Pennsylvania Congestion Management System: PA 100 Corridor

June 2002

DELAWARE VALLEY REGIONAL
PLANNING COMMISSION

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REGIONAL PLANNING COMMISSION

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties, as well as the City of Philadelphia, in Pennsylvania; and Burlington, Camden, Gloucester and Mercer counties in New Jersey. DVRPC provides technical assistance and services; conducts high priority studies that respond to the requests and demands of member state and local governments; fosters cooperation among various constituents to forge a consensus on diverse regional issues; determines and meets the needs of the private sector; and practices public outreach efforts to promote two-way communication and public awareness of regional issues and the Commission.

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 its findings and conclusions, which may not represent the official views or policies of the funding agencies.

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I. EXECUTIVE SUMMARY

As a component of the Pennsylvania Congestion Management System (CMS), this report provides an examination of congestion at key intersections, arterial segments, and transportation systems within the PA 100 corridor in Chester County, Pennsylvania. The corridor covers an area of approximately 100 square miles and is located within one of the fastest growing sections of the County. In this study, congested areas were evaluated and improvement strategies that are both practical and implementable were identified as a means of developing an efficient transportation system that is necessary to ensure adequate movement of goods and people.

Conditions at the major intersections within the corridor were evaluated during the peak periods. A total of 13 approaches at 10 intersections experienced 80 seconds or more of delay during the peak periods. These ten most congested intersections were examined in further detail. Measures to alleviate current and future congestion were identified. Intersection strategies to mitigate congestion included adjusting traffic signal timing and coordination, installing protected left turn signals, adding right turn lanes, striping pedestrian crosswalks, and evaluating on-street parking feasibility.

In addition to the intersection evaluation, 37 arterial sections (subcorridors) were identified. A level of service analysis was undertaken by direction on all of the subcorridors. Five of the subcorridors performed at a level of service F, while six performed at level of service E. Recommendations for reducing congestion on the subcorridors included traffic signal coordination, road widening, shoulder improvements, and Travel Demand Management measures.

Transit service improvements have also been identified. Although the vast majority of trips are presently taken via auto, growth pressures and an increase in future highway congestion will continue to make transit an important commuting option. Inflationary trends in fuel prices, concerns over the environment and air quality, and changing land use patterns will make automobile use less desirable and build a stronger case for more transit service. Increasing transit ridership can be achieved through a variety of measures. Bus service can be improved by convenient routing, timely and appropriate headways, installing adequate shelter at stops, and by providing a comfortable and safe environment. Adequate parking and frequent, timely service can help to increase regional rail ridership.

Journey-to-work travel patterns, based on DVRPC's 2025 forecast, show a suburb to suburb travel pattern with most person trips in the study area being completed by passenger car. This lack of transit use is due mostly to the absence of an extensive rail or bus network in much of the area to accommodate current commuting patterns.

In addition to transit and site specific recommendations, region wide Travel Demand Management (TDM) measures should be promoted. TransitChek is a commuter benefit program that enables employers of any size to offer financial vouchers for use on all modes of public transportation.

Mobility Alternatives Program (MAP) is an outreach program that provides commuters with information on Share-a-Ride, car- and vanpools, and flexible work hours. Other initiatives identified that can reduce emissions and relieve congestion are telecommuting (telework), park and ride facilities, a compressed work week, subscription buses, and improvements to pedestrian and bicycle facilities and amenities.

II. PURPOSE

A Congestion Management System (CMS) is a systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods. The CMS, developed by the Delaware Valley Regional Planning Commission (DVRPC) for the Pennsylvania portion of its region, (*Pennsylvania Congestion Management System - Phase 2 Report, July 1997*), represents a comprehensively planned regional approach to managing the area's transportation infrastructure and improving the efficiency of the transportation system.

Three goals have been established for the CMS. The CMS seeks to: (1) ease traffic congestion through the reduction of single occupant vehicles (SOV's), (2) optimize the efficiency of existing transportation systems by reducing traffic congestion along travel corridors and at critical intersections through incident management, access control, needed highway improvements, and advanced technology systems, and (3) improve access and proficiency of the transportation network to improve mobility.

The CMS consists of five components: (1) performance measures, (2) data collection and system monitoring, (3) identification and evaluation of proposed strategies, (4) implementation of strategies, and (5) evaluation of implemented strategies. In Transportation Management Areas (urban areas of over 200,000), like the DVRPC region, no significant widening project can be implemented unless it is part of an approved CMS study.

DVRPC's *Year 2020 Long Range Plan* identifies individual CMS studies from the region's major travel corridors that serve as connectors for major activity centers. Creating a corridor specific CMS is an effective extension of the regional CMS. The *Year 2020 Transportation Plan* presents an extensive list of policies and strategies, as well as the actions required by each agency to carry them out. The *Year 2025 Transportation Plan* incorporates most of these policies but makes some additions and modifications consistent with the vision statements. These include congestion reduction policies that would a) Implement a coherent strategy for delivering more transit options for commuters, and b) Use transportation demand management techniques for corridor and system planning.

The PA 100 Corridor was chosen from those corridors in the *Year 2020 Long Range Plan* and the Pennsylvania CMS. The corridor is particularly suitable for a CMS study, due to its consistent recurring traffic congestion, future growth pressures on the traffic system, and the potential for improved public transportation.

The PA 100 Corridor CMS study is designed to:

- Identify locations that experience traffic congestion and document the severity and duration
- Identify causes of congestion
- Identify, document, and analyze alternatives to manage traffic congestion including:
  - traffic operations
  - transit service and related elements
  - programs and policies that reduce traffic within the corridor
- Develop a program of recommended improvements to reduce traffic congestion

The PA 100 Corridor CMS allows transportation projects in a given area to be developed according to a cohesive plan and programmed in a prioritized manner.

III. STUDY AREA DESCRIPTION

PA 100 is an arterial highway located in central Chester County in the western suburbs of the Philadelphia Region. The landscapes on PA 100 vary considerably throughout the corridor. Much of the northern reaches of the study area are rural with low density residential development. The PA 100 corridor through the Lionville and Exton area is a highly commercial area, with large shopping centers and corporate centers. The US 30 corridor, which bisects the study area on an east-west axis, is a major commuting corridor for passenger vehicles, freight, and public transit.

The CMS study area spans the PA 100 Corridor from Horseshoe Trail Road in West Vincent Township through central Chester County to Boot Road in West Whiteland Township. The area includes many parallel, adjacent, and intersecting arterials including PA 401, PA 113, US 322, and US 30. The study area includes all or part of the following townships: West Vincent, West Pikeland, Charlestown, East Whiteland, West Whiteland, Uwchlan, Upper Uwchlan, East Brandywine, Caln, and East Caln. Downingtown Borough is also included.

Chester County is characterized by rapid population growth. According to the 2000 US Census, Chester County has a population of 433,501. The County experienced a 15.2% increase between 1990 and 2000. The 2010 forecasted population is 482,000, an increase of approximately 9% over the 2000 figure. Chester County faces many challenges by attempting to balance future growth pressures while trying to preserve open space and mitigating traffic congestion. The study area is the focal point of much of the growth in the County, and as such, will experience even greater growth than the County as a whole. Between 1990 and 2000, the population within the study area increased by 21%. Much of the future development will be single family residential subdivisions, regional corporate parks, and large shopping centers. **Map 1** shows the forecasted 2025 land use patterns for the study area. Large sections of the study area are already developed or are expected to grow in the future. This is particularly evident in the areas adjacent to the transportation arteries of US 30 and PA 100, where large tracts of commercial and office development are located. This pattern is expected to continue through 2025.

The PA 100 area is served by several public transportation services. The SEPTA R5 is the commuter rail line that links central Chester County to Center City Philadelphia. Several SEPTA bus routes and KRAPF's Transit Route A also serve the area. Despite increased traffic congestion and improved service, only 3% of work trips involved public transportation in 1990.

PA 100 CMS

🟨 1995 Developed
🟦 Preserved Farmland
🟧 Future Growth Area
🟩 Parkland 2000
🟩 Proposed Open Space

N

0 0.5 1 1.5 Miles

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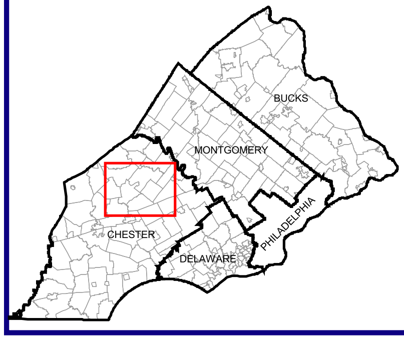
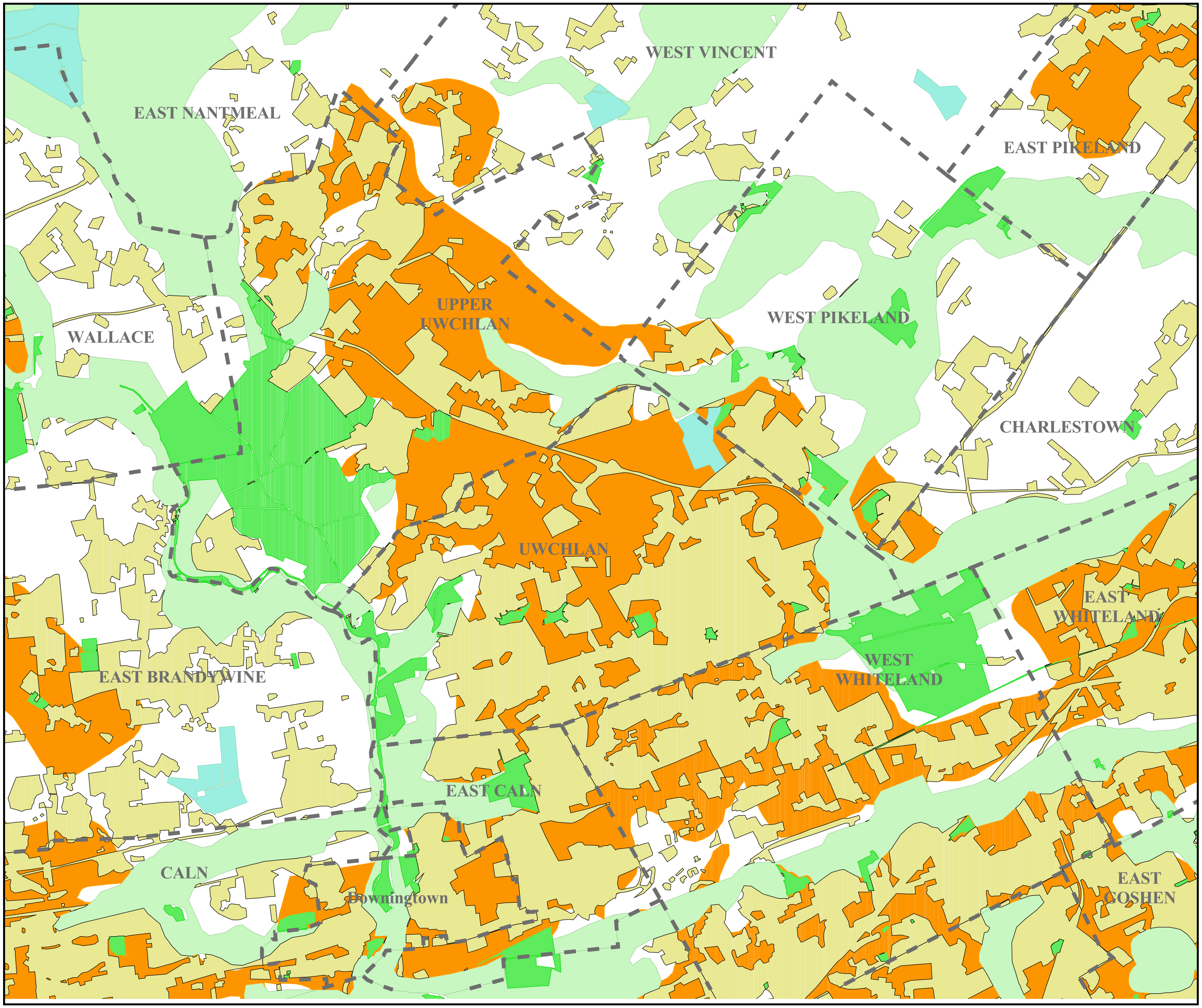




Map 1: 2025 Land Use

IV. HIGHWAY NETWORK

Designation of Arterial Sections

The PA 100 region is served by a number of highways and arterials, providing mobility and access to both freight and vehicular traffic. The highway network of the PA 100 study area is comprised of about 52 miles of roadway. **Map 2** shows the road network within the study area and the Federal Functional Classification. A brief description of the major arterials is given below.

Pennsylvania Turnpike (I-76)
This is an interstate highway extending across Pennsylvania from Philadelphia in the east to the Ohio border in the west. It is a limited access toll road, with the Downingtown interchange being the only point of ingress or egress within the study area. It is located in the middle of the PA 100 study area, allowing direct access to points to the east and west. Any new interchanges on I-76 within the PA 100 region could have a significant effect on development and local traffic patterns.

US 202
US 202 is generally a four-lane expressway, extending from New Castle County, Delaware through Chester, Montgomery, Delaware, and Bucks Counties in Pennsylvania. US 202 is the primary commuter route from central and eastern Chester County to King of Prussia. There are two major US 202 interchanges in the study area; PA 401 and US 30.

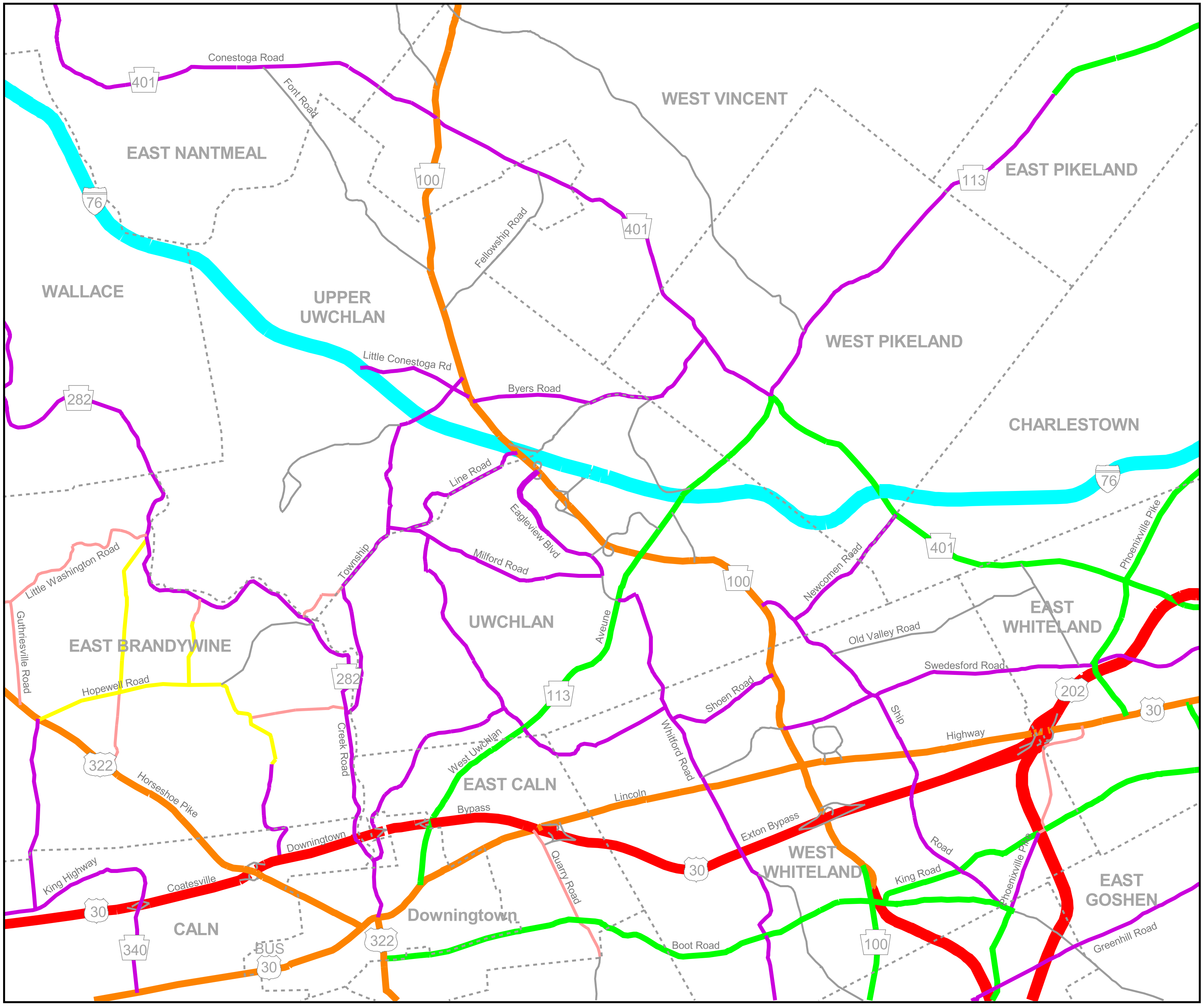
US 30 (Coatesville-Downingtown and Exton By-Pass)
This is a limited access freeway that extends from the intersection with US 202 in East Whiteland, to Sadsbury Township in western Chester County. It provides a high speed alternative to US 30 Business.

US 30 Business
This is a major east-west arterial which bisects the study area, extending from Philadelphia through western Chester County and beyond. Within the study area, this roadway provides local east-west access between Coatesville and the Exton area. US 30 Business varies from between two to five travel lanes, and the posted speed limit ranges from 25 mph in urban areas to 45 mph in rural areas.

PA 100 (Pottstown Pike)
This highway extends from the state of Delaware to eastern Berks County and beyond. The section from West Chester through the study area is a principle arterial highway. Within the study area, the northern section is primarily two travel lanes, while the southern section is generally four lanes in width.

PA 113
PA 113 is a Rural Minor Arterial from US 30 to PA 401. From PA 401 to Phoenixville, this road is classified as a Rural Major Collector. It is an important east-west connector, facilitating access to central Chester County.

PA 100 CMS



🟦 Interstate Highway

🟥 Other Freeways and Expressways

🟧 Other Principal Arterial Highways

🟩 Minor Arterials

🟪 Urban Collector and Rural Major Collector

🟨 Rural Minor Collector

▬ Local Roads

▬ Unclassified Local Roads

N

0 0.5 1 1.5 Miles

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Map 2: Federal Functional Classification

PA 282
This is primarily a Rural Major Collector extending from Downingtown northward through East Brandywine and Wallace Townships to PA 82. It generally has two travel lanes.

PA 340
This is a Urban Collector at its easternmost limits where it intersects with US 30. In its western limits, it is classified as a Rural Major Collector. Overall, it extends from Lancaster County in the west, to US 30 (Lincoln Highway) in the east.

PA 401
This road extends from US 30 in East Whiteland Township westward into Berks County. It is a Minor Arterial from US 30 to the intersection with PA 113. From PA 113 to its terminus in Berks County, it is classified as a Major Collector. This is generally a two lane road that provides direct access to US 202, PA 100 and PA 113.

Little Conestoga Road
This is a Rural Major Collector from its intersection with the PA 100 to the Pennsylvania Turnpike overpass. From the overpass to the westernmost limits of the study area, it is classified as a Rural Minor Collector. This is primarily a two lane road with an east-west orientation that provides direct access to PA 100.

Byers Road
This is a Rural Major Collector extending from PA 100 to PA 401 through West Pikeland and Upper Uwchlan Townships. It generally has two travel lanes.

Eagleview Boulevard
This is a local road that runs parallel to PA 100 through the Eagleview Corporate Park. It extends from PA 113 northward to PA 100. There are two travel lanes in each direction.

Whitford Road
This is an Urban Collector that extends from PA 113 in the north to Boot Road in the south. It is a two lane road with little or no shoulder throughout the corridor.

Gordon Drive
Gordon Dirve connects PA 100 and PA 113 in Uwchlan Township. It is generally a two lane local road.

For the purposes of traffic operation analysis, these arterial segments were further divided into subsections of roadway with similar characteristics, including adjacent land use, roadway geometry, capacity, and traffic demand.

Traffic Counts 1997 - 2000

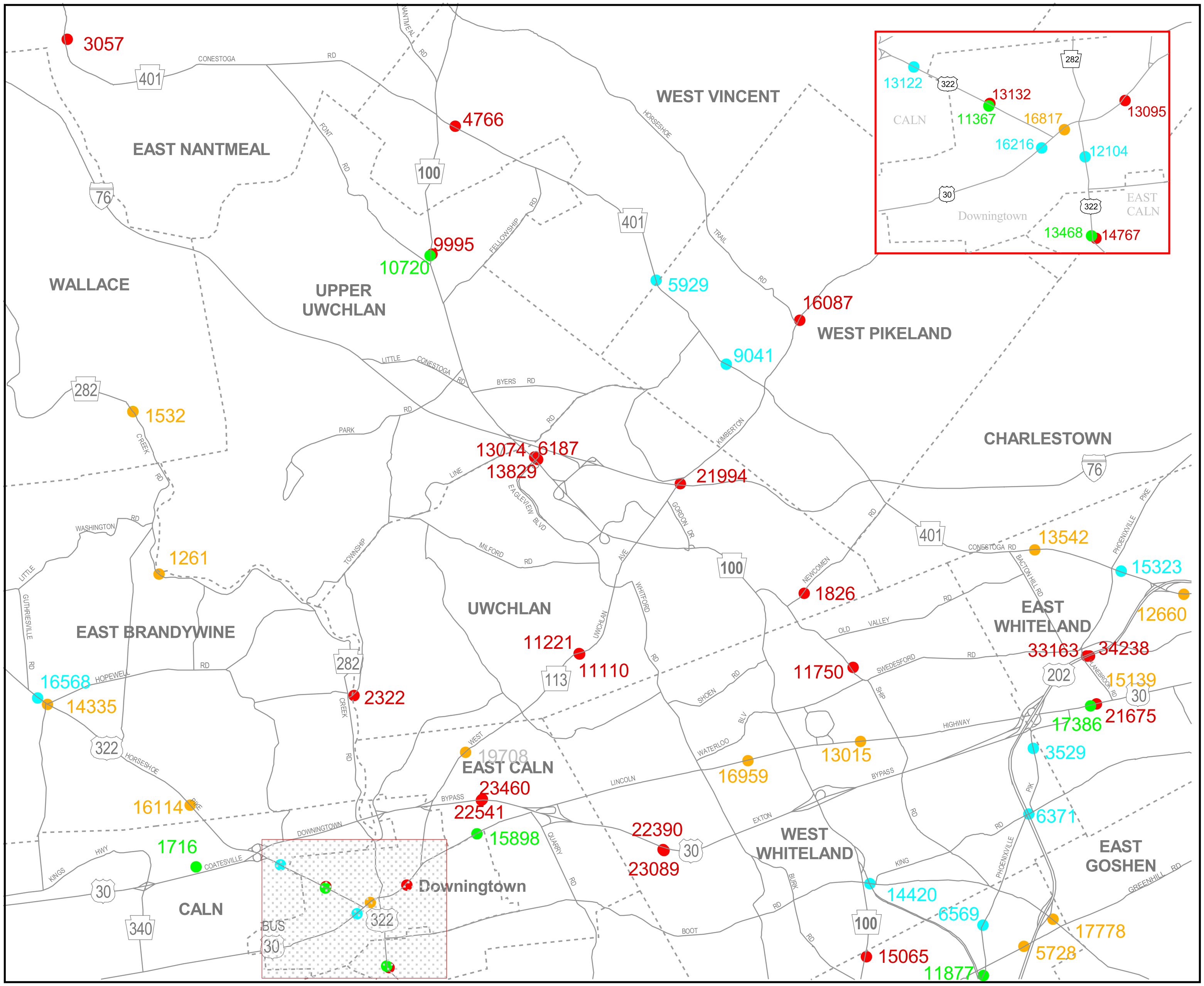
The spatial and temporal recording of traffic counts is important as a measure to gauge the direction and flow of traffic over time. It is also a basis with which to evaluate the potential impact a development will have on the transportation network. **Map 3** illustrates the daily traffic levels within the study area over the period 1997 - 2000. The highest volumes were observed along US 30 By-Pass and US 30 Business, PA 113, PA 100 and US 322. The highest growth in traffic recorded is along PA 401 in East Whiteland and US 30 Business in East Whiteland. This area has experienced a significant increase in development in recent years. Other areas of growth include US 322 in East Brandywine and Downingtown.

Year 2000 Traffic Accidents

Map 4 shows all accidents designated as fatal or major injury accidents in the study area in the year 2000. Along PA 100 itself there are a number of accident clusters. Specifically, in West Whiteland at the Exton By-Pass, three accidents were recorded of which two were fatal. Just south of the Exton By-Pass, two more accidents were recorded, one of which was fatal. Another high accident area on PA 100 is around the intersection with Eagleview Boulevard. Four accidents occurred at this location but only one was fatal. At the intersection of Font Road and PA 100, one major injury accident was reported. To the north of this intersection, there were four more accidents, two of which were fatal. Five accidents (two fatal) were recorded on PA 100 in the vicinity of Nantmeal Road and Horseshoe Trail Road.

Along PA 113, the largest cluster of accidents was at the intersection with Norwood Road near the border of Uwchlan and East Caln. There were three fatal accidents and two major injury accidents in this area. There were six major injury accidents at the intersection of the Coatesville Downingtown By-Pass and US 322.

PA 100 CMS



Average Annual Daily Traffic (AADT)

- 🟢 1997 Traffic Count
- 🟠 1998 Traffic Count
- 🔵 1999 Traffic Count
- 🔴 2000 Traffic Count

N

0 0.5 1 1.5 Miles

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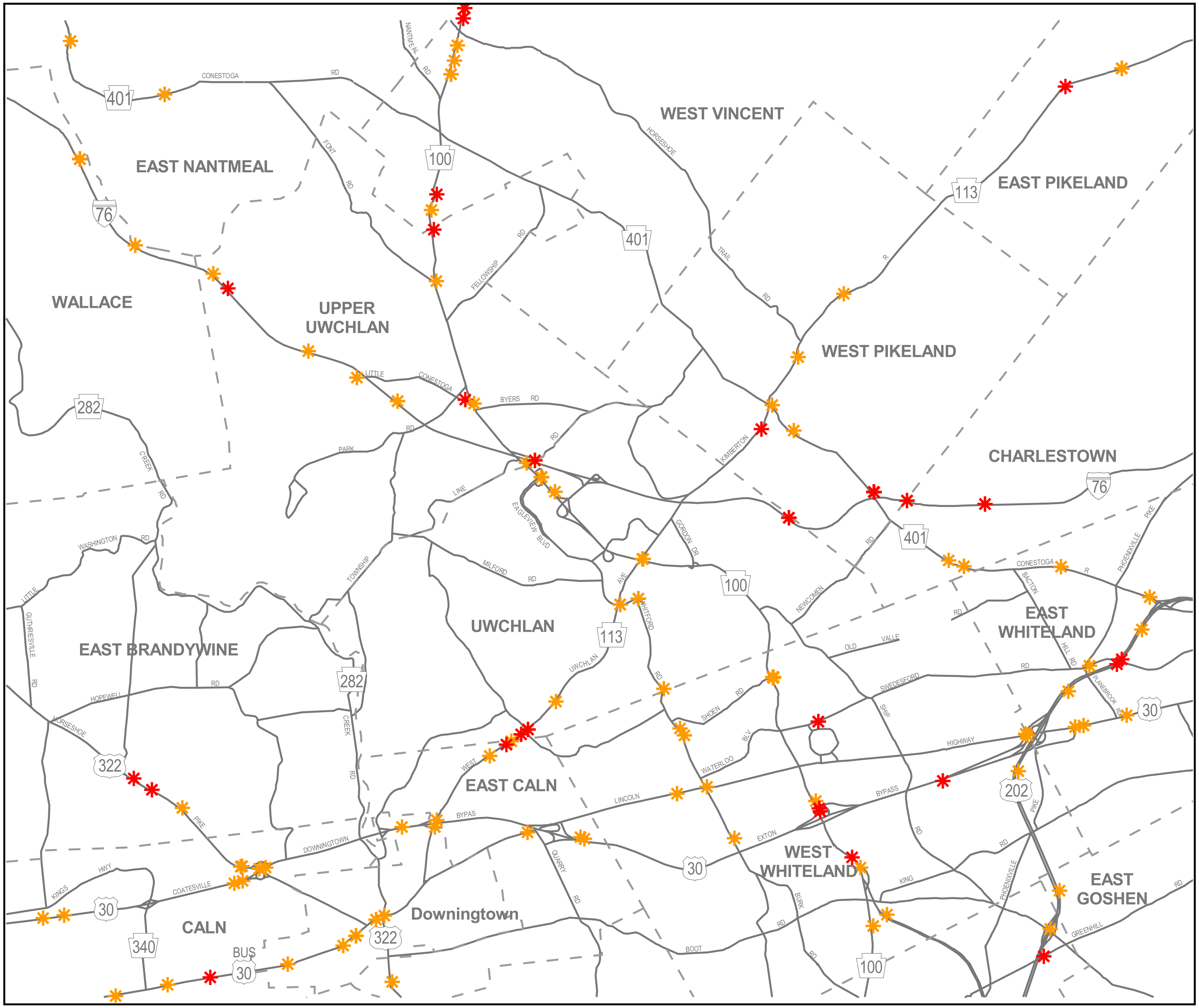
Map 3: Traffic Counts 1997 -2000

PA 100 CMS



Severity
✱ Fatal Accident
✱ Major Injury Accident

N

0 0.5 1 1.5 Miles

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Map 4: Year 2000 Traffic Accidents

Measures of Performance

The basic unit of the arterial is the *segment*, which is the one-directional distance from one signalized intersection to the next. If two or more consecutive segments are comparable in arterial classification, segment length, speed limit, and general land use activity, then the segments were aggregated into *arterial sections*.

Based on comprehensive data collection and analysis of both the segment and each arterial section as a whole, several criteria were used to measure traffic performance. A travel time study was conducted on the most congested arterials within the study area. There were several measures of performance used to interpret the amount of congestion on an arterial section. It should be noted that the gathered information was based on field observations, and represent a snapshot of roadway conditions at that time. Because this is a rapidly growing section of Chester County, traffic conditions are rapidly changing, due mainly to increases in person trips and vehicle miles traveled (VMT).

- Travel Time Study - For the purpose of this analysis, travel time studies were conducted to measure actual travel speeds on arterials within the study area. *Travel time studies* are used specifically to evaluate the extent and causes of congestion. The travel time information can be used to identify problem locations on facilities by virtue of high travel times and delays, and to measure arterial level of service.

- Average Car Technique - To ensure uniformity of data, a method called the *average car technique* was used. In this procedure, the driver approximates the average conditions by maintaining a similar position within the traffic stream.

Measurements of time travel were taken at each intersection of the travel area. Travel runs were conducted during the AM and PM peak periods. A single travel run took an average of ten to fifteen minutes to complete. This allowed adequate time for three travel runs in each direction to be conducted for each peak period. Using this technique, a representative sample of traffic conditions throughout the peak period was documented to assure that the duration and variation of congestion throughout the period was taken into account. Directional variations in traffic flow were also noted.

The AM and PM peak periods were conducted during same time frame each day that travel times were performed. The AM peak period generally ranged from 7:00 am to 8:30 am. The PM peak was generally from 4:00 pm to 6:00 pm. Travel runs were conducted on Tuesdays, Wednesdays, and Thursdays of non-holiday weeks, while school was in session. This technique was used to capture typical weekday traffic conditions. The *travel speed*, or average speed of a traffic stream computed as the length of a roadway segment divided by the average travel time of a vehicle traversing the segment, was calculated for each segment on the arterial.

- <u>Free-Flow Speed</u> - The *free-flow speed* (FFS) is defined by the *2000 Highway Capacity Manual* (HCM) as the theoretical speed of traffic when density is zero. This can be interpreted in practical terms as the average speed vehicles tend to drive when they are not constrained by control delay. The free-flow runs were conducted during times of unimpeded travel, typically between 9:00 am and 10:00 am in the morning. Two travel runs were performed in each direction and an average free-flow speed was computed. It should be noted that the free-flow speed is an ideal speed that serves as a benchmark by which the effect of traffic congestion and other impediments to normal traffic flow can be gauged.

- <u>Travel Time Speed versus Free-Flow Speed</u> - **Table 1** shows the relationship between average travel speed and free-flow speed. The top ten arterial sections are ranked based on travel speed as a percentage of ideal speed. The peak period and the corresponding Highway Capacity Manual level of service are also given. Additional variations in peak period and direction of the top ten arterial sections are listed, providing that the travel speed to free-flow speed ratio is less than fifty percent.

In general, the level of service is consistent with the percentage of free-flow speed. However, since the travel speeds and free-flow speeds were recorded from field research, a straightforward comparison between the two speeds is more precise than level of service.

- <u>Level of Service (LOS)</u> - Arterial level of service is based on average through-vehicle travel speed for the segment or arterial section under consideration. *Level of Service* is defined in terms of the average travel speed of all through vehicles on the arterial. On a given facility, such factors as inappropriate signal timing, poor progression, traffic signal density, increasing traffic flow, turning vehicles, and average intersection control delay can influence level of service.

The arterial sections are categorized based on a combination of average travel speed and street classification. Determining the street classification is established from direct field measurements of the free-flow speed and on an assessment of the street's functional and design categories. Functional categories are based on mobility, access, connectivity, and predominant trip type. Design is based on a variety of criteria, including driveway density, arterial type, parking, speed limit, pedestrian activity, and roadside development. Once the arterial sections have been properly classified, the appropriate level of service can be determined based on average travel speed.

TABLE 1

Ten Worst Performing Arterial Sections

	Arterial Section	Peak Period	Average Travel Speed (mph)	Free-Flow Speed (mph)	Travel Speed as Percentage of Free-Flow Speed	HCM Level of Service
1.	**WB PA 401** from US 202 to Phoenixville Pike	PM	6.3	38	16%	F
	EB PA 401 from Phoenixville Pike to US 202	AM	16.5	42	39%	E
	WB PA 401 from US 202 to Phoenixville Pike	AM	15.9	38	42%	E
2.	**NB US 322** from Boot Road to US 30 Business	PM	7.8	38	20%	F
	NB US 322 from Boot Road to US 30 Business	AM	17.9	38	47%	E
3.	**SB PA 100** from Font Road to Byers Road	AM	9.2	43	21%	F
4.	**SB PA 113** from Horseshoe Trail Road to PA 401	AM	11.9	49	24%	F
5.	**SB PA 113** from Gordon Drive to PA 100	AM	8.8	31	29%	E
	NB PA 113 from PA 100 to Gordon Drive	AM	11.9	25	47%	E
6.	**EB US 30 Business** from Miller Road to Exton Square Parkway	AM	12.4	35	35%	F
	WB US 30 Business from Exton Square Parkway to Miller Road	PM	13.3	37	36%	E
	EB US 30 Business from Miller Road to Exton Square Parkway	PM	13.2	35	37%	E
	WB US 30 Business from Exton Square Parkway to Miller Road	AM	18.1	37	49%	D
7.	**SB US 322** from US 30 By-Pass to US 30 Business	AM	15.1	42	36%	E
	SB US 322 from US 30 By-Pass to US 30 Business	PM	19.7	42	46%	D
8.	**NB PA 100** from Boot Road to US 30 Business	PM	17.9	47	38%	D
9.	**WB US 30 Business** from PA 113 to US 322	PM	8.5	21	40%	E
10.	**EB US 30 Business** from US 202 to Planebrook Road	AM	16.6	38	44%	E

The level of service (LOS) analysis is used extensively in this report. A general description taken from the *2000 Highway Capacity Manual* of the different LOS follows:

LOS A- describes primarily free-flow operations at average travel speeds. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Control delay at signalized intersections is minimal.

LOS B- describes reasonably unimpeded operations at average travel speeds. The ability to maneuver within the traffic stream is only slightly restricted, and control delays at signalized intersections are not significant.

LOS C- describes stable operations; however, ability to maneuver and change lanes in midblock locations may be more restricted than at LOS B. Longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50 percent of the free-flow speed (FFS) for the street class.

LOS D- borders on a range in which small increases in flow may cause substantial increases in delay and decreases in travel speeds. LOS D may be due to adverse signal progression, high signal densities, high volumes, or a combination of these factors.

LOS E- is characterized by significant delays. Such operations are caused by a combination of adverse progression, high signal density, high volumes, extensive delays at critical intersections, and inappropriate signal timing.

LOS F- is characterized by traffic flow at extremely low speeds, typically one-third to one-fourth of the FFS. Intersection congestion is likely at critical signalized locations, with high delays, high volumes, and extensive queuing.

There is some subjectivity in determining the road classification in the level of service analysis. Arterial roads in any given area can change capacity and geometry very rapidly; generalizing an urban street may be difficult. There may be instances where an arterial falls into multiple categories, or may be so unique that it does not fall into any distinct category at all. When this occurred, the free-flow speed was used to aid in this determination, because each arterial classification has a characteristic range of free-flow speeds. Although there is some subjectivity, it is important to remember that the level of service is a widely accepted and valid indicator of traffic performance.

Map 5 shows the AM peak levels of service for the study area observed through travel time surveys conducted during the hours of 7:00 am to 8:30 am on a typical weekday. **Map 6** shows the PM level of service for the study area observed through travel time surveys conducted during the hours of 4:00 pm to 6:00 pm on a typical weekday. **Map 7** combines the worst levels of service for a particular arterial section from either the AM or PM peak.

PA 100 CMS

KEY

🟦	**Level of Service A**
🟦	**Level of Service B**
🟩	**Level of Service C**
🟨	**Level of Service D**
🟧	**Level of Service E**
🟥	**Level of Service F**

0 1 2

MILES

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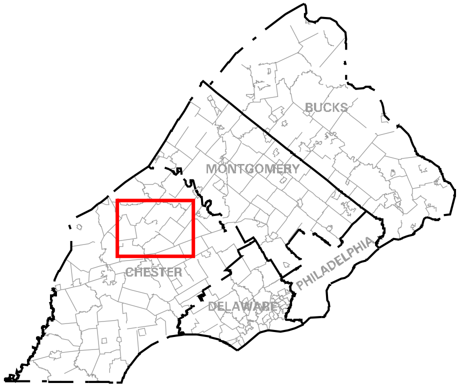
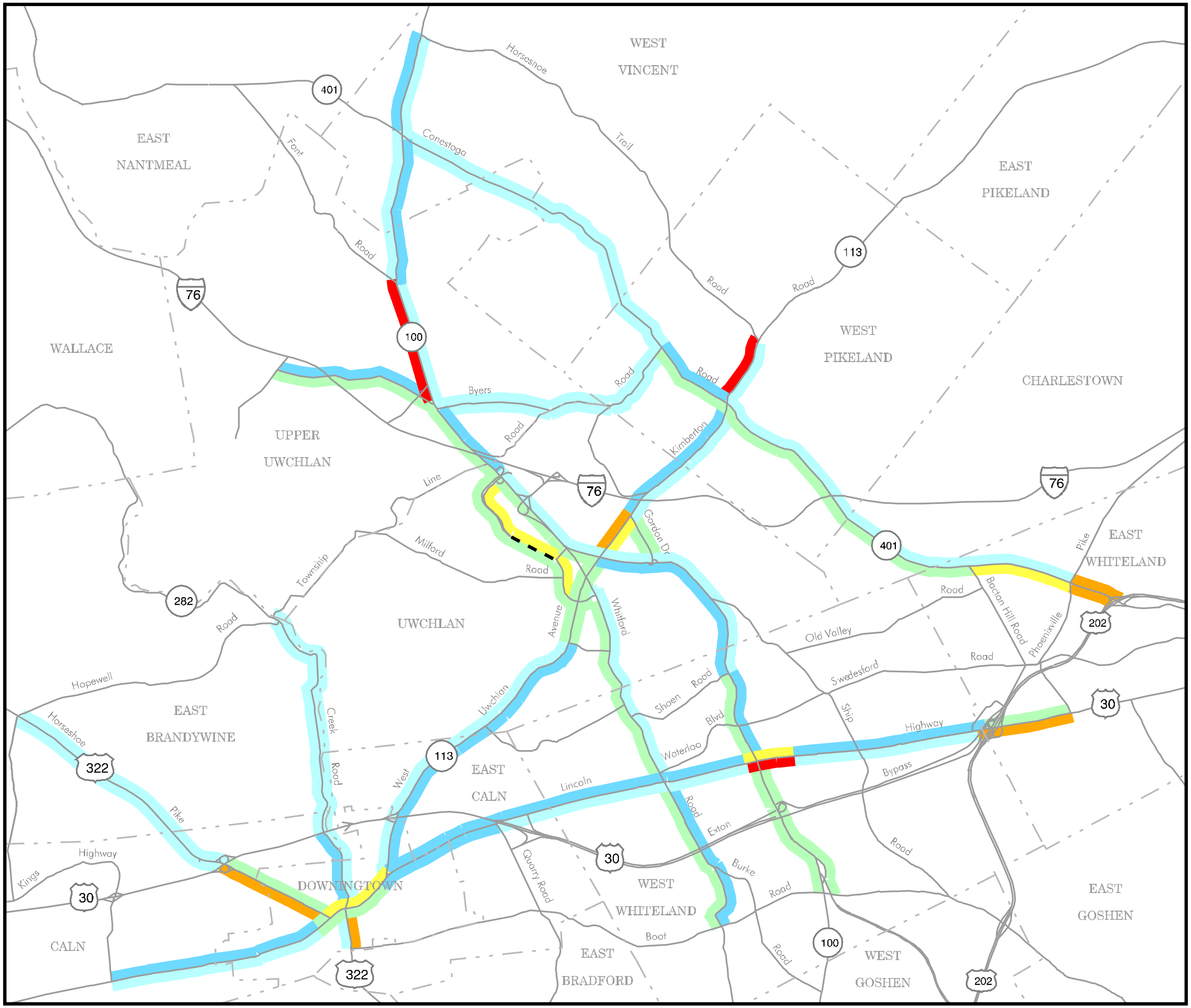


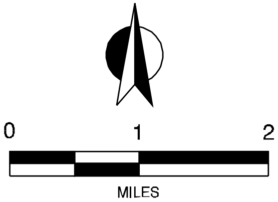


Map 5: *AM Peak Levels of Service*

PA 100 CMS

KEY

- 🟦 Level of Service A
- 🟦 Level of Service B
- 🟩 Level of Service C
- 🟨 Level of Service D
- 🟧 Level of Service E
- 🟥 Level of Service F



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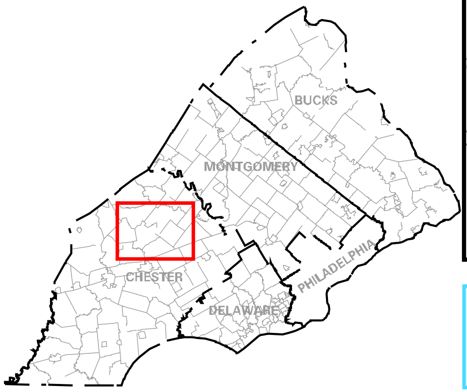

Map 6: PM Peak Levels of Service

PA 100 CMS

KEY

- Level of Service A
- Level of Service B
- Level of Service C
- Level of Service D
- Level of Service E
- Level of Service F

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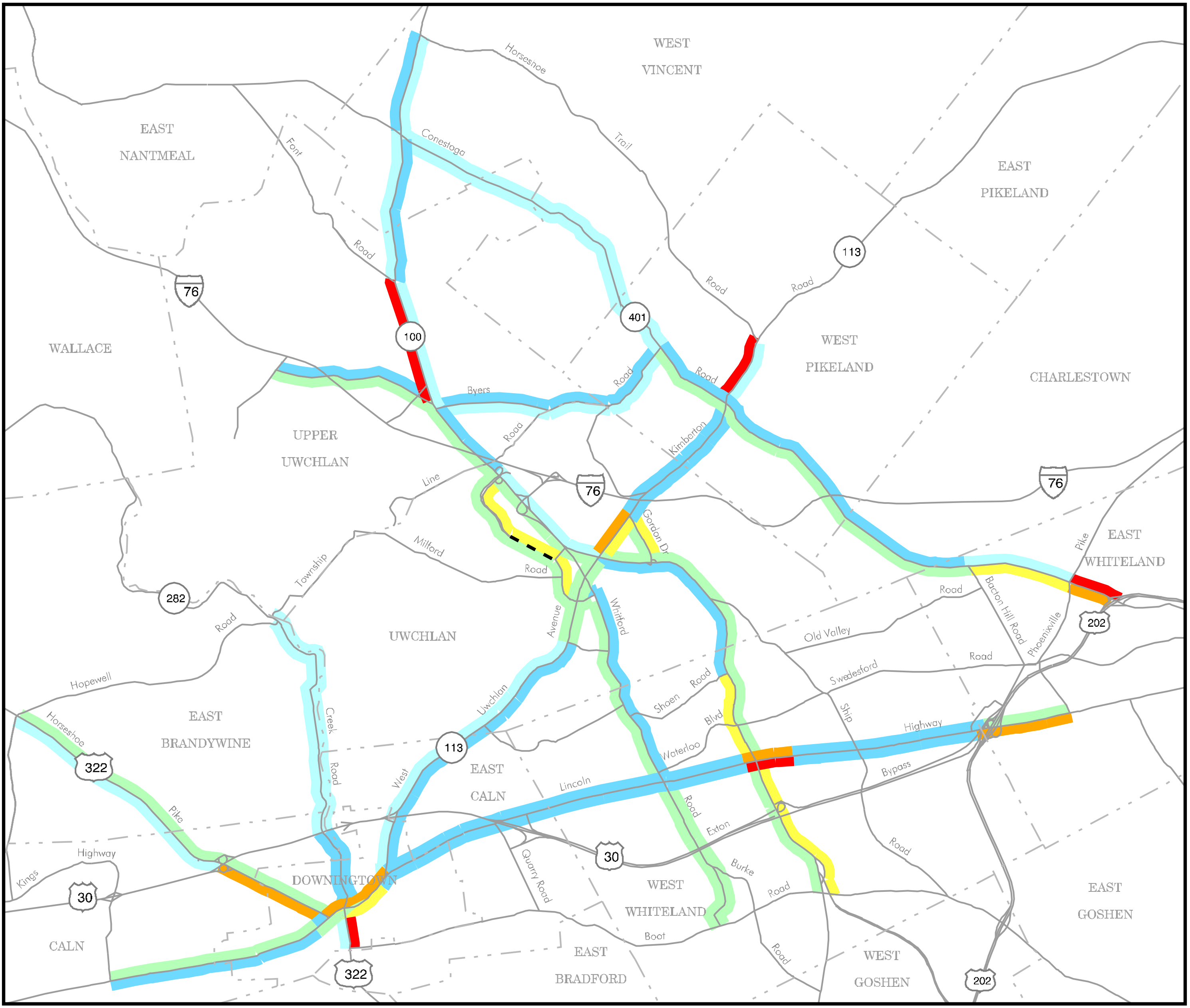
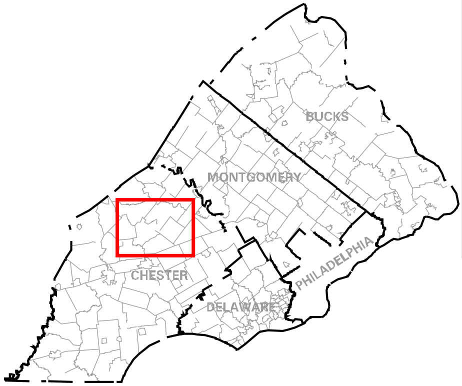




Map 7: AM and PM Worst Levels of Service

V. MOST CONGESTED ARTERIAL SECTIONS

The ten most congested arterial sections are listed based on the travel speed as a percentage of free-flow speed as identified in **Table 1.** The arterial sections were examined based on the existing conditions of the arterial section and immediate vicinity. It should be noted that the Level of Service recorded for each arterial section represents an average for that section. However, there are variations in congestion within each section which may be greater or lesser than the average depending on location of the sub-section. Recommendations were made regarding the policies and actions necessary for reducing current and future congestion. The recommended improvements are coordinated with local, state, and federal construction projects. These improvements include TIP projects, adding capacity to roadways and intersections, ITS elements, and the construction of by-passes.

1. PA 401 from US 202 to Phoenixville Pike

Existing Conditions

This section of roadway is very congested during the AM and PM peak periods. The AM Level of Service is E in both directions. During the PM peak, the westbound traffic experiences Level of Service F. The section is negatively affected by its proximity to the US 202 interchange. The large volume of vehicles exiting the US 202 off-ramp onto PA 401 results in almost gridlock conditions during the PM peak. Congestion at the US 202 interchange with PA 401 results in traffic spilling back up the exit ramp causing congestion on southbound US 202. This situation also causes significant delays for through traffic on PA 401 approaching the US 202 interchange from the east. The average westbound travel speed on PA 401 between US 202 and Phoenixville Pike during the PM peak is less than seven miles per hour. Peak hour traffic bottlenecks as PA 401 narrows from four lanes at the approach to Moores Road, to two lanes between Moores Road and Phoenixville Pike.

Recommended Improvements

a) Coordinate the traffic signals at the Moores Road and Phoenixville Pike intersections on PA 401. This will improve traffic flow through the corridor on PA 401.

b) Widen PA 401 from two to four lanes between Moores Road and Phoenixville Pike. Currently, this link is at almost gridlock conditions during peak periods with speeds averaging between eight and sixteen miles per hour in the westbound direction. PA 401 north of this intersection could remain as two travel lanes.

c) Implement the plans of the US 202 Section 300 project which will add capacity to the US 202 and PA 401 interchange by adding traffic signals and improving traffic flow.

2. US 322 from Boot Road to US 30 Business

Existing Conditions

This corridor is very congested during the PM peak mainly due to a high volume of northbound traffic and a limited amount of green time at the US 30 intersection. The corridor is located in a dense urban setting with one travel lane in each direction. Traffic is constrained by a railroad overpass just north of Boot Road, which, due to its low clearance and narrow travel lanes, impedes the movement of traffic. On-street parking, frequent curb cuts, and driveways further impede the flow of traffic throughout the corridor.

Recommended Improvements

a. Major improvements in travel time can be achieved through traffic signal coordination within the Downingtown section of the US 30 Business corridor. TIP Project # 6911 will coordinate the traffic signals through the Downingtown corridor to include the intersections at Manor Road, Park Lane, and PA 113 to improve traffic flow along US 30 Business . The construction is scheduled to begin after FY02.

b. A right turn lane should be designated at the northbound approach on PA 322 at the US 30 intersection. A through and a right turn lane would permit traffic to clear the intersection more quickly and thereby reduce delays on PA 322. The Downingtown Streetscape Improvement Project will reconfigure and add capacity to the US 322 northbound approach to US 30 Business.

c. Examine the feasibility of reducing on-street parking or consolidate parking along PA 322 in order to minimize interference with the traffic flow.

d. Implementing the Preferred Alternative of the Keystone Opportunity Zone Transportation Needs Report would also mitigate traffic flow on US 30 Business through Downingtown.

3. PA 100 from Font Road to Byers Road

Existing Conditions

This section of PA 100 is a heavily traveled two lane stretch of highway. Southbound PA 100 operates at Level of Service F during the AM peak period. Traffic is congested throughout the entire corridor. Three consecutive unchannelized intersections at Park Road, Little Conestoga Road, and Byers Road severely impede the flow of traffic. There are a large number of vehicles merging onto PA 100 at Little Conestoga that impacts traffic flow on PA 100. The average vehicle delay is over 375 seconds in the southbound direction between Font Road and Park Road in the AM peak. This section of PA 100 is expected to see an increase of traffic volumes due to large residential developments currently proposed along PA 100 just north of the Font Road intersection. At the time the northbound AM peak flow was evaluated, the high levels of congestion were not observed. Subsequently, Level of Service for the northbound PM peak traffic has since deteriorated due to greater volume over capacity and slower speeds. A recent travel time study, conducted by Chester County, revealed that the level of congestion has increased since the original analysis was conducted. Average speeds of 28.7 miles per hour predominates the segment.

Recommended Improvements

a. TIP Project #6782 would improve the intersection of Park Road and PA 100. The intersection would be widened to accommodate left turn lanes on all approaches as well as the installation of new traffic signals. Completion is expected in FY 04.

b. In the long term, TIP Project #6907 would construct a By-pass extending from the I-76 interchange in the south to Fellowship Road in the north. This would remove through traffic from this segment of PA 100 thereby reducing volume and congestion.

c. Improve and widen the shoulders on PA 100 to allow safer passing around left turning vehicles

d. Construct a Park and Ride facility on PA 100 in the northern end of the County which would reduce vehicle trips on the PA 100 corridor.

4. PA 113 from Horseshoe Trail to PA 401

Existing Conditions

The section of PA 113 is one lane in each direction and has few curb cuts. It is a major conduit for commuters from Phoenixville, East Pikeland, and West Pikeland traveling to the south and west. In the AM peak, vehicles are queued over a half-mile from the PA 401 intersection on PA 113. This approach operates at Level of Service F during the AM Peak. All of the approaches at the intersections have only one lane for through, right and left movements. Virtually all of the delay experienced on this corridor on PA 113 is due to the PA 401 intersection (See also Worst Performing Intersections section VI).

Recommended Improvements

a. TIP Project # 6772 will widen the intersection to improve safety and channelization by adding left turn lanes on all four approaches. This increased capacity is expected to reduce delays at the intersection and thereby speed travel time along this corridor.

b. The feasibility of originating bus service from Phoenixville along PA 113 to employment centers in the study area should be explored. This could initially be a subscription bus that would evolve to a fixed schedule full size bus as demand increases. The TMA of Chester County has just initiated bus service along PA 113.

c. The impact of the improvement should be evaluated some time after completion to assess whether further improvement is warranted. If congestion still persists, TDM measures should be promoted through the TMA in an effort to reduce single occupant vehicles.

d. Construct a Park and Ride facility in close proximity to PA 113 in the Phoenixville Borough area to reduce vehicle trips on the PA 113 corridor.

5. PA 113 from Gordon Drive to PA 100

Existing Conditions

This corridor is located in a largely commercial area which includes the Marsh Creek Corporate Center and the Stonebridge Business Center. PA 113 between Gordon Drive and PA 100 is two lanes in each direction, with most of the corridor having a middle turning lane. Delays incurred at the Gordon Drive, Sheree Boulevard, and PA 100 intersections result in the slow progression of traffic. During the AM Peak, the southbound direction on PA 113 experiences a Level of Service of E. Much of the congestion along this segment is a result of delays at the intersection of PA 100 and PA 113. PA 100 is the primary artery for north-south traffic in the study area and is therefore allocated more green time than the PA 113 at the approach at this intersection.

Recommended Improvements

a. Evaluate the traffic signal phasing of the Central Chester County Closed Loop system along the corridor, including the Gordon Drive, Sheree Boulevard, and PA 100 intersections, to optimize traffic flow during peak periods.
b. By promoting regionwide TDM solutions such as telecommuting, compressed work week and ridesharing, traffic volume can be appreciably reduced. Promote the use of the existing Park and Ride lot on PA 113.
c. More effective solutions would require major capital outlay which might not be implementable at this time.

6. US 30 Business from Miller Road to Exton Square Parkway

Existing Conditions

This section of US 30 Business includes the intersection of Miller Road, PA 100, Iron Lake Boulevard, and Exton Square Parkway. It is a major retail and commercial area that consist of the Exton Mall and the Whiteland Towne Center. The commercial centers produce a large number of trips that impact US 30 Business throughout the corridor. PA 100 corridor is also a very heavily traveled arterial in this area. At the PA 100 and US 30 intersection, there is significantly more green time given to the north- and southbound traffic on PA 100 due to heavy traffic volumes. As a result, both the east- and westbound approaches to PA 100 on US 30 Business experience significant delays in both the AM and PM peak periods. Although this intersection has recently been geometrically improved, the through vehicles on US 30 experience low levels of service due to long cycle lengths.

Recommended Improvements

a. Evaluate the loop detector system along PA 100 to increase green time whenever traffic along PA 100 is experiencing excessive delays.
b. Coordinate signals at Miller Road, PA 100, Iron Lake Boulevard, and Exton Square Parkway along the US 30 Business corridor to facilitate the progression of traffic. Set traffic signal phases to reflect peak Exton Mall traffic.

c. Minimize green time for the signalized entrance to Exton Mall in the AM peak. This includes the Iron Lake and Exton Square Parkway intersections. This would not adversely affect Exton Mall traffic because the mall hours of operation occur after the AM Peak.

d. The West Whiteland Town Center project would widen PA 100 to three lanes in each direction from the Exton By-Pass to US 30 Business. A proposed system of loop roads around the development would also alleviate traffic along PA 100 and reduce traffic at the US 30 Business / PA 100 intersection.

7. US 322 from US 30 By-Pass to US 30 Business

Existing Conditions

This section of US 322 includes the intersections of US 30 Business, East Pennsylvania Avenue, Rock Raymond Road, and North Lloyd Avenue. The corridor is one lane in each direction, and much of US 322 has a middle turning lane between East Pennsylvania Avenue and Rock Raymond Road. There is traffic generated on US 322 by US 30 By-Pass interchange just north of North Lloyd Avenue. There are several schools along the corridor on US 322, and AM, midday, and PM traffic is affected by school zone speed limits. This results in slower travel speeds and increased delay. This corridor on US 322 performed at level of service E during the AM peak and level of service D in the PM peak in the southbound direction. The AM southbound delay on US 322 is attributed to delays at the North Lloyd Avenue and Rock Raymond Road intersections, school zones, and the US 30 Business intersection.

Recommended Improvements

a. Coordinate the traffic signals at Rock Raymond Road and North Lloyd Avenue intersections. This would help with the progression of the through traffic and the vehicles entering and exiting US 30 By-Pass.

b. Add a right turn lane on US 322 at the US 30 Business intersection. The lane would require approximately 10 feet of right-of-way. This would significantly reduce delay for the vehicles making a right turn.

c. TIP Project # 6911 will coordinate the traffic signals through the Downingtown corridor to include the intersections at Manor Road, Park Lane, and PA 113 to improve traffic flow along US 30 Business. Improved traffic progression and better signal coordination along the US 30 Business corridor through Downingtown would reduce congestion on the US 322 approach to US 30 Business. The construction is scheduled to begin after FY02.

d. A proposed trail system would link the schools along PA 113 with the adjacent neighborhoods and the Downingtown CBD. A system of pedestrian trails could reduce the number of vehicle trips on PA 113 caused by school related traffic.

8. PA 100 from Boot Road to US 30 Business (Lincoln Highway)

Existing Conditions

The PA 100 / US 202 connector merges with PA 100 between Boot Road and the Exton By-Pass. There is a large volume of traffic coming off the connector during the PM peak which slows at the merge. Through traffic is also affected by motorists using Mountain View Drive, the access road to and from the Exton Station parking lot. Travel speeds on the segment from Boot Road to US 30 Business average eighteen miles per hour during the PM peak. There is also a slow progression of traffic through the US 30 By-Pass southern ramp signal, the US 30 By-Pass northern ramp signal, and at the Bartlett Avenue intersection on PA 100. There are two rail bridges over PA 100 just south of Exton By-Pass interchange. Both structures limit any lane additions on PA 100 in this area.

Recommended Improvements

a. When implemented, evaluate the signal phasing of the closed loop system on PA 100 through the two traffic signals of the Exton By-Pass interchange and Bartlett Avenue intersection to increase the traffic flow.
b. Formalize a pedestrian trail from nearby residential and commercial areas to the Exton Rail Station.
c. Continue the promotion of the Whirl Bus circular service to reduce auto demand. The service currently transports riders from residential areas to the Exton Rail Station.
d. Expand the free Park & Ride lot at the Exton Rail Station to accommodate increasing demand from rail carpooling and rail commuters.
e. As part of the West Whiteland Town Center Project, PA 100 will be expanded to three travel lanes in each direction between the Exton By-Pass and US 30 Business. A system of new loop roads into the new development from US 30 Business will also help alleviate traffic on PA 100.

9. US 30 Business from PA 113 to US 322

Existing Conditions

This section of US 30 Business is located in the CBD of Downingtown. There is one lane in each direction, with some on-street parking located on the north side of US 30 Business between US 322 and Green Street and on the south side between Green Street and PA 113. There is intense commercial development throughout the corridor, and expansion of the road is not practical. The section is congested during both the AM and PM peak periods. Westbound US 30 Business operates at Level of Service E during the PM period, and Level of Service D during the AM peak period. This is a high pedestrian area, and there are no crosswalks at the US 30 Business and Park Lane / Wallace Avenue intersection.

Recommended Improvements

a. TIP Project # 6911 will coordinate the traffic signals through the Downingtown corridor to include the intersections at Manor Road, Park Lane, and PA 113 to improve traffic flow along US 30 Business. The construction is scheduled to begin after FY02.

b. The Downingtown Streetscape Improvement Project, planned for downtown Downingtown, proposes many vehicular and pedestrian improvements to the area. The intersection of US 30 Business and US 322 will also be reconfigured.

c. Examine the feasibility of reducing on-street parking or consolidating parking along US 30 Business in order to minimize interference with the traffic flow.

d. Implementing the Preferred Alternative of the Keystone Opportunity Zone Transportation Needs Report would also mitigate traffic flow on US 30 Business through Downingtown.

10. US 30 Business from US 202 to Planebrook Road

Existing Conditions

This corridor is most congested during the AM period. US 30 Business eastbound operates at level of service E during the AM peak. The US 202 interchange significantly affects the corridor. Vehicles use the US 202 interchange on US 30 Business as an alternative to the PA 401 / US 202 interchange to get to the corporate centers and industrial parks in the area. The Exton By-Pass terminates at the US 202 / US 30 Business intersection. This adds traffic to US 30 Business in the eastbound direction from US 202. The area along US 30 Business between Phoenixville Pike and Planebrook Road is densely commercial.

Recommended Improvements

a. Coordinate the traffic signals from Phoenixville Pike to Planebrook Road to facilitate the flow of traffic.

b. By promoting regionwide TDM solutions such as telecommuting, compressed work week and ridesharing, traffic volume can be appreciably reduced. In particular, the Park & Ride lot at intersection of US 30 and US 202 should be promoted.

c. Examine the effectiveness of widening US 30 Business to provide two through lanes in each direction with a center turn lane.

d. More effective solutions would require major capital outlay which might not be implementable at this time.

VI. WORST PERFORMING INTERSECTIONS

All of the intersections were analyzed based on peak period approach delay in seconds. The ten worst performing intersections are listed in **Table 2.** In **Table 2**, *Approach delay* includes stopped time and time lost when a vehicle decelerates from its ambient speed to a stop. The delay time is displayed with the direction of traffic flow, the peak period in which the delay occurs, and the total delay in seconds. In several cases, multiple legs of the intersection are listed if the delay at additional approaches is significant. **Map 8** shows the most congested intersections are on three important arterials in the study area - PA 100, US 322 and PA 401. Also illustrated are the locations of large commercial, office, and residential developments which are planned for the area. The cumulative effect of the existing congestion and the proposed developments will necessitate improvement of key intersections and highway segments, some of which have already been programmed on the TIP.

TABLE 2

Ten Worst Performing Intersections

	Intersection	Direction	Peak Period	Approach Delay (sec)
1.	**PA 113** at PA 401 **PA 113** at PA 401 **PA 401** at PA 113	SB NB EB	AM PM AM	207 70 86
2.	**US 322** at US 30 Business	NB	PM	197
3.	**US 322** at Hopewell Road	NB	PM	128
4.	**PA 401** at Phoenixville Pike **PA 401** at Phoenixville Pike	WB EB	PM AM	127 106
5.	**PA 100** at S. Exit Ramp of Exton By-Pass	NB	PM	111
6.	**PA 401** at Moores Road **PA 401** at Moores Road	WB EB	PM AM	106 59
7.	**Little Conestoga Road** at PA 100	EB	AM	105
8.	**Eagleview Blvd** at PA 100	NB	AM	99
9.	**US 30 Business** at Park Lane	EB	PM	88
10.	**US 30 Business** at PA 100 **US 30 Business** at PA 100 **PA 100** at US 30 Business	EB EB SB	AM PM PM	85 65 58

PA 100 CMS

🟩 Proposed Development

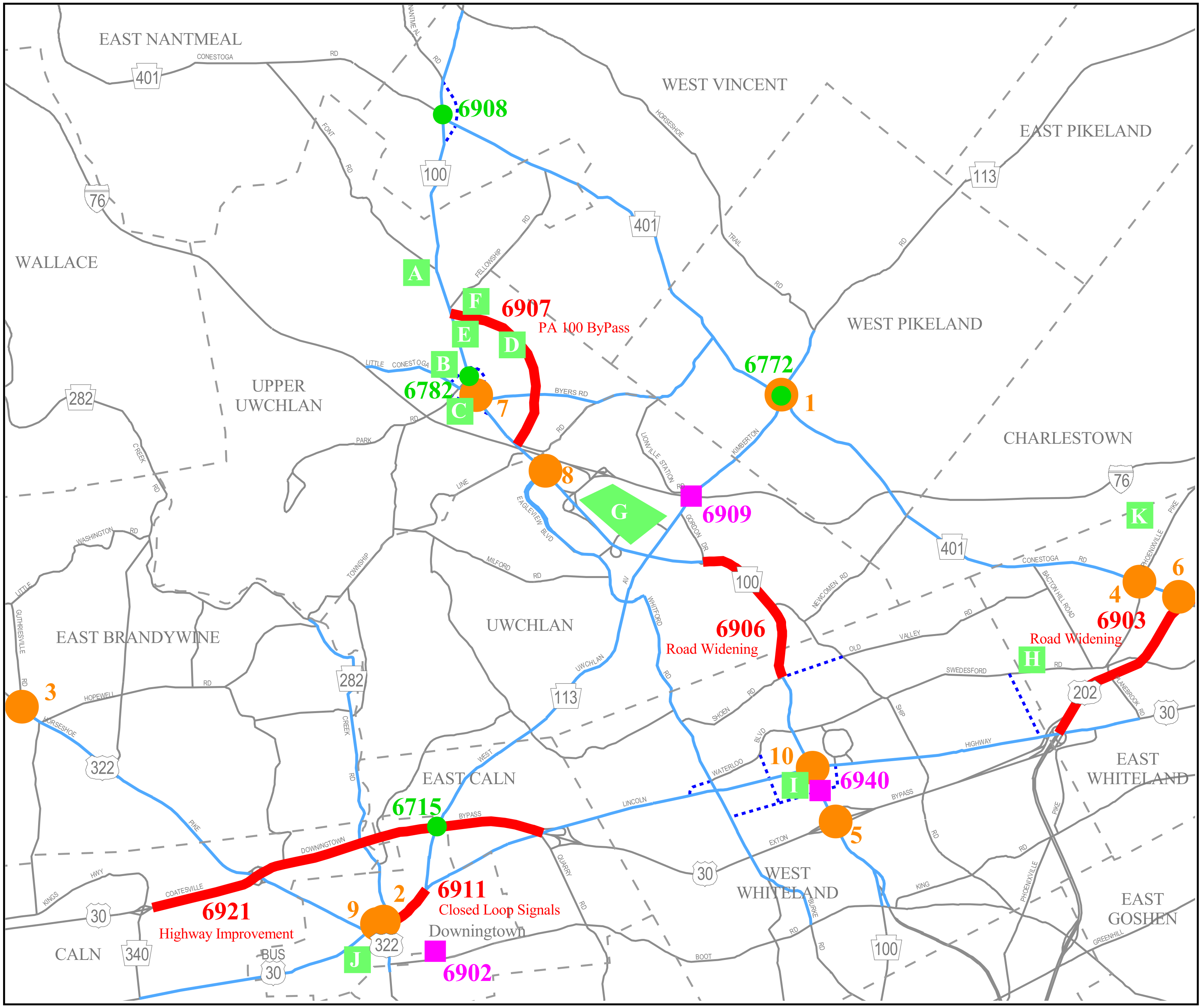
A. The Reserve at Eagle
B. Waynebrook at Eagle
C. Eaglepointe
D. Byers Station
E. Archdiosese of Philadelphia
F. Eagle Hunt
G. Vanguard Corporate Campus
H. Malvern Hunt
I. Town Center
J. Keystone Opportunity Zone
K. Atwater Development

—	Study Area Road
┈	Proposed Road
999	TIP Number
━	Roadway Improvement
●	Intersection Improvement
■	Bridge Improvement
●	Congested Intersection

N

0 0.5 1 1.5 Miles

Delaware Valley Regional Planning Commission
June 2002



Map 8: Most Congested Intersections, Proposed Development & Programmed TIP Projects

An analysis was done on the ten most congested intersections to identify improvement strategies. The following is a description of the congested intersection. Existing conditions were evaluated and recommendations were made to alleviate current and future congestion. The recommended improvements are coordinated with local, state, and federal construction projects. These improvements include TIP projects, adding capacity to roadways and intersections, ITS elements, and the construction of loop roads and by-passes.

1. PA 113 at PA 401

Existing Conditions

This intersection experiences tremendous delay on the southbound approach on PA 113. An average of 207 seconds of delay is experienced on PA 113 on this approach in the AM peak. In the northbound direction on PA 113, drivers incur an average of 70 seconds of delay during the PM peak. The average delay for the eastbound approach on PA 401 during the AM peak was 86 seconds. Each approach of the intersection has only one lane for the right, left and through movements. Motorists frequently use the shoulders to maneuver around left-turning vehicles. The pavement striping is barely visible, and there are no pedestrian crosswalks. The Sunoco Station, located on the southeast corner of the intersection, is used by vehicles to make illegal turns. During peak hours, vehicles turning out of the service station also impede the flow of traffic through the intersection.

Recommended Improvements

a. TIP Project # 6772 will widen the intersection to improve safety and channelization by adding left turn lanes on all four approaches. The right-of-way acquisitions began in FY99, and the construction is underway.
b. Install road designation signs on the crossbar of the traffic signal to assist unfamiliar drivers and improve traffic flow.
c. Traffic flow at this intersection should be periodically evaluated to determine the effectiveness of the planned improvements.
d. Signal phasing should reflect peak hour volumes to improve traffic flow.

2. US 322 / PA 282 at US 30 Business

Existing Conditions

This intersection experiences an average of 197 seconds of delay on the northbound approach during the PM peak. The approach has a left turn lane and a through / right turn lane. The other approaches on US 30 Business are restricted from adding additional lanes due to dense commercial development of Downingtown. There is a split phasing cycle on US 30 Business in both directions. Curbside parking on US 322 between the rail overpass and US 30 Business, and numerous curb cuts throughout the corridor also increase delay. This area is also has high pedestrian activity throughout the CBD, and there are no crosswalk signals and the pavement markings are badly faded.

Recommended Improvements

a. TIP Project # 6911 will coordinate the traffic signals through the Downingtown corridor to include the intersections at Manor Road, Park Lane, and PA 113 to improve traffic flow along US Business 30. The construction is scheduled to begin after FY02.

b. Further evaluate the Park Lane, Wallace Avenue, and US 30 Business intersection to implement an improved signal phasing system. This would reduce overall intersection delay.

c. Realign the northbound approach of US 322 at US 30 Business to improve channelization.

d. Incorporate road designation signs on the crossbars at all approaches to assist unfamiliar drivers.

e. Introduce crosswalk signals for pedestrians and upgrade and maintain crosswalks and intersection striping. This measure would optimize pedestrian flow throughout the Downingtown Central Business District.

f. The Downingtown Streetscape Improvement Project, planned for downtown Downingtown, proposes many vehicular and pedestrian improvements to the area. The Borough's priority is to optimize pedestrian movement in this area. As a result, vehicular traffic flow may be compromised.

g. Implementing the Preferred Alternative of the Keystone Opportunity Zone (KOZ) Needs Analysis would also mitigate traffic flow on US 30 Business through Downingtown. One scenario would reduce the vehicular demand at the intersection of US 322 and US 30 by providing an alternate route for these vehicles. This would include the extension of Manor Avenue (US 322) from US 30 to Brandywine Avenue via a bridge over Brandywine Creek. There would also be a connection from the Manor Avenue extension to the KOZ.

3. US 322 at Hopewell Road

Existing Conditions

The westbound approach of US 322 at Hopewell Road is congested during the PM peak. The eastbound approach experiences congestion in the AM peak. Both approaches of US 322 have a left turn lane and one through / right turn lane. Vehicles experience 128 seconds of delay on the northbound approach of the intersection. US 322 has left turn lanes in both directions, although there is no permitted phasing for turning vehicles. Delay can be attributed to the high volumes of westbound traffic in the PM peak. There is commercial development on three corners of the intersection. Numerous curb cuts at the intersection also contributes to additional delay.

Recommended Improvements

a. Optimize all phases of the signal timing to increase green time to the east- and westbound traffic on US 322 during peak periods. As residential and commercial developments continue to increase in the vicinity of the US 322 / Hopewell intersection, future eastbound AM peak volumes on US 322 is also expected to significantly increase.

b. Install road designation signs on the crossbar of the traffic signal to assist unfamiliar drivers.

c. Extend northbound approach left turn lane to accommodate more vehicles. This would help to avoid queued vehicles blocking the through and right turn lane. A protected left turn signal at this approach to increase traffic flow during peak periods should be also be considered.

d. Locate a Park and Ride facility west of the Hopewell Road intersection on US 322 to reduce vehicle trips in the area.

4. PA 401 at Phoenixville Pike

Existing Conditions

The east-west traffic on PA 401 is heavily congested in both the AM and PM peaks. During the AM Peak, the westbound approach traffic experiences an average of 127 seconds of delay, while the eastbound approach traffic experiences 106 seconds of delay during the PM Peak. Both approaches have left turn lanes and through lanes. The southbound approach of Phoenixville Pike has one left and one through lane with a protected left turn signal, while the northbound approach has only one lane for all movements. The signal cycle phasing is split on the north and south approaches on Phoenixville Pike, which increases delay. The intersection experienced very high volumes on the westbound approach due to traffic coming off US 202 during the PM peak. The Moores Road intersection is located approximately a third of a mile east of Phoenixville Pike on PA 401, and traffic is heavily congested through the area during peak periods. The Great Valley High School, located just north of this intersection on Phoenixville Pike results in high volumes turning onto the northbound leg of Phoenixville Pike during the AM peak. The split phasing and high peak volumes result in a Level of Service F in peak periods.

Recommended Improvements

a. Coordinate the traffic signals at Moores Road and Phoenixville Pike intersections on PA 401 to improve traffic flow.

b. Add a right turn lane on PA 401 on the westbound approach to improve congestion for the large number of vehicles turning onto Phoenixville Pike.

c. Adjust the signal timing to provide more green time to the east and westbound traffic in PA 401 during peak periods to improve traffic flow on PA 401.

d. The US 202 Section 300 project will add additional capacity to the US 202 and PA 401 interchange, improving traffic flow and adding traffic signals.

5. PA 100 at South Side Exit Ramp of Exton By-Pass

Existing Conditions

The PA 100 / US 202 Connector merges with PA 100 between Boot Road and the Exton By-Pass. There is a large volume of traffic coming off the Connector during the PM peak. The traffic becomes congested from the traffic signals at the Exton By-Pass through the merge area of the PA 100 / US 202 Connector. Travel speeds on this segment average eighteen miles per hour during the PM peak. There is also a slow progression of traffic through the south exit ramp signal, the north exit ramp signal, and the at the Bartlett Avenue intersection on PA 100.

Recommended Improvements

a. When implemented, evaluate the traffic signals on PA 100 through the two traffic signals of the Exton By-Pass interchange and Bartlett Avenue intersection to increase the traffic flow.

b. As part of the West Whiteland Town Center Project, PA 100 will be expanded to three travel lanes in each direction between the Exton By-Pass and US 30 Business. A system of new loop roads into the new development from US 30 Business will also help alleviate traffic on PA 100.

c. A proposed Intelligent Transportation Systems element on the US 30 By-Pass would monitor traffic conditions and alert drivers of any adverse situations.

6. PA 401 at Moores Road

Existing Conditions

This intersection is heavily affected by the PA 401 and US 202 interchange. During the PM peak, vehicles are queued from the Moores Road intersection onto the US 202 southbound exit ramp. There is insufficient merge area on the westbound exit ramp from US 202. Vehicles needing to make a right turn at Moores Road off the US 202 ramp will often drive on the shoulder to avoid merging altogether. The westbound leg has one through lane, a shared through/left turn lane, and a right turn lane. The right turn lane has only enough capacity for two or three vehicles, and there is a weaving conflict between the vehicles merging off US 202 and the vehicles making a right turn at Moores. PA 401 westbound also narrows from two to one lane in each direction immediately past the Moores Road intersection, resulting in additional delays.

Recommended Improvements

a. Coordinate the Moores Road and Phoenixville Pike traffic signals on PA 401 to increase the progression of traffic during peak periods.

b. Increase the capacity on PA 401 between Moores Road and Phoenixville Pike from two to four lanes to accommodate traffic making a right turn onto Phoenixville Pike that are destined for the schools and corporate office parks.

c. The US 202 Section 300 project will add capacity to the US 202 and PA 401 interchange by improving traffic flow and adding traffic signals.

7. Little Conestoga Road at PA 100

Existing Conditions

The approach on Little Conestoga Road to PA 100 is very congested during the AM Peak. Both PA 100 and Little Conestoga Road are one lane in each direction. The approach leg of Little Conestoga at PA 100 has one lane to make the right turn; left turns are prohibited. Traffic in the AM peak is congested on PA 100, and traffic on Little Conestoga is delayed while trying to make a right turn onto PA 100. Traffic on PA 100 is slowed due to heavy volumes and vehicles making a left turn onto Byers Road, which is less than one-tenth of a mile south of the PA 100 / Little Conestoga Road intersection. If a vehicle is turning left during the heavy morning volumes, the traffic quickly backs up past the Little Conestoga intersection. Heavy volumes on PA 100 result in 105 seconds of delay for vehicles on Little Conestoga Road. Vehicles frequently use the shoulder to get around left turning vehicles on PA 100 at Byers in the southbound direction and on PA 100 at Little Conestoga in the northbound direction. Many of the causes of delay throughout the Byers / Little Conestoga / Park section on PA 100 experienced in the AM peak in the southbound direction are also experienced on PA 100 during the PM peak in the northbound direction. The parking lot of the Eagle Tavern, located on the northeast corner of the intersection, also poses a hazzard. Vehicles have a difficulty entering and exiting the parking lot during peak hours. Vehicles often cut through the Eagle Tavern lot to make an illegal turn.

Recommended Improvements

Short term:

a. Improve and widen the shoulders on PA 100 to allow safer passing around left turning vehicles.

b. Erect warning signs on PA 100 to alert motorists of slowed or stopped traffic at Little Conestoga Road due to large volumes of merging traffic.

c. TIP Project # 6782 would eliminate the left turn from PA 100 onto Little Conestoga Road and shift the left turn movement to Park Road. The Park Road / PA 100 intersection would also be widened on all approaches and install a new traffic signal.

Mid term:

a. TIP Project # 6907 would construct a two lane PA 100 loop road from the Pennsylvania Turnpike to Fellowship Road. The alignment of the loop road would be to the east of Eagle Road. This loop road, called Eagle Loop Road, would greatly reduce traffic volumes through the Park Road, Little Conestoga Road, and Byers Road intersections. The design and construction of the loop road is scheduled for some time after FY02.

b. Upper Uwchlan Township is proposing Eagle Point Boulevard to connect Park Road with PA 100. This would relieve traffic congestion at PA 100 and Little Conestoga Road.

Long term:

a. The proposed loop road TIP Project #6907, would expand PA 100 to five lanes.

8. Eagleview Boulevard at PA 100

Existing Conditions

Eagleview Boulevard, at PA 100, is the entrance to the Eagleview Corporate Park. The traffic exiting the Eagleview Park at PA 100 experiences long delays due to the extend cycle lengths. The traffic signal cycle favors PA 100, due to larger volumes of traffic. During PM peak, not all of the queued vehicles on Eagleview Boulevard can clear the PA 100 intersection, and must wait a second cycle. Vehicles at the eastbound approach on Eagleview Boulevard experience an average of 54 seconds of delay.

Recommended Improvements

a. Allow slight adjustments in the signal timings during the PM peak period to allow for the exiting traffic from the Eagleview Corporate Park.
b. Conduct further analysis at this intersection in the future as Eagleview development and related traffic volumes increase.

9. US 30 Business at Park Lane

Existing Conditions

The US 30 corridor is very congested during both the AM and PM peak periods. The average travel speed during the PM peak eastbound from Manor Avenue to Park Lane and from PA 113 to Park Lane in the westbound direction is less than five miles per hour. During the AM peak, from Green Street to Park Lane, the average travel speed is just six miles per hour. This intersection is located in the CBD of Downingtown, an intensely commercial urban setting, and adding capacity to the intersection is not feasible. The westbound approach on US 30 has a right turn lane and a left / through lane. The eastbound approach has a left turn lane and a right / through lane. This is an area of high pedestrian activity, and there are no pedestrian crosswalks at the intersection.

Recommended Improvements

Improvements to this intersection should be done in concert with those recommended for #2, US 322 / PA 282 at US 30 Business, which is in the same general area.

a. TIP Project # 6911 will coordinate the traffic signals through the Downingtown corridor to include the intersections at Manor Road, Park Lane, and PA 113 to improve traffic flow along US Business 30. The construction is scheduled to begin after FY02.
b. Install pedestrian signals and crosswalks at the intersection to serve the pedestrian traffic of the CBD.
c. The Downingtown Streetscape Improvement Project, planned for downtown Downingtown, proposes many vehicular and pedestrian improvements to the area. This measure would optimize pedestrian flow throughout the Downingtown Central Business District.
d. Implementing the Preferred Alternative of the Keystone Opportunity Zone Needs Analysis that would also mitigate traffic flow on US 30 Business through Downingtown.

10. US 30 Business at PA 100

Existing Conditions

PA 100 and US 30 Business are both heavily traveled corridors in the region. There are also major commercial areas located within the vicinity, including the Exton Mall. Subsequently, this intersection experiences delays on all approaches during the peak periods due to the heavy traffic generated by the commercial activity and daily commuters. Additional lanes have recently been added to the intersection. There are no pedestrian crosswalks at the intersection. All approaches have right-turn only lanes, and the approaches on US 30 have two left-turning lanes. Much of the delay is due to heavy volumes, especially on north- and southbound PA 100.

Recommended Improvements

a. Evaluate the traffic signal timing to improve phasing during peak hours.
b. Due to the recent reconstruction of the PA 100 and US 30 intersection, traffic patterns should be evaluated in the future to evaluate the recent improvements.
c. Reduce background volumes by instituting TDM measures.
d. As part of the West Whiteland Town Center Project, PA 100 will be expanded to three travel lanes in each direction between the Exton By-Pass and US 30 Business. A system of new loop roads into the new development from US 30 Business will also help alleviate traffic at the US 30 Business / PA 100 intersection.

A summary of arterial and intersection strategies is listed in **Table 3**. The improvements recommended for the intersections are site specific, while the arterial improvements may apply to all or parts of the arterial section.

TABLE 3

Summary of Arterial and Intersection Strategies

	Location	Signal Coor.	Signal Timing	Parking Study	Intersection Widening	Road Widening	Shoulder Improv.	Left Turn Lane	Right Turn Lane	Left Turn Signals	Pedestrian Crosswalks	Overhead Street Signs
1.	**PA 113** at PA 401		X		X			X		X		X
2.	**PA 113** at PA 100	X	X									
3.	**PA 113** between Gordon Drive and PA 100	X										
4.	**US 322** at US 30 Business	X	X		X				X		X	X
5.	**US 322** between Boot Road and US 30			X								
6.	**US 322** at Hopewell Road		X		X					X		X
7.	**US 322** between North Lloyd Avenue and Rock Raymond Road	X	X				X					
8.	**PA 401** at Phoenixville Pike	X	X		X				X			
9.	**PA 401** at Moores Road	X			X		X		X			
10.	**PA 401** between Moores Road and Phoenixville Pike					X	X					
11.	**PA 100** at Little Conestoga Road						X					
12.	**PA 100** at Park Road				X			X				
13.	**PA 100** at Eagleview Boulevard		X									
14.	**PA 100** at Exton By-Pass	X										
15.	**US 30 Business** at Park Lane	X		X							X	X
16.	**US 30 Business** from Miller Road to Exton Square Parkway	X	X									
17.	**US 30 Business** at PA 100		X		X	X						

VII. TRANSIT SERVICE

Transit service within the study area is primarily concentrated along the PA 100 and US 30 corridors. As can be seen from **Map 9**, *Public Transportation Network*, all public transit within the study area is provided by Southeastern Pennsylvania Transportation Authority (SEPTA), AMTRAK and Krapf's Transit. SEPTA's R-5 Thorndale / Paoli line, is the sole commuter rail line in the study area. AMTRAK's intercity service via its Keystone Service provides high speed service between Harrisburg, Philadelphia, and New York. AMTRAK's Pennsylvanian trains provides regional connections to New York, Philadelphia, and Pittsburgh. SEPTA Route 92 Bus (Exton - West Chester), SEPTA's Route 204 bus, and Krapf's Transit bus Route A provide local bus service. The Transportation Management Association of Chester County (TMACC) provides scheduled shuttle bus service to major employment sites in the area with the Phlyer. West Whiteland Township and SEPTA operate the WHIRL bus which serves the Exton, Whitford, Whiteland Towne Center, Exton Square Mall, and the Oaklands Corporate Center.

Based on 2000 census numbers, only 2.6% of Chester County's residents commuted to work by public transportation. This is a decrease of 0.3 % from 1990. Rail transit is oriented towards Center City Philadelphia, the traditional employment center. Suburb to suburb transit access is made possible in cases where connecting bus service from train stations to employment sites exist. Several bus shuttles connecting the Exton rail station with outlying office parks and retail centers are in operation.

R5 Regional Rail Service

The R5 provides frequent daily service to the sections of the study area in the vicinity of US 30. Downingtown, Whitford, and Exton stations provide park and ride lots for SEPTA patrons at these stations. There are six AM peak trains and a total of 9 inbound weekday AM trains which serve all three stations in the study area. Overall, 17 inbound trains depart from Downingtown Station between 5:56 AM and 10:47 PM, while there are 19 outbound weekday trains arriving at the same station between 7:47 AM to 1:16 AM. These trains also serve the Whitford and Exton stations.

Downingtown Station is accessible from US 30 and Viaduct Road. There are also connections to AMTRAK and Krapf's Transit Route A. According to SEPTA's 1999 ridership census, 386 passengers board the train to Center City Philadelphia from Downingtown Station. SEPTA's December 2000 counts show a total of 213 daily parking spaces at this station with all 213 spaces being utilized. There are also 99 city spaces available with 53% being utilized. Long term on-street parking is not permitted on US 30 Business or on Viaduct Road which are adjacent to the station. A plan is in place to develop a vacant lot which exists at the station fronting US 30 Business to be used for additional commuter parking.

Whitford Station is located at Whitford Road and Spackman Lane just south of US 30 By-Pass. It is accessible from Boot Road in the south and US 30 Business (Lincoln Highway) in the north. A 1999 SEPTA census shows a total of 195 passengers boarding the train to Center City Philadelphia from this station. The station has a total of 280 spaces based on a December 2000 survey by SEPTA, of which 230 are daily spaces and 50 are free spaces. At the time of the survey,

PA 100 CMS

● Rail Station

🟥 R-5 SETPA Rail/ Amtrak

┈ Proposed Road

🟧 Krapf's Transit

┄ Whirl Commuter

🟩 Whirl Circulator

SEPTA Bus Routes

🟦 204

┈ 204 (express)

🟪 92

– – 133

N

0 0.5 1 1.5 Miles

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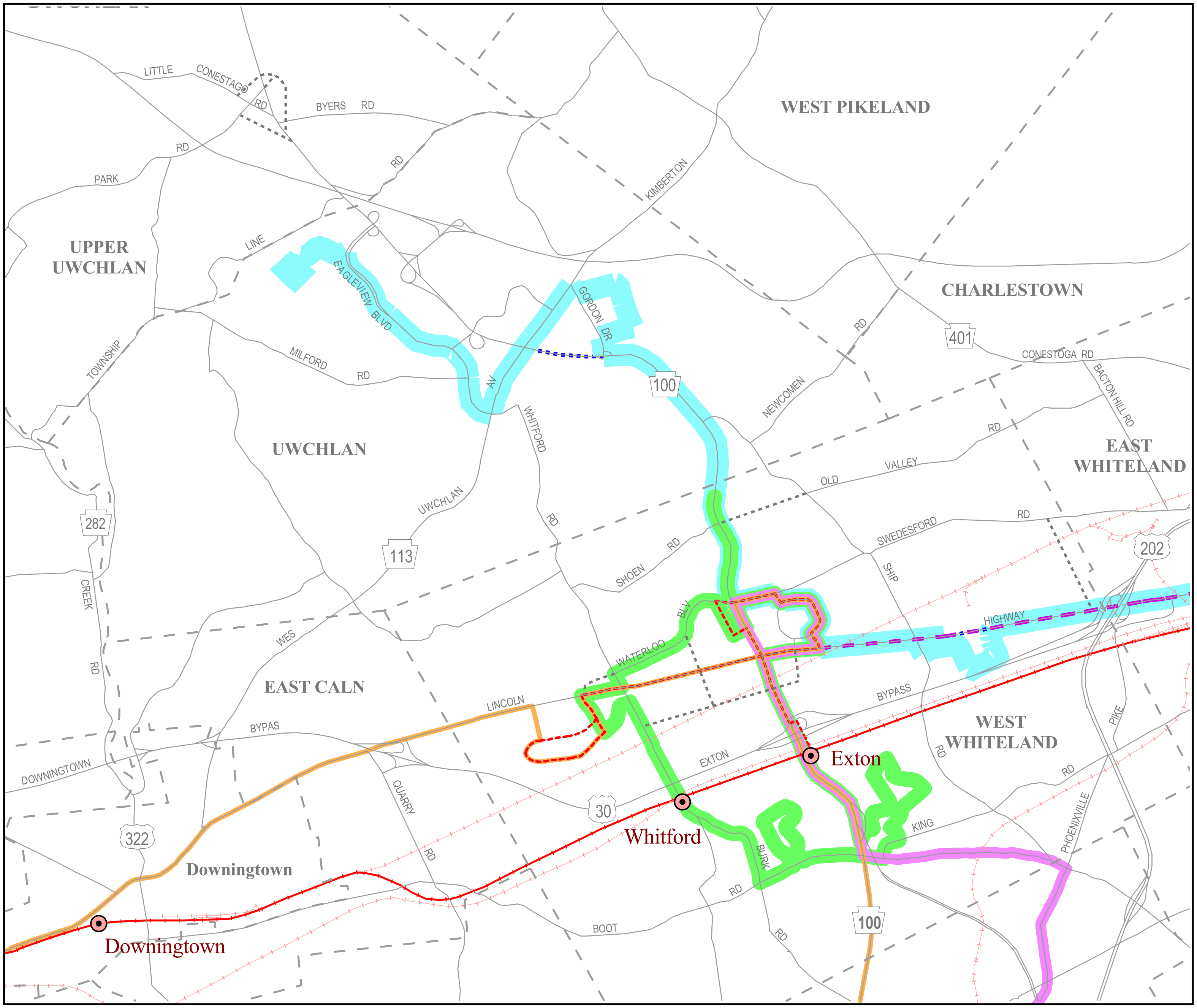

Map 9: Public Transportation Network

142 of the daily spaces were utilized while 37 of the permit spaces were utilized. There is an unpaved lot parallel to the station, which has a capacity of approximately 20 cars. This lot is usually fully utilized.

Exton Station is the easternmost station in the study area. It is accessible by PA 100, US 30 and US 202. It has a regional function due to its centralized location. Connections can be made here to the # 92 SEPTA bus, which plies between West Chester and Exton Mall, AMTRAK, three Whirl bus lines, and Krapf's Transit Route A. Based on the December 2000 SEPTA survey, this station has a total of 220 daily spaces and 116 free spaces, all of which are utilized. There are also 88 permit spaces of which 66 are utilized. According to SEPTA's 1999 ridership census, a total of 416 passengers board the R5 train to Center City at Exton Station. With all daily and most permit spaces utilized, the demand for commuter parking at this station is therefore acute.

Bus Service

Bus transit service within the corridor has an orientation towards West Chester, the county seat, rail stations, and major employment sites. SEPTA Route 92 serves the area from Exton to West Chester, with PA 100, Boot Road, Phoenixville Pike, Marshall Street, and High Street being the primary thoroughfares. It serves two primary functions. First, it acts as a connector between the Exton train station and the major employment centers in the area such as the Exton Mall. Second, it provides access to and from West Chester and some of the corridor's largest residential and employment sites. There are six inbound buses in the AM and 10 outbound buses in the PM on this route. Buses operate on one hour headways in both directions, with the first departure from Exton Mall at 6:50 AM and the last departure at 9:50 PM.

SEPTA's Route 204 bus is operated by Krapf's Coaches and serves the area from Eagleview Corporate Park to the Paoli train station, using PA 100 and Lincoln Highway as the primary thoroughfares. The major employers served by this route consist of the Pickering Creek Industrial Park, Whiteland Business Park, and Eagleview Corporate Park. It also serves several retail centers, including the Exton Square Mall and the Lionville Shopping Center. There are four eastbound AM departures from the Eagleview Corporate Park, while there are seven AM arrivals at the same location. There are a maximum of 16 eastbound departures on this route each day with service concentrated at the Exton Mall.

Krapf's Transit Route A bus serves the Exton Mall, West Chester, and communities along US 30. There are 12 eastbound and 12 westbound buses that serve this area daily. The first bus departs Strode Avenue in Coatesville at 6:00 AM while the last bus departs the same location at 6:00 PM.

The Phlyer serves the area from the Spring City, Phoenixville Great Valley Corporate Center to the Exton Square Mall. There are four AM departures from Spring City, with the first at 5:35 AM and the last at 11:40 AM. There are five PM departures from Exton Square Mall, with the first at 1:05 PM and the last at 9:50 PM.

There are three Whirl bus routes that provide service to the area. The Whirl Circulator is the "get around town bus" which provides loop service through West Whiteland. It has three weekday AM departures from the Oaklands Corporate Center and 11 weekday PM departures from the same location. The Whirl Commuter / Oaklands Corporate Center Route provides weekday service for reverse commuters from the Philadelphia area to the workplaces in the Exton area, Whiteland Town Center, and Oaklands Corporate Center via the R5 Regional Rail line. There are three AM arrivals and two PM departures from Exton station. The Whirl Commuter / Indian King Route provides weekday service for persons commuting to the R5 train from Exton to Philadelphia or to Thorndale. There are five AM arrivals and five PM departures at the Exton Station.

CMS Benefits of Transit Service Improvements

New or improved transit service is only a valid CMS strategy so far as it attracts travelers, particularly commuters, who would otherwise drive. To manage traffic congestion by transit service improvements or transit use incentives, it is necessary to identify elements that may convert travelers who choose to drive to become transit passengers. An analysis of such factors is as follows:

- Travel Time - With the exception of rail transit service from the western end of the corridor into Philadelphia, transit travel times compare unfavorably with driving. Because suburban employment centers are dispersed, bus transit is the only viable transit option. Slow bus traffic, due to congestion and frequent stops, negatively affects travel times. The delays in transit travel time is further exacerbated by the time spent accessing and waiting for transit, and making connections before reaching the final destination.

- Cost - For commuters that currently drive, it is reasonable to assume that they have already taken steps, intentionally or by economic necessity, to minimize their costs associated with driving. Employer paid transit vouchers are the most direct incentive to encourage transit use, particularly if the employer does not offer parking compensation or other payment options. Parking restrictions and price increases at driver destinations may also swing the financial advantage to transit.

- Frequency of Service - The fact that a car is available whenever the driver wants it is a transit-use deterrent for many commuters. Transit, on the other hand, forces passengers to conform their schedule to transit service times. Frequency is constrained by the demand for service and the resources of the transit operator, but can often be improved within these constraints by measures such as smaller, more frequent buses or trains to a point where infrequent service is not a reason to avoid transit. If service is every 40-minutes, the employee who has to work 10-minutes later than planned is unlikely to view transit as a satisfactory alternative to driving. If the headway is every 15-minutes, it is unlikely that frequency would deter anyone not wholly opposed to taking transit.

- Comfort and Convenience - These subjective lifestyle issues play a significant role in transportation mode choice and should be integral to all services. Recognizing the lack of potential to capture new transit riders by travel time improvement or cost, and, usually the lack of demand or funding to increase frequency, comfort and convenience become pivotal factors for improvement.

Transit must become competitive in terms of travel time, convenience, and lifestyle, if it is to be a viable option for those currently commuting by automobile. Several deficiencies exist which, if addressed, could increase the transit share in the region and therefore have a positive impact in mitigating congestion.

Recommended Improvements

A. Immediate

- Trailblazer Signs - Erect "trailblazer" signs at strategic locations along arterials within the corridor (US 202, US 30, PA 100, Boot Road, and Whitford Road) to indicate the direction to the nearest or most convenient point of access for SEPTA's rail stations. These signs would increase the visibility of transit as a travel mode. Signs should also be placed along US 30, PA 100, and PA 113 to direct drivers to the park and ride lots at US 30 at the US 202 interchange in East Whiteland Township and on PA 113 at PA 100 in Uwchlan Township. It is recommended that the trailblazer assembly be designed to include the appropriate SEPTA train/bus symbol and a single-headed, directional arrow pointed along the route leading to the facility.

- Improve Station Access - Improve approaches to station area by providing adequate lighting, as well as safe and unimpeded accessways for pedestrian traffic. The Downingtown Station in particular needs sidewalks, crosswalks, pedestrian actuation where appropriate, and other pedestrian improvements to provide safe pedestrian access. A pedestrian bridge over PA 100 should be constructed at the Exton Station to provide better pedestrian access.

- Waiting Areas - Improve waiting areas at transit stations by providing adequate shelter such as canopies, benches, and glass windscreens designed for customer comfort. Since the value of transit as a congestion reduction measure is to serve commuters who could otherwise drive, such measures must compete with comfort and convenience of a private vehicle. Most stations along the R5 line have been renovated over the past few years and are in need of only minor improvement.

- Bus Stop Shelters - Erect shelters at existing bus stops, where appropriate, along the major bus corridors such as PA 100, PA 113 in Lionville, Eagle View Boulevard, and US 30. These shelters should be made accessible by having paved walkways on their approach and having appropriate seating and glass windscreens to enhance customer comfort. A current bus schedule should be posted at each bus stop for each route as well as transfer points for intersecting buses and trains. This will increase the attractiveness of transit and could result in a corresponding decrease in auto travel.

- Location of Bus Stops - Where feasible, parking bays that remove buses from the traffic stream while loading and unloading should be constructed. This will encourage bus use by making the service more attractive and safe and reduce delay for other vehicles on the roadway.

- Bicycle Parking - Bike racks that are functional and secure should be provided at all railroad stations. Bicycle lockers are not provided at any station along the R5 line within the study area. Since bicycles are not permitted on trains during peak periods, bicycle commuter's access to transit is discouraged by a lack of secure storage at the regional stations. A CMS commitment has been made by SEPTA for improvements related to US 202, which will include installing bike lockers at all rail stations in the study area.

B. Long Term

- Parking **-** Provide adequate parking at transit stations to accommodate current demand and projected future growth in transit ridership.

  SEPTA maintains park-and-ride lots at the three R5 rail stations within the study area. These SEPTA-owned parking lots provide a total of 917 spaces, which include daily as well as monthly permit users. In addition to the SEPTA lots, there are 99 municipal parking spaces at the rail stations. A field inventory of parking indicates that there is generally more demand for parking than space provided. In most locations, there are no alternatives to park near the station other than in the SEPTA lot. The lack of parking at some stations makes commuting by train unavailable, or at best an unreliable choice for an unknown number of commuters who comprise a latent demand. Furthermore, the lack of parking negates much of the potential to attract new riders.

- Increased Frequency - An alternative would be to examine the feasibility of increasing the number of express trains that serve the heavy loading stations, particularly the Exton station, during the peak period. The feasibility of operating a second "Great Valley Flyer" should be considered based on peak demand.

- Circulator Bus Service - Study the feasibility of circulator bus service for all types of development in the study area and for commercial development in areas that may be served by transit from the corridor.

  Rather than providing inadequate service for a large number of origins and employment centers, it is more desirable to serve routes with the most promising trip demand and employer / community support.

Table 4 provides a summary of the transit strategies and station enhancements that should be employed at or close to regional rail stations within the corridor that will facilitate increased rail ridership.

TABLE 4

Summary of Transit Strategies

R5 Regional Rail Station	Trailblazer Signs on Approach Roads	Station Facade Rehab.	Improve Pedestrian Access	Improve Station Amenities	Bike Racks	Additional Parking*
Exton	X	X	X	X	X	X
Whitford	X		X	X	X	
Downingtown	X	X	X	X	X	X

* Parking lots at these stations may have a few empty general spaces, or unused permit spaces or handicap spaces. However, full utilization of outlying spaces and the presence of illegally parked vehicles indicate that commuters can not rely on finding a space; the lots are effectively beyond capacity.

VIII. 2025 JOURNEY-TO-WORK TRAVEL PATTERNS

In applying the DVRPC travel demand forecasting model in the study area, the nine-county Delaware Valley region was divided into 43 traffic analysis Zones (TAZs). All or part of Zones 1 through 5, Zones 7 through 10, Zone 12, Zone 14, and Zones 18 through 20, falls in the PA100 corridor study area. Person, vehicle, and transit home-based work trips were run separately in the forecast model. Most trips were internal trips (trips starting and ending in the same zone). Trip patterns indicate a trend of trips from many origins to many destinations. To better analyze these trends, seven superzones (a combination of several traffic analysis zones outside of the study area) were created. Travel to and from these superzones to the study area was evaluated, as was travel between the zones within the study area.

Person Trips

Table 5 illustrates the major municipal origins and destinations for person trips within the study area. This is followed by a series of tables and maps which provide a detailed analysis of person trips by zones.

Zone 1

Zone 1 is located primarily in the southeastern quadrant of the study area and is comprised entirely of the township of West Whiteland. It is located at the transportation nexus of US 30 and PA 100, which provides regionwide highway and transit access. As can be seen from **Table 6** and **Maps 10** and **11**, the year 2025 forecast shows a total of 49,804 Home Based Work (HBW) person trips entering this zone and 21,995 HBW person trips originating in this zone. These figures include a total of 6,037 internal trips. The intersection of PA 100 and US 30 is located near the centroid of the zone. This is a nexus of corporate office parks and retail establishments. US 202 and US 30 intersect at the eastern edge of the zone.

Within the study area, Zones 3 and 12 generate the most trips to Zone 1 with 5,249 and 4,391 trips, respectively, based on the 2025 forecast. Zones 2 and 5 send over 3,000 trips per day to Zone 1. Outside the study area, superzone 26 (western Chester County) to the west, generates 5,358 or 11% of the work trips to Zone 1.

Zone 1 is well served by the highways cited above. From the north, the most logical route for commuters is PA 100, while from the south they will have the option of US 202 or PA 100. From the east, US 202 and US 30 provide access. To and from the west, US 30 is the major access road to the area. Commuters leaving Zone 1 primarily travel to four zones. Zones 10 and 12, as well as superzones 22 and 25, each attract over 2,000 trips from Zone 1. Zone 10 receives the most trips from Zone 1, at 2,428 trips.

Table 5: 2025 Home Based Work Person Trips (>500)

	Destination																														
Origin	West Whiteland	Downingtown	Uwchlan	Coatesville	West Brandywine	Upper Uwchlan	East Whiteland	Willistown	West Goshen, East Goshen	West Chester	East Bradford	Kennett, Oxford, Avondale	Octoraro	Honeybrook, West Caln	Coventry, Warwick	West Vincent, East Vincent	Phoenixville	Tredyffrin	Chester City, Western Del. County	North Western Del. County	South Eastern Del. County	South Philadelphia	West Philadelphia	North Philadelphia	Merions	Conshohocken Area	Norristown Area	Lower Perkiomen	Pottstown, Upper Perkiomen	Berks County	North Penn	Center City
West Whiteland	6037	648	713				2428	1044	2719	863								1052	1054	614					1011							303
Downingtown	3944	4274	1377	2582			1776	824	2479	1417	578	652						937	1479	681					1060							393
Uwchlan	5249	1030	3597	697		634	2224	912	1817	677								984	850	593					1115							351
E. Brandywine	731	530		765																												89
Coatesville	3639	3412	1403	10657	710	685	1788	866	1872	912		1219	1527	744				1057	1272	732				541	1270							705
W. Brandywine	1077	785		1903			545		524																							
Upper Uwchlan	1809	579	1287	677		1553	878		742																596							291
West Pikeland	505																															64
East Whiteland	906						2486	804	925									883							708							186
Willistown	857						1612		1569																							
West Goshen, East Goshen	4391	771	703				4601	3723	13917	4289	554							2429	7896	3318	1509	660	610	943	2570	669	617					1125
West Chester	1794						1402		4469																							
East Bradford	1584	907		514			1213	710	3968	2634	1392	808						673	4167	867	581				837							700
Kennett, Oxford, Avondale	1944	1694	631	3091			1412		3715		1024																					
Octoraro	928	709		2386			503		582																							
Honeybrook, West Caln	1409	924	592	2597			774		735																							
Coventry, Warwick	635														766		601								953			897	4042	602	519	356
West Vincent, East Vincent	655						646									626	1118	586							1081			1024	1934			287
Phoenixville	1682		616				3077	1510	1273							583	5437	3074	833	1378				926	5100	1019	1646	3877	1995		1362	915
Tredyffrin	799						1655		864																							
Chester City, W. Del. County	1339						1375		4163																							
North Western Del. County	533						839		1181																							
South Eastern Del. County							619		1184																							
N. Philadelphia	598						875		691																							
Merions	542						955		653																							
Norristown Area	525						896		510								602															
L. Perkiomen	870						1619		781								2604															
Pottstown, U. Perkiomen	1523		688				1696		1016						1438	1143	2863															
North Penn							678																									
Center City	15	3	2	2		0	20		13		0				0	0	0															

🟧 Trips > 4000
🟪 Trips Beginning or Ending within Study Area
🟨 Trips between Center City and the Study Area

Table 6: Zone 1 HBW Person Trips

Destination Zone	Trips Originating in Zone 1	Percent	Origin Zone	Trips Terminating in Zone 1	Percent
1	6037	27%	**1**	6037	12%
2	648	3%	**2**	3944	8%
3	713	3%	**3**	5249	11%
4	29	0%	**4**	731	1%
5	363	2%	**5**	3639	7%
7	11	0%	**7**	403	1%
8	168	1%	**8**	1809	4%
9	84	0%	**9**	505	1%
10	2428	11%	**10**	906	2%
12	2719	12%	**12**	4391	9%
14	122	1%	**14**	1584	3%
18	17	0%	**18**	635	1%
19	27	0%	**19**	655	1%
20	241	1%	**20**	1682	3%
21*	589	3%	**21***	3379	7%
22*	2147	10%	**22***	2841	6%
23*	303	1%	**23***	15	0%
24*	1128	5%	**24***	1252	3%
25*	2096	10%	**25***	1656	3%
26*	208	1%	**26***	5358	11%
27*	1917	9%	**27***	3133	6%
TOTAL	**21995**	**100%**	**TOTAL**	**49804**	**100%**

*Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzone	**Zones**
21	34-43
22	28-33
23	26
24	23-25, 27
25	11, 21
26	6, 15-17
27	13, 22

PA 100 CMS
2025 Forecast

➡ 3	Greater than 3000
➡ 3	1501 to 3000
➡ 3	500 to 1500
→ 3	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
6037 1 (27%)	Person trips within zone

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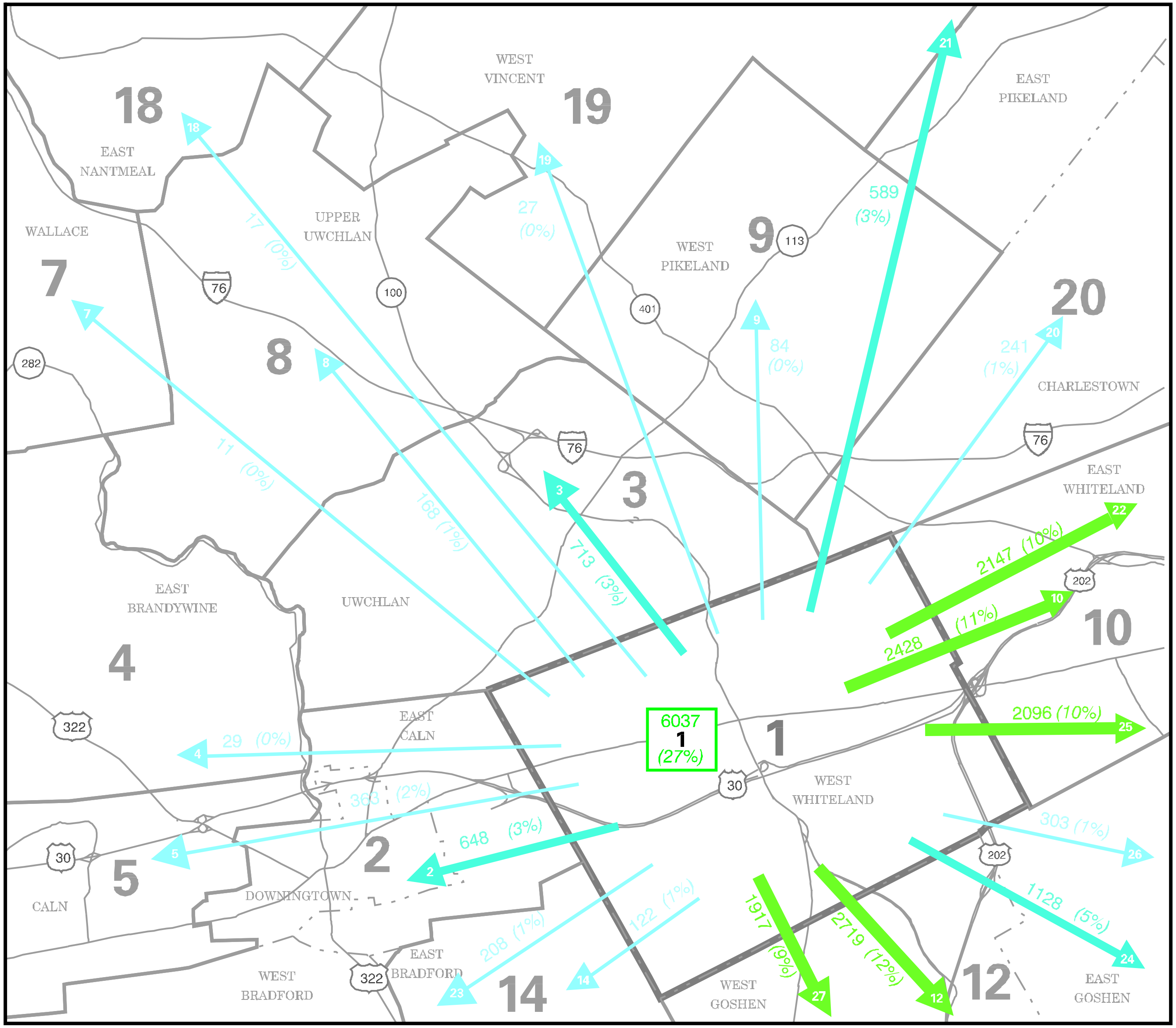
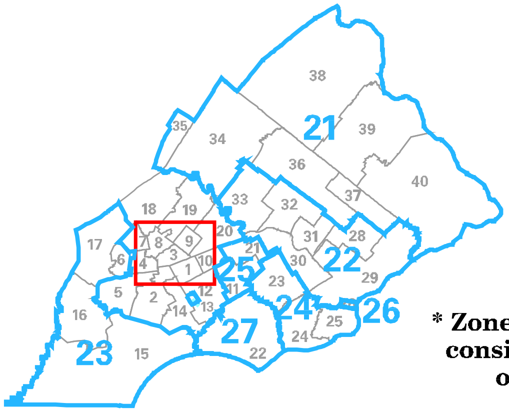


Superzones and Zones



* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 10: Journey-To-Work Person Trips From Zone 1

PA 100 CMS
2025 Forecast

➔ 3	**Greater than 3000**
➔ 3	**1501 to 3000**
➔ 3	**500 to 1500**
➔ 3	**Less than 500**
15	**Total number of person trips**
(47%)	**Percentage of person trips**
6037 1 *(12%)*	**Person trips within zone**

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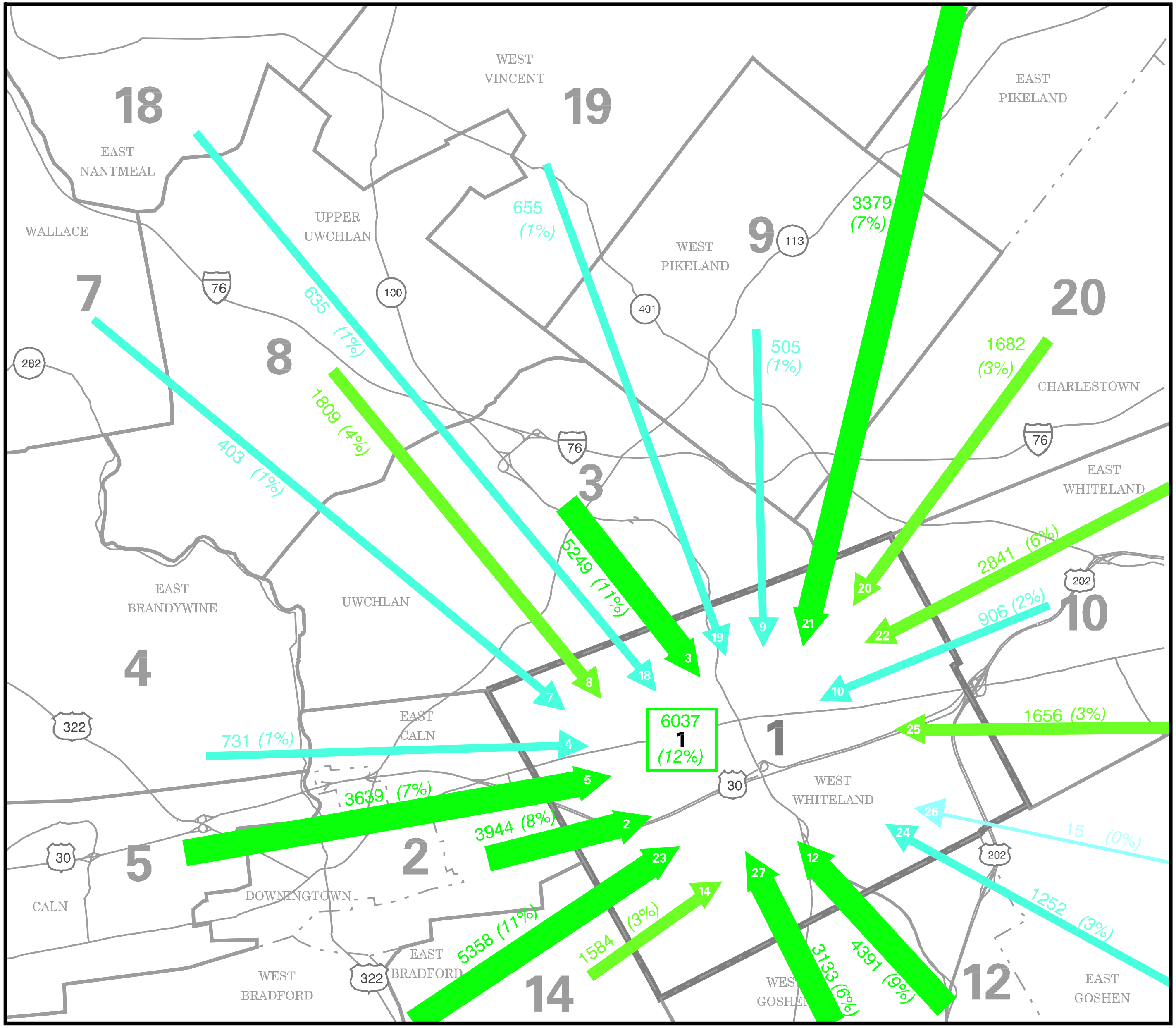
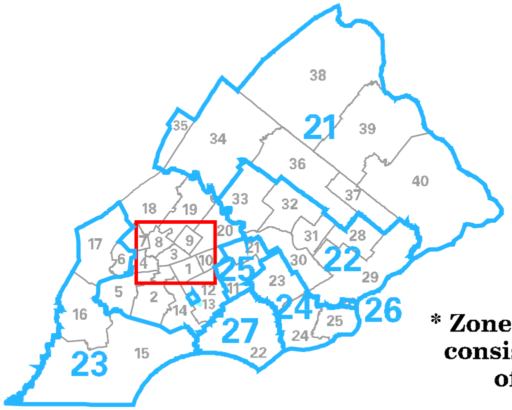


Superzones and Zones



* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 11: Journey-To-Work Person Trips To Zone 1

Zone 2

Zone 2 is located in the southwest portion of the study area. This includes some of the more developed areas of the zone, as well as congested roads, such as US 30, PA 113 and US 322. It includes the townships of East Caln and West Bradford, and the borough of Downingtown. While it accounts for less trips than Zone 1, it is still a major contributor of work trips in the study area. As illustrated in **Table 7** and **Maps 12** and **13**, the year 2025 forecast shows almost 30,000 trips originating in the zone and just fewer than 20,000 trips terminating there. Internal trips account for the largest number (4,274) of trips in the zone. Zone 2 sends 14% (3,944) of its commuters to Zone 1 and 9% (2,479) to Zone 12. Superzone 27 (western Delaware County and southern Chester County) to the southeast attracts the most trips outside the study area with 2,896.

Commuters traveling to Zone 2, travel in the largest numbers from Zones 3 and 5 with 1,030 and 3,412 trips, respectively. Superzone 26 (western Chester County) to the south and west sends 21% (4,112) of the trips to Zone 2. The most logical route for commuters from the east and west is US 30. PA 113 provides access from the northeast while US 322 and PA 282 run from the northwest. US 322 is the most logical route for commuters traveling south.

Table 7: Zone 2 HBW Person Trips

Destination Zone	Trips Originating in Zone 2	Percent	Origin Zone	Trips Terminating in Zone 2	Percent
1	3944	14%	**1**	648	3%
2	4274	15%	**2**	4274	21%
3	1377	5%	**3**	1030	5%
4	145	0%	**4**	530	3%
5	2582	9%	**5**	3412	17%
7	42	0%	**7**	225	1%
8	396	1%	**8**	579	3%
9	88	0%	**9**	80	0%
10	1776	6%	**10**	119	1%
12	2479	9%	**12**	771	4%
14	578	2%	**14**	907	5%
18	31	0%	**18**	185	1%
19	54	0%	**19**	149	1%
20	258	1%	**20**	298	1%
21*	883	3%	**21***	793	4%
22*	2386	8%	**22***	538	3%
23*	393	1%	**23***	3	0%
24*	1383	5%	**24***	250	1%
25*	1761	6%	**25***	248	1%
26*	1340	5%	**26***	4112	21%
27*	2896	10%	**27***	733	4%
TOTAL	**29066**	**100%**	**TOTAL**	**19884**	**100%**

*Zones 21-27 are Superzones

PA 100 CMS
2025 Forecast

➡ 3	**Greater than 3000**
➡ 3	**1501 to 3000**
➡ 3	**500 to 1500**
→ 3	**Less than 500**
15	**Total number of person trips**
(47%)	**Percentage of person trips**
4274 **2** *(15%)*	**Person trips within zone**

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MILES

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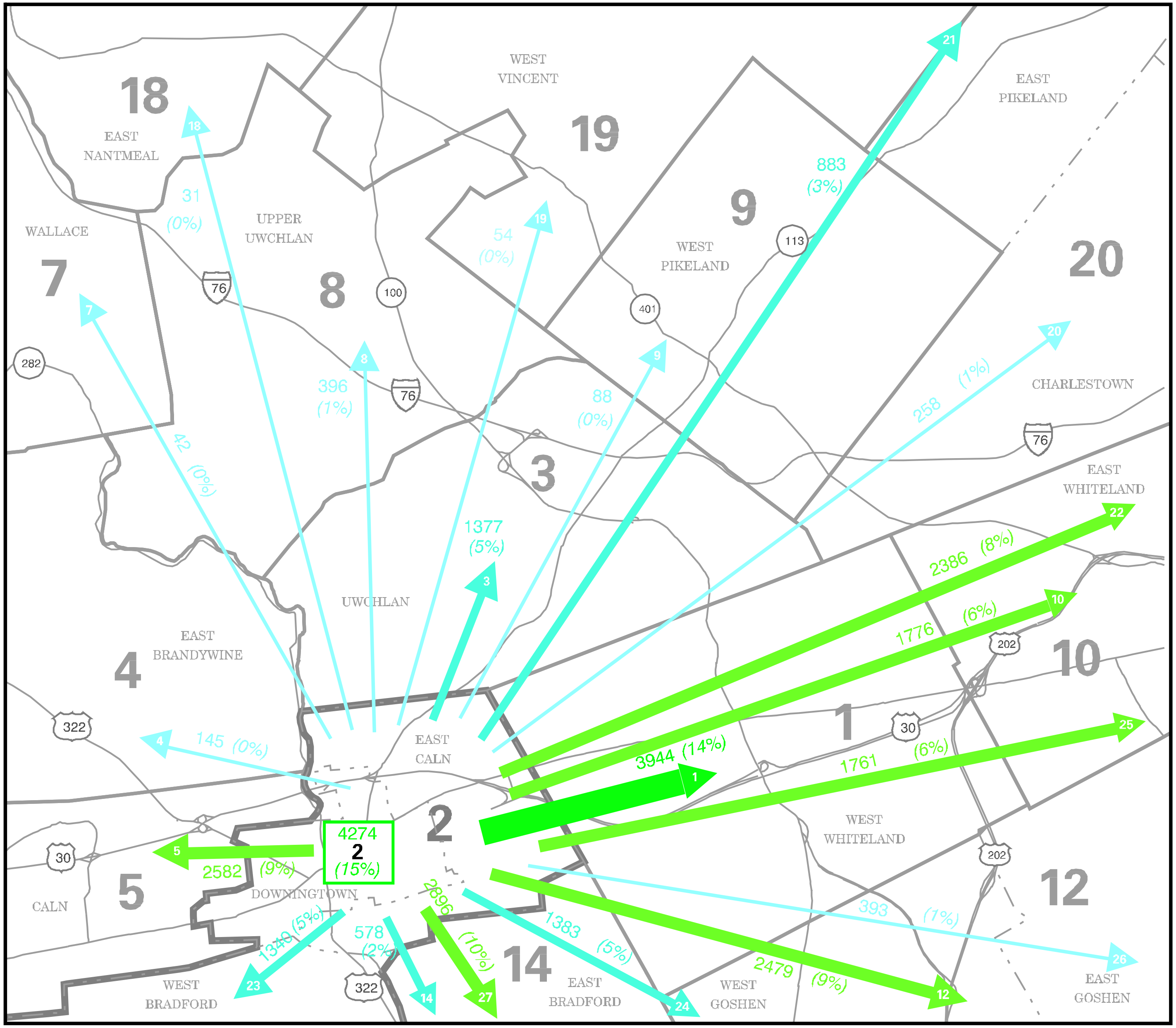
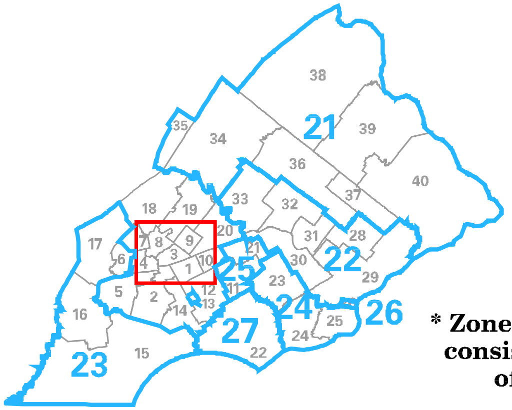
June 2002



Superzones and Zones



*** Zones 21-27 are Superzones consisting of combinations of zones as follows:**

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 12: Journey-To-Work Person Trips From Zone 2

PA 100 CMS
2025 Forecast

🟩	Greater than 3000
🟩	1501 to 3000
🟦	500 to 1500
🟦	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
4274 2 (21%)	Person trips within zone

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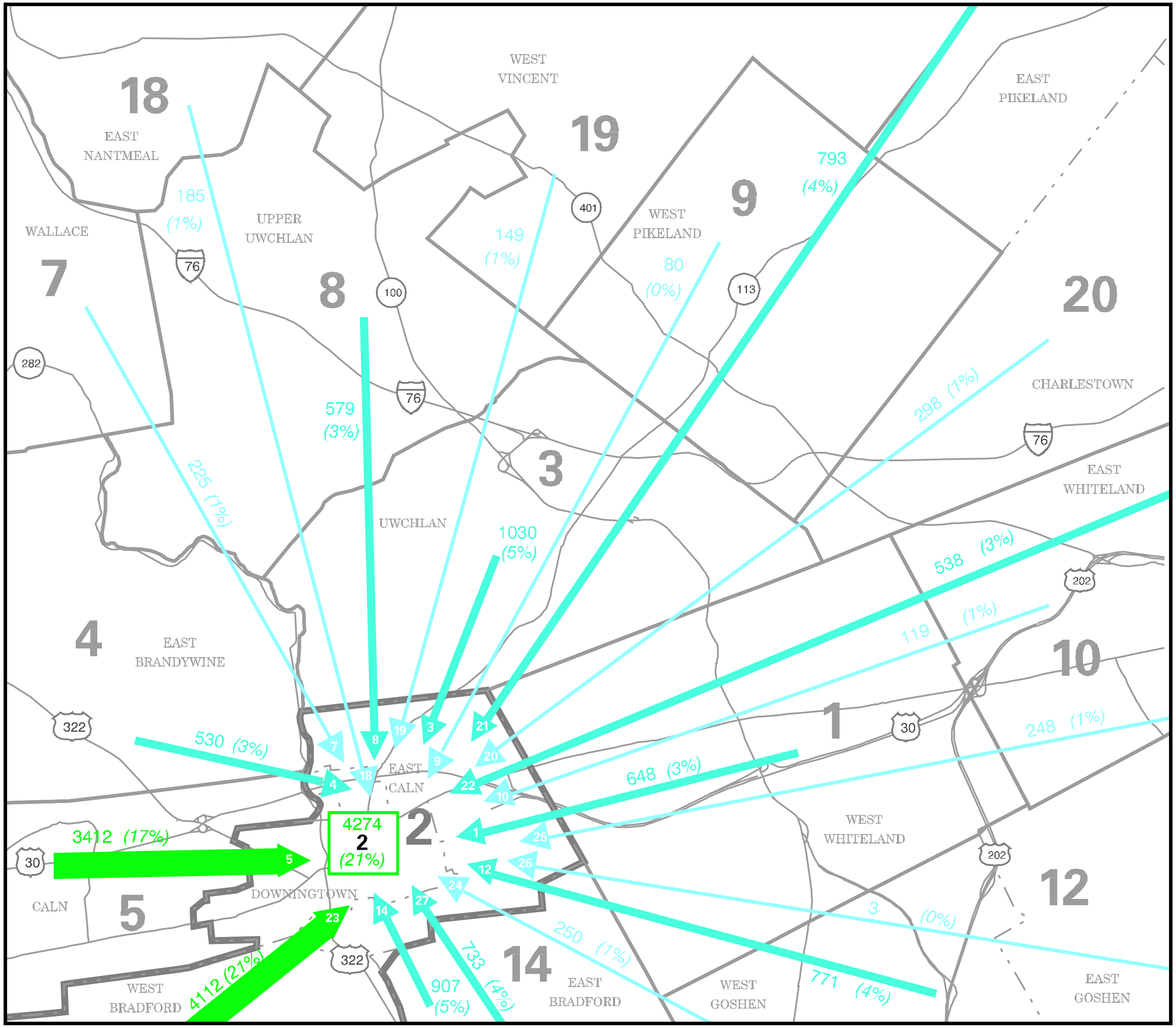
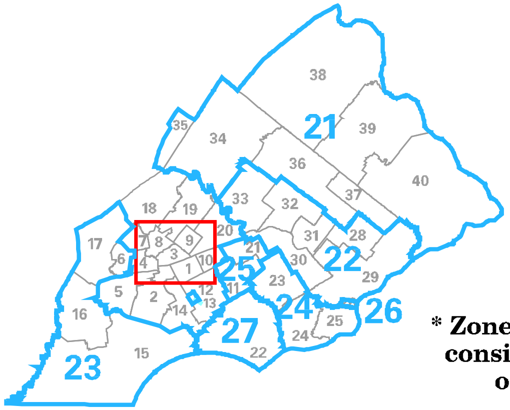


Superzones and Zones



* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 13: Journey-To-Work Person Trips To Zone 2

Zone 3

This zone is located at the center of the study area and encompasses the PA 100 / PA 113 intersection and the PA 100 / Interstate 76 interchange, which facilitates access to a wide area. This zone is delimited by the municipal boundary of Uwchlan Township. The interchange facilitates access to other parts of the study area and region. In the vicinity of the intersection of PA 100 and PA 113, there are large retail and corporate centers. As illustrated in **Table 8** and **Maps 14** and **15**, the year 2025 forecast shows 25,036 trips originating in Zone 3 and 16,888 terminating in Zone 3. Zone 3 sends the largest number of commuters to Zone 1 (5,249 or 21%). Zone 10 attracts 2,224 trips while 3,597 trips are internal trips. Outside of the study area, superzone 22 (northern Philadelphia County and eastern Montgomery County) to the east receives 2,550 trips or 10% of trips originating in Zone 3.

The largest number of trips terminating in Zone 3 are internal trips at 3,597. Zones 2, 5, and 8 all send over 1,000 people to Zone 3 each day, with Zone 5 sending the most at 1,403 trips. Outside of the study area, superzone 26 to the south and west generates 2,030 (12%) trips to Zone 3. I-76 provides the most logical east-west access to Zone 3, while PA 100 provides north-south access. PA 113 connects the northeast and southwest portions of the study area.

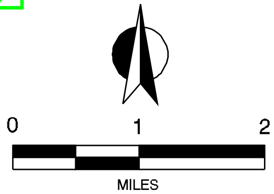
Table 8: Zone 3 HBW Person Trips

Destination Zone	Trips Originating in Zone 3	Percent	Origin Zone	Trips Terminating in Zone 3	Percent
1	5249	21%	**1**	713	4%
2	1030	4%	**2**	1377	8%
3	3597	14%	**3**	3597	21%
4	77	0%	**4**	495	3%
5	697	3%	**5**	1403	8%
7	32	0%	**7**	228	1%
8	634	3%	**8**	1287	8%
9	232	1%	**9**	207	1%
10	2224	9%	**10**	142	1%
12	1817	7%	**12**	703	4%
14	115	0%	**14**	372	2%
18	48	0%	**18**	309	2%
19	85	0%	**19**	330	2%
20	463	2%	**20**	616	4%
21*	944	4%	**21***	1226	7%
22*	2550	10%	**22***	735	4%
23*	351	1%	**23***	2	0%
24*	1099	4%	**24***	249	1%
25*	1896	8%	**25***	286	2%
26*	369	1%	**26***	2030	12%
27*	1527	6%	**27***	581	3%
TOTAL	**25036**	**100%**	**TOTAL**	**16888**	**100%**

*Zones 21-27 are Superzones

PA 100 CMS
2025 Forecast

➔ 2	Greater than 3000
➔ 2	1501 to 3000
➔ 2	500 to 1500
→ 2	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
3597 3 (14%)	Person trips within zone



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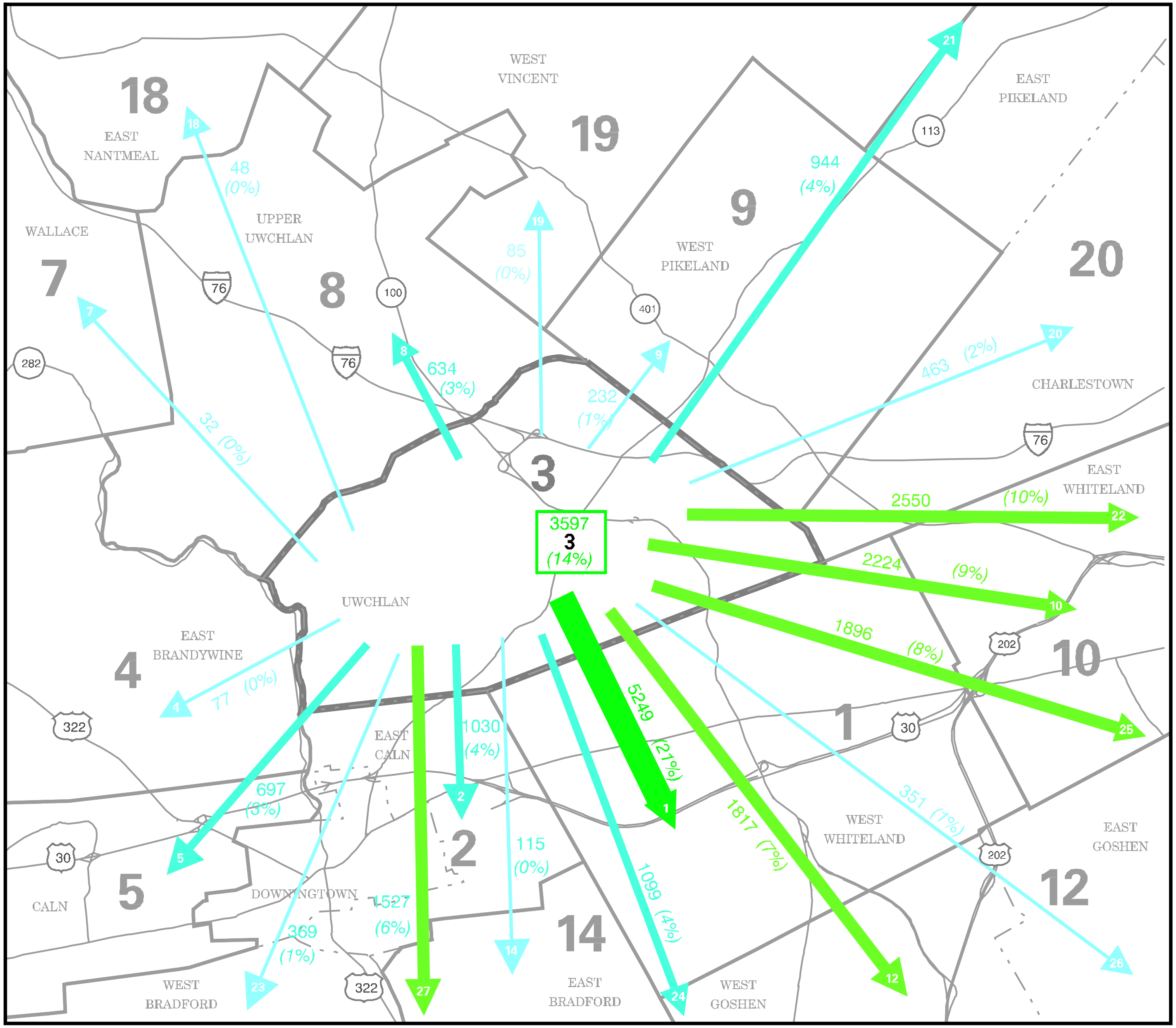
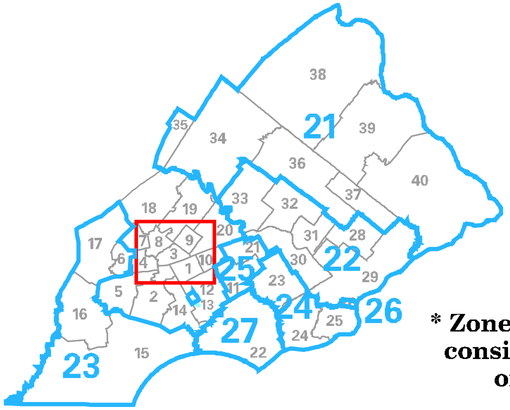


Superzones and Zones



* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 14: Journey-To-Work Person Trips From Zone 3

PA 100 CMS
2025 Forecast

🟩 2	Greater than 3000
🟩 2	1501 to 3000
🟩 2	500 to 1500
🟩 2	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
3597 3 (21%)	Person trips within zone

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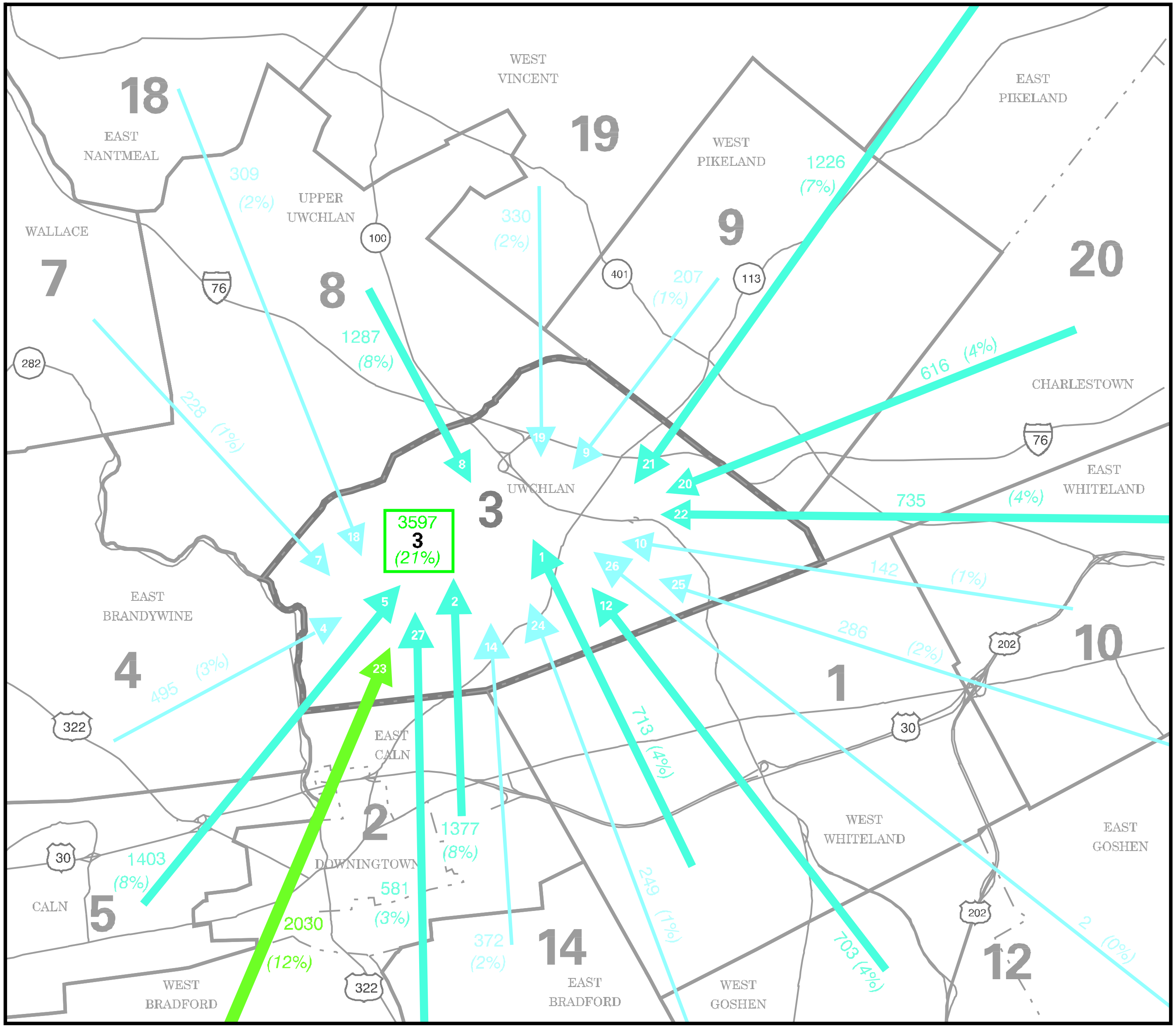
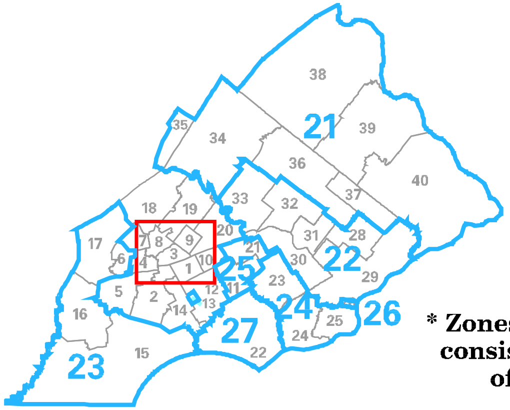


Superzones and Zones



* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 15: Journey-To-Work Person Trips To Zone 3

Zone 5

This zone encompasses the area of western Chester County and includes the townships of Caln, Valley, and East Fallowfield, and the borough of Coatesville. As illustrated in **Table 9** and **Maps 16** and **17**, the year 2025 forecast shows a total of 29,914 home based work person trips entering this zone and 39,513 home based work person trips originating in this zone. This includes a total of 10,657 internal trips (trips that originate and end within the zone). A more detailed examination shows the largest source of external trips to this zone, 9,977 trips, originating in superzone 26 (southwest Chester County), while the second largest source, Zone 2, has 2,582 trips. All other zones send less than 900 trips each to Zone 5.

This zone is well served by several highways: US 30, US 322, and US 340. US 30 provides excellent access, primarily from superzone 26 in the west and Zone 2 in the east. US 340 also provides access from the west, albeit at a lesser degree than US 30. US 322 is an important north-south link to this zone. It is the most direct route to Zone 14 in the south and Zone 4 in the north.

Trips leaving Zone 5 are destined for five primary locations, Zones 1 and 2 as well as superzones 22, 26 and 27. Approximately 9% of all trips from Zone 5 are destined for Zones 1 and 2, (3,639 and 3,412, respectively). Superzone 22 (central and eastern Montgomery County) accounts for 2,993 person trips from Zone 5, while superzones 26 (southwest Chester County) and 27 (southern Chester County and western Delaware County) account for 4,200 and 2,184 trips, respectively.

Table 9: Zone 5 HBW Person Trips

Destination Zone	Trips Originating in Zone 5	Percent	Origin Zone	Trips Terminating in Zone 5	Percent
1	3639	9%	**1**	363	1%
2	3412	9%	**2**	2582	9%
3	1403	4%	**3**	697	2%
4	309	1%	**4**	765	3%
5	10657	27%	**5**	10657	36%
7	133	0%	**7**	433	1%
8	685	2%	**8**	677	2%
9	92	0%	**9**	55	0%
10	1788	5%	**10**	76	0%
12	1872	5%	**12**	454	2%
14	348	1%	**14**	514	2%
18	60	0%	**18**	236	1%
19	63	0%	**19**	123	0%
20	304	1%	**20**	222	1%
21*	1216	3%	**21***	805	3%
22*	2993	8%	**22***	474	2%
23*	705	2%	**23***	2	0%
24*	1527	4%	**24***	179	1%
25*	1923	5%	**25***	174	1%
26*	4200	11%	**26***	9977	33%
27*	2184	6%	**27***	449	2%
TOTAL	**39513**	**100%**	**TOTAL**	**29914**	**100%**

*Zones 21-27 are Superzones

PA 100 CMS
2025 Forecast

➔ 3	Greater than 3000
➔ 3	1501 to 3000
➔ 3	500 to 1500
➔ 3	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
10657 5 (27%)	Person trips within zone

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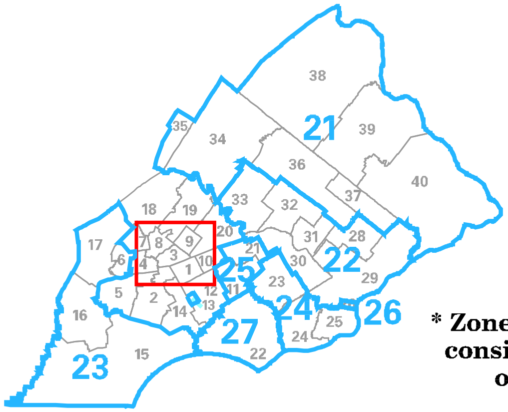
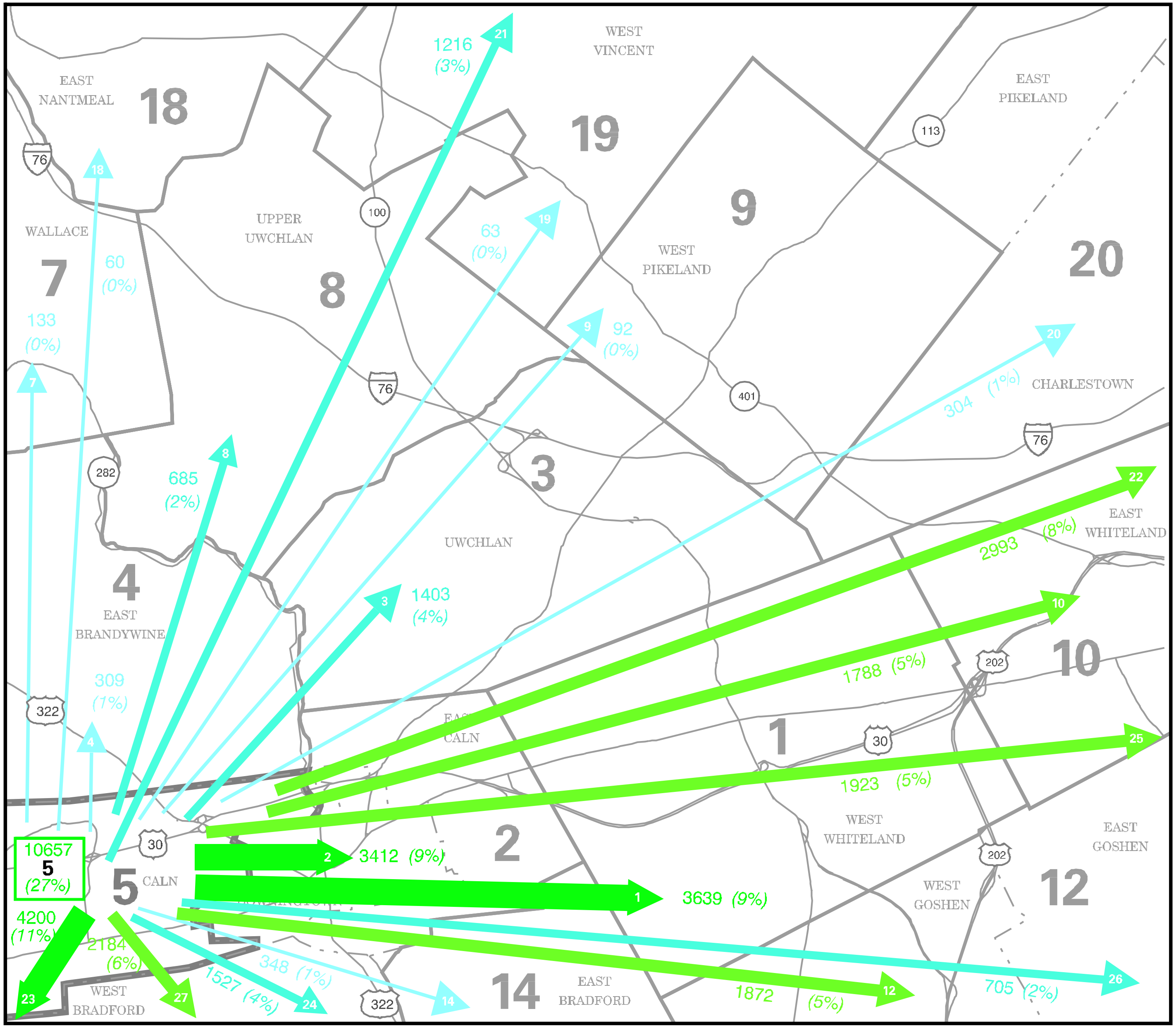
Superzones and Zones





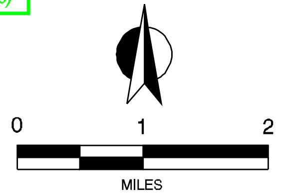
Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Map 16: Journey-To-Work Person Trips From Zone 5

PA 100 CMS
2025 Forecast

🟩 3	Greater than 3000
🟩 3	1501 to 3000
3	500 to 1500
3	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
10657 5 (36%)	Person trips within zone



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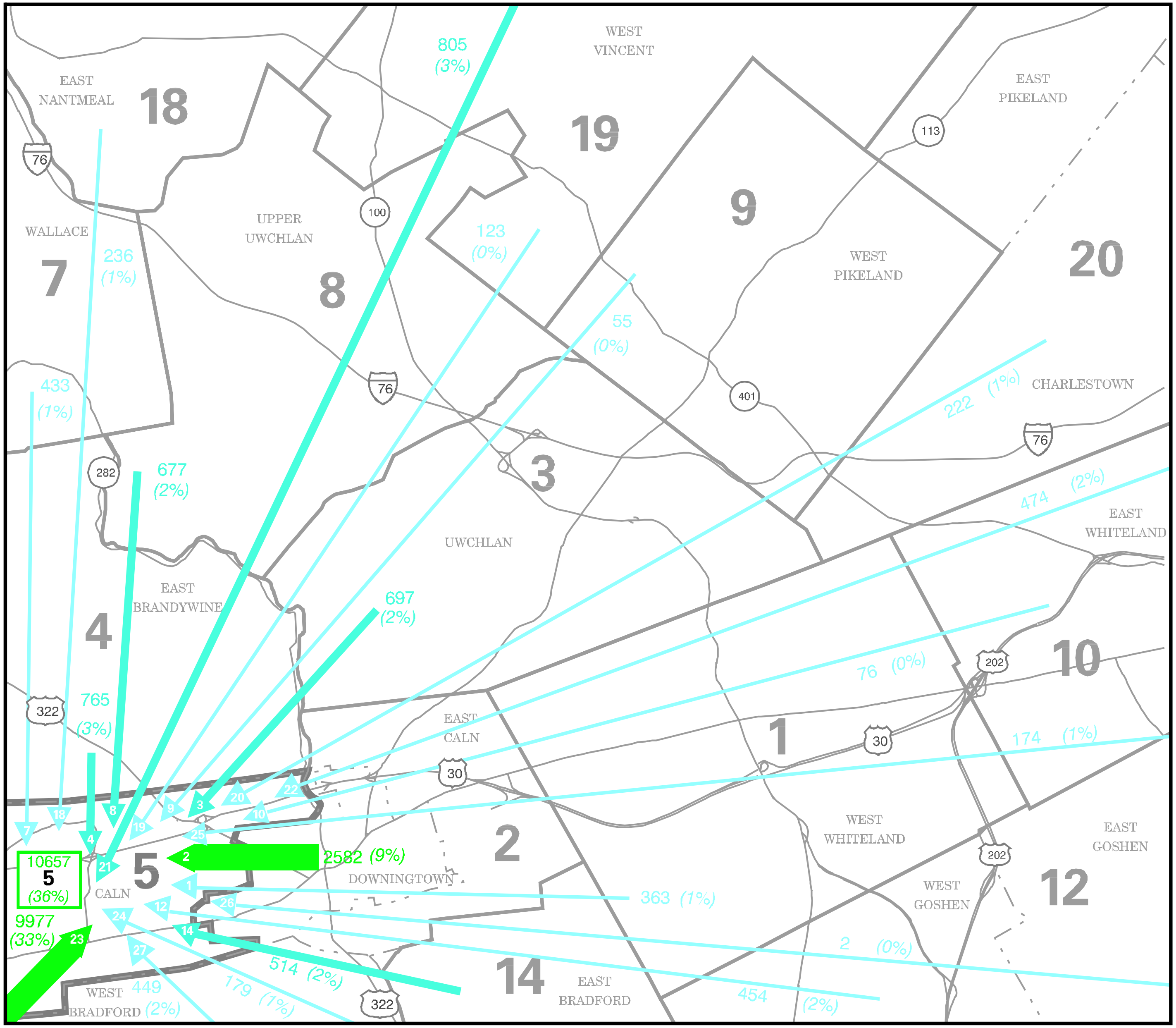
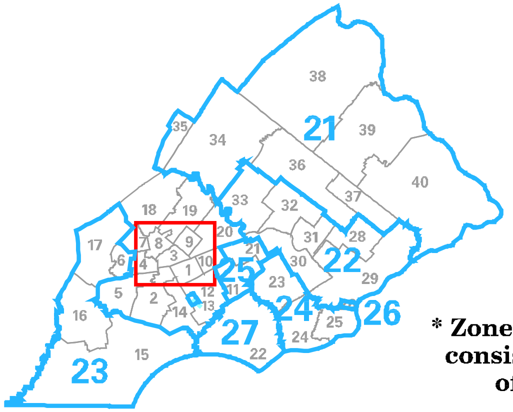


Superzones and Zones



* Zones 21-27 are Superzones consisting of combinations of zones as follows:

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 17: Journey-To-Work Person Trips To Zone 5

Zone 8

Zone 8 is located in the northeast section of the study area. Interstate 76 and PA 100 are the major avenues passing through the zone. Zone 8 is totally contained in the township of Upper Uwchlan. A relatively small number of trips originate and terminate in Zone 8. As illustrated in **Table 10** and **Maps 18** and **19**, the year 2025 forecast shows that Zone 8 is the destination of only 7,787 trips from the entire region, and only 13,354 trips originate in Zone 8. The largest number of trips originating in Zone 8 terminates in Zones 1 (1,809) and 3 (1,287). Zone 8 also has 1,553 internal trips. Superzone 22 to the north and west draws the most trips outside of the study area at 1,379 or 10%.

Zones 3 and 5 are the only zones inside the study area that contribute significant trips to Zone 8 at 634 and 685, respectively. Besides internal trips, superzone 26 (southern and western Chester County) to the south and west is the only zone that sends more than 1,000 people, with 1,290 trips or 17%. PA 100 is the most logical choice for north-south trips in Zone 8. PA 282 also runs north-south along the southwestern border of the zone. I-76 provides for east-west travel, however, there are no interchanges within the zone.

Table 10: Zone 8 HBW Person Trips

Destination Zone	Trips Originating in Zone 8	Percent	Origin Zone	Trips Terminating in Zone 8	Percent
1	1809	14%	**1**	168	2%
2	579	4%	**2**	396	5%
3	1287	10%	**3**	634	8%
4	168	1%	**4**	465	6%
5	677	5%	**5**	685	9%
7	79	1%	**7**	312	4%
8	1553	12%	**8**	1553	20%
9	129	1%	**9**	69	1%
10	878	7%	**10**	36	0%
12	742	6%	**12**	183	2%
14	54	0%	**14**	101	1%
18	66	0%	**18**	247	3%
19	104	1%	**19**	244	3%
20	228	2%	**20**	182	2%
21*	794	6%	**21***	657	8%
22*	1379	10%	**22***	255	3%
23*	291	2%	**23***	0	0%
24*	572	4%	**24***	85	1%
25*	863	6%	**25***	81	1%
26*	439	3%	**26***	1290	17%
27*	663	5%	**27***	144	2%
TOTAL	**13354**	**100%**	**TOTAL**	**7787**	**100%**

*Zones 21-27 are Superzones

PA 100 CMS
2025 Forecast

➡ 3	Greater than 3000
➡ 3	1501 to 3000
➡ 3	500 to 1500
→ 3	Less than 500
15	Total number of person trips
(47%)	Percentage of person trips
1553 8 (12%)	Person trips within zone

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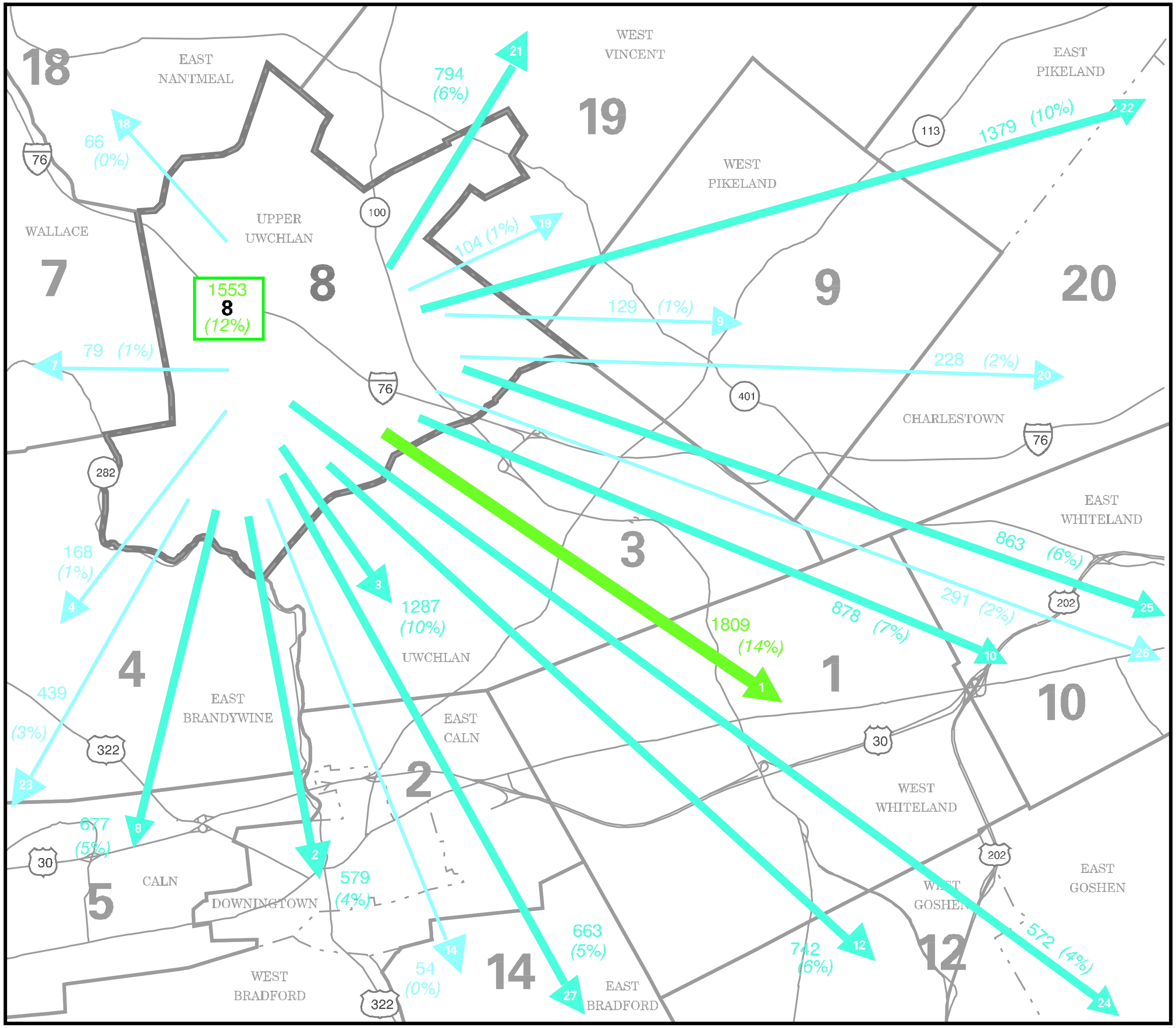
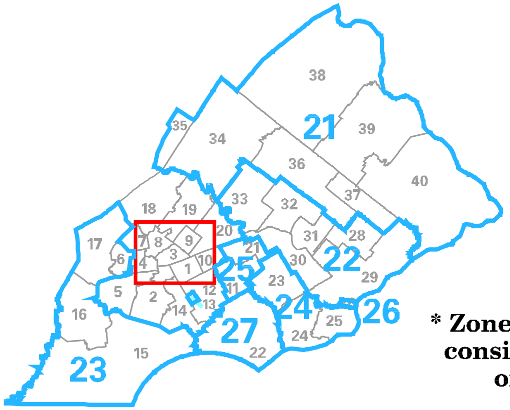


Superzones and Zones



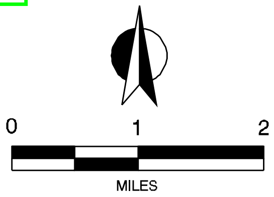
*** Zones 21-27 are Superzones consisting of combinations of zones as follows:**

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 18: Journey-To-Work Person Trips From Zone 8

PA 100 CMS
2025 Forecast

➡ 3	**Greater than 3000**
➡ 3	**1501 to 3000**
➡ 3	**500 to 1500**
→ 3	**Less than 500**
15	**Total number of person trips**
(47%)	**Percentage of person trips**
1553 **8** *(20%)*	**Person trips within zone**



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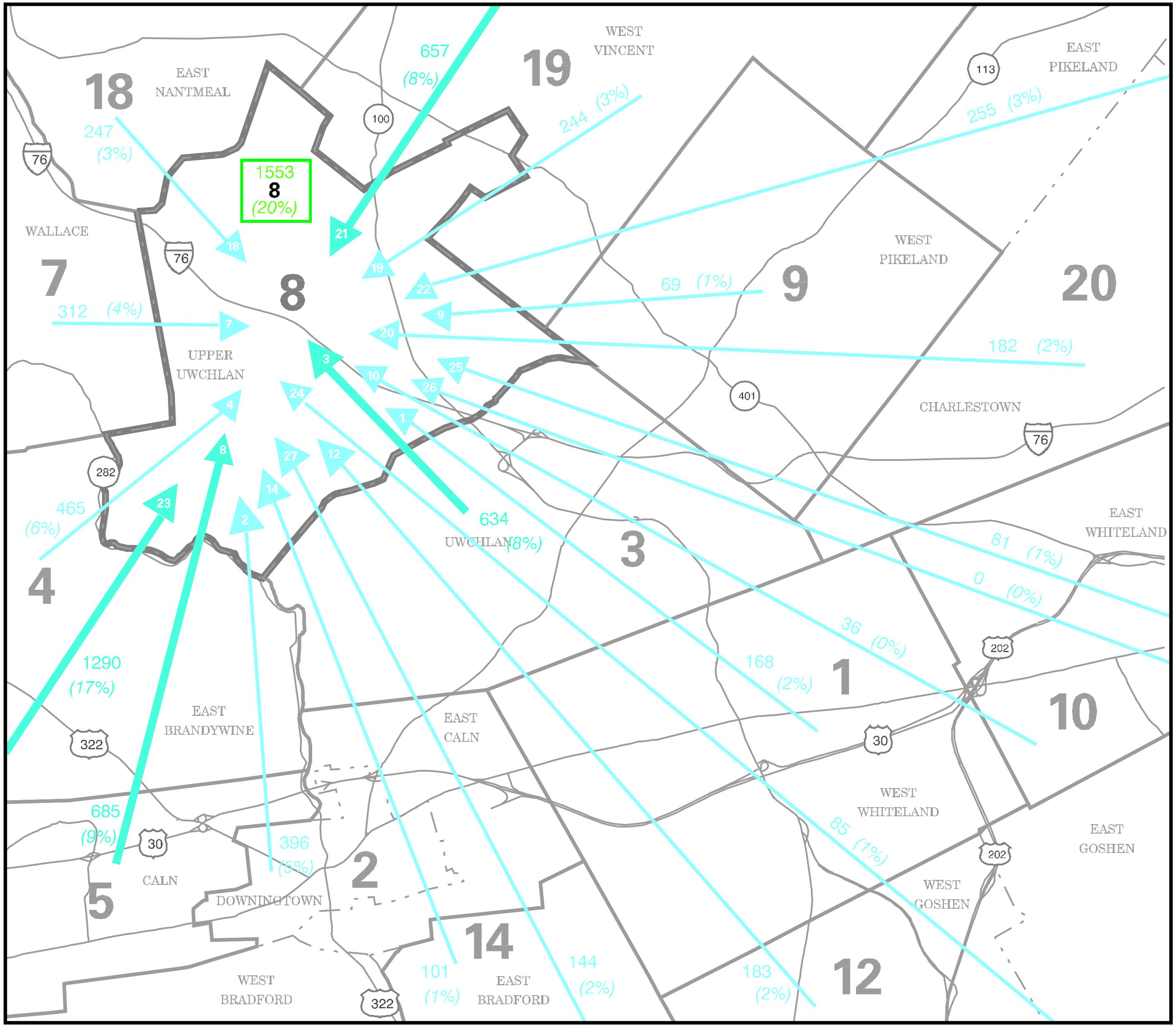
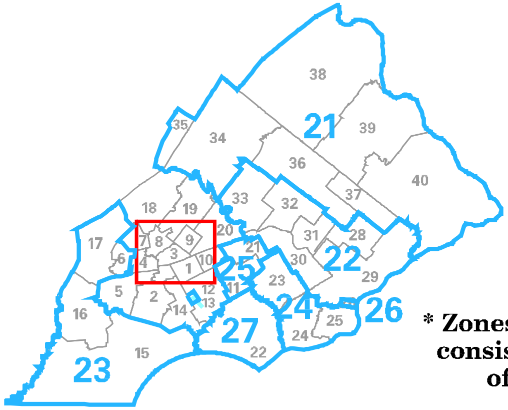


Superzones and Zones



*** Zones 21-27 are Superzones consisting of combinations of zones as follows:**

Superzones	Zones
21	34-43
22	28-33
23	6, 15-17
24	23-25, 27
25	11, 21
26	26
27	13,22

Map 19: Journey-To-Work Person Trips To Zone 8

Vehicle Trips

The trends cited in the person trip category remain very similar for vehicle trips, as most travel in the study area is completed by passenger car (see **Tables 11A** and **11B**). The trip numbers are usually slightly lower than the person trips because of a ridesharing component. Zones 1, 3,10, and 12 attract the most vehicle trips, being major employment destinations for motorists in the study area. Based on the 2025 forecast, each zone receives at least 30,000 vehicle trips per day with over 50,000 vehicles traveling to Zone 1. Internal trips account for 27% or less of the trips terminating in each of the four zones.

Zones 1 and 3 serve as major exporters, with over 40,000 total vehicle trips originating in the two zones. Zone 3 sends 4,645, or 21%, of its vehicle trips to Zone 1, while more than 2,000, or 11%, of vehicles from Zone 1 is destined for Zones 10 and 12 each. To emphasize the importance of Zone 1 as a major employment center, the forecast data shows that it is the destination for more than 400 vehicle trips from seven different zones and accounts for at least 8% of the trips from each of eight zones. This is further enhanced by Zone 1 being at the transportation nexus of US 30 and PA 100, which provides regionwide vehicular access. Zone 3 encompasses the PA 100 / PA 113 intersection and the PA 100 / I-76 interchange, which facilitates access to a wide area.

Transit Trips

SEPTA's R-5 Regional Rail is the primary transit provider within the study area. It runs parallel to the US 30 corridor and serves the municipalities within its commutershed. The stations of Downingtown, Whitford, Exton and Thorndale (to the west of the study area) are the major access nodes to the system. SEPTA and Krapf's Transit provides bus service to the major employment centers in the area.

The primary destination zone for the majority of transit trips from the zones within the study area is Center City Philadelphia. The largest numbers of transit riders originate from Zones, 1, 3, 12, and 20 (see **Table 11C**) which represent approximately 73% of all transit trips in the study area. Each of these Zones serve as the origin point for more than 100 Center City-bound commuters each day. Commuters to Center City account for 39-56% of all transit trips in these four Zones. Zone 1 accounts for the largest number of transit riders, due primarily to the presence of the Exton and Whitford regional rail stations, as well as the study area's primary bus routes. Zones 11, 12, 13, and 20 were the primary destination Zones within the study area, attracting between 362 and 407 trips to each Zone. The rest of the study area sees very low transit ridership with fewer than 100 trips from each Zone. This is due mostly to the absence of a rail or bus network for much of the area.

Table 11 A

Year 2025
Home-Based Work Trips Primary Origins and Destinations
Person Trips
Primary Destination Zones

		Zone 1		Zone 3		Zone 10		Zone 11		Zone 12		Total Trips *
		#	%	#	%	#	%	#	%	#	%	
Origin	**1**	6,037	27	713	3	2,428	11	1,044	5	2,719	12	21,995
	3	5,249	21	3,597	14	2,224	9	912	4	1,817	7	25,036
	8	1,809	14	1,287	10	878	7	392	3	742	6	13,354
	12	878	7	141	1	920	8	745	6	2,783	23	11,855

Table 11 B

Year 2025
Home-Based Work Trips Primary Origins and Destinations
Vehicle Trips
Primary Destination Zones

		Zone 1		Zone 3		Zone 10		Zone 11		Zone 12		Total Trips *
		#	%	#	%	#	%	#	%	#	%	
Origin	**1**	5,343	27	631	3	2,149	11	925	5	2,406	12	19,465
	3	4,645	21	3,183	14	1,968	9	807	4	1,609	7	22,156
	8	1,602	14	1,138	10	777	7	347	3	657	6	11,818
	12	777	7	124	1	814	8	659	6	2,463	23	10,492

Table 11 C

Year 2025
Home-Based Work Trips Primary Origins and Destinations
Transit Trips
Primary Destination Zones

		Zone 11		Zone 12		Zone 13		Zone 20		Zone 26		Total Trips *
		#	%	#	%	#	%	#	%	#	%	
Origin	**1**	25	7	10	3	21	6	8	2	142	39	361
	3	17	5	3	1	0	0	7	2	176	54	328
	12	3	1	9	3	48	17	2	1	158	56	285
	20	3	1	3	1	3	1	19	6	128	39	332

*Total number of trips within region from Zone of origin

IX. DEVELOPMENT TRENDS

Several residential and commercial developments have been approved for the PA 100 study area that will add to the congestion currently experienced on the major arterials.

The 2025 forecast shows an increase in personal and vehicle trips along the major roadways. The more critical stretches of these highways show current levels of service ranging from C through F. This will only deteriorate once the planned developments are completed. **Map 8** shows the largest developments planned for the area, representing more than 1,030 residential units and more than 2,847,000 square feet (SF) of office and commercial use. The following is a detailed description of these proposed developments.

Future Vanguard Corporate Campus at PA 100

A Vanguard corporate campus is proposed for a site to the north and east of PA 100. When completed, the campus will include the development of 2,000,000 SF of corporate campus space, as well as 500,000 SF of general office space, with a total of 8,000 employees. Phase I of construction is scheduled for completion in 2004.

Based on a previous DVRPC travel simulation model for 2020, the AADT for the PA 100 corridor between Eagleview Boulevard and PA 113 will be 56,400. This figure assumes a moderate amount of development on the new Vanguard corporate campus, but not full build-out.

Assuming full build-out on the Vanguard site, PennDOT has estimated evening peak hour traffic forecast of 5,043 vehicles and an AADT volume of 64,657. Trip generation for the full build-out of the Vanguard site was shown to be 31,128 daily trips, based on data from Vanguard's current campus. This increase in volume will have a significant impact on the adjacent roadways.

Five intersections were studied by PennDOT, and the morning and evening peak period LOS was determined. These intersections are located at PA 100 and Eagleview Boulevard, Sheree Boulevard and PA 113, Eagleview Boulevard and Sheree Boulevard, and Sheree Boulevard and the Vanguard access Drive. Without road improvements, there is expected to be failure at 4 out of the 5 intersections during at least one peak period. Only the intersection of Eagleview Boulevard and PA 100 offers a "D" LOS during both peak periods.

Keystone Opportunity Zone - Downingtown Borough

The Borough of Dowingtown has established a Keystone Opportunity Zone (KOZ) of approximately 70 acres adjacent to the Conrail right-of-way extending from Lloyd Avenue to Brandywine Avenue (US 322). This area is planned to be developed as a mix of office, retail, recreation and / or residential uses in the coming years. It is assumed that the majority of the development will occur within the general area bounded by Bradford Avenue, Viaduct Avenue, and Lancaster Avenue. An increase in traffic volumes as a result of the development of the KOZ is expected to exacerbate the AM and PM peak volumes on US 30. Mitigating measures will have to be taken in order to alleviate congestion in this area.

Wal-Mart Site and West Whiteland Proposed Town Center

An area to the west of PA 100 between the US 30 Business and US 30 By-Pass interchange is being developed to house a Wal-Mart store. A new entry will be created on PA 100 to provide direct access to the site. In addition, a road parallel to US 30 will be constructed to provide alternate access to the site from US 30 Business, as well as to the planned West Whiteland Town Center development. This town center is an area of the community that the Township intends to be developed in such a way that sense of place is created. To this end, the Township has adopted Ordinances that require certain pedestrian amenities and design features for all development within the Town Center Zoning District. These features include: street lights, brick pavers at intersections and access ways, street trees, and sidewalks. Other features, such as benches and bike racks, will be required when appropriate for the development. Finally, the West Whiteland Town Center will be the area of the Township where the most intense land uses and mix of land uses will be located.

Once these developments are complete, the intersection of US 30 and PA 100 will have to be upgraded to accommodate the increased traffic volumes.

Trammel Crow's Atwater Development - East Whiteland

The proposed Atwater Development is located on the eastern side of PA 29, and the southerly side of Yellow Springs Road in East Whiteland and Tredyffrin Townships. It will comprise a total of approximately 2.5 million square feet of class A office space and is expected to create 10,000 new jobs on site at full build-out. The design year is 2012. Although this development is outside the study area, it is expected that employees will be commuting to the site from the study area, thereby affecting the access roads during peak periods. Traffic mitigation measures have been planned for the site to ameliorate this impact. This includes a new interchange on the Pennsylvania Turnpike at PA 29.

Development on PA 100

There are a number of important development projects underway, or soon to be underway, along PA 100. Upper Uwchlan Township has approved development applications for 6 significant projects on PA 100.

- The Reserve at Eagle is a 208 Single Family Unit development that will be located in the vicinity of PA 100 and Font Road.
- The Eagle Hunt Development to be located north and east of PA 100 along Fellowship Road will include 131 Single Family Units.
- Byers Station lies west of PA 100 and between Fellowship Road and Byers Road. It will include 620 dwelling units at a mixture of densities as well as 240,000 square feet of commercial development.
- Waynebrook at Eagle is being constructed between PA 100 and Little Conestoga Road and north of Park Road. This development will be next to a proposed loop road which bypasses the intersections of PA 100 and Byers Road, PA 100 and Park Road, and PA 100 and Little Conestoga Road.

- Eaglepointe Shopping Center will also be completed near the proposed By-pass. The shopping center will be south of Little Conestoga Road and Park Road and West of PA 100. This shopping center will include a food store, retail development, a skating rink, and a bank, for a total of 107,000 square feet.
- Finally, the Archdiocese of Philadelphia will build a family church as well as a K-8 school and a Social Hall on the east side of PA 100 between Fellowship Road and Byers Road.

X. AREA-WIDE CMS STRATEGIES

In addition to transit service, there are a number of programs that support the reduction of single occupancy vehicle trips that could be effective to reduce congestion in the PA 100 study area. These include:

- **TransitChek** is a public transportation commuter benefit program that is tax-free to employees and tax-deductible to employers. TransitChek enables employers of any size to help reduce the cost of employees' commutes on public transit or vanpools with a voucher. Federal tax laws allow employers to offer up to $100 / month or $1,200 / year per employee, either as a company paid benefit or a pre-tax payroll deduction. TransitChek is accepted by major transit systems such as SEPTA, PATCO, NJ Transit, DART-First State, and third-party vanpool companies.

- **Mobility Alternatives Program (MAP)** is a PennDOT-funded, DVRPC- managed program, which provides employers in Southeastern Pennsylvania with alternatives to driving to work alone. Administered through a network of seven subcontractors (five Transportation Management Associations (TMA's), The City of Philadelphia Mayor's Office of Transportation, and SEPTA), MAP is an outreach and education program that provides information on a variety of options available to commuters, including transit, car or van pools, and flexible work hours. **Share-A-Ride**, a component of the MAP program, is a computerized match service that provides commuters with the most convenient transit options. The service also offers a listing of other commuters who live and work nearby. (Chester County TMA is one of the seven MAP subcontractors.)

- **Transportation Management Association** - The Chester County TMA should be supported in its efforts to promote non-traditional transportation, such as carpools, vanpools, demand responsive paratransit, subscription buses, telecommuting, and compressed work week. Since the role of these programs is, in part, to support transit, recommendations depend on specific transit services and programs that are studied or implemented. An integral part of any ridesharing program is the Guaranteed Ride Home program. This program, which is usually operated by a TMA, acts as a safety net for employees who use transit, carpool, or vanpool. It provides an emergency ride home, usually by taxi, for employees ridesharing who have an emergency during the day or are required to work late.

- **Ridesharing**
  Carpool -This is a method used to reduce Single Occupancy Vehicle (SOV) trips. Individuals with similar commuting patterns travel to work in the same vehicle rather than each person in a separate vehicle. Commuting can be more relaxing as individuals are not responsible for driving vehicles. Other benefits to individuals include reduced vehicle miles

traveled and thus reduced wear and tear on automobiles. This can lead to lower insurance rates for some policies, less depreciation, and lower maintenance costs for the individual. Various incentives can be provided by both the public and private sector. Through the **Share-A -Ride** program, the TMA helps match individuals with similar commuting patterns. Private employers can also help facilitate the process by disseminating a list of where employees live. Generally, carpools are recommended when the one-way commute is at least 10 miles.

Vanpool -Vanpools are similar to carpools except that a van is used and it can often be sponsored by an employer. Again, individuals with similar commuting patterns all ride in one van instead of many SOVs. If there are a large number of employees (typically six or more) of a single company who live in close proximity to each other, a corporate-sponsored vanpool is good option to reduce SOV trips. More frequently however, vanpools are formed by groups of employees that contract with a service provider that provides the vehicle and related maintenance. Generally, vanpools are most cost effective when the one-way commute distance is at least 20 miles.

- **Telecommuting** is a useful technique in reducing journey to work trips. When it is not necessary that an employee performs tasks at a specific location, they can work at another location other than their usual office, thus eliminating or shortening the journey to work trip. This is known as telecommuting or teleworking. Employees can telecommute from home, a satellite work center, or a neighborhood work center. A satellite work center is for employees of one company. A neighborhood work center is for employees of multiple companies and is ideally located within walking or biking distance of a large number of residents. Individuals can telecommute full-time or part-time, or sometimes, just for a few hours.

- **Compressed Work Week -** Roads become congested at peak periods due to the fact that a majority of work trips are performed at the same times in the morning and evening. One way to combat this problem is through a compressed work week. Many employers are allowing employees to work the expected 40-hour week in a four day period. Adjusting schedules so that trips are made before or after the peak periods is another method of reducing congestion. Additionally, a compressed work schedule reduces the number of weekly trips overall. A compressed work week differs from flextime in that the start and end times of the work day are still set by the employer.

- **Flexible Work Hours** has the effect of spreading the demand for travel over a wider band of time through alternative work hours. Staggered work hours is one such technique where different groups of employees are assigned different start times. Flex time is a technique where individual employees can choose a flexible start time within a prescribed window, usually between 7:00 am and 9:30 am. This works well for office workers who work independently.

- **Subscription Bus** can be a useful link between a main transit line and a residential area or a corporate campus. Subscription buses, often known as shuttle buses, are usually small buses that help reduce short car trips. This can help mitigate congestion by reducing the number of SOVs on the roads. There are several opportunities for subscription bus within the study area. The Exton rail station on SEPTA's R5 line is ideally suited for subscription buses, taking passengers from the station to nearby corporate office parks and other employment centers.

- **Parking Cash Out** is an option given to employees to choose cash in lieu of non-taxable parking subsidies. Since employers can provide tax-free parking of up to $170 per month, employees have an incentive to drive. However, if employers provide cash instead of parking, employees can see a direct benefit and are more inclined to find an alternative to driving alone.

- **Park and Ride** facilities can provide a number of benefits in terms of air quality and improving commuting. They serve as points where individuals can transfer to high occupancy vehicles, reducing the number of single occupancy vehicles on the road. This, in turn, reduces emissions and congestion. Commuting time can be reduced, especially with express transit services from Park and Ride lots. Park and Ride lots are generally free or charge a nominal fee to attract potential users.

  Park and Ride locations at the three rail stations within the study area act as collection points for travelers near the origin point of their trip. The Downingtown Station has a total of 213 SEPTA provided parking spaces. The Whitford Station has 280 paved parking spaces, while the Exton Station has 424 parking spaces.

  Park and Ride lots are also integral to the success of carpool formation and retention. Within the study area, there are three official park and ride sites.

PA 113 at PA 100 in Uwchlan Township

This lot is centrally located and is intended to capture SOV traffic from PA 100 and PA 113. Located adjacent to a strip mall, the lot has 37 spaces. The #204 bus serves this lot. The utilization rate of this lot could be improved by measures such as marketing the benefits to the target market, as well as offering transportation incentives for users of this lot.

US 30 at the US 202 interchange in East Whiteland Township

This lot has a total of 125 spaces and is served by the #204 and #133 bus line. This lot has phone access and the parking is free.

US 30 at PA 100 interchange at West Whiteland Township

There are a total of 116 available spaces for park and ride use at this location. Most current users of this lot are using the R5 Exton Rail Station. This is a free park and ride.

The Transportation Management Association of Chester County identifies 29 Park-and-Ride lots in the southeastern part of the Metropolitan Area, of which 6 are near or in the PA Route 100 study area. All of these lots are either free or cost $0.50 per day to park. Four of the lots are on SEPTA's R5 regional rail line providing access to Center City Philadelphia and the inner suburbs of the main line.

The need for additional park and ride lots should be explored in a effort to promote greater ridesharing. A location in the northern portion of US 322 would intercept single occupant vehicles traveling south in the AM peak. A second location could be in the northern portion of PA 100, which would intercept single occupant vehicles before they reach the more congested southern segments.

- **Pedestrian and Bicycle** trips account for less than five percent of all work trips in Chester County. However, they can be an effective method of reducing vehicle trips, especially for short-distance trips. Most bike trips are less than five miles and most pedestrian trips are less than one-half mile. In order to make bicycling and walking a viable alternative to driving, there must be safe facilities, including sidewalks and bike lanes. Employers should provide bicycle racks where employees can store their bikes securely. Safe crossing areas at intersections, including marked crosswalks, are necessary to encourage pedestrian traffic. Finally, the regional bikeway network should be implemented. The Chester Valley Trail, which links Valley Forge National Historic Park, The Schuylkill River Trail and Struble Trail is 23 miles long. It follows the Chester Valley right-of-way and terminates in Downingtown Borough. This project is currently on the TIP.

  TIP Project #6939 would construct approximately three miles of pathway that will cross PA 100 in Uwchlan Township. This pathway will link the Township's existing four mile pathway system allowing pedestrians to safely access numerous shops, businesses, employment centers and parks without the use of motorized vehicles.

  DVRPC's *Opportunities for On-Road Bicycle Facilities in Chester County* technical memorandum identified several bicycle corridors within the PA 100 study area. For each of the corridors, low cost improvements were recommended to improve safety for the cyclists, increase driver awareness of bicyclists, and to enhance bicycle ridership throughout the corridor. The following are bicycle corridors within the PA 100 study area:

Bicycle Corridor H - Swedsford Road

Limits:	Pottstown Pike (PA 100) to Conestoga Road (PA 401)
Length:	5.1 miles
Major Destinations Served:	Exton Square Mall Fairfield Place Shopping Center Exton Commons Office Campus Brentwood Shopping Center Transco Industrial Park Great Valley Corporate Center
Recommendations:	Widen curb lane to 15’

Bicycle Corridor I - Little Conestoga Road

Limits:	Creek Road (PA 282) to Pottstown Pike (PA 100)
Length:	3.9 miles
Major Destinations Served:	Village of Eagle Eagle Pointe Industrial Park Marsh Creek State Park
Recommendations:	Widen to create 4’ climbing lanes on grades

Bicycle Corridor J - Pottstown Pike

Limits:	Little Conestoga Road to Lionville Avenue (PA 113)
Length:	2.2 miles
Major Destinations Served:	Village of Eagle Eagle Pointe Industrial Park Marsh Creek State Park Eagle Industrial Park Eagleview Corporate Park Marsh Creek Corporate Center
Recommendations:	Widen 8’ to create 6’ shoulder north of I-76 (PA Turnpike) Stripe Turnpike interchange to channel bicyclists Improve surface of existing shoulder

The Chester County Planning Commission has adopted a map with a “Recommended Bikeway Network for Chester County”. The network consist of a series of roadways throughout this corridor. Uwchlan Township has implemented an extensive trail network. One missing element of that network is a pedestrian / bikeway overpass at PA 100 near Sheree Blvd. TIP Project #6940 would implement this project.

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Geographic Area Covered:

The study area consists of an area of Chester County surrounding PA 100. It includes or is adjacent to the following Chester County municipalities: East Whiteland, West Whiteland, East Goshen, West Goshen, East Bradford, Downingtown, East Brandywine, Caln, East Caln, Charlestown, Uwchlan, Upper Uwchlan, Wallace, West Pikeland, East Pikeland, West Vincent, and East Nantmeal.

Key Words:

congestion, level of service, intersection analysis, improvement options, traffic counts, development, station access, park and ride, trip generators, transit, journey-to-work, functional class, average car technique, bus, incentives, strategies

ABSTRACT:

This report is part of the Pennsylvania Congestion Management System (CMS) and provides analysis of the PA 100 corridor in Chester County. Key intersections, arterial subcorridors and transportation systems were examined. Ten intersections experiencing significant delays were studied at greater detail and congestion mitigation strategies were developed. Level of Service was evaluated on 37 arterial subcorridors. Five subcorridors were rated at level of service F and six performed at level of service E. Strategies were given for improving poor levels of service. The 2025 Journey-to Work forecasts showed that private automobiles will be the predominant method of commuting in the study area. Growth pressures, increasing fuel prices and air quality concerns make transit an attractive method of reducing single occupant vehicle trips in the study area. Transit improvements were explored as a viable method of mitigating congestion. The report also suggests a number of Travel Demand Management (TDM) measures such as TransitChek and Mobility Alternative Programs as additional methods of reducing single occupant vehicle trips. Bicycle and pedestrian facilities were also examined to determine ways to promote their use.

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