## PA 41 Corridor Analysis Study Area


## PA 41

- ***Is a Major Investment Study (MIS) Needed?***
  - **Is the planning process participatory and collaborative?**
  - **Are there outstanding issues not addressed by the existing planning process?**
  - **Are there major modal alternatives?**

May, 1999

# PA 41 Corridor Analysis

May, 1999

## PA 41 Corridor Analysis

### Participating Agencies

- **Municipalities:** Avondale Borough, Kennett Township, London Grove Township, Londonderry Township, New Garden Township
- **Other Governmental Organizations:** Chester County Planning Commission, Chester County Commissioners Office, DART, DelDOT, Lancaster County, New Castle County, PA Turnpike, PennDOT Bureau of Design, PennDOT Central Office, PennDOT District 6-0, PennDOT Rail Freight Bureau, SEPTA
- **Regional Organizations:** Avon Grove Regional Planning Commission, Chester County TMA, DVRPC, WILMAPCO
- **Transportation Companies:** Delaware Valley Railway, Norfolk Southern Corporation, PA Motor Truck Association, Port of Wilmington
- **Advocacy Groups:** ACT-41, Dairy Farm Representative, DVRPC Regional Citizens Committee Representative, Mushroom Farm Representative, Save, SCOOT

## PA 41 Corridor Needs and Deficiencies

- **Safety**
  - Accident rates and severity generally exceed statewide average
- **Traffic**
  - Deficient levels of service throughout corridor
  - Thirty-seven to 52 percent traffic increase projected by 2020
  - High percentage of heavy truck traffic (16% of total)
- **Existing Roadway Infrastructure**
  - Geometric deficiencies at 10 intersections
  - Uncontrolled driveway access
  - Poor pavement conditions
  - Sub-standard shoulders



## Issues

- **Diversion of Truck Traffic to Rail**
  - Truck Travel Patterns — Origins and Destinations — Shipping Distances
  - Type of Commodities Carried
  - ~~Availability of Alternate Rail Routes~~
- **Diversion of Truck Traffic to Other Roads**
  - PA Turnpike and Relationship of Truck Traffic to Tolls
  - Other Alternate Routes
- **Land Use Planning**
  - Encroachment of Development and Concern that Bypass will Accelerate this Trend
  - Growth Management
  - Access Management
- **Other Issues**
  - Reduced Speed Limit and/or Traffic Signals to Slow Trucks
  - Documentation of Lack of Need for Full-scale Expressway
  - "Enhanced No-build" Alternative

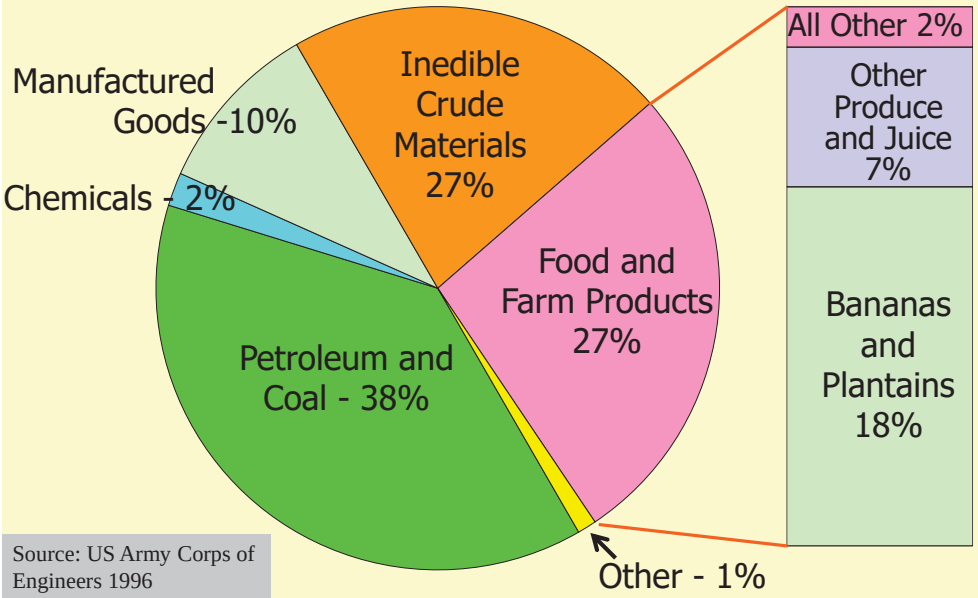





## Diversion of Truck Traffic to Rail

- **Characteristics of Shipment by Truck vs. Train**
  - **Rail usually suitable for:**
    - **long-distance shipments**
    - **bulk/low value shipments**
    - **non-time sensitive shipments**
    - **shipments with single origin and destination**
  - **Nationally, average truck trip distance is approximately 400 miles; average rail shipment is about 800 miles**
  - **Generally, more than 90% of shipments by truck are on time; on-time performance ranges from 60% to 85% for rail**

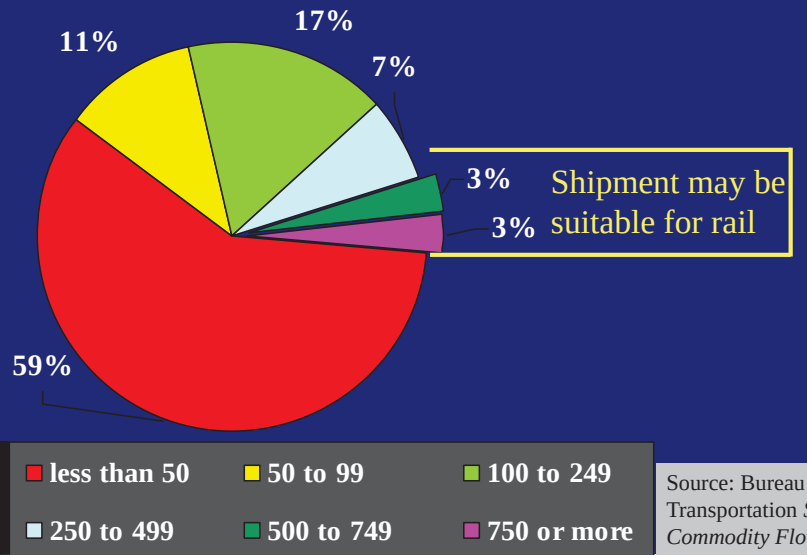
# Wilmington Harbor Freight Traffic (by weight)




Source: US Army Corps of Engineers 1996 Commodity Survey

# Diversion of Truck Traffic to Rail

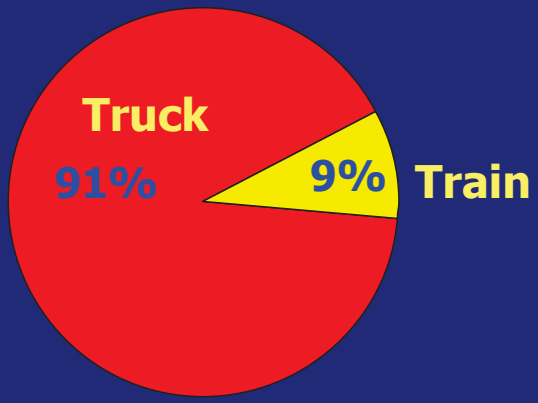
## Distance Shipped for Commodities Originating in Delaware




Source: Bureau of Transportation *Statistics 1993 Commodity Flow Survey*.

# Diversion of Truck Traffic to Rail

## Existing Modal Split of Shipments Originating in Delaware (by weight)

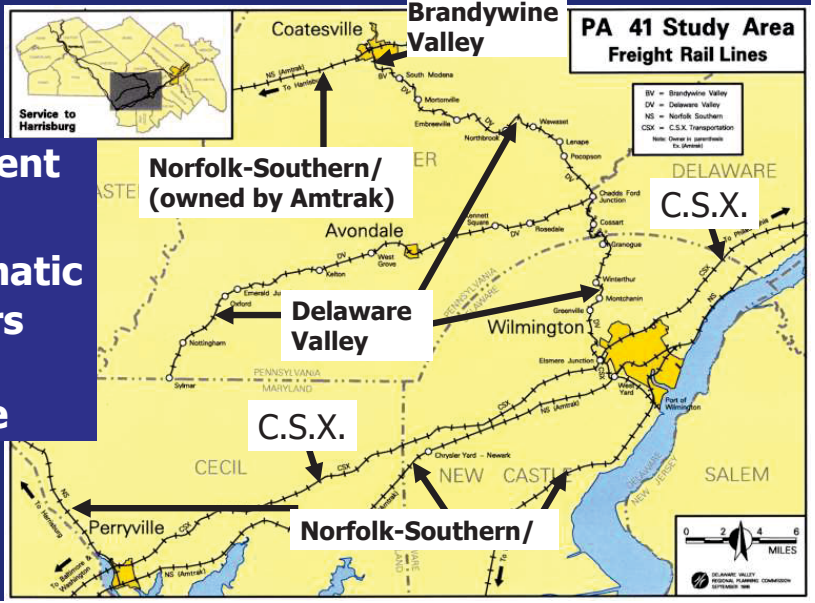



Source: Bureau of Transportation *Statistics 1993 Commodity Flow Survey*. (Data normalized to 100 percent to compensate for unknowns)

# Diversion of Truck Traffic to Rail

## Existing Rail System

- Lack of direct service
- Infrequent service
- Problematic transfers among multiple carriers



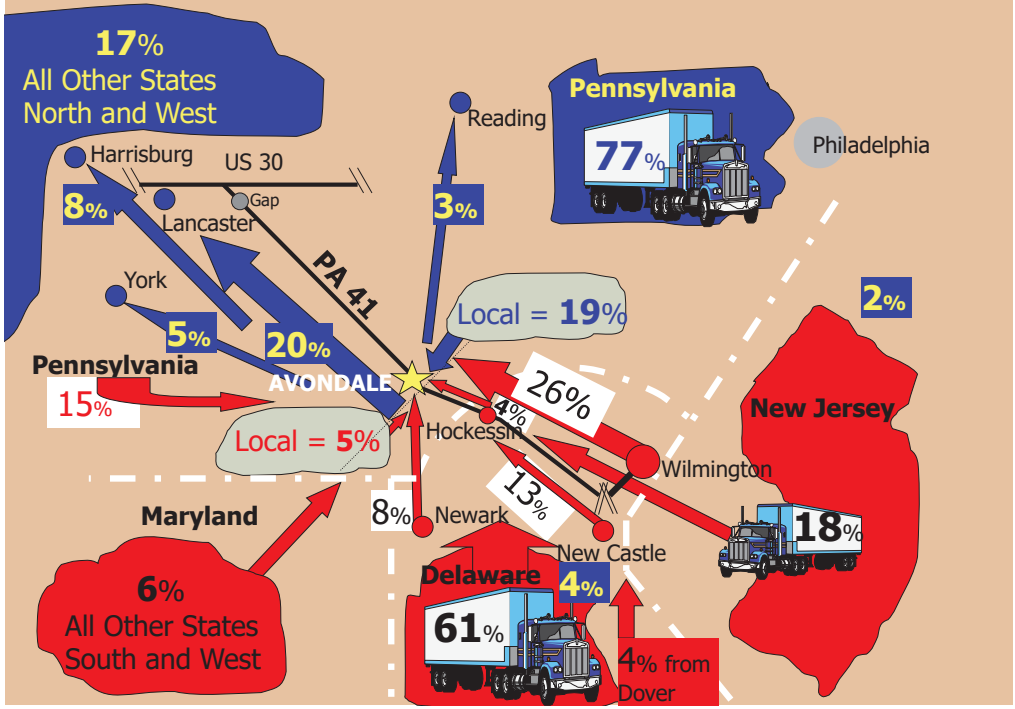
# PA 41 Truck Survey

- About 1800 truck drivers surveyed on PA 41 near Avondale

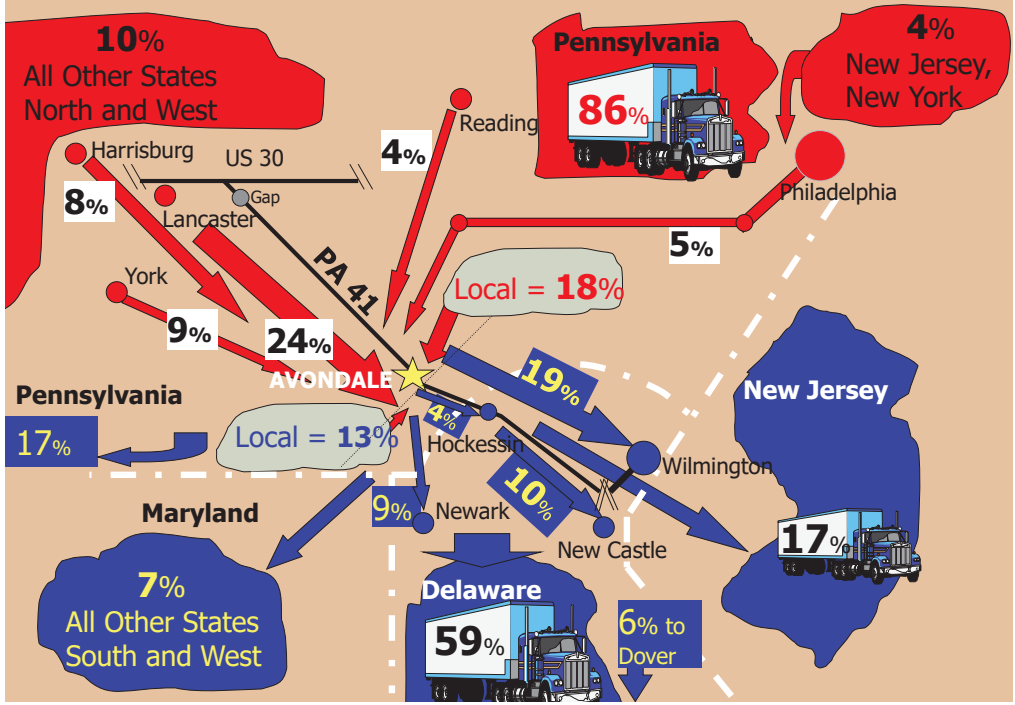
## Key Findings:

- 77% of NB Trucks have destinations within PA, 86% of SB trucks originate from PA
- 23% have at least one stop in Avondale area
- About half of all PA 41 trucks are tractor trailers
- Only about 3% directly associated with Port
- About one-third of trucks are empty
- Less than 10% of trips are longer than 400 mi.
- Somewhat less than 19% carry perishable goods

## Origins and Destinations of Northbound Trucks on PA 41

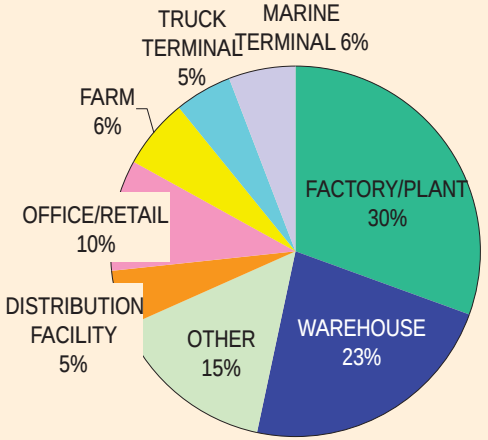



## Origins and Destinations of Southbound Trucks on PA 41

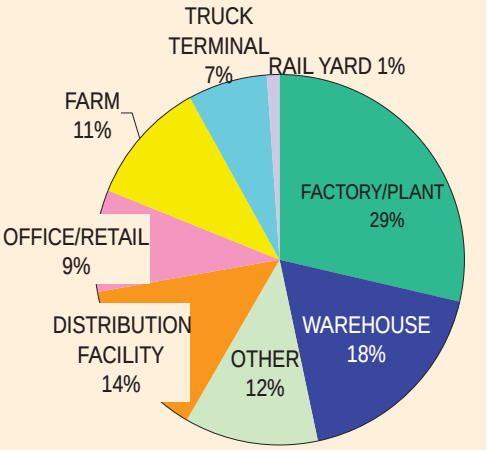



## Trip Origin Facility Type — PA 41 Trucks

### Northbound

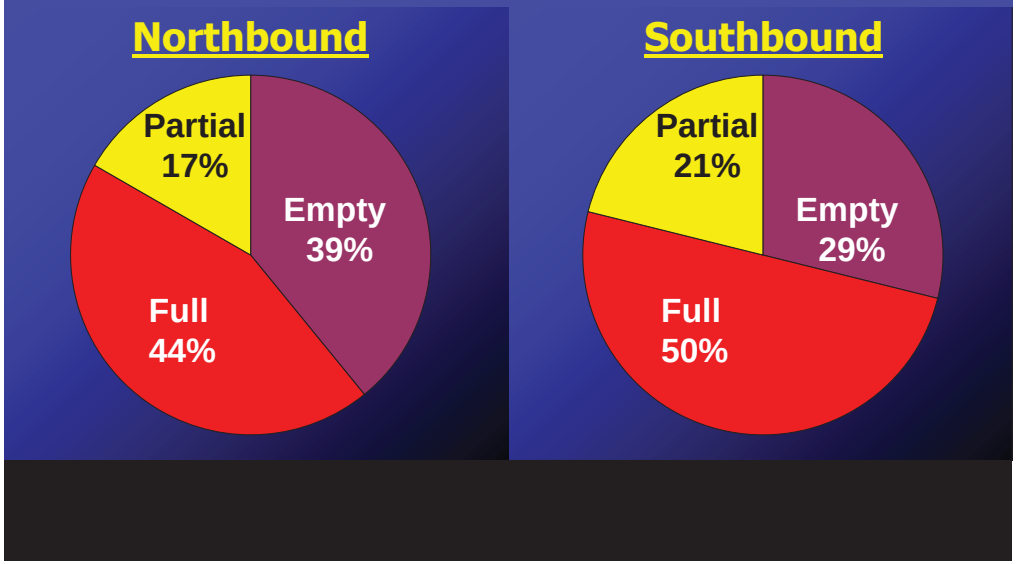



### Southbound



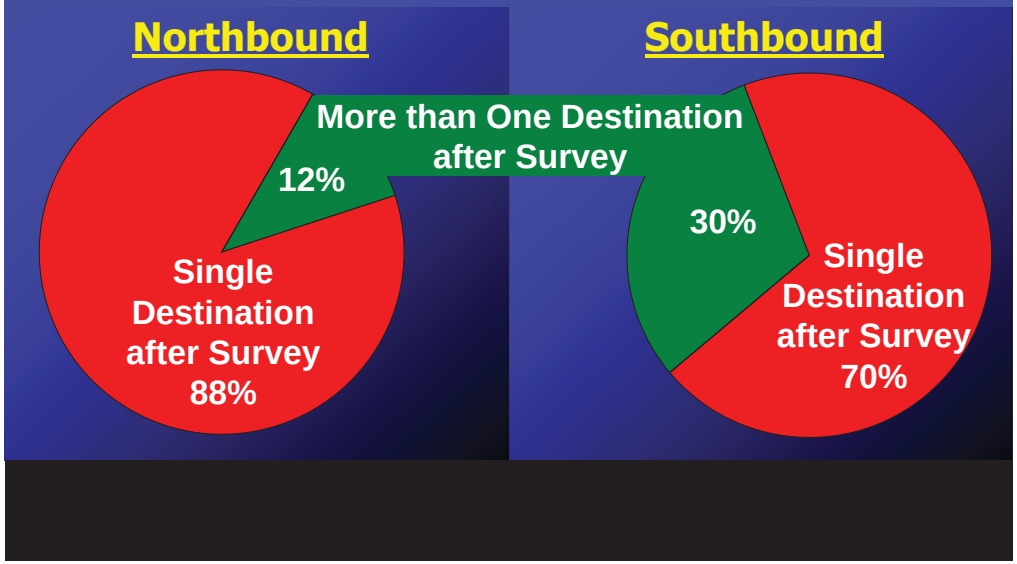
## PA 41 Corridor Analysis

### Load Size of PA 41 Trucks

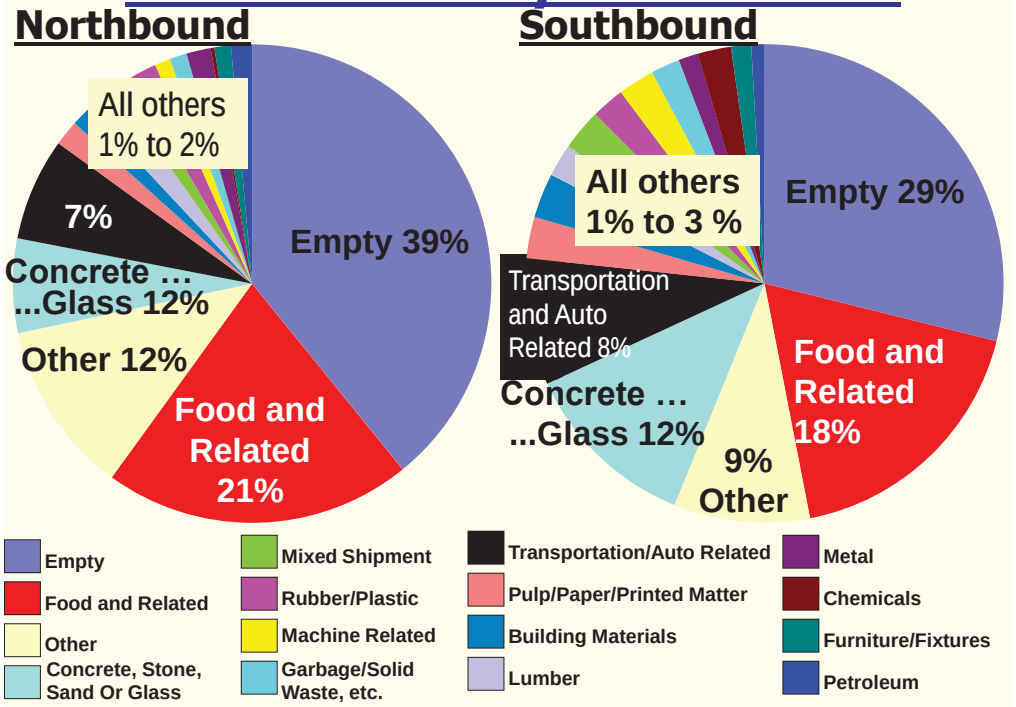



## PA 41 Corridor Analysis

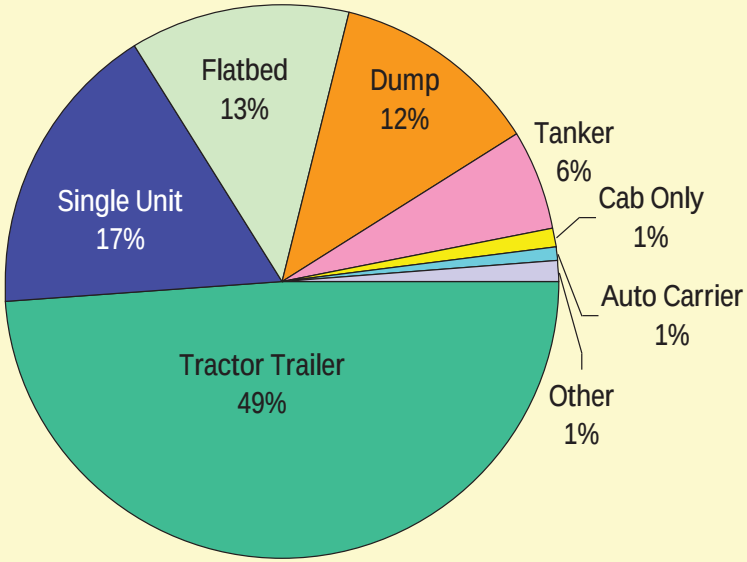
### PA 41 Trucks with Multiple Destinations



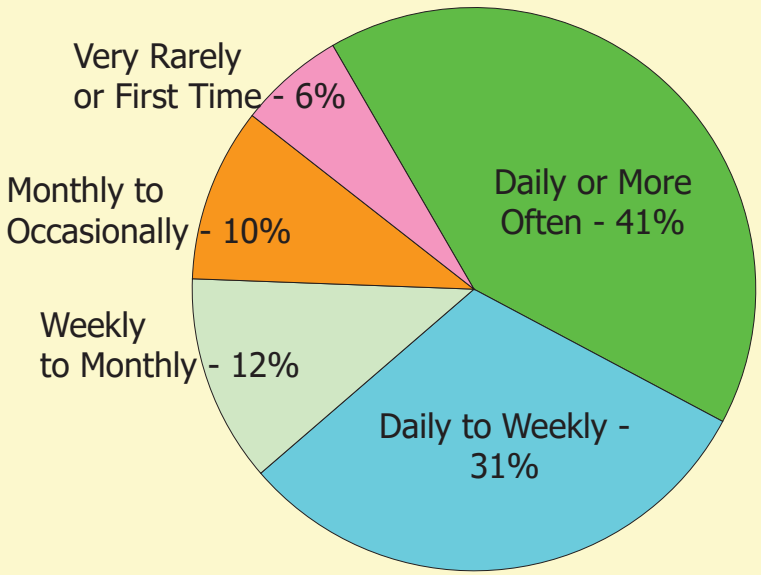

### Goods Carried by PA 41 Trucks




### PA 41 Truck Types



## Trip Frequency for PA 41 Trucks




## Diversion of Truck Traffic to Rail

### Conclusions:

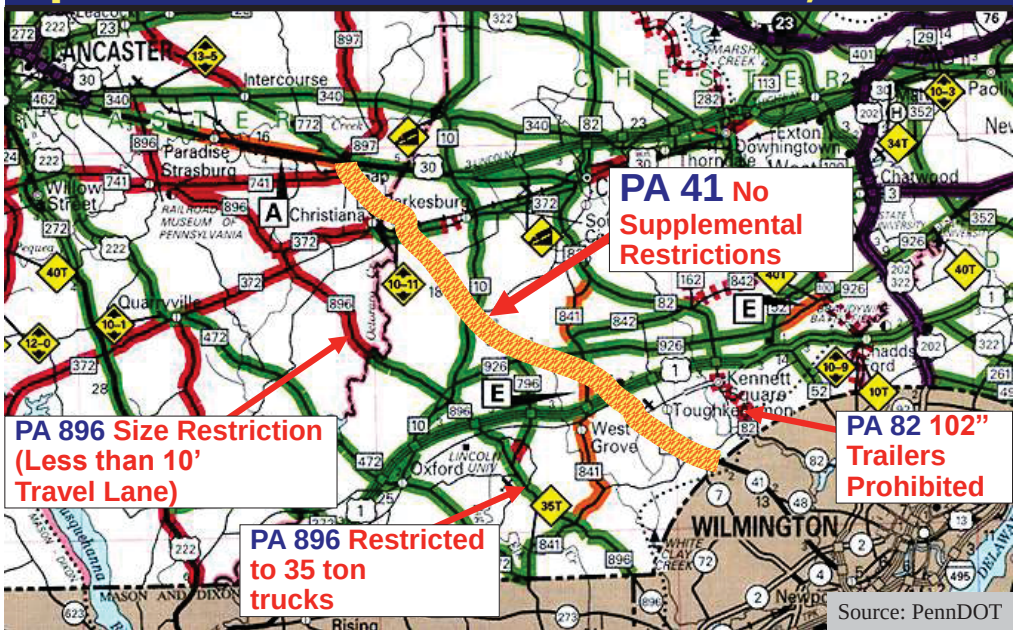
- Fragmented existing rail system not conducive to shipment of goods presently served by PA 41
- Few truck trips through the region are long enough to consider rail
- Rail generally does not well link primary origins and destinations
- Many long distance shipments can not use rail due to time-sensitivity of perishable goods or other logistical constraints
- PA 41 shipments amenable to rail amount to less than 145 trucks per day (of >2000 total)

PA 41 Corridor Analysis

***. . . Can PA 41 Truck Traffic be Diverted to Alternative Routes? . . .***

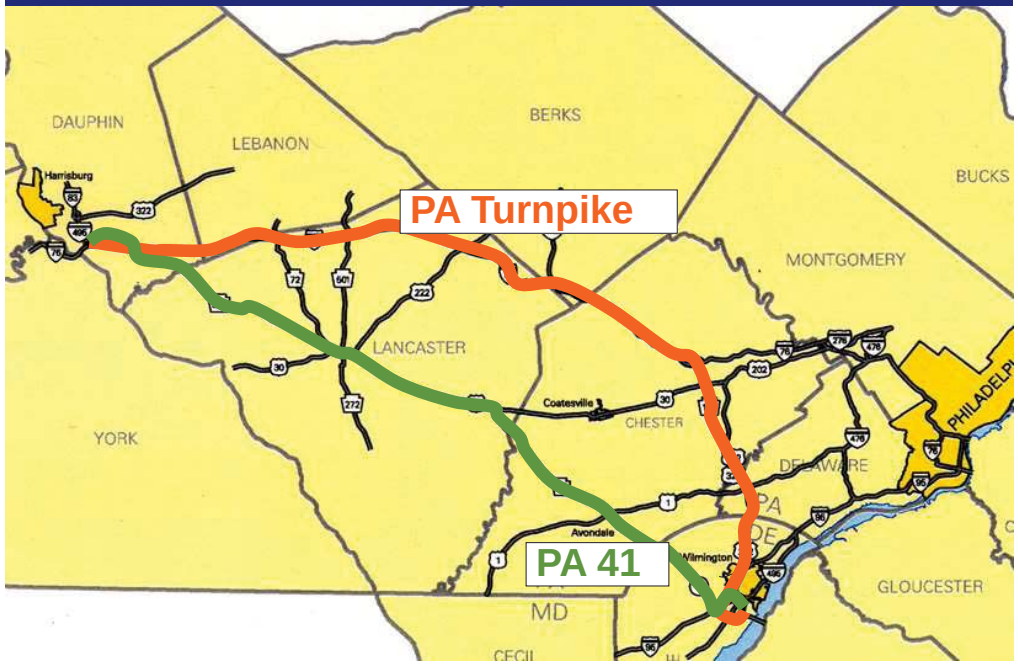
## Alternative Truck Routes

### Options for Parallel Routes: PA 896, PA 82




Source: PennDOT

## Alternative Travel Time Study Routes: Via US 202 and PA Turnpike vs. PA 41



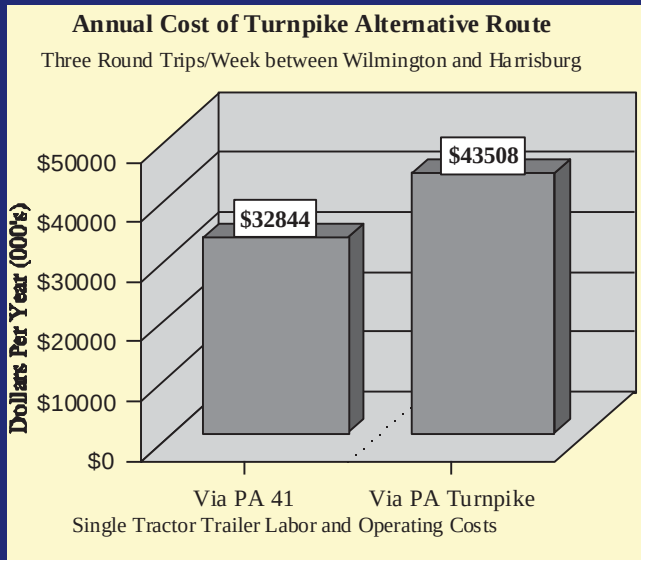

## Alternative Travel Time Study Routes: Via US 202 and PA Turnpike vs. PA 41

| | Route 1: DE 41, PA 41, US 30, PA 283 | | Route 2: I-295, I-95, US 202, PA 100, PA Turnpike | |
|---|---|---|---|---|
| Distance | 82 miles | | 100 | |
| PA Turnpike Toll | n/a | | $12.40 (for a tractor trailer) | |
| Travel Times | From Port of Wilmington to Harrisburg | From Harrisburg to Port | From Port of Wilmington to Harrisburg | From Harrisburg to Port |
| Morning Peak | 103 minutes | 105 | 115 | 120 |
| Midday | 103 | 103 | 121 | 122 |
| Afternoon Peak | 113 | 105 | 119 | 122 |

## Alternative Truck Routes

### Via US 202 and PA Turnpike

- About 18 miles and 10 minutes longer than travel via PA 41
- Substantial added expense due to tolls ($12.40 each way for a typical, loaded tractor-trailer) and other increased operating costs




## Alternative Truck Routes

### Conclusions:

- Parallel highway routes do not serve large heavy trucks as does PA 41
- Origin and destination data indicates that PA 41 is the only reasonable route for the trucks it serves
- US 202/PA Turnpike option is time and cost prohibitive even for the minority of total PA 41 shipments that could use the route to serve their origins and destinations

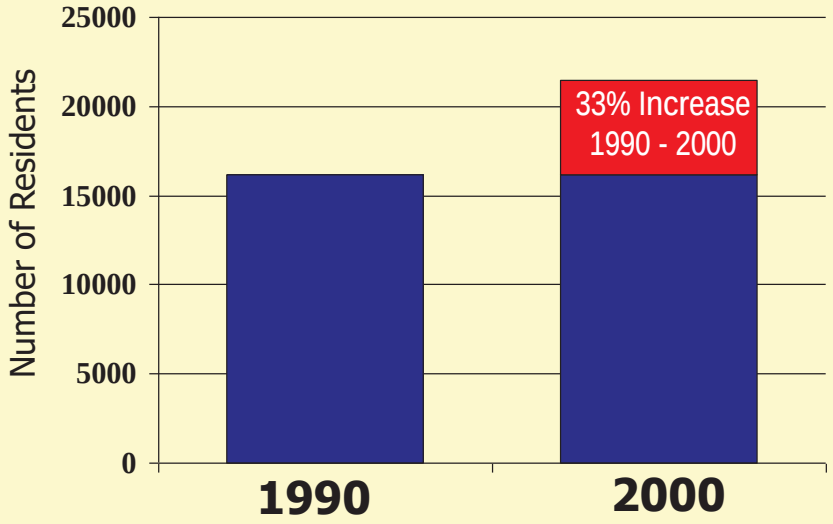

## Land Use

### Highlights:

- Corridor study area consists of Avondale Boro., Kennett, Londonderry, London Grove and New Garden Twps.
- Corridor population increased from about 16,200 in 1990 to about 21,400 in 1997
- Employment increased from about 6,700 to about 8,000 during same period
- Between 1970 and 1995 about 4000 acres, or 16% of the corridor's 1970 agricultural land was developed
- Land occupied by residential development increased from about 2,600 to 4,900 acres between 1970 and 1995

## Land Use

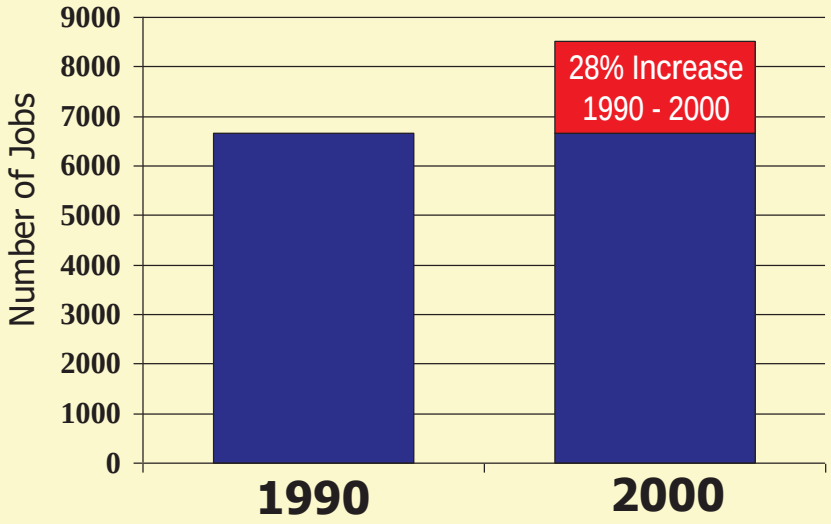
### PA 41 Corridor Population Growth




Source: 1990 Census, DVRPC Estimates through 1997, then projected according to trendline

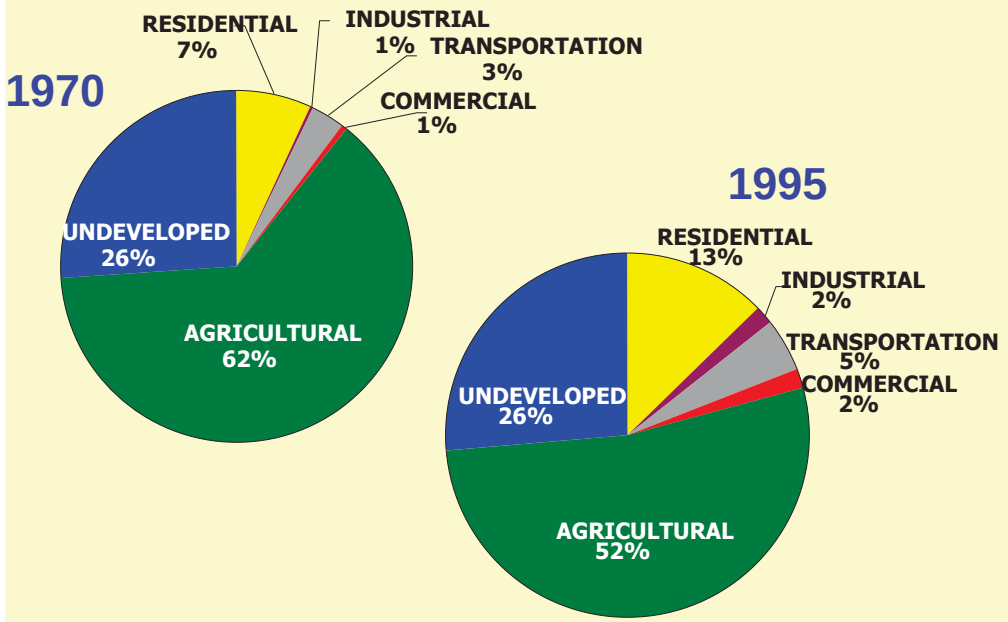
## Land Use

### PA 41 Corridor Employment Growth




Source: 1990 Census, DVRPC Estimates through 1997, then projected according to trendline

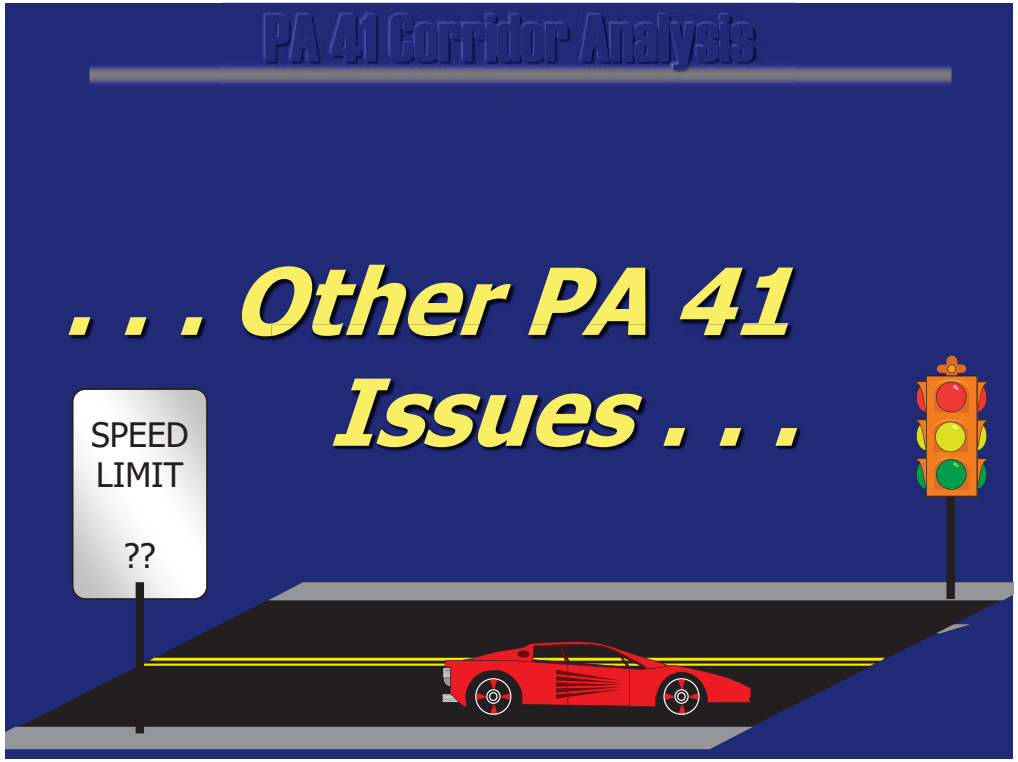
## Land Use




## Land Use

### Conclusions:

- Development pressures will increasingly impact area transportation system capacity and safety
- Municipal land use controls should advance consistent with Chester County's *Landscapes* Plan
- Strategies to address land use concerns should be developed through a multi-municipal and participatory process




## Other PA 41 Issues

- ***Safety Concerns***
- Safety is foremost PA 41 concern of municipalities
- Nine intersections being improved by PennDOT SAMI projects
- Support for lower speed limits and new traffic signals
- Safety improvements must comply with MUTCD warrants

## Other PA 41 Issues

- ***Is a Four-Lane, Limited Access Expressway for the Entire Length of PA 41 Needed or Desired?***

**Key Findings:**

- **Project is not included in or supported by municipal, county, regional and state plans**
- **New highway would be 22.5 to 25 miles**
- **Project is likely to cost about $340 - 500 million**
- **Project of this magnitude would have significant environmental impact**

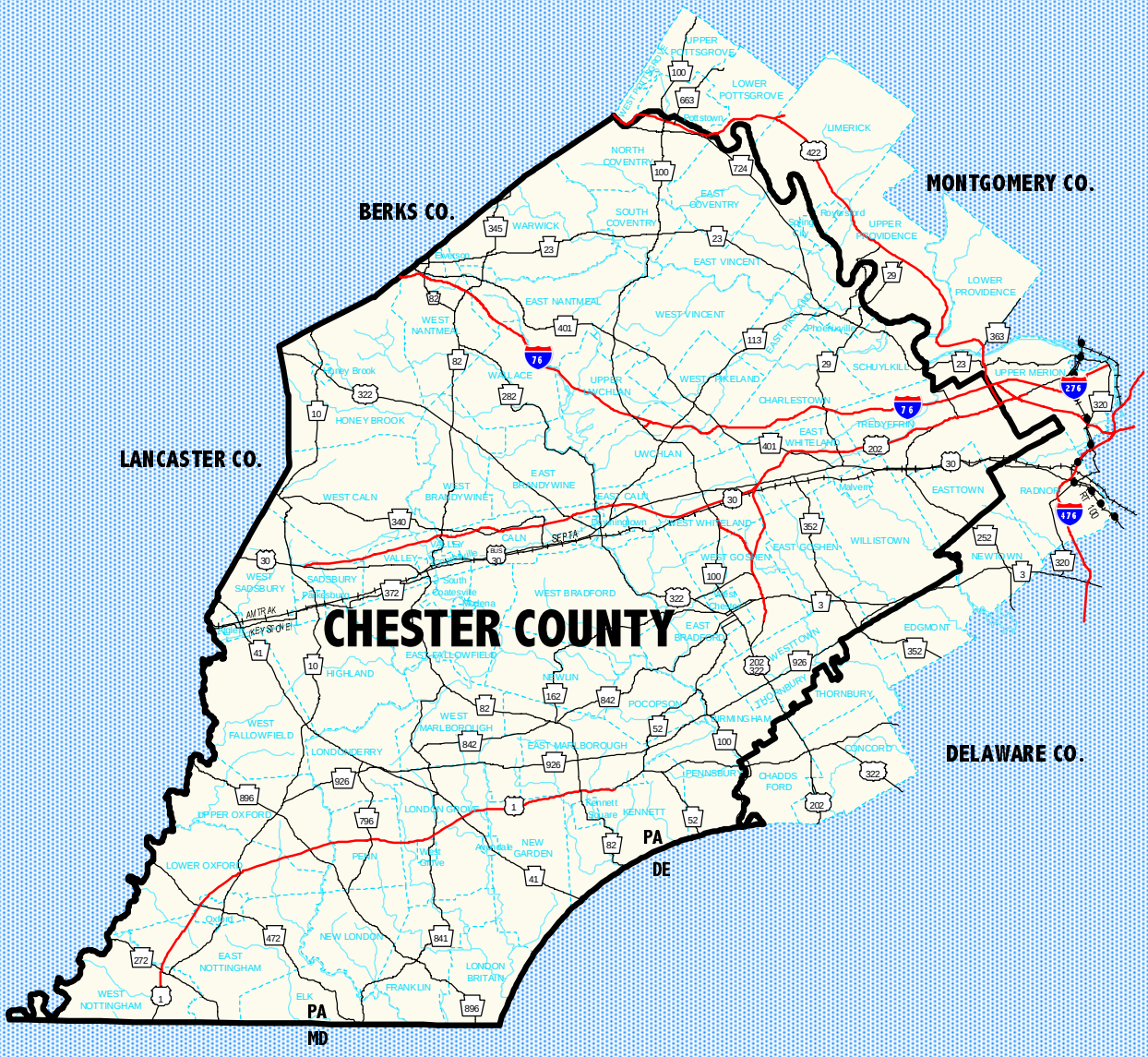
## Other PA 41 Issues

- ***"Enhanced No-build" Option***
- **Supported by SAVE and other local interest groups**
- **Objective is to develop an alternative which is smaller in scope that a bypass**
- **PennDOT has agreed to evaluate enhanced no-build option**

## Conclusions

- ***An MIS is not Needed***
  - **The planning process is participatory and collaborative**
  - **Outstanding issues will be addressed by the existing planning process**
  - **There are no major modal alternatives**

# CHESTER COUNTY, PA
# TRANSPORTATION STUDY




Prepared for
Chester County Planning Commission
By
Delaware Valley Regional Planning Commission
December 2001

# EXECUTIVE SUMMARY

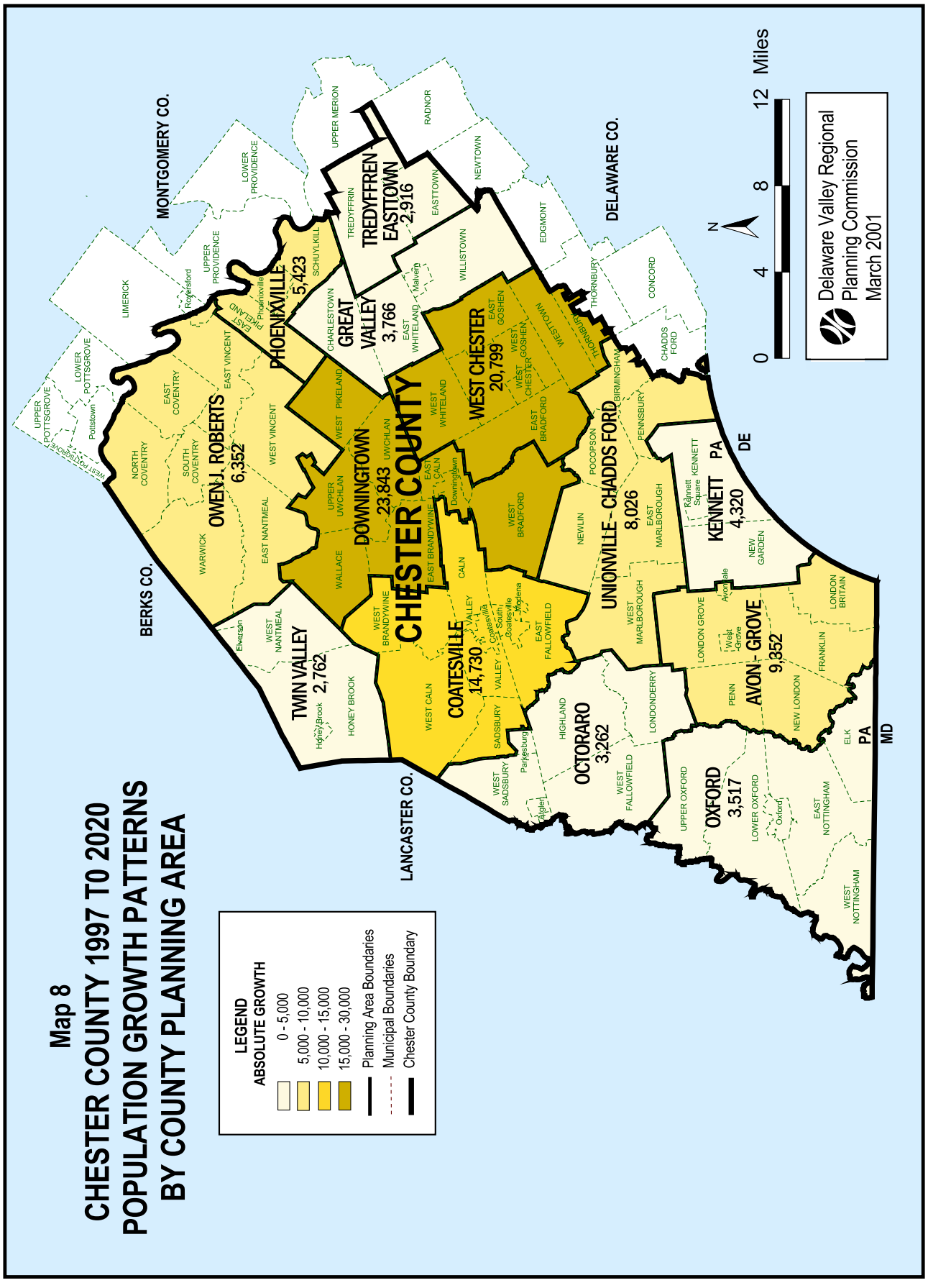
In response to a request from Chester County, DVRPC staff prepared a special version of the DVRPC enhanced regional travel simulation model focused on the County. This county-wide focused model provides more transportation system detail and greater accuracy than the regional model, while maintaining a much larger study area than a traditional, project-specific focused model. This model was developed to assist Chester County in evaluating the impact of alternative transportation scenarios on highway levels of service given population and employment forecasts that concentrate new residential and commercial development in appropriate areas identified by the County's *Landscapes* development plan. This work supports the development of a county-wide transportation plan that promotes implementation of the goals, objectives, and policies included in the *Landscapes* Plan.

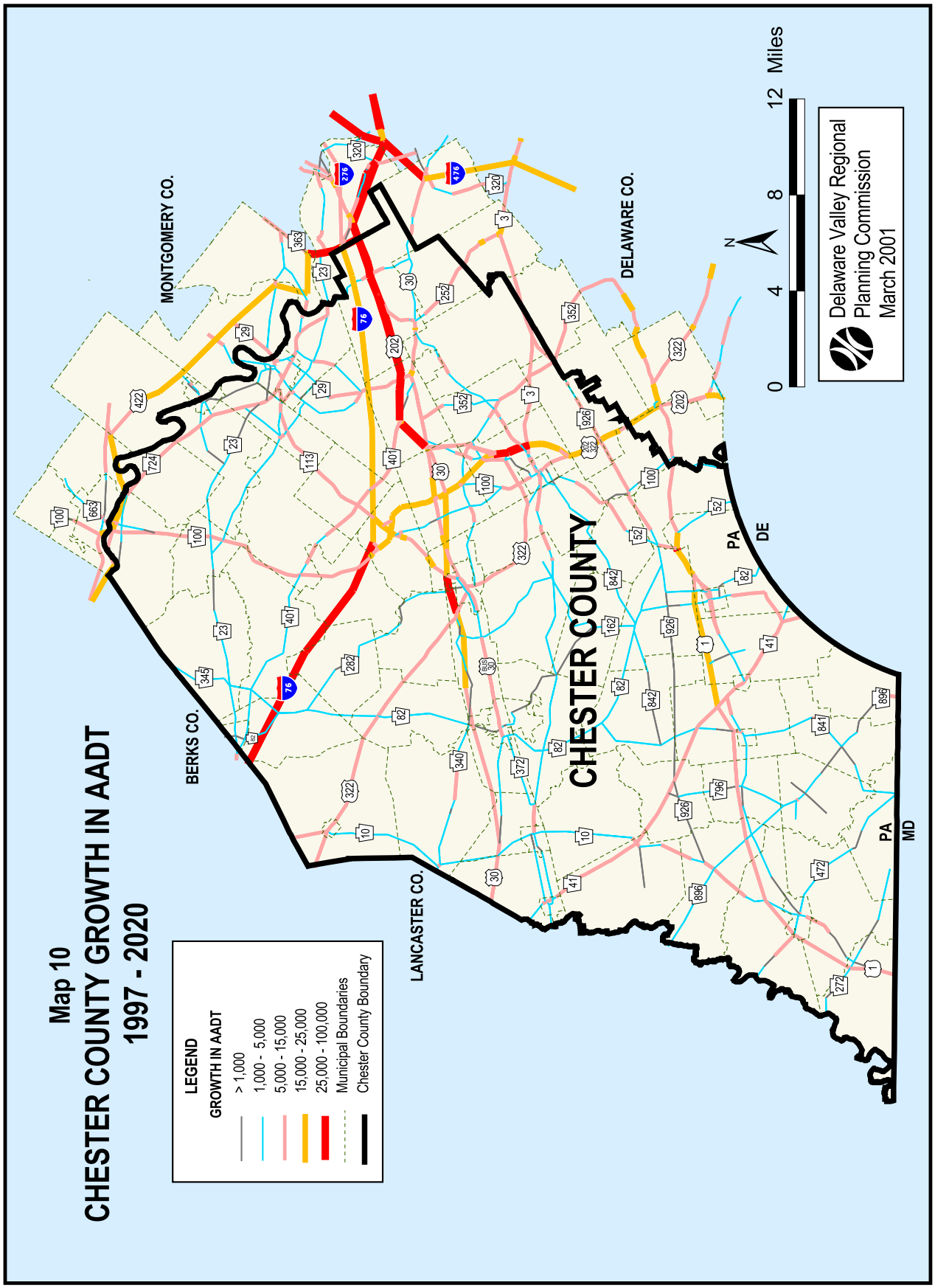
This report documents the 2020 model runs made with *Landscapes* development patterns and socioeconomic forecasts, testing three alternative levels of highway and public transit improvements - a No-Build, moderate improvement (Scenario 1) and extensive improvement (Scenario 2). The results of these travel simulations give insight into the levels of transportation investment that will be required to stabilize highway service levels at current conditions and reduce congestion levels in existing problem areas. The two build scenarios were constructed for evaluation purposes. Actual recommendations by the county will be made based on a technical and policy analysis of these scenarios.

For the county as a whole, Scenario 2 is adequate to preserve highway service levels at 1997 levels and in some locations reduce highway congestion below 1997 levels. Scenario 1 also for the most part preserves highway service levels at 1997 conditions, but reductions in existing operating speeds may occur in some areas, particularly during peak periods. These county-wide averages may not be indicative of prevailing highway conditions in certain corridors and on specific roadways. For this reason, separate more detailed analyses prepared for each of nine corridor/areas within Chester County are included in this report. These corridors/areas include: PA 100 Corridor, US 322 Corridor, US 1 Corridor, US 202 Corridor, Phoenixville Area, Downingtown Area, PA 41 Corridor, PA 113 Corridor, and the West Chester Area.

Chester County will experience very high rates of population and employment growth in the next 20 years. Although it may be possible to concentrate much of this growth in developed areas, traffic congestion will increase significantly unless new roadway capacity is created through investments in the transportation system. In some portions of the county, it is not possible to significantly reduce peak period congestion below current levels even with the Scenario 2 transportation improvements.

The projections, analyses, and conclusions presented in this report are intended for general overall planning purposes. They are valid given the socio-economic projections and the proposed highway and transit facilities included in the improvement scenarios 1 and 2. Forecast volumes included in this report should not be used for planning or design of specified facilities. These results are subject to refinement and adjustment in detailed traffic and public transit studies that must be conducted at the facility level of analyses prior to implementation.


Map 8
CHESTER COUNTY 1997 TO 2020
POPULATION GROWTH PATTERNS
BY COUNTY PLANNING AREA
LEGEND
ABSOLUTE GROWTH
0 - 5,000
5,000 - 10,000
10,000 - 15,000
15,000 - 30,000
Planning Area Boundaries
Municipal Boundaries
Chester County Boundary
CHESTER COUNTY
COATESVILLE 14,730
DOWNINGTOWN 23,843
KENNETT 4,320
OWEN J. ROBERTS 6,352
PHOENIXVILLE 5,423
TREDYFFRIN EASTTOWN 2,916
TWIN VALLEY 2,762
UNIONVILLE - CHADDS FORD 8,026
WEST CHESTER 20,799
AVON GROVE 9,352
GREAT VALLEY 3,766
OCTORARO 3,262
OXFORD 3,517
MONTGOMERY CO.
BERKS CO.
LANCASTER CO.
DELAWARE CO.
PA
DE
MD
0 4 8 12 Miles
N
Delaware Valley Regional Planning Commission
March 2001


Map 10
CHESTER COUNTY GROWTH IN AADT
1997 - 2020
LEGEND
GROWTH IN AADT
> 1,000
1,000 - 5,000
5,000 - 15,000
15,000 - 25,000
25,000 - 100,000
Municipal Boundaries
Chester County Boundary
MONTGOMERY CO.
BERKS CO.
LANCASTER CO.
DELAWARE CO.
CHESTER COUNTY
PA
DE
PA
MD
N
0 4 8 12 Miles
Delaware Valley Regional
Planning Commission
March 2001


Map 13
CHESTER COUNTY HIGHWAY CORRIDORS
AND DETAILED STUDY AREAS INDEX
CHESTER COUNTY
MONTGOMERY CO.
BERKS CO.
LANCASTER CO.
DELAWARE CO.
PA
DE
MD
PHOENIXVILLE AREA
DOWNINGTOWN AREA
WEST CHESTER AREA
PA 100 CORRIDOR
PA 113 CORRIDOR
US 322 CORRIDOR
US 202 CORRIDOR
US 1 CORRIDOR
PA 41 CORRIDOR
0 4 8 12 Miles
N
Delaware Valley Regional Planning Commission
March 2001

*7. PA 41 Corridor Study - Delaware State Line to Lancaster County Line*

PA 41 provides for travel from northwest to southeast in the southwest portion of Chester County (see Figure 8). It is a major truck route connecting the Port of Wilmington to points west, with heavy trucks representing over 10 percent of the vehicle mix. PA 41 also accommodates commuter travel to Wilmington as well as recreational travel to New Castle County and the Delmarva Peninsula. Within the study area, from Lancaster County to the Delaware State line, truck and commuter traffic combine with substantial impacts on travel conditions. Municipalities in this corridor include from south to north: New Garden Township; Avondale Borough; and London Grove, Londonderry, Highland, West Fallowfield, Atglen, and West Sadsbury townships.

Projected population and employment growth in the PA 41 corridor is high in percentage terms at 39 percent and 34 percent, respectively. Population is expected to grow from 21,500 to almost 30,000, with employment rising from 8,500 to over 11,000. This corridor is primarily designated either rural or natural. Rural centers are planned at Kaolin, Chatham, and Cochranville. Urban areas are designated at Atglen and Avondale, with the Avondale growth area extending along PA 41 from the borough itself to north of US 1. Only a small portion of this corridor is designated suburban, highlighting the desire to limit development within this corridor.

Through most of the study area PA 41 is a two lane rural road with shoulders. Immediately north of the Delaware State line, PA 41 carries an AADT of 11,000. Just north of this point, there is a grade separated intersection with Limestone Road, a major route into Delaware. Current traffic volume north of this point rises to 15,000 vpd. The next major intersection is Newark Road which provides access to US 1 to the north. After Newark Road, Baltimore Pike joins PA 41 from the east, passing through Avondale, a small town with a population of 1,000. PA 41 at this location is a typical "Main Street," with on-street parking, abutting structures, and generally limited capacity. Current volume through Avondale is 17,500 vpd. North of Avondale, Baltimore Pike veers west and PA 41 diverges from this road. Traffic levels drop to 15,000 north of Baltimore Pike. The next major intersecting road is US 1, a four lane freeway. North of this point, the character of the corridor becomes rural. Several miles north of US 1, PA 841 and the village of Chatham are crossed. Current traffic volume is 15,300 in Chatham. The next major intersection moving north is PA 10. Next, PA 41 skirts the developed portions of Atglen, with constrained geometry. North of Atglen, PA 41 reaches Lancaster County, the northern limit of the corridor.

Projected traffic growth to 2020 for this corridor is high. Volume is anticipated to rise by 50 percent throughout the study area. This growth will range from 6,000 to 10,000 vpd. On most of the corridor, traffic volume is projected to be over 20,000 vehicles per day. North of Kaolin Road, projected No-Build volume is 25,800 vpd. Through Avondale volume is anticipated to be 27,900 vpd. North of Chatham 23,700 vpd is projected. All of these volumes indicate moderate congestion in rural areas, with heavy congestion passing through Cochranville, Atglen, and Avondale. At projected volumes, the capacities of isolated intersections will likely control flow.

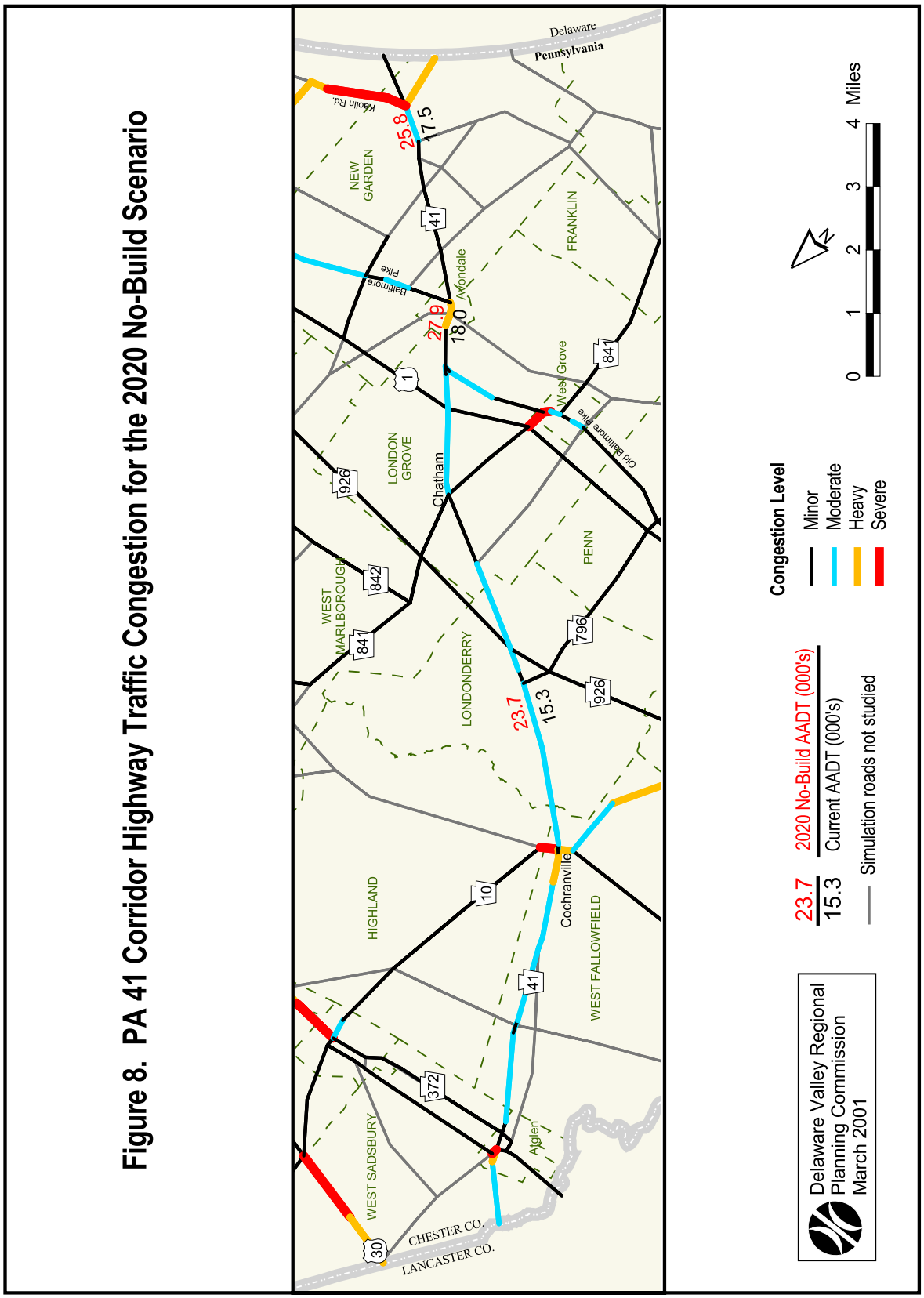
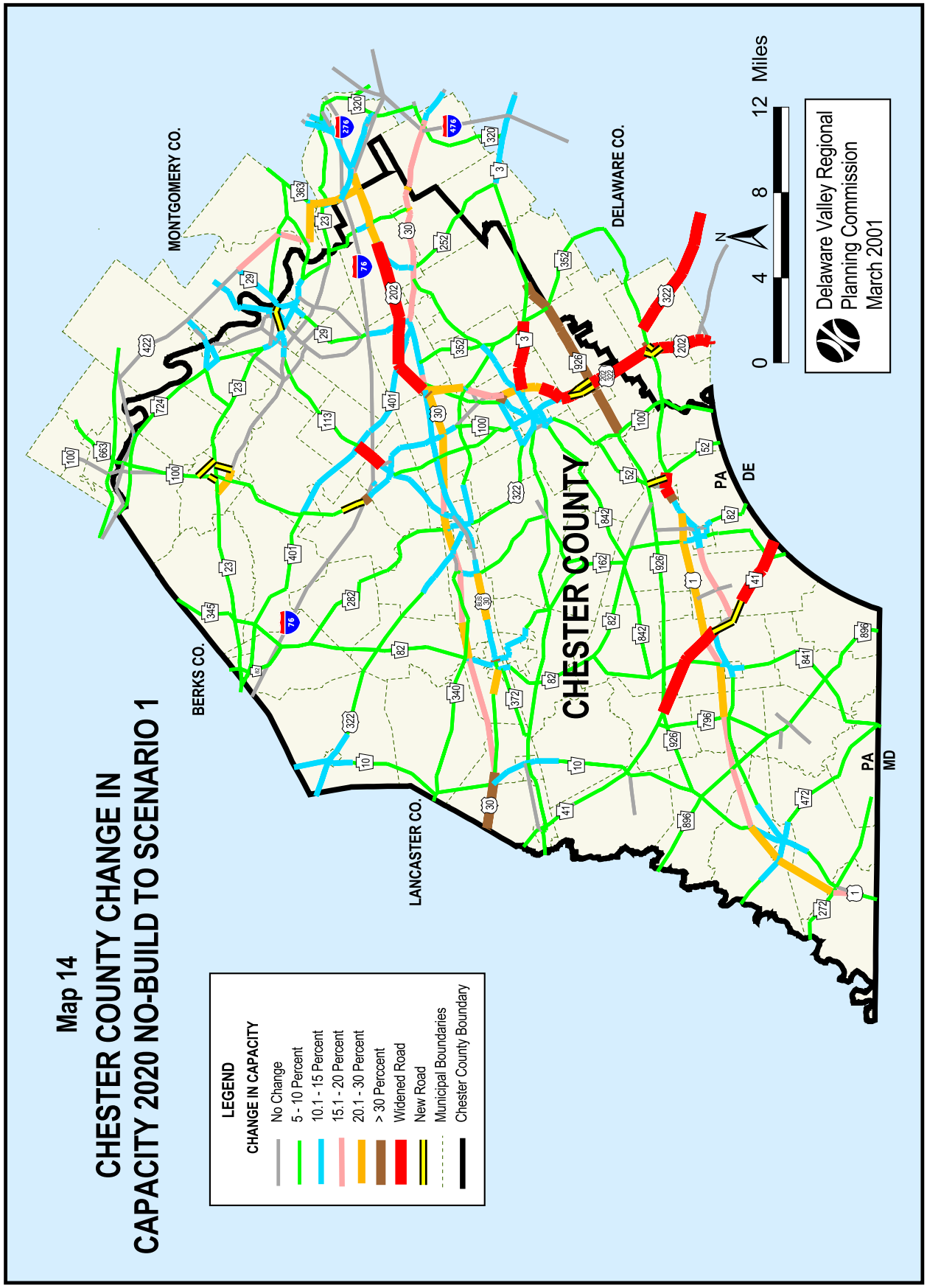


Figure 8. PA 41 Corridor Highway Traffic Congestion for the 2020 No-Build Scenario
Delaware
Pennsylvania
Kaolin Rd.
NEW GARDEN
FRANKLIN
Baltimore Pike
Avondale
West Grove
Old Baltimore Pike
LONDON GROVE
Chatham
WEST MARLBOROUGH
LONDONDERRY
PENN
HIGHLAND
Cochranville
WEST FALLOWFIELD
WEST SADSBURY
Atglen
CHESTER CO.
LANCASTER CO.
25.8
17.5
27.9
18.0
23.7
15.3
1
10
30
41
372
841
842
926
796
841
926
Congestion Level
Minor
Moderate
Heavy
Severe
23.7 2020 No-Build AADT (000's)
15.3 Current AADT (000's)
Simulation roads not studied
0 1 2 3 4 Miles
Delaware Valley Regional Planning Commission
March 2001


Map 14
CHESTER COUNTY CHANGE IN
CAPACITY 2020 NO-BUILD TO SCENARIO 1
LEGEND
CHANGE IN CAPACITY
No Change
5 - 10 Percent
10.1 - 15 Percent
15.1 - 20 Percent
20.1 - 30 Percent
> 30 Percent
Widened Road
New Road
Municipal Boundaries
Chester County Boundary
CHESTER COUNTY
BERKS CO.
MONTGOMERY CO.
DELAWARE CO.
LANCASTER CO.
PA
DE
MD
N
0 4 8 12 Miles
Delaware Valley Regional
Planning Commission
March 2001

*7. PA 41 Corridor Study, Delaware State Line to Lancaster County Line*

South of US 1, both scenarios include widening of PA 41 to four lanes from the Delaware state line to Avondale and construction of a two-lane arterial bypass around Avondale to US 1. North of US 1, both scenarios include widening PA 41 to four lanes, but Scenario 2 also includes construction of the Chatham bypass as a two lane arterial. These improvements are listed in Table 34, below.

**Table 34. PA 41 Corridor Study Highway Improvements for Scenarios 1 and 2**

| Location | Scenario 1 | Scenario 2 |
|---|---|---|
| US 30 to PA 926 | Increase capacity 10 percent | Increase functional class to high parkway |
| PA 926 to US 1 | Widen to 4 lanes, and increase functional class to high parkway | Widen to 4 lanes and build Chatham bypass |
| US 1 to Avondale | Build 2 lane bypass | Build 2 lane bypass |
| Avondale to Delaware State Line | Widen to 4 lanes and increase functional class to high parkway | Widen to 4 lanes and increase functional class to high parkway. |

a. Description of Results

Figures 25 and 26 present the 2020 travel simulation results for the PA 41 Corridor under scenarios 1 and 2, respectively. Traffic volumes moving through this corridor were not significantly impacted by the addition of bypasses around Chatham and Avondale. The maximum impact was a 2,000 vehicle increase north of Chatham in scenario 2. As expected, the bypasses diverted traffic away from existing PA 41 in Avondale and Chatham. In Scenario 2 a reduced number of vehicles pass through Chatham, while the maximum load in Avondale is roughly 9,300 vpd.

In the northern portion of PA 41, differences between the scenarios are minimal, with Scenario 2 about 2,000 vpd higher than the no build. All three options yield AADTs above 20,000 throughout the corridor. Two further observations can be made regarding this portion of the roadway. First, the ring roads suggested in the Cochranville area do provide some relief to the intersection of PA 41 with PA 10. Of particular note is the road in the east quadrant of this intersection, which carries a volume around 5,000 vehicles per day. The ring road in the north quadrant also generates a substantial simulated volume. Second, traffic volumes in the Atglen area in all scenarios exceed 20,000 vpd. This suggests that attention should be given to solving traffic problems in this area.

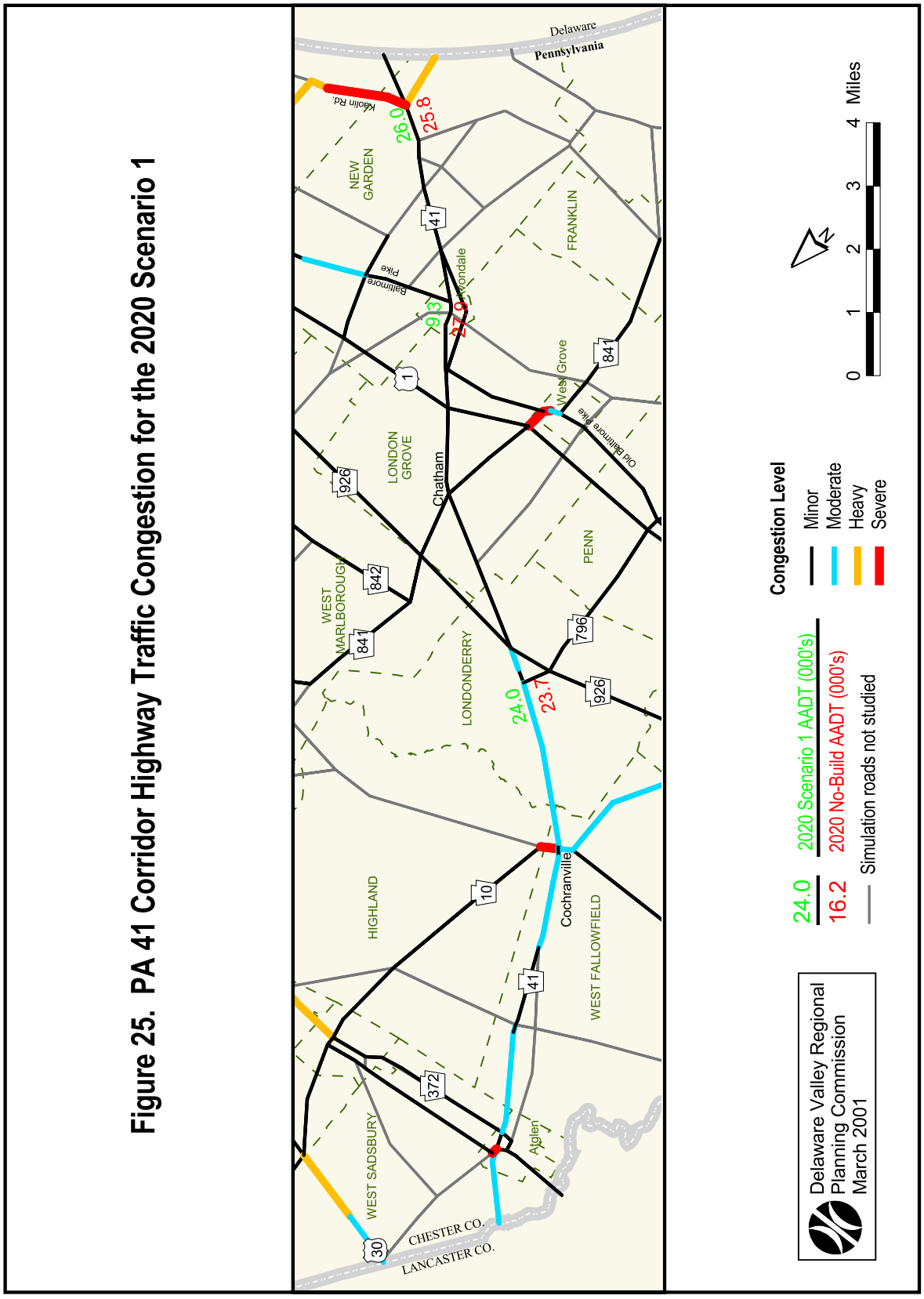



**Figure 25. PA 41 Corridor Highway Traffic Congestion for the 2020 Scenario 1**

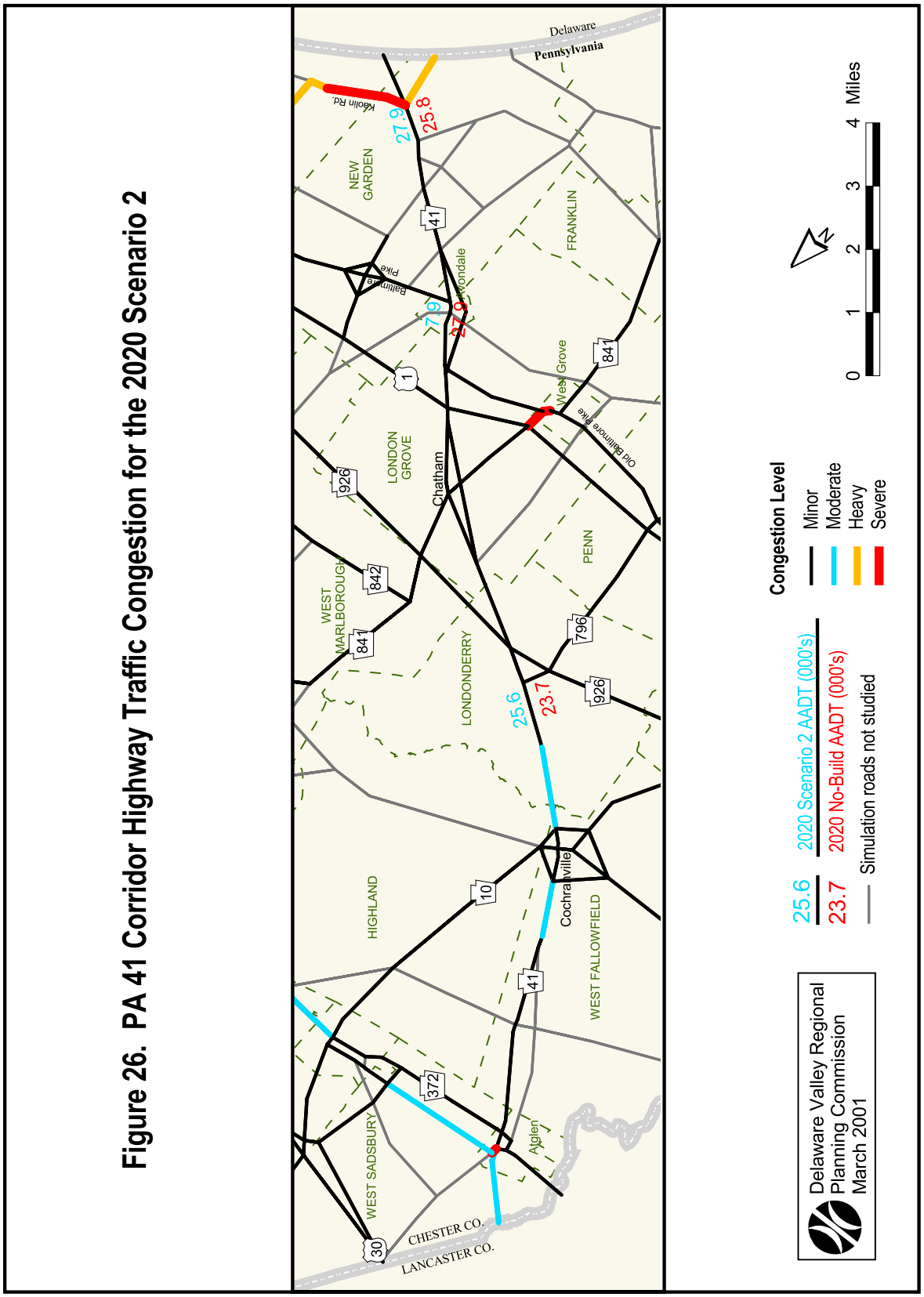



**Figure 26. PA 41 Corridor Highway Traffic Congestion for the 2020 Scenario 2**

percent to 75 percent in Scenario 2. Where capacity increases are highest, at bypasses and through Uwchlan Township, congestion is minimal. However, because of the additional travel that is attracted to the corridor, those areas that receive minimal upgrades (south of US 30 and north of PA 401) experience little or no improvement over current conditions.

- The US 322 corridor remains congested despite additional capacity. A moderate increase in capacity produced substantial gains in volume. This is most acute approaching Downingtown from the west where Scenario 2 added 4,600 vehicles over the No-Build. Overall, congestion did decrease within the corridor, with positive impacts to parallel roads, particularly Bondsville Road and PA 282. Also, provision of a ring road at Guthriesville reduced congestion at this location.

- Improvements to US 1 provide substantial relief throughout the corridor in both build scenarios, although accommodating roughly 50 percent traffic growth over 1997. First among these successes is widening US 1 to six lanes from the Kennett-Oxford Bypass to PA 52 which eliminates congestion in this segment. East of PA 52, heavy congestion predominates in the No-Build Scenario. However, upgrades to US 1 result in a projection of moderate congestion for both build scenarios in this area, with much traffic using an improved PA 926.

- Increased capacity drastically reduces congestion on US 202. Much of this corridor is projected to experience heavy congestion under the No-Build Scenario, with traffic growth of 30 to 50 percent over 1997 levels. Travel on US 202 in the build scenarios increases moderately, but the proposed improvements allow US 202 to accommodate projected demand. Also, problem intersections at PA 926 and US 1 are relieved with the addition of ring roads and grade separation.

- The Phoenixville area in the No-Build is the most congested portion of Chester County. Provision of additional roadways, widenings, and capacity improvements provide only moderate relief. With additional capacity, travel that previously avoided Phoenixville due to congestion now passes through the area in both build scenarios. While small improvements occur on most major roads, minor roadways experience more substantial drops in volume versus the No-Build Scenario.

- The Downingtown area experiences substantial congestion in the No-Build Scenario, with traffic growth on the order of 50 percent from 1997. Most of the Downingtown area received slight capacity increases in the build scenarios, with the exception of US 30 which receives substantial capacity increases as a result of widening to six lanes in Scenario 2. US 322 remains congested in all scenarios, while improvements to US 30 improve east-west travel by diverting traffic off of US 30 Business. In all scenarios, pockets of congestion persist in the downtown area.

- PA 41 under the No-Build Scenario is projected to be moderately congested through much of the corridor, with heavy congestion in Avondale, Cochranville, and Atglen. Both build scenarios alleviate this congestion, with combinations of bypasses, ring roads, and widening

September 2002

Cordon Line Highway Traffic Survey for the Delaware Valley Region

# I-95, US 202 and PA 41 South Cordon Stations in Chester and Delaware Counties

Report 2


Delaware Valley Regional Planning Commission

# EXECUTIVE SUMMARY

The External and Through Traffic Survey collected current information on traffic entering and exiting the DVRPC region. The traffic surveys at I-95 (consisting of I-95, I-495 and the Naamans Road Ramps survey stations), US 202, and PA 41 South (this is where PA 41 crosses state line between Chester and New Castle counties) taken together were five of fourteen stations surveyed around the region during the summer of 2001. Twenty four hour classification counts were performed prior to the roadside surveys; however, classification counts on I-95 were collected only in the northbound direction and I-495 counts (which were supplied by Delaware Department of Transportation) lack hourly classification counts. The I-95 counts have been factored to account for both directions.

Survey information was collected in both directions through a roadside interview, using the questionnaire shown on page 6. Questions were asked about trip origin and destination, purpose, highways used, vehicle type, occupancy, truck garage location and truck commodities. Detailed findings are available individually in Section III and in the Appendices in the back of the report. The survey was conducted with the cooperation of the Delaware Department of Transportation and Delaware State Police. Traffic was surveyed at each of the stations in both directions during the time period from 6:45 a.m. to 7:15 p.m. though some surveys were called early on account of darkness.

The major findings for these three survey stations are as follows:

- The 24 hour counts for I-95, US 202 and PA 41 South were 117,745, 41,300 and 17,810 AADT respectively.

- The completed survey samples for I-95, US 202 and PA 41 South was close to the desired goals. The I-95 stations completed 2,996 of 3,600 surveys for 83 percent of the desired sample goal. US 202 completed 1,665 of 1,800 surveys for about 93 percent of the desired sample goal, and PA 41 South completed 1,543 of 1,700 surveys for about 91 percent of the desired sample goal.

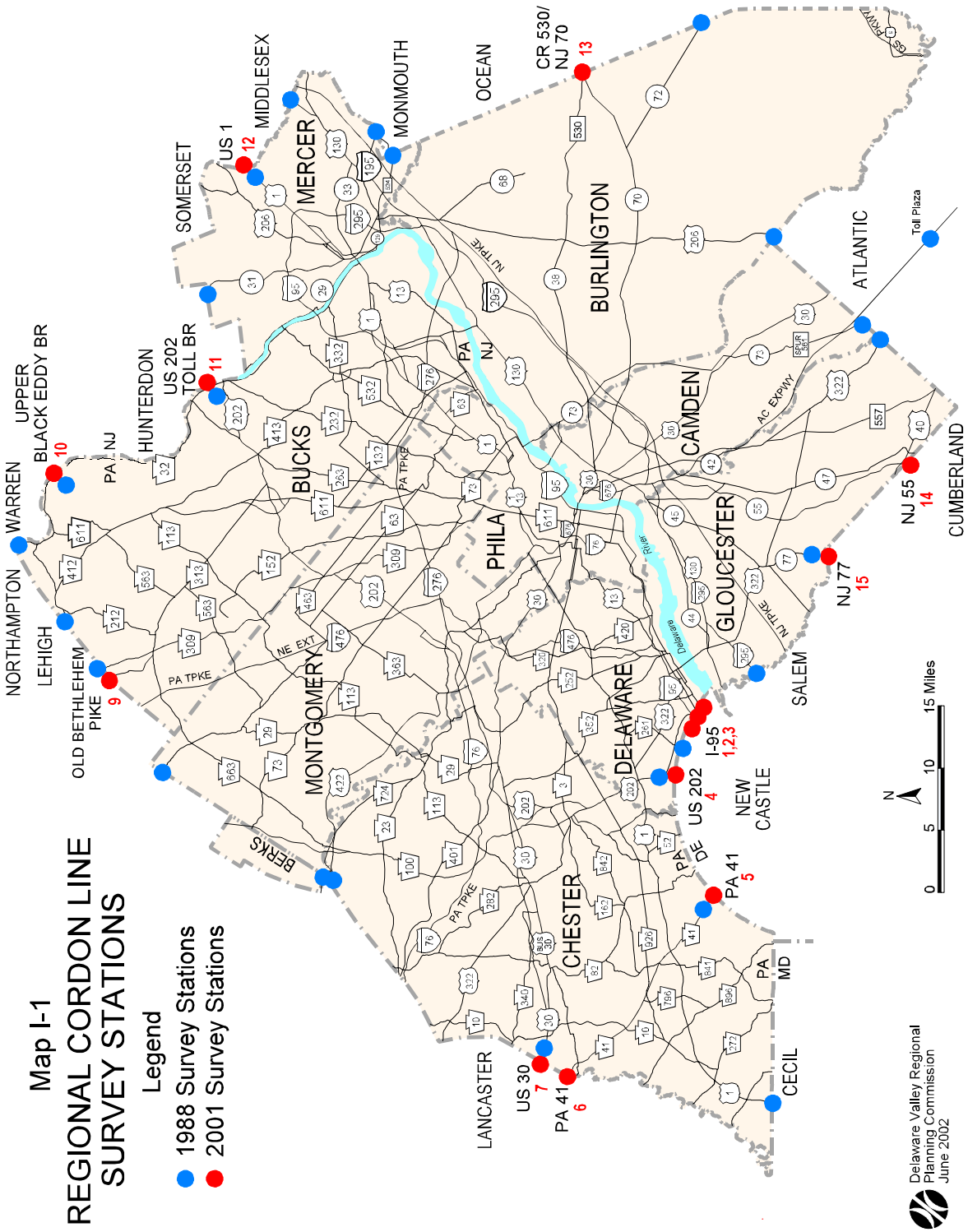
- The most common I-95 origin inbound was Brandywine with a 42 percent share and outbound was Philadelphia with a 30 percent share. There were two major US 202 inbound origins: Wilmington with 32 percent and Brandywine with 28 percent, and outbound with Concord at 15 percent. The most common origin inbound for PA 41 South was Piedmont with 24 percent and outbound New Garden with 24 percent.

- The automobile driver's reasons for traveling I-95 was 73 percent saving time and 22 percent most direct, while truck drivers responded with 73 percent saving time and 19 percent most direct. Along US 202, automobile driver's reasons were 60 percent to save time and 32 percent most direct, while truck drivers responded 76 percent saving time and 17 percent most direct. On PA 41 South, automobile driver's respones were 71 percent to save time and 22 percent most direct, while truck drivers responded 71 percent saving time and 24 percent most direct.

- The work trip was the main trip purpose for I-95, US 202 and PA 41 South with 62 percent, 54 percent, and 43 percent shares, respectively. The secondary trip purposes on I-95 and PA 41 South were for social visits with 16 percent and 31 percent respectively, while US 202 had shopping trips with a 22 percent share.

- The average total vehicle occupancy varied by survey stations, with I-95, US 202 and PA 41 South having 1.30, 1.34 and 1.61 persons per vehicle respectively, while the occupancy for work trips was 1.14, 1.12 and 1.23 persons per vehicle, respectively.

- The largest response regarding commodities carried by trucks on I-95, US 202 and PA 41 South were 24 percent "other", 29 percent building materials and 25 percent building materials, respectively.


Map I-1
REGIONAL CORDON LINE
SURVEY STATIONS
Legend
1988 Survey Stations
2001 Survey Stations
NORTHAMPTON
WARREN
LEHIGH
UPPER BLACK EDDY BR
10
OLD BETHLEHEM PIKE
9
PA
NJ
HUNTERDON
US 202 TOLL BR
11
SOMERSET
US 1
12
MIDDLESEX
MERCER
MONMOUTH
OCEAN
CR 530/ NJ 70
13
BURLINGTON
ATLANTIC
Toll Plaza
CAMDEN
GLOUCESTER
NJ 55
14
CUMBERLAND
NJ 77
15
SALEM
BUCKS
PHILA
MONTGOMERY
DELAWARE
CHESTER
BERKS
LANCASTER
US 30
7
PA 41
6
US 202
4
I-95
1,2,3
NEW CASTLE
PA 41
5
DE
PA
MD
CECIL
NJ TPKE
PA TPKE
NE EXT
AC EXPWY
Delaware River
0
5
10
15 Miles
N
Delaware Valley Regional Planning Commission
June 2002

## Figure II-1. External and Through Survey Field Form

**Delaware Valley Regional Planning Commission** **Nº** 10000
**EXTERNAL AND THROUGH TRIP SURVEY** **Time :** : 1[ ] AM 2[ ] PM

**1. Where did you start this trip? (Origin)** **2. Is this home?** 1[ ] Yes 2[ ] No

_____
Street address or nearest intersection

_____
Town or City County State Zip Code

**3. Where will this trip end? (Destination)** **4. Is this home?** 1[ ] Yes 2[ ] No

_____
Street address or nearest intersection

_____
Town or City County State Zip Code

**5. Will you stop before arriving at your destination?** **6. Is this home?** 1[ ] Yes 2[ ] No

1[ ] No 2[ ] Yes, If yes, where?

_____
Street address or nearest intersection

_____
Town or City County State Zip Code

**7. Why do you use this road? (check one or more)**
1[ ] Saves Time 3[ ] Less Congestion 5[ ] No Traffic Lights
2[ ] Saves Money 4[ ] Better Road Condition 6[ ] Other_____

**8. What is/are the major road(s) that you will take to reach the destination after this road?**

1st Highway_____ 2nd Highway _____

**9. What type of vehicle is used for the trip?**

| **Passenger Vehicles** | **Light Trucks** | **Heavy Trucks (3 axles or more)** |
|---|---|---|
| 1[ ] Auto | 5[ ] Pickup | 9[ ] Tractor-Trailer |
| 2[ ] Van, Sta. Wagon | 6[ ] Panel | 10[ ] Double Trailer |
| 3[ ] SUV | 7[ ] Single Unit | 11[ ] Other _____ |
| 4[ ] Other _____ | 8[ ] Other _____ | |

**10. What is the purpose of this trip? (Passenger Vehicles Only)**
1[ ] Work 3[ ] Eat Meal 5[ ] Social/Recreation 7[ ] Visitor/Tourist
2[ ] School 4[ ] Shopping 6[ ] Medical 8[ ] Other _____

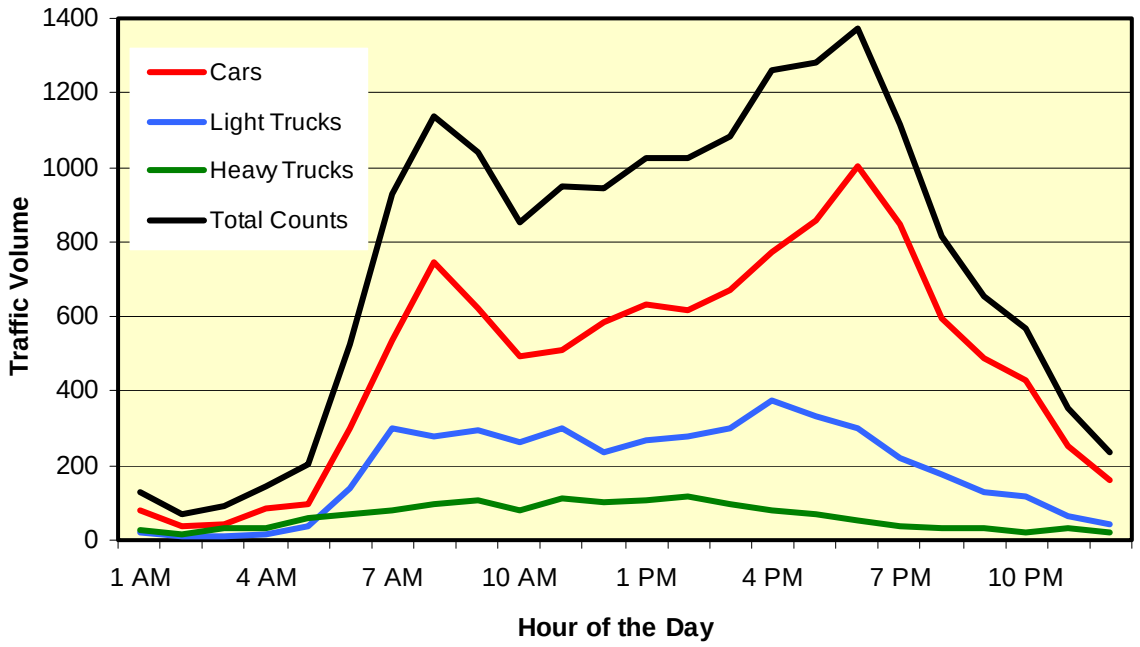
**11. How many people are in the vehicle? (Passenger Vehicles Only)**
1[ ] One 2[ ] Two 3[ ] Three 4[ ] Four 5[ ] Five 6[ ] More than Five

**12. Where is this truck garaged or parked when not in service? (Trucks Only)**
1[ ] Bucks County 4[ ] Montgomery County 7[ ] Burlington County 10[ ] Mercer County
2[ ] Chester County 5[ ] Philadelphia County 8[ ] Camden County 11[ ] Other NJ County
3[ ] Delaware County 6[ ] Other PA County 9[ ] Gloucester County 12[ ] Other State

**13. What type of commodities are you carrying? (Trucks Only)**
1[ ] Empty 4[ ] Agricultural Products 7[ ] Retail Store Merchandise
2[ ] Manufactured Products 5[ ] Building Materials 8[ ] Parcels
3[ ] Petroleum Products 6[ ] Refrigerated Products 9[ ] Other _____

# Part 5
## PA 41 South Summary Survey Results

## Daily Traffic Counts by Hour of the Day




- Vehicle classification counts were collected during a 24 hour count preceding each of the surveys. PA 41 south hourly counts were taken just north of Kaolin Road in New Garden Township where the field survey was conducted. The daily traffic volume at that point was 17,810 vehicles classified by vehicle type. The full statistical portrait of the classification counts for PA 41 south is shown in Appendix E, Table E-1 in the back of the report.

- The AM peak hour occurred between the hours of 7:00 a.m. to 8:00 a.m. The count for that hour was 1,366 vehicles. This count was about 6 percent of the 24 hour traffic volume. The PM peak occurred between the hours of 5:00 p.m. to 6:00 p.m. The count for that hour was about 1,375 vehicles. This constitutes about 8 percent of the 24 hour traffic volume.

- The vehicular counts were dominated by 11,469 automobiles. This is about 64 percent of total daily vehicular count.

- Light trucks (two axles) constitute 4,368 or about 25 percent of total traffic volume, while heavy trucks (three or more axles) constitute about 9 percent of the total volume. Buses and motorcycles make up about 2 percent of the total traffic volume

**Total Interviews by Survey Period**

| Survey Period | Total Surveys | Inbound Surveys | Inbound % of Total | Outbound Surveys | Outbound % of Total |
|---|---|---|---|---|---|
| **Morning Shift** | | | | | |
| 6:30 a.m. - 10:30 a.m. | 338 | 162 | 21% | 176 | 23% |
| 10:30 a.m. - 1:00 p.m. | 373 | 182 | 24% | 191 | 25% |
| **Evening Shift** | | | | | |
| 1:00 p.m. - 4:30 p.m. | 396 | 201 | 26% | 195 | 25% |
| 4:30 p.m. - 8:00 p.m. | 436 | 229 | 30% | 207 | 27% |
| **TOTAL** | **1543** | **774** | **100%** | **769** | **100%** |

- The survey interviewed 1,543 drivers. This sample is about 91 percent of the desired goal of 1,700 responses. The hourly shift totals have been aggregated to create the table above. The reader may examine the disaggregated numbers in greater detail in Table E-2 in the Appendix.

- The difference in directional movement is small, with similar inbound and outbound flows in the morning shift from 6:30 a.m. to 10:30 a.m. (21% versus 23%). These percentages are reversed in the evening shift between 4:30 p.m. and 8:00 p.m. when the inbound traffic (30%) is larger than the outbound traffic (27%).

- The inbound and outbound volumes are fairly constant throughout the day, suggesting considerable regional interaction through this station. Inbound and outbound flows are roughly similar in every time period with little directional traffic disparities.

## Place of Trip Origin by Municipality

| Inbound Trip Origins | | Outbound Trip Origins | |
|---|---|---|---|
| **Municipality** | **% of Total** | **Municipality** | **% of Total** |
| 1. Piedmont | 24% | 1. New Garden | 24% |
| 2. Lower Christiana | 14% | 2. London Grove | 15% |
| 3. Pike Creek | 11% | 3. Avondale | 4% |
| 4. New Castle | 8% | 4. Penn | 4% |
| 5. Wilmington | 7% | 5. Lower Oxford | 3% |
| 6. Brandywine | 5% | 6. Harrisburg | 3% |
| 7. Greater Newark | 5% | 7. Kennett Square | 2% |
| 8. Upper Christiana | 4% | 8. Lancaster | 2% |
| 9. Ocean City, Md | 3% | 9. Salisbury | 2% |
| 10. Dover | 2% | 10. York | 2% |

- There were 1,416 drivers responding to the question, "Where did you start this trip?" The numbers in the table above only show the top ten trips origin municipalities. The readers may examine the disaggregated origin numbers in detail in table E-3 in the Appendix.

- About half of inbound trip origins (49%) are in three municipalities: Piedmont, Lower Christiana, and Pike Creek while the remaining seven municipalities add up to only about 38 percent. The top two outbound trip origins, New Garden and London Grove, have a 39 percent share, while the remaining eight municipalities have a 27 percent share. The "other" category has more than two times the outbound trips (34%) as inbound trips (13%).

- About 49 percent of the surveyed trips have home-based trip origins. The top three Inbound municipal origins are Piedmont, Lower Christiana, and Pike Creek with a combined 52 percent share. Outbound rankings are similar to the total trip rankings with New Garden and London Grove combining for a 40 percent share.

- Truck trips make up about 18 percent of the total number of drivers surveyed. All of these trips do not fall in the same rank order as total or home-based trips. Piedmont, Lower Christiana, and New Castle (replacing Pike Creek) have a 42 percent share of the inbound truck origins. Outbound origins stick with the rank order of the total trips with New Garden and London Grove remaining the top two. The "other" inbound origins represent a 19 percent share, while outbound origins represent a 44 percent share.

## Place of Trip Destination by Municipality

| Inbound Trip Destinations | | Outbound Trip Destinations | |
|---|---|---|---|
| **Municipality** | **% of Total** | **Municipality** | **% of Total** |
| 1. New Garden | 22% | 1. Piedmont | 23% |
| 2. London Grove | 15% | 2. Pike Creek | 15% |
| 3. Avondale | 3% | 3. Lower Christiana | 15% |
| 4. Lancaster | 3% | 4. New Castle | 9% |
| 5. Harrisburg | 3% | 5. Wilmington | 8% |
| 6. Penn | 3% | 6. Brandywine | 4% |
| 7. Kennett Square | 3% | 7. Ocean City, Md | 4% |
| 8. Manheim | 3% | 8. Upper Christiana | 3% |
| 9. York | 3% | 9. Greater Newark | 3% |
| 10. Salisbury | 2% | 10. Lewes | 2% |

- There were 1,455 drivers responding to the question, “Where will this trip end?” The readers may examine the disaggregated destination numbers in detail in Table E-4 in the Appendix.

- Inbound trips to New Garden and London Grove make up 37 percent share of total inbound trip destinations. The outbound destination trio of Piedmont, Lower Christiana, and Pike Creek are a 53 percent share, with Piedmont accounting for about 23 percent of the bunch. “Other” destinations are 33 percent of inbound and only 11 percent of outbound trips.

- Work trips make up 48 percent of the total trips. There is little variation between the total trips and home-based trips in either inbound or outbound direction. The only variation of note is that their are 84 fewer inbound than outbound home-based trips.

- Inbound and outbound truck trips vary slightly from the total trip rankings, requiring some changes in the rank trip order. Inbound destinations such as Harrisburg with about 7 percent and York with a 5 percent share rise into third and fourth place in the rankings. The outbound trip destination of New Castle rises to second place with a 14 percent share.

## Trip Stops by Vehicle Type

| Survey Period | Passenger Vehicle Stopping | Commercial Vehicle Stopping | Total Stopping |
|---|---|---|---|
| **Inbound Trips** | | | |
| 6:30 a.m. - 10:30 a.m. | 6.7% | 9.3% | 7.4% |
| 10:30 a.m. - 1:00 p.m. | 3.6% | 11.9% | 5.5% |
| 1:00 p.m. - 4:30 p.m. | 5.5% | 0.0% | 4.5% |
| 4:30 p.m. - 8:00 p.m. | 0.5% | 0.0% | 0.4% |
| **Outbound Trips** | | | |
| 6:30 a.m. - 10:30 a.m. | 2.1% | 0.0% | 1.7% |
| 10:30 a.m. - 1:00 p.m. | 0.0% | 0.0% | 0.0% |
| 1:00 p.m. - 4:30 p.m. | 1.3% | 0.0% | 1.0% |
| 4:30 p.m. - 8:00 p.m. | 2.9% | 3.0% | 2.9% |

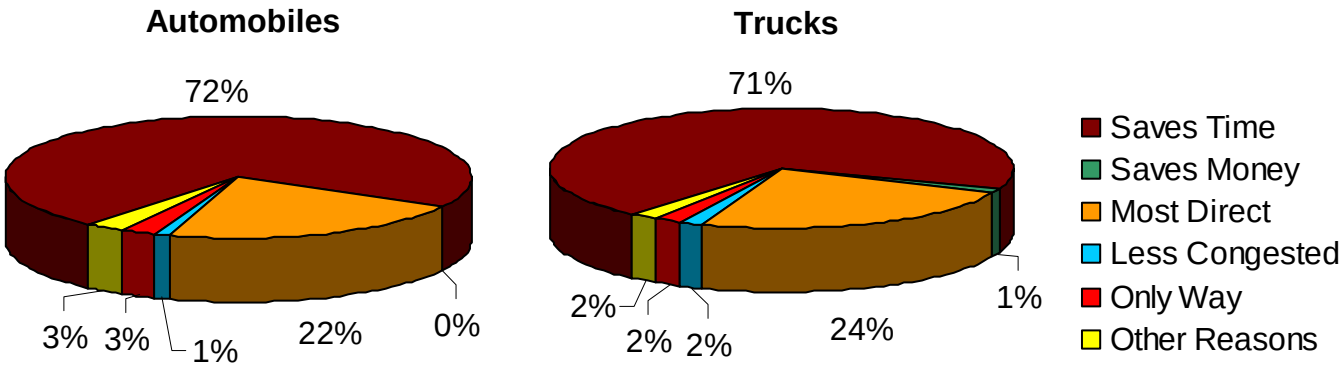
- There were 1,543 drivers responding to the question, “Will you stop before arriving at your destination?” The numbers in the above table were aggregated from the complete data set shown in Table E-5 in the Appendix.

- Only a few vehicles on PA 41 south stop before arriving at their destinations (43 of 1,543). Less than 3 percent of all vehicles stop before reaching their destination, with automobiles slightly less likely to stop than trucks (2.7% versus 3.2% respectively).

- Inbound and outbound vehicles exhibit difference in stopping rates, with 32 of 774 inbound vehicles stopping before reaching the final destination. The outbound direction, however, had 11 of 769 total trips stopping. The difference may lie with inbound travelers trip chaining, planning multiple stops as they approach the denser, more urban parts of the region.

- The greatest share of passenger vehicles stopping (7% for the time period) go inbound between 8:30 a.m. and 10:30 a.m., while 16 percent of inbound truck drivers between 12:00 p.m. and 1:00 p.m. state they will be stopping. The largest percentage of outbound vehicles stopping before reaching their destination (3% for the time period) occurs between 6:30 p.m. and 8:30 p.m., while 5 percent of outbound truck drivers between 4:30 p.m. and 6:00 p.m. state they will be stopping.

## Reason for Using PA 41 South by Automobile and Truck Drivers




*Totals may exceed 100% due to multiple answers

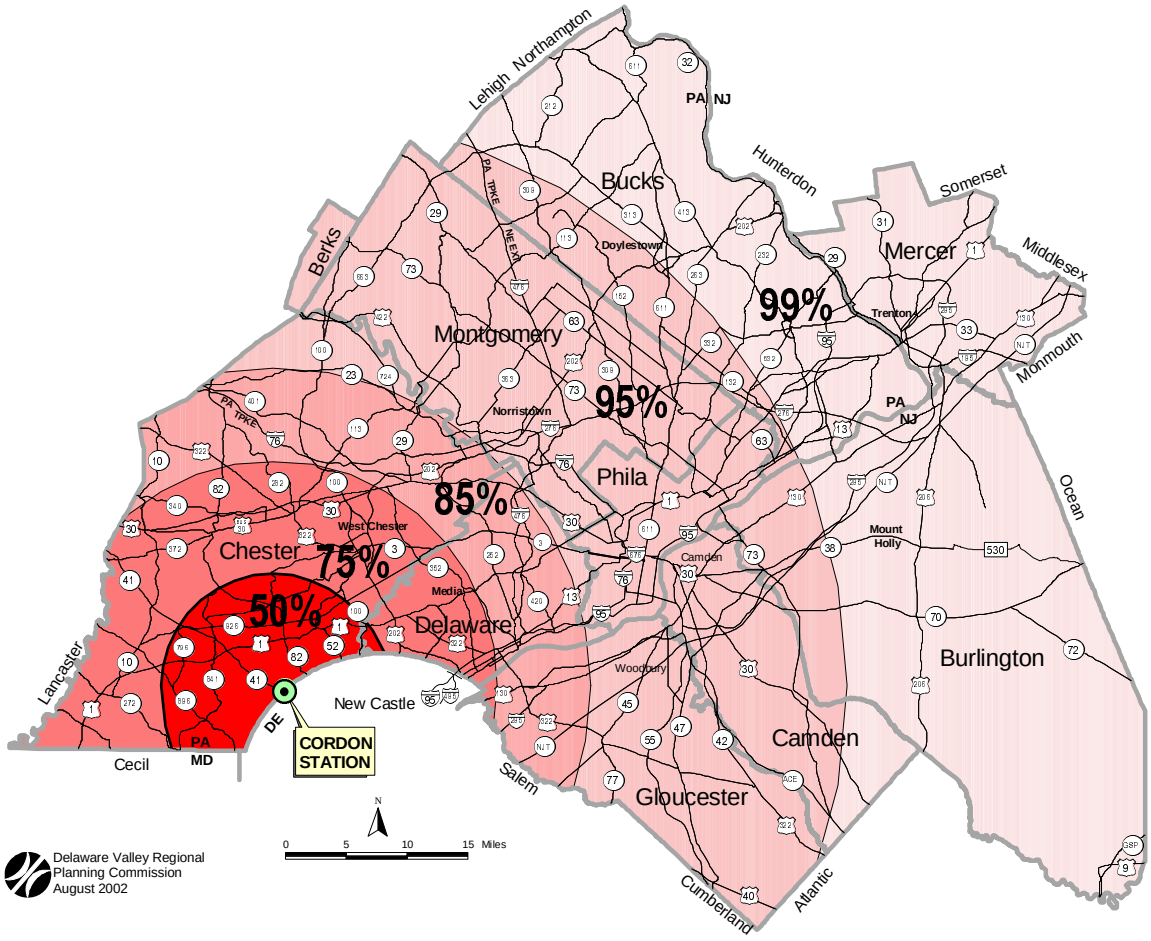
- There were 1,222 passenger and 313 commercial vehicles responding to the question, "Why do you use this road?" The drivers were permitted to provide more than one answer. The complete data set is in Tables E-6 and E-7 in the Appendix.

- "Save time" and "most direct" are the most reported overall reasons for passenger vehicles with 71 percent and 22 percent respectively. "Other reasons" and "only way" to a destination were third and fourth both with about 3 percent. Less congested" had about 1 percent of the responses.

- "Saves time" was the dominant response in both directions but particularly so outbound. Between 4:30 p.m. and 6:30 p.m. 98 percent of the inbound automobile surveys (107 of 109 responses) responded that "saves time" is the reason for using PA 41 south. Between 6:30 a.m. and 2:30 p.m. the outbound survey response rate was in the 90 percent range and the time from 1:00 p.m. to 2:30 p.m. peaked with a 98 percent automobile share (81 of 83) answering "saves time".

- "Save time" and "most direct" were the greatest reported truck reasons for using PA 41 south, with 71 percent and 24 percent respectively. The other four reasons outlined by truck drivers with about 2 percent apiece. "Saves time" was the dominant response outbound with a response rate in the 90 percent range from 6:30 a.m. to 6:00 p.m.

## Distribution of PA 41 South Inbound Trips




- The map shows the distribution of inbound trips within the DVRPC region, though the percentages also include values outside the region but within the isochrone lines. About 65 percent of the trips end within the region, the through trips are described below.

- About 35 percent of the surveyed vehicles were through trips with destination outside the region. Of these trips about 32.5 percent of all trips were headed west out of the region into Pennsylvania towards Lancaster County.

- About 2.4 percent of the trips had destinations outside the region in north New Jersey and north towards New York City.

**Major Roads Taken by all Vehicles**

| Inbound Trips | | Outbound Trips | |
|---|---|---|---|
| **Roads Used** | **% of Total** | **Roads Used** | **% of Total** |
| 1. US 30 | 28% | 1. DE 7 | 33% |
| 2. US 1 | 20% | 2. I-95 | 11% |
| 3. PA 283 | 11% | 3. DE 48 | 8% |
| 4. PA 10 | 4% | 4. DE 141 | 6% |
| 5. PA 896 | 3% | 5. DE 1 | 5% |
| 6. PA 772 | 2% | 6. US 13 | 5% |

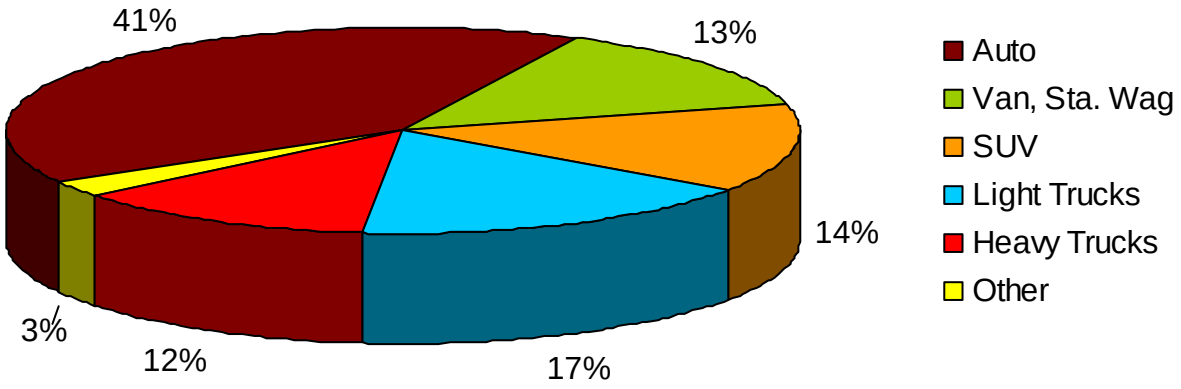
- There were 483 driver responses to the question, "What is/are the major roads that you will take to reach your destination after this road?" This survey question had the lowest response rate (31% of sample), perhaps owing to many driver's lack of knowledge or confusion with road or highway names. The complete data set is in Table E-8 in the Appendix.

- About half the inbound trips were taken on either US 30 or US 1 (28% and 20% respectively). PA 772 and PA 82 were each identified in about 2 percent of the responses, while PA 283 lies in the middle with an 11 percent share. Outbound responses had DE 7 and I-95 as the top two major roads (33% and 11% respectively), though the combined share is less than the top two inbound roads (48%). The "other" response was fairly consistent in every vehicle category with approximately 29 percent shares.

- Inbound passenger vehicle responses are similar to the total vehicle responses, though outbound passenger vehicles had a larger share identifying DE 7 than total vehicles (38% versus 33% respectively).

- Trucks generally identified the larger facilities as more likely to be used in their trip. Inbound trucks identified US 30, US 1, and PA 289 for about 65 percent of the trips, and "other" with a 28 percent share. The outbound direction's top two facilities make up about 40 percent and "other" has about 29 percent share of the responses.

**Type of Vehicles Surveyed**

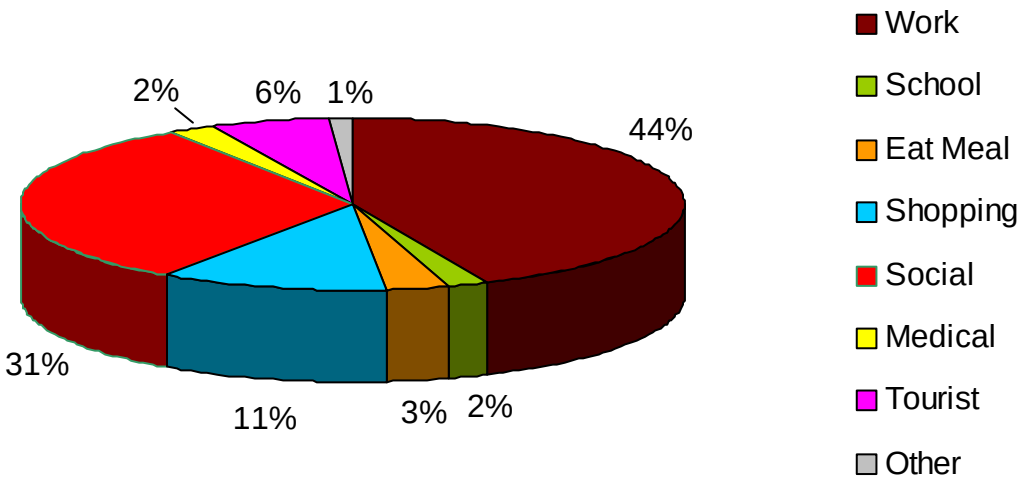



- The response to this question was obtained by observation rather than directly questioning the drivers of 1,543 vehicles in the survey sample. While the categories are not as extensive as the 24 hour vehicle classification count, some categories have been broken out and some combined in order to help with the analysis. The complete data set is in Table E-9 in the Appendix.

- The composition of the surveyed vehicles differ somewhat from the 24 hour vehicle classification counts. Surveyed passenger vehicles (auto, van, SUV) had similar shares to the 24 hour count (68% versus 64% respectively), light trucks (pickup, panel, and single unit) were underrepresented at this station with about 17% of survey and 25% of 24 hour sample, and heavy trucks were 14% of survey and 9% of 24 hour sample.

- The automobile share is greatest during the PM peak inbound and the PM off-peak outbound (44% and 45% respectively), though by far, the smallest share occurred inbound during the AM peak with only 33 percent share of the volume. Within the light truck category, pickup trucks showed a surge during the PM peak and off-peak outbound with a 15 percent share. Conversely, heavy trucks had the largest volumes recorded inbound during the AM peak and off-peak.

## Trip Purpose of Passenger Vehicles



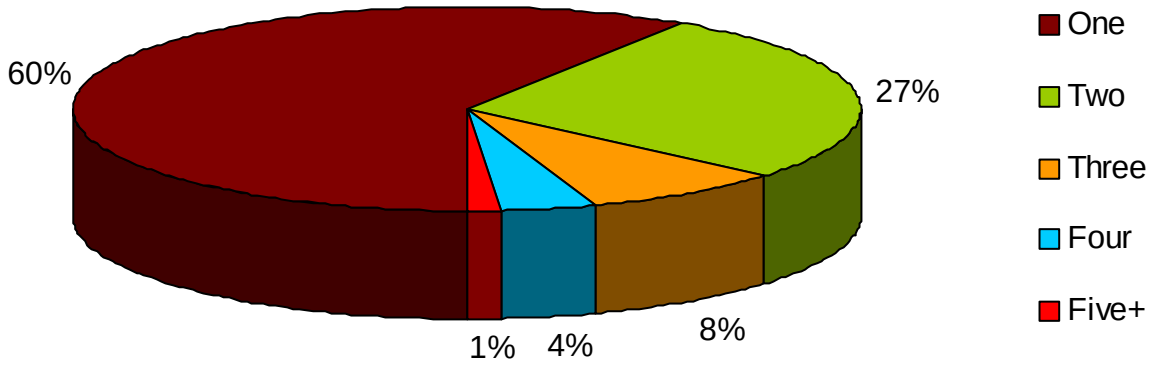

- Drivers in passenger vehicles were asked "What is the purpose of this trip?" Trucks and commercial vehicles were not asked this question as their trip purpose was evident. The complete data set is in Table E-10 in the Appendix.

- Work trips had the largest share of driver responses with about 44 percent of the total responses. Between 6:30 a.m. and 8:30 a.m. about 67 percent of the inbound and outbound survey period is work bound. A reciprocal inbound volume (62%) between 4:30 p.m. and 6:00 p.m. is not evident in the outbound direction (40%).

- The social trip is about a 31 percent share of the volume with an inbound peak (53%) and outbound peak (45%) between 10:30 a.m. and 12:00 p.m. corresponding with lunch time. Shopping occupies an 11 percent share with its peak times similarly occurring between 12:00 p.m. and 2:30 p.m. after lunch time.

- The remaining 25 percent share is divided between the remaining six trip purposes. Only the tourist purpose shows much life during the day with a 12 percent share between 10:30 a.m. and 12:00 p.m., which is twice the average total of about 6 percent.

## Vehicle Occupancy



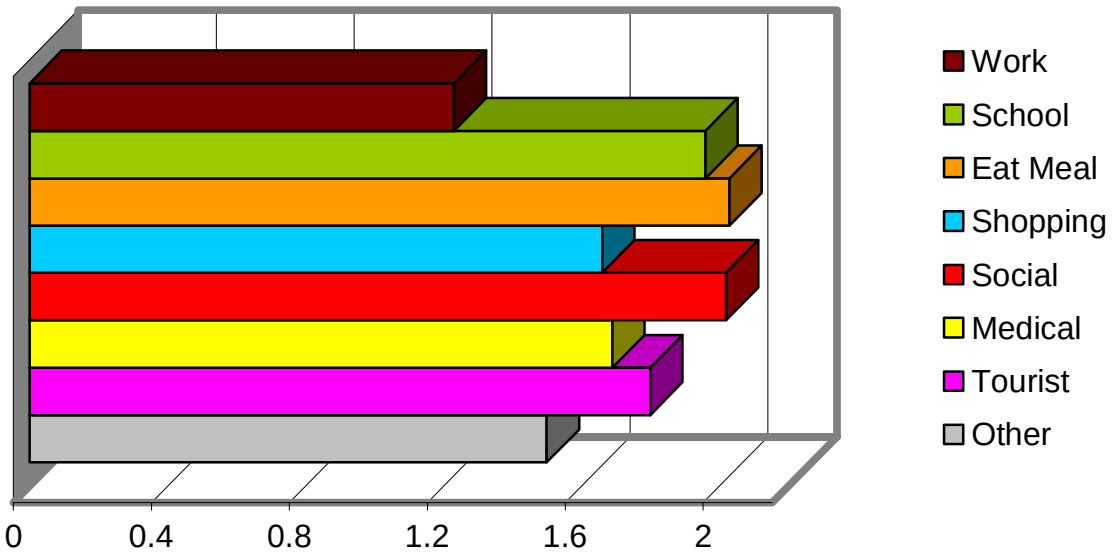

- The question, “How many people are in the vehicle?” was obtained by observation rather than questioning 1,543 drivers in the survey sample. This survey question was applied to passenger vehicles only. The complete data set is in Table E-11 in the Appendix.

- One and two occupant vehicles dominate the surveyed traffic with a combined 87 percent share of the traffic surveyed (60% and 27% respectively). During certain survey periods the shares exceed the average. The inbound PM off-peak time between 4:30 p.m. and 8:00 p.m. reported a 74 percent share of single occupant vehicles which is more than 10 percentage points greater than any other reported survey period. Between 12:00 p.m. and 1:00 p.m. inbound two occupant vehicles have about 38 percent share of the traffic, relating perhaps to lunch time car pooling.

- Higher occupancy vehicles (3, 4, and 5+ occupants) make up a combined 13 percent share. Three occupant vehicle shares spike outbound at 14 percent between 8:30 a.m. and 10:30 a.m. and inbound at 14 percent between 1:00 p.m. and 2:30 p.m. Four occupant vehicles also spike at 11 percent between 10:30 a.m. and 12:00 p.m. The other values keep close to their average occupancy rates through out the survey periods.

- The trend for the average vehicle occupancy shows that inbound and outbound trips are roughly similar by survey period. The exception is the outbound PM peak period where an increase in occupancy diverges from the general data trend (between 4:30 p.m. and 8:00 p.m.). Though this is not reflected in some of the individual peaks within the survey periods.

**Average Vehicle Occupancy by Trip Purpose**




- Average Vehicle Occupancy by Trip Purpose was obtained by cross tabulating the observed vehicle occupancy with the survey question regarding trip purpose. The complete data set broken out by trip purpose and occupancy is in Table E-12 in the Appendix.

- Average occupancy (1.88) is largest for van/station wagon category, exceeding the average SUV occupancy (1.71) and auto occupancy (1.57). It is intuitive that the vehicle with the greatest seating capacity carries the greatest number of people.

- The work trip has the lowest total vehicle occupancy (1.23). Automobile and SUVs have identical occupancy rates (1.22), while the van/station wagon has a greater occupancy rate (1.30). This affirms the dominance of single occupancy traffic found during the morning commute times in the previous table.

- The trip purpose with greatest occupancy rate are school trips taken in vans/station wagons, averaging 2.57 persons per vehicle. Taking more than one child to school is a logical explanation in this case. The van/station wagon has the highest rates of vehicle occupancy.

- SUV occupancy is greatest for social/recreation (2.23 persons per vehicle), reflecting its larger size permitting family outings.

## Vehicle Trip Length Distribution within the DVRPC Region

| Trip Length | Work Trips | Automobile Trips | Truck Trips |
|---|---|---|---|
| 0-5 miles | 63% | 64% | 66% |
| 5-10 miles | 16% | 18% | 8% |
| 10-20 miles | 22% | 15% | 22% |
| 20-50 miles | 0% | 2% | 4% |
| >50 miles | 0% | 0% | 0% |
| **Average Trip Length** | **6.17** | **5.85** | **7.13** |

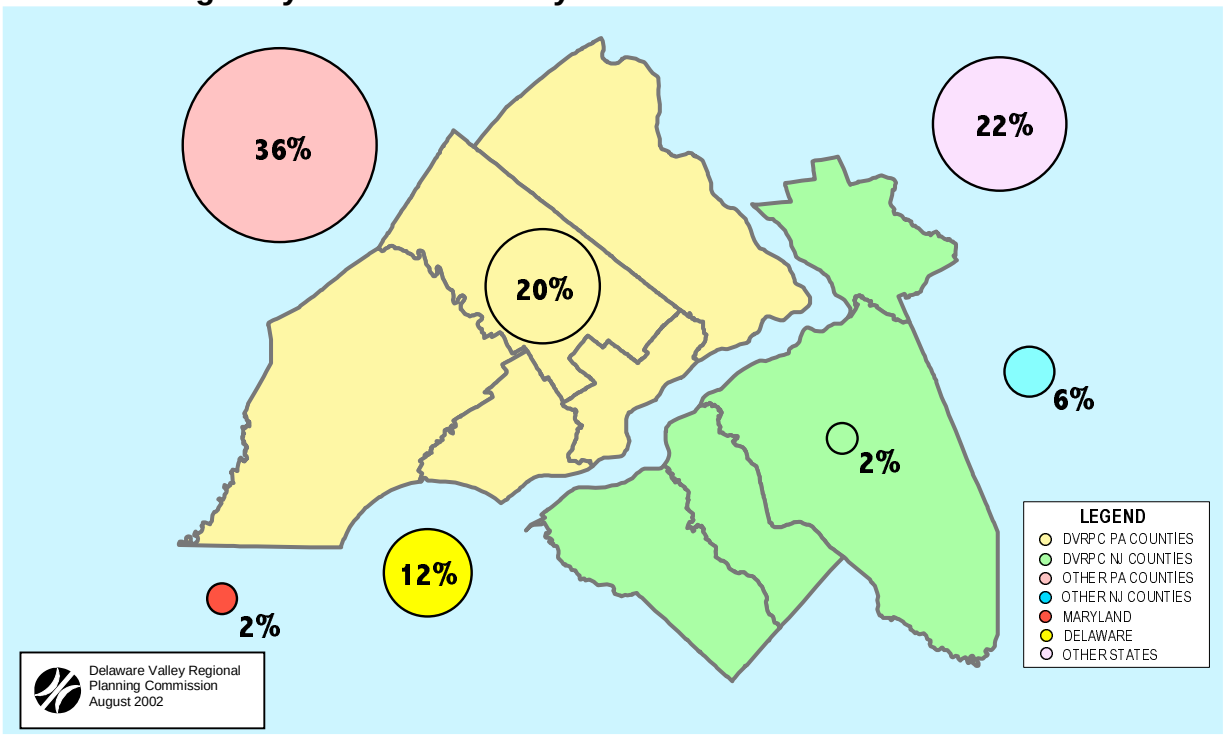
- The data for this query was obtained by using the GIS to compute distances between the cordon station and origins/destinations within the region gathered with the first two questions in the survey. This data is broken out by home based work trips, passenger vehicle trips and truck trips. The data has been put into three groupings by the distance: 0-5 miles, 5-10 miles, 10-20 miles, 20-50 miles and above 50 miles range. The average distances vary by the vehicle class. The complete data set is in Table E-13 in the Appendix.

- The greatest number of trips is between 0 and 5 miles, with trucks possessing the greatest share with about 66 percent, though automobile and work trips are close behind with about 64 percent and 63 percent, respectively.

- Generally there were two peak shares for the modes: between 0-5 and a secondary peak at 10-20 miles. The largest share of trips for work (63%), passenger (64%), and truck trips (66%) falling in the 0-5 mile range. The second peak for home-based and truck trips (22%) is at the 10-20 mile distance. Passenger vehicle trip lengths, however, are generally shorter with their secondary peak occurring at 5-10 miles.

- The average trip lengths for work and passenger vehicles are roughly the same at about 6 miles while trucks come in at about 7 miles for an average trip length. The range of trips falls to almost nothing after 20 miles and there are only three trips for distances more than 50 miles, reflecting the proximity of major destinations to the survey station.

**Trucks Garaged by State and County**

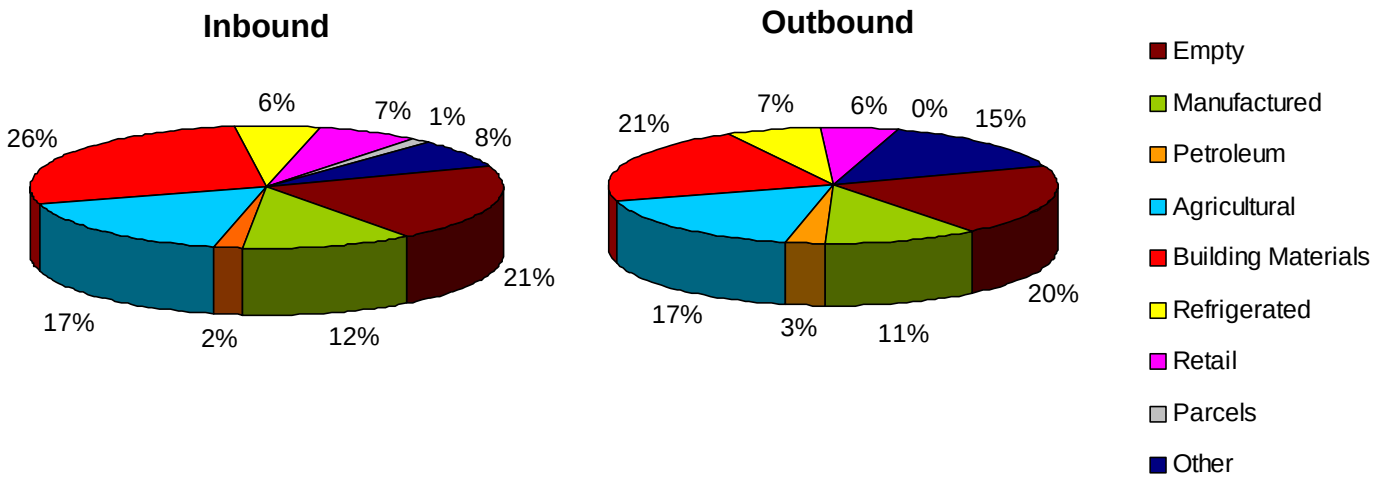



- There were 314 truck drivers were asked "In what county is your truck garaged or parked when not in service?" Passenger vehicles were not asked this question. The complete data set is in Table E-14 in the Appendix.

- About 22 percent of the trucks surveyed are garaged within the two state DVRPC region with 20 percent on the Pennsylvania side and 2 percent on the New Jersey side. The largest share of trucks (36%) are garaged in Pennsylvania but outside the DVRPC region. Only about 6 percent of the trucks were garaged in New Jersey, but outside the DVRPC region.

- The remaining shares of the surveyed trucks are garaged in Maryland (2%), Delaware (12%), and in the "Other State" category with about a 22 percent scattered singularly about the United States.

## Type of Commodities Carried by Trucks




- Truck Drivers were asked "What type of commodities are you carrying?" Passenger vehicles were not asked this question. The complete data set is in Table E-15 in the Appendix.

- The volume of inbound and the outbound truck traffic sample was not equal (170 versus 144 respectively). The categories of agricultural products, manufactured products and "empty" have similar inbound and outbound volumes (17%, 12%, 20% respectively). These responses also represent about half (49%) of the surveyed truck drivers through the survey location.

- The greatest share of commodities was building materials with about 25 percent of the total trucks, though varying by direction with about 26 percent inbound and 21 percent outbound. At the other extreme, only two surveyed trucks were carrying parcels in both directions.

- "Other" products are 8 percent (inbound) and 15 percent (outbound) of trucked commodities. Other disparities are much smaller with retail merchandise making up 7 percent (inbound) and 6 percent (outbound) of trucked commodities. Petroleum and refrigerated products also vary by direction with inbound totals (2% and 6% respectively) slightly different than outbound totals(3% and 7% respectively)

# Executive Summary

# Wilmington-Harrisburg Freight Study


**Submitted to:**
**The Wilmington-Harrisburg Freight Study Steering Committee**
**December 2002**

**Submitted By:**

**Wilbur Smith Associates**
**Reebie Associates**
**Martin Associates**

ENGINEERS
PLANNERS
ECONOMISTS
Wilbur Smith Associates

## Wilmington-Harrisburg Freight Study – Steering Committee Members

Mr. Terry Adams – PennDOT, District 8-0
Mr. Paul Archibald – McCormick Taylor & Associates
Mr. Ronald Bailey – Lancaster County Planning Commission
Mr. James Blair – Reebie Associates
Mr. John Bork – Federal Highway Administration, Pennsylvania Division
Mr. Gregory Brown – PennDOT, District 6-0
Mr. John Brown – PennDOT, Bureau of Rail Freight, Ports & Waterways
Ms. Lisa Brozey – KCI Technologies
Mr. Joseph Bryan – Reebie Associates
Mr. Richard Clepper – Yellow Freight System
Mr. Rick Crawford – Norfolk Southern Corporation
Ms. Felicia Dell – York County Planning Commission
Mr. Carmine Fiscina – Federal Highway Administration, Philadelphia Division
Mr. George Hannon – Pennsylvania Turnpike Commission
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Mr. Paul Ignudo, Sr. – Diamond State Port Corporation
Mr. Michael Kirkpatrick, Delaware Department of Transportation
Mr. Thomas Kotay – PennDOT, Center for Program Development and Management
Mr. Paul Lang – Federal Highway Administration, Delaware Division
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Mr. Ran Marshall – PennDOT, Bureau of Rail Freight, Ports & Waterways
Dr. John Martin – Martin Associates
Mr. Ted Matley – Wilmington Area Planning Council
Mr. Dennis McGee – Federal Highway Administration, FMCSA
Mr. Carl Millard III – Tri-County Regional Planning Commission
Mr. Christopher Neumann – Lancaster County Planning Commission
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Ms. Kathleen Quinn – Federal Highway Administration, HOFM
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Mr. James Runk – PA Motor Truck Association
Mr. Timothy Scanlon – Pennsylvania Turnpike Commission
Mr. Bill Schafer – Norfolk Southern Corporation
Mr. Donald Shanis – Delaware Valley Regional Planning Commission
Mr. Daniel Smyser – PennDOT, Motor Carrier Division
Mr. Donald Siekerman – PA Motor Truck Association
Mr. Tom Stettler – PennDOT, Bureau of Rail Freight, Ports & Waterways
Mr. Spencer Stevens – Federal Highway Administration, Pennsylvania Division
Mr. Jeffrey Sweeney – Martin Associates
Mr. Jim Szymborski – Tri-County Regional Planning Commission
Mr. Glenn Taggart – Lancaster County Planning Commission
Mr. Stephen Thienel – CSX Corporation
Mr. Tom Tillett – Congressman Joseph Pitts Office
Ms. Lisa Wassel – PennDOT, Center for Program Development and Management
Mr. Lee Whitmore – Chester County Planning Commission
Mr. Craig Zumbrun – South Central Assembly for Effective Governance

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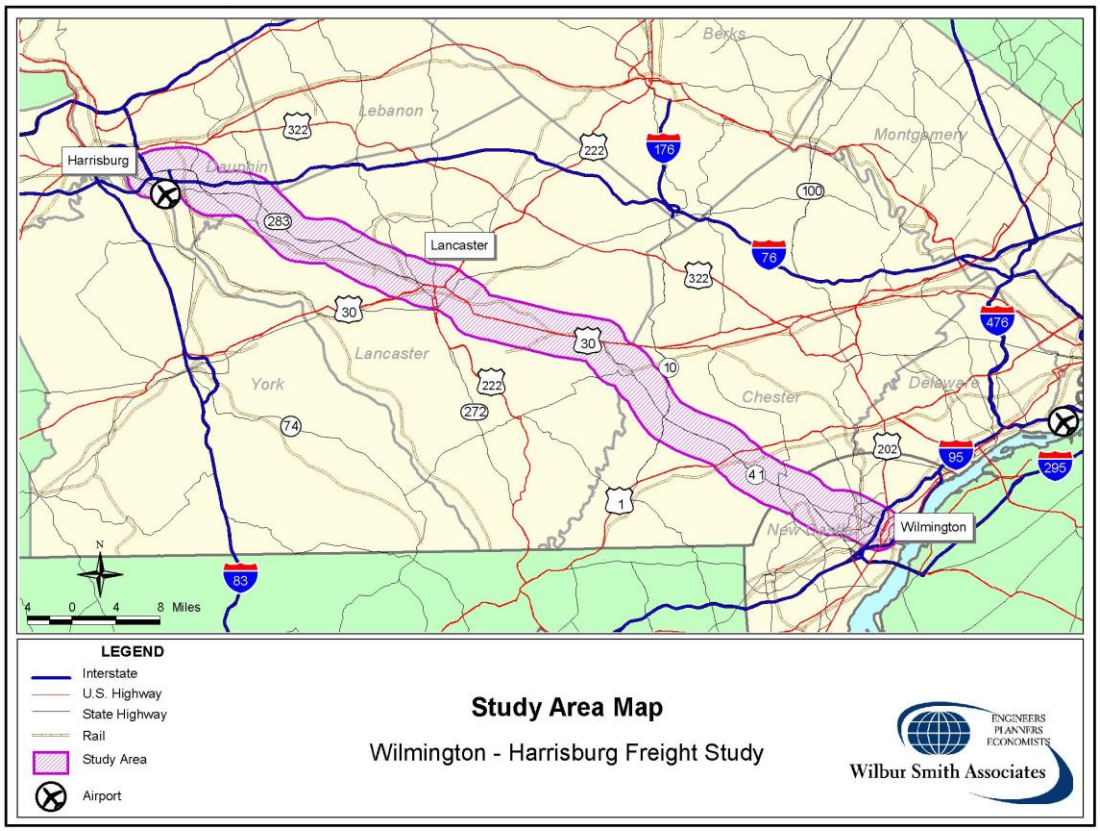
# Wilmington-Harrisburg Freight Study
# Executive Summary

## 1. Introduction

The Wilmington-Harrisburg Freight Study (WHFS) addresses the issue of the increasing truck and intermodal freight traffic along the Corridor between the Ports of Wilmington and Philadelphia and the Harrisburg/Carlisle area, with special attention being paid to the intermediate Lancaster County market and overhead traffic. The principal routes involved are Route 41 (PA & DE), US 30, and PA 283. [See Exhibit 1-1.]

**Exhibit 1-1**
**Wilmington-Harrisburg Freight Study Region**




The first phase of this study described the existing conditions and base level freight traffic in the corridor. The second phase identified planned enhancements along the corridor and developed forecasts of Year 2010 and 2025 freight volumes. The third and final phase developed four scenarios outlining strategies for more efficient and safe movement of freight along the Corridor, with recommendations for specific actions and areas needing future study. These four scenarios, as selected by the Steering Committee, are:

- ***Railroad Scenario*** – explores the extent to which investment in the railroad system can provide a more efficient transportation network in the Corridor.

- ***Shipper Scenario*** – gain a better understanding of the supply chain patterns of key shippers and identify potential strategies for improved freight flow.
- ***Combination of Proposed Local Roadway Improvements*** – look at the combination of Roadway proposals along the Corridor to examine their impact on freight movements.
- ***Pennsylvania Turnpike Scenario*** – explore what is required to entice through trucks to use the PA Turnpike, rather than the shorter, toll free route over the Corridor.

# 2. Corridor Freight Traffic

Public perception is that the Delaware River Ports send numerous trucks through the Corridor every day filled with freight not serving local markets. Therefore, this study began as an analysis of strategies to divert port traffic traversing the Corridor to other routes and modes. Through a series of detailed interviews conducted with shippers at Delaware River Ports, it was discovered that the ports generate less than 10% of the Corridor truck volumes. It was further discovered that the vast majority of the freight traffic was either originating or terminating (and often both) in the counties along the Corridor (New Castle, Chester, Lancaster, and Dauphin).

The WHFS Technical Report #1 provides detailed estimates of the volume of freight traversing Routes 41, 30, and 283. Port related traffic was obtained through a series of detailed interviews conducted with shippers at Delaware River ports. For the remainder of the truck volumes, Reebie Associate's TRANSEARCH® freight database was used. TRANSEARCH is a nationwide database updated annually with freight movements by origin, destination, commodity, and mode of travel. Forecasts for the years 2010 and 2025 were developed in the WHFS Technical Report #2. Forecasts of international traffic through the ports were derived from expansion plans and goals obtained from the ports and principal shippers. Forecasts of the non-port related corridor freight volumes were developed using regional commodity based factors from an econometric model developed at York College in York, PA. Given the uncertainty in long-range forecasts, the 2025 values were bracketed with a high and low value. Summaries of the base level and forecasted truck volumes, subdivided by road, are contained in Exhibit 2-1.

**Exhibit 2-1**
**Average Daily Truck Volumes and Forecasts in Study Corridor***

| | | Base** | Year 2010 | | Year 2025 Low | | Year 2025 High | |
|---|---|---|---|---|---|---|---|---|
| **Type** | **Road** | **Trucks** | **Trucks** | **Pct** | **Trucks** | **Pct** | **Trucks** | **Pct** |
| **Port** | | 279 | 297 | 6.5% | 324 | 16.1% | 324 | 16.1% |
| **Non-Port*** ** | | | | | | | | |
| | Route 41 | 3,052 | 3,942 | 29.1% | 4,487 | 47.0% | 5,602 | 83.5% |
| | US 30 | 13,722 | 16,764 | 22.2% | 18,924 | 37.9% | 22,551 | 64.3% |
| | PA 283 | 8,601 | 10,599 | 23.2% | 11,967 | 39.1% | 14,426 | 67.7% |

*Source: Wilmington-Harrisburg Freight Study, Report #2, Table 1

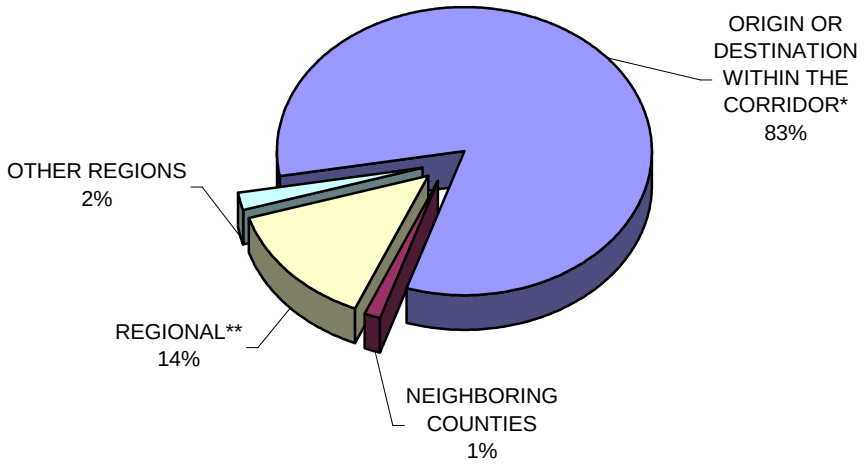
**For Port Traffic the Base Year is 2001. For Non-Port Traffic the Base Year is 2000.

***Non-Port traffic converted from Annual to Daily using 260 days/year

The primary reason for developing the base estimates and forecasts is to gain a perspective on the nature of the freight moving on the Corridor and the potential for diverting this freight to alternative modes or routes, thereby relieving part of the congestion and improving safety along the Corridor. Diverting freight traffic requires an understanding of the origin-destination patterns for the movements. Exhibit 2-2 shows that eighty-three percent (83%) of the non-port related

traffic utilizing the Corridor has either an origin or termination in New Castle, Chester, Lancaster, or Dauphin County. Ninety-eight percent (98%) originates or terminates in Pennsylvania, Delaware, or Southern NJ. Only two percent (2%) of the trucks using the Wilmington-Harrisburg Corridor are not conducting business within the region. Thus, the vast majority of trucks in the Corridor are there because of local businesses.

**Exhibit 2-2**
**Distribution of Traffic**
**Base-Year Non-Port Freight Volumes on Corridor**




* Includes traffic originating or terminating in New Castle County, DE, and Chester, Lancaster, or Dauphin Counties, PA
** The remainder of PA, DE, and Southern NJ

Exhibit 2-2 is useful in understanding the nature and importance of trucks utilizing the Corridor, but it is less useful in identifying the traffic base that can potentially be diverted to other modes or routes. Exhibit 2-3 separates the long haul traffic from the shorter regional moves to establish the base traffic level that could be diverted. Exhibit 2-3 contains the number of long haul trucks moving over Route 41, US 30, and PA 283 between Delaware, New Jersey, and Chester County in the east and several mid-western states in the west. **The key message in Exhibit 2-3 is that there is an average of 3,331 daily trucks on Route 41; two-thirds serving local markets along the Corridor and one-third serving long haul markets.** The long haul estimates climb from 1,125 on Route 41 to 1,522 on US 30 and PA 283.

**Exhibit 2-3**
**Percentage Long Haul Trucks Versus Total Trucks By Route**

| Route | 2000 Base* | Long Haul | Percentage |
|---|---|---|---|
| Route 41 | 3,331 | 1,125 | 33.8% |
| US 30 | 14,001 | 1,522 | 10.9% |
| PA283 | 8,880 | 1,522 | 17.1% |

* From Exhibit 2-1. Includes Port Traffic.

The Steering Committee, recognizing that most of the traffic is serving local businesses and supporting the local economy, devised strategies in two broad categories. The railroad and PA Turnpike scenarios address the long haul, through traffic by exploring the potential to divert it from the Corridor. The shipper and local improvement scenarios are focused on enhancing the efficiency of freight flows that are necessary to support local businesses.

# 3. Railroad Scenario

The rail scenarios explore the extent to which investments in the freight railroad system can provide a more efficient transportation network in the Wilmington-Harrisburg Corridor. This is accomplished by exploring several different rail improvements, including addition of a freight only line along Amtrak's Northeast Corridor, construction of a Norfolk Southern Railroad (NS) Triple Crown terminal in New Castle County, increased use of the Brandywine Valley Railroad, and a look at the ramifications of the recently approved improvements to the Shellpot Bridge.

## Dedicated Rail Freight Mainline (Perryville, MD – Newark/Wilmington, DE)

The Norfolk Southern Railroad (NS) is the only freight railroad operating single line service between Harrisburg and Wilmington/Newark, DE area. Trains departing Harrisburg move southeast parallel to the Susquehanna River to Perryville, MD and then northeast to Wilmington. The track from Perryville to Wilmington is owned by Amtrak and is part of the Northeast Corridor (NEC) passenger system, one of the most congested passenger rail lines in the country. Largely for capacity reasons (but also for safety reasons), freight trains are not usually operated on the NEC between 6 A.M. and 10 P.M. Thus, NS has an eight-hour window in the middle of the night to operate trains over this segment of track.

The solution is to construct a freight only rail line adjacent to Amtrak's NEC line. This has been previously proposed in the Delaware Freight Rail Plan and the I-95 Corridor Coalition Mid-Atlantic Rail Operations Study, with the cost ranging between $60 and $135 million. Analysis in the WHFS identified 1125 average daily trucks traversing the entire Corridor that have sufficient length of haul to potentially divert to rail service [see Exhibit 2-3]. A typical diversion rate for the percentage of truck traffic captured by new rail service is 5-10% and a more aggressive rate is 25%. Construction of this freight only rail line could divert to rail somewhere between 56 and 281 trucks per day off of the Wilmington-Harrisburg Corridor. The WHFS Steering Committee should participate in, or at least monitor, any further studies related construction of this freight only line to insure that Corridor concerns are included.

## New Castle County Intermodal Terminal

One scenario that appears to have some measurable potential for diverting truck traffic from the Corridor is the construction of an intermodal terminal in New Castle County. Currently, most intermodal loads originating and terminating in the Wilmington area are "grounded" (taken off the train) in Harrisburg, PA. One carrier identified that would benefit from a Wilmington intermodal terminal is Triple Crown Services – the RoadRailer®-based intermodal company headquartered in Fort Wayne, IN. Triple Crown is unlike conventional intermodal operations in that the trailers are themselves the body of the railcar. The RoadRailer trailer operates over the highway as a conventional trailer and then attaches to a rail "bogie" which provides steel wheels for travel by rail.

The cost of new intermodal terminal construction is approximately $250,000 per acre (not including land acquisition costs), with most recent terminals consuming in excess of 200 acres. Thus a conventional intermodal terminal economics require a $30,000,000 investment and approximately 130 trailers of freight *in each direction* to break-even. Conversely, RoadRailer

operations have a much-lower break-even point. Terminal construction costs average between $70,000 and $150,000 per acre, and can be erected on as little as 50 to 60 acres.

In the Wilmington-Harrisburg Corridor, Triple Crown already represents a significant presence. The firm moves between 60 and 70 trailers per day by truck between their Rutherford (Harrisburg) terminal and the Wilmington region. Triple Crown representatives indicated a willingness to explore the opportunity of a New Castle Intermodal Terminal with public sector representatives, and to assist in a subsequent public-private partnership analysis of the concept. Triple Crown also suggested that the availability of a New Castle terminal might allow them to divert additional traffic from Southern Delaware and Southern New Jersey to rail intermodal that is currently uneconomical to service from Harrisburg. In addition, the availability of lower cost transportation service in a region such as New Castle County could provide an added incentive to commercial development similar to other intermodal terminal development initiatives across the country. A more detailed study of this concept, including representatives from state and local government, the railroads, area shippers and Triple Crown could help to quantify the inherent benefits of such a project, and to identify the menu of available funding sources for its completion.

### Brandywine Valley Railroad

The Bethlehem Steel Corporation owns eight subsidiary railroad companies in Pennsylvania, Maryland, and Indiana under a marketing company called BethIntermodal, Inc. Of particular interest to the WHFS is the Brandywine Valley Railroad (BVRY), which parallels Route 41 and operates between a connection with the Norfolk Southern at Coatesville, PA and a connection with CSX at Wilmington, DE and between Chadds Ford, PA and Nottingham, PA. Discussions with BethIntermodal and the BVRY have yielded two areas of interest with respect to the WHFS. The first is expanded service to local businesses, either through transload facilities or direct rail service. The second is to use BVRY as a rail link between CSX in Wilmington and NS in Coatesville.

The BVRY operates transload facilities in Coatesville and Avondale. At a transload facility, rail cars and trucks interchange freight. The BVRY handles about 600 carloads of transloaded grains, agricultural products, and meat annually, most of it received from CSX in Wilmington. The greatest potential benefits the BVRY can contribute to freight flows in the Wilmington-Harrisburg Corridor would be increased transloading and direct rail service of traffic moving between Chester and New Castle Counties and the mid-western states. Lancaster and Dauphin Counties are not relevant since the BVRY does not extend west of Coatesville. Potential diversions to rail, as estimated in the WHFS, range from an average of 70 to 150 trucks per day. The WHFS Steering Committee should designate someone to open discussion with BethIntermodal to further define this scenario. As a next step, the Steering Committee and BethIntermodal should initiate a study that: targets specific commodities and industries for direct rail or transloading service; builds a case showing benefits to shippers of switching to these services; determines the traffic levels necessary for this service to be profitable to BVRY and NS and/or CSX; and, identifies and estimates the costs of rail enhancements necessary to support this service (new track, new transloading facilities, new equipment).

Another potential benefit of the BVRY is as a rail connection between CSX in Wilmington and NS in Coatesville. CSX and NS (via Amtrak) run parallel to each other from Perryville, MD through Delaware and into Philadelphia. The two do not connect until Philadelphia. The BVRY has suggested it could act as a bridge between CSX and NS for traffic moving from CSX to NS

points such as Lancaster, Harrisburg, King of Prussia, and Reading. This would avoid trips through Philadelphia, helping relieve congestion in the rail yards. This may have value for the railroads, but it would seem to be of little benefit to the Wilmington-Harrisburg Corridor. There would be no benefit to the Corridor of rerouting interchanges that currently take place in Philadelphia. The benefit to the Corridor would come from truck to rail diversions attracted to this new service, but these diversions would be minimal, if there were any, since the rail route is not significantly enhanced. In fact, the route over the BVRY may even be slower than the route through Philadelphia since an additional railroad and interchange are being added to the route and the distance is not greatly reduced.

### Shellpot Bridge

Norfolk Southern serves the Port of Wilmington, which is located on the southern bank of the Christiana River. NS has a rail yard (Edgemoor Yard) on the northern side of the river. Crossing the Christiana River is the Shellpot Bridge, is a swing-style railroad drawbridge originally constructed in 1888 and upgraded in 1951. Service was discontinued over the bridge in December 1994, forcing freight trains serving the Port of Wilmington to head south, access the NEC track, travel through the Wilmington Transit Center, and then head back down to the Edgemoor Yard. Since the freight trains cannot interfere with Amtrak's passenger service, this arrangement adds delay and limits the times that trains can serve the Port. To enhance the competitiveness of the Port of Wilmington and improve rail freight service to the Delmarva Peninsula, the State of Delaware and NS have agreed to rehabilitate the Shellpot Bridge.

What does this mean for the Wilmington-Harrisburg Corridor? Interviews conducted with shippers at all Delaware River ports, including the Port of Wilmington, identified an average of 280 port related trucks per day utilizing the Corridor. Only 30% of those trips were passing through the Corridor (versus 70% local). Most of the traffic passing through is destined for western PA (e.g.: 12 trucks per day hauling steel to Bedford.) There were only twenty-one daily loaded trucks of Port generated traffic identified as currently moving through the Corridor and having sufficient length of haul for rail to be an option. Ten of these trucks are hauling fresh fruit, which historically does not move by rail. Improvements to the Shellpot Bridge should have minimal impact on Port of Wilmington generated freight flows in the Corridor.

While the Shellpot Bridge rehabilitation will have little impact on the Corridor with respect to port traffic, reopening this bridge could have an impact on freight moving along the corridor to and from the Delmarva Peninsula. Commodities on the Peninsula include chemicals, grain, and poultry products. This traffic would be able to move by rail up the Peninsula, over the Shellpot Bridge, and into Edgemoor Yard where it is staged for movement on the NEC and out toward Harrisburg. Of course, construction of a freight only rail line down to Perryville, MD would greatly enhance the potential for truck to rail diversions.

# 4. Shipper Scenario

The purpose of the Shipper Scenario is to better understand the supply chain patterns, concerns, and issues of key shippers using the Corridor. Several area shippers were contacted and asked questions pertaining to mode of travel, time of day and seasonal distribution patterns, opinions of the current freight system, and the opportunity to suggest improvements or changes.

## Alternate Modes of Travel

It is hardly surprising that the predominant mode of freight transportation used by businesses in the Wilmington-Harrisburg Corridor is truck. Trucks accounted for 81% of the total tonnage originated and 84% of the tonnage terminated in the Philadelphia-Wilmington region while rail accounted for 4% of the originations and 6% of the terminations. The national average is 78% for trucks and 13% for rail. With respect to the WHFS, the only modal options are truck and rail. The WHFS Steering Committee needs to work with both the freight railroads (CSX, NS and BVRY) and local businesses to boost the low level of rail usage. Specific strategies were discussed in Section 3.

## Off-Peak Deliveries

The Corridor follows the typical pattern of having the highest concentration of freight shipments coinciding with the morning rush hour. Approximately 35% inbound freight arrives between 7 and 10 AM in preparation for the day's activities. The outbound traffic is even more heavily skewed toward the morning hours as goods are pushed out the door for daytime delivery to customer.

Off-peak and nighttime movement and delivery of freight can be an effective and efficient method for increasing throughput and reducing delays on the congested road network. It not only benefits the community, but also the benefits businesses by freeing up staff from daytime logistics duties and helps truck drivers avoid congestion. Off-peak deliveries will not work for every business due to production schedules, customer commitments, and the nature of their business. But it is a simple, low cost program that should be encouraged in the Wilmington-Harrisburg Corridor for non-residential areas.

## Warehouse/Distribution Centers for Local Deliveries

Warehouses and distribution centers (DC) are an important component in the freight transportation network. Temporary storing of goods, consolidating shipments accumulated in local pick-up and delivery trucks to long haul trucks, and redistributing goods between long haul trucks are some of the activities that occur. The strategy is to pack the trucks as fully and efficiently as possible to maximize the utilization of each vehicle. These facilities tend to be located near large production or consumption areas, or at the crossroads of major freight routes, or both. A typical operation might see truckload carriers arriving at the dock and shifting their loads to smaller trucks or delivery vans for distribution to the customer. These long haul trucks then pick-up outbound loads for their backhaul move.

One concept is to find an appropriate location for clustering warehouses and distribution centers serving the Corridor. This would become the focal point for distribution of goods in smaller delivery vans to local businesses and markets, thereby taking some of the local heavy trucks off of the existing Corridor. This idea has been used in other localities, where an actual zoning designation of Warehouse Location was created. The ideal location would be along a major roadway and also have rail access.

## Alternative Routes

Between Wilmington and Harrisburg, Route 41, US 30, and PA 283 form the most direct route. Travel between the Port of Wilmington and Harrisburg using US 202 and the PA Turnpike

instead of the Corridor, was included in this study and also studied by the Delaware Valley Regional Planning Commission. The PA Turnpike route is 18 miles further, and depending on the time of day, 10 minutes longer. This adds additional expense from extra fuel, driver hours, and tolls. Annual operating costs, with the additional mileage and the PA Turnpike toll, for three round trips per week were estimated by DVRPC to be 32% higher than using the Corridor. The WHFS found that reducing tolls by 50% for trucks would only lead to a diversion of 32 trucks from the Corridor.

The Pennsylvania Official Transportation and Tourism Map shows Routes 41 and US 30 as Major Through Traffic Routes. The alternative parallel routes, especially those parallel to Route 41, are all designated as Secondary Traffic Routes. These include Routes 896, 82, and 472 which are even less suitable for truck traffic than Route 41.

In conclusion, the Corridor provides the best route for freight traffic between Wilmington and Harrisburg, with few good alternatives available.

## Satisfaction Questions and Comments

Not a scenario, per say, but the questionnaire included questions about satisfaction with the current freight system and an opportunity to provide comments. The following are excerpts of comments received on the questionnaire. The comments address the question of "Are there strategies or improvements you would recommend to help relieve congestion along Routes 41, 30, and 283 between Wilmington and Harrisburg?" Comments added by the consultant for clarification are enclosed in brackets [].

- "Build a true by-pass to help take the long-haul traffic off of 41 & 30."
- "Increase the use of rail from the Port of Wilmington to Harrisburg."
- "Reduce toll rates on PA Turnpike to encourage use."
- "Closing 41 to truck traffic is not a viable option!"
- "Everyone knows what needs to be done to relieve congestion on Rt 41, 30, 283 and Rt 23, but no one has the resolve to hold the "smoking gun"." [Construct a by-pass]
- "Usually, travel between Lancaster & Harrisburg is not an issue for us…. Due to traffic congestion and limited lanes on Rt 30 E & 41, travel between Lancaster & Wilmington area can be a big problem." [This shipper went on to say by telephone that the transportation system has limited their growth. There are contracts they do not bother bidding on due to limitations in the transportation system.]

## Recommendations for Shipper Scenario

The concepts discussed in this shipper scenario are not concepts that can be realistically be mandated, rather they are strategies that need to be sold the local businesses as being beneficial to both the community and the business. The WHFS Steering Committee should develop a brochure promoting the use of "Community Friendly Logistics." This would consist of good logistics practices that have tangible benefits to companies and community. These include off-peak deliveries, alternate modes and routes, and consolidation of loads.

# 5. Combination of Proposed Local Roadway Improvements Scenario

Two major efforts underway that likely will have a large impact on freight flows are the Route 30 Corridor Improvement Project and the PA Route 41 Improvement Project. There has also been a series of suggestions put forth by concerned citizens for improving safety and relieving congestion on Route 41. Both topics were reviewed as scenarios.

## Improving Freight Traffic Flow

The Route 30 Corridor Improvement Project is being lead by McCormick, Taylor & Associates, Inc. and sponsored by PennDOT. This is a multi-year study focusing on the nine and a half-mile section of US 30 from Route 896 Route 41. The goals of the study are to reduce congestion and improve safety conditions on US 30. A wide range of improvement alternatives for increasing roadway capacity in the corridor—from widening the roadway to the construction of a new highway—will be developed, along with improvements to the intersection of Route 41 and US 30, and a no-build analysis. From a freight standpoint, a US 30 bypass would be highly desirable. It would allow unencumbered passage of westbound trucks to Lancaster City, Harrisburg, and points west and eastbound trucks to Philadelphia, Wilmington, and other eastern locations. A bypass would take many of the 1522 trucks per day reported in Exhibit 2-3 off of the existing US 30 and away from the tourist attractions, restaurants, shops, and hotels.

The Route 41 study is being sponsored by PennDOT and FHWA and is being conducted by KCI Technologies, Inc. The Route 41 study addresses improvements for the 9.5-mile section of PA Route 41 between PA 926 and the Delaware state line in Chester County. It does not address the remainder of Route 41 to Gap. The Route 41 Improvement Project began in fall of 1993 and it currently is under environmental study and preliminary engineering. The alternatives currently under evaluation include various alignments of bypasses around Avondale and Chatham. The anticipated posted speed limit on the bypasses is 45 mph versus the 35 mph on the existing segments through Avondale and Chatham. Given the added circuitry, this will not amount to much transit-time savings. The real transit-time savings should come from eliminating the narrow roads and congestion in Avondale and Chatham. These bypasses would be of benefit to ease congestion and improve freight flow, but without a more complete bypass, the impact of these changes on truck traffic will be minimal.

Members of the WHFS Steering Committee are already participating in these studies. A role the Steering Committee could play is to engage area shippers on how a bypass could be designed to benefit them. Should there be connections to the existing route, and if so, where? Could local shippers utilize warehouses or DCs to make pick-ups or final delivery in smaller cargo vans or trucks, and if so, where should these warehouses and DCs be located? The bypass will attract the through traffic, but by working with area shippers it may be possible to shift some of the local trucks off of the existing roads, thereby enhancing safety for tourist and the horse and buggies.

## Managing Freight Traffic Flow

Managing freight traffic flow includes a ban on through trucks, installing traffic calming measures, and increasing enforcement of traffic laws.

A ban on trucks that pass through a region without serving customers in the region is a strategy that has been used successfully in some parts of the country. Truck bans are usually imposed on roads ill suited to handle heavy trucks, with safety and reduction of hazardous conditions the principal motivators. These bans are invoked at the state level, generally by the Department of Transportation.

Should the WHFS Steering Committee support or oppose a ban on through truck traffic on Route 41? First of all, a truck ban is likely infeasible because Route 41 is designated as part of the National Highway System (NHS). Second, any truck ban in which "through traffic" is narrowly defined as Chester County, would have a very negative impact on business in Lancaster, Dauphin, York, and New Castle Counties. Third, any ban must include all other parallel rural roads in the area so that traffic is not diverted to even less suited roads. Finally, the Steering Committee should recognize that a truck ban on Route 41 would have less of an impact on US 30 since many of the nearly 14,000 trucks per day (Exhibit 2-1) use US 30 east to/from the Philadelphia area and do not use Route 41. Also, a large portion of the trucks banned from Route 41 would use Route 202 to US 30 and still avoid the PA Turnpike toll. In conclusion, the WHFS Steering Committee should not consider or support a ban on through trucks on Route 41.

Traffic Calming refers to any of a number of strategies to impede the flow of vehicles on the roadways with the goals of reducing speed and enhancing safety. The most common techniques are: speed humps and bumps; traffic circles; median islands; curb extensions, chokers, and road closures; speed trailer and reader board programs; and, traffic enforcement programs. Traffic calming strategies involving geometrical changes to the roadway are aimed at reducing capacity. Therefore, unless significant numbers of vehicles are diverted to other routes or modes of travel, these techniques will increase congestion and delay on the roads.

If traffic calming were implemented on Route 41, there would be increased usage by cars and trucks of parallel routes such as 82, 472, 896, 30/202, and the PA Turnpike. The hope is that this traffic (especially the trucks) would choose to pay the toll and use the PA Turnpike, but this is really only practical for traffic moving to Harrisburg and points west. Trucks serving business in Chester, Lancaster, York, or southeastern Dauphin Counties would still need to move over Route 41 or other parallel rural roads. This will increase delays and costs for all vehicles and any increase in transit time or cost is a detriment to local businesses and economic development. Though not related to freight, the other argument against traffic calming is that it impedes the movement of emergency response vehicles. The WHFS Steering Committee should not consider or support traffic calming measures on the primary routes of this study. The primary reasons are negative affects on area businesses and increased traffic on other parallel, rural roads.

Increased enforcement is directed at speed limits, over-weight vehicles, and roadside safety inspections. Increased speed limit enforcement would come through additional local or state police stationed along Route 41. Over-weight vehicle enforcement would require increased operating hours for existing weigh stations. Roadside safety inspections require sufficient land with good sight distance to allow for safe stopping and inspections. All of these measures are promoted as strategies to improve safety on Route 41. Ensuring that both trucks and cars operate within the posted speed limits and that trucks are within the legal weight limits and are in good operating condition can only have a positive impact on road safety. However, there would likely be minimal impact to reducing congestion or encouraging through trucks to utilize the PA Turnpike. The rationale behind this is that the truckers most likely to break the laws are also the most likely to avoid paying tolls. Increasing enforcement is a good idea, but it is largely a local effort and should not be a concern of the WHFS Steering Committee.

# 6. Pennsylvania Turnpike Scenario

This scenario explores options for diverting existing Wilmington-Harrisburg Corridor truck traffic to the PA Turnpike. Moving from the Port of Wilmington to Harrisburg over US 202 and the PA Turnpike is approximately 20 miles and 10 minutes longer than using Route 41, US 30, and PA 283. The PA Turnpike route is also more expensive due to the longer distance and the toll. To help offset these additional costs, two alternatives were considered: a value pricing study looking at the impact of lower truck tolls on part of the PA Turnpike; and, allowing longer combination vehicles on the PA Turnpike and connecting roads.

## Truck Toll Reduction -- Value Pricing Study

Wilbur Smith Associates was asked by the Pennsylvania Turnpike Commission (PTC) to evaluate the potential amount of existing truck traffic on Route 41 in Chester County that would shift to the PA Turnpike due to a reduction in truck toll rates between Interchanges 19/247 (Harrisburg East) and 23/312 (Downingtown). Using a detailed intercept survey conducted by the Delaware Valley Regional Planning Commission (DVRPC), it was determined that less that 18% of the current truck trips on Route 41 would be able to take advantage of this discount.

WSA performed a manual diversion analysis that estimates the likelihood of a vehicle choosing the PA Turnpike over Route 41. This analysis included the costs associated with travel time, operating costs, and any toll costs. Toll rate reductions ranging from 10% to 50% were tested, in 10% increments. For a 10% toll reduction only 2 truck trips were diverted to the PA Turnpike and for a 50% reduction on 33 truck trips diverted. These results reaffirm the conclusions reached by DVRPC in their own analysis of the potential to shift traffic from the Route 41 corridor to the Turnpike. A summary document DVRPC developed concluded that the "US 202/PA Turnpike option is time and cost prohibitive even for the minority of total PA 41 shipments that could use the route to serve their origins and destinations."

## Longer Combination Vehicles (LCV)

The typical trucks hauling freight in the Wilmington-Harrisburg Corridor that have been discussed in this report are the standard 5-axle, 18-tire trucks. There are also 6-axle trucks, usually consisting of a tractor and two 26-28 ft trailers, which are allowed to operate on the PA Turnpike and area interstates. Longer Combination Vehicles (LCV) refers to seven or more axles. These include Rocky Mountain Doubles (one 45-48 ft trailer and one 26-28 ft trailer), Turnpike Doubles (two 45-48 ft trailers), and triples (three 26-28 ft trailers). This scenario addressed whether allowing LCVs on the PA Turnpike, connecting interstates, and selected access roads would divert truck traffic from the Corridor.

The US Department of Transportation submitted a report on the Comprehensive Truck Size and Weight Study to Congress in August 2000. According to this study, if a National Network (consisting of interstates, primary toll roads, and key connectors) was open to LCVs, there would be a decrease of 77% in 5-axle truck use, an increase of 2600% in LCV use, and an overall decrease of 23% in total truck use, based on vehicle miles traveled. Furthermore, freight rail usage would decline by 20%. The study went on to identify significant economic savings associated with pavement, congestion, energy, and shipper costs. There were substantial increases in bridge and roadway geometric costs.

While the benefits of LCVs on the Wilmington-Harrisburg Corridor are potentially large, the obstacles are even larger. Obtaining the approval to operate LCVs on the PA Turnpike and connecting roads (specifically US 202) will meet with enormous and numerous obstacles. These include:

- A current freeze on new LCV operations at the federal level
- Strong opposition from the Pennsylvania Turnpike Commission (PTC)
- Strong opposition from concerned citizen and lobbyist groups (including the Coalition Against Bigger Trucks and Citizens for Reliable and Safe Highways (CRASH))
- Strong opposition from the freight railroads
- Regulatory changes and Legislative approval from multiple states
- Safety concerns
- Cost of geometrical improvements to sections of the roadway
- Cost of possible bridge upgrades
- Cost of constructing areas to assemble and break-down the LCVs

It is very unlikely that LCVs will be allowed to operate on the PA Turnpike in the near future, but should the WHFS Steering Committee decide to further explore this option, a task force should be formed to:

- Identify all the specific PA, DE, and Federal regulations that would have to be changed.
- Initiate a study to identify all necessary geometrical, bridge, and facility changes along with the estimated costs. This would include the PA Turnpike, US 202, PA 100 and any roads necessary to access the assembly/breakdown yards.
- Further refine and identify the benefits to the Corridor.

# 7. Final Recommendations

The committee established for this study is a unique multi-jurisdictional collection that spans city, county, and state boundaries and includes both public and private sector interests. This is the only group that is focused on the big picture freight and economic concerns of the entire Corridor. This Committee realizes the dependencies that exist between roads, modes, and regions in an efficient freight network.

This Steering Committee provides a good basis for increasing involvement. One of the ways of increasing involvement is to create task forces in the form of sub-committees that focus on specific areas or activities. This might include producing newsletters that report on the progress and improvements in the region's freight system, identifying projects for subsequent Transportation Improvement Programs (TIP) or long range plans, and coordinating with shippers and receivers by working together with local traffic clubs.

The first steps of the Steering Committee should be to establish a goal, a set of objects, and a set of proposed strategies. The goal might be to: **"Plan and develop a reliable and sustainable freight system in the Wilmington-Harrisburg Corridor."** The objectives towards achieving this goal should attempt to balance: enhancing freight mobility; improving the quality of life;

improving safety, and; enhancing economic development. The proposed set of strategies has been the focus of this report.

The strategies themselves fall into the four scenario categories: railroad, shipper, proposed local improvements, and the PA Turnpike. A tasks force for each could be created.

The rail task force should:

- Initiate contact with the I-95 Corridor Coalition and lend additional arguments and support for a dedicated freight line along Amtrak's NEC.
- Initiate a study of a New Castle County rail terminal with the support of NS, DelDOT, and WILMAPCO.
- Initiate a study of increased utilization of the Brandywine Valley Railroad with the support of the BVRY. This effort involves working with shippers to identify new direct rail and transload opportunities.

The shipper task force must open a dialog with local industries and farmers to devise freight movement strategies that benefit all. These might include:

- Alternate modes of travel (need to coordinate with the BVRY effort)
- Off-peak deliveries
- Warehouse/Distribution Centers for clustering freight activities
- Alternate routings over the roads (these appear to be minimal)
- Develop a "Community Friendly Logistics" brochure and work with local businesses as outlined in Section 4.6

The task force on proposed local improvements needs to insure that the vitality of the entire corridor is maintained as local improvements are designed or planned. This includes:

- US 30 bypass or widening
- Route 41 bypasses
- Through truck ban
- Traffic calming

The PA Turnpike scenarios seem to hold the least promise. Regardless of how much the tolls are discounted, unless they are eliminated they will still be greater than the cost of using the Corridor. The LCV concept has great potential to divert truck traffic to the PA Turnpike, but the opposition, legislative, and legal battles would make this an extremely difficult concept to implement.

Each of the Corridor Metropolitan Planning Organizations (MPO) should work individually and together to continue the momentum generated from this study. The following summarizes, for each scenario, the role of each MPO and the impact on that MPO's area. Roles are defined as none, monitor, support, or lead the effort. Impact is categorized as low, medium, or high.

## *DVRPC (Role/Impact)*

- Rail Freight Line along NEC (Support/Medium)
- New Castle County Intermodal Terminal (Support/Medium)
- Brandywine Valley RR (Lead/Medium)
- Industry Solutions – Community Friendly Logistics (Lead/Medium)
- U.S. 30 Bypass – (Monitor/High)
- PA 41 Bypasses – (Lead/High)

- Truck Ban – (Monitor/High)
- Traffic Calming – (Monitor/High)
- Increased Speed/Weight Enforcement – (None/Low)
- PA Turnpike/Tolls – (Support/Low)
- PA Turnpike/LCV's – (Monitor/High)

### *Lancaster County Transportation Coordinating Committee (Role/Impact)*

- Rail Freight Line along NEC (Lead/Medium)
- New Castle County Intermodal Terminal (Support/Medium)
- Brandywine Valley RR (Support/Low)
- Industry Solutions – Community Friendly Logistics (Lead/Medium)
- U.S. 30 Bypass – (Lead/High)
- PA 41 Bypasses – (Monitor/Low)
- Truck Ban – (Monitor/High)
- Traffic Calming – (Monitor/High)
- Increased Speed/Weight Enforcement – (None/Low)
- PA Turnpike/Tolls – (Support/Low)
- PA Turnpike/LCV's – (Monitor/High)

### *Harrisburg Area Transportation Study (Role/Impact)*

- Rail Freight Line along NEC (Support/Medium)
- New Castle County Intermodal Terminal (Support/Medium)
- Brandywine Valley RR (Support/Low)
- Industry Solutions – Community Friendly Logistics (Lead/Medium)
- U.S. 30 Bypass – (Monitor/High)
- PA 41 Bypasses – (None/High)
- Truck Ban – (Monitor/High)
- Traffic Calming – (Monitor/Medium)
- Increased Speed/Weight Enforcement – (None/Low)
- PA Turnpike/Tolls – (Support/Low)
- PA Turnpike/LCV's – (Monitor/High)

### *WILMAPCO (Role/Impact)*

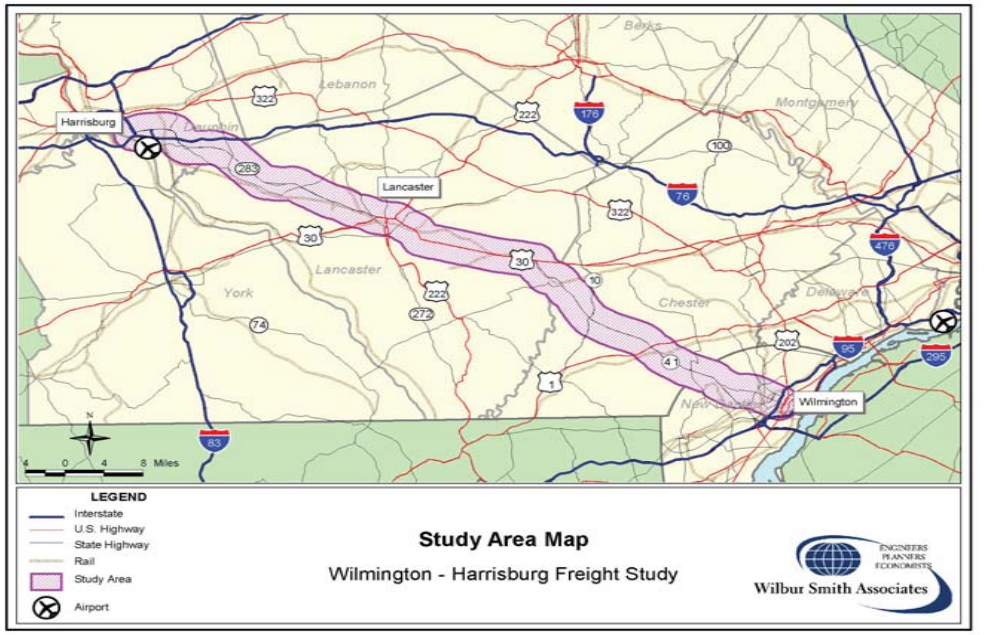
- Rail Freight Line along NEC (Support/Medium)
- New Castle County Intermodal Terminal (Lead/Medium)
- Brandywine Valley RR (Support/Medium)
- Industry Solutions – Community Friendly Logistics (Lead/Medium)
- U.S. 30 Bypass – (Monitor/Low)
- PA 41 Bypasses – (Monitor/Low)
- Truck Ban – (Monitor/High)
- Traffic Calming – (Monitor/High)
- Increased Speed/Weight Enforcement – (None/Low)
- PA Turnpike/Tolls – (None/Low)
- PA Turnpike/LCV's – (Monitor/High)

This study and the work of the Steering Committee have drawn attention to the interdependencies and importance of the freight system to this region. The momentum should not be lost.

# Wilmington-Harrisburg Freight Study


**Presentation to the**
**Delaware Valley Regional Planning Commission**
**April 16, 2003**

Wilbur Smith Associates




**Retail, Residential**

**Farming**


**Small Towns**

**Manufacturing**

**Tourism**

**Warehouses / DC**

## STUDY GOAL

**To more efficiently move freight in the Wilmington-Harrisburg Corridor, with special consideration for…**

Wilbur Smith Associates

## Safety Issues

- Car/Truck Interactions
- Horse & Buggy/Traffic Interaction
- Increasing Traffic Volumes (Year round)
- Roadway Geometry/Conditions (Rt. 41 & 30)

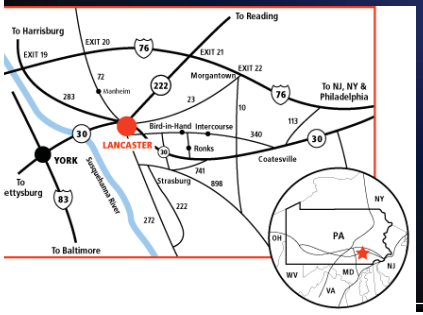
Wilbur Smith Associates

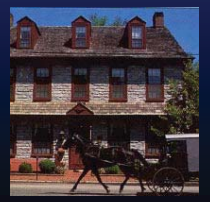
## Quality of Life







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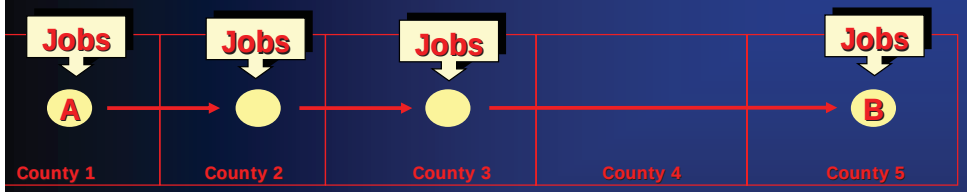
## Economic Growth




Freight markets transcend boundaries

Competitive Distribution System (Ports, others)

Wilbur Smith Associates

## Project Team

- Wilbur Smith
- Lancaster County Planning Commission
- Steering Committee
- Reebie Associates
- Martin Associates

Wilbur Smith Associates

# PROJECT FLOW CHART

Task 1
Project Description & Corridor Definition

**CURRENT**

Task 2 : Assemble Freight Data

Task 3: Analyze Existing Conditions

Tech Report # 1
Understanding the Current Corridor

**FUTURE**

Task 4: Forecast Freight Data

Task 5: Future Issues and Constraints

Tech Report #2
Projecting the Future of the Corridor

**SOLUTIONS**

Task 6: Alternative Scenarios

Task 7: Final Recommendations

Final Report
Wilmington – Harrisburg Corridor

Wilbur Smith Associates

# Average Annual Trucks Per Day Averaged Over All Road Segments in the Corridor

Rte 41 – 3,331

US 30 – 14,001

PA 283 – 8,880

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# Delaware River Port Traffic Using the Corridor

280 Daily Truck Trips

Wilbur Smith Associates

# Port of Wilmington – 70% Local to Corridor

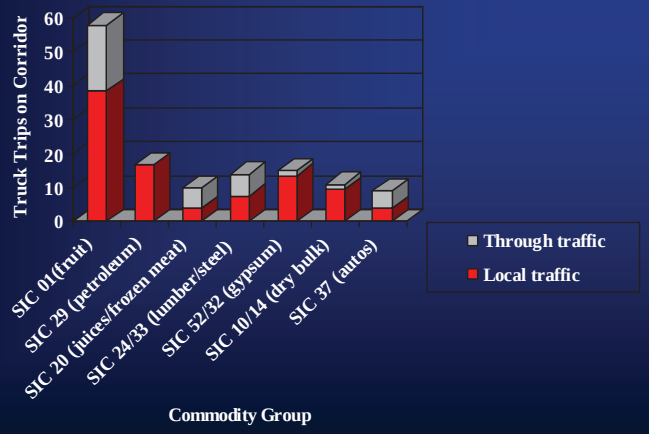


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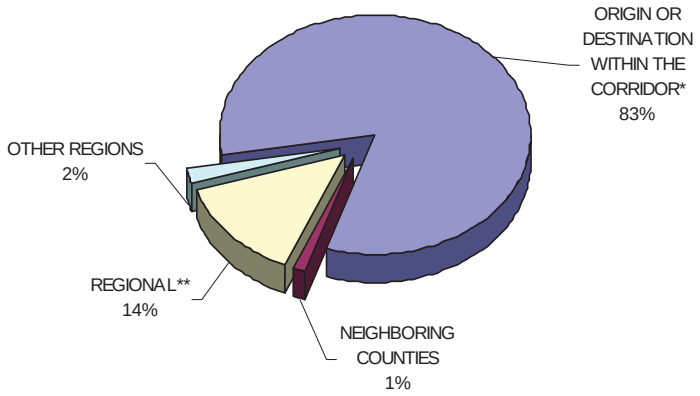
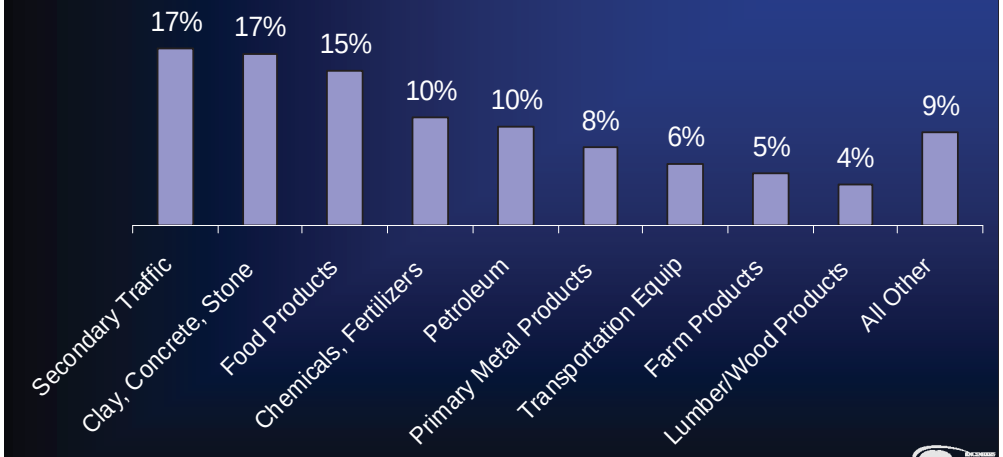
**Exhibit 2-2**
**Distribution of Traffic**
**Base-Year Non-Port Freight Volumes on Corridor**




* Includes traffic originating or terminating in New Castle County, DE; and Chester, Lancaster, or Dauphin Counties PA
** The remainder of PA, DE, and Southern NJ.

Wilbur Smith Associates

## Distribution of All Commodities on Route 41 (Percentages Based on Tonnage)

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## Potential For Corridor Traffic Diversions

| | Base | Long-Haul | Pct |
|---|---|---|---|
| Rte 41 | 3,331 | 1,125 | 33.8% |
| US 30 | 14,001 | 1,522 | 10.9% |
| PA 283 | 8,880 | 1,522 | 17.1% |

Wilbur Smith Associates

**What does the data tell us?**

### Port Truck Traffic – Small Role

- Seasonal traffic - FRUIT
- Not extremely divertible
- Mostly local – not long haul

### Overall Truck Traffic – Significant Role

- Food, secondary traffic, construction materials
- Bulk is to/from New Castle County
  - Wilmington/Newark
- Much is local……but
- Significant long haul densities

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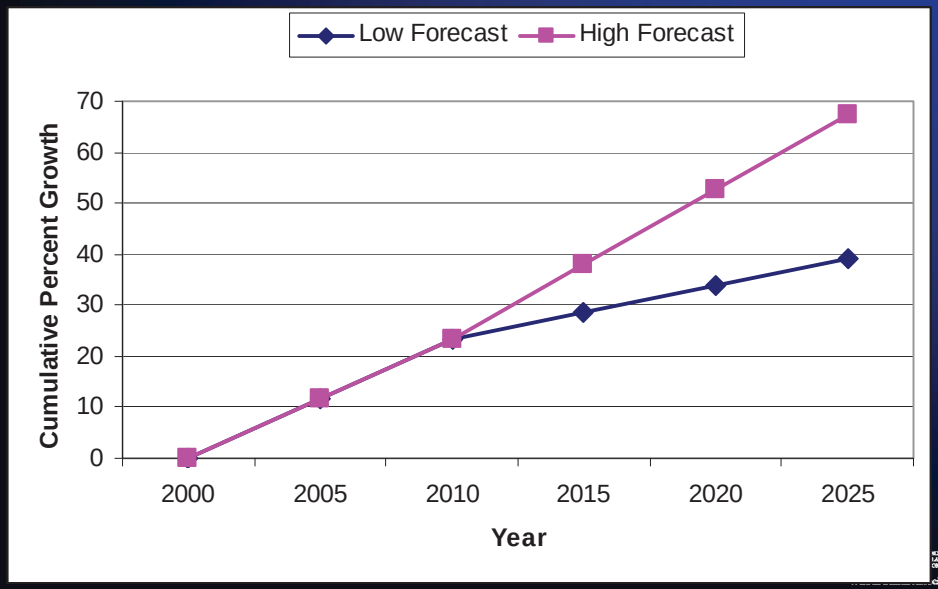
## Forecasts




## Growth in Freight Traffic

- 0.62% annual population growth
- 23% total growth in freight by 2010
- 40-69% total growth in freight by 2025

**What does this all mean?**

## Nothing on Horizon to Shift Patterns

- No major modal shifts (Shellpot Bridge?)
- No major route shifts
  - TIP's mostly reconstruction, maintenance
  - Major plans (bypasses, I-95/PA TPK) are in early planning

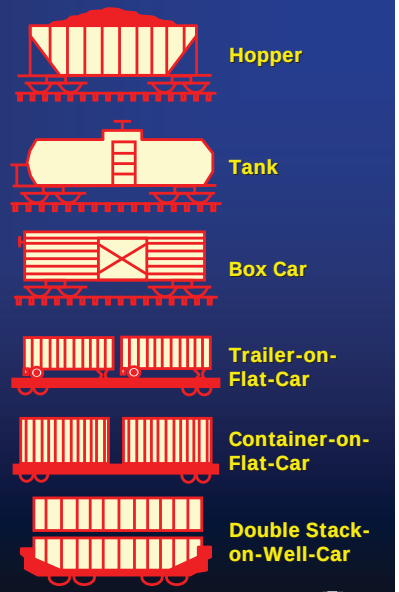
## Scenarios

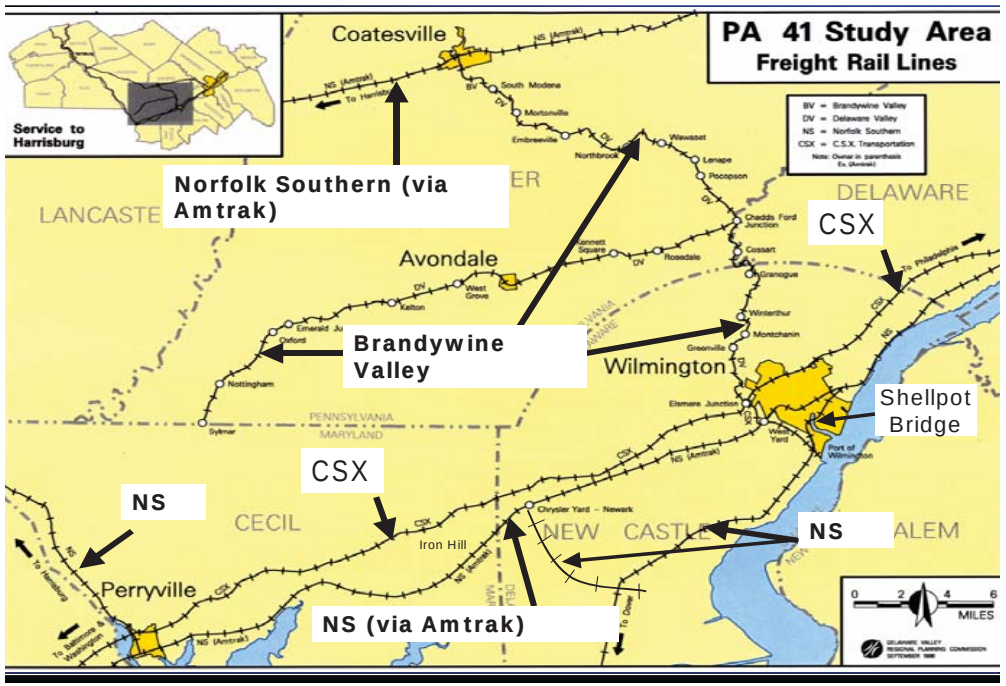
- ***Railroad Scenario*** – explores the extent to which investment in the railroad system can provide a more efficient transportation network in the Corridor.
- ***Shipper Scenario*** – gain a better understanding of the supply chain patterns of key shippers and identify potential strategies for improved freight flow.
- ***Proposed Local Improvements*** – look at the combination of local proposals along the Corridor to examine their impact on freight movements.
- ***Pennsylvania Turnpike Scenario*** – explore what is required to entice through trucks to use the PA Turnpike, rather than the shorter, toll free route over the Corridor.

**Local Traffic** **Through Traffic**

## Rail Scenarios

- Dedicated Rail Freight Mainline Adjacent to NEC
- New Castle County Intermodal Terminal
- Brandywine Valley Railroad
- Shellpot Bridge






## Shipper Scenario
## "Community Friendly Logistics"

- Many shippers have sophisticated logistics programs
  - Wal-Mart
  - Home Depot
- Target small to mid-sized shippers
- Promote best practices
  - Off-peak deliveries
  - Logistics webs
  - DCs for converting between local pick-up/deliveries and long-haul
- Public sector role in CFL
  - Educator of best practices
  - Facilitator of enhanced communications
  - Provider of infrastructure and freight facilities
- Under CFL, public sector involved in planning and operations

Wilbur Smith Associates

## "Community Friendly Logistics"
## Different Goals – Common Solutions

| | Carriers | Shippers | Communities |
|---|---|---|---|
| Consolidating Loads | Reduces fleet size, fleet costs | Reduces per unit transportation costs | Reduces number of trucks |
| Identifying Backhauls | Reduces non-revenue miles | Reduces one-way rates | Reduces number of trucks |
| Reducing Transit Times | Reduces fleet size, fleet costs | Reduces inventory carrying costs | Reduces congestion, air pollution |

Wilbur Smith Associates

## Proposed Local Improvements Scenario

- Improving Freight Traffic Flow
  - U.S. 30 Corridor Improvements
  - Route 41 Improvements
- Managing Freight Traffic Flow
  - Through Truck Ban
  - Traffic Calming
  - Enhanced Enforcement (speed, weight)

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## Pennsylvania Turnpike Scenario

- Value Pricing Study Between Exit 19 (Harrisburg) and Exit 23 (Downingtown)
- Longer Combination Vehicles (LCV)

## Future of the Wilmington-Harrisburg Freight Study Steering Committee

- Need to continue working together to progress the ideas in this study
- Need to add shippers to the committee
- Need to adopt a goal and set of objectives for freight movement in the Corridor

## DVRPC (Role within Steering Committee/Local Impact)

- Rail Freight Line along NEC (Support/Medium)
- New Castle County Intermodal Terminal (Support/Medium)
- Brandywine Valley RR (Lead/Medium)
- Industry Solutions – Community Friendly Logistics (Lead/Medium)
- U.S. 30 Improvements – (Monitor/High)
- PA 41 Improvements – (Lead/High)
- Truck Ban – (Monitor/High)
- Traffic Calming – (Monitor/High)
- Increased Speed/Weight Enforcement – (None/Low)
- PA Turnpike/Tolls – (Support/Low)
- PA Turnpike/LCV's – (Monitor/High)

## Conclusion

**No one magic solution....**

**....many partial solutions**

CAMBRIDGE SYSTEMATICS

# WILMAPCO Regional Freight and Goods Movement Analysis

final

# report

*prepared for*

**WILMAPCO**

*prepared by*

**Cambridge Systematics, Inc.**

*with*

**Global Insight, Inc.**

*September 2007*

www.camsys.com

**Final Report**

# WILMAPCO Regional Freight and Goods Movement Analysis

## 1.0 Introduction

### 1.1 Motivation for Study

Due to its geography, the Wilmington Area Planning Council (WILMAPCO) region is a major thoroughfare for goods moving along the busy northeast corridor on Interstate 95 (I-95) and on the CSX Transportation (CSXT) and Norfolk Southern (NS) railroads. Much of this freight passes through on the interstates and rail lines to the major population centers in the Northeast, but a significant portion travels on local roads serving places like Harrisburg and the Delmarva Peninsula. The WILMAPCO region also is a significant producer and consumer of goods, with large traffic generators, such as the Port of Wilmington, located in New Castle County. This freight movement brings significant economic advantages to the region, but it also contributes to congestion, infrastructure deterioration, and air quality and safety issues.

This study was initiated by WILMAPCO to examine freight as a system, focusing primarily on movements by truck and – to a lesser degree – by rail.[1] The purpose of this study is to report what is known about freight movement in the region for the current and future years – 2005 and 2030, respectively; to identify potential deficiencies and bottlenecks in the freight system; and to recommend specific action items for WILMAPCO in response to the study findings.

The project tasks include:

- **Task 1 –** Purpose of Study, Importance of Freight Planning, and Building a Freight Planning Program;
- **Task 2 –** Literature Review of Recent, Relevant Studies;
- **Task 3 –** Current System Profile and Freight Forecasts;
- **Task 4 –** Identification of Potential Gaps and Conflicts in Freight Network; and
- **Task 5 –** Recommendations.

[1] Air and waterborne movements will not be covered in this study. A rail summary is contained in Table 11 of the Appendix.

Access to the Port of Wilmington is via Terminal Avenue, which directly connects to I-495 and then to I-95. According to analysis in the Wilmington-Harrisburg Freight Study, the vast majority (over 90 percent) of the Port of Wilmington cargo is moved inland to customers and distribution centers via truck. The numbers may have changed since the opening of the Shellpot Bridge, though the primary reason for using trucks is the time and temperature sensitive nature of the fresh fruit and juices. Furthermore, the primary markets for over two-thirds of the cargoes are within a one-day drive of the Port (Western Pennsylvania, Ohio, New York, Massachusetts, and Eastern Canada). On an average day, between 650 to 700 truckloads of international cargo arrive and depart the Port's facilities. When considering empty moves, this figure is closer to 1,300 to 1,400 total truck trips to and from the Port every day.

## 4.0 Summary of Findings for Tasks 1, 2, and 3

- The WILMAPCO region is a major thoroughfare for goods moving along the northeast corridor on I-95 and CSX Transportation (CSXT) and Norfolk Southern Railroads (NS). Much of freight passes through on the interstates and rail lines to the major population centers in the Northeast. These through moves are expected to grow considerably in the future.

- The Port of Wilmington is a major traffic generator, estimated to accommodate 650 to 700 truckloads of international cargo on an average day, which can translate to 1,300 to 1,400 truck trips when empty moves are taken into account.

- Employment data and related estimates of freight generation also underscore the prominence of manufacturing centers, including Wilmington, New Castle, and Newark in New Castle County. Cecil County, due to its largely agricultural nature, does not reflect this pattern to a similar degree, although Elkton is an important center in that county.

- Traffic volumes in Cecil County highlight the importance of I-95 a major freight route; in New Castle County, connecting roads such as U.S. 202, U.S. 13, SR 41, SR 896, U.S. 301, and Delaware Route 4 are significant, as are the larger interstates, including I-95, I-295, and I-495.

- In terms of commodity flow patterns, from 2005 to 2030, *total truck tonnage* in the WILMAPCO region is projected to increase by about 84 percent, from 135 million to 249 million total truck tons.

  - *Through* truck tonnage represents the largest share of the total tonnage – roughly 53 percent – and is projected to grow by 88 percent.
  - *Outbound* truck tonnage represents the second-largest share – 27 percent – and is projected to grow by 73 percent.
  - *Inbound* truck tonnage represents a 19 percent share, and is projected to grow by 91 percent.
  - *Internal* truck tonnage represents less than 1 percent of total tonnage, and is projected to grow by 96 percent.
- The top three commodity groups for *inbound, outbound, and internal truck tonnage* are: secondary traffic (STCC 50); clay, concrete, glass, or stone (STCC 32); and chemicals or allied products (STCC 28). For *through* tonnage, the top groups are chemicals and allied products (STCC 28); nonmetallic minerals (STCC 14); and secondary traffic (STCC 50).

- The WILMAPCO region is a net exporter with about 37 million truck tons flowing out of the region, in comparison with about 26 million truck tons flowing into the region.

- The top three regions – South-South Atlantic, Pennsylvania, and Midwest-East North Central – accounted for 55 percent of total *inbound* flows to the region in 2005.

- The top three regions for *outbound* flows include South-South Atlantic, Pennsylvania, and Northeast-New England, accounting for about 51 percent of the total in 2005.

# 5.0 Identification of Potential Bottlenecks

Within the larger context of total traffic, the identification of areas – or segments – that experience recurring and nonrecurring congestion *related to trucks* was performed with considerable assistance from WILMAPCO staff and existing datasets. To ensure that all eligible segments were identified and highlighted, WILMAPCO staff undertook a comprehensive effort to "score" the entire roadway network in the region using five and six scoring factors for Cecil and New Castle counties, respectively.[32] It should be noted that the roadway network includes all roadways with a functional class of arterial or above.

To produce an ordered list of problem segments, each scoring factor was weighted equally to derive an average score for each segment. The average score was achieved by calculating the total points divided by the applicable number of scoring factors. The highest potential average score for a segment in either county was "3.0." In the case of New Castle County, a maximum of 18 total points were divided by (at most) 6 scoring factors, subject to applicable data. In Cecil County, a maximum of 15 points were divided

[32]New Castle County had one additional scoring factor – a truck crash score – due to data availability of safety-related data for that county.

by (at most) five scoring factors, also subject to data availability and relevance.[33] The complete scoring breakdown for New Castle County across the various criteria can be found in Table 12 of the Appendix, while the summary for Cecil County can be found in Table 13. It should be cautioned that, due to variability in the type and physical characteristics across these segments, the scores are not intended to provide a true hierarchical ranking system, but rather to illustrate how the segments compare across the five or six scoring dimensions.

The six scoring criteria were meant to expand upon the more traditional measures of congestion that describe all traffic (passenger vehicles and nonpassenger vehicles) to also take account for those vehicles that transport goods. A brief summary and the related scoring thresholds for each factor are described below. Figures 14 through 19 in the Appendix also provide a graphical summary of each.

- **Average Annual Daily Traffic (AADT) –** This is one of the simpler traditional measures for how busy a road is, and is displayed for the WILMAPCO Region in Figure 14. It reflects the total volume in both directions of a highway or road for a year divided by 365 days. A segment in the WILMAPCO road network that had an AADT level of more than 60,000 vehicles was assigned the greatest number of points – a total of three. An intermediate AADT level of 40,000 to 60,000 was assigned two points. A segment that had between 20,000 and 40,000 vehicles was assigned one point.

- **(Volume/Capacity (V/C) –** Similar to AADT, this is another traditional measure of congested conditions. As shown in Figure 15, this criterion reflects the ratio of demand flow rate to capacity for a traffic facility and answers the question of whether there is sufficient capacity to accommodate a given volume of traffic. The V/C ratio was accompanied by level-of-service (LOS) criteria – represented by letters "A" through "F" – with "A" being most favorable traffic conditions and "F" being least favorable. Urban areas typically identify system deficiencies as worse than LOS "D." The potential conflict areas in the WILMAPCO region were assigned one point if they had a LOS "D"; a total of two points for an LOS "E"; and three points for an LOS "F" rating. LOS "E" represents a V/C ratio between 0.93 and 1.0, whereas LOS "F" represents a V/C ratio more than 1.0.

- **Travel Time (Percent Below Posted Speed) –** As shown in Figure 16, LOS ratings were used to assign points to segments where traffic was moving more slowly than posted speeds allow. For arterials, a LOS "E" rating corresponds to 60 percent to 70 percent traveling under the speed limit, whereas LOS "F" corresponds to more than 70 percent. For freeway segments, an LOS "E" equates to 30 percent to 50 percent traveling under the speed limit, whereas an LOS "F" equates to more than 50. LOS "D," "E," and "F" segments are assigned one, two, and three points, respectively.

- **Average Daily Truck Percentage –** This factor is displayed for the WILMAPCO region in Figure 17. It focuses specifically on freight-related contributors to congestion by

[33] Where data was not available or applicable, the scoring factor was assigned "0" points and was excluded from the denominator used to calculate the average score across all scoring factors (i.e. total score/number of scoring factors).

identifying the share of trucks as part of the overall traffic mix. The greatest number of points – a total of three – are assigned to segments where more than 12 percent of all road traffic is trucks; two points are assigned to an average daily truck percentage between 8 percent and 12 percent; and one point is assigned to an average daily truck percentage between 4 percent and 8 percent.

- **Daily Truck Generation by Traffic Analysis Zone (TAZ) –** Like average daily truck percentage, this factor also aims to focus specifically on freight-related traffic. An estimated number of truck trips generated by each zone was derived using the number (and type) of employment and total households. One point was assigned to areas with 500 to 1,000 trips; two points were assigned to 1,000 to 2,000 trips; and three points were assigned to more than 2,000 trips. A map of truck trip generations for the region is shown in Figure 18.

- **Aggregate Crash Score –** This safety measure was applied only to New Castle County and is based on two criteria: 1) the total number of crashes involving trucks aggregated along a road segment, excluding crashes at intersections; and 2) for those segments that have more than 20 total crashes, a score based on the total percentage of crashes relative to the New Castle countywide average of 5.5 percent. The aggregate crash scores were based on a six-point maximum and were further stratified into three tiers: significant, moderate, and minor. A map showing the results of this methodology is found in Figure 19.

Figure 11 shows the location of potential bottlenecks in the WILMAPCO region, while Figures 12 and 13 in the Appendix show them separately for each county. The regional and county maps aim to provide a cross-sectional view of areas that experience both recurring congestion percent as expressed through growing AADT; for example, percent and nonrecurring congestion (as reflected by the crash data), as well as areas where relatively high truck volumes intersect with or perhaps contribute to existing chokepoints. While the more detailed application of the segment analysis and six criteria methodology was used as the basis for developing these maps, they use a broader three-tiered scoring system to provide a more simplified view.

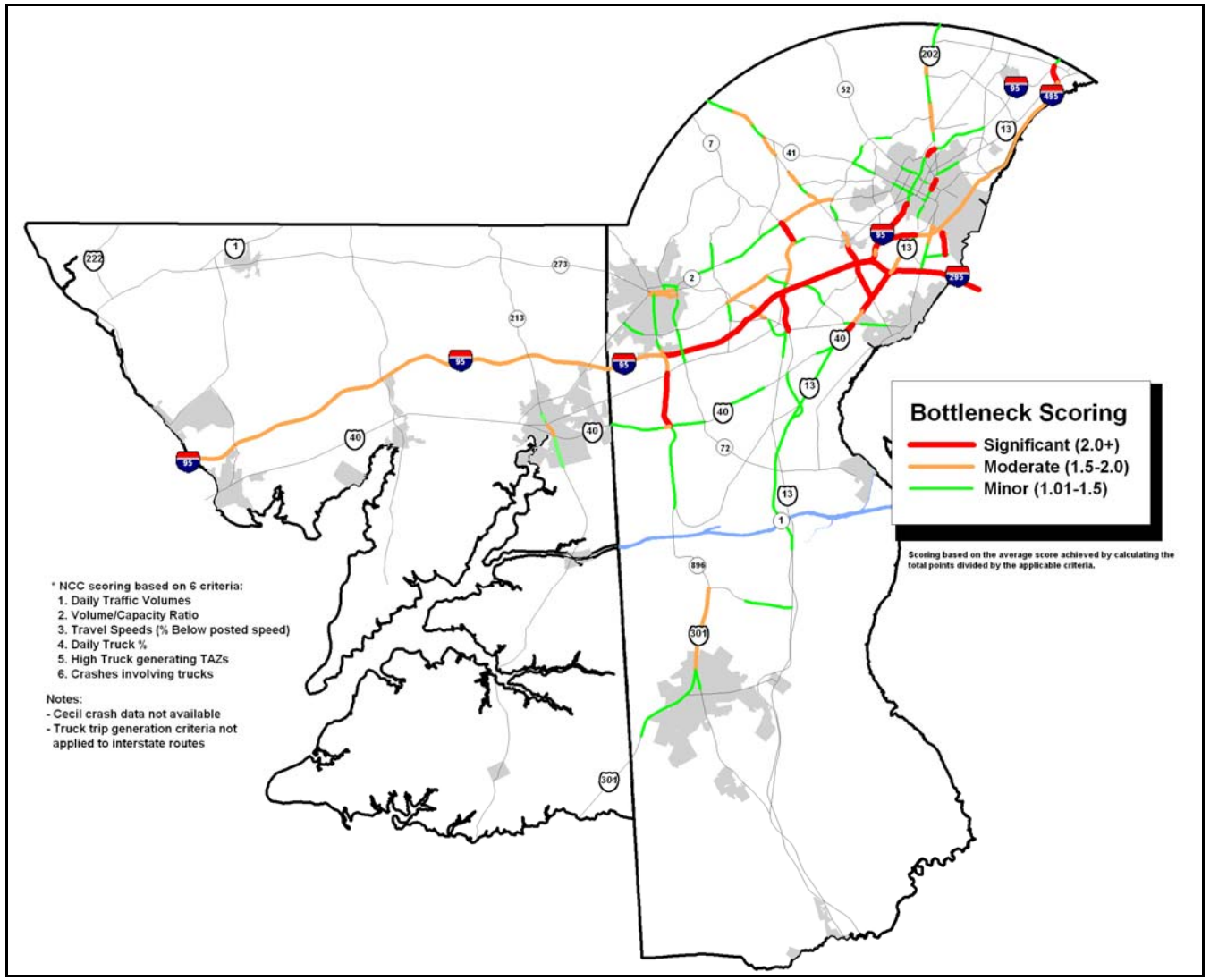
The three-tiered scoring includes the following thresholds for identifying bottlenecks:

- **Significant Percent –** Refers to segments with multiple failing criteria, and generally includes roadways which carry the highest traffic volumes and experience heaviest congestion.

- **Moderate –** Refers to segments that are experiencing some failing, or nearly failing, criteria. There is more variation in scoring across the criteria, with some criteria demonstrating failure and others at more modest levels.

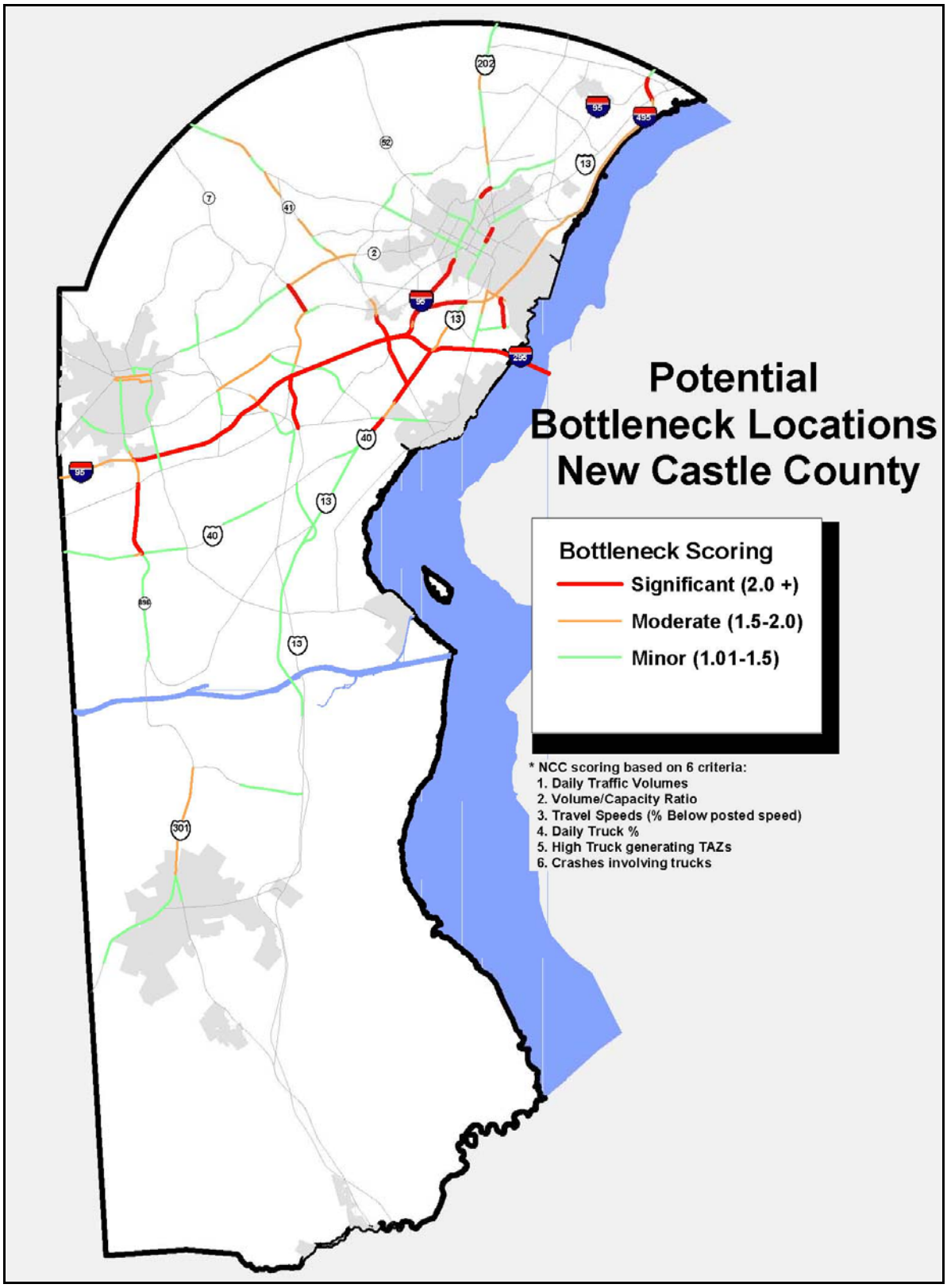
- **Minor –** Refers to segments that experience one or more criteria that are near failing. While most have only a few criteria showing near failure, others are at acceptable levels.

**Figure 11. WILMAPCO Potential Bottleneck Locations**




Source: WILMAPCO.

**Figure 12. Potential WILMAPCO Bottleneck Locations**
*New Castle County*

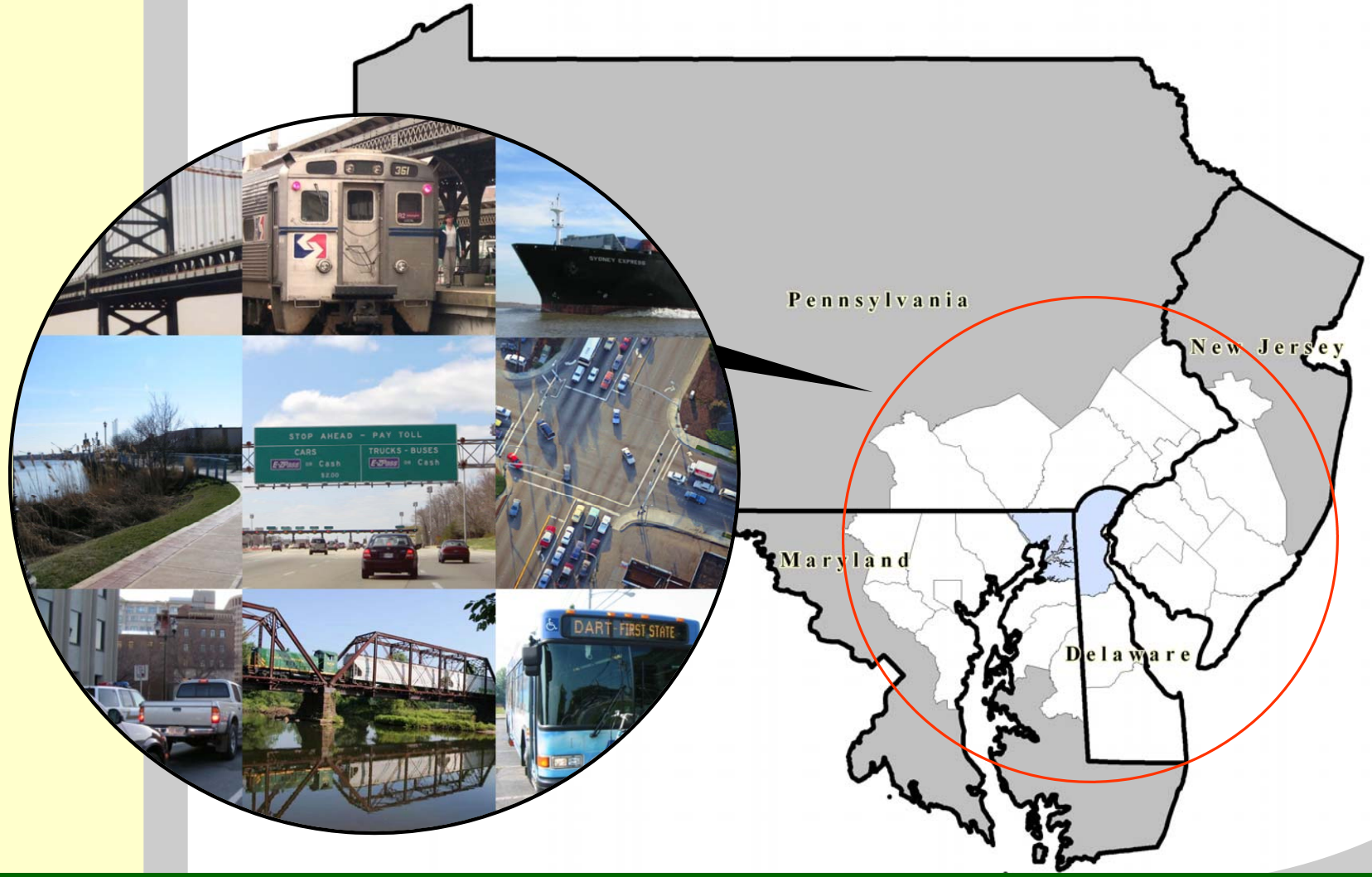



Source: WILMAPCO.

WILMAPCO

# 2012
# Inter-Regional Report

## Making Connections Across Our Region's Borders



# Executive Summary

Nationally, major demographic changes and travel challenges are foreseen that will impact many regions. The Wilmington Area Planning Council (WILMAPCO) has a vested interest in our region's infrastructure, conditions that will shape it in the future, and how it can more effectively serve current and future users.

In response, WILMAPCO has adopted an Inter-Regional Report which is updated every four years, dating back to 2004. WILMAPCO has utilized a two-step approach to inter-regional studies which entails improving communication with adjacent planning agencies, and strengthening data collection and sharing with those agencies. This report provides snapshots of trends beyond our regional borders to ensure every necessary measure is taken to preserve and enhance the transportation system.

The broad goals of this report are to provide a current and future demographic and travel behavior profile of the study area, and to gain an understanding of the effects of growth on transportation infrastructure. The report begins by identifying the study area which consists of Metropolitan Planning Organizations (MPO) and county planning departments surrounding the region. It then captures a variety of data which include travel speeds, work commute time, volume to capacity, projected freight volumes, transportation equity, and more. The report closes with a list of inter-regional transportation corridors that will be significant to many regions in the future.

Below are some of the major findings:

- From 2010 to 2035, the population of the study area is expected to grow by more than 1 million residents.
- Cecil County, Maryland is expected to see the highest rate of growth in population and employment by 2035.
- By 2035, employment for the study area is forecasted to grow by 14.5%, adding more than 835,000 new jobs.
- In the last four years workers who drove alone to work has risen from 75% to 78%.
- Since 2006, the average commute time improved by 1.6 minutes. However, more than half of the counties exceed the regional average of 25.5 minutes for commuting.
- Numerous roadways are projected to see truck volumes expand more than 150% by 2035.
- Since the 2004 report, eight projects with an inter-regional element have been completed.
- Within the study area roughly 12% of the population is below poverty and close to 32% are minority.
- Similar to the national expansion of urban areas, the study area is becoming more urban in its composition.

Based on the results of the analyses, one of the important targets for future actions is to work more closely with neighboring planning agencies to establish a coordinated plan of action to accommodate significant future growth.

## A Broad Perspective of Key Issues

The future of the United States is being shaped by significant population growth and demographic shifts such as employment changes and aging population. The nation's population is expected to grow by nearly 40%, reaching 420 million people by 2050, which will create both opportunities and challenges[1]. It is recognized at national, state, and regional levels that critical investments are essential to accommodate growth, propel sustainable land use and transportation, maintain economic competitiveness in a global market, and enhance quality of life.

These demographic changes are transforming existing metropolitan regions into emerging megaregions. Mega-regions are geographical units described as clusters of major metropolitan regions interconnected by job markets, transportation networks, and land use that have similar social, cultural and environmental characteristics. In decades to come, more than 70% of the nation's population growth is expected to occur within eleven identified mega-regions[2].

The Northeast megaregion stretches over 11 states from Maine to Maryland and the District of Columbia. It is a major thoroughfare for travel along the Northeast Corridor via Interstate 95 and railways, and encompasses several east coast metropolitan areas such as Philadelphia, New York, and Baltimore.

Additionally, 46 million acres of existing urban land could exceed 200 million acres by 2050 if current population growth and land consumption continue to climb[3]. Along with notable rates of growth and expansion of urban areas, other expected trends include aging transportation infrastructure, longer commute times, global climate change, rising goods movements, and congested airports.

Understanding the future impact of these present and future planning challenges will help in the identification of necessary measures to ensure that our future growth contributes to the success of the greater Northeast region. In an effort to coordinate future transportation planning and other goals, the following pages of this report will evaluate the transportation network of surrounding counties which border the WILMAPCO region.








[1]Regional Plan Association, "America 2050: A Prospectus" New York: September 2006
[2]Ross, Catherine L., "Megaregions, Competiveness and Freight Planning". July 2009
[3]Carbonell, Armando, "American Spatial Development and the New Megalopolis". April 2008

# Introduction

## Study History and Goals

In step with the goals of our region's long-range transportation plan, WILMAPCO began including inter-regional coordination as part of our core planning work dating back to 2000. During that time the MPO joined conversations with other planning agencies from Delaware, Maryland, and New Jersey to define common inter-regional issues. These early collaboration efforts led to WILMAPCO's development and adoption of its first Inter-Regional Report in 2004.

The goals of this report are to:

- Re-evaluate present and future demographic and travel changes.
- Examine key roadways where large amounts of traffic traverse our borders.
- Identify existing and potential conflicts within the inter-regional transportation system and ways to devise solutions through coordinated efforts.

The initial 2004 report looked at projected demographics and travel behavior from 2000 to 2025. In 2008, a new report included updated analyses that expanded to 2030, and 2035 where data was available. This present 2012 report includes new Census data, recalculated projections, a transit service feasibility scoring, and the framework to begin monitoring nationally designated marine highways. Overall, the Inter-Regional Reports are intended for use as a technical tool to guide transportation investments and informed decision making, with cross-border coordination in mind.

Along with compiling these reports, WILMAPCO has been involved in a number of organizations and committees with an inter-regional focus that brings together a variety of agencies from various jurisdictions. A complete list and summary of these initiatives and WILMAPCO's involvement is found in Section 8: Path Forward.

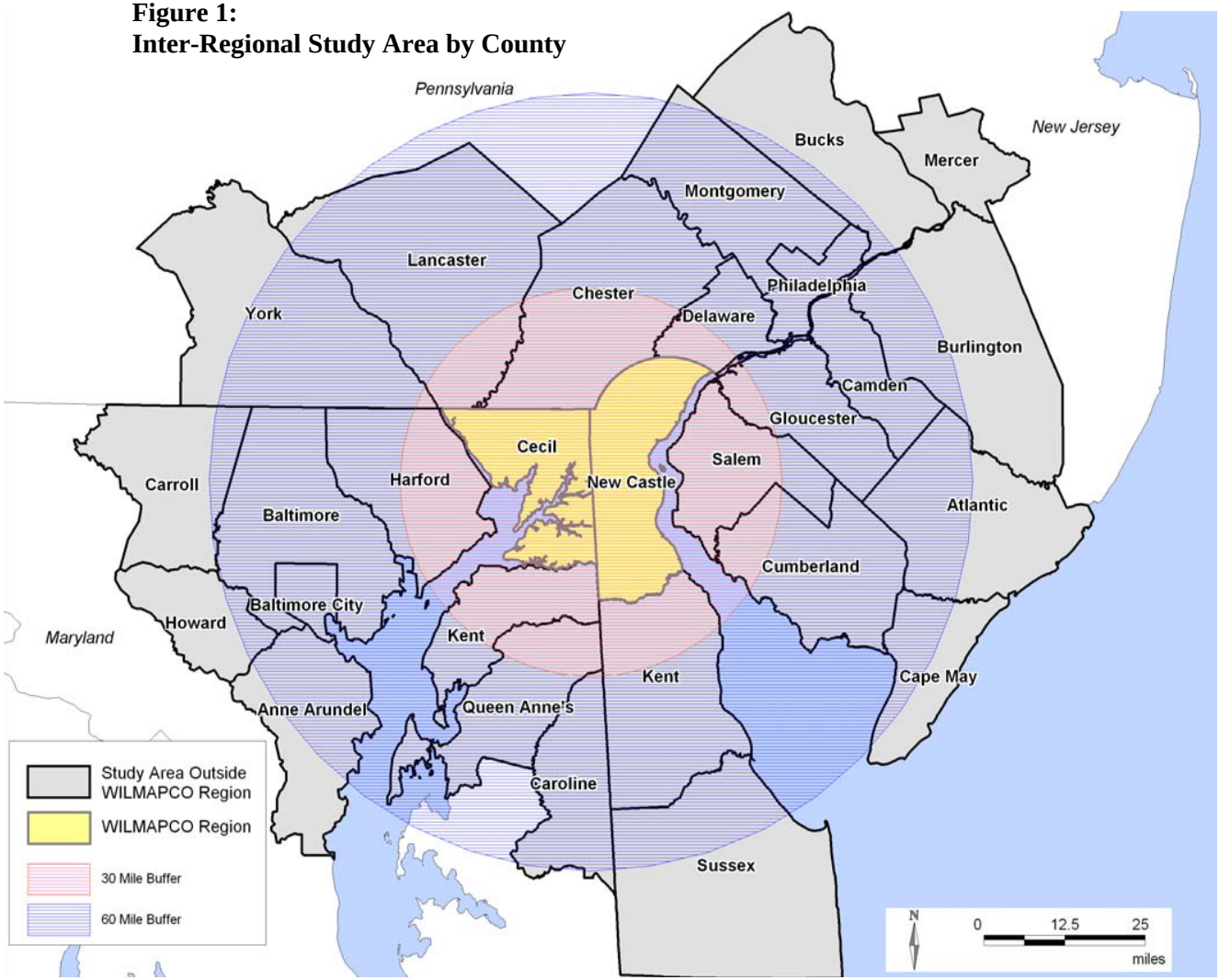
## Study Area

At the center of the study area is the WILMAPCO region, which is a major thoroughfare for travel along the Northeast Corridor via Interstate 95 and rail lines. The Port of Wilmington in New Castle County serves as a major Mid-Atlantic access point for a myriad of import and export commodities. Our region is also in close proximity to several east coast metropolitan areas such as Philadelphia, New York, and Baltimore. In addition to goods, large amounts of people travel through the two WILMAPCO counties to reach other prime destinations. Due to vast amounts of traffic, transportation conflicts along the Northeast Corridor and within the WILMAPCO region are expected. Many of our region's challenges are shared by adjacent counties and planning organizations, and the findings of this Inter-Regional Report seeks to frame those issues.

## Inter-Regional Study Area

The study area, shown in **Figure 1**, was derived by identifying Metropolitan Planning Organizations (MPOs) and counties that are approximately 60 miles from the center of the WILMAPCO region. In total, the report looks at 28 counties, covering four states. Regional data from the study area was collected to analyze the effects that changing demographics, transportation, and land use issues have on the WILMAPCO region.

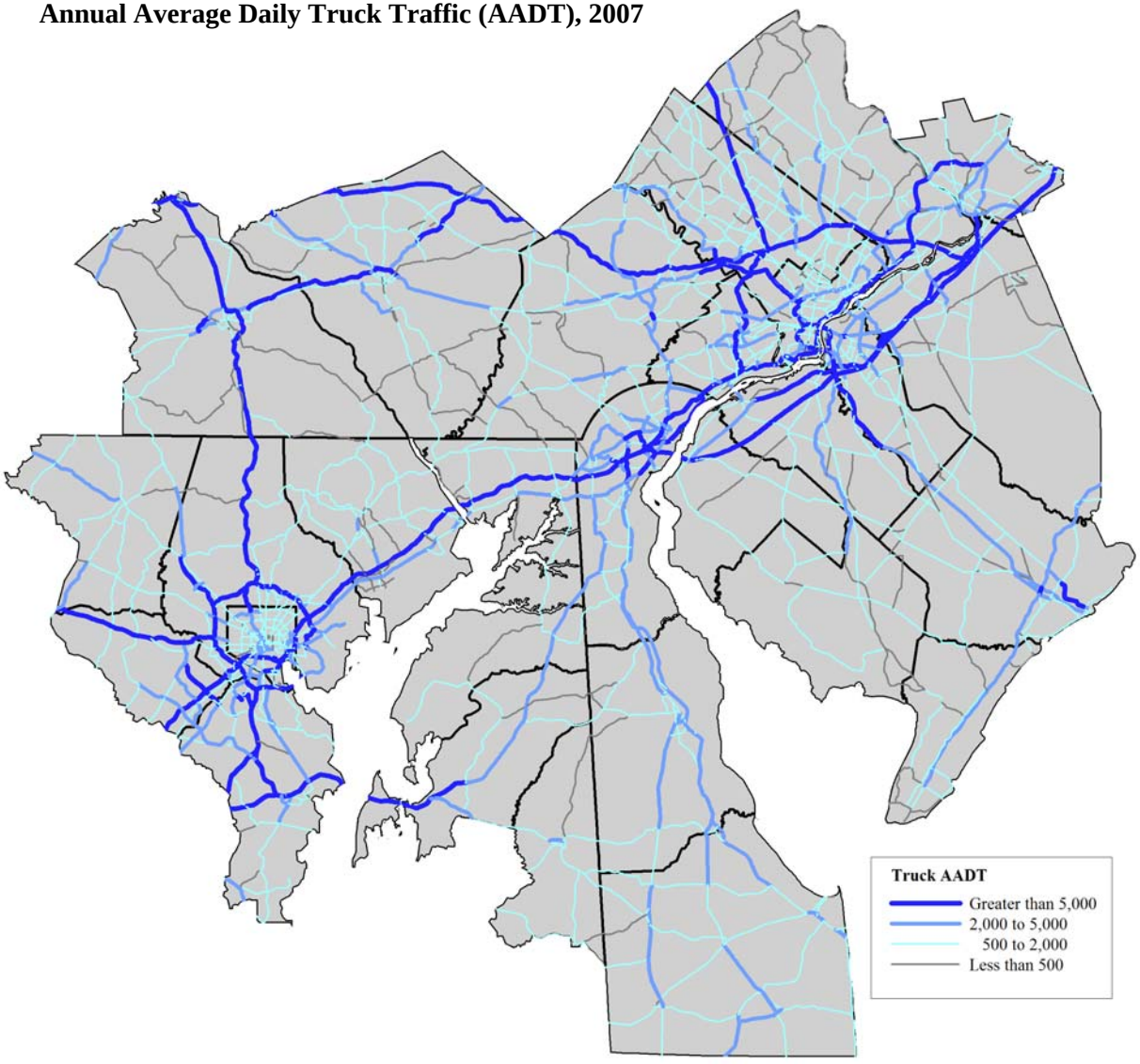
**Figure 1:**
**Inter-Regional Study Area by County**




## Current Truck Volumes

Traffic congestion and vehicle delay can impede the efficient movement of goods and services and economic activity. Freight shipments and services serving the region moves mostly along I-95. Nationally, I-95 in the Mid-Atlantic region is the most heavily traveled truck route. Throughout the study area, I-95 carried just over 947,000 trucks per day in 2007, of which 16% comprised local truck traffic. Regional highways with truck volumes of more than 2,000 trucks per day comprised 82.2% of total daily volume, compared to 66.6% of roads with more than 5,000 trucks daily. In the WILMAPCO region, trucks made up 26.5% of all traffic on major roadways. In addition to the I-95 corridor, a notable amount of trucks moved along I-83 connecting Baltimore City and York County, I-76 connecting Philadelphia to Lancaster County, and I-295 connecting New Jersey counties.

**Figure 15:**
**Annual Average Daily Truck Traffic (AADT), 2007**

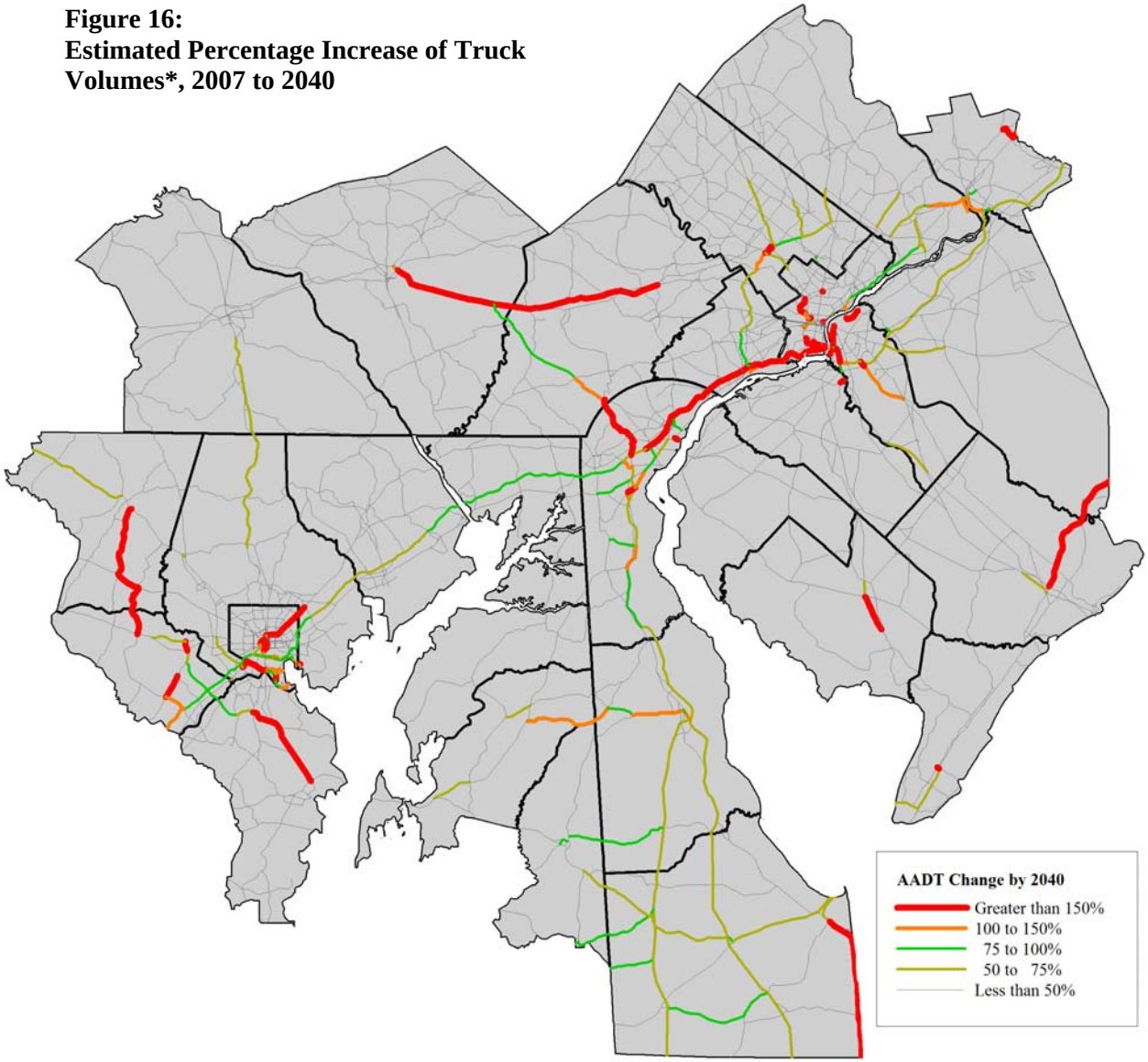



Source: FHWA, Freight Analysis Framework

## Projected Truck Volumes

Moving trucks and other modes for freight activity is essential to maintaining an efficient and reliable system that meets regional needs. In just over two decades about one-third of vehicles moving throughout the study area is expected to be trucks. By 2040, daily truck volumes along I-95 are estimated to double (100.1%) from 2007. Generally, much of this growth in traffic is predicted to represent long distance trips, rather than local trips. In 2007, 57.8% of traffic was classified as long distance. This figure is expected to rise to 69.8% by 2040. Corridors most encumbered by rises in truck volumes (greater than 150%) include portions of I-95, Route 30 linking Chester and Lancaster counties in Pennsylvania, Route 444 connecting Atlantic and Burlington counties in New Jersey, and Route 1 in Sussex, Delaware.

**Figure 16:**
**Estimated Percentage Increase of Truck Volumes*, 2007 to 2040**




*Projected truck volumes represent long distance truck trips of 50 miles or greater.

Source: FHWA, Freight Analysis Framework

## Freight Impact on the WILMAPCO Region

The WILMAPCO region is a major thoroughfare for goods moving along the busy northeast corridor on Interstate 95, the CSX Transportation (CSXT), and Norfolk Southern (NS) railroads. Much of this freight passes through on the interstates and rail lines to the major population centers in the Northeast, but a significant portion travels on local roads serving places like Harrisburg and the Delmarva Peninsula. It is clear that I-95 is a major route that sees heavy traffic flows, and likely carries the majority of the region's freight traffic, connecting key locations of Wilmington, Newark, and Elkton. Also connected are major economic and population centers of Philadelphia and New York to the north and Baltimore and Washington to the south of the region. Commodity flow data indicates that freight is moving primarily north and south along I-95, US 301, US 40 and US 13. All these routes travel through multiple states and metropolitan areas.

The WILMAPCO region generates a small percentage of overall movement in the country. However, along the I-95 corridor, large amounts of through trips occur on our roadways. In 2005, roughly 135 million tons originated, terminated, or moved through the region by truck. By 2030, that total is projected to increase by about 84% to approximately 249 million tons annually. Assuming a weight of 17 tons per truck, nearly 8 million truck trips impact the WILMAPCO region's roadways annually.

**Figures 17 and 18** illustrate the total goods (in tons) that either originate or terminate in the WILMAPCO region in 2005. Overall the region exported approximately 37 million tons out of the region and received 25 million tons. Our top trading partners are located along the Southeastern U.S, the upper Midwest and the Northeast and over one-half of our total trading takes place in these regions. Yet, there is a significant portion that stays within a 13 county area around WILMAPCO. Roughly 15 million tons, or one-quarter of our total tonnage originate and terminate close to home.

**Figure 17: WILMAPCO Truck Tonnage by Direction 2005-2030**

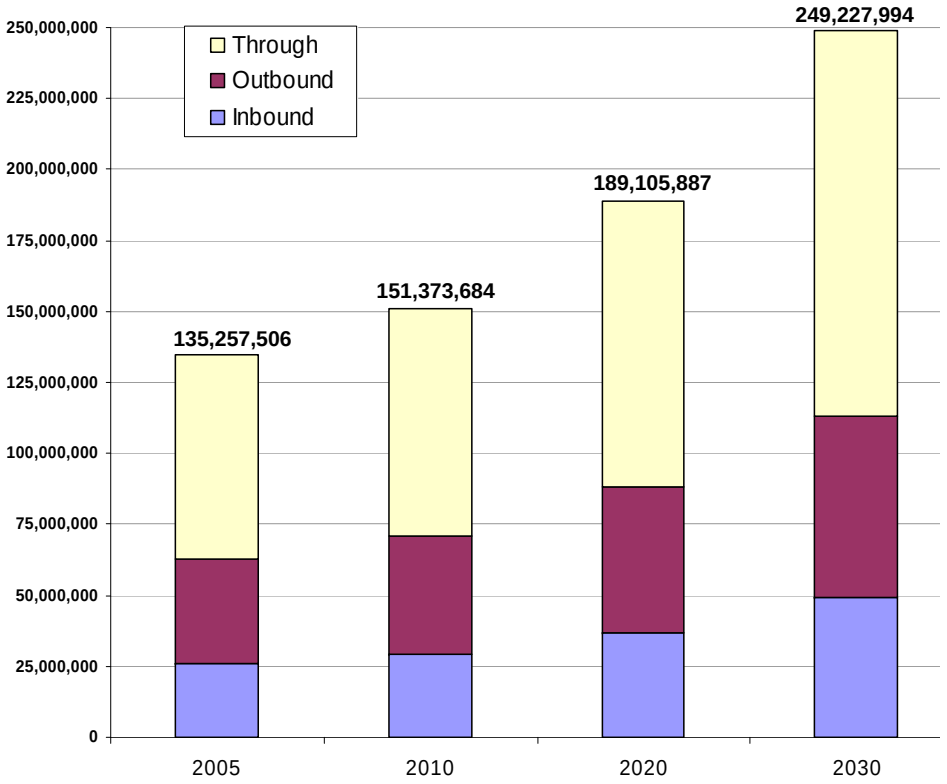
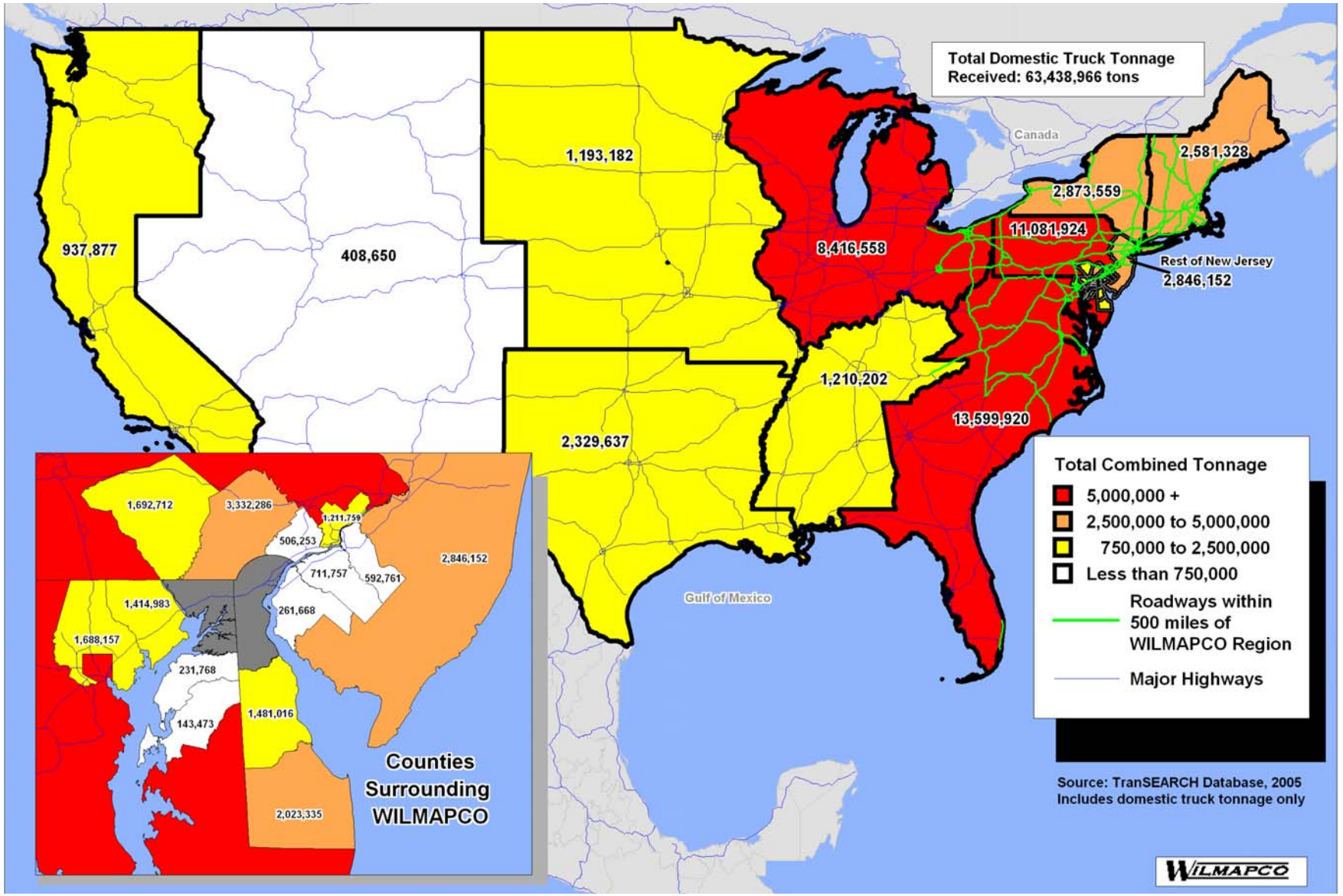


**Figure 18: Total Domestic Truck Tonnage Originating/Terminating in the WILMAPCO Region 2005**



# Section 7: Inter-regional Projects

## Significant Regional Transportation Projects

Based on the Transportation Improvement Programs (TIP) of surrounding agencies, there are several major projects in progress or slated for completion in the future. **Table 6** lists projects within or near WILMAPCO's borders that may have a significant effect on traffic flows to and from the region. More than $1.3 billion is estimated to be spent on these projects to FY 2015 and beyond. As the table reflects, the vast majority of our major transportation projects are highway upgrades, suggesting our continued over-reliance on that system. Most recently completed projects include toll facilities and added capacity along the I-95 corridor through Delaware, and US 202 corridor improvements through Pennsylvania. A map corresponding to this table is shown on the next page.

**Table 6: Significant Inter-Regional Projects**

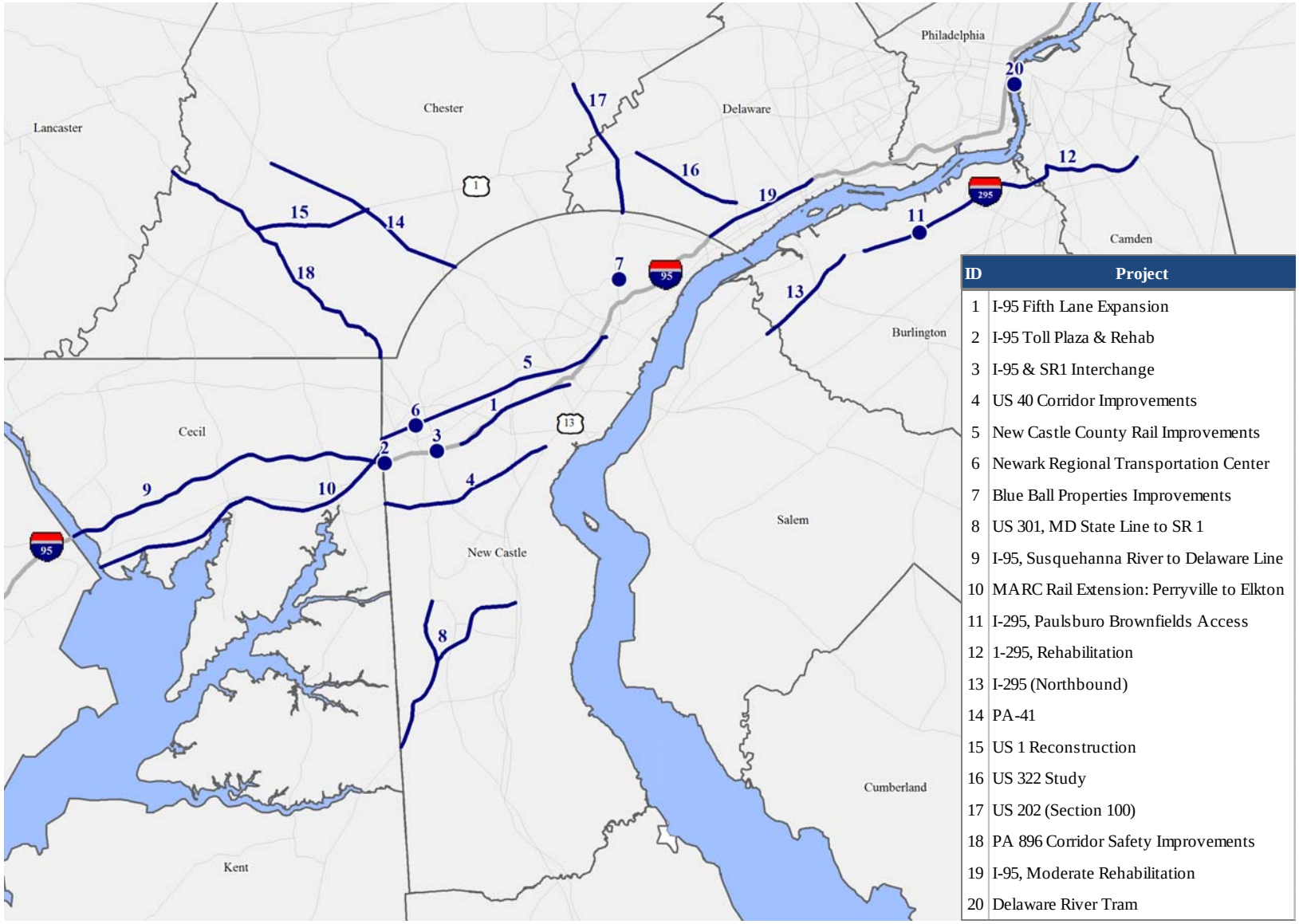
| ID | ST | Project | Description | Current Funding* | Outyear Funding |
|---|---|---|---|---|---|
| 1 | DE | I-95 Fifth Lane Expansion | 5th Lane (Churchman's Bridge to SR141) | n/a | n/a |
| 2 | DE | I-95 Toll Plaza & Rehab | E-Z pass Improvements | $5,583.9 | $0.0 |
| 3 | DE | I-95 & SR1 Interchange | New multilpe lane interchange | $127,841.9 | $0.0 |
| 4 | DE | US 40 Corridor Improvements | Intersection, roadway, & bike/ped. improvements | $10,800.4 | $14,870.0 |
| 5 | DE | New Castle County Rail Improvements | new train cars for R2 line, third track expansion | $68,536.0 | $0.0 |
| 6 | DE | Newark Regional Transportation Center | Expand passenger rail platform; new freight track | $17,398.9 | $0.0 |
| 7 | DE | Blue Ball Properties Improvements | SR 141 and US 202 area improvements | n/a | n/a |
| 8 | DE | US 301, MD State Line to SR 1 | Construction four-lane limited access highway | $577,465.8 | $93,380.2 |
| 9 | MD | I-95, Susquehanna River to DE Line | Lanes and brige expansion | $0.0 | $0.0 |
| 10 | MD | MARC Extension: Perryville to Elkton | Expand passenger rail service | $0.0 | $0.0 |
| 11 | NJ | I-295, Paulsburo Brownfields Access | Access to I-295 (design/row/construction) | $0.0 | $0.0 |
| 12 | NJ | 1-295, Rehabilitation | Rehabilitation, increase auxiliary lanes/shoulders | $0.0 | $0.0 |
| 13 | NJ | I-295 (Northbound) | Resurfacing | $0.0 | $0.0 |
| 14 | PA | PA-41 | Reconstruction & widening | $3,385.0 | $0.0 |
| 15 | PA | US 1 Reconstruction | Roadway reconstruction | $0.0 | $0.0 |
| 16 | PA | US 322 Study | Road widening, median barriers | $11,380.0 | $61,330.0 |
| 17 | PA | US 202: Matlack Street to DE Line | Improve traffic flow, add lanes | $1,093.0 | $374,866.0 |
| 18 | PA | PA 896 Corridor Safety Improvements | Corridor safety and mobility improvements | $0.0 | $0.0 |
| 19 | PA | I-95, Moderate Rehabilitation | Moderate rehabilitation | $0.0 | $0.0 |
| 20 | PA, NJ | Delaware River Tram | Design & construction aerial tramway over river | $0.0 | $0.0 |

Shaded lines are completed projects; other are not complete.

Sources: DVPRC 2007-10 TIP and 2005-08 TIP* for NJ and PA,WILMAPCO TIP 2012-15, BMC TIP, Chester County, Kent/Dover MPO, NJDOT

# Section 7: Inter-regional Projects

**Figure 27:**
**Major Transportation Improvement Projects, FY 2012-2015**




| ID | Project |
|---|---|
| 1 | I-95 Fifth Lane Expansion |
| 2 | I-95 Toll Plaza & Rehab |
| 3 | I-95 & SR1 Interchange |
| 4 | US 40 Corridor Improvements |
| 5 | New Castle County Rail Improvements |
| 6 | Newark Regional Transportation Center |
| 7 | Blue Ball Properties Improvements |
| 8 | US 301, MD State Line to SR 1 |
| 9 | I-95, Susquehanna River to Delaware Line |
| 10 | MARC Rail Extension: Perryville to Elkton |
| 11 | I-295, Paulsburo Brownfields Access |
| 12 | 1-295, Rehabilitation |
| 13 | I-295 (Northbound) |
| 14 | PA-41 |
| 15 | US 1 Reconstruction |
| 16 | US 322 Study |
| 17 | US 202 (Section 100) |
| 18 | PA 896 Corridor Safety Improvements |
| 19 | I-95, Moderate Rehabilitation |
| 20 | Delaware River Tram |



Sources: DVPRC 2007-10 TIP and 2005-08 TIP* for NJ and PA,WILMAPCO TIP 2012-15, BMC TIP, Chester County, Kent/Dover MPO, NJDOT

# Section 8: Path Forward

## KEY REGIONAL CORRIDORS

In the previous 2008 Inter-Regional Report, seven corridors that span across more than one metropolitan area and would benefit from planning and coordination at a wider multi-state level were identified. These corridors are based on a variety of past plans and studies. Likewise, future development activity within these corridors also make them of interest to a variety of planning stakeholders. Key points for each corridor along with some updated projection figures, are summarized here:

1.**SR 41**—This busy corridor stretches from SR-141 in Delaware to Lancaster, PA, and is widely used by commuters and trucks. While this roadway was previously identified on both the WILMAPCO and DVRPC congested corridors list, it currently is not. However, several roadway segments and intersections (particularly around Wilmington in the WILMAPCO region) are currently functioning at LOS E or F in the a.m. and p.m. peak periods. The corridor falls within the Developing and Rural/Agricultural Transportation Investment Areas (TIAs) and notably lacks significant transit service.

Future population and employment is projected to grow 15% to 30% for New Castle and Chester Counties, where the corridor stretches. Along the Pennsylvania section, roughly a 25% population increase by TAZs is estimated, while Delaware sections grew by 10%. In 2010, more than 80% of workers living nearby this roadway drove alone to work.

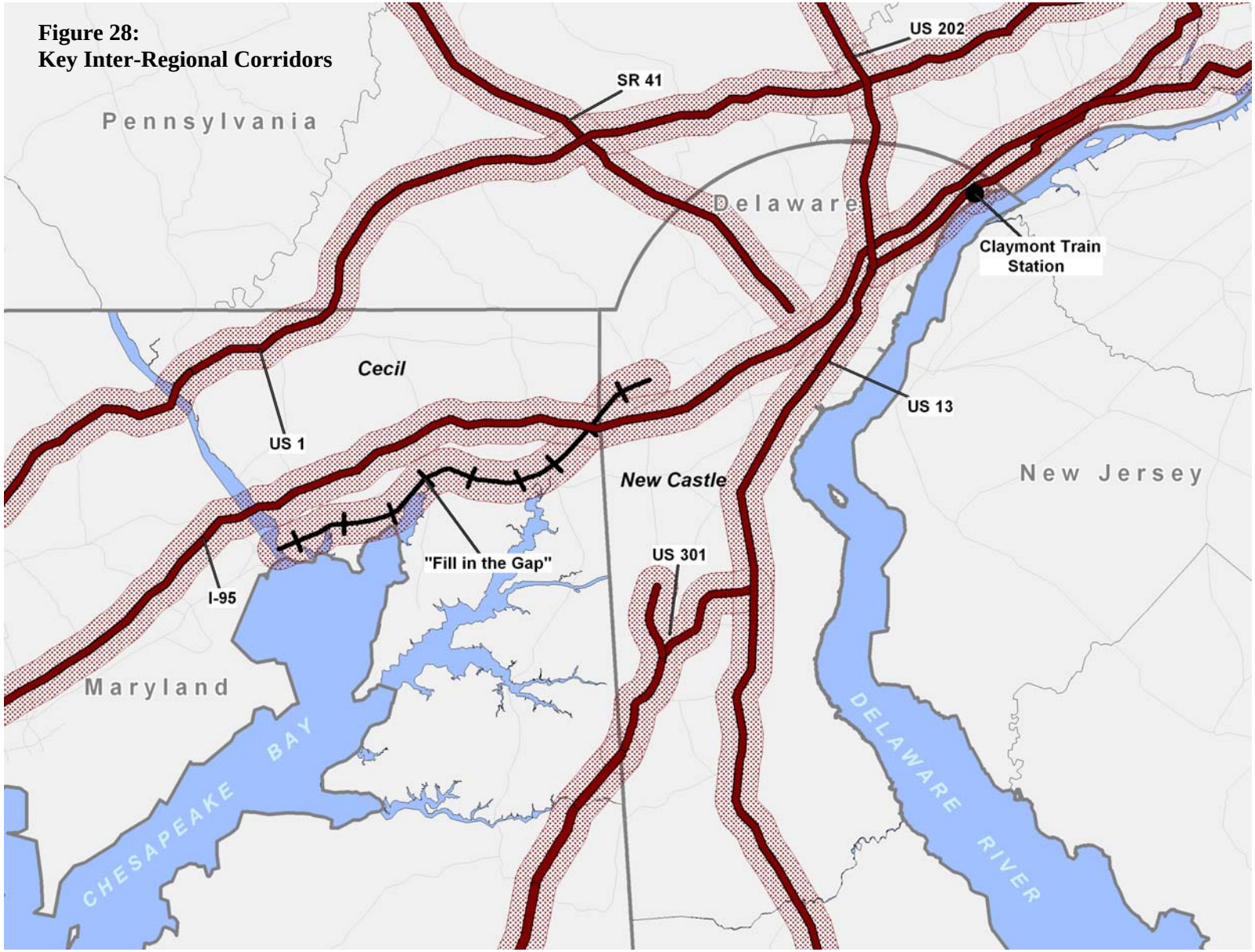
The Average Annual Daily Traffic (AADT) is projected to increase as well. On average, annual daily traffic is projected to rise by 52% from just under 15,000 vehicles per day in 2007 to roughly 22,300. More recent truck volumes along SR 41 are projected to rise between 100% to 150% by 2040, up from past projects of 75% and above. Speeds along the roadway are expected to decrease by a minimum of 50% by 2040.

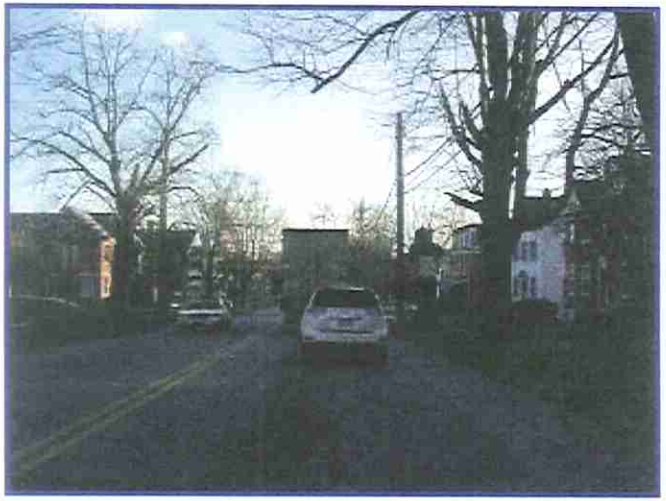
Both current Transportation Improvement Programs covering New Castle and Chester Counties, include a Highway Safety Improvement project for new signal and pedestrian improvements and funding for the PA Route 41 Study from the Delaware State line to PA Route 926. This project scope includes the completion of an environmental study and to continue to study alternatives, which include widening and a slight realignment of the road.

**US 1**— This thoroughfare makes connections from Philadelphia to Baltimore and destinations beyond the study area. Most of the corridor is located in Developing or Rural/ Agricultural designated TIAs, and traffic is expected to grow. While much less developed than further east on US 1, the area is comprised of suburban development with commuting primarily to New Castle County. Between 2006 and 2010 more than 80% of commuters drove alone, as transit services are lacking. US 1 west of US 202 is classified by the DVRPC as a congested corridor. Appropriate strategies identified through the Congestion Management Process include improving circulation, providing park-and-ride lots, turning movement enhancements, and enhancements to transit services. This corridor was also identified as being potentially under pressure as result of BRAC activities.

Based on updated projections, the population in this corridor is still expected to increase by more than 30% across stretches of

**Figure 28:**
**Key Inter-Regional Corridors**






# Route 41 Planning Study

## SR 0041, Section STY
## Chester County, PA

pennsylvania
DEPARTMENT OF TRANSPORTATION

*January 12, 2010*

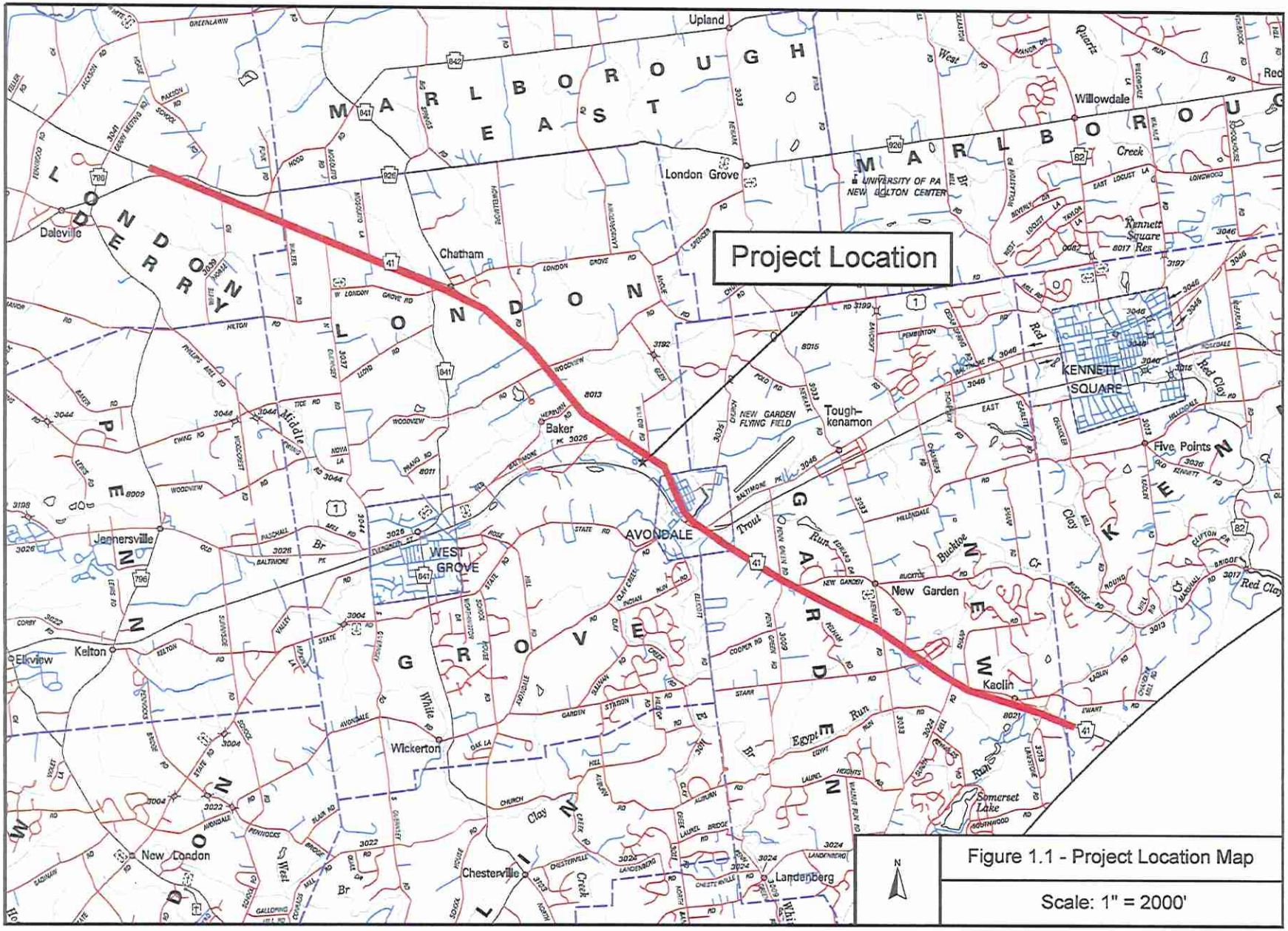
# 1.0 Introduction

The SR 0041, Section STY, (PA 41 Project) project is located in southern Chester County, Pennsylvania. The project area includes approximately ten miles of PA 41, from the intersection with PA 926 to the Delaware State Line in the following municipalities: Londonderry Township, London Grove Township, Avondale Borough, New Garden Township, and Kennett Township (refer to **Figure 1.1 – Project Location Map**). The PA 41 Project was initiated in 1993 as a result of local planning efforts initiated by municipalities along PA 41 in southern Chester County. Previously, in 1988, the Avon-Grove Regional Planning Commission completed a report that recommended that PA 41 be expanded to four lanes as a result of traffic congestion, circulation and safety. This study was used to place the PA 41 Project on the Pennsylvania Department of Transportation (PennDOT) 12-year capital improvement program.

The PA 41 *Needs Study*, completed in 1994, identified safety, traffic congestion and projected growth, and poor transportation infrastructure as project needs. The *Preliminary Alternatives Analysis* (PAA), completed in May 1999, presented several alternatives to address the project needs as stated in the *Needs Study*. These alternatives included online widening to four lanes, or a combination of online widening with bypass alternatives around Avondale Borough and the Village of Chatham (London Grove Township) (refer to **Appendix A – 1999 Alternative Alignment Plates**).

From 1994 through 2002, environmental studies, agency coordination, engineering design and public involvement activities were ongoing to further refine the option developed in the PAA. In 2004, PennDOT, concerned with the financial status of the transportation program put several projects on hold, including the PA 41 Project. The costs and need for the PA 41 Project were evaluated by PennDOT. It was determined that the study area had changed significantly from the original planning efforts in the 1980s. The projected growth was not occurring as quickly, and the study area had changed from a rural landscape to more of an urban/suburban type of environment.

In 2008, PennDOT and the Federal Highway Administration (FHWA) considered how the study area had changed, and recommended a review of the project needs and options. At that time, it was determined that additional traffic studies and a review of growth projections, as well as the environmental, cultural and social environment would be undertaken and summarized in a revised PAA. Information from previous work would be reviewed, updated and summarized to provide a current context of the study area. In conclusion, this revised PAA summarizes information that can be used by PennDOT and FHWA to determine what type of improvements should be evaluated to address the existing and anticipated project needs.


Project Location
Upland
Willowdale
London Grove
Daleville
Chatham
Baker
Tough-kenamon
KENNETT SQUARE
Five Points
AVONDALE
WEST GROVE
New Garden
Jennersville
Kelton
Elkview
Wickerton
Kaolin
New London
Chesterville
Landenberg
Somerset Lake
MARLBOROUGH
EAST MARLBOROUGH
LONDONDERRY
LONDON GROVE
NEW GARDEN
PENN
KENNETT
WEST GROVE
Figure 1.1 - Project Location Map
Scale: 1" = 2000'

# 2.0 Project Background and Need

This section details the PA 41 Project context and need evaluations that were conducted as part of the 1994 Needs Study, the 1999 Preliminary Alternatives Analysis, and presently in this Route 41 Planning Study (2010). The core of the PA 41 Project study area consists of a 10-mile section of existing PA 41 in Chester County, extending from PA 926 in Londonderry Township south to the Pennsylvania/Delaware State line (refer to **Figure 1.1 – Project Location Map**).

## 2.1 Corridor Context and Need (1994 Evaluations)

Population trends of the study area had been evaluated to develop a corridor context and to analyze the existing and anticipated transportation network needs. The U.S. Census published population statistics for 1990, and Chester County had developed population projections to the year 2030. In 1994, it was projected there would continue to be a population increase in the study area municipalities with London Grove Township experiencing the greatest increase at almost 75 percent by 2030. With limited developable area available, Avondale Borough would experience the least amount of growth. The county's population was also expected to increase by 32 percent in the same period.

Considering population growth, density, and other factors, the transportation deficiencies for a design year of 2020 were presented in detail in the *Final Needs Study, PA 41, Section STY, Avondale Transportation Improvement Project, Chester County, Pennsylvania* in 1994. The project needs of improved safety, traffic capacity, infrastructure and modal interrelationships are outlined below.

### 2.1.1 Safety

Due to the high usage of PA 41 and the conflict of local and through traffic observed through the study corridor, safety along PA 41 had been identified as a significant concern. A crash analysis indicated that PA 41 south of US Route 1 exhibited a crash rate greater than the statewide average for similar roadways. The fatal crashes that occurred between 1990 and 1993 were located in the section between US Route 1 and PA 926 and four of the five fatal crashes were head-on collisions. This number of fatal crashes equated to a fatality rate greater than the statewide average.

An analysis of the collision types revealed that rear-end crashes accounted for 37 percent of the total reportable crashes. Angle type (27 percent) and hit-fixed-object (18 percent) were other notable types of crashes along the corridor. The major causes of the crashes were tailgating (16 percent), failing to heed to a stopped vehicle (16 percent), and driving on the wrong side of the road (10.5 percent).

### 2.1.2 Traffic Volumes and Level of Service

Level of Service (LOS) is a qualitative measure describing operational conditions within a traffic stream, and the perception of the condition by motorists. In 1994, the PA 41 corridor was classified as a rural principal arterial. Rural principal arterials should generally be designed for LOS B; however, LOS C can be acceptable in some instances (American Association of State and Highway Transportation Officials [AASHTO] 2004). From a rural two-lane capacity analysis, it was determined that in the peak period, PA 41 was expected to operate in base year conditions at LOS E south of PA 841, except in Avondale which was expected to operate at LOS F, and LOS D north of PA 841 (**Table 2.1**). Using the year 2020 forecasted traffic volumes, similar LOS were expected.

**Table 2.1 – Level of Service for the PA 41 Project Study Area (Based on 1994 Evaluations and Rural Analysis)**

| Segment | 1993 ADT[1] | LOS[2] | 2020 ADT | 2020 LOS No-Build |
|---|---|---|---|---|
| PA 926 to PA 841 | 13,100 | D | 18,000 | E |
| PA 841 to Baltimore Pike (west) | 12,800 | E | 19,300 | E |
| Baltimore Pike (west) to Baltimore Pike (east) | 18,600 | F | 26,100 | F |
| Baltimore Pike (east) to Limestone Road | 13,900 | E | 20,800 | E |

[1] ADT – Average Daily Traffic
[2] LOS analysis based on roadway segments and the rural nature of the corridor.

Four signalized and seven unsignalized intersections along PA 41 were also analyzed in terms of operating conditions. The LOS for a signalized intersection depends on traffic volumes, signal timing and vehicle progression. For unsignalized intersections, the LOS is based on the availability of gaps in the major street traffic. In year 2020, the

# 4.0 Engineering Considerations

## 4.1 Design

Based on the current project needs and corridor context discussed in **Sections 2.0** of this report, new solutions to address the needs of the PA 41 corridor were developed. These options were developed while considering project needs and the preliminary environmental constraints discussed in **Section 3.0** of this report. The focus on this options analysis is to address the safety and intersection concerns discussed under the project needs. Several improvements have already been made to this corridor since the project inception. These improvements helped improve the safety and mobility of the corridor and addressed many of the project needs from the 1994 studies. These previously completed improvements include the following:

- Repaving the roadway surface
- Lowering of the speed limit from 55mph to 45mph (35mph in the villages)
- Adding centerline and edge line rumble strips
- Adding pull-off areas for enforcement
- Signalization and the addition of left turn lanes at the Newark Road and Penn Green Road intersections with PA 41
- Updated signalization and coordinated timings at the State Street and Baltimore Pike intersections with PA 41
- Reconfiguration and signalization of the PA 41/Baltimore Pike intersection north of Avondale
- Restriping the second through lanes to dedicated left-turn lanes on PA 41 over US Route 1
- Signalization of both US Route 1 ramps with PA 41
- Installation of overhead flashing warning lights for reduced speed in the village of Chatham
- Addition of left-turn lanes at the PA 926 intersection with PA 41.

Based on the current project needs, most of the safety concerns are at intersection locations. This is also consistent with the level-of-service (LOS)/capacity concern isolated at the intersections. One safety concern, the fatalities, is not an isolated problem, but it is not one that follows a pattern. The fatalities are random in nature, and no two occur at the same location. The most consistent feature about the fatality safety concern is excessive speed. As this is a principal arterial with a high percentage of through traffic, the posted speed of 45mph outside of the villages is consistent with the nature of the road. However, speeds well over the posted speeds are regularly recorded. Outside of traffic calming techniques, which are usually not applied to principal arterials outside of villages, increased enforcement is probably the best solution to this

problem. Other solutions, in addition to traffic calming and gateway features in the villages should be investigated along the corridor.

Another study area need of improved infrastructure for pedestrians is an issue that will be addressed on two levels. First, the options discussed below address sidewalks and pedestrian needs with each localized area. However, a more comprehensive solution should be developed by host municipalities. For example, sidewalks would be rebuilt in the vicinity of PA 841 in the Village of Chatham, but not for the entire length of the village. In Pennsylvania, PennDOT does not typically have stand alone projects to repair sidewalks as the maintenance and ownership of the sidewalks usually rests with the host municipality.

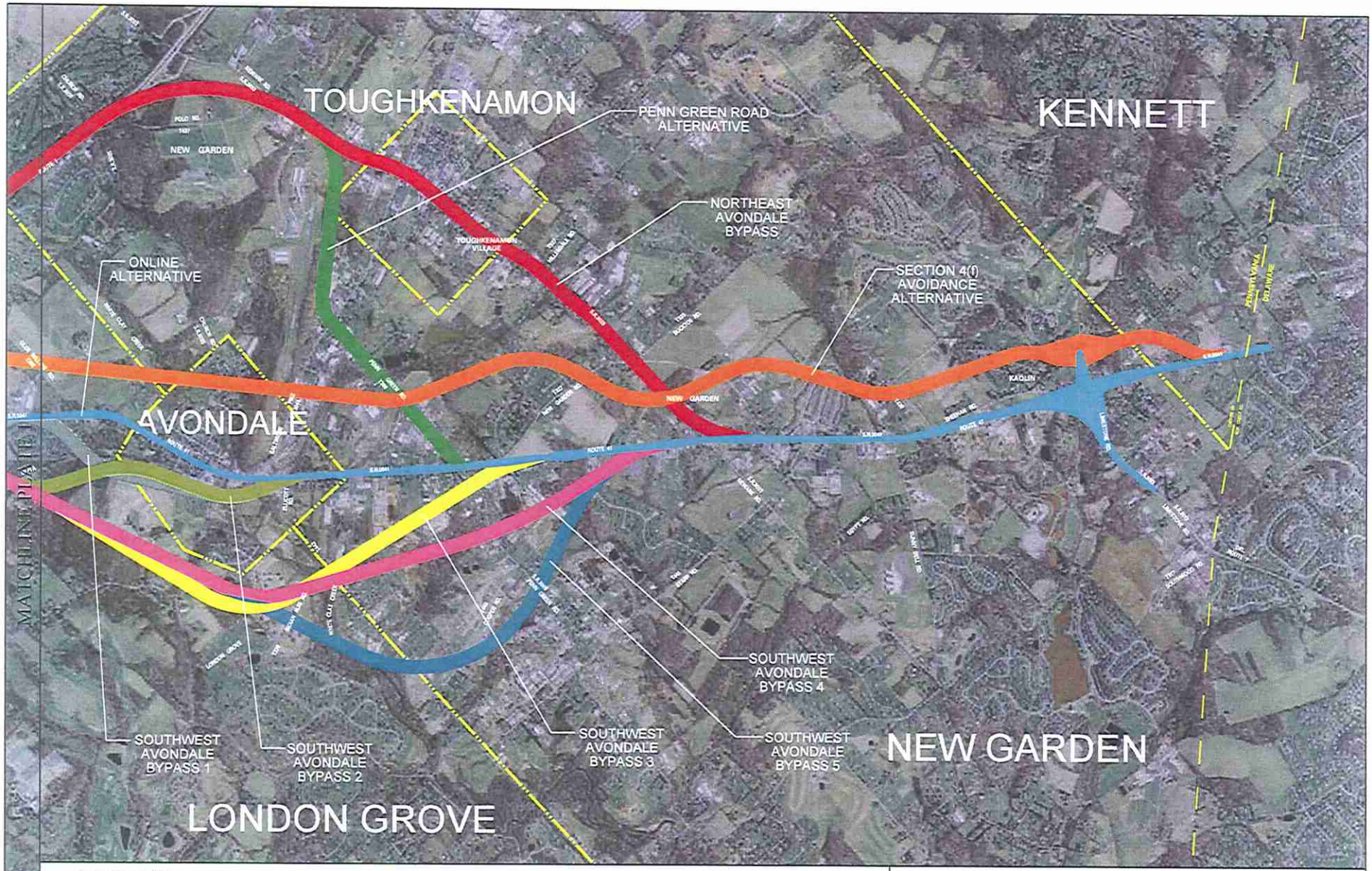
A bike lane along Old Baltimore Pike is planned for construction this summer (2010). The bike lane will follow Route 41 from Baltimore Pike in the North to Baltimore Pike south of Avondale.

Another significant improvement project is currently proposed along PA 41 just north of Limestone Road near the White Clay Point development. The approved highway occupancy permit (HOP) improvement for this development includes the following improvements to the study corridor

- Add a northbound lane from the Limestone Road intersection to just north of Sunny Dell Road as a lane add from the Limestone Road on-ramp
- Add a second southbound lane from just north of Sunny Dell Road; it ends as a lane drop to the Limestone Road off-ramp
- Signalization with turn lanes to Sunny Dell Road
- Relocation and signalization with turn lanes to Sharp Road
- Signalization of the PA 41 ramps with Limestone Road

Not only do these HOP improvements address the future capacity needs south of Starr Road along PA 41, they also provide relief to some of the isolated safety concerns along PA 41. These improvements eliminate the safety concerns at the stop-controlled northbound Limestone Road on-ramp and improve general intersection geometry in this part of the study area.

## 4.2 Description of Options




## LEGEND

- ONLINE ALTERNATIVE
- PENN GREEN ROAD ALTERNATIVE
- SECTION 4(f) AVOIDANCE ALTERNATIVE
- NORTHEAST AVONDALE BYPASS
- SOUTHWEST AVONDALE BYPASS 1
- SOUTHWEST AVONDALE BYPASS 2
- SOUTHWEST AVONDALE BYPASS 3
- SOUTHWEST AVONDALE BYPASS 4
- SOUTHWEST AVONDALE BYPASS 5
- MUNICIPAL BOUNDARIES

AERIAL PHOTOGRAPHIC SOURCE: DVRPC 2005

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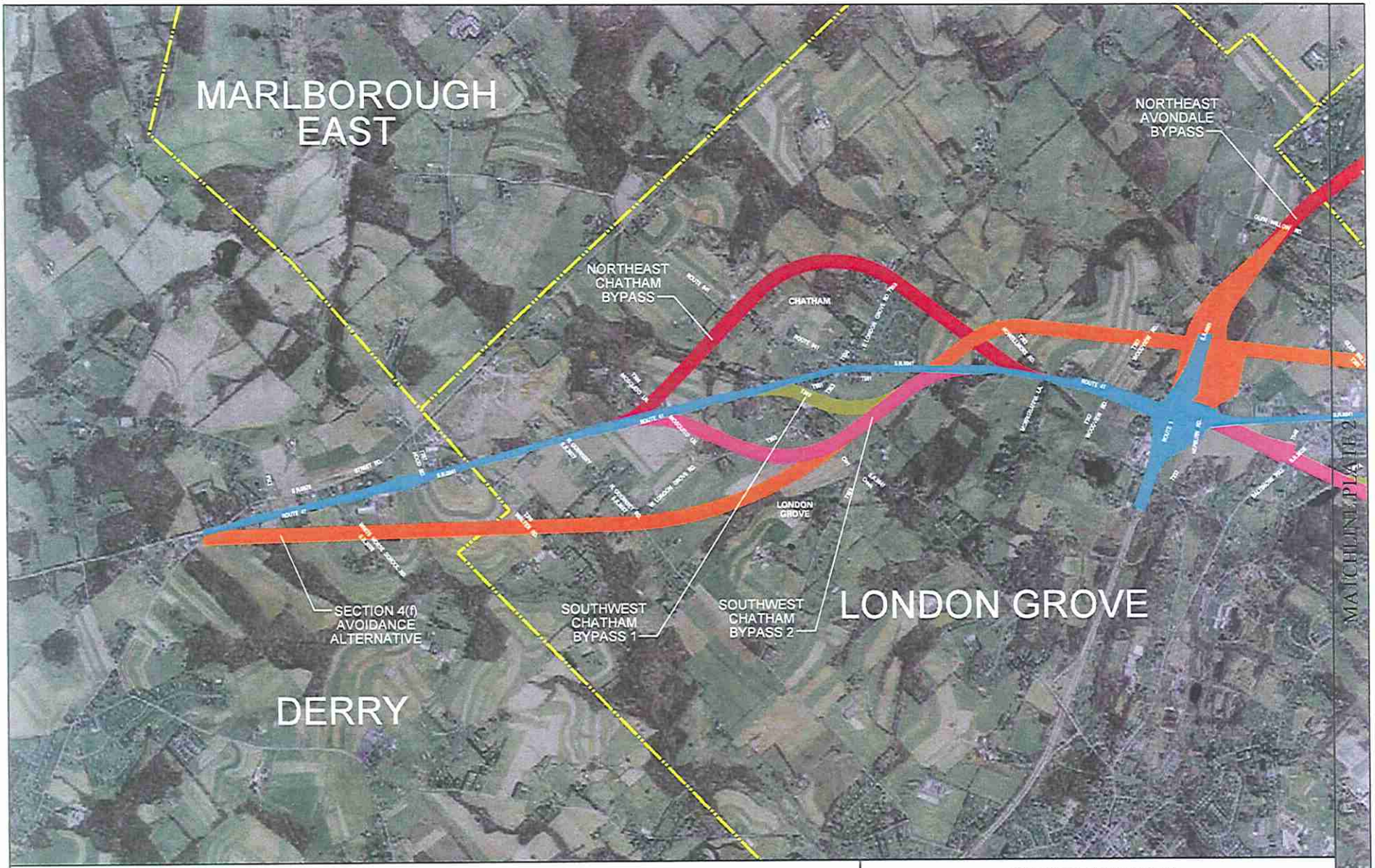
0 1500 3000

SCALE IN FEET

OCTOBER 2009

# SR 0041, SECTION STY
# PRELIMINARY ALTERNATIVES ANALYSIS
# CHESTER COUNTY, PA

## 1999 ALTERNATIVE ALIGNMENTS - PLATE 2




LEGEND

- ONLINE ALTERNATIVE
- SECTION 4(f) AVOIDANCE ALTERNATIVE
- NORTHEAST CHATHAM BYPASS
- SOUTHWEST CHATHAM BYPASS 1
- SOUTHWEST CHATHAM BYPASS 2
- NORTHEAST AVONDALE BYPASS
- MUNICIPAL BOUNDARIES

AERIAL PHOTOGRAPHIC SOURCE: DVRPC 2005

N

0 1500 3000

SCALE IN FEET

OCTOBER 2009

# SR 0041, SECTION STY
# PRELIMINARY ALTERNATIVES ANALYSIS
# CHESTER COUNTY, PA

## 1999 ALTERNATIVE ALIGNMENTS - PLATE 1

# DELMARVA FREIGHT PLAN

## FINAL DRAFT REPORT

March 2015

Delaware Department of Transportation

Maryland Department of Transportation

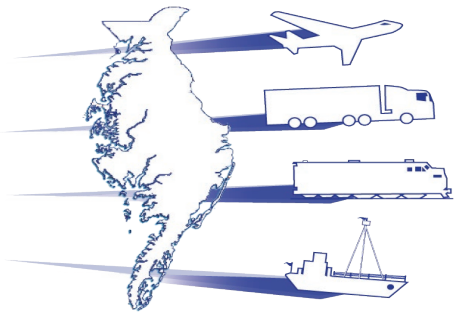
VDOT

WRA

# Executive Summary

The Delmarva Freight Plan summarizes current and future freight planning and transportation needs to enhance freight and goods movement and related economic opportunities on the 14-county tri-state area of the Delmarva Peninsula (*Exhibit ES.1*). Undertaken by the Delaware Department of Transportation (DelDOT) and in fulfillment of statewide freight planning requirements for the state of Delaware, the plan aims to comply with Sections 1115 through 1118 of the Moving Ahead for Progress in the 21st Century (MAP-21) act and related National Freight Policy. It supports a regional perspective of freight flows, targets freight issues relevant to the local and regional economies, integrates commodity flow modeling and performance-based scenario planning, and ultimately provides insights to help inform future decision-making, freight infrastructure investments, and related policy guidance.

The plan recognizes and supports the need for multimodal freight planning collaboration within regional jurisdictions and across economic corridors to enhance mobility at the local, state, multi-state, and national level. It spans state boundaries on the peninsula to provide additional insights relevant to existing freight plans in Maryland and Virginia. Its development was thus informed by collaboration with state and Metropolitan Planning Organization (MPO) partners and public/private freight and economic stakeholders across the peninsula.



*The Delmarva Freight Plan is organized by chapter to cover:*

1. Introduction
2. Existing Economic Context
3. Existing Commodity Flows
4. Existing Freight Transportation System
5. Existing Freight Planning Resources
6. Freight Trends, Needs, and Issues
7. Future Freight Planning Scenarios
8. Freight Project Guidance
9. Freight Policy Guidance and Beyond

***DelDOT's Delmarva Freight Plan was developed in collaboration with:***

» Maryland Department of Transportation (MDOT)

» Virginia Department of Transportation (VDOT)

» Wilmington Area Planning Council (WILMAPCO)

» Dover/Kent County MPO (Dover/Kent MPO)

» Salisbury/Wicomico MPO (S/WMPO)

» University of Delaware

» IHS Global Insight

» Federal Highway Administration

***Outreach and coordination efforts supporting the development of this plan included:***

» 2012-2014 Delmarva Freight Summits

» 2013-2014 Delmarva Freight & Goods Movement Working Group meetings

» 12 Project Advisory Committee Meetings

» 30 targeted freight or economic stakeholder interviews

» Over 60 online freight survey responses

» Multiple presentations to area chambers of commerce

» Extensive background document reviews

Delmarva Freight Plan

# Chapter 4

## Existing Freight Transportation System

*Exhibit 4.26 – Major Freight Corridors, Zones, and Gateways on the Delmarva Peninsula*

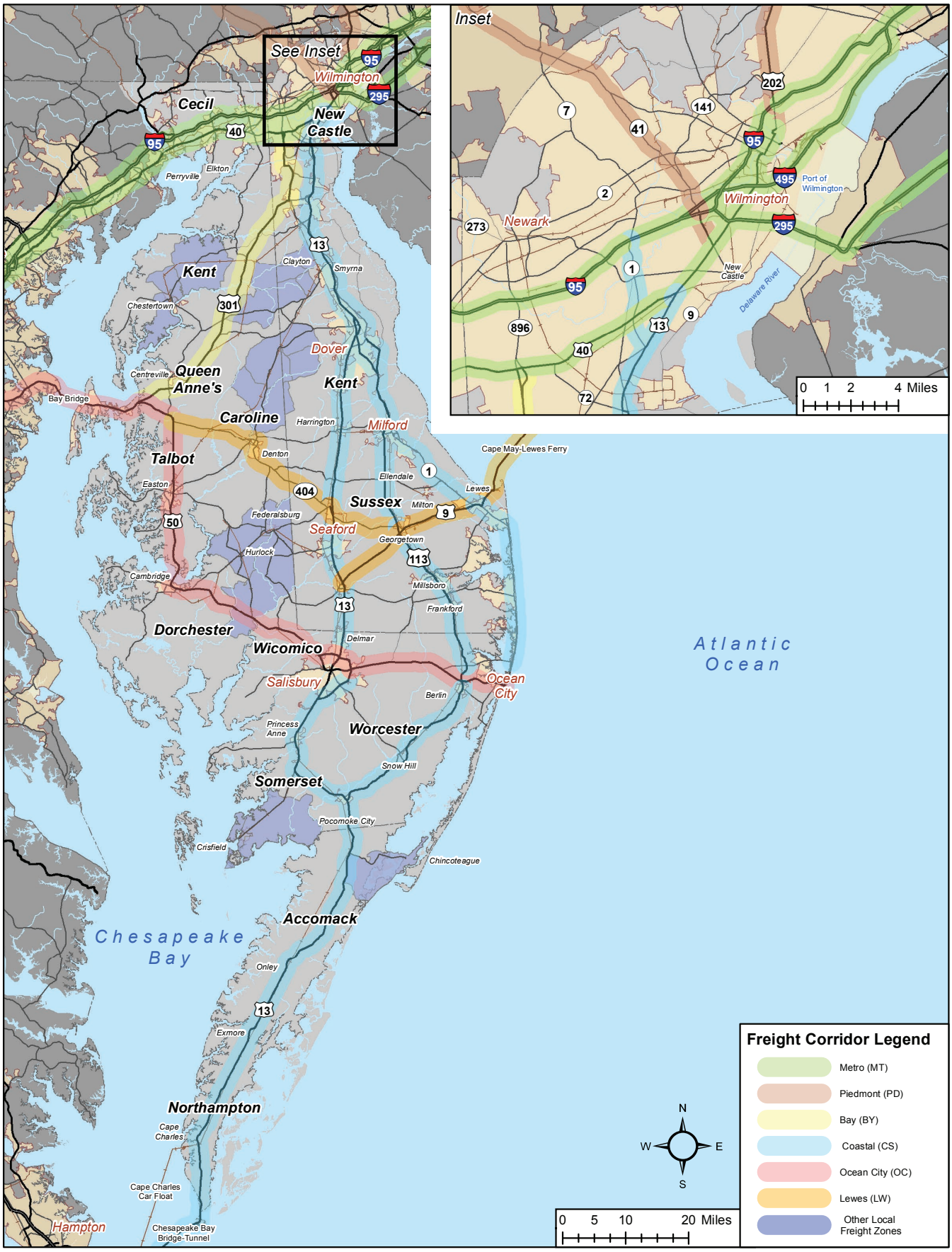


*Exhibit 4.32 – Summary of US 202/DE 41 "Piedmont" Freight Corridor*

| **US 202/DE 41 "Piedmont" Freight Corridor** | |
|---|---|
| Primary Roadways: | - US 202<br>- DE/PA 41<br>- Pennsylvania linkages to I-76, US 30, and US 322 |
| Regional Freight Hubs | - Northern Delmarva Peninsula<br>- Lancaster/York/Harrisburg area (via I-76, US 30, US 322)<br>- Pittsburgh metro (via I-76, US 30)<br>- U.S. Midwest markets (via linkage to I-70, I-80) |
| Project Area Freight Hubs | - Hockessin-Elsmere-Newport-Stanton-Talleyville, DE<br>- Newark-Wilmington, DE and extended areas via connection to other freight corridors |
| Key Roadway Junctions | - ***Other Freight Corridors:*** I-95; US 301; DE 1/US 13/US 113<br>- ***Local Connections:*** DE 2, 7, 48, and 62 (between Newark and Wilmington); DE 92 and 141 (north of Wilmington); PA 100 (linking US 202 to US 30 and I-76 through Exton, PA)<br>- ***Special Facilities:*** Pennsylvania Turnpike (I-76) |
| Rail Access | - ***Class I Service:*** Junction with I-95 Freight Corridor; also NS access into Pennsylvania (Perryville to Harrisburg)<br>- ***Major Rail Yards:*** Access to most NS, CSX, and AMTRAK rail yards/facilities in Wilmington/Newark metro; also access to major facilities in Harrisburg, PA, area including NS Enola Yard, Harrisburg Intermodal Terminal, Rutherford Intermodal Terminal, and Triple Crown Services<br>- ***Shortline Services:*** WWRC access from CSX lines to Hockessin, DE; ESPN access from NS lines into Pennsylvania |
| Port Access | - ***Major Ports:*** Port of Wilmington<br>- ***River Systems:*** Susquehanna River (Perryville/Havre de Grace to Harrisburg) |
| Airport Access | - ***Project Area:*** Wilmington-Philadelphia Regional<br>- ***Extended Area:*** Harrisburg International/Olmsted Field |

Delmarva Freight Plan

# Chapter 7

## Future Freight Planning Scenarios

## *US 202 and DE 41 Piedmont Freight Corridor*

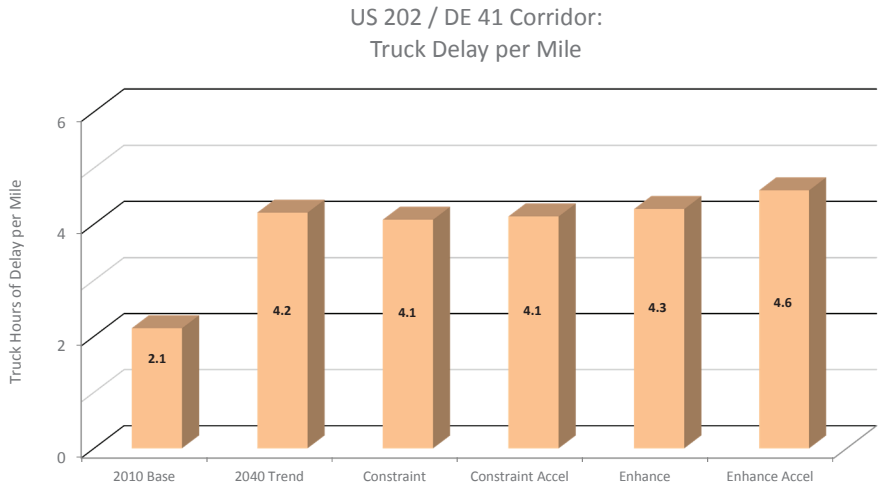
Relative to other freight corridors on the peninsula, the US 202 and DE 41 Piedmont corridor did not appear to be exceptionally sensitive to the scenarios analyzed in this plan. That trend can largely be attributed to the fact that most of the key scenario assumptions were geographically distant from the Piedmont corridor's location at the northern tip of the peninsula, or their regional influence was directed more along the I-95 corridor than it was into southeastern Pennsylvania. Notable insights include the following:

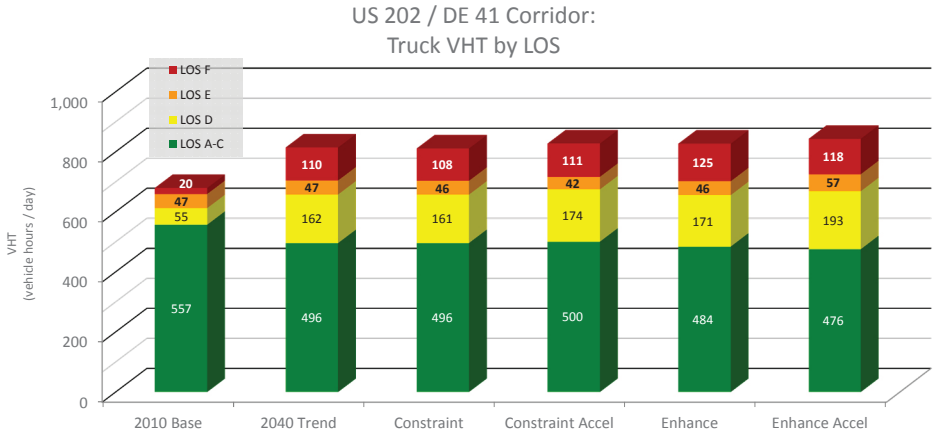
**Accelerated Growth Impacts**: A nominal sensitivity to the Accelerated Growth scenario appears in estimated VMT or VHT increases of 4% or less. However, the Piedmont Corridor does provide numerous connections between Pennsylvania and freight-centric urbanized areas in northern New Castle County, including Newark and Wilmington; plus nearby access to the I-95 corridor; plus access into northern Cecil County if connectivity to MD 273 is considered. As such, future freight related economic developments, increases in background congestion, or related influences on circulation between local areas (e.g., along DE state routes 2, 7, 48, or 141) will be important issues to monitor.

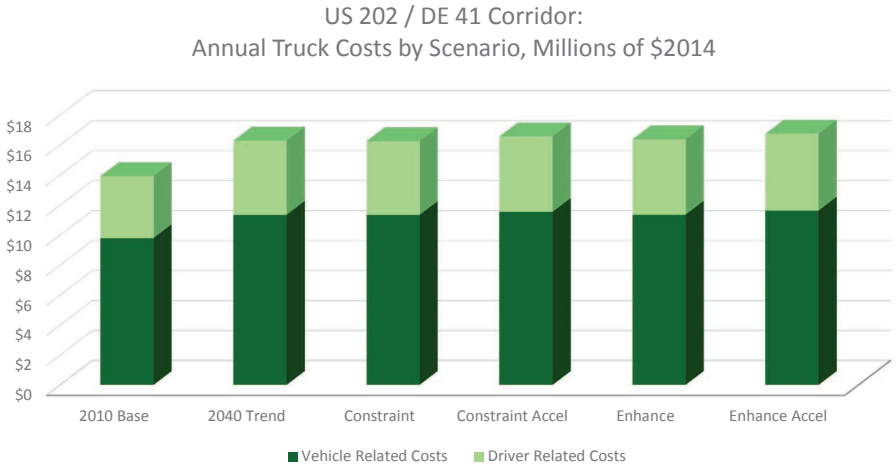

**Community Freight Access**: Considering the numerous residential areas and local communities throughout the northern portion of New Castle County, balancing community interests with potential freight access needs will likely be an ongoing challenge for this corridor. Such challenges may encompass through-freight connections into Pennsylvania (e.g., via DE 41) as well as first/last mile access throughout the area.

**Multi-Jurisdictional Planning**: Given the Piedmont Corridor's reach into Pennsylvania, including access to US 1, US 30, I-76, and various communities from Lancaster to King of Prussia, multi-jurisdictional cooperation between adjacent states (DelDOT and PennDOT) and MPOs (WILMAPCO and DVRPC) would be relevant to corridor-specific freight planning efforts in this area. Identifying a consistent vision, approach, priorities, or typical solutions for the broader multi-state corridor area will help to support future economic opportunities or freight transportation needs while managing any potential growth or community impacts such as those noted above.

*Exhibit 7.17 – Corridor Performance Summary – US 202 and DE 41 Piedmont Freight Corridor*




| US 202 / DE 41 | 2010 Base | 2040 Trend | Constraint | Constraint Accel | Enhance | Enhance Accel |
|---|---|---|---|---|---|---|
| **Truck VMT** | 33,192 | 38,428 | 38,400 | 39,113 | 38,473 | 39,412 |
| *% Change* | - | *16%* | *0%* | *2%* | *0%* | *3%* |
| | | | | | | |
| **Truck VHT** | 680 | 815 | 811 | 828 | 827 | 844 |
| *% Change* | - | *20%* | *0%* | *2%* | *2%* | *4%* |

** % change in 2040 Trendline as compared to 2010 Baseline; in all other scenarios as compared to 2040 Trendline.*

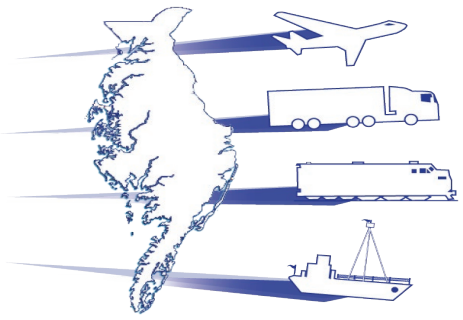
Delmarva Freight Plan

# Chapter 8

## Freight Project Guidance

# Chapter 8
# Freight Project Guidance

Building on details throughout this plan, including the previous summaries of freight trends, needs, issues, and scenario planning insights, closing efforts focus on a compilation of action planning elements that will help to support freight and goods movement opportunities and transportation systems throughout the Delmarva region. These elements may be referenced individually or integrated within the broader planning programs and strategies that are managed by the peninsula's federal, state, MPO, and other public/private partners tasked with overseeing their respective operations, systems, or jurisdictions. Actions outlined below encompass project planning guidance; the subsequent chapter will add policy level guidance, future performance monitoring considerations, and future freight plan maintenance or update interests.

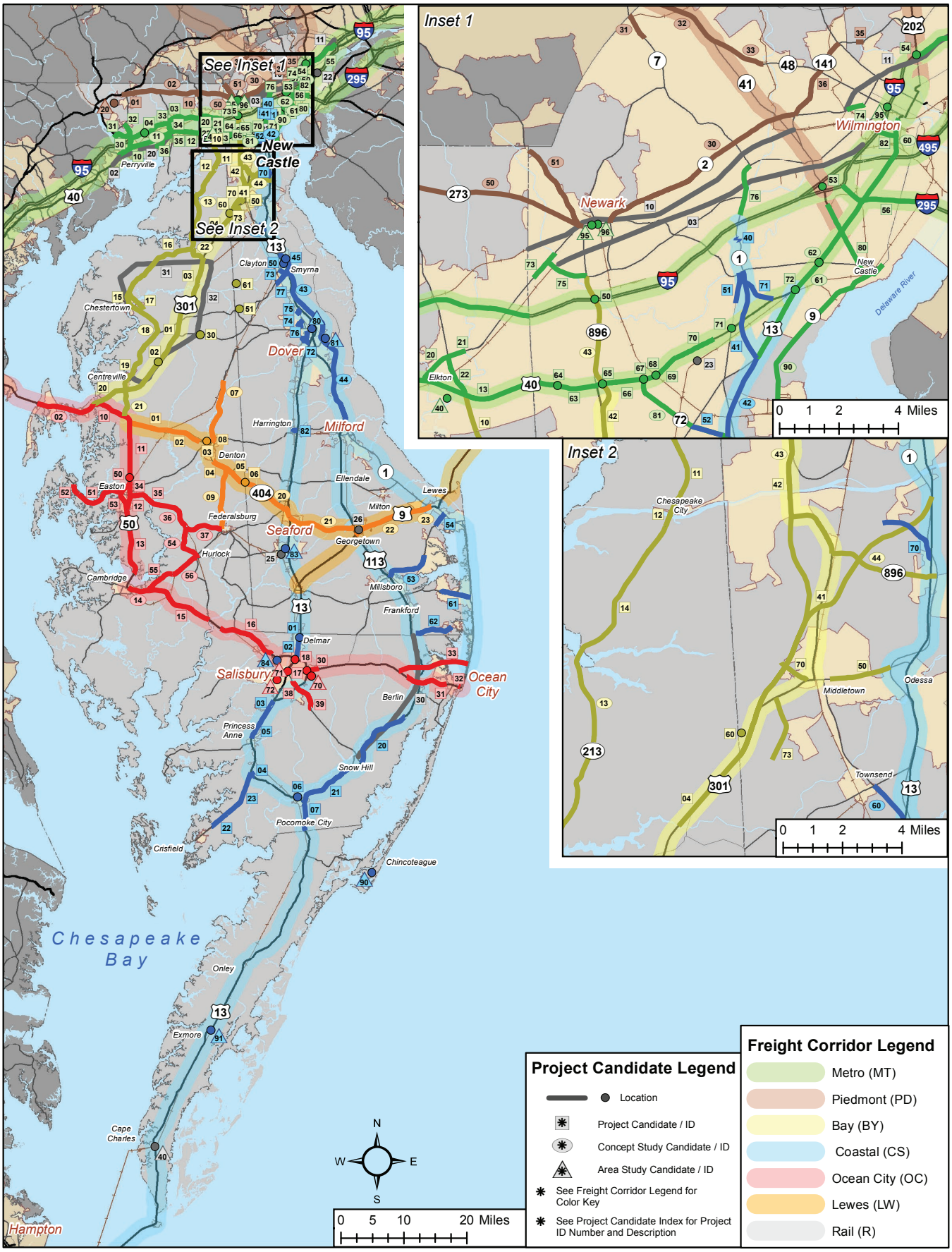


## 8.1 Project Candidates

A shortlist of project candidates having the potential to influence freight transportation was compiled in cooperation with input from the freight plan's project advisory group and with reference to the plan's various document reviews, stakeholder outreach efforts, and technical analyses. This list includes current anticipated project commitments (*Chapter 5*), relevant project aspirations or unfunded needs from other planning documents, and additional needs as identified throughout the course of this freight plan. A summary of all project candidates has been organized by corridor (map *Exhibit 8.1*; index *Exhibit 8.2*); additional details are provided in the project screening and prioritization summaries that follow.

It may be observed that most of the freight plan's project candidates are not exclusively freight-related. However, the project screening and prioritization efforts developed here provide a customized perspective to help reveal general candidates having the most potential to influence freight transportation conditions or opportunities relative to the peninsula's freight focus areas. It may also be observed that most of the project candidates are oriented to the roadway network. In part, this reflects the fact that the largest component of the freight transportation system over which DelDOT, MDOT, or VDOT can exercise any direct control is the roadway network (e.g., versus private rail, port, pipeline, warehousing, or similar infrastructure). However, this orientation should not be construed as lacking a multimodal perspective; rather, candidate selection and subsequent screening/prioritization efforts included a strong focus on enhancing overall access and connectivity to the area's multimodal hubs and facilities. This approach works alongside key multimodal policy guidance and separate private infrastructure plans (e.g., the Port of Wilmington's strategic master plan) to encompass the overall freight and goods movement system while also recognizing that – except in unique cases and excluding pipeline – freight by any mode typically moves by truck for at least some portion of its overall journey.

*Exhibit 8.1 – Summary Project Candidates Map*



## *Exhibit 8.2 – Summary Project Candidates Index (Continued)*

| Index # | Route / Area | Limits | Description |
|---|---|---|---|
| **US 202 / DE 41 Piedmont (PD) Freight Corridor** | | | |
| **MARYLAND** | | | |
| PD 01 | MD 273 | East Limits of Rising Sun to Sylmar Rd | Two-lane reconstruct |
| PD 02 | MD 273 | US 1 to DE Line | Corridor Study / Concept Design for freight management upgrades (approximately Rising Sun to DE Line) |
| PD 10 | MD 213 | Providence Rd to MD 273 | Two-lane reconstruct |
| PD 20 | Local Area | Western Cecil County | Freight Management Study (incl. MD 222, MD 276, and access to I-95, US 1, US 222, Conowingo, Rising Sun, and PA) |
| **DELAWARE** | | | |
| PD 30 | DE 2 | DE 273 to DE 141 | Corridor Study / Concept Design for freight managment upgrades |
| PD 31 | DE 7 | Valley Rd to PA Line | Corridor Study / Concept Design for freight management upgrades (w/ continuation into PA along SR 3013 to PA 41) |
| PD 32 | DE 41 | DE 48 to PA Line | Corridor Study / Concept Design for freight management upgrades (w/ continuation into PA along PA 41 to SR 3013) |
| PD 33 | DE 48 | Hercules Rd to DE 41 | Corridor Study / Concept Design for freight management upgrades and potential roadway widening |
| PD 35 | DE 141 | Tyler McConnell Bridge | Construct Tyler McConnell Bridge (over Brandywine Creek) and DE 141 tie-ins (approx Montchannin Rd to Alapocas Rd |
| PD 36 | DE 141 | DE 2 to DE 52 | Signalized corridor improvements and regular optimization |
| PD 50 | DE 273 | MD Line to DE 896 | Corridor Study / Concept Design for freight management upgrades |
| PD 51 | DE 896 | DE 273 to MD Line | Corridor Study / Concept Design for freight management upgrades |
| **MD/DE 404 and US 9 Freight Corridor** | | | |
| **MARYLAND** | | | |
| LW 01 | MD 404 | US 50 to MD 404 Bus | Upgrade existing MD 404 to a 4 lane divided highway with access control |
| LW 02 | MD 404 | Queen Anne's Co Line to MD 404 Bus | Reconstruct and widen MD 404 |
| LW 03 | MD 404 | at MD 328 | Construct interchange at junction of MD 404 and MD 328 in Denton |
| LW 04 | MD 404 | MD 16 (Harmony Rd) to MD 16 (Greenwood Rd) | Divided hwy reconstruction and potential widening w/ access control improvements (along MD 404 / MD 16 overlap seg.) |
| LW 05 | MD 404 | MD 16 (Harmony Rd) to DE Line | Divided hwy reconstruction w/ access control improvements |
| LW 06 | MD 404 | Denton Area | Future VWS |
| LW 07 | MD 313 | MD 317 to MD 287 | Corridor Study / Concept Design for freight management upgrades (approximately north of Denton to Goldsboro) |
| LW 08 | MD 313 | MD 404 to MD 317 | Multi-lane reconstruction (Denton area) |
| LW 09 | MD 313 | MD 318 to MD 404 | Corridor Study / Concept Design for freight management upgrades (approximately Federalsburg to MD 404) |
| **DELAWARE** | | | |
| LW 20 | DE 404 | MD Line to US 13 | Corridor Study / Concept Design for freight management upgrades (including peak season traffic influence) |
| LW 21 | DE 404 | US 13 to US 113 | Corridor Study / Concept Design for freight management upgrades (including peak season traffic influence) |
| LW 22 | US 9 / US 9 Tk | US 113 to DE 5 | Corridor Study / Concept Design for freight management upgrades (including peak season traffic influence) |
| LW 23 | US 9 | DE 5 to DE 1 | Corridor Study / Concept Design for freight management upgrades (including peak season traffic influence) |
| **Delmarva Rail** | | | |
| **Amtrak** | | | |
| R 01 | Amtrak | Baltimore City | FRA Tunnel Study Phase 2; Improve clearance, alignment, and grade through B&P and Union Tunnels |
| R 02 | Amtrak | Susquehanna River Bridge | Rehabilitate bridge |
| R 03 | Amtrak | Yard to Ragan Interlockings | New third track |
| **CSX Transportation** | | | |
| R 10 | CSX | MD Line to to Landenberg Junction | Double Tracking of 9.9 miles of existing CSX line |
| R 11 | CSX | Elsmere to PA Line | Double Tracking of 9.1 miles of existing CSX line |
| **Norfolk-Southern** | | | |
| R 20 | NS | Chesapeake Connector | New third track from Prince to Bacon Interlockings |
| R 22 | NS | Edgemoor Yard | Raise yard from 2 to 6 feet elevation to reduce frequency of flooding-related service disruptions. |
| R 23 | NS | Edgemoor Yard | Relocation of NS Edgemoor Yard to a location around Bear or Porter to centralize north end operations |
| R 25 | NS | at Seaford Rail Bridge | Rail bridge replacement and/or modernization across Nanticoke River |
| R 26 | NS | Georgetown Siding | Install one-track switch in the Indian River Secondary Line and construct small siding adjacent to Georgetown Station |
| **Maryland and Delaware Railroad** | | | |
| R 30 | MDDE | Frankford to Snow Hill | 286k rail upgrade of Snow Hill Line |
| R 31 | MDDE | Massey to Worton | 286k rail upgrade |
| R 32 | MDDE | Massey to Centreville | 286k rail upgrade |
| **Bay Coast Railroad** | | | |
| R 40 | BCRR | Cape Charles to Pocomoke City | Feasibility or Market Study of multimodal service enhancements (track, carfloat operations, rail access, maintenance) |

## 202 41 *Piedmont Freight Corridor*

- **Focal Routes and Typical Improvement Types**
  - » DE 41, DE 48, DE 7: freight management upgrades, potential widening (DE 48)
  - » DE 2, DE 1: upgrades, operations, bridge widening
- **Focal Connections**
  - » Freight Corridors: Metro (including surrounding urban areas)
  - » Freight Hubs: Northern Cecil County (including MD 273)
  - » Regional: PA/MD access into Newark; PA access to Lancaster
- **Multimodal Visions or Opportunities**
  - » Rail: Northeast Corridor (CSX, NS, and related rail yard, transfer, or support facilities); Shortline opportunities to/from Pennsylvania via WWRC or ESPN
  - » Water: --
  - » Air: --
  - » Pipeline: --

***Key Studies per Exhibits 8.15-8.16:***

PD 32: DE 41; DE 48 to PA Line

PD 30: DE 2; DE 273 to DE 141

PD 31: DE 7; Valley Rd to PA Line

PD 33: DE 48; Hercules Rd to DE 41

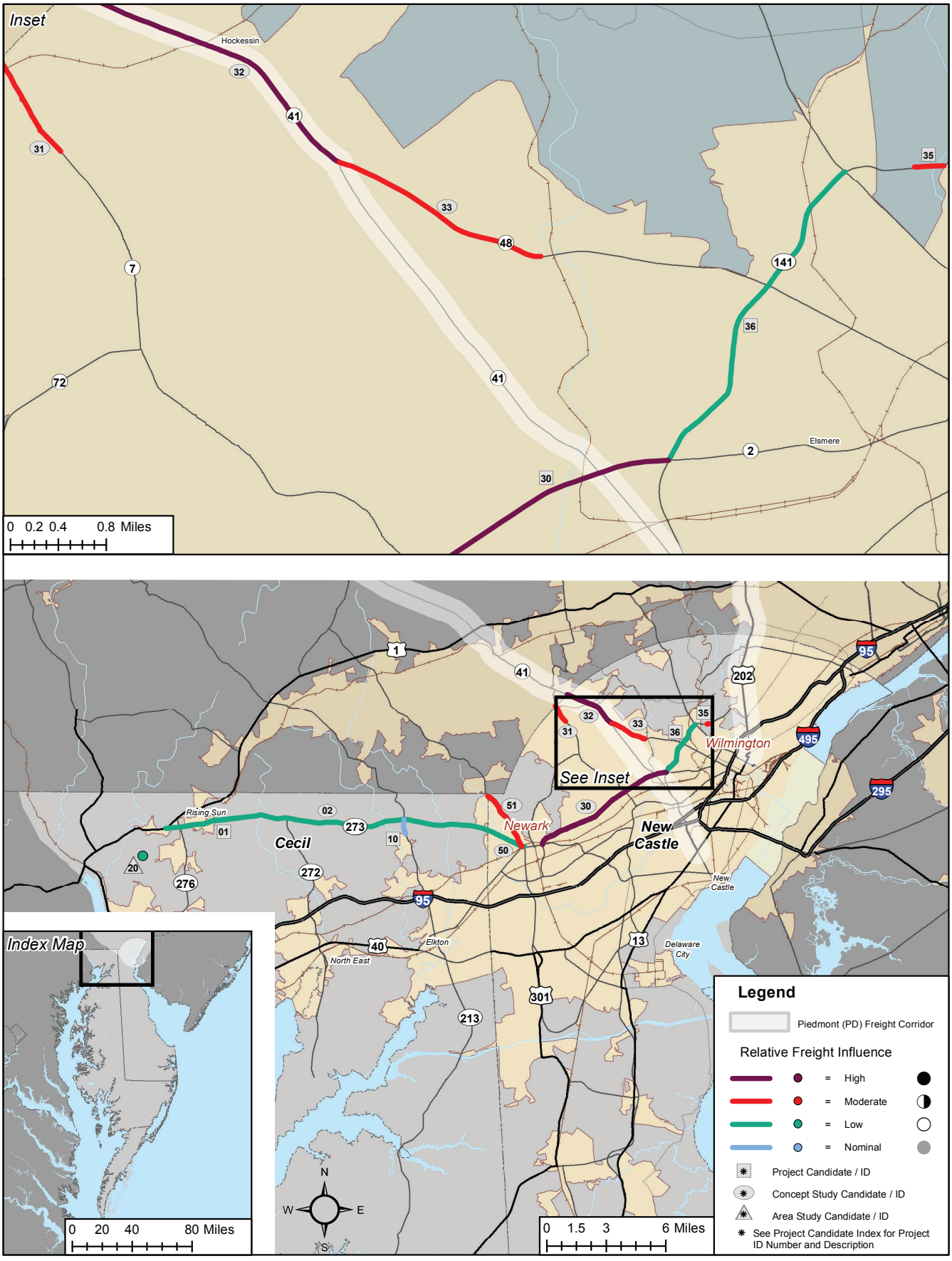
PD 51: DE 896; DE 273 to MD Line

***Key Projects per Exhibits 8.15-8.16:***

PD 35: DE 141; Tyler McConnell Bridge

PD 36: DE 141; DE 2 to DE 52 (signals)

*Exhibit 8.15 – US 202 and DE 41 Piedmont Freight Corridor – Project Candidates Map*



## *Exhibit 8.16 – US 202 and DE 41 Piedmont Freight Corridor – Project Screening Summary*

| Candidate Project Details | | | | | | | | Focus Area Influence | | | | | | Scenario Influence | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Index # | Route / Area | Limits | Description | State | County | Commit Tier | Network Tier | Overall | Economic Vitality | Connectivity Mobility | Safety Security | Management O&M | Sustainability Env Steward | Trendline | Constraint | Constraint Accel | Enhance | Enhance Accel |
| **MARYLAND** | | | | | | | | | | | | | | | | | | |
| **Tier 2 Routes (State Secondary)** | | | | | | | | | | | | | | | | | | |
| PD 01 | MD 273 | East Limits of Rising Sun to Sylmar Rd | Two-lane reconstruct | MD | CEC | 2 | 2 | ○ | ○ | ◑ | ○ | ○ | ○ | ○ | | | | |
| PD 02 | MD 273 | US 1 to DE Line | Corridor Study / Concept Design for freight management upgrades (approximately Rising Sun to DE Line) | MD | CEC | 4 | 2 | ○ | ○ | ◑ | ○ | ○ | ○ | ● | | | | |
| **Tier 3 Routes (Other Freight or FLM Connections)** | | | | | | | | | | | | | | | | | | |
| PD 10 | MD 213 | Providence Rd to MD 273 | Two-lane reconstruct | MD | CEC | 2 | 3 | ○ | ○ | ○ | ○ | ○ | ○ | ○ | | | | |
| **Other Details** | | | | | | | | | | | | | | | | | | |
| PD 20 | Area Study | Western Cecil County | Freight Management Study (including MD 222, MD 276, and related access to I-95, US 1, US 222, Conowingo, Rising Sun, and PA) | MD | CEC | 4 | 4 | ○ | ◑ | ◑ | ○ | ○ | ○ | ◑ | | | | |
| **DELAWARE** | | | | | | | | | | | | | | | | | | |
| **Tier 1S Routes (State Primary)** | | | | | | | | | | | | | | | | | | |
| PD 30 | DE 2 | DE 273 to DE 141 | Corridor Study / Concept Design for freight managment upgrades | DE | NCC | 4 | 1S | ◑ | ○ | ● | ◑ | ○ | ○ | ◑ | | ⚑ | | ⚑ |
| PD 31 | DE 7 | Valley Rd to PA Line | Corridor Study / Concept Design for freight management upgrades (w/ potential continuation into PA along SR 3013 to PA 41) | DE | NCC | 4 | 1S | ○ | ◑ | ◑ | ○ | ○ | ○ | ● | | | | |
| PD 32 | DE 41 | DE 48 to PA Line | Corridor Study / Concept Design for freight management upgrades (w/ potential continuation into PA along PA 41 to SR 3013) | DE | NCC | 4 | 1S | ◑ | ◑ | ● | ○ | ○ | ○ | ● | | | | |
| PD 33 | DE 48 | Hercules Rd to DE 41 | Corridor Study / Concept Design for freight management upgrades and potential roadway widening | DE | NCC | 4 | 1S | ◑ | ◑ | ● | ○ | ○ | ○ | ● | | ⚑ | | ⚑ |
| PD 35 | DE 141 | Tyler McConnell Bridge | Construct/reconstruct Tyler McConnell Bridge (over Brandywine Creek) and DE 141 tie-ins between approximately Montchannin Rd to Alapocas Rd | DE | NCC | 1 | 1S | ◑ | ○ | ◑ | ◑ | ◑ | ○ | ● | | ⚑ | | ⚑ |
| PD 36 | DE 141 | DE 2 to DE 52 | Signalized corridor improvements and regular optimization | DE | NCC | 2 | 1S | ○ | ○ | ◑ | ○ | ○ | ○ | ◑ | | ⚑ | | |
| **Tier 2 Routes (State Secondary)** | | | | | | | | | | | | | | | | | | |
| PD 50 | DE 273 | MD Line to DE 896 | Corridor Study / Concept Design for freight management upgrades | DE | NCC | 4 | 2 | ○ | ○ | ◑ | ○ | ○ | ○ | ● | | | | ⚑ |
| PD 51 | DE 896 | DE 273 to MD Line | Corridor Study / Concept Design for freight management upgrades | DE | NCC | 4 | 2 | ○ | ○ | ◑ | ○ | ○ | ○ | ● | | | | |

## 8.4 Freight Prioritization Summary

Supplementing the screening results from above, the project prioritization stage adds additional insights based on the more quantitative, performance-based process that was applied to Delaware project candidates only. With these insights, the summary compilations on the following pages (*Exhibit 8.21* through *Exhibit 8.31*) identify and group the leading anticipated freight priorities for Delaware. Key Maryland and Virginia candidates are similarly compiled for ease of reference, though solely based on previous screening efforts, reiterating that priority implications for non-Delaware projects are ultimately subject to their own respective jurisdictional processes. Leading project candidates are identified/grouped as follows:

- *Delaware Key Projects w/Anticipated Commitments:* includes Tier 1 project possibilities for which funding and implementation are currently anticipated as part of other formal transportation plans. Ensuring, supporting, or advancing the timeline for implementation of such projects would provide overlapping benefits to freight movement on the peninsula.
- *Delaware Key Projects w/Unfunded Aspirations*: includes Tier 2 or 3 project possibilities that are identified as unfunded future aspirations in other formal transportation plans. Exploring future funding and formal planning/programming opportunities to implement such projects would provide overlapping benefits to freight movement on the peninsula.
- *Delaware Key Projects w/Planned VWS Focus*: highlights proposed VWS sites that provide focused benefits to safety, management and operations, and truck enforcement; but that may otherwise be underrated within the strict confines of the prioritization process relative to candidates having broader-reaching regional influences.
- *Delaware Targeted Studies w/Corridor or Concept Design Focus*: includes Tier 3 or 4 study candidates that require additional investigation to define location-specific issues, potential solutions, or new project candidate possibilities. Studies may be pursued internally by agency staff, or externally through contracts that advertise specific corridor study needs.
- *Delaware Targeted Studies w/Area-wide Focus*: highlights areas that may benefit from an investigation of localized urban freight details including, for example, first/last mile connectivity, local congestion or community conflicts, truck parking or loading strategies, or site-specific safety, intersection, or geometric improvement needs.
- *Delaware Key Multimodal Candidates*: highlights key multimodal interests based on overall freight planning insights and in support of subsequent policy level perspectives.
- *Maryland or Virginia Key Candidates*: summarizes key project, study, or multimodal candidates in Maryland or Virginia based on a review and compilation of previous screening efforts.

*Exhibit 8.21 – Key Project Candidates Map*

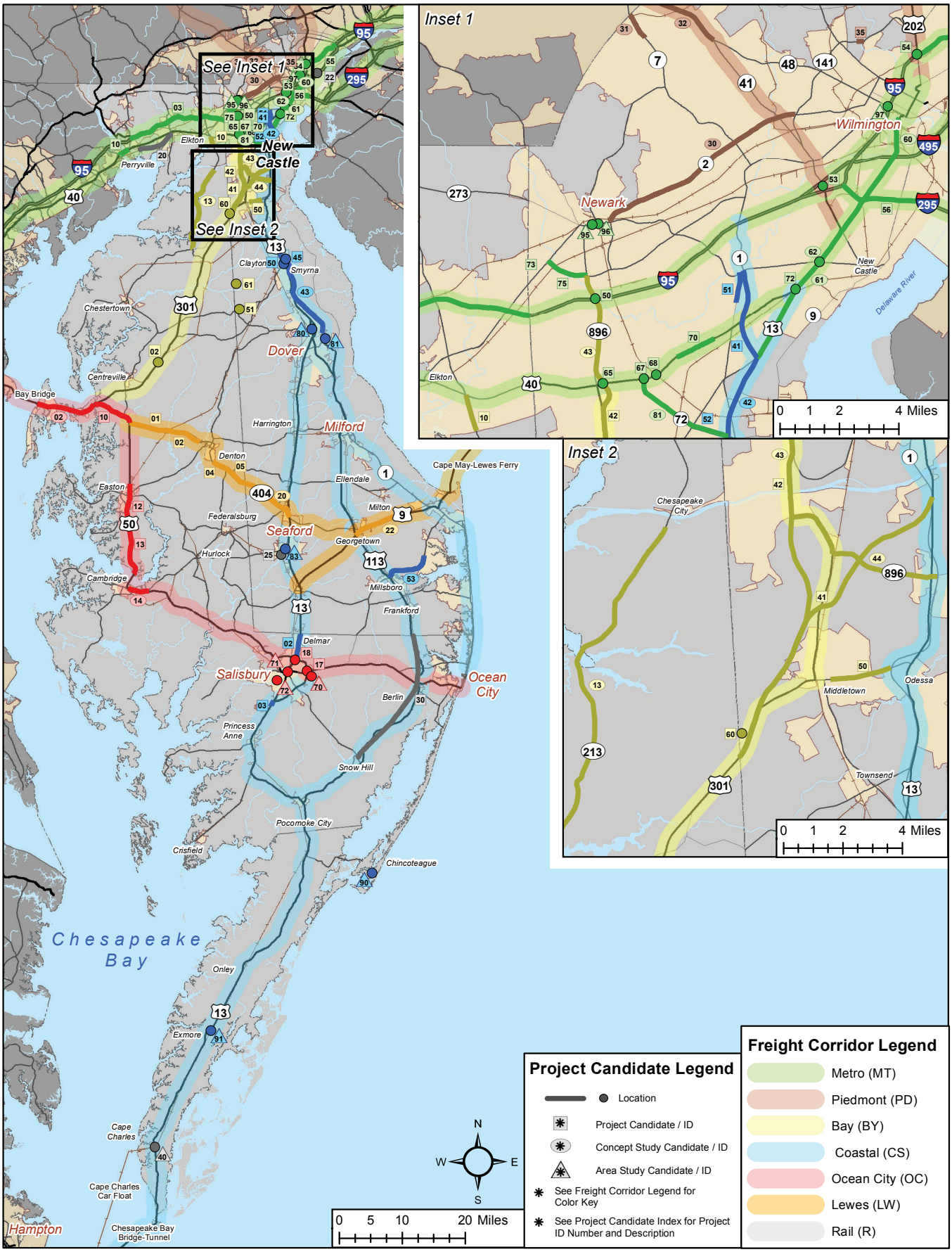


*Exhibit 8.22 – Delaware Key Projects w/ Anticipated Commitments*

| ID | Route/Area | Limits | Description |
|---|---|---|---|
| MT 54 | I-95 | at US 202 | Interchange improvements |
| **MT 56** | **I-295** | **I-95 to DE Memorial Bridge** | **Improvements** |
| MT 75 | DE 4 | DE 2 to DE 896 | Eastbound widening |
| **BY 41** | **US 301** | **MD Line to DE 1** | **New 4-lane expressway** |
| BY 50 | DE 299 | DE 1 to Catherine St | Widen |
| CS 51 | DE 7 | Newtown Rd to DE 273 | Widen |
| CS 52 | DE 72 | McCoy Rd to DE 71 | Widen from 2 to 4 lanes |
| PD 35 | DE 141 | Tyler McConnell Bridge | Construct bridge and DE 141 tie-ins |

*Exhibit 8.23 – Delaware Key Projects w/ Unfunded Aspirations*

| ID | Route/Area | Limits | Description |
|---|---|---|---|
| **MT 50** | **I-95** | **at DE 896** | **Major interchange reconstruction** |
| **MT 53** | **I-95** | **at DE 141** | **Phase I and II interchange projects** |
| MT 55 | I-95 | US 202 to I-495/DE 2 | Widen from 4 to 6 lanes |
| MT 65 | US 40 | at DE 896 | New interchange |
| MT 67 | US 40 | at DE 72 | Intersection improvements |
| MT 68 | US 40 | at NS Rail Crossing (Bear, DE) | Grade separation |
| MT 70 | US 40 | Salem Church Rd to Walther Rd | Widen from 4 to 6 lanes |
| **MT 72** | **US 40** | **at US 13** | **New interchange** |
| **BY 42** | **DE 896** | **DE 2 to Boyds Corner Rd** | **Signal retiming and/or upgrades** |
| CS 41 | DE 1 | Tybouts Corner to DE 273 | Widen from 4 to 6 lanes |

*Exhibit 8.24 – Delaware Key Projects w/ Planned VWS Focus*

| ID | Route/Area | Limits | Description |
|---|---|---|---|
| BY 51 | DE 300 | West of Smyrna | Planned VWS |
| BY 60 | DE 299 | West of Middletown | Planned VWS |
| BY 61 | DE 6 | West of Smyrna | Planned VWS |
| CS 45 | DE 1 | Northbound near Smyrna | Planned VWS |
| CS 50 | US 13 | Northbound near Smyrna | Planned VWS |

* **BOLD** *text indicates High Priority Rating per screening/prioritization efforts*

*Exhibit 8.25 – Delaware Targeted Studies w/ Corridor or Concept Design Focus*

| ID | Route/Area | Limits | Study Focus |
|---|---|---|---|
| **MT 60** | **US 13** | **I-495 to Christiana River** | **Freight management upgrades** |
| **MT 61** | **US 13** | **DE 1 to I-495** | **Roadway or capacity upgrades** |
| **MT 62** | **US 13** | **at DE 273** | **Interchange feasibility** |
| **MT 81** | **DE 72** | **US 40 to US 13** | **Freight management upgrades** |
| BY 43 | DE 896 | C&D Canal to US 40 | Roadway or capacity upgrades |
| **BY 44** | **DE 896** | **US 301 to DE 1** | **Freight management upgrades** |
| **CS 42** | **DE 1/US 13** | **DE 72 to DE 71** | **Freight management upgrades** |
| CS 43 | DE 1 | Dover (Exit 97) to Smyrna (Exit 119) | Freight management upgrades |
| CS 53 | DE 24 | US 113 to DE 23 | Freight management upgrades |
| **PD 30** | **DE 2** | **DE 273 to DE 141** | **Freight management upgrades** |
| PD 31 | DE 7 | Valley Rd to PA Line | Freight management upgrades |
| **PD 32** | **DE 41** | **DE 48 to PA Line** | **Freight management upgrades** |
| LW 20 | DE 404 | MD Line to US 113 | Freight management upgrades |
| LW 22 | US 9/US 9 Tk | US 113 to DE 5 | Freight management upgrades |

*Exhibit 8.26 – Delaware Targeted Studies w/ Area-wide Focus*

| ID | Route/Area | Limits | Study Focus |
|---|---|---|---|
| MT 95 | Newark | Area study and/or upgrades | Freight management |
| MT 97 | Wilmington | Area study and/or upgrades | Freight management, route signage |
| CS 80 | Dover | Area study and/or upgrades | Freight management |
| CS 83 | Seaford | Area study and/or upgrades | Freight management |

*Exhibit 8.27 – Delaware Key Multimodal Candidates*

| ID | Route/Area | Limits | Description |
|---|---|---|---|
| MT 96 | Newark | Area study | Intermodal center feasibility |
| CS 81 | Dover | Area study | Air cargo ramp, Aero Park development |
| **R 20** | **NS/NEC** | **Prince to Bacon interlocking** | **Chesapeake Connector** |
| R 22 | NS | Edgemoor Yard | Flood mitigation; raise yard 2-6 feet |
| R 25 | NS | Seaford Rail Bridge | Bridge replacement or modernization |

** **BOLD** text indicates High Priority Rating per screening/prioritization efforts*