PA 291 Area Study

FEBRUARY 2015

DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION

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

The symbol in our logo is adapted from the official DVRPC seal and is designed as a stylized image of the Delaware Valley. The outer ring symbolizes the region as a whole while the diagonal bar signifies the Delaware River. The two adjoining crescents represent the Commonwealth of Pennsylvania and the State of New Jersey.

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

The Delaware Valley Regional Planning Commission (DVRPC) fully complies with Title VI of the Civil Rights Act of 1964, the Civil Rights Restoration Act of 1987, Executive Order 12898 on Environmental Justice, and related nondiscrimination statutes and regulations in all programs and activities. DVRPC's website, www.dvrpc.org, may be translated into multiple languages. Publications and other public documents can be made available in alternative languages and formats, if requested. DVRPC public meetings are always held in ADA-accessible facilities and in transit-accessible locations when possible. Auxiliary services can be provided to individuals who submit a request at least seven days prior to a meeting. Requests made within seven days will be accommodated to the greatest extent possible. Any person who believes they have been aggrieved by an unlawful discriminatory practice by DVRPC under Title VI has a right to file a formal complaint. Any such complaint may be in writing and filed with DVRPC's Title VI Compliance Manager and/or the appropriate state or federal agency within 180 days of the alleged discriminatory occurrence. For more information on DVRPC's Title VI program, or to obtain a Title VI Complaint Form, please call (215) 238-2871 or email public_affairs@dvrpc.org.

Table of Contents

Executive Summary 1

Overview 1

Key Recommendations 2

CHAPTER 1: Introduction 3

Project Background 3

Access Management 5

Corridor Planning 8

CHAPTER 2: Demographics 9

Population and Employment 9

Environmental Justice 14

CHAPTER 3: Planning Context 17

Existing Land Use 17

Industry and Opportunity 20

Zoning 22

Hydrologic Characteristics 24

Stormwater and Coastal Zone 26

CHAPTER 4: Transportation Context 29

Network Characteristics 29

Traffic Mobility and Intersection Analysis 32

Travel Speeds 34

Heavy Vehicles 36

CHAPTER 5: Public Transit 37

Wilmington/Newark Regional Rail Line 37

SEPTA Buses 38

Improving Transit 39

CHAPTER 6: Bicycle and Pedstrian Facilities 41

Bicycle Facilities 41

Pedestrian Facilities 45

CHAPTER 7: Traffic Safety 47

Corridor Summary 47

Intersection Summary 49

CHAPTER 8: Goods Movement Analysis 51

Economic Impact 51

Industrial Preservation 53

Truck Routes 54

CHAPTER 9: Action Plan 55

PA 291 Cross-Section 55

Pedestrian Safety 56

Wayfinding 58

Green Infrastructure 60

Land Use Redevelopment 61

Implementation Sources 63

Potential Funding Sources 64

Figures

- **Figure 1:** Regional Setting **4**
- **Figure 2:** Access/Mobility Relationship **5**
- **Figure 3:** Intersection Conflict Points **7**
- **Figure 4:** Employment by Sector **13**
- **Figure 5:** Indicators of Potential Disadvangage **15**
- **Figure 6:** Severity of Indicators **16**
- **Figure 7:** Land Use **19**
- **Figure 8:** Redevelopment Opportunity Areas **21**
- **Figure 9:** Zoning **23**
- **Figure 10:** Floodplains and Wetlands **25**
- **Figure 11**: Delaware County Coastal Zone **27**
- **Figure 12:** PA 291 Traffic Counts **30**
- **Figure 13:** Key Intersections and Data Collection Locations **33**
- **Figure 14:** Cultural Amenities **42**
- **Figure 15:** Major Freight Generators **52**
- **Figure 16:** PA 291 Cross-Section Improvements **55**
- **Figure 17:** PA 291 Roadway Improvements **56**
- **Figure 18:** Pedestrian Signal Improvements **57**
- **Figure 19:** Wayfinding Signs **59**

- **Figure 20:** Potential Infill Housing **61**
- **Figure 21:** PA 291 Vacant Property **62**
- **Figure 22:** Potential Urban Supermarket **62**

Tables

- **Table 1:** Greater Study Area Population and Employment **10**
- **Table 2:** Population Characteristics **11**
- **Table 3:** Employment by Sector **12**
- **Table 4:** Land Uses **18**
- **Table 5:** Zoning by Type **22**
- **Table 6:** Level-of-Service Description **32**
- **Table 7:** Peak Hour Level-of-Service **34**
- **Table 8:** Corridor Travel Speeds **35**
- **Table 9:** Heavy Vehicle Percentages **36**
- **Table 10:** Wilmington/Newark Regional Rail Ridership **37**
- **Table 11:** SEPTA Bus Ridership **38**
- **Table 12:** Corridor Crash Types 2010-2012 ..... **48**
- **Table 13:** Intersection Crashes **49**

Appendices

Appendix A: Sample Ordinance Language **A-1**

Appendix B: Amtrak Bridge Clearance Inspection **B-1**

Executive Summary

Overview

This study addresses the PA 291 corridor in southeastern Delaware County. The study area corridor encompasses sections of the City of Chester, Eddystone Borough, and Ridley Township.

Highway access management techniques were assembled for the study corridor to improve safety and mobility and to prolong highway serviceability in light of ongoing regional growth and development. The work was performed by DVRPC staff in support of the Pennsylvania Department of Transportation's (PennDOT) effort to promote planning for the application of access management procedures within the commonwealth. The procedures are applicable to both state and local highways, and the strategies are most effectively delivered through municipal ordinances that govern the land development, design, review, and approval process. The principal guidance for developing the plan was obtained from PennDOT's publication *Access Management Model Ordinances for Pennsylvania Municipalities Handbook*.

Ultimately, this study examined several concerns of municipal officials: improving access to the Delaware River waterfront, seeking a balance between the concentration of industry and its impact on local residents, and creating a safer environment for all users of the corridor.

Opportunities in land use redevelopment, stormwater management, green infrastructure, bicycle facilities, pedestrian safety, transit facilities, wayfinding, and changes to the roadway cross-section were identified. The final section of the report identifies recommended improvements that could be implemented throughout the study area.

Chester City Waterfront

Source: DVRPC 2013

Key Recommendations

This report addresses a wide range of concerns within the PA 291 study area. These issues were identified by the project team, through individual meetings with the local municipalities, and from discussions with citizens. The following highlights the key recommendations within the study area.

Land Use:

- Capitalize on the study area's strategic advantage in access to highway, rail, and water facilities to encourage new industrial development.
- Utilize the abundance of vacant land to facilitate a diverse range of economic activity.
- Apply programs that prioritize "Green Street" design that use vegetated facilities to manage stormwater runoff, thus mitigating the risk of flooding.

Transportation:

- Implement a new cross-section design for PA 291 to include a center median, bike lanes, and green infrastructure to achieve lower travel speeds and provide safer environment for motorists and pedestrians.
- Continue to improve the multi-modal links between transit stations and residential neighborhoods with the amenities located along the Delaware River Waterfront.

Pedestrian and Bicycle Amenities:

- Continue to encourage the development of the Circuit Trails network and the East Coast Greenway to support non-vehicular travel and to complete links between cultural resources.
- Introduce upgraded pedestrian crossing infrastructure at high activity locations to create a safer, more pedestrian-friendly environment.

Heavy Vehicles:

- Develop and implement a heavy-vehicle-focused sign strategy that includes wayfinding, cultural identifiers, truck routes, and vertical clearance to help minimize impacts on the community.

CHAPTER 1

Introduction

DVRPC regularly conducts access management corridor studies. Potential case study corridors are assessed by their inclusion in the regional Congestion Management Process, in addition to other qualitative factors to determine a study's benefit locally and regionally. In June 2013, an Access Management Task Force meeting was held to discuss potential corridors. The PA 291 corridor was recommended by the Delaware County Planning Commission. The project's steering committee included representatives from the City of Chester, Eddystone Borough, Ridley Township, Delaware County, the Pennsylvania Department of Transportation (PennDOT), and the East Coast Greenway.

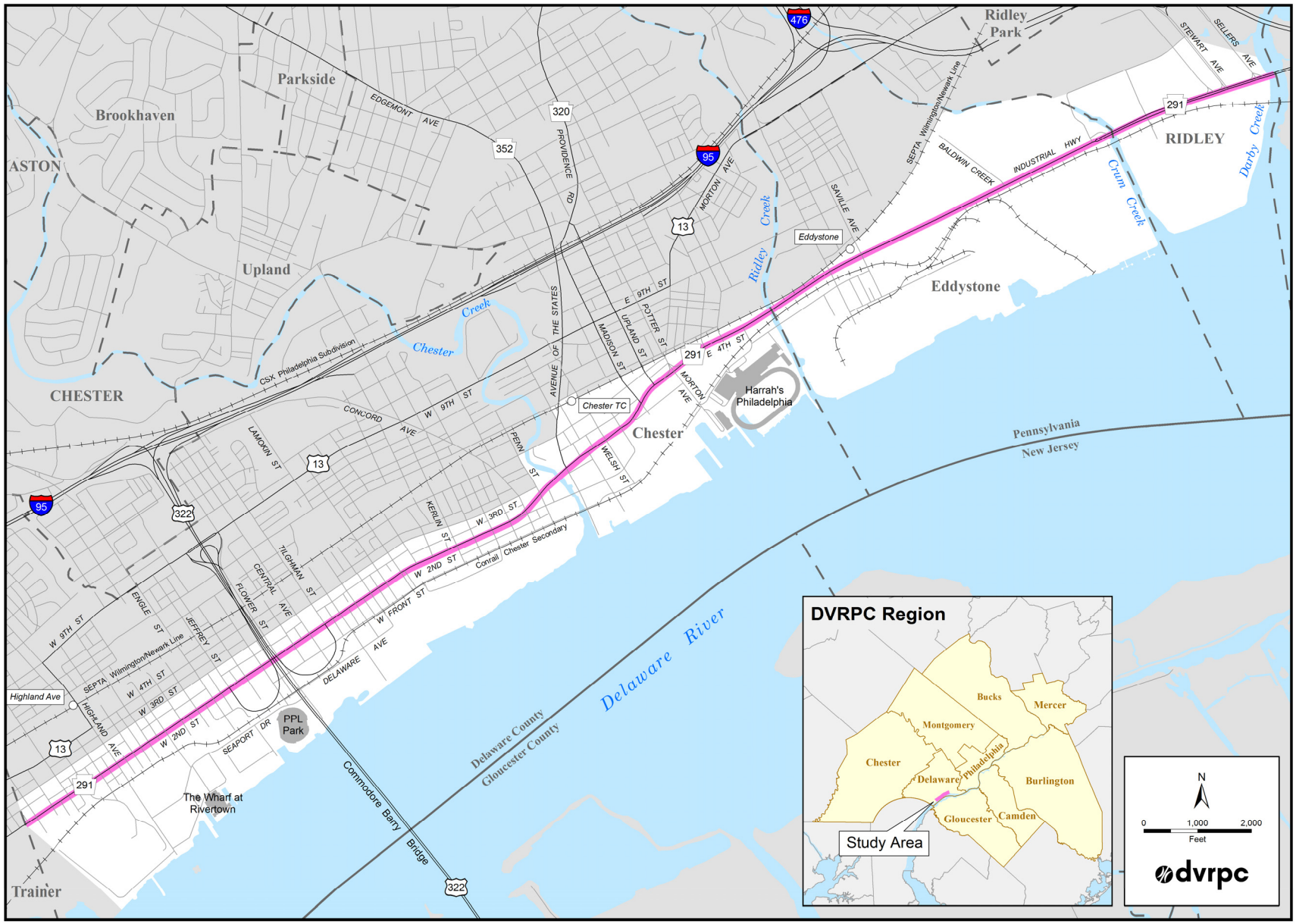
Project Background

This project seeks to inventory topics related to existing transportation and land use in the PA 291 study area. Strategies focused on enhancing the corridor, identifying areas for improvement, creating a safer environment, and implementing funding are also presented.

The PA 291 study area runs adjacent to the Delaware River in southeastern Delaware County. The corridor extends from the Trainer Borough municipal line through the City of Chester and Eddystone Borough, ending at the Darby Creek Bridge in Ridley Township, as illustrated in **Figure 1**. The study area includes PA 291 and many parallel, adjacent, and intersecting arterials and local streets. The major cross-streets include Highland Avenue, Flower Street, Welsh Street, Madison Street, Morton Avenue, Kerlin Street, Saville Avenue, and Stewart Avenue.

This section of PA 291, also known as the Industrial Highway, is a regionally significant thoroughfare. It is located within close proximity to many major highways and regional landmarks, including I-95, US 322, the Commodore Barry Bridge, I-476, and the Philadelphia International Airport. PA 291 also serves as a primary detour route when incidents occur on I-95. Within the study area, PA 291 provides access to many residential, commercial, and industrial areas. Regional destinations, including Harrah's Philadelphia and PPL Park, are also located within the study area.

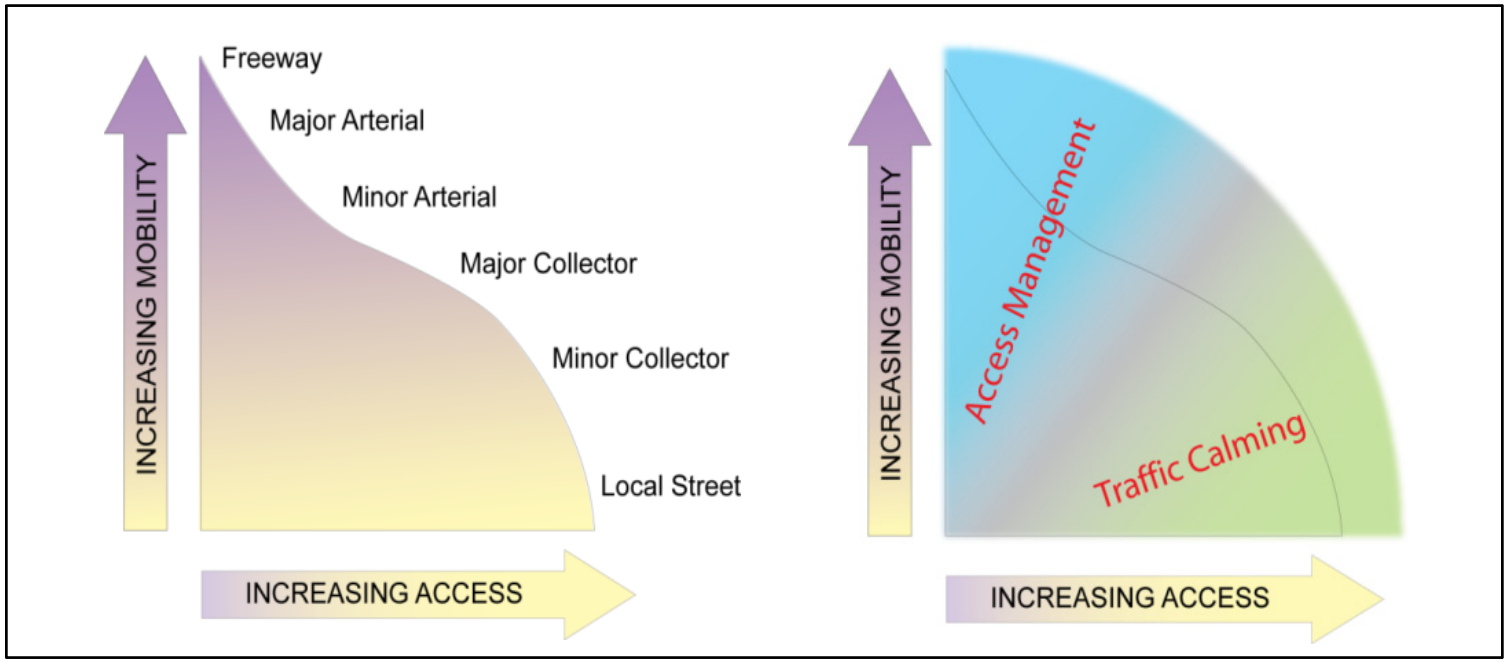
Figure 1: Regional Setting



Access Management

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 highway and the accesses along it. The function of the highway ultimately dictates the magnitude of access management that is appropriate. For example, the functions of an expressway and local road are vastly different, and the degree of access management required is reflected. An expressway has the highest degree of access management, while a local road has minimal or no access management. The graphs in **Figure 2** show the relationship between access and highway function, and also the relationship between access management and traffic calming.

Figure 2: Access/Mobility Relationship



Sources: Federal Highway Administration and DVRPC 2008

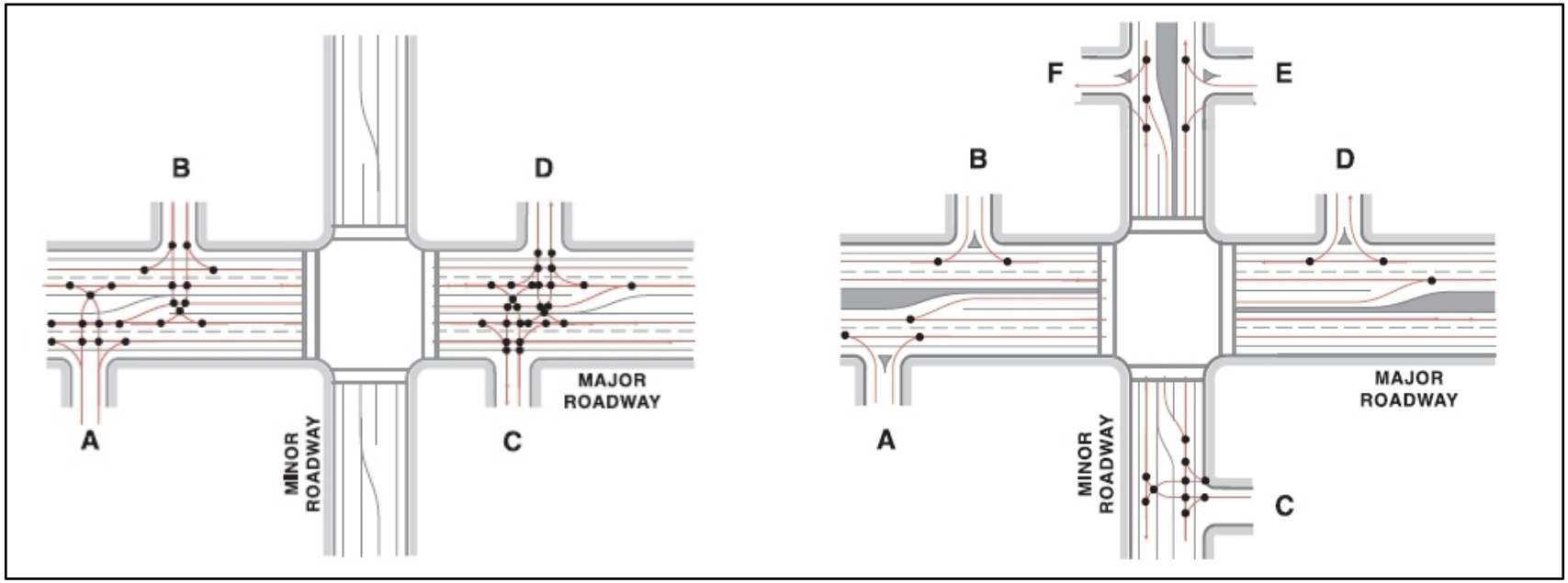
Access management may be implemented through a variety of methods. Common techniques include:

- Minimum driveway spacing requirements;
- Minimum intersection spacing requirements;
- Left and/or right turning lanes;
- Deceleration and acceleration lanes;
- Shared driveways;
- Traffic signal spacing requirements;
- Turn-restricted driveways; and
- Requiring driveways to be located on intersecting streets.

These techniques become requirements when codified in municipal zoning and subdivision and land development ordinances. Sample ordinances pertaining to the PA 291 study area can be found in **Appendix A**. Additionally, an official map highlighting access requirements is also often beneficial, particularly for multiple parcel access management requirements. When implemented, access management seeks to reduce turbulences affecting highway mobility. These strategies can be applied during construction to minimize the development's impact on highway mobility, or when abutting land is redeveloped or changes use.

Figure 3 illustrates an example of how reconfiguring access points from a major roadway onto a minor roadway and incorporating a center median can significantly reduce the number of conflict points. Driveways A, B, C, and D on the left represent how access points typically intersect major roadways. All movements are permitted onto the major roadway, which creates an abundance of conflict points. The illustration on the right proposes a right-in/right-out condition at locations A, B, D, E, and F. This shifts access onto the minor roadway, reducing the number of conflict points. Drivers are more likely to make mistakes when presented with complex driving situations. By reducing the number and type of conflict points, a simpler and safer driving environment is achieved.

Figure 3: Intersection Conflict Points



Source: FHWA 2010

There are two primary benefits associated with access management: mobility and traffic safety. Roadway mobility is improved when turning vehicles are removed from the travel lanes. For mobility, the goal of access management is to allow development to occur along a highway without negatively impacting the flow of traffic. It can also prolong the serviceability of a highway that has already developed abutting lands. Traffic safety is benefitted by access management by creating a more predictable driving environment.

PennDOT currently works to implement access management along state-owned roads. Pennsylvania Code, Title 67, Chapter 441 defines the access management regulations employed by PennDOT. Through these regulations, PennDOT encourages the implementation of access management across the state; however, these regulations do not fully consider local context or the desires of any one municipality. The 1997 Commonwealth Court of Pennsylvania decision, Ice v. Cross Roads Borough, set a legal precedent for municipalities to enforce their own access management regulations, provided that they are more stringent than those of PennDOT. PennDOT supports the concept of having municipalities initiate their own access management regulations that meet that requirement.

Corridor Planning

DVRPC takes a multimodal approach in identifying practical solutions to corridor issues in the spirit of MAP-21, while working cooperatively with state, county, municipal, and business stakeholders, as well as the general public. Several regional corridor planning studies are completed each year based on needs identified in the Long-Range Plan and the Congestion Management Process. DVRPC's corridor studies are targeted analytical studies that address specific needs of a corridor or particular geographic area. They support the initiatives and policies of the New Jersey Department of Transportation and PennDOT and are responsive to the needs of county and municipal governments.

Corridor studies aim to recognize improvements that will increase the accessibility of people and goods. They also identify effective strategies that promote investments in areas that are either already developed or designated as appropriate for future growth. Through working with our member governments, DVRPC uses the best available tools to provide advice and direction based on evaluations of performance measures, project implementation cost data, and public participation outcomes.

CHAPTER 2

Demographics

For the purpose of demographic analysis, the study area was expanded to include all of the City of Chester and the surrounding municipalities. This information can be useful for planning, development, and improvement of residents' quality of life. Statistical information enables civic leaders and local governments to make good decisions regarding their community. Furthermore, this information allows citizens to examine the decisions made by local authorities and subsequently decide whether they serve the public that they are meant to help.

Population and Employment

A population and employment comparison among the municipalities and Delaware County is displayed in **Table 1**. Data is presented in years 2010 and 2040 to illustrate the change that can be expected. According to DVRPC forecasts, the population of the City of Chester and the surrounding municipalities will remain relatively stable between now and 2040. Although much of the greater study area is built out, demographic trends can influence future growth and development within the study area. Redeveloping vacant or blighted parcels presents an opportunity to attract both employment centers and housing developments.

Table 1: Greater Study Area Population and Employment

	Population				Employment			
	2010	2040	Change in Population	Percent Change	2010	2040	Change in Employment	Percent Change
City of Chester	33,972	34,222	250	0.7%	12,057	12,146	89	0.7%
Chester Township	3,940	4,049	109	2.8%	2,496	2,565	69	2.8%
Eddystone Borough	2,410	2,392	-18	-0.7%	3,005	2,983	-22	-0.7%
Lower Chichester Township	3,469	3,450	-19	-0.5%	1,183	1,176	-7	-0.6%
Marcus Hook Borough	2,397	2,439	42	1.8%	2,876	2,926	50	1.7%
Ridley Township	30,768	30,482	-286	-0.9%	7,992	7,918	-74	-0.9%
Trainer Borough	1,828	1,727	-101	-5.5%	1,278	1,207	-71	-5.6%
Upland Borough	3,239	3,229	-10	-0.3%	1,798	1,792	-6	-0.3%
Upper Chichester Township	16,738	17,290	552	3.3%	6,097	6,298	201	3.3%
Greater Study Area	98,761	99,280	519	.05%	38,782	39,011	229	.06%
Delaware County	**558,979**	**569,982**	**11,003**	**2.0%**	**238,448**	**243,655**	**5,207**	**2.2%**

Sources: DVRPC 2013, U.S. Census Bureau 2010

A further breakdown of the study area's population characteristics is presented in **Table 2**. There are four census tracts that, either wholly or partially, comprise the PA 291 study corridor, totaling 13,141 residents. These residents make up 4,507 households, 1,577 with children. While the low population numbers reflect the industrial nature of the study area, it is important to note that the area is not exclusively industrial. The needs of area residents must be accommodated, even while the industrial activity, of vital importance to the local economy, is strengthened.

Table 2: Population Characteristics

Census Tract / Municipality	Population	Median Age	Households	Average Household Size	Households with Children	Percent Households with Children
4107 / Chester	5,279	33.2	1,491	2.71	556	37.3%
4050 / Chester	2,130	37.8	752	2.63	244	32.4%
4043 / Eddystone	2,410	34.8	926	2.6	350	37.8%
4041.3 / Ridley	3,322	40.2	1,338	2.48	427	31.9%
Sub-Area Total	13,141	36.5	4,507	2.61	1,577	34.9%
Greater Study Area Total	**99,545**	**35.2**	**36,999**	**2.66**	**12,763**	**34.5%**
Delaware County	**558,979**	**38.7**	**208,700**	**2.57**	**69,373**	**33.2%**

Source: US Census Bureau 2010

Over 7,000 jobs are located within the study area, as indicated in **Table 3**. Services, which includes Harrah's Philadelphia, account for nearly 40 percent of the total employment in the study area. Manufacturing jobs account for over 23 percent. Jobs in Transportation/ Public Utilities account for approximately 16 percent, while public administration provides nearly nine percent of study area jobs. The remaining employment sectors—Wholesale Trade, Construction, Finance, Insurance, Real Estate, Retail Trade, and Agriculture, Forestry, and Fishing—account for approximately 13 percent. Industrial sector employment is higher in the study area than across the remainder of Chester, Eddystone, and Ridley. In addition, industrial sector firms averaged higher employment per firm than other industries. Of the 10 largest employers in the study area in 2010, seven were industrial sector employers.

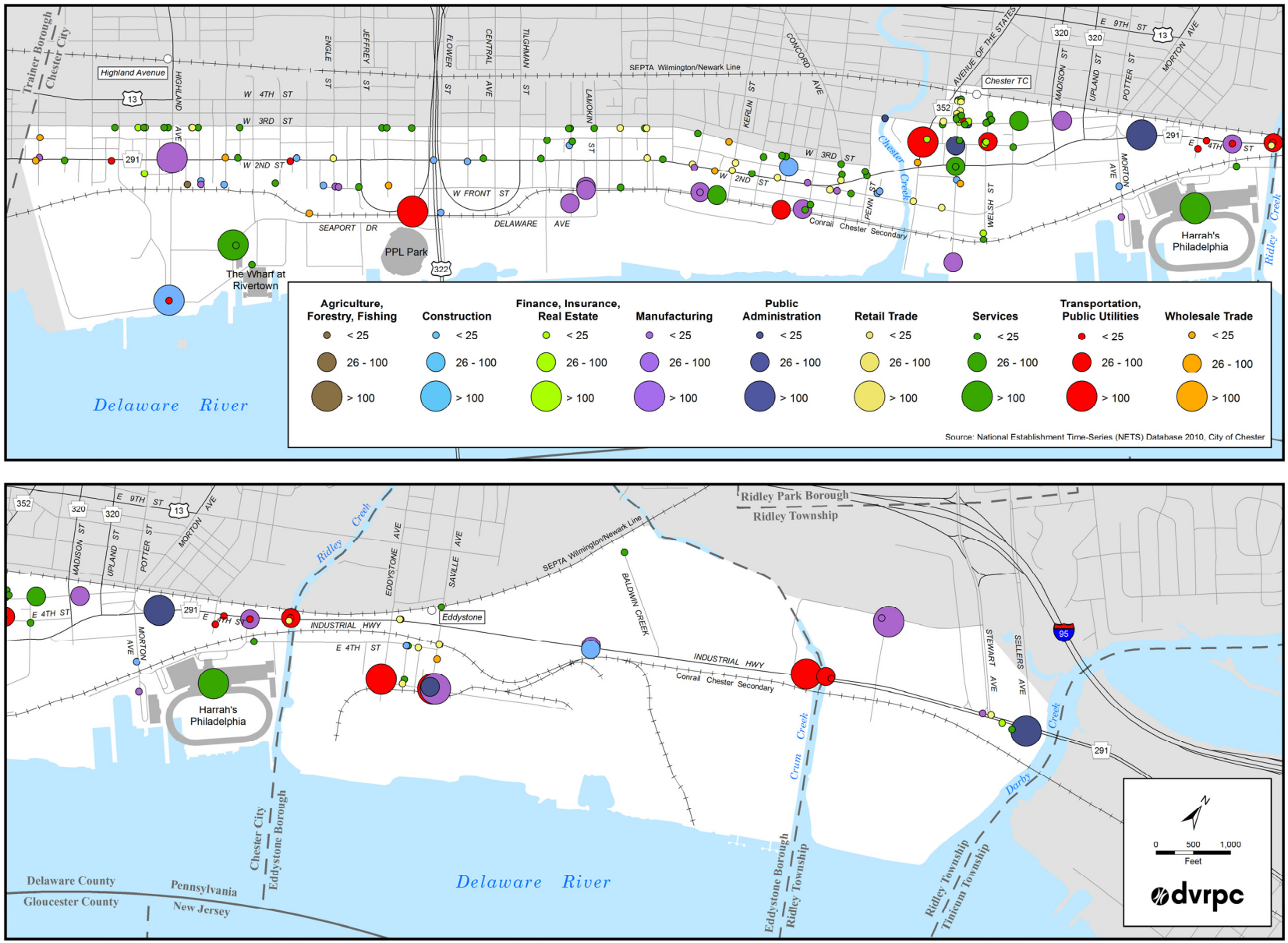
Table 3: Employment by Sector

Employment Sector	Number of Businesses	Total Employees	Percent Employees	Sales Dollars
Manufacturing	33	1,749	23.7%	$353,380,377
Services	117	2,816	38.2%	$149,996,433
Transportation, Public Utilities	26	1,187	16.1%	$127,136,400
Wholesale Trade	23	310	4.2%	$83,944,400
Construction	24	355	4.8%	$65,540,729
Finance, Insurance, Real Estate	25	151	2.0%	$23,935,900
Retail Trade	34	145	2.0%	$13,335,073
Agriculture, Forestry, Fishing	2	19	0.3%	$959,200
Public Administration	9 offices	648	8.8%	n/a
Total	283	7,380	1	$818,228,512

Source: National Establishment Time-Series (NETS) Database; City of Chester

A representation of employment by sector is illustrated in **Figure 4**. The number of employees is symbolized by the size of the circle. This graphic shows a concentration of services in the Chester City central business district, while larger employment centers are generally found closer to the waterfront.

Figure 4: Employment by Sector



Environmental Justice

To the degree that federal funding might be involved in aspects of developing or implementing recommendations from this study, it deserves mention that some advance inventorying work was performed in identifying human and natural environments in the study area. As projects are developed, this information may be helpful in engaging residents and preparing for the eventual compliance with the requirements of federal mandates.

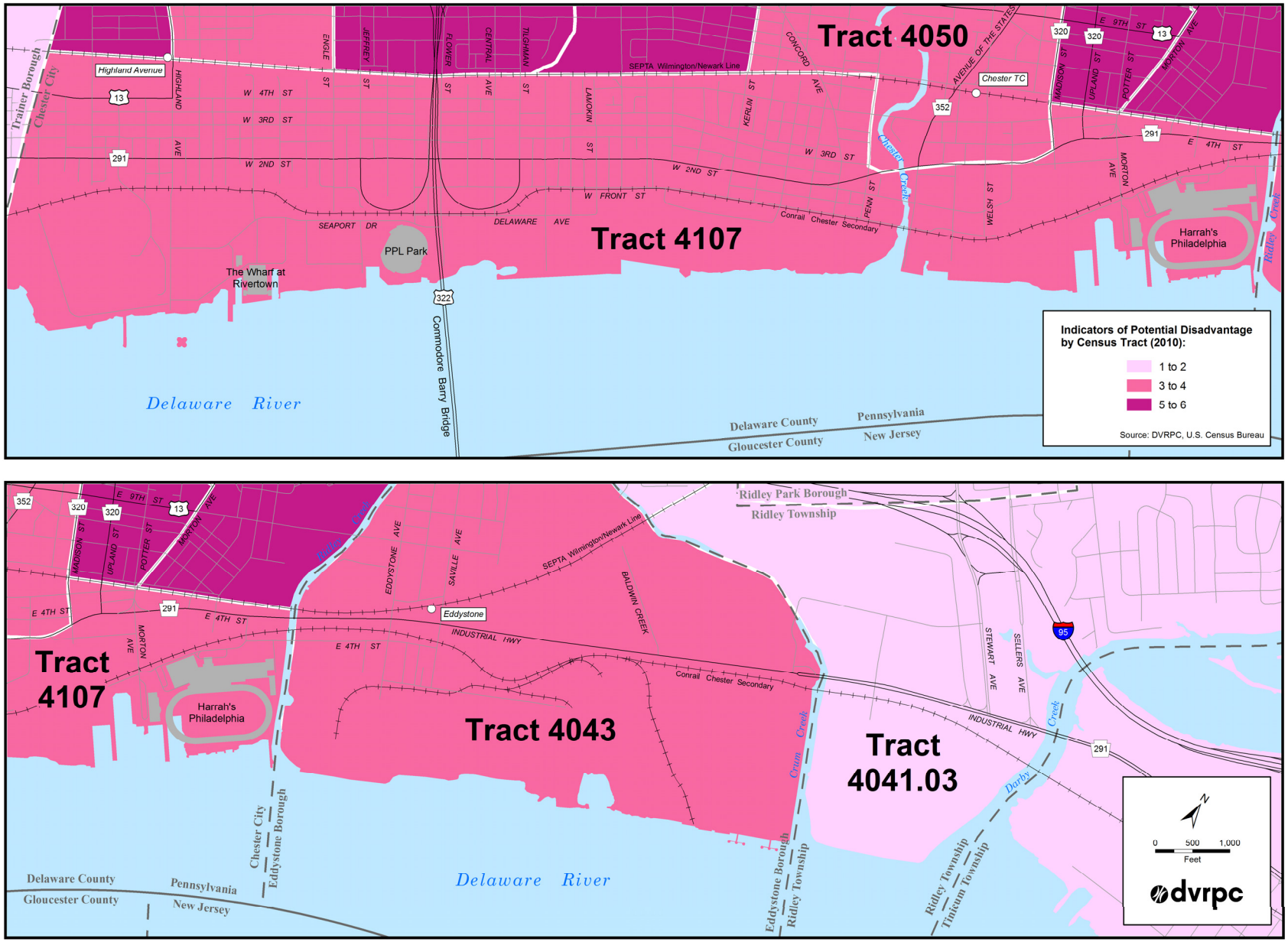
Federal law Title VI of the Civil Rights Act of 1964 and the 1994 President's Executive Order on Environmental Justice (#12898) state that no person or group shall be excluded from participation in, or denied the benefits of, any program or activity utilizing federal funds. Each federal agency is required to identify any disproportionate adverse health or environmental effects of its programs on minority or low-income populations. Metropolitan Planning Organizations (MPOs), as part of the United States Department of Transportation's certification requirements, are charged with evaluating their plans and programs for environmental justice sensitivity, including expanding their outreach efforts to low-income, minority, or other disadvantaged population groups.

DVRPC first developed a method of analysis in 2001, and has since completed several updates. U.S. Census data is used to assess seven indicators of potential disadvantage:

- Carless Households;
- Elderly, 75 and over;
- Female Heads of Household with Child;
- Limited English Proficiency;
- Households in Poverty;
- Hispanic; and
- Non-Hispanic Minority.

The indicators-of-potential-disadvantage process was applied to the PA 291 study corridor using data from the 2010 Census and is shown in **Figure 5**. Four census tracts are wholly or partially located within the PA 291 study area. Census Tracts 4050 and 4107 in Chester City exhibited four indicators; Tract 4043 in Eddystone Borough exhibited three indicators, while 4041.3 in Ridley exhibited one indicator.

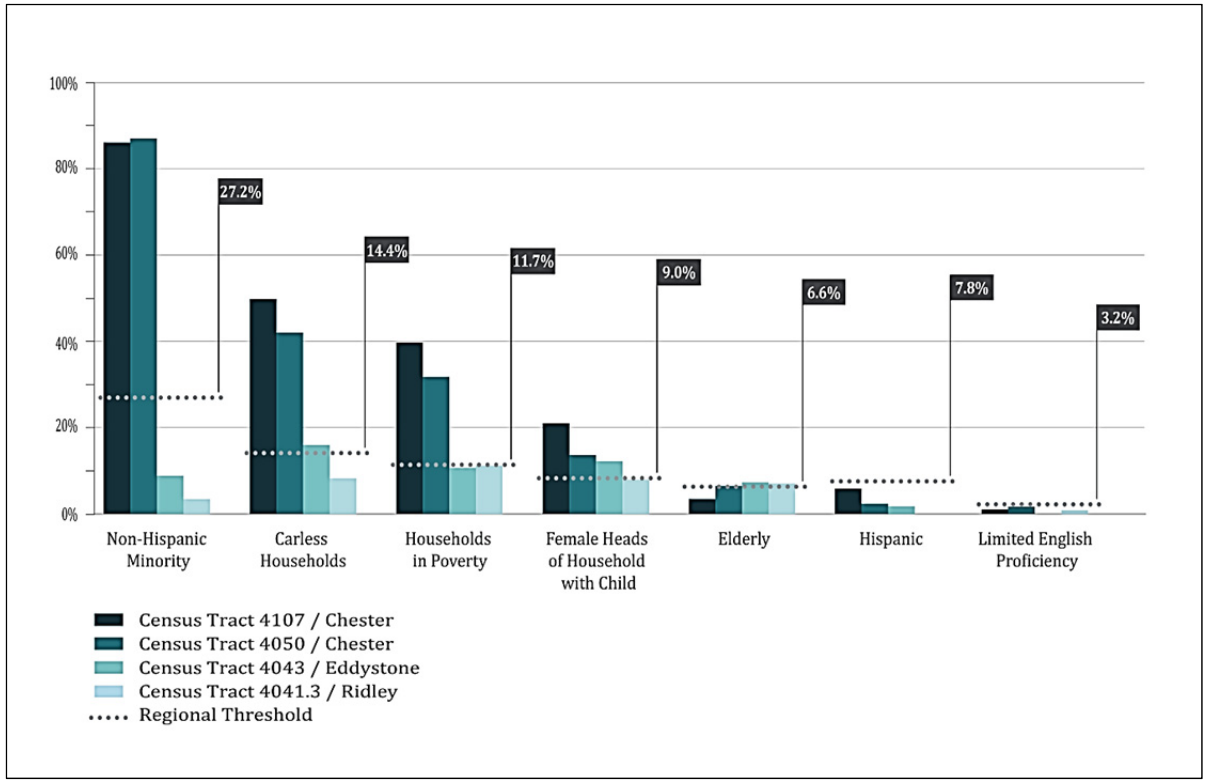
Figure 5: Indicators of Potential Disadvantage



This analysis provides an indication as to where disadvantaged populations may be located. These groups should be taken into account and given special consideration when considering transportation improvements in the PA 291 study area.

Figure 6 illustrates the types of environmental justice factors affecting census tracts in the PA 291 study area. The severity of the indicators for each census tract is compared to the regional threshold. For example, the percentage of carless households in tracts 4107, 4050, and 4043 both exceed the regional threshold of 14.4 percent. A high concentration of carless populations may translate into higher levels of transit dependency. Higher percentages of elderly, as found in Eddystone Borough, may result in pedestrian amenities that are more sensitive to senior citizens. By far, the highest indicator in the study area is non-Hispanic minority in tracts 4107 and 4050, where levels are over three times the regional average.

Figure 6: Severity of Indicators



Source: US Census 2010

CHAPTER 3

Planning Context

To understand how the recommendations from this study may begin to impact Chester City and local travel behavior, it is necessary to understand the current land use and transportation context. The relationship between land use and transportation facilities is central to any area study. The use of land, where people live and work, and its intensity is responsible for generating trips. The geographic distributions of uses, and the transportation facilities connecting and serving the uses, are responsible for how trips are made.

Philadelphia Electric Company building in 1926

Source: Widener University Archives

Existing Land Use

The Delaware waterfront in Chester, Eddystone, and Ridley has long been an active industrial area. Since the early 1800s, the waterfront has provided access to transportation and markets that helped to build the city and grow its population into the mid-1900s. In the 1800s, oil refining, chemical manufacturing, shipbuilding, and other industries dominated the waterfront. At the area's economic peak, Sun Shipbuilding, Scott Paper, and Ford Motor Company provided thousands of jobs and supported the local economy. The availability of jobs helped to create a vibrant community, drawing immigrants from Eastern Europe and migrants from the southern United States. During these times, an electronic sign lit above the city welcomed those who entered the town, reading "What Chester Makes, Makes Chester." Despite this strong industrial history, the changing tides of the economy in the postwar era led to the slowing of manufacturing. This shift brought about an exodus of much of the wealthier population from the study area.

Today, although the industrial base is much diminished from its peak, it still accounts for nearly 40 percent of all land use within the study area, and several of its original industries remain. A summary of land use coverage is shown in **Table 4**. Scott Paper Company, now owned by Kimberly-Clark, maintains a large operation on the waterfront that includes a power generation station, as well as manufacturing, research and development, and distribution facilities. Several oil refineries are located just outside the study area, and two natural gas generation stations located within the study area help to power the region. The old Ford Motor Company property has become the Riverbridge Industrial Center and continues to grow in activity.

Creating an inventory of existing land use in a corridor study is important for understanding the context of the transportation network and the relationship of roads and transit to growth centers and jobs. DVRPC maintains land use data and maps for the entire nine-county region, based on digital orthophotography flown every five years, most recently in 2010. DVRPC asks its member county governments to review the draft land use files for specific errors and revises accordingly. Thus, the land use data is based on both interpretation of orthophotography and local knowledge. **Figure 7** displays the existing land use for the PA 291 study area.

Land uses within the study area are well established and have developed in response to the regional nature of the transportation infrastructure and the area's relationship with the Delaware River. Accordingly, industrial land uses dominate the corridor, with just over 38 percent of the study area.

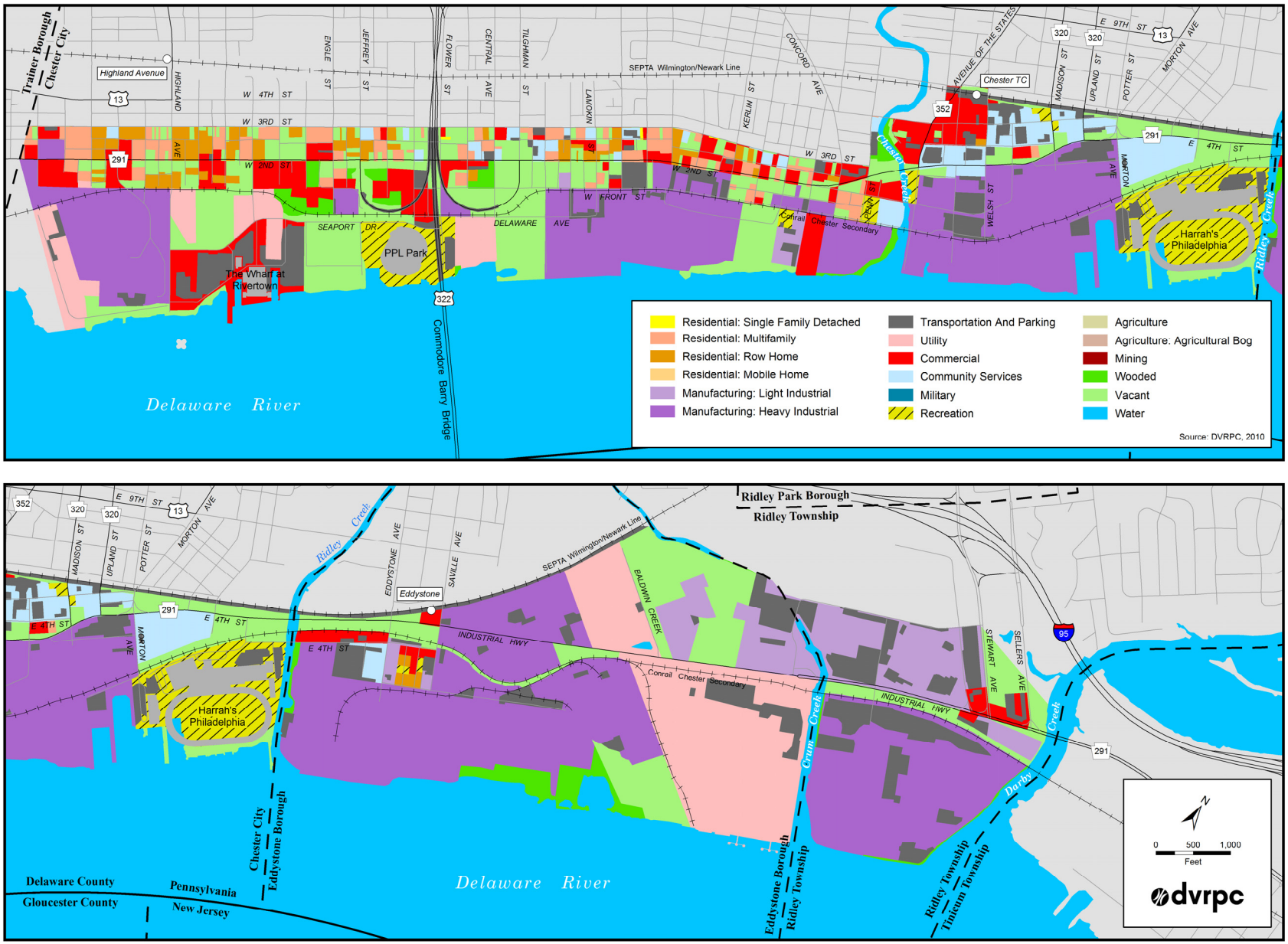
The corridor is also identified by the presence of a relatively high number of multifamily and row home residential uses. These residential uses account for roughly 4.71 percent of the study area; there is only nominal single-family detached housing within the study area. Commercial uses constitute only approximately 6.82 percent of the corridor, yet have a disproportionately large impact on how the corridor is experienced. A large portion of the study area's commercial development is prominently located within the Chester City central business district. Because of the built-out nature of the study area, most growth and change along the corridor will occur as a result of redevelopment. Vacant land accounts for over 18 percent of the study area.

Table 4: Land Uses

Land Use	% of Total
Industrial (all)	38.78%
Vacant	18.29%
Utilities	10.49%
Parking (all)	9.42%
Commercial	6.82%
Recreation	4.96%
Residential (all)	4.71%
Community Services	2.99%
Wooded	2.18%
Transportation	1.37%

Source: DVRPC 2013

Figure 7: Land Use



Industry and Opportunity

The industrial portion of the study area is well served by a variety of modes due to its location along the Delaware River and proximity to major surface transportation routes. All of the lands adjacent to PA 291 in the study area corridor are within a few miles of the nearest interchange with I-95, a key route for the movement of products to East Coast markets. In addition, the study area is near the Philadelphia International Airport, which provides access to international markets. The entire length of the study area is also served by CSX and Norfolk Southern on the Chester Secondary.

Land parcels served by rail also abut the Delaware River. In fact, 18 percent of all Pennsylvania rail served waterfront property that is still available for industrial use along the Delaware River is located in the study area. This provides the study area with a strategic advantage in attracting new industrial firms that require maritime, rail, and highway access.

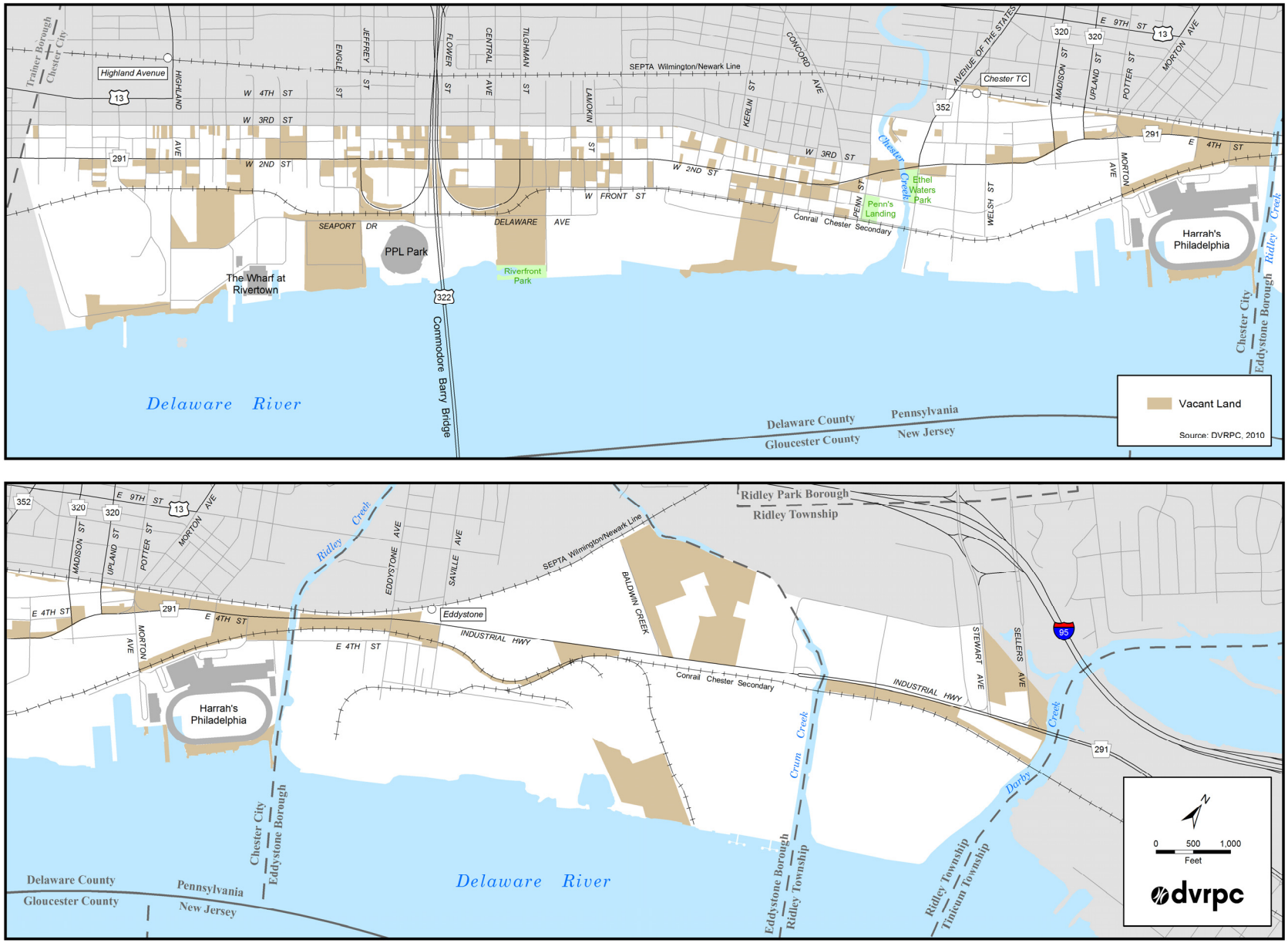
While industry remains important, productive, and the dominant use between PA 291 and the Delaware River, local efforts to bring other types of activity to the waterfront have also been successful. Several developments in Chester—PPL Park, the Wharf at Rivertown, and Harrah's Philadelphia Casino and Racetrack—have taken advantage of the new W-1 zoning designation and have increased public access to the waterfront area by providing destinations.

The Wharf of Rivertown is a significant part of the three-mile stretch of Chester's Riverfront corridor and presents an excellent opportunity for continued reinvestment. An illustrative master plan has been developed, depicting the area to be developed with mixed uses consisting of office, commercial, and residential multifamily.

Two types of development along the waterfront, industrial and recreation/entertainment are both appropriate for the area and provide jobs to the local economy. However, these land uses must be carefully balanced. Industrial sites are generally hazardous for the general public, yet the public should be able to safely access the waterfront. Moving forward, it is imperative that any new development accommodate the needs of both types of uses.

Figure 8 reveals that there is an abundance of vacant land (nearly 20 percent) that is spread rather evenly throughout the study area. However, there are several large vacant parcels along the waterfront. This land, in conjunction with the proliferation of surface parking (almost 10 percent of the study area), offers a good deal of space that could be developed strategically to maximize the public's access to the waterfront.

Figure 8: Redevelopment Opportunity Areas



Zoning

There are 11 different zoning designations represented within the study area—seven in Chester, three in Eddystone, and one in Ridley. The majority of the land (59%) is zoned for industrial uses. Waterfront-oriented uses consist of 35 percent of the land, while just over five percent is zoned for commercial uses, and less than one percent is zoned for residential uses. **Table 5** shows the breakdown of land within the 11 zoning districts.

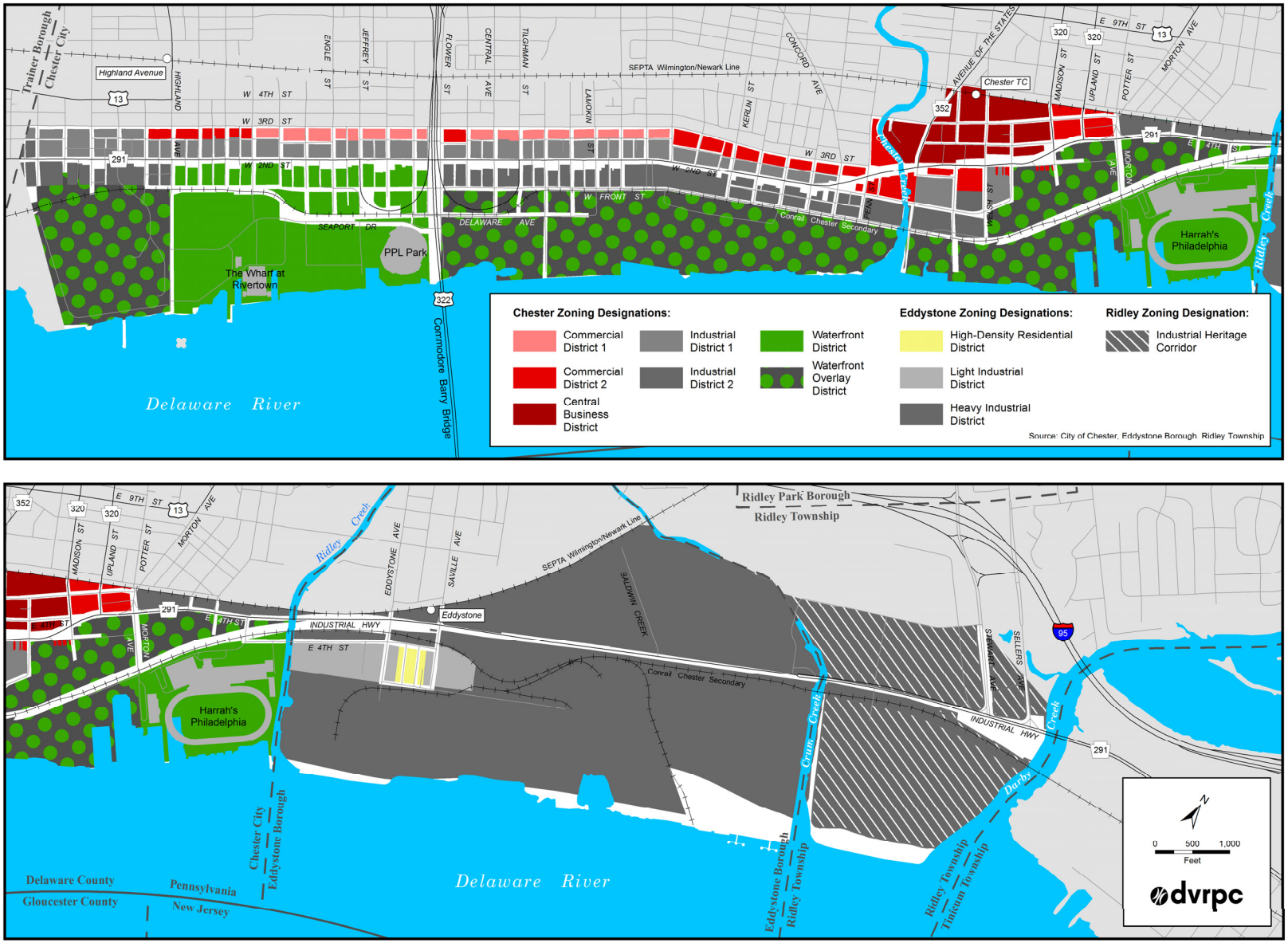
Table 5: Zoning by Type

	Municipality	Zone Name	Area (square feet)	% of Total Area
Residential	Eddystone	R-3	134,850	**0.22%**
Commercial	Chester	C-1	781,488	**5.53%**
	Chester	C-2	1,285,830	
	Chester	CBD	1,339,915	
Waterfront	Chester	W	1,3718,387	**35.28%**
	Chester	W-1	8,005,093	
Industrial	Chester	M-1	2,391,613	**58.96%**
	Chester	M-2	2,638,959	
	Eddystone	LI	661,390	
	Eddystone	HI	20,530,971	
	Ridley	IHC	10,077,367	

Source: City of Chester, Eddystone Borough, Ridley Township, DVRPC

Although Chester City has eight different zoning districts represented within the study area, those zones fall into only three categories: commercial, industrial, and waterfront-oriented. **Figure 9** displays the zoning designations for the study area. The three commercial districts, Commercial District 1 (C-1), Commercial District 2 (C-2), and the Central Business District (CBD), run along Third Street at the northern border of the study area, including almost the entire length of the portion of the corridor that passes through Chester. All of these districts provide for a mix of residential and business/commercial uses. C-2 expands the permitted uses to include some very light industry (metal working, cabinet making, etc.) and industrial uses that are accessory uses to permitted business uses. Within the CBD, the mix of uses also permits municipal buildings and parking lots.

Figure 9: Zoning



Manufacturing uses dominate the study area and the underlying zoning is consistent with this. Two industrial zones, Industrial District 1 (M-1) and Industrial District 2 (M-2), are located along either side of PA 291 in Chester. These zones provide for industrial and commercial uses that are greater in intensity than those permitted in the residential and commercial zones. The intensity of the activity permitted increases as the zone numbers increase; M-1 allows the lowest intensity and M-2 the highest. The heaviest uses are located directly adjacent to the Delaware River.

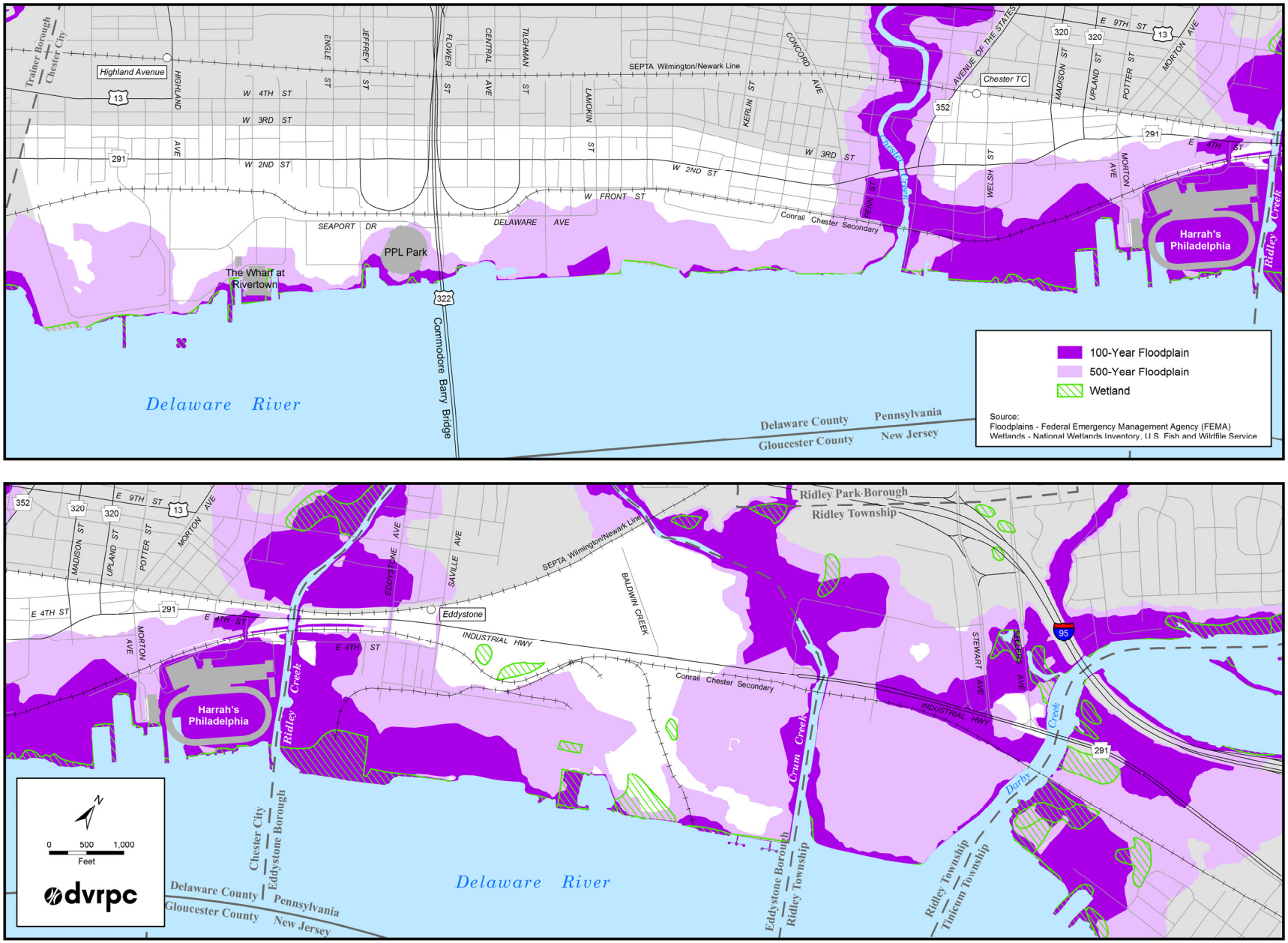
The Waterfront District (W-1) and the Waterfront Overlay District are both located primarily to the south of PA 291 between the roadway and the Delaware River and serve to break up the band of heavy industry directly on the waterfront. The Waterfront Overlay District, created by the city to be a transitional area where land uses are flexible in order to respond to the changing development climate, includes the parcels along the river formerly zoned M-3 and used for heavy industrial uses. The intent of these districts is to capitalize on the city's Delaware Riverfront location by providing a space for land uses that are diverse and particularly suited to the waterfront, while also providing public access to the water and preserving the river as an asset to the city. The two areas designated W-1 have been recently redeveloped; one area houses PPL Park and the Wharf at Rivertown, while the other is home to Harrah's Philadelphia Casino and Racetrack.

In Eddystone, there is a very small area zoned for high-density residential uses (although the housing density is quite low), surrounded by a swath of light industrial land. The rest of the land in Eddystone (over 96%) is zoned for heavy industry. All of the study area land in Ridley Township is designated as the Industrial Heritage Corridor, which allows for a variety of industrial uses in addition to lower impact, technology-based, and water-related uses.

Hydrologic Characteristics

The presence of natural features influences development patterns and the development of infrastructure. This is evident along the PA 291 corridor, where industrial development is located primarily along the Delaware riverfront. In addition to the Delaware River, which runs along the entire south side of the study area, there are three creeks that intersect it—Chester Creek, Ridley Creek, and Crum Creek—and one, Darby Creek, that serves as the eastern boundary of the study area.

Figure 10: Floodplains and Wetlands



While the waterfront location supports maritime access, it is also vulnerable to flooding. Significant portions of the study area adjacent to waterways are within either the 100- or 500-year flood plain, as shown in **Figure 10**. In Chester, from the Trainer Borough border to Chester Creek, there is very little land affected by either flood plains or wetlands; what is affected is primarily in the 500-year floodplain.

However, east of Chester Creek there is a large portion of land in the 100-year floodplain (including the entirety of Harrah's Philadelphia Casino and Racetrack) and several small areas of wetlands.

Chester has adopted a Flood Plain Conservation District zoning for all lands within the 100-year floodplain in an effort to mitigate the effects of flooding. Provision exists to regulate development within flood-prone areas in order to protect life and property. In floodplain areas, the underlying zoning still applies; where it conflicts with the provisions of the Flood Plain Conservation District, the more restrictive provisions apply.

Stormwater and Coastal Zone

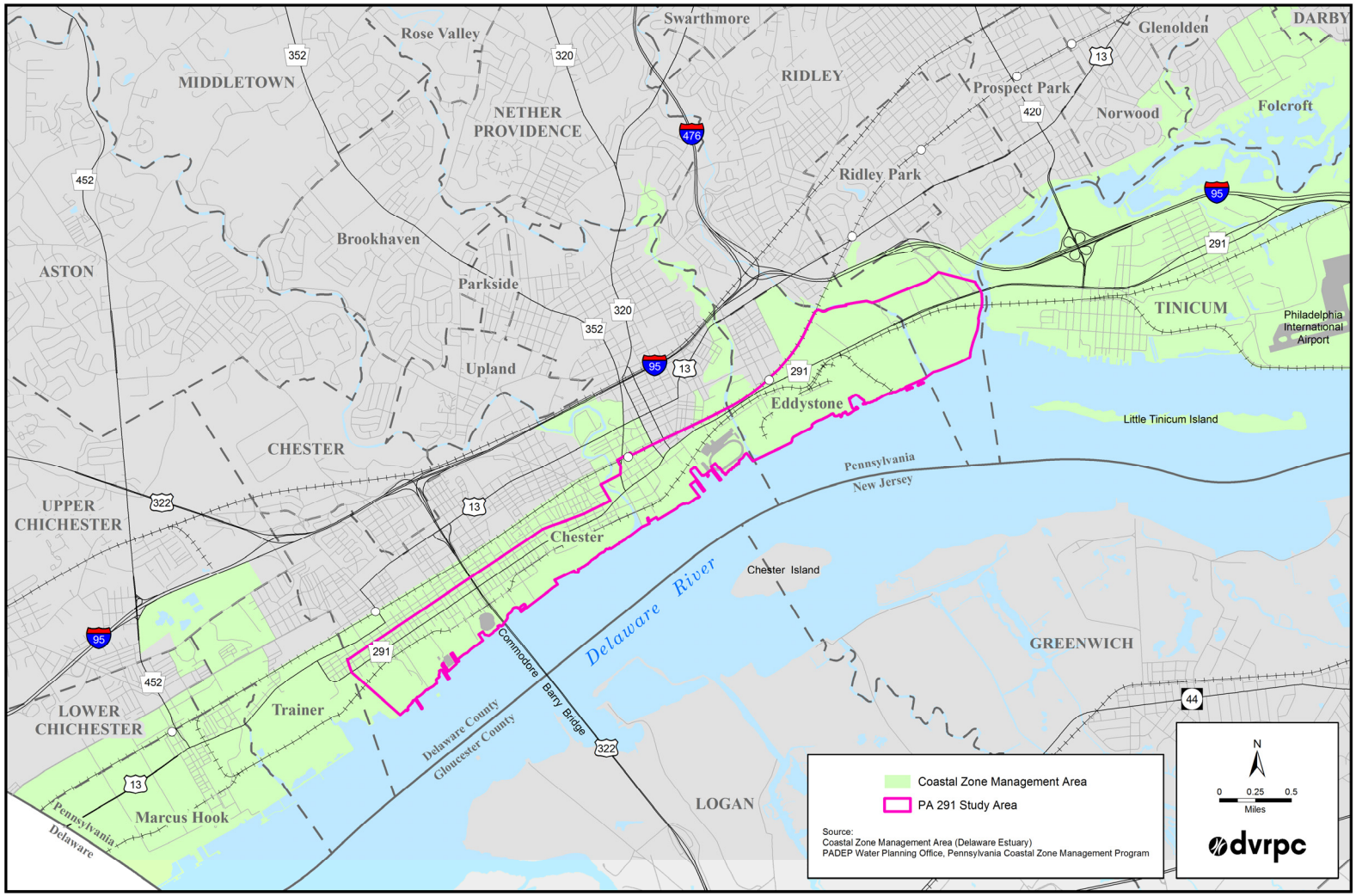
Several residents and employees of businesses along the PA 291 corridor mentioned that the area has significant flooding issues on the east side, particularly at the intersection of PA 291 and South Stewart Avenue near the Boeing Headquarters in Ridley.

Stormwater management entails designing, constructing, and maintaining land surfaces that direct and control the runoff during rain and melting snow events. As shown in Table 4 (page 18), over nine percent of the study area is dedicated to parking. This relatively large area of paved parking, combined with other impervious surfaces from sidewalks, roadways, and driveways, prevents rainwater infiltration and natural groundwater recharge. Current land use patterns, with an abundance of impervious surfaces, significantly increases the amount of runoff. The runoff is concentrated quickly, resulting in brief but damaging flood events.

The Coastal Zone Management Act is an Act of Congress passed in 1972 to encourage coastal states to develop and implement coastal zone management plans, with the goal to preserve, protect, enhance, and where possible, restore the resources of the coastal areas. Under this act, The National Coastal Zone Management Program (CZM) was created. Common goals of the CZM program include protecting natural resources, providing public access for recreations, managing development, and coordinating state and federal actions.

The Delaware County Coastal Zone, illustrated in **Figure 11**, extends for 12 miles along the Delaware River, encompassing 13 municipalities from Tinicum Township to the Borough of Marcus Hook. A Costal Zone Task Force, formed in 1995, meets bimonthly to discuss ongoing issues and share information.

Figure 11: Delaware County Coastal Zone



CHAPTER 4

Transportation Context

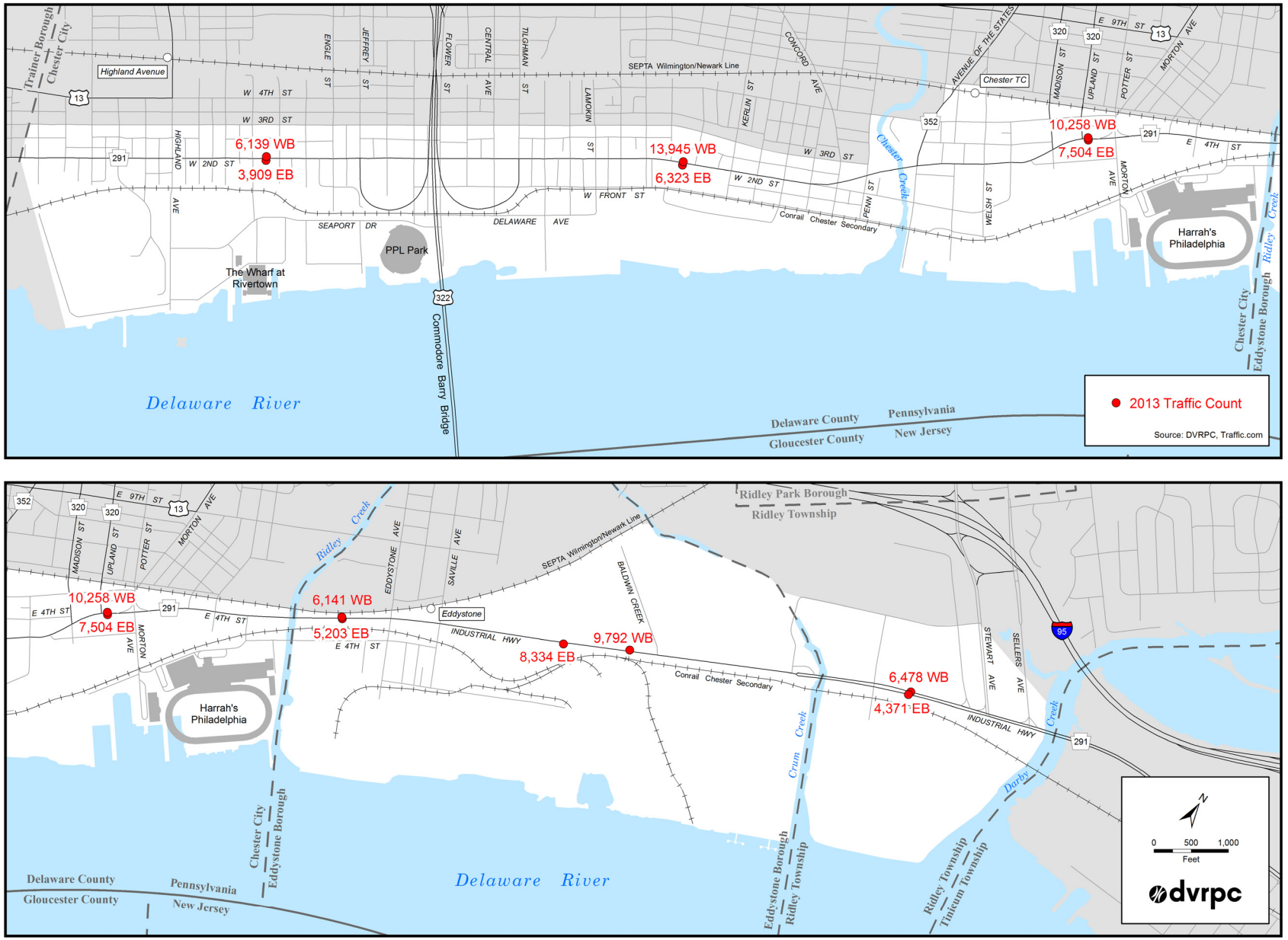
The purpose of a transportation network is to move people, goods, and services safely, reliably, and efficiently for all modes of travel. As a major public investment, the system is important for establishing policy goals of mobility and fiscal goals that support a prosperous economy. The City of Chester, Ridley Township, and Eddystone Borough contain a host of transportation infrastructure, including interstate highways; state and local roadways; bus and regional rail; port facilities and water transport; private rail; multiuse trails and bicycle facilities; and pedestrian amenities.

Network Characteristics

In 2001, the first phase of the PA 291 reconstruction project was completed. The 1.2-mile section, from the Eddystone Borough line to Franklin Street, was widened to a five-lane cross-section. This area consists of two travel lanes per direction, with a middle turn lane throughout. At the signalized intersections, the middle turn lane reverts to a left-turn lane. The second phase, completed in 2003, widened PA 291 from Franklin Street to the Trainer Borough line. The quarter-mile section in Trainer Borough, from US 13 to the borough boundary, is a single lane in each direction. In order to enhance access and complement the city's redevelopment and revitalization efforts, new ramps off the Commodore Barry Bridge were opened in 2011. These ramps provide direct access to I-95 via a westbound on-ramp and an eastbound off-ramp on US 322.

Today, PA 291 is functionally classified as a principal arterial highway throughout the access management corridor. **Figure 12** shows traffic volumes within the study area taken by DVRPC in 2013. These counts reflect an annual average daily volume for a given segment of roadway and are labeled as eastbound (EB) or westbound (WB). Westbound traffic levels on PA 291 range from 6,139 in the western section, 13,945 near Kerlin Street, to 9,792 in Eddystone Borough. Eastbound traffic volumes are generally lower than in the westbound direction for the same locations.

Figure 12: PA 291 Traffic Counts



The reconstructed section of PA 291 within the study area runs through the entire length of the City of Chester, from Trainer Borough to Eddystone Borough. This section has the following characteristics that were noted from data collection efforts and field visits:

- Posted 35 mph speed limit;
- A considerable heavy vehicle presence;
- Two travel lanes in each direction;
- A middle turn lane;
- Dedicated left-turn lanes at the signalized intersections;
- Wide shoulder adjacent to curb-side lane;
- Intermittent on-street parking;
- Consistent curbs and sidewalks;
- Some residential frontage; and
- Wide pedestrian crossings.

Ridley Creek is the municipal border between the City of Chester and Eddystone Borough. The characteristics of PA 291 change considerably crossing over the Ridley Creek Bridge. This section of PA 291 can generally be described as:

- Posted 35 mph speed limit;
- Two travel lanes in each direction;
- Lack of sidewalks and pedestrian facilities;
- Little or no shoulders;
- No middle turn lane;
- Consolidated driveways; and
- Lower traffic volumes.

This is a largely industrial area, with driveways to Exelon's Eddystone Generation Facility and Boeing's helicopter facility. The full interchange of I-95 at Stewart Avenue provides access for the large employment centers.

Traffic Mobility and Intersection Analysis

In order to better understand traffic patterns and characteristics along the corridor, multiple data collection efforts were undertaken. Intersection turning movement counts were taken during the AM and PM peak periods at four intersections, shown as numbered circles in **Figure 13**. Data collection locations, shown as red squares in Figure 13, display the locations where the percentage of heavy vehicles and directional speed information was collected.

PA 291 carries thousands of vehicles on a daily basis through the City of Chester, providing access and mobility for passenger cars and heavy vehicles. It is important for these types of facilities to provide an efficient flow of traffic during times of peak demand. To that end, DVRPC conducted a Level-of-Service (LOS) analysis at four signalized intersections within the study area to determine the performance of PA 291 during peak hours.

Signalized intersection LOS is defined in terms of the average total vehicle delay of all movements through an intersection. Vehicle delay is a method of quantifying several intangible factors, including driver discomfort, frustration, and lost travel time. It provides a scale that is intended to match the perception by motorists with the operation of the intersection. LOS provides a means for identifying intersections that are experiencing operational deficiencies, as well as providing a scale to compare intersections with each other.

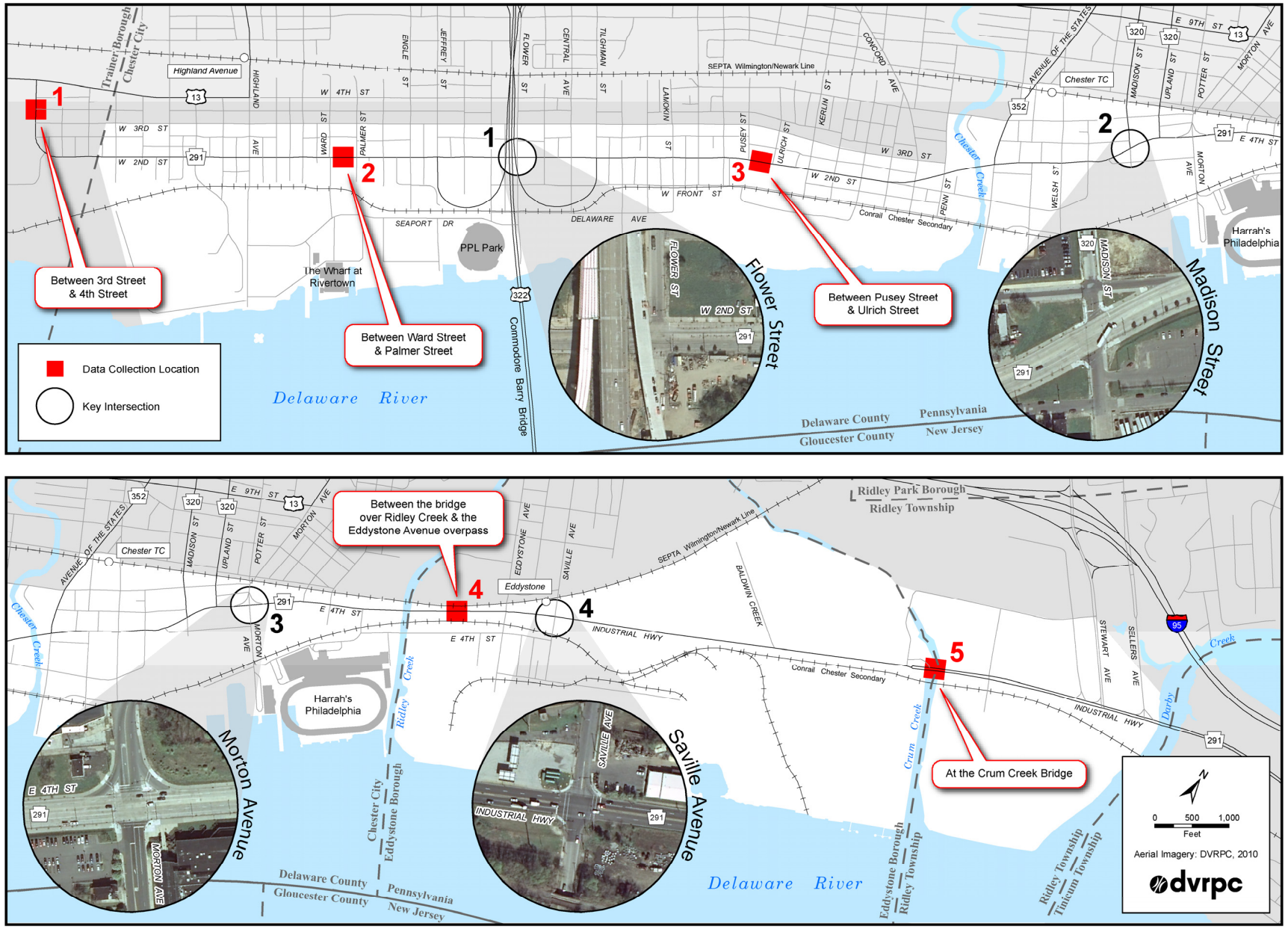
Table 6: Level-of-Service Description

LOS	Vehicle Delay	General Description
A	≤ 10	Free Flow
B	> 10 - 20	Stable Flow (slight delays)
C	> 20 - 35	Stable Flow (acceptable delays)
D	> 35 - 55	Approaching Unstable Flow (tolerable delay)
E	> 55 - 80	Unstable Flow (intolerable delay)
F	> 80	Forced Flow (jammed)

Source: Highway Capacity Manual 2010

Table 6 shows the standard for LOS criteria for signalized intersections, as defined in the *Highway Capacity Manual*. Specifically, LOS criteria are stated in terms of average delay (in seconds) during a specific time period, such as a peak hour.

Figure 13: Key Intersections and Data Collection Locations



Turning movement counts were taken in October 2013 at Flower Street, Madison Street, Morton Avenue, and Saville Avenue along the PA 291 corridor. From the count data, the peak hours were determined to be 7:30 to 8:30 in the AM and 4:45 to 5:45 in the PM. Peak hour turning movement counts were entered into Sychro, a microsimulation software. Roadway geometry, traffic signal timings and phasing, and pedestrian counts were also entered into the Synchro network to replicate real-world conditions. An AM and PM peak hour LOS analysis was conducted to gauge the degree of congestion at the four intersections. The results of the analysis are shown in **Table 7**.

The results of the LOS analysis reveal that peak hour traffic congestion and delay is not a major issue along the PA 291 corridor. No intersection recorded a LOS worse than 'C', which represents stable conditions. The results show that the high percentage of heavy vehicles throughout the PA 291 corridor does not significantly impede the general traffic flow. Furthermore, should the middle turn lane be converted to a landscaped median in the future, the signalized intersection would have the capacity to handle the additional turns. It should be noted that the counts for the analysis were taken when the bridge over Darby Creek was under construction. This may have slightly altered travel patterns in the area.

Table 7: Peak Hour Level-of-Service

Intersection with PA 291	Level of Service	
	AM Peak Hour	PM Peak Hour
Flower Street	A	A
Madison Street	B	C
Morton Street	A	C
Saville Avenue	B	A

Source: DVRPC 2013

Travel Speeds

The speed of vehicles on PA 291 was a concern raised by steering committee members, local officials, and citizens at the study's open house meeting. Vehicles traveling at high speeds were also observed during field visits to the corridor. The posted speed limit on PA 291 is 35 miles per hour. However, in much of the study area, the expansive cartway, low traffic signal density, unimpeded visibility, and low traffic volumes contribute to vehicles traveling at higher speeds. In order to quantify the actual rate at which vehicles were travelling along the corridor, speed data was collected. The average speed and the 85th percentile speeds of all vehicles were calculated. Speeds were taken at the five locations, represented as red squares in Figure 13.

Sample corridor travel speeds are shown in **Table 8**. The AM period represents 7:00 to 9:00, while the PM reflects 3:00 to 6:00. The data reflects speeds recorded from all vehicles during the given time period, including vehicles that may have been slowing to make a turn. As such, the free flow speed of vehicles is likely higher than our data shows.

Table 8: Corridor Travel Speeds

PA 291 Cross Street		Location 1		Location 2		Location 3		Location 4		Location 5	
		3rd Street (Trainer Borough)		Ward Street		Ulrich Street		Ridley Creek Bridge		Crum Creek Bridge	
Period	Direction	Average	85th Percent	Average	85th Percent	Average	85th Percent	Average	85th Percent	Average	85th Percent
AM	Eastbound	27.4	32.2	39.9	46.9	39.6	46.5	46.7	55.0	47.0	55.3
AM	Westbound	30.2	35.5	32.6	38.3	41.7	49.1	43.6	51.3	43.6	51.3
PM	Eastbound	27.4	32.2	41.1	48.3	38.2	44.9	44.7	52.6	42.0	49.4
PM	Westbound	29.9	35.1	38.1	44.8	41.4	48.7	43.7	51.4	45.7	53.8

Source: DVRPC 2013

Location 1 is found in Trainer Borough, where PA 291 narrows to one lane per direction. This is also located near where PA 291 makes a 90-degree curve between Wilcox Street and Mary Street. Not surprisingly, the travel speeds are well below the posted speed limit. Locations 2 and 3 are located in open, unimpeded sections of PA 291. All of the average speeds are above the speed limit, the 85th percentile speed considerably higher. Locations 4 and 5 are in the industrial area of Eddystone Borough and Ridley Township. Here, the average speeds are nearly ten miles per hour higher above the speed limit.

In summary, DVRPC's data collection verified the beliefs of residents that live on or near PA 291 that travel speeds are higher than the posted speed limit. This creates an unfriendly environment for bicyclists and pedestrians alike along and crossing PA 291.

Heavy Vehicles

Goods movement is an important component to the economic activity of the City of Chester, Ridley Township, and Eddystone Borough. In order to quantify the significance of heavy vehicles, truck classification counts were taken along the PA 291 corridor. For this study, trucks are defined as bus, two-axle light trucks, three-axle single unit, four-axle single unit, three-axle single trailer, and four-axle single trailer trucks. **Table 9** summarizes the truck percentage at five cross-street locations along PA 291. The data is categorized by time period and direction. The AM time period is from 7:00 to 9:00, while the PM is from 3:00 to 6:00. The truck percentage varies by location, but overall heavy vehicles make up a significant portion of the traffic flow.

Table 9: Heavy Vehicle Percentages

PA 291 Cross Street		Location 1		Location 2		Location 3		Location 4		Location 5	
		3rd Street (Trainer Borough)		Ward Street		Ulrich Street		Ridley Creek Bridge		Crum Creek Bridge	
Period	Direction	Total Vehicles	Percent Trucks	Total Vehicles	Percent Trucks	Total Vehicles	Percent Trucks	Total Vehicles	Percent Trucks	Total Vehicles	Percent Trucks
AM	Eastbound	222	16.7%	779	18.9%	1,196	8.1%	693	13.7%	414	12.7%
AM	Westbound	507	9.9%	1,387	5.2%	752	12.9%	585	14.0%	717	13.0%
PM	Eastbound	902	6.0%	1,109	10.3%	1,721	3.5%	1,385	7.4%	1,258	6.9%
PM	Westbound	557	7.0%	202	5.4%	2,683	6.6%	2,279	5.1%	2,175	4.8%

Source: DVRPC 2013

CHAPTER 5

PUBLIC TRANSIT

Public transit plays an important role in mobility along the study corridor. Transit service is comprised of a regional rail line, several Southeastern Pennsylvania Transportation Authority (SEPTA) bus routes, and shuttles. Serving as a local hub, the Chester Transportation Center facilitates the transfer between multiple modes and routes. Chester Transportation Center is located three blocks north of the study corridor, at the intersection of East Sixth and Welsh streets. The center is a stop on the Wilmington/Newark Regional Rail Line, and seven SEPTA bus routes, four of which terminate at the center.

Wilmington/Newark Regional Rail Line

The Wilmington/Newark Regional Rail Line serves three stations in the study area, including Eddystone, Chester Transportation Center, and Highland Avenue. Running parallel to I-95, this line stretches between Philadelphia and Newark, Delaware. Weekday service consists of 30-minute peak and 60-minute off-peak headways. All weekday service continues to Marcus Hook, fewer trains run to Wilmington and Newark. Weekend service is limited to 60-minute headways to Marcus Hook and two-hour headways to Wilmington. Service does not extend past Wilmington on weekends. **Table 10** shows the number of average weekday boards and alights for the three study area regional rail stations.

Table 10: Wilmington/Newark Regional Rail Ridership

	Boards	Alights
Highland	83	90
Chester TC	314	318
Eddystone	63	65
Total	**460**	**473**

Source: SEPTA 2013

SEPTA Buses

A review of the bus ridership data shows that a high percentage of the transit ridership in the area is associated with either Harrah's Philadelphia Casino or Chester Transportation Center. With the exception of these two locations, no other bus stop location along the study corridor handles significant passenger volumes. However, roughly 50 passengers per direction were counted using one of the several bus stops that serve the Boeing and Exelon facilities. **Table 11** summarizes ridership at Harrah's Philadelphia Casino and Chester Transportation Center for the bus routes that serve the study corridor.

- **Route 37** operates between South Philadelphia (Broad and Snyder) and Chester Transportation Center. The route serves the Philadelphia International Airport, Harrah's Philadelphia Casino, and the Boeing facility. Within Chester City, Route 37 operates on PA 291 between the Eddystone Borough and Welsh Street. At Welsh Street, the route departs PA 291 to serve the Chester Transportation Center. The route also leaves PA 291 for a short distance to serve Harrah's Philadelphia Casino. Weekday service consists of roughly 30-minute headways between 5:30 AM and 1:30 AM. Saturday and Sunday headways are 50 minutes between 6:00 AM and 2:30 AM.
- **Route 113** operates between the Tri-State Mall in Delaware and the 69th Street Transportation Center in Upper Darby. Harrah's Philadelphia Casino is the most significant attraction served by the route. Within Chester City, the route operates on PA 291 between the casino and Penn Street, though it departs PA 291 to serve the Chester Transportation Center. South of Penn Street, the route operates along Third Street and Seaport Drive, serving the Wharf at Rivertown and PPL Park, which parallels PA 291. Weekday service consists of roughly 30-minute headways between 4:00 AM and 1:30 AM. Weekend service is similar, though it begins and ends roughly an hour later.
- **Route 119** operates between Cheyney University and the Chester Transportation Center. The route travels on PA 291 for only a short distance, but parallels it between the Chester Transportation Center and Trainer Borough. Weekday service consists of roughly one-hour headways between 5:00 AM and 11:00 PM. Weekend service is similar, though beginning one hour later.

Table 11: SEPTA Bus Ridership

SEPTA Bus Route	Chester TC Boards	Chester TC Leaves	Harrah's Boards	Harrah's Leaves
37	321	361	236	277
113	248	216	62	195
119	143	179		

Source: SEPTA 2013

Improving Transit

Two types of improvements are appropriate for transit along the PA 291 corridor: pedestrian connectivity and stop amenities. Pedestrian connections between transit stops and passenger origins and destinations are important, as all transit riders are pedestrians on one or both ends of their trips. The value of a transit service is diminished if a passenger cannot make their final connection. There are four focus areas for improving pedestrian connections:

- Eddystone Station to Penn Terminals;
- Chester Transportation Center to the waterfront, including Harrah's Philadelphia;
- Highland Avenue to the waterfront; and
- Bridge crossings over creeks where sidewalks are lacking.

For the most part, the sidewalk network is in place in the mentioned focus areas. Pedestrian crossings vary and would benefit from a consistent design within the city.

Transit stop amenities provide comfort and security for waiting passengers. Amenities may include bus shelters, benches, bike racks, lighting, and trash cans. A review of bus stops along PA 291 (rail stations not included) found three bus stops with shelters—PA 291 at Seaknight Avenue (Boeing access), PA 291 at Saville Avenue, and at Harrah's Philadelphia Casino. A typical bus stop along the study corridor consists simply of a sign mounted onto a utility pole. Some, particularly in the eastern portion of the study corridor, are located in areas without sidewalks. For more information, refer to DVRPC's *SEPTA Bus Stop Design Guidelines*, published in 2012.

SEPTA bus stop at Saville Avenue

Source: DVRPC 2013

The three rail stations in the study area (Highland Avenue, Chester Transportation Center, and Eddystone) are important gateways that are in close proximity to existing and proposed bike routes. Installing bike racks at these stations would encourage bike use as a commute option. This could be coordinated with SEPTA's *Bike Action Plan*, which will be published in the near future. Ideally, bicycle facilities at the rail stations would also include bicycle lanes or sharrrows on the neighboring street network.

Highland Avenue sidewalk south of 4th Street

Source: DVRPC 2013

The Highland Avenue corridor is of particular importance to the study area, providing a link from I-95 to the Chester Waterfront. The Highland Avenue station, located between Fourth Street and Sixth Street, serves a large residential community. There are also several vacant tracts of land within walking distance of the station. Proximity to the Highland Station could play an important role in how these vacant areas are redeveloped. Should these areas be improved, ridership at the station would likely increase.

The two-block section, between Second Street and Fourth Street, has recently been upgraded with new sidewalks, curbs, streetlighting, and ADA crosswalk ramps. It is desired to continue these improvements from the Highland SEPTA station to PA 291. South of PA 291, Highland Avenue would link into the East Coast Greenway, providing a multimodal link from PA 291 to the waterfront and the existing Riverwalk Trail.

CHAPTER 6

Bicycle and Pedestrian Facilities

Communities often encourage the development of cultural amenities as a strategy for attracting and retaining quality employment, generating tax revenue, and enhancing the quality of life. Furthermore, these amenities can serve as catalysts for urban redevelopment and stimulate local economies through tourism. Within the study area, there are a variety of historic, cultural, and recreational features of interest and importance to both residents and visitors, as shown in **Figure 14**. Although these amenities are located throughout the study area, they tend to be clustered around Chester City's Central Business District and along the Delaware River Waterfront.

East Coast Greenway Sign

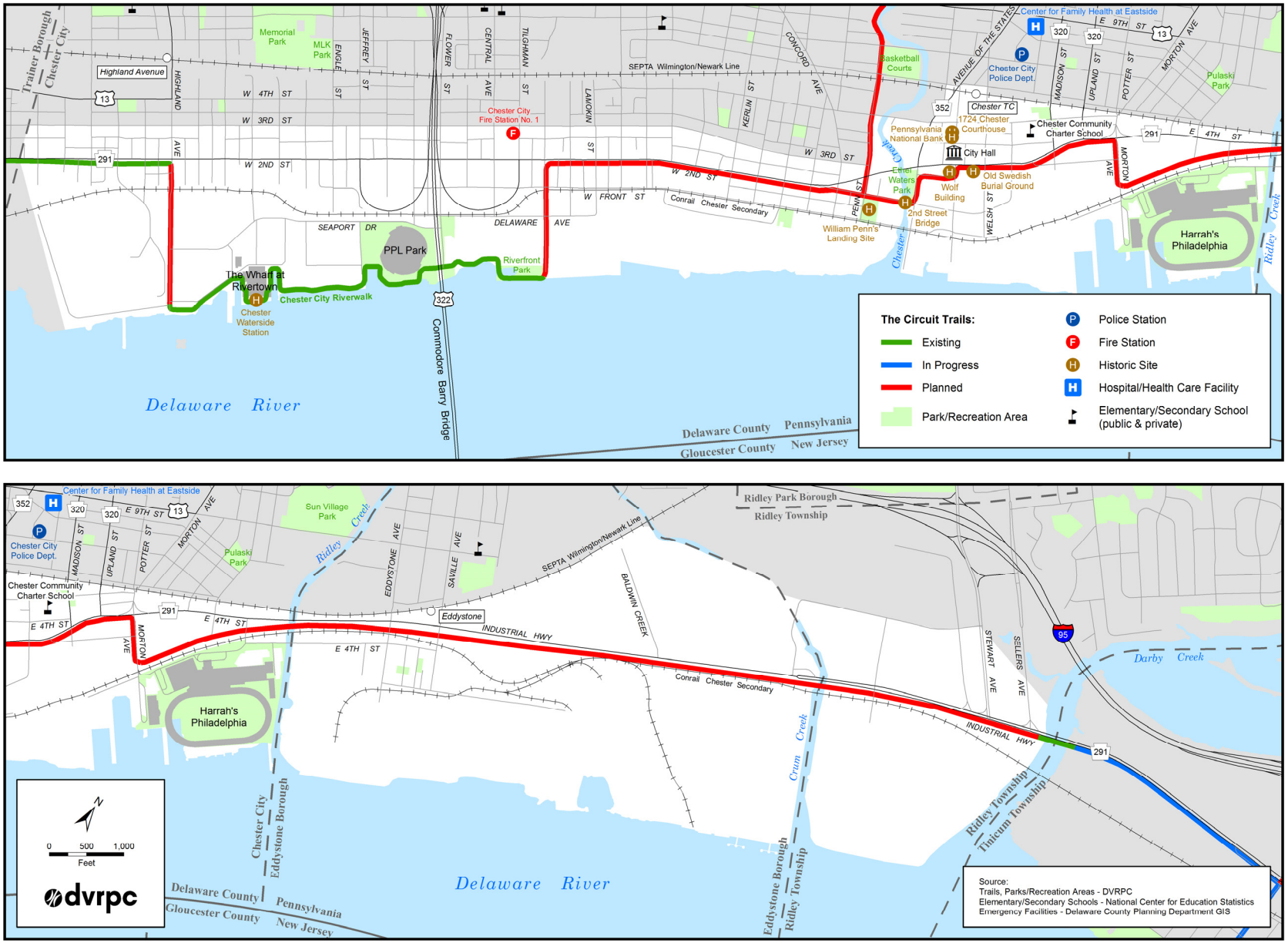
Source: DVRPC 2013

Bicycle Facilities

The transportation network in the study area comprises a dense roadway network of different functional classifications, ranging from principal arterials to local roads, transit networks, and bicycle and pedestrian networks. Bicycle traffic utilizes the on-road and off-road network to access various employment centers, parks, recreational facilities, and scenic areas. Pedestrian facilities and amenities are concentrated where more dense residential development is located. Employment centers and recreation areas are generally located to the east of PA 291 and along the waterfront. These are largely accessible by pedestrians and cyclists.

Figure 14 also illustrates the study area's existing and proposed bicycle network, commonly referred to as the Circuit Trails network. This network consists of a variety of multiuse trails connecting communities throughout Greater Philadelphia. As of 2013, over 280 miles of the system are open for use, while a 750-mile network is envisioned. As part of the Circuit network, a portion of the East Coast Greenway passes through the study area. The completed portion of the Riverwalk/East Coast Greenway extends along the waterfront adjacent to the Wharf at Rivertown, PPL Park, and Barry Bridge Park. The section currently in design utilizes Highland Avenue from PA

Figure 14: Cultural Amenities



291 down to the waterfront. The proposed East Coast Greenway route being planned will run alongside PA 291 and would improve the connection between City Hall (an important community resource with computer rooms and meeting rooms available to the public), Ethel Waters Park (a historic park with space for programming), and the Old Swede Burial Ground. Although not directly adjacent to the proposed route, the Chester Community Charter School and Penn's Landing Park are both nearby and could be connected through signage or streetscape treatments.

Riverfront Trail

Source: DVRPC 2013

The completed Riverwalk/East Coast Greenway experiences considerable activity. Pedestrian counts were taken along the Chester Riverfront Trail in October 2013. At the western end near Highland Avenue, daily counts averaged approximately 30 pedestrians. Other sections of the trail averaged nearly 100 pedestrians per day. During a special event at PPL Park, over 2,000 pedestrians utilized portions of the trail.

The proposed expansion would complete the network through the study area and tie into the regional Circuit Trails network, with the goal to provide a continuous network of bicycle facilities for commuting and recreation use. A large segment of the bicycle network is on-road or sharing the road with motor vehicles. A safe, efficient bicycle network is best achieved by separating motorized traffic from bicycle traffic. However, in this corridor, because of lower volumes, bicyclists' safety can be enhanced by separating bicycles and motorized vehicles through on-street bike lanes. By utilizing shoulders within the existing cartway, as well as utility rights-of-way where possible, the number of conflict points are reduced.

The proposed bicycle route along PA 291 would be primarily along the shoulder. The American Association of State Highway and Transportation Officials' (AASHTO) Guide for the Development of Bicycle Facilities states that where a paved shoulder is used as a bicycle lane, a minimum of four feet in width of paved shoulder is needed in order to be designated as a bicycle facility. This should be of useable width and should not include the gutter pan or any area treated with rumble strips. Widths should be increased with higher bicycle usage, motor vehicle speeds

above 50 miles per hour, or a higher percentage of truck and bus traffic. Due to the high truck percentages, it is preferred to have six-foot bike lanes as part of the East Coast Greenway route. The potential cross-section for the PA 291 corridor is shown in **Figure 16** on page 55.

Paved shoulders, whether they are designated and signed as bikeways or not, provide a great place for people to bicycle. AASHTO guidelines further state that paved shoulders should not be designated or marked as bikeways unless they meet the width guidelines noted above (four feet, or five feet from a barrier or railing) and have a rideable width free from obstructions or treatments. Designating a shoulder as a bikeway may also be useful to provide guidance to cyclists following a particular route (e.g., between two trails, or other popular destinations for bicyclists). There is enough room on most segments of PA 291 to accommodate a bike trail that meets AASHTO standards.

To clearly define the bike route, it is proposed that appropriate signage be installed demarcating bike routes within the study area to enhance their safety and attractiveness. These are particularly appropriate for on-road facilities. The AASHTO Guide describes signed shared roadways (bike routes) as "those that have been identified by signing as preferred bike routes." Signed shared roadways should meet certain conditions, including continuity between bicycle lanes, trails, or other bicycle facilities; marking a common route for bicyclists through a high-demand corridor; directing cyclists to low-volume roads or those with a paved shoulder; and directing cyclists to particular destinations (e.g., park, school, or commercial district).

According to Table 9 (page 36), the PA 291 study area averages nearly 13 percent heavy vehicles throughout the day. Large, slow-turning vehicles can pose a challenge to cyclists along the corridor. The most active stretch for heavy vehicles is the section of PA 291 to the north of the Commodore Barry Bridge. This is a major access road for vehicles entering and leaving the port. Penn Terminal is an active port, with numerous trucks entering and leaving each day. Bicycle/truck conflict is therefore a major concern. By clearly demarcating the bike lane in this area through Share-the-Road signage and pavement markings, the potential for crashes can be reduced.

Pedestrian Facilities

A walkable, safe environment can increase pedestrian activity and stimulate economic activity in the area. In evaluating pedestrian travel patterns and amenities along several preferred routes, several key subcorridors and intersections were studied to see if they were up to acceptable standards. The areas of heavy pedestrian activity in the study area are those leading to and from the commuter rail stations, bus stops, and employment centers.

- The Highland Avenue commuter rail station is located in southern Chester City at Highland Avenue, which provides direct access to waterfront attractions, such as PPL Park. Sidewalks at this section of Highland Avenue from West Second Street to Seaport Drive are mainly absent or substandard.
- The sidewalk in the vicinity of the Chester Transportation Center is continuous and in good condition. Avenue of the States is an important artery, as it acts as a connector between the transportation center and City Hall. As a result, sidewalks in this area are important.
- Saville Avenue connects the Eddystone rail station with its adjacent residential neighborhood, and serves as a conduit to Penn Terminals on the waterfront. There are sidewalks in this area that are in fair condition.
- Fulton Street, from the newer townhouse development at Union Street to PA 291, serves as a link for residents to access the highway (PA 291). At the intersection of PA 291 and Fulton Street, high-visibility crosswalks, such as continental or ladder-type, should be implemented.
- Morton Avenue is the major access road to Harrah's Casino. Sidewalks are present for most of its length and in good condition. However, there are occasional gaps and obstructions that prevent seamless pedestrian movement.

PA 291 at Highland Avenue

Source: DVRPC 2013

- The sidewalks on Welsh Street are in good condition. This is important since it is in close proximity to a school and is a principal route for trucks. However, the intersection of Welsh Street and PA 291 is lacking in pedestrian amenities, such as countdown signals and high-visibility crosswalks.

This study aims to identify ways in which pedestrian thoroughfares can be made safe, secure, and comfortable for all pedestrians. Even where sidewalks are present along PA 291, often there are obstacles. Signs, telephone poles, and trees present hazards to pedestrians walking on the sidewalks and may violate ADA regulations. Based on guidelines established by the Pedestrian Bicycle Information Center (www.pedbikesafe.org/PEDSAFE/), the following enhancements to the pedestrian environment in the PA 291 corridor are appropriate.

- Sidewalks are important in high-traffic areas because they reduce pedestrian collisions with motor vehicles, creating a separation of both travel modes. Such facilities also improve mobility for pedestrians and provide access for all types of pedestrian travel, such as: to and from home, work, parks, schools, shopping, and transit stops. Sidewalks in the corridor, where deficient, should be upgraded to better meet these goals and, where needed, should be constructed to provide this function.
- Marked crosswalks indicate preferred locations for pedestrian crossings and help designate rights-of-way for motorists to yield to pedestrians. Marked crosswalks are desirable at some high pedestrian volume locations to guide pedestrians along a preferred walking path. Marked crosswalks should be present in areas of high pedestrian activity within the corridor.
- Adequate lighting can enhance an environment, as well as increase comfort and safety. Without sufficient overhead lighting, motorists may not be able to see pedestrians in time to stop. Adequate lighting should be considered in high-pedestrian areas of the corridor.

CHAPTER 7

Traffic Safety

For this study, DVRPC quantified and analyzed crash data along the PA 291 study corridor. Reportable crash data was obtained from the PennDOT database. A reportable crash is one resulting in injury or property damage, or requiring vehicle towing services. The three-year period, between 2010 and 2012, was used for both the corridor and intersection crash analysis. During this time, there were a total of 169 crashes along the corridor. Further investigation revealed that 75 of these crashes, or 44 percent, occurred at one of the 11 signalized intersections along PA 291.

The crash data used in this report was provided by PennDOT for DVRPC's traffic-safety-related transportation planning and programming purposes only. The raw data remains the property of PennDOT, and its release to third parties is expressly prohibited without the written consent of the department. Since there is always room for improvement in regards to safety, several recommendations are offered for intersections within the corridor with higher crash rates.

Corridor Summary

Table 12 summarizes all of the crashes that occurred on the 5.4-mile stretch of the PA 291 study area. Each crash type and number of each crash type occurring over the analysis period are presented. According to PennDOT, rear-end and sideswipe collisions involve traffic moving in the same direction. Angle crashes involve angular traffic, and left-turn and head-on events involve opposing vehicles.

Angle crashes are the most common crash type along PA 291. These crashes are likely due to turning vehicles colliding with oncoming vehicles. Further analysis would need to be conducted to identify the cause of all angle crashes. However, introducing a center median with directional openings would reduce the number of opportunities for vehicles to make left turns. A center median would likely reduce speeds on PA 291, thus potentially reducing the severity of crashes.

Table 12: Corridor Crash Types 2010-2012

Crash Types	Number of Each Crash Type	% of Each Crash Type
Noncollision	1	1%
Rear-end	41	24%
Head-on	8	5%
Angle	71	42%
Sideswipe (same dir.)	13	8%
Sideswipe (Opposite dir.)	1	1%
Hit fixed object	29	17%
Hit pedestrian	5	3%
Total	**169**	**100%**

Source: DVRPC 2013

Although crashes involving pedestrians accounted for only three percent of all crashes, measures can be taken to provide a safer and more pleasant experience for pedestrians. Implementing median and pedestrian refuge (or islands) areas at crosswalk locations provides a protected area where pedestrians can stop before finishing the crossing. Typically used for wider streets with higher speeds, PA 291 is a good candidate for pedestrian islands.

Installing sidewalks to avoid walking along the roadway can also increase pedestrian safety. According to *Desktop Reference for Crash Reduction Factors*, a report conducted by the Federal Highway Administration in September 2008, installing sidewalks can reduce pedestrian/vehicle crashes by 65 percent.

Intersection Summary

Table 13 summarizes the crashes at the 11 signalized intersections on PA 291 within the study area. The functional intersection is defined as the area that extends both upstream and downstream from the physical intersection, including auxiliary lanes and their associated channelization.

Table 13: Intersection Crashes

Intersection	Total	Rear-end	% Rear-end	Angle	% Angle	Hit Fixed Object	% Hit Fixed Object
Flower Street	5	1	20%	3	60%	0	0%
Penn Street	6	2	33%	2	33%	2	33%
Welsh Street	1	0	0%	1	100%	0	0%
Madison Street	2	0	0%	0	0%	0	0%
Morton Avenue	12	2	17%	5	42%	1	8%
Harrah's Boulevard	2	0	0%	1	50%	1	50%
Saville Avenue	10	2	20%	3	30%	1	10%
Baldwin Creek	4	3	75%	1	25%	0	0%
Boeing Driveway	6	3	50%	2	33%	0	0%
Sellers Avenue	15	4	27%	6	40%	3	20%
Stewart Avenue	12	4	33%	7	58%	1	8%
Total	**75**	**21**	**28%**	**31**	**41%**	**9**	**12%**

Source: DVRPC 2013

Table 13 includes a breakdown of the top three crash types: rear-end, angle, and hit fixed object. There were four intersections with more than 10 crashes: Morton Avenue, Saville Avenue, Sellers Avenue, and Stewart Avenue. The most crashes at a single intersection during the period were 15 crashes at Sellers Avenue, including four rear-end crashes, six angle crashes, and three hit-fixed-object crashes. The most crashes of a single type were seven angle crashes at the Stewart Avenue intersection. There were also a high number of angle crashes at the Sellers Avenue and Morton Avenue.

Additional countermeasures to reduce the number of crashes at signalized intersections include:

- Consider converting permissive to protected left-turn-only phasing;
- Increase the yellow change interval; and
- Coordinate the traffic signals for appropriate progression.

Any changes to the signal timings should be accompanied with a traffic study to ensure that the signals are functioning optimally.

CHAPTER 8

Goods Movement Analysis

The PA 291 corridor in Eddystone and Chester is identified by the Delaware Valley Regional Planning Commission as one of the 44 regionally significant freight centers. The Chester/Eddystone Mega Freight Center comprises approximately 970 acres of industrial land uses located along the Delaware River south of PA 291. In the region, these centers are identified as a means of planning for and preserving key industrial land uses that help to support both the local and regional economy.

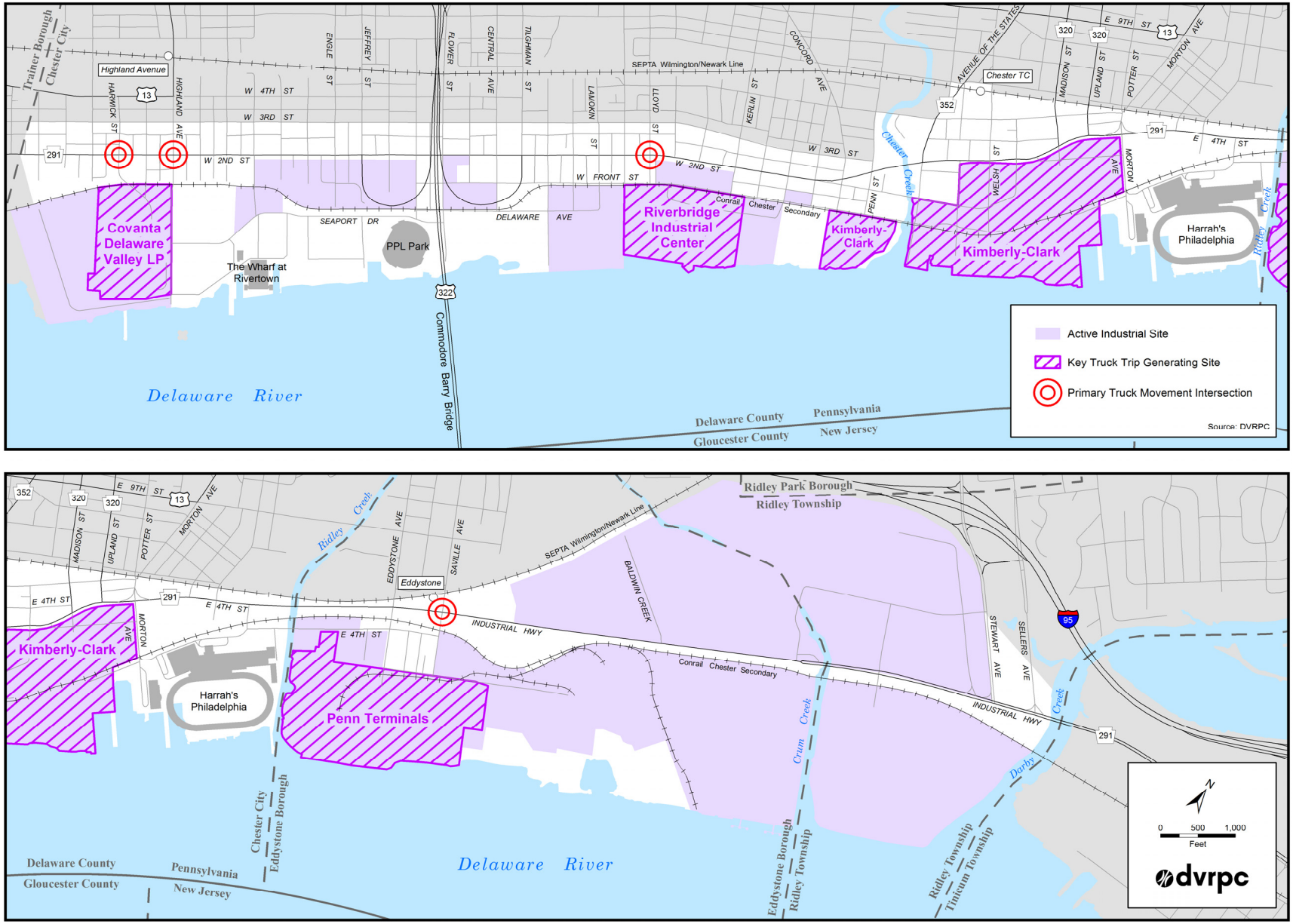
Economic Impact

Employment in industrial sectors is very important for local communities. A recent study prepared by the Delta Development Group for Delaware County identified the manufacturing sector as a key sector to develop in the county, specifically along the Delaware River. The strategy encouraged developing an innovation corridor along the PA 291/I-95 corridor through Eddystone, Chester, and Trainer. In addition to this, the recommendations included expanding on the capacity of Penn Terminals and creating an optimum climate for logistics and manufacturing sector businesses.

Figure 15 shows the major freight generators along the Delaware River Waterfront and the key intersection where heavy vehicles access PA 291. These facilities include the Chester Recovery Plant, Riverbridge Industrial Complex, Kimberly-Clark, and Penn Terminals. Among them, they employ hundreds of workers and produce freight that is moved by rail, truck, and barge.

The development of these industrial sector jobs will be essential to the growth and vibrancy of the local community. Nationwide, the median wage for industrial sector employment far outpaces that of the retail and minimum wage rates. Industrial median wage is $21.50 per hour or $45,000 per year for fulltime employees compared to retail, which is $15.50 per hour or minimum wage at $7.25 per hour. These jobs create living wages for individuals without educational barriers. In the United States, 65 percent of industrial jobs do not require a college degree, and the economic activity created by these jobs support other consumer-based industries.

Figure 15: Major Freight Generators



According to the National Establishment Time-Series (NETS) Database, the greater study area[1] was home to 236 firms employing 5,220 individuals. The top sectors for employment were Manufacturing, Services, Transportation and Public Utilities, and Public Administration. Industrial sector employment comprised 60 percent of the employment in the study area and 31 percent of employment across all of Chester City and Eddystone Borough. In addition, industrial sector firms averaged higher employment per firm than other industries. Of the 10 largest employers in the study area, seven were industrial sector employers.

Industrial Preservation

The value of industrial jobs to the local community is a key reason to support the preservation and expansion of industrial development along the PA 291 corridor. As outlined by the Delta Development Study, this corridor presents tremendous opportunities for incubating and expanding industrial firms to support new types of manufacturing, transportation and logistics, and supporting industries. Revitalization of the Chester and Eddystone waterfront should focus on a two-pronged approach that seeks to preserve industry, while expanding mixed-use development and recreational uses, where appropriate. The PA 291 corridor is fortunate to experience strategic proximity to key markets and infrastructure that is essential to industrial sector firms.

The access to key transportation infrastructure is a major consideration for site selection of industrial firms, often ranking in the top three of considerations. The study area should leverage these transportation assets, as well as the availability of other resources, such as major pipelines, energy, and water, to better preserve existing industrial development, while encouraging new industrial development. Balancing these uses with new residential and commercial development in the area of the casino and new soccer stadium will help to ensure shared use of the waterfront and employment opportunities for the community.

[1] Includes Eddystone and Chester, but not Ridley Township. The employment data excludes Boeing Company and related firms in Ridley Township.

Truck Routes

The flow of truck freight in and out of the PA 291 corridor is important for the local economy. However, it is also important for heavy vehicle traffic to minimize its impact on the community. The purpose of a truck route system is to provide rules that balance the needs of commerce with the desire to minimize the impact of trucks on sensitive land uses. The system should not prohibit trucks from using any road within the municipality, but it does require that they use roads most suitable to the greatest extent possible.

Truck route designation should consider several factors: adequacy of signage, roadway geometry, and freight operations. The consistent design and placement of truck route signs is an important characteristic of the freight system. Truck drivers need to have clear and recognizable signage to ensure that they follow the appropriate paths. For large trucks, it is imperative to have the appropriate lane widths, turning radii, and overhead clearance to minimize the impact on roadway infrastructure and other drivers. Understanding freight operations helps guide policies such as time-of-day restrictions. Implementing a truck route system is a process that should also provide a clear definition of a truck in terms of size and weight, a list and reference map of the truck route system, and special provisions for hazardous materials.

Some of the key truck routes within the study area include:

- PA 291 from US 13 to I-76;
- Stewart Avenue from I-95 to PA 291;
- Penn Street from PA 291 to waterfront terminus;
- PA 320 and PA 420; and
- Saville Avenue.

Another potential hazard for trucks and other large heavy vehicles is inadequate bridge underpasses. The DVRPC study team identified over 30 Amtrak/SEPTA rail underpasses in the study area. Many of these locations have inconsistent or missing advanced warning signs. Furthermore, most of the overpasses do not have appropriate clearance signs located on the bridge structure. For obvious reasons, this can be problematic for trucks and other high-profile vehicles. With high volumes of truck traffic within the study area, it is preferred to have advanced warning signs and posted clearances at all underpass locations. This would aid drivers to make better decisions regarding their choice of route. A detailed inventory of bridge clearance can be found in **Appendix B**.

CHAPTER 9

Action Plan

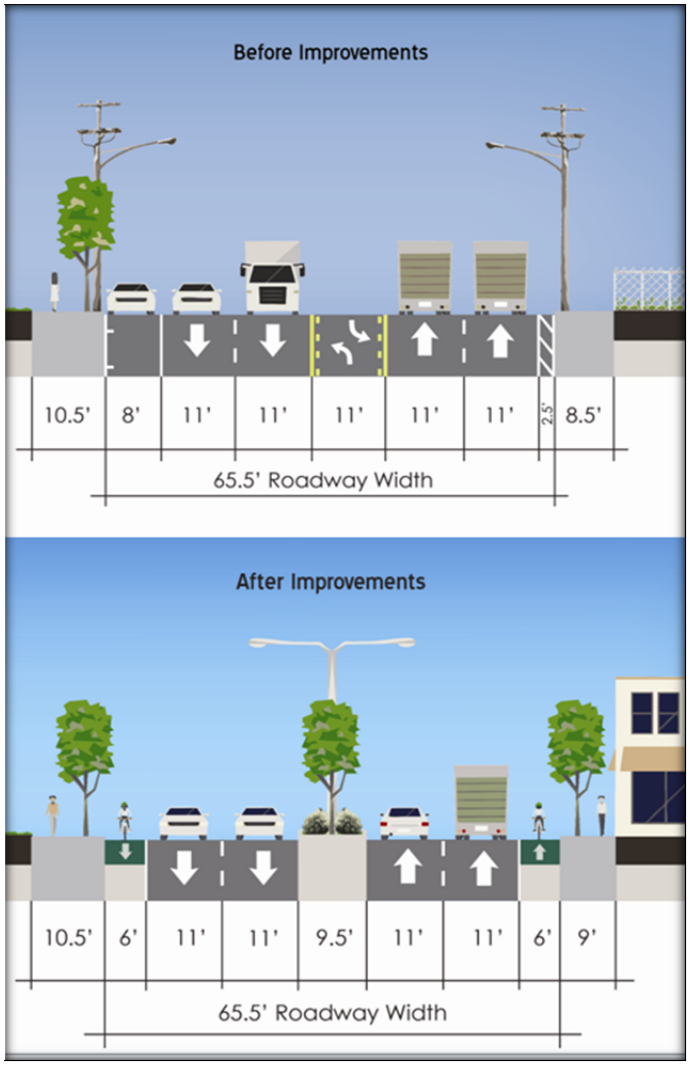
DVRPC staff has recognized several opportunities for improving the PA 291 corridor. These suggestions were a culmination of ideas from local citizens, municipal leaders, and elected officials, and they serve as a guide for implementation. This section identifies strategies designed to enhance PA 291 and the surrounding community.

PA 291 Cross-Section

Figure 16 shows the existing and recommended cross-section for a typical segment of PA 291. The recommended section includes several new enhancements. First, the two-way left-turn lane is replaced with a raised center median. The median contains greenery and new lighting. The roadway geometry is also adjusted to allow for bike lanes on either side of PA 291. This would create a true multimodal facility, while accommodating portions of the East Coast Greenway. Finally, the utility poles are removed to give pedestrians unimpeded movement on the sidewalks and to reduce the visual clutter.

The removal of parking on PA 291 is preferred under the future-year improvement scenario, thus reducing the opportunity for parking-related conflicts with the general traffic flow. Vehicle door-zone conflicts with passing bicyclists would also be eliminated. Lastly, the removal of parking improves site distance for right-turning vehicles coming off a side street.

Figure 16: PA 291 Cross-Section Improvements



Source: DVRPC 2014

Pedestrian Safety

The Chester Community Charter School is situated one block to the north of the Madison Street and PA 291 intersection. This location is a critical crossing point for pedestrians, including school students. Recommended improvements to this intersection are identified in **Figure 17**. The existing crosswalk stripes are deteriorated. Each leg of the intersection should be striped with longitudinal marking patterns, also referred to as continental crosswalks. These types of crosswalk markings are known to provide a higher visibility. Other amenities that would enhance pedestrian safety include refuge islands and corner bumpouts. These treatments are also recommended for Edgemont Avenue, Welsh Street, and Morton Avenue.

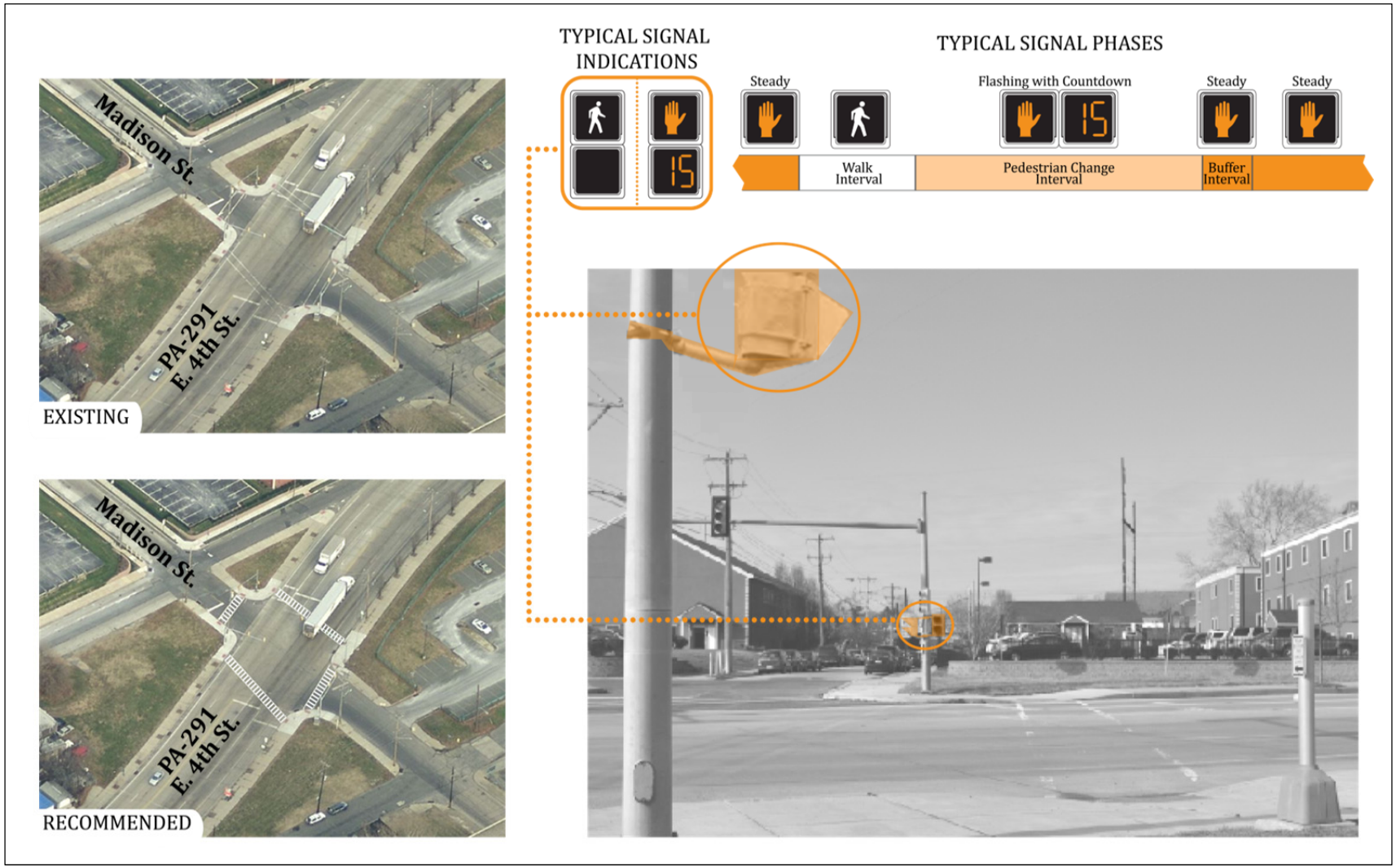
Figure 17: PA 291 Roadway Improvements

Source: DVRPC 2014

Upgraded pedestrian signals can also benefit pedestrians. The width of PA 291 and the speed of passing vehicles make it difficult for pedestrians standing at a corner to determine when they should cross the street. Many locations on the corridor, including at Madison Street, are without *Walk* and *Don't Walk* pedestrian signals. **Figure 18** illustrates the type of infrastructure that is recommended for pedestrians along the corridor. Pedestrian countdown signals encourage safer crossing because they inform walkers of the number of seconds remaining to complete the crossing. Madison Street is one of five Gateway Corridors identified by the City of Chester. The four others include Highland Avenue, Flower Street, Kerlin Avenue, and Morton Avenue. These corridors generally link I-95 with PA 291 and

focus access to the Chester Waterfront. Pedestrian signal improvements, like those shown in Figure 18, would be appropriate at the Gateway Corridors where they intersect with PA 291.

Figure 18: Pedestrian Signal Improvements



Source: DVRPC 2014

Wayfinding

From central business districts to major attractions, the signs that point travelers to these locations are a key form of advertising for that location. Hospitals, schools, historic sites, transit stations, senior centers, police stations, and municipal buildings are among the types of places that may benefit from wayfinding signs within a community. Other private facilities, such as Harrah's Philadelphia and PPL Park, could also benefit from wayfinding signs, as they receive many visitors.

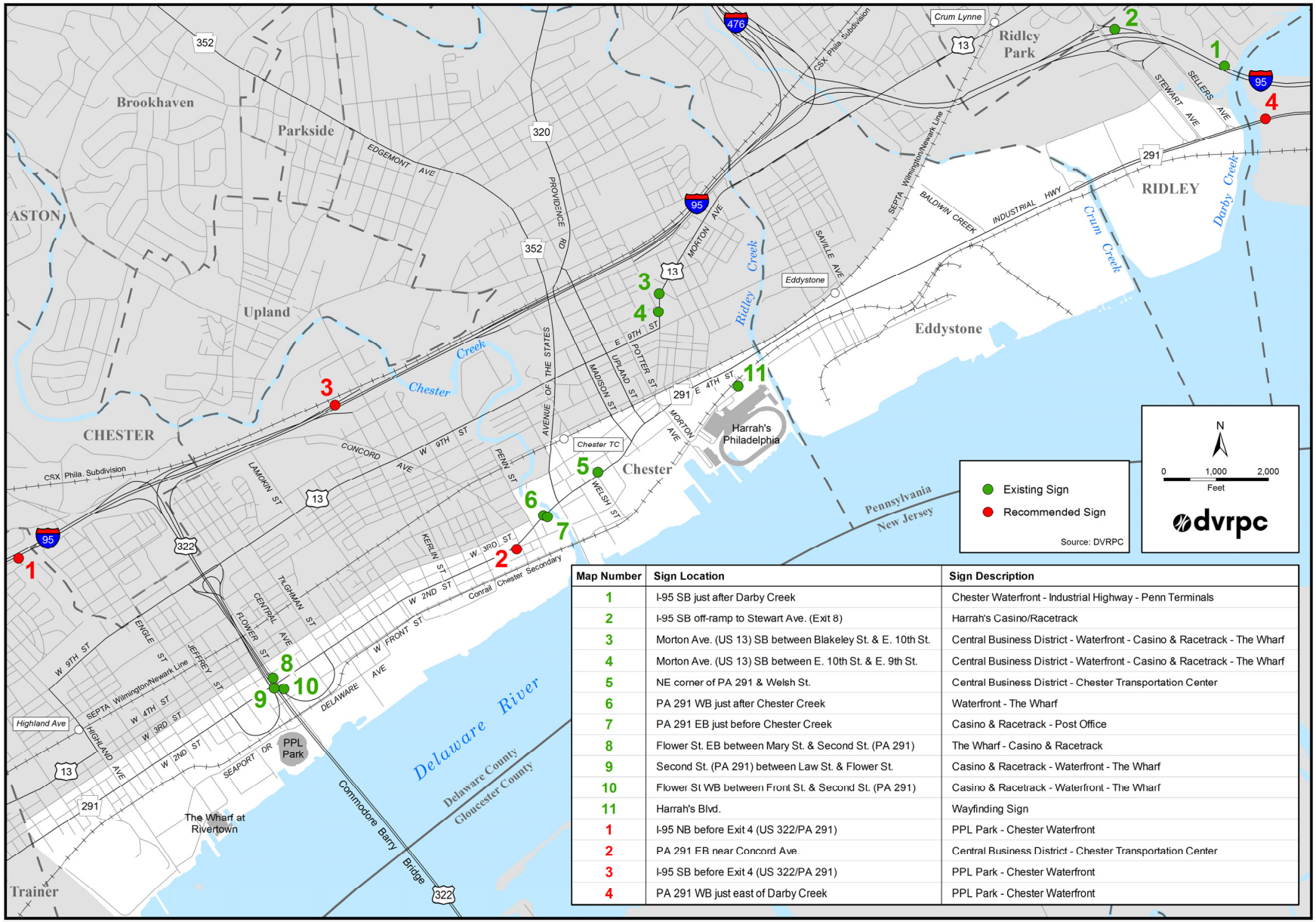
Street signs are also a form of wayfinding. A traveler may become lost if the lettering is too small or if the distance required to read the sign is too great. It is also helpful for a visitor to know when they are entering a new community, either at the municipal or place-name level. Persons unable to find their destination may create traffic hazards by changing lanes or turning abruptly. Municipalities need to be conscious of where wayfinding signs are placed to maximize their effectiveness.

Appropriate signage was an issue identified by steering committee members and by local residents. Citizens suggested that the street signs within the PA 291 study area were either too difficult to read, inadequate, or missing altogether. Though it is beyond the scope of this study to conduct a thorough inventory, DVRPC catalogued wayfinding signs located on the state, U.S. and interstate system within the greater study area. **Figure 19** shows the locations of the existing wayfinding signs found during this exercise. PPL Park, a major study area destination, was not referenced on any sign. Figure 19 also shows the location of where additional signs could be located to aid drivers who may be unfamiliar with the area.

PA 291 Wayfinding Sign

Source: DVRPC 2014

Figure 19: Wayfinding Signs



Map Number	Sign Location	Sign Description
1	I-95 SB just after Darby Creek	Chester Waterfront - Industrial Highway - Penn Terminals
2	I-95 SB off-ramp to Stewart Ave. (Exit 8)	Harrah's Casino/Racetrack
3	Morton Ave. (US 13) SB between Blakeley St. & E. 10th St.	Central Business District - Waterfront - Casino & Racetrack - The Wharf
4	Morton Ave. (US 13) SB between E. 10th St. & E. 9th St.	Central Business District - Waterfront - Casino & Racetrack - The Wharf
5	NE corner of PA 291 & Welsh St.	Central Business District - Chester Transportation Center
6	PA 291 WB just after Chester Creek	Waterfront - The Wharf
7	PA 291 EB just before Chester Creek	Casino & Racetrack - Post Office
8	Flower St. EB between Mary St. & Second St. (PA 291)	The Wharf - Casino & Racetrack
9	Second St. (PA 291) between Law St. & Flower St.	Casino & Racetrack - Waterfront - The Wharf
10	Flower St WB between Front St. & Second St. (PA 291)	Casino & Racetrack - Waterfront - The Wharf
11	Harrah's Blvd.	Wayfinding Sign
1	I-95 NB before Exit 4 (US 322/PA 291)	PPL Park - Chester Waterfront
2	PA 291 EB near Concord Ave.	Central Business District - Chester Transportation Center
3	I-95 SB before Exit 4 (US 322/PA 291)	PPL Park - Chester Waterfront
4	PA 291 WB just east of Darby Creek	PPL Park - Chester Waterfront

Green Infrastructure

A large part of a municipal stormwater program can be the implementation of a "Green Streets" program that incorporates stormwater controls into the built environment through streetscape improvements, traffic calming devices, and greening efforts. The Green Streets program was first developed by Portland, Oregon, and it has since been adopted and adapted by the Philadelphia Water Department.

Green Streets programs prioritize the street design that uses vegetated facilities to manage stormwater runoff at its source. These elements include bioswales, planters, rain gardens, stormwater bumpouts, and street trees. Using these tools, a Green Street captures stormwater runoff from streets and sidewalks, infiltrates it into the soil to recharge groundwater and surface water, reduces the amount of polluted stormwater runoff going into the sewer system, and reduces overflow events. Another strategy is to use paving materials, such as pervious pavers, pervious pavement, or turf blocks, to infiltrate runoff into the ground. The advantage of the Green Streets approach is that almost any size roadway can accommodate a landscape or paving element to capture and treat stormwater at its source.

Several types of green infrastructure would be appropriate for PA 291. Vegetated swales are gently sloping depressions of land planted with dense plants. Swales are located in strategic positions to capture runoff from streets and parking lots and allow it to filter into the ground. Infiltration planters, which include tree trenches, are structures with open bottoms that allow stormwater to slowly infiltrate into the ground. They contain a layer of gravel, soil, and vegetation. These planters are ideal for space-limited sites and are easily integrated into a sidewalk or building site; they can be placed closely to building walls. This type of stormwater control facility is suitable for nearly any commercial corridors.

Sidewalk Greenscaping

Source: Portland Bureau of Environmental Services

Implementing green infrastructure along the PA 291 corridor can benefit in multiple ways. By retaining rainfall, green infrastructure reduces stormwater discharges. Lower discharge volumes translate into reduced combined sewer overflows and lower pollutant loads. This translates into mitigated flood risk by slowing and reducing stormwater discharge. Replacing pavement with natural land cover reduces surfaces that retain heat, thus helping to cool urban areas.

Furthermore, adding green infrastructure can enhance the visual quality of PA 291. Raised medians increase roadway safety by creating a barrier between opposing traffic, while reducing the number of locations at which a left turn can be made. Raised landscaped medians are also a traffic calming technique designed to slow motor vehicle speeds. Reducing speeds also have the ability to create a safer environment and reduce crashes.

Land Use Redevelopment

As discussed and shown in Figure 8 on page 21, there is an abundance of vacant property within the study area. **Figure 20** illustrates a conceptual plan for infill housing along West Third Street, between Penn Street and Concord Avenue. Infill sites are typically already served by public infrastructure, such as roads and utilities. This site is currently occupied by a vacant weigh station. This location is

Figure 20: Potential Infill Housing

Source: DVRPC 2014

within walking distance to commercial businesses, the Chester City Central Business District, and the Chester Transportation Center.

For decades, low-income communities have suffered as grocery stores and fresh, affordable food disappeared from their neighborhoods. Grocery stores adapted their outfits to suit their new environs, building large, auto-dependent stores. The lack of adequate access to healthy food negatively impacts the well being of residents.

Figure 21: PA 291 Vacant Property

Source: DVRPC 2014

The expense and scarcity of land in urban areas pose problems for supermarket developers. However, underutilized land, such as the vacant area adjacent to PA 291 near Flower Street, presents an opportunity to build a neighborhood market. **Figure 21** and **Figure 22** present a vision of how infill development can be used to facilitate a positive change. Urban grocery stores and supermarkets can serve as economic anchors in a neighborhood, supplying local jobs and creating foot traffic for additional businesses.

Figure 22: Potential Urban Supermarket

Source: DVRPC 2014

Implementation Sources

Business Improvement Districts (BIDs) are public/private partnerships in which businesses in a defined area elect to pay an additional tax in order to fund future improvements within that specific geographic area. Funds are collected by the taxing authority and used to provide services, such as street and sidewalk maintenance, marketing, and capital improvements. BIDs are formed through the adoption of a municipal ordinance. State financial assistance is available for municipalities.

Community Impact Assessments are a process by which municipalities can evaluate the effects of a transportation (infrastructure) action on a community and the quality of life for its residents. This type of assessment should be done when large-scale development will be taking place within a community or as part of a large transportation improvement. This assessment can help the municipality integrate land use, economics, and transportation to achieve common goals, as well as bringing all federal and state agencies to agreement on the sustainable choice of improvement.

The Capital Improvement Program (CIP) sets out a municipality's plans for future capital improvements, such as roads and other public facilities. The range and scope of these vary, but most cover an immediate Five-year period and can be scoped for up to 20 years. A successful CIP should include a schedule of implementation with a projected budget. If a municipality's CIP is consistent with the master plan and zoning ordinance, it can be a useful tool, allowing the municipality to plan for future growth and improvements, while lowering costs by anticipating the future demands of the municipal infrastructure system. The CIP can also provide developers and the public with more certainty concerning future public improvements, thereby improving opportunities for participation and increasing accountability. The adoption and updating of the CIP is no small task, but should be considered an immediate priority for municipalities.

Impact Fees are paid by developers to help finance a variety of needed services and facilities that result from growth. This type of revenue provides a better quality of life for residents by financing the infrastructure needed to support additional population, employment, and development. It ultimately reduces the need to impose higher taxes on existing residents to finance additional facilities. An impact fee ordinance requires modification to the master plan and subdivision and zoning codes. Parkland Dedications/Fees-in-Lieu requires developers to provide open space within their development or to contribute fees-in-lieu to improve or preserve open space elsewhere. Fees-in-lieu should be outlined in the zoning and municipal subdivision code for the municipality. They are often based on the number of automobile trips that a particular development will incur.

Potential Funding Sources

Smart Growth

Business in Our Sites

Eligibility: Pennsylvania municipalities, municipal authorities, redevelopment/industrial development agencies, private developers
Purpose: To empower communities to attract businesses by helping them build an inventory of ready sites
Terms: Grants may not exceed 50% of the total amount of financing provided, or $5 million (whichever is less). Site must be previously utilized property or undeveloped property that is planned and zoned for development. Private developers are only eligible for loans, not grants.
Deadline: Open
Contact: Pennsylvania Department of Community and Economic Development
Phone: 800-379-7448
www.newpa.com

Certified Local Governments Grant Program (CLG)

Eligibility: Limited to Pennsylvania Certified Local Governments
Purpose: To promote and protect historic properties and planning for historic districts
Terms: Grants up to 60% of project costs
Deadline: Annual
Contact: Pennsylvania Bureau of Historic Preservation
Phone: 717-787-0771
www.artsnet.org

Community Development Block Grant (CDBG)

Eligibility: Pennsylvania local governments, nonprofits, and for-profit developers.
Purpose: Grants and technical assistance for federal-designated municipalities for any type of community development
Terms: 70% of each grant must be used for activities that benefit low to moderate-income persons. Competitive Program - $500,000 maximum
Deadline: Quarterly
Contact: Pennsylvania Department of Community and Economic Development
Phone: 866-466-3972
www.newpa.com

Community Revitalization Program

Eligibility: Pennsylvania local governments, redevelopment authorities, industrial development agencies, and nonprofits
Purpose: To support local initiatives that promote the stability of communities
Terms: Grants of $5,000—$25,000
Deadline: Three funding rounds during fiscal year
Contact: Pennsylvania Department of Community and Economic Development
Phone: 866-466-3972
www.newpa.com

Economic Adjustment Program (Title IX)

Eligibility: Pennsylvania local governments, states, counties, municipal authorities, or Indian tribes
Purpose: To assist local interests in design and implementation strategies to bring change to the local economy
Terms: Vary
Deadline: Open
Contact: Pennsylvania Department of Commerce
Phone: 215-597-4603
www.doc.gov

Economic Development Administration Assistance Programs

Eligibility: Varies with program
Purpose: Provides funds needed infrastructure improvements to spur redevelopment
Terms: Varies
Deadline: Annual
Contact: U.S. Department of Commerce
Phone: 215-597-4603
www.eda.gov

Elm Street Program

Eligibility: Pennsylvania local governments, redevelopment authorities, nonprofit economic development organizations, other nonprofits, BIDs, neighborhood improvement districts (Elm Street)
Purpose: Grants for planning and improvements to mixed-use areas in proximity to central business districts
Terms: Maximum $50,000 for administrative grants; maximum $250,000 for development projects and loans.
Deadline: Open
Contact: Pennsylvania Department of Community and Economic Development

Phone: 866-466-3972
www.newpa.com

Land Use Planning and Technical Assistance Program (LUPTAP)

Eligibility: Pennsylvania cities, boroughs, townships, counties or multimunicipal entities
Purpose: For the purpose of developing and strengthening community planning and management capabilities
Terms: 50% of total costs; $100,000 maximum grant per fiscal year
Deadline: Open
Contact: Pennsylvania Department of Community and Economic Development
Phone: 215-560-2256
www.landuseinpa.com

Local Municipal Resources and Development Program (LMRDP)

Eligibility: Pennsylvania local governments and nonprofits
Purpose: Provides grants to municipalities for improving the quality of life within the community
Terms: No maximum or minimum
Deadline: Open
Contact: Pennsylvania Department of Community and Economic Development
Phone: 800-379-7448
www.newpa.com

Main Street Program

Eligibility: Pennsylvania municipalities and downtowns
Purpose: Provides funds for administrative costs associated with Main Street Manager positions, physical improvements, and acquisition costs
Terms: $115,000 over a 5-year period. Downtown Reinvestment and Anchor Building components: up to $250,000, or not to exceed 30% of project costs
Deadline: Varies
Contact: Pennsylvania Department of Community and Economic Development
Phone: 866-466-3972
www.newpa.com

Infrastructure

Infrastructure Development Program (IDP)

Eligibility: Pennsylvania municipalities, counties, industrial development authorities, redevelopment authorities, local development districts
Purpose: For specific infrastructure improvements that complement capital investments by private development
Terms: Grant maximum: $1.25 million for public improvements; loan maximum: $1.25 for private investment
Deadline: Varies
Contact: Pennsylvania Department of Community and Economic Development
Phone: 717-787-7120
www.newpa.com

Public Works and Development Facilities Program (Title I)

Eligibility: Pennsylvania municipalities, political subdivisions, municipal authorities, or Indian tribes
Purpose: To revitalize, expand, and upgrade physical infrastructure to attract new development
Terms: Varies
Deadline: Varies
Contact: Pennsylvania Department of Commerce
Phone: 215-597-4603
www.doc.gov

Transportation

Bikes Belong Coalition

Eligibility: Federal, state, regional, county, and municipal agencies, nonprofits, organizations whose mission is expressly related to bicycle advocacy
Purpose: To fund bicycle facilities and paths encourage facility, education, and capacity building
Terms: $10,000 or less
Deadline: Quarterly
Contact: Bikes Belong Coalition
Phone: 617 -734-2111
www.bikesbelong.org

Community Transportation Development Fund (CTDF)

Eligibility: Nonprofit transit providers, public agencies, local and state governments, and community organizations
Purpose: To promote better transportation options
Terms: Low-interest loans of up to $150,000 per recipient and 75 % of the total project cost
Deadline: Varies
Contact: Community Transportation Association of America
Phone: 202-661-0210
www.ctaa.org

Competitive Congestion Mitigation and Air Quality Program (CMAQ)

Eligibility: Public agencies, incorporated private firms, non-profits, local and county governments
Purpose: For projects that contribute to the attainment of the Clean Air Act standards by reducing emissions
Terms: 80% of costs
Deadline: Temporarily suspended
Contact: Delaware Valley Regional Planning Commission (DVRPC)
Phone: 215.592-1800
www.dvrpc.org

Home Town Streets/Safe Routes to School (HTS/SRS)

Eligibility: Federal or state agencies, Pennsylvania county or local governments, school districts, nonprofits
Purpose: To encourage the reinvestment in and redevelopment of downtowns
Terms: 80% of total costs. Projects must be included in the 12-year Transportation Improvement Program (TIP)
Deadline: Varies
Contact: Delaware Valley Regional Planning Commission (DVRPC)
Phone: 215-592-1800
www.dvrpc.org

Municipal Bus Shelters

Eligibility: Delaware County local governments and businesses
Purpose: To assist municipalities in the provision of safe bus shelters
Terms: Contact County Transportation Management Association
Deadline: Open
Contact: Delaware County Transportation Management Association
Phone: 610-892-9440

www.delcotma.org

Pennsylvania Infrastructure Bank

Eligibility: Pennsylvania local governments and contractors
Purpose: To provide low-cost financing to municipalities and contractors for eligible transportation improvements
Terms: Low-interest loans from $50,000 to $3.9 million through a revolving loan fund for implementation
Deadline: Open
Contact: Pennsylvania Department of Transportation (PennDOT)
Phone: 717-772-1772
www.dot.state.pa.us

Transit Research and Demonstration Program

Eligibility: Pennsylvania local governments, transit operators, university, and transit organizations
Purpose: To fund innovative projects that improve the attractiveness of public transit
Terms: Grants for 80% of funding, with a 20% local match
Deadline: Open
Contact: Pennsylvania Department of Transportation
Phone: 717-705-1493
www.dot.state.pa.us

Transit Revitalization Investment District (TRID)

Eligibility: Pennsylvania local governments, counties, transportation authorities, and public transit agencies
Purpose: To encourage private sector investment and revitalization of areas adjacent to transit stations
Terms: 25% match for TRID planning study
Deadline: Open
Contact: Pennsylvania Department of Community and Economic Development
Phone: 717-783-1132
www.newpa.com

Transportation and Community Development Initiative (TCDI)

Eligibility: Eligible municipalities
Purpose: Support local planning projects to improve transportation and encourage redevelopment
Terms: Grants up to $100,000 for single projects and $125,000 for multimunicipal projects; 20% local match required
Deadline: Every two years

Contact: Delaware Valley Regional Planning Commission (DVRPC)
Phone: 215-592-1800
www.dvrpc.org

Transportation Alternatives Program (TAP) - Pennsylvania

Eligibility: Pennsylvania local governments, transportation authorities, transit agencies, school districts, natural resource or public land agencies
Purpose: Funds pedestrian and bicycle facilities, improves access to public transportation, creates safe routes to school, preserve historic transportation structures, provide environmental mitigation, and create trails projects that serve a transportation purpose
Terms: 80/20 cost share
Deadline: Varies
Contact: Delaware Valley Regional Planning Commission (DVRPC)
Phone: 215.592-1800
www.dvrpc.org

Environmental

Coldwater Heritage Partnership Grants (CHP)

Eligibility: Pennsylvania local governments, counties, and municipal authorities
Purpose: To prepare preliminary watershed assessments
Terms: Grants up to $5,000
Deadline: Varies
Contact: Pennsylvania Department of Conservation and Natural Resources
Phone: 717-787-2316
www.dcnr.state.pa.us

Coastal Zone Management

Eligibility: Pennsylvania county or municipal governments, higher educational institutions, nonprofits located within a coastal zone
Purpose: Provides grants and technical assistance to encourage the proper use of land and the management of floodplain lands within Pennsylvania
Terms: Grants up to $100,000, 50% match required
Deadline: Varies
Contact: Water Planning Office/Coastal Zone Management Program
Phone: 717-722-4785
www.dep.state.pa.us/river/grants/crmgrants.htm

Floodplain Land Use Assistance Program

Eligibility: Pennsylvania local governments
Purpose: Provides grants and technical assistance to encourage the proper use of land and the management of floodplain lands within Pennsylvania
Terms: 50% of the eligible costs
Deadline: Varies
Contact: Pennsylvania Governor's Center for Local Government Services
Phone: 888-223-6837
www.newpa.com

Growing Greener Grants

Eligibility: Pennsylvania municipality, authority, or private entity that is eligible under PENNVEST
Purpose: Infrastructure improvements such as drinking water, wastewater, or stormwater
Terms: Vary
Deadline: Varies
Contact: Pennsylvania Infrastructure Investment Authority
Phone: 717-783-6798
www.pennvest.state.pa.us

Growing Greener II

Eligibility: Pennsylvania local governments and nonprofits
Purpose: Provides redevelopment grants to municipalities and nonprofits to help a community's downtown redevelopment effort, focusing on the improvement of downtown sites and buildings
Terms: No minimum or maximum; typical grants average between $250,000 and $500,000
Deadline: Varies
Contact: Pennsylvania Department of Community and Economic Development
Phone: 866-466-3972
www.newpa.com

Municipal Challenge Grant

Eligibility: Pennsylvania local governments
Purpose: Supports municipal tree inventories, tree planting, and tree care
Terms: Grant range from $1,000—$5,000; in-kind match required
Deadline: Annual
Contact: Pennsylvania Department of Community and Natural Resources

Phone: 717-727-2757
www.dcnr.state.pa.us

PECO Green Regions

Eligibility: Municipalities in Bucks, Chester, Delaware, Montgomery, and Philadelphia counties
Purpose: To protect, acquire, and enhance open space
Terms: Grants of up to $10,000
Deadline: Spring and fall
Contact: Natural Lands Trust
Phone: 610-353-5597
www.natlands.org

Recreational Trails Program

Eligibility: Pennsylvania county and municipal governments, state and federal agencies, private organizations
Purpose: Provide grants for developing and maintaining recreational trails and trail-related facilities
Terms: Local match of 50% is required
Deadline: Annual
Contact: Pennsylvania Department of Conservation and Natural Resources
Phone: 888-727-2757
www.dcnr.state.pa.us

Source Water Protection (SWP) Watershed Protection Grants

Eligibility: Pennsylvania local governments and community water systems
Purpose: To fund watershed activities
Terms: One time grants up to $200,000; 10% local match is required
Deadline: Varies
Contact: Pennsylvania Department of Environmental Protection
Phone: 717-705-5400
www.dep.state.pa.us

TreeVitalize

Eligibility: County and local governments in Southeastern Pennsylvania
Purpose: To develop private-public partnership to address tree coverage in southeastern Pennsylvania
Terms: Grants and technical assistance

Deadline: Varies
Contact: Pennsylvania Horticultural Society
Phone: 215-988-8874
www.treevitalize.net

Appendix A

Appendix A: Sample Ordinance Language

CORRIDOR ACCESS MANAGEMENT OVERLAY (CAMO) DISTRICT -SAMPLE ORDINANCE)

Section 00: Declaration of Legislative Intent. In expansion of the Statement of Community Development Objectives contained in Article I, Section 101 of this Ordinance the overall intent of the CAMO – Corridor Access Management Overlay District shall be to control the use, development and highway access of lands located along the frontage of PA 291 located within the Township, in order to accomplish the following specific purposes:

00.1 To promote the orderly development of land along PA 291 located in the Township.

00.2 To minimize, to the maximum extent possible, hazardous traffic flow conditions and confusion for drivers along the Township's segment(s) of PA 291.

00.3 To enhance the overall function and appearance of the Township's segment(s) of PA 291, which serves as a "gateway" to the community.

00.4 To promote channelized and coordinated access ways along PA 291, in order to reduce existing conflicting turning movements and prevent new conflicting turning movements, traffic congestion and other potential vehicular hazards.

00.5 To make the transition between the high-speed, free-flowing driving experience of the Township's segment(s) of PA 291 and the lower-speed, more restrictive driving conditions encountered on the intersecting roads, access points and driveways as smooth as possible for highway users.

00.6 To provide for safe, understandable and convenient access to abutting uses without causing traffic flow problems.

00.7 To avoid the adverse effects of uncoordinated, lot-by-lot development on the flow of traffic along PA 291, and to increase the application of unified development plans with coordinated highway access as the preferred alternative within such areas, in order to minimize and prevent unnecessary accessways and conflicting turning movements.

00.8 To provide setbacks for both principal and accessory uses, including signs and off-street parking and loading areas that may be located along PA 291, in order to facilitate the potential highway widening or related access improvements, should future traffic volumes warrant such improvements.

00.9 To require, where feasible, natural features preservation in conjunction with man-made buffering in order to preserve a spacious and scenic visual environment along PA 291.

00.10 To require, as part of the development plan review process, related traffic control improvements (acceleration / deceleration lanes, traffic signalization, marginal access roads, jug handles, turning or stacking lanes and similar low-capital intensive improvements) and public transit enhancements (bus laybys and stops) in order to minimize the effects of new development on traffic flow along PA 291.

00.11 To encourage reverse-frontage and other design techniques for those development plans proposed to be located along PA

291, in order to minimize the need for additional accessways or intersecting roads.

00.12 To combine with other zoning requirements, as an overlay, to place limitations and additional requirements upon the underlying zoning districts, in order to accomplish the specific purposes described in this Section, in furtherance of the general welfare of the residents of the Township and of the users of PA 291.

Section 01: Boundary Definition. The CAMO – Corridor Access Management Overlay District is defined and established as follows:

01.1 Primary Arterial Corridor Impact Area. The area extending for a distance of two hundred (200) linear feet from the centerline of the right-of-way, along each side of PA 291 located within the Township.

01.2 Secondary Highway Corridor Impact Area. Where the Primary Arterial Corridor Impact Area, as defined in subsection 01.1, is intersected by another highway of arterial classification that is not otherwise included in a CAMO District, the following Secondary Highway Corridor Impact Area shall be defined and added to the area of the Primary Arterial Corridor Impact Area:

a. From the centerline of the intersecting road, the area extending for a distance of two hundred (200) linear feet along each side of the intersecting road, for a distance of one-eighth mile (660 linear feet) along said road.

b. For regulatory purposes, where the component defined in subsection 01.2a. occurs, all those portions of the Secondary Highway Corridor Impact Area which extend beyond the boundaries of the Primary Arterial Corridor Impact Area shall be included within the boundaries of the CAMO District. In all cases, the distances and areas defined in this section shall be plotted so as to include the maximum possible area consistent with the boundary definition.

Section 02: District Mapping. The CAMO – Corridor Access Management Overlay District shall be delineated on the Zoning Map as follows:

02.1 Those areas referred to in Section 01 shall be plotted on the Zoning Map to indicate the boundaries of the CAMO District. The Zoning Map shall be available in the Township building for inspection by the public.

02.2 Any subsequent changes in the boundaries of the CAMO District, as a result of new construction, revisions to official plans or for any other reason, shall be plotted on the Zoning Map as amendments thereto, following consideration of the proposed revisions in the usual manner prescribed for amending the Zoning Ordinance.

Section 03: Corridor Access Management Overlay District Concept. The CAMO District shall be deemed to be an overlay on any zoning district(s) now or hereafter enacted to regulate the use of land in the township.

03.1 The CAMO District shall have no effect on the permitted uses in the underlying zoning district(s), except where said uses are

intended to be located within the boundaries of the CAMO District, as defined herein, and the uses are in conflict with the requirements and specific intent of this Article.

03.2 In those areas of the Township where the CAMO District applies, the requirements of the CAMO District shall supersede the requirements of the underlying zoning district(s), unless those requirements are more stringent than the requirements of this Article.

03.3 Should the CAMO District boundaries be revised as a result of legislative or administrative actions or judicial decision, the zoning requirements applicable to the area in question shall revert to the requirements of the underlying zoning district(s) without consideration of this Article.

03.4 Should the zoning classification(s) of any parcel or any part thereof on which the CAMO District applies be changed, as a result of legislative or administrative actions or judicial decision, such change(s) in classification shall not affect the boundaries of the CAMO District or its application to said parcel(s), unless an amendment to the boundaries or the effect of the District on said parcel(s) was part of the proceedings from which the changes originated.

Section 04: Boundary Interpretation and Appeals Procedure. An initial determination as to whether or not the requirements of the CAMO District apply to a given parcel shall be made by the Zoning Officer.

04.1 Any party aggrieved by the decision of the Zoning Officer, either because of interpretation of the exact location of the CAMO District boundaries, or because of the effect of the District on the development of the parcel(s) in question, may appeal said decision to the Zoning Hearing Board, as provided for in Section 14 of this Article. 04.2 The burden of proving the incorrectness of the Zoning Officer's decision shall be on the applicant.

Section 05: Uses Permitted in the Corridor Access Management Overlay District. The following uses shall be permitted in the CAMO District:

05.1 Any limited access or arterial highway located within the boundaries of the Interchange Corridor Overlay District, as defined in Section 01 of this Article, and the appurtenant rights-of-way, including the interchange access ramps, service roads and any informational or directional signs erected therein.

05.2 Those portions of existing roads of a lower classification than arterial, as defined on the Township's Ultimate Right-of-Way Map (a PennDOT-approved map of ultimate rights-of-way that is consistent with the municipal comprehensive plan), or existing access driveways which are located within the boundaries of the CAMO, as defined in Section 01 of this Article. Any improvements to these roads should comply with the requirements of this Article, to the maximum extent possible.

05.3 Public and private open space and recreation areas, including biking, hiking, and equestrian trails, but excluding structural development, except that which is in accordance with Section 06.6 and 06.7 of this Article.

05.4 Outdoor plant nursery, orchard, woodland preserve, arboretum and similar conservation use, according to recognized soil conservation practices, but excluding structural development, except that which is in accordance with Section 06.6 and 06.7 of this Article.

05.5 Forestry, lumbering and reforestation, according to recognized natural resource conservation practices.

05.6 Those portions of a lot in combination with contiguous lands located beyond the boundaries of the CAMO District in order to meet the yard and area requirements of the underlying zoning district(s), when uses not permitted within the CAMO District are to be located on such contiguous lands.

05.7 Subsurface utility lines.

05.8 Fences of wood, wire and any other materials, provided they are located so as to maintain a clear sight triangle at any intersection or access point along PA 291 within the CAMO District.

05.9 Sidewalk, crosswalk, or passenger stop or shelter for public transportation.

05.10 Any other non-structural, principal or accessory use permitted in the underlying zoning district(s) but excluding any extractive uses, parking and loading areas and outdoor storage areas.

05.11 Those uses permitted by right in the underlying zoning district(s) and existing uses made non-conforming by the adoption of this Article.

Section 06: <u>Restricted Uses Permitted by Special Exception</u>. The following restricted uses shall be permitted only as a special exception in the Interchange Corridor Overlay District, except those uses expressly prohibited in Section 07 of this Article, subject to the requirements and procedures set forth in Sections 08 through 11 of this Article.

06.1 Above-ground utility lines.

06.2 Off-street parking areas associated with passenger stop or shelter or related public transportation facilities.

06.3 Proposed public and private roads or access driveways that are inconsistent with the development guidelines specified in Section 08, herein.

06.4 Parking and loading areas, including above-grade, structured parking facilities.

06.5 Temporary structures, including signs and buildings, whether principal or accessory.

06.6 Permanent, freestanding structures, including advertising devices or signs not exempted by subsection 05.1 with a surface of one hundred (100) square feet or less, and accessary building permitted in the underlying zoning district with a ground coverage of no more than one hundred and fifty (150)square feet. No such uses located within the CAMO District shall exceed a height of thirty-five (35) feet.

06.7 Expansion of a use rendered non-conforming by the adoption of this Article in accordance with the requirements of Section 14 of this Article.

06.8 Any other use, not specifically listed herein, which may contribute to a hazardous traffic condition or visual intrusion along PA 291 or any intersecting road within the CAMO District.

06.9 Those uses permitted by special exception or as conditional uses in the underlying zoning district(s).

Section 07: Prohibited Uses. The following uses shall not be permitted within the boundaries of the CAMO District:

07.1 Permanent, freestanding structures permitted in the underlying zoning district(s) that do not qualify under Section 06.2, 5, 6, and 7 of this Article.

07.2 Junkyards, scrapyards or similar outdoor storage uses.

07.3 Billboards or similar advertising devices or signs that exceed a surface area of one hundred (100) square feet.

07.4 Flashing signs or other advertising devices of any type or configuration.

07.5 Subdivisions and land developments composed of uses permitted in accordance with the underlying zoning district(s) that do not comply with the development regulations specified in Section 08, herein.

07.6 Any use of the same general character as those uses listed in subsections 07.1 through 07.4 of this Section.

Section 08: Guidelines for Subdivisions, Land Developments and Individual Uses within the Corridor Access Management Overlay District. For any subdivision, land development or individual uses proposed to be located within the CAMO District the following guidelines shall apply:

08.1 Access Controls. Direct residential or non-residential driveway access to PA 291 or intersecting roads within the CAMO District from either a subdivision or land development or an individual use shall not be permitted, unless the following alternative development techniques are demonstrated by the applicant to be infeasible on other than purely economic grounds. The application of these techniques shall be governed by the requirements of the Township's Subdivision and Land Development Ordinance. The following alternatives (a., b., and c.) are presented according to their priority in meeting the Declaration of Legislative Intent of this Article.

a. Marginal access road, where direct driveway access is to a residential or marginal access road parallel to PA 291 or an intersecting road within the CAMO District, and the only access to said roads is from one or more accessways from the marginal access road to PA 291. Every effort should be made to minimize the number of intersections from marginal access roads within the CAMO District.

b. Reverse-frontage development, where direct driveway access is to a residential or feeder road and the only access to PA 291 or an intersecting road within the CAMO District is from one or more of said residential or feeder roads (either existing or new construction.) Every effort should be made to

minimize the number of intersections from new roads within the CAMO District.

c. Joint access, where direct driveway access from a lot or development to Route 202 or an intersecting road within the CAMO District is provided jointly with other lots or parcels created as part of the same subdivision or land development, or with adjacent lots or parcels not part of the same subdivision of land development. If this approach is to be used, a turnaround area or similar technique shall be provided on the lot.

d. The minimum spacing between the centerline of new and existing roads along PA 291 or an intersecting road within the CAMO District shall be no less than six hundred (600) feet. No new accessway to PA 291 shall be located closer than one hundred (100) feet to the point of intersection of an intersecting road.

e. Where direct driveway access to PA 291 or an intersecting road within the CAMO District is unavoidable, the minimum spacing between the centerline of such access driveways shall be no less than two hundred (200) feet.

08.2 Development Regulations.

a. The minimum setback for any proposed use within the CAMO District shall be one hundred (100) feet measured from the ultimate right-of-way line of Route 202 and seventy-five (75) feet from the ultimate right-of-way line of an intersecting road within the CAMO District.

b. The minimum lot width within the CAMO District shall be one hundred (100) feet.

c. No sign, except a traffic safety or directional sign, shall be located closer than twenty-five (25) feet to the ultimate right-of-way line of PA 291 or other intersecting road located within the CAMO District.

d. No parking, loading or other storage area shall be located closer than twenty-five (25) feet to the ultimate right-of-way line of PA 291 or other intersecting road located within the CAMO District.

Section 09: <u>Application Requirements for Those Uses Permitted by Special Exception</u>. An applicant proposing to locate a use or uses specified in Section 06 of this Article within the CAMO District shall submit the following additional information to the Zoning Hearing Board to accompany an application for a special exception.

09.1 A plan or plans delineating the necessary information to be shown on a preliminary plan in accordance with the pertinent requirements of the Township's Subdivision and Land Development Ordinance.

09.2 A written statement, in accordance with the requirements of Section 10 of this Article, justifying the need for the requested special exception(s).

09.3 A Landscaping Plan in accordance with the requirements of Section 13 of this Article; or

09.4 A plan showing those existing natural features, vegetation and topography, where pertinent, to justify a full or partial

modification of the landscaping requirements of Section 13 of this Article.

Section 10: Justification Statement for Special Exception Use(s). An application for a special exception shall be accompanied by a written statement justifying the requested modifications from the requirements of this Article, the materials required by Section 13 of the Article, as well as any pertinent supplementary materials. The narrative description shall contain, as a minimum, the following information:

10.1 The relationship of the proposed actions(s) to the Declaration of Legislative Intent of this Article.

10.2 A general description and map of the proposed action(s), including any proposed modifications from the standards of this Article.

10.3 A description and map of the existing natural features, vegetation, and topography of the site and their relationship to the proposed action(s).

10.4 A general description of the alternatives considered by the applicant, prior to requesting the proposed course(s) of action and proposed modification(s).

Section 11: Procedures for Consideration of a Special Exception. The Zoning Hearing Board, in reviewing an application for a special exception, shall review the plan, justification statement and other materials submitted by the applicant. Furthermore, the Zoning Hearing Board shall:

11.1 Notify the Township and County planning commissions at least thirty (30) days prior to the hearing on the application, who may, at their discretion, become a party to the matter in question.

11.2 Notify the Harrisburg and District 6-0 offices of the Pennsylvania Department of Transportation at least thirty (30) days prior to the hearing on the application, who may, at their discretion, become a party to the matter in question.

11.3 Notify the Township Engineer at least thirty (30) days prior to the hearing on the application, who may, at the direction of the Board of Supervisors, submit his advisory opinion on the matter in question to the Board of Supervisors.

11.4 In addition to the guidelines specified in Section 12 of the Article, have the discretion to impose special measures or conditions, as deemed reasonably necessary and appropriate, to ensure that approval of a special exception will be consistent, to the maximum extent feasible, with the Declaration of Legislative Intent of this Article.

Section 12: Guidelines for Approval of Uses by Special Exception. In considering an application for a special exception, the Zoning Hearing Board shall use the following guidelines, as minimums:

12.1 The consistency of the proposed special exception with the Declaration of Legislative Intent of this Article.

12.2 The relationship of the proposed special exception to the possible functional effects on existing and proposed traffic flow, the number and location of curb cuts, and visual

character of PA 291 and any intersecting roads located within the boundaries of the CAMO District.

12.3 The relationship of the proposed special exception to the existing topography, vegetation and other natural features, as well as the degree to which the applicant has incorporated such features in the overall development plan.

12.4 The degree to which the applicant's proposed mitigating actions, in accordance with the guidelines specified in Section 13 of this Article, will minimize visual intrusions, traffic flow disruptions and the number and spacing of curb cuts along PA 291 or intersecting road(s) located in the CAMO District.

Section 13: <u>Guidelines for Mitigating Actions Within the Corridor Access Management Overlay District</u>. The following mitigating actions shall be incorporated with the site development plan for a use proposed to be located within the CAMO District in order to minimize visual intrusions, traffic flow disruptions and the number and spacing of curb cuts along PA 291 or intersecting road(s) located in the CAMO District. These actions may be separate from or in combination with existing natural features, vegetation or topography on the site in question. However, applicants are encouraged to incorporate existing site features as part of any necessary mitigating actions, wherever such an approach is feasible, in order to retain the natural character of the landscape.

13.1 Landscaped Areas. The applicant shall submit a landscape plan with the application, showing all pertinent information, including the existing or proposed topography and the location, size and specie of those individual trees and shrubs to be preserved or planted, or alternatively, the general characteristics of existing vegetation masses which are to be preserved.

a. Planted Areas. Along the right-of-way of PA 291 and the intersecting roads located within the CAMO District the applicant shall provide a single row of deciduous trees, at least eight (8) feet in height when planted and at least twenty (20) feet in height at maturity, with a spacing of not more than forty (40) feet on-center, wherever necessary for adequate sight distance.

b. Mounding. Mounding is encouraged as a means of reducing visual encroachment along PA 291 or intersecting roads within the CAMO District, provided that such mounding shall not exceed a slope of three to one (3:1), or interfere with sight lines.

c. Shrubs and Grass. Coniferous and deciduous shrubs and grass shall be provided, as needed, to complete the landscaped area. The width of such area measured from the ultimate right-of-way line shall not be less than fifteen (15) feet.

d. Buffer Maintenance. All vegetation shall be permanently maintained and, in the event of death or other destruction, shall be replaced within one (1) year by the persons responsible for maintenance at the time death or destruction occurred.

e. Architecture and Site Design. The applicant may demonstrate, through the submission of pertinent plans, renderings or models, that the development of the proposed structures(s), building(s), parking area(s) or sign(s) will be accomplished in a manner that will

be compatible with PA 291 corridor and its surroundings and that will minimize the visual effects on both highway users and the users of the proposed development.

13.2 Traffic Flow and Access Study. For any non-residential use and for any residential use involving more than five (5) dwelling units, the applicant shall prepare a traffic flow and access study, unless the Township Engineer, with the concurring opinion of the Pennsylvania Department of Transportation, District 6-0, shall determine that such a study is not warranted based upon the submitted plan and proposed development. The study shall describe and map the present and projected traffic flow patterns both with and without the proposed development, based upon existing and 20-year projected traffic counts from the Pennsylvania Department of Transportation, the Delaware Valley Regional Planning Commission or the applicant's traffic engineer. Particular attention shall be placed upon the relationships of the proposed accessways to PA 291 or other intersecting roads located within the CAMO District. The source(s) for all traffic flow data, turning movements and projections shall be clearly labeled in the submitted study. The study shall include the rationale for the accessway(s) chosen as well as any alternatives rejected by the applicant.

13.2 Driveway Spacing. Driveways should be spaced a minimum of two hundred (200) feet apart or shared with an adjacent property, unless rigid adherence to this standard is determined to be either impractical or infeasible, upon the written request of their applicant with the concurrence of the Township Engineer. The minimum distance of fifty (50) feet shall be provided between an access driveway and the intersection of a public road with PA 291. However, any such minimum corner clearance accessways shall be restricted through their design to right turns in and out.

13.3 Sight Distance. Adequate sight distance shall be provided at every accessway and intersecting road, upon review and determination by the Township Engineer.

13.4 Other Traffic Flow Improvements. The applicant is encouraged to submit related traffic flow improvement proposals in conjunction with the Traffic Flow and Access Study required in subsection 13.2. Acceleration/deceleration lanes, traffic s ignalization, marginal access roads and curbing or stacking lanes are examples of low capital intensive improvements which would facilitate traffic flow in conjunction with new development. Any such proposed improvements shall be reviewed and approved by the Township Engineer, with the advice of Pennsylvania Department of Transportation District 6-0 staff, except on state maintained roads, where final approval shall be obtained from the Pennsylvania Department of Transportation.

Section 14: <u>Uses or Structures Rendered Non-Conforming by the Adoption of this Article</u>. Following the adoption of this Article, any use or structure which is situated within the boundaries of the CAMO District and which does not conform to the permitted uses specified in Section 05, herein, shall become a non-conforming use or structure, regardless of its conformance with the requirements of the District(s) in which it is located without consideration of this Article.

14.1 The expansion or continuance of a non-conforming use or structure which is nonconforming with respect to the other District(s) in which it is located without consideration of this Article, shall be governed by the requirements of Article ---,

Section --- of this Ordinance. However, the Zoning Hearing Board shall ensure that the standards contained in Section 12, herein, are applied to the expansion or continuance of said non-conforming use or structure.

14.2 The expansion or continuance of a non-conforming use or structure which is rendered non-conforming due to the adoption of this Article shall be governed by the standards contained in Section 09, herein. The Zoning Hearing Board shall ensure that these standards are enforced with respect to said non-conforming use or structure.

Section 15: <u>Appeals</u>. A property owner of a lot of record, as of the date of enactment of this Article, who contends that the strict enforcement of this Article would create undue hardship, by denying a reasonable use of an existing lot situated wholly or partially within the CAMO District, or who contends that the Zoning Officer's interpretation of the effects or boundaries of the CAMO District on said lot are incorrect, may seek relief by applying for a variance from the Zoning Hearing Board.

15.1 The Zoning Hearing Board, after deciding upon the merits of the appeal, may permit the applicant to make some reasonable use of the property in question, while ensuring that such use will not violate the Declaration of Legislative Intent of this Article.

15.2 Any use(s) permitted by variance shall represent the minimum relief possible to overcome the proven hardship, and the location of said use(s) within the CAMO District shall be conditioned upon the incorporation of pertinent mitigating activities, as set forth in Section 13 of this Article, in order to minimize the effects of encroachment along PA 291.

Appendix B

Appendix B: **Table B-1 Amtrak Bridge Clearance Inspection**

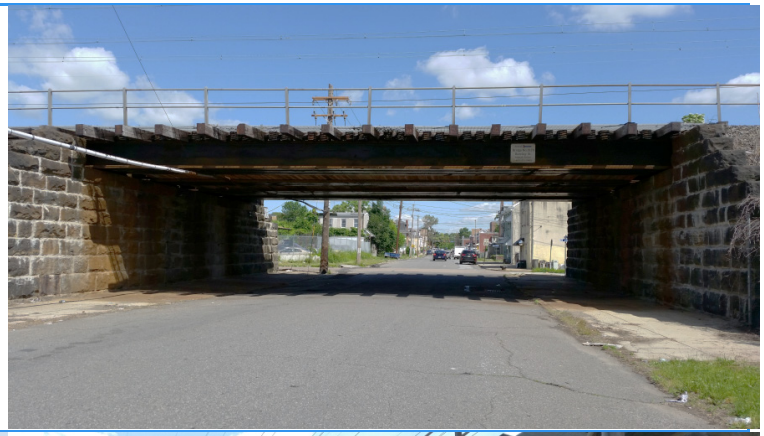
Street Under Amtrak Railroad	Clearance Height	Amtrak Bridge #	Description	Photo
Booth Street	11’-11”	15.70	• Westbound signage too small, located on bridge • No advance westbound warning • Eastbound advance warning one block away • No clearance signage on bridge in eastbound direction	
Highland Avenue	12’-9”	15.50	• No advance warning signs • Existing signage in good condition	

Wilson Street	12’-7”	15.36	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	
Engle Street	14’-2”	15.09	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	
Jeffrey Street	13’-1”	15.02	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	

Street Under Amtrak Railroad	Clearance Height	Amtrak Bridge #	Description	Photo
Yarnall Street	12’-10”	14.94	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	
Reaney Street	12’-5”	14.85	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	
Flower Street	13’-8”	14.80	• No advance warning • Clearance signage directly adjacent to bridge • Existing signage in good condition	

Central Avenue	12’-3”	14.67	• No advance westbound signage • Westbound clearance signage directly adjacent to bridge • Advance eastbound signage one block away • No clearance signage on bridge • All existing signage in good condition	
Tilghman Street	12’-9” EB 12’-10” WB	14.60	• No advance signage • Clearance signage directly adjacent to bridge in good condition • No clearance signage on bridge	
Lloyd Street	Bridge over RR	N/A	Bridge closed over Lloyd Street	-Bridge is currently being rehabilitated-

Street Under Amtrak Railroad	Clearance Height	Amtrak Bridge #	Description	Photo
Kerlin Street	12’-0”	14.02	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	
Parker Street	13’10” EB 13’-9” WB	13.96	• Advance warnings one block away • Existing signage in good condition • No clearance sign on bridge	
Concord Avenue	13’-2” EB 13’5” WB	13.83	• No advance signage • Clearance signage directly adjacent to bridge in good condition	

Barclay Street	13’-10”	13.79	• No advance eastbound signage • Eastbound clearance signage directly adjacent to bridge • Advance westbound signage half block away • No clearance signage on bridge • No indication of clearance from West 6th Street • Existing signage in good condition	
Penn Street	16’-1”	13.70	• No advance eastbound signage • Eastbound clearance signage on bridge • Advance westbound signage directly adjacent to bridge • No westbound clearance signage on bridge • No indication of clearance from West 6th Street • Existing signage in good condition	
Sproul Street	12’-8”	13.51	• No advance eastbound signage • Eastbound signage adjacent to bridge • No advance westbound signage • Westbound signage directly on bridge • Westbound signage in very poor condition	

Street Under Amtrak Railroad	Clearance Height	Amtrak Bridge #	Description	Photo
Edgemont Avenue	Pedestrian Walkway	13.49	• Pedestrian walkway • Closed to automobile travel	
Avenue of the States	13'-6"	13.49	• One way eastbound street • Trucks prohibited • No advance eastbound signage • Eastbound signage adjacent to bridge and on bridge • Existing signage in good condition	
Welsh Street	13'9"	13.42	• No westbound signage • No advance eastbound signage • Eastbound signage adjacent to bridge and on bridge • Existing signage in good condition	

Madison Street	13’-9”	13.25	• One way westbound street • Advance westbound signage one block away in good condition • No signage directly on bridge itself • Existing signage in good condition	
Upland Street	12’-6”	13.17	• One way eastbound street • No advance eastbound signage • Eastbound signage instead adjacent to bridge • Existing signage in good condition	
Potter Street	12’-9”	13.07	• Advance westbound signage • Westbound signage adjacent to and on bridge • No advance eastbound signage • Eastbound signage adjacent to bridge • Existing signage in good condition	

Street Under Amtrak Railroad	Clearance Height	Amtrak Bridge #	Description	Photo
Morton Avenue	12’-9”	13.07	• Advance westbound signage • Westbound signage on bridge • No advance eastbound signage • Eastbound signage adjacent to bridge • Existing signage in good condition	
Caldwell Street	12’-1”	12.92	• Signage adjacent to bridge • No signage on bridge • Existing signage in good condition	
Hinkson Street	12’-3”	12.85	• Signage adjacent to bridge • No signage on bridge • Existing signage in good condition	

Eddystone Avenue	13’-10”	12.41	• Advance clearance signage located at both ends of street • Eastbound signage on bridge • Westbound signage located on previous bridge (Conrail Bridge) • Existing signage in good condition	
Saville Avenue	12’-2”	12.28	• Advance westbound signage a half block away • Advance eastbound signage located a half block and also one block away (2 signs) • Existing signage in good condition	

Other Railroad Bridges

Rail/ Road Intersection	Clearance Height	Bridge #	Description	Photo
Saville Ave & Conrail	14’-0”	N/A	• No advance warning signage • Signage adjacent to bridge • Signage on bridge • Existing signage in good condition	
Eddystone Ave & PA 291	13’-10”	N/A	• No clearance signage on or adjacent to bridge • Clearance signage located on previous bridges on either end • All three adjacent bridges assumed to share equal clearance	

Eddystone Ave & Conrail	13’-10”	N/A	• Clearance signage located at both ends of street • Signage on bridge • Existing signage in good condition	
Harrah’s Blvd & Conrail Bridges	-	N/A	• No clearance signage on or adjacent to bridge • Unknown clearance	
West 7th Street between Norris Street and Lamokin Street	12’-6”	N/A	• Abandoned railroad bridge • No advance warning before bridge • Clearance signage located on bridge • Existing signage in good condition	

PA 291 Area Study

Publication Number: 14013

Date Published: February 2015

Geographic Area Covered:

City of Chester, Ridley Township, Trainer Borough, Delaware County, Pennsylvania

Key Words:

Access management, traffic safety, corridor planning, zoning, environmental justice, travel speeds, truck routes, bicycle facilities, wayfinding, green infrastructure, heavy vehicles, intersection analysis, industrial preservation, pedestrian safety, municipal ordinances

Abstract:

The evaluations summarized in this report were in support of PennDOT's statewide effort to promote the establishment of formal access management ordinances for state and local highways. A case study of PA 291 was conducted and ideas and plans were prepared to illustrate the benefits of safety and access management strategies.

Staff Contact:

Keith Hartington
Senior Transportation Planner
(215) 238-2852
khartington@dvrpc.org

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

190 N. Independence Mall West, 8th Floor
Philadelphia, PA 19106-1520
Phone: (215) 592-1800
Fax: (215) 592-9125
www.dvrpc.org

DVRPC, 8TH FLOOR
190 N. INDEPENDENCE MALL WEST
PHILADELPHIA, PA 19106-1520
(215) 592-1800
WWW.DVRPC.ORG