ENHANCED BUS SERVICE

on West Chester Pike

dvrpc

FEBRUARY 2016

The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great region even greater. Shaping the way we live, work, and play, DVRPC builds consensus on improving transportation, promoting smart growth, protecting the environment, and enhancing the economy. We serve a diverse region of nine counties: Bucks, Chester, Delaware, Montgomery, and Philadelphia in Pennsylvania; and Burlington, Camden, Gloucester, and Mercer in New Jersey. DVRPC is the federally designated Metropolitan Planning Organization for the Greater Philadelphia Region — leading the way to a better future.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

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The Delaware Valley Regional Planning Commission (DVRPC) conducted this study to provide a blueprint for improving the quality of transit service on the corridor. This study builds on the findings and recommendations of several previous planning efforts by DVRPC and its planning partners focused on the corridor. Like prior studies, it focuses on SEPTA's Route 104 bus, the lone route that provides end-to-end service along the corridor. The study team set out to accomplish three objectives:

- Develop express service operational concepts that can be piloted and evaluated by SEPTA,
- Identify strategies to enhance pedestrian access to high-priority bus stops, and
- Promote coordination between corridor municipalities as they plan for the future of West Chester Pike.

Efforts to improve transit along West Chester Pike can be understood as part of a larger transit service concept known as Enhanced Bus Service (EBS). EBS can improve mobility along corridors where transit options are often limited to local bus service by providing faster travel times and a more comfortable experience for passengers.

On West Chester Pike, EBS will be defined by four characteristics that will distinguish it from existing service:

Faster: Travel time is improved by consolidating service to a small number of strategically-located stops.

More Comfortable: Enhanced stops will make using the service more convenient and pleasant.

Better Connected: Pedestrian access improvements will make walking to and from stops safer and more direct.

Branded: Consistent and distinctive treatments on vehicles, shelters, and signage will enhance the image of the service.

The successful implementation of EBS will require continued collaborative planning. Key implementation actions described in the report include assembling a coalition to advocate for improved mobility along the corridor, piloting the EBS route on the corridor, and making localized pedestrian access improvements at priority stations.

PLANNING FOR THE FUTURE

Recently, Marriot International announced its intention to relocate its corporate headquarters to a transit-accessible site in suburban Maryland. According to the Washington Post, this move is

"...the latest sign that mass transit, once viewed as a prescription for traffic congestion, is now considered a must-have economic development tool to attract millennials – the country's largest living generation – along with their employers, and the taxes they contribute to local governments. Adding to the demand is the country's second largest demographic group: empty-nest baby boomers seeking to downsize in the suburbs and drive less as they grow older."

Suburbs such as Montgomery County Rethink Transit to Court Millennials
Washington Post, March 29, 2015

1. Introduction

Pennsylvania Route 3 (PA 3)/West Chester Pike is one of the region's most important transportation and economic corridors. Between West Chester Borough and the 69th Street Transportation Center, the corridor passes through ten communities in Delaware and Chester counties. The area within one half-mile of the corridor is home to over 90,000 people, 50,000 jobs, and a number of regionally significant destinations. Despite its stature, residents and visitors have few options beyond the private automobile for traveling along the corridor.

The Delaware Valley Regional Planning Commission's (DVRPC) 2011 Report *Boosting the Bus: Better Transit Integration Along West Chester Pike* (Publication # 10033) presented a vision for transit service along West Chester Pike in which buses become a mode of choice rather than a last resort. The key to this transformation is not only faster transit travel times, but also an enhanced quality of service that emphasizes convenience, comfort, and safety. The 2011 study determined that the best-case bus operating pattern could be achieved by combining limited-stop (express) service with transit signal priority (TSP) and far-side bus stop locations. Of these elements, the consolidation of stops was deemed to have the largest impact on projected travel time savings. A number of other transit-supportive studies have analyzed elements of transit service and portions of the corridor in recent years.

This study, *Enhanced Bus Service on West Chester Pike*, was conducted by DVRPC to help turn this collective transit vision into a reality. Like earlier efforts, this study focuses on SEPTA's Route 104 Bus, the lone route that provides end-to-end service along the corridor. This study seeks to accomplish three objectives central to the goal of improving transit service along West Chester Pike:

- Develop express service operational concepts that can be piloted and evaluated by SEPTA,
- Identify strategies to enhance pedestrian access to high-priority bus stops, and
- Promote coordination between corridor municipalities as they plan for the future of West Chester Pike.

Meeting these objectives required working with a broad coalition of corridor stakeholders. Throughout the study, DVRPC's work was guided by a Study Advisory Committee consisting of representatives from SEPTA, PennDOT, Delaware County, Chester County, the Transportation Management Association of Chester County (TMACC), and the Delaware County Transportation Management Association (DCTMA). DVRPC also conducted a stakeholder workshop to share information about the corridor and gather specific feedback on potential transit improvements. For more information about the workshop, see the sidebar on page 4.

A Regional Perspective

Enhancing bus service along important corridors is becoming a priority for municipalities and transit providers in the Greater Philadelphia Region. The need is greatest along those corridors that are not well served by existing rail lines, where transit options are often limited to local bus service.

The discussion of how to improve bus service on West Chester Pike is happening alongside a number of similar planning efforts in other parts of the region, most notably along Roosevelt Boulevard in Philadelphia and Bucks County. Together, these efforts to improve bus transit are referred to as Enhanced Bus Service (EBS). EBS is a transit concept that can help bridge the gap between conventional bus service and higher-performing levels of transit such as Bus Rapid Transit (BRT) and rail. More information on EBS is provided in Chapter 3.

Although EBS may vary from one part of the region to another based on local conditions and transit service objectives, these efforts share common goals: faster buses and a more comfortable and enjoyable passenger experience.

Document Overview

Providing effective suburban transit service can be a difficult task. The remainder of this chapter is dedicated to documenting the challenges and benefits of operating and improving transit service in suburban environments. The second chapter provides some context on the West Chester Pike corridor itself and describes how it is currently served by transit. Chapter 3 details an express transit concept for the study area as well as a variety of strategies designed to promote transit use along the corridor. Chapter 4 identifies a variety of pedestrian access elements and illustrates how they can be applied to priority stops along the corridor. The report concludes by recommending a series of implementation actions.

Throughout this document, additional information is presented in blue sidebars. Look for the 🔍 symbol for background on the study or commentary on the issues affecting the corridor.

The Suburban Transit Challenge

There are multiple reasons why suburban areas have traditionally been difficult places for buses to serve. Defined by low-density land uses and highly dispersed activity centers, the suburbs were designed for automobiles. How can buses compete with cars in these types of environments when every trip is practically door-to-door, and free parking is abundant?

Answering this question will require new ways of thinking about suburban mobility. In the Greater Philadelphia Region, this often means redesigning pedestrian-unfriendly arterials as mixed-use, multi-modal corridors. However, the process of physically reshaping these arterials into streets that better accommodate all modes of travel is a time-consuming and gradual process. In order to

🔍 BUILDING CONSENSUS

As part of this study, DVRPC conducted a stakeholder workshop at the Newtown Township Municipal Building on February 4, 2015. Thirty-three invited stakeholders participated in the workshop, including representatives from nine of the ten municipalities through which the Route 104 passes. The purpose of the workshop was to share thoughts and experiences related to transportation and development along West Chester Pike.

During the workshop, participants worked in small groups to complete structured activities related to bus stop prioritization, transit amenities, and site improvements.

According to participants, key considerations for future transit service should include:

- Faster service from one end of the corridor to the other,
- Safer, more accessible bus stops with covered waiting areas,
- Convenient pedestrian connections between stops and adjacent land uses,
- Enhanced vehicles that offer a more comfortable ride for long-distance commuters, and
- New development along the corridor that supports transit use.

MAKING THE CASE FOR TRANSIT

Public transportation provides greater mobility and freedom for people from every walk of life. However, it is important to remember that you don't need to use public transportation to feel like it benefits you.

Health

According to the Victoria Transport Policy Institute, individuals who use public transit get over three times the amount of physical activity per day than those who don't by walking to stops and final destinations. Breathing fresh air, driving safely, being physically active, and avoiding excessive stress are all well-known ingredients of a healthy lifestyle that public transit supports.

Safety

Vehicle crashes are responsible for approximately 40,000 deaths (and many more injuries) per year, making them one of the largest causes of death for people under 50. The National Safety Council estimates that riding the bus is over 170 times safer than automobile travel.

Economic

Car payments, maintenance, gas, and parking can be a major burden on household finances. According to the June 2015 *Transit Savings Report*, the American Public Transportation Association estimates that a two-person household can save an average of $9,530 by taking public transportation and living with one fewer car.

Beyond personal benefits, public transit can help mitigate the costs of delays and fuel consumption that are linked to traffic congestion. Furthermore, public transportation routes create strong communities by becoming natural focal points for economic and social activities. These activities help create strong neighborhood centers that are more economically stable, safe, and productive.

Environment

By reducing the number of cars on the road, public transportation can improve air quality, save energy, and reduce carbon emissions. Buses, especially newer diesel and electrically powered vehicles, produce less pollution than cars per passenger mile by using advanced technology and higher standards.

more effectively compete with the automobile and meet the changing needs and expectations of today's citizens in the near term, planners need to also rethink how buses operate along suburban corridors.

Along West Chester Pike, decades of suburbanization have resulted in a corridor that contains many of the features that make transit service challenging: an incomplete sidewalk network, imposing pedestrian crossings, and shopping and employment centers that are set back from the street. Despite these obstacles, transit service must play an important role in the future of West Chester Pike. Public transportation is a safe and affordable way to travel that saves energy, reduces traffic, and helps the environment. Some of the most commonly-cited benefits of transit service are listed in the sidebar on this page.

Despite a challenging operating context, SEPTA's Route 104 is already a success story. With nearly 3,400 weekday riders, the 21.3-mile route is the fourth busiest bus in SEPTA's Victory Division, which serves Chester, Delaware, and Montgomery counties. To help put this in perspective, the 111 buses that traverse West Chester Pike on a typical weekday represent less than one percent of vehicles on the corridor. However, despite this small presence, buses carry over 14 percent of total travelers on West Chester Pike.[1]

This relatively high ridership represents a strong foundation to build on. The alignment of the route itself also helps to justify further investment in the line. In addition to serving a number of important commercial and employment centers, Route 104 is anchored by major educational institutions and transportation facilities: in the west by West Chester University and the West Chester Transportation Center; in the east by 69th Street Transportation Center (see Figure 1).

Although these destinations ensure continued demand for transit service along West Chester Pike, there are several reasons why transit service may become essential to the long-term economic competitiveness of the communities along the corridor. A combination of demographic trends and citizen preferences point to the growing importance of walkable, transit-accessible environments.

According to US Census Bureau Population Projections, the US population is expected to grow by 18 percent between 2010 and 2040.[2] Arthur C. Nelson describes the potential implications of this growth in his 2013 book, *Reshaping Metropolitan America*. According to Nelson, two aspects of this growth will

have a particularly significant impact on the real estate market: the aging of the population and the changing composition of households. In 2010, 13 percent of the U.S. population was aged 65 and older. By 2040, this group will number 81 million and account for roughly 20 percent of the population. Similarly, more than 80 percent of growth in households is expected to be households without children.[3] These trends make sense given that baby boomers are now often empty nesters; and their offspring, commonly referred to as millennials, are for the most part delaying marriage and parenthood.

The growth of these demographic groups, currently the two largest in the country, has important implications for transportation planning. Transit provides access to essential needs later in life. Buses can function as a lifeline for nondrivers, particularly seniors and disabled individuals. However, the option to live in walkable neighborhoods with the opportunity to travel by public transportation is becoming an increasingly common lifestyle preference for seniors.

Meanwhile, having a variety of transportation options appears to be a way of life for the millennial generation, born between 1980 and the early 2000s. Averse to being car-dependent and less interested in car ownership than their predecessors, young people are more likely than previous generations to want to live in walkable, transit-accessible environments.

These demographic trends are being reinforced by two important travel trends. In 2014, Americans took 10.8 billion trips on public transportation —the highest in 58 years. Conversely, in recent years, the total vehicle-miles-traveled by Americans has remained below the 3.05 trillion miles recorded during the peak year of 2007.

Figure 1: Route 104 Anchors

Access to transit also seems to be a critical factor in the housing and location decisions households are making. The *2015 Community Preference Survey*, conducted by the National Association of Realtors, notes that Americans continue to desire the closeness and convenience that comes from communities where walking is easy and where errand and commute times are short. When asked to identify the most important factors in deciding where to live, 64 percent of respondents listed having public transit nearby as "very" or "somewhat important."[4]

When considered together, the evidence seems to point toward a growing demand for a more compact, less sprawling, less car-dependent way

of life. Communities that wish to remain attractive given these shifts will need to assess how well the amenities and services they offer correspond with the preferences of the residents and businesses they hope to attract and retain. Along corridors such as West Chester Pike, which are not served by rail or rapid bus lines, upgrades to traditional bus service will be necessary to meet changing lifestyles and remain competitive.

2. Corridor Overview

UNDERSTANDING WEST CHESTER PIKE

To successfully plan for effective transit service, policymakers must understand how West Chester Pike currently functions and what it means to the communities through which it passes. This chapter provides detailed information on the West Chester Pike Corridor and its existing transit service. In many places, the focus is on areas within close proximity (generally one-quarter mile) to West Chester Pike because this is the area most likely to draw transit users. In other cases, more generalized information is provided to help provide a comprehensive view of the corridor.

Location and Context

The study area is part of the larger Pennsylvania Route 3 (PA-3) corridor, a 24.3-mile state highway that connects West Chester Borough—the county seat of Chester County, Pennsylvania—with City Hall in Philadelphia. The majority of the route between West Chester Borough and 69th Street in Upper Darby is a four-lane suburban arterial known as West Chester Pike. The roadway includes a center-median with curbs along much of the route. The median, composed of grass and trees in the eastern half of the corridor and concrete in the western half, is a remnant left over from when trolley service operated to West Chester Pike between 1898 and 1954.

SEPTA's Route 104 is the only bus that provides end-to-end service along West Chester Pike from the 69th Street Transportation Center to West Chester.

The route passes through 10 municipalities, which have a combined land area of approximately 99 square miles and had a total population of 250,594 in 2010. These 10 communities amount to 11 percent of the land area of Chester and Delaware counties, but are home to 24 percent of the two counties' population. Many of the communities on the western end of the corridor—including East Goshen, West Goshen, and Westtown—are also projected to grow significantly in the coming decades (see Table 1). Without new transit options, this growth could contribute to additional congestion along the corridor.

Figure 2: Study Corridor

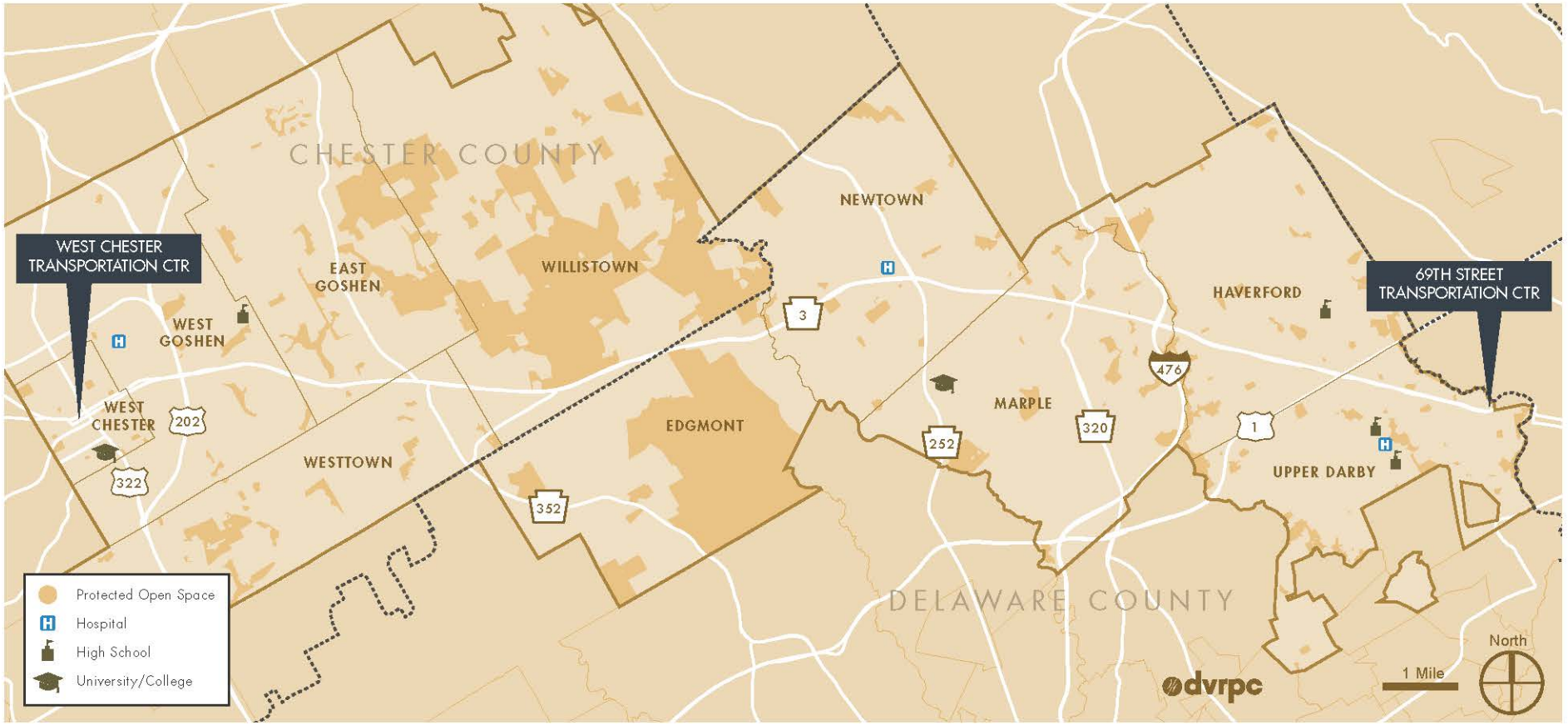


Table 1: Municipal Population

CHESTER COUNTY

Municipality	Community Type	2010 Census	2040 Forecast	% Change
East Goshen	Growing Suburb	18,026	22,397	24%
West Chester	Developed Community	18,461	20,164	9%
West Goshen	Growing Suburb	21,866	26,655	22%
Westtown	Growing Suburb	10,827	13,496	25%
Willistown	Growing Suburb	10,497	11,779	12%

DELAWARE COUNTY

Municipality	Community Type	2010 Census	2040 Forecast	% Change
Edgmont	Growing Suburb	3,987	4,672	17%
Haverford	Developed Community	48,491	48,585	0.2%
Marple	Developed Community	23,428	23,174	-1%
Newtown	Growing Suburb	12,216	12,438	2%
Upper Darby	Developed Community	82,795	85,354	3%

Source: DVRPC, Regional, County, and Municipal Population Forecasts, 2010-2040 (Publication ADR018-A, 2013)

The Long-Range Plan for the region, *Connections 2040*, classifies communities into four different planning areas: core cities, developed communities, growing suburbs, and rural areas. The municipalities on the eastern edge of the corridor—Upper Darby, Haverford, and Marple—are classified as Developed Communities, while five other municipalities—Newtown, Edgmont, Willistown, Westtown, East Goshen, and West Goshen—are classified as Growing Suburbs.

Connections 2040 recommends targeting growth in centers. The route passes through three centers: 69th Street in Upper Darby and West Chester in Chester County are considered *Town Centers*, while the Ellis Preserve development in Newtown is considered a *Planned Center*.

Communities

Given the length of the corridor, it is no surprise that West Chester Pike travels through a variety of community types and built and natural environments.

Upper Darby
The area south of the 69th Street Transportation Center is a walkable retail district, filled with a mix of large chain retailers and smaller convenience stores, variety stores, and beauty supply stores. Upper Darby's multicultural population is evident in the area's Thai, Vietnamese, Korean, Mexican, Salvadorian, and Punjabi restaurants. The blocks immediately west of the Transportation Center feature two-story attached buildings with ground floor retail.

West of State Street, the Township is largely characterized by small-lot single-family detached residential neighborhoods. Between Pennock Avenue and Linden Avenue, West Chester Pike has a more suburban commercial feel; many of the commercial uses, such as gas stations, car washes, and banks, have parking lots out front or drive-throughs around the building.

Haverford
The area near Darby Road in Haverford is dominated by big box stores, such as Kohl's, Lowe's Home Improvement, and Giant Grocery Store. The area north of West Chester Pike remains commercial westward to Eagle Road, while the area south of West Chester Pike is more residential. West of the Llanerch Country Club is downtown Havertown, where the Manoa Shopping Center is located. Between Havertown and I-476, there are primarily single-family homes with a few multifamily apartment complexes and medical facilities.

Sidewalks are common on both sides of West Chester Pike in both Upper Darby and Haverford, as well as along many side streets, with the exception of a few areas, which are generally parking lots or curb cuts to access businesses that front on West Chester Pike.

Marple
In Marple, much of West Chester Pike is residential with single-family homes fronting onto the corridor. Commercial uses are concentrated around the intersection of Sproul Road and West Chester Pike and west of Manor Road.

Newtown
After entering Newtown from the east, one passes Dunwoody Village, a retirement community set back from the road, to the south. The area around the intersection of PA 252 and West Chester Pike is a commercial center consisting of a number of shopping centers that are set back from the road.

THE EVOLUTION OF WEST CHESTER PIKE

Transit on West Chester Pike has a long, rich history. As far back as 1793, Philadelphia and West Chester were linked by a dirt road. The Philadelphia and West Chester Turnpike Company built a toll road between Philadelphia and Newtown in 1848. In the 1850s, it was converted from a dirt road to a plank road and then to a stone road in the 1880s.

A horse-drawn rail line was built along part of the turnpike in the late 1850s. Trolley service was established between Philadelphia and Newtown Square in 1896 and extended to West Chester within two years. In 1907, 69th Street Terminal opened. In 1918, West Chester Pike was designated a state highway. The trolley line was discontinued in June 1954 and replaced by buses. West Chester Pike was widened from two lanes to four lanes in the 1950s and 1960s.

A 1948 photo of West Chester Pike at Carol Boulevard in Upper Darby.
Source: Upper Darby Historical Society

The Ellis Preserve property, which includes a corporate campus and an under-construction shopping center, is located north of West Chester Pike, while an older neighborhood with ranch homes and a grid street pattern is located south of West Chester Pike.

Edgmont and Willistown
West of Newtown Square, the corridor is significantly less populated. There are several golf courses, the Okehocking Preserve, and several farms. Buildings are generally located far back from the road. There are no sidewalks in this part of the corridor, and the speed limit increases to 55 MPH.

Westtown
The portion of Westtown along West Chester Pike is characterized by single-family and townhouse subdivisions with curvilinear streets. There is a small auto-oriented commercial area near the intersection of West Chester Pike and PA 352, but no sidewalks.

East Goshen
Through most of East Goshen, West Chester Pike has a speed limit of 45 MPH and lacks sidewalks. The eastern edge is lined with trees, which shield some of the 1970s and 1980s two-bedroom townhome subdivisions, such as Steeplechase and Summit House, from the street. Farther west, there are multifamily apartment complexes, like Waterview Apartments, The Metropolitan at East Goshen, Rosehill Apartments, and the Racquet Club Apartments.

West Goshen
The section of the corridor in West Goshen is predominantly composed of auto-oriented commercial development surrounded by surface parking lots.

The largest shopping center is the West Goshen Town Center. There are several apartment complexes, including Golf Club Apartments, Strasburg Court Apartments, and Goshen Terrace Apartments. West of US 202, the westbound 104 travels briefly on Paoli Pike, where there are several shopping centers, such as the West Goshen Shopping Center and Turner Square, as well as several national retailers and fast food chains.

West Chester
In West Chester Borough, the landscape quickly changes to a dense, walkable downtown. The grid street pattern has short blocks and red brick sidewalks—a hallmark of this historic community that has been around since the 1780s. Gay Street and Market Street are lined with commercial storefronts, government buildings, banks, and religious institutions. The housing stock is a mix of rowhouses, twins, and single-family homes on small lots.

West Chester is also home to West Chester University, the western terminus of Route 104. The University is discussed in greater detail on page 25.

Land Use

There is a diverse mix of land uses within a half-mile of the SEPTA 104 Route—including residential, commercial, manufacturing, community services, and recreational, among others (see Figures 3 and 4). This diverse mix of land uses helps to justify enhanced bus service because it ensures that people will have a variety of destinations to access. Some may use the route to go to work, while others use it to go to school, shop, or to visit family and friends. A mix of destinations ensures that ridership on the bus will be high throughout the day, not just during peak periods.

More than half of the land within a half-mile of the 104 route is residential. Multifamily housing, such as apartments, tends to cluster along the ends of the corridor in West Chester and Upper Darby, while the majority of housing in the central section of the corridor is detached single-family. The second biggest land use category is wooded (15 percent), which is concentrated in Willistown and Edgmont. The third largest category is transportation and parking (8 percent), followed by commercial (7 percent), which tends to cluster directly on West Chester Pike.

There is an inconsistent sidewalk network and weak (or non-existent) infrastructure for pedestrians along much of the arterial. The importance of pedestrian connections is highlighted in DVRPC's *Philadelphia Regional On-Board Transit Survey* (Publication #14040), which showed that 95 percent of transit riders walk to their final destination in the morning, 91 percent walk to their final destination at midday, and 74 percent walk to their final destination in the evening. Investing in additional sidewalks will be needed to ensure that all residents—regardless of their mode of choice—arrive safely at their destination.

Figure 3: Corridor Land Use (2010)

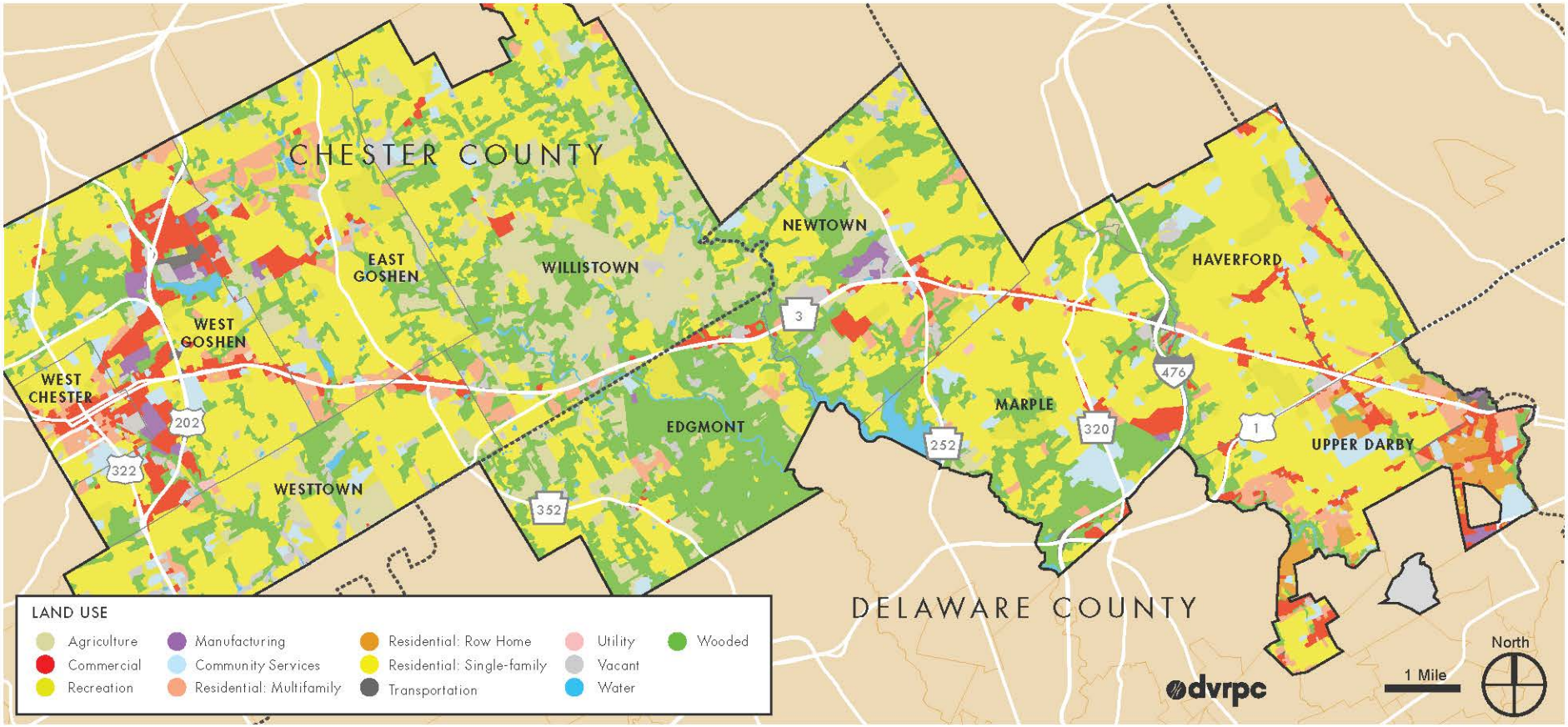
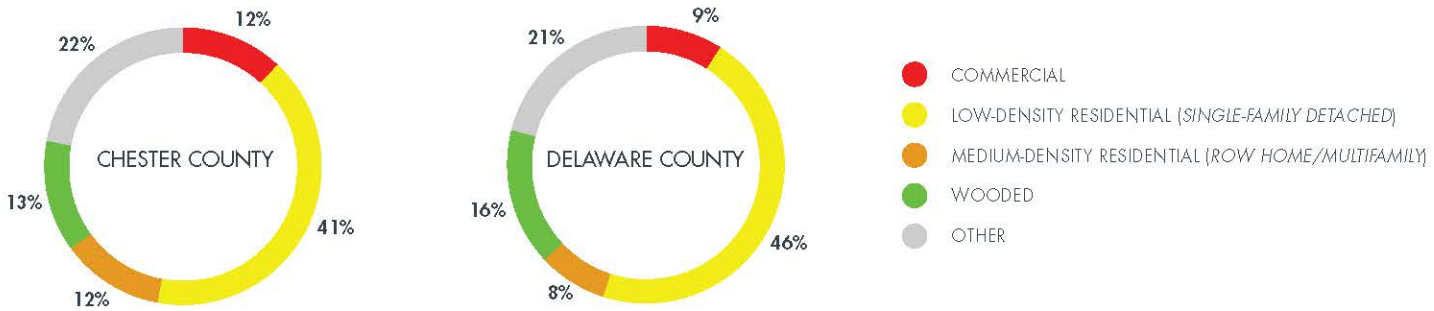


Figure 4: Land Use Within One-Half Mile of West Chester Pike (2010)



Source: DVRPC

Demographics

Approximately 57,500 people live within a quarter-mile of the SEPTA 104 route. This population represents a large potential pool of transit users that may be attracted to faster, more reliable bus service. The high number of potential riders living within a walkable distance of the route underscores the importance of pedestrian infrastructure that enables these residents to access the corridor.

Approximately 36 percent of these nearby residents are under the age of 25, while 13 percent are seniors over the age of 65. Young people and seniors are less likely to own cars, but they still need to travel to school, work, stores, doctor's appointments, and recreational activities. Enhancing bus service along West Chester Pike will offer more mobility options for these populations and all nearby residents.

The median income in Chester County is $86,050 and the median income in Delaware County is $64,041. Approximately 41 percent of households within one-quarter mile of the Route 104 earn less than $50,000 per year. Nearly one third of households earn between $50,000 and $99,999, while 29 percent earn over $100,000.

Indicators of Potential Disadvantage

As a Metropolitan Planning Organization (MPO), DVRPC is charged with evaluating plans and programs for environmental justice (EJ) sensitivity to historically disadvantaged populations. Accordingly, DVRPC has developed a methodology to identify potentially disadvantaged populations within the Greater Philadelphia region. Using 2012 Census data, DVRPC tracks eight population groups (defined by the U.S. Census Bureau) which may require special planning consideration:

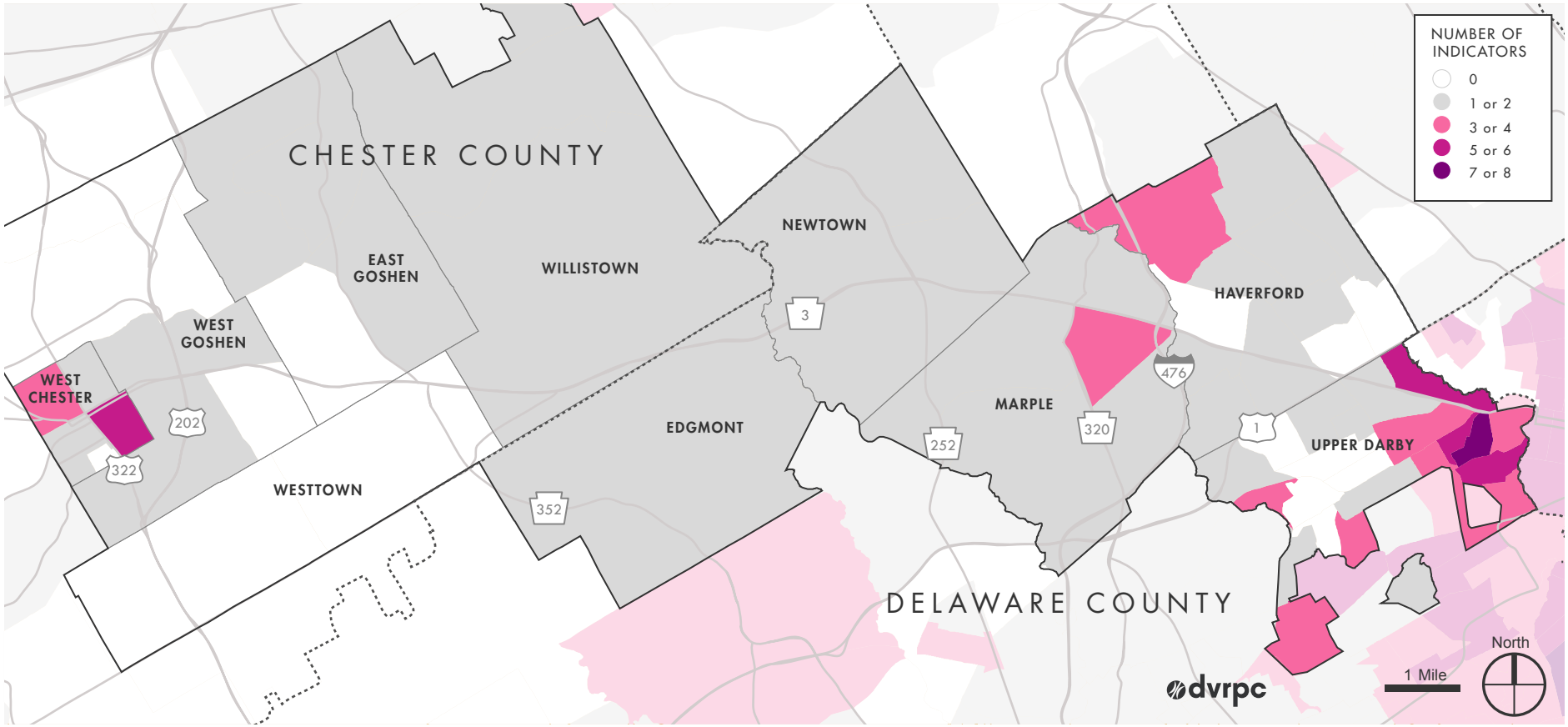
- Non-Hispanic Minority
- Carless Households
- Households in Poverty
- Female Head of Household with Child
- Elderly (75 years and over)
- Hispanic
- Limited English Proficiency
- Persons with a Physical Disability

Collectively, DVRPC refers to these factors as Indicators of Potential Disadvantage (IPD). Census tracts with a population that exceeds the regional average for any of these factors are considered EJ-sensitive.

There are 63 Census tracts within the 10 municipalities along the SEPTA 104 (see Figure 5). Of these, 15 (23 percent) have no indicators of potential disadvantage, while one Census tract in Upper Darby has a higher percentage than the regional average in seven of the eight categories.

Over half of the Census tracts have a higher proportion of carless households than the regional average. Additionally, over half of the households have a higher proportion of elderly residents. Carless households, households in poverty, and the elderly are likely to be transit dependent, so enhanced bus service will help these residents.

Figure 5: Indicators of Potential Disadvantage (2012)



INDICATOR	NUMBER OF CENSUS TRACTS IN THE STUDY CORRIDOR EXCEEDING REGIONAL AVERAGE
Non-Hispanic Minority	12/63 (19%)
Carless Households	33/63 (52%)
Households in Poverty	10/63 (16%)
Female Head of Household with Child	11/63 (17%)
Elderly (75 years and over)	33/63 (52%)
Hispanic	11/63 (17%)
Limited English Proficiency	12/63 (19%)
Persons with a Physical Disability	11/63 (17%)

Source: DVRPC

MOBILITY

Motorists, transit riders, and pedestrians all rely on West Chester Pike for getting around. In particular, buses and cars may have more in common than many may think. Because motorists and bus passengers share the same lanes along West Chester Pike, they experience the corridor in much the same way. This often means that improvements that decrease travel time for automobiles will also positively impact buses and vice versa. The remainder of this section will describe some of the key mobility issues and factors that influence planning for the corridor. Localized pedestrian improvements are discussed in Chapter 4.

Drive Time

When there is no congestion, it takes approximately 30 minutes for an automobile to travel on West Chester Pike between High Street in West Chester and State Road in Upper Darby.[1] During times of peak congestion, travel times average approximately 39 minutes (see Corridor Driving Times in Figure 7). However, due to accidents and other unforeseeable events, the planning time that a traveler should allow to ensure an on-time arrival can be closer to one hour when traveling westbound around 8:00 AM or 50 minutes traveling eastbound at 5:00 PM.

Part of the reason for the lengthy drive time along the corridor is the number of traffic lights. There are 89 traffic signals along the 104 Route, 41 of which are located in Chester County and 48 of which are located in Delaware County. These signals are all owned and operated by different municipalities, which means they are often not coordinated, which leads to delays for all vehicles on the road.

Congestion

As one of the few east-west connections between eastern Chester County and Philadelphia, West Chester Pike is a well-used arterial. However, traffic volumes vary considerably along West Chester Pike, ranging from approximately 8,300 vehicles to nearly 22,500 vehicles per day (both directions; see Figure 7). Congestion is generally worse at both ends of the corridor, while traffic flows more freely in the section west of Newtown Square and east of PA 352. The road is most congested in both directions during the morning and evening rush hours. Congestion is particularly heavy near West Chester Pike and I-476, especially traveling westbound on West Chester Pike in the morning in order to access the ramps for I-476 northbound (see sidebar on page 17 for more information).

All of West Chester Pike has been identified as a priority subcorridor in DVRPC's Congestion Management Process (CMP). The CMP identifies the following strategies as "Very Appropriate Strategies" for this corridor:

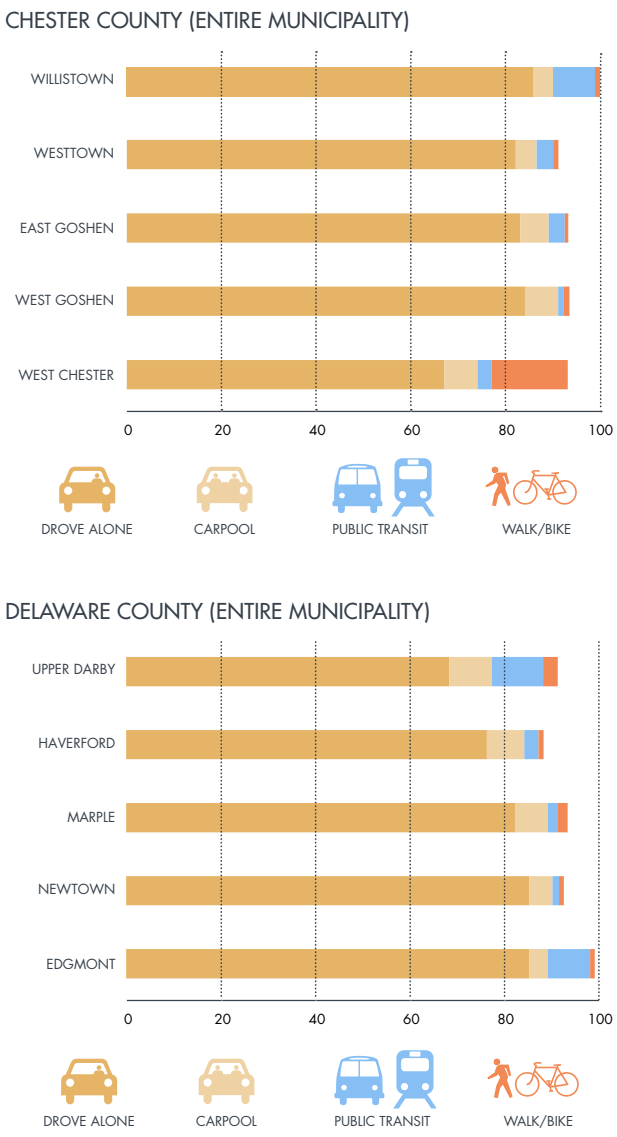
- Closed Loop Computerized Traffic Signals
- Transit Signal Prioritization (TSP)
- Enhanced Transit Amenities and Safety
- Turning Movement Enhancements
- Improve Circulation
- County and Local Road Connectivity

Many of these strategies are described in Chapter 3.

Journey to Work

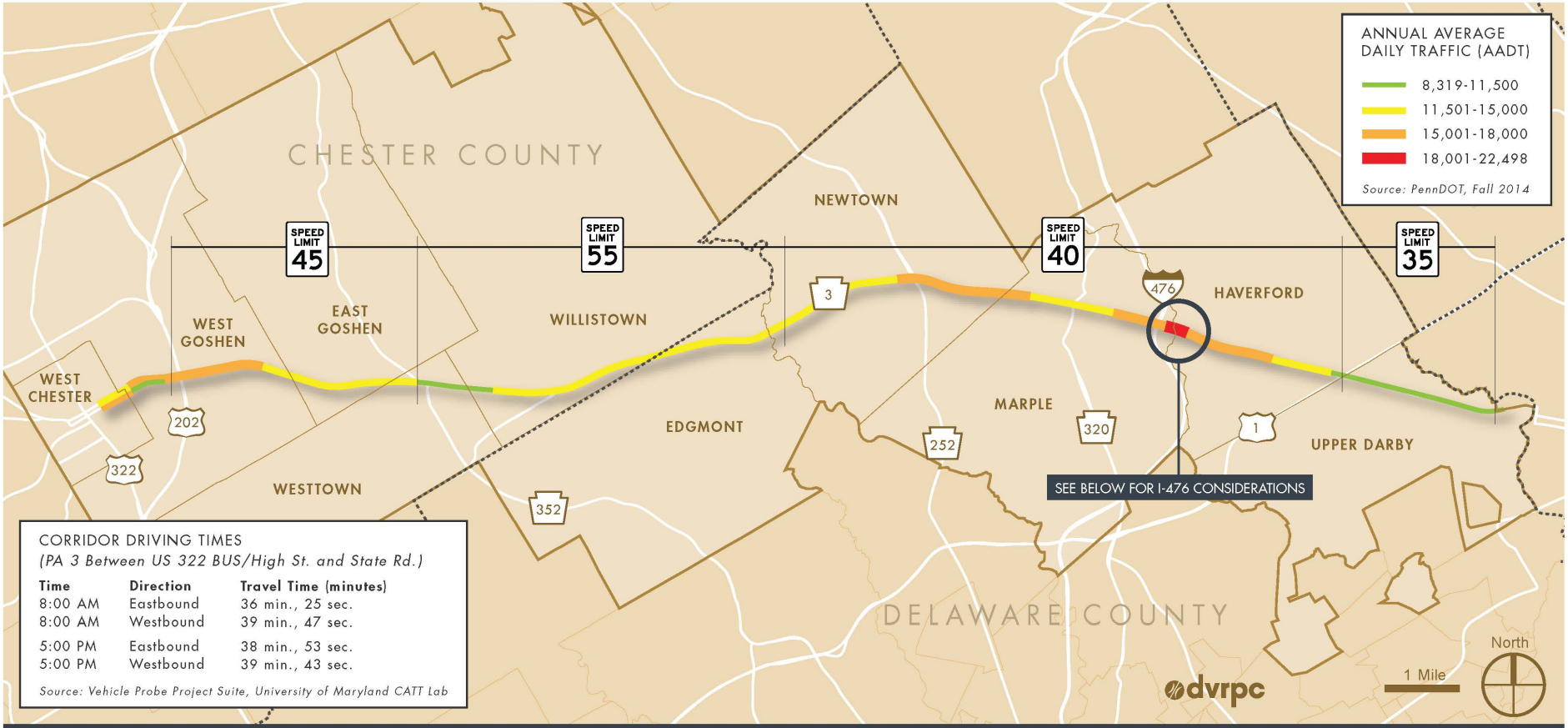
According to the 2013 American Community Survey five-year estimates, there are 123,376 commuters in the 10 communities along the 104 route. Over three-quarters of them drive to

Figure 6: Journey to Work Mode Choice



Source: U.S. Census Bureau,American Community Survey, 2008—2012

Figure 7: Corridor Traffic Volume and Drive Times



FIGHTING CONGESTION

Everyone knows that the most notorious congestion along West Chester Pike occurs at the I-476 Interchange. The congestion is most acute in the westbound direction during the morning peak as motorists attempt to access the northbound lanes of I-476. During the 8 AM hour, the westward 3.7-mile drive between US 1/Township Line Road and PA 320/Sproul Road can take over 20 minutes.

This morning congestion, and its afternoon reciprocal, impact transit users and drivers equally. Finding a way to mitigate this congestion will benefit all West Chester Pike users. The interchange, which falls in Marple Township, may be revised as part of the development of a 30-acre tract southwest of the interchange, near the Blue Route, West Chester Pike, and Lawrence Road. Preliminary plans call for a large commercial center, traffic lane alterations, and a traffic signal adaptive system to synchronize the lights on West Chester Pike from New Ardmore Avenue to South Lawrence Road.

Managing this congestion over the long term will require a variety of strategies. Furthermore, even though this congestion manifests itself locally in Marple and Haverford townships, the responsibility for improving the situation must be shared by municipalities and stakeholders all along the corridor.

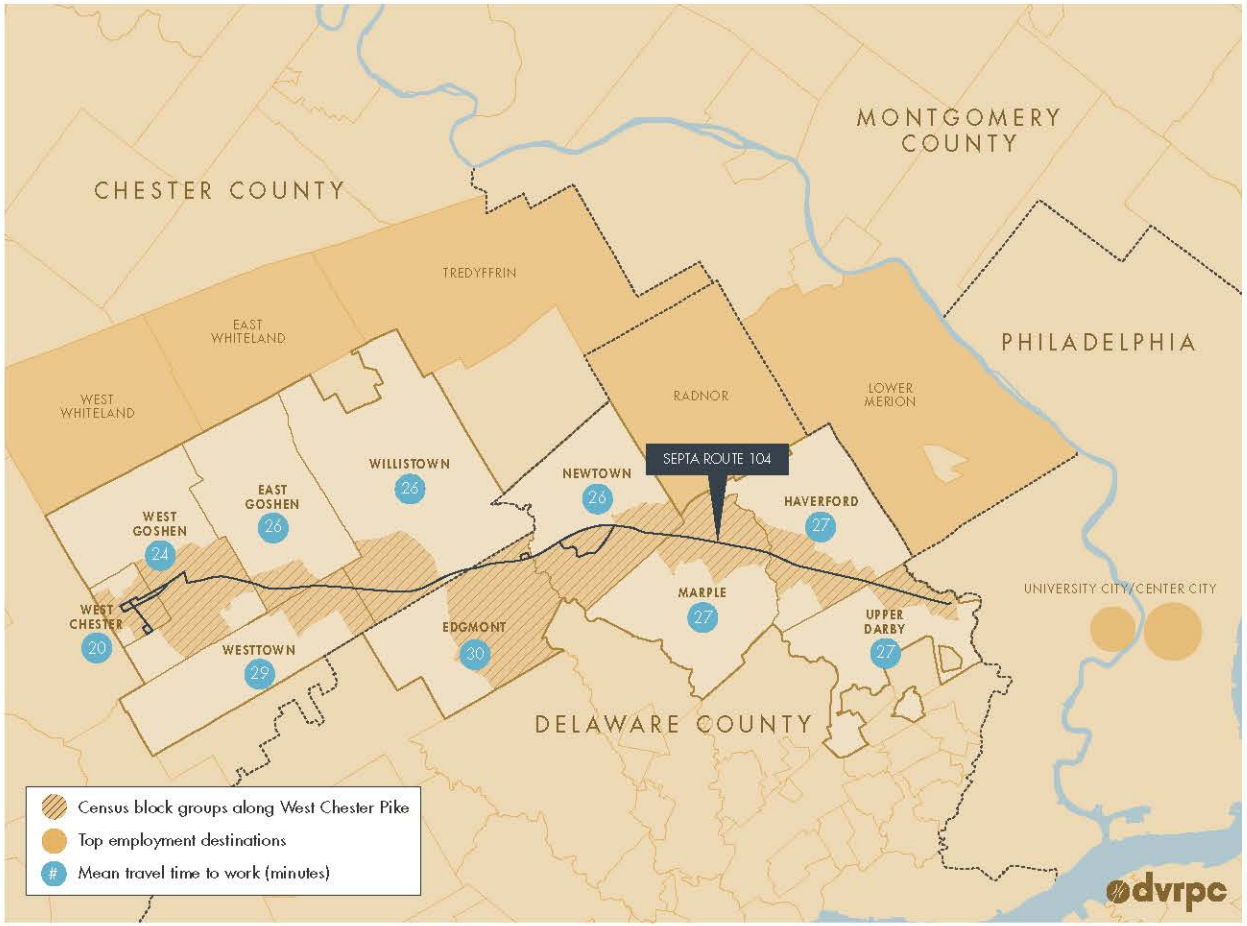
work alone (see Figure 6). Approximately eight percent carpool, while another eight percent take public transit. Because transit ridership in these communities is generally low, there is a larger market of potential riders who might consider switching to public transit once enhanced bus service is introduced and properly marketed.

Commuting Patterns

There are 22,859 commuting residents who live in Delaware County Census block groups served by the 104 (highlighted in Figure 8). Many of them—23 percent—travel to Philadelphia for work. Approximately 17 percent work in the study corridor municipalities of Upper Darby, Haverford, Newtown, or Marple. Other top employment destinations include locations outside of the corridor, such as Radnor and Lower Merion.

In Chester County, there are 14,856 commuting residents who live in the Census block groups served by the 104. Approximately 18 percent work in the corridor municipalities of West Chester, West Goshen, or East Goshen. An additional nine percent work in Philadelphia, while other top employment destinations include West Whiteland, East Whiteland, and Tredyffrin.

Figure 8: Employment Destinations



CHESTER COUNTY: 14,856 Commuting Residents

TOP EMPLOYMENT DESTINATIONS:

1. West Chester (10.2%)
2. Philadelphia (9.0%)
3. West Whiteland (5.2%)
4. West Goshen (4.7%)
5. Tredyffrin (4.2%)
6. East Goshen (2.9%)

DELAWARE COUNTY: 22,859 Commuting Residents

TOP EMPLOYMENT DESTINATIONS:

1. Philadelphia (22.9%)
2. Lower Merion (4.9%)
3. Upper Darby (4.8%)
4. Haverford (4.2%)
5. Newtown (4.0%)
6. Marple (3.9%)

Source: U.S. Census Bureau,American Community Survey, 2008—2012

ECONOMIC ACTIVITY

Major Employers

West Chester Pike is a major employment corridor. It functions as the spine of two regional employment centers (see Figure 9). There are 17,421 employers in the 10 municipalities along the study corridor; together they employ over 117,000 people[2]. More specifically, there are 7,670 employers that employ 50,635 people within a half-mile of the SEPTA 104 route. Figure 9 highlights the largest employers (those with 100 or more employees) within one-quarter mile of Route 104. The largest companies include: SAP in Newtown Square; West Chester University and the County of Chester in West Chester; Apple Vacations in Newtown Square; and several health care and social assistance facilities, such as Dunwoody Village. The Newtown Square Corporate Campus, composed of 15 corporate office buildings, is another important employment node along the corridor.

Just as the municipalities on the western end of the corridor are growing faster in terms of population, they are also expected to see more significant employment growth (see Table 2). According to DVRPC forecasts, West Goshen Township is expected to add the largest number of jobs—4,724—in terms of absolute change between 2010 and 2040, followed by East Goshen Township, which is expected to add 1,958 jobs.[3] West Chester Borough, Westtown Township, and Willistown Township are all expected to add over 900 jobs each over the next three decades. Where those jobs will be located will have a significant impact on future travel patterns along the corridor. Encouraging job growth in areas with better transit access can help keep more cars off the road and reduce overall congestion.

Overall, 55 percent of the employed population over 16 and living within one-quarter mile of the Route 104 are employed in the service industry. This group of workers represents a large potential pool of transit-reliant workers that can benefit from improvements to bus service along the corridor.

Shopping Centers

Shopping centers serve as commercial destinations and employment centers along the corridor. There are 23 shopping centers within a quarter-mile of the SEPTA 104 bus route, and many shoppers and employees use transit to reach these locations. Defined as three or more stores built as a unified structure, shopping centers come in a variety of shapes and sizes. The corridor's existing shopping centers can be classified into three types: strip centers, neighborhood centers, and community centers (see Figure 10). Combined,

Table 2: Municipal Employment

CHESTER COUNTY

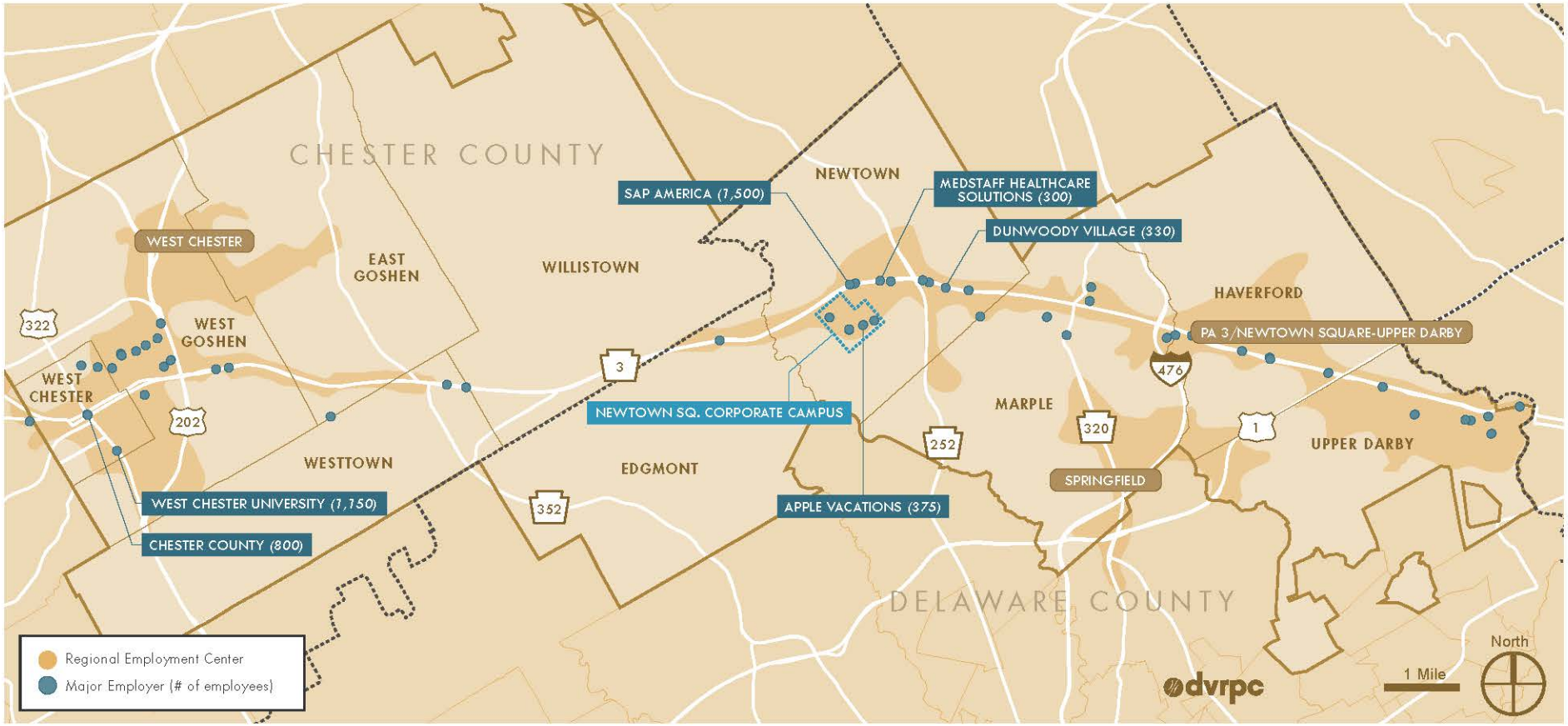
Municipality	2010 Employment	2040 Forecast	% Change
East Goshen	8,013	9,971	24%
West Chester	10,090	11,036	9%
West Goshen	26,066	30,790	18%
Westtown	3,749	4,688	25%
Willistown	7,432	8,355	12%

DELAWARE COUNTY

Municipality	2010 Employment	2040 Forecast	% Change
Edgmont	2,060	2,414	17%
Haverford	14,369	14,397	0.2%
Marple	12,277	12,144	-1%
Newtown	11,577	11,788	2%
Upper Darby	22,078	22,760	3%

Source: DVRPC, 2013

Figure 9: Corridor Employment



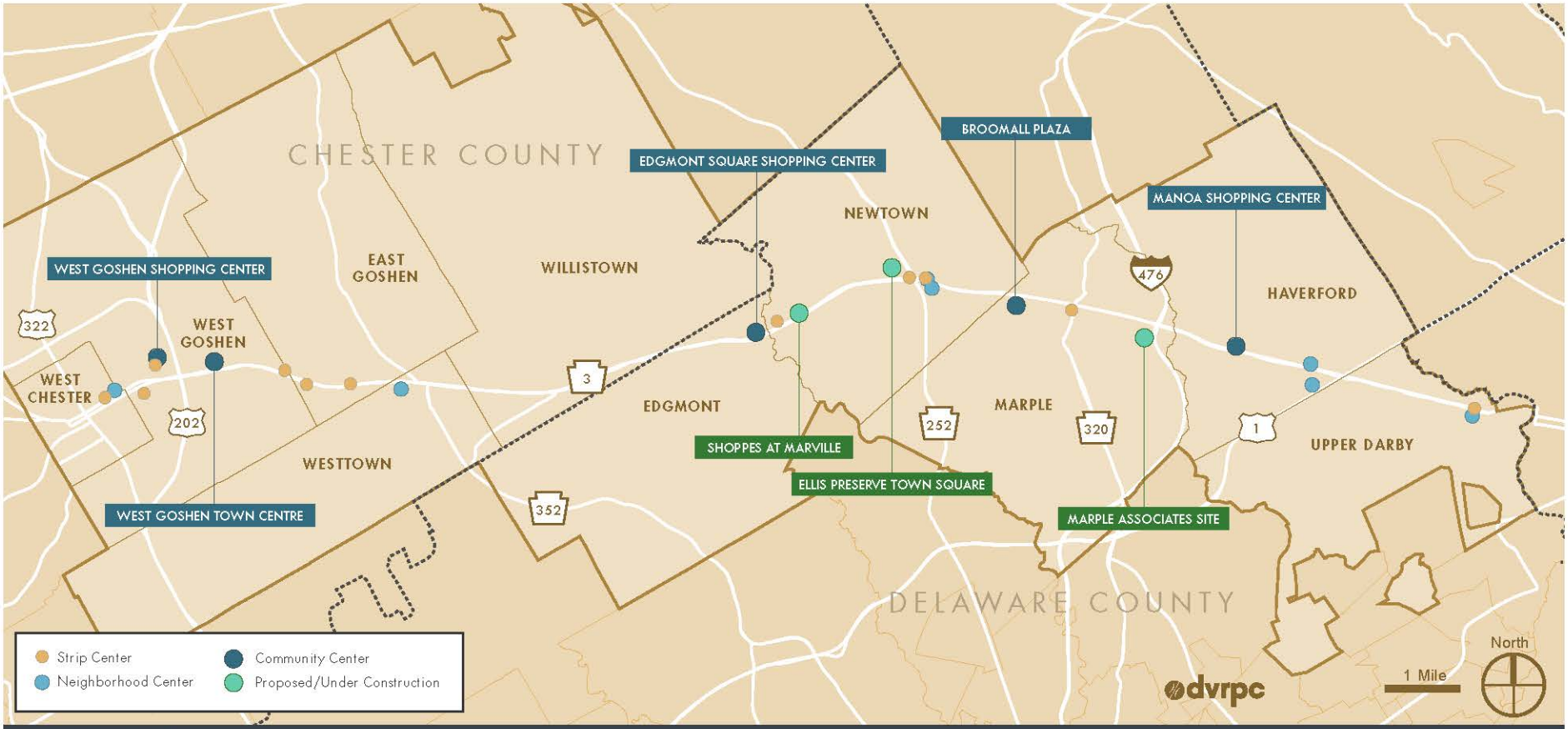
Source: National Establishment Time-Series (NETS) Database, 2010 (Walls & Associates)

these shopping centers represent nearly 2,500,000 square feet of gross leasable area (GLA).

Currently, the largest development projects along the corridor consist of in-progress and proposed shopping centers. Three of the most notable proposed and under construction projects are identified in Figure 10. The Ellis Preserve Town Square is a shopping center being constructed as part of a 210-acre mixed-use development anchored by a Whole Foods grocery store near Route 252 and West Chester Pike. Equus Capital's plans for Ellis Preserve call for the construction of 350,000 square feet of retail space, apartments, townhouses, and an office building.

The plans for the Shoppes at Marville, proposed for a location one mile west of the intersection of Route 252 and West Chester Pike, include a 300,000 square foot town center, hotel, and a performing arts center. A Veterans Memorial has already been constructed on a portion of the site. A shopping center is also being proposed by Marple Associates for a 30-acre site southwest of the Blue Route/West Chester Pike Interchange, near Lawrence Road.

Figure 10: Corridor Shopping Centers



Shopping Center Types

Source: CoStar Realty Information Inc.

STRIP CENTER

An attached row of stores, with on-site parking usually located in front of the stores. A strip center may be configured in a straight line, or have an "L" or "U" shape.

NEIGHBORHOOD CENTER

Provides for the sales of convenience goods (food, drugs, etc.) and personal services (laundry, dry cleaning, etc.) for day-to-day living needs of the immediate neighborhood with a supermarket being the principal tenant. The typical gross leasable area (GLA) may range from 30,000 to 100,000 square feet.

COMMUNITY CENTER

Typically offers a wider range of apparel and other soft goods than neighborhood centers. Among the more common anchors are supermarkets, super drugstores, and discount department stores. The center is usually configured in a straight line as a strip—or may be laid out in an L or U shape. The size of such a center ranges from 100,000 to 350,000 square feet.

LIFESTYLE CENTER

An upscale, specialty retail, main street concept shopping center. Typically built without anchors, lifestyle centers are usually about 300,000 square feet GLA or larger. They tend to be built near affluent neighborhoods and include upscale retail, trendy restaurants, and entertainment retail.

OUTLET CENTER

Usually located in a rural or occasionally in a tourist location, an outlet center consists of manufacturer's outlet stores selling their own brands at a discount. Sizes and forms vary, but a strip configuration is most common. Some outlet centers are built as enclosed malls arranged in a village cluster.

ROUTE 104 OVERVIEW

SEPTA's 104 bus route operates between West Chester University and 69th Street Transportation Center in Upper Darby, a corridor that is not well served by existing rail service (See Figure 11). Along its 21.3-mile route, the Route 104 passes through five municipalities in Delaware County and five municipalities in Chester County. The 104 is part of SEPTA's Victory District, which covers Montgomery, Chester, and Delaware counties. With 3,396 average daily weekday riders, the 104 is the fourth busiest of SEPTA's suburban bus routes. It has an on-time performance of 79 percent.[4]

Weekday Service

The 104 makes a total of 111 trips between 4:10 AM and 2:15 AM on weekdays. Buses operate approximately every 15 minutes during the morning and afternoon peak, and operate hourly at night. There are approximately eight 40-foot buses in service along the route during peak periods.

Weekend Service

SEPTA offers weekend service on the 104 between 5:00 AM and 2:30 AM. The Route 104 makes 51 trips on Saturdays and 40 trips on Sundays. The frequency is approximately once per hour.

Route Variations

The 104 is a complex route, as there are several runs that only traverse half of the route, either starting or ending at the Newtown Square Corporate Campus or Chapel Avenue and Newtown Street Road (see Table 4). Only 70 percent of weekday westbound trips and 69 percent of weekday eastbound trips travel end-to-end between West Chester University and 69th Street Transportation Center.

There are also several runs that operate express —mostly to and from Eagle Road, with one run that operates express to Sproul Road, with a stop at Eagle Road. Furthermore, after 7:00 PM the 104 loops into the Edgmont Shopping Center.

Weekdays: Westbound

On weekday mornings, seven buses that leave from 69th Street Transportation Center end their route at the Newtown Square Corporate Campus. On weekday afternoons, seven westbound buses also end their runs at the Newtown Square Corporate Campus. There are two afternoon trips (the 1:20 PM and the 2:25 PM), which end at Chapel Avenue and Newtown Street Road.

There are also three weekday morning buses—the 6:05 AM, 7:35 AM, and 8:05 AM—that operate express to Eagle Rd. These are designated on the schedule with an "X." There is also an "XS" run that leaves 69th Street on weekday mornings at 5:50 AM and operates Express to Sproul Road with a stop at Eagle Road.

Weekdays: Eastbound

On weekdays, there are currently 38 trips that start in West Chester and go all the way to 69th Street. Of these, six operate express ("X") from Eagle Road. There are an additional 13 trips that start from the Newtown Square Corporate Campus (five in the morning and eight in the afternoon). There are also three trips that start from Chapel Avenue and Newtown Square.

Evenings

After 7:00 PM, the 104 circulates through the Edgmont Square Shopping Center. This generally affects the last six to nine trips on each schedule.

WHAT ABOUT THE TRAIN?

The western terminus of Route 104 is West Chester, the county seat of Chester County, the fastest growing Pennsylvania county in Southeastern Pennsylvania. West Chester is also the only suburban county on the Pennsylvania side of the region without rail access to its county seat. This was not always the case.

Previously, West Chester was connected via rail to Malvern and Media. Most recently, passenger train service between the Borough and Media was suspended in 1986 due to declining ridership, deteriorating infrastructure, and competition from faster lines. Part of the route is still in use by the West Chester Railroad, a private company that offers 90-minute tourist excursions via rail.

Restoring rail service to West Chester has remained a popular topic and the Borough has organized a Railroad Restoration Committee. The planned extension of the Media/Elwyn Line has added a new dimension to these discussions. In 2011, DVRPC conducted a ridership forecast for the Wawa to West Chester Regional Rail Extension (Publication #10036). This forecast suggested that between 800 and 1,100 total passengers would board the train on a typical weekday at a downtown and university station in the target year of 2035.

Nonetheless, any future service restoration will take years of additional study and funding. In the interim, enhanced bus service along West Chester Pike can be a shorter-term, less expensive way to move people more quickly, efficiently and safely between the Borough and Philadelphia. In the long term, restored rail service, and express bus service could work together to provide more robust transportation options for Chester County.

Figure 11: Regional Transit Context

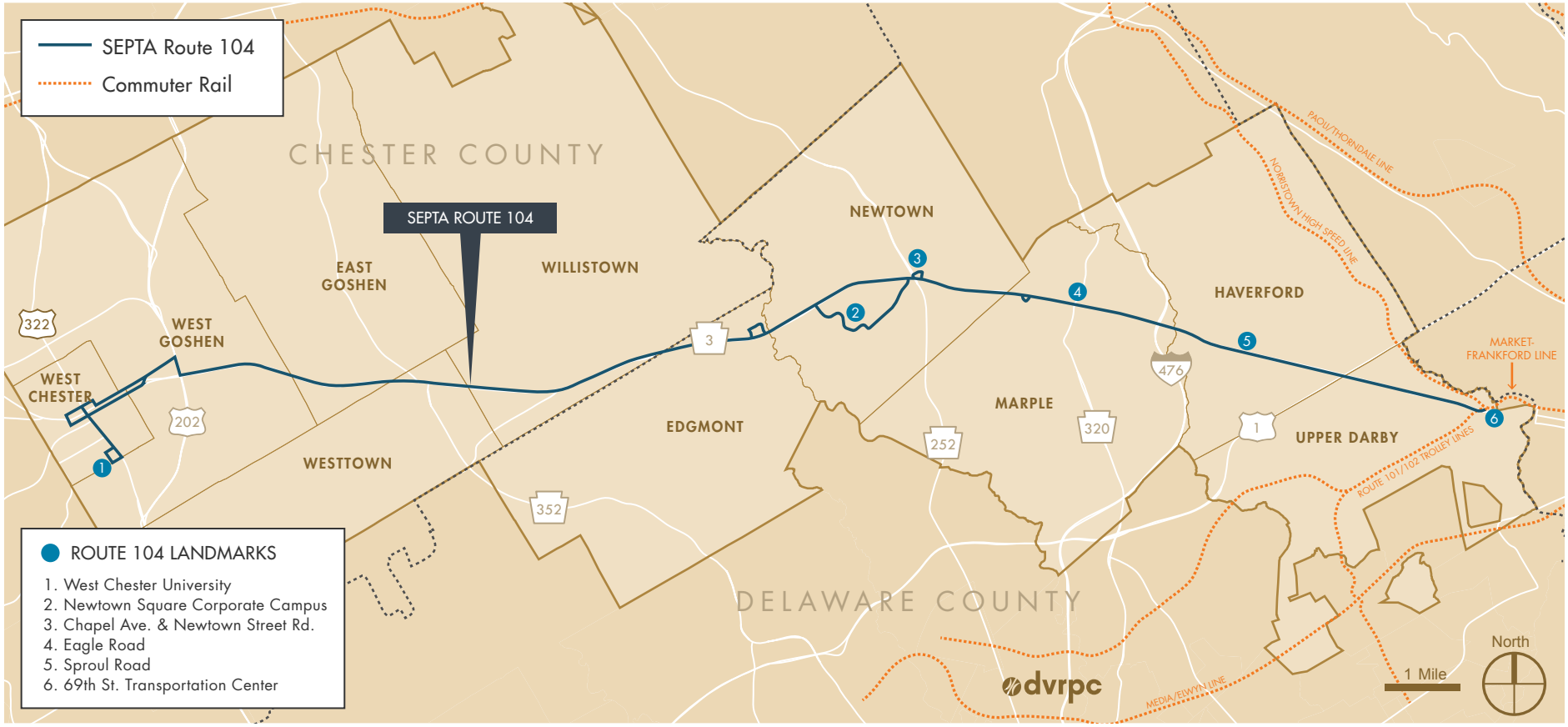
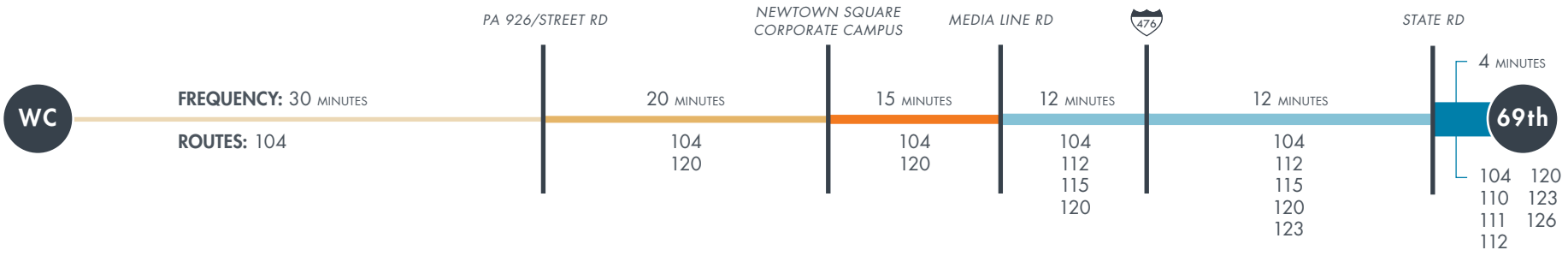


Figure 12: West Chester Pike SEPTA Bus Service Summary (AM Peak: 7AM—9AM)



Source: DVRPC using SEPTA schedules

Saturdays
The 104 makes 20 westbound trips to West Chester and 21 eastbound trips to Upper Darby. In addition, it also makes four trips from Upper Darby to Chapel Avenue and Newtown Street Road, and six trips from Chapel Avenue and Newtown Street Road to Upper Darby.

Sundays
There is no modified schedule on Sundays. The 104 makes 20 eastbound trips and 20 westbound trips.

Route Anchors

The 104 route is anchored by two high-activity, multi-modal destinations: 69th Street Transportation Center in Upper Darby and West Chester University.

Eastern Terminus: 69th Street Transportation Center
SEPTA's 69th Street Transportation Center is located at the edge of Upper Darby's downtown retail district. At 69th Street Transportation Center, passengers can transfer to the Market-Frankford Line which provides direct access to the employment, educational, and cultural centers in University City and Center City Philadelphia. Passengers also have the ability to transfer to the Norristown High Speed Line (NHSL), Trolley Lines 101 and 102, and 18 bus routes (21, 30, 65, 68, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 120, 123, and 126).

Upper Darby is an eight-square-mile community with over 80,000 residents in the northeastern part of Delaware County along the border with Philadelphia. With approximately 15,000 foreign-born residents, Upper Darby ranks as the municipality with the third-highest number of foreign-born people in the Greater Philadelphia region; only Philadelphia and Trenton have more foreign-born residents. In fact, Upper Darby has a higher proportion of foreign-born residents than neighboring Philadelphia. Almost half of Upper Darby's foreign-born arrived after 2000, which makes them relatively recent arrivals. They are more likely to rent than own and they are also more likely than the native-born population to take public transportation and carpool. The top ten places of origin for Upper Darby's foreign-born are:

Table 3: Route 104 Service Levels (Frequency in Minutes)

Weekdays		Weekends	
AM Peak	15	AM Peak	60
Base	30/15	Base	60
PM Peak	15	PM Peak	60
Early Evening	60	Early Evening	60
Late Night	60	Late Night	60
Service Span: 4 AM—2 AM		Service Span: 5 AM—2:30 AM	

Source: SEPTA

Table 4: Route 104 Trips

WESTBOUND

Route	Weekdays	Saturday	Sunday
To West Chester University	38	20	20
Express to Eagle Rd.	6	—	—
Express to Sproul Rd. with Eagle Rd. Stop	1	—	—
Ends at Newtown Square Corporate Campus	14	—	—
Ends at Chapel Avenue and Newtown Street Rd.	2	4	4
Daily Total	***54***	***24***	***20***

EASTBOUND

Route	Weekdays	Saturday	Sunday
To 69th St. Trans. Center	38	21	20
Express from Eagle Rd.	6	—	—
Starts at Newtown Square Corporate Campus	13	—	—
Starts at Chapel Avenue and Newtown Street Rd.	3	6	—
Daily Total	***54***	***27***	***20***

Source: DVRPC using SEPTA schedules

Vietnam, India, Liberia, Ecuador, Bangladesh, Pakistan, China, Mexico, Jamaica, and Greece. The diversity of the local population necessitates the need to consider non-English speakers when communicating about transit service.

Western Terminus: West Chester University

The western terminus of the 104 is in the heart of West Chester University's 106-acre North Campus, a 10-minute walk from downtown West Chester. West Chester University (WCU) is a member of the Pennsylvania State System of Higher Education. It is a public, regional, comprehensive institution that provides undergraduate education, as well as select post-baccalaureate and graduate programs. West Chester University has a total enrollment of 15,845 students, of which 13,711 are undergraduates and 2,134 are graduate students. Approximately 93 percent of freshmen live on campus. West Chester University also has 887 full- and part-time faculty, as well as 768 full-time non-instructional staff.

The SEPTA 104 stop is co-located with WCU's Church Street shuttle stop. The University offers four main routes: the Express Bus, the Q Lot Bus, the All Stops Bus, and the East Campus Loop. Service is offered during the spring and fall semesters. The buses begin service at 7:15 a.m. on weekdays and at 10:00 a.m. on weekends. Bus service continues until 2:00 a.m. Sunday through Saturday. There is also an Exton Train Station Shuttle, which picks students, faculty, and staff up from the Exton train station hourly on weekday mornings between 7:50 a.m. and 9:50 a.m. and leaves from campus hourly between 2:45 and 4:45 p.m. WCU buses transport over 4,300 riders on a typical class day.

Who Uses the 104?

While it is impossible to know exactly who rides the 104 without conducting a comprehensive passenger survey, we do know that the route is used by a diverse group of people who live, work, and study along the corridor. Participants at the February 4, 2015 Stakeholder Workshop were asked to identify current and potential future bus riders in their communities. The list they generated illustrates the important role that transit plays along the corridor:

- Older adults
- Transit-dependent families and riders (people who do not have access to a car)
- Service workers employed at corridor shopping centers
- Office park employees
- Hospital workers
- Students
- Young people who cannot afford to own a car (or prefer to live without one)
- Faculty and staff of educational institutions
- Commuters who will transfer from the bus to another service
- Residents, particularly those who live within walking distance of the route, conducting their daily business

EBS on West Chester Pike would complement the existing service patterns by offering these passengers—many of whom are on the bus for long distances—a shorter, quicker way to get to their homes, jobs, schools, shopping, and recreational opportunities.

Ridership Patterns

Route 104 is somewhat unique among suburban bus lines because of the number of long-distance commuters it carries. It is also distinguished by relatively consistent ridership throughout the day. Instead of seeing most of its ridership during conventional peak periods like many routes, the 104's ridership is spread fairly evenly throughout the day.

The majority of Route 104 passenger activity is concentrated in the eastern portion of the corridor as well as in and around West Chester. The 69th Street Transportation Center itself accounts for approximately 42 percent of total weekday passenger activity (boards and alights). At the 69th Street Transportation Center, many of these passengers are transferring to services such as the Market-Frankford Line, Route 108 towards Philadelphia International Airport, or Route 113 towards Darby Transportation Center.

Although it is the most active individual station on the route by far, the majority of passenger trips do not involve the 69th Street Transportation Center. Instead, their journeys begin and end in West Chester or intermediate locations along the corridor. In this way, Route 104 cannot be classified simply as a typical commuter or reverse commuter service; it serves a much more complex array of trip patterns and purposes.

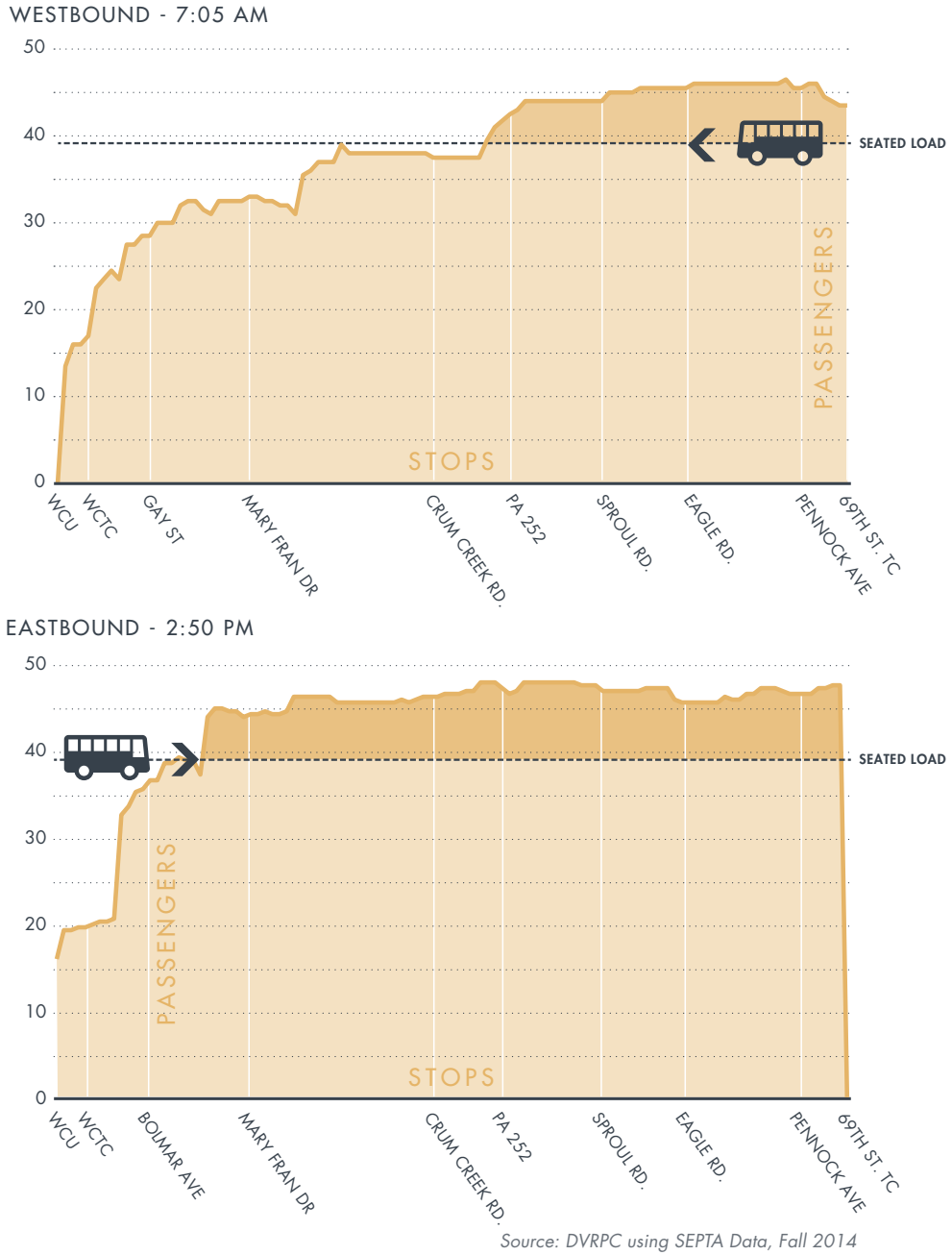
The passenger loads illustrated in Figure 13 can help highlight some of the general characteristics of Route 104. Westbound buses typically depart 69th Street Transportation Center with more passengers than there are seats on the bus. In the 7:05 a.m. example shown, the number of passengers does not fall below the seated load until west of PA 252 in Newtown Square.

The reverse is true in the eastbound direction. Buses departing West Chester University typically start with fewer than 20 passengers, gaining riders as they travel east. In the 2:50 p.m. example shown in Figure 13, the bus exceeds its seated capacity relatively quickly. During other times of the day, the accumulation of passengers occurs more gradually. Eastbound buses are typically at or near their seated load by the time they reach the 69th Street Transportation Center.

Costs

It costs SEPTA $4,965,401 in fully allocated expenses to operate the 104 route.[4] It receives $1,210,687 in passenger revenues, which results in an operating ratio of 24 percent, placing it sixteenth in terms of SEPTA's suburban transit routes. The route requires 41,546 in annual vehicle hours and 621,572 in annual vehicle miles.

Figure 13: Route 104 Passenger Loads



Source: DVRPC using SEPTA Data, Fall 2014

3. EBS on West Chester Pike

Enhanced Bus Service (EBS) is a package of transit improvements that can lead to faster travel times and a more comfortable trip for bus passengers. EBS, sometimes referred to as Bus Rapid Transit (BRT)-lite, incorporates elements of BRT and can help bridge the gap between local bus service and higher-performing types of transit (See sidebar on page 28).

On West Chester Pike, EBS is envisioned as an ultra-express version of the Route 104 that will run between West Chester University and 69th Street Transportation Center with limited stops and improved passenger amenities. EBS will be integrated with existing local service to provide comprehensive transit coverage for the corridor

West Chester Pike EBS will be defined by four characteristics that will distinguish it from existing service:

> **FASTER:** Improved travel times will make the service more useful to existing and new riders.
>
> **MORE COMFORTABLE:** Enhanced stops will make using the service more convenient and pleasant.
>
> **BETTER CONNECTED:** Pedestrian access improvements will make walking to and from stops safer and more direct.
>
> **BRANDED:** Consistent and distinctive treatments on vehicles, shelters, and signage will enhance the image and define the identity of the service.

Each of these aspects of the EBS concept is described in this chapter. Each aspect is essential to the service and they are presented here in no particular order. Where possible, the potential effectiveness of various BRT elements is referenced according to local and industry standards. The chapter concludes by identifying a series of complementary corridor-wide strategies that can be used to support EBS.

FASTER

"Public transportation is too slow" is one of the most common reasons people give for not using transit. This can be especially true for buses, which typically travel in mixed traffic. When asked how to improve the perception and utility of transit along West Chester Pike, participants in the February 2015 workshop agreed that improving travel time and making buses more competitive with cars was one of the most important goals. There are several aspects of the concept that can help EBS reduce travel times.

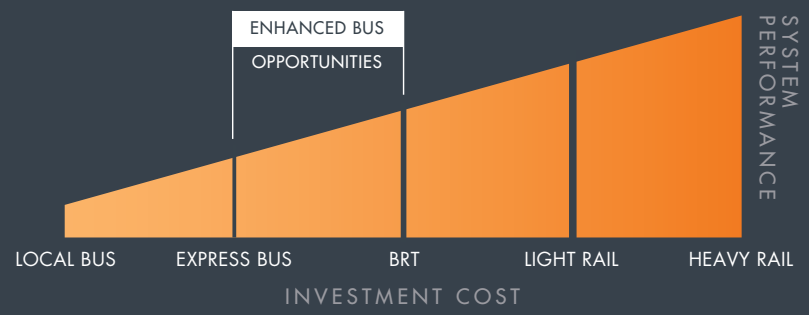
Alignment

The goal of West Chester EBS is to provide efficient transit service between 69th Street Transportation Center and West Chester/West Chester University while serving the most important destinations along West Chester Pike. Although several route alignments were analyzed, the recommended EBS alignment largely follows the existing alignment of Route 104 (see Figure 14). The conceptual route strives to minimize travel time while maintaining a direct, simple alignment that is easily understood by passengers.

Three potential route deviations are identified in Figure 14. These deviations are included because they represent ways that the EBS travel time or route distance could be shortened. In the eastern end of the corridor, the travel time for eastbound buses could potentially be shortened during peak periods by adding a bypass lane to the center median between Brief and Victory avenues. As noted in DVRPC's 2007 Study, *Feasibility Analysis of West Chester Pike Busway* (Publication # 07001), much of the median is occupied by trolley storage tracks that are typically unoccupied during rush hours. If these tracks could be paved to permit joint bus and trolley use, eastbound buses could bypass the congestion that often typically develops at the Brief Avenue and Bypass Avenue traffic signals. Eastbound buses could then continue into the West Terminal in the same manner as Route 101 and 102 trolleys.

Two other potential deviations are located in the western portion of the corridor. The first suggests that rather than using US 202 and Paoli Pike to serve the West Goshen Shopping Center in West Goshen, EBS could continue directly into West Chester via E. Gay Street. This alternative may have modest perceived and real transit times savings but would remove one of the higher ridership stops from the route.

WHAT DOES EBS HAVE TO DO WITH BRT?



EBS can help to bridge the gap between local bus service and BRT.

BRT is a bus-based transit system that includes specialized service and infrastructure designed to improve service quality and mitigate the typical causes of delay. It does this through the provision of dedicated lanes, iconic stations, off-board fare collection, and fast and frequent operations.

BRT attempts to emulate higher-intensity forms of transit such as light and heavy rail at a lower cost. Although no BRT systems currently operate in the Greater Philadelphia Region, BRT is becoming an increasingly important transit strategy for cities around the country.

The option of a dedicated busway along West Chester Pike was studied and largely dismissed by DVRPC's 2007 Study, *Feasibility Analysis of West Chester Pike Busway* (Publication #07001).

However, several aspects of BRT service can still be effective along corridors that do not include dedicated busways. For example, in Minneapolis/St. Paul, Metro Transit is planning to introduce a new service known as arterial BRT in 2016.

The system includes several features designed to improve bus speeds:

- fewer stops,
- off-board ticket machines,
- low-floor buses,
- curb extensions, and
- transit signal priority (TSP).

Metro Transit also plans to create a more comfortable experience by enhancing shelters with the following features:

- NexTrip signs,
- bike racks,
- trash cans,
- emergency phones, and
- security cameras.

Figure 14: EBS Concept

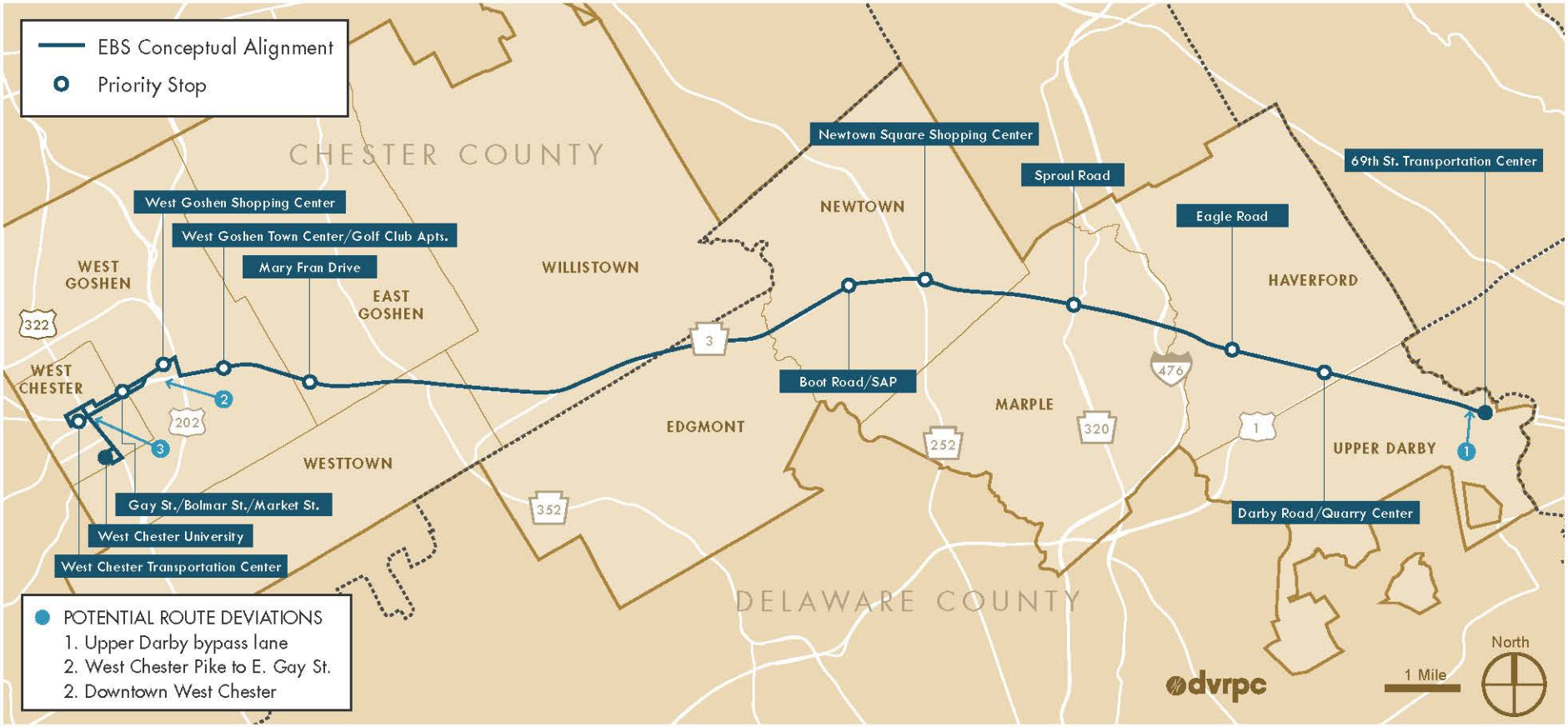


Table 5: EBS Service Comparison (Weekday Morning)

Service	Direction	Number of Stops	Existing Travel Time*	Projected Travel Time**	Projected Time Savings
Route 104 Local	EB	113	67 mins.	–	–
	WB	106	75 mins.	–	–
EBS	EB	12	–	59.6 mins.	7.4 mins. (11.0%)
	WB	12	–	64.8 mins.	10.2 mins. (13.6%)

Source: DVRPC

** Based on fall 2014 SEPTA schedule.*

***Projected travel times for EBS on West Chester Pike were generated from a spreadsheet model based on a three-step calculation. Projected travel times were derived by first establishing a baseline automobile travel time for the corridor. Bus dwell times at stops and a heavy vehicle time penalty were then applied to this baseline to project travel times for the EBS route. See the Appendix for more information on how this projection was generated.*

The second alternative shortens the route distance in downtown West Chester by skipping the West Chester Transportation Center and instead proceeding directly to West Chester University. This alternative would likely necessitate the inclusion of an alternate downtown West Chester EBS stop.

Consolidated Stops

One of the simplest and most effective ways to improve transit travel times is to stop the bus less frequently. DVRPC's 2011 study, *Boosting the Bus*, modeled the impact of limited stop service, Transit Signal Priority (TSP), and the relocation of near-side stops to the far side of intersections on transit travel times. Consolidating stops was found to be the most significant factor in reducing projected travel time. By stopping less often, the delays associated with stops, deceleration, passenger loading and unloading, and reaccelerating into traffic, can be minimized.

Any future EBS service along West Chester Pike will need to balance speed with service coverage. The stops highlighted in Figure 14 represent priority stop locations for future EBS service. These stops were selected based on existing ridership, current stop amenities, adjacent land uses, and feedback from stakeholders.

As conditions along the corridor change and new development is constructed, the EBS route may need to be amended to include additional or relocated stops. As future stops are considered, planners should strive to balance the needs of existing transit users with new potential riders who may be attracted by EBS's level of service and amenities.

Stop selection was one of the topics discussed during the February 2015 Stakeholder Workshop. Two of the leading discussions dealt with stop spacing and service along the eastern portion of the corridor. The 10 EBS priority stops presented here (not including the endpoints) represent a drastic reduction in the number of stops currently included on the Route 104 (111 eastbound, 104 westbound). This consolidation results in stops spaced approximately 1.75 miles apart rather than the 1,000 feet that currently separates stops on an eastbound local 104.

Although several high-ridership stops exist in the Upper Darby portion of the corridor, none are included in the concept because they are well served by multiple bus lines, including the 112, 120, and 126, that converge on West Chester Pike and terminate at 69th Street Transportation Center. These overlapping routes result in high-frequency service, particularly during peak hours. Passengers traveling east here are likely to take the next available bus regardless of route and may not benefit significantly from EBS.

Stop Location Considerations

Within a BRT system, bus stops are frequently referred to as stations to signify their enhanced visibility and amenities. Deciding where to place these stations, which can include platforms, shelters, and vehicle stopping points, requires careful design consideration before implementation.

Stations serve as the primary customer interface, affecting accessibility, reliability, comfort, safety, and security, as well as dwell times and system signage.[1] Station siting can also influence system performance. Curbside stops can be located prior to an intersection (near side) or just past an intersection (far side). The distinctions between these types of stops are covered in more detail in Chapter 4.

LOW-FRICTION PAYMENT

How people pay for the bus can influence its speed. The major benefit of the low-friction payment methods described below is that they shorten dwell times, particularly at busy stops, by allowing passengers to board using the front and rear doors.

Off-board fare payment and **proof-of-payment** can be implemented either with a barrier system (e.g., gates) or barrier-free. Proof-of-payment requires passengers to have a valid pass, transfer, or ticket when boarding the bus. Tickets can be bought from a ticket vending machine (TVM) and are subject to inspection, with financial penalties for riders who cannot show proof-of-payment.

Implementing off-board fare collection has been shown to decrease boarding times by up to 38 percent.[2] For this reason, off-board fare collection is preferred for many BRT systems.

On-board payment can also enable multidoor boarding with lower risks of fare evasion and reduced TVM installation and maintenance costs. Installing new payment methods such as readers for contactless credit cards and smart cards at multiple doors on a vehicle would still allow for time savings to be garnered relative to SEPTA's current fare payment approach.

Over a five-year period, the back door on-board fare payment device installed on Muni buses in San Francisco decreased boarding time per passenger by 1.5 seconds (38 percent) and dropped fare evasion from 9.5 percent to an estimated 7.9 percent.[3]

Although both types of stops have advantages and disadvantages, far-side stops are generally preferred for BRT systems because they can save time by reducing conflict with right-turning automobiles and can be effectively combined with TSP.

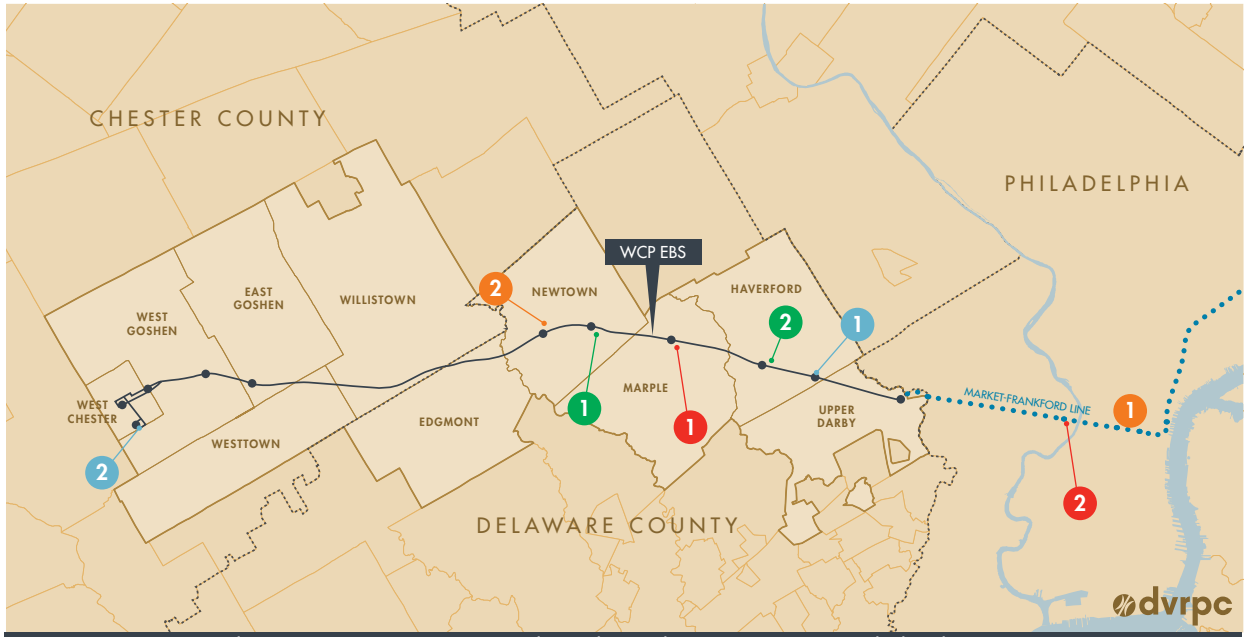
Travel Time Estimates

Improving transit travel times benefits existing transit users and may attract new discretionary riders, particularly as transit travel times become more competitive with driving times. For purposes of comparison, potential travel times for the EBS concept described here were developed for weekday mornings (see Table 5).

To project end-to-end transit travel times for EBS on West Chester Pike, the study team used a spreadsheet model[4] that was developed from a three-step calculation.[5] The projected transit travel time was derived by adding dwell times for 10 stops and a heavy vehicle time penalty to a baseline travel time for an automobile (see Appendix A for details).

These projections suggest that EBS service could save over seven minutes (11 percent) in the eastbound direction and over 10 minutes (13.6 percent) in the westbound direction during the AM peak when compared to existing local service. To further illustrate the potential effect of EBS on travel times, the same methodology was used to calculate travel times for four hypothetical yet plausible scenarios (see Figure 15). Each scenario is color-coded with the number 1 denoting origins and the number 2 denoting destinations. Transit trips incorporate walking and transfer times.

Figure 15: Travel Time Scenarios (Weekday Morning)



Traveler	Travel Time by Mode (mins)			Calculated Transit Time Comparison	
	Auto	Current Transit	EBS	Projected Savings (mins.)	Projected Savings (%)
West Chester University student from Haverford Township [DARBY RD TO WCU]	46	58	54.4	3.6	6%
Senior citizen living in Dunwoody Village visiting her grandchildren in Havertown [NEWTOWN SQ TO EAGLE RD]	12	19	17.1	1.9	10%
Reverse commuter traveling from Center City to SAP [MFL TO 69TH ST TC TO BOOT RD/SAP]	44	63	55.8	7.2	11%
Drexel University employee commuting from Marple Township [SPROUL RD TO 69TH ST TC TO UNIVERSITY CITY VIA MFL]	32	45	41.3	3.7	8%

Source: DVRPC

Source: U.S. Census Bureau,American Community Survey, 2008-2012

MORE COMFORTABLE

Although important, faster travel times are just one aspect of proposed EBS service. Providing a high-quality waiting environment is critical to retaining existing riders and attracting new ones. EBS stations can improve passenger comfort by providing weather protection, passenger information, seating, and adequate lighting.

Station Size and Amenities

Typical BRT systems have stations of various sizes based on ridership, transfer volume, budget, and available space. Currently, stop facilities along the corridor vary considerably (see Figure 17). The three most common types of stops are:

1. *Basic post*: A sign is fixed to a free-standing post or attached to an existing utility pole. Passengers wait on adjacent sidewalk or grassy area.
2. *Post and Bench*: Stop also includes a bench and typically a concrete platform.
3. *Basic Shelter*: Stop includes shelter and oftentimes a bench and some piece of passenger information.

Ideally, each EBS stop on West Chester Pike will include a shelter, seating, lighting, passenger information, and branding. These elements are successfully integrated in RapidRide stations in King County, Washington (see Figure 16 for an example). These well-lit stations share branding with vehicles, and include shelters, seats, and stop request signals for passengers to use at night.

Due to space constraints at certain locations, including each of these elements at each EBS stop may not be possible in the near future. However, to maximize the impact of transit investments, station facilities should be upgraded to include as many amenities as possible at a given location. Specific station features are discussed below.

Station Features

BRT stations are often enhanced with a variety of station features that distinguish them from conventional bus stops. The following list identifies some features that have been incorporated into BRT stations in the United States and around the world.

- Colors, texture, and materials for shelter design
- Leaning benches or true benches
- Security phones
- Climate control
- Drinking fountains
- Trees for shade
- Trash cans
- Landscaping
- Vending machine
- Vendors
- Newsstand
- Public art
- Bike racks or lockers
- Lighting (pedestrian scale)
- Information
- Public restrooms

There is evidence that certain station components, when combined, can lead to an increase in ridership of up to 15 percent.[6] Table 6 identifies some of these amenities and their potential contribution to increased ridership.

Figure 16: RapidRide Station

Source: King County Metro Transit

Table 6: Impact of Station Features

Station Feature	Contribution to Ridership Increase
Attractively designed shelters	2%
Lighting	2%
Telephones/security phones	3%
Climate-controlled waiting areas	3%
Passenger amenities*	3%
Passenger services**	2%
	Total: 15%

*Passenger amenities such as seating, trash containers, restrooms, and public address information systems.

**Passenger services such as vending machines, newsstands, shops, and special services (dry cleaners).

Source: Bus Rapid Transit Practitioner's Guide (page 4-51)

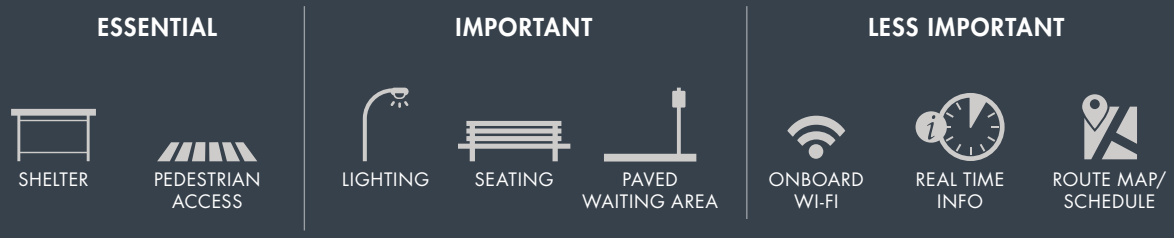
Figure 17: Existing Route 104 Stops

Source: Google Maps

PRIORITIZING TRANSIT AMENITIES

The passenger experience can be greatly influenced by the presence or lack of a variety of bus stop and vehicle elements. Workshop participants were asked to vote on the importance of eight different transit amenities to current and potential riders.

Based on the results, these amenities can be grouped into three categories: **Essential** (selected by nearly every participant), **Important** (selected by roughly half of participants), and **Less Important** (selected by one-third or less of participants). The emphasis on access, visibility, and comfort can help focus site improvements along the corridor.



Passenger Information

Transit systems can be difficult for new passengers to comprehend. This lack of knowledge can be a barrier that keeps potential riders from using a system. However, various forms and types of passenger information can be used at stations to make transit easier and more convenient to use. Examples of the type of information that can be conveyed to passengers include:

- General static information such as fares, end-to-end travel times, wayfinding information, and available transfers with travel times for common destinations;
- Estimated arrival, departure, or countdown times for the approaching vehicle;
- Real-time transit vehicle locations;
- Service disruptions and delays; and
- Real-time information such as the date, time, weather, and current news.

Through customer satisfaction surveys and academic research, it has been determined that the public places a dollar value on real-time information, and that this feature alone has the potential to increase ridership by 1–3 percent.[7]

Providing real-time passenger information at each stop location gives passengers an opportunity to make an informed choice on the time it will take them to get to their destination, and it may also make the wait time feel less onerous. Studies have shown that time spent traveling to and waiting at transit stops is perceived to be three times as long as the amount of time spent on the vehicle itself, and that reducing the uncertainty of wait time substantially lowers the perceived burdens of using transit.[8]

Passenger real-time information is provided for various types of transit in many cities in the United States. However, there can be barriers to implementing this type of system due to cost, institutional coordination, and difficulty of providing accurate information.

Currently, SEPTA provides customers with various types of electronic passenger information. The SMS Transit Schedule Information service allows passengers to text their station ID to find out the next four scheduled trips for this location. The official SEPTA app is another way passengers can stay connected to schedule information. When downloaded, the app allows passengers to view a map that shows the current location of buses along a particular route.

However, data for these apps is updated through a Computer-Aided Radio Dispatch, which does not have the capacity to update more than every three minutes (longer during peak periods). SEPTA's anticipated fare payment system, SEPTA Key, requires that all vehicles have cellular modems on them. Engineers at SEPTA believe that (by 2016) the same wireless technology on these modems could improve the next arrival notification system.[9]

Currently, the EBS stop locations have few of the amenities described in this chapter. After providing basic shelter and pedestrian access, SEPTA and corridor municipalities should focus on providing static and real-time information enhancements that make the new service more attractive to potential passengers.

BETTER CONNECTED

Improved access to stations is an essential part of EBS on West Chester Pike. During the workshop, stakeholders emphasized the need for pedestrian upgrades along the corridor (see Prioritizing Transit Amenities sidebar on page 34). The alignment of the route, location of stops, and lack of park-and-ride facilities mean that transit riders need to walk to and from bus stops.

However, as discussed in Chapter 1, suburban corridors are often inhospitable to pedestrians. Walkers can be easily deterred by the physical and psychological barriers, such as missing sidewalks and imposing crossings, that they encounter on and near an arterial such as West Chester Pike. Nonetheless, providing and improving pedestrian access to EBS stations can reinforce existing ridership and help attract new passengers. In addition to facilitating transit use, pedestrian facilities can pay huge dividends to municipalities by promoting active lifestyles and creating multimodal communities.

Physical Design and Station Access

Like automobiles and buses, pedestrians require infrastructure that enables safe movement and minimizes conflicts with vehicles. The pedestrian infrastructure of the study corridor is composed of the network of sidewalks, crosswalks, and trails that facilitate travel on foot. The quality and interconnectedness of these individual elements help define an area's pedestrian environment.

In terms of accessing transit on West Chester Pike, there are three types of pedestrian movements to consider:

1. Movement along West Chester Pike;

This passenger information display in Chapel Hill, NC updates riders on upcoming arrivals.

Source: Data Display

A pedestrian path connects this bus stop to nearby commercial development.

Source: SEPTA

2. Movement across West Chester Pike; and
3. Movement to/from adjacent origin or destination (residence, workplace, etc.) to the corridor.

This study focuses on facilitating the first two types of movement in the areas immediately adjacent to each EBS priority stop. Some of the most important pedestrian elements in these station areas are:

- Sidewalks on both sides of the street;
- High-visibility crosswalks at intersections;
- Pedestrian refuge islands on wide cartways; and
- Pedestrian countdown timers and/or pedestrian-only signal phases at locations with high pedestrian activity.

Chapter 4 presents an inventory of these and other pedestrian access tools and provides specific recommendations for improving pedestrian access to each of the EBS stations.

BRANDED

As noted in Chapter 1, Route 104 moves roughly 14 percent of travelers on West Chester Pike while only accounting for less than one percent of the vehicles. Marketing and branding, along with physical station improvements, can help elevate the image of transit along West Chester Pike to be more in line with the role it plays in moving people along the corridor.

Marketing and Branding

Whether we like it or not, bus service often suffers from an image problem. Marketing is a core investment that transit providers and municipalities can make together. A better public image can attract riders, leading to higher revenue and greater demand for transit service.

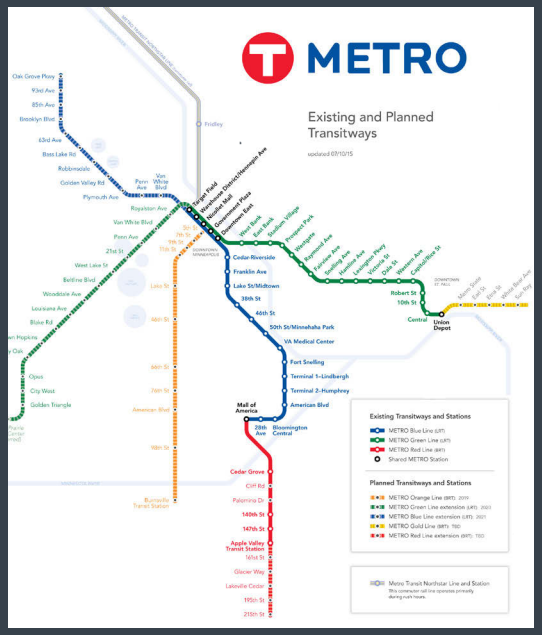
Creating a distinctive brand for EBS on West Chester Pike is one of the best ways to market the service, enhance positive public recognition, and promote higher ridership. Some studies suggest that unique branding and imaging alone can contribute to a 20 percent increase in ridership.[10]

The way a transit service is branded will influence the public perception of that service. This is evident in transit branding examples from around North America. For instance, transit branding can include names that intimate fast and connected service (such as MetroRapid in Los Angeles or B-Line in Vancouver), colors that connote style or values (SilverLine in Boston or the Emerald Express in Eugene, OR), and logos that suggest energy (Viva in Toronto) or luxury (Lymmo in Orlando).

A branding campaign should begin with the following steps:

1. Identify the target audience, including current and potential new users,
2. Determine which aspects of the service to highlight (i.e., faster travel times, increased frequency, or passenger amenities),
3. Decide how the brand will be communicated to this audience (posters, vehicle wraps, public meetings, website, media outreach, etc.).

WHAT'S IN A MAP?



Source: Metro Transit

Marketing bus service can take many forms, including how it is depicted on transit system maps. Metro Transit, which serves the Minneapolis/St. Paul metro-area of Minnesota, includes BRT (shown in red on the map above) along with light and heavy rail lines on its transitways map.

By including BRT on this map, Metro is stating that BRT should be recognized as a high-performing part of regional infrastructure. As EBS corridors are developed around the region, special consideration should be given to all aspects of how these lines are presented to the public.

Once these considerations have been addressed, consistent branding for vehicles, stations, and signage should be developed and applied.

Improvements to transit along West Chester Pike should be clearly communicated and marketed. This is important even where improvements are invisible to the rider and have benefits measured in seconds rather than minutes. When it comes to branding, perception is reality, and new logos, colors, and stations can help "get the message out" about EBS.

Vehicle Considerations

The vehicles themselves can play an important role in motivating existing and potential riders to use transit. Vehicles serve as the primary platform for the service's brand. After all, customers spend most of their time in the vehicle, and it is typically the most visible element of transit service along a corridor. At a minimum, EBS vehicles should project reliability as well as a clean and comfortable image.

EBS can commence with the existing fleet of buses. Branding elements can be incorporated into current vehicles at a relatively low cost by using vehicle wraps and seat inserts that reinforce the brand identity. Modifications to existing vehicles can also impact the customer experience in other ways. For example, New York City's Select Bus Service (SBS) vehicles are equipped with bright passenger notification lights on the front of the vehicle that allow a passenger to see whether the bus coming down the street is a SBS vehicle or a local bus. Relatively minor modifications such as these help make the service more identifiable to local bus riders and potential passengers.

On-board amenities can also be a part of future EBS planning on West Chester Pike. Amenities such as power outlets, Wi-Fi, more comfortable seats, worktables, and restrooms are all features that may appeal to long-distance riders on a route like the 104. Most of these amenities cannot be incorporated into the existing fleet of vehicles. However, these types of amenities may influence SEPTA's decisions about which buses to purchase in the future.

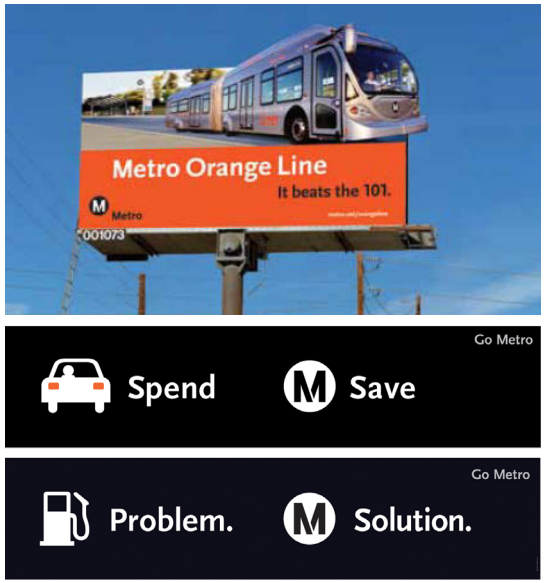
Aesthetic changes to existing buses and the potential use of new vehicles will likely have operations implications. Can branded vehicles be used to serve other routes? Can existing bus depots accommodate more or different vehicles that may be associated with a new service? These issues and the potential costs associated with them need to be evaluated early in the planning process.

A CONCEPTUAL BRAND

As part of DVRPC's 2011 study, *Boosting the Bus*, a conceptual branding package was developed for EBS on West Chester Pike. Known as RapidBus, this branding draws on SEPTA's color scheme, but is intended to differentiate the newly improved service from local operations through new design elements.

This conceptual branding incorporates the line's West Chester destination and reflects the bi-directional ridership patterns. This branding example is useful because it helps to visualize the types of treatments that can be applied to vehicles (pictured), stations, and marketing materials on an EBS line.

Source: DVRPC, 2011



Metro developed a unified brand and clear messaging for its Orange Line BRT.

Source: Los Angeles County Metropolitan Transportation Authority (METRO)

The notion of high-quality service is reinforced on Community Transit's Swift BRT (Washington state) by consistent branding of stations and vehicles.

Source: SounderBruce on Flickr (CC BY-SA 2.0)

COMPLEMENTARY CORRIDOR STRATEGIES

Because buses and private automobiles share the same lanes, improving overall mobility along West Chester Pike benefits everyone. There are a number of techniques and tools that corridor municipalities can employ to enhance overall mobility, thereby supporting transit use. Likewise, there are several physical design strategies that can help promote a more multimodal corridor.

Signal Optimization

Signal optimization is a change in cycle length to reduce the delay for vehicles at a specific signal or along a corridor, helping to improve travel times for cars and buses alike. In general, signal optimization changes the cycle length to favor the progression of traffic on the higher-capacity roadway. This technique can be done by purchasing little or no additional equipment and can be adjusted as corridor conditions change.

However, coordinating multiple signals along a corridor can be complex; municipalities would need to work together with a holistic approach that considers the entire corridor. PennDOT's Green Light-Go program is one potential source of funds for this type of effort.

Transit Signal Priority (TSP) Implementation

The Federal Transit Administration's evaluation of the Los Angeles Metro Orange Line BRT Project notes that as much as 25 percent of all bus travel time consists of delay at intersections. TSP is one strategy that can help mitigate this delay, saving between three and ten percent in travel time, depending on the operating context.

TSP is a modification of the phase split times of a traffic signal. Generally, the green phase is extended or the red phase truncated to provide more time for a vehicle to pass through the intersection. TSP is already commonly in use for emergency vehicles and can be adapted for transit vehicles.

TSP can be implemented at a single intersection or at a number of intersections along a transit corridor. Signal times given to the transit vehicle upon TSP actuation are generally recovered by cross streets on the following signal cycle or cycles, still allowing for signal loop coordination. TSP is particularly effective when combined with complementary time savings strategies such as stop consolidation or the relocation of near-side bus stops to the far side of an intersection.

TSP is often found to work best with far-side transit stops, as this allows the transit vehicle to clear the intersection before stopping to load and unload passengers. As a result, the time that it takes the transit vehicle to clear the intersection after being detected by the controller is more predictable.

Alternatively, the major benefit of TSP for near-side stops, especially under moderately congested conditions, is the ability to clear the general traffic queue between a transit vehicle and the near-side stop. This allows the transit vehicle to only stop once, if at all, instead of twice—once behind the vehicle queue to reach the stop and again while waiting to load and unload passengers.

One obstacle to installing TSP can be concern about delays for cross-street or other through traffic due to the extended green time for transit. However, increases in cross-street traffic delay

accompanying TSP have been shown to be fairly low, ranging from 0.3 to 2.5 percent.[11]

DVRPC has explored the potential of TSP as an emerging best practice in prior planning projects with SEPTA. For purposes of order-of-magnitude time savings estimates, previous studies drew on the TSP experiences of Los Angeles and Portland in referencing a rule-of-thumb reduction of 6.8 percent in running time savings following TSP implementation.

DVRPC's 2011 *Boosting the Bus* Study suggests that when implemented by itself, TSP could reduce transit vehicle travel times on West Chester Pike by roughly three percent. This smaller-than-expected result could be due to the density of transit vehicles in the corridor. In that simulation, once a vehicle actuated a green phase extension, the signal entered a recovery period and would not grant another extension for four minutes. Implementing TSP on EBS vehicles only would most likely result in additional travel times savings.

Land Use and Site Development

Land use and transit are linked in critical ways. Active land uses support transit service, and transit access increases the value of a development site. Over time, coordinating land use decisions and transportation investments can help neutralize some of the physical factors that make transit service challenging along suburban corridors. In general, transit-supportive planning emphasizes pedestrian-friendly design, mixed-use development, and place making. By increasing the diversity and intensity of uses around a station, transit service becomes more effective since there are more potential users and destinations in a smaller geographic area.

Table 7: Transit-supportive Land Uses

Transit-Supportive Land Uses	Inherently Auto-Oriented Land Uses
• multifamily residential • small-lot single-family and townhouses • health care facilities • personal services • retail shops • grocery stores • coffee shops/cafes • day care facilities • dry cleaners • health clubs • staff-intensive offices • neighborhood-oriented businesses	• automotive parts, repair, and service • drive-through facilities • gas stations • parking lots • large-lot single-family residential • large-format retail • storage facilities • warehouses • strip malls

SHOPPING CENTER DESIGN

Large shopping centers and big box retailers have the potential to be significant generators of transit ridership. However, the conventional layout and design of these centers often acts as a barrier to transit use. Most shopping centers are set back from the street (where the stop is located) and surrounded by large areas of surface parking. It is time consuming for buses to circulate through a shopping center and so these locations are typically served by curbside stops at driveways or nearby intersections. This arrangement typically results in long and unpleasant walks for passengers.

This shopping center uses a combination of speed tables and brick paving to create a high-visibility pedestrian route through the parking lot.

Transit can be better integrated into new and redeveloped shopping centers by locating stores as close to the street as possible, thereby minimizing walking distances. In the meantime, existing shopping centers can be retrofitted to improve access in several ways:

- Adding sidewalks to access roads and driveways,
- Designating pedestrian walkways through large parking areas, or
- Employing traffic calming devices and formalizing circulation patterns to increase the predictability of vehicular movements.

Comprehensive plans, zoning overlays, and site development statutes are all tools that municipalities can use to promote transit-supportive design and multimodal mobility. The following list identifies some of the most important physical design strategies for retrofitting suburban corridors like West Chester Pike:

- Encourage mixed-use development that generates higher levels of pedestrian activity near transit stops (see Table 7 for a list of transit-supportive land uses).
- Situate buildings close to the streetline, locating primary entrance points along key pedestrian routes, and design building facades that actively engage public streets.
- Arrange vehicular access and parking to minimize pedestrian conflicts.
- Organize larger developments in a way that strengthens the connection between adjacent land uses and transit stations (see the sidebar on page 38 for more information).

Attitudes toward density vary across the region and throughout the study corridor. Along West Chester Pike, municipalities should consider opportunities to increase development density around EBS stations in a way that meets the goals of enhanced access to transit while also complementing the existing community character.

Access Improvements

One of the factors that makes transit access challenging along West Chester Pike is the number of driveways and curb cuts found in portions of the corridor. Frequent and/or large curb cuts and driveways disrupt the pedestrian network and can make it difficult to site a transit station.

Access management involves the proactive management and design of driveways and intersections for the purpose of promoting a complementary relationship between the function of the roadway and the destinations along it.

Access management may be implemented through a variety of methods. Common techniques include:

- minimum driveway, intersection, and traffic signal spacing requirements,
- left and/or right turning lanes,
- deceleration and acceleration lanes,
- shared driveways,
- turn-restricted driveways, and
- requiring driveways to be located on intersecting streets.

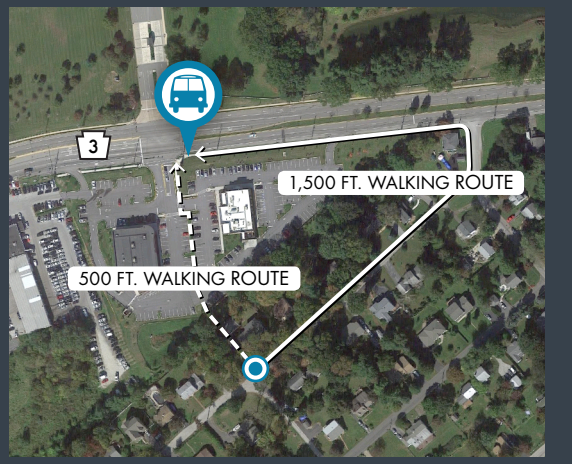
Opportunities to correct access deficiencies are present during land development, redevelopment, and land use changes when the proper enabling ordinances are in place (see PennDOT Publication 574, *Access Management: Model Ordinances for Pennsylvania Municipalities*, and DVRPC Publication 15027, *Access Management Brochure*, for more information). While designing access for new development is often a simpler task to accomplish, issues caused by existing development also need to be recognized and addressed.

These techniques listed above become requirements when codified in municipal zoning and subdivision and land development ordinances. They can be applied during construction to minimize the development's impact on highway mobility, or when abutting land is redeveloped or changes use. An official map highlighting access requirements is also often beneficial, particularly for multiple parcel access management requirements (see PennDOT Publication 703, *The Official Map: A Handbook for Preserving and Providing Public Lands and Facilities*).

WALKING DISTANCE

Despite living in close proximity to West Chester Pike bus stops, many residents face long and circuitous walking routes to reach the corridor (see the example below). More direct access is often blocked by fences along private property or commercial development.

Suburban municipalities should consider enhancing pedestrian connectivity, even when it is not feasible to connect two roads directly. For example, in a suburban neighborhood with curvilinear streets in Leonia, NJ, a simple concrete sidewalk flanked by chain link fences was included in two sections of the development to offer pedestrians easier access to Broad Avenue, a major north-south thoroughfare.



A residential neighborhood is located just south of the CVS and Pizzeria Uno at the Boot Road/SAP bus stop. Residents from this neighborhood must walk a significantly longer distance to reach the bus stop than if a pedestrian cut-through were available.

Aerial Source: Google Maps

WHAT MAKES A GOOD TRANSIT STOP?

"A high-quality transit stop is one that is well connected to the neighborhood or community it serves, accommodates the needs of all transit passengers safely and comfortably, and permits efficient and cost-effective transit operations."

SEPTA Bus Stop Design Guidelines
SEPTA/DVRPC, October 2012

4. Stop-Area Planning

This chapter presents detailed information on each of the priority stops identified as part of the EBS concept in Chapter 3. Organized into a series of station profiles, this chapter summarizes the existing conditions of each stop and provides a table and map that summarize recommendations on stop location, passenger amenities, and pedestrian access.

Bus Stop Design

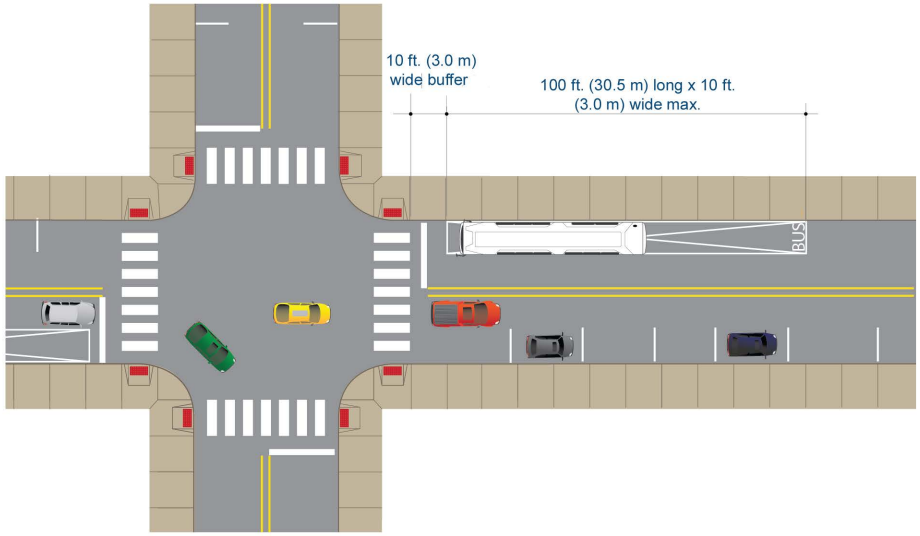
In 2012, DVRPC partnered with SEPTA to produce *SEPTA Bus Stop Design Guidelines* (Publication #12025). The purpose of that document was to provide municipalities and developers with a consistent set of guidelines for designing bus stops. The *Design Guidelines* cover four interrelated elements that together comprise a transit stop:

- *Stop location*: A stop's placement relative to other stops, to the nearest intersection, and to the development it serves.
- *In-street design*: The space allocated for the transit vehicle to curb for passenger loading and to exit and reenter the flow of traffic.
- *Curbside design*: The space reserved for passengers to wait for and board the transit vehicle, as well as the connectivity between the space and nearby development.
- *Passenger amenities*: Site-specific elements such as shelters, lighting, and seating.

Where possible, the recommendations in this chapter follow the guidance set forth by the *SEPTA Bus Stop Design Guidelines*. The most common bus stop type along West Chester Pike is the in-line curbside stop. These stops often occur at or near intersections and can be described as near-side or far-side (see Figure 18 for illustrations). While stops along the corridor will continue to be curbside, this study recommends relocating some existing stops to improve operations or enhance pedestrian accessibility.

Figure 18: Curbside Stop Configurations

TYPICAL NEAR-SIDE STOP CONFIGURATION



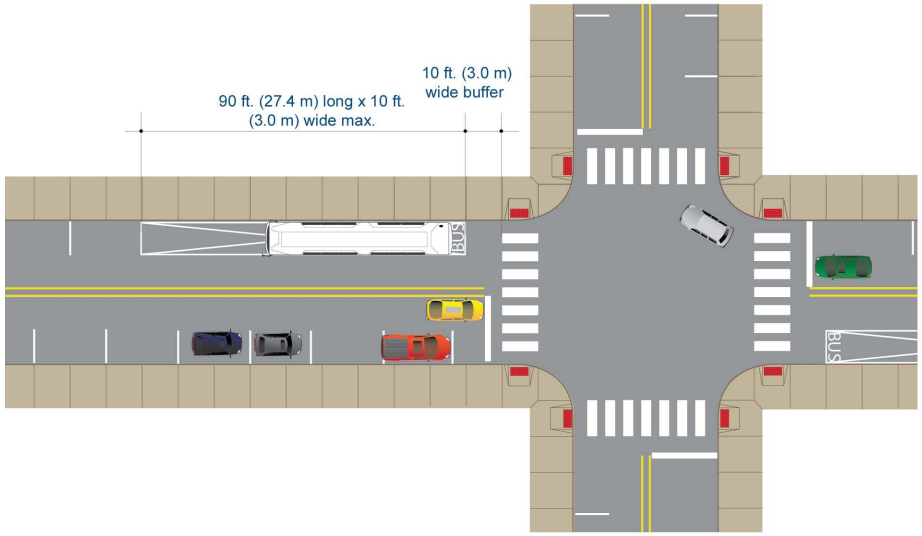
ADVANTAGES

- Minimizes traffic interference during peak traffic flow hours.
- Passengers are able to board the bus closer to the crosswalk.
- Bus can use the intersection for acceleration space.
- Avoids double stopping for both signal and passenger movements.
- The driver has the advantage of full view of intersection activity.
- Can be coordinated with a far-side stop for a crossing route to allow passengers to transfer without crossing the street.

DISADVANTAGES

- Conflicts between the bus and right-turning vehicles may arise.
- The bus can physically obscure general traffic sight lines for both intersection movements and signals.
- Multiple buses queuing during peak hours may obstruct traffic.
- Crossing pedestrian sight lines are obstructed.
- May present a conflict between pedestrians crossing the intersection and passengers waiting to board the bus.

TYPICAL FAR-SIDE STOP CONFIGURATION



ADVANTAGES

- Minimizes conflicts with right-turning vehicles.
- Minimizes sight-line conflicts for drivers and pedestrians.
- Encourages pedestrians to cross more safely behind the bus.
- Stopping at the far side of the intersection creates a shorter deceleration zone for the stop area because the intersection absorbs some of the space requirement.
- The gap in traffic flow created by the signal allows the driver room to pull back into the travel lane.
- Most effective stop location for Transit Signal Priority (TSP): preferential treatment for transit vehicles at traffic signals (typically extended green or shortened red phases).

DISADVANTAGES

- If the bus is unable to fully pull through the intersection during peak hours, traffic conflicts may occur ("blocking the box").
- A bus stopped near the intersection may block sight lines for pedestrians and vehicles crossing the intersection.
- Can cause the bus to double stop (once for the light and once for passenger activity).
- Rear-end incidents may be more frequent if distracted drivers do not realize the bus is stopping beyond the intersection.

Source: SEPTA, DVRPC (2012)

Pedestrian Access

Transit riders need safe and convenient routes to get to and from a bus stop. The improvements presented later in this chapter emphasize safety and access for people who walk in the areas surrounding priority bus stops.

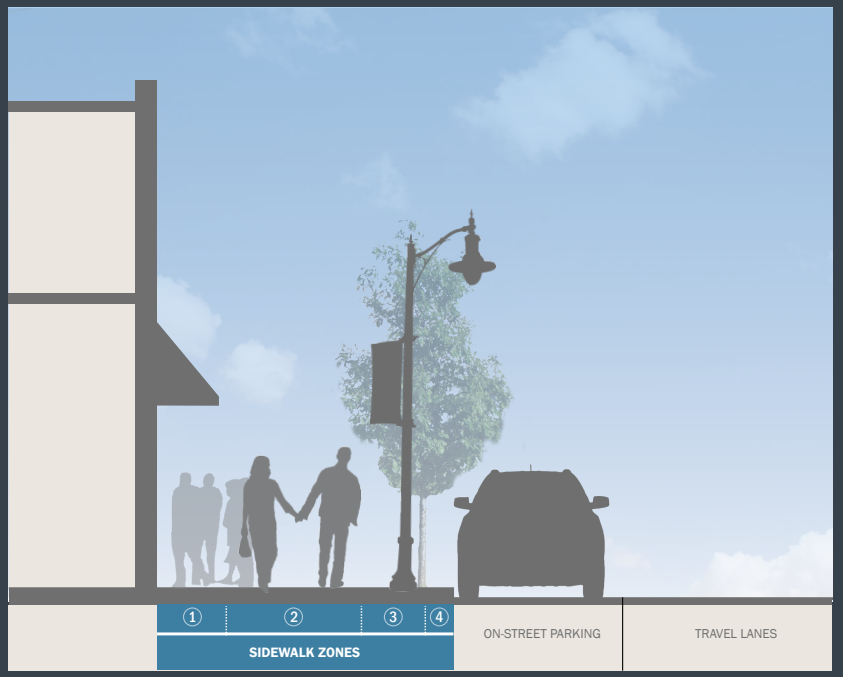
Riders will typically walk one-fourth to one-half mile (about a five- to ten-minute walk for most people) to and from transit. As such, a transit rider's needs extend well beyond the bus stop and into the surrounding neighborhood. However, in many locations, walking to or from a bus stop can be unsafe, inconvenient, or simply unpleasant.

Inadequate pedestrian access can be one of the greatest obstacles to using any bus system. Circuitous routes, deteriorated pavement or sidewalks, heavy traffic, and dark or isolated paths can all discourage transit use. In a 2011 survey conducted by DVRPC in preparation for the SEPTA Bus Stop Design Guidelines, municipal respondents identified "pedestrian access" as the most important feature of a bus stop.

There are a variety of elements that communities may employ to enhance access to transit. Some of the most common are highlighted below. Many of the generalized tools presented here will be referenced later in this chapter as appropriate for a specific stop area. In general, the recommendations contained in this chapter seek to encourage transit use along West Chester Pike by eliminating barriers, improving connectivity, and providing more comfortable environments for people who walk.

Unless otherwise specified, all costs cited here are based on estimates documented in *Costs for Pedestrian and Bicyclist Infrastructure Improvements* by the UNC Highway Safety Research Center. These costs are provided for estimation purposes only. The actual cost of implementing any of these improvements could vary significantly based on local conditions.

ANATOMY OF A SIDEWALK



Source: DVRPC

The most successful sidewalks are often found in shopping districts and include four distinct zones (illustrated above).

Outside of commercial areas, it is imperative to maintain clear, continuous, wide pedestrian zones with a buffer between the sidewalk and moving traffic where possible.

1. **Frontage Zone:** Buffer zone between the sidewalk and structures or parking areas.
2. **Pedestrian Zone:** a clear space, typically at least 4–6 feet on the sidewalk for walking.
3. **Amenity Zone:** Used for street furniture, trees and plantings, bicycle racks, lighting, and kiosks.
4. **Curb Zone:** Buffer between the roadway and the sidewalk; creates a link between the sidewalk and crosswalk at intersections.

SIDEWALKS

Sidewalks are the most basic and important component of the pedestrian network. When a sidewalk network is continuous and well connected, it creates a safe and comfortable environment for pedestrians. Often used by motorists and cyclists at some point in their journey, sidewalks should be at least five feet wide, but may need to be wider in areas with high pedestrian volumes.

Obstructions, such as utility poles and signs, should be located outside of the path of travel to ensure adequate access for persons with disabilities. Sidewalks can be constructed with a variety of materials, including concrete, asphalt, and brick.

Average Cost: $32 per linear foot of concrete sidewalks (costs for other materials can vary substantially).

STREET FURNITURE

Providing street furniture on sidewalks can act as a buffer between pedestrians and moving vehicles. Street furniture can include benches, bus shelters, trash cans, newspaper racks, and other pedestrian amenities that serve to create a more pleasant and attractive environment for pedestrians. These types of items should be placed outside of the pedestrian zone (see the sidebar on p. 43) so as not to interfere with pedestrian mobility.

Average Cost: Varies depending on the design, style, and manufacturer.

LANDSCAPING

Like street furniture, landscaping, such as regularly-spaced street trees, can be used to create a buffer between pedestrians and moving traffic. Landscaping can also make a streetscape more visually appealing and provide shade for walkers. The costs of sidewalk landscaping must consider watering and maintenance, which can be a challenge for implementation. Selecting appropriate plant species for particular environments can reduce maintenance costs and improve the effectiveness of any plantings.

Average Cost: Varies depending on size of installation, vegetation type, and maintenance.

STREET LIGHTING

Pedestrian-scale lighting can help pedestrians safely navigate sidewalks and feel more secure. Street lights are most effective when they are installed on both sides, illuminate both the sidewalk and street, and produce a consistent amount of light. Intersections and underpasses often require additional lighting to ensure pedestrians feel safe and are visible to motorists.

Average Cost: Approximately $5,000 for a streetlight, although costs can vary widely depending on the fixture type.

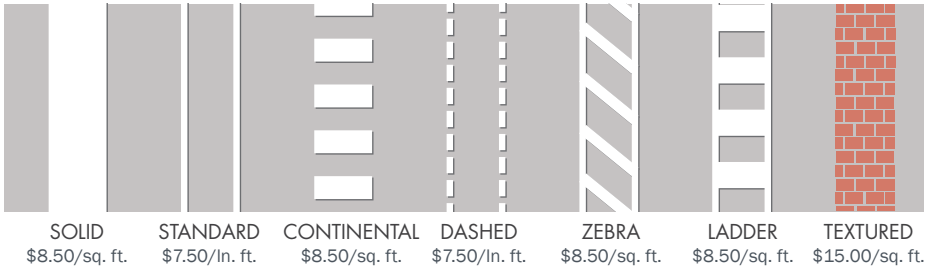
CROSSWALKS

Marked crosswalks help pedestrians identify safe locations at which to cross a street. Crosswalks may be installed at intersections or midblock locations, and indicate to motorists where pedestrians have priority and where to yield.

Crosswalks should be highly visible to pedestrians and drivers. Research has shown that continental (also known as ladder stripping) is more visible to motorists than standard parallel markings.

Average Cost: Standard striped crosswalks can cost approximately $770, while higher-visibility patterns, such as continental or ladder markings, can cost approximately $2,500.

Figure 19: Crosswalk Types



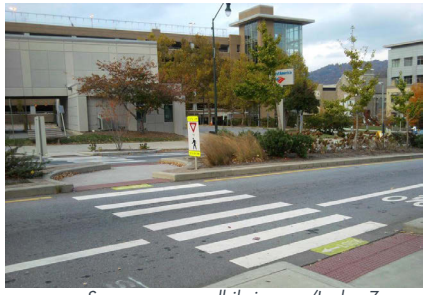
Source: DVRPC

CROSSING AMENITIES

Several design elements can be integrated into intersections to improve the safety and convenience of walking to transit stations.

Refuge islands create a protected space for pedestrians in the middle of a street and allow them to focus on crossing one direction of traffic at a time. Refuge islands are particularly useful at wide intersections and unsignalized midblock locations.

Average Cost: $13,520



Source: www.pedbikeimages/LyubovZuyeva

Curb extensions extend the sidewalk or curb line out into the parking lane, which reduces the crossing distance of a street. These bumpouts can increase the visibility of pedestrians and serve as a traffic calming feature.

Average Cost: $13,000

Source: www.streets.mn

Curb ramps provide access between the sidewalk and roadway for people using wheelchairs, walkers, and strollers as well as people with difficulty stepping up and down high curbs.

Average Cost: $810

Pedestrian countdown timers allow pedestrians to know the amount of time they have to cross the street before the traffic signal will change. These timers can be combined with ***pedestrian push buttons***. Push buttons can be effective on arterial and congested streets because they can allot more time to pedestrians only when they are present, thereby reducing the delay for vehicles. Push button signals should be carefully considered so as not to diminish pedestrian conditions at intersections with large numbers of pedestrians. For example, requiring walkers to press for a walk phase may increase instances of crossing against the signal.

Average Cost: $1,480

STATION PROFILE

MUNICIPALITY: UPPER DARBY

TRANSIT CONNECTIONS: MARKET-FRANKFORD LINE; NHSL; TROLLEY LINES 101 & 102; BUS ROUTES 21, 30, 65, 68, 103, 105, 106, 107, 108, 109, 110, 111, 112, 113, 120, 123, AND 126.

POPULATION: 1,954 RESIDENTS WITHIN 1/4 MILE

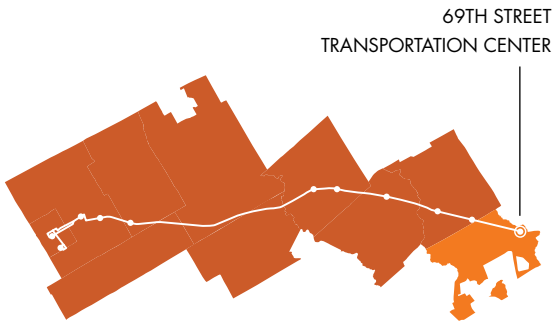
EMPLOYMENT: 1,906 JOBS WITHIN 1/4 MILE

WALK SCORE: 85

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 2,883

WESTBOUND: 1,611 ONS

EASTBOUND: 1,272 OFFS



69th STREET TRANSPORTATION CENTER

Station Context

The 69th Street Transportation Center is a 105-year old, multi-modal facility located at the intersection of Market and 69th streets in Upper Darby. The Transportation Center serves passengers on SEPTA's Market-Frankford Line, Norristown High Speed Line, trolley routes 101 and 102, and 18 bus routes. The Route 104 starts/terminates in the West Terminal of the Transportation Center. This stop is the busiest along the entire route by far: over 2,800 passengers begin or end their bus trip at this location on a typical weekday.

Much of this passenger activity can be attributed to the multimodal connections available at the Transportation Center, particularly the Market-Frankford Line which provides service to University City and Center City Philadelphia.

The area surrounding the Center is an important residential, retail, and employment node in its own right. The Transportation Center is located at the northern end of Upper Darby's retail district. This area includes a number of national retailers along 69th Street, as well as a mix of smaller, locally owned restaurants and stores on Garrett Road and Terminal Square. A mix of housing types, including single-family detached, rowhouses, and apartment buildings, surround the retail district and contribute to the area's relatively high residential density.

In spring 2015, SEPTA began construction on a series of improvements to the West Terminal. This project includes:

- Reconstructed pedestrian ramps,
- New and reconstructed platforms and canopies,
- New center platform waiting area, and
- Safety and security improvements.

During construction, the Route 104 stop location has been moved to a temporary bus terminal located at the corner of Market Street and N. Chatham Road.

Station Access

The West Terminal improvement project will upgrade the facilities used by EBS and other passengers at this location. However, pedestrian access to and from the Transportation Center from the surrounding area is complicated by an irregular road network, mixed traffic movements, and difficult intersections, particularly the intersection of West Chester Pike with Bywood Avenue, Grant Avenue/Garrett Road.

Pedestrians traveling from south of the Transportation Center can cross Market Street/ West Chester Pike via an overpass at 69th Street or use a crosswalk near the intersection of Copley Road. However, during field visits, pedestrians have been observed crossing Market Street near Bywood Avenue despite the lack of crosswalks on West Chester Pike.

Traveling to the Transportation Center on the north side of West Chester Pike is difficult for pedestrians and potentially unsafe. After crossing the right turn and through lanes of Victory Avenue, walkers must pass through a small

parking area and then cross the 125-foot bus and trolley entrance before reaching the pedestrian entrance near the Copley Road crosswalk.

This complex area was addressed in the 2013 *West Chester Pike Transportation and Land Use Plan*. This plan suggests that realigning Victory Avenue to form a new four-way intersection with Brief Avenue (west of Bywood Avenue) can simplify traffic movements and enhance nonmotorized access to the station. This potential realignment must be considered within the broader context of a new TOD transit-oriented development (TOD) overlay district.

In the short term, repainting the existing crosswalks on the south side of Market Street and adding new high-visibility crosswalks to the north side can help clarify pedestrian movements and alert motorists to the presence of walkers.

FIGURE 20: 69th Street Transportation Center

Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

Pedestrians have the option of using an overpass at 69th Street to cross over Market Street.

Walking on the north side of Market Street requires crossing the driveway used by buses and trolleys to access the Transportation Center.

This rendering highlights several of the improvements now being made to the West Terminal.

Source: SEPTA

Table 8: 69th Street Transportation Center Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install new high-visibility crosswalks at the intersection of Victory Avenue and Market Street as well as the entrance to the West Terminal of the Transportation Center.	$$
2	Repaint existing crosswalks on Garrett and Copley roads at Market Street and across Market Street near the entrance to the West Terminal of the Transportation Center.	$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

Figure 21: 69th Street Transportation Center Recommended Improvements

Existing stop location

New crosswalk

North

100 Feet

STATION PROFILE

MUNICIPALITY: HAVERFORD

TRANSIT CONNECTIONS: ROUTES 112, 120 (115 Darby Rd.)

POPULATION: 971 RESIDENTS WITHIN 1/4 MILE

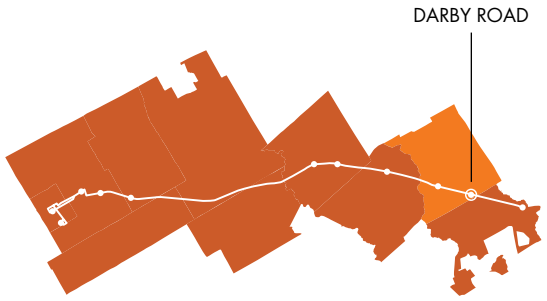
EMPLOYMENT: 916 JOBS WITHIN 1/4 MILE

WALK SCORE: 58

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 81

WESTBOUND: 14 ONS, 32 OFFS

EASTBOUND: 22 ONS, 13 OFFS



DARBY ROAD

Station Context

Darby Road is the first EBS stop west of the 69th Street Transportation Center. Located in Haverford Township, the stop is named after the closest intersecting street, even though the westbound and eastbound stops are located 600 ft. and 400 ft. west of Darby Road, respectively.

Commercial uses line West Chester Pike in this portion of the corridor. The westbound stop is located in front of a Public Storage self-storage facility and next to a Burger King. The eastbound stop is located in front of a Kohl's and near the entrance to the Quarry Center, a large shopping center recently constructed on the site of the former Llanerch quarry. The Quarry Center is anchored by a Giant and a Lowe's and is connected by a sidewalk to West Chester Pike. These commercial areas are surrounded by relatively dense single-family residential neighborhoods. Llanerch Crossing Park is a small neighborhood park located on a triangular parcel at the northwest quadrant of the intersection of Darby Road and West Chester Pike.

This stop was selected for EBS due to the existing high ridership as well as the existing transit and pedestrian facilities. Shelters are already present at both the east- and westbound stops. Good sidewalks exist along West Chester Pike and the Kohl's entrance intersection includes crosswalks, pedestrian refuges, and pedestrian signals.

Access Improvements

The Darby Road stop already possesses the basic infrastructure for effective bus service. Pedestrian crossings can be improved by upgrading the existing crosswalks at the Kohl's entrance. New sidewalks should also be added to the south side of West Chester Pike between the existing shelter and Darby Road. Currently, no sidewalk exists although a well-worn path indicates pedestrian usage. This sidewalk could provide pedestrians with better connections to local commercial destinations as well as Bus Route 115, which runs on Darby Road.

Residents traveling to the station from the north or east would likely need to traverse the intersection of Darby Road and West Chester Pike. This wide, offset intersection already includes pedestrian refuges but can be improved by adding high-visibility crosswalks. A more direct connection to the westbound stop can be made by using Park Avenue and cutting through the Burger King or Public Storage parking areas. Formalizing this walkway along the edge of the Burger King property can significantly reduce the distance residents must travel to use this bus line.

One characteristic worth noting about this location is the placement of the eastbound stop. Its current location, when combined with the presence of a stairway linking the Kohl's parking lot with the sidewalk, provides convenient access to Kohl's. However, its midblock location (roughly 425 ft. from Darby Road and 375 ft. from the Kohl's entrance intersection) may tempt some passengers to make potentially dangerous midblock crossings.

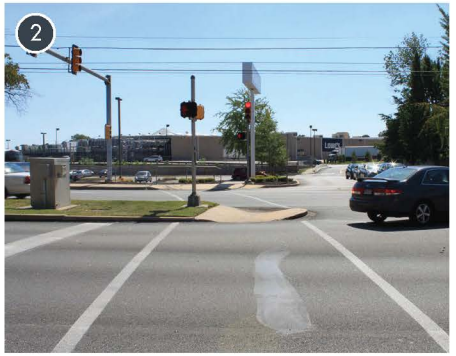
If this is deemed to be a problem, or access to the Quarry Center from West Chester Pike becomes a priority, it may make sense to relocate this stop closer to the entrance driveway, provided that the site could accommodate a shelter.

FIGURE 22: DARBY ROAD

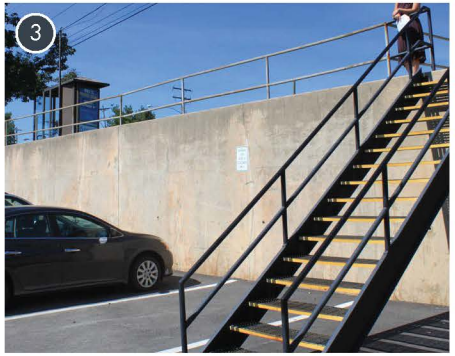
Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The westbound Darby Road stop is located in front of a Public Storage facility.



The Quarry Center (shown in the distance) is connected to the intersection by internal sidewalks.



The eastbound stop is connected to the Kohl's parking area by a stairway.

A well-worn path shows that pedestrians walk between the eastbound stop and Darby Road despite the lack of sidewalks.

Table 9: Darby Road Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks and pedestrian countdown signals at the intersection of West Chester Pike and the entrance to Kohl's/Quarry Center.	$$
2	Add sidewalks to the south side of West Chester Pike between Darby Road and the stairway to the Kohl's parking lot.	$$
3	Install high-visibility crosswalks and pedestrian countdown timers at the intersection of West Chester Pike and Darby Road.	$$$
4	Install a walkway between Park Road and West Chester Pike along the edge of the Burger King property.	$$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000


Figure 23: Darby Road Recommended Improvements
PUBLIC STORAGE
LLANERCH AVE
PARK RD
LANSDOWNE RD
BURGER KING
DARBY RD
TENBY RD
WEST CHESTER PIKE
3
1
4
2
3
Newly installed sidewalk provides access to Quarry Center
Stairway connecting parking lot to sidewalk
QUARRY CENTER
KOHL'S
dvrpc
Existing stop location
Alternative stop location
New crosswalk
New sidewalk
New pedestrian connection
Countdown timer
North
100 Feet

STATION PROFILE

MUNICIPALITY: HAVERFORD

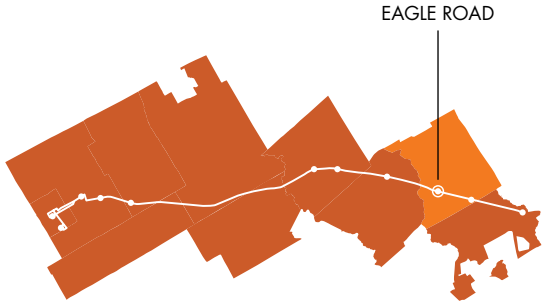
TRANSIT CONNECTIONS: ROUTES 112, 115, 120, 123, 126

POPULATION: 1,431 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 1,259 JOBS WITHIN 1/4 MILE

WALK SCORE: *77*

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 182
WESTBOUND: 39 ONS, 72 OFFS
EASTBOUND: 55 ONS, 16 OFFS



EAGLE ROAD

Station Context

The intersection of Eagle Road and West Chester Pike is a commercial node in Haverford that includes the Manoa Shopping Center, anchored by a Staples and a Superfresh grocery store. The westbound Eagle Road stop is located near the eastern edge of the shopping center and next to a gas station at the Eagle Road intersection. The eastbound stop is located in front of a Starbucks, just east of the Eagle Road intersection. Each of these far-side stops includes a transit shelter with seating.

The commercial uses that line West Chester Pike are surrounded by relatively dense single-family neighborhoods. The Llanerch Country Club, which includes a 129-acre golf course, is located approximately one-third of a mile east of the stop.

This stop is appropriate for EBS because of the existing high ridership, residential density, and proximity to commercial destinations.

Access Improvements

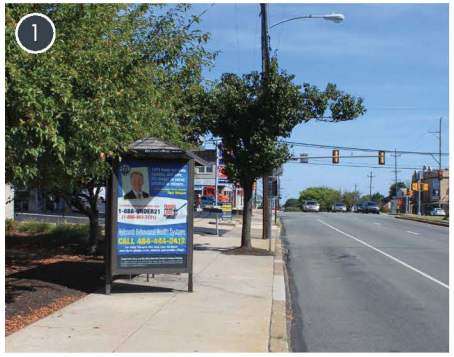
The configuration of the Manoa Shopping Center makes it easier to serve via transit because it is not set back from the road by large parking areas like most shopping centers on the corridor. From the westbound Eagle Road stop, passengers can access the center directly from the sidewalk. In addition, the Eagle Road intersection is made more manageable for pedestrians by the presence of pedestrian signals and refuge islands.

The standard crosswalks at Eagle Road are faded and difficult to see. Adding new high-visibility crosswalks to all legs of this intersection can help alert motorists to the presence of pedestrians in the area.

FIGURE 24: EAGLE ROAD

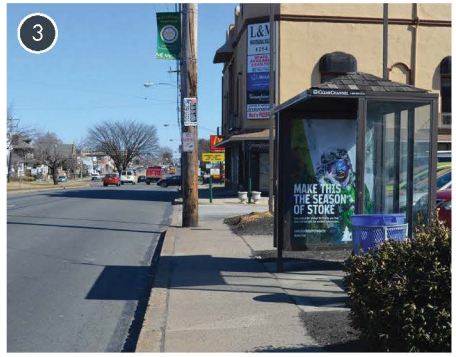
Source: Microsoft Bing Maps

STATION AREA IMAGES

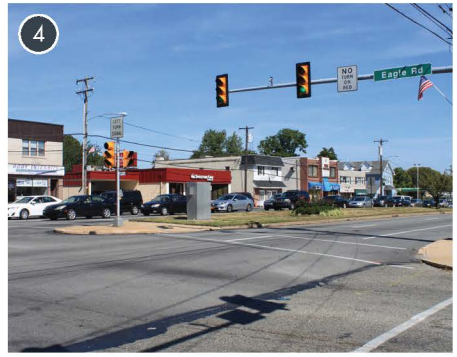


The westbound stop is located in front of the Super Fresh, along the eastern edge of the Manoa Shopping Center.

East of Eagle Road, businesses are set back from the road to accommodate head-in angled parking.



The eastbound stop is located in front a Starbucks to the east of Eagle Road.



Pedestrians benefit from refuge islands at the intersection of West Chester Pike and Eagle Road.

Table 10: Eagle Road Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks and pedestrian countdown signals at the intersection of West Chester Pike and Eagle Road.	$$$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

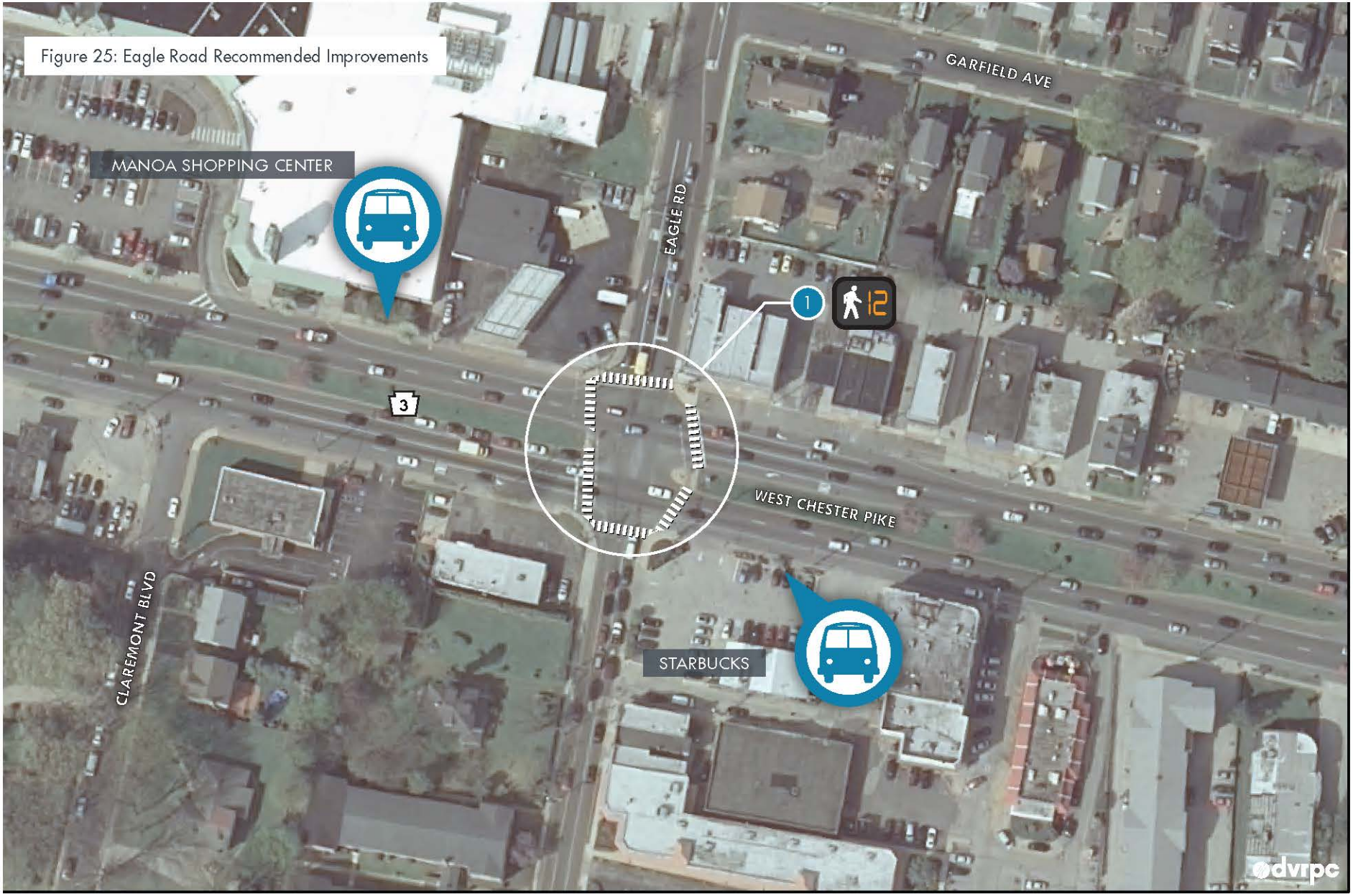


Figure 25: Eagle Road Recommended Improvements
GARFIELD AVE
MANOA SHOPPING CENTER
EAGLE RD
1
12
3
WEST CHESTER PIKE
CLAREMONT BLVD
STARBUCKS
dvrpc
Existing stop location
Countdown timer
New crosswalk
North
100 Feet

STATION PROFILE

MUNICIPALITY: MARPLE

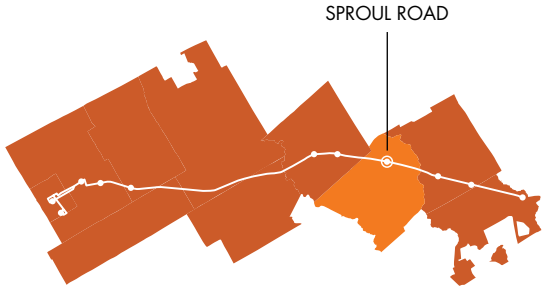
TRANSIT CONNECTIONS: ROUTES 112, 115, 120

POPULATION: 973 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 884 JOBS WITHIN 1/4 MILE

WALK SCORE: 64

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 159
WESTBOUND: 16 ONS, 69 OFFS
EASTBOUND: 62 ONS, 12 OFFS



SPROUL ROAD

Station Context

Sproul Road/PA 320 intersects West Chester Pike approximately one mile west of I-476. This portion of West Chester Pike is one of Marple Township's commercial centers. The area is home to a mix of retailers and service providers in a variety of configurations. This includes the shops on the north side of West Chester Pike, east of Sproul Road, that are set back from the road to accommodate diagonal, head-in parking.

The CVS at 2507 West Chester Pike is an example of how larger-format retail can be more successfully integrated into a commercial street. By locating the building along the street, with parking to the side, the CVS extends the pedestrian-friendly character of the business district.

The existing bus facilities at Sproul Road consist of a pair of far-side stops. The westbound stop is located in front of a McDonald's and includes a bench and trash can, but not a shelter. The eastbound stop is located in front of a gas station at the southeast corner of Sproul Road and West Chester Pike. This stop includes a transit shelter that was donated by the Broomall Chapter of Rotary International (see Chapter 5 for more information).

Beyond West Chester Pike, the Sproul Road intersection is largely surrounded by single-family detached residential neighborhoods. These neighborhoods are generally well connected to West Chester Pike via the existing sidewalk network.

EBS on West Chester Pike can capitalize on the existing ridership base at this location as well as the recently installed eastbound shelter. Adding a shelter to the westbound stop will make this location more comfortable for passengers. However, this may be challenging due to space constraints. This stop may be a candidate for a narrower shelter type that provides some weather protection without obstructing pedestrian movements on the sidewalk.

Access Improvements

The sidewalk network along West Chester Pike is relatively complete near the Sproul Road intersection. Crossing Sproul Road or West Chester Pike on foot, however, is complicated by the presence of channelized right-turns connecting Sproul Road to West Chester Pike. For example, a passenger exiting the bus at the westbound stop must cross over the turning lane to a traffic island before crossing West Chester Pike.

The intersection itself is equipped with refuge islands and pedestrian signals. Adding high-visibility crosswalks to each segment of this intersection can improve pedestrian safety in this area.

Sidewalks are less consistent on Sproul Road just north and south of West Chester Pike. For example, on the north side, sidewalks along portions of both sides of Sproul Road are interrupted by driveways or parking spaces.

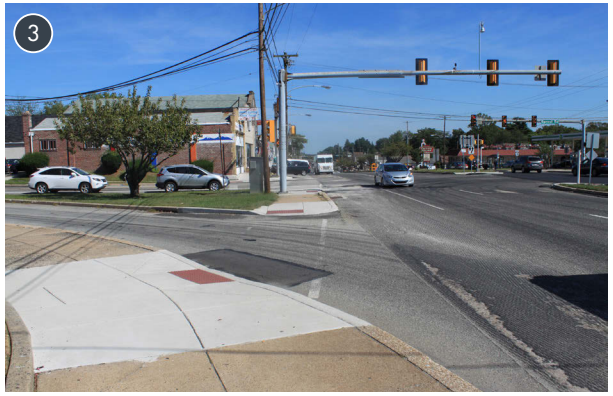
FIGURE 26: SPROUL ROAD

Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The eastbound stop is located in front of a gas station and includes a shelter that was donated by the Broomall Chapter of Rotary International.

The westbound stop is located in front of a McDonald's and includes a bench.



New curbs ramps have recently been installed at the intersection of Sproul Road and West Chester Pike. This section of West Chester Pike was being repaved in September 2015.

Table 11: Sproul Road Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks and pedestrian countdown signals at the intersection of West Chester Pike and Sproul Road.	$$$
2	Install a bus shelter at the westbound Sproul Road stop.	$
3	Install sidewalks along Sproul Road as needed to complete sidewalk network between West Chester Pike and Summit Road.	$$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

Figure 27: Sproul Road Recommended Improvements

STATION PROFILE

MUNICIPALITY: NEWTOWN

TRANSIT CONNECTIONS: ROUTE 120

POPULATION: 227 RESIDENTS WITHIN 1/4 MILE

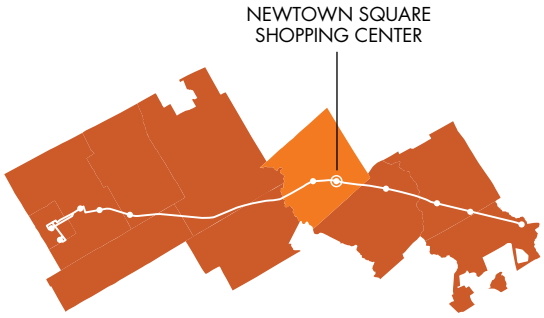
EMPLOYMENT: 2,137 JOBS WITHIN 1/4 MILE

WALK SCORE: 63

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 159

WESTBOUND: 8 ONS, 69 OFFS

EASTBOUND: 71 ONS, 11 OFFS



NEWTOWN SQUARE SHOPPING CENTER

Station Context

The Newtown Square Shopping Center is part of the larger Newtown Square commercial center in Newtown Township. This 140,000 sq. ft. shopping center is located approximately 750 feet east of the intersection of West Chester Pike and Route 252/Newtown Street Road and is anchored by an Acme grocery store. A commercial strip mall is located on the north side of West Chester Pike across the street from the shopping center.

EBS can best serve this area by using the existing stops located between St. Albans Avenue and Clover Lane: near the shopping center entrance on the south side and the Wells Fargo bank on the north side. The eastbound stop (far-side) includes a shelter with a bench, while the westbound stop (near-side) includes no amenities.

This station differs from those in Marple and Haverford because of its concentration of jobs. Over nine times as many jobs as residents are located within one-quarter mile of these existing stops. Single-family residential neighborhoods are located to the north and west of the shopping center; however, many of these homes may lie beyond a reasonable walking distance due to the curvilinear street grid. Dunwoody Village, a non-profit, non-denominational continuing care retirement facility with 400 residents, is located to the east of the shopping center.

EBS at this location can help improve access to the shopping and employment destinations found in and around the Newtown Square Shopping Center.

Access Improvements

Pedestrians are only permitted to cross West Chester Pike on the west side of the shopping center intersection. Recent improvements have added push-button pedestrian signals, tactile-warning curb ramps, and an enlarged pedestrian refuge. The addition of high-visibility crosswalks and countdown timers could enhance this crossing further.

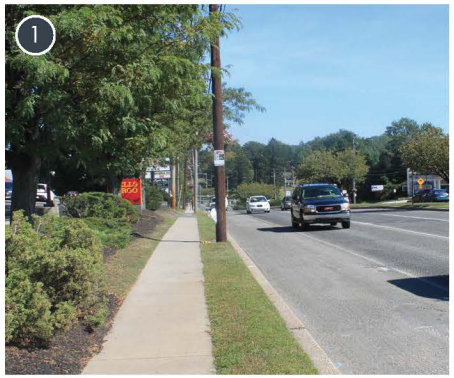
The sidewalk network in the area surrounding the Sproul Road intersection is relatively complete. However, traveling between West Chester Pike and local stores, which are set back from the roadway, can be challenging. Township officials can work with property owners to designate the best pedestrian circulation patterns within the Newtown Square Shopping Center.

On the north side, no sidewalks are present along West Chester Pike immediately west of the Wells Fargo bank. Walkers can make use of the sidewalk directly in front of the stores but need a better connection between the shops and West Chester Pike. Creating a walkway from the sidewalk to the shops could also enhance access to the station for residents living in the neighborhood north of Rhoads Avenue. Staff observations and paths worn into the vegetation indicate that residents cut through the parking areas behind these shops and walk along a grassy path to reach West Chester Pike. Extending a walkway to the rear parking area will provide a safer route for pedestrians.

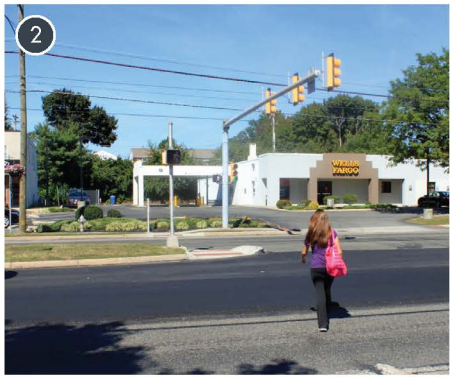
FIGURE 28: NEWTOWN SQUARE SHOPPING CENTER

Aerial Source: Microsoft Bing Maps

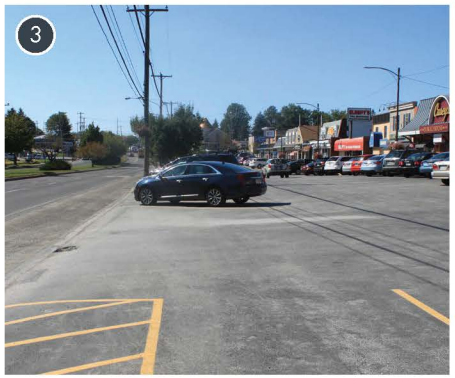
STATION AREA IMAGES



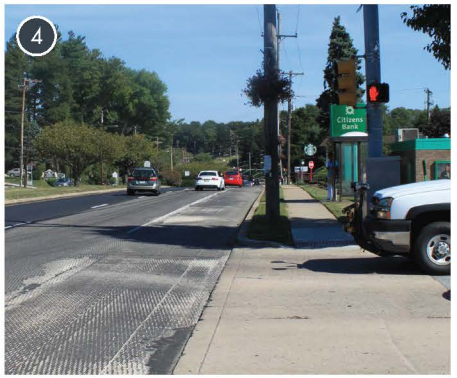
The westbound stop is located in front of a Wells Fargo Bank. Passengers currently wait on the sidewalk but the location could accommodate a shelter.



New push-button pedestrian signals, tactile curb ramps, and an enlarged pedestrian refuge were recently added to the west side of this intersection.



Parking for a shopping center obstructs pedestrians walking along West Chester Pike. Walkers must use the sidewalk located in front of stores.



The eastbound stop is located on the far-side of the shopping center entrance.

Table 12: Newtown Square Shopping Center Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks and pedestrian countdown signals to the west side of the intersection of West Chester Pike and the entrance to the shopping center.	$$
2	Install a bus shelter at the westbound Newtown Square Shopping Center stop.	$
3	Install a sidewalk or striped walkway that connects the sidewalk on the north side of West Chester Pike to the shopping center and the parking lot behind the shopping center.	$$
4	Install a sidewalk or striped walkway that connect the sidewalk on the south side of West Chester Pike to the Newtown Square Shopping Center.	$$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

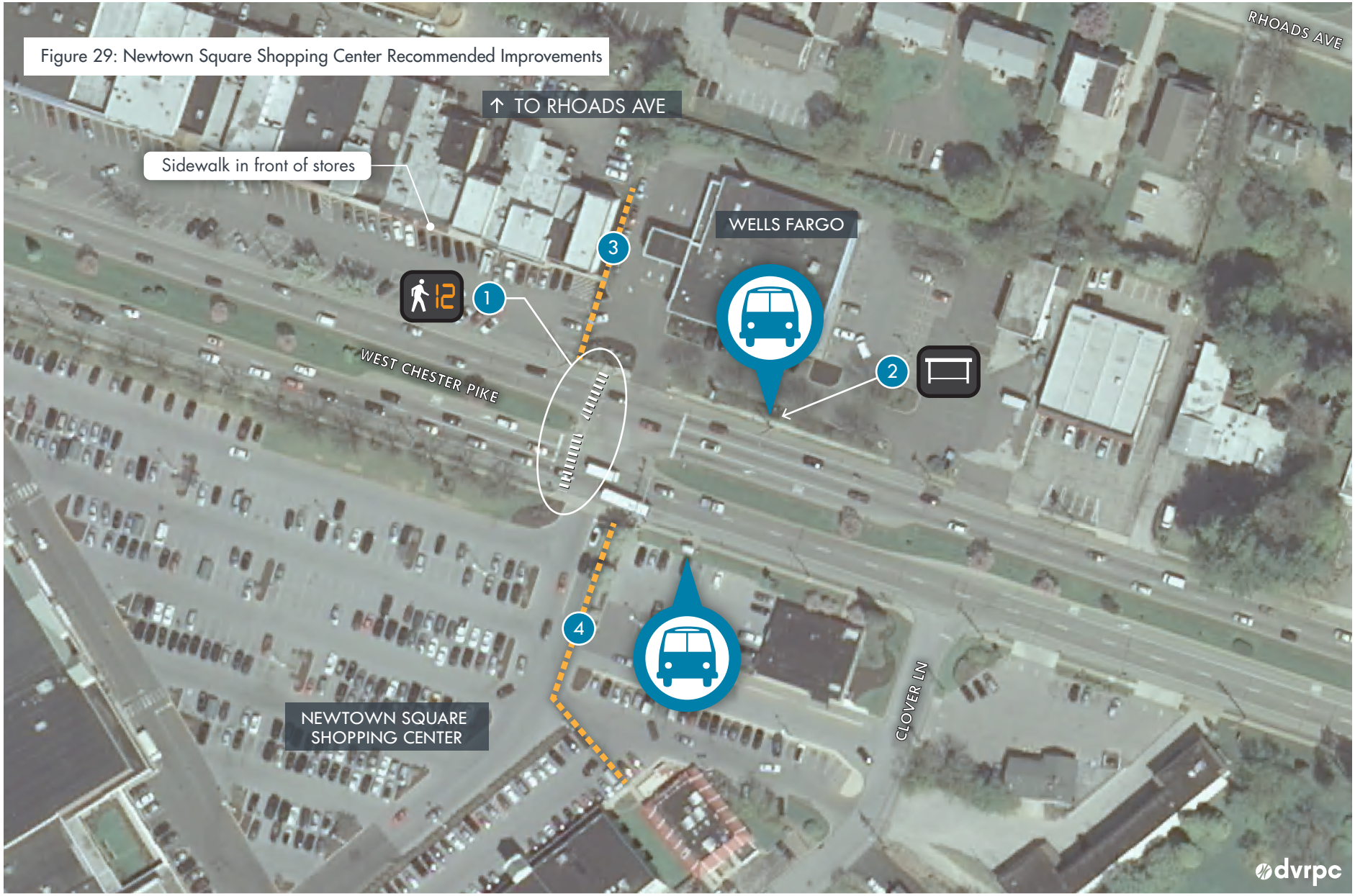


Figure 29: Newtown Square Shopping Center Recommended Improvements
↑ TO RHOADS AVE
Sidewalk in front of stores
WELLS FARGO
WEST CHESTER PIKE
RHOADS AVE
CLOVER LN
NEWTOWN SQUARE SHOPPING CENTER
1
2
3
4
12
dvrpc
Existing stop location
New shelter
New pedestrian connection
New crosswalk
Countdown timer
North
100 Feet

STATION PROFILE

MUNICIPALITY: NEWTOWN

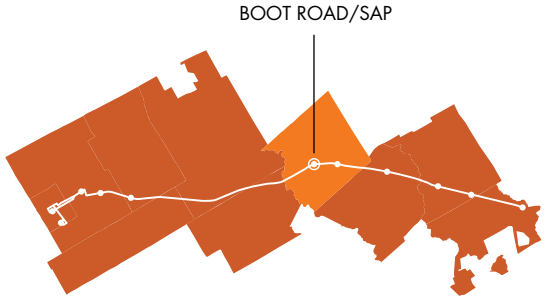
TRANSIT CONNECTIONS: ROUTE 120

POPULATION: 93 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 1,837 JOBS WITHIN 1/4 MILE

WALK SCORE: 34

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 84
WESTBOUND: 5 ONS, 35 OFFS
EASTBOUND: 36 ONS, 8 OFFS



BOOT ROAD/SAP

Station Context

Named for nearby Boot Road, bus stops for the Route 104 and 120 are located near the western entrance to the Ellis Preserve loop road. Formerly home to Ellis College, Ellis Preserve has evolved into a 210-acre suburban office campus, including tenants such as SAP America and numerous health care facilities.

The headquarters for SAP America, the largest employer on the corridor and one of the largest business software companies in the world, is located roughly 1,000 feet north of West Chester Pike (although walking routes are significantly longer due to the placement of the building entrance). Future plans for Ellis Preserve are being finalized and are expected to include a mix of office, retail, and residential uses. The first phase of development will focus on Ellis Town Square, a shopping center to be located near the intersection of West Chester Pike and PA 252/Newtown Street Road. This development, which includes a Whole Foods Market, will be located on the parcel bounded by West Chester Pike, Winding Way, and Clyde Lane.

The Main Line Health Center, which includes a Rothman Institute Orthopedic Center, is located approximately one-third of a mile east of the Boot Road Stop. Directly south of the stop, a new CVS and Pizzeria Uno have been constructed. Several car dealers are located to the west.

Like Newtown Square Shopping Center to the east, this stop is important to the corridor as an employment destination. Neither the east- nor westbound Boot Road/SAP stop provides a shelter, but sidewalks are present along both sides of West Chester Pike in the immediate vicinity of the intersection. The commercial development to the south of West Chester Pike includes internal sidewalks and crosswalks and is a good example of how to provide pedestrian access to stores that are set back from the road.

Access Improvements

Currently, pedestrians are only permitted to cross West Chester Pike on the east side of the Ellis Preserve entrance road. Crossing West Chester Pike can be made easier and safer by allowing crossings on the west side, adding high-visibility crosswalks, and constructing a pedestrian refuge on the eastern crossing. Adding a crosswalk to the Ellis Preserve entrance road is also critical. All westbound transit riders wishing to enter the site are dropped off on the far-side of the intersection, then must cross the street to enter Ellis Preserve because sidewalks are only present on the east side of the entrance road.

Despite the concentration of jobs and the potential improvements described here, getting Ellis Preserve employees to use transit may still be a challenge because of the distances these employees must walk from the bus stop to reach their place of employment. For example, portions of SAP's office building are located 600 feet from West Chester Pike, but an employee riding the bus would have to walk roughly 2,000 feet from the westbound bus stop to reach the main entrance at the back side of the building.

As planning for Ellis Preserve continues, developers and officials should look for opportunities to better integrate local and EBS transit into the site. Future considerations may include:

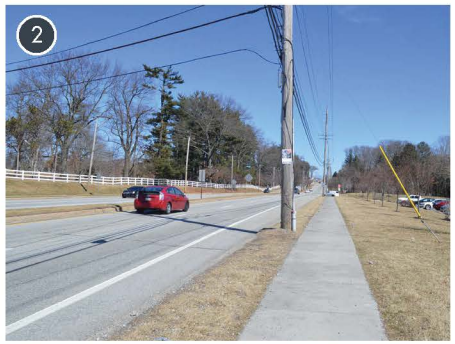
- moving the location of EBS to better serve emerging destinations on the site such as the Ellis Preserve Town Square;
- providing circulator shuttle service through the site to better connect employers with transit on West Chester Pike; or
- allowing SAP employees to use alternate building entrances that reduce the distance people must walk from the bus stop.

FIGURE 30: BOOT ROAD/SAP

Aerial Source: Google Maps

STATION AREA IMAGES

The westbound stop is located on the far-side of the Ellis Preserve entrance road.



The eastbound stop is located on the sidewalk in front of Pizzeria Uno.

A pedestrian refuge island could be created on the east side crossing by extending the existing center median.

A system of internal sidewalks and crosswalks help walkers safely access the commercial development south of West Chester Pike.

Table 13: Boot Road/SAP Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install a bus shelter at the westbound Boot Road/SAP stop.	$
2	Install high-visibility crosswalks and pedestrian countdown timers to the intersection of West Chester Pike and the Ellis Preserve entrance road.	$$$
3	Install a pedestrian refuge island in the center median of West Chester Pike at the Ellis Preserve entrance road.	$$
4	Install a bus shelter at the eastbound Boot Road/SAP stop.	$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

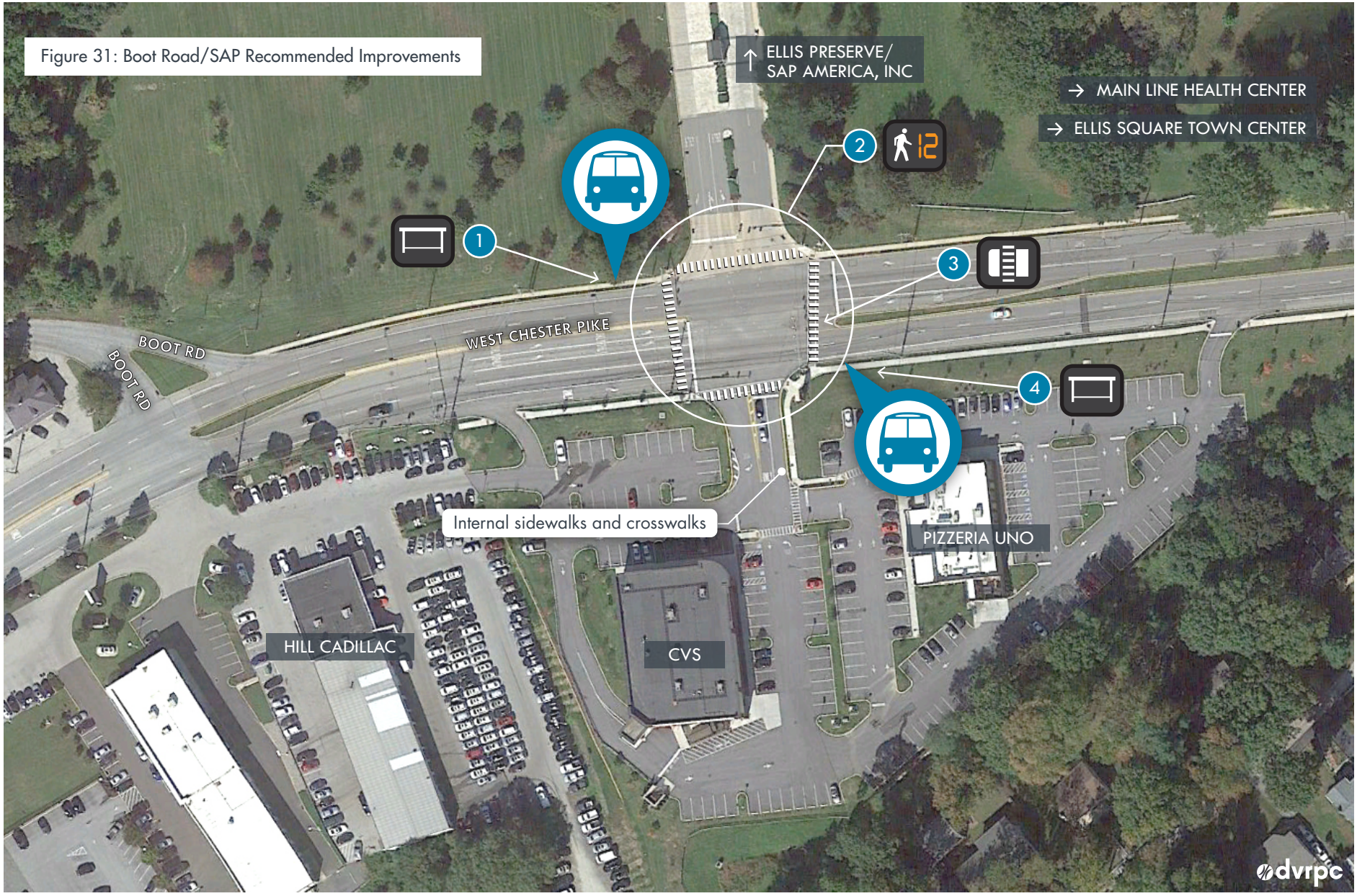
Source: DVRPC

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000



Aerial Source: Google Maps

STATION PROFILE

MUNICIPALITY: EAST GOSHEN

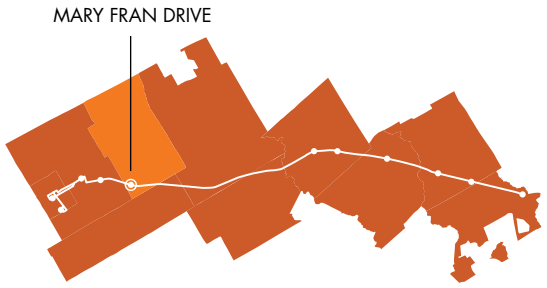
TRANSIT CONNECTIONS: —

POPULATION: 1,196 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 298 JOBS WITHIN 1/4 MILE

WALK SCORE: 35

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 36
WESTBOUND: 10 ONS, 4 OFFS
EASTBOUND: 16 ONS, 6 OFFS



MARY FRAN DRIVE

Station Context

The intersection of Mary Fran Drive and West Chester Pike is located in East Goshen Township, approximately three-tenths of a mile west of Westtown Way. The station area represents a node of higher-intensity multifamily housing along the western portion of the corridor.

The westbound stop is located well past the Mary Fran Drive intersection, in front of the recently rebranded Metropolitan apartment complex. The eastbound stop is located well before the Mary Fran Drive intersection, in front of the Rose Hill Apartments and just to the east of the Racquet Club Apartments. There is a small convenience shopping center integrated into the Rose Hill apartment complex. A mix of commercial uses is located west of the stops on West Chester Pike, and the station area is surrounded by lower-density single-family residential neighborhoods.

This station has a lower level of passenger activity than other EBS priority stops. Nonetheless, the existing residential density makes this an attractive candidate for enhanced transit service. The existing westbound stop consists of a sign on a utility pole and does not include a concrete platform, shelter, or connecting sidewalk. The eastbound stop includes a branded Rose Hill shelter, bench, and light. This portion of West Chester Pike does not have sidewalks, but the shelter is connected to the apartment parking lot by a walkway.

Station Access

Access to the Mary Fran Drive stops can be improved by adding additional crossing amenities and potentially relocating the existing stops. Pedestrians are only permitted to cross West Chester Pike on the east side of the Mary Fran Drive intersection. This crossing can be made safer by adding high-visibility crosswalks and countdown timers. Each corner of the intersection also needs to have curb ramps and concrete pads installed. Furthermore, the existing crosswalk across the Metropolitan entrance is interrupted by a planted median, potentially forcing pedestrians to use the roadway shoulder. Integrating the crosswalk into a reconfigured median will make this crossing safer and more accessible to all users.

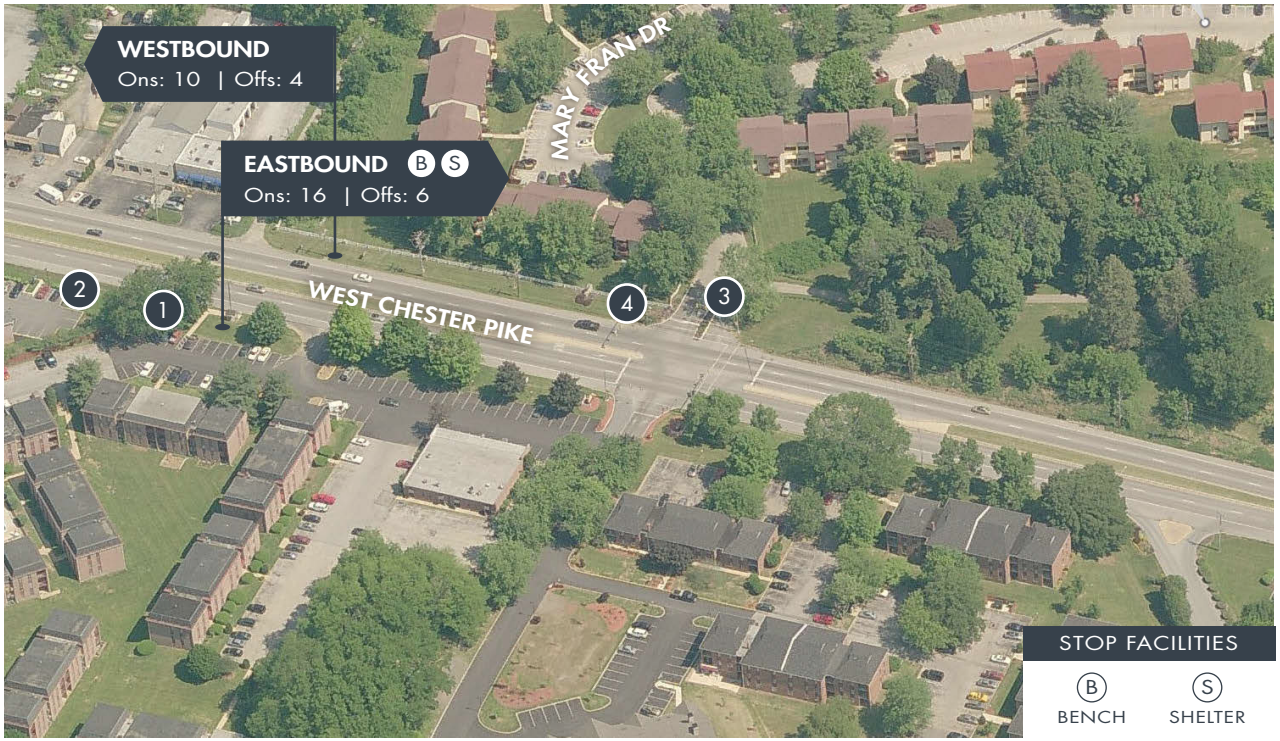
The lack of sidewalks also creates access problems at this location, particularly when combined with the distance each stop is currently located from the intersection. The placement of the existing stops may encourage passengers to cross West Chester Pike at an unsignalized location rather than walking to the intersection. The westbound stop could be relocated closer to the intersection of Mary Fran Drive. In the future, this location could accommodate a shelter and could be connected to the intersection by a sidewalk.

For safety purposes, moving the eastbound stop to a location closer to the Mary Fran Drive intersection should also be considered. Although the existing stop has a shelter, it offers few amenities and will likely need to be upgraded

or replaced in the future. Topography is an issue along West Chester Pike that may impact relocation options. Regardless of which location is selected, sidewalks should be added to the south side of West Chester Pike connecting residential development to the stops.

Pedestrian access from within the Metropolitan and Rose Hill complexes to West Chester Pike is limited by a lack of internal sidewalks, fences, and landscaping. These properties can enhance their appeal to future tenants by enhancing pedestrian access to West Chester Pike.

FIGURE 32: MARY FRAN DRIVE



Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The existing eastbound stop includes a shelter connected to the Rose Hill Apartment complex parking lot.

Looking west along the south side of West Chester Pike, the lack of sidewalks limits pedestrian access.

The crosswalk at Mary Fran Drive is interrupted by a landscaped median, potentially forcing pedestrians into the street.

The westbound stop is currently located nearly 300 feet from the intersection with no sidewalk access.

Table 14: Mary Fran Drive Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install bus shelter at relocated westbound stop.	$
2	Install a sidewalk along the north side of West Chester Pike between Mary Fran Drive and adjacent businesses.	$$
3	Install high-visibility crosswalks and curb ramps at the north, east, and west sides of the intersection of West Chester Pike and Mary Fran Drive. Install pedestrian countdown signals to the West Chester Pike crosswalk at Mary Fran Drive.	$$
4	Install a sidewalk along the south side of West Chester Pike between the entrance to the Rose Hill Apartments/Mary Fran Drive and Ellis Lane (roughly 1/4 mile west).	$$$
5	Install bus shelter at relocated eastbound stop.	$

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC


Figure 33: Mary Fran Drive Recommended Improvements
METROPOLITAN APARTMENTS
MARY FRAN DR
EAST GOSHEN ESTATES
WEST CHESTER PIKE
RACQUET CLUB APTS.
ROSE HILL APARTMENTS
VALLEY DR
1
2
3
4
5
12
3
dvrpc
Existing stop location
Alternative stop location
New crosswalk
New sidewalk
New curb ramp
Countdown timer
North
100 Feet

STATION PROFILE

MUNICIPALITY: WEST GOSHEN

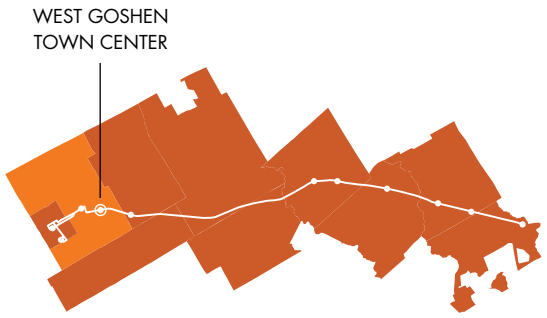
TRANSIT CONNECTIONS: —

POPULATION: 1,766 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 700 JOBS WITHIN 1/4 MILE

WALK SCORE: 56

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 111
WESTBOUND: 27 ONS, 28 OFFS
EASTBOUND: 34 ONS, 22 OFFS



WEST GOSHEN TOWN CENTER

Station Context

Situated approximately one-half mile east of US 202, the West Goshen Town Center is a 135,000 sq. ft. community shopping center anchored by a Shop Rite supermarket. Other tenants include Applebee's, Panera Bread, and AC Moore. In addition to this commercial destination, the area represents a relatively large residential node along the corridor, mostly due to the presence of the Golf Club Apartments and Townhomes south of the Town Center. The Golf Club Apartments is a 12-building complex that extends for roughly three-tenths of a mile along West Chester Pike.

EBS at this location can make use of the existing Route 104 stops, both of which include shelters and benches. The existing westbound stop is located on the far side of the Town Center entrance, while the eastbound stop is located on the near side of the entrance to the Golf Club Apartments. This portion of the corridor is home to two other apartment complexes and a number of single-family residential neighborhoods. However, the lack of sidewalks along West Chester Pike suggests that most EBS passengers would be drawn from the Town Center and Golf Club Apartments.

Station Access

Pedestrian mobility along this section of West Chester Pike is severely limited by the lack of sidewalks. However, pedestrians also have difficulty traveling from the bus stops into the adjacent developments. There are no dedicated pedestrian paths or sidewalks from either bus stop into the Town Center or connecting to the Golf Club Apartments internal sidewalk network.

Pedestrian access at this location can be improved by making it easier and safer to cross West Chester Pike and linking the stops to nearby destinations. Pedestrians are only permitted to cross West Chester Pike on the west side of the intersection. Adding high-visibility crosswalks and countdown timers can make this intersection less formidable to pedestrians.

Creating better transit access from the Golf Club Apartments will require a new sidewalk that connects the complex's internal sidewalk network to the intersection. The eastern side of the entrance drive appears to offer more space for such a sidewalk; however, installing this walkway would require realigning the fence and creating a path around the existing signage.

On the north side of the intersection, pedestrians face the prospect of a long, unprotected walk to reach most of the Town Center stores, which are set back from the street by a large parking lot. Rather than creating a walkway along the main entrance drive, pedestrians may be better served by sidewalks along West Chester Pike, which provide links to one or both of the east

and west wings of the shopping center. Such a route is longer than walking directly through the parking lot but would improve mobility along West Chester Pike and reduce pedestrian-vehicle conflicts.

FIGURE 34: WEST GOSHEN TOWN CENTER

Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The westbound stop is located on the far-side of the shopping center entrance. No sidewalks are available to walkers here.

Most of the stores in the Town Center are set back from the street by a parking area. New sidewalks along the entrance drive or along the edge of the property could help walkers access the site.

The eastbound stop is located on the near side of the entrance to the Golf Club Apartments.

No sidewalks currently exist to connect residents of the Golf Club Apartments to West Chester Pike.

Table 15: West Goshen Town Center Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install a sidewalk connecting westbound shelter to Town Center intersection.	$
2	Install high-visibility crosswalks, pedestrian countdown timers, and curb ramps to the intersection of West Chester Pike and the Town Center.	$$$
3	Provide walkway from West Chester Pike to the Town Center by installing sidewalks along east and west edges of property (Option A) or along main driveway (Option B).	A: $$$ B: $$
4	Install a sidewalk between West Chester Pike and the Golf Club Apartments' sidewalk network.	$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

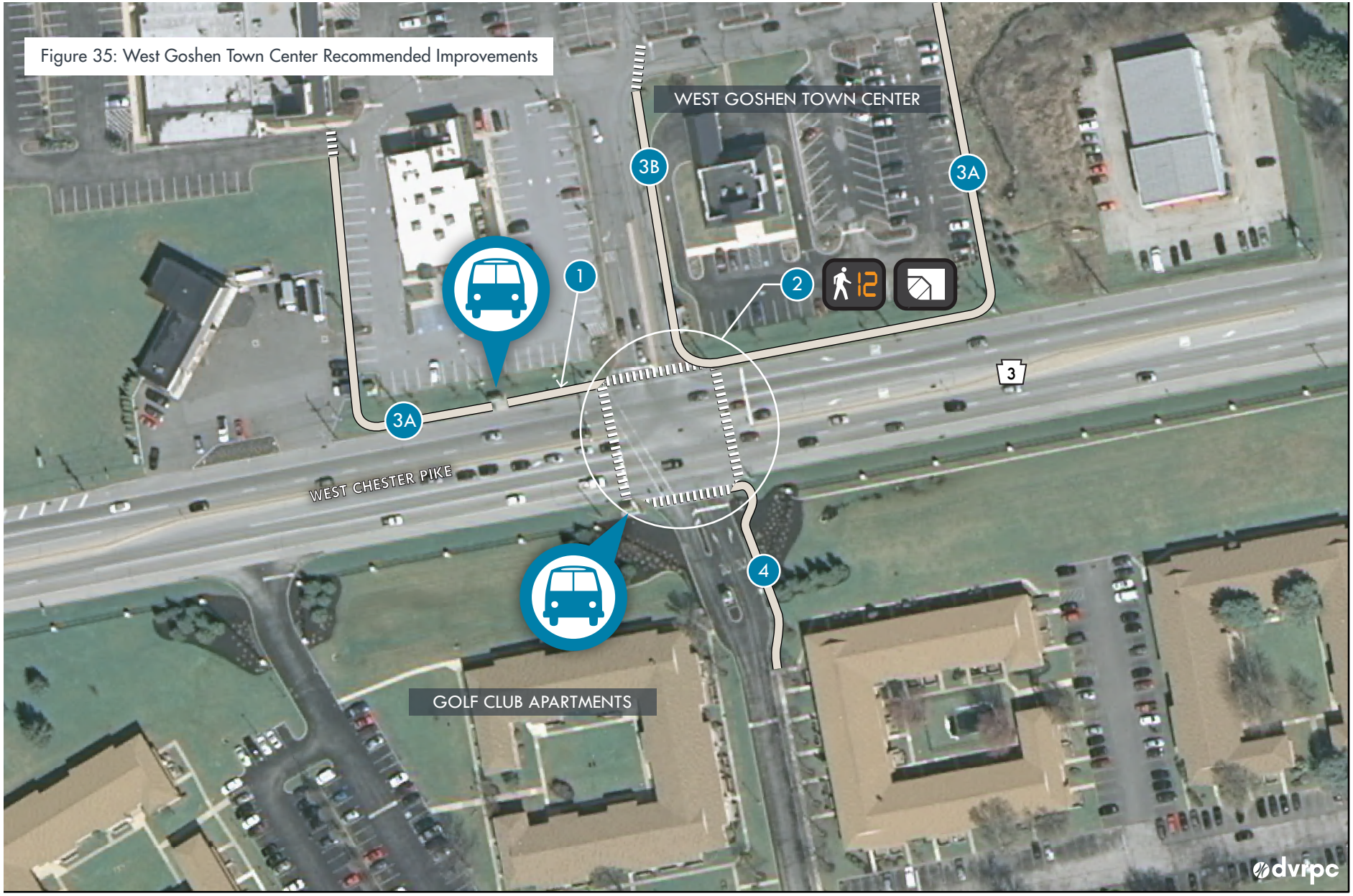
APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

Figure 35: West Goshen Town Center Recommended Improvements



STATION PROFILE

MUNICIPALITY: WEST GOSHEN

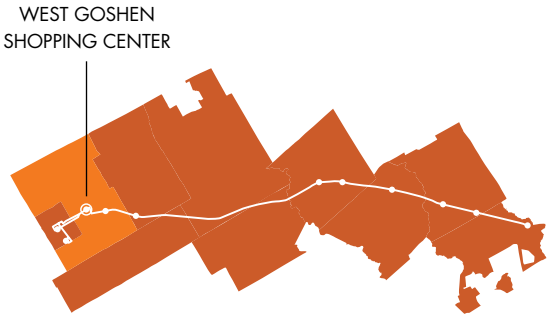
TRANSIT CONNECTIONS: —

POPULATION: 464 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 1,127 JOBS WITHIN 1/4 MILE

WALK SCORE: 53

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 93
WESTBOUND: 15 ONS, 45 OFFS
EASTBOUND: 21 ONS, 12 OFFS



WEST GOSHEN SHOPPING CENTER

Station Context

After traveling for miles exclusively on West Chester Pike, westbound Route 104 buses use US 202 North and Paoli Pike to approach West Chester. The pair of near-side stops at the intersection of Paoli Pike and Concord Road serve the West Goshen Shopping Center, other nearby commercial development, and the residential neighborhood south of Paoli Pike and west of US 202.

The West Goshen Shopping Center is a community center anchored by an ACME supermarket that also includes a K-Mart and a Staples. This center is bordered to the west by Turner Square, a linear commercial strip set back from Paoli Pike behind a Bryn Mawr Trust Bank branch.

The eastbound stop is located on a sidewalk in front of a private residence. The westbound stop lacks any amenities, including a concrete pad for passengers to stand on. While the sidewalk network is fairly complete south of Paoli Pike, it is inconsistent to the north. Sidewalks and internal crosswalks are present west of the shopping center but absent in front of it.

This location is also noteworthy due to the presence of a park-and-ride lot on the north side of Paoli Pike between the US 202 off-ramp and the entrance to the shopping center. This lot contains approximately 50 parking spaces and is primarily used as part of a shuttle system for AstraZeneca in Wilmington, Delaware. Based on observations, the majority of spaces go unused on a typical weekday. Although located approximately 500 feet from the existing stops, this lot, and the adjacent unused portion of the shopping center parking lot, represents a potential opportunity for an EBS park-and-ride facility. Such a use would necessitate new pedestrian infrastructure along Paoli Pike.

Station Access

The westbound stop can be improved by building a shelter at the current near-side location. Alternatively, the westbound stop could be relocated to the far side of the intersection. Moving the stop would help avoid conflicts between the bus and vehicles turning right into the shopping center. The relocation could be combined with the creation of a curb bumpout on the far side of the intersection that creates more room for a passenger platform and shelter. Any relocation would have to consider the turning movements of vehicles entering Turner Square.

Regardless of the stop location, pedestrians would benefit from sidewalks along both sides of Paoli Pike and a clear pedestrian path into the shopping center. The intersection itself can be enhanced by high-visibility crosswalks, countdown timers, and a pedestrian refuge. The eastbound stop is space-constrained and cannot accommodate a conventional shelter. Similar conditions exist on the far side of the intersection, so there is no spatial advantage to moving the stop. Any shelter provided in this location would need to be designed with a narrower footprint.

FIGURE 36: WEST GOSHEN SHOPPING CENTER

Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The westbound stop is located on a patch of grass on the near-side of the shopping center entrance.

Adding a pedestrian refuge to the east crosswalk can make the crossing more comfortable for walkers.

The eastbound stop is located on the near-side of the Concord Road intersection at a location without much space for a shelter.

Transit riders face a long, unprotected walk from Paoli Pike into the shopping center.

Table 16: West Goshen Shopping Center Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks and pedestrian countdown signals to the intersection of Paoli Pike and Concord Road.	$$$
2	Install crosswalks and sidewalk connecting Paoli Pike to the Shopping Center.	$$
3	Install bus shelter at existing westbound stop.	$
4	Install sidewalks and crosswalks along the north side of Paoli Pike. Extending the sidewalk beyond the existing bus stop becomes a priority if EBS riders begin using the park-and ride lot.	$$$
5	Install a pedestrian refuge island in the center median of the east side of the intersection of Paoli Pike and Concord Road.	$$
6	Install sidewalks along the south side of Paoli Pike between Concord Road and Thomas Avenue (approximately 0.15 miles to the east).	$$
7	Consider relocating westbound stop to the farside of the Concord Road intersection. A reconfigured stop could include a shelter and curb bumpout.	$$

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC


Figure 37: West Goshen Shopping Center Recommended Improvements
PARK-AND-RIDE LOT
ACME
PAOLI PIKE
TURNER AVE
PATRICK AVE
CONCORD RD
1
2
3
4
5
6
7
dvrpc
Existing stop location
Alternative stop location
New crosswalk
New sidewalk
Countdown timer
Pedestrian refuge
Bus shelter
Curb bumpout
100 Feet
North

STATION PROFILE

MUNICIPALITY: WEST GOSHEN/WEST CHESTER

TRANSIT CONNECTIONS: —

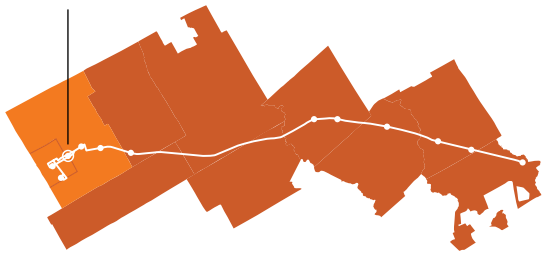
POPULATION: 541 RESIDENTS WITHIN 1/4 MILE

EMPLOYMENT: 1,631 JOBS WITHIN 1/4 MILE

WALK SCORE: 76

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 135
WESTBOUND: 5 ONS, 72 OFFS
EASTBOUND: 52 ONS, 6 OFFS

BOLMAR STREET



BOLMAR STREET

Station Context

This pair of stops is located along the border between West Goshen and West Chester. These stops are unique because the east- and westbound stops are separated by a block and located on a pair of one-way streets: Gay Street (west) and Market Street (east). The westbound stop, which falls in West Goshen, is located in front of a McDonald's at the intersection of Gay and Bolmar streets and includes a bench and concrete platform.

The eastbound stop, which falls in West Chester, is located nearly 500 feet south at the southwest corner of the intersection of Market and Bolmar streets. The area served by these stops is dominated by auto-oriented commercial uses such as a Wawa convenience store and gas station, Pep Boys, Tires Etc., and several fast food restaurants. There is a small pocket of homes south of Market Street, between Bolmar and Franklin streets. Further south, the area includes a number of industrial and warehousing uses.

Sidewalks are limited throughout the area, making it difficult to walk between Gay and Market streets and reach other nearby destinations such as Henderson High School, which is located one-quarter mile north of Gay Street.

Station Access

As evidenced by the high passenger activity at these stations, many pedestrians are walking within the station area despite the lack of sidewalks. Initial pedestrian improvements should focus on street crossings and establishing a pedestrian connection between Gay and Market streets. High-visibility crosswalks and countdown timers should be added to both the Gay and Market street intersections.

There appear to be fewer obstacles to adding a sidewalk to the east side of Bolmar Street (Wendy's, TD Bank) than the west side. Using the east side would create a sidewalk that lines up with the Gay Street crosswalk and would avoid the trees, driveways, utility poles, and parking spaces found on the west side. Nonetheless, even an eastern sidewalk will require new curb ramps and the potential relocation of signs and signal boxes.

The block created by Bolmar, Gay, Worthington, and Market streets may be a candidate for redevelopment in the future. At that time, sidewalks should be integrated into any new development to improve the connection between these two stops.

Over time, pedestrian mobility in the larger area can be enhanced by expanding the sidewalk network along Gay and Market streets and along Montgomery Avenue to Henderson High School.

FIGURE 38: BOLMAR STREET

Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The westbound stop is located in front of a McDonald's and includes a bench.

The eastbound stop is located on the near-side of the Bolmar Street intersection. This location does not afford much room for a conventional shelter.

Looking north on Bolmar Street, a new sidewalk on east side of Bolmar Street can help pedestrians walk between Gay and Market streets.

Sidewalks along Montgomery Avenue could better connect EBS to the Henderson High School, approximately ¼ mile away.

Table 17: Bolmar Street Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install bus shelter at the existing westbound stop.	$
2	Install high-visibility crosswalks, pedestrian countdown timers, and curb ramps to the intersection of Gay Street and Bolmar Street.	$$
3	Install a sidewalk along the east side of Bolmar Street between Gay and Market streets.	$$
4	Install high-visibility crosswalks, pedestrian countdown timers, and curb ramps to the intersection of Market Street and Bolmar Street.	$$$
5	Install sidewalks along both sides of Gay Street between Worthington Street and Bolmar Street and along the south side of Gay Street between Bolmar Street and the Wawa.	$$$
6	Install high-visibility crosswalk and curb ramps at the intersection of Gay Street and Montgomery Avenue. Install sidewalk along Montgomery Avenue to provide pedestrian connection to Henderson High School.	$$
7	Install a sidewalk along the north side of Market Street between Worthington Street and the Wawa	$$$

APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

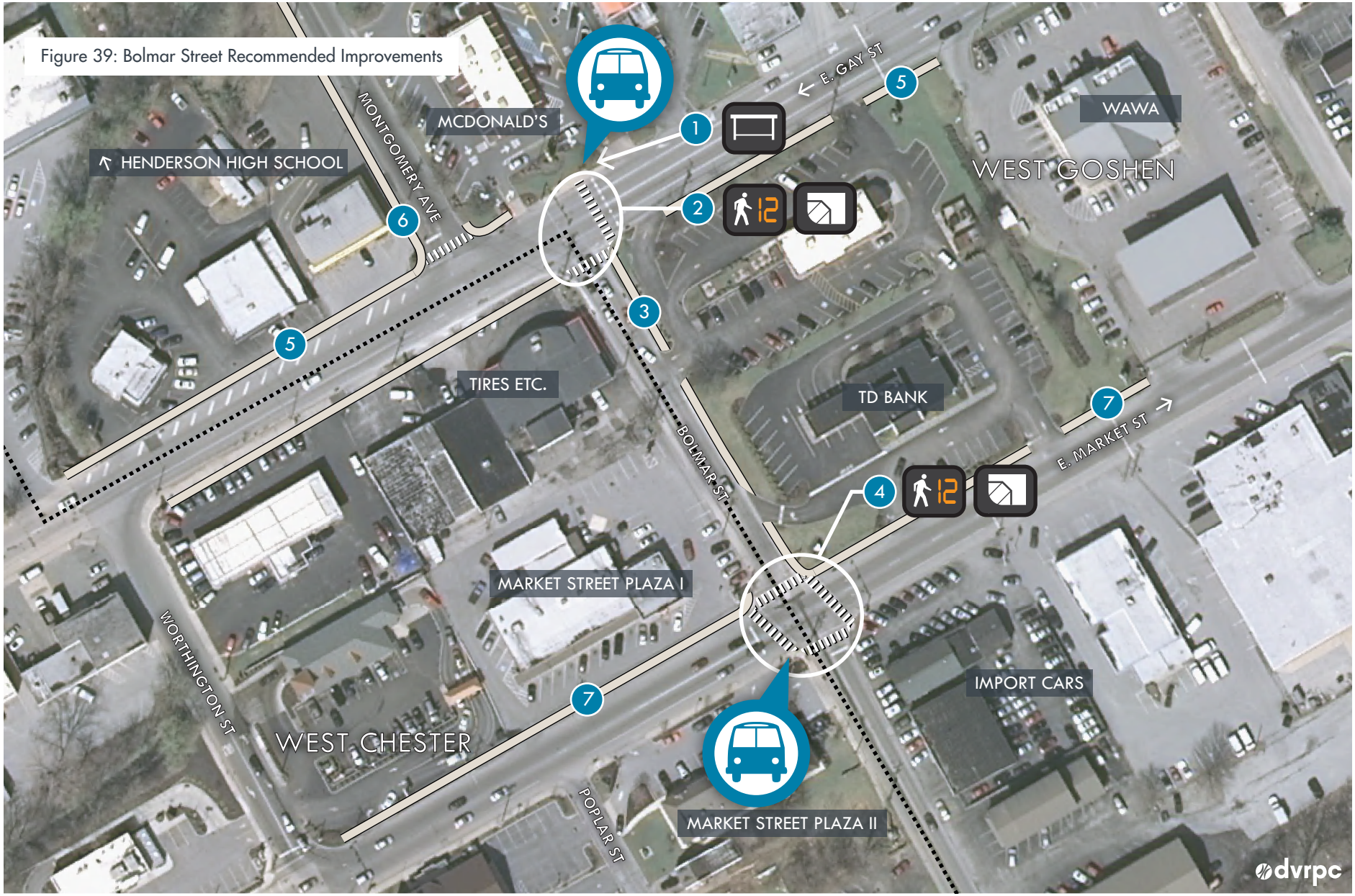


Figure 39: Bolmar Street Recommended Improvements
MCDONALD'S
HENDERSON HIGH SCHOOL
MONTGOMERY AVE
E. GAY ST
WAWA
WEST GOSHEN
TIRES ETC.
TD BANK
BOLMAR ST
E. MARKET ST
MARKET STREET PLAZA I
IMPORT CARS
WORTHINGTON ST
WEST CHESTER
POPLAR ST
MARKET STREET PLAZA II
1
2
3
4
5
6
7
dvrpc
Existing stop location
Bus shelter
New crosswalk
New sidewalk
Countdown timer
Curb ramp
100 Feet
North

STATION PROFILE

MUNICIPALITY: WEST CHESTER

TRANSIT CONNECTIONS: SEPTA ROUTE 92; KRAPF'S ROUTE A; TMACC SCCOOT

POPULATION: 3,126 RESIDENTS WITHIN 1/4 MILE

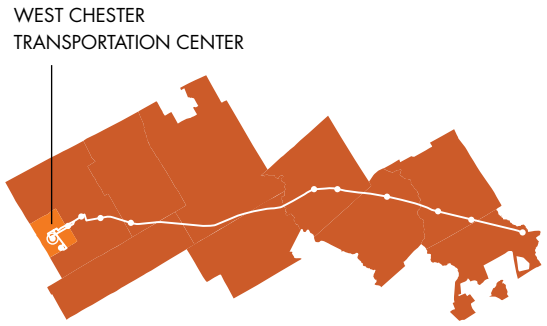
EMPLOYMENT: 4,620 JOBS WITHIN 1/4 MILE

WALK SCORE: 95

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 326

WESTBOUND: 160 ONS, 8 OFFS

EASTBOUND: 12 ONS, 146 OFFS



WEST CHESTER TRANSPORTATION CENTER

Station Context

The West Chester Transportation Center is a bus terminal located in the ground floor of the parking structure across from the Chester County Justice Center in downtown West Chester. In addition to SEPTA Route 104, the Transportation Center provides connecting bus service for SEPTA Route 92 (service to Exton Square Mall and King of Prussia), Krapf's Route A, which provides service to Downingtown and Coatesville, and TMACC's SCCOOT bus routes that provide service to southern Chester County. Public parking is available in the garage, although space is limited.

West Chester itself is an important employment, educational, and cultural destination. Nearly 90 percent of the borough is listed on the National Register of Historic Places. Downtown West Chester offers a variety of restaurants, shops, and museums that cater to locals and visitors.

The area within one-quarter mile of the Transportation Center is home to 666 businesses, which employ over 4,600 employees—the most of any stop along Route 104. Furthermore, the Transportation Center station area is home to over 3,000 residents, second to only the West Chester University stop.

Station Access

Buses serving the West Chester Transportation Center pull into the first floor of the Transportation Center to pick up and drop off passengers. Accordingly, east and westbound passengers use the same facilities and are protected from the elements while waiting.

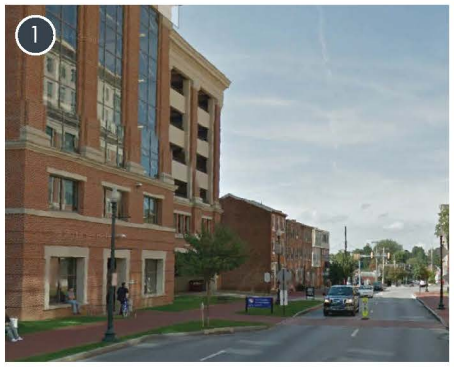
Outside of the center, downtown West Chester is the most pedestrian-friendly area of the corridor. Most streets include generous sidewalks, and many intersections feature curb bumpouts, which help shorten crossing distances. Pedestrians also benefit from a midblock crosswalk that connects the Courthouse to the Transportation Center.

The crosswalks at the two closest intersections, New and Market streets and New and Darlington streets, are faded and difficult to see. These high-volume crossings could benefit from high-visibility crosswalks. However, there are a number of important intersections throughout the downtown. The borough may wish to develop consistent crosswalk treatments that can contribute to the character of the downtown and be installed over time.

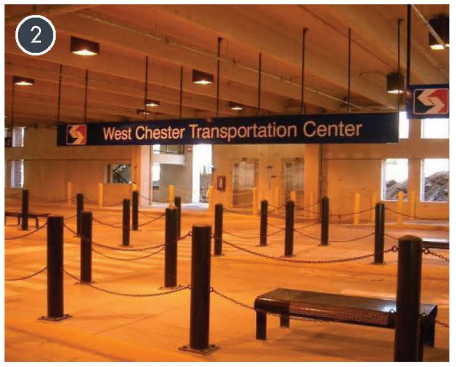
FIGURE 40: WEST CHESTER TRANSPORTATION CENTER

Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES



A mid-block crosswalk connects the West Chester Transportation Center to the Chester County Justice Center.



Passenger loading and unloading takes place on the ground level of the Transportation Center.

Narrow streets, wide sidewalks, and historical character contribute to Downtown West Chester's excellent pedestrian infrastructure.

Table 18: West Chester Transportation Center Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks at the intersection of Market Street and New Street.	$
2	Install high-visibility crosswalks at the intersection of Market Street and Darlington Street.	$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

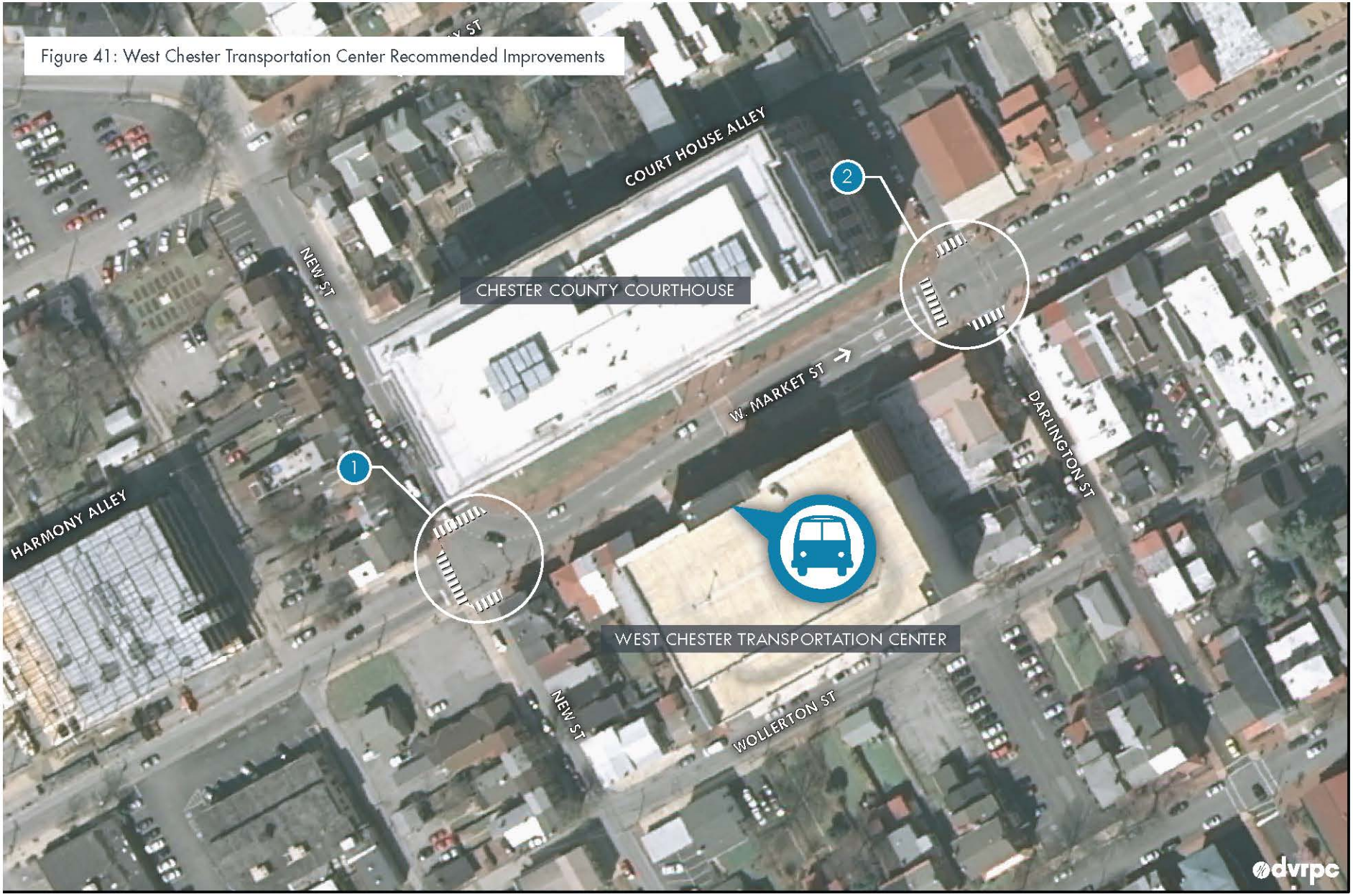
APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

Figure 41: West Chester Transportation Center Recommended Improvements



STATION PROFILE

MUNICIPALITY: WEST CHESTER

TRANSIT CONNECTIONS: WEST CHESTER UNIVERSITY SHUTTLES

POPULATION: 4,735 RESIDENTS WITHIN 1/4 MILE

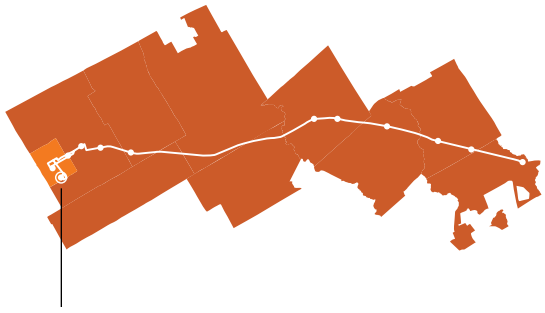
EMPLOYMENT: 1,309 JOBS WITHIN 1/4 MILE

WALK SCORE: *77*

TOTAL WEEKDAY STOP ACTIVITY (SPRING 2014): 512

WESTBOUND: 244 OFFS

EASTBOUND: 268 ONS



WEST CHESTER UNIVERSITY

Station Context

The western terminus of the Route 104 is located at the intersection of University Avenue and Church Street (approximately one-half mile from downtown West Chester) in the heart of West Chester University's 106-acre north campus. West Chester University (WCU) has a total enrollment of 15,845 students: 13,711 undergraduates and 2,134 graduate students. Approximately 93 percent of freshmen live on campus. WCU also has 887 full- and part-time faculty, as well as 768 full-time non-instructional staff, making it one of the largest employers on the corridor.

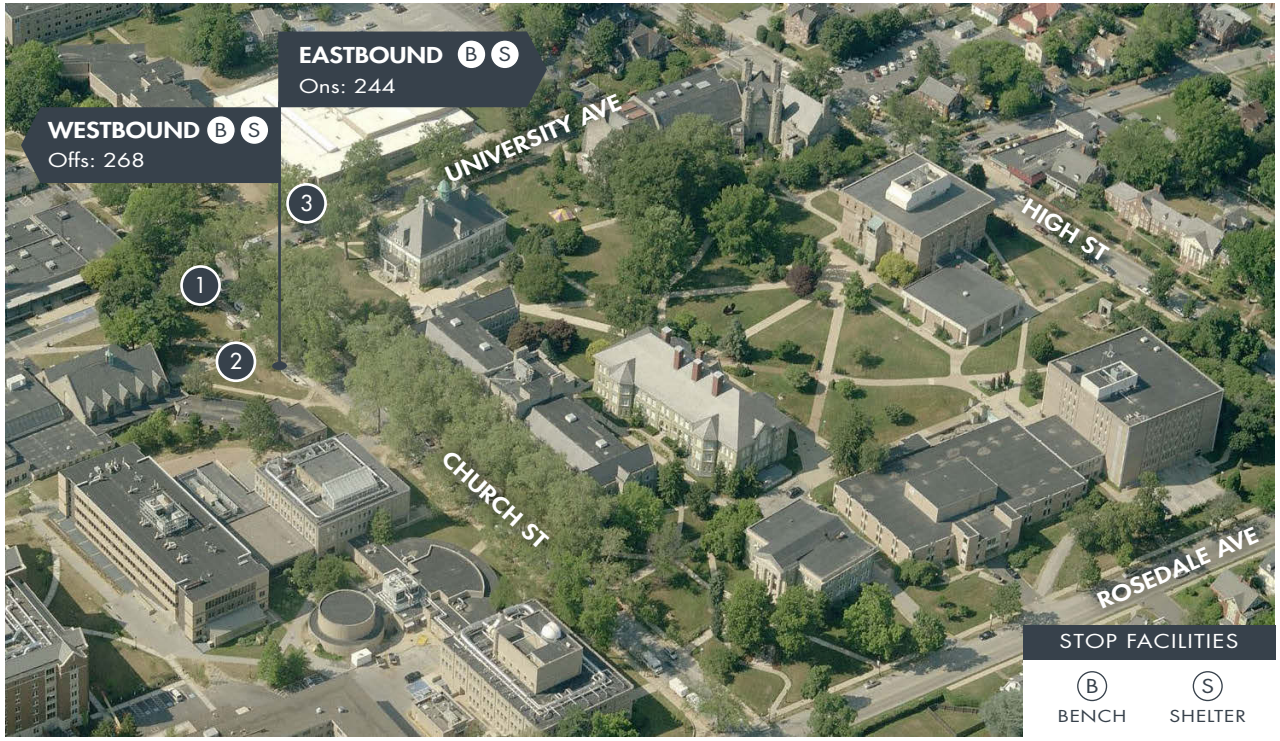
The Route 104 stop is co-located with WCU's Church Street shuttle stop. The University offers four main shuttle routes, all of which use the Church Street stop: the Express Bus, the Q Lot Bus, the All Stops Bus, and the East Campus Loop. Service is offered during the spring and fall semesters. The shuttles begin service at 7:15 AM on weekdays and at 10:00 AM on weekends. Shuttle service continues until 2:00 AM. There is also an Exton Train Station Shuttle, which makes six trips each weekday between the Exton train station and campus. WCU buses transport over 4,300 riders on a typical class day.

The bus stop at this location includes a shelter with a bench. Several additional benches as well as trash and recycling receptacles, newspaper boxes, and a bicycle rack are located nearby.

Station Access

Similar to downtown West Chester, the WCU campus includes excellent pedestrian infrastructure. In addition to a complete network of sidewalks, pedestrians can use an extensive system of internal paths to travel through the campus. The intersection of University Avenue and Church Street is stop-controlled. The addition of high-visibility crosswalks could enhance this environment further.

FIGURE 42: WEST CHESTER UNIVERSITY



Aerial Source: Microsoft Bing Maps

STATION AREA IMAGES

The West Chester University stop is located on the west side of Church Street, just south of University Avenue.

This location includes a shelter, trash and recycling cans, and several newspaper boxes. Several additional benches are located nearby.

The Route 104 stop is also served by four West Chester University shuttles.

Table 19: West Chester University Recommended Improvements

NUMBER	DESCRIPTION	COST RANGE*
1	Install high-visibility crosswalks at the intersection of Church Street and University Avenue.	$

*All cost ranges generated using average cost estimates documented in Costs for Pedestrian and Bicyclist Infrastructure by the UNC Highway Safety Research Center. Actual costs of implementation may vary significantly based on local conditions.

Source: DVRPC

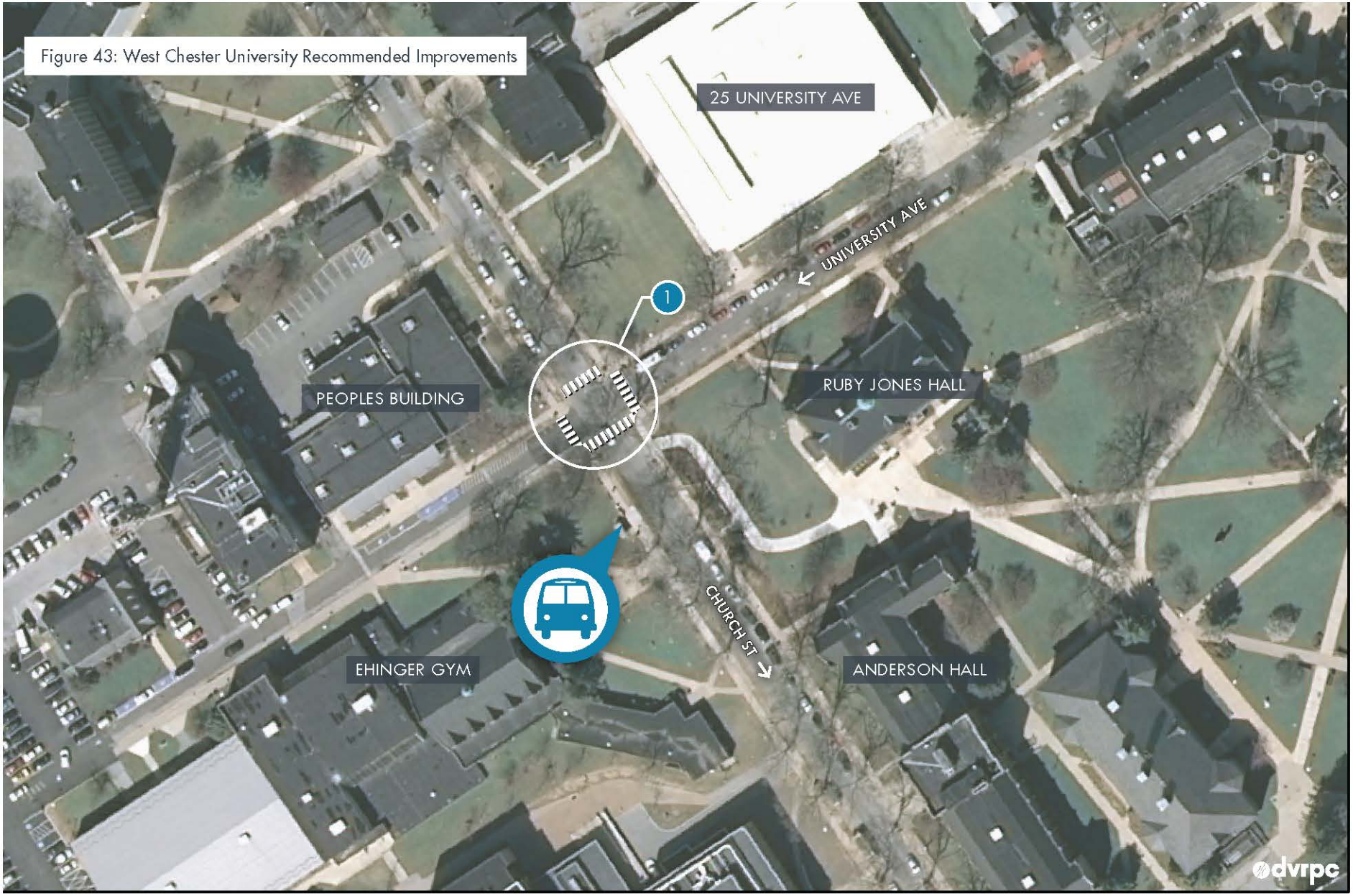
APPROXIMATE COST RANGES

$: Less than $10,000

$$: $10,000 to $25,000

$$$: More than $25,000

Figure 43: West Chester University Recommended Improvements



Existing stop location

New crosswalk

North

100 Feet

5. Implementation

EBS can play a critical role in the continued evolution of West Chester Pike. A future in which corridor residents, employees, and visitors have more transportation options benefits each of the communities along West Chester Pike and the region as a whole.

However, making EBS a reality will require strong leadership, continued proactive planning, and aggressive collaboration. Additionally, the full EBS concept described in this report will not be implemented all at once. The proposed recommendations will need to be phased in as funding is identified and plans are finalized.

Four key implementation actions are outlined in this chapter:

> Assemble a **coalition** dedicated to improving mobility along West Chester Pike.
>
> **Pilot EBS** on the corridor to clarify benefits and costs of improved service.
>
> Develop a **regional strategy** for prioritizing and marketing EBS.
>
> Enhance **pedestrian connections** at priority stop locations.

Each of these actions is described in this chapter. The report concludes by identifying potential funding sources for improvements identified in this document.

1 Establish the West Chester Pike Coalition

Corridor municipalities can achieve greater results by working as a group than they can as individuals. The first step in realizing EBS on West Chester Pike is to create a coalition whose mission is to improve mobility along the corridor for all users. Rather than focusing exclusively on transit, building a broad coalition around the theme of mobility will help bring people to the table and emphasize the key role West Chester Pike plays for all corridor residents and visitors.

Building and maintaining this coalition will require strong leadership from Delaware and Chester counties as well as DCTMA and TMACC. However, the large turnout and lively conversations that occurred during the February 2015 workshop indicate that there is a strong interest in the future of the corridor. The West Chester Pike Coalition can keep these stakeholders engaged by establishing clear priorities for the group and holding regularly scheduled meetings.

Core members of the coalition will likely include representatives from corridor municipalities, PennDOT, and SEPTA. However, reaching out to a broader audience such as local employers, educational institutions, and the development community can help ensure success.

Early Agenda

One of the ongoing goals of the coalition will be educating elected officials and other corridor stakeholders about the critical role that transit plays along the corridor. This report, as well as recent studies, can serve as important resources for coalition members.

The coalition should focus its initial efforts on laying the foundation for EBS and building consensus on improvements that will benefit all users of the corridor. Early priorities for the coalition should include:

- Working with SEPTA to pilot EBS service on the corridor (key considerations for an EBS pilot project are discussed later in this chapter);
- Identifying and prioritizing multimunicipal improvement projects, such as signal upgrades, that can enhance mobility for all roadway users; and
- Collaborating on local pedestrian access improvements along the EBS route (some key funding opportunities are outlined later in this chapter).

PUSHING FOR BRT IN PITTSBURGH

Get There PGH is a collaborative group of over 45 organizations advocating for additional BRT investment in the Pittsburgh area. Facilitated by Sustainable Pittsburgh, the group's website, www.gettherepgh.org, includes background information on BRT and stresses the benefits that enhanced bus service can bring to the region.

Get There PGH has developed a variety of materials that are written in concise, plain language that citizens can understand. The website invites residents to use an embedded BRT simulator and to get involved by joining a mailing list, attending a public meeting, or by giving feedback.

Source: Sustainable Pittsburgh

2 Pilot EBS on West Chester Pike

Although it will take time to implement all the aspects of EBS described here, SEPTA can begin testing operational aspects of the concept in the near future. Piloting the route described in this report, or something similar, will allow SEPTA to observe how buses perform along the corridor and how passengers respond to limited-stop service. Several considerations have to be taken into account before EBS can be tested.

Service Levels and Costs

EBS can be combined with local bus service to provide comprehensive coverage along the corridor. Implementing some version of EBS will likely result in removing the existing end-to-end express versions, known as X and XS, of the Route 104 (see Chapter 2 for more information on existing service).

As part of this planning process, SEPTA prepared a preliminary cost estimate for providing EBS to the 12 stops identified in this report. These costs are summarized in Table 20, and additional cost information is contained in Appendix B. Cost estimates were prepared for full and partial frequency service on the corridor. Full service operates continuously and can include peak and off-peak service patterns (Option A) or simply run at a consistent headway throughout the day (Option B). For EBS, service frequencies of 20 minutes may be appropriate during morning and afternoon peaks, with 30-minute intervals during other times. The route's relatively consistent ridership suggests that afternoon peak service could begin earlier, perhaps 1:30 PM, than is typically common on most bus routes.

Table 20: Estimated EBS Operating Costs

SERVICE TYPE	ANNUAL MILES	ANNUAL HOURS	SCHEDULED TRIPS	PEAKS VEHICLES REQUIRED	PROJECTED OPERATOR RUNS	ANNUAL TOTAL COSTS
1. Full EBS Service*						
A. 20 Minute Peak/ 30 Minute Off Peak	369,709	21,318	68	7	12	$3,023,954
B. 30 Minute Service	304,057	17,463	56	5	10	$2,388,637
2. Partial Service						
1 Round Trip	10,883	680	2	1	1	$190,921
2 Round Trips	21,767	1,360	4	2	2	$381,841
3 Round Trips	32,650	2,040	6	3	3	$572,762
4 Round Trips	43,534	2,720	8	4	4	$763,682
5 Round Trips	54,417	3,400	10	5	5	$954,603

*Based on departure times from 69th Street Transportation Center between 5:00 AM and 6:30 PM.

Source: SEPTA, 2015 (See Appendix B for Full Table)

Alternatively, partial EBS service could simply operate at specialized headways during specific time periods during the day. Section 2 of Table 20 shows the costs associated with running up to five EBS round trips.

Overall, implementing EBS on West Chester Pike will result in additional operating costs for SEPTA. However, over time, costs may be reduced as riders gravitate to EBS stops and local service can be scaled back.

Short-term Advertising

However, without properly advertising and promoting the service, it will be difficult to assess the success of the route in terms of ridership.

What level of branding is appropriate during the pilot phase? Developing and promoting the EBS brand can be broken down into short- and long-term objectives. Short-term objectives apply to the pilot period and should be directed towards existing riders and motorists that may be attracted to the new service pattern. Longer-term marketing considerations are discussed later in this chapter.

Existing transit riders are most likely to be the initial users of EBS on West Chester Pike. SEPTA can invest in this audience by educating them about the new service early on. The basic questions that riders will be interested in include:

- What is it?
- Who is affected?
- Where does it go?
- When does it start?
- Why should I ride it?

To answer these questions, it will be necessary to clearly differentiate local and EBS service on West Chester Pike. EBS stops, service frequencies, and transfer opportunities should be prominently featured on maps and timetables. These materials can be displayed at shelters along the route, in printed schedules, and in buses serving Delaware and Chester counties.

Wrapping buses that travel in the corridor in EBS-related advertisements may be the most powerful way to promote the service to corridor users. The West Chester Pike Coalition can play a valuable role in shaping and reviewing the marketing materials developed for the pilot phase.

It is also important to provide riders with an opportunity to offer feedback, as they will be the most familiar with the system. Without effective methods to communicate feedback, both positive and negative, riders can feel unimportant. SEPTA already has an extensive customer service system in place, including commenting via the web (www.septa.org/cs/), mail, Twitter (@SEPTA_Social), Facebook (Facebook.com/septaphilly), by mail, or in person. SEPTA should choose whether it will use existing channels to collect feedback about the service enhancements, or whether it will set up a separate survey instrument, such as it did for the 2015 Airport Line Survey.

Other Considerations

Although the primary goal of the pilot phase is to test the EBS service concept in the real world, making early-stage physical improvements at a high-profile stop location may be one of the best ways to publicize the project and generate support. The passage of Act 89 in 2013 has stabilized funding for SEPTA and may allow the agency, in partnership with a municipality, to contribute capital improvement funding to select station(s) to demonstrate EBS characteristics such as enhanced transit shelters, passenger amenities, or pedestrian infrastructure.

PILOTING BRT-LITE IN LA

Los Angeles is the second largest city in the United States, and it is served by a wide range of rapid transit lines, including Metro Rapid, a BRT-Lite system that is similar to the EBS concept proposed for West Chester Pike.

The Metro Rapid Demonstration Program was implemented along two key corridors in June 2000. To help improve bus speeds, Metro Rapid included bus signal priority, low-floor buses, and fewer stops. Passenger travel times were reduced by as much as 29 percent.[1] Los Angeles Metro saw a 40 percent increase in ridership on two key corridors after implementing the Metro Rapid Demonstration Program. More importantly, one third of that ridership increase was from new riders who had never used public transit.

Source: Los Angeles Metro

3 Develop a Regional Strategy

A robust transit network is essential to the region's future. As discussed in Chapter 1, EBS can play an important role in strengthening our transit network by providing enhanced service along strategic bus corridors. In addition to West Chester Pike, recent planning efforts have focused on bus service improvements along Roosevelt Boulevard (see *Alternatives Development for Roosevelt Boulevard Transit Enhancements*, Publication #13072).

Rather than implementing EBS on these and future corridors in a piecemeal way, SEPTA should provide a framework for future EBS investments. While conducting a demonstration project on West Chester Pike, SEPTA can be developing EBS vehicle and station treatments and thinking strategically about how to prioritize other regionally significant bus corridors.

Developing a systematic approach to EBS implementation can provide guidance to transit providers, counties, and municipalities as they answer the following questions:

- What role can EBS play across SEPTA's entire system?
- Should EBS have a recognizable brand regardless of where it is being implemented?
- What types of shelters are appropriate along EBS routes? How can existing shelters be integrated?
- What types of vehicles can best serve these routes in the future?
- If EBS requires different vehicles in the future, how can they be integrated into SEPTA's overall operations?

Developing a regional framework for EBS could begin by inventorying corridors where EBS is most appropriate. Screening criteria could include:

- Existing high bus ridership,
- Limited access to rail transit service, and
- Service to significant destinations and/or transportation hubs.

Bus corridors exceeding defined thresholds could be assessed for EBS and prioritized based on local conditions and agency goals. This regional EBS framework could help inform SEPTA capital improvement and operations planning and promote collaborative planning amongst local stakeholders.

Phase Two Marketing

During the pilot phase, advertising will be necessary to inform existing riders about changes to the Route 104 and to market EBS to potential users. Longer-term marketing, however, will be critical to the success of EBS on West Chester Pike and any other EBS corridors.

Just as major automobile companies spend billions of dollars annually to advertise their products to customers, marketing needs to be a key investment for transit agencies. *From Here to There: A Creative Guide to Making Public Transit the Way to Go* summarizes the relationship between marketing and transit use:

"A better public image attracts riders, leading to higher revenue and greater demand for transit service. In turn, higher revenue and greater demand increase the likelihood of service expansion and improvements, making public transport even more attractive to riders. In short, marketing can lead to a virtuous circle of ever growing demand and service."[2]

Before a marketing plan can be developed, SEPTA must determine how EBS will be branded. Successful brands are based on core values, and the branding of EBS can reflect goals and strategies established during the regional EBS prioritization described above. Examples of core values that a public transit system might want to convey include: modern, efficient, rapid, reliable, convenient, comfortable, and safe.

Attracting New Riders

Enhanced transit may be attractive to many people who currently travel through the West Chester Pike corridor by automobile. However, potential riders may be easily deterred from using the bus by their unfamiliarity with the system, which may include questions about the route, fare collection, and the boarding process. Accordingly, marketing the service to discretionary riders will require careful consideration and effective messaging.

Often transit agencies try to promote public transit by emphasizing its environmental benefits. While this method works with a small percentage of potential riders, a better method is to focus on various aspects of the user experience. Some potential riders might respond to messaging that emphasizes the cost savings that transit can provide. Other potential riders might be persuaded by the thought of arriving at their

destination in a relaxed frame of mind because someone else does the driving for them, and they do not have to fight traffic. Still others might find their time on transit to be productive because they can read, answer e-mails, and get work done. All potential customers might be intrigued to learn that transit use encourages walking and can help contribute to a healthy lifestyle.

Recommendations that may help attract new riders include:

Elevate EBS: Put EBS on the SEPTA's regional system map to emphasize its improved service level.

Identify costs and how to pay: Make the price information clear and more prominent (larger on the farebox for the visually impaired and also available off board, as opposed to on the farebox itself).

Give it away: Offer the new service for free for several days to build ridership. Consider offering EBS riders free transfers at 69th Street Transportation Center.

Help passengers navigate their entire trip: A customer's trip does not begin when they enter the stop and does not end when they get off of a transit vehicle. Transit agencies should not only help customers navigate the system but help them navigate throughout the entire trip to their final destination. One easy way to accomplish this in a suburban context like West Chester Pike is to equip shelters with schedule information and clear, simple, user-friendly maps of the surrounding area.

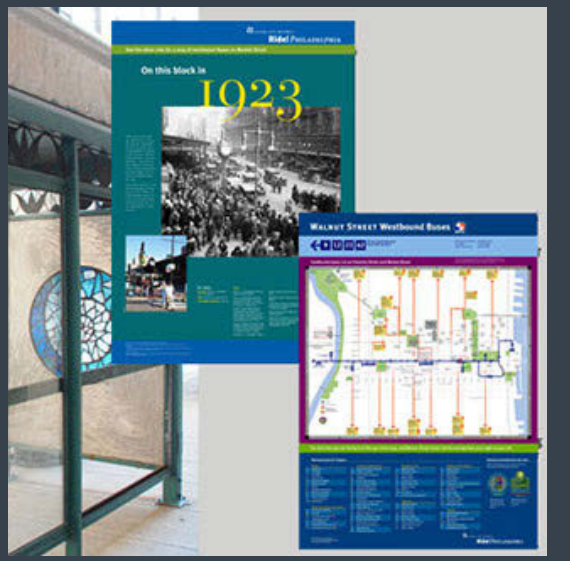
Improve paper and online schedules: Designers need to think more like novice transit users and less like transportation planners. For example, the 104 currently makes 110 stops, yet the paper and online schedules only list 12 stops. Obviously, this choice is made for legibility and space constraints, but the full list of stops should be listed somewhere on the schedule or online.

Celebrate EBS: Rather than announce the implementation of EBS with a press release, celebrate the start of EBS with balloons, giveaways, music, and fun at the termini and individual stops. Elected officials and members of the press could be invited to an inaugural ride.

CONNECTING BUS RIDERS TO THE COMMUNITY

Transit shelters can serve as important gateways into the community. Equipping shelters with clear, simple, user-friendly maps can help riders navigate the area and promote local businesses and destinations. The Ride! Philadelphia transit posters were developed by the Center City District in partnership with SEPTA, PATCO, PennDOT, and the Central Philadelphia Transportation Management Association.

These two-sided posters, which measure 25" x 36", can be found throughout Center City and include a localized transit map on one side and a historic street scene image on the other. They were designed by Joel Katz Design Associates and fabricated in embedded fiberglass by PANNIER.



Source: Joel Katz Design

Municipalities can play an active role in the implementation of EBS by helping to create an environment around transit stations that supports walking. While SEPTA is piloting EBS service on the corridor, municipalities can begin to provide the pedestrian connections and amenities detailed in Chapter 4. In addition to creating safer access to transit for EBS and local bus riders, these improvements will help to provide basic connectivity between local destinations for local residents and employees. By focusing their efforts on the priority stops outlined in this document, where transit use and pedestrian activity is greatest, municipalities can maximize the impact of limited funds.

Local Improvements

Figure 44 summarizes the recommended improvements at each priority station for three categories: shelters, sidewalks, and crosswalks. Dark blue circles indicate the types of improvements that are recommended at each stop. For shelters, half-circles indicate where improvements are needed at only the east- or westbound stop. Four stations lack shelters in both directions, while two other stations are lacking westbound shelters. Sidewalk improvements have been cited at five stations. New, high-visibility crosswalks are recommended for each of the 12 stops.

Traditionally, the implementation of pedestrian infrastructure has relied heavily on the local land development process as outlined in municipal subdivision and land development and/or zoning ordinances. Where applicable, these ordinances should be updated to encourage transit-supportive land use and design (see Chapter 3 for several examples).

New pedestrian facilities and retrofits to existing facilities can also be implemented through targeted capital improvement projects. Potential funding sources for these types of improvements are identified at the end of this chapter. Capital improvement projects should target locations where facilities are needed the most and land development may not be imminent. The West Chester Pike Coalition can play a role in coordinating applications.

Transit Shelters

Traditionally, suburban bus shelters and related stop amenities have been provided and maintained through agreements with advertising firms, such as Clear Channel. While these arrangements have led to the provision of many shelters over the years, it may not be the best strategy to pursue along West Chester Pike and other EBS corridors.

Advertising firms are interested primarily in visibility to auto drivers, and so there may be a mismatch between their target areas and where shelters are needed most. Additionally, in these types of agreements, consideration may not be given to the presence of sidewalks and other infrastructure that supports pedestrian movements.

Figure 44: Summary of Priority Stop Needs

Source: DVRPC

EBS may represent an opportunity to rethink how bus stops are provisioned in suburban environments. SEPTA, in partnership with municipalities, may wish to play a more active role in providing shelters. Such a partnership could help ensure that any shelters installed along a corridor are consistent and contribute to the EBS brand.

Alternatively, municipalities may wish to develop shelter sponsorship opportunities at strategic locations with local land owners and/or organizations (see the sidebar on this page). By directing sponsors to specific locations, municipalities can help to create a more complete EBS system on the corridor.

Regardless of how they are obtained, stakeholders will need to develop a maintenance plan that includes cleaning, repairs, and snow shoveling.

PARTNERING TO PROVIDE SHELTERS

Adding new shelters to bus routes can be a challenge, and municipalities appear to be steering away from using advertising as a way to finance the ongoing maintenance of shelters. Recently, Marple Township partnered with the Broomall Chapter of Rotary International to install a shelter at the intersection of West Chester Pike and Sproul Road (pictured here).

The Broomall Chapter donated the shelter and paid all costs associated with installing it. The township owns, maintains, and insures the shelter, which is located within the PennDOT right-of-way. The shelter includes a bench and a small Rotary logo. These types of partnerships may represent a new model for providing shelters along West Chester Pike and similar corridors.

FUNDING SOURCES AND ADDITIONAL RESOURCES

The most complete list of potential funding sources for locally initiated planning and development projects can be found in DVRPC's *Municipal Resource Guide* (Publication #12003, 2012, also available as a searchable database online: www.dvrpc.org/asp/MCDResource). Information on five specific potential funding sources that may be appropriate for the types of improvements recommended for West Chester Pike is presented below. Most programs that help pay for pedestrian improvements are competitive and require applications that clearly document project need, costs, and benefits.

Transportation Alternatives Program (TAP)

PennDOT

TAP provides funding for programs and projects defined as transportation alternatives, including on- and off-road pedestrian and bicycle facilities, infrastructure projects for improving non-driver access to public transportation, recreational trail program projects, and safe routes to school projects. The TAP program funds the construction phase of eligible projects at 100%.

Deadline: New rounds offered every two years
Website: www.dvrpc.org/TAP

Multimodal Transportation Funding (MTF)

PennDOT and the PA Department of Community & Economic Development (DCED)

PennDOT and DCED manage separate grant programs designed to improve transportation assets that enhance communities, pedestrian safety, and transit access. The program provides financial assistance to municipalities, councils of governments, businesses, economic development organizations, and public transportation agencies. Each grant requires matching local funds equal to 30 percent of the non-federal share of project costs.

Deadline: Grants awarded annually
Websites: www.penndot.gov/ProjectAndPrograms/MultimodalProgram; http://community.newpa.com/programs/multimodal-transportation-fund

Green Light – Go: Pennsylvania's Municipal Signal Partnership Program

PennDOT

Green Light – Go provides state funds for the operation and maintenance of traffic signals along critical and designated corridors on state highways. "Critical" corridors are defined as state highways with AADT greater than 10,000 vehicles per day or for signals at the end of Limited Access Ramps. "Designated" corridors are state highways with fewer than 10,000 vehicles per day. The projects on critical corridors are managed by PennDOT, while those on designated corridors are managed by the local municipality.

All projects require a 50 percent municipal match using local or private funds. Eligible types of projects include: Study and Removal of Unwarranted Traffic Signals; Traffic Signal Retiming; Development of Detour, Special Event and Operations Plans; LED Replacement; Asset Management; Traffic Signal Operations (Real-Time Monitoring); Traffic Signal Maintenance; Innovative Technologies (e.g., Adaptive signals); Communications; Connections back to Traffic Management Center (TMC); Detection Upgrades; Controller Upgrades; Modernization Upgrades (poles, etc.); and Other Traffic Signal Improvements.

Deadline: Future rounds to be announced
Website: www.dot.state.pa.us/Portal%20Information/Traffic%20Signal%20Portal/FUNDGLG.html

Automated Red Light Enforcement Grant Program (ARLE)

PennDOT

Automated Red Light Enforcement (ARLE) utilizes multiple cameras to capture the license plate of vehicles that run red lights. The registered owner of the vehicle receives a ticket in the mail. In Pennsylvania the typical ticket fine is $100. The funds from these tickets are deposited in PennDOT's restricted Motor License Fund account and can be used for low-cost projects that improve the safety and mobility of the traveling public, such as traffic signals improvements, roadway improvements, or school zones, guiderail, and roadside safety installation. Improvements recommended by Local Technical Assistance Program (LTAP) through the Local Safe Roads Communities and Walkable Communities programs are also eligible.

PennDOT will post yearly revenues available for the ARLE Funding Program in the Pennsylvania Bulletin each spring prior to the submission of applications. Multi-municipal submissions are encouraged and will be given priority. Applicants can submit an unlimited number of applications. No matching funds are required for eligibility in the ARLE Grant Program.

Deadline: June 1 through June 30 annually
Website: http://www.dot.state.pa.us/Portal%20Information/Traffic%20Signal%20Portal/FUND.html

Congestion Mitigation and Air Quality Improvement Program (CMAQ)

DVRPC

CMAQ funds transportation-related projects that can help the region reduce emissions from mobile sources and meet ambient air quality standards. Eligible projects include bicycle and pedestrian projects, transit improvement programs, and congestion reduction and traffic flow improvements. Public agencies and public–private partnerships with a public agency sponsor are eligible to apply for CMAQ Program funds.

Deadline: A Pennsylvania round of funding is expected to be announced in 2016
Website: www.dvrpc.org/CMAQ

Local Safe Roads and Walkable Communities

The Local Safe Roads Communities Program and the Walkable Communities Program are designed to help municipalities improve safety on municipal roads one location at a time. These free programs are administered through PennDOT's Local Technical Assistance Program (LTAP).

The Local Safe Roads Communities Program examines locations that have definitive or perceived safety concerns, such as problem intersections or winding roadway segments. The Walkable Communities Program examines known problem pedestrian safety corridors or locations in a community. In both programs, LTAP collects data, meets with the municipality, and makes site visits. LTAP then prepares a report that includes short, mid-, and long-term safety improvements. To learn more about LTAP and these programs, visit www.ltap.state.pa.us.

ENDNOTES

Chapter 1

[1] According to PennDOT, the Annual Average Daily Traffic (AADT) on various portions of West Chester Pike in fall 2014 ranged between 8,319 and 22,498. This calculation used the median, 15,408, as the number of vehicles on the corridor. To determine the total number of corridor travelers, a regional multiplier of 1.33 passengers per car was used. The total number of travelers also includes the 3,396 passengers who ride the 104 on a typical weekday.

[2] United States Census Bureau, *2014 National Population Projections*, www.census.gov/population/projections/data/national/2014.html.

[3] Archur C. Nelson, *Reshaping Metropolitan America: Development Trends and Opportunities to 2030* (Island Press, 2013).

[4] National Association of Realtors, *2015 Community Preference Survey*, National Association of Realtors, www.realtor.org/reports/nar-2015-community-preference-survey.

Chapter 2

[1] The travel and planning times cited here were gathered from the Vehicle Probe Project Suite maintained by the University of Maryland CATT Lab. For more information on the Vehicle Probe Project Suite, visit www.cattlab.umd.edu/?portfolio=vehicle-probe-project-suite.

[2] Walls & Associates, *National Establishment Time-Series (NETS) Database*, 2010.

[3] Delaware Valley Regional Planning Commission, *Analytical Data Report: Regional, County, and Municipal Employment Forecasts, 2010—2040* (ADR 19, January 2013). www.dvrpc.org/reports/ADR019.pdf

[4] SEPTA Strategic Planning Department, SEPTA Route Statistics 2015. www.septa.org/strategic-plan/reports/route-statistics.pdf

Chapter 3

[1] Federal Transit Administration, *Characteristics of Bus Rapid* Transit for Decision-Making, by Dennis Hinebaugh and Roderick B. Diaz (2009), 2-1.

[2] Transportation Research Board, Transit Cooperative Highway Research Program, *Transit Capacity and Quality of Service Manual,* 2nd Edition (TCRP Report 100, 2003).

[3] San Francisco Municipal Transportation Agency, *All-door Boarding Evaluation Final Report* (2014).

[4] A spreadsheet model is a sketch planning model used to calculate travel time savings based on a set of assumptions. A recent San Francisco Municipal Transportation Authority survey of BRT travel time forecasting techniques compared sketch planning methods, such as spreadsheet models, to advanced computer simulations. While there are tradeoffs inherent to each method, their research found that the travel times projections derived from sketch planning and advanced simulations were often very similar.

[5] Transportation Research Board, Transit Cooperative Highway Research Program, T*ransit Capacity and Quality of Service Manual,* 3rd Edition (TCRP Report 165, 2013).

[6] Transportation Research Board, Transit Cooperative Highway Research Program, *Bus Rapid Transit Practitioner's Guide* (TCRP Report 118, 2007), 4-55.

[7] Federal Transit Administration, *Literature Search and Review of Current Practices in Providing Real-time Transit Information* (2002).

[8] University of California Center on Economic Competitiveness, ACCESS Magazine, *Thinking Outside the Bus* (2012).

[9] WHYY, NewsWorks, *Next to arrive on all SEPTA platforms: real time ETA data*, PlanPhilly (January 23, 2015). www.planphilly.com/articles/2015/01/23/next-to-arrive-on-all-septa-platforms-real-time-eta-data.

[10] American Public Transportation Association, APTA Bus Rapid Transit Working Group, *BRT Branding, Imaging, and Marketing* (2010).

[11] *Bus Rapid Transit Practitioner's Guide,* 4-31.

Chapter 5

[1] Los Angeles County Metropolitan Transportation Authority, *Metro Rapid.* www.metro.net/projects/rapid/2015.

[2] EMBARQ, *From Here to There: A creative guide to making public transport the way to go* (2011)

Appendix A: Calculating EBS Travel Time

Projected travel times for EBS on West Chester Pike were generated from a spreadsheet model based on a three-step calculation. The projected travel time for EBS (shown in rows one and two) can be summarized by the following equation:

Projected Travel Time **(D)** = Calculated Auto Travel Time **(A)** + Total Bus Dwell Time **(B)** + Heavy Vehicle Time Penalty **(C)**

In order to test the validity of this spreadsheet model, travel times for existing Route 104 local service were also calculated using the same approach. These results are shown in rows three and four. The calculated travel times for local service are nearly identical to the scheduled travel times. The calculated eastbound trip differs by 0.2 minutes (0.2 percent) and the westbound trip varies by 4.1 minutes (5 percent).

A. Calculated Auto Travel Time – Projected travel times were derived by first establishing a baseline automobile travel time for the corridor. This baseline was generated by dividing the proposed EBS route into a series of segments. A travel time for each segment (West Chester Pike, US 202, and local streets) was generated by multiplying the average vehicle speed (gathered from The University of Maryland CATT Lab's Vehicle Probe Project Suite) by the number of miles traveled on that road segment.

B. Projected Total Vehicle Dwell Time – Bus dwell times were generated by dividing the number of passengers by the number of stops on a given route. Including termini, the EBS concept includes 12 stops. The number of stops used in the local service example is based on the average number of times that a local bus actually stops during end-to-end service. Industry standards were used to calculate the time needed for passengers to enter and exit the vehicle as well as the time needed for the bus to decelerate and accelerate at each stop.

C. Heavy Vehicle Penalty – A heavy vehicle time penalty was added to the total travel time based on the rule of thumb that buses operate 5 MPH slower than the average traffic speed.

Bus Service	A. Calculated Auto Travel Time		B. Bus Dwell Time			C. Heavy Vehicle Travel Time Penalty (mins)	D. Projected Travel Time (mins)	Calculated Travel Time Comparison		
	1. Total Miles	2. Calculated Travel Time (mins)	1. Number of Stops	2. Seconds Per Stop	3. Dwell Time (mins)			Scheduled Transit Travel Time (mins)	Projected Time Savings (mins)	Projected Time Savings (%)
1. EBS (Eastbound)	20.8	45.2	12	47.1	7.9	6.5	59.6	67	7.4	11%
2. EBS (Westbound)	21.1	49.4	12	44.7	7.5	7.9	64.8	75	10.2	14%
Model Verification										
3. Eastbound Local Service	20.8	45.2	56	15.1	14.1	7.9	67.2	67		
4. Westbound Local Service	21.1	49.4	48	15.1	15.1	9.4	70.9	75		

Source: DVRPC, 2015

Appendix B: Estimating EBS Costs

SERVICE TYPE	NOTE	ANNUAL MILES	ANNUAL HOURS	SCHEDULED TRIPS	PEAK VEHICLES REQUIRED	PROJECTED OPERATOR RUNS	ANNUAL TOTAL COST	DAILY PASSENGER TRIPS TO MEET MINIMUM ECONOMIC PERFORMANCE STANDARD	AVERAGE PASSENGERS PER SCHEDULED TRIP	ANNUAL PASSENGER REVENUE	OPERATING RATIO	SUBSIDY PER PASSENGER
FULL SERVICE												
Present Route 104 Weekday Service	*1*	*335,812*	*23,311*	*62*	*7*	*13*	*$3,068,555*	*2,345*	*38*	*$753,449*	*25%*	*$3.87*
20 Minute Peak; 30 Minutes Off Peak	2	369,709	21,318	68	7	12	$3,023,954	1,300	19	$417,690	14%	$7.86
30 Minute Service	2	304,057	17,463	56	5	10	$2,388,637	1,050	19	$337,365	14%	$7.66
PARTIAL SERVICE												
Schedule 1 Round Trip	3	10,883	680	2	1	1	$190,921	85	43	$27,311	14%	$7.55
Schedule 2 Round Trips	4	21,767	1,360	4	2	2	$381,841	165	41	$53,015	14%	$7.82
Schedule 3 Round Trips	4	32,650	2,040	6	3	3	$572,762	250	42	$80,325	14%	$7.72
Schedule 4 Round Trips	4	43,534	2,720	8	4	4	$763,682	325	41	$763,682	14%	$7.95
Schedule 5 Round Trips	4	54,417	3,400	10	5	5	$954,603	410	41	$131,733	14%	$7.87

NOTE

1	*Accounts for only scheduled service between 69th Street TC and West Chester University between 5:00 AM and 6:30 PM -- Fall 2015, including #3 note Existing conditions would be the baseline to measure ridership increases/decreases versus the proposed service*
2	Based on departure times from 69th Street TC between 5:00 AM and 6:30 PM
3	A special express trip is presently scheduled (Express between 69th Street TC and Newtown Street Road with stops at Eagle and Sproul Roads)
4	Could assume a limited/specialized headway, versus a traditional headway, and would supplement present Route 104 scheduled service

2	**Concept bus stops at 69th St TC, Quarry Center, Eagle Rd, Sproul Rd, Newtown Square SC, SAP, Mary Fran Dr, West Goshen Town Ctr,**
3	**West Goshen SC, Gay/Market & Bolmar, West Chester TC, West Chester University**
4	

2 Statistics do not reflect any service degradation on Route 104, except all scheduled trips to/from West Chester University would operate in local service

Source: SEPTA, 2015

ENHANCED BUS SERVICE ON WEST CHESTER PIKE

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Key Words

West Chester Pike, SEPTA, SEPTA Route 104, Enhanced Bus Service (EBS), Bus Rapid Transit (BRT), pedestrian

Abstract

This study was conducted by DVRPC to improve the quality and effectiveness of bus service on West Chester Pike between West Chester Borough and the 69th Street Transportation Center in Upper Darby. This report describes an operational concept for Enhanced Bus Service (EBS) along the corridor that includes consolidated stops, improved passenger amenities, and branded service. Localized pedestrian improvements are also identified for 12 priority stops along the route.

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