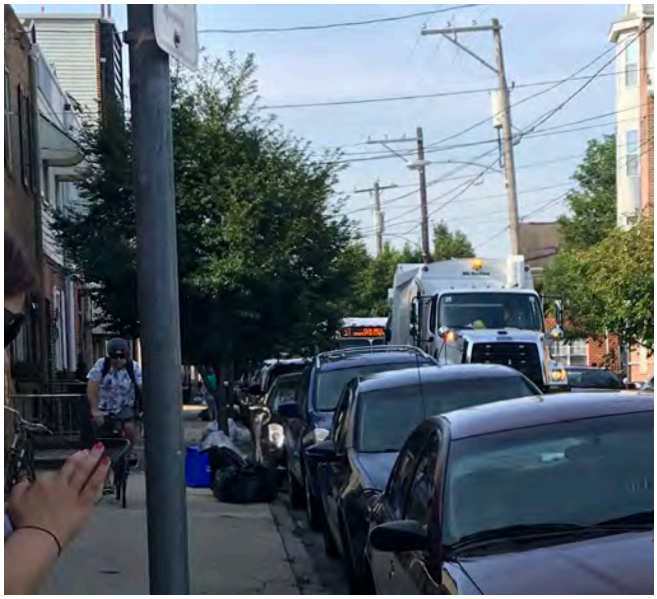
Source: DVRPC (2017)

Figure 61 | Route 57 to 3rd Street Transit Facility



Source: SEPTA (2017)

Figure 62 | Route 57 Heading Northbound Stuck behind a Garbage Truck



Source: DVRPC (2018)

Figure 63 | Route 57 Bus with Accessibility Ramp Deployed

Source: DVRPC (2018)

A signal is proposed at the intersection of 3rd Street and Oregon Avenue to ensure SEPTA vehicles can maneuver in and out of the new layover facility without delay. Table 27 acknowledges the cost savings of this routing change. Figures 62, 63, and 64 show Route 57 along its path. Modifications for Route 57 with end-of-line transit facilities at Pier 70 and IKEA were considered but eliminated due to the travel time and cost.

Figure 64 | Route 57 Stop at Walnut Street

Source: DVRPC (2017)

Route 64 Overview

50th Street and Parkside to Pier 70

Route 64 travels from 50th Street and Parkside Avenue in West Philadelphia to the Pier 70 shopping center. The route provides north-south service in West Philadelphia along 48th Street and east-west service in South Philadelphia along Washington Avenue. In addition, the route enables a connection between West and South Philadelphia via the Gray's Ferry Bridge. Figures 65 and 66 show the route patterns and ridership in the study area. Table 28 gives background route statistics about Route 64. The route provides a valuable north-south service within West Philadelphia, and a direct connection from West Philadelphia to South Philadelphia.

Table 28 | Route 64 Statistics

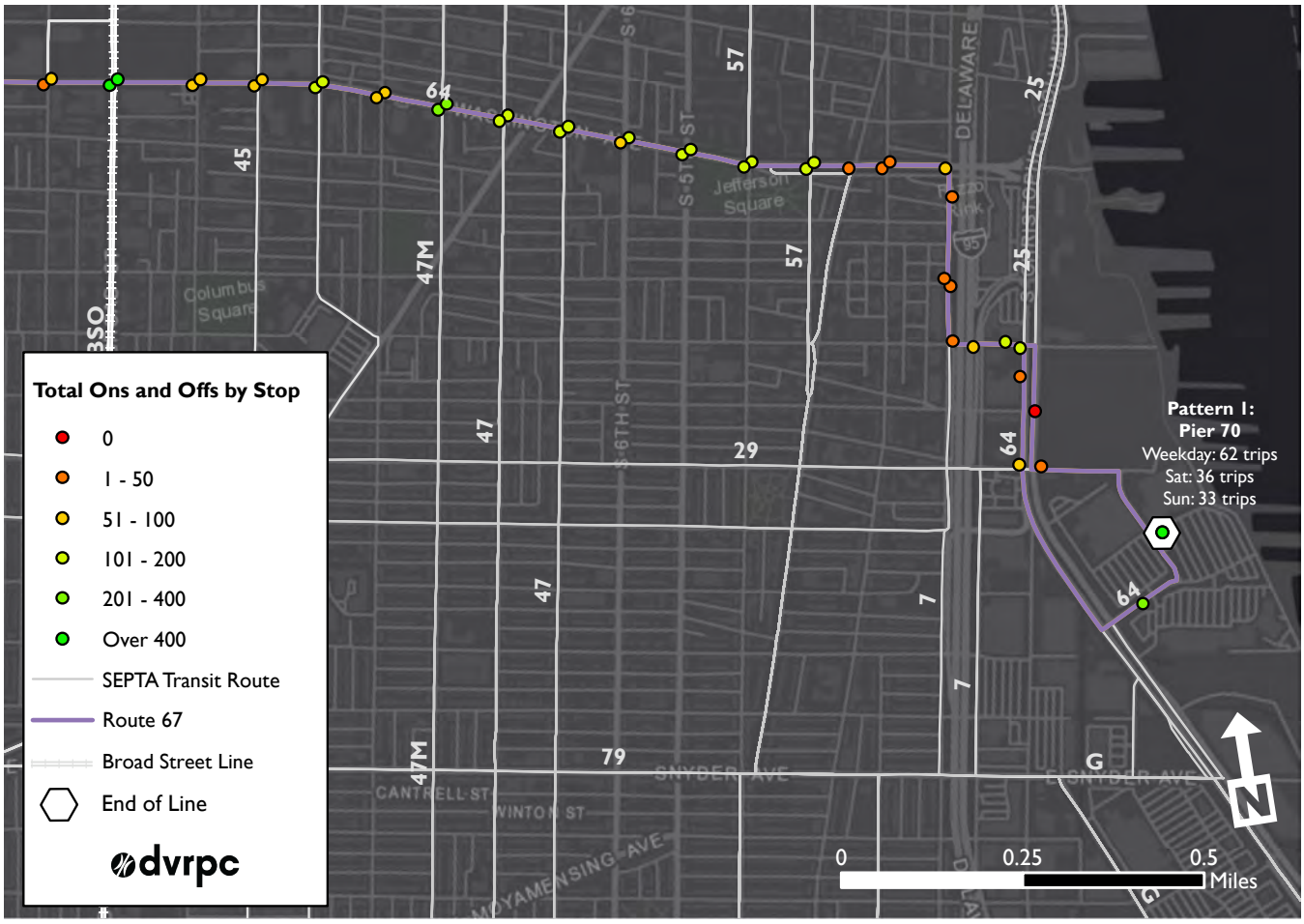
Peak Frequency (AM/PM)	10/15
Base Frequency	20
Saturday Base Frequency	30
Sunday Base Frequency	30
Average Daily Boards	5,845 (38th)
Route Mileage (One Way)	9
Operating Ratio	32%
On-Time Performance	78%
Total Route Patterns	4
Depot	Southern

Source: SEPTA (2017)

Figure 65 | Route 64 Overview

Source: SEPTA (2017)

Figure 66 | Route 64 Patterns and Ridership by Stop



Source: SEPTA (2017)

The route connects with the Market-Frankford Line at 46th Street; the Media/Elwyn Regional Rail line at 49th Street; trolley Routes 10, 11, 13, 15, 34, and 36 in West Philadelphia; and 16 bus routes along the way.

Figure 66 illustrates the range in ridership at relevant stop locations along this route. The majority of these stops are along Washington Avenue, which is the primary corridor of Route 64 in the study area. Figure 67 shows the existing stop on Oregon Avenue adjacent to Whitman Plaza.

Figure 67 | Route 64 Bus Stop on Oregon Avenue

Source: DVRPC (2017)

Route 64 Modifications

Route 64 Modification to Pier 70

Figure 68 shows the proposed routing modification for Route 64 with a new layover facility at Pier 70. The new location would provide a single layover facility for vehicles and operators, as well as a final stop for passengers to board and alight.

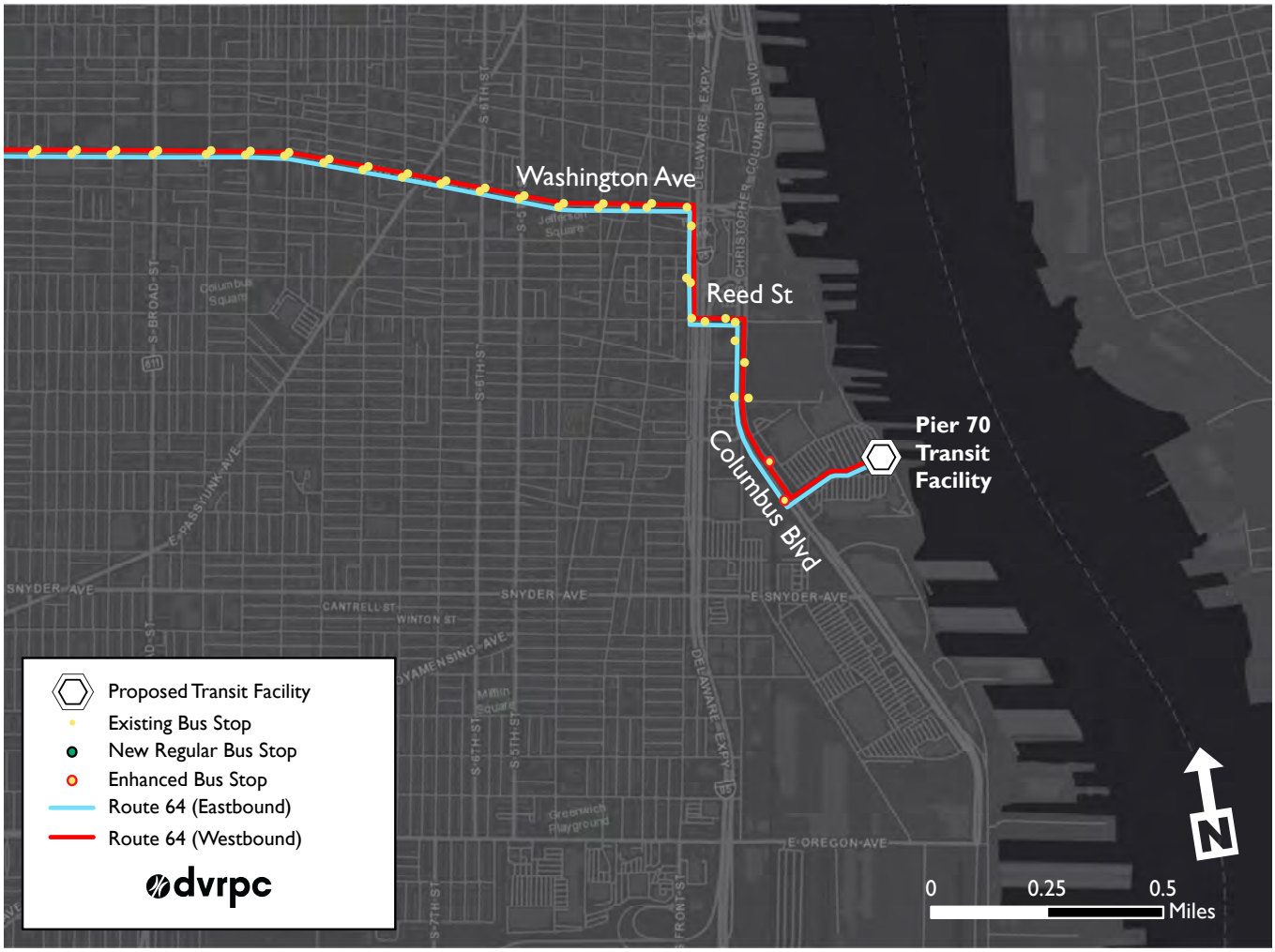
In this option, the SEPTA vehicles would enter and exit the shopping center from Columbus Boulevard. This routing remains primarily the same due to the high ridership at Pier 70, due to shoppers and employees. Table 29 acknowledges the cost of this routing change.

Table 29 | Route 64 Modification Option Pier 70

Additional Round-Trip Mileage Pattern 1 (Pier 70)	Additional Annual Operating Cost	**Principles**
+.37	$148,650	**3, 4, 5, 6**

Source: DVRPC (2017)

Figure 68 | Route 64 to Pier 70 Transit Facility



Route 64 Modification to IKEA

Figure 69 shows the proposed routing modification for Route 64 with a new layover facility at IKEA. The new location would provide a single layover facility for vehicles and operators, as well as a final stop for passengers to board and alight. In this scenario, Route 64 would extend to loop around the new IKEA via Columbus Boulevard, Snyder Avenue, and Weccacoe Avenue.

Table 30 acknowledges the additional costs of this routing change, which is symbolized in Figure 69 with solid red and blue lines.

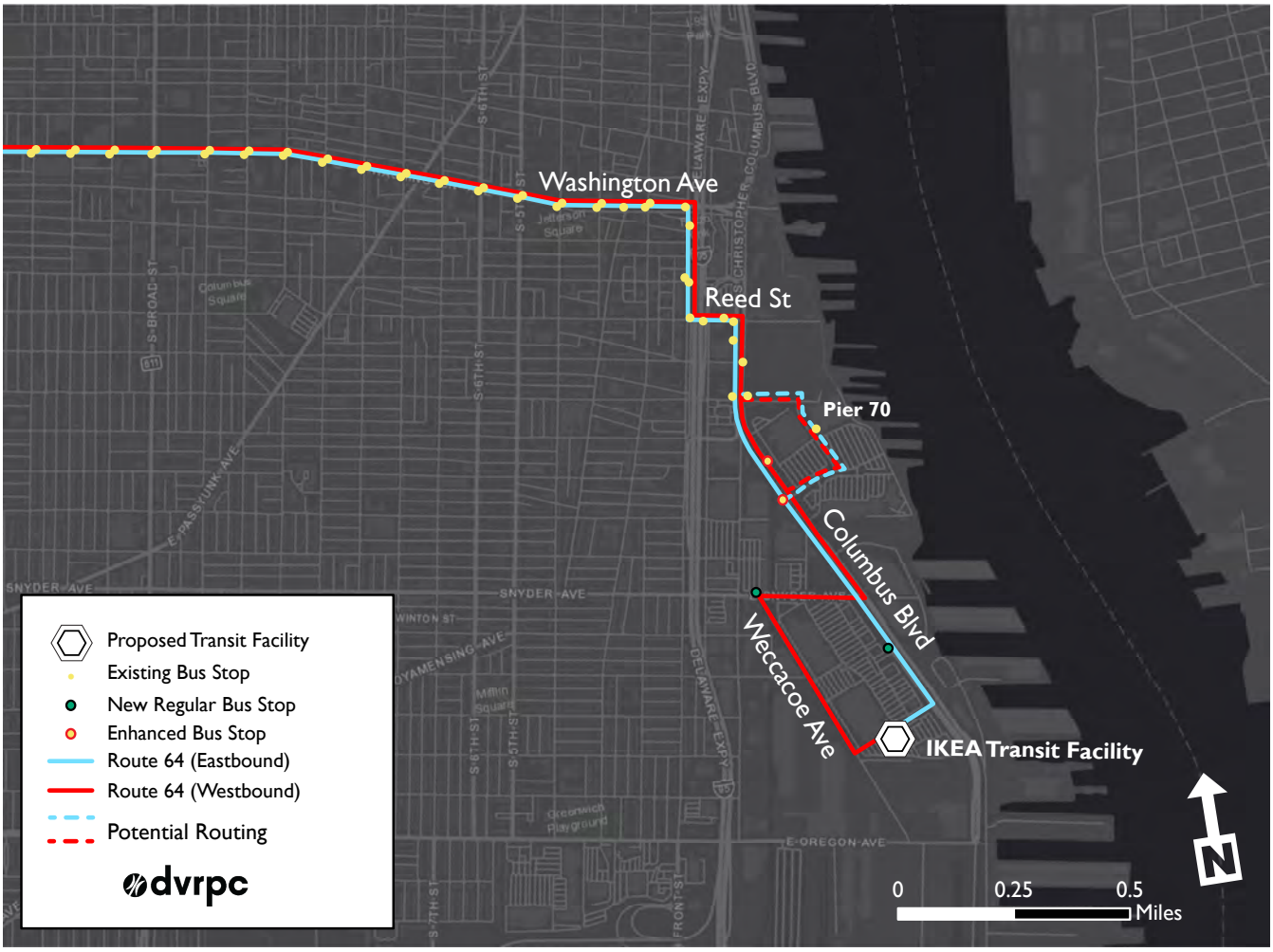
Similarly to the Routes 25 and 29 modifications to IKEA, there are two options shown for serving Pier 70: one that goes into the shopping center and another that stops along Columbus Boulevard only. If new enhanced plazas are built and the crosswalk is improved for pedestrians at the intersection of Columbus Boulevard and Pier 70, it is suggested that the route only stop outside of the shopping center and not enter it to serve it. This will cut down on total route travel time.

Table 30 | Route 64 Modification Option IKEA

Additional Round-Trip Mileage Pattern 1 (Pier 70)	Additional Annual Operating Cost	**Principles**
+1.922	$773,550	**3, 5, 6**

Source: DVRPC (2017)

Figure 69 | Route 64 to IKEA Transit Facility



Route 79 Overview

Columbus Commons to 29th and Snyder Avenue

Route 79 provides crosstown service along Snyder Avenue from 29th Street in Point Breeze to Columbus Commons. Figures 70 and 71 show the route patterns and ridership in the study area. Table 31 shows route statistics for Route 79.

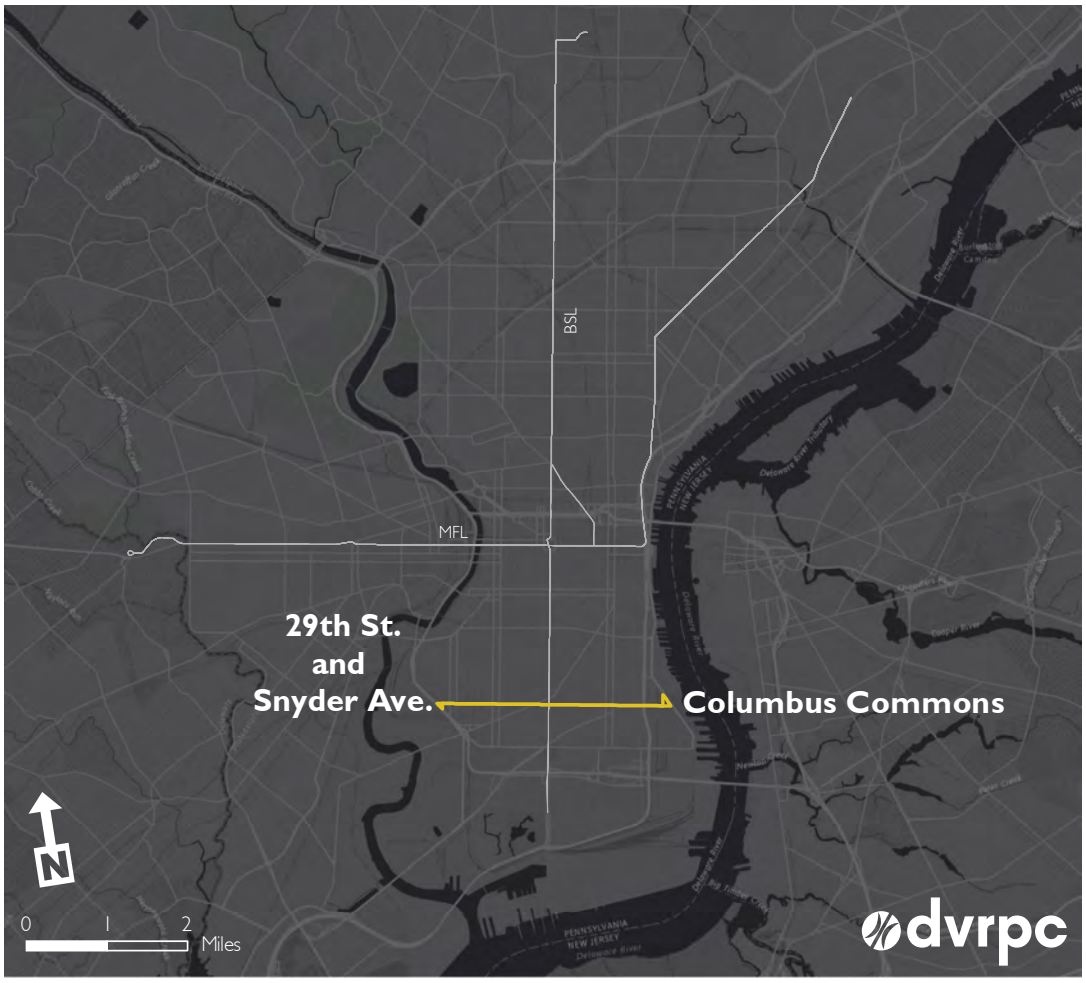
The route connects with the Broad Street Line at the Snyder Avenue stop and with 11 bus routes along the way.

Table 31 | Route 79 Statistics

Peak Frequency (AM/PM)	6/10
Base Frequency	12
Saturday Base Frequency	15
Sunday Base Frequency	30
Average Daily Boards	5,872 (37th)
Route Mileage (One Way)	3
Operating Ratio	52% (4th)
On-Time Performance	90%
Total Route Patterns	2
Depot	Southern

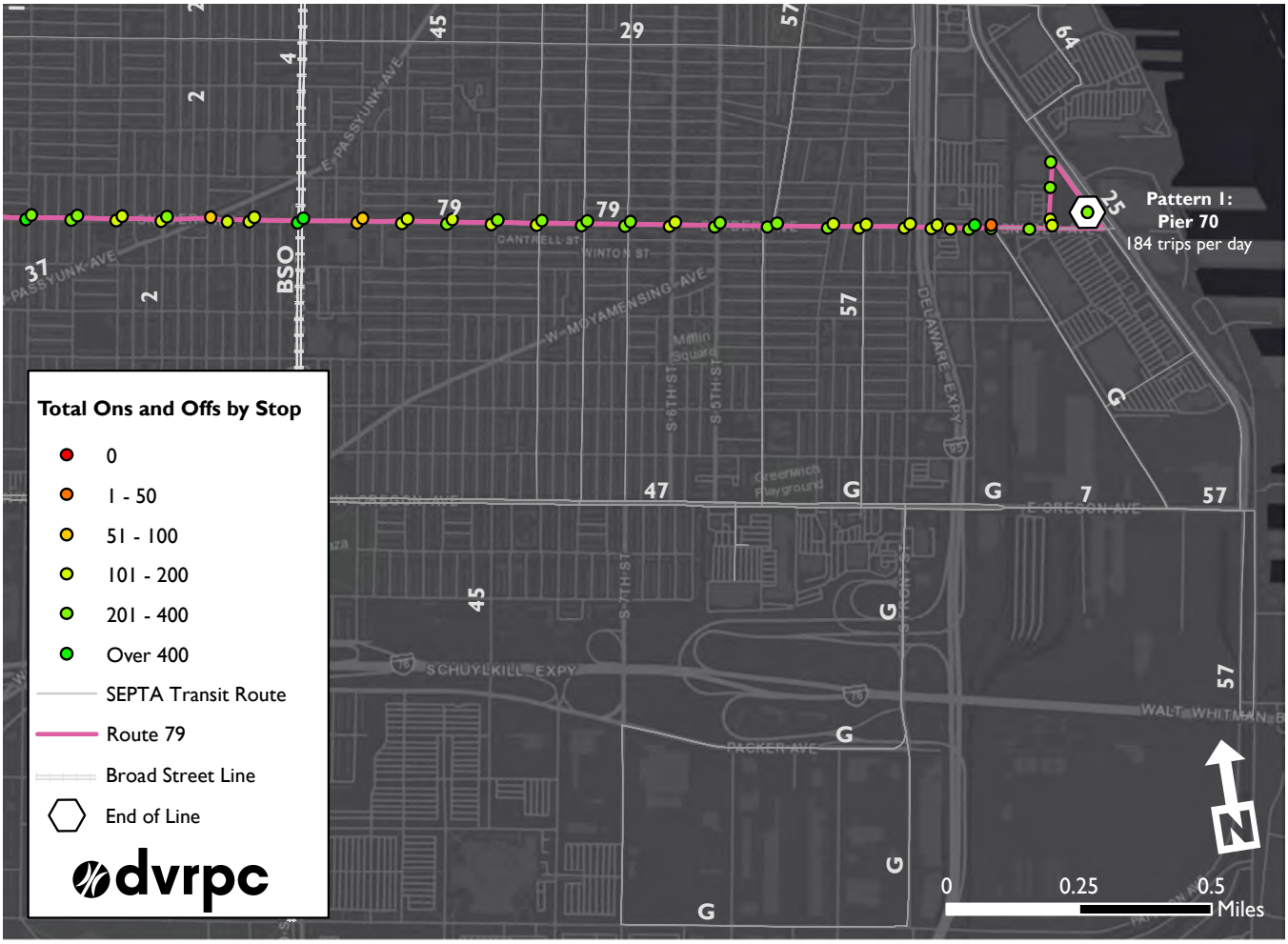
Source: SEPTA (2017)

Figure 70 | Route 79 Overview



Source: SEPTA (2017)

Figure 71 | Route 79 Patterns and Ridership by Stop



Source: SEPTA (2017)

Figure 71 illustrates the range in ridership at relevant stop locations along this route. The majority of these stops are along Snyder Avenue, which is the primary corridor of Route 79 in the study area.

Figure 72 shows a stop for Route 79 and on-street layover location for SEPTA buses. SEPTA operations relayed to the DVRPC team that Route 79 has been approved to lay over at Pier 70; however, there is not enough space for it to do so.

Figure 72 | Route 79 Stop near IKEA

Source: DVRPC (2017)

Route 79 Modifications

Route 79 Modification to Pier 70

Figure 73 shows the proposed routing modification for Route 79 with a new layover facility at Pier 70. The new location would provide a single layover facility for vehicles and operators, as well as a final stop for passengers to board and alight.

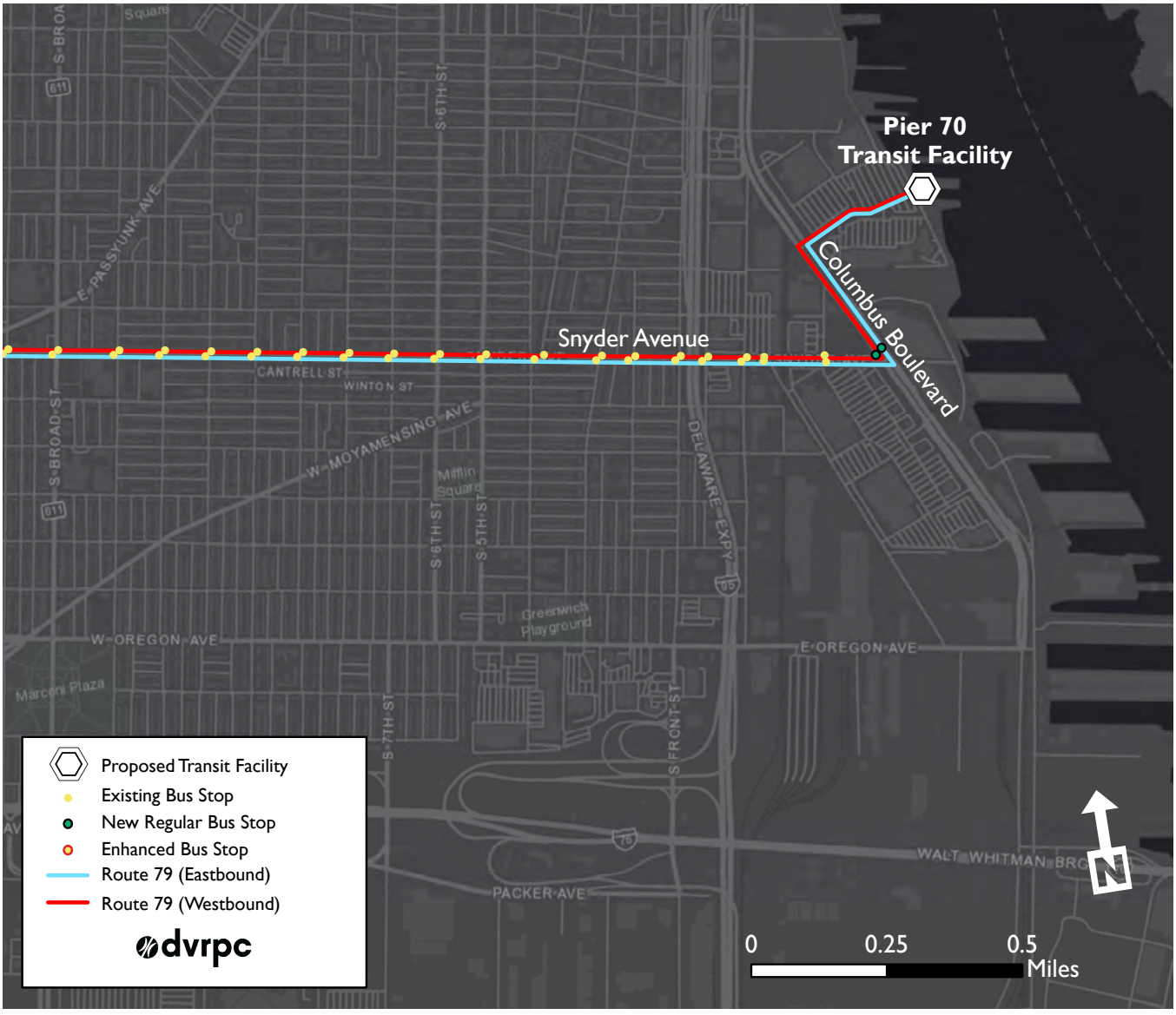
Table 32 acknowledges the additional costs of this routing change.

Table 32 | Route 79 Modification Option Pier 70

Additional Round-Trip Mileage Pattern 1 (Pier 70)	Additional Annual Operating Cost	**Principle**
+.74 miles	$324,600	**3**

Source: DVRPC (2017)

Figure 73 | Route 79 to Pier 70 Transit Facility



Route 79 Modification to IKEA

Figure 74 shows the proposed routing modification for Route 79 with a new layover facility in a parking area adjacent to IKEA. The new location would provide a single layover facility for vehicles and operators, as well as a final stop for passengers to board and alight.

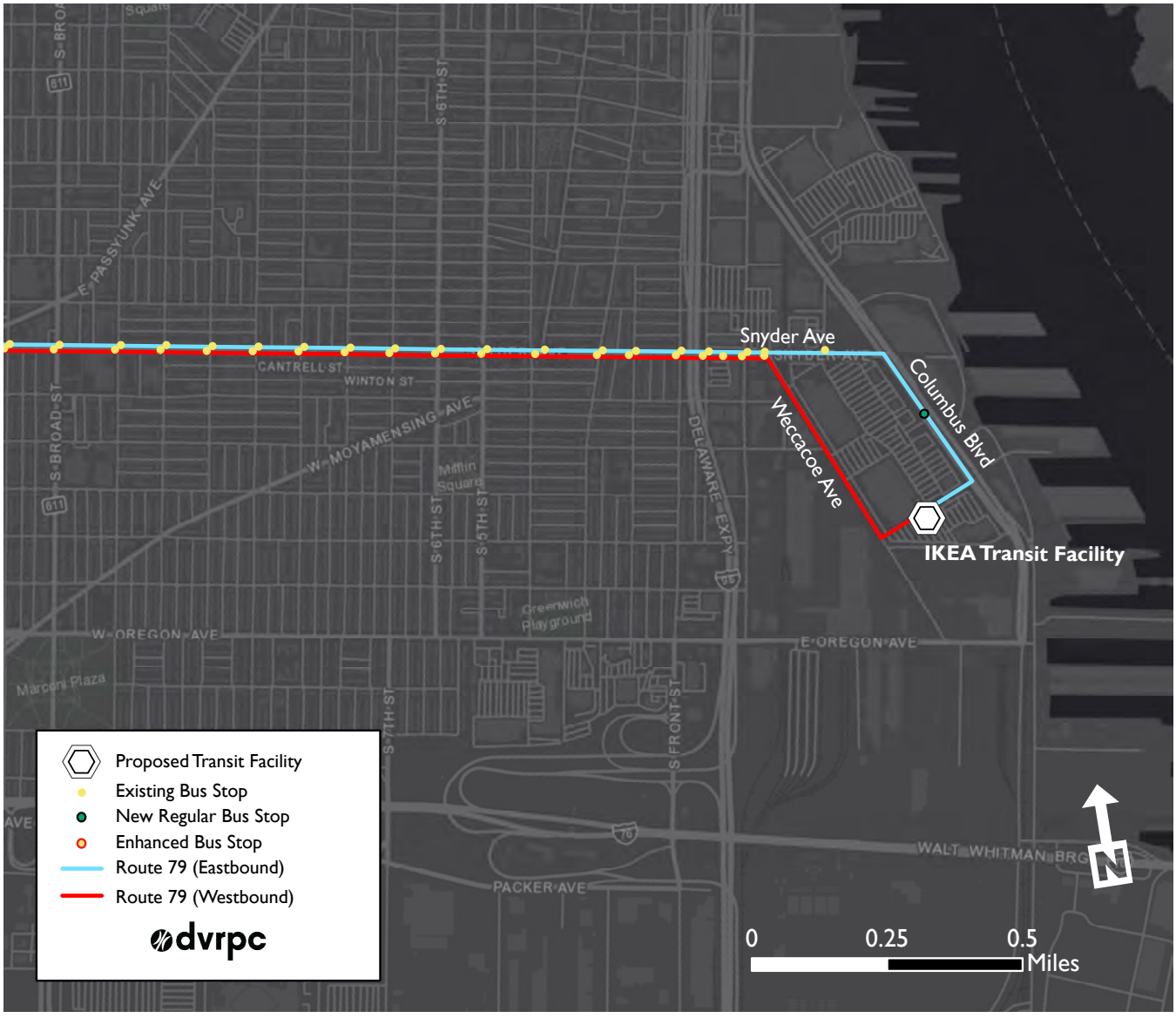
In this scenario, Route 79 would extend south on Columbus Boulevard and into the IKEA parking lot, terminating at the new transit facility. This would provide shoppers and employees with more service to this location. Table 33 acknowledges the additional costs of this routing change.

Table 33 | Route 79 Modification Option IKEA

Additional Round-Trip Mileage Pattern 1 (Pier 70)	Additional Annual Operating Cost	**Principles**
+1.14 miles	$499,200	**3, 5**

Source: DVRPC (2017)

Figure 74 | Route 79 to IKEA Transit Facility



Source: DVRPC (2018)

Chapter 4: Recommendations

The following chapter presents recommendations on bus operations changes to each of the three proposed transit facilities in South Philadelphia. Several unknowns still remain around the availability of real estate at each of the potential sites, as well as decisions by SEPTA about what operational changes are most viable. Therefore, the recommendations offer two scenarios:

- a composite of operations centered around new facilities in which Pier 70 serves as the end of line and layover for east-west bus routes, and the 3rd Street Loop is used for routes providing north-south service; and
- a composite of operations where IKEA serves as the end-of-line and layover for east-west bus routes, and the 3rd Street Loop is used for routes providing north-south service.

No final decision was made about what composite operations should be recommended. However, due to the higher volume of riders, more limited space, and additional operational savings, the Pier 70 and 3rd Street scenario was site planned as a part of this report rather than the IKEA and 3rd Street option. The Pier 70 combination has an additional operations savings of $274,136 over the IKEA combination.

Composite Operations Scenario 1: Pier 70 and 3rd Street Transit Facilities

This scenario proposes a new layover location and signal at 3rd Street, six new enhanced stops for locations with high passenger activity, and three new bus stops due to additional mileage on the route. Figure 75 shows the existing layover location at Pier 70 for SEPTA vehicles. Table 34 shows the change in operating cost for this scenario. Figure 76 is a composite map of all route changes proposed if a new transit facility is built at Pier 70. See Chapter 3 for details on each routing modification.

Figure 75 | Existing Layover at Pier 70

Source: DVRPC (2017)

Table 34 | Pier 70 Design Route Modification—Savings Summary

Route	Proposed Layover Location	Change in Annual Operating Cost
G	Pier 70	$656,400
7	Southern Depot	$4,443,800
25	3rd Street	$1,798,000
29	Pier 70	$38,200
47	3rd Street	$131,000
47M	None (Service Elimintated)	$1,648,000
57	3rd Street	$691,385
64	Pier 70	$148,650
79	Pier 70	$324,600
Total		$3,762,735

Savings

Cost

Sources: DVRPC and SEPTA (2018)

Figure 76 | Composite Operations Scenario 1

Composite Operations Scenario 2: IKEA and 3rd Street Transit Facilities

A composite of all route changes proposed if a new transit facility is built at IKEA is shown in Figure 77. This option also proposes a new transit facility and signal at 3rd Street, six new enhanced stops for locations with high passenger activity, and four new bus stops due to additional mileage on a route. In the subsequent pages all routing proposals are addressed individually. Table 35 shows the change in operating cost for this scenario.

Table 35 | IKEA Design Route Modification—Savings Summary

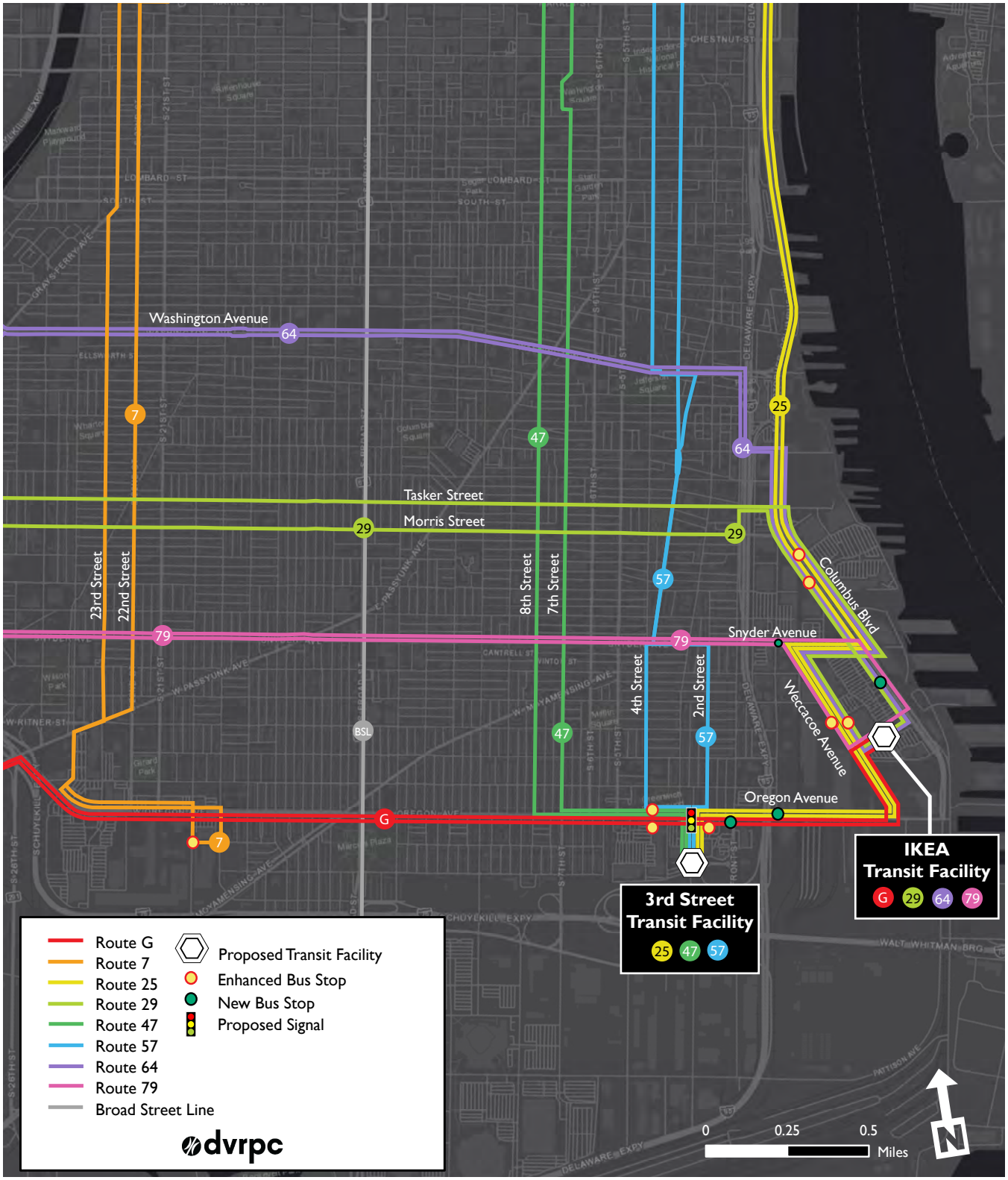
Route	Proposed Layover Location	Change in Annual Operating Cost
G	IKEA	$775,400
7	Southern Depot	$4,443,800
25	3rd Street	$1,798,000
29	IKEA	$853,150
47	3rd Street	$131,000
47M	None (Service Elimintated)	$1,648,000
57	3rd Street	$691,385
64	IKEA	$773,550
79	IKEA	$499,200
Total		$3,695,185

Savings

Cost

Sources: DVRPC and SEPTA (2018)

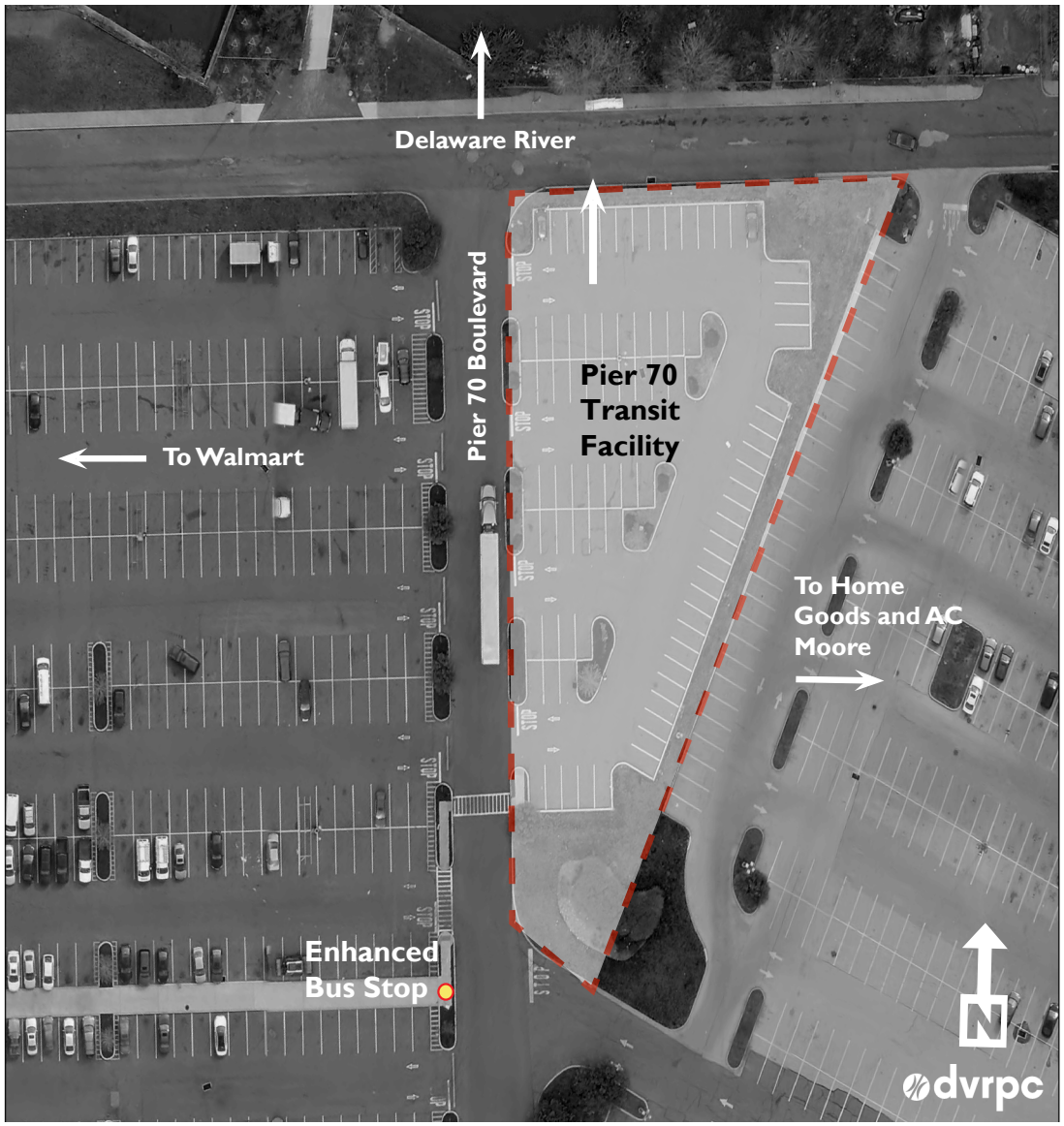
Figure 77 | Composite Operations Scenario 2



Pier 70 Proposed Transit Facility

The Pier 70 transit facility is located south of Pier 70 Boulevard between Walmart (to the north) and Delaware River and Pier 68 Park to the east. The location is a triangular parking lot (1675 S Christopher Columbus Boulevard) owned by Walmart Real Estate Business Trust. The area is typically empty or used by semi-tractor- trailers for parking (see Figure 78). The property was originally sold to Walmart by the City of Philadelphia for $1 in 2011. At this time, Routes 7, 25, 29, and 64 laid over at Pier 70. In this scenario, Route 7 (52 weekday, 41 Saturday, and 42 Sunday trips) will provide service until 19th and Oregon Avenue eastbound and lay over at Southern Depot. Routes G, 29, 64, and 79 will lay over at Pier 70 (see Table 36 for more details). Vehicles using the transit facility will use Pier 70 Boulevard to access the site. Pier 70 Boulevard is a busy interior road that provides access to Columbus Boulevard and is the primary route into and out of Pier 70 for Walmart and Home Depot customers. Pier 70 Boulevard has limited sidewalks and bicycle facilities, making it difficult for non-motorized users to access the site (Figures 79 and 80).

Figure 78 | Aerial of Existing Underused Parking at Pier 70



Aerial imagery: City of Philadelphia (2017)

Table 36 | Summary of Total Proposed Trips (Entering and Exiting) Pier 70

Route	G			29			64			79		
Day of Week	WD	SAT	SUN	WD	SAT	SUN	WD	SAT	SUN	WD	SAT	SUN
Total Trips	248	131	85	179	98	76	126	72	66	182	110	80

Sources: DVRPC and SEPTA (2017)

Figure 79 | Proposed Location for Transportation Facility at Pier 70

Source: DVRPC (2018)

Figure 80 | Proposed Location for New Bus Stop at Pier 70

Source: DVRPC (2018)

Pier 70 Transit Facility Design

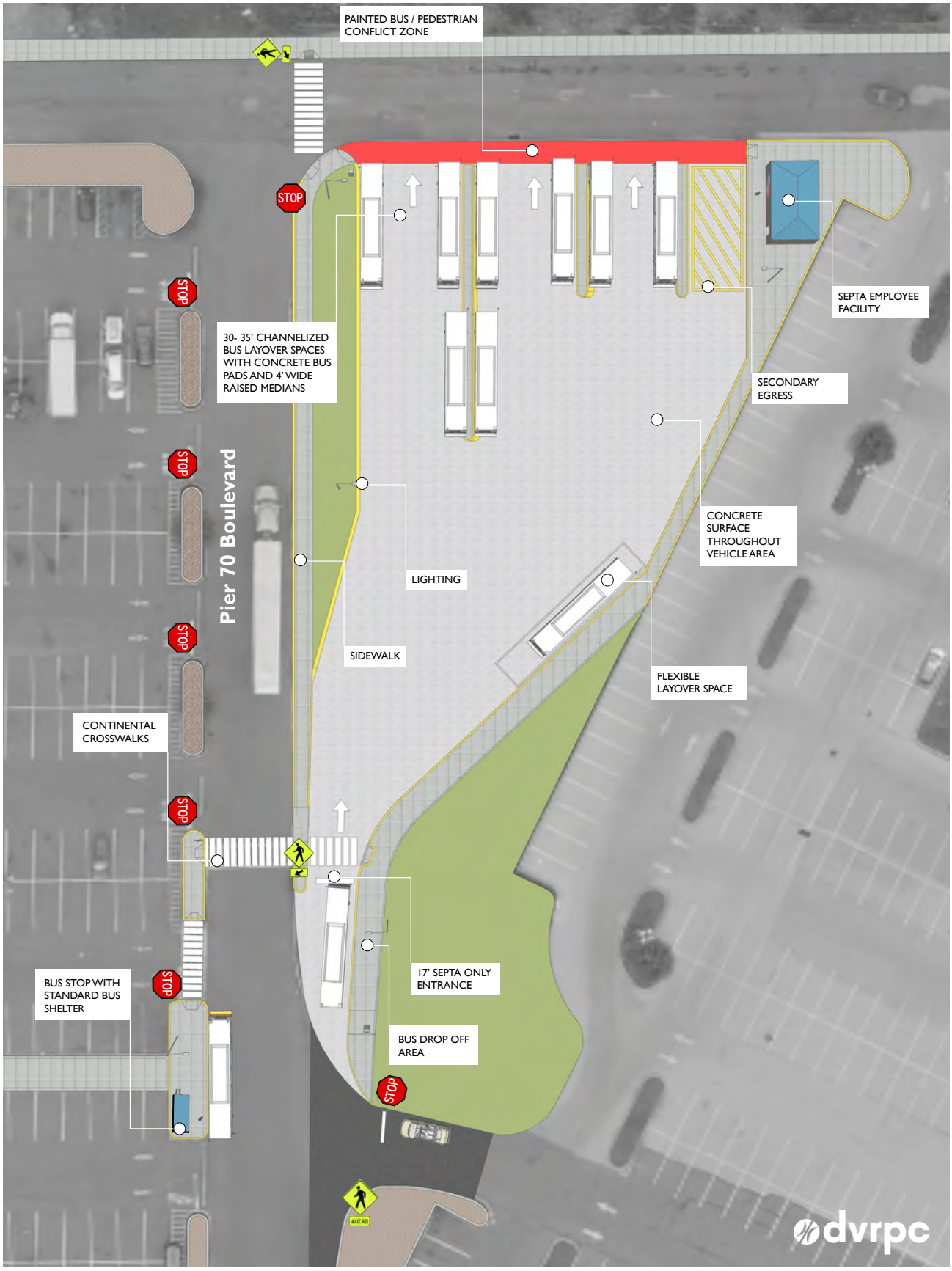
Figure 81 shows the design of a Pier 70 transit facility. This design has four points of focus: site access, maneuverability, walkability, and maximizing vehicle layover spaces. Vehicles will enter the site through a new access point on the west side of the existing parking lot. This entrance includes a drop-off area where all remaining customers would alight from the vehicle. This new stop allows buses to pull completely out of traffic and includes a pedestrian connection that leads to a sidewalk connecting to Walmart. This design also seeks to improve traffic movements and visibility by reshaping the existing intersection just west of the entrance to create a more perpendicular stop location for vehicles turning onto Pier 70 Boulevard from the south.

The central portion of the facility is open to allow for increased bus maneuverability into open layover spaces. The spaces, located along the east side of the lot, include 30–35-foot channelized lanes with four-foot medians, which allow for vehicles to comfortably stack and maneuver around one another to exit on the unnamed driveway adjacent to the lot to the east. The facility also includes flexible layover spaces along the south side in case all channelized spaces are full. A second egress, adjacent to a new SEPTA employee facility along the southeast side of the transportation center, provides a comfortable egress for vehicles parked in flexible layover spaces.

The design retains the existing crosswalk across Pier 70 Boulevard that connects to a walkway to Walmart and improves upon existing circulation by creating a new sidewalk along the north side of the transportation center. This new sidewalk provides a safe and direct pedestrian connection to the Delaware River Trail and Pier 68 Park.

In this design, customers do not board vehicles inside of the transit facility. Instead, a new standard bus stop will be located on Pier 70 Boulevard adjacent to the existing sidewalk connection to Walmart. This bus stop could be built using the existing sidewalk and the striped no-parking zone next to it.

Figure 81 | Pier 70 Transit Facility Design



Source: DVRPC (2019). Aerial imagery: City of Philadelphia (2017)

To better understand this design, Figures 82 and 84 show existing aerials looking west and east from the triangular parking parcel, and Figures 83, 85, and 86 illustrate how DVRPC's site design would look from the west, east, and south.

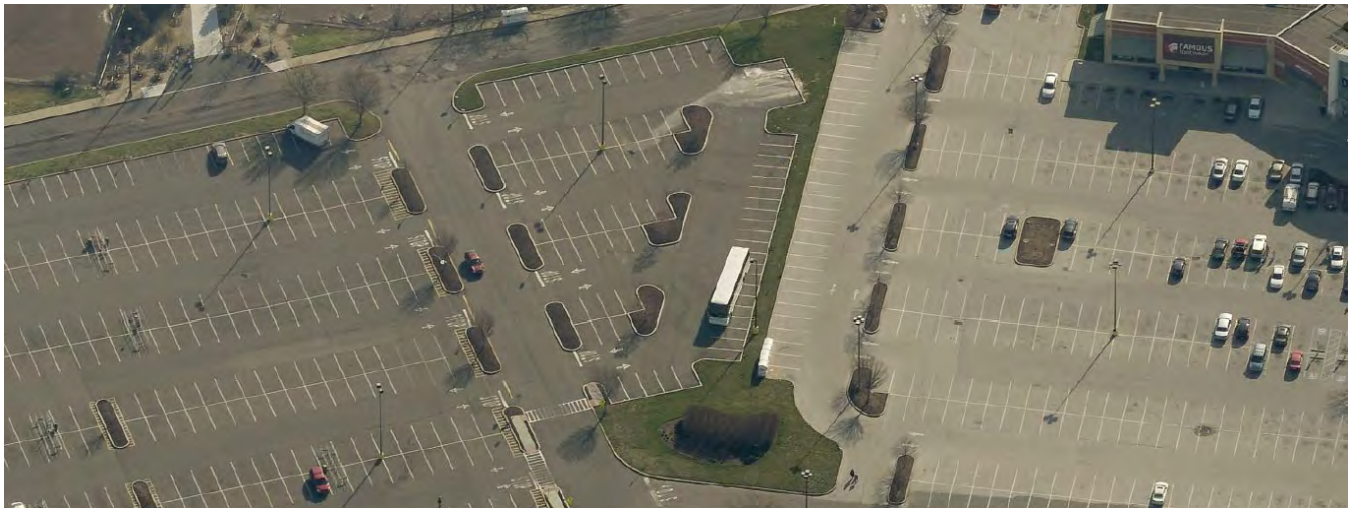
Figure 82 | Pier 70 Existing Conditions Looking West

Source: City of Philadelphia (2018)

Figure 83 | Proposed Pier 70 Transit Facility Looking West

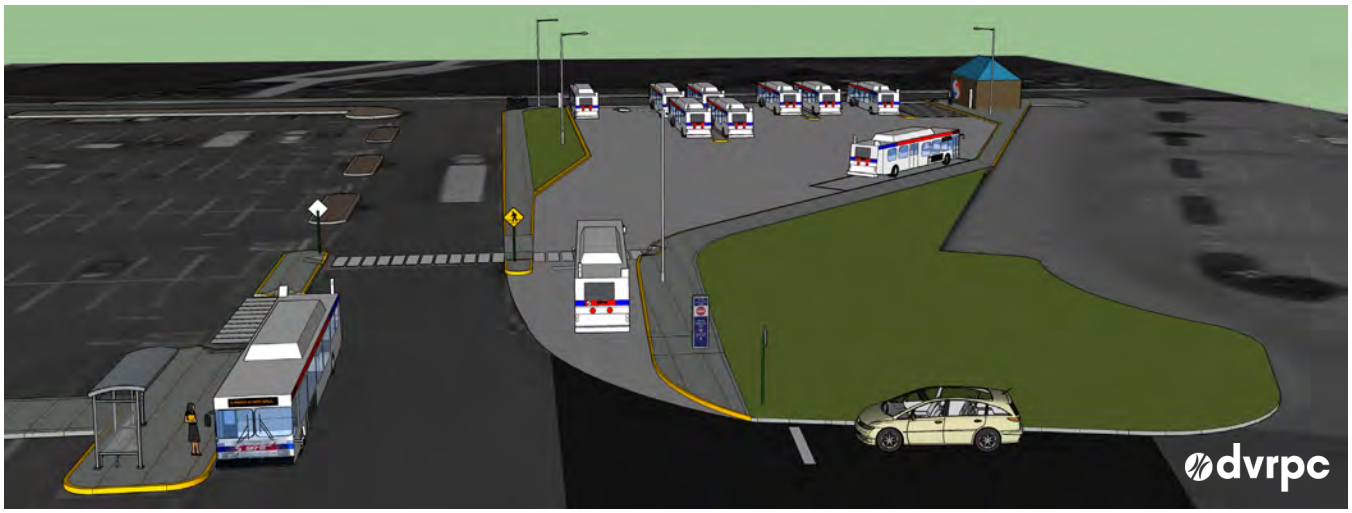
Source: DVRPC (2018)

Figure 84 | Pier 70 Existing Conditions Looking East



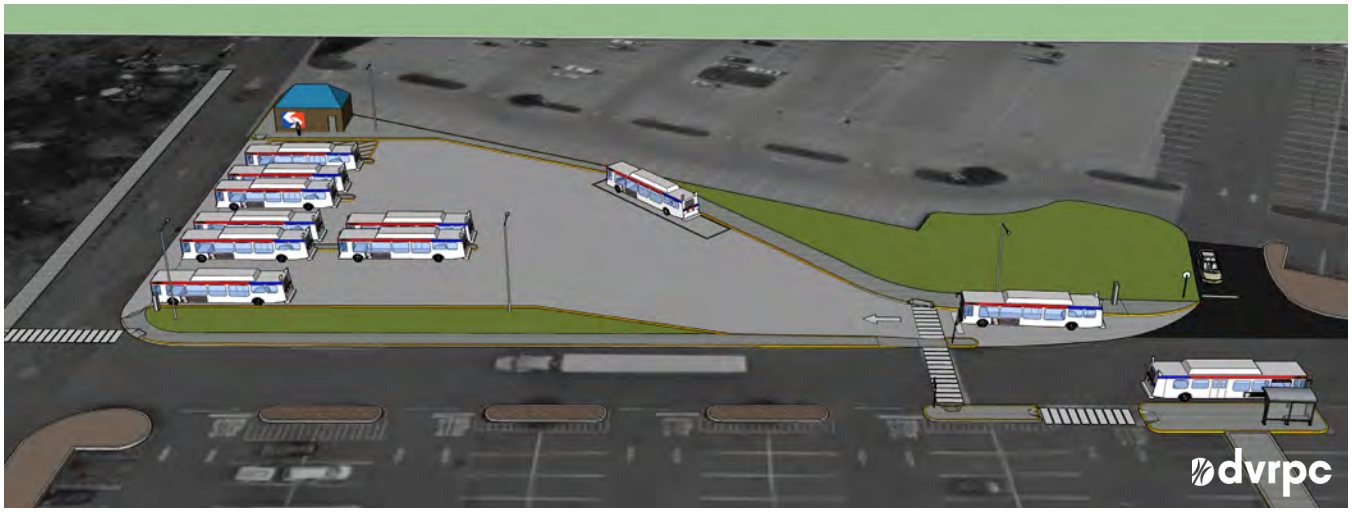
Source: City of Philadelphia (2018)

Figure 85 | Proposed Pier 70 Transit Facility Design, Looking East



Source: DVRPC (2019)

Figure 86 | Proposed Pier 70 Transit Facility Design, Looking South



Source: DVRPC (2019)

3rd Street Proposed Transit Facility

The proposed 3rd Street transit facility is located on South 3rd Street south of Oregon Avenue; it is within the City of Philadelphia Streets Department right-of-way. This section of 3rd Street is a cul-de-sac that connects to a back entrance of Whitman Plaza to the southwest (see Figure 87). This is where SEPTA vehicles currently lay over. Table 37 are the proposed routes that would turn around and lay over at the new facility. Other neighboring properties include Oregon Market to the west; the former Toys "R" Us to the east (now occupied by a seasonal Halloween store); the Oregon Diner; and Ritz Car Wash, Lube, and Detailing Center to the north (see Figure 88.)

The street is primarily used for deliveries and typically has semi-trucks parked along each side of the street. Additionally, DVRPC staff found that the turn-around area at the end of 3rd Street is used for illegal dumping (see Figure 89).

3rd Street has two proposed designs: one which is primarily located within the right-of-way owned by the City of Philadelphia and another that is designed within the former Toys "R" Us property east of 3rd Street shown in Figure 87.

Figure 87 | Aerial of South 3rd Street Terminus South of Oregon Avenue

Aerial imagery: City of Philadelphia (2017)

Table 37 | Summary of Total Proposed Trips (Entering and Exiting) 3rd Street

Route	25			47			57		
Day of Week	WD	SAT	SUN	WD	SAT	SUN	WD	SAT	SUN
Total Trips	68	54	54	258	152	125	196	106	106

Sources: DVRPC and SEPTA (2017)

Figure 88 | South 3rd Street at Oregon Avenue

Source: City of Philadelphia (2018)

Figure 89 | South 3rd Street Cul-de-Sac Looking North

Source: City of Philadelphia (2018)

3rd Street Layover Facility, In-Street Design

The first proposed design for the 3rd Street transit facility is shown in Figures 90 and 91. The existing right-of-way and sidewalk areas are used to limit costs associated with purchasing property or easements. One challenge with using street right-of-way is that the turn-around at the end of 3rd Street may be too small for SEPTA buses to make a full 180-degree turn. This design attempts to solve this issue by taking the underused sidewalk located along the southwest side of the turn-around and make it part of the bus right-of-way.

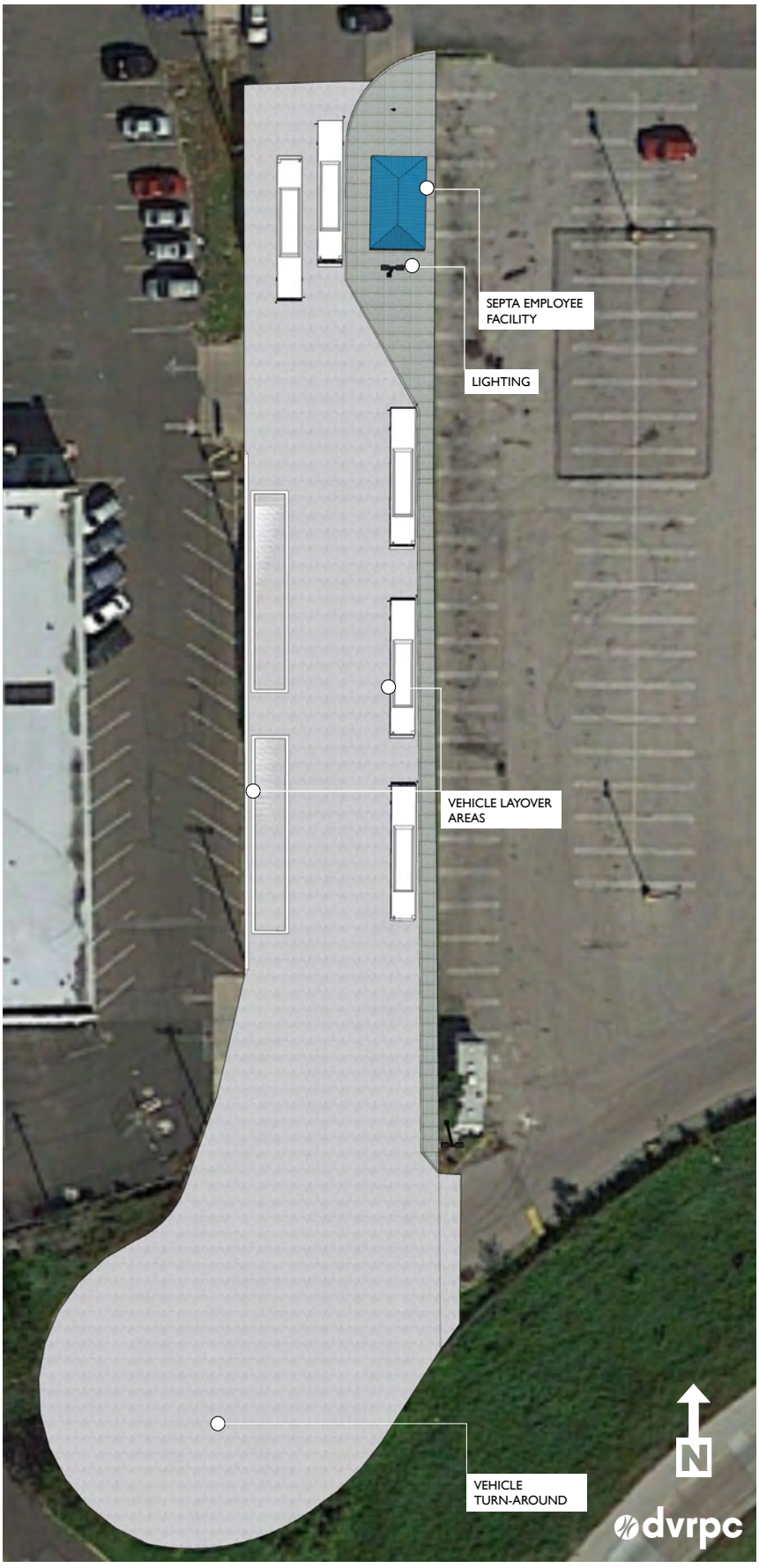
The existing sidewalk and grass along the east side of the street (which is 20 feet wide, total) is currently underused. This design shows a sidewalk where grass currently exists, and the sidewalk area has a bus bay large enough for three SEPTA vehicles to lay over. By taking a portion of the sidewalk, it clears space within the right-of-way for vehicles to comfortably pass one another, as well for two vehicles to lay over along the western curbside of the street.

A small portion of property, roughly 1,000 square feet, would need to be purchased or leased by SEPTA to build the SEPTA employee facility located on the north side of the layover. Additional lighting should be included throughout the facility area. A plan view of this design is shown in Figure 91

Figure 90 | 3rd Street Transit Facility, In-Street Design Looking South

Source: DVRPC (2019)

Figure 91 | 3rd Street Transit Facility, In-Street Design



Source: DVRPC (2019)

3rd Street Layover Facility, Off-Street Design

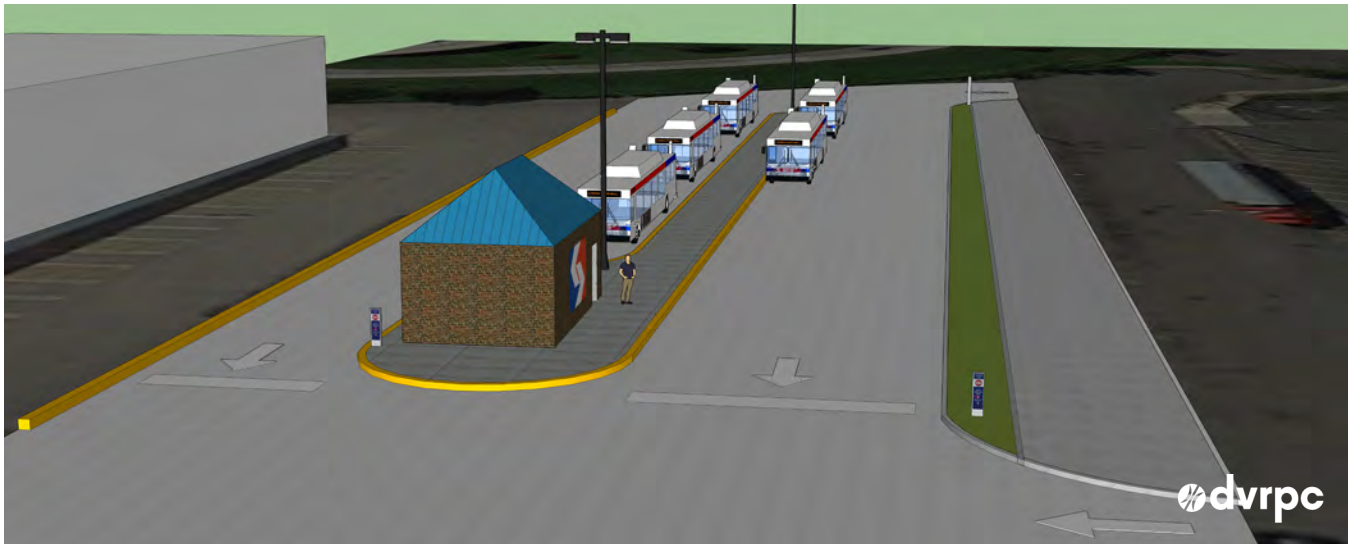
SEPTA requested an additional design for 3rd Street located in the former Toys "R" Us parking lot just east of the 3rd Street right-of-way. This design would require SEPTA to purchase or lease approximately 25,000 square feet of land. In the design, vehicles would drive to the end of 3rd Street and turn left into the entrance of the parking lot located on the southeast side of the street.

Vehicles would then turn into one of two marked SEPTA-only driveways and park along a 10-foot wide raised median (see Figures 92 and 93). The eastern boundary of the transit facility would be delineated by a curb to separate shopping center traffic from the facility. Entrances and exits from the parking lot would be built with concrete to improve durability and would be shared with the public. A SEPTA employee facility would be located near the north side of the station area. A plan view of this design is shown in Figure 94.

Figure 92 | Third Street Transit Facility, Off-Street Design, Looking Northeast

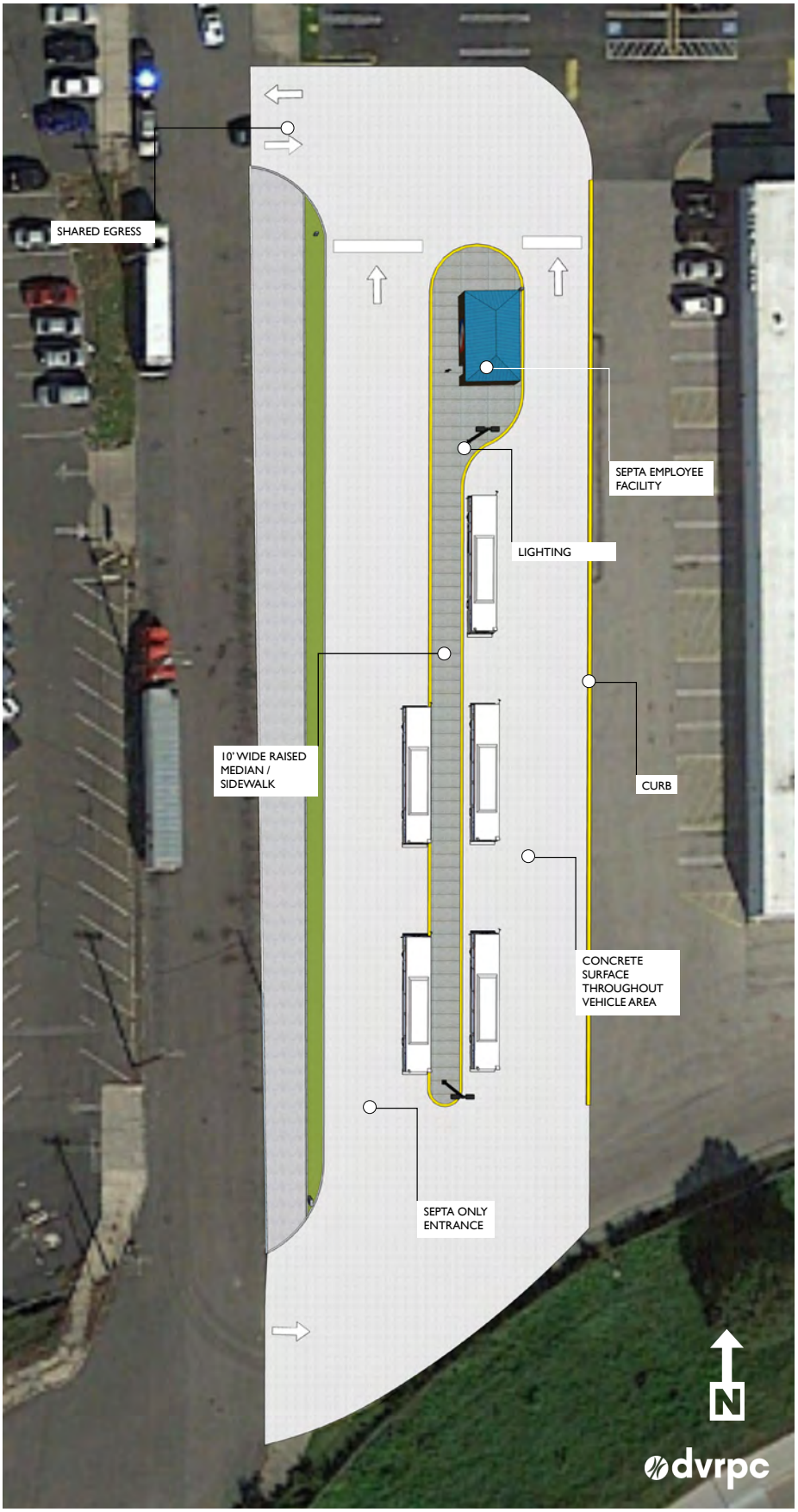
Source: DVRPC (2019)

Figure 93 | Third Street Transit Facility, Off-Street Design, Looking South



Source: DVRPC (2019)

Figure 94 | 3rd Street Transit Facility, Off-Street Design



Source: DVRPC (2019)

Undeveloped Land on Columbus Boulevard Next to Pier 70

Source: City of Philadelphia (2018)

Chapter 5: Next Steps

A number of actions need to be taken to implement the recommendations in Chapter 4. The team prioritized three next steps that can be taken by SEPTA staff to take action on the recommendations of this plan. The steps may require some additional funds and dedicated staff time. Following these steps should help SEPTA move closer to creating a transit facility for operators and passengers in the studied area.

Investigate Real Estate Acquisition

A crucial step in deciding between possible transportation center locations is for SEPTA's real estate department to reach out to land owners about purchasing or establishing long-term leases for the following properties:

1. 1675 S Christopher Columbus Boulevard: The triangular lot proposed for a transit facility at Pier 70 is owned by Walmart Real Estate Business Trust. The property was originally sold to Walmart by the City of Philadelphia for $1 in 2011.

2. 2743 S 3rd Boulevard: The former location of Toys "R" Us is owned by TRU Taj LLC, a debt-issuing company that is a subsidiary of Toys "R" Us Inc. The company is based in Wayne, New Jersey.

3. 2204-6 S Christopher Columbus Boulevard is owned by IKEA Capital BV.

Figure 95 shows aerial views of the three parcels.

Figure 95 | Potential Real Estate Acquisition Sites for SEPTA

Source: City of Philadelphia (2018)

City of Philadelphia Streets Department Authorizations

To move forward and create a dedicated facility at 3rd Street, SEPTA needs to work with the City of Philadelphia agencies (oTIS, PWD, and PCPC) to get the following authorizations from the Streets Department. These ideas could require more analysis and investigation.

- Close part of 3rd Street south of Oregon Avenue to public traffic, and create a designated SEPTA-only layover location.
    - Known Need: Discuss and observe access on 3rd Street and the driveways leading to Oregon Market and Whitman Plaza, and the possibility of striking the street as a public right-of-way.
- Install a traffic signal at the intersection of South 3rd Street and Oregon Avenue that will give buses priority to make a left onto Oregon Avenue from 3rd Street.
    - Known Need: Analysis of traffic signal density on Oregon Avenue.
- Assessment of utilities needed for the placement of SEPTA operator restrooms at any selected facility.
- Coordination with the PWD should continue for possible inclusion of green infrastructure at any selected facility.

SEPTA Operator Information Gathering

Discuss and gather information from SEPTA operators. Questions should target how and what operators find to be the most difficult obstacles on these routes in terms of street design and other operations issues. This can provide insight to the priority of capital and operational projects and modifications.

South Philadelphia Transportation Center

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Abstract: This study investigates the best location for a transit facility in South Philadelphia where SEPTA-owned property is limited. Bus operations analyses and conceptual site designs were done for sites that were favored.

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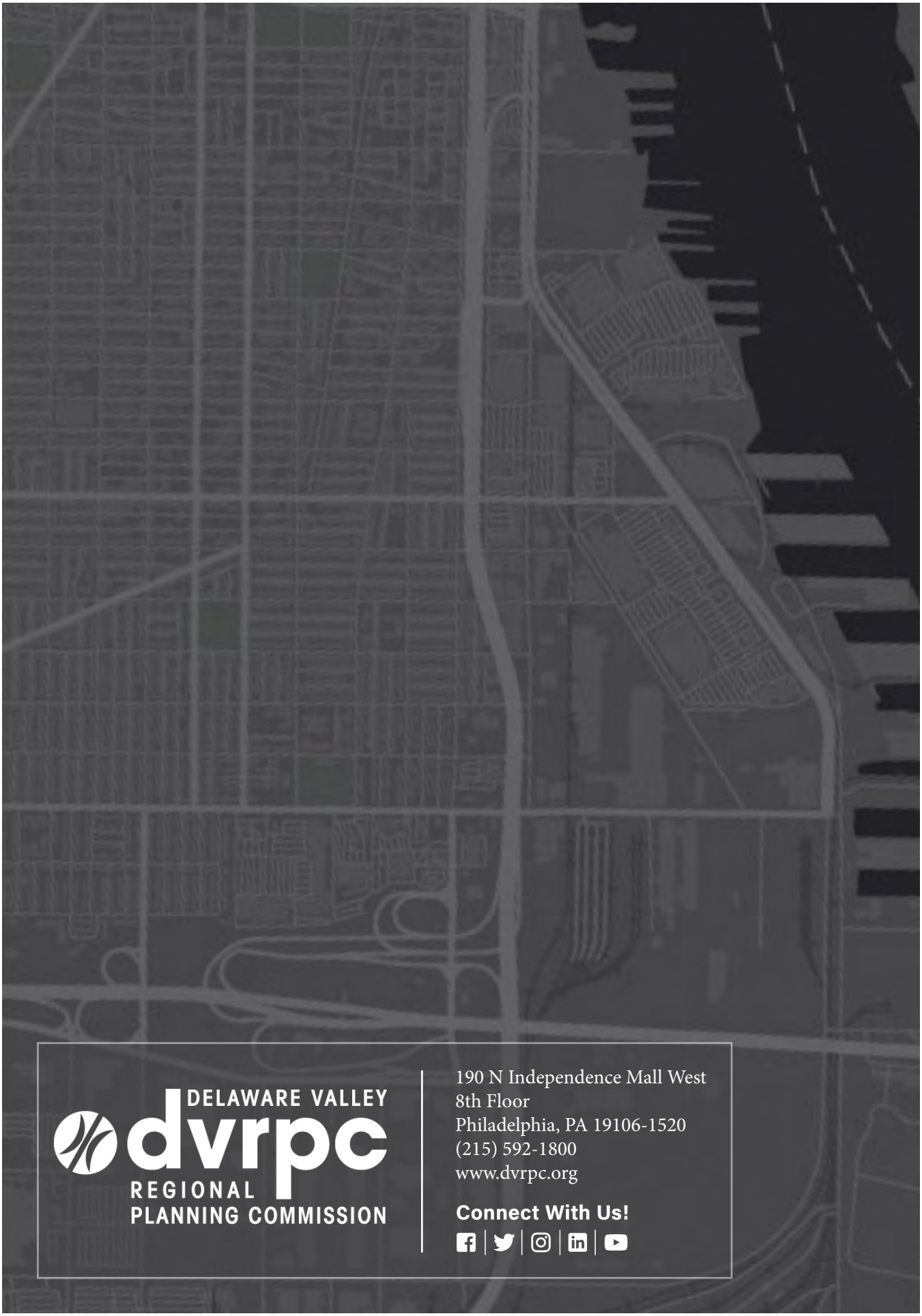

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