NJ 168 CORRIDOR STUDY

CAMDEN COUNTY
GLOUCESTER COUNTY

NJ 168

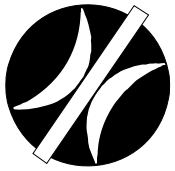
SEPTEMBER›2004

DVRPC

DELAWARE VALLEY REGIONAL
PLANNING COMMISSION

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

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



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

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1. EXECUTIVE SUMMARY

NJ 168 was originally identified in DVRPC's long range transportation plan, *Direction 2020,* as an important corridor for moving people and goods in the region. This plan outlines opportunities and constraints of the region`s transportation system, and singles out important corridors for further study. Since the adoption of the long range plan, DVRPC has conducted studies on many of these corridors, including: US 130, PA 100, NJ 38, NJ 73, and US 30.

This report presents an evaluation of the transportation issues and opportunities of the NJ 168 corridor. The study area is located in southern New Jersey and comprises the entire length of NJ 168, and CR 605 Mount Ephraim Avenue, for a total study area length of approximately twelve miles. The study area lies between Camden City and Washington Township and includes fifteen municipalities and two counties. In addition to NJ 168 and CR 605 proper, the study also considers issues on surrounding parallel and intersecting facilities where appropriate.

The study area, which is mostly built out, is predominated by single-family residential subdivisions with strip commercial development bordering much of NJ 168. Since 1980 population has been flat or declining in all of the study area municipalities except for those in the southern end of the corridor. This trend of suburbanization along NJ 168 is characteristic of the Delaware Valley where smaller inner ring suburbs are losing residents while population is growing in places where land for new development is available.

NJ 168 functions as both a local route and main street for the established communities, as well as a reliever for NJ 42– a limited access major arterial carrying regional traffic to and from the emerging communities. The transportation issues identified in the study area involve localized congestion, mobility, access, and safety. Although automobile issues received the most attention, significant consideration was also given to transit, pedestrian, and bicycle issues.

The transportation issues identified in the NJ 168 Corridor Study have been divided into three categories: 1)Identified Problems and Potential Improvement Scenarios– an examination of isolated problem locations originally identified by municipal representatives, 2) Cut-Through Traffic Problems– a symptom of the recurring peak period congestion, especially within the study core, 3) Study Core Traffic Analysis– a two and one-half mile section of NJ 168 that experiences recurring congestion during the A..M. and P.M. peak periods. In addition, a crash analysis of two years of data supplements these transportation issues by identifying crash rates and cluster locations.

The most predominant transportation problem in the study area is recurring peak period congestion. A correlation was made between peak period congestion and cut-through traffic within the study core. To quantify the current problem and assess future conditions a level of service analysis was conducted at each signalized intersection within the study core. This resulted in the identification of two deficiencies contributing to the congestion: 1) uncoordinated traffic signals on NJ 168, and 2) a capacity problem at the intersection of NJ 168 and NJ 41 Clements Bridge Road, an important nexus of two regionally significant routes. The major recommendations for the study core include the addition of a dedicated left turn lane on Evesham Road and signal coordination and optimization on NJ 168. There are two projected benefits– better traffic flow and reduced congestion both on NJ 168 and Clements Bridge Road,

and less cut through traffic in the adjacent neighborhoods as traffic flow improves on the regional facilities.

Through the study core NJ 168 is one lane per direction with a center turn lane. Adding more capacity was considered as a way of reducing congestion, however, this approach has many constraints in addition to being contextually inappropriate for the small-scale commercial areas of Bellmawr and Runnemede. There is also growing evidence that a three lane cross section is safer for making left turns, without compromising capacity, compared to a four lane cross section.

The report culminates with an implementation plan and an improvement matrix. The matrix is intended to be used as a punch list for advancing projects. Each problem is numbered and described according to the following criteria: priority ranking (high, medium, low), cost range (high, medium, low), and benefits (safety, mobility, congestion). Also identified on the matrix is the government agency responsible for assuming the lead and assisting roles in the project implementation, i.e.: State DOT, County, or Municipality).

2. INTRODUCTION

The Delaware Valley Regional Planning Commission was requested by the New Jersey Department of Transportation (NJDOT) to conduct a corridor planning effort to identify transportation issues affecting the NJ 168 corridor. A study task force comprised of representatives from the participating study area municipalities, and representatives from NJDOT, played an active role throughout the study process. A list of the study task force members can be found in appendix A. The following municipalities were included in the study area: Audubon Borough, Audubon Park Borough, Bellmawr Borough, Camden City, Collingswood Borough, Deptford Township, Gloucester City, Gloucester Township, Haddon Heights Borough, Haddon Township, Mount Ephraim Borough, Oaklyn Borough, Runnemede Borough, Woodlynne Borough, and Washington Townships.

NJ 168, classified as an urban principal arterial, serves regional and local traffic in southern New Jersey. The facility is 10.75 miles long running northwest from Washington Township, Gloucester County, to Camden City, Camden County. Locally, NJ 168 is known as the Black Horse Pike. The corridor study area also includes CR 605 Mount Ephraim Avenue– a 1.43 mile county route situated in Camden City beginning at the northern terminus of NJ 168. Essentially, Mount Ephraim Avenue continues the corridor through to CR 561 Haddon Avenue. The study are also includes NJ 42 which runs parallel to NJ 168 between Washington Township and Bellmawr Borough where it provides connections to I-295 and I-76. NJ 42 is a limited access facility carrying daily traffic volumes in excess of 90,00 vehicles through the NJ 168 study area. Although NJ 42 was included in the study area the focus remained on NJ 168. NJ 42 warrants its own study effort.

At the time this study was begun, the New Jersey Department of Transportation was midway through a needs analysis of NJ 168. Their study focused on 2.04 miles of the corridor between the NJ Turnpike interchange in Bellmawr, and Merchant Street in Audubon. The following municipalities were involved: Bellmawr, Haddon Heights, Mount Ephraim, and Audubon. This effort, which produced the report *Route 168 Operational and Safety Improvements,* concentrated on NJ 168 proper and utilized traffic data including level of service data, and management system data. DVRPC and NJDOT coordinated outreach efforts and shared resources between the two projects. Recommendations from their report are sited in this document where relevant.

DVRPC's report is organized into nine sections followed by the appendix. The body of the document begins with an examination of the study area in terms of regional setting, highway facilities, and rail facilities. This is followed by background information concerning population and employment, land use, transportation network and traffic volumes, public transportation, bicycle and pedestrian issues, and employment commuting trends. The background section culminates with an examination of sensitive populations in the environmental justice piece.

Transportation issues are addressed in sections five, and six, concerning crash conditions, and transportation problems, respectively. A crash analysis was performed on NJ 168, CR 605 Mount Ephraim Avenue, and on select links within the vicinity of Camden County College. The transportation issues section examines both isolated problem locations and issues spanning multiple municipalities.

The final three report sections deal with intelligent transportation systems, the congestion management system, and plan implementation. Included in the implementation is a matrix intended for use as a quick reference for identifying improvement projects.

2.1 Work Program

The following tasks were undertaken during the course of the study.

Initial Tasks:
1. Kick-off letter to mayors
2. Establish municipal/coordinating agency contacts
3. Needs Inventory
4. Kick-off meeting
5. Conduct municipal field visits

Ongoing Tasks/Data Gathering:
1. Background data
    - Regional setting
    - Population
    - Employment
    - Journey-to-Work/travel patterns
    - Environmental Justice
2. Conduct follow-up field visits
3. Traffic data
    - Traffic counts (AADT)
    - Turning movement counts
    - Transit service
    - Bicycle/pedestrian amenities
    - Intersection inventory
    - Crash data
    - Intelligent Transportation Systems
    - Congestion Management System

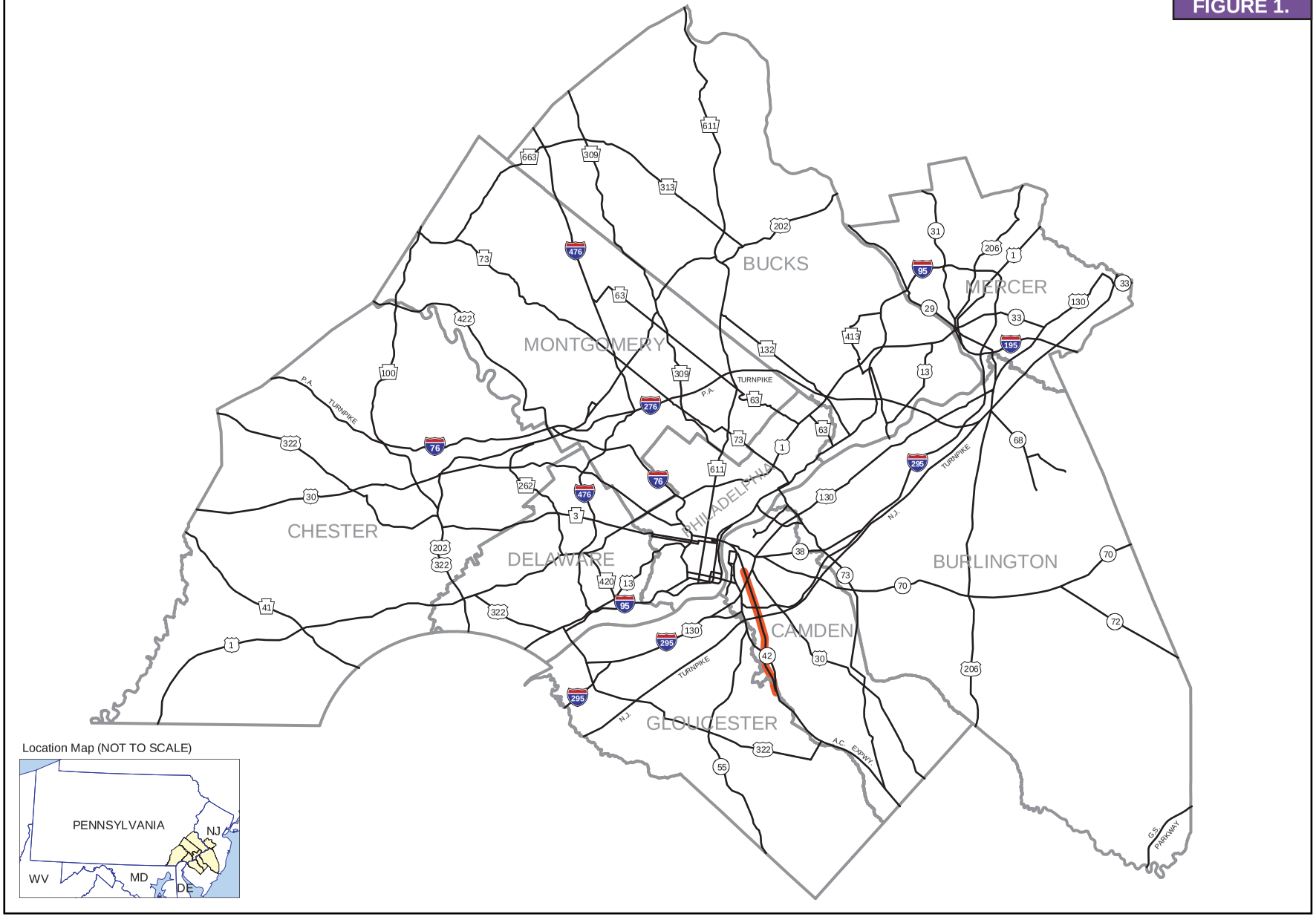
Analysis
1. Problem analysis and improvement scenario development
2. Feedback from stakeholders
3. Traffic signal analysis of study core

Final Tasks:
1. Develop NJDOT problem statements
2. Compile report

NJ 168 Corridor Study

Regional Setting

FIGURE 1.



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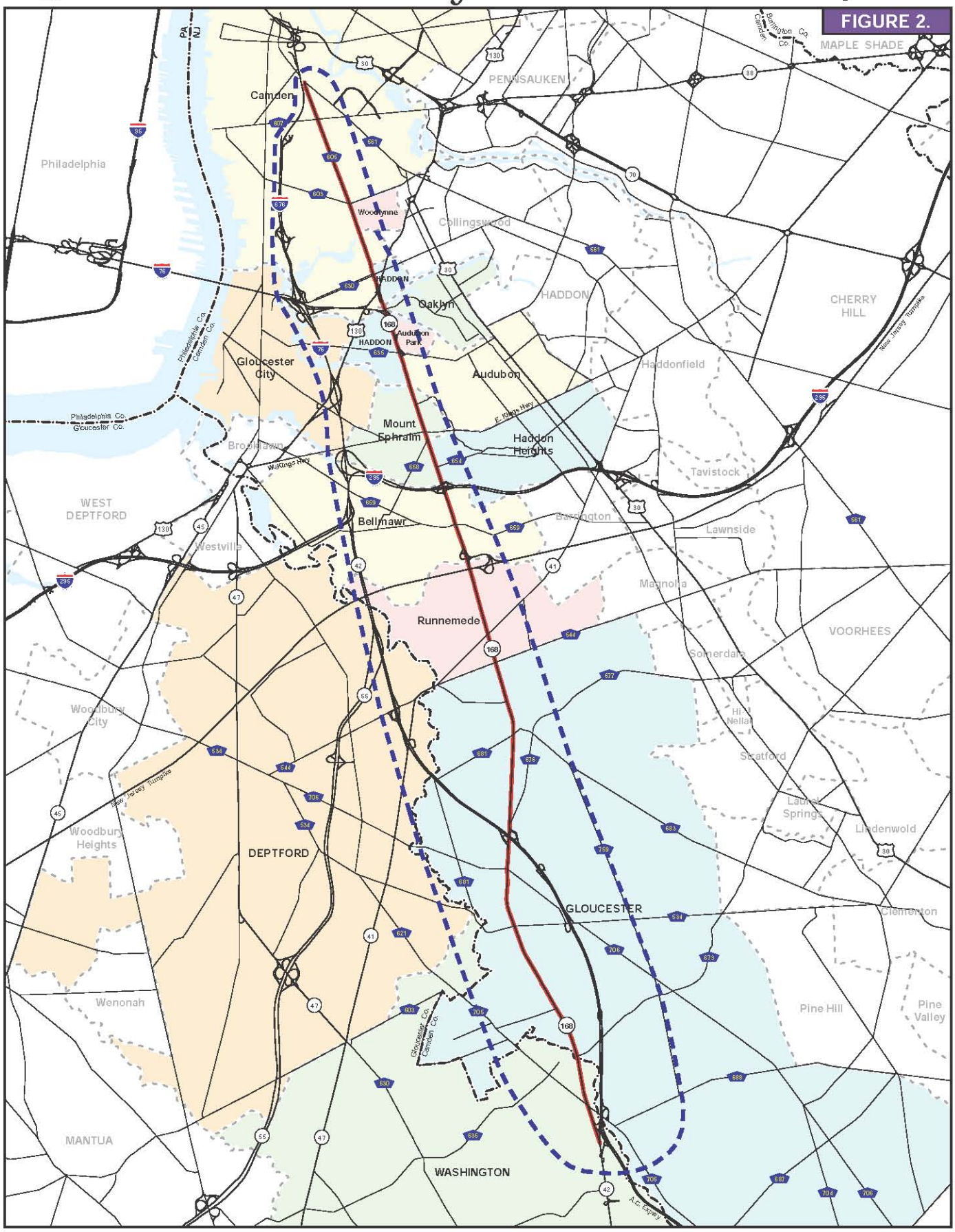
NJ 168 Corridor Study

Study Area

FIGURE 2.



0 1 2

Miles

NJ 168

Study Area Boundary

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3. STUDY AREA

3.1 Regional Setting

NJ 168 is an arterial highway located in the southern suburbs of the DVRPC region (figure 1). It is oriented radially to the region's core – Center City Philadelphia. The 12-mile long study corridor follows the alignment of NJ 168 and Mount Ephraim Avenue (Route 605), and comprises Camden City and Gloucester City; Audubon, Audubon Park, Bellmawr, Collingswood, Haddon Heights, Haddon, Mount Ephraim, Oaklyn, Runnemede, and Woodlynne boroughs; and Deptford, Gloucester, and Washington townships. The corridor study area is depicted in figure 2.

Land uses along NJ 168 are mostly commercial but vary somewhat. Rows of storefronts with short setbacks; strip shopping malls; big box retailers; and occasional natural features, the creeks that lace the area and their veneer of woods, characterize different portions of NJ 168`s alignment. Regional development centers[1] that influence corridor travel include the City of Camden, Cherry Hill, Deptford, and the City of Philadelphia.

Access to and beyond these activity centers is afforded by a network of freeways, principal arterial highways, and regional rail service.

3.2 Highway Facilities

Freeways providing mobility in the vicinity of the study corridor include the New Jersey Turnpike, I-295, the North-South Freeway (NJ 42), and I-76.

The turnpike is a four-lane, toll highway providing high levels of mobility for long distance trips to/from the east, west, and north. The turnpike's Camden/Philadelphia Interchange (exit 3) is situated in the middle of the NJ 168 study corridor and allows for direct movement between the two highways. The nearest neighboring interchanges are 7 miles to the south and 13 miles to the north.

I-295 is a six-lane highway that complements the parallel New Jersey Turnpike. It serves the local and regional traffic needs of Salem, Gloucester, Camden, Burlington, and Mercer counties. The I-295 Bellmawr/Runnemede/Mount Ephraim Interchange (exit 28) is situated in the middle of the NJ 168 study corridor. The I-295 and turnpike interchanges are located a mile apart on NJ 168, allowing access between the two highways.

The North-South Freeway is a north-south controlled access facility that runs parallel to NJ 168. It provides eight lanes of travel between the I-295 / I-76 interchange in Bellmawr and the NJ 55 junction in Deptford, and six lanes of travel south of the I-55 junction. It, along with I-76 / I-676, allows for seamless highway travel between the Atlantic City Expressway and Central Philadelphia.

[1]Development centers are concentrations of and foci for dense development, typically offering and mixing opportunities for shopping, employment, entertainment, etc.

I-76 is a north-south, ten lane, controlled-access facility. In conjunction with I-676, it provides a direct express link from I-295 in Camden County to the Walt Whitman Bridge, the Ben Franklin Bridge, and the cities of Camden and Philadelphia.

Principal arterial highways serving study area travel include: NJ 168, Crescent Boulevard (US 130), and Clements Bridge Road (NJ 41). NJ 168, along with Route 605, runs on a north-south axis from Camden City to Washington Township. The configuration of NJ 168 is typically two lanes plus a center left-turn lane, but, in some locations, it is four lanes or the center left-turn lane drops out. NJ 168 offers access to both the New Jersey Turnpike and I-295.

Crescent Boulevard crosses the northern part of the study corridor on its way from Salem County to Burlington County. In the vicinity of NJ 168, it is a divided, six-lane highway.

Clements Bridge Road traverses the study corridor on a southwest to northeast axis, connecting the older suburbs of Haddonfield and Barrington to Deptford and points beyond in Gloucester County. The highway provides one through lane in each direction.

3.3 Rail Facilities

The broad study area is served by regional train service, oriented radially to Center City Philadelphia. The Speedline (Lindenwold to Camden and Central Philadelphia) is PATCO's regional rail service within the corridor. There are connections to the New Jersey Transit Atlantic City Line at the Lindenwold Station. Speedline station stops, within the broad study area, are at Collingswood and Ferry Avenue. Commuter bus service also provides access to other nearby stations.

There is one active freight rail line within the corridor study area, the Grenloch Industrial Track. Its right-of-way parallels NJ 168 a few blocks to the west and runs between Camden City and Grenloch Lake in Gloucester Township. The active portion of this line serves only a few customers between Camden City and the border between Bellmawr and Runnemede. From that point south, the track has been removed and in two locations converted to a rail-trail. This re-use is covered in more detail in the Bicycle and Pedestrian section of the report.

To consider the right-of-way of this facility in terms of its viability as a travel corridor would require a separate, focused analysis. Such analysis is beyond the scope of this study.

4. BACKGROUND

4.1 Demographics

The study area experienced an increase in population (8 percent) between 1980 and 1990, and a nominal increase (2 percent) between 1990 and 2000 (see table 1). Yet the overall trend masks divergent fortunes among the study area municipalities. Most of the growth took place in Gloucester Township and Washington Township, while the population of other municipalities held constant or declined.

TABLE 1
STUDY AREA DEMOGRAPHIC CHARACTERISTICS: 1980, 1990, and 2000

		Population			Employment		
Municipality	**Area (mi^2)**	**1980**	**1990**	**2000**	**1980**	**1990**	**2000**
Audubon Borough	1.5	9,533	9,205	9,180	2,119	2,317	2,006
Audubon Park Borough	0.2	1,274	1,150	1,100	770	683	607
Bellmawr Borough	3.1	13,721	12,603	11,265	4,055	5,353	5,462
Camden City	10.4	84,910	87,492	79,905	42,812	42,017	32,054
Collingswood Borough	1.9	15,838	15,289	14,326	4,438	5,097	5,197
Deptford Township	17.6	23,473	24,137	26,770	8,761	10,740	12,304
Gloucester City	2.8	13,121	12,649	11,484	4,471	2,942	2,951
Gloucester Township	23.2	45,156	53,797	63,310	8,754	12,505	14,145
Haddon Township	2.8	15,875	14,837	14,651	3,306	4,978	4,215
Haddon Heights Borough	1.6	8,361	7,860	7,545	1,517	2,652	2,853
Mount Ephraim Borough	0.9	4,863	4,517	4,495	987	1,332	1,035
Oaklyn Borough	0.7	4,223	4,430	4,188	964	1,290	1,100
Runnemede Borough	2.1	9,461	9,042	8,535	2,158	2,564	3,212
Washington Township	21.6	27,878	41,960	48,155	3,465	8,138	11,374
Woodlynne Borough	0.2	2,578	2,547	2,795	363	370	325
Total	**90.8**	**280,265**	**301,515**	**307,704**	**88,940**	**102,978**	**98,840**
Camden County	227.5	471,650	502,824	507,889	186,746	227,933	216,865
Gloucester County	337.0	199,917	230,082	255,719	61,732	86,079	99,436

Employment within the study area increased 16 percent between 1980 and 1990, with the largest absolute increases occurring in Washington Township, Gloucester Township, and Deptford Township. Between 1990 and 2000, study area employment actually declined by 4 percent but, once again, there were large differences among the municipalities. At one

extreme, Camden City lost almost one-quarter of its employment base during the decade; meanwhile, employment in Washington Township, Runnemede Borough, Gloucester Township, and Deptford Township continued to grow, although at a slower rate.

With respect to the most recent data, the City of Camden has the highest levels of population and jobs within the study area, and the second highest densities for these demographics. Audubon Park Borough and Woodlynne Borough, each occupying an area of 0.2 square miles, have the highest population densities. In contrast, the other municipalities with the next highest population and jobs levels – Gloucester Township, Washington Township, and Deptford Township – have the lowest densities in the study area.

4.2 Land Use

Figure 3 illustrates land use conditions in the corridor in 2000. The extensive, linear study area is predominated by single-family residential subdivisions. On the other hand, strip commercial development borders much of NJ 168. The core of the study area – roughly the area south of Route 130 and north of Big Timber Creek – is comprised of mature suburbs, many of them built out and some with small shopping centers. North of Route 130 where the facility enters Camden City, the study area has an urban character having a large number of multifamily dwellings. This is especially true along Mount Ephraim Avenue. To the south, newer suburbs in Gloucester Township and Washington Township are growing rapidly, taking the place of a disappearing rural landscape of woodlands and farms.

By stripping away the lower intensity uses from the existing land use map, concentrated nodes of commercial, industrial, and higher density residential use are revealed. Figure 4 displays this and shows activity/development centers in and around the study area.

There are five important development centers contained within the study area:

- Blackhorse Pike Shopping Center, located in Audubon at the intersection of NJ 168 and Nicholson Road.
- Interstate Industrial Park, located in Bellmawr on Benigno Boulevard, with access to the NJ Turnpike and the North-South Freeway. A United States Postal Service facility employing more than 1,600 workers, is the hub of the Interstate Industrial Park.
- Deptford Mall, The Court at Deptford, The Plaza at Deptford, Deptford Crossing and other shopping centers straddle Clements Bridge Road on the western boundary of the study area.
- Camden County Hospital Complex, located in Gloucester Township on the south end of the study area.
- Camden County College (Blackwood Campus), also located in Gloucester Township at the intersection of College Drive and Little Gloucester Road.

There are also three important development centers located adjacent to the study area

boundaries that draw trips from the study area:

- Downtown Camden, where a number of medical, educational, and governmental institutions are concentrated.
- Airport Industrial Park, abutting the Cooper River, located in Pennsauken.
- Plaza 42, which consists of more than 214,000 square feet of retail space, plus the Plaza Shoppes, both located in Washington Township, south of the study area.

Figure 4 also displays the location of major employers within the corridor during 2002. These are described in table 2.

TABLE 2
MAJOR EMPLOYERS IN THE VICINITY OF NJ 168

Fig. _ ref. #	Company	Product / Services	Local, Full Time Employees
1	Camden County Social Service Board	Public Agency	640 employees
2	Campbell Soup Company	Canned Specialties	1,600 employees
3	Cooper River West	Office Building	650 employees
4	Cooper Health Systems	Hospital, General Medical and Surgical	3,000 employees
5	Rutgers State University	State University	700 employees
6	West Jersey Health and Hospital	Hospital, General Medical and Surgical	800 employees
7	USPS Processing & Distribution Center	United States Postal Service	1,664 employees
8	L-3 Communications	Communications Equipment	840 employees
9	Camden County Health Services Center	Public Hospital, Psychiatric; Nursing Home	650 employees

SOURCE D&B MarketPlace 2002
Harris Infosource 2002
www.camdencounty.com
Philadelphia Business Journal Book of Business Lists 2003

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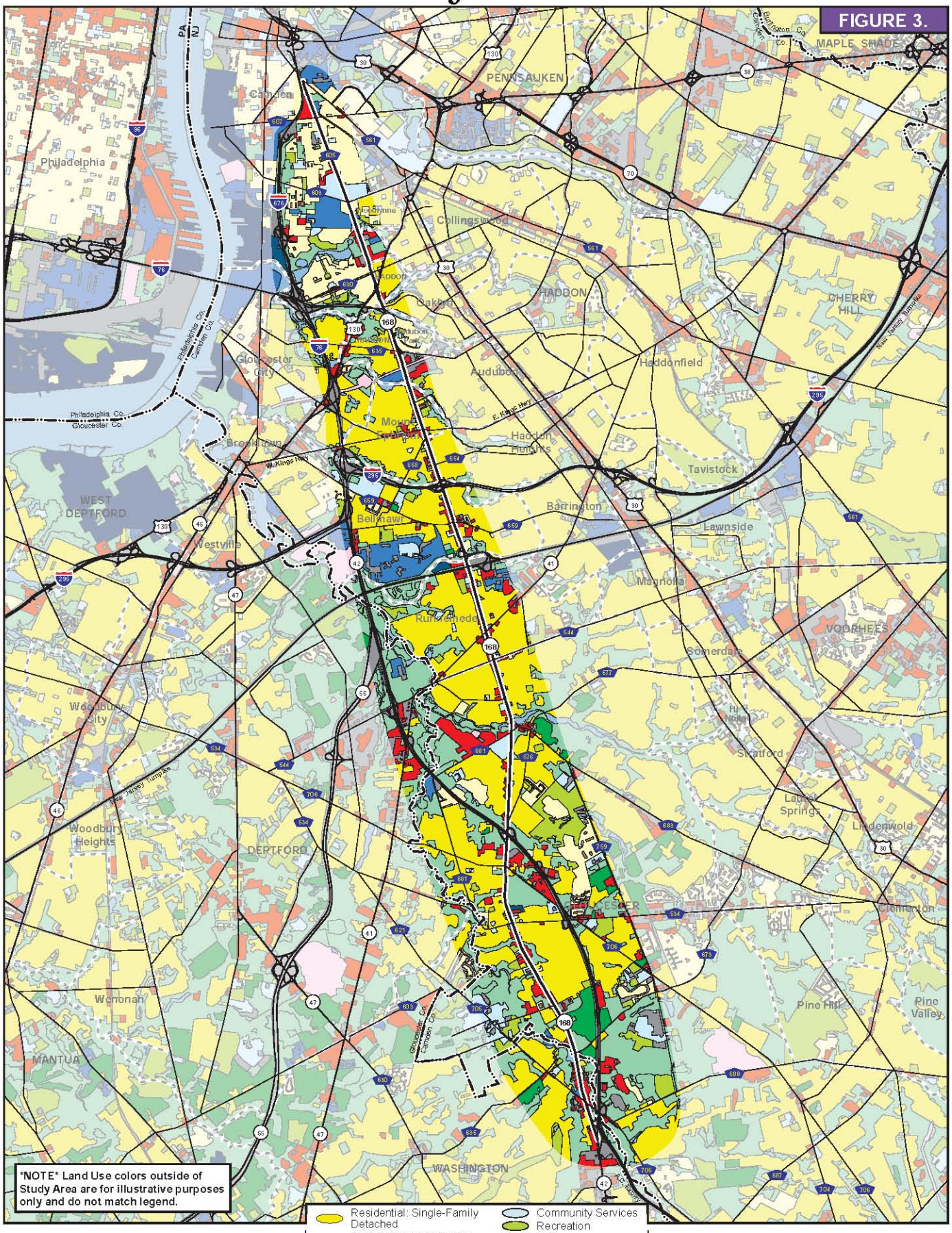
2000 Land Use

FIGURE 3.



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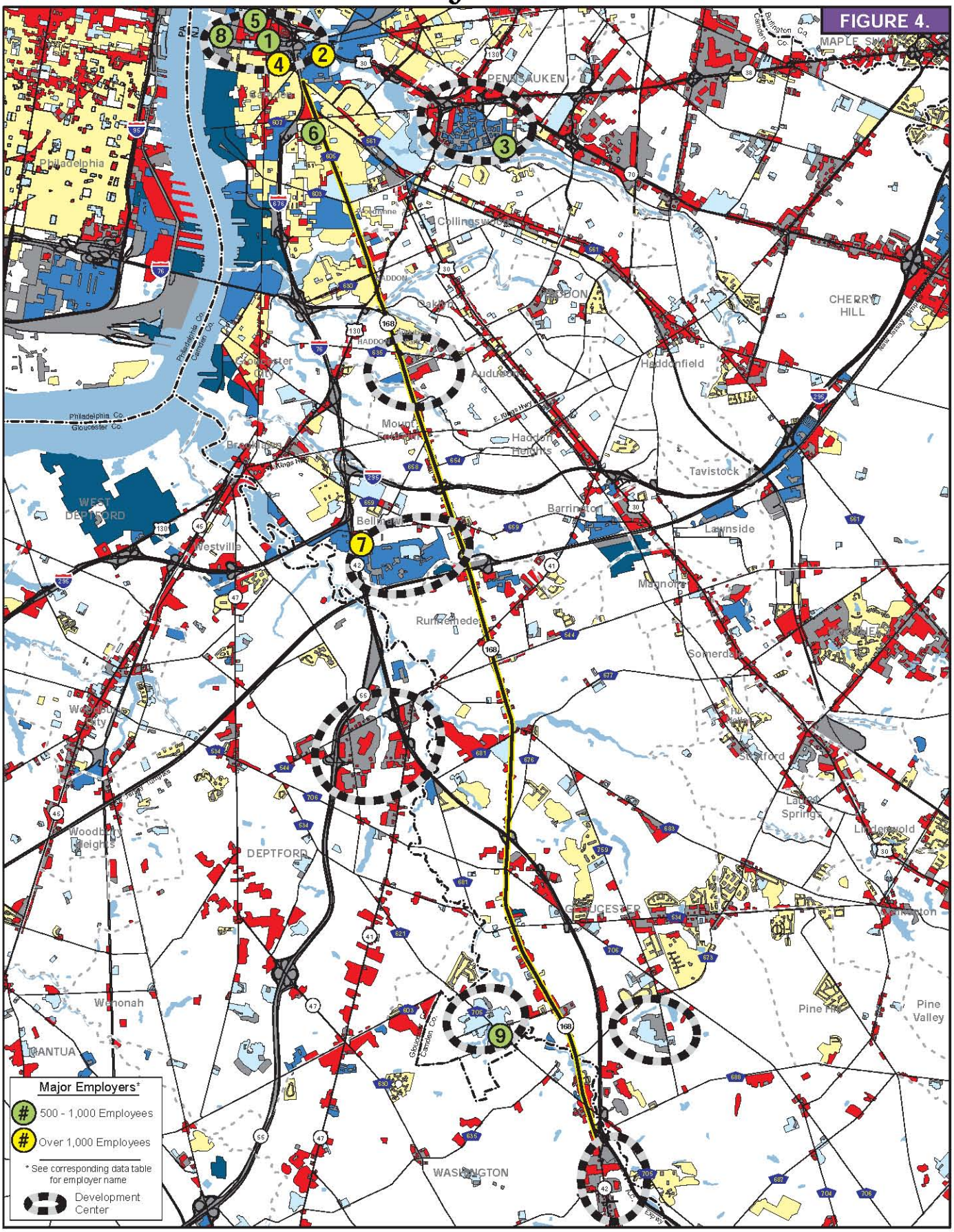
NJ 168 Corridor Study

Development Centers - 2000

FIGURE 4.



4.3 Transportation Network

In the northern portion of the study corridor, which runs from Haddon Avenue to Crescent Boulevard (US 130), the geometry of NJ 168 (and Mount Ephraim Avenue) changes two times. North of Van Hook Street, Mount Ephraim Avenue is a two-lane undivided highway offering one lane for each direction of travel. There is street parking on both sides of Mount Ephraim Avenue. Within the one mile length of this section, seven intersections are controlled by a traffic signal.

South of Van Hook Street, where there are two adjacent cemeteries, and then in Woodlynne, where the adjacent commercial businesses have their own parking lots, there are two travel lanes for each direction of travel. The three-quarter mile section has two intersections controlled by traffic signals. South of Woodlynne, NJ 168 has a three-lane cross section with a center left turn lane supplementing the through travel lane in each direction. The center left turn lane is wide and there are no true intersections to break up the roadside businesses along the half-mile length. Olympia Road/Grant Avenue and Collings Avenue, located south of this commercial strip, are controlled by a traffic signal. The posted speed limit is 35 miles per hour throughout.

From Crescent Boulevard (US 130) to I-295, just over two miles in length, NJ 168 is a divided four-lane highway providing two lanes for each direction of travel. Traffic signals, auxiliary turning lanes and/or jughandles, are present at 10 intersections to accommodate turning and crossing traffic movements. In addition, between the I-76 interchange and Merchant Street, a heavily commercial area, there are left turn slots that interrupt the median in several locations. Posted speed limits are 40 to 45 miles per hour.

South of I-295 to College Drive, a section of six and one-half miles, NJ 168 has a three lane cross section with a through travel lane in each direction and a center left turn lane. The center lane drops away briefly at the North-South Freeway interchange, to accommodate acceleration and deceleration lanes. There are 14 intersections controlled by traffic signals. Posted speed limits are 30 to 45 miles per hour.

Over its last three-quarters of a mile, before it merges with NJ 42, NJ 168 is a divided four-lane highway; the posted speed limit is 50 miles per hour. There is a left-side turnaround on southbound NJ 168 just before the merge with NJ 42.

Other key highway facilities within the study corridor parallel or intersect NJ 168. The most important parallel facility is the North-South Freeway (NJ 42). Perpendicular highways include the New Jersey Turnpike, I-295, Crescent Boulevard (US 130), Clements Bridge Road, and Evesham Road. Table 3 summarizes some of the attributes of these and other study corridor highways. Figure 5 shows the transportation network of the study area in detail.

NJ 168 Corridor Study

Transportation Network

FIGURE 5.

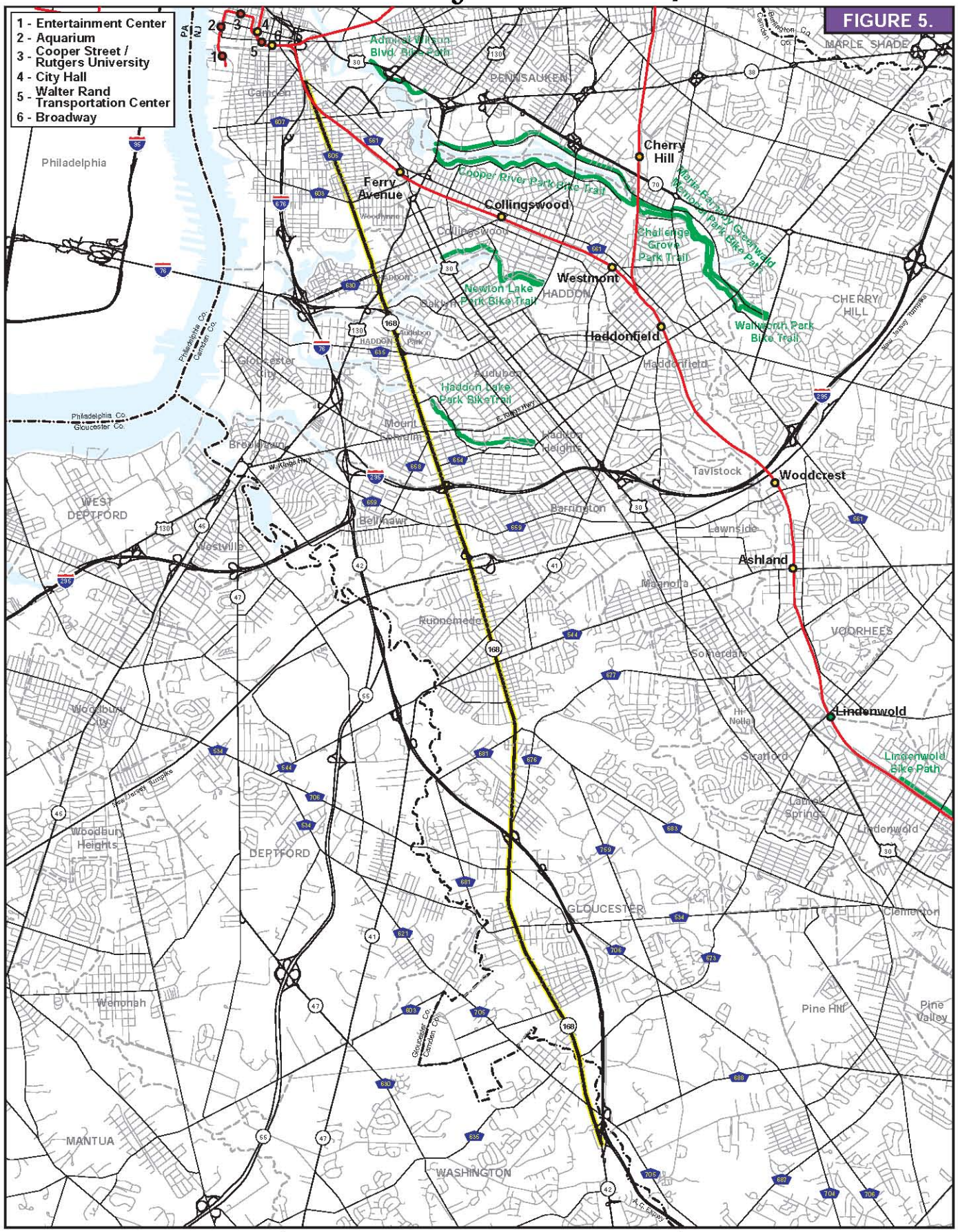


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TABLE 3
CHARACTERISTICS OF MAJOR STUDY CORRIDOR HIGHWAYS

Highway	Limits	Ownership	Functional Classification	Lanes by Direction	Posted Speed (mph)
Blackhorse Pike	Ferry Ave to Crescent Blvd	NJDOT (NJ 168)	Principal Arterial	1-2	35-45
	Crescent Blvd to I-295	NJDOT (NJ 168)	Principal Arterial	2	40-45
	I-295 to College Dr	NJDOT (NJ 168)	Principal Arterial	1	30-45
	College Dr to NJ 42	NJDOT (NJ 168)	Principal Arterial	2	50
Mount Ephraim Avenue	Haddon Ave to Ferry Ave	Camden County (CR 605)	Principal Arterial	1-2	35
Interstate 76	I-295 to I-676	NJDOT	Interstate	5	55
North-South Freeway	Atlantic City Expwy to I 295	NJDOT	Freeway / Expressway	3-4	55
Kaighn Avenue	Broadway to Haddon Ave	Camden County (CR 607)	Minor Arterial	1	not posted
Ferry Avenue	Broadway to US 30	Camden County (CR 603)	Minor Arterial	1	25
Collings Road / Collings Avenue	I-76 to US 30	Camden County (CR 630)	Minor Arterial	1	25
Crescent Boulevard	I-76 to US 30	NJDOT (US 130)	Principal Arterial	3	40-45
Nicholson Road	Crescent Blvd to NJ 168	Camden County (CR 635)	Minor Arterial	1	25
	NJ 168 to US 30	Camden County (CR 635)	Principal Arterial	2	25
Kings Highway	Browning Rd to US 30	Camden County (CR 551-Spur)	Minor Arterial	1	25
Bell Road	Creek Rd to NJ 168	Camden County (CR 658)	Collector	1	25
Prospect Ridge Blvd	NJ 168 to 10th Ave	Camden County (CR 654)	Minor Arterial	1	25
Interstate 295	Vicinity of NJ 168 (exit #28)	NJDOT	Interstate	3	65
Creek Road	NJ 42 to NJ 168	Camden County (CR 659)	Minor Arterial	1	25
Browning Road	NJ 168 to Bellmawr boundary	Camden County (CR 659)	Minor Arterial	1	25
New Jersey Turnpike	Vicinity of NJ 168 (exit #3)	NJ Turnpike Authority	Freeway / Expressway	2	65

TABLE 3
CHARACTERISTICS OF MAJOR STUDY CORRIDOR HIGHWAYS

Highway	Limits	Ownership	Functional Classification	Lanes by Direction	Posted Speed (mph)
Clements Bridge Road	Almonesson Rd to NJ 168	Camden County / NJDOT (CR 544 / NJ 41)	Principal Arterial	1-2	30-35
	NJ 168 to Runnemede boundary	NJDOT (NJ 41)	Minor Arterial	1	25-30
Evesham Road	Clements Bridge Rd to Runnemede boundary	Camden County (CR 544)	Minor Arterial	1	35
Chews Landing Road	NJ 168 to Little Gloucester Rd	Camden County (CR 683)	Minor Arterial	1	40
Little Gloucester Road	Chews Landing Rd to Hickstown Rd	Camden County (CR 759)	Minor Arterial	1	35
Almonesson-Blenheim Road	Almonesson Road to NJ 168	Camden County (CR 706)	Minor Arterial	1	25-45
Blenheim-Erial Road	NJ 168 to College Dr	Camden County (CR 706)	Minor Arterial	1	25-45
Church Street	Good Intent Rd to Blenheim-Erial Rd	Camden County (CR 534)	Minor Arterial	1	35
College Drive	NJ 168 to Blackwood-Clementon Rd	Camden County (CR 673)	Minor Arterial	1-2	35
Hickstown Road	Sicklerville Rd to Little Gloucester Rd	Camden County (CR 688)	Minor Arterial	1	30-45
County House Road	Hurffville-Grenloch Rd to NJ 168	Gloucester County (CR 705)	Minor Arterial	1	40
Sicklerville Road	NJ 168 to Hickstown Rd	Camden County (CR 705)	Minor Arterial	1	35

4.4 Traffic Volumes

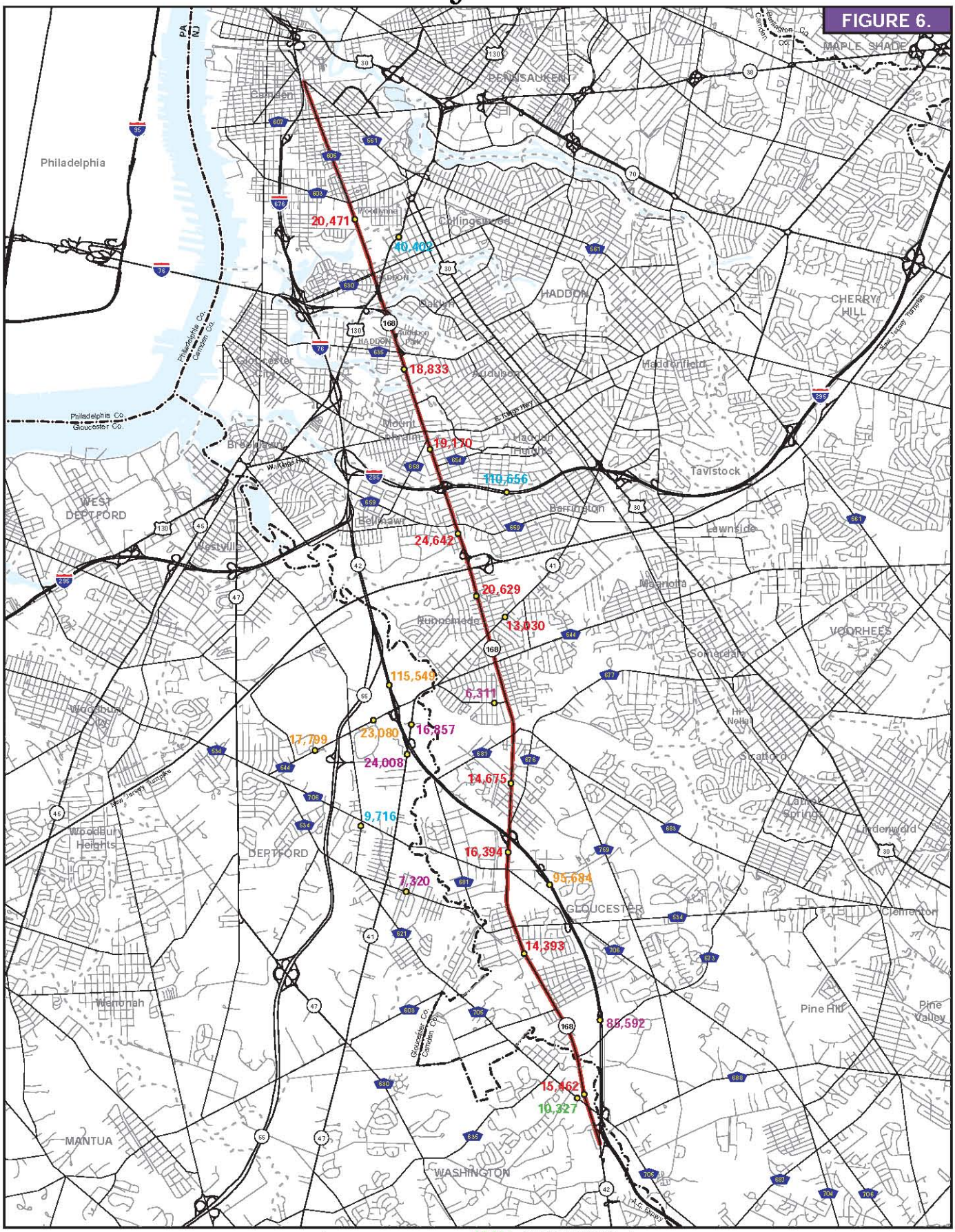
Figure 6 illustrates daily traffic levels occurring along NJ 168 and the rest of the study area highway network since 1999. NJ 168 experiences average annual daily traffic volumes of between 18,000 and 21,000 vehicles north of I-295. Between I-295 and the New Jersey Turnpike, volume increases to approximately 24,000. Between the New Jersey Turnpike and Station Avenue in Runnemede, volume returns to between 20,000 and 21,000. South of Station Avenue and continuing to the end of NJ 168 in Washington Township, a five-mile segment, volume subsides, falling to between 14,000 and 17,000 vehicles per day.

Other major facilities within the corridor include I-295, the New Jersey Turnpike, Crescent Boulevard (US 130), and Clements Bridge Road. Daily traffic loadings on I-295 are between 105,000 and 110,000 vehicles per day. The New Jersey Turnpike carries approximately 45,000 daily vehicles to the north of the NJ 168 interchange, and 52,000 vehicles to the south of NJ 168. Crescent Boulevard carries approximately 40,000 daily vehicles. The volume of traffic on Clements Bridge Road is between 12,000 and 13,000 vehicles per day.

NJ 168 Corridor Study

Current Traffic Volumes

FIGURE 6.



0 1 2 Miles

Average Annual Daily Traffic (AADT)

Count Location

15,254	1999 Traffic Count
15,254	2000 Traffic Count
15,254	2001 Traffic Count
15,254	2002 Traffic Count
15,254	2003 Traffic Count

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4.5 Public Transportation

Existing Conditions: Public Transit in the NJ 168 Corridor
Public transportation provides another level of mobility for those inhabiting the area or for outsiders coming to work in the region. Generally speaking, the NJ 168 corridor has direct access by bus to employment centers such as the central business district (CBD) of Philadelphia or regional malls. The future of transit rests ultimately on land use, demographic patterns, and willingness to ride, all of which are beyond the scope of this study. For those who have no other choice but to ride transit, the "captive rider," there still exists opportunities to improve the system, perhaps enough so to capture more of the discretionary rider.

NJ Transit Bus Service
Public transportation within the study area is composed of six bus routes and three proximate rail stations. These are illustrated in figure 7. The Route 400 bus runs on a north-south axis along the length of the study area on County Route 605, Mount Ephraim Avenue, which becomes New Jersey Route 168, Black Horse Pike at Ferry Avenue. Four of the remaining five bus routes (450, 452, 453 457) cross NJ 168 at the northwest end of the study area after leaving Camden City along an east-west orientation in the region, though Route 453 is much shorter within this study area than the others. The Route 403 bus just nips the northern and southern ends of the study area, while paralleling NJ 168 along NJ 30.

Philadelphia and Camden are the primary origins for these bus services with their destinations outside the study area in suburban New Jersey. Three of the buses also have connections to rail stations outside the study area: PATCO's Ferry Avenue station (the 403 and 453 buses), Westmont station (the 450 bus), and Haddonfield station (the 457 bus). The PATCO system provides convenient commuter connections into the central business district of Philadelphia. In the following text, each bus route will be described along with the service measures of hours of operation, frequency, and routing within the study area.

Table 4 provides a statistical summary of the bus routes with intersecting service in the CR 605/NJ 168 corridor. The routes have been disaggregated into times where the route crosses the study area, and the figures shown have been calculated using year 2004 service maps and schedules. Peak trips are figured using inbound trips to Camden/Philadelphia.

TABLE 4
SUMMARY OF BUS SERVICE IN NJ 168/CR 605 STUDY AREA

Bus Route	Service Span In Study Area	Daily Wkdy Trips	Peak Trips Am/Pm	Average Am Pk	Corridor Pm Pk	Headway Off-Pk
400	3:58am-2:13am	128	12-Dec	15 min	15 min	24 min
403	5:16am-1:59pm	79	8-Nov	16 min	22 min	30 min
450	4:40am-10:50pm	41	3-Apr	45 min	60 min	56 min
452	6:14am-11:43pm	70	6-May	36 min	30 min	29 min
453	6:16am-7:08pm	28	3-May	36 min	60 min	69 min
457	6:01am-10:42pm	38	4-Jun	30 min	45 min	71 min

Source: NJ Transit 2004 Bus Schedules

Some of these calculations may differ from general route characteristics due to the smaller sample area and variations in the study area. Categories shown include the service span, weekday trips, peak trips, and average weekday inbound headways disaggregated by peak and off-peak periods. The waiting time for an inbound bus is shorter in the morning and afternoon peaks than the off-peak periods, as would be expected. The exception is the Route 452 bus whose morning peak frequency is slightly more than its peak frequencies. Further text describing each route in some details follows.

The Route 400 bus runs from Sicklerville to Philadelphia passing through the length of the study area along CR 605, Mount Ephraim Avenue and then NJ 168, the Black Horse Pike. The bus takes about 70 minutes to traverse the length of the study area from where CR 605 crosses NJ 561 to where NJ 168 merges with NJ 42. The first bus comes out of Turnersville at 3:58 a.m. with the last bus arriving back in Turnersville at 2:13 a.m., for a span of service of about 22 hours. There are 64 inbound trips daily; with the morning peak period between 6 a.m. and 9 a.m., with inbound service to Philadelphia about every 15 minutes. During the 4 p.m. to 7 p.m. afternoon peak period there are inbound headways of about 15 minutes between buses.

The Route 403 bus runs from Philadelphia to Turnersville, New Jersey, crossing Route 605 north of Ferry Avenue where the road is Mount Ephraim Avenue with minimal interaction with the corridor. Outside the study area, it connects with the Ferry Avenue PATCO station and runs along White Horse Pike connecting with the Echelon Mall and the Lindenwold PATCO station. The 403 bus briefly reenters the southern end of the study area on Sicklerville Road, making a sharp turn and leaving the study area south on Black Horse Pike where the road becomes NJ 42. The first bus originates from Philadelphia into the study area at 5:16 a.m. and the last trip back in is at 1:59 a.m. for a span of service of about 21 hours. There are 79 total trips passing through the north end of the study area. The morning peak period between 6 a.m. and 9 a.m. has 11 trips inbound to Philadelphia/Camden with service about every 16 minutes. Between 4 p.m. and 7 p.m., there are eight inbound trips with headways of 22 minutes. Off-peak headways inbound have average headways of about 30 minutes.

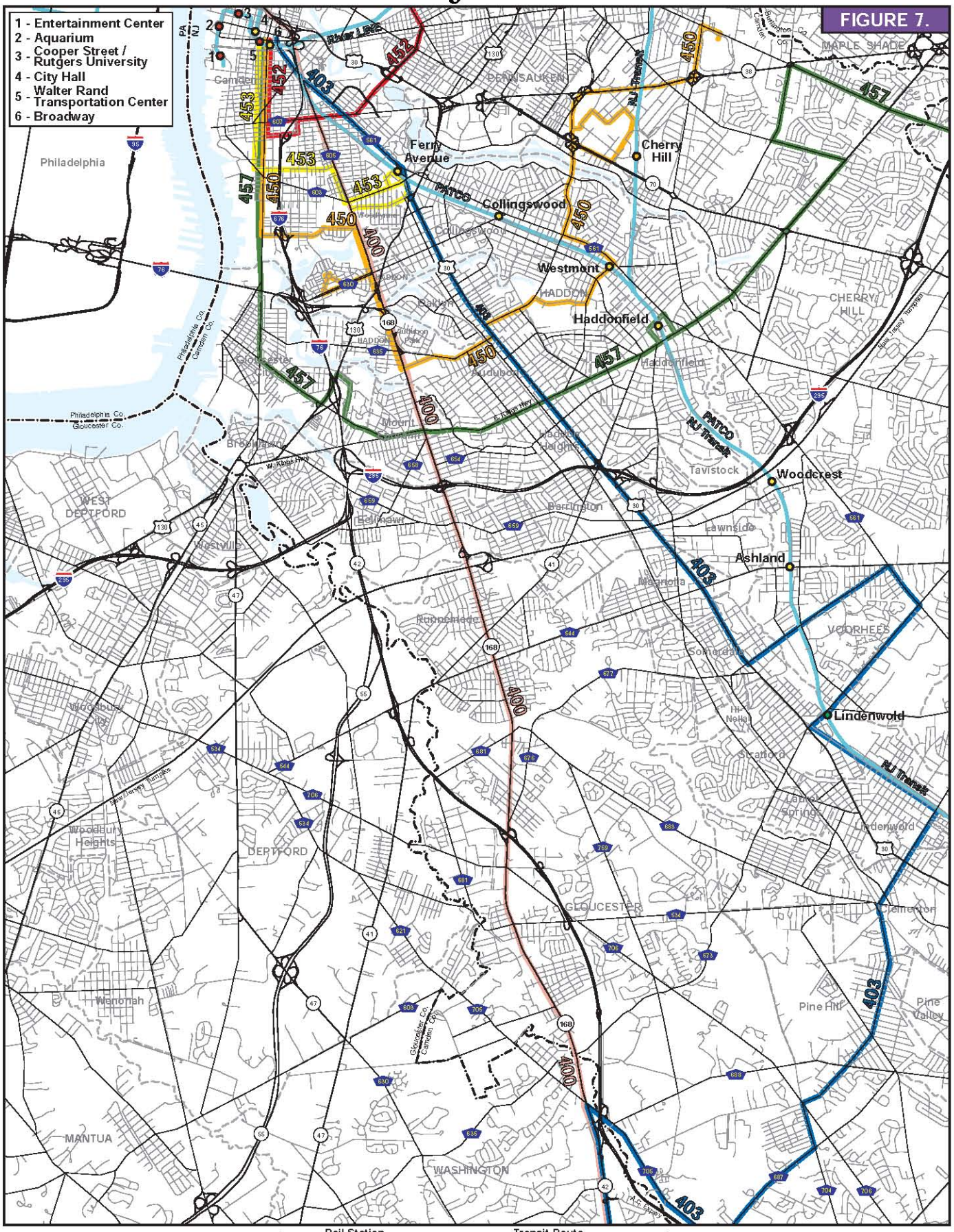
The Route 450 bus runs from Camden to the Cherry Hill Mall, zig-zagging along NJ 168 and through the study area. Buses travel on the Black Horse Pike making a detour in the Fairview community at Route 630, Collings Avenue, getting back onto Black Horse Pike and then turning off toward the Black Horse Center in Audubon and continuing on Cuthbert Road (NJ 636) to the Westmont PATCO station. From the PATCO station, the route continues on to the Cherry Hill Mall. The first service in the corridor (from Audubon) commences at 4:40 a.m. with the last bus passing through en route to the Walter Rand Transportation Center at 10:50 p.m. for about an 18-hour span of service. There are 45 minute inbound headways during the morning peak period between 6 a.m. and 9 a.m., which becomes about 60-minute headways during the afternoon peak and the rest of the day.

The Route 452 bus provides service along the waterfront in Camden (the New Jersey State Aquarium, Tweeter Center, and Campbell's Field) and crosses Mount Ephraim Avenue at the north end of the study corridor on Kaighn Avenue (Route 607). The first bus service is at 6:14 a.m. out of the Cramer Hill neighborhood in Camden with the final bus stop being at 11:43 p.m. back in Cramer Hill for a service span of about 17-and-a- half hours. There are 70 total trips passing through the northern tip of the study area. The average peak headway inbound during the morning peak is about 36 minutes and in the afternoon peak about 30 minutes between buses. The off-peak average inbound headway is 29 minutes

NJ 168 Corridor Study

Transit Network

FIGURE 7.



The Route 453 bus runs between Camden and the Ferry Avenue PATCO station. It runs mainly on Broadway Avenue and passes briefly through the north end of the study corridor on Mount Ephraim Avenue. The first bus leaves Camden passing through the study area at 6:16 a.m. with the last arrival at the Ferry Avenue PATCO station at 7:08 p.m. for about a 13-hour span of service. There are 28 total inbound and outbound trips per day. The average inbound headways in the morning peak are 36 minutes, an afternoon peak inbound of 60 minutes, and off-peak averaging 69 minutes.

Route 457 runs from Camden to Moorestown Mall traveling north on Kings Highway (NJ 551), to loop around the Haddonfield Train Station (PATCO) where it continues on Kings Highway (now NJ 41), turning east on Church Road (NJ 616) and north again on Fellowship Road (NJ 673) looping back at Harper Drive into the Moorestown Mall. The first bus departs the Haddonfield train station inbound to Camden, crossing into the corridor at 6:01 a.m., and comes back towards Camden at 10:42 pm for about a 16-and -a-half hour span of service. There are 20 inbound and 19 outbound trips for a total of 39 daily trips serving the corridor. The average inbound headways in the morning peak are 30 minutes, the average afternoon peak inbound is 45, and the off-peak headway averages 71 minutes.

Table 5 provides New Jersey Transit numbers for weekday bus ridership in comparable months of January for the years 2000 and 2004. These numbers show total weekday ridership, not just the ridership within the study area. Overall, there has been a ridership decline of about 1.3 percent between years 2000 and 2004. The 453 bus had the largest total and percent change with 209 fewer boards for a decline of about 32 percent. At the other extreme, both the 403 and the 452 buses had increases of about 6 percent and 8 percent, respectively. Taken together, the magnitude of ridership change is quite small with an absolute change of only 154 riders over four years time.

TABLE 5
CHANGES IN WEEKDAY BUS RIDERSHIP BY ROUTE

Bus Route	2000 Weekday Ridership	2004 Weekday Ridership	2000-2004 Percent Difference	2004 Total Trips	Avg. Ridership per Trip
400	4,680	4,595	-1.80%	128	36
403	2,804	2,961	5.60%	79	34
450	1,174	1,131	-3.70%	41	28
452	1,638	1,772	8.20%	76	25
453	651	442	-32.10%	28	16
457	789	683	-13.40%	38	18
Total	11,736	11,584	-1.30%		

Source: New Jersey Transit, Median Ridership Report, January 2000 & 2004

The 2004 average weekday ridership on all of these routes ranges from 36 per trip to 16 per trip. This does not mean, for example, that the 403 bus is near capacity with 39 people throughout the trip. Rather it means that, on average, 39 people ride the bus at some point during each trip. The 450 and 452 buses are an interesting example, with similar average ridership per trip (28 and 25 respectively), but differing weekday ridership totals (1,131 and 1,772 respectively), and contrasting ridership trends (-3.7 percent and +8.2 percent

respectively). There is greater average ridership on the smaller ridership Route 450, suggesting perhaps clustering in the peaks or along a specific segment of the routing. These are ideas that could be pursued further if warranted. The point here is that the average trip ridership is meaningful in light of the other statistics.

Patterning of Bus Ridership in Study Corridor

Method of Analysis

Matching New Jersey Transit zonal farebox data to the study area, one may generalize about the patterning of bus ridership. This includes the magnitude, generalized origins and destinations at the zonal level. This information provides insight into how the transit system is used by riders and how this movement relates to the corridor and is shown in figure 8. In this analysis the congruence between assigned farebox zones and the study corridor provide opportunity for analysis. The Route 400 represents transit movement through the CR 605/NJ 168 corridor. The other bus lines only minimally intersect the corridor at the northern end of the study area, consequently the zone level data does not permit generalizations using these routes.

The sample data for Route 400 uses three days taken midweek Tuesday, Wednesday, and Thursday on the 13, 14, 15 of January 2004. Other bus ridership data in this study uses data gathered in January in order to provide comparable numbers. The process of computing zonal distributions involved matching NJ Transit fare zones with study corridor geography. It was with this exercise in matching that the other bus routes were discarded as inappropriate for corridor analysis. Ridership was then tabulated between the zones: through the corridor (1 to 5), within the corridor (3 and 4), and internal-external corridor trips (zones 1 to 3 / 4 and 3 /4 to 5). Only boards that occurred cleanly inside the appropriate study corridor were accounted for in the final column in table 5. Fully a third of the identified zonal trips conclusively occur in the corridor.

Included in the table is the average weekday ridership for the month of January 2004. This is included to provide a sense of the volume carried in the corridor versus that carried outside the study corridor. Where fare zones are not congruent with the borders of the study area individual judgments must be made for their respective in/exclusion. The zonal totals in each direction were then averaged to provide a representative weekday travel movement which assumes symmetry. This means that the numbers shown graphically in figure 8 and numerically in table 6, express ridership in only one direction and must be doubled to approximate total ridership for that zone.

Analysis of the Route 400 Bus Ridership Patterns

The Route 400 bus travels through five zones, of which only two are entirely within the study area. Zone 1 is from the central business district of Philadelphia to Walter Rand Transportation Center, which is outside the study corridor. Zone 2 is from Broadway at Penn Street in Camden to the 76/676 ramp near Kendall Boulevard in West Collingswood, which straddles the northern part of the corridor. Zone 3 continues from near Kendall Boulevard to the Black Horse Pike at Clements Bridge Road (NJ 41) in Runnemede. Zone 4 is from the Black Horse Pike at Clements Bridge Road to the Black Horse Pike at County House Road (NJ 705) in Gloucester Township. Zone 4 leaves about half a mile in the study area falling into Zone 5. The last zone stretches from the Black Horse Pike at County House Road south to Sicklerville. The entire

Route 400 runs about 13.1 miles in the study area with an approximate time of 70 minutes for an average speed of about 11 miles per hour.

Table 6 shows the distribution of trips with numbers in parentheses showing the bi-directional totals. This reflects the average number of riders during the time of data collection, incorporating the assumption that riders in one direction will return in the other direction. The distribution of these trips is shown in figure 8, though the exact breakout of riders within the sub areas (such as into zones 3 / 4) are not available.

TABLE 6
DISTRIBUTION OF ROUTE 400 TRIPS (ASSUMES SYMMETRY)

Bus Route	Through Trips	Internal Trips	Phl/Camden Ex-In Trips	Southern Ex-In Trips	Total Weekday*	% in Corridor
400	66 (132)	124 (248)	371 (742)	188 (376)	4,595*	33%

Source: New Jersey Transit Farebox Counts, January 2004
*New Jersey Transit Median Ridership January 2004

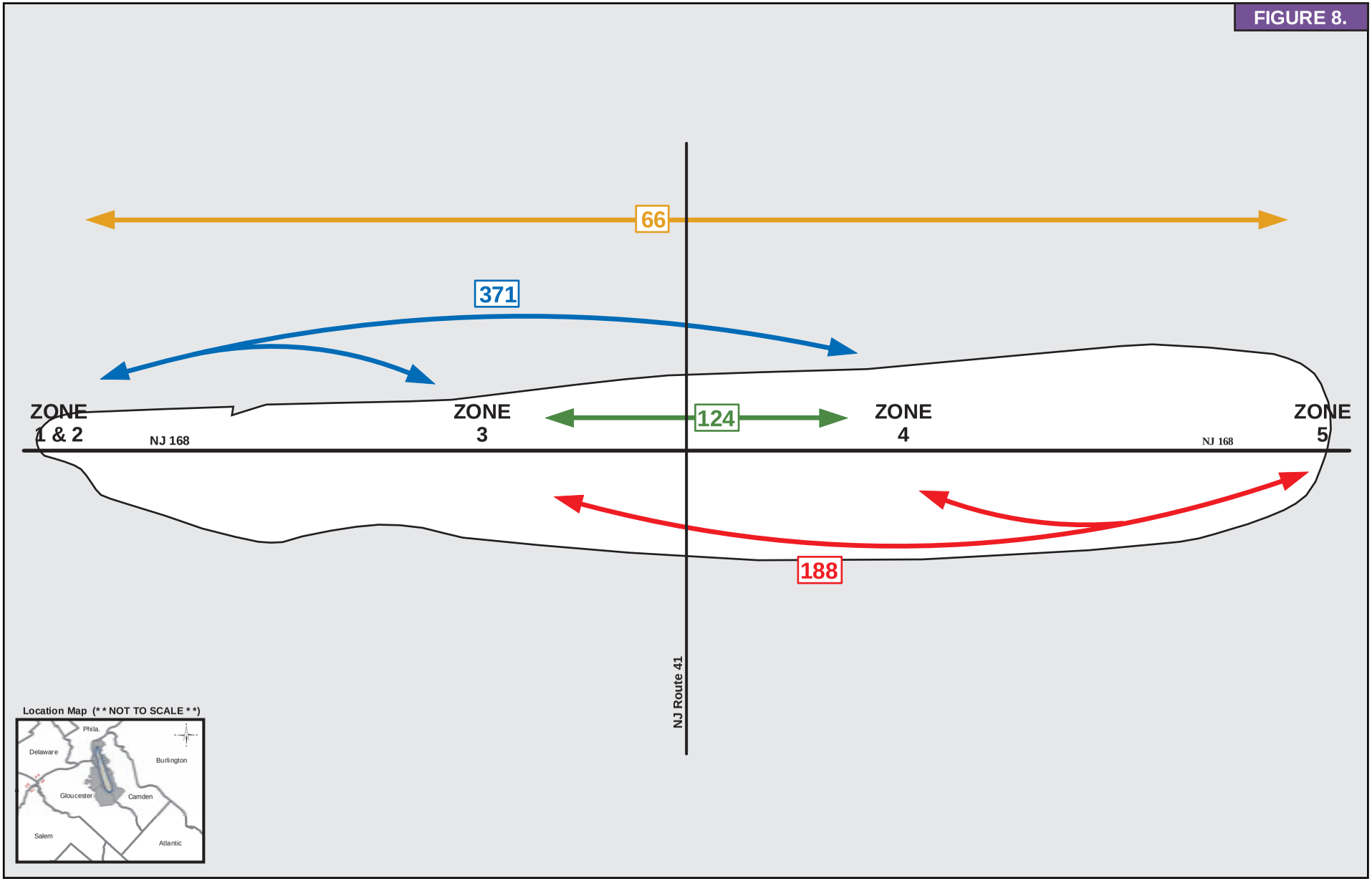
As stated above, only about one-third of the average total weekday trips travels into or through the defined study area. Over the course of the day there are 132 “through” trips from zone 1 to zone 5 and back again. There are 248 weekday trips internally, between and within zones 3 and 4. External-internal trips between zone 1 and either zones 3 or 4 have the largest single number of trips with 371 boards in each direction for a total of 742 trips. These are oriented inbound to the Philadelphia or Camden/Walter Rand Transportation Center in the morning and outbound to either zones 3 or 4 in the evening. The external-internal trips between zone 5 and either zones 3 or 4 at the northern end have 188 boards in each direction for a total of 376.

One item not included in table 6 or figure 8 are the trips within zone 2, the zone straddling CR 605, Camden City portion of the study area. This zone was excluded because the distribution of trips in the study area can not be cleanly determined. In Zone 2, between Walter Rand and the I-676/76 ramps near Kendall Boulevard, there were 982 trips in each direction. This is more than double the total one-way trips in table 6. The obvious conclusion from this is that the trips are being generated at the Walter Rand Transportation Center, but without other data or supplemental counts one can not say definitively.

NJ 168 Corridor Study

Route 400 Trip Distribution

FIGURE 8.



0 1 2
Miles

Source: NJ Transit passenger fare 3 day sample 4,5,6 November 2003

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Existing Conditions: Rail Transit Service

There are no rail stations within the defined study corridor, however, buses passing through the corridor make connections with three PATCO rail stations outside the corridor. The 403 and 453 bus runs connect Camden City and the Ferry Avenue PATCO station. The 450 bus has a stop at the Westmont PATCO station on its route between Camden City and the Cherry Hill Mall. Furthest east on the PATCO line, the 457 bus loops around the Haddonfield Station on its way from Camden City to Moorestown Mall. The PATCO line provides rapid and frequent access to employment in Philadelphia`s central business district. Average weekday boards and parking usage at the three rail stations bordering the corridor are shown in table 7. Included in the table is the volume of available parking and the rate of use at each station.

TABLE 7
AVERAGE WEEKDAY BOARDS AND PARKING USE AT RAIL STATIONS

PATCO Station	2000 Daily Boards	2003 Daily Boards	Percent Change	Parking / %Use*
Ferry Avenue	2,870	2,390	-16.70%	1,900 / 94%
Westmont	1,744	1,543	-11.50%	1,149 / 100%
Haddonfield	1,854	1,491	-19.60%	1,021 / 94%

Sources: PATCO Average Weekday Riders, 2000 and 2003 Passenger Statistics
*DVRPC PATCO Parking Study, February 2002

Table 7 describes the number of riders boarding the PATCO highspeed line inbound to Philadelphia and provide data as to what extent parking may limit their boards. The stations listed are three of the four inbound stations prior to entering the City of Camden, the fourth being Collingswood. Each of these stations have connections with the bus routes traveling through the study area, though none of the stations is in the study area.

Each station has experienced a decline in boards. The Ferry Avenue station has had the largest absolute decline, losing 480 daily boards between 2000 and 2003, while Haddonfield station has had the greatest relative decline (-20 percent). These may be explained by the regional trend of declining transit ridership as well as a shift in jobs out of the Philadelphia central business district to the suburbs. Both explanations are two sides of suburbanization in the region.

Parking may only slightly constrain the number of boards at each. There have been only marginal differences in parking counts between 2000 and 2003, so the 2002 counts remain valid for this analysis. Only the Westmont parking lot is at capacity and the other parking lots have unused capacity. The decline in boards at each station has narrowed the gap between potential users and available parking, since as boardings decline, parking use will remain high as empty parking spaces are appropriated by those who were previously dropped off. The Ferry Avenue and Haddonfield stations are still about 100 automobiles under capacity, though at Haddonfield this may be due to the lack of free parking and the easy access to more free parking at the other stations.

DVRPC's February 2002 technical memorandum *Ridership and Parking Requirement Forecasts for the PATCO High Speed Line New Jersey Stations* examined current and future demand for station parking. If the current catchment areas are held constant, then station

parking space requirements are projected to be adequate to satisfy projected demand in future years 2011 and 2025. The parking demand at these three stations is projected to decrease over the next 20 years. Looking at future demand suggests that not only is parking demand being met now, but likely to be met in the foreseeable future with the current number of parking spaces.

Issue Identification and Recommendations

- Land use in the northern end of the study area, with higher densities, mixed use development, and multiple transit connections better supports transit than the newer suburban development in the southern end of the study area. The presence of the Walter Rand Transportation Center and a number of bus routes near the northern end of the study area contribute positively to this mobility.

- Train and bus ridership has collectively declined in the last four years. One outcome from this is that PATCO parking will likely not need to be expanded in the future.

- Bus ridership is growing in some service areas and declining in others. Again this is likely a function of the changing job/skills match, served along and by each route. It is recommended that transit amenities such as signage and shelters be explored at employment nodes. These are strong selling points for employee recruitment and retention.

- The time required to traverse the study area on the Route 400 bus is long and slow (about 70 minutes to travel 13.1 miles). It is recommended to explore signal coordination, signal preemption, and the use of shoulders as express bus lanes during the peaks in the corridor. The use of enhanced shoulders as bus travel lanes and traffic signal changes have been used elsewhere by NJ Transit through its Enhanced Bus Improvements Program (EBIP). One such example is the Route 9 corridor in Ocean and Middlesex counties.

- Bus routes 403, 450, 453 and 457 connect with the PATCO high speed line. The frequent PATCO service, and less frequent bus service, make it easier to go from the bus to the train than from the train to the bus. It is recommended that real time information, such as when the next train or next bus is arriving, be provided along with prominently posted updated system maps at shelters.

- Subdivision guidelines limiting curb cuts, encouraging full shoulders, and creating access roads encourage safer traffic movements by reducing the potential for crashes and speeding the traffic flow. The NJ 168 corridor is of sufficient length for these options to be explored as ways of making the corridor more suitable for transit usage.

4.6 Bicycle and Pedestrian Issues

NJDOT Bicycle and Pedestrian Master Plan
In 1995 the New Jersey Department of Transportation released the state's first bicycle and pedestrian master plan. The year 2004 saw the completion of a major update of that plan. The original plan consisted of a comprehensive set of policies designed to achieve a vision for bicycling and walking. The 2004 update, or Phase 2, revisited the vision, goals and objectives of the 1995 policy plan.

Reflecting changing concerns and priorities, the revised vision states: *New Jersey is a state where people choose to walk and bicycle; residents and visitors are able to conveniently walk and bicycle with confidence and a sense of security in every community; and both activities are a routine part of the transportation and recreation systems and support active, healthy life styles.*

While Phase 1 focused on policies, Phase 2 concentrates on facilities. This focus is the result of heightened interest in developing bicycle and pedestrian accommodations to the extent that funding requests for such projects far exceed available funds. Therefore, the primary goal of Phase 2 is to provide clear guidance on the most efficient and effective use of federal, state, and local resources to implement bicycle and pedestrian initiatives.

Phase 2 prioritized, through the application of demand and suitability measures, segments of the CMS roadway network for bicycle and pedestrian infrastructure improvements. Segments were identified as high priority where demand is high yet facilities are least suitable.

Bicycle demand is principally a function of demographics and mode split, where a younger population, college students, a high-transit mode split and numbers of current bicycle commuters contribute to demand. Pedestrian demand is derived from street network, population and employment density, and relative balance of land uses.

Suitability is a level-of-service measure, a way of quantifying how comfortable a bicyclist or pedestrian would be traveling along or across a given facility. Bicycle Suitability is determined by roadway characteristics such as traffic speed and volume, presence of shoulders, or shoulder lane width. Pedestrian suitability, defined as the ability of a person on foot to cross the roadway, factors in the speed and volume of traffic, the presence of a median refuge, and spacing of signalized crossings to determine overall delay from waiting for a safe gap in traffic in which to cross. Details on the analytical methodology used to classify priority segments may be found in the Phase 2 plan document.

NJ 168 Corridor Study Area Assessment
The priority segments identified in the Statewide Bicycle and Pedestrian Master Plan Phase 2 within the study area are listed in tables 8 and 9.

Route 168 south of the New Jersey Turnpike has shoulders suitable for bicycling. Through the borough of Mount Ephraim, the roadway takes on a more densely built urban character, and the shoulders are replaced by on-street parking. The roadway's section through Haddon Township is unpleasant for bicycle and pedestrian travel, characterized by a lack of shoulders and auto-oriented commercial development. Scattered short segments found throughout the length of the main line present barriers for pedestrian crossing due to infrequent signalized intersections.

Route 130 presents an inhospitable environment for both modes. Sidewalks are narrow and inadequately separated from the roadway, shoulders are absent, and crossing opportunities in the form of signalized intersections with crosswalks are infrequent. The intersection of routes 130 and 168 presents a barrier to bicycle and pedestrian movement along the Route 168 main line due to a geometry that facilitates high motor vehicle speeds, and presents lengthy crossings.

County roads were not subject to the NJDOT suitability analysis as a part of this study. Rough bicycle suitability estimates, however, may be found on the Greater Philadelphia Regional Bicycle Map (2003, Bicycle Coalition of Greater Philadelphia). Roads were ranked "Bicycle Friendly," "Average," and "Below Average." Only Graisbury Avenue in Audubon rated "Bicycle-Friendly." Roads rated "Below Average" included:

- Blackwood-Clementon Road in the immediate vicinity of the Route 42 interchange
- Little Gloucester Road between Blackwood-Clementon Road and Erial Road and
- Erial Road between Brae Mar Avenue and College Road.

These roads provide critical links between the Blackwood business district, the concentration of retail stores and apartments along Blackwood-Clementon Road, and Camden County College. Therefore these segments should receive high priority for bicycle level of service improvements including bicycle lanes.

Mount Ephraim Avenue, CR 605, through the City of Camden, is the only segment of the corridor having readily observable bicycle volume, and has the highest level of pedestrian activity. Along it are found two hospitals, both significant employers; a magnet high school specializing in medical arts; and a significant local retail district. Although not identified as high priority in the state plan, this segment should be considered for bike lanes coincident with the next resurfacing.

Road segments identified as high-priority pedestrian should be considered for sidewalk improvements, crosswalk treatments, and more marked crosswalks. Segments identified as high-priority bicycle should be considered for bike lanes or shoulders to be installed coincident with the next resurfacing; and "Share the Road" warning signs should be installed at appropriate locations. Engineers should reconsider the widths of the general-purpose lanes in order to create room for bike lanes or shoulders.

Due to its urbanized nature, including frequent bus service along the Route 168 main line and many other roads within the corridor, and the intensity of land use, the entire corridor should be considered a pedestrian and bicycle zone, where accommodation of these modes is routinely considered in every roadway project including resurfacing. An inventory of pedestrian amenities at signalized intersections along NJ 168 is shown in table 10. Descriptions of specific problem locations for pedestrians and recommendations for their remediation are found elsewhere in this report.

TABLE 8
HIGH PRIORITY BICYCLE LINKS

Route	Begin Mile Post	End Mile Post
NJ 168	2.11	2.65
NJ 168	3.12	4.3
US 130	28.6	29.46

TABLE 9
HIGH PRIORITY PEDESTRIAN LINKS

Route	Begin Mile Post	End Mile Post
NJ 168	3.6	4.3
NJ 168	5	5.2
NJ 168	7.02	7.38
US 130	26.4	29.46

Bicyclist and Pedestrian Crashes

An analysis of NJDOT crash data for the Route 168 corridor, including all state and county roadways, for the years 2001 and 2002, indicated no crashes occurred that involved bicyclists or pedestrians as the primary event. Only two years of crash data were analyzed because 2001 marked the initiation of a new data collection and recording procedure, and because 2002 data is the most recent available. Given the brief history analyzed, it is remarkable nonetheless that no crashes of this type appear in the data. That no crashes actually occurred is highly unlikely given the length of the corridor, the volume of pedestrian and bicycle traffic readily observed along the Mount Ephraim Avenue (CR 603) segment of the corridor, the intensity of development, demographics, and the operation of NJ Transit's Route 400 bus service, which carries the highest daily passenger volume of any local bus route in the region. Close scrutiny should be given to the new crash data collection methodology to ensure that motor vehicle crashes with pedestrians and bicyclists are recorded and easily identified.

Existing, Proposed, and Planned Trails

Gloucester and Mount Ephraim Rail Trail. The right of way is 5.5 miles long, roughly parallel with Route 168. Approximately two miles total have been paved in two segments: between Lakeland Road and Cole Road in Blackwood, and between Eighth Avenue and Kings Highway (NJ 41) in Runnemede. Much of the remainder between Glendora and Glenloch has cinder base and is already being used intensively as a bike and walking trail. With the exception of the completed Runnemede segment, the right of way between Bellmawr and Glendora is overgrown but passable. If completed, this trail would be a suitable alternative to Route 168 for through bicycle traffic.

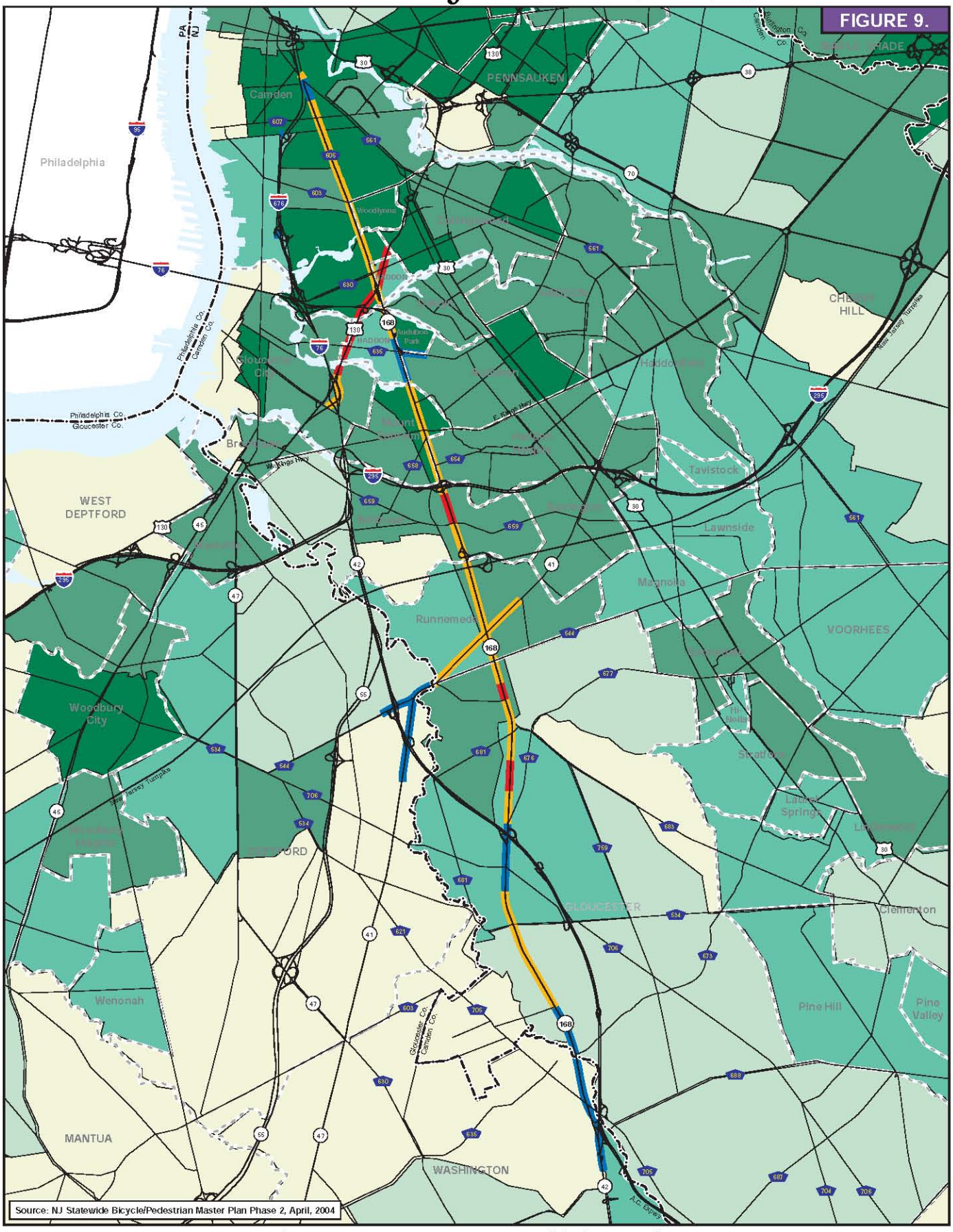
Haddon Lake Park Bike Trail. Existing 1.7-mile, asphalt surface trail within the park in Haddon Heights, Mount Ephraim and Audubon boroughs, running from Station Avenue to the Mount Ephraim playground. With improvements at either end, this trail could connect the Haddon Heights business district with the Black Horse Pike Shopping Center.

West Jersey and Seashore Rail Trail. The right-of-way is still visible along this proposed 4.7 mile trail from Haddonfield to Westville. The line was only 70 percent completed when abandoned. All poles and wires have been removed.

NJ 168 Corridor Study

Pedestrian Crossing Improvement Priority: CMS Network
Daily Walk Trips by Census Tract

FIGURE 9.



Source: NJ Statewide Bicycle/Pedestrian Master Plan Phase 2, April, 2004

0 1 2
Miles

Walk Trips
0 - 5
6 - 10
11 - 20
21 - 40
40 - 100

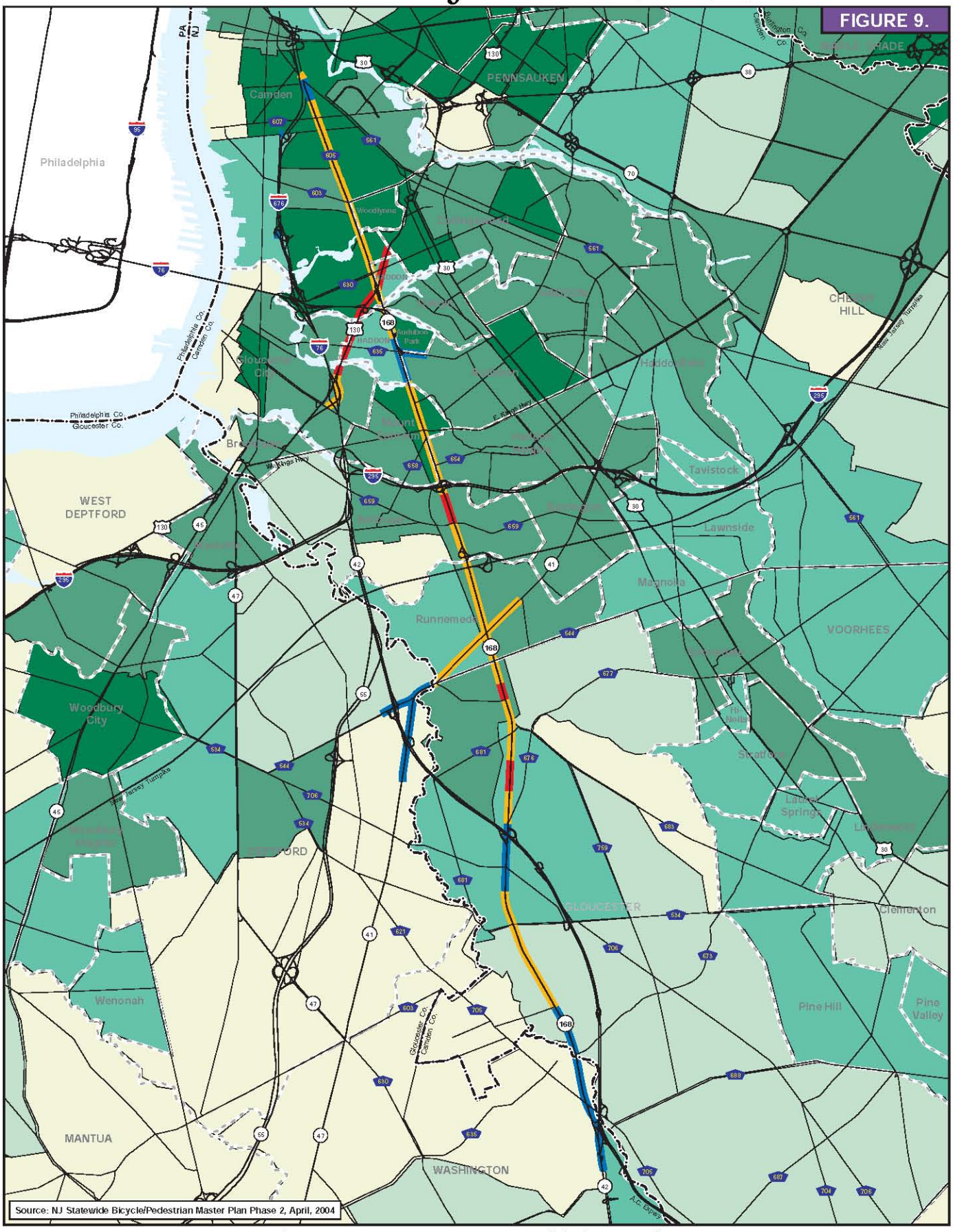
Priority
HIGH
MEDIUM
LOW

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
SEPTEMBER 2004

NJ 168 Corridor Study

Pedestrian Crossing Improvement Priority: CMS Network
Daily Walk Trips by Census Tract

FIGURE 9.



Source: NJ Statewide Bicycle/Pedestrian Master Plan Phase 2, April, 2004

0 1 2
Miles

Walk Trips
0 - 5
6 - 10
11 - 20
21 - 40
40 - 100

Priority
HIGH
MEDIUM
LOW

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
SEPTEMBER 2004

TABLE 10
PEDESTRIAN AMENITIES AT SIGNALIZED INTERSECTIONS ON NJ 168

Road Name	Route Number	NJ 168 Mile Post	NJ 168				Cross Street			
			Striped Crosswalks	Push Buttons	Signal Head	Curb Ramp	Striped Crosswalks	Push Buttons	Signal Head	Curb Ramp
Ferry Avenue	CR 603	10.75	Y	N	N	Y	Y	N	N	N
Woodlynne Avenue **T**	Local	10.66	Y-NS	Y	N	N	Y	N	N	N
Fairview Street	Local	10.43	Y	Y	N	Y	N	N	N	N
Grant Avenue	Local	10.01	Y	Y	N	N	Y-SS	Y	N	Y-SS
Collings Avenue	CR 630	9.91	Y	Y	Y	N	Y, F	Y	Y	Y-SS
130	US 130	9.72	Y	N	N	N	Y	N	N	N
Kendall Blvd. **T**	CR 650	9.5	Y, F	Y	Y	N	Y-SS, F	N	N	Y-WS
Kennedy Drive	Local	9.19	Y-SS	Y	N	N	N	Y	N	N
Nicholson Road	CR 635	8.99	N	N	N	N	N	N	N	N
Merchant Street	Local	8.62	N	Y	N	N	Y	Y	N	Y
Valley Road	CR 660	8.39	Y-SS	Y	N	Y	N	N	N	Y
Kings Highway	CR 551	8.07	Y	Y	Y	Y	Y	Y	Y	Y
Prospect Ridge Blvd. **T**	CR 654	7.67	Y-NS	Y	Y	Y	Y	N	Y	Y
Maple Avenue	Local	7.5	N	Y	N	N	N	N	N	Y
Hendrickson Avenue	Local	7.35	N	N	N	N	N	N	N	Y
Browning Road	CR 659	6.98	Y, F	Y	Y	Y	Y, F	Y	Y	Y
Benigno Blvd. **T**	Local	6.79	Y-NS	Y	Y	Y	Y	N	N	Y
Ninth Avenue	Local	6.28	Y	Y	Y	Y	Y	Y	Y	Y
Third Avenue **OS**	Local	5.9	Y	Y	Y	Y	Y	Y	Y	Y
Clements-Bridge Road	NJ 41	5.71	Y	Y	Y	Y	Y	N	Y	Y
Evesham Road	CR 544	5.39	Y	Y	Y	Y	Y	Y	Y	Y
Station Avenue	Local	4.94	Y	Y	Y	Y	N	N	N	Y
Lower Landing Road	CR 681	4.56	N	Y-SS	N	Y	N	Y	N	Y
Almonesson Road	CR 706	3.07	Y	Y	Y	Y	N	N	N	Y
Church Street	CR 534	2.43	Y	Y	Y	Y	Y	Y	Y	Y
Lakeland Avenue	CR 747	1.39	Y	Y	N	Y	Y	N	N	Y
College Drive	Local	0.81	N	Y-SS	N	Y	N	Y	N	Y
Wilson Road	Local	0.52	N	Y	N	N	N	Y	N	N
Sicklerville Road	CR 705	0.25	Y	Y	N	Y	Y	Y	N	Y

Intersection Type		Location of Striping/Ramp		Striping Condition		
T	T-Intersection	NS	North Side	F	Faded	
OS	Off-set Intersection	SS	South Side			
		WS	West Side			

ex: Benigno Boulevard meets NJ 168 at a T-intersection, at NJ 168 mile post 6.79.
A striped crosswalk, push buttons, signal heads, and curb ramps, are in place for crossing NJ 168 on the north side of the intersection
For crossing Benigno Boulevard, striped crosswalks and curb ramps are available. Push buttons and signal heads are not available.

4.7 Journey-To-Work Travel (2000)

A significant share of all trips made on an average weekday are those involving commuting to and from work (approximately 20 to 25 percent of total trips). Typically work trips are compressed into just two to three hours in the morning and two to three hours in the evening on any given workday. The inclination to use public transportation in completing work trips is higher than for any other trip purpose. As a result, travel to and from work creates a high temporal demand on highway and transit facilities and contributes significantly to the degree of congestion and delay encountered on those facilities.

In order to gain a better understanding of these conditions within the corridor, detailed evaluations of Journey-to-Work data from the 2000 Census were conducted.

Table 11 summarizes some of the information pertinent to the study corridor. At the time the census was conducted (April 2000) there were about 225,000 work trips made to, from, and within the study corridor's municipalities. Roughly 60 percent of the corridor's work trips were outbound to job sites (131,827), and 40 percent were inbound (93,427).

TABLE 11
JOURNEY-TO-WORK CHARACTERISTICS

	Workers Traveling From Municipality					Workers Traveling to Municipality				
		Means of Transportation					Means of Transportation			
Municipality	Total Workers	Drive Alone	Car/Van Pool	Public Transit	Other	Total Workers	Drive Alone	Car/Van Pool	Public Transit	Other
Audubon Borough	4,545	3,670	344	230	285	1,730	1,395	130	55	145
Audubon Park Borough	486	375	85	8	14	366	280	54	20	4
Bellmawr Borough	5,545	4,345	730	185	280	5,865	4,800	680	130	254
Camden City	21,970	10,100	4,915	4,375	2,580	30,380	21,850	3,945	2,475	2,105
Collingswood Borough	7,280	5,280	755	645	600	4,595	3,665	540	75	309
Deptford Township	12,580	10,380	1,515	340	345	11,235	9,365	1,155	399	319
Gloucester Township	31,705	25,735	3,425	1,380	1,165	13,570	11,320	1,495	270	499
Gloucester City	4,835	3,525	805	210	290	2,665	2,085	280	59	239
Haddon Township	6,975	5,230	615	595	530	3,185	2,505	305	95	279
Haddon Heights Borough	3,540	2,990	285	125	140	2,420	2,070	210	25	114
Mount Ephraim Borough	2,095	1,675	209	100	109	820	615	75	35	94
Oaklyn Borough	2,080	1,670	190	130	100	970	765	150	4	50
Runnemede Borough	3,975	3,015	500	170	290	2,455	2,055	170	35	199
Washington Township	23,005	19,710	2,275	490	530	12,970	11,470	1,035	149	314
Woodlynne Borough	1,211	765	165	195	90	201	155	15	0	25
Total	**130,616**	**97,700 (74.8%)**	**16,648 (12.7%)**	**8,983 (6.9%)**	**7,258 (5.6%)**	**93,226**	**74,240 (79.6%)**	**10,224 (11.0%)**	**3,826 (4.1%)**	**4,924 (5.3%)**

SOURCE: 2000 US Census

Major work trip origin-destination pairings (desire lines) to / from the corridor municipalities were determined and are shown in figures 11 and 12. For analytical purposes, work trip pairings between municipalities were identified as "major" when a threshold of 500 or more one-way worker trips, between municipal pairs, was equaled or exceeded. As a result, data for some of the smaller boroughs, which are not substantial producers or attractors of work trips, are not shown on the maps. Figure 11 shows outbound work trips and figure 12 illustrates inbound work trips. On each figure, the major work trips desire lines, those exceeding 500 work trips, are represented by arrows with solid lines. The value in the center of the municipality, which is common to both figures, is the number of worker trips that begin and end in the same municipality.

Observations about the desire lines shown on the figures are:

1) A marked gravitation of work travel to municipalities containing some of the region's important development centers: Philadelphia (Center City Philadelphia), Camden, and Cherry Hill.
2) Short trip lengths – work trips are less than ten airline miles in length and frequently take place within municipalities (11percent of all trips) or between adjacent municipalities.
3) Inter-municipal travel along the I-295 corridor (between Bellmawr / Deptford / Gloucester Township / Runnemede and Cherry Hill / Moorestown / Mount Laurel) accounts for 6,756 daily trips.
4) Trip pairings between Gloucester Township and Philadelphia (1,737 daily trips), Gloucester Township and Deptford Township (1,137 daily trips), and between Gloucester Township and Washington Township (1,099 daily trips) represent other notable trip pairings in the corridor.

4.8 Future Demographics

Table 12 summarizes the projected changes to municipal population and employment.

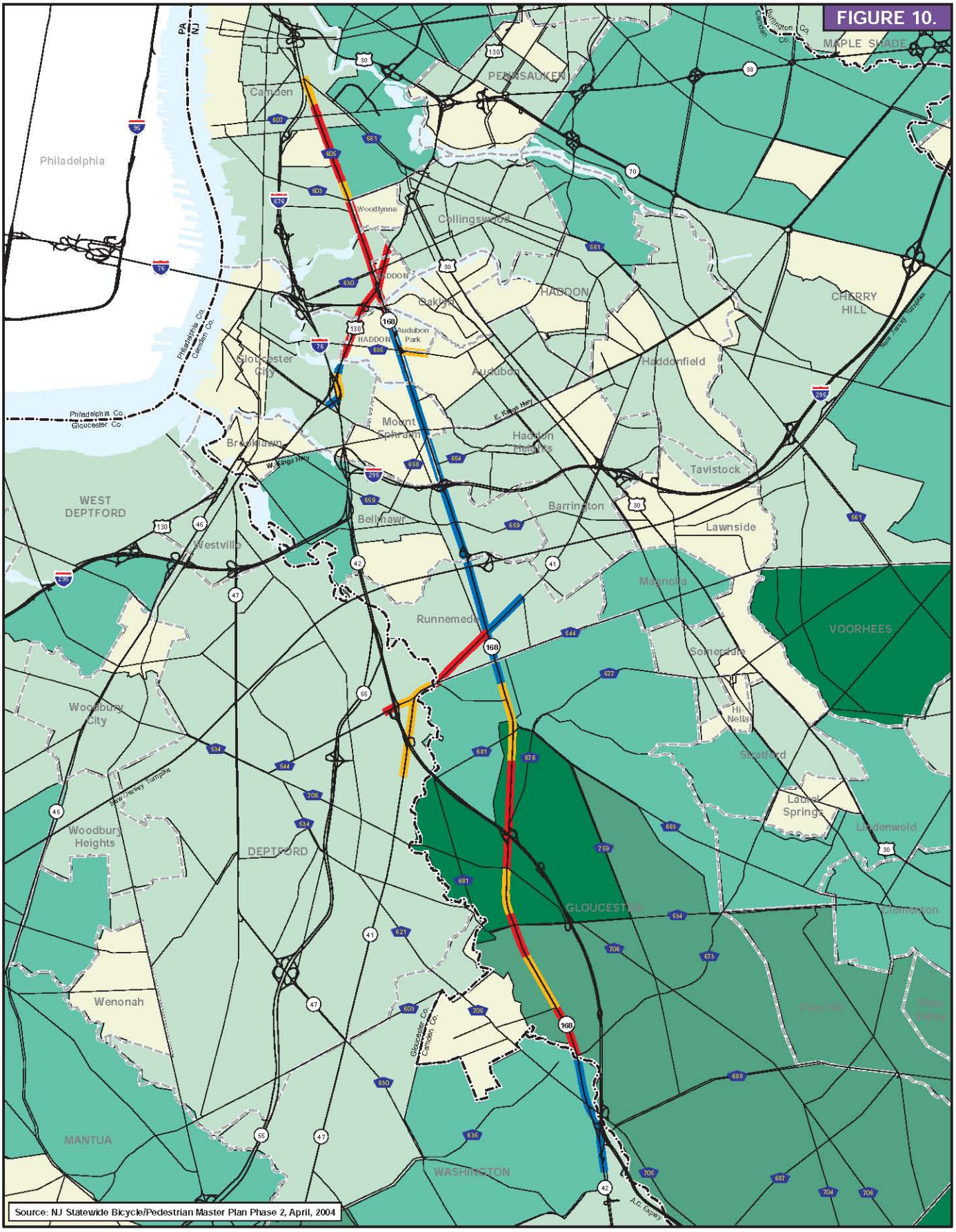
By way of summary, the greatest absolute increases in population are projected for Gloucester Township, which shows gains of 16,000 persons between 2000 and 2025, followed, although at some distance, by Washington Township (7,400 persons). Over the same period, the city of Camden is projected to lose 6,000 persons. The greatest employment gains will also take place in Gloucester Township (5,900 jobs) and Washington Township (5,000 jobs), followed by Runnemede Borough (2,300 jobs) and Deptford Township (2,000 jobs). The total population of the study area municipalities will stay about the same, increasing by only 2 percent, but with a significant geographical shift. The total employment of the study area municipalities between 2000 and 2025 is projected to rise by 17 percent.

Figures 13 and 14 show the magnitude of the changes stratified by Transportation Analysis Zones (TAZ).

NJ 168 Corridor Study

Bicycle LOS Improvement Priority: CMS Network
Daily Bike Trips by Census Tract

FIGURE 10.



Source: NJ Statewide Bicycle/Pedestrian Master Plan Phase 2, April, 2004

0 1 2
Miles

Bike Trips
0 - 250
251 - 500
501 - 1,000
1,001 - 2,000
2,001 - 8,500

Priority
HIGH
MEDIUM
LOW

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
SEPTEMBER 2004

NJ 168 Corridor Study

Selected Major Journey-to-Work Travel Patterns TO Study Area Municipalities

FIGURE 12.

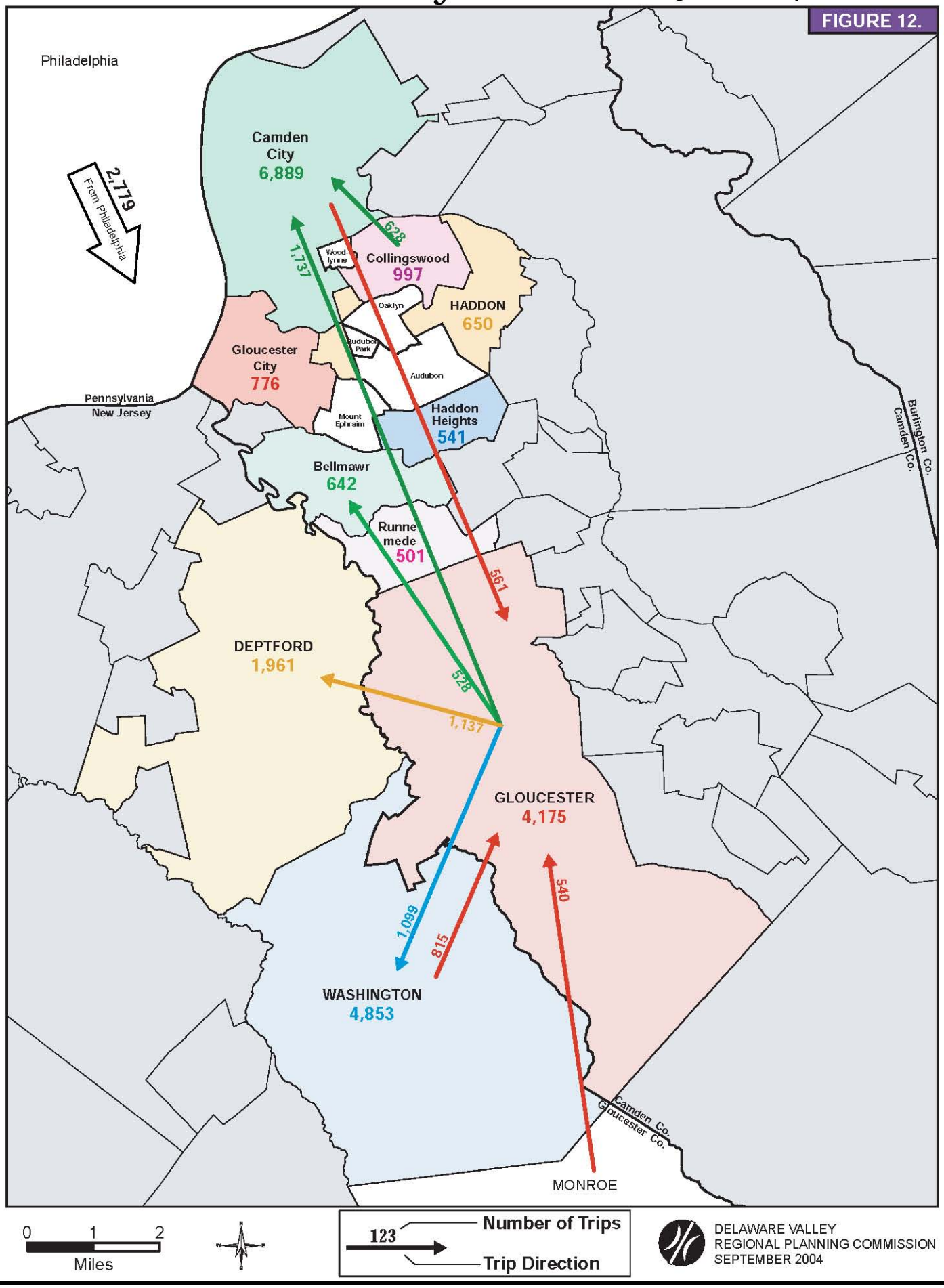


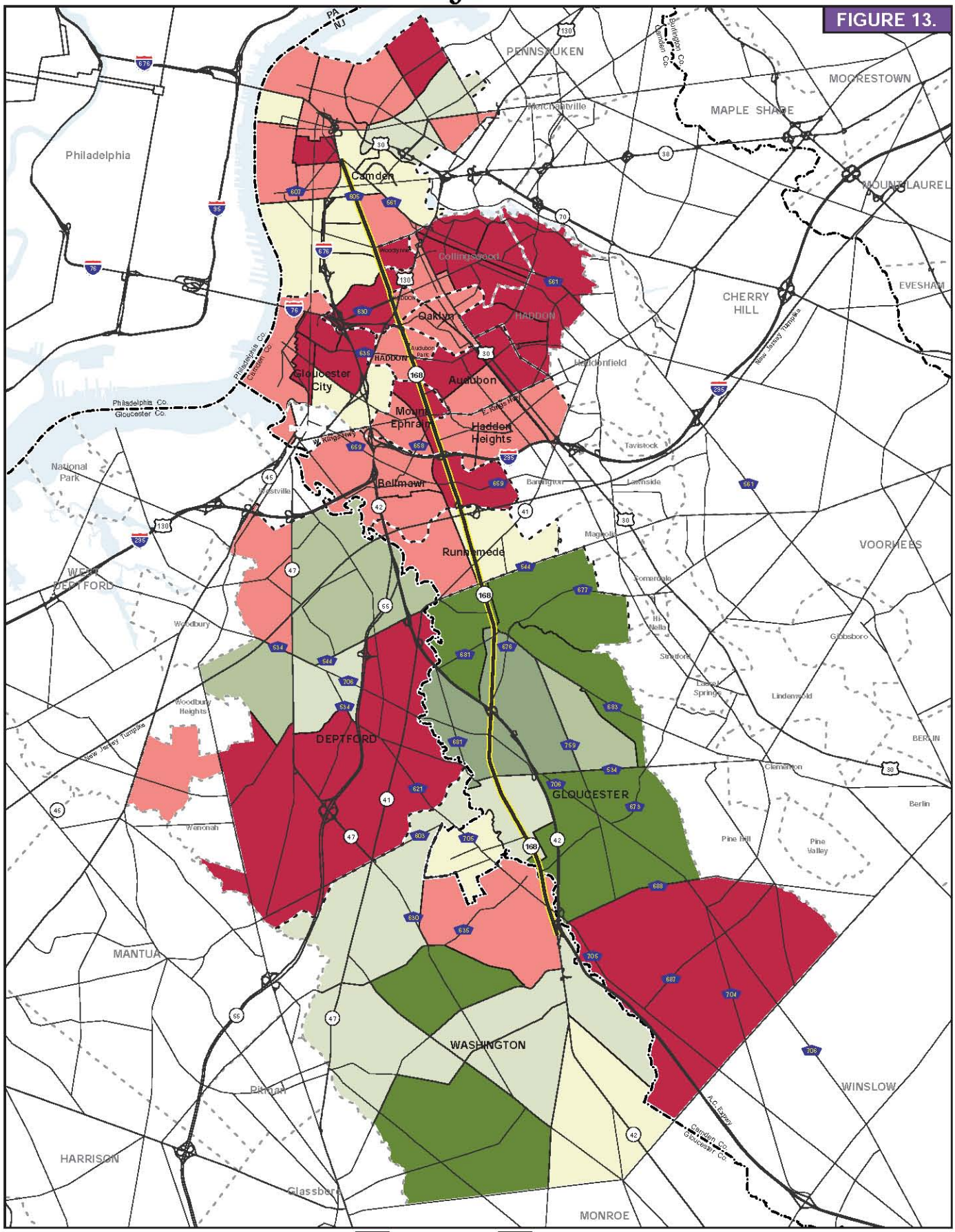
TABLE 12
DEMOGRAPHIC PROJECTIONS: 2000 and 2025

		Population				Employment			
				Change				Change	
Municipality	Area (mi^2)	2000	2025	Abs.	%	2000	2025	Abs.	%
Audubon Borough	1.5	9,180	7,730	-1,450	-16	2,006	1,970	-36	-2
Audubon Park Borough	0.2	1,100	820	-280	-25	607	660	53	9
Bellmawr Borough	3.1	11,265	9,370	-1,895	-17	5,462	5,040	-422	-8
Camden City	10.4	79,905	73,900	-6,005	-8	32,054	33,370	1,316	4
Collingswood Borough	1.9	14,326	11,970	-2,356	-16	5,197	4,790	-407	-8
Deptford Township	17.6	26,770	29,460	2,690	10	12,304	14,350	2,046	17
Gloucester City	2.8	11,484	9,110	-2,374	-21	2,951	2,420	-531	-18
Gloucester Township	23.2	63,310	79,330	16,020	25	14,145	20,060	5,915	42
Haddon Township	2.8	14,651	12,800	-1,851	-13	4,215	4,230	15	0
Haddon Heights Borough	1.6	7,545	6,480	-1,065	-14	2,853	4,130	1,277	45
Mount Ephraim Borough	0.9	4,495	3,680	-815	-18	1,035	1,310	275	27
Oaklyn Borough	0.7	4,188	3,600	-588	-14	1,100	1,110	10	1
Runnemede Borough	2.1	8,535	8,140	-395	-5	3,212	5,540	2,328	72
Washington Township	21.6	48,155	55,580	7,425	15	11,374	16,400	5,026	44
Woodlynne Borough	0.2	2,795	2,450	-345	-12	325	450	125	38
Total	**90.8**	**307,704**	**314,420**	**6,716**	**2**	**98,840**	**115,830**	**16,990**	**17**
Camden County	227.5	507,889	513,506	5,617	1	216,865	241,885	25,020	12
Gloucester County	337.0	255,719	322,487	66,768	26	99,436	121,506	22,070	22

NJ 168 Corridor Study

Projected Change in Study Corridor Population
2000 - 2025 (by TAZ)

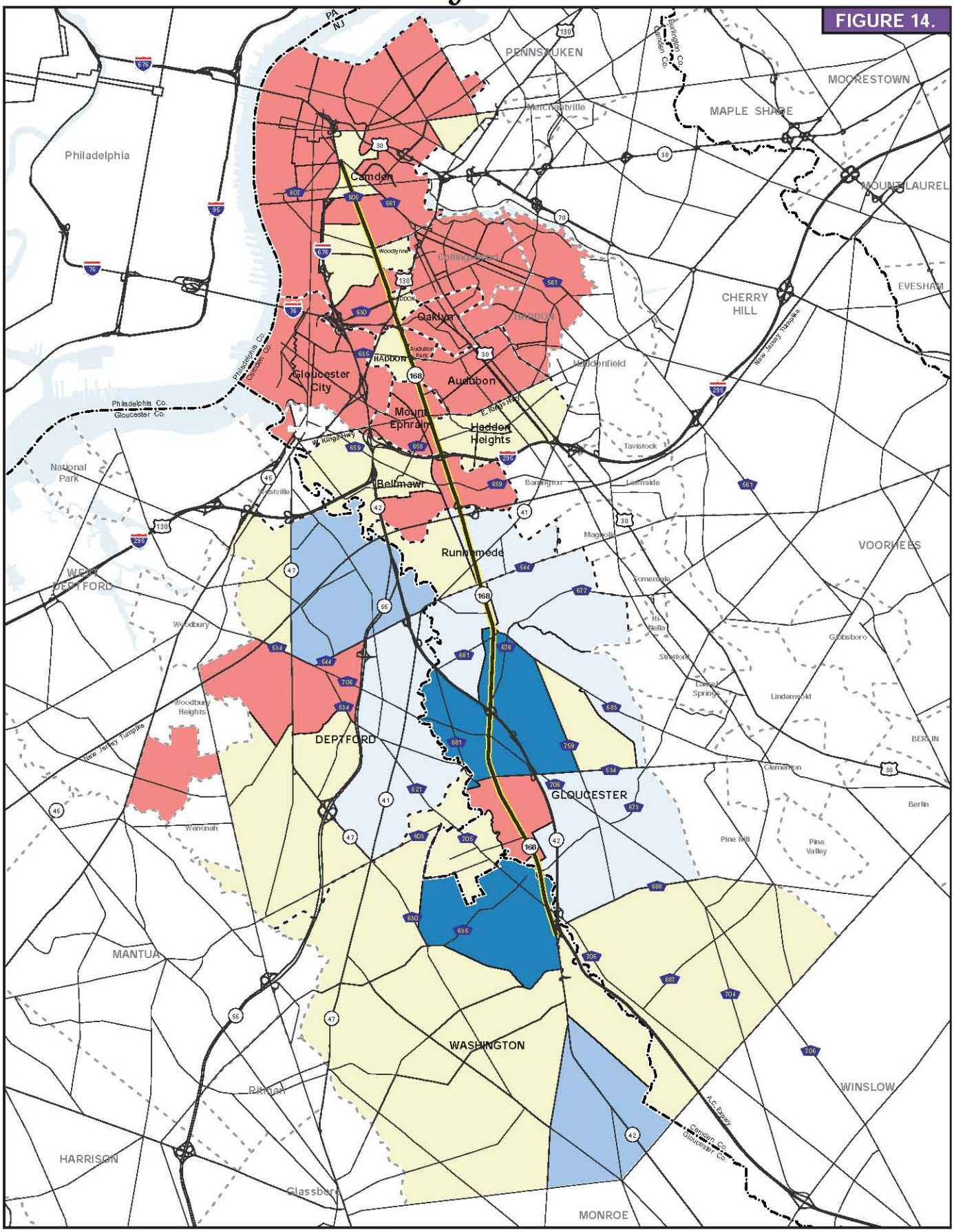
FIGURE 13.



NJ 168 Corridor Study

Projected Change in Study Corridor Employment
2000 - 2025 (by TAZ)

FIGURE 14.



DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
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4.9 Environmental Justice

Introduction
Title VI of the Civil Rights Act of 1964 and the 1994 President's Executive Order on Environmental Justice (#12898) states that no person or group shall be excluded from participation in or denied the benefits of any program or activity utilizing federal funds. Each federal agency is required to identify any disproportionately high and adverse health or environmental effects of its programs on minority populations and low-income populations. In turn, metropolitan planning organizations (MPO's), as part of the United States Department of Transportation's certification requirements, are charged with evaluating their plans and programs for environmental justice sensitivity.

Year 2000 Census Data for Degrees of Disadvantage
As environmental justice is concerned with the impacts of disparate funding and disparate services on defined minority and low-income groups, locating and mapping these groups in the region, at the smallest geographic units possible (either census tract or municipality), is important. The quantitative methodology developed in the original report ***"****…and Justice for All": DVRPC's Strategy for Fair Treatment and Meaningful Involvement of All People* in September 2001, and subsequent updates rely primarily upon available U.S. Census data.

A regional threshold, or average, is determined to assess whether each census tract meets or exceeds this average. A total of all persons in the specified demographic group in the nine-county region is divided by the total nine-county population to obtain this average. Each census tract that meets or exceeds the regional average is considered an "environmental justice area," and is highlighted on the corresponding map. These tracts are areas of concern and sensitivity, based on their population composition, and form the basis for the remainder of the geographic analysis. The number of these factors that apply in a given census tract represent the "Degrees of Disadvantage" (DOD).

Poverty
Poverty, or low-income, concentrations include persons whose household income is at or below the Department of Health and Human Services poverty guidelines. In 2000, a family of four qualified as low income if their household income was at or below $17,650. The regional threshold for low-income persons for the year 2000 is 11 percent.

TABLE 13
POVERTY GUIDELINES BY FAMILY SIZE –1990 AND 2001

Size of Family Unit	1990 Household Income	2001 Household Income
1	$6,280	$8,590
2	$8,420	$11,610
3	$10,560	$14,630
4	$12,700	$17,650
5	$14,840	$20,670
6	$16,980	$23,690
Each Additional Person	Add $2,140	Add $3,020

Source: Federal Register, Vol. 66, No. 33, February 16, 2001, pp. 10695-10697.

Limited English Proficiency
"Limited English Proficiency" is defined in the U.S. Census as "Primary Language Spoken At Home Other Than English" and "Speak English Not Very Well." In the 2000 Census, the regional threshold is 2 percent.

Car Less
Car less households are defined in the U.S. Census as having zero vehicle availability. This population is often referred to as "transit dependent," i.e., those who must rely on public transit for their daily travel needs and who have limited mobility. The regional threshold for car less households in 2000 is 16 percent.

Disabled
Although no generally accepted definition of disability exists in this country, the 2000 U.S. Census identifies disabled persons according to the categories of sensory, physical, mental, self-care, and employment capabilities. For this analysis, physically disabled were mapped. The regional threshold for disabled persons for 2000 is 7 percent.

Elderly
In assessing elderly populations, DVRPC has chosen to define only those considered extremely old, age 85 and older. Using 2000 Census data the regional threshold is 2 percent.

Non-Hispanic Minority
The U.S. DOT Order (5610.2) on Environmental Justice defines "Minority" as:

1. Black: a person having origins in any of the black racial groups of Africa.
2. Asian American: a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands.
3. American Indian and Alaskan Native: a person having origins in any of the original people of North America and who maintains cultural identification through tribal affiliation or community recognition.

The regional threshold for the non-Hispanic, minority population for the year 2000 is 24 percent.

Hispanic
Hispanic ethnic origin, though often included in the minority definition, deserves special mention, since it is not a racial category. In the 2000 Census Hispanics are defined as persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race. The regional threshold for the Hispanic population for the year 2000 is 5 percent.

Female Head of Household with Child
"Female Head of Household with Child" is defined in the 2000 Census as a female maintaining a household with no husband present, and with at least one child under 18 years old who is a son or daughter by birth, marriage (a stepchild) or adoption residing in the home. The regional threshold for Female Head of Household with Child for the year 2000 is 8 percent.

Application to the NJ 168 Corridor
The purpose of the NJ 168 Corridor Study is to identify transportation problem areas and provide potential improvement scenarios. These improvements may include a wide range of options and associated costs. If a potential improvement scenario were to evolve into a project,

it could possibly have environmental justice implications, irrespective to the extent of the project's scope or cost.

The purpose of this environmental justice analysis is to identify sensitive populations within the study area. Specifically, the Degrees of Disadvantage Map can be used as an "early warning indicator" of EJ-sensitive areas. Improvement projects recommended in these areas should be evaluated concerning the extent to which they may impact neighboring communities. Although an individual project may traverse only a portion of a larger multi-census tract area, project impacts may be felt throughout a community or even in several communities. This project level review process is governed by National Environmental Policy Act (NEPA) procedures.

Corridor Level Evaluation

The study area involves 2 counties, 14 municipalities, and 31 census tracts. These census tracts are either wholly or partially contained within the study area boundary. Tracts that share an outside boundary with the study area were not included. These 31 tracts have a total population of 102,359. The degrees of disadvantage are shown on figure 15**.**

The following table summarizes the number of DODs per census tract, the total population of the combined tracts, and their share of the combined total tract population of the 31 tracts. Observation from the analysis:

- Eighty five percent of the population experiences one or more degrees of disadvantage, with 21 percent (21,315 people) experiencing 7 DODs.
- Of the 27 tracts with one or more DODs, only three did not exceed the regional threshold of 7 percent for physically disabled persons.
- Of the six tracts that contained seven DODs none exceeded the elderly population threshold of 2 percent. These people are predominantly non-Hispanic minorities (44-82 percent), have high rates of female headed households with children at home (20-39 percent), are impoverished (17-52 percent), and are car less or dependent on public transportation (26-69 percent). The one tract with five DODs differs from these by not exceeding the thresholds for poverty (10.9 percent) and car availability (14 percent). All six of these tracts are in Camden City.
- Seven of the 11 tracts with two DODs all meet or exceed the regional threshold for physically disabled persons (7-11 percent), and for extremely old persons (2-3 percent).
- Four of the 31 tracts experienced no degrees of disadvantage.

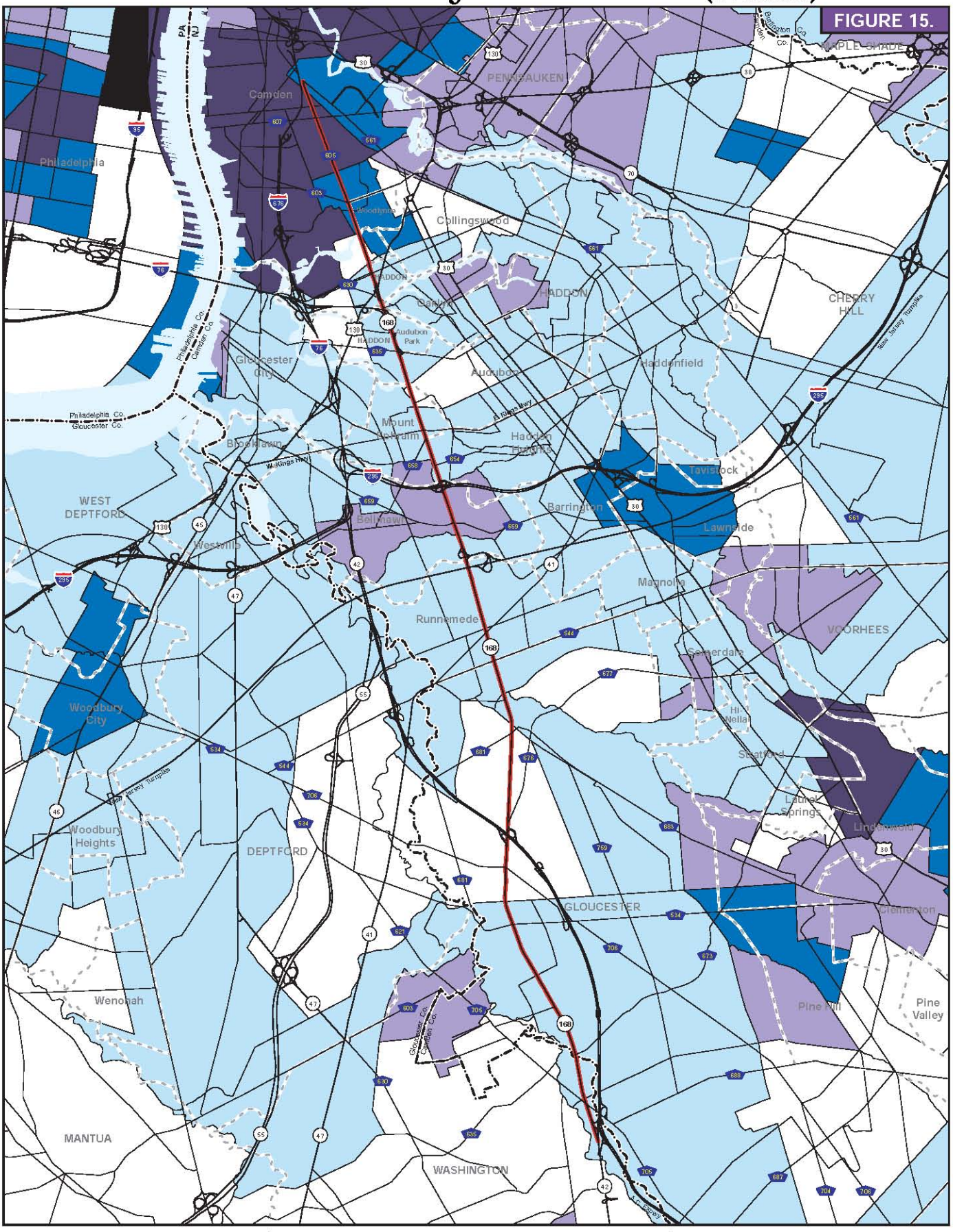
TABLE 14
CONCENTRATION OF DODs PER CENSUS TRACT

Number of Tracts	Number of DODs Per Tract	Combined Population of Tracts	Percent of Combined Total Tract Population
6	7	21,315	21%
1	5	2,591	3%
2	4	689	1%
1	3	3,740	4%
11	2	36,256	35%
6	1	21,323	21%
4	0	16,445	15%
Total			
31		102,359	100.00%

NJ 168 Corridor Study

Degrees of Disadvantage
(8 Factors)

FIGURE 15.



0 1 2
Miles

2000 Census Tract
0 Degrees of Disadvantage
1 - 2 Degrees of Disadvantage
3 - 4 Degrees of Disadvantage
5 - 6 Degrees of Disadvantage
7 - 8 Degrees of Disadvantage

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5. CRASH ANALYSIS

Introduction
The crash data used in this analysis was obtained from the New Jersey Department Of Transportation's data reference Web page. Data for years 2001 and 2002 were utilized. The crash analysis is divided into three parts:

1) Section 5.1 focuses on NJ 168 and provides the following analyses: 1) a comparison of 2002 crash data summaries between the study area and statewide data, 2) a comparison of crash rates by cross section type between NJ 168 and statewide data for year 2002, and 3) a crash cluster analysis for data years 2001 and 2002 combined.

2) Section 5.2 focuses on CR 605 Mount Ephraim Avenue and provides a corridor summary analysis using 2002 data, and a crash cluster analysis for data years 2001 and 2002 combined.

3) Section 5.3 focuses on the county roads in the vicinity of Camden County College, located in Gloucester Township. Municipal representatives from Gloucester Township reported excessive crashes in this vicinity. A review of data supported this claim. This analysis provides corridor summaries, a crash cluster analysis, and a collision type analysis.

The purpose of this analysis is two fold. First to perform a comprehensive safety overview of the study corridor, and second to substantiate problem locations presented during the municipal field visits and identify probable causes and potential improvements. In many cases the safety analysis overlapped the identified problems. In other cases where a safety issue was identified by the analysis, but not by local officials, further study is required to identify the most appropriate improvement that will addresses safety while balancing mobility issues.

Due to the exploratory nature of the crash analysis, (i.e.: the use of only two years of data, and the lack of accident diagrams) the potential improvement scenarios identified in each of the crash cluster locations, as well as any other recommendations, have not been included in the transportation improvements implementation matrix.

5.1 NJ 168 Corridor

Corridor Summary
During 2002 there were 515 accidents at 238 unique milepost locations along the 10.75 miles of NJ 168. Of the total, there were no fatalities, 185 injuries, and 330 property damage only accidents. Less than 23 percent (117) occurred at signalized intersections, with the balance at either unsignalized (41.94 percent) intersections or within the mid-block (35.34 percent). Concerning collision type, there were 190 same direction-rear end accidents accounting for 36.89 percent of the total making it the most predominant type. Over 77 percent of the crashes occurred during the daytime, which excludes dawn and dusk.

Next is a comparison between NJ 168 crash statistics and the *NJDOT At/Between Intersections Accident Summaries for State System Roads*, excluding toll roads and interstates, using 2002 data (see table 15) Considering the corridor as a whole, NJ 168 exceeds the statewide threshold for angle accidents with 27.18 percent compared to 12.93 percent for the state system roads. Left turn collisions also surpass the statewide threshold at 8.35 percent compared to 3.6 percent statewide. According to the New Jersey Department of Transportation, rear-end and sideswipe collisions involve traffic moving in the same direction. Angle crashes involve angular traffic (i.e. north and west), and left turn and head-on events involve opposing traffic.

TABLE 15
NJ 168 Corridor (MP 0.00 - 10.75) Crash Summary, 2002

Total:	**515**		**State Total:**	67,263
Collision Type	Count	% of Total	State Count	State % of Total
Same Direction-Rear End	190	36.89%	30,528	45.39%
Same Direction-Sideswipe	60	11.65%	11,383	16.92%
Angle	140	27.18%	8,696	12.93%
Left Turn	43	8.35%	2,420	3.60%
Head On	9	1.75%	1,081	1.61%
Pedestrian	0	0.00%	494	0.73%
Fixed Object	0	0.00%	6,971	10.36%
Parked Vehicle	11	2.14%	1,078	1.60%
Pedacycle	0	0.00%	333	0.50%
Other	62	12.04%	4,279	6.36%
Severity	Count	% of Total	State Count	State % of Total
Fatal	0	0.00%	181	0.27%
Injury	185	35.92%	21,204	31.52%
Property Damage	330	64.08%	45,878	68.21%
Light	Count	% of Total	State Count	State % of Total
Day	400	77.67%	47,347	70.39%
Night/Dawn/Dusk	114	22.14%	19,611	29.16%
Unknown	1	0.19%	305	0.45%
Intersection	Count	% of Total	State Count	State % of Total
At Signalized	117	22.72%	13,062	19.42%
At Unsignalized	216	41.94%	17,617	26.19%
Between Intersections	182	35.34%	36,584	54.39%
Railroad Crossing	0	0.00%	0	0.00%
Surface Condition	Count	% of Total	State Count	State % of Total
Dry	420	81.55%	50,628	75.27%
Wet Surface	86	16.70%	14,867	22.10%
Snow or Ice	7	1.36%	1,462	2.17%
Unknown or Other	2	0.39%	306	0.45%

Cross Section Analysis

NJ 168 is comprised of five different cross section geometry types over nine distinct sections (figure 16). Using the rate methodology developed by NJDOT, rates were calculated for each NJ 168 cross section type. These rates were compared to NJDOT's published rates by cross section geometry for year 2002, expressed in crashes per million vehicle miles traveled. Each of NJ 168's nine cross section types is compared individually to the statewide cross section rates for 2002 to identify areas of over representation along NJ 168. The New Jersey Department of Transportation considers 0.4 miles to be the minimum length necessary for determining a crash rate. With the two sections that fall short of the minimum threshold removed, only three of the nine sections exceed the state's crash rates by cross section geometry. They are each described in the following text.

MP 0.00 to 0.75

Cross Section Type: 4 lanes, grass median, with shoulder

At this location, located in Washington Township in the southern end of the corridor, the crash rate is 4.38 percent exceeding the state threshold of 1.95 percent. This 3/4 mile section experienced 20 crashes in 2002. Thirty percent of the crashes were same direction-rear end collisions. This section contains the intersection of NJ 168 and CR 705 Sicklerville Road which serves traffic exiting NJ 168 and NJ 42 bound for Sicklerville Road. There were 25 crashes at this intersection over the period 2001 to 2002. A field observation revealed this to be a congested location during the p.m. peak period. A summary of this intersection is contained in the cluster analysis.

MP 3.07 to 3.95

Cross Section Type: 2 lanes, no median, with shoulder

At this location in Gloucester Township, the crash rate is 6.27 percent compared to 2.82 percent statewide. This 0.88 mile section experienced 37 accidents during 2002. Field observations revealed this segment to be very congested in both directions during the a.m. peak. The data shows that the direction of travel is nearly split between northbound and southbound. The predominant collision type is same-direction rear end, accounting for over 46 percent of the crashes. The vast majority of the crashes (82 percent) took place between the signalized intersections, also know as mid-block. The crashes within this section are somewhat evenly distributed and do not include any single milepost locations that meet the cluster criteria of 17 incidents over the 2001 to 2002 period.

MP 9.83 to 10.44

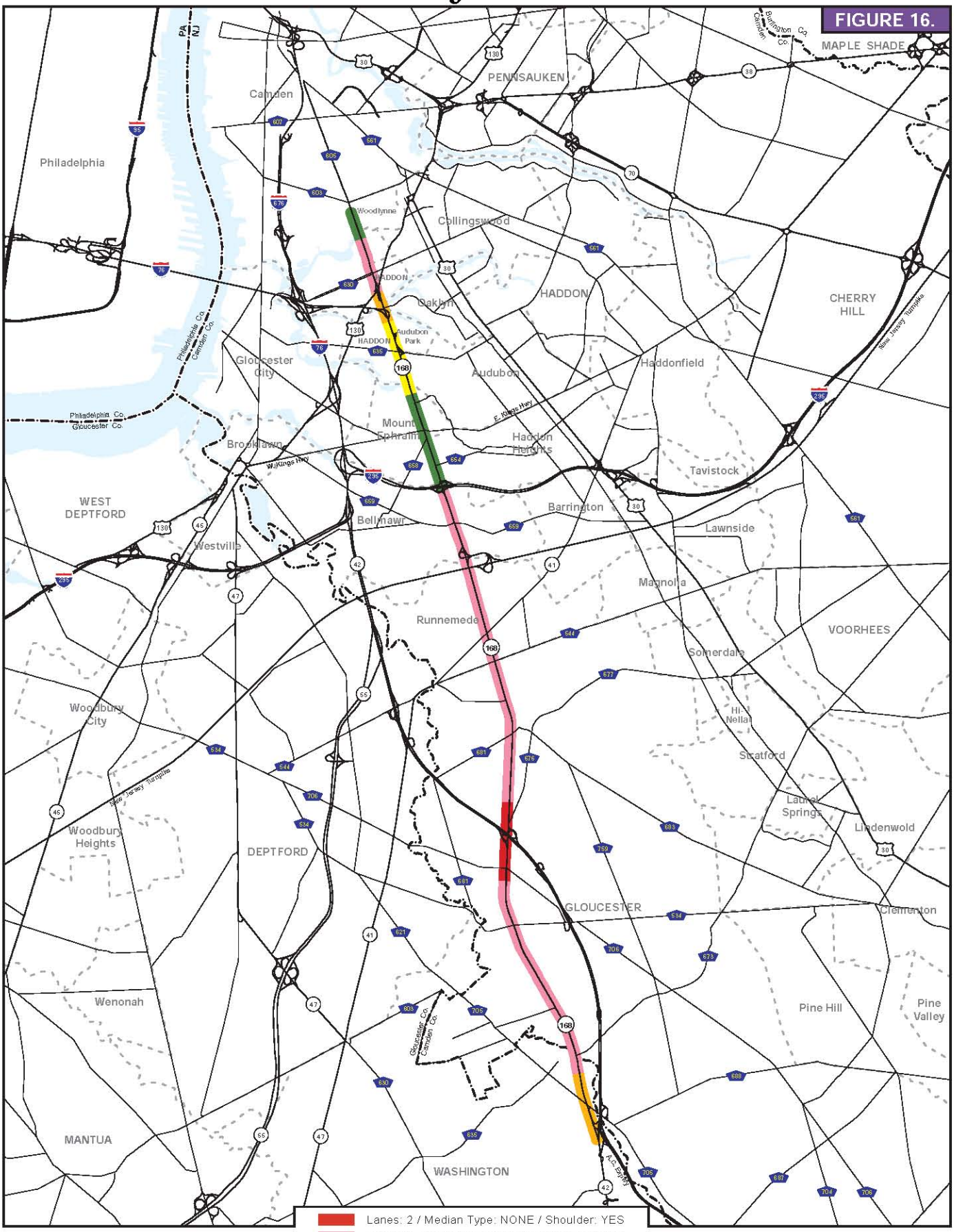
Cross Section Type: 3 lanes, no median, with shoulder

Located in Haddon Township and Camden City, this section has a crash rate of 8.59 percent, almost double the state rate of 4.31 percent. There were 30 crashes within this 0.61 mile segment. The intersection of NJ 168 and Fairview Street, located within this segment, was identified as a crash cluster having 21 crashes over the 2001 - 2002 period. Aside from that location, there is a large concentration of closely spaced crashes north of the NJ 168 and CR 630 Collings Avenue intersection. The predominant collision type was same direction rear end at 30 percent with same direction sideswipe, left turn, and angle accidents all between 16 percent and 20 percent. The high percentage of mid-block crashes (70 percent) may be related to the turning movements in and out of the shopping area parking lot.

NJ 168 Corridor Study

Lane Configurations

FIGURE 16.



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Cluster Analysis

For the purposes of this study, a cluster is defined as any single milepost location with 17 or more crashes during the period of 2001 to 2002. This is a modification of the New Jersey Department of Transportation's criteria, which requires a threshold of eight crashes per year for analysis. The purpose of the higher threshold used in this study is to compensate for the use of two years of data instead of three, due to data availability. Ten clusters were identified in the study area on NJ 168 (table 16). Figure 17 shows the location of each cluster and table 16 provides details. No clusters were identified on CR 605. Combined, the 10 clusters account for 210 crashes or 19.6 percent of the 1,074 crashes on NJ 168 during the two-year period. The remaining 864 crashes are distributed along the corridor in lesser concentrations. Seven clusters were at intersections and two were in the mid-block.

TABLE 16
NJ 168 CRASH CLUSTERS >= 17, 2001-2002

Mile Post	Nearest Cross Street	Type	Total Injured	Total Killed	Total Crashes	Predominant Collision Type
0.25	CR 705 Sicklerville Rd.	signalized	14	0	25	Angle (6), Left Turn (6)
4.61	CR 681 Lower Landing Rd.	signalized	7	0	23	Rear End (9)
4.93	Fourth Ave.	mid-block	9	0	27	Angle (14)
4.99	Station Ave.	signalized	5	0	17	Rear End (4)
6.84	Benigno Blvd.	signalized	9	0	24	Angle (6)
7.04	CR 659 Browning Rd.	signalized	7	0	19	Rear End (10)
7.73	CR 654 Prospect Ridge Blvd.	signalized	10	0	18	Left Turn (7)
8.09	CR 551 Kings Highway	signalized	5	0	18	Rear End (7)
9.27	Kennedy Dr.	mid-block	8	0	18	Same Direction-Sideswipe (7)
10.5	Fairview St.	signalized	14	0	21	Rear End (13)
TOTAL			88	0	210	

Each cluster summary was compared to statewide summaries for either at intersection or midblock locations. The state summaries are contained in these two documents: 1) *Total Accidents at Intersections For State System Roads*, and 2) *Total Accidents Between Intersections for State System Roads*. All crash cluster summaries, and state statistics summaries are located in Appendix C. The following observations were made:

MP 0.25

Angle and left turn collisions, 24 percent each, exceed the state percentage in each category. This intersection provides a dedicated left turn lane and signal phase, followed by a permissive left turn, for NJ 168 southbound traffic only. Northbound traffic turning left must queue in the passing lane and wait for an opportunity to turn left across two live lanes. This configuration can cause a shadowing effect that compromises sight distance, potentially contributing to left turn accidents. (See #24 in section 6.1)

Potential Improvement Scenario: Dedicated left turn lane w/protected signal phase on NJ 168 northbound.

MP 4.61

Angle crashes (30%) and left turn crashes (13%) exceed the state percentage in each category. At this location CR 681 meets NJ 168 at a signalized intersection. NJ 168 is three lanes with a dedicated left turn lane and signal phase at both the northbound and southbound

approaches. The green arrow is followed by an all green phase allowing permissive left turns. Field observations confirmed this to be an area of recurring congestion during the a.m. peak period.
Potential Improvement Scenario: Conduct an in-depth intersection safety analysis to pinpoint the unsafe movements. Also, conduct a level of service analysis to determine the optimum phasing necessary to achieve maximum safety and efficiency.

MP 4.93
Angle accidents, which involve vehicles moving in angular directions (i.e. north and east), account for 51.85 percent, greatly exceeding the statewide percentage of 6.15 percent. At this location, Fourth Avenue meets NJ 168 at an unsignalized intersection. This section of NJ 168 experiences both A.M. and P.M. peak period congestion making left turns to and from Fourth Avenue difficult. These conditions may contribute to the high percentage of angle accidents.
Potential Improvement Scenario: Conduct an in-depth intersection safety analysis to pinpoint the unsafe movements and identify appropriate safety measures.

MP 4.99
At this signalized intersection left turn crashes and those involving parked vehicles exceed the state percentages. NJ 168 is three lanes with a dedicated left turn lane and signal phase at both the northbound and southbound approaches. CR 682 Station Avenue connects NJ 168 to CR 544 and can be used as a cut through for traffic attempting to avoid the intersection at CR 544 and NJ 168. This location experiences moderate congestion during the A.M. and P.M. peak periods, possibly contributing to the crash frequency.
Potential Improvement Scenario: Conduct an in-depth intersection safety analysis to pinpoint the unsafe movements. Also, conduct a level of service analysis to determine the optimum phasing necessary to achieve maximum safety and efficiency.

MP 6.84
Same direction sideswipe and angle accidents marginally exceed the statewide percentages. Crashes in the "other" category account for 37.50 percent greatly exceeding the statewide percentage. At this location Benigno Boulevard meets NJ 168 at a signalized T intersection. Benigno Boulevard experiences a heavy volume of traffic en route to and from the Bellmawr Industrial Park. The intersection has a very tight turning radius, especially for large trucks. This location also experiences recurring A.M. and P.M. peak period congestion, increasing the potential for crashes. NJDOT has identified this intersection for improvements to address these issues.
Potential Improvement Scenario: This location was studied as part of the *NJ 168 Safety and Operational Improvements* project conducted by NJDOT. A plan which involves reconstruction of the intersection has been advanced.

MP 7.04
At this signalized intersection same direction rear-end and angle crashes exceed the statewide percentages. This location experiences recurring A.M. and P.M. peak period congestion, which may contribute to the high number of rear-end accidents. NJ 168 carries one lane per direction with a continuous center-left turn lane and a left turn phase on both approaches at this location.
Potential Improvement Scenario: Conduct an in-depth intersection safety analysis to pinpoint the unsafe movements. Also, conduct a level of service analysis to determine the optimum phasing necessary to achieve maximum safety and efficiency.

MP 7.73
Left turn crashes greatly exceed the statewide percentage while angle and same direction sideswipe crashes marginally exceeds the state's numbers. At this location CR 654 Prospect Ridge Boulevard meets NJ 168 at a signalized intersection. Although Prospect Ridge Boulevard ends at NJ 168, the access to a McDonald's restaurant, located on the opposite side of NJ 168, is incorporated into the signal phasing creating a four way intersection. NJ 168 is two lanes per direction with no dedicated left turn lane or protected signal phasing to accommodate left turns. This configuration forces left turning vehicles on NJ 168 to queue in the passing lane and turn left crossing two live lanes when gaps appear. Weaving on NJ 168 from the passing lane to the through lane is common as vehicles try to avoid cars queuing in the passing lane to turn left. This situation greatly increases the potential for left turn and sideswipe crashes.
Potential Improvement Scenario: Add a dedicated left turn lane with a protected signal phase which prohibits permissive turns.

MP 8.09
Same direction - sideswipe crashes and left turn crashes exceed the statewide percentages, although the predominant crash type is same direction - rear end. At this location, CR 551 King's Highway meets the four-lane cross section of NJ 168 at the peak of a vertical curve. No turn lanes are provided on NJ 168, although a lead-left arrow is provided for NJ 168 southbound traffic only. This arrow then turns to a green phase allowing permissive left turns or through traffic. Weaving on NJ 168 from the passing lane to the through lane is common as vehicles try to avoid cars queuing in the passing lane to turn left. In addition, the vertical curve inhibits sight distance of oncoming traffic. A field observation revealed high volumes and seemingly excessive speeds on NJ 168. The combination of these conditions increases the potential for sideswipe, rear end, and left turn crashes. Municipal representatives identified this as an area of high pedestrian activity including school children and senior citizens.
Potential Improvement Scenario: Add a dedicated left turn lane with a protected signal phase which prohibits permissive turns.

MP 9.27
Same direction - sideswipe and angle crashes both exceed the statewide averages. In addition, crashes occurring during night, dawn, dusk, and wet surface conditions exceed the statewide percentages. This location is in the mid-block between Kennedy Drive and Kendal Boulevard in the vicinity of the Walt Whitman Bridge approach overpass. Municipal representatives indicated that the overpass seems to compromise view of the traffic signal at Kendal Boulevard, located north of the overpass, for motorists on NJ 168 NB, especially truck drivers. This condition may contribute to the high percentage of angle crashes.
Potential Improvement Scenario: Install signal-ahead sign.

A field observation also revealed that the current lane configuration on NJ 168 northbound can be confusing. North of Kennedy Drive there are 4 lanes: The two left-most lanes are intended for through traffic on NJ 168 northbound, the next lane is for the bridge access, and the right most lane provides access to the Audubon Park development. These lanes are not well marked causing confusion as motorists weave out of the right lanes to avoid the Audubon Park access or the bridge access. This may contribute to the high percentage of same direction-sideswipe crashes.
Potential Improvement Scenario: Install clearly marked signs delineating the purpose of

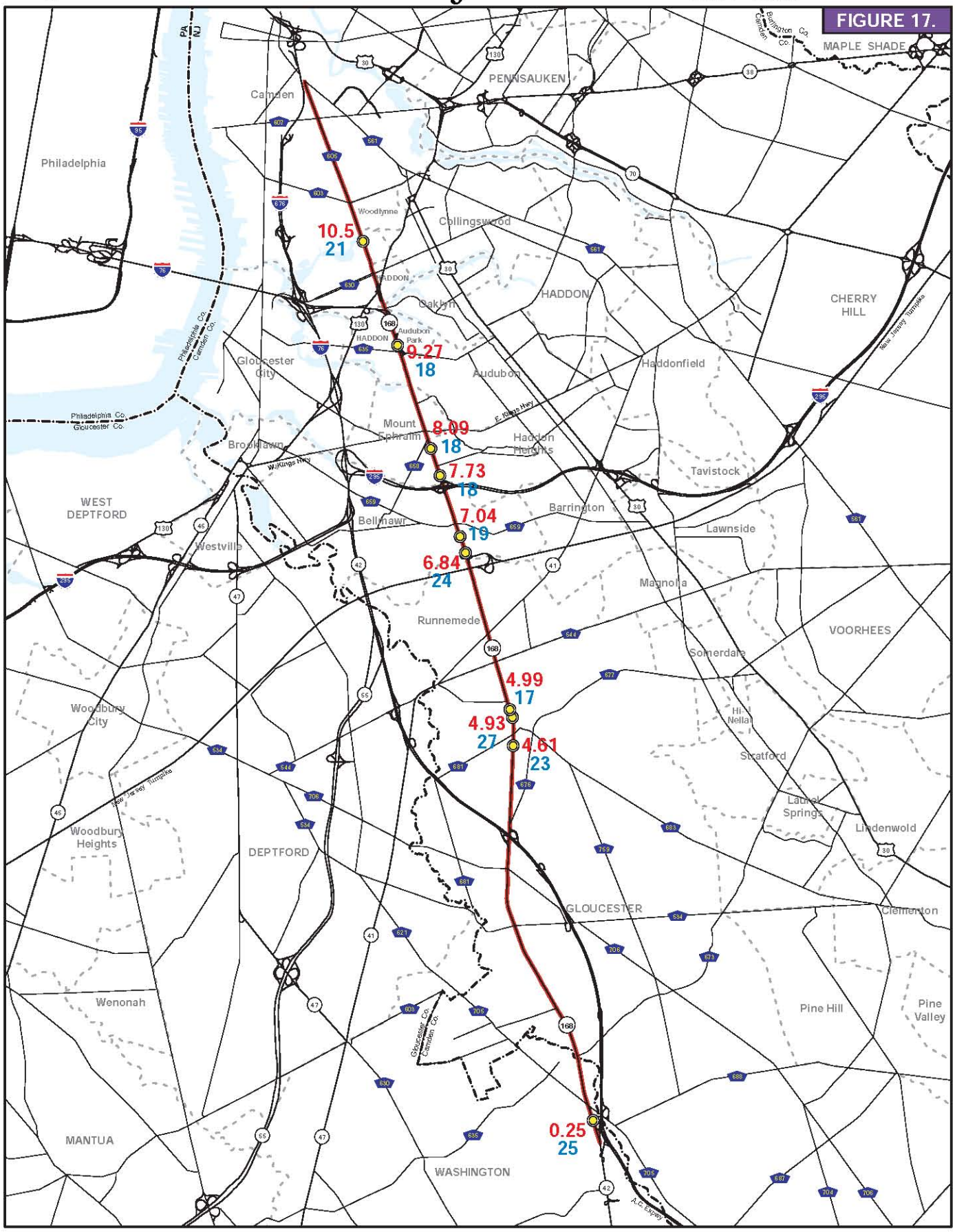
each lane and corresponding reflective lane markings.

MP 10.50
At this signalized intersection same direction-rear end crashes exceed the statewide percentage and are the predominant collision type. NJ 168 is four lanes with no median or shoulders. This location is in the vicinity of Fairview Street in Camden City, which provides direct access to the industrial site and port facilities along the waterfront. This stretch of NJ 168 is also used as an alternate route from US 130 to the PATCO Station at Ferry Avenue. The port traffic combined with the PATCO traffic may contribute to the high percentage of rear end crashes. The stretch of NJ 168 from US 130 to Ferry Avenue, which includes this milepost location, was identified by municipal representatives as having frequent crashes. This location is included in the identified problems section of the report (see #1B in section 6.1.)
Potential Improvement Scenario: Conduct an in-depth intersection safety analysis to pinpoint the unsafe movements and identify appropriate safety measures.

NJ 168 Corridor Study

Crash Cluster (≥ 17) Locations
2001 - 2002

FIGURE 17.



0 1 2
Miles

Accident Location
0.25 Milepost
25 Total Number of Accidents

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5.2 CR 605 Mount Ephraim Avenue

Corridor Summary

The northern end of the corridor includes County Route 605 Mount Ephraim Avenue. CR 605 is 1.43 miles in length serving both local and through traffic in Camden City. The route is a four-lane cross section from milepost 0.00 to 0.4, and a two-lane cross section from 0.4 to 1.43, with eight signalized intersections along its length. CR 605 is considered an urban principal arterial and is densely developed as a main street in the two-lane section.

During 2002 there were 104 accidents at 35 unique milepost locations along the 1.43 miles of CR 605. Of the total, there were no fatalities, 31 injuries, and 73 property damage only accidents. Concerning collision type, there were 25 same direction-rear end accidents accounting for 24.04 percent of the total making it the most predominant type. Angle crashes were next at 23.08 percent (24 crashes) which exceeds the NJDOT 2002 Accident Summary for the County Road System percentage of 21.92 percent. The percentage of crashes involving parked vehicles (19.23 percent) greatly exceeds the state's percentage of 6.09 percent, most likely due to the availability of on-street parking throughout the 2-lane cross section. Crashes at signalized intersections accounted for 30.77 percent (32 crashes) with the balance at either unsignalized intersections (53.85 percent) or within the mid-block (15.38 percent). CR 605 exceeds the state's percentage by 10 percent at signalized intersections and by 19 percent at unsignalized intersections. The high number of crashes at unsignalized locations may be related to the high population and land development density of this area, plus the high number (27) of cross streets.

Crash Rates

The New Jersey Department of Transportation does not provide accident rates for non-state facilities on its internet site.

Cluster Analysis

No clusters were identified at individual milepost locations that meet the minimum threshold of 17 crashes for the two-year period of 2001-2002. However, four clusters with 16 crashes each were identified at mile post locations 0.65, 0.85, 1.0, and 1.4. Table 17 provides a summary of this data. Of the four locations only milepost 1.4 at Pine Street is unusual due to the percentage for angle crashes (75%), which greatly exceeds the statewide average (21.92%) This may be related to compromised site distance. A more in-depth analysis including three years of data is recommended before improvement scenarios can be identified.

TABLE 17
CR 605 CRASH CLUSTER LOCATIONS, 2001-2002

Mile Post	Nearest Cross Street	Type	Total Injured	Total Killed	Total Crashes	Predominant Collision Type
0.65	Thurman St.	unsignalized	7	0	16	Same Direction-Rear End (4)
0.85	Atlantic Ave.	signalized	6	0	16	Other (5)
1	CR 605 Kaighns Ave.	signalized	6	0	16	Same Direction-Rear End (7)
1.4	Pine Street	unsignalized	7	0	16	Angle (12)
TOTALS			26	0	64	

5.3 Camden County College

During the course of field visits, DVRPC was informed by Gloucester Township that some of the roads in the vicinity of Camden County College had been the scene of excessive numbers of crashes. After a preliminary review of crash data appeared to support the original report, DVRPC collected detailed crash data on selected segments of the following facilities:

- Blackwood-Clementon Road (CR 534)
- College Drive (CR 673)
- Erial Road (CR 706)
- Little Gloucester Road / Peter Cheeseman Lane (CR 759)

Figure 18 illustrates a comprehensive inventory of crashes along the selected segments. The information was obtained through NJDOT's Crash Statistics / Highway Safety Improvement Program. The NJDOT program is used as a tool for determining general crash patterns in terms of location and type.

Between 2001 and 2002, there were a total of 648 reportable traffic crashes on the selected segments. Table 18 describes the segments and lists crashes for each one.

Two of these crashes involved fatalities and 228 involved injuries. The balance were crashes involving property damages only. By far the most crashes took place on Blackwood-Clementon Road, 354 crashes over two years on a 2.4 mile segment.

TABLE 18
CRASHES, VICINITY OF CAMDEN COUNTY COLLEGE, 2001-2002

Route	Begin Milepost	End Milepost	Description	Accidents
CR 534	3.8	6.2	from Blackhorse Pike to College Drive	354
CR 673	0.0	2.5	from Blackhorse Pike to Blackwood-Clementon Road	141
CR 706	8.0	9.4	from College Drive to Blackwood-Clementon Road	91
CR 759	0.0	2.1	from Hickstown Road to Blackwood-Clementon Road	62
TOTAL				**648**

In addition to the total crash experience along the selected segments, two special sets of crash data were inspected. The first set identifies locations where intersection crashes or mid-block crashes are concentrated. The second data set identifies clusters where common types of crashes take place.

Intersections that have experienced 17 or more reported traffic crashes over the two year reporting period are shown in table 19.

Between 2001 and 2002, there were no mid-block crash locations within the study corridor that exceeded the 17 crash threshold.

TABLE 19
CRASH CLUSTERS, VICINITY OF CAMDEN COUNTY COLLEGE, 2001-2002

Route	Mile Post	Nearest Cross Street	Type	Total Injured	Total Killed	Total Crashes	Predominant Collision Type
CR 534	4.45	NJ 42 North-South Freeway	interchange	16	0	36	Rear End (30)
CR 534	5.14	CR 759 Little Gloucester Rd	signalized	12	0	19	Read End (11)
CR 534	6.15	CR 673 College Drive	signalized	24	0	39	Rear End (15)
CR 673	1.32	CR 706 Erial Rd	signalized	19	0	22	Rear End (7)

Clusters of collision types (left turn, sideswipe, etc.) that have been identified within the selected road segments are also shown in figure 18. Crash clusters were identified by dividing the roadway into control sections of 0.2 miles (1,056 feet). Next, a comparison of crash rates by collision type was made between the control segments; and the collision type rates for the entire set of crash data for the focus area. In general, crash clusters exceeded the average crash rate (by collision type) by a factor of three. The crash thresholds used in the cluster analyses differ depending on the collision type being evaluated. Therefore, data regarding one cluster type may not be directly comparable with another. The number of locations where a given cluster type was cited in the data is tabulated in table 20.

TABLE 20
CRASH COLLISION TYPES, VICINITY OF CAMDEN COUNTY COLLEGE, 2001-2002

Collision Type	Accident Threshold	Locations
Rear End	10^{+} accidents / 1,056'	7
Sideswipe	4^{+} accidents / 1,056'	4
Angle	7^{+} accidents / 1,056'	4
Head On	2^{+} accidents / 1,056'	5
Left Turn	6^{+} accidents / 1,056'	6

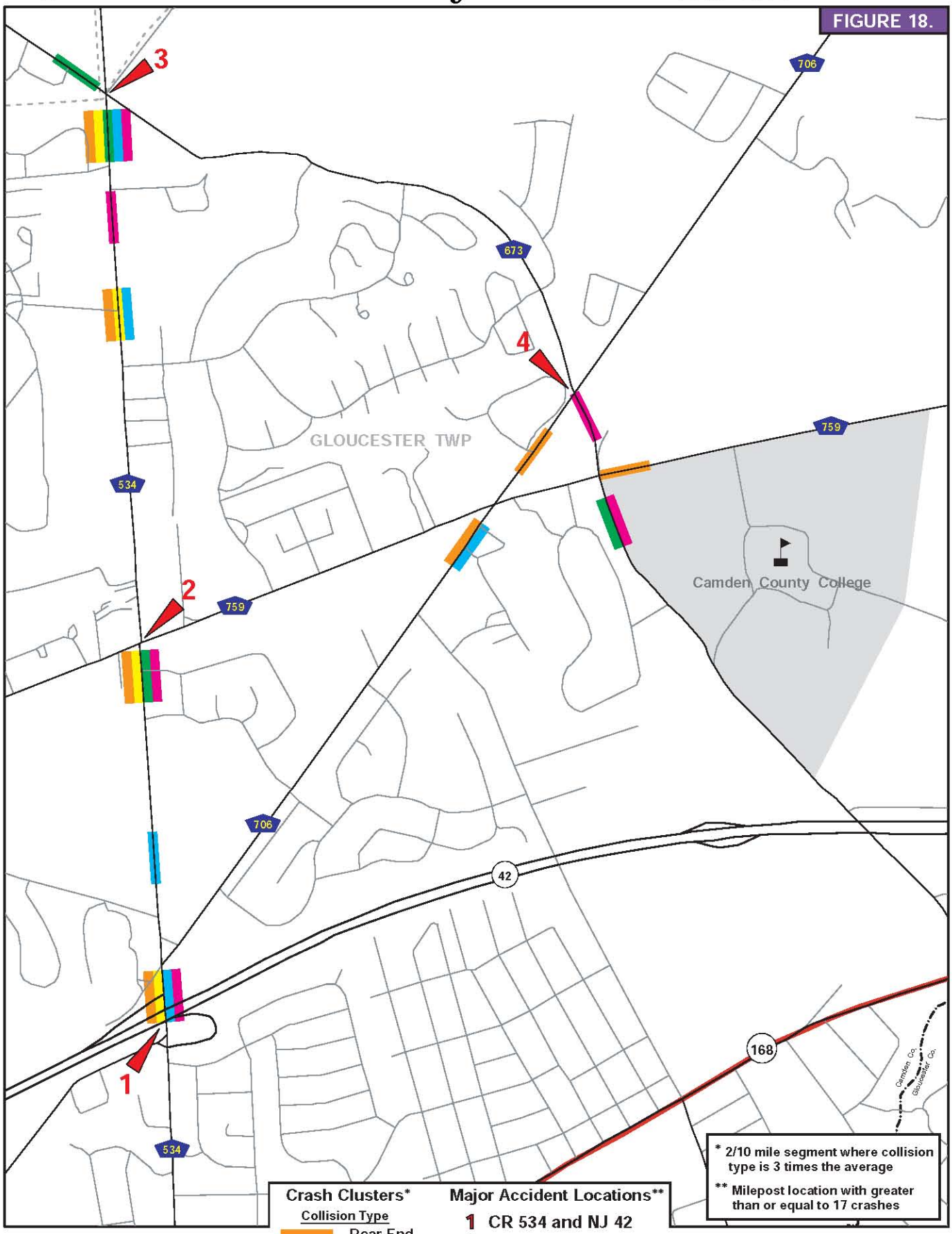
Although there are about the same number of clusters for each crash cluster type, some types of crashes are far more common than others. Rear end crashes are the most common, amounting to 276 crashes or 43 percent of the total, a much higher share than that seen on county roads statewide (29 percent). Left turn crashes also made up a higher share (12 percent) of crashes than the county road average (6 percent). In addition, the rate of crashes involving injury (37 percent) was above the county road average (31 percent). Most of the crash clusters are close to intersections; the only exception is Blackwood-Clementon Road, where they also appear in mid-block locations.

The large number of crashes on these segments suggests the need for an in-depth study of the geometric, operational, and behavioral issues that may be behind the problems. Blackwood-Clementon Road should be a priority.

NJ 168 Corridor Study

Crashes, Vicinity of Camden County College, 2001 - 2002

FIGURE 18.



* 2/10 mile segment where collision type is 3 times the average

** Milepost location with greater than or equal to 17 crashes

Crash Clusters*

Collision Type

- Rear End
- Sideswipe
- Angle
- Head On
- Left Turn

Major Accident Locations**

1. CR 534 and NJ 42
2. CR 534 and CR 759
3. CR 534 and CR 673
4. CR 673 and CR 706

0 1/8 1/4 Miles

N

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6. TRANSPORTATION ISSUES

Introduction

The transportation issues identified in the NJ 168 Corridor Study have been divided into three categories for the purposes of this report:

1) Identified Problems and Potential Improvement Scenarios
   This component examines isolated problem locations originally identified by municipal representatives. Each problem is described briefly and a potential improvement is recommended. Problem locations are depicted on figures 19A and 19B. The plan implementation matrix is comprised of these problem locations (see table 30).

2) Cut-Through Traffic
   Problems of this nature were identified by municipal representatives from several of the study corridor municipalities, in particular those within the study core (see 3 below). In the case of NJ 168, cut-through traffic is a symptom of the recurring peak period congestion in the study core. Cut-through routes are depicted on figure 20. These problem locations are not included in the plan implementation matrix because location specific improvement scenarios are not identified. Instead, improvement strategies are offered for consideration and should be included as part of a more comprehensive improvement plan.

3) Study Core Traffic Analysis
   As a result of several field visits conducted during the A.M. and P.M. peak periods, the study team was able to define a subset of the corridor that experiences recurring congestion. Referred to as “The Study Core,” this two and one-half mile section of NJ 168, extending from I-295 to Station Avenue / Fifth Avenue and comprising nine signalized intersections / interchanges, is critical to the functioning of the corridor and is also the source of its major challenges. Level of service analysis was conducted to establish current and future operating conditions. Opportunities for improvement and related constraints are discussed. Recommendations from this analysis are included in the plan implementation matrix.

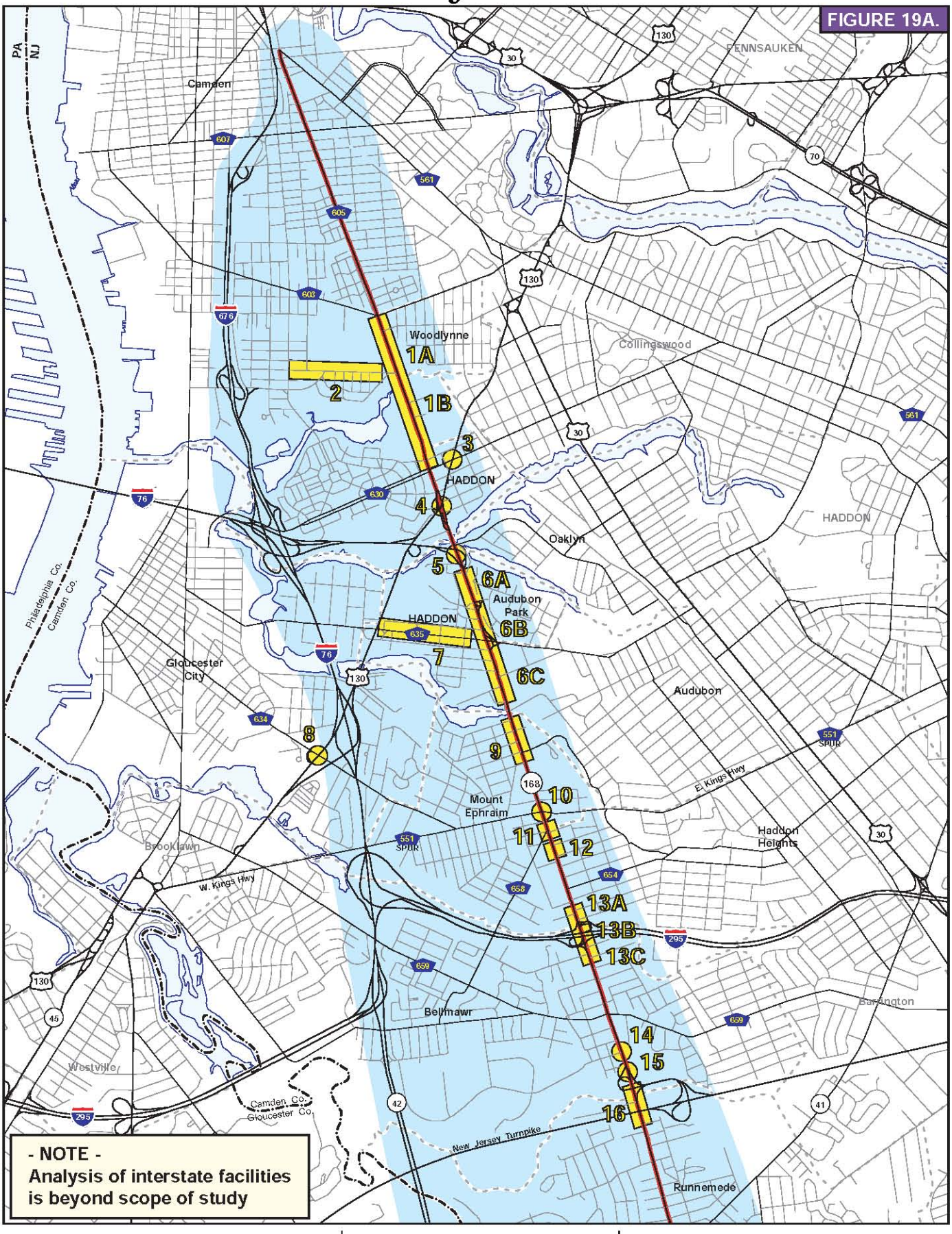
6.1 Identified Problem Locations and Potential Improvement Scenarios

The following problem locations were identified through meetings and field visits with representatives from each of the study area municipalities. These locations are depicted on figures 19A and 19B. Follow up visits to the field were conducted by staff during off peak and peak periods to gather data and examine typical conditions. After the initial data gathering was complete and the problem areas defined, determinations were made concerning the regional significance of each location. As a result, those problems deemed to be of greater local significance than regional, were excluded. This exercise is an important step in keeping the study focused on the corridor.

NJ 168 Corridor Study

Identified Problem Locations

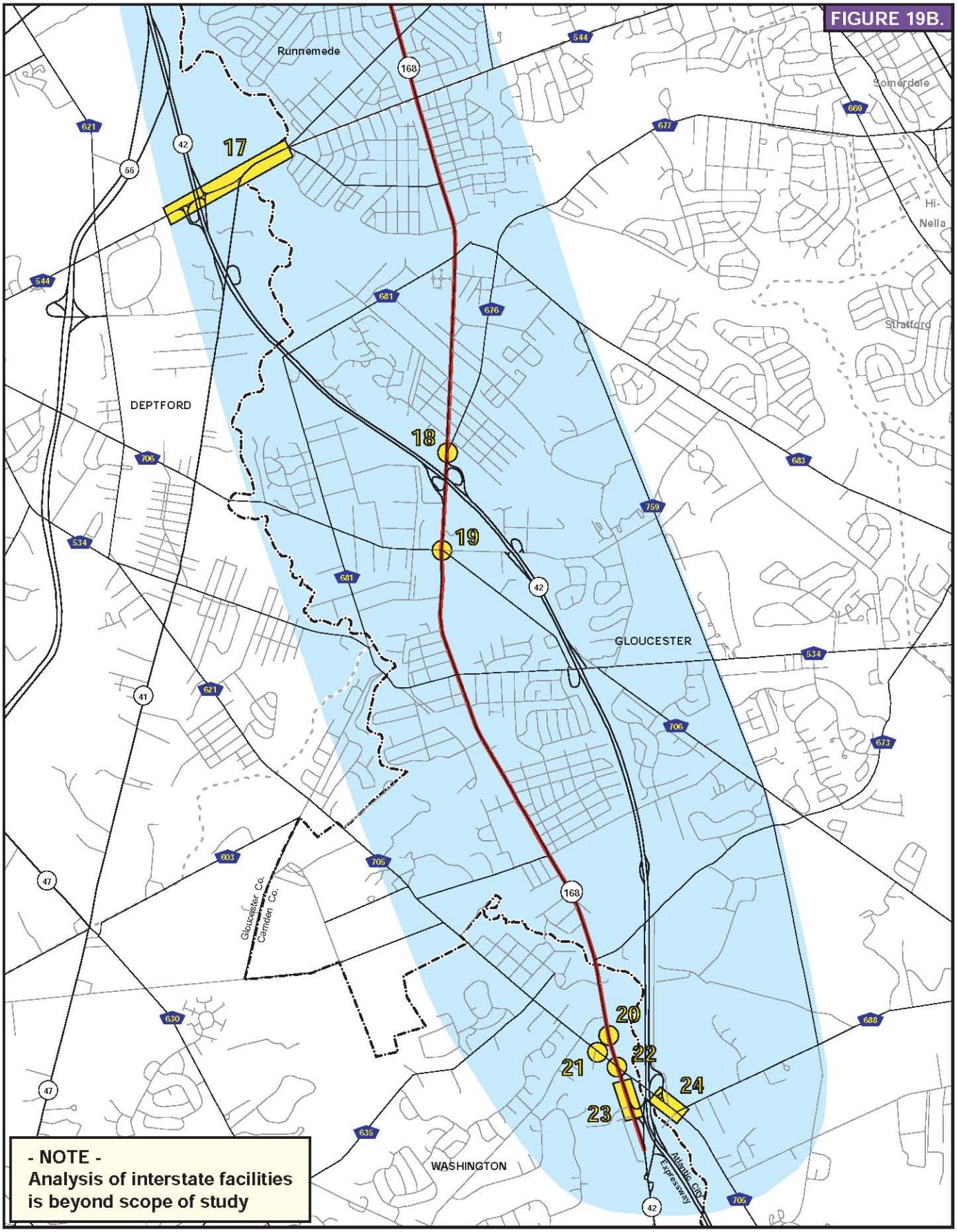
FIGURE 19A.



NJ 168 Corridor Study

Identified Problem Locations

FIGURE 19B.



- NOTE -
Analysis of interstate facilities is beyond scope of study

0 1/2 1
Miles

NJ 168

Study Area Boundary

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WOODLYNNE BOROUGH/CAMDEN CITY

1A. NJ 168 Between Ferry Avenue and US 130 (Crescent Boulevard) - Cut Through Traffic

Identified Problem

Traffic en route to the Ferry Avenue PATCO station is deflected to Mount Ephraim Avenue from US 130 northbound when the Collingswood Circle is congested. This is a recurring problem that is often caused by flooding in the vicinity of the circle. This traffic was reported to be heavy at times and to exceed the speed limit.

Potential Improvement Scenario

Short Term

Implement traffic calming and/or a greater police presence to curtail excessive speeds of the cut through traffic. The volume of traffic will most likely be reduced upon the completion of the Collingswood Circle project (se e Long Term).

Long Term

DVRPC's current Transportation Improvement Program includes a circle elimination project at this location (DB 155B & 155C). The plan is to create a signalized intersection including measures to eliminate the flooding problems in the vicinity of the circle. Construction is tentatively scheduled for FY 2005. This improvement project will address mobility issues at the Collingswood Circle making it easier to get from US 130 to the Ferry Avenue PATCO Station. There is a strong possibility that traffic will continue to use Mount Ephraim Avenue en route to the station from US 130 in the interim and during the construction phase of the project.
An official circulation plan that includes a traffic calming element should be implemented during the construction phase of the project.

1B. NJ 168 Between Ferry Avenue and US 130 (Crescent Boulevard) - Crashes

Identified Problem

This stretch of NJ 168 is reported to have an elevated number of accidents due to speeding and misuse of the center/left-turn lane. This location experiences significant pedestrian activity because of the retail establishments, including a grocery store. A field observation revealed deficient pavement surface, faded or absent lane markings, and a lack of pedestrian amenities. Other problems at this location include lane configuration changes, inadequate or missing signage, and poor lighting.

This stretch includes a crash cluster identified at milepost 10.5 (see section 5.1, crash cluster analysis). There were 21 crashes during 2001 and 2002 at this location. The predominant crash type was same direction rear end with 13 crashes accounting for 61 percent of the total, exceeding the state percentage in this category.

Potential Improvement Scenario

Resurface the asphalt pavement and install more prominent, reflective lane markings. Install pedestrian crossing amenities including raised crosswalk, curb ramps, and pedestrian signal heads with countdown timers at signalized intersections. Due to the high volume of pedestrian movements and the presence of multiple vehicular access points, a mid-block pedestrian crossing facility with flashing beacon should be considered.

2. Truck Traffic From Fairview Street

Identified Problems

Municipal representatives reported excessive truck traffic on NJ 168 entering from Fairview Street (NJ 168 milepost 10.44). This traffic, originating at the port facilities along the Delaware River, is attempting to avoid congestion on Interstate 676 by using Fairview Street and NJ 168 en route to major arterial routes, i.e, NJ 42 and I-76.

Potential Improvement Scenario

Consider prohibiting trucks access to Fairview Street from its western end near the port facilities. This could be implemented on a trial basis during peak travel periods, i.e. 6 a.m. to 9 a.m. and 4 p.m. to 7 p.m. If the problem is less predictable occurring at random times, a truck ban on Fairview Street may be considered.

HADDON TOWNSHIP

3. Jug Handle at US 130 and Collings Avenue

Identified Problem

There is a tight turning radius from the Collings Avenue jug handle to US 130 southbound. Although the jug handle is controlled by a stop sign, the alignment functions more like a merge but without an acceleration lane to allow traffic to blend into the flow. Motorists were observed either overshooting the closest lane, or moving directly into the center lane. The situation is worsened by high average speeds on US 130 southbound, and the horizontal curve of the facility that compromises sight distance. It was noted in the field that the shrubbery from the defunct automotive business, located within the jug handle, greatly compromises the visibility of oncoming US 130 southbound traffic.

Potential Improvement Scenario

Short Term

Cut back shrubbery and remove any other non-permanent objects that compromise sight distance.

Long Term

If a review of crash history reveals this to be a significant cluster location, then an in-depth intersection analysis should be undertaken to identify improvements which address safety and mobility. Haddon Township Police Department suggested closing the jug handle access to US 130 and redirecting the traffic west to the intersection of Collings Avenue and NJ 168. At this intersection, traffic en route to US 130 southbound would turn left at the signal onto NJ 168 southbound, and follow through the next signal to US 130 southbound. This improvement may divert a significant number of vehicles potentially warranting a level of service analysis for the intersection of NJ 168 and Collings Avenue.

A second option is to study feasibility of redesigning the jug handle. This improvement may involve right of way acquisition and require more intensive study.

HADDON TOWNSHIP/CAMDEN CITY

4. Signs and Lane Markings at the Nexus of NJ 168 and US 130 (NJ 168 milepost 9.72)

Identified Problem

This location can be somewhat confusing especially for drivers new to the area. Faded signs and numerous signal heads creates visual clutter that adds to the ambiguity of the intersection. In particular, there is a staging area after NJ 168 southbound splits off from US 130 southbound where a driver unfamiliar with this location could mistakenly enter the NJ 168 northbound lanes, instead of continuing in the southbound lanes. This problem is worse during nighttime hours.

Potential Improvement Scenario

To better delineate each route install new signs and lane markings with reflective properties, including arrows to indicate pathways. To minimize confusion, install optical signal heads that are only visible to vehicles queuing in the appropriate lane.

HADDON TOWNSHIP/OAKLYN BOROUGH

5. Intersection of NJ 168 and Kendall Boulevard (NJ 168 milepost 9.50)

Identified Problem

Kendall Boulevard meets NJ 168 northbound at a signalized T-intersection. Municipal representatives reported that traffic on NJ 168 northbound has been known to stop abruptly at, or drive through, the red light phase at this intersection. Visibility of the signal appears to be compromised by the Walt Whitman Bridge approach overpass, which is located just south of the intersection. The problem may be worse for drivers in vehicles that sit higher off the road, i.e. trucks, SUVs, etc.

The crash analysis identified a cluster at milepost 9.27, approximately 2/10 of a mile south of the Kendall Boulevard intersection. Of the 18 crashes that occurred at this location during 2001 and 2002, the predominant collision type was same direction sideswipe. Milepost 9.27 is the approximate location where the access ramps for the Walt Whitman Bridge approach meet NJ 168 northbound. North of Kennedy Drive there are 4 lanes: the two left-most lanes are intended for through traffic on NJ 168 northbound, the next lane is for the bridge access, and the right most lane provides access to the Audubon Park development. These lanes are not well marked causing confusion as motorists weave out of the right lanes to avoid the Audubon Park access and/or the bridge access. This behavior was observed during several field visits. This may contribute to the high percentage of same direction-sideswipe crashes.

Potential Improvement Scenario

Install a flashing, red signal ahead warning sign to inform motorists of the approaching signalized intersection at Kendall Boulevard.

Install lane reflective markings and better signs to help distinguish between the NJ 168 northbound lanes, the bridge approach access lane, and the Kendall Boulevard access lane into the Audubon Park development.

HADDON TOWNSHIP/AUDUBON PARK/AUDUBON BOROUGH

6A,6B,6C. Pedestrian Access Issues Between Kendall Boulevard and Merchant Street (NJ 168 milepost 9.50 to milepost 8.62).
Pedestrian access across NJ 168 is greatly lacking in this section. This area is particularly daunting for pedestrians due to the four and six lane roadway cross sections.

6A. Kendall Boulevard to Nicholson Road
Identified Problem
Municipal representatives indicated that there is pedestrian activity between Audubon Park and the businesses in West Collingswood Heights, across NJ 168. Although a pedestrian fatality occurred along this segment during the recent past, this location was not identified as a crash cluster in the crash analysis. Currently there is crosswalk striping and push buttons for crossing NJ 168 at the intersection of Kennedy Drive.

Potential Improvement Scenario
Evaluate the suitability of upgrading the crossing amenities with the following treatments: raised crosswalks, signs, flashing beacons, pedestrian signal heads with countdown timers.

6B. Intersection of NJ 168 and CR 635 Nicholson Road (NJ 168 milepost 8.99)
Identified Problem
Pedestrian accommodations are lacking at this intersection. NJ 168 is three lanes per direction. Nicholson Road is two lanes per direction but widens at the intersection approach to accommodate left turns. In addition, the jug handles and channelized turns make this a particularly wide intersection resulting in pedestrian movements that are onerous and unsafe. Currently the only pedestrian accommodation is the crosswalk striping for crossing Nicholson Road along NJ 168 southbound.

Residential neighborhoods occupy the northwest, southwest, and northeast quadrants of this intersection. The southeast quadrant contains the Black Horse Pike Shopping Center where a grocery store, pharmacy, and video rental shop are located. During field observations pedestrians were witnessed attempting to cross both NJ 168 and Nicholson Road at this location. According to municipal representatives there are also school students who need to cross at these locations en route to and from school. The lack of pedestrian accommodations forces walkers to dodge traffic and traverse grass areas to reach their destinations.

Potential Improvement Scenario
Conduct a pedestrian crossing analysis for both NJ 168 and Nicholson Road at this intersection to determine the best location for a crossing, and to evaluate the existing signal plan for opportunities to implement a pedestrian crossing phase. Appropriate pedestrian amenities should also be incorporated at this time. Treatments for consideration include: raised crosswalks, striping, signs, flashing beacons, pedestrian signal heads with countdown timers, and refuge islands.

There may also be an opportunity to accommodate pedestrians crossing NJ 168 as part of the new access points planned for the Walmart Development (see North Merchant Street to Nicholson Road).

6C. North Merchant Street to Nicholson Road

Identified Problem

Municipal representatives noted pedestrian/vehicle conflicts along this segment. NJ 168 lies between the residential neighborhoods of West Collingswood Heights and the Black Horse Shopping Center. The redevelopment of the shopping center could potentially increase pedestrian traffic. Plans includes a new signalized entrance to be located between two existing commercial businesses. A mid-block alignment creates the opportunity to provide a signalized and well-marked crosswalk between West Collingswood Heights and the shopping center.

Potential Improvement Scenario

Evaluate the proposed access plan for the shopping center redevelopment to determine the suitability for pedestrian amenities at that location. Practical treatments may include raised striped cross walks with reflective markings, pedestrian signals heads with countdown timers, curb ramps, and refuge islands where appropriate. These treatments should be part of a comprehensive pedestrian improvement plan, offering multiple crossing opportunities for the entire stretch of NJ 168 between Kendall Boulevard and North Merchant Street.

NJ 168 Improvements Related to Walmart Development (not mapped)

Planned Development

According to municipal representatives, plans are in place for the redevelopment of the Black Horse Pike Shopping Center, located in Audubon Borough along NJ 168 northbound between Merchant Street and Nicholson Road. Plans include a new and improved signal controlled access from NJ 168 between the existing IHOP restaurant and Pep Boys automotive store. The signal currently located at NJ 168 and North Merchant Street will be removed. In addition, the rear entrance on Nicholson Road would be upgraded to a signalized intersection to better accomodate traffic from neighboring communities (Oaklyn, Westmont, Collingswood, and Audubon).

Potential Problems

This development will be the only big-box style general merchandise retail store in the vicinity of Audubon, Mount Ephraim, Haddon Heights, Haddon Township, and Collingswood. Although the improved access plan from NJ 168 will better accommodate traffic from NJ 168 southbound, there are other intersections that may be impacted by increased traffic volume. The following intersections, if not included in the traffic impact analysis, should be monitored after the development begins operations to assess the impact of increased traffic:

- NJ 168 and CR 635 Nicholson Road
- CR 635 Nicholson Road and US 30
- CR 635 Nicholson Road and West Atlantic Avenue

Potential Improvements Scenario

Further study may be warranted if the increased traffic volumes result in transportation problems, i.e.: congestion, automobile conflicts, automobile/pedestrian conflicts, cut through traffic, etc.

HADDON TOWNSHIP

7. Wilson Avenue

Identified Problem

According to Municipal representatives traffic on CR 635 Nicholson Road eastbound deflects onto Wilson Avenue during the A.M. peak period to avoid congestion. Wilson Avenue, a neighborhood street, runs parallel to Nicholson Road one block to the south. Haddon Township police have made unsuccessful attempts to address this problem in the past.

Potential Improvement Scenario

A combination of one-way routing and traffic calming measures may be appropriate at this location. The goal is to keep the through traffic on the county route (CR 635 Nicholson Road) and off the neighborhood street (Wilson Avenue). It is important that these treatments do not push the cut through traffic from Wilson Avenue onto adjacent streets, moving the problem to another location. Also, these kinds of improvements should have community support.

GLOUCESTER CITY

8. Intersection of US 130 Southbound and Market Street

Identified Problem

At this location US 130 southbound is three lanes with two through lanes, and a right-turn lane which leads to a far side jug handle on the south side of the intersection. The cross street is CR 634 Market Street, a two-lane facility. Traffic seeking to turn left onto Market Street from US 130 southbound is supposed to use this jug handle. Instead, municipal representatives reported that motorists are making an illegal left turn at Market Street from the intersection. This jug handle has limited stacking capacity and a tight turning radius. In addition, there is a short weave distance between the I-676 off-ramp to US 130 southbound and the intersection at Market Street. Traffic en route to Market Street eastbound is weaving unnecessarily to the left lane instead of staying to the right for access to the jughandle.

Additional traffic has been added to this intersection due to the Delaware River Port Authority ramp rehabilitation project on the New Jersey side of the Walt Whitman Bridge. This project has necessitated the closure of the I-676 off-ramp to US 130 northbound. Municipal officials have reported an increase in congestion and accidents along the detour route: US 130 southbound, to the Market Street eastbound jug handle, to US 130 northbound.

Potential Improvement Scenario

The completion of the bridge rehabilitation project, and the subsequent reopening of the off-ramp to US 130 northbound, will reduce the volume of traffic currently being detoured through this intersection. According to local officials this project was slated as a two-year effort.

Speeding within the short weave distance between the I-676 off-ramp and the intersection at Market Street will remain a problem. Measures should be considered along the length of the weave to reduce speeds and to reduce the potential for crashes (i.e.: rumble strips). In addition, incorporate better signage further in advance of the intersection that directs left turning traffic to use the jug handle. This will help reduce the inappropriate weave movements and encourage better, safer, movements.

MOUNT EPHRAIM BOROUGH

Planned Development Along NJ 168 Northbound (not mapped)
Plans are in place for the development of a large convenience store and gas station to be located along NJ 168 northbound, north of CR 661 Valley Road in Mount Ephraim Borough. DVRPC and Mount Ephraim Borough municipal representatives have discussed potential traffic impacts of this development.

DVRPC has been copied on two letters from Mount Ephraim Borough to the New Jersey Department of Transportation concerning issues raised about the proposed development regarding access and alignment with existing cross streets. A modified plan was being considered as of the last letter.

9. Flooding Along NJ 168

Identified Problem

During periods of heavy rain, flooding occurs along NJ 168 southbound in the vicinity of second and fourth streets. At this location NJ 168 has a four lane cross section. According to municipal representatives flooding disables the right lane, forcing traffic into the left lane. This problem creates a safety hazard as motorists weave to avoid the flooded area. The flooded lane also temporarily restricts capacity.

Potential Improvement Scenario

Short Term
Inspect the drainage grates to ensure they are free of debris, which may prevent adequate drainage. Institute an inspection and maintenance schedule.

Long Term
A more comprehensive evaluation of the existing drainage system should be performed to determine if it meets the current NJDOT design standards.

MOUNT EPHRAIM BOROUGH/HADDON HEIGHTS BOROUGH

10. Intersection of NJ 168 and Kings Highway (NJ 168 milepost 8.07)

Identified Problem

The vicinity of this intersection was reported by municipal representatives as being an excessive crash location. Milepost 8.09, located approximately 100 feet north of the intersection, was identified as a crash cluster location in the crash analysis. The current conditions at this location contribute to the problem. NJ 168 is two lanes per direction. Left turns are made from the left/passing lane, in both directions on NJ 168. Kings Highway provides two approach lanes, a shared through/right-turn lane and a left-turn-only lane with a protected signal phase. On NJ 168 southbound there is a lead left arrow that is triggered when vehicles occupy the left lane during a red signal phase. This arrow allows several cars to turn left at the beginning of the phase and then changes to an all green phase allowing permissive left turns and through traffic. Sight distance is compromised due to a vertical curve that crests at the intersection with Kings Highway. This compounds a left-turn problem inherent at intersections with this type of cross section geometry. Specifically, when vehicles are queuing

to turn left from both directions (on NJ 168) a shadowing effect is created as they block the sight distance of oncoming vehicles in the travel lanes. A field observation revealed that average vehicle speeds appear to exceed the posted speed limit, making the probability for an accident even greater.

Potential Improvement Scenarios

NJDOT has analyzed this location in detail as documented in the *Route 168 Operational and Safety Improvements* study. The proposed improvement involves reconstructing the intersection to a five-lane cross section having two through lanes and a dedicated left-turn lane with a protected signal phase. Prohibiting left turns outside of the protected phase is an effective way of reducing the potential for crashes. A five lane cross section will make this already wide intersection wider, thus making the crossing distance for pedestrians even greater. This intersection is regularly crossed by school children and riders of NJ Transit's 400 and 457 bus lines. The proposed improvement must consider pedestrian needs and quality of life for the adjacent neighborhoods.

Another concern is the historic Harwan Theater of Mount Ephraim located along NJ 168 southbound between Kings Highway and Bell Avenue. It is recommended that the proposed alignment consider preserving this important landmark. As well, any potential impacts to the businesses located on each of the four intersection quadrants should be considered.

The section of NJ 168 between North Merchant Street and I-295, which includes crash cluster locations at the Kings Highway and Prospect Ridge Boulevard intersections, is a qualified candidate for a road diet. A road diet involves a reduction in lanes, in this case from four lanes to three lanes. The new configuration, one lane per direction with a two-way left turn lane and shoulders, would accommodate left turns better and more safely without compromising the carrying capacity of the through lane. In their report *Evaluation of Lane Reduction "Road Diet" Measures and Their Effects on Crashes and Injuries,* the Federal Highway Administration states:

> "Under most average daily traffic conditions tested, road diets have minimal effects on vehicle capacity, because left turning vehicles are moved into a common two-way left turn lane."

The study also found a reduction in the number of crashes, approximately 6%, in the after period of the road diet conversions from undivided four lane facilities to three lane facilities.

The road diet tool is not a new concept. Research by Dan Burden, director of Walkable Communities, Inc., and Peter Lagerwey, transportation professional for the City of Seattle Engineering Department, identified sixteen locations in the United States and Canada where AADTs remained the same or increased in the after period of roadway lane reduction projects completed during the 1990s.

Although careful evaluation of existing conditions and desired outcomes is necessary, a road diet on this stretch of NJ 168 is a comparatively low cost improvement for addressing mobility, access, and safety issues.

11. Pedestrian Access in the vicinity of NJ168 and Bell Road

Identified Problem

According to municipal representatives there have been pedestrian accidents along NJ 168 in the vicinity of New Jersey Avenue/Bell Road. The reported crashes were said to have involved individuals who were crossing NJ 168 en route to the strip mall located along NJ 168 northbound. A senior citizens residence facility is also located near this location. This section of NJ 168 is part of a school route to an elementary school located on Bell Road a short distance from NJ 168. Pedestrian activity at this location is likely to increase if plans to rehabilitate the historic Harwan Theater are realized.

Potential Improvement Scenario

Conduct a pedestrian crossing analysis to determine if a mid-block pedestrian crossing is warranted. If so, appropriate pedestrian amenities should be incorporated, such as: pedestrian crossing warning signs with a flashing beacon, raised crosswalks, striping, signs, and pedestrian signal heads with countdown timers.

NJDOT Concept Development Study

The intersection of CR 658 Bell Road and NJ 168 was examined as part of NJDOT's *Route 168 Operational and Safety Improvements*. Geometric issues related to alignment and sight distance were identified. In particular, there is insufficient intersection sight distance due to the acute angle of the intersection.

12. Flooding Along NJ 168

Identified Problem

During periods of heavy rain flooding occurs along NJ 168 southbound in the vicinity of White Avenue near the Kershaw Elementary School, south of Bell Road. NJ 168 has a four lane cross section at this location. Flooding reportedly disables the right lane, forcing traffic into the passing lane. This problem creates a safety hazard as motorists weave to avoid the flooded area, and temporarily restricts capacity.

Potential Improvement Scenario

Short Term

Inspect the drainage grates to ensure they are free of debris, which may prevent adequate drainage. Institute an inspection and maintenance schedule.

Long Term

A more comprehensive evaluation of the existing drainage system should be performed to determine if it meets the current NJDOT design standards.

NJDOT Concept Development Study

NJDOT's *Route 168 Operational and Safety Improvements* study examined the drainage systems serving this location. A more in-depth analysis that models the system on a 25 year horizon was recommended.

HADDON HEIGHTS BOROUGH/BELLMAWR BOROUGH

13A,13B,13C. Mobility Issues in the Vicinity of the I-295/NJ 168 Interchange. (NJ 168 milepost 7.50 to7.23)

The problems analyzed at this location were identified during the initial field visits conducted with municipal representatives and were reexamined upon return field visits during the peak period. NJDOT's *Route 168 Operational and Safety Improvements* study also examined this location. Specifically, NJDOT's study identified congestion related to substandard conditions at Ramps A and F, safety concerns related to geometric issues at Ramp D, poor deck condition and a structurally deficient bridge over I-295.

13A. Intersection of Maple Avenue and NJ 168 (NJ 168 milepost 7.50)

Identified Problem

At this location, NJ 168 is four lanes and Maple Avenue is two lanes with one approach lane. Maple Avenue meets NJ 168 at a T-intersection controlled by a stop sign. This intersection is in close proximity to the I-295 southbound off-ramp to NJ 168 northbound. Municipal representatives reported that vehicles exiting the I-295 southbound off-ramp to 168 northbound do not always heed the stop sign. In addition, the line of sight from the intersection is poor. Left turns from Maple Avenue are difficult to make during peak congestion periods and are relatively unsafe due to the four-lane cross section of NJ 168. Municipal representatives also reported that it is not uncommon for motorists to exit Maple Avenue and cut across the four lanes of NJ 168 to access the I-295 southbound on-ramp, a potentially dangerous movement. Although the potential for conflicts may be high at this location, a crash cluster was not identified.

In addition, the stop bar is missing on the Maple Avenue approach.

Potential Improvement Scenario

Change Maple Avenue's access to NJ 168 to right-in, right-out only. Prohibiting left turns from Maple Avenue will decrease the potential for crashes related to left-turn movements. Traffic seeking to access NJ 168 southbound from this neighborhood would be forced to use adjacent streets located further north, further from the I-295 off ramp. This improvement could be implemented on a trial basis.

Repaint the stop bar on the Maple Avenue approach.

13B. Pedestrian Accommodations Along NJ 168 Over the I-295 Bridge (NJ 168 milepost 7.42)

Identified Problem

This location provides a pedestrian environment that is less than ideal. Inadequate sidewalk width (less than four feet wide) and overgrown vegetation, combined with a multilane cross section makes this pedestrian movement arduous and potentially unsafe.

Potential Improvement Scenario

Appropriate pedestrian amenities should be incorporated during any bridge rehabilitation and or ramp improvements, such as: striped crosswalks with reflective properties, signs, and pedestrian signal heads with countdown timers.

13C. Intersection of NJ 168 Anderson Avenue (NJ 168 milepost 7.32)

Identified Problem

The intersection of NJ 168 and Anderson Avenue is located near the I-295 off-ramp. Turning left from Anderson Avenue to NJ 168 northbound during the P.M. peak period (4-7 P.M.) is dangerous due to heavy traffic on NJ 168 southbound and compromised sight distance from Anderson Avenue.

Potential Improvement Scenario

Prohibit left turns from Anderson Avenue during peak congestion times, i.e. 4-7 P.M. This can be implemented on a trial basis.

14. Intersection of NJ 168 and Benigno Boulevard (NJ 168 milepost 6.79)

Identified Problem

At this location Benigno Boulevard meets NJ 168 at a T-intersection. Benigno Boulevard has two lanes and NJ 168 has three lanes. Benigno Boulevard provides access to the Bellmawr Interstate Business Park and the U.S. Post Office's Bellmawr Regional Facility. These developments generate a heavy daily volume of both car and large truck traffic. This stretch of NJ 168 is heavily developed with retail uses including businesses located on both corners of the intersection, and across from Benigno on NJ 168 northbound**.** In addition, a multi-phase redevelopment project is planned at this location along NJ 168 northbound.

The tight turning radius at this intersection makes it difficult for large trucks to maneuver, causing traffic backups as they swing wide to make turns into and out of Benigno Boulevard. This adds to the peak period congestion on both NJ 168 and Benigno Boulevard.

Planned Improvement Scenario

NJDOT's *Route 168 Operational and Safety Improvements* study examined this location. The conceptual solution calls for an improvement to the geometrics of the intersection including better turning radii, a dedicated left turn lane on the Benigno Boulevard approach, and the addition of a signal phase for access to the planned development across from Benigno Boulevard. The intersection would then become four way. This project has moved into NJDOT's feasability assessment stage of the planning and engineering process.

15. New Jersey Turnpike Interchange at NJ 168 (NJ 168 milepost 6.60)

Identified Problem

In the absence of a deceleration lane to access the New Jersey Turnpike, NJ 168 southbound traffic utilizes the shoulder, which is also used as an access lane for a motel and a fast food establishment located between Benigno Boulevard and the NJTPK entrance. This situation becomes further complicated by vehicles turning left from businesses located across the street along NJ 168 northbound. This creates the potential for crashes and may be exacerbated in the future due to additional traffic generated by the planned developments.

Potential Improvement Scenario

Short Term

Install new pavement markings and appropriate signage prohibiting the use of the shoulder as an access lane for the turnpike entrance.

Long Term
There is undeveloped space behind the two businesses that may be usable as an access road to Benigno Boulevard. There is a slight grade discrepancy between the two establishments, which would need to be addressed. This road could be used to force all left-turning traffic leaving these businesses out to Benigno Boulevard to utilize the signalized intersection at NJ 168. Traffic would then make left turns on the green arrow. To ensure usage of the new access road, left turns onto NJ 168 should be prohibited from these businesses.

16. NJ 168 Center/Left-turn Lane (NJ 168 milepost 3.65 to 7.35)

Identified Problem

Municipal representatives reported that the center turn lane of NJ 168 is being used as a through lane, a problem worsened by congestion along NJ 168 northbound. Representatives reported collisions between vehicles misusing the center turn lane and left-turning vehicles entering the turn lane en route to cross streets and driveways. The worst location was reported to be the segment of NJ 168 between the New Jersey Turnpike and Benigno Boulevard. This location was not identified as a cluster in the NJ 168 crash analysis.

Potential Improvement Scenario

To retain mobility and calm traffic, install rumble strips in the center lane between those locations where left turns can be made. This can be implemented on a trial basis using portable devices. For example, this treatment could be used for a long length between the New Jersey Turnpike overpass north to the point where an appropriate stacking queue for left turns into Benigno Boulevard should begin. This will not keep vehicles out of the center lane, but will force lower speeds, thus reducing the potential for crashes. It will also discourage misuse of the center turn lane in advance of the turn queue.

DEPTFORD TOWNSHIP

17. Intersection of NJ 42 and CR 544 Clements Bridge Road (NJ 42 milepost 11.95)

Identified Problem

According to municipal representatives, a major commercial development is planned for the northwest quadrant of the NJ 42 and Clements Bridge Road intersection. Also mentioned were plans to redevelop the northeast quadrant. These new developments will generate many more trips, further exacerbating the traffic problems in this already congested area. Municipal representatives, in a related issue, reported that left turns from Hurffville Road to Clements Bridge Road are unsafe.

Improvement Scenario

Both of these problems are being addressed by the *Route 41/42 Freeway - Singley Avenue to Cooper Street (Sec. 1A 2A 14M)* project currently on the New Jersey portion of DVRPC's Transportation Improvement Program (DB# 201). This project includes widening Route 41 from south of Deptford Center Road to Clements Bridge Road in order to provide a center left-turn lane, one lane in each direction, and outside shoulders. The existing interchanges on Route 42 Freeway for Clements Bridge Road and Route 41 will be reconfigured to improve the access to

and from Route 42 Freeway and improve the circulation of the existing network of roads and ramps. The Route 41 bridge over Route 42 Freeway will be rehabilitated. This is a multi-year, funded project, under the provisions of Section 13 of P.L. 1995, c.108.

GLOUCESTER TOWNSHIP

18. Intersection of NJ 168 and CR 676 Old Black Horse Pike (NJ 168 milepost 3.55)

Identified Problem

This intersection is located north of the NJ 168/NJ 42 interchange. CR 676 meets NJ 168 at an acute angle in very close proximity to the New Jersey Turnpike off-ramp to NJ 168 northbound. Traffic entering NJ 168 from Old Black Horse Pike has poor sight distance of traffic exiting the 42 northbound off-ramp onto NJ 168 northbound, as well as sight distance of through traffic on NJ 168. Local officials also indicated this to be a location where frequent crashes occur. The crash analysis did not identify a crash cluster in this vicinity.

Potential Improvement Scenario

Explore the possibility of reconstructing CR 676 as a T-intersection with NJ 168. This alignment will improve sight distance and address the merge issues between the NJ 42 off-ramp and CR 676 by further separating the two access points. This treatment is also appropriate at the NJ 42 off-ramp intersection with NJ 168. In addition to addressing the merge issues it would provide access to NJ 168 southbound which is currently not available. Undeveloped tracts of land were identified in the vicinity of both locations that may be available for these improvements.

19. Intersection of NJ 168 and CR 706 Almonesson Road and Coles Road (NJ 168 milepost 3.07)

Identified Problem

During the P.M. peak when NJ 42 northbound becomes congested, traffic is deflected to NJ 168 northbound via the Coles Road exit. Westbound Coles Road traffic does not have direct access to NJ 168. Coles Road has been designated a one-way street between NJ 168 and Tice Avenue, allowing eastbound movements only. To access NJ 168, vehicles on Coles Road westbound must turn left on Tice Avenue and then right on CR 706 (Blenheim Erial Road). This change to Coles Road was most likely done to reduce the intersection configuration from five legs to four. However, during peak periods it causes a traffic back up on Coles Road westbound.

Potential Improvement Scenario

This intersection has an unusual configuration and would benefit from a focused study that includes a level of service analysis. This would quantify the number of cars using the intersection and the movements they are making, i.e right, left, or through. If a significant number of cars are crossing NJ 168 to continue on Coles Road westbound, then reconfiguring the intersection to allow two way traffic on the Coles Road approach should be explored. This improvement would eliminate the need to use Tice Avenue, a neighborhood street.

WASHINGTON TOWNSHIP

20. Intersection of NJ 168 and Wilson Road (NJ 168 milepost 0.52)

Identified Problem

Municipal representatives reported this location as having a high number of crashes involving left-turning vehicles. The problem was said to be related to vehicles seeking to turn left from both sides of Wilson Road at the same time. A crash cluster was not identified at this intersection in the crash analysis.

Potential Improvement Scenario

First , perform a detailed crash analysis for the intersection to confirm the cause of the problem. This analysis may already be available from local law enforcement. Local officials recommended the signal be changed to a split phase configuration allowing traffic from one side of Wilson Road at a time. This signal phasing will improve safety by eliminating the competing left turn movements. A level of service analysis should be conducted to test the effects of this timing change and to identify the optimum timing for maximum efficiency under the split phasing. This effort should be initiated at the local level and coordinated with the New Jersey Department of Transportation.

21. Intersection of CR 705 Sicklerville Road and Wilson Road (CR 705 milepost 0.39)

Identified Problem

This intersection is currently controlled by a four-way stop. Municipal representatives indicated that it experiences high volumes of traffic, possibly enough to warrant a traffic signal.

Potential Improvement Scenario

Conduct a signal warrant analysis. This effort should be initiated at the municipal level and coordinated with the New Jersey Department of Transportation.

22. Intersection of NJ 168 and CR 705 Sicklerville Road (NJ 168 milepost 0.25)

Identified Problem

At this location, NJ 168 has a four-lane cross section. Left turns from NJ 168 northbound to Sicklerville Road westbound are made from the passing lane, a left turn lane and signal phase are not provided. Left-turns from NJ 168 southbound to Sicklerville Road eastbound are accommodated by a dedicated left-turn lane and lead left arrow. The signal then changes to an all green phase, allowing permissive left-turns for the remainder of the cycle. Permissive left turns that require crossing multiple lanes of live traffic are inherently unsafe. The situation becomes worse during the P.M. peak period when traffic volumes are higher.

Sicklerville Road in this vicinity is highly congested during the P.M. peak period. This intersection is at milepost 0.25 which was identified as a cluster location in the crash analysis. There were 25 incidents at this location during 2001 and 2002, making it the second highest crash cluster in the study area. Twenty four percent were angle crashes and another 24 percent were left-turn crashes.

Potential Improvement Scenario

Conduct a level of service analysis to determine the impact of adding a dedicated left turn lane

and signal phase to NJ 168 northbound. This dedicated phase would permit the left turns from both directions simultaneously. In this scenario, left turns would only be allowed during the green arrow phase when through traffic on NJ 168 has a red phase. This improvement has been used by NJDOT at other intersections (US 30 and Gibbsboro Rd.) as a way to reduce the potential for crashes related to left turns.

23. Median of NJ 168 between CR 705 Sicklerville Road and the Southern Terminus of NJ 168 at NJ 42 (NJ 168 milepost 0.25 to 0.00)

Identified Problem

Municipal representatives reported problems related to the three median cut openings along NJ 168 between Sicklerville Road and the terminus of NJ 168 where it merges with NJ 42 southbound. These median breaks are being used due to the lack of turnaround, or u-turn, accommodations on NJ 168. In this stretch there are a few residences and businesses located along NJ 168 southbound only. The northbound lanes of NJ 168 are fed traffic exclusively from the NJ 42 southbound off-ramp.

Potential Improvement Scenario

A tract of undeveloped land, located just before the merge of NJ 168 southbound and NJ 42 southbound, may be suitable to create an official jug handle providing u-turn access to NJ 168 northbound. This improvement would help reduce the number of problematic movements and provide a safer alternative without compromising access. The closure of the three median breaks along NJ 168 between Sicklerville Road and NJ 42 should be implemented upon completion of the jug handle.

GLOUCESTER TOWNSHIP

24. Intersections: Sicklerville Road and NJ 42 Interchange, Sicklerville Road and Orr Road, Sicklerville Road and Hickstown Road (CR 705 milepost 7.56 to 7.43)

Identified Problem

Local officials reported that CR 705 Sicklerville Road is congested east of the NJ 168 intersection to Hickstown Road. The problem is exacerbated by left-turning vehicles queuing in the through lane waiting to enter Orr Road and Hickstown Road. Field observations identified this to be a predominantly P.M. peak period problem. At this location Sicklerville Road is two lanes plus a left-turn lane at the NJ 42 northbound on-ramp intersection only. A left-turn lane is not provided at the Orr Road or Hickstown Road intersections. Much of the volume is from NJ 168 and NJ 42 southbound traffic en route to points east and south via Sicklerville Road.

Potential Improvement Scenario

A left turn lane for Orr Road and one for Hickstown Road is needed to separate the turning traffic from the through traffic. The addition of this extra lane would remove queuing vehicles from the through traffic allowing Sicklerville Road to flow more efficiently. Pavement width between the NJ 42 on-ramp and Orr Road measures 62 feet, ample width for re-striping to a three lane cross section. In conjunction, a stop bar and a “do not block intersection” sign should be added on Sicklerville Road westbound at Orr Road to facilitate access to Orr Road. A second left turn lane should begin just east of Orr Road to accommodate left turns to Hickstown Road. The pavement width on Sicklerville Road measured 42 feet at a location

midway between Orr Road and Hickstown Road. This width is sufficient for re-striping to a three lane cross section.

In addition, this stretch of Sicklerville Road is serviced by NJTransit's 403 bus. Two bus stop signs were identified along eastbound Sicklerville Road between Orr Road and Hickstown Road, although neither sidewalks nor a shoulder is provided along this stretch of roadway. Both improvements should be considered during the re-striping of the facility.

6.2 Cut -Through Traffic

When vehicles encounter traffic congestion on a higher level facility that they would typically prefer to use, they sometimes seek an alternate route on a lower level facility in an effort to bypass the congestion. When the lower level facility is a residential street, the vehicles appear as "cut-through" traffic to residents along this otherwise quiet street. Cut-through traffic has been reported to DVRPC by local officials and traffic officers from a number of the NJ 168 study area municipalities. Most of the reports refer to excessive travel speeds, excessive travel volumes, or both.

Figure 20 shows reported cut-through routes in the NJ 168 study area. Most of the cut-through routes identified are located in municipalities adjacent to I-295 and the New Jersey Turnpike, including Bellmawr, Haddon Heights, Mount Ephraim, and Runnemede. Isolated problems were also reported in Camden, Haddon Township, and Gloucester Township.

The existence of cut-through traffic may be an indicator of traffic congestion on a higher level facility. For example, several of the cut-through routes are on streets that run parallel to NJ 168, clearly an attempt to bypass congestion on the higher level facility. A second cause of cut-through traffic is when a particular street happens to be the most direct route between two points. For example, because the North-South Freeway interchange at Creek Road in Bellmawr is surrounded by residential neighborhoods, traffic must cut through these neighborhoods to access the facility.

On figure 20, arrows indicate the direction of flow. Most of these problems get worse during the A.M. or P.M. peak, while some cut-through routes are busy during the midday as well. Some cut-through routes are a problem in both directions and are marked accordingly. Many of the cut through routes pass close to schools; six schools are located directly on a cut-through route. Several municipalities expressed concern about the presence of high-speed, high volume traffic on residential streets traveled by school children. Public schools and nonpublic schools that are located within one-half mile of a cut-through route, are shown on figure 20.

Recommendations

Several techniques are available to discourage or prohibit use of parallel routes for drivers looking for shortcuts around congestion on NJ 168. The most straight forward measure is to improve the flow of traffic on the main facility, i.e: NJ 168. This strategy is examined in the report section entitled Study Core Traffic Analysis. An improvement that calls for additional capacity in an attempt to achieve better traffic flow may not be the most desirable approach if right-of-way constraints exist. The NJ 168 corridor may benefit from a combination of signal

improvements and traffic calming measures. This treatment recognizes that congestion management is realistic, and congestion elimination is not. Signal modifications are aimed at improving flow on the main facility and traffic calming improvements are aimed at reducing vehicle speeds through residential areas. These strategies are complimentary when used together.

The following techniques may be suitable for managing cut through traffic in the affected neighborhoods in the NJ 168 corridor. It is important to remember that calming traffic on one street may push traffic to another street. Thus, it is recommended that these treatments be considered in terms of the effects the target street and the neighborhood as a whole.

1. Prohibit Turns Onto Selected Roads During Peak Hours
Signs prohibiting turns, with the exception of local traffic, onto a parallel route during the morning and/or afternoon peak period can be installed rather easily. The larger issue is the enforcement of such a ban that requires police enforcement.

2. Install Traffic Control Devices On Parallel Routes
Stop signs or traffic signals forces traffic to stop frequently which may make the alternative route less desirable. However, traffic control devices should only be installed if warranted by careful traffic pattern analysis. Many times stop signs create a phenomenon called speed spiking where motorists accelerate excessively in the mid-block sections to try to make up for time lost at stop signs. This also occurs where speed bumps have been installed (see 3 below.)

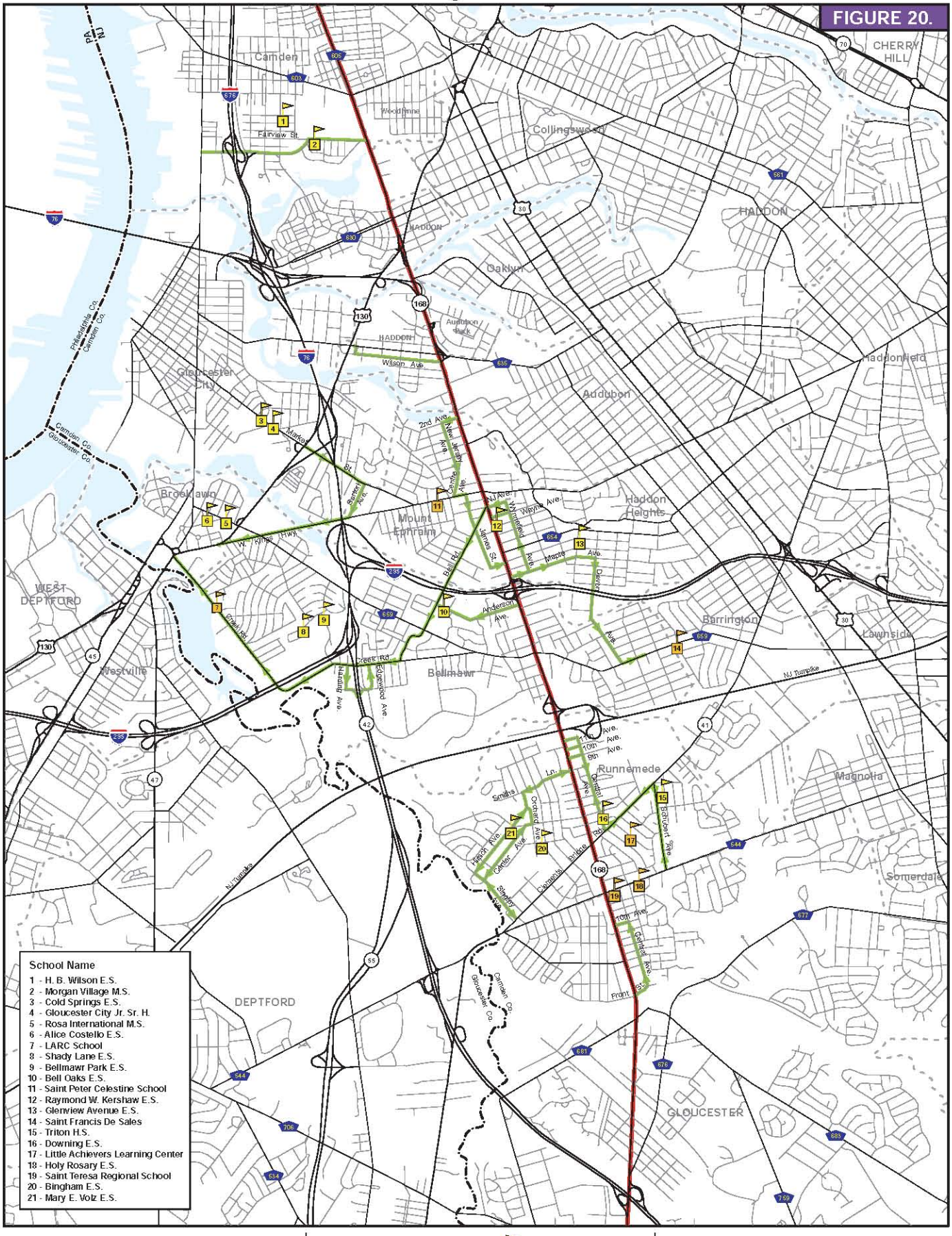
3. Evaluate Traffic Calming
Traffic calming involves measures that rely on human psychology and physical constraints to slow or deter traffic. Traffic calming does not rely on regulatory measures (i.e.: speed limits) or traffic control devices, although these could be used in combination with traffic calming measures in order to control traffic volumes and speeds. These measures can be used to reduce speeds and volumes to acceptable levels, improve livability and safety, help prevent crime, and encourage redevelopment.

Center medians, bulb-outs at intersections, speed tables, textured pavements, and raised crosswalks are applicable traffic calming measures. Not all are appropriate for every road. Before a particular measure is implemented, a comprehensive evaluation of the surrounding road network, and the impacts on local circulation must be considered.

NJ 168 Corridor Study

Cut Through Traffic Routes

FIGURE 20.



School Name

1 - H. B. Wilson E.S.
2 - Morgan Village M.S.
3 - Cold Springs E.S.
4 - Gloucester City Jr. Sr. H.
5 - Rosa International M.S.
6 - Alice Costello E.S.
7 - LARC School
8 - Shady Lane E.S.
9 - Bellmawr Park E.S.
10 - Bell Oaks E.S.
11 - Saint Peter Celestine School
12 - Raymond W. Kershaw E.S.
13 - Glenview Avenue E.S.
14 - Saint Francis De Sales
15 - Triton H.S.
16 - Downing E.S.
17 - Little Achievers Learning Center
18 - Holy Rosary E.S.
19 - Saint Teresa Regional School
20 - Bingham E.S.
21 - Mary E. Volz E.S.

0 1 2
Miles

Cut Through Route
Traffic Direction
Public School
Non-Public School

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
SEPTEMBER 2004

6.3 Study Core Traffic Analysis

Introduction
After collecting data and completing field views for the NJ 168 study, it became obvious that one section of the study corridor would require the most attention because it was simultaneously critical to the functioning of the corridor and the source of its major challenges. That section of the study corridor, designated "the study core," is a two-and-one-half mile section of NJ 168 extending from I-295 to Station Avenue / Fifth Avenue (Runnemede); and comprising nine signalized intersections / interchanges (see figure 21). In north-south order, they are:

- I-295 ramp (Maple Avenue)
- I-295 ramp (Hendrickson Avenue)
- Browning Road
- Benigno Boulevard
- Constitution Avenue/Ninth Avenue
- Third Avenue
- Clements Bridge Road
- Evesham Road
- Station Avenue/Fifth Avenue

There are six reasons that this section of NJ 168 was designated the study core:

1) the highest travel volumes in the study area (AADT = 24,000 to 25,000) coincide with it;
2) the highest level of peak period congestion coincides with it;
3) cut-through traffic, which may be caused by intersection delay, has been reported by study municipalities;
4) poor traffic signal coordination, which may exacerbate congestion, has been reported by study municipalities;
5) the presence of regionally significant east-west facilities (Clements Bridge Road and Evesham Road); and
6) based on forecasts of future growth, congestion at the nine intersections / interchanges is likely to get worse.

Three analyses of the study core are presented: 1) Current Level of Service, 2) Future Level of Service - Scenario, and 3) Traffic Signal Coordination. Conclusions and recommendations follow.

Methodology
The data used in the level of service and the traffic signal coordination analyses were taken from two sources.

DVRPC conducted manual turning movement counts at five NJ 168 intersections:

- Constitution Avenue / Ninth Avenue
- Third Avenue

- Clements Bridge Road
- Evesham Road
- Station Avenue / Fifth Avenue

The counts were done on Tuesday, March 30, 2004; Wednesday, March 31, 2004; Thursday, April 1, 2004; Tuesday, April 6, 2004; and Thursday, April 8, 2004, from 6:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 7:00 P.M. Each intersection was counted once during the A.M. peak and once during the P.M. peak.

Buchart-Horn, Inc. conducted manual turning movement counts at four NJ 168 intersections / interchanges:

- I-295 ramp (Maple Avenue)
- I-295 ramp (Hendrickson Avenue)
- Browning Road
- Benigno Boulevard

The counts were done on Tuesday, July 23, 2002; Wednesday, July 24, 2002; and Thursday, July 25, 2002, from 7:00 A.M. to 9:00 A.M. and from 4:00 P.M. to 6:00 P.M. Each intersection was counted three times during the A.M. peak and three times during the P.M. peak.

The latter counts were published originally in *Route 168 Operational and Safety Improvements: Traffic Analysis Report* (November 2002), which was prepared by Buchart Horn, Inc. for the New Jersey Department of Transportation

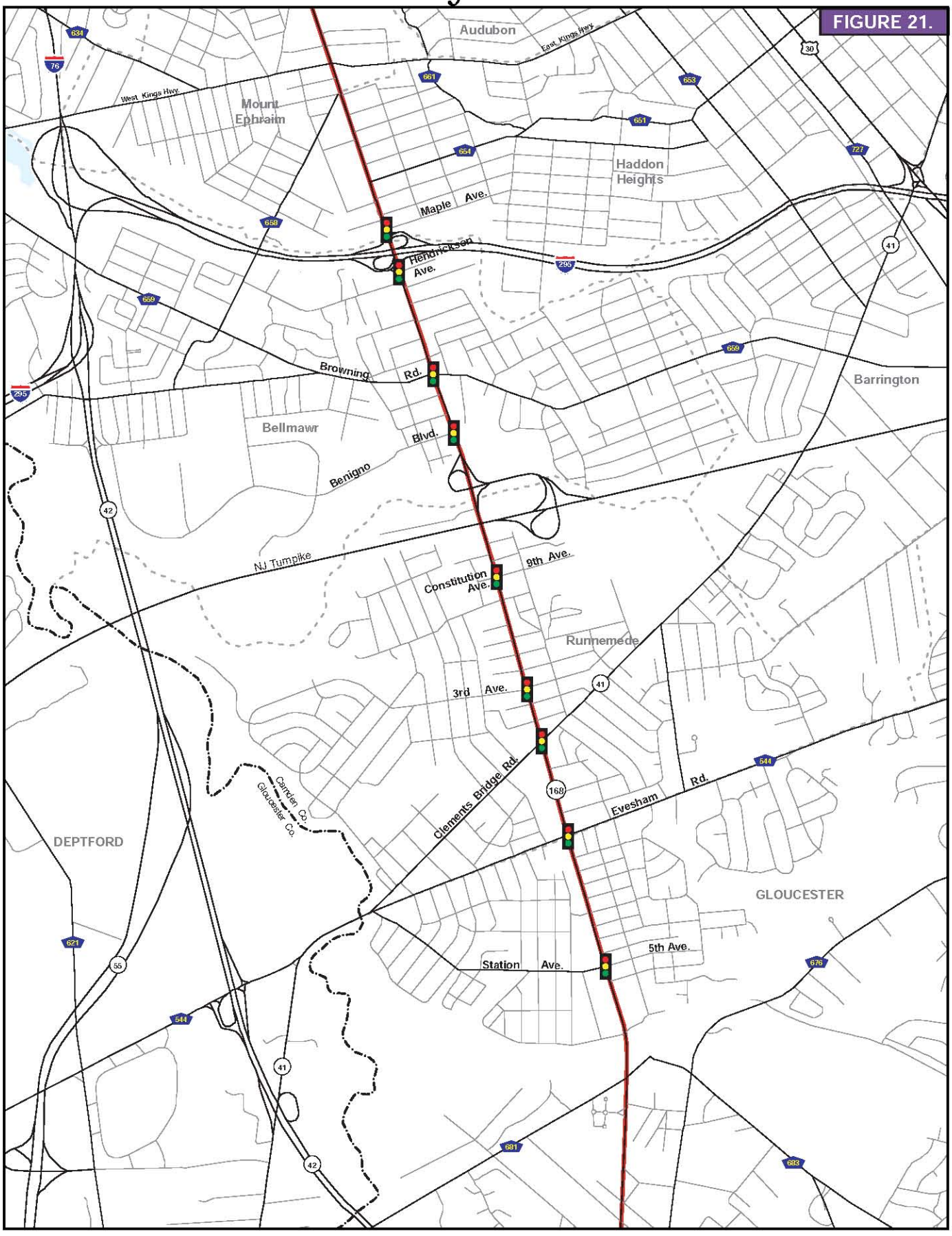
All the data were input to Synchro, a traffic signal optimization program that was used to perform the level of service and traffic signal coordination calculations.

In addition, signal plans and timing permits for all intersections were obtained from the office of Traffic Engineering and Investigations, New Jersey Department of Transportation.

NJ 168 Corridor Study

Study Core Traffic Analysis

FIGURE 21.



0 1/2 1
Miles

Signalized Intersection

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
SEPTEMBER 2004

Current Level of Service (LOS)

The performance of nine NJ 168 intersections / interchanges was analyzed under existing road conditions. The analysis covered a two-and-one-half mile section of NJ 168 from I-295 to Station Avenue / Fifth Avenue (i.e, the study core). Synchro Traffic Analysis Software was used to simulate traffic on NJ 168 and nine east-west facilities. It then determined how well the intersections / interchanges functioned with the traffic.

Level of Service (LOS) is a common tool for analysis of transportation facilities. The concept of level of service, when applied to the performance of an intersection, has a precise meaning: it refers to the average delay experienced by a vehicle traveling through the intersection. Table 21 shows level of service categories, from A to F, with associated criteria for each category. Under existing road conditions, one intersection in the study core is operating at an unacceptable level of service (i.e., LOS = E or F) during at least one of the peak periods: Constitution Avenue / Ninth Avenue. NJ 168 itself is also operating at an unacceptable level of service at one intersection – the same intersection, Constitution Avenue / Ninth Avenue – but the primary problems are on the east-west facilities. Vehicles on Browning Road, Clements Bridge Road, and Evesham Road are experiencing delays in the range of one to three minutes.

TABLE 21
LOS CRITERIA FOR SIGNALIZED INTERSECTIONS[1]

LEVEL OF SERVICE	Control Delay per Vehicle (s/veh)
A	<= 10
B	10 - 20
C	20 - 35
D	35 - 55
E	55 - 80
F	> 80

[1]Highway Capacity Manual 2000

The following observations are taken from the Synchro Level of Service analysis and from field views of NJ 168:

1) Operationally, the study core may be divided into two groups:

North of New Jersey Turnpike	South of New Jersey Turnpike
I-295 ramps (north)	Constitution Avenue / Ninth Avenue
I-295 ramps (south)	Third Avenue
Browning Road	Clements Bridge Road
Benigno Boulevard	Evesham Road
	Station Avenue / Fifth Avenue

The five facilities south of the turnpike function de facto as a unit; they are connected by a network of neighborhood streets (see 3). Of these, Clements Bridge Road and Evesham Road are regionally significant roads that permit travel between Gloucester County, the North-South Freeway, US 30, and points beyond. The four facilities north of the turnpike function separately from each other.

2) During peak periods, turning traffic from Clements Bridge Road and Evesham Road discharges onto NJ 168 at a rate faster than it can absorb. Through traffic on these facilities is also delayed at the NJ 168 intersection. The problem on Clements Bridge Road stands out because both the eastbound and westbound approaches are one lane, but the intersection must handle a high volume of left turns and through movements. The inflow of traffic onto NJ 168 is absorbed (or exits) downstream. Congestion on NJ 168 generally dissipates at I-295 to the north, and Station Avenue / Fifth Avenue to the south.

3) During peak periods, turning traffic on Clements Bridge Road and Evesham Road avoids the congestion at NJ 168 and, instead, shifts to Constitution Avenue / Ninth Avenue, Third Avenue, and Station Avenue / Fifth Avenue. Therefore, the delays on Clements Bridge Road and Evesham Road are responsible, in part, for long queues on other facilities. Vehicles travel on neighborhood streets to make these movements. All cut through routes that have been reported to DVRPC are shown in figure 20.

Table 22 , which shows left turns, through movements, and right turns, during the A.M. peak hour, reveals driver behavior. There are large numbers of through movements only on Clements Bridge Road and Evesham Road. In contrast, at the northern-most intersection (Constitution Avenue / Ninth Avenue), eastbound left turns and westbound right turns – all of them traveling north on NJ 168 – predominate. Likewise, at the southern-most intersection (Station Avenue / Fifth Avenue), eastbound right turns and westbound left turns – all of them traveling south on NJ 168 – predominate.

4) During peak periods, traffic on NJ 168 may impede turning movements from east-west facilities. This is true at Constitution Avenue / Ninth Avenue; it was not observed at other intersections.

5) Browning Road peak period travel volumes exceed the capacity of the facility and are inappropriate for a residential street. However, the facility provides access to the North-South Freeway, via Creek Road. The immediate problem is excessive demand for the left-turn lanes on both the eastbound and westbound approaches. The capacity of those lanes is only six or seven vehicles, but increasing the length of the lanes would require acquisition of right-of-way that is now residential.

TABLE 22
LEFT TURNS, THROUGH MOVEMENTS, AND RIGHT TURNS, FROM SELECTED FACILITIES, AT NJ 168[1]

Intersection	Eastbound Traffic			Westbound Traffic		
	Left	Thru	Right	Left	Thru	Right
Constitution Avenue / Ninth Avenue	181	16	3	56	11	226
Third Avenue	99	36	78	8	12	6
Clements Bridge Road	179	286	20	118	168	23
Evesham Road	71	424	12	163	237	104
Station Avenue / Fifth Avenue	33	33	91	100	24	0

[1]AM Peak Hour

Future Level of Service (LOS) – Scenario

The performance of nine NJ 168 intersections / interchanges was analyzed under a future growth scenario. The scenario covered a two-and-one-half mile section of NJ 168 from I-295 to Station Avenue / Fifth Avenue. Synchro was used to simulate increased traffic on NJ 168 and nine east-west facilities. It then determined how well the intersections / interchanges functioned with the increased traffic.

The simulation required making an assumption about the growth of traffic in the future. The assumption used was that between 2004 and 2025 traffic would grow at an average annual rate of one-half percent (0.5 percent). Other rates would have also been plausible; 0.5 percent was selected as the minimum rate at which traffic was likely to grow.[1]

If trip-making grows at an annual rate of 0.5 percent (compounded) each year from 2004 to 2025, the result would be about 11percent more trips by 2025. The increased traffic (i.e., the 11 percent) was input to Synchro, which output level of service for the nine intersections / interchanges. Tables 23 and 24 show future level of service at the intersections / interchanges for the A.M. peak and P.M. peak, respectively. Table 25 shows a summary of current and future level of service at the intersections / interchanges, with associated average delay per vehicle, for the A.M. peak and the P.M. peak.

Under the future growth scenario, four intersections are operating at an unacceptable level of service (i.e., LOS = E or F) during at least one of the peak periods: Browning Road, Constitution Avenue / Ninth Avenue, Clements Bridge Road, and Evesham Road. NJ 168 itself is operating at an unacceptable level of service at two intersections – Browning Road and Constitution Avenue / Ninth Avenue – but the primary problems are on the east-west facilities. Vehicles on Browning Road, Clements Bridge Road, and Evesham Road are experiencing delays in the range of one to four minutes.

It should be noted that the future growth scenario is not a forecast of future travel conditions in the study corridor. Instead, it refers to one possible future outcome: That an 11 percent increase in traffic would be reached in 2025. The question of when such an increase would actually be realized is beyond the scope of this study. But it is important to point out that if, for example, the annual growth of traffic was 2 percent, then the congestion levels seen under the future growth scenario would be reached in 2009.

[1]Three considerations suggest that a rate of 0.5 percent is reasonable. First, it is lower than the rate of growth of traffic on other roads in Camden County between 1995-2000 (for which data is available). Second, it is the same or lower than the rate of population growth and employment growth forecast in Gloucester Township, Washington Township, and Deptford Township. Based on the 2000 Census Journey-to-Work data, these municipalities are major generators and attractors of trips for NJ 168 and east-west facilities in the study core. Finally, the same rate had been used by a NJDOT consultant in a recent study of NJ 168.

TABLE 23
FUTURE LOS (AM PEAK) AT SELECTED NJ 168 INTERSECTIONS / INTERCHANGES

Intersection / Interchange	LOS	LOS by Approach
I-295 ramps (North)	A	A / C / A
I-295 ramps (South)	A	A / C / A
Browning Road	D	B / E / E
Benigno Boulevard	B	C / D / A
Constitution Avenue / Ninth Avenue	F	A / F / B
Third Avenue	C	F / D / C
Clements Bridge Road	D	B / F / D
Evesham Road	E	B / F / E
Station Avenue / Fifth Avenue	C	C / D / A

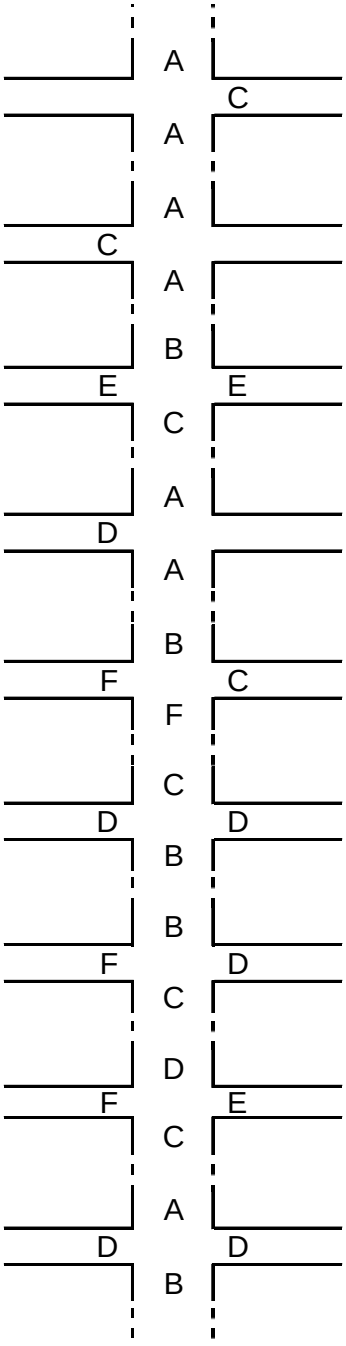


TABLE 24
FUTURE LOS (PM PEAK) AT SELECTED NJ 168 INTERSECTIONS / INTERCHANGES

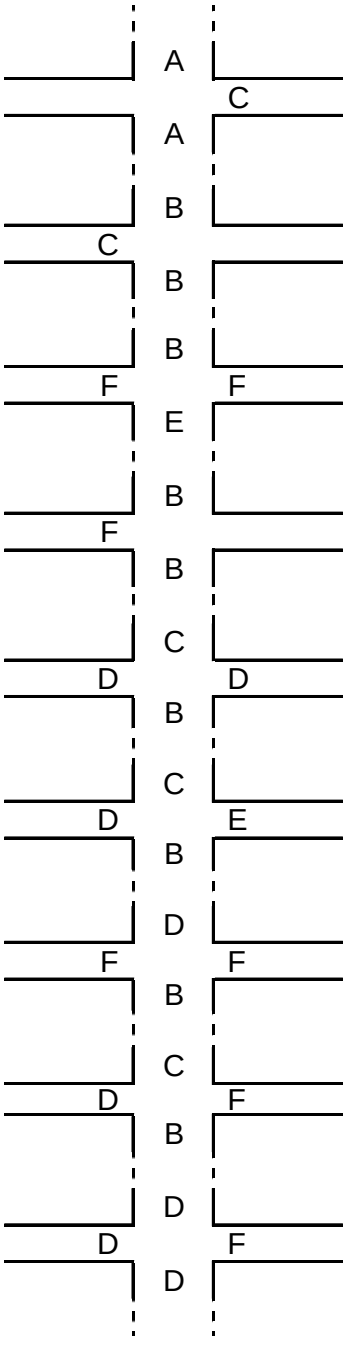
Intersection / Interchange	LOS	LOS by Approach
I-295 ramps (North)	B	
I-295 ramps (South)	C	
Browning Road	E	
Benigno Boulevard	C	
Constitution Avenue / Ninth Avenue	C	
Third Avenue	C	
Clements Bridge Road	E	
Evesham Road	D	
Station Avenue / Fifth Avenue	D	

TABLE 25
SUMMARY OF CURRENT LOS AND FUTURE LOS, WITH AVERAGE DELAY PER VEHICLE, AT SELECTED NJ 168 INTERSECTIONS / INTERCHANGES

Intersection / Interchange	Direction of Travel	Current / 2004				Future / 2025 (scenario)			
		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
I-295 ramps (North)									
	Northbound	A	1	A	6	A	1	A	6
	Southbound	A	3	A	5	A	4	A	6
	Eastbound								
	Westbound	C	31	C	31	C	31	C	34
	Intersection	A	7	B	12	A	7	B	13
I-295 ramps (South)									
	Northbound	A	6	B	15	A	7	B	18
	Southbound	A	2	B	13	A	3	B	16
	Eastbound	C	22	C	31	C	21	C	31
	Westbound								
	Intersection	A	7	B	18	A	7	C	20
Browning Road									
	Northbound	C	22	C	32	C	26	**E**	**58**
	Southbound	B	19	B	16	B	20	B	19
	Eastbound	D	49	**F**	**112**	**E**	**56**	**F**	**145**
	Westbound	D	52	**F**	**93**	**E**	**68**	**F**	**123**
	Intersection	C	30	D	51	D	36	**E**	**71**
Benigno Boulevard									
	Northbound	A	2	A	8	A	2	B	13
	Southbound	A	8	B	17	A	9	B	18
	Eastbound	D	38	**E**	**58**	D	51	**F**	**81**
	Westbound								
	Intersection	A	9	B	18	B	11	C	24
Constitution Avenue / Ninth Avenue									
	Northbound	**E**	**76**	B	14	**F**	**120**	B	17
	Southbound	B	17	C	21	B	19	C	24
	Eastbound	**F**	**184**	D	41	**F**	**242**	D	41
	Westbound	C	24	D	37	C	28	D	41
	Intersection	**E**	**66**	C	22	**F**	**96**	C	26
Third Avenue									
	Northbound	A	10	B	12	B	13	B	19
	Southbound	C	24	B	15	C	26	C	23
	Eastbound	D	42	D	38	D	42	D	39
	Westbound	D	42	**E**	**58**	D	43	**E**	**66**
	Intersection	C	20	B	17	C	22	C	24

TABLE 25
SUMMARY OF CURRENT LOS AND FUTURE LOS, WITH AVERAGE DELAY PER VEHICLE, AT SELECTED NJ 168 INTERSECTIONS / INTERCHANGES

Intersection / Interchange	Direction of Travel	Current / 2004				Future / 2025 (scenario)			
		AM Peak		PM Peak		AM Peak		PM Peak	
		LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)
Clements Bridge Road									
	Northbound	B	19	A	8	C	23	B	15
	Southbound	A	9	C	24	B	20	D	41
	Eastbound	**E**	**80**	D	49	**F**	**122**	**F**	**85**
	Westbound	C	33	**F**	**97**	D	41	**F**	**147**
	Intersection	C	33	D	41	D	48	**E**	**66**
Evesham Road									
	Northbound	B	17	B	10	C	23	B	11
	Southbound	B	19	C	23	D	41	C	25
	Eastbound	**F**	**83**	D	47	**F**	**112**	D	54
	Westbound	**E**	**61**	D	55	**E**	**72**	**F**	**90**
	Intersection	D	41	C	34	**E**	**56**	D	48
Station Avenue / Fifth Avenue									
	Northbound	B	14	C	31	B	18	D	49
	Southbound	A	7	C	28	A	9	D	44
	Eastbound	D	36	D	39	D	39	D	51
	Westbound	D	51	**F**	**89**	D	54	**F**	**115**
	Intersection	B	18	D	37	C	22	D	54

Traffic Signal Coordination

Under the right circumstances, coordination of adjacent traffic signals should improve the flow of traffic by synchronizing vehicle movement along a facility. In contrast, the lack of traffic signal coordination may impede the flow of traffic and exacerbate congestion.

During field views, DVRPC received reports from Bellmawr and Runnemede that the NJ 168 traffic signals located in both municipalities appeared to be operating “out of sync.” In response, DVRPC reviewed NJDOT signal plans and timing permits for the series of nine intersections / interchanges from the I-295 ramps to Station Avenue / Fifth Avenue. Although there are no physical connections between them, the traffic signals are time based coordinated. All signals run on a two-minute cycle. The signal at Evesham Road is the main controller; the other signals are programmed to run at different offsets (e.g., 30 seconds) relative to the main controller. Most of the timing permits, which specify phasing plans of the cycles as well as the offset, date from 1996 or 1997 (a few date from 2000 or 2001). Yet despite the existence of a coordination plan, it is possible that the offsets are no longer optimal.

To answer that question, a traffic signal coordination analysis was performed on the nine signals. The analysis had two goals: 1) determine the potential for coordination between the nine intersections, and 2) assess the effectiveness of the existing coordination plan.

NJDOT’s *Route 168 Operational and Safety Improvements* study also examined signal coordination for their study area (NJTPK to North Merchant Street). As an interim action item

their report recommends implementing time based signal coordination. The study core analysis section of this report overlaps but does not duplicate NJDOT's work. Thus, recommendations of both efforts should be considered during project development.

Potential for Coordination

Synchro was used to analyze the potential for coordination, or "coordinatability," of the nine intersections. To assess coordinatability, Synchro evaluates intersection pairs (i.e., adjacent intersections and the roadway segment between them) based on four measures: 1) travel time, 2) storage space, 3) proportion of traffic in platoon, and 4) main street volume (vph). The four measures are then used to calculate a coordinatability factor for each intersection pair. The coordinatability factor is on a scale of zero to 100, with 100 indicating maximum coordinatability. Synchro also outputs a recommendation for or against coordination.

Table 26 shows Synchro's recommendations, and associated coordinatability factors, for the intersection pairs (there are two recommendations, one for the A.M. peak and one for the P.M. peak). All recommendations suggest a potential for coordination, but the strength of the associated score varies. For example, the I-295 ramps (north) - I-295 ramps (south) intersection pair, where the ramps are spaced 300 feet apart, has scores in the high 90s, but the Benigno Boulevard - Constitution Avenue / Ninth Avenue intersection pair has scores in the 50s.

In general, when there are short travel times and high travel volumes between two intersections, the potential for coordination is also usually high. This is most true for three intersection pairs: 1) Browning Road and Benigno Boulevard, 2) Third Avenue and Clements Bridge Road, and 3) Constitution Avenue / Ninth Avenue and Third Avenue.

TABLE 26
COORDINATABILITY OF SELECTED NJ 168 SIGNALIZED INTERSECTIONS

Intersection Pair		Coordination Recommended? AM Peak (score[1])	Coordination Recommended? PM Peak (score[1])
I-295 ramps (North)	I-295 ramps (South)	Definitely (97)	Definitely (98)
I-295 ramps (South)	Browning Road	Probably (68)	Probably (70)
Browning Road	Benigno Boulevard	Definitely (92)	Definitely (92)
Benigno Boulevard	Constitution Avenue / Ninth Avenue	Probably (51)	Probably (58)
Constitution Avenue / Ninth Avenue	Third Avenue	Definitely (86)	Definitely (77)
Third Avenue	Clements Bridge Road	Definitely (86)	Definitely (90)
Clements Bridge Road	Evesham Road	Probably (67)	Definitely (71)
Evesham Road	Station Avenue / Fifth Avenue	Probably (58)	Probably (68)

[1]Coordination Factor

Effectiveness of the Existing Coordination Plan

The effectiveness of the existing traffic signal coordination plan was analyzed by comparing it to an optimal coordination plan generated by Synchro. If a significant difference between the performance of the two plans became evident, that would suggest that the existing plan could be inadequate. Performance was determined by measuring delay at individual intersections under each plan. Less delay equals faster travel times. The specific measure, which was calculated by Synchro, was average intersection delay per vehicle.

Table 27 shows average intersection delay under the existing coordination plan and under the optimized coordination plan generated by Synchro, for the nine intersections / interchanges, during the A.M. and P.M. peak periods. The difference, or change, in delay is also shown. The sum of the changes (at the bottom of the table) equals the average total reduction in travel time for a vehicle traveling the two-and-one-half mile section of NJ 168 between I-295 and Station Avenue / Fifth Avenue. The reduction in travel time for both the A.M. peak and P.M. peak is around one-half minute.

The analysis performed was preliminary. More data collection and further analysis may be required to validate these results. The following observations are taken from the Synchro coordination optimization and from field views of NJ 168:

- Given the high travel volumes on this section of the facility, the reduction in travel time would probably be sufficient to warrant implementation of a new traffic signal coordination plan.

- Dividing the signals into two independent groups and re-running the Synchro coordination optimization with different timing plans and offsets may yield better results. Intersections / interchanges north and south of the New Jersey Turnpike could

be separated.

- For much of the time, at most places, during the peak periods, better coordination could improve the flow of traffic on NJ 168. But random episodes, in which vehicles are delayed one or two traffic cycles at intersections, are not uncommon. During these episodes, if capacity fails then coordination will also fail.

TABLE 27
TRAFFIC SIGNAL COORDINATION OPTIMIZATION - CHANGE IN INTERSECTION DELAY, AM AND PM

Intersection / Interchange	Intersection Delay, AM Peak (seconds)			Intersection Delay, PM Peak (seconds)		
	Existing	Optimized	Change	Existing	Optimized	Change
I-295 ramps (North)	6.9	7.3	-0.4	11.6	9.7	1.9
I-295 ramps (South)	7.2	5.1	2.1	17.5	13.2	4.3
Browning Road	30.3	23.2	7.1	50.7	42.9	7.8
Benigno Boulevard	9.1	7.2	1.9	17.8	12.7	5.1
Constitution Avenue / Ninth Avenue	66	62.6	3.4	22.2	16.6	5.6
Third Avenue	20.4	12.3	8.1	16.9	10.1	6.8
Clements Bridge Road	32.6	32.9	-0.3	41	42.4	-1.4
Evesham Road	40.6	36.6	4	34.3	31.4	2.9
Station Avenue / Fifth Avenue	18.2	19.7	-1.5	36.9	38.6	-1.7
Total Reduction in Travel Time:			**24.4 seconds**			**31.3 seconds**

Implementing A Coordination Plan

Traffic signal coordination analysis and implementation on New Jersey state roads is overseen by the office of Traffic Engineering and Investigations, New Jersey Department of Transportation. Municipalities seeking further information should direct their inquiries to:

Traffic Engineering and Investigations
New Jersey Department of Transportation
P.O. Box 613
Trenton, NJ 08625-0613

Reference data that may be useful for future analysis of traffic signal coordination on NJ 168 is included at the end of this document. In appendix D, existing and optimized signal controller settings (i.e., the offsets) for nine NJ 168 intersections / interchanges are listed. Also in Appendix D, manual turning counts for the same intersections / interchanges are listed.

Conclusions

1) During peak periods, turning traffic from Clements Bridge Road and Evesham Road discharges onto NJ 168 at a rate faster than it can absorb. Through traffic on these facilities is also delayed at the NJ 168 intersection. The problem on Clements Bridge Road stands out because both the eastbound and westbound approaches are one lane, but the intersection must handle a high volume of left turns and through movements. The inflow of traffic onto NJ 168 is absorbed (or exits) downstream. Congestion on NJ 168 generally dissipates at I-295 to the north, and Station Avenue / Fifth Avenue to the south.

2) During peak periods, turning traffic on Clements Bridge Road and Evesham Road avoids the backups at NJ 168 and, instead, shifts to Constitution Avenue / Ninth Avenue, Third Avenue, and Station Avenue / Fifth Avenue. Therefore, the delays on Clements Bridge Road and Evesham Road are responsible, in part, for long queues on other facilities. Vehicles travel on neighborhood streets to make these movements.

3) An optimal traffic signal coordination plan for the two-and-one-half mile section of NJ 168 between I-295 and Station Avenue / Fifth Avenue, was generated using Synchro. The reduction in travel time, compared to the existing coordination plan, for both the A.M. peak and P.M. peak, is around one-half minute.

Recommendations

1) Ideally, NJ 168 would have additional capacity where it is needed to reduce peak period congestion. The need for additional capacity is greatest between Clements Bridge Road and I-295. If that segment were widened, there would be direct and immediate advantages for traffic flow on NJ 168. There would be indirect advantages for traffic flow on east-west facilities south of the New Jersey Turnpike, where turning traffic is unable to discharge onto NJ 168. That appears to be a problem right now only at Constitution Avenue / Ninth Avenue, but if congestion worsens it could spread to other NJ 168 intersections.

Despite the advantages of additional capacity, there appear to be severe constraints on a widening project. First and foremost, the New Jersey Turnpike overpass would have to be rebuilt to add a second lane in each direction on NJ 168. Even if the Turnpike did not constrain capacity, widening would come at a high cost. That part of the corridor is built out and includes the central business district of Bellmawr and Runnemede, making right-of-way acquisition expensive and politically problematic.

Widening to a four-lane configuration may also be contextually inappropriate for the existing small-scale commercial areas. Furthermore, there is growing evidence that a four-lane configuration (two travel lanes per direction) is less safe than a three-lane configuration (one travel lane per direction plus center turn lane), which is now the configuration. The higher speeds of a four-lane configuration would increase vehicle conflict at commercial access points.

2) The corridor would benefit from widening the eastbound and westbound approaches of Clements Bridge Road at NJ 168 and adding left-turn lanes. There is right-of-way available that would allow the construction of 200 foot lanes that would hold approximately twelve vehicles. The primary advantage would be increasing the flow of through traffic, which is now impeded by turning traffic, by providing a lane where left-turning vehicles could queue. The improvement would become crucial in a future scenario in which turning vehicles on Clements Bridge Road were prevented from turning by congestion on NJ 168. Under that scenario, because left-turning vehicles could queue separately, through traffic on Clements Bridge Road would continue to flow.

Simulation using Synchro indicates that improving the two Clements Bridge Road approaches would improve peak period LOS. During the A.M. peak period, the eastbound approach would improve from LOS E (80 seconds average delay) to LOS D (41 seconds); and the westbound approach would stay at LOS D, although average delay would increase slightly (from 33 seconds to 37 seconds). During the P.M. peak period, the eastbound approach would stay at LOS D but average delay would decrease (from 49 seconds to 41 seconds); and the westbound approach would improve from LOS F (97 seconds) to LOS D (37 seconds).

Widening the approaches is one strategy. Another strategy is widening the approaches combined with adding a protected left-turn phase. Simulation indicates that this second strategy is also strikingly superior when compared to existing intersection performance. In addition, it would have the advantage of further reducing delays for left-turning vehicles, although through traffic would suffer somewhat. It is probably the better strategy because of the high volume of left-turning vehicles at the two Clements Bridge Road approaches.

Either strategy of improvements would also likely reduce cut-through traffic on nearby neighborhood streets. Much of the cut-through traffic is the result of delays on Clements Bridge

Road. Faced with these delays, turning vehicles (whether turning left or right) appear to be using neighborhood streets to access NJ 168.

In summary, the Clements Bridge Road improvements would increase the flow of through traffic on a regionally significant route and would also draw turning traffic back to Clements Bridge Road from neighborhood streets, where the turns are now being made.

Note: It is possible that Constitution Avenue / Ninth Avenue would also benefit from the addition of left-turn lanes, but that decision should be postponed until the Clements Bridge Road improvements have been implemented and the results of the improvements have been determined.

3) Traffic signal coordination is a promising strategy for nine NJ 168 signalized intersections / interchanges between I-295 and Station Avenue / Fifth Avenue. An optimal coordination plan was tested using software simulation. It produced a reduction in travel time of around 30 seconds for the two-and-one-half mile segment. Although the time saved per vehicle may appear slight, when multiplied by daily traffic on NJ 168 (AADT = 24,000-25,000) it is substantial. A reduction in vehicle emissions would be another benefit. Moreover, dividing the signals into two independent groups and re-running the software simulation may yield better results. (Intersections / interchanges north and south of the New Jersey Turnpike could be separated.)

In summary, the analysis performed by DVRPC was preliminary; and more data collection and further analysis may be necessary. But based on the results obtained to date, we recommend that implementation of a new traffic signal coordination plan be pursued.

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7. INTELLIGENT TRANSPORTATION SYSTEMS

The New Jersey Department of Transportation (NJDOT) has developed an Intelligent Transportation System (ITS) Strategic Deployment Plan to meet future transportation challenges facing the state through the deployment of ITS components. ITS is the application of advanced technologies (computers, communications, electronics, sensors) in an integrated manner for the operation of transportation systems at their optimal safety and efficiency. The intent of the plan is to use existing projects in the NJDOT pipeline to introduce ITS elements or initiate new projects that will best maximize the benefits of ITS and limited available funding.

NJ DOT has identified the South Jersey Urban Commuting Corridor as a priority corridor for ITS investment. Although this corridor does not incorporate NJ 168, it does encompass the surrounding limited access routes such as I-76, I-295, I-676, NJ 42, NJ 55, NJ 90 and the NJ Turnpike as well as urban arterials such as US 30, US 130, NJ 38, NJ 70, and NJ 73. This South Jersey Urban Commuting Corridor addresses the needs of commuting within the counties of Gloucester, Camden, and Burlington.

A significant investment in ITS technologies has already taken place and is programmed to continue, such as the installation of closed circuit TV (CCTV) cameras, variable message signs (VMS) and highway advisory radio (HAR). In Cherry Hill, NJDOT has installed a Traffic Operation Control Center (TOC). This center is staffed twenty four hours per day and serves the 10 southernmost counties in New Jersey. All new ITS systems now include fiber optic installation to the TOC and allow staff to monitor and operate the ITS equipment. Table 28 identifies the ITS existing components deployed in and around the NJ 168 Corridor Study area.

The TOC also assists in incident management by dispatching Emergency Service Patrols (ESP) on major highways; coordinating Incident Management Response Teams (IMRT) that respond to major incidents; and disseminate information to the public. Although ESPs do not operate on NJ 168, they do operate on the surrounding highways such as NJ 42, I-76, I-676, and I-295. The ESP patrol along highways and stop to assist disabled vehicles at accident scenes. The ESP operators are equipped to perform minor repairs such as changing a flat tire. When major repairs are needed, the ESP operators radio a dispatcher who calls a towing company to remove the disabled vehicle. The program is designed to improve the efficiency of the highway system through the expedited removal of incidents that impact traffic flow and help reduce the risk of secondary accidents by deploying appropriate warning devices.

NJ 168 does have a Weigh-In-Motion Station located near Woodland Avenue. The weight measuring equipment, including fixed sensors embedded in the pavement, can ascertain the weight of a commercial vehicle at highway speeds to ensure the vehicle is operating within legal weight limits.

Recently, NJDOT has expanded Web-based commuter services by adding real-time traffic reports and traffic camera images on the department's Web site. Commuters can now access a statewide map that features traffic delays, congestion and construction areas to better plan their daily trips to and from work. This information is available at www.state.nj.us/transportation/commuter/trafficinfo.

NJDOT also has a partnership with SmartRoute Systems to provide free, real time,

route-specific travel reports and construction /special event information available twenty four hours per day . This information is available at www.smartraveler.com.

TABLE 28
INTELLIGENT TRANSPORTATION SYSTEM COMPONENTS

Route	Milepost	Location	Municipality	Component
NJ 168	1.3	Woodland Avenue	Gloucester Twp.	Weigh in Motion
NJ 42	13.2	New Jersey Turnpike	Runnemede	CCTV
NJ 42	13.2 NB	South of NJ Turnpike	Runnemede	VMS
NJ 42	13.6 SB	North of NJ Turnpike	Bellmawr Boro	VMS
I-295	28.6 NB	North of Rt. 168	Bellmawr Boro	VMS
I-295	24.4 SB	North of Rt. 130	West Deptford	VMS
I-295	24.4 NB	North of Rt. 130	West Deptford	VMS

8. CONGESTION MANAGEMENT SYSTEM

Introduction

The Congestion Management System (CMS) is one of the six management systems established by the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The purpose of the management systems is to aid decision-makers in gauging system performance and needs, and selecting cost-efficient strategies and actions to improve and protect the investment in the nation's infrastructure. The management systems are used in a variety of planning endeavors such as prioritizing and selecting projects for the Transportation Improvement Program (TIP), and guiding the planning activities of the Long Range Plan.

The Congestion Management System is defined in the federal regulations as a "systematic process that provides information on transportation system performance and alternative strategies to alleviate congestion and enhance the mobility of persons and goods." The federal guidance declares that the CMS should include strategies to reduce single occupant vehicle (SOV) travel and improve the efficiency of the existing transportation infrastructure.

New Jersey Congestion Management System Report

The *New Jersey Congestion Management System Report* is based on 16 travel corridors that were established in DVRPC's *Direction 2020 Long Range Transportation Plan*. Each CMS corridor is typically organized around a major highway and parallel road. Even though a corridor contains many roads and CMS recommendations apply to the entire corridor, the primary focus is on the major highway(s). To be more reflective of the transportation network, land use, and trip-making patterns, corridors were divided into subcorridors. In each subcorridor the location and severity of traffic congestion in the CMS network was evaluated along with the primary and secondary causes of congestion. Similarly for the transit network, all bus routes and rail stations in the subcorridor are noted along with service frequency and parking availability where applicable.

More than 60 improvement strategies were evaluated to determine their effectiveness in reducing SOV travel within a subcorridor. The strategies are grouped by the three goals of the regional CMS: (1) easing traffic congestion through the reduction of single-occupant vehicles, (2) optimizing the efficiency of the existing transportation systems, and (3) improving access to and proficiency of the transportation network to relieve congestion and improve the mobility of goods and people. The strategies range from low-cost alternatives to driving, to moderate improvements to the transit and highway systems and ultimately to significant SOV capacity improvements.

NJ 168 Corridor Study CMS Considerations

NJ 168 falls within CMS Corridor 9: Williamstown to Camden. Originally consisting of three subcorridors, a refinement based on current conditions (i.e. traffic volumes and patterns, congested facilities, land use) yielded four subcorridors for the purposes of this study (see figure 21). A review of the recommended strategies was performed and updates were made where necessary. The purpose of this CMS evaluation is to provide an overview of the transportation issues identified during the NJ 168 Corridor Study, and the potential strategies that may be appropriate. Any single occupant vehicle capacity-adding project (SOV CAP) recommended by this study will be evaluated to determine if a project level CMS is necessary.

CORRIDOR 9: WILLIAMSTOWN TO CAMDEN

This corridor runs in a north-south direction through Gloucester and Camden Counties. The primary facilities carrying traffic through this corridor are NJ 42, the Atlantic City Expressway, and NJ 168. Four distinct subcorridors have been identified:

Subcorridor A: Camden/Woodlynne/Haddon Township,
Subcorridor B: Haddon Township/Audubon Park/Audubon/Mount Ephraim/Haddon Heights,
Subcorridor C: Bellmawr/Runnemede/Gloucester Township,
Subcorridor D: Gloucester Township/Washington Township

Subcorridor A: Camden/Woodlynne/Haddon Township

This subcorridor includes the northern portion of NJ 168 through Haddon Township and Camden City and CR 605 Mount Ephraim Avenue, a 1.43 mile long facility in Camden City. The NJ 168 corridor study area ends at CR 561 Haddon Avenue while the CMS corridor covers a larger area that continues to the Ben Franklin Bridge. Land use in the NJ 168 portion of the subcorridor is characterized by a mix of strip and industrial uses. Fairview Avenue (CR 603), which intersects NJ 168 in this section, provides access to the Camden waterfront, which is home to industrial port facilities. The downtown section of Camden along Mount Ephraim Avenue is a mix of residential and commercial uses. Densely developed residential areas can be found spread throughout this section of the subcorridor.

Routes I-76, I-676, and US 130 are the primary facilities in this and all except I-76 carry three travel lanes in each direction. I-76 is a limited access facility, which carries five lanes in each direction. I-676 is also a limited access facility, while US 130 is a controlled access divided highway with left turns and U-turns accommodated through a series of jug handles. I-76 provides direct access to Pennsylvania via the Walt Whitman Bridge and also connects to NJ 42 for points in southern New Jersey.

Public transportation within the subcorridor area is composed of five bus routes (400, 450, 452, 453, 457) and one intersecting rail station at the PATCO Speedline Ferry Avenue station. Only the Route 400 line runs exclusively along NJ 168`s entire length, it also provides service to Philadelphia. All other routes pass through the subcorridor en route to the Walter Rand Transportation Center of Camden City. Because all NJTransit bus lines serving southern New Jersey pass through the transportation center multiple connections are possible. In addition, the center also provides connections to the PATCO Speedline and to NJTransit's Riverline, which provide access to Philadelphia and Trenton respectively.

Within this subcorridor, US 130 is frequently congested in the vicinity of the Collingswood Circle where US 130 meets US 30. Heavy through volumes with significant truck traffic in combination with inherent design issues of the circle are the leading causes of congestion. In addition, the circle invariably floods during heavy rains greatly exacerbating the congestion. These issues are being addressed by a Transportation Improvement Project entitled Route 30 / 130 Collingswood Circle Elimination (DB# 155B & 155C).

Recommended CMS Strategies:
The concentration of employment in downtown Camden and the accessibility of transit service make mode-shift strategies such as car pool/vanpool programs, transit marketing and transit

first policies very practical strategies for addressing congestion. Given the higher-than-average transit dependency, improvements to the bicycling and pedestrian environment are recommended and can be achieved through mode shift and access management strategies. Alternative work hours, parking management and transit enhancements are also considered very practical strategies. The Walt Whitman Bridge, I-76, and I-676 would benefit from strategies such as advanced traveler information services and other incident management strategies.

Subcorridor B: Haddon Township/Audubon Park/Audubon/Mount Ephraim/Haddon Heights

This subcorridor extends from the Walt Whitman Bridge approach on NJ 168 south to I-295 at the municipal border between Haddon Heights and Bellmawr. Land use in the NJ 168 portion of the subcorridor is characterized by a mix of strip retail and service establishments, representing the main concentration of commercial development within the subcorridor. NJ 168 has a four-lane cross section throughout the subcorridor. The piece north of Merchant Street has a grass median with several breaks providing access via left turn slots. South of Merchant Street, NJ 168 is a four lane cross section, with no median or left-turn lane. Development becomes more dense in the vicinity of Kings Highway and continuing through to I-295. This area is predominated by multiple curb cuts. There are eight signalized intersections within this subcorridor. The primary cross-corridor roads include CR 635 Nicholson Road, CR 551 Kings Highway, and I-295. I-76 parallels NJ 168 to the west and connects with both I-295 and NJ 42.

Public transportation within the subcorridor area is composed mainly of two bus routes, the 400 and 457. Only the Route 400 bus runs exclusively along NJ 168`s entire length, it also provides service to Philadelphia. The Route 457 bus runs between the Walter Rand Transportation Center and the Moorestown Mall, crossing the subcorridor on Kings Highway. Because all NJTransit bus lines serving southern New Jersey pass through the transportation center, multiple connections are possible. In addition, the center also provides connections to the PATCO Speedline and to NJTransit's Riverline which provide access to Philadelphia and Trenton respectively.

Municipal representatives reported congestion on NJ 168 through this section during the peak periods, especially during the summer vacation season. In addition, NJ 168`s capacity is compromised by the lack of left-turn accommodations (Merchant Street to I-295). Its four lane cross section also contributes to crashes due to weaving, high speeds, and an excessive number of curb cuts. During the week day p.m. peak periods congestion occurs on NJ 168 southbound at the I-295 interchange due to the bottleneck where NJ 168 narrows from four lanes to three. The nexus of I-76, NJ 42, and I-295 experiences heavy congestion during both the a.m. and p.m. peak periods. This congestion is a result of heavy through traffic, high truck volumes, insufficient capacity, incidents and the disjointed nature of the I-76/I-295/NJ 42 interchange. A two-pronged improvement project, which will address the excessive horizontal curvature and the missing movements, is currently in NJDOT's design phase.

Recommended CMS Strategies:

Incident management strategies, automated toll collection, park and ride lots, and advanced traveler information systems are considered very practical strategies for addressing congestion on NJ 42, I-76, I-295 within this subcorridor. Strategies such as access management and traffic operations improvements are applicable to NJ 168 and to NJ 42, I-176, and I-295.

Subcorridor C: Bellmawr/Runnemede/Gloucester Township
The subcorridor extends from the I-295 interchange at the western border of Bellmawr Borough to the NJ 42 interchange in Gloucester Township. This subcorridor was the focus of the Synchro traffic modeling analysis for the study, which quantified the operation of each of the signalized intersections. Municipal representatives reported heavy congestion and cut through traffic throughout this section. Multiple field observations during the peak periods confirmed these accounts. This stretch of NJ 168 is three lanes, one lane per direction and a center left-turn lane. NJ 168 is intensely developed and the land use is almost exclusively retail and services, with many restaurants, serving as the main business district of Bellmawr and Runnemede. On street parking is available through most of Runnemede. Development becomes less dense moving into Gloucester Township and residential uses begin to mix in. Outside of the NJ 168 corridor the land use is predominantly residential with a high concentration of single family detached dwellings.

NJ 42, a limited access freeway, parallels NJ 168 in this subcorridor. It is the main facility carrying north south traffic to southeastern New Jersey and provides connections to NJ 55, NJ 41, and the Atlantic City Expressway. When NJ 42 becomes congested traffic often uses NJ 168 as a reliever route where appropriate. Due to the burgeoning real estate market in southeastern Camden County, i.e. Gloucester, Waterford, and Winslow townships, traffic volumes have been slowly rising over time on county routes that connect to NJ 42, and even NJ 168.

Transit options are fewer in the southern portion of the subcorridor than in the north as is typical in suburban areas when the development density is lower. The primary bus service is the Route 400 line, which serves the entire length of NJ 168. The 403 line, which runs along US 30 located north of NJ 168, parallels the 400 line although it is too far removed from the corridor to be a viable option.

Recommended CMS Strategies:
Because of the high growth nature of this subcorridor, growth management and access management strategies are very practical. Park and ride facilities and incident management strategies are also considered to be very practical. The lack of transit options necessitates an examination of transit enhancements including feeder services linking suburban communities.

Subcorridor D: Gloucester Township/Washington Township
This subcorridor represents the remaining section of the NJ 168 corridor study from mid Gloucester Township south to Washington Township at the southern terminus of NJ 168. Land use along NJ 168 in this section is less dense than in the northern areas. Commercial development is still concentrated along NJ 168, although less intensively. There are pockets of higher density land use (i.e. Blackwood, Turnersville) along the subcorridor. Between the major routes (NJ 42 and NJ 168) the land use is predominantly single family residential, with some higher density uses mixed in.

NJ 168 has three lane configurations in this subcorridor, the majority being one lane per direction with a center left-turn lane. In Turnersville it changes to four lanes with a grass median. This section experiences higher traffic volumes due to the NJ 168/NJ 42 interchange and Camden County Community College (Blackwood Campus), a significant trip generator. Recurring congestion was reported by municipal representatives, especially in the vicinity of the

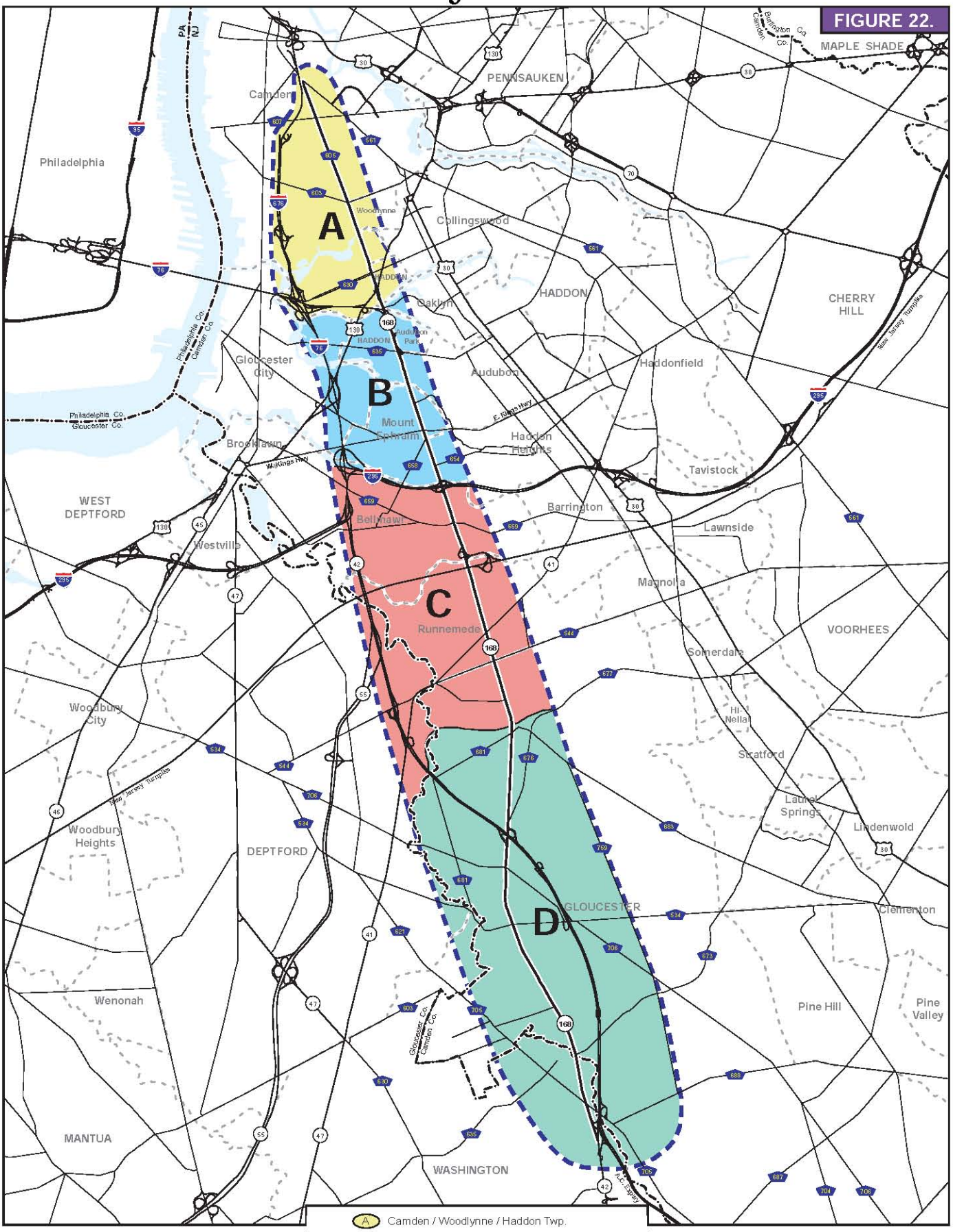
CR 705 Sicklerville Road and NJ 168 intersection. This location is also in close proximity to the extensive commercial and retail strip development along NJ 42 just south of NJ 168`s terminus. This subcorridor's transit options are equal to that of subcorridor C; fewer than in the north as is typical in suburban areas when the development density is lower. The primary bus service is the Route 400 line which serves the entire length of NJ 168. The 403 line, which runs along US 30 located north of NJ 168, parallels the 400 line and reenters the study are via CR 705 in Turnersville.

Recommended CMS Strategies:
Because of the high growth nature of this subcorridor, growth management, operational improvements (ramp metering), and access management strategies are very practical. The transportation needs of this growing population may warrant an evaluation of mode shift strategies to complement growth management. Park and ride facilities and incident management strategies are also considered to be very practical. The lack of transit options necessitates an examination of transit enhancements including feeder services linking the burgeoning suburban communities.

NJ 168 Corridor Study

CMS Subcorridors

FIGURE 22.



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Miles

- A — Camden / Woodlynne / Haddon Twp.
- B — Haddon Twp. / Audubon Park / Audubon / Mount Ephraim / Haddon Heights
- C — Bellmawr / Runnemede / Gloucester Twp.
- D — Gloucester Twp. / Washington Twp.

DELAWARE VALLEY
REGIONAL PLANNING COMMISSION
SEPTEMBER 2004

TABLE 29

CMS STRATEGY EVALUATION, CORRIDOR 9: WILLIAMSTOWN TO CAMDEN												
Strategy	**Camden/ Woodlynne/ Haddon Twp**			**Haddon Twp/ Audubon Park/ Audubon/ Mount Ephraim/Haddon Heights**			**Bellmawr/ Runnemede/ Gloucester Twp**			**Gloucester Twp/ Washington Twp**		
	VP	P	NP	VP	P	NP	VP	P	NP	VP	P	NP
GOAL 1: EASE TRAFFIC CONGESTION THROUGH REDUCTION OF SOV's												
MODE SHIFT												
carpool/vanpool	✓				✓		✓					✓
guaranteed ride home programs	✓				✓		✓					✓
demand responsive transit services			✓		✓				✓			✓
transit marketing	✓				✓			✓			✓	
pedestrian improvements	✓			✓				✓				✓
transit first policy	✓				✓				✓			✓
promotion of TransitChek	✓			✓				✓			✓	
bicycle improvements		✓		✓				✓		✓		
park & ride			✓		✓		✓			✓		
CONGESTION PRICING												
increased peak tolls			✓			✓			✓			✓
parking rate adjustments			✓			✓			✓			✓
PARKING MANAGEMENT												
parking regulations/ordinances	✓					✓			✓			✓
enforcement	✓					✓			✓			✓
restrict new parking facilities			✓		✓				✓			✓
preferential HOV parking	✓					✓	✓				✓	
parking supply adjustment		✓				✓		✓				✓

Key: VP-Very Practical P-Practical NP-Not Practical

TABLE 29

CMS STRATEGY EVALUATION, CORRIDOR 9: WILLIAMSTOWN TO CAMDEN

Strategy	Camden/ Woodlynne/ Haddon Twp			Haddon Twp/ Audubon Park/ Audubon/ Mount Ephraim/Haddon Heights			Bellmawr/ Runnemede/ Gloucester Twp			Gloucester Twp/ Washington Twp		
	VP	P	NP	VP	P	NP	VP	P	NP	VP	P	NP
HOV TREATMENTS												
HOV lanes			✓			✓		✓				✓
HOV/ramp bypass lanes			✓			✓			✓			✓
HOV toll savings		✓				✓		✓				✓
TDM												
TMA	✓				✓		✓					✓
ride matching	✓				✓		✓				✓	
telecommute		✓			✓			✓			✓	
GROWTH MANAGEMENT												
activity centers			✓		✓				✓	✓		
land use policies/regulations			✓	✓					✓	✓		
GOAL 2: OPTIMIZE EFFICIENCY OF EXISTING TRANSPORTATION SYSTEMS												
ACCESS MANAGEMENT												
median control			✓		✓		✓			✓		
driveway controls	✓			✓			✓			✓		
frontage roads			✓			✓			✓	✓		
TRANSIT SERVICE/OPERATIONS IMPROVEMENTS												
traffic signal preemption	✓			✓					✓			✓

Key: VP-Very Practical P-Practical NP-Not Practical

TABLE 29

CMS STRATEGY EVALUATION, CORRIDOR 9: WILLIAMSTOWN TO CAMDEN												
Strategy	**Camden/ Woodlynne/ Haddon Twp**			**Haddon Twp/ Audubon Park/ Audubon/ Mount Ephraim/Haddon Heights**			**Bellmawr/ Runnemede/ Gloucester Twp**			**Gloucester Twp/ Washington Twp**		
	VP	P	NP	VP	P	NP	VP	P	NP	VP	P	NP
transit coordination		✓		✓					✓	✓		
new transit service		✓			✓			✓		✓		
bicycle improvements at rail stations			✓			✓			✓		✓	
transit enhancements/expansion		✓			✓			✓		✓		
TRAFFIC OPERATIONS IMPROVEMENTS												
intersection & roadway widening	✓					✓	✓					✓
channelization	✓				✓			✓				✓
traffic surveillance & control systems		✓			✓				✓	✓		
ramp metering			✓			✓			✓			✓
computerized signal systems		✓		✓			✓			✓		
elimination of bottlenecks		✓			✓			✓			✓	
coordinate & upgrade traffic signals	✓			✓			✓			✓		
one-way streets			✓		✓				✓			✓
vehicle use limitations/restrictions			✓			✓			✓		✓	
INCIDENT MANAGEMENT												
incident detection/verification	✓				✓		✓			✓		
emergency response time improvements	✓				✓		✓			✓		
alternative routing techniques	✓				✓		✓			✓		
construction management			✓		✓		✓					✓

Key: VP-Very Practical P-Practical NP-Not Practical

TABLE 29

CMS STRATEGY EVALUATION, CORRIDOR 9: WILLIAMSTOWN TO CAMDEN												
Strategy	Camden/ Woodlynne/ Haddon Twp			Haddon Twp/ Audubon Park/ Audubon/ Mount Ephraim/Haddon Heights			Bellmawr/ Runnemede/ Gloucester Twp			Gloucester Twp/ Washington Twp		
	VP	P	NP	VP	P	NP	VP	P	NP	VP	P	NP
ALTERNATIVE WORK HOURS												
staggered work hours flexible work schedules	✓					✓	✓					✓
compressed work weeks	✓					✓	✓					✓
GOAL 3: IMPROVE ACCESS AND PROFICIENCY OF TRANSPORTATION NETWORK TO RELIEVE CONGESTION AND IMPROVE MOBILITY OF GOODS AND PEOPLE												
Transit Capital Improvements												
exclusive ROW rail/bus		✓			✓				✓			✓
expand parking at rail stations			✓			✓			✓			✓
INTELLIGENT TRANSPORTATION SYSTEMS												
intelligent bus stops	✓			✓					✓			✓
advanced mode choice system	✓			✓			✓					
automated toll collection	✓					✓	✓			✓		
traveler information services	✓				✓		✓			✓		
commercial vehicle operations			✓		✓			✓			✓	
GENERAL PURPOSE LANES												
SOV roadway widening			✓			✓	✓			✓		

Key: VP-Very Practical P-Practical NP-Not Practical

9. IMPLEMENTATION

The NJ 168 Corridor Study can be used as a tool for the systematic selection of transportation improvement projects. This section is intended to serve as a punch list for the government agencies having a stake in the implementation of improvements.

Characteristics
In choosing which projects should advance, stakeholders can be guided by the information presented in the NJ 168 Corridor Transportation Improvements Implementation Matrix (see table 30). This easy to use matrix suggests the relative importance of each problem location. The potential improvement scenarios are evaluated against the following criteria: State Development and Redevelopment Plan (SDRP) center designation, project priority, relative cost range, and project benefits. In addition, the stakeholders necessary to carry out the plan are also identified.

State Development and Redevelopment Plan (SDRP) Centers
The concept of centers is the organizing planning principle for achieving a more effective and efficient pattern of development in New Jersey. Under the state plan, new growth and development should be organized into compact development in the form of centers surrounded by carefully controlled "environs" by way of municipal master plans and regulations, and through public investment policy. Specifically, the SDRP defines center as " central places within planning areas where growth either should be attracted or not attracted, depending upon the unique characteristics and growth opportunities of each center". The Plan identifies five types of Centers: 1) Urban Centers; 2) Towns; 3) Regional Centers; 4) Villages; and 5) Hamlets and designates specific locales as centers. In the NJ 168 corridor there are two designated centers: 1) the City of Camden is designated as an urban center, and 2) Gloucester City is designated as a town.

Priority
There are three categories of priorities: high, moderate, and low. Priorities are assigned based on the type and severity of problem presented to motorists or other users of the system. Although safety issues usually receive the highest priority, other conditions such as congestion (time delay) and mobility are also considered. A higher degree of priority is assigned if there is an urgency to complete the improvement due to the anticipated completion of a nearby major investment (development or transportation improvement). If there is concern that a section of right-of-way needed to complete an improvement is in danger of being developed or used for another use, the priority to act on that improvement is also heightened. If a project is relatively small scale and low cost, yet offers a projected high benefit, it may also receive a higher priority ranking.

Cost Range
Relative project costs are described as high, moderate, or low. High cost projects ($5 to 35$ million, or more) usually involve a major commitment from one or more funding source, lengthy public involvement, and require several years lead time in programming the required funds. They are typically large scale, complex, or multi-phased improvements usually involving new facilities. An improvement estimated to have a moderate cost (between $2 and $5 million)

could involve reconstruction of an intersection, construction of a short connector road, or a widening of an existing road. Low cost projects (less than $2 million) often involve operational type improvements at isolated locations can often be fast-tracked by maintenance departments. These cost ranges are general estimates and could be significantly changed due to design criteria or to environmental, right-of-way, or other issues.

Benefits
The assigned benefit of the project refers to the type of improvement expected, such as: safety enhancements, congestion mitigation, mobility improvements, or economic development. The location and magnitude of the improvement determines the extent of the benefits received.

Roles of Agencies
In terms of a hierarchy of agencies, the New Jersey Department of Transportation (NJDOT) is primary, both in terms of maintaining NJ 168 and providing much of the design, right-of-way, and construction funding for major improvements. Municipalities make land use decisions in the corridor, which ultimately affects travel and traffic in the corridor.

New Jersey Department of Transportation
NJDOT has jurisdiction over the state highways in the corridor. In addition to NJ 168 these include: I-295, NJ 42, NJ 41, and US 130. Improvements to these highways are typically financed by state and/or federal funds. The state coordinates with the county and municipalities on what improvements are made to these facilities.

NJDOT Pipeline Process
The New Jersey Department Of Transportation's Project Development Process consists of four levels for implementing projects. Known as pipelines, they are used to categorize projects according to the level of planning, engineering, regulation, and design necessary for implementation. Projects in pipeline one involve the most steps: concept development, feasibility assessment, preliminary design, final design, and construction. Large scale projects involving right-of-way acquisition fall into this category. Projects in pipeline four usually involve little planning or engineering and can be accomplished through a maintenance contract. Typical pipeline four projects include lane striping, short stretches of new pavement, or the addition of signs or lighting.

Camden County
The county has jurisdiction over a network of roads throughout the study area. In New Jersey, county roads are given 500, 600 or 700 route designations. The 500 series of county roads are typically part of a statewide network of interconnected county routes; therefore 500 series routes are generally more significant than the other county roads. The primary function of the county network is to serve medium range trips or to serve as feeder routes to the state system.

Metropolitan Planning Organization (MPO)
DVRPC, serving as the MPO for this region, is required to coordinate a comprehensive and continuing transportation planning process. This process results in the development of a Transportation Improvement Program (TIP) which identifies all priority projects for which federal funds will be sought. The TIP represents a consensus among state and regional officials as to which regional improvements are to be made. In addition to the TIP, the MPO is required by federal legislation to develop a long rang plan (LRP) to help direct region-wide transportation decision making over a period of at least 20 years. Long range plans do not specify the design of actual projects. Rather, they identify future needs to address transportation deficiencies.

Municipalities

Local governments have jurisdiction over their local road system and they control local land use decisions. Decisions made at the local level can influence the travel on roads at all levels. Therefore, local officials must understand the traffic impacts which could be generated from a particular development and understand the synergy that exists between land use decisions and transportation improvements. Local officials need to be involved in the transportation planning process to assist in the problem definition and to make improvement recommendations. Ideally, municipal officials utilize the circulation element of their municipal master plan to balance transportation priorities and quality of life issues.

TABLE 30: NJ 168 TRANSPORTATION IMPROVEMENTS IMPLEMENTATION MATRIX

Location		*Municipality*	*Center*	*Priority*	*Cost Range*	*Benefits*	*Lead Role*	*Assisting Role*	*NJDOT Pipeline*
1A	NJ 168 Between Ferry Avenue and US 130-Cut Through Traffic	Camden City	C	L	L	CON, MOB	MCD	CC, DOT	4
1B	NJ 168 Between Ferry Avenue and US 130 - Crashes	Camden City	C	M	M	SAFE	MCD	DOT	4
2	Truck Traffic From Fairview Street	Camden City	C	L	L	CON, MOB	MCD	DOT	4
3	Jug handle at Collings Avenue and US 130	Haddon Twp.		L	L	SAFE, MOB	DOT	MCD	4
4	Signs and Lane Markings at the Nexus of NJ 168 and US 130	Camden City/Haddon Twp.	C	M	L	SAFE, MOB	DOT	MCD	4
5	Intersection of NJ 168 and Kendall Boulevard	Oaklyn Boro		H	L	SAFE, MOB	DOT	MCD	3
6A **6B** **6C**	Pedestrian Access Issues Between Kendall Boulevard and Merchant Street (NJ 168)	HaddonTwp./ Audubon Park/ Audubon Boro		L H M	M M M	SAFE, MOB	DOT	CC, MCD	4 3 4
7	Wilson Avenue	Haddon Twp.		L	L	MOB, CON	MCD	CC	4
8	Intersection of US 130 Southbound and Market Street	Gloucester City		M	L	CON, MOB	DOT	CC	3
9	Flooding Along NJ 168 (west)	Mt. Ephraim Boro		M	M	SAFE, CON	DOT	MCD	2
10	Intersection of NJ 168 and Kings Highway*	Mt. Ephraim Boro/Haddon Heights Boro		H	M	SAFE, MOB	DOT	CC, MCD	1
11	Pedestrian Access in the vicinity of NJ168 and Bell Road	Mt. Ephraim Boro/Haddon Heights Boro		H	L	SAFE	DOT	MCD	3

TABLE 30: NJ 168 TRANSPORTATION IMPROVEMENTS IMPLEMENTATION MATRIX

Location		*Municipality*	*Center*	*Priority*	*Cost Range*	*Benefits*	*Lead Role*	*Assisting Role*	*NJDOT Pipeline*
12	Flooding Along NJ 168 (east)	Mt. Ephraim Boro		M	M	SAFE, CON	DOT	MCD	2
13A **13B** **13C**	Mobility Issues in the Vicinity of the I-295/NJ 168 Interchange	Haddon Heights Boro/Bellmawr Boro		M M M	L M L	SAFE, MOB, CON	DOT	MCD	3
14	Intersection of NJ 168 and Benigno Boulevard*	Bellmawr Boro		H	M	CON, MOB	DOT	MCD	1
15	New Jersey Turnpike Interchange at NJ 168*	Bellmawr Boro		M	L	CON, MOB	DOT	MCD	4
16	NJ 168 Center/Left-turn Lane	Bellmawr Boro		M	M	CON, MOB	DOT	MCD	4
17	Intersection of NJ 42 and CR 544 Clements Bridge Road**	Deptford Twp.		M	M	CON, SAFE	DOT	CC	
18	Intersection of NJ 168 and CR 676 Old Black Horse Pike	Gloucester Twp.		M	M	SAFE	MCD	DOT	3
19	Intersection of NJ 168 and CR 706 Almonesson Road and Coles Road	Gloucester Twp.		L	L	CON	MCD	CC	3
20	Intersection of NJ 168 and Wilson Road	Washington Twp.		L	L	MOB, SAFE	MCD	CC	3
21	Intersection of CR 705 Sicklerville Road and Wilson Road	Washington Twp.		L	L	SAFE, MOB	MCD	CC	4
22	Intersection of NJ 168 and CR 705 Sicklerville Road	Washington Twp.		H	L	SAFE, MOB	DOT	CC	4
23	Median of NJ 168 between CR 705 Sicklerville Road and the Southern Terminus of NJ 168 at NJ 42.	Washington Twp.		L	L	MOB, SAFE	DOT	MCD	3
24	Intersections: Sicklerville Road and NJ 42 Interchange, Sicklerville Road and Orr Road, Sicklerville Road and Hickstown Road	Gloucester Twp.		H	M	CON	CC	MCD	4

TABLE 30: NJ 168 TRANSPORTATION IMPROVEMENTS IMPLEMENTATION MATRIX

Location	*Municipality*	*Center*	*Priority*	*Cost Range*	*Benefits*	*Lead Role*	*Assisting Role*	*NJDOT Pipeline*
Study Core Traffic Analysis: - Clements Bridge Road & NJ 168 Intersection Improvements	Bellmawr Boro / Runnemede Boro / Gloucester Twp.		H	M	CON, MOB	CC	DOT	3
- NJ 168 Signal Coordination/Optimization*			H	L	CON, MOB	DOT	CC	4

Key:

Center: C = State Development and Redevelopment Plan designated center/corridor;

Priority: H = High; M = Moderate; L = Low

Cost Range: H = High; M = Moderate; L = Low

Benefits: CON = Congestion; MOB = Mobility; SAFE = Safety

Role: MCD = Municipality; CC = Camden County; DOT = NJ Department of Transportation

NJDOT Pipeline
1 = Concept Development, Feasibility Assessment, Preliminary Design, Final Design, Construction
2 = Scope Development, Feasibility Assessment, Preliminary Design, Final Design, Construction
3 = Environmental Documentation, Final Design, Construction
4 = Maintenance Contract

* An improvement scenario was recommended by NJDOT in the NJ 168 Corridor Needs Analysis study

** An improvement project is currently on DVRPC's Transportation Improvement Program

APPENDIX A

Municipal Representatives

Audubon Borough
David Taraschi, Administrator
Audubon Park Borough
Honorable Donald M. Pennock
Bellmawr Borough
George R. Coleman, Superintendent
Camden City
Charles E. Lyons, Jr., Chief of Planning
Collingswood Borough
John Kane, Director of Community Development
Deptford Township
Peter Carbone, Director of Community Development
Gloucester City
Honorable Robert T. Gorman
Gloucester Township
Jay Pantalone, Police Lt.
Haddon Heights Borough
Ronald S. Shute, Chief of Police
Haddon Township
Joseph Gallagher, Jr., Chief of Police
Mount Ephraim Borough
Brian Beppel, Police Captain
Oaklyn Borough
John Shelly, Police Captain
Runnemede Borough
Honorable Frank Hartman
Washington Township
Steve Branco, Police Cfc.
Woodlynne Borough
Honorable J. Drew Coyle

Coordinating Agency Representatives

NJDOT
Evens Marcellus, Principal Engineer
NJ Transit
Beth Waltrip, Senior Service Planner
Camden County
Doug Griffith, Director, Planning Department
Cross County Connection TMA
Bill Ragozine, Executive Director

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APPENDIX B

NJ 168 Corridor Study Transportation Needs Inventory

ID#
A - Congestion Mitigation
B - Safety
C - Mobility
D - Operational Improvement
E - Maintenance
F - Transit / TDM
G - ITS

SOURCE:
DB - Transportation Improvement Program / NJ Sub region FY 2004-2006
S&D - NJ Study & Development Program FY 2004-2006
2025 - DVRPC Year 2025 Plan / Transportation Element, (P) - Project, (S) - Study

A. Congestion Mitigation

ID#	Route	Description	Source
A1	NJ 41	NJ 41, South of Cooper Street to south of Deptford Center Road This project will address proposed improvements to the intersection of Cooper Street and NJ 41. Home Depot provided partial improvements on NJ 41, however additional improvements are needed to complete improvements at the Cooper Street intersection. (Deptford Township)	S&D#02392
A2	NJ 41	NJ 41 from Singley Avenue to Cooper Street (CR 706), widening and other improvements The project will include widening of Route 41 from south of Deptford Center Road to Clements Bridge Road in order to provide a center left-turn lane, one lane in each direction, and outside shoulders. The existing interchanges on Route 42 Freeway for Clements Bridge Road and Route 41 will be reconfigured to improve the access to and from Route 42 Freeway and improve the circulation of the existing network of roads and ramps. The Route 41 bridge over Route 42 Freeway will be rehabilitated. (Various)	DB#201 2025#C007(P)
A3	CR 534	CR 534 from NJ 42 to CR 673, widening A proposed Camden County project with the primary purpose of improving capacity. (Various)	2025#D003(P)

B. Safety

ID#	Route	Description	Source
C5	NJ 168	NJ 168 Corridor Improvements, NJ 42 to Haddon Avenue A coordinated program of improvements on the NJ 168 will address several identified needs including congestion, safety, landscape, and drainage. (Various)	DB#X227A S&D#X227A

C. Mobility

ID#	Route	Description	Source
C1	I-295 NJ 42	I-295, NJ 42 Missing Moves This project will provide new ramps between I-295 and Route 42 to address missing movements. The ramps will tie into Route 42 at milepost 13.30. The federal Transportation Equity Act for the 21st Century(TEA-21) provided funding for this project under Section 1601, High Priority Projects Program. The Act allocated $14 million for this project. FY 2000 and FY 2001 RABAs have increased the total authorization amount to $14,368,683. (Bellmawr Borough)	DB#355A 2025#A026(P)
C2	I-295 NJ 42 I-76	I-295, NJ 42, I-76, Direct Connection Development of this project will provide for construction of a proposed viaduct facility to carry I-295 directly through the interchange with I-76 and Route 42, relieving a major regional traffic bottleneck. This project will eliminate hazardous weaving which currently occurs between Route 42 and I-295. I-295 currently carries four travel lanes; the final configuration will also carry four travel lanes. (Bellmawr Borough, Mount Ephraim Borough)	DB#355 S&D#355 2025#A037(P)
C3	NJ 42 CR 579	NJ 42, CR 579 Grenloch-Little Gloucester Road (aka College Road) A concept development study is considering a new interchange at Grenloch-Little Gloucester Road (aka College Road) to relieve congestion and improve safety in the southern part of Gloucester Township. (Gloucester Township)	S&D#00349
C4	NJ 168 NJ 42	NJ 168, NJ 42 DVRPC Corridor Study The Delaware Valley Regional Planning Commission has undertaken a two-year study of this corridor. The study will include the entire length of NJ 168 as well as NJ 42 from NJ 168 to I-295. The study will explore transportation-related issues aimed at enhancing mobility on NJ 168 and NJ 42 as well as parallel facilities along the corridor, and on improving access to NJ 168 and NJ 42 from facilities perpendicular to it. Recommendations from this corridor study will be incorporated in the NJ 168 Corridor Improvement Projects. (Various)	S&D#02398

ID#	Route	Description	Source
C5	NJ 168	NJ 168 Corridor Improvements, NJ 42 to Haddon Avenue A coordinated program of improvements on the NJ 168 will address several identified needs including congestion, safety, landscape, and drainage. The work encompasses the entire length of NJ 168 as well as the route's extension into Camden known as CR 605(Mount Ephraim Avenue). This work will also incorporate recommendations from the ongoing NJ 168 Corridor Study. (Various)	DB#X227A S&D#X227A

D. Operational Improvements

ID#	Route	Description	Source
D1	NJ 168 CR 659	NJ 168, CR 659, Browning Road Intersection Improvements Intersection improvements of Black Horse Pike (Route 168) and Browning Road (CR 659) will include widening of Browning Road and approximately 400 feet on the Black Horse Pike. Work will include addition of left-turn lanes, improving curb radii, and upgrading the traffic signal system and controller. Completed 2003. (Bellmawr Borough)	
D2	NJ 42 CR 655	NJ 42, Safety and Operational Improvements (ACX to CR 655) This study will identify capacity and operational problems as well as physical deficiencies. This study will also develop a range of conceptual improvements to address the problems and deficiencies. (Washington Township)	S&D#01343 2025#D096(S)
D3	I-295	I-295 Gloucester / Camden Rehabilitation This project will address the proposed rehabilitation/reconstruction of I-295. (Various)	DB#00372 S&D#00372

E. Maintenance

ID#	Route	Description	Source
E1	NJ 168	NJ 168 Runnemede Drainage, from NJ 41 to Sixth Avenue The project will provide for construction of a new storm drainage system within the project limits. New inlets and pipes will be constructed along Clements Bridge Road. Two outfalls will be constructed in this project which includes stream stabilization and scour holes. Also, improvements will include a connection to pumped discharge from a business located within the project area in order to stop further damages to roadway pavement. Due to the nature of the project, no consideration has been given to bicycle/pedestrian accommodations. (Runnemede Borough)	DB#95059 S&D#95059

ID#	Route	Description	Source
E2	NJ 168	NJ 168, Bellmawr Borough, Drainage Flooding is experienced along Route 168 within the vicinity of Beaver Brook, a branch of Big Timber Creek. During rainfall events, highway runoff is not able to drain out due to build up and tidal influences of Beaver Brook. The highway and adjacent areas of the brook are at elevations below or close to stream elevation. Due to these conditions backwater effects flood the highway and upstream areas. This project will recommend alternatives for this problem. (Bellmawr Borough)	S&D#02406 DB#02406
E3	CR 705	Wilson Road Bridge This two lane-bridge carries an AADT of about 8,400 vehicles. The bridge is on an off system local road. The current sufficiency rating is 2.0. The improvements include replacing the existing bridge over Bell's Lake Branch and realigning Wilson Road to lessen its curvature to the bridge approach. Improvements will extend from the Woodbury-Turnersville Road (CR 705) at the eastern end of the project to a point about 130 feet west of the existing bridge. The improvements are being developed through the Local Scoping process. (Washington Township)	DB#L165

F. Transit / TDM

ID#	Route	Description	Source
F1		Southern NJ LRT, Camden / Glassboro Light Rail System A conceptual project for Camden and Gloucester Counties scheduled for the 2006-2013 construction period and with the primary purpose of capacity. (Various)	2025#A020(P)

G. ITS

ID#	Route	Description	Source
D3	I-295	I-295 Gloucester, Camden Rehabilitation A variable message sign (VMS) component will be included in this I-295 proposed rehabilitation/reconstruction project. (Various)	S&D#00372

APPENDIX C

Table I
NJ 168 Corridor (MP 0.25)
Accident Cluster
Year 2001 - 2002

Total: 25

Collision Type	Count	% of Total
Same Direction - Rear End	5	20.00%
Same Direction -Sideswipe	2	8.00%
Angle	6	24.00%
Left Turn	6	24.00%
Head On	2	8.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	4	16.00%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	14	56.00%
Property Damage	11	44.00%
Light	Count	% of Total
Day	18	72.00%
Night/Dawn/Dusk	7	28.00%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	25	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	19	76.00%
Wet Surface	6	24.00%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table II
NJ 168 Corridor (MP 4.61)
Accident Cluster
Year 2001 - 2002

Total: 23

Collision Type	Count	% of Total
Same Direction - Rear End	9	39.13%
Same Direction -Sideswipe	3	13.04%
Angle	7	30.43%
Left Turn	3	13.04%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	1	4.35%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	7	30.43%
Property Damage	16	69.57%
Light	Count	% of Total
Day	21	91.30%
Night/Dawn/Dusk	2	8.70%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	23	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	14	60.87%
Wet Surface	7	30.43%
Snow or Ice	2	8.70%
Unknown or Other	0	0.00%

Table III
NJ 168 Corridor (MP 4.93)
Accident Cluster
Year 2001 - 2002

Total: 27

Collision Type	Count	% of Total
Same Direction - Rear End	8	29.63%
Same Direction -Sideswipe	2	7.41%
Angle	14	51.85%
Left Turn	2	7.41%
Head On	1	3.70%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	0	0.00%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	9	33.33%
Property Damage	18	66.67%
Light	Count	% of Total
Day	23	85.19%
Night/Dawn/Dusk	4	14.81%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	0	0.00%
At Unsignalized	27	100.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	19	70.37%
Wet Surface	8	29.63%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table IV
NJ 168 Corridor (MP 4.99)
Accident Cluster
Year 2001 - 2002

Total: 17

Collision Type	Count	% of Total
Same Direction - Rear End	4	23.53%
Same Direction -Sideswipe	1	5.88%
Angle	3	17.65%
Left Turn	3	17.65%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	2	11.76%
Pedacycle	0	0.00%
Other	4	23.53%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	5	29.41%
Property Damage	12	70.59%
Light	Count	% of Total
Day	12	70.59%
Night/Dawn/Dusk	5	29.41%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	12	70.59%
At Unsignalized	4	23.53%
Between Intersections	1	5.88%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	13	76.47%
Wet Surface	4	23.53%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table V
NJ 168 Corridor (MP 6.84)
Accident Cluster
Year 2001 - 2002

Total: 24

Collision Type	Count	% of Total
Same Direction - Rear End	2	8.33%
Same Direction -Sideswipe	5	20.83%
Angle	6	25.00%
Left Turn	2	8.33%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	9	37.50%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	9	37.50%
Property Damage	15	62.50%
Light	Count	% of Total
Day	19	79.17%
Night/Dawn/Dusk	5	20.83%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	24	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	20	83.33%
Wet Surface	4	16.67%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table VI
NJ 168 Corridor (MP 7.04)
Accident Cluster
Year 2001 - 2002

Total: 19

Collision Type	Count	% of Total
Same Direction - Rear End	10	52.63%
Same Direction -Sideswipe	1	5.26%
Angle	5	26.32%
Left Turn	1	5.26%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	1	5.26%
Pedacycle	0	0.00%
Other	1	5.26%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	7	36.84%
Property Damage	12	63.16%
Light	Count	% of Total
Day	13	68.42%
Night/Dawn/Dusk	6	31.58%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	19	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	17	89.47%
Wet Surface	2	10.53%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table VII
NJ 168 Corridor (MP 7.73)
Accident Cluster
Year 2001 - 2002

Total: 18

Collision Type	Count	% of Total
Same Direction - Rear End	2	11.11%
Same Direction -Sideswipe	3	16.67%
Angle	4	22.22%
Left Turn	7	38.89%
Head On	1	5.56%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	1	5.56%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	10	55.56%
Property Damage	8	44.44%
Light	Count	% of Total
Day	14	77.78%
Night/Dawn/Dusk	4	22.22%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	18	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	17	94.44%
Wet Surface	1	5.56%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table VIII
NJ 168 Corridor (MP 8.09)
Accident Cluster
Year 2001 - 2002

Total: 18

Collision Type	Count	% of Total
Same Direction - Rear End	7	38.89%
Same Direction -Sideswipe	5	27.78%
Angle	1	5.56%
Left Turn	3	16.67%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	2	11.11%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	5	27.78%
Property Damage	13	72.22%
Light	Count	% of Total
Day	14	77.78%
Night/Dawn/Dusk	4	22.22%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	18	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	15	83.33%
Wet Surface	3	16.67%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table IX
NJ 168 Corridor (MP 9.27)
Accident Cluster
Year 2001 - 2002

Total: 18

Collision Type	Count	% of Total
Same Direction - Rear End	2	11.11%
Same Direction -Sideswipe	7	38.89%
Angle	6	33.33%
Left Turn	0	0.00%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	3	16.67%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	8	44.44%
Property Damage	10	55.56%
Light	Count	% of Total
Day	11	61.11%
Night/Dawn/Dusk	7	38.89%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	0	0.00%
At Unsignalized	18	100.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	13	72.22%
Wet Surface	5	27.78%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

Table X
NJ 168 Corridor (MP 10.50)
Accident Cluster
Year 2001 - 2002

Total: 21

Collision Type	Count	% of Total
Same Direction - Rear End	13	61.90%
Same Direction -Sideswipe	1	4.76%
Angle	3	14.29%
Left Turn	0	0.00%
Head On	0	0.00%
Pedestrian	0	0.00%
Fixed Object	0	0.00%
Parked Vehicle	0	0.00%
Pedacycle	0	0.00%
Other	4	19.05%
Severity	Count	% of Total
Fatal	0	0.00%
Injury	7	33.33%
Property Damage	14	66.67%
Light	Count	% of Total
Day	17	80.95%
Night/Dawn/Dusk	4	19.05%
Unknown	0	0.00%
Intersection	Count	% of Total
At Signalized	21	100.00%
At Unsignalized	0	0.00%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%
Surface Condition	Count	% of Total
Dry	16	76.19%
Wet Surface	5	23.81%
Snow or Ice	0	0.00%
Unknown or Other	0	0.00%

New Jersey Department of Transportation
Bureau of Safety Programs
Accident Summary

Total Accidents At Intersections For State System Roads

(Excluding Toll Roads and Interstates)

For calendar year 2002

Total Accidents: 30679

Severity	Count	% of Total
Fatal	58	0.19%
Injury	10158	33.11%
Property Damage	20463	66.70%

Intersection	Count	% of Total
At Signalized	13062	42.58%
At Unsignalized	17617	57.42%
Between Intersections	0	0.00%
Railroad Crossing	0	0.00%

Collision Type	Count	% of Total
Same Dir- Rear End	13100	42.70%
Same Dir- Sideswipe	4719	15.38%
Angle	6447	21.01%
Left Turn	1912	6.23%
Head On	517	1.69%
Overturned	68	0.22%
Pedestrian	254	0.83%
Fixed Object	2127	6.93%
Animal	217	0.71%
Parked Vehicle	236	0.77%
Pedacycle	191	0.62%
Other types	891	2.90%

Surface Condition	Count	% of Total
Dry	23235	75.74%
Wet Surface	6819	22.23%
Snow or Ice	499	1.63%
Unknown or Other	126	0.41%

Light	Count	% of Total
Day	21973	71.62%
Night, Dawn, Dusk	8585	27.98%
Unknown	121	0.39%

New Jersey Department of Transportation
Bureau of Safety Programs
Accident Summary

Total Accidents Between Intersections For State System Roads

(Excluding Toll Roads and Interstates)

For calendar year 2002

Total Accidents: 36584

Severity	Count	% of Total
Fatal	123	0.34%
Injury	11046	30.19%
Property Damage	25415	69.47%

Intersection	Count	% of Total
At Signalized	0	0.00%
At Unsignalized	0	0.00%
Between Intersections	36584	100.00%
Railroad Crossing	0	0.00%

Collision Type	Count	% of Total
Same Dir- Rear End	17428	47.64%
Same Dir- Sideswipe	6664	18.22%
Angle	2249	6.15%
Left Turn	508	1.39%
Head On	564	1.54%
Overturned	230	0.63%
Pedestrian	240	0.66%
Fixed Object	4844	13.24%
Animal	1452	3.97%
Parked Vehicle	842	2.30%
Pedacycle	142	0.39%
Other types	1421	3.88%

Surface Condition	Count	% of Total
Dry	27393	74.88%
Wet Surface	8048	22.00%
Snow or Ice	963	2.63%
Unknown or Other	180	0.49%

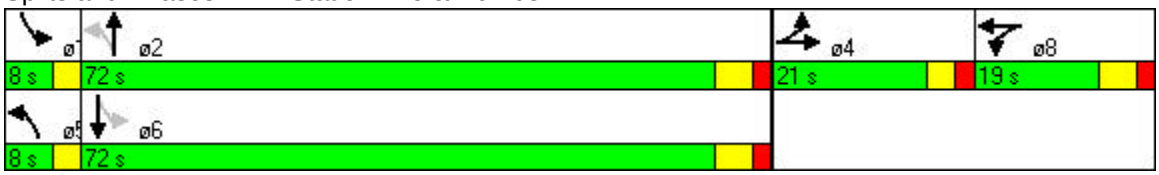
Light	Count	% of Total
Day	25374	69.36%
Night, Dawn, Dusk	11026	30.14%
Unknown	184	0.50%

APPENDIX D

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1700	0	0	1790	0	1770	1853	0	1770	1852	0
Flt Permitted		0.990			0.961		0.514			0.145		
Satd. Flow (perm)	0	1700	0	0	1790	0	957	1853	0	270	1852	0
Satd. Flow (RTOR)		48						3			3	
Volume (vph)	33	33	91	100	24	0	143	733	28	1	274	12
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	171	0	0	135	0	155	827	0	1	311	0
Turn Type	Split			Split			pm+pt			pm+pt		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases							2			6		
Total Split (s)	21.0	21.0	0.0	19.0	19.0	0.0	8.0	72.0	0.0	8.0	72.0	0.0
Act Effct Green (s)		14.0			14.0		79.2	78.4		76.0	72.0	
Actuated g/C Ratio		0.12			0.12		0.66	0.65		0.63	0.60	
v/c Ratio		0.71			0.65		0.24	0.68		0.00	0.28	
Uniform Delay, d1		36.4			50.6		7.3	14.5		0.0	11.4	
Delay		36.1			50.8		8.5	15.2		5.0	7.0	
LOS		D			D		A	B		A	A	
Approach Delay		36.1			50.8			14.1			7.0	
Approach LOS		D			D			B			A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.71	
Intersection Signal Delay: 18.2	Intersection LOS: B
Intersection Capacity Utilization 77.8%	ICU Level of Service C

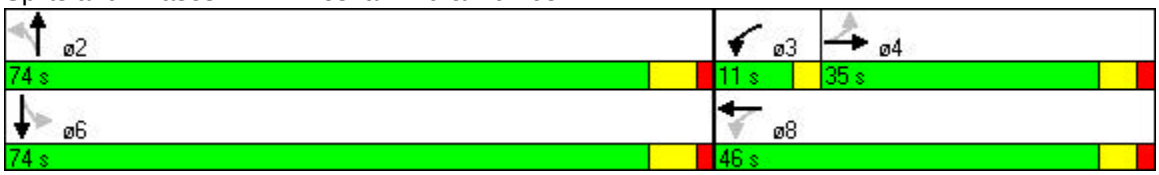
Splits and Phases: 1: Station Ave & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1652	1732	0	1652	1659	0	1829	1881	0	1829	1975	0
Flt Permitted	0.449			0.114			0.352			0.124		
Satd. Flow (perm)	781	1732	0	198	1659	0	678	1881	0	239	1975	0
Satd. Flow (RTOR)		1			20			13			3	
Volume (vph)	71	424	12	163	237	104	22	690	122	79	471	20
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	77	474	0	177	371	0	24	883	0	86	534	0
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	35.0	35.0	0.0	11.0	46.0	0.0	74.0	74.0	0.0	74.0	74.0	0.0
Act Effct Green (s)	31.0	31.0		42.0	42.0		70.0	70.0		70.0	70.0	
Actuated g/C Ratio	0.26	0.26		0.35	0.35		0.58	0.58		0.58	0.58	
v/c Ratio	0.38	1.06		1.15	0.62		0.06	0.80		0.62	0.46	
Uniform Delay, d1	36.6	44.4		29.3	30.5		10.8	19.2		16.3	14.2	
Delay	37.9	90.5		122.4	31.2		14.3	17.5		25.8	17.9	
LOS	D	F		F	C		B	B		C	B	
Approach Delay		83.2			60.7			17.4			19.0	
Approach LOS		F			E			B			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 40.6	Intersection LOS: D
Intersection Capacity Utilization 100.5%	ICU Level of Service F

Splits and Phases: 2: Evesham Rd & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1818	0	0	1809	0	1652	1693	0	1652	1688	0
Flt Permitted		0.707			0.644		0.347			0.177		
Satd. Flow (perm)	0	1309	0	0	1188	0	603	1693	0	308	1688	0
Satd. Flow (RTOR)		2			4			14			16	
Volume (vph)	179	286	20	118	168	23	33	577	120	91	383	91
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	528	0	0	336	0	36	757	0	99	515	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	50.0	50.0	0.0	50.0	50.0	0.0	70.0	70.0	0.0	70.0	70.0	0.0
Act Effct Green (s)		46.0			46.0		66.0	66.0		66.0	66.0	
Actuated g/C Ratio		0.38			0.38		0.55	0.55		0.55	0.55	
v/c Ratio		1.05			0.73		0.11	0.81		0.59	0.55	
Uniform Delay, d1		36.8			31.3		12.9	21.4		17.9	16.8	
Delay		80.0			33.1		9.5	19.4		11.9	8.5	
LOS		E			C		A	B		B	A	
Approach Delay		80.0			33.1			19.0			9.1	
Approach LOS		E			C			B			A	

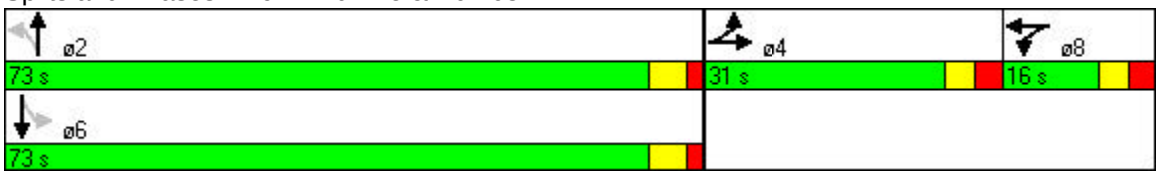
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 58 (48%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.05	
Intersection Signal Delay: 32.6	Intersection LOS: C
Intersection Capacity Utilization 106.4%	ICU Level of Service F

Splits and Phases: 3: Clements Bridge & NJ 168

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1904	0	0	1952	0	1770	1863	0	1770	1850	0
Flt Permitted		0.977			0.985		0.367			0.228		
Satd. Flow (perm)	0	1904	0	0	1952	0	684	1863	0	425	1850	0
Satd. Flow (RTOR)		22			7						3	
Volume (vph)	99	36	78	8	12	6	14	652	1	32	444	21
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	232	0	0	29	0	15	710	0	35	506	0
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2			6		
Total Split (s)	31.0	31.0	0.0	16.0	16.0	0.0	73.0	73.0	0.0	73.0	73.0	0.0
Act Effct Green (s)		20.2			9.0		78.8	78.8		78.8	78.8	
Actuated g/C Ratio		0.17			0.08		0.66	0.66		0.66	0.66	
v/c Ratio		0.68			0.19		0.03	0.58		0.13	0.42	
Uniform Delay, d1		42.3			39.4		7.2	11.4		7.7	9.6	
Delay		41.5			42.2		9.6	10.0		20.9	24.4	
LOS		D			D		A	A		C	C	
Approach Delay		41.5			42.2			10.0			24.1	
Approach LOS		D			D			A			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 52 (43%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.68	
Intersection Signal Delay: 20.4	Intersection LOS: C
Intersection Capacity Utilization 63.9%	ICU Level of Service B

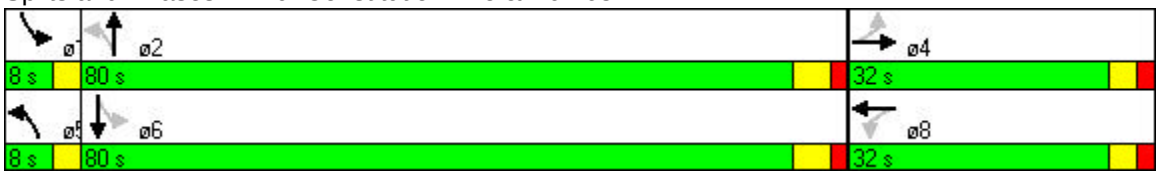
Splits and Phases: 9: Third Ave & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1898	0	0	1764	0	1652	1799	0	1652	1788	0
Flt Permitted		0.342			0.927		0.441			0.053		
Satd. Flow (perm)	0	678	0	0	1650	0	767	1799	0	92	1788	0
Satd. Flow (RTOR)		1			132			1			4	
Volume (vph)	181	16	3	56	11	226	5	1145	10	79	385	18
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	217	0	0	319	0	5	1256	0	86	438	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	0.0	8.0	80.0	0.0	8.0	80.0	0.0
Act Effct Green (s)		28.0			28.0		80.0	76.0		83.2	82.4	
Actuated g/C Ratio		0.23			0.23		0.67	0.63		0.69	0.69	
v/c Ratio		1.36			0.66		0.01	1.10		0.75	0.36	
Uniform Delay, d1		45.7			23.6		0.0	22.0		5.7	8.7	
Delay		184.4			24.4		3.4	76.6		30.4	14.7	
LOS		F			C		A	E		C	B	
Approach Delay		184.4			24.4			76.4			17.3	
Approach LOS		F			C			E			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 108 (90%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.36	
Intersection Signal Delay: 66.0	Intersection LOS: E
Intersection Capacity Utilization 115.4%	ICU Level of Service G

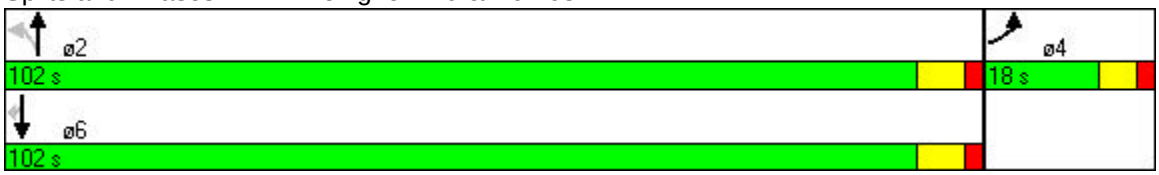
Splits and Phases: 10: Constitution Ave & NJ 168



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1869	0	1770	1863	1863	1583
Flt Permitted	0.989		0.376			
Satd. Flow (perm)	1869	0	700	1863	1863	1583
Satd. Flow (RTOR)	120					145
Volume (vph)	54	192	164	771	609	133
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Lane Group Flow (vph)	268	0	178	838	662	145
Turn Type			Perm			Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Total Split (s)	18.0	0.0	102.0	102.0	102.0	102.0
Act Effct Green (s)	13.4		98.7	98.7	98.7	98.7
Actuated g/C Ratio	0.11		0.82	0.82	0.82	0.82
v/c Ratio	0.85		0.31	0.55	0.43	0.11
Uniform Delay, d1	28.6		2.5	3.4	2.9	0.0
Delay	37.5		2.0	2.1	9.7	2.3
LOS	D		A	A	A	A
Approach Delay	37.5			2.1	8.4	
Approach LOS	D			A	A	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 46 (38%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.85			
Intersection Signal Delay: 9.1		Intersection LOS: A	
Intersection Capacity Utilization 70.8%		ICU Level of Service C	

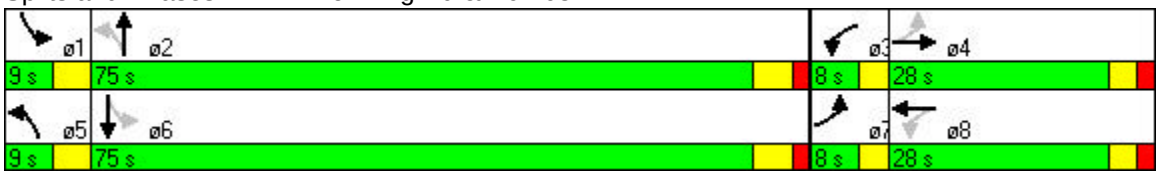
Splits and Phases: 11: Benigno Blvd & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1783	0	1770	1747	0	1770	1859	0	1770	1840	0
Flt Permitted	0.167			0.307			0.267			0.145		
Satd. Flow (perm)	311	1783	0	572	1747	0	497	1859	0	270	1840	0
Satd. Flow (RTOR)		15			26			1			6	
Volume (vph)	90	167	66	101	176	122	53	779	13	61	566	48
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	98	254	0	110	324	0	58	861	0	66	667	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	8.0	28.0	0.0	8.0	28.0	0.0	9.0	75.0	0.0	9.0	75.0	0.0
Act Effct Green (s)	27.2	23.2		27.2	23.2		77.6	73.6		77.6	73.6	
Actuated g/C Ratio	0.23	0.19		0.23	0.19		0.65	0.61		0.65	0.61	
v/c Ratio	0.82	0.71		0.65	0.90		0.15	0.76		0.28	0.59	
Uniform Delay, d1	36.6	42.5		36.9	43.4		6.7	17.2		6.7	14.4	
Delay	64.3	42.9		41.7	55.6		8.3	23.0		8.0	19.8	
LOS	E	D		D	E		A	C		A	B	
Approach Delay		48.8			52.1			22.1			18.7	
Approach LOS		D			D			C			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 101 (84%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.90	
Intersection Signal Delay: 30.3	Intersection LOS: C
Intersection Capacity Utilization 86.0%	ICU Level of Service D

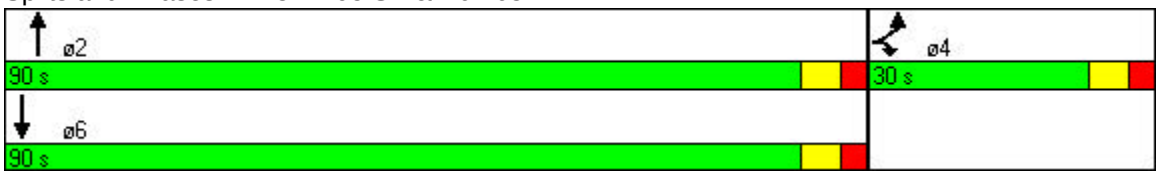
Splits and Phases: 12: Browning Rd & NJ 168



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3433	1583	0	3421	3260	0
Flt Permitted	0.950					
Satd. Flow (perm)	3433	1583	0	3421	3260	0
Satd. Flow (RTOR)		240			154	
Volume (vph)	126	221	0	1066	555	252
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Lane Group Flow (vph)	137	240	0	1159	877	0
Turn Type		Prot				
Protected Phases	4	4		2	6	
Permitted Phases						
Total Split (s)	30.0	30.0	0.0	90.0	90.0	0.0
Act Effct Green (s)	13.3	13.3		98.7	98.7	
Actuated g/C Ratio	0.11	0.11		0.82	0.82	
v/c Ratio	0.36	0.62		0.41	0.32	
Uniform Delay, d1	49.4	0.0		2.9	2.0	
Delay	48.8	6.1		6.2	2.2	
LOS	D	A		A	A	
Approach Delay	21.6			6.2	2.2	
Approach LOS	C			A	A	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 61 (51%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.62	
Intersection Signal Delay: 7.2	Intersection LOS: A
Intersection Capacity Utilization 47.0%	ICU Level of Service A

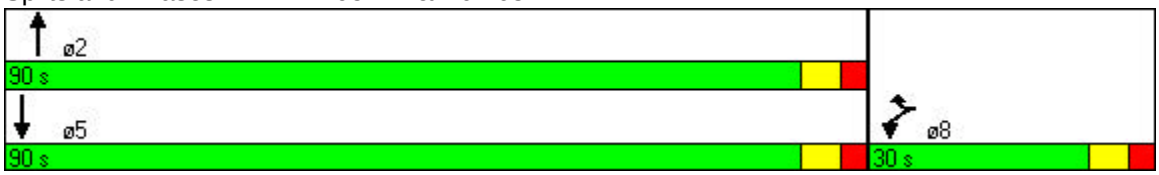
Splits and Phases: 13: I-295 SB & NJ 168



Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3433	1583	3243	0	0	3421
Flt Permitted	0.950					
Satd. Flow (perm)	3433	1583	3243	0	0	3421
Satd. Flow (RTOR)		153	205			
Volume (vph)	200	141	613	326	0	751
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Lane Group Flow (vph)	217	153	1020	0	0	816
Turn Type		Prot				
Protected Phases	8	8	2			5
Permitted Phases						
Total Split (s)	30.0	30.0	90.0	0.0	0.0	90.0
Act Effct Green (s)	15.6	15.6	96.5			96.5
Actuated g/C Ratio	0.13	0.13	0.80			0.80
v/c Ratio	0.49	0.45	0.39			0.30
Uniform Delay, d1	48.5	0.0	2.5			3.0
Delay	48.1	7.3	1.0			3.2
LOS	D	A	A			A
Approach Delay	31.2		1.0			3.2
Approach LOS	C		A			A

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 61 (51%), Referenced to phase 2:NBT and 5:SBT, Start of Yellow			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.49			
Intersection Signal Delay: 6.9		Intersection LOS: A	
Intersection Capacity Utilization 45.9%		ICU Level of Service A	

Splits and Phases: 14: I-295 NB & NJ 168



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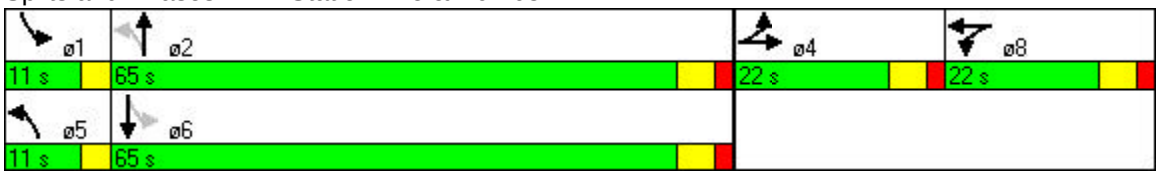
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1667	0	0	1788	0	1770	1859	0	1770	1859	0
Flt Permitted		0.993			0.962		0.066			0.073		
Satd. Flow (perm)	0	1667	0	0	1788	0	123	1859	0	136	1859	0
Satd. Flow (RTOR)		96						1			1	
Volume (vph)	33	33	179	193	48	3	4	765	12	155	892	11
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	267	0	0	265	0	4	845	0	168	982	0
Turn Type	Split			Split			pm+pt			pm+pt		
Protected Phases	4	4		8	8		5	2		1	6	
Permitted Phases							2			6		
Total Split (s)	22.0	22.0	0.0	22.0	22.0	0.0	11.0	65.0	0.0	11.0	65.0	0.0
Act Effct Green (s)		16.8			18.0		66.8	62.2		72.8	71.4	
Actuated g/C Ratio		0.14			0.15		0.56	0.52		0.61	0.60	
v/c Ratio		0.84			0.99		0.03	0.88		0.94	0.89	
Uniform Delay, d1		31.9			50.9		9.8	25.5		19.1	22.9	
Delay		38.8			89.4		9.8	31.5		51.8	24.3	
LOS		D			F		A	C		D	C	
Approach Delay		38.8			89.4			31.4			28.3	
Approach LOS		D			F			C			C	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.99			
Intersection Signal Delay: 36.9		Intersection LOS: D	
Intersection Capacity Utilization 98.8%		ICU Level of Service E	

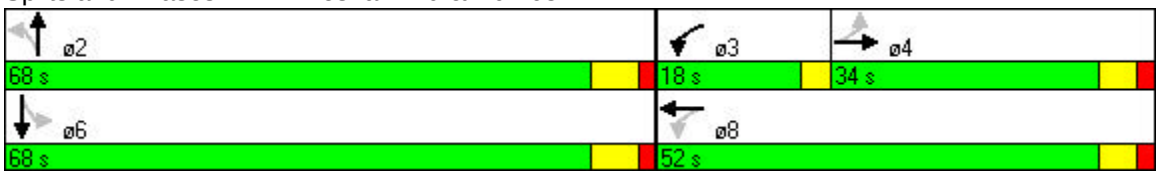
Splits and Phases: 1: Station Ave & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1652	1721	0	1652	1700	0	1829	1861	0	1829	1953	0
Flt Permitted	0.142			0.229			0.190			0.266		
Satd. Flow (perm)	247	1721	0	398	1700	0	366	1861	0	512	1953	0
Satd. Flow (RTOR)		3			9			18			8	
Volume (vph)	37	282	20	270	519	88	29	436	125	40	583	75
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	40	329	0	293	660	0	32	610	0	43	716	0
Turn Type	Perm			pm+pt			Perm			Perm		
Protected Phases		4		3	8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	34.0	34.0	0.0	18.0	52.0	0.0	68.0	68.0	0.0	68.0	68.0	0.0
Act Effct Green (s)	30.0	30.0		48.0	48.0		64.0	64.0		64.0	64.0	
Actuated g/C Ratio	0.25	0.25		0.40	0.40		0.53	0.53		0.53	0.53	
v/c Ratio	0.65	0.76		0.96	0.96		0.16	0.61		0.16	0.69	
Uniform Delay, d1	40.2	41.2		26.8	34.6		14.3	18.7		14.3	20.3	
Delay	65.3	44.2		58.5	52.8		4.3	10.6		19.0	23.5	
LOS	E	D		E	D		A	B		B	C	
Approach Delay		46.5			54.5			10.3			23.3	
Approach LOS		D			D			B			C	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green, Master Intersection	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.96	
Intersection Signal Delay: 34.3	Intersection LOS: C
Intersection Capacity Utilization 87.1%	ICU Level of Service D

Splits and Phases: 2: Evesham Rd & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1805	0	0	1824	0	1652	1683	0	1652	1662	0
Flt Permitted		0.635			0.759		0.109			0.282		
Satd. Flow (perm)	0	1162	0	0	1400	0	190	1683	0	490	1662	0
Satd. Flow (RTOR)		7			4			18			27	
Volume (vph)	100	226	50	118	392	41	46	437	120	40	559	230
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	409	0	0	599	0	50	605	0	43	858	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Total Split (s)	50.0	50.0	0.0	50.0	50.0	0.0	70.0	70.0	0.0	70.0	70.0	0.0
Act Effct Green (s)		46.0			46.0		66.0	66.0		66.0	66.0	
Actuated g/C Ratio		0.38			0.38		0.55	0.55		0.55	0.55	
v/c Ratio		0.91			1.11		0.48	0.65		0.16	0.93	
Uniform Delay, d1		34.4			36.7		16.5	18.2		13.3	23.9	
Delay		49.2			96.8		9.7	7.8		6.0	25.2	
LOS		D			F		A	A		A	C	
Approach Delay		49.2			96.8			7.9			24.3	
Approach LOS		D			F			A			C	

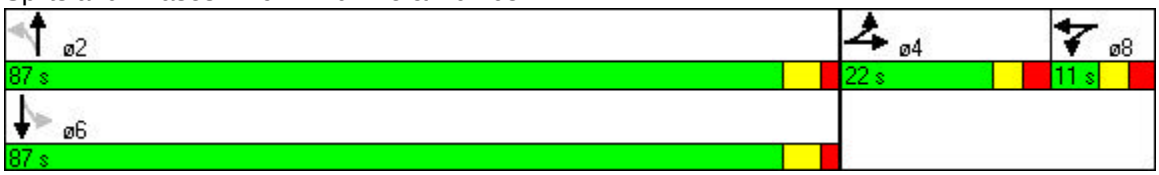
Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 68 (57%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.11	
Intersection Signal Delay: 41.0	Intersection LOS: D
Intersection Capacity Utilization 111.7%	ICU Level of Service G

Splits and Phases: 3: Clements Bridge & NJ 168

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1890	0	0	1954	0	1770	1861	0	1770	1855	0
Flt Permitted		0.979			0.987		0.088			0.316		
Satd. Flow (perm)	0	1890	0	0	1954	0	164	1861	0	589	1855	0
Satd. Flow (RTOR)		27			11			1			2	
Volume (vph)	46	14	45	20	38	19	56	621	5	4	1000	25
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	114	0	0	84	0	61	680	0	4	1114	0
Turn Type	Split			Split			Perm			Perm		
Protected Phases	4	4		8	8			2			6	
Permitted Phases							2			6		
Total Split (s)	22.0	22.0	0.0	11.0	11.0	0.0	87.0	87.0	0.0	87.0	87.0	0.0
Act Effct Green (s)		12.9			7.0		88.2	88.2		88.2	88.2	
Actuated g/C Ratio		0.11			0.06		0.74	0.74		0.74	0.74	
v/c Ratio		0.50			0.68		0.50	0.50		0.01	0.82	
Uniform Delay, d1		38.3			48.0		6.7	6.6		4.2	10.5	
Delay		37.6			58.2		15.7	12.0		2.8	14.9	
LOS		D			E		B	B		A	B	
Approach Delay		37.6			58.2			12.3			14.8	
Approach LOS		D			E			B			B	

Intersection Summary			
Cycle Length: 120			
Actuated Cycle Length: 120			
Offset: 52 (43%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 17.0		Intersection LOS: B	
Intersection Capacity Utilization 85.5%		ICU Level of Service D	

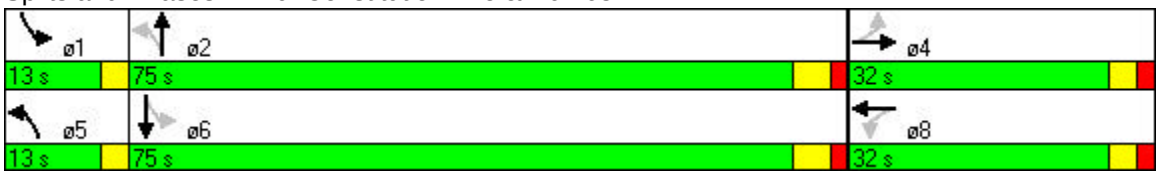
Splits and Phases: 9: Third Ave & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	0	1895	0	0	1805	0	1652	1792	0	1652	1790	0
Flt Permitted		0.691			0.795		0.116			0.317		
Satd. Flow (perm)	0	1339	0	0	1461	0	202	1792	0	551	1790	0
Satd. Flow (RTOR)		9			49			2			3	
Volume (vph)	63	51	26	86	18	130	5	528	17	74	800	36
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	0	151	0	0	254	0	5	592	0	80	909	0
Turn Type	Perm			Perm			pm+pt			pm+pt		
Protected Phases		4			8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	32.0	32.0	0.0	32.0	32.0	0.0	13.0	75.0	0.0	13.0	75.0	0.0
Act Effct Green (s)		22.2			22.2		84.3	80.6		89.8	88.0	
Actuated g/C Ratio		0.19			0.19		0.70	0.67		0.75	0.73	
v/c Ratio		0.59			0.82		0.03	0.49		0.17	0.69	
Uniform Delay, d1		41.9			37.6		4.2	9.9		4.0	10.0	
Delay		41.0			37.0		8.0	14.0		7.1	21.8	
LOS		D			D		A	B		A	C	
Approach Delay		41.0			37.0			14.0			20.6	
Approach LOS		D			D			B			C	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 13 (11%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.82		
Intersection Signal Delay: 22.2	Intersection LOS: C	
Intersection Capacity Utilization 88.1%	ICU Level of Service D	

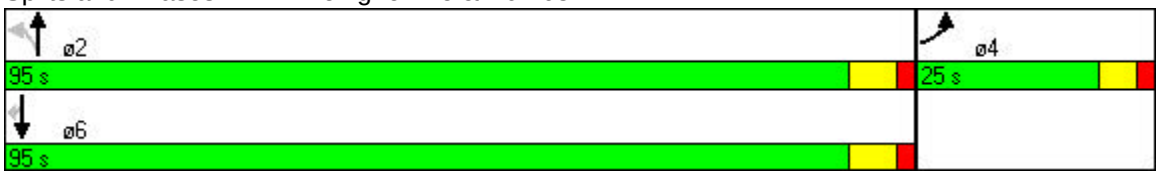
Splits and Phases: 10: Constitution Ave & NJ 168



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1668	0	1770	1863	1863	1583
Flt Permitted	0.983		0.267			
Satd. Flow (perm)	1668	0	497	1863	1863	1583
Satd. Flow (RTOR)	71					54
Volume (vph)	100	196	234	867	775	50
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Lane Group Flow (vph)	322	0	254	942	842	54
Turn Type			Perm			Perm
Protected Phases	4			2	6	
Permitted Phases			2			6
Total Split (s)	25.0	0.0	95.0	95.0	95.0	95.0
Act Effct Green (s)	20.8		91.2	91.2	91.2	91.2
Actuated g/C Ratio	0.17		0.76	0.76	0.76	0.76
v/c Ratio	0.93		0.67	0.67	0.59	0.04
Uniform Delay, d1	37.9		7.1	7.0	6.3	0.0
Delay	57.8		9.0	7.7	17.8	2.9
LOS	E		A	A	B	A
Approach Delay	57.8			8.0	16.9	
Approach LOS	E			A	B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 60 (50%), Referenced to phase 2:NBTL and 6:SBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.93	
Intersection Signal Delay: 17.9	Intersection LOS: B
Intersection Capacity Utilization 87.6%	ICU Level of Service D

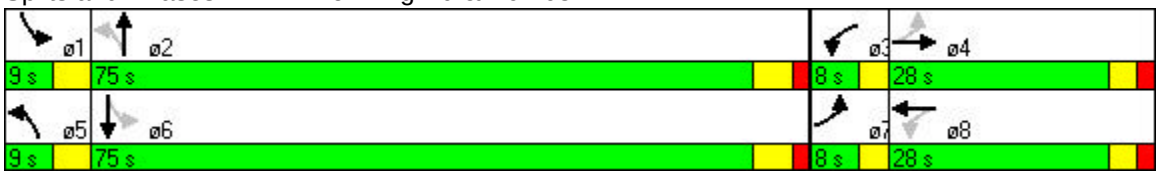
Splits and Phases: 11: Benigno Ave & NJ 168



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	1770	1792	0	1770	1799	0	1770	1824	0	1770	1846	0
Flt Permitted	0.167			0.167			0.159			0.183		
Satd. Flow (perm)	311	1792	0	311	1799	0	296	1824	0	341	1846	0
Satd. Flow (RTOR)		13			11			12			5	
Volume (vph)	103	291	98	79	283	85	202	631	105	131	725	47
Confl. Peds. (#/hr)												
Confl. Bikes (#/hr)												
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0	0	0	0	0	0	0
Parking (#/hr)												
Mid-Block Traffic (%)		0%			0%			0%			0%	
Lane Group Flow (vph)	112	423	0	86	400	0	220	800	0	142	839	0
Turn Type	pm+pt			pm+pt			pm+pt			pm+pt		
Protected Phases	7	4		3	8		5	2		1	6	
Permitted Phases	4			8			2			6		
Total Split (s)	8.0	28.0	0.0	8.0	28.0	0.0	9.0	75.0	0.0	9.0	75.0	0.0
Act Effct Green (s)	28.0	24.0		28.0	24.0		76.0	71.0		76.0	71.0	
Actuated g/C Ratio	0.23	0.20		0.23	0.20		0.63	0.59		0.63	0.59	
v/c Ratio	0.93	1.15		0.71	1.08		0.88	0.74		0.51	0.77	
Uniform Delay, d1	37.8	46.3		34.6	46.6		8.8	17.4		7.3	18.2	
Delay	85.3	118.7		51.0	101.9		41.8	29.3		6.0	17.6	
LOS	F	F		D	F		D	C		A	B	
Approach Delay		111.7			92.9			32.0			16.0	
Approach LOS		F			F			C			B	

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 114 (95%), Referenced to phase 2:NBTL and 6:SBTL, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 1.15	
Intersection Signal Delay: 50.7	Intersection LOS: D
Intersection Capacity Utilization 98.1%	ICU Level of Service E

Splits and Phases: 12: Browning Rd & NJ 168



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3433	1583	0	3421	3336	0
Flt Permitted	0.950					
Satd. Flow (perm)	3433	1583	0	3421	3336	0
Satd. Flow (RTOR)		122			35	
Volume (vph)	220	360	0	908	903	183
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%			0%	0%	
Lane Group Flow (vph)	239	391	0	987	1181	0
Turn Type		Prot				
Protected Phases	4	4		2	6	
Permitted Phases						
Total Split (s)	45.0	45.0	0.0	75.0	75.0	0.0
Act Effct Green (s)	29.6	29.6		82.4	82.4	
Actuated g/C Ratio	0.25	0.25		0.69	0.69	
v/c Ratio	0.28	0.81		0.42	0.51	
Uniform Delay, d1	36.6	28.7		8.3	8.7	
Delay	35.0	27.7		14.6	13.0	
LOS	D	C		B	B	
Approach Delay	30.5			14.6	13.0	
Approach LOS	C			B	B	

Intersection Summary		
Cycle Length: 120		
Actuated Cycle Length: 120		
Offset: 90 (75%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow		
Control Type: Actuated-Coordinated		
Maximum v/c Ratio: 0.81		
Intersection Signal Delay: 17.5	Intersection LOS: B	
Intersection Capacity Utilization 64.4%	ICU Level of Service B	

Splits and Phases: 13: I-295 SB & NJ 168

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0
Satd. Flow (prot)	3433	1583	3274	0	0	3421
Flt Permitted	0.950					
Satd. Flow (perm)	3433	1583	3274	0	0	3421
Satd. Flow (RTOR)		196	88			
Volume (vph)	322	239	715	288	0	813
Confl. Peds. (#/hr)						
Confl. Bikes (#/hr)						
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Growth Factor	100%	100%	100%	100%	100%	100%
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%
Bus Blockages (#/hr)	0	0	0	0	0	0
Parking (#/hr)						
Mid-Block Traffic (%)	0%		0%			0%
Lane Group Flow (vph)	350	260	1090	0	0	884
Turn Type		Prot				
Protected Phases	8	8	2			6
Permitted Phases						
Total Split (s)	45.0	45.0	75.0	0.0	0.0	75.0
Act Effct Green (s)	20.1	20.1	91.9			91.9
Actuated g/C Ratio	0.17	0.17	0.77			0.77
v/c Ratio	0.61	0.61	0.43			0.34
Uniform Delay, d1	46.3	10.7	4.4			4.4
Delay	45.7	12.2	6.1			4.8
LOS	D	B	A			A
Approach Delay	31.4		6.1			4.8
Approach LOS	C		A			A

Intersection Summary	
Cycle Length: 120	
Actuated Cycle Length: 120	
Offset: 90 (75%), Referenced to phase 2:NBT and 6:SBT, Start of Yellow	
Control Type: Actuated-Coordinated	
Maximum v/c Ratio: 0.61	
Intersection Signal Delay: 11.6	Intersection LOS: B
Intersection Capacity Utilization 54.2%	ICU Level of Service A

Splits and Phases: 14: I-295 NB & NJ 168

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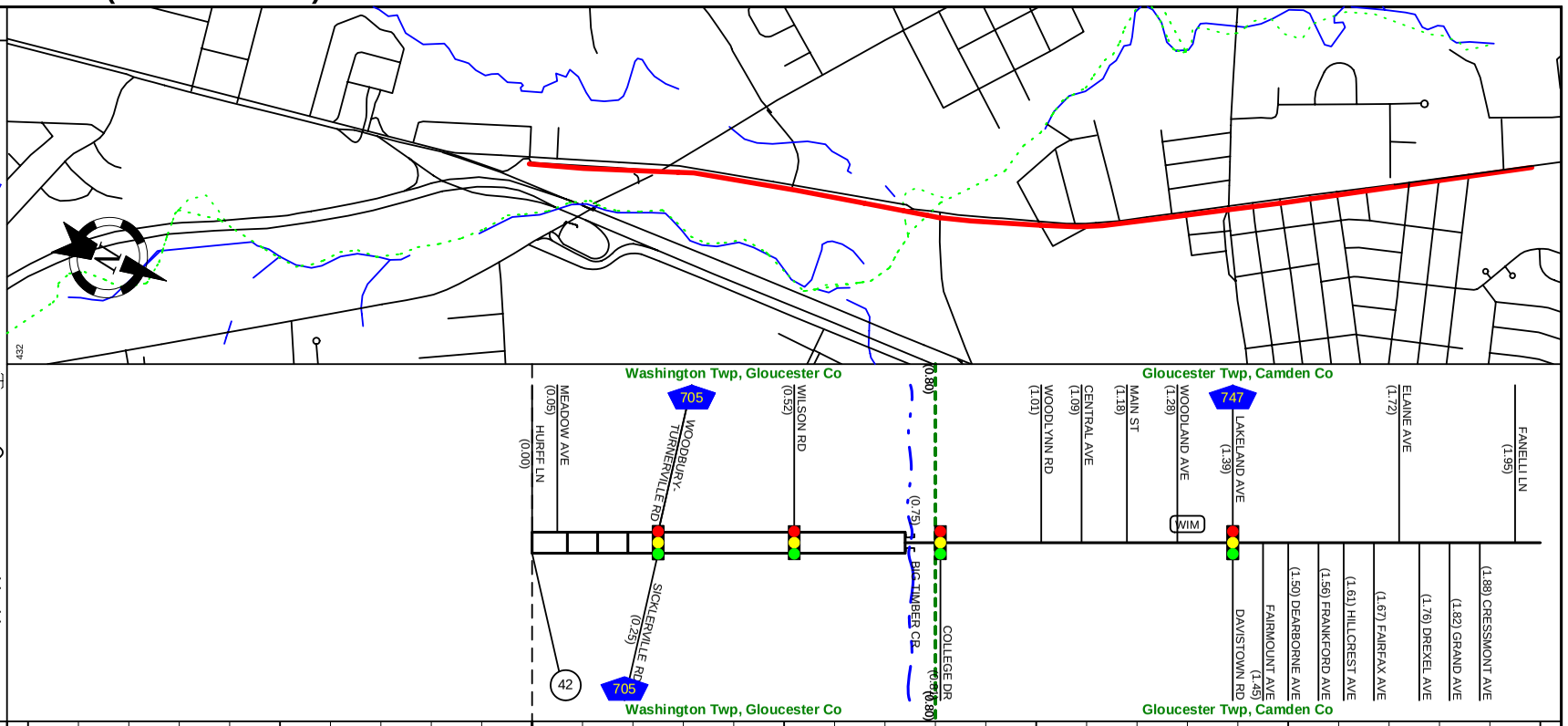
APPENDIX E

NJ 168 (South to North)

Mile Posts: 0.000 - 2.000



Street Name		Black Horse Pike	
Jurisdiction		N.J.D.O.T.	
Functional Class		Urban Principal Arterial	
Federal Aid Sys		STP	
Control Section		0819	0425
Speed Limit		50	40
Number of Lanes		4	2
Divided	SB/WB Shou.	10	8
	SB/WB Pave.	20	
	Med. Type	Unprotected	None
	Med. Width	18	0
	Undiv. NB/EB Pave.	20	30
	Undiv. NB/EB Shou.	10	8
Traffic Volume		16,470 (94) / 12,430 (94)	11,992 (00) / 12,254 (03)
Traffic Sta. ID		4I2C022 / 4I2A022	1681-1685 / 7-1-030
Structure No.		0819150	
Contract No. & Date		N.J. 42 SEC. 7 (1932) RECONST.	
Enlarged Views			

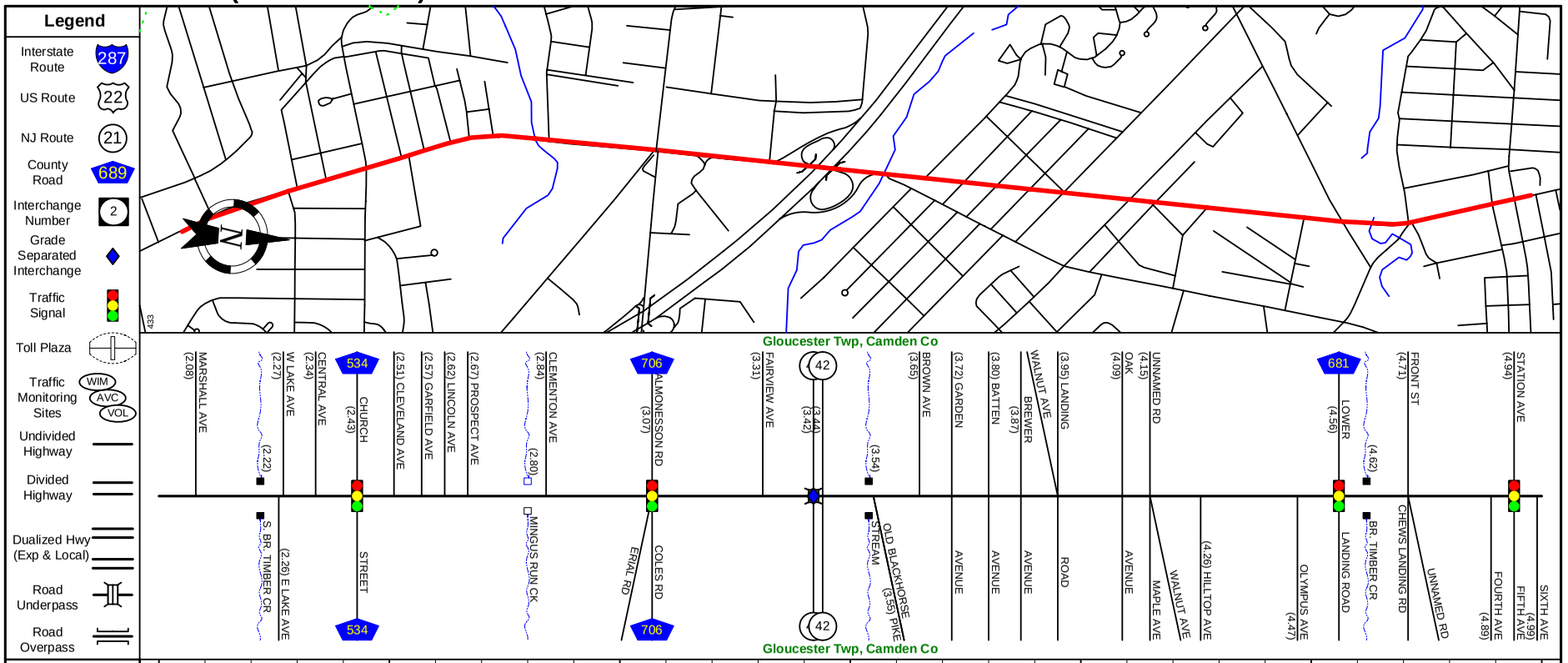
Begin NJ 168 MP=0.00

SRI = 00000168__

Date last inventoried: March 2002

NJ 168 (South to North)

Mile Posts: 2.000 - 5.000



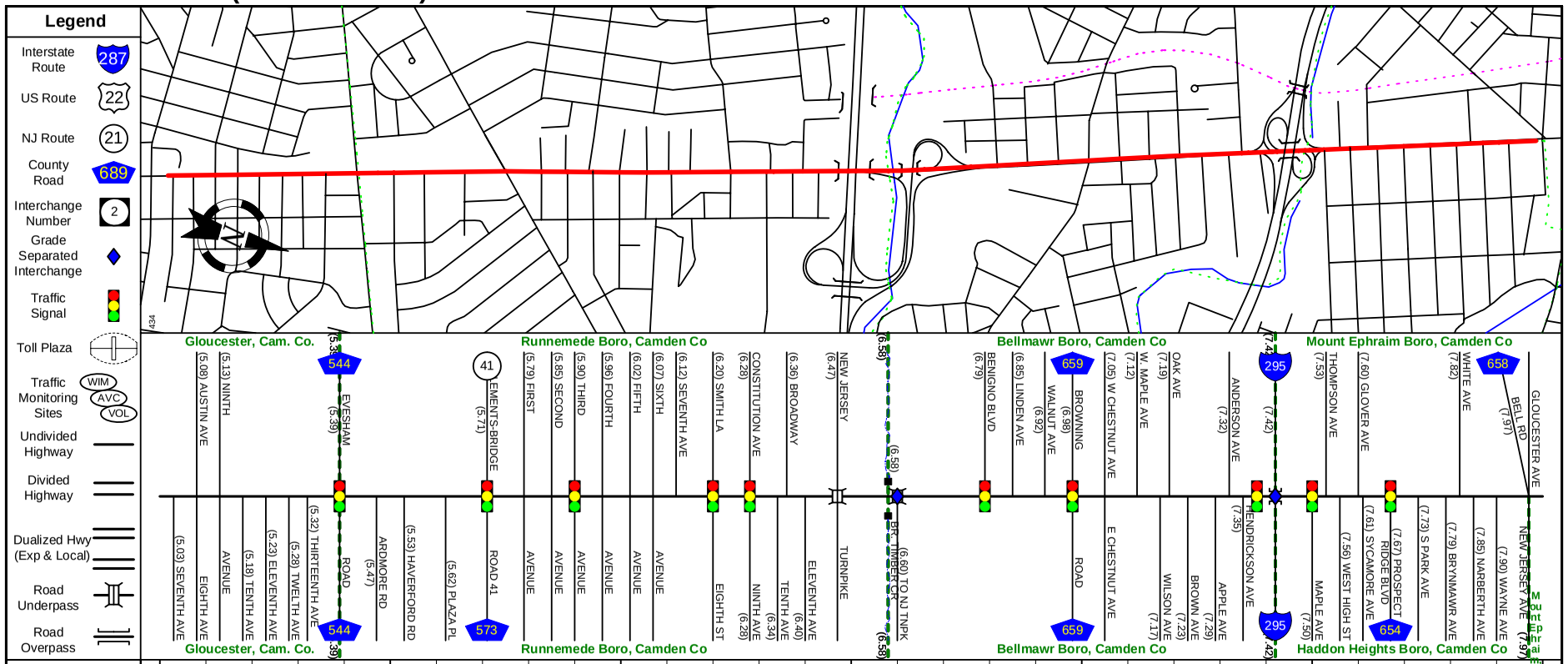
Street Name	Black Horse Pike				
Jurisdiction	N.J.D.O.T.				
Functional Class	Urban Principal Arterial				
Federal Aid Sys	STP				
Control Section	0425				
Speed Limit	40	30	45		40
Number of Lanes	2				
Divided — SB/WB Shou.	8		11	8	
Divided — SB/WB Pave.					
Divided — Med. Type	None				
Divided — Med. Width	0				
Undiv. — NB/EB Pave.	30		24	30	
Undiv. — NB/EB Shou.	8		11	8	
Traffic Volume			17,868 (03)	14,480 (91)	21,860 (95) 25,250 (95)
Traffic Sta. ID			7D5C301	7T5C105	5I2A111 5I2C111
Structure No.	0425150	N/	0411159,160 0425151	0425152	
Contract No. & Date					
Enlarged Views					

SRI = 00000168__

Date last inventoried: March 2002

NJ 168 (South to North)

Mile Posts: 5.000 - 8.000



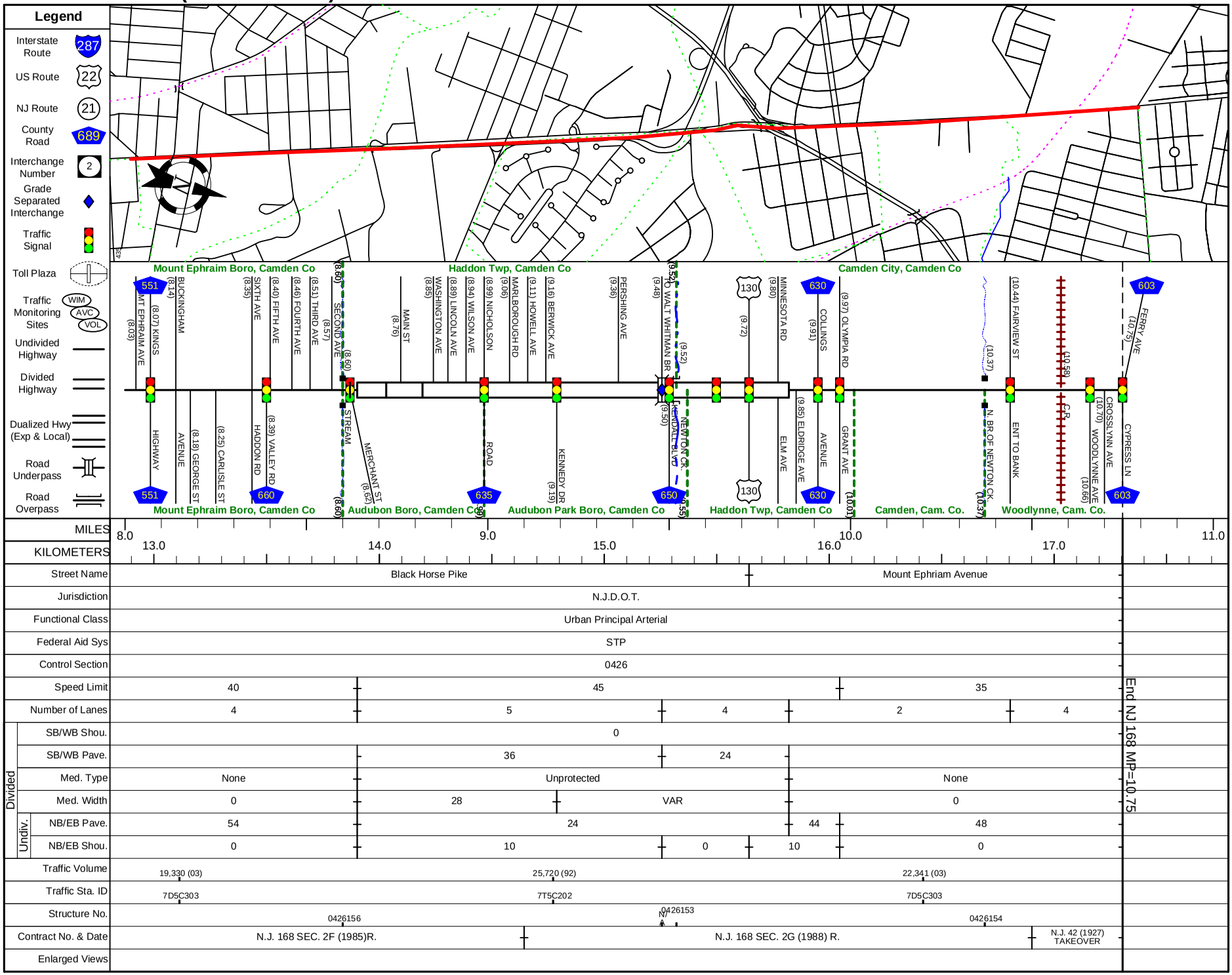
Street Name	Black Horse Pike		
Jurisdiction	N.J.D.O.T.		
Functional Class	Urban Principal Arterial		
Federal Aid Sys	STP		
Control Section	0425	0426	
Speed Limit	40	35	40
Number of Lanes	2		4
Divided — SB/WB Shou.	8		0
Divided — SB/WB Pave.			
Divided — Med. Type	None		
Divided — Med. Width	0		
Undiv. — NB/EB Pave.	30		54
Undiv. — NB/EB Shou.	8		0
Traffic Volume	21,860 (95) 20,670 (91)	20,890 (93) 19,740 (93)	28,171 (02) 25,780 (91)
Traffic Sta. ID	5I2A111 7D5-390	3I2C103 3I2A103	7D5-394 7D5C302
Structure No.		0426150 NJTP2588,1613A,1613B,1613C	0426151
Contract No. & Date	N.J. 168 SEC. 2F (1985)R.		
Enlarged Views			

SRI = 00000168__

Date last inventoried: March 2002

NJ 168 (South to North)

Mile Posts: 8.000 - 10.750

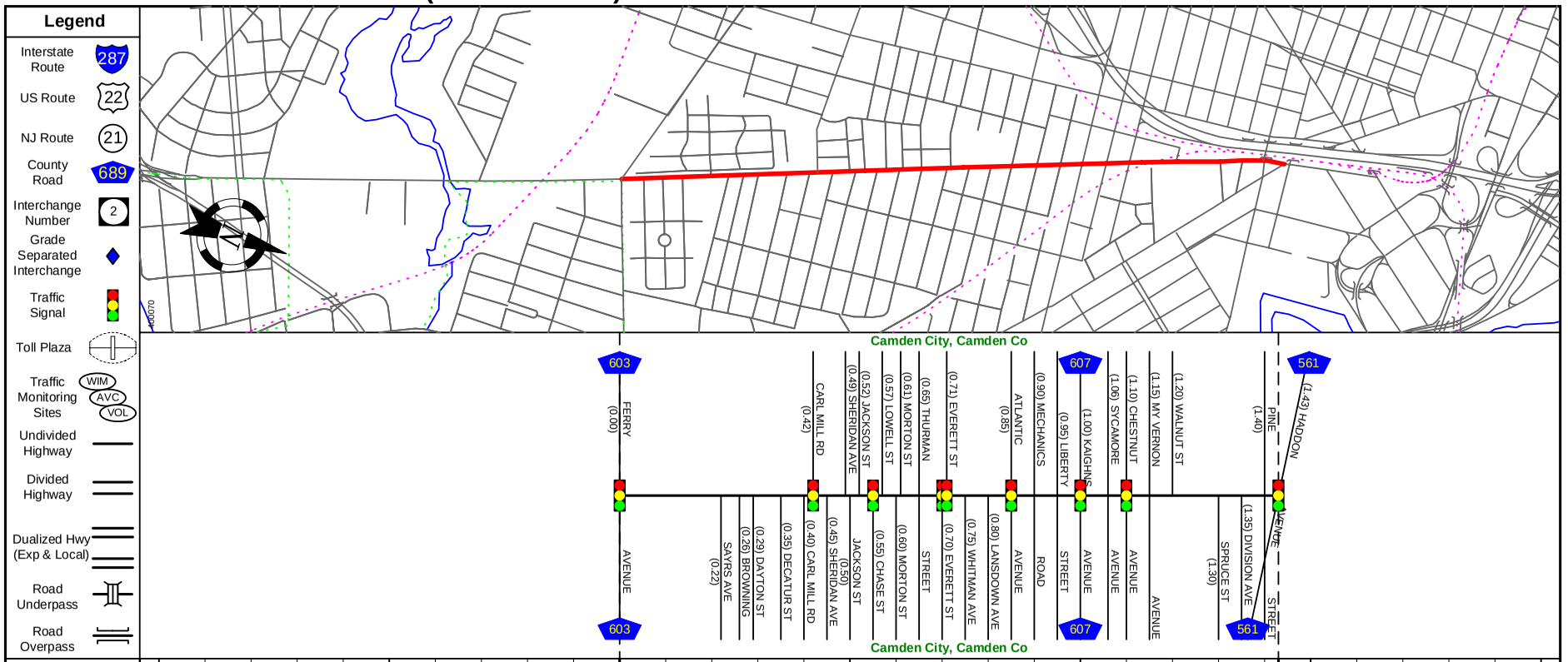


SRI = 00000168__

Date last inventoried: March 2002

CAMDEN COUNTY 605 (South to North)

Mile Posts: 0.000 - 1.430



MILES	-1.0	0.0	1.0 2.0 3.0
KILOMETERS	-1.0	0.0	1.0 2.0
Street Name		Mt Ephraim Avenue	
Jurisdiction		County	
Functional Class		Urban Principal Arterial	
Federal Aid Sys		STP	
Control Section			
Speed Limit		35	
Number of Lanes		4 | 2	
Divided — SB/WB Shou.		0	
Divided — SB/WB Pave.			
Divided — Med. Type		None	
Divided — Med. Width		0	
Divided — Undiv. — NB/EB Pave.		46	
Divided — Undiv. — NB/EB Shou.		0	
Traffic Volume			
Traffic Sta. ID			
Structure No.			
Contract No. & Date			
Enlarged Views			

Begin Camden County 605 MP=0.00

End Camden County 605 MP=1.43

SRI = 04000605__

Date last inventoried: September 1999

NJ 168 CORRIDOR STUDY

Publication No.: 04042

Date Published: September 2004

Geographic Area Covered: Audubon Borough, Audubon Park Borough, Belmawr Borough, Camden City, Collingswood Borough, Deptford Township, Gloucester City, Gloucester Township, Haddon Heights Borough, Haddon Township, Mount Ephraim Borough, Oaklyn Borough, Runnemede Borough, Washington Township, and Woodlynne Borough

Key Words: corridor study, transportation problem locations, improvement scenarios, project priorities, project benefits, implementation plan

ABSTRACT: This document presents a transportation improvement plan for the NJ 168 Corridor in Camden and Gloucester Counties. The corridor planning effort undertakes the traditional examinations of an existing transportation/circulation system, in this case NJ 168 and surrounding facilities, identifying safety and functional or operational problems and recommending potential solutions, as appropriate. This plan takes a comprehensive look at the transportation needs of the corridor and identifies which project locations are in need of immediate attention, and identifies who is responsible for advancing these projects to the next step.

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