DELAWARE VALLEY
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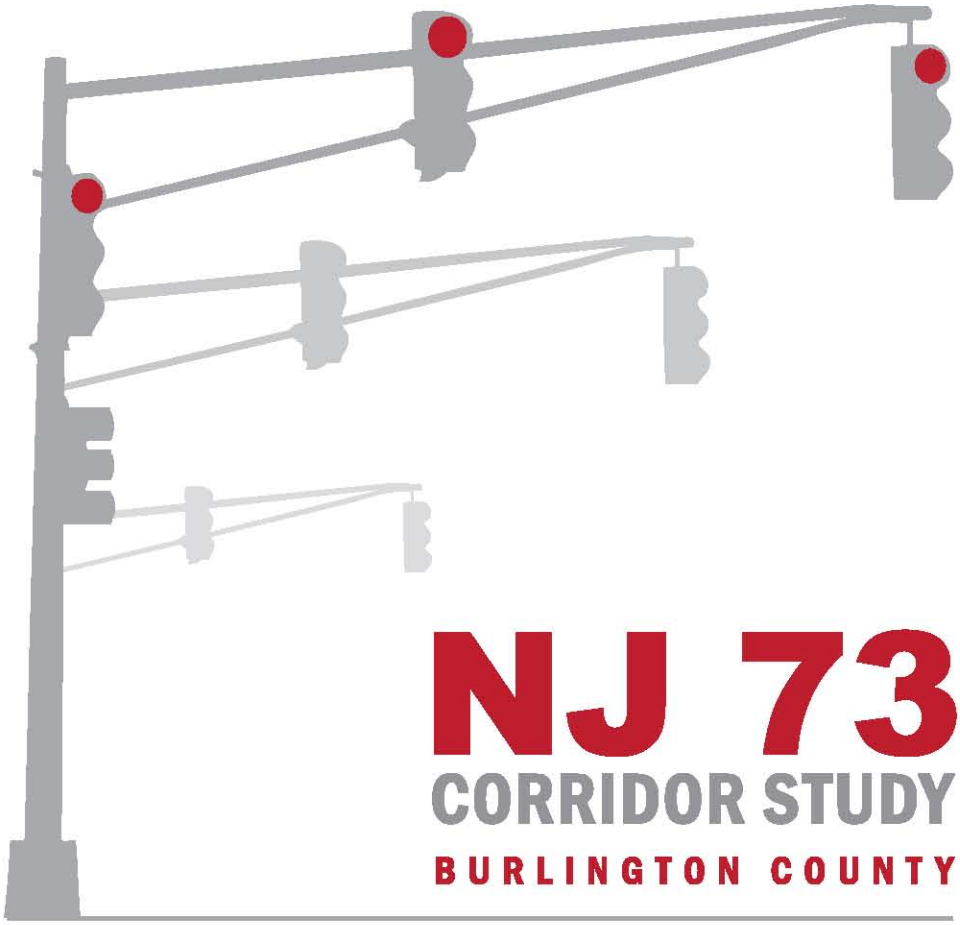
MARCH 2011



NJ 73
CORRIDOR STUDY
BURLINGTON COUNTY

EVESHAM, MAPLE SHADE, MOORESTOWN, & MOUNT LAUREL TOWNSHIPS

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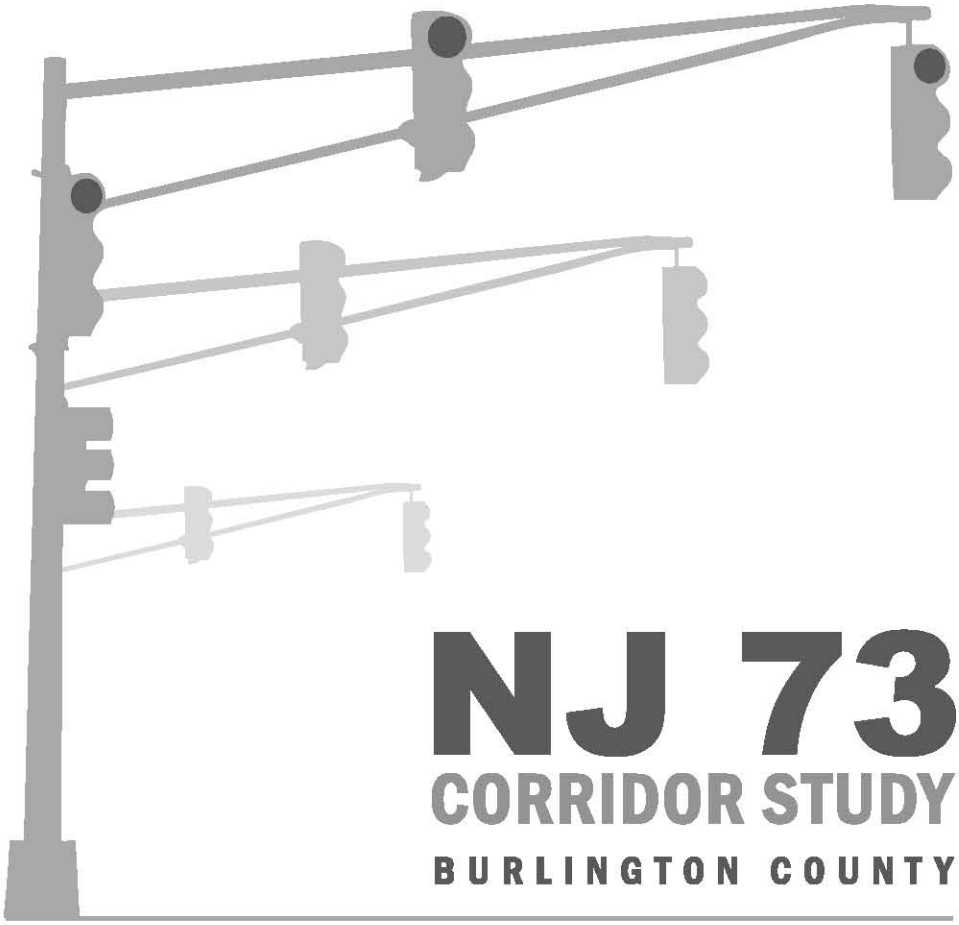

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CORRIDOR STUDY
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The Delaware Valley Regional Planning Commission is dedicated to uniting the region's elected officials, planning professionals, and the public with a common vision of making a great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

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

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

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Executive Summary

This study was undertaken by the Delaware Valley Regional Planning Commission (DVRPC), as part of its FY 2010 Planning Work Program. The study evaluated the current state of congestion and mobility as well as land-use patterns within the study area. The area studied is the segment of New Jersey Route 73 (NJ 73) that traverses through four townships in western Burlington County: Evesham Township, Maple Shade Township, Moorestown Township, and Mount Laurel Township. Within this segment, NJ 73 intersects with, and is impacted by, several regionally significant roadways, including the New Jersey Turnpike, Interstate 295, New Jersey Route 38, and several county highways. The study area covers a total of approximately 8.4 square miles.

The study is multi-modal in scope. It integrates transportation and land use, and is responsive to emerging lifestyle patterns. In an effort to preserve and improve the operating performance of the highway facility and enhance the character of the adjacent land uses, a comprehensive approach is taken in which innovative land use and transportation improvements were identified while being sensitive to the natural environment.

An environmental analysis was conducted of the study area, primarily an assessment of water resources within the area. Five severely impaired waterbodies were identified. To improve the water quality of these waterbodies, while enhancing the aesthetics and quality of life in the study area, actions including 1. Stormwater basin retrofits; 2. Protection of woodlands; 3. Natural landscaping; 4. Parking lot retrofitting; 5. Riparian buffers and greenways; and 6. Residential best management practices are recommended.

The study's land use principles for the corridor are aimed at achieving the desired goal of creating a vibrant, attractive, and economically stable commercial corridor along NJ 73, while still maintaining a high level of mobility and safety for both regional and local travelers using all modes of transportation.

There is a variety of land uses, which is an asset to the corridor. However, in most cases, each parcel contains a single use with access available only from NJ 73, thus requiring patrons to travel along NJ 73 in order to access various establishments. This activity adds unnecessary traffic to NJ 73, thereby exacerbating congestion along the roadway. The study recommends that by allowing and encouraging multiple land uses to occur on the same parcel, patrons can manage a variety of needs in fewer locations, thus using NJ 73 less to accommodate short trips between multiple nearby properties.

The highway can become an asset to local communities and as a destination for the broader region by encouraging development along NJ 73 that will contribute to the revitalization of this corridor. Consistent design is recommended that can be implemented through a special zoning overlay that details the preferred design parameters for the affected parcels along the roadway.

To help establish a unique sense of place, municipalities along NJ 73 can create a sign district overlay to implement uniform signage along the NJ 73 corridor that would extend across municipal boundaries.

In assessing current traffic circulation, a thorough examination of access, safety, public transportation, and bicycle and pedestrian infrastructure was conducted. Specific intersections were analyzed to help provide recommendations for improving traffic flow.

Improved access management practices were recommended at specific locations through the creation and maintenance of a connected street network. This would help provide routes for local trips that reduce or eliminate the need to travel along NJ 73.

Improvements to the highway network include a detailed analysis of twelve intersections where the level of service, delay, and congestion was evaluated and improvements recommended that would improve mobility.

Pedestrian recommendations included installing continental-style pedestrian crosswalks, pedestrian push buttons, countdown man-hand signal heads, and ADA-accessible curb ramps at intersections. In addition, retiming traffic signals to provide adequate pedestrian crossing time upon actuation was also recommended.

The NJ 73 corridor experiences heavy vehicular volumes with numerous areas of excessive speeding due to the open nature of some roadway segments. In addition, there are no bicycle-specific accommodations along NJ 73. However, many of the intersecting streets carry significantly smaller volumes and thus may provide a suitable environment for cycling, particularly where there is adequate shoulder width that may accommodate an on-street bicycle lane. The study has developed a potential bikeway network with new bicycle connections to major destinations and proposed improvements at conflict points.

Overall, recommendations were made that would improve pedestrian and bicyclist mobility and safety, while recognizing the importance of active transportation and its strong impact upon the health of a community. A section identifying the merits of designing for public health was also developed. It acknowledges that by increasing the opportunities for active transportation, mixed-use development patterns, and other health planning tools, planning can again serve as an instrument to reduce the occurrence of certain lifestyle related diseases and thus improve the health of communities.

The NJ 73 corridor is a fairly low-density suburban environment which is not an ideal location for transit service. Yet despite the dispersed nature of the corridor’s destinations, most of the study area still has characteristics suitable for transit. These include commercial clusters and high - density residential clusters. Improvements to existing bus service as well as transit facilities and amenities were recommended.

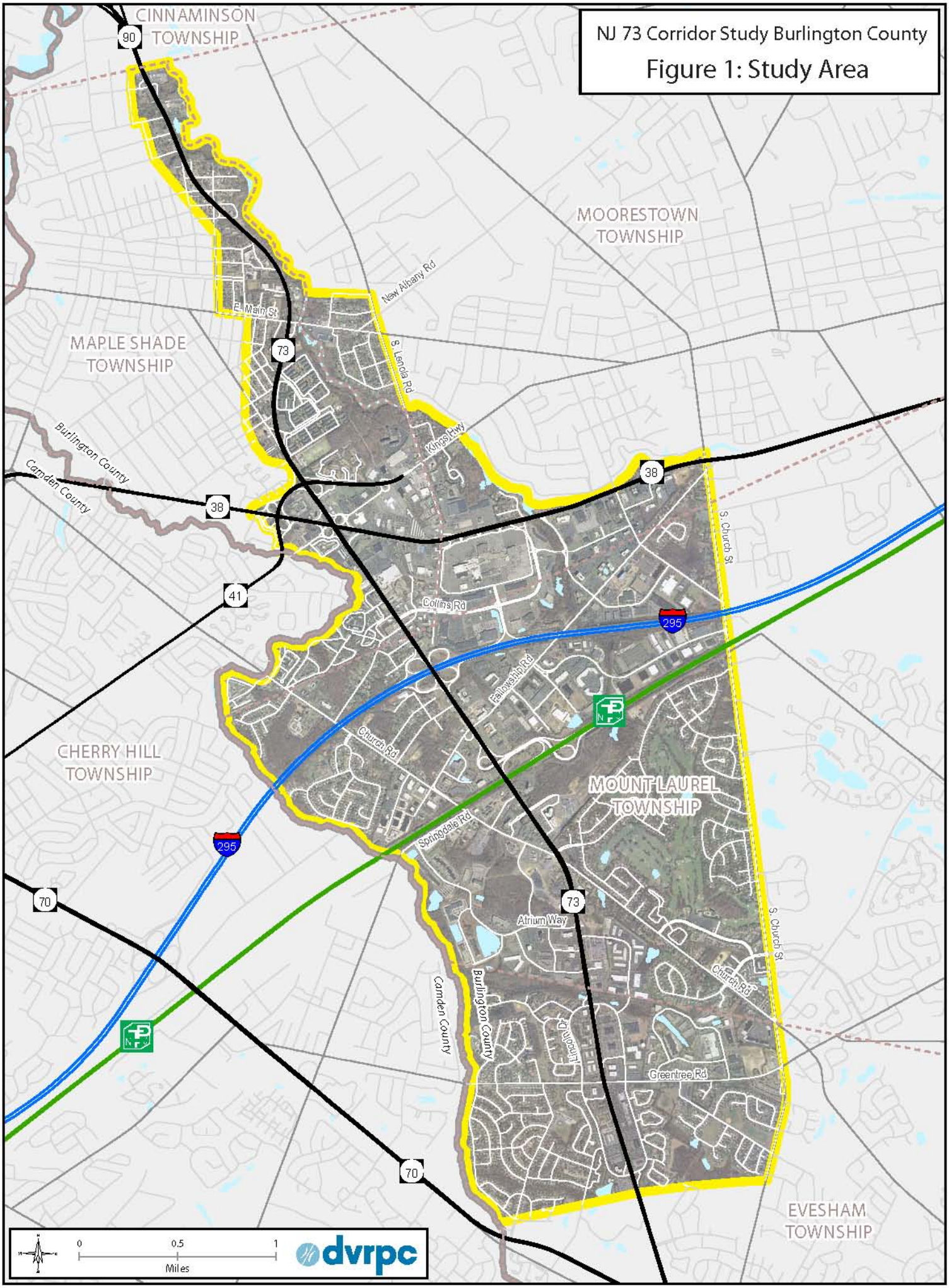
Introduction

In the summer of 2009, and with the direction and assistance of Burlington County's Office of Economic Development and Regional Planning, DVRPC initiated a study of the NJ 73 corridor. This study builds upon the previous year's effort, which examined a section of NJ 73 to the immediate south in Camden County. In addition, recommendations from the draft 2010 AECOM study of NJ 38 were also incorporated. DVRPC worked with the county, local municipalities, and other pertinent agencies to identify and analyze existing environmental resources, land use practices, and transportation facilities. The DVPRC study team was instructed to identify improvements that could assist with preservation of the natural environment, guide and encourage redevelopment, and improve highway congestion and safety. With these directives, and while also recognizing the incredible significance of inter-municipal and agency cooperation necessary for their advancement, this study provides the following recommendations for the continued success of the NJ 73 corridor:

- Improve the quality, while leveraging their aesthetics and usability, of the study area's waterbodies;
- Redevelop underutilized and vacant parcels, and do so in an organized and consistent fashion;
- Reduce congestion, increase safety, and encourage alternative modes of transportation;
- Support and maintain the corridor's overall quality of life.

Study Area

The study area consists of a 6.5-mile segment of NJ 73 as well as the surrounding areas in western Burlington County, from NJ 90 in the north to the area just north of the Marlton Circle in the south. The study did not include the Marlton Circle because roadway construction in that area is incomplete. While the Moorestown Industrial Park is outside the northern extent of the study area, the study team was cognizant of the impact of truck traffic on the disadvantaged area in the downtown. In the east, the study area is bounded by Church Street (CR 607) and to the west, mainly by the Camden County border. The study area municipalities are Evesham Township, Maple Shade Township, Moorestown Township, and Mount Laurel Township. The study area is shown in Figure 1.


NJ 73 Corridor Study Burlington County
Figure 1: Study Area
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
New Albany Rd
E. Main St
S. Lenola Rd
Kings Hwy
Burlington County
Camden County
Collins Rd
Fellowship Rd
Church Rd
Springdale Rd
Atrium Way
S. Church St
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Assets, Constraints, and Opportunities

Assets:

- NJ 73 corridor has a diverse mix of land uses;
- A strong mix of local and destination retail;
- A strong mix of office and industrial employment in the corridor;
- Availability of both local and regional bus service;
- Direct access to major highways, such as the New Jersey Turnpike and I-295;
- The northern end of the corridor leads to the Betsy Ross and Tacony-Palmyra bridges;
- The corridor is well served by several bus transit routes that run perpendicular to NJ 73;
- NJ 73 accommodates both local and regional travelers; and
- There is steady residential growth in the surrounding neighborhoods, local townships, and the county overall.

Constraints:

- Land uses are isolated and separated from each other;
- As the corridor develops, vehicular congestion also increases, and there are few safe and convenient alternatives to the automobile;
- There are no transit routes that run along NJ 73;
- Safe bicycle and pedestrian connections are lacking along and across NJ 73;
- No consistent approach to access management, including a mixture of jughandles and left turn lanes;
- Disconnected local street network results in local trips utilizing NJ 73;
- Many developments along NJ 73 are considered unattractive in their design; and
- Disinvestment in developments along or near NJ 73.

Opportunities:

- Vacant land along NJ 73 provides opportunities for redevelopment;
- The corridor accommodates a large volume of employees and visitors who require supportive services, such as retail, dining, and entertainment opportunities;

- As a regional highway, NJ 73 brings a large volume of possible clients and consumers into the area;
- There is a large population, 111,315 (2000 census) within a five-mile buffer of the corridor in New Jersey; and
- The median household income within a five-mile buffer of the corridor is $54,198.45 (2000 census) which is higher than similar communities in southern New Jersey.

CHAPTER 2

Demographics

Population and Employment

According to DVRPC estimates and forecasts, the population of the study area municipalities is currently over 126,000 persons. As shown in Table 1, population growth is expected to continue within all of the study area communities, totaling an increase of approximately 14 percent by 2035. In 2005, approximately 82,000 people were employed in study area municipalities, with Mount Laurel Township containing 38 percent of the total employment. As shown in Table 2, employment in the study area is also forecasted to increase by 19 percent by the year 2035.

Table 1: Population Forecasts, 2005 - 2035

	Population 2005-2035			Change 2005-2035	
Municipality	**2005**	**2015**	**2035**	**Absolute**	**Percent**
Evesham Township	**46,558**	**48,914**	**52,867**	**6,309**	**14%**
Maple Shade Township	**19,335**	**20,112**	**21,417**	**2,082**	**11%**
Moorestown Township	**19,839**	**21,499**	**24,286**	**4,447**	**22%**
Mount Laurel Township	**40,287**	**41,911**	**44,636**	**4,349**	**11%**
Study Area Total	**126,019**	**132,436**	**143,206**	**17,187**	**14%**
Burlington County	**446,866**	**482,153**	**541,203**	**94,337**	**21%**

Source: DVRPC

Table 2: Employment Forecasts, 2005 - 2035

	Employment 2005-2035			Change 2005-2035	
Municipality	**2005**	**2015**	**2035**	**Absolute**	**Percent**
Evesham Township	**23,128**	**25,028**	**28,218**	**5,090**	**22%**
Maple Shade Township	**5,969**	**6,169**	**6,504**	**535**	**9%**
Moorestown Township	**22,125**	**23,479**	**25,755**	**3,630**	**16%**
Mount Laurel Township	**30,790**	**33,095**	**36,965**	**6,175**	**20%**
Study Area Total	**82,012**	**87,771**	**97,442**	**15,430**	**19%**
Burlington County	**214,621**	**231,760**	**260,529**	**45,908**	**21%**

Source: DVRPC

Environmental Justice

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. Metropolitan Planning Organizations (MPOs), as a part of the United States Department of Transportation's Certification requirements, are charged with evaluating their plans and programs for environmental justice (EJ) sensitivity to identify any disproportionately high and adverse health or environmental effects of its programs on these groups. DVRPC developed a method of analysis in 2001, which has been updated several times since. U.S. Census data is used to assess eight degrees of disadvantage (DOD): minorities, Hispanics, the disabled, carless households, impoverished households, female heads of household with children, and limited English proficiency households. Census tracts with a population that exceeds the regional average, or threshold, are considered EJ-sensitive.

NJ 73 Corridor Evaluation

The NJ 73 corridor study area includes nine census tracts within the study area's four municipalities.

Figure 2 displays the Degrees of Disadvantage, which is an indicator of EJ-sensitive areas and populations, per census tract. The specific DODs that are present for each census tract are summarized in detail in Table 3. The study area includes portions, not all, of these nine census tracts.

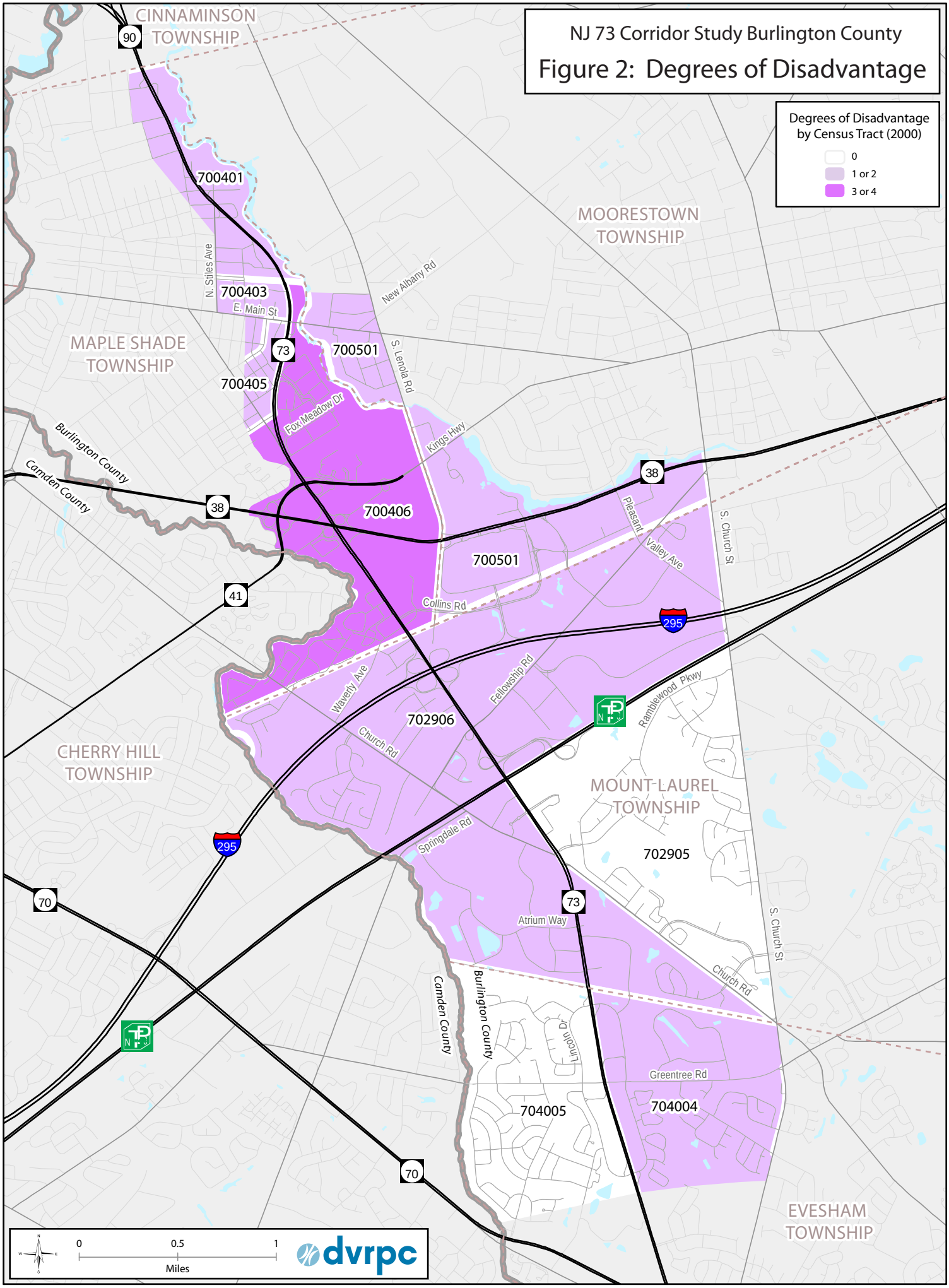

NJ 73 Corridor Study Burlington County
Figure 2: Degrees of Disadvantage
Degrees of Disadvantage by Census Tract (2000)
0
1 or 2
3 or 4
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
700401
700403
700405
700406
700501
702905
702906
704004
704005
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Burlington County
Camden County
Collins Rd
Pleasant Valley Ave
S. Church St
Waverly Ave
Fellowship Rd
Church Rd
Ramblewood Pkwy
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Table 3: Degrees of Disadvantage Analysis Summary

		Degrees of Disadvantage									
	Municipality	Maple Shade Township				Moorestown Township	Mount Laurel Township		Evesham Township		
	Census Tract	700403	700405	700406	700401	700501	702906	702905	704004	704005	Total Tracts
Degree of Disadvantage (regional threshold)	Non-Hispanic Minority (24.9%)	--	--	X	--	--	--	--	--	--	1
	Carless Households (16%)	--	--	--	--	--	--	--	--	--	0
	Households in Poverty (10.9%)	--	--	--	--	--	--	--	--	--	0
	Persons with Physical Disabilities (7.7%)	X	X	X	X	--	--	--	--	--	4
	Female Head of Household with Child (7.4%)	--	--	--	--	--	--	--	--	--	0
	Hispanic (5.4%)	--	--	X	--	--	--	--	--	--	1
	Elderly, 75 and over (6.6%)	X	--	--	X	X	X	--	--	--	4
	Limited English Proficiency (2.4%)	--	--	X	--	--	--	--	X	--	2
	Total DODs	2	1	4	2	1	1	0	1	0	

Source: DVRPC, 2010

This DOD analysis calls the following to attention:

- None of the study area tracts meet the regional threshold populations for carless households, households in poverty, and female heads of household with children;
- Four tracts meet the regional threshold population for Persons with Physical Disabilities; and
- Four tracts meet the regional threshold population for Elderly population.

Special DOD Considerations

Persons with Physical Disabilities and Elderly are the most significant EJ-sensitive populations in this study area. Population details for these groups are summarized below in Table 4. Bolded numbers indicate a percentage that exceeds the regional threshold.

Table 4: Persons with Physical Disabilities and Elderly Population Details

Municipality	Census Tract	Total Population	Persons with Physical Disabilities Population (7.7%)		Elderly, 75 and over Population (6.6%)	
			Count	Percent	Count	Percent
Maple Shade Township	700403	4,248	410	9.65%	461	10.85%
	700405	1,732	185	10.68%	91	5.25%
	700406	7,587	618	8.15%	409	5.39%
	700401	2,016	174	8.63%	157	7.79%
Moorestown Township	700501	5,387	376	6.98%	522	9.69%
Mount Laurel Township	702906	2,163	148	6.84%	247	11.42%
	702905	4,162	180	4.32%	216	5.19%
Evesham Township	704004	3,802	220	5.79%	203	5.34%
	704005	3,689	192	5.20%	132	3.58%
	Totals	34,786	2,503	7.20%	2,438	7.01%

Source: DVRPC, 2010

While not all tracts exceed the regional threshold population for these DODs, those that do are significantly higher. Aggregate percentages for the four study area tracts exceeding the regional threshold for each of these DODs are summarized below:

DOD (regional threshold)	Percent of population
Persons with Physical Disabilities (7.7%)	8.90%
Elderly, 75 and over (6.6%)	10.04%

Improvement projects recommended in the study area should be evaluated based on the extent to which they may impact sensitive populations. Persons with physical disabilities often rely on alternative modes of transportation for all mobility needs, and accessible streets and sidewalks are especially important. This often also applies to the elderly. As their rate of driving decreases with an increase in age, their mobility is dramatically impacted by the quality and connectivity of the pedestrian network, the breadth and frequency of transit service, and the availability and accessibility of local services and employment.

Health Planning

The efforts of modern planning professionals have long been associated with the health of communities, beginning with sanitation services that removed wastewater and zoning laws that separated incongruous land-uses. Such efforts have dramatically reduced the rate of infectious diseases, but unfortunately contemporary society is increasingly prone to chronic diseases such as heart disease and diabetes, whose risk factors include obesity and physical inactivity. However, by increasing the opportunities for active transportation, mixed-use development patterns, and other health planning tools, planning can again serve as an instrument to reduce the occurrence of common diseases and thus improve the health of communities.

Public Health Issues

Heart Disease

Heart disease refers to several types of heart conditions, the most common being coronary artery disease, which can cause heart attacks, angina, heart failure, and arrhythmias. According to the Centers for Disease Control (CDC), heart disease is the leading cause of death in the United States, representing a quarter of all deaths. Among the 50 states, New Jersey experienced the 18th highest rate of heart disease-related deaths per capita (National Vital Statistics Reports, Volume 57, Number 14; 2009), and Burlington County had the 7th highest mortality rate from heart disease among the 21 New Jersey counties (CDC Division for Heart Disease and Stroke Prevention 2010). Behavioral risk factors for heart disease include physical inactivity, obesity, poor diet, and tobacco use.

Obesity

For adults, obesity is defined via a measure of one's weight in relation to one's height, specifically a Body Mass Index (BMI) of 30 or higher. Obesity is associated with increased risk for a variety of conditions, including coronary artery disease, type 2 diabetes, certain cancers, hypertension, dyslipidemia, and stroke, among others. According to the CDC, 26 percent of adults within the United States are obese (Morbidty and Mortality Weekly Report, Volume 58, Number 46; 2009), though New Jersey has the 9th lowest prevalence of adult obesity (Overweight and Obesity 2010). Within New Jersey, Burlington County is the 6th highest county for adult obesity (Diabetes Data and Trends 2010). Obesity is the result of an energy imbalance, in which more calories are consumed than expended. Though a multitude of factors contribute to this imbalance, behavior and environment are the principal factors for preventative and treatment actions.

Respiratory Illnesses

The occurrence and severity of respiratory illnesses, such as asthma and chronic obstructive pulmonary disease (or lung disease), are linked to an individual's exposure to air pollution.

According to the CDC, almost 9 percent of adults and children in New Jersey are currently diagnosed with asthma (2008 Adult Ashma Data 2010; 2008 Child Asthma Data 2010). According to the state's Department of Health and Senior Services, Burlington County experiences a lower than average rate of hospital visits for asthma-related issues, though asthma is still responsible for around 1,000 emergency department discharges in 2006 (New Jersey Asthma Strategic Plan 2007). It is well recognized that certain pollutants, such as nitrogen oxides (NO_x), carbon monoxide (CO), volatile organic compounds (VOC), and particulate matters (PM) have negative impacts upon human health. These pollutants are generated by both natural and anthropogenic sources, though within the latter, vehicular emissions are a large contributor.

Health Planning Tools

Active Transportation Facilities

One tool to combat heart disease, obesity, and respiratory illnesses is an increase in the opportunities for active transportation. Increased potential for walking or cycling is facilitated by the presence of well-designed and maintained facilities. A comprehensive sidewalk network, highly visible crosswalks, and informative pedestrian signals are just a few of the potential facilities that encourage walking. The appeal and comfort of cycling is significantly improved by specific facilities such as adequate bike lanes, formal bicycling routes, and targeted wayfinding signage. Another benefit of these facilities is their ability to provide an alternative mode of travel to the automobile. Trips that can be completed entirely or even just partially via foot or bicycle places fewer vehicles on the roadway, thus decreasing the amount of pollutants that enter the immediate environment from vehicle emissions.

Mixed Use and Neo-Traditional Design

The design and orientation of a community's built environment has a strong influence upon the travel behavior of its residents, employees, and visitors. When planned well, a mix of uses decreases the distance between destinations while increasing their accessibility, thus reducing automobile dependence. Consequently, a physical design that encourages walking, cycling, and transit use will be helpful with reducing the levels of physical inactivity among adults and children. Elements of this design may be accomplished via shorter block lengths, a high level of street connectivity, reduced building setbacks, and traffic-calming measures. In addition, all of these measures are particularly effective for the very young, elderly, and disabled populations. The latter two were identified in the EJ analysis as having exceeded the regional threshold for some portions of the study area.

CHAPTER 3

Environmental Resources

The environmental health and integrity of an area is reflected in the quality and conditions of its waterways. Precipitation that is not infiltrated into the groundwater is drained into the nearest waterbody, carrying with it any surface pollutants it may have encountered. With increased development and more impervious surfaces, less water percolates into the ground and more is carried into the surface waters, either through direct runoff or through stormwater outfalls. Frequent high volumes of stormwater runoff not only cause severe flooding problems, but they also increase the pollutant loads carried to waterbodies and cause erosion of stream banks. The ultimate result is contaminated waterbodies with impacts to drinking water supply, aquatic life, property values, and quality of life for people, wildlife, and the overall environment.

The land that drains to a particular waterway such as a river, stream, lake, or wetland is called a watershed. Large watersheds are divided into smaller subwatersheds that drain to specific portions of streams. Both the North and South Branches of the Pennsauken Creek run through the NJ 73 corridor study area. Most of this area drains to one of these streams, although a small portion of Evesham Township drains to the Rancocas Creek to the south. Both branches of the Pennsauken Creek and the Rancocas Creek drain to the Lower Delaware River, which eventually flows to the Atlantic Ocean. The Pennsauken Creek North Branch is tidal until the area just below Lenola Road, and the South Branch is tidal until just above Main Street.

Water Quality Assessment

In New Jersey, water quality of streams is measured at their subwatershed level. Subwatersheds are assessed on the degree to which they attain certain designated uses, including aquatic life, recreation, drinking water supply, agriculture, industrial use, and fish consumption. There are six subwatersheds in the study area. Table 5 describes the water quality of each as measured by their attainment of designated uses, via sublist designation values as defined in Table 6. For five of the six subwatersheds, two of the designated uses are impaired: aquatic life and drinking water supply. Aquatic life represents the most general and encompassing designated use, and its level of attainment is shown in Figure 3. The least impaired subwatershed is the North Branch of the Pennsauken Creek above the New Jersey Turnpike (NJTP), while the most impaired are the South Branches of the Pennsauken Creek above and below NJ 41.

Table 5: Water Quality of Subwatersheds within the Study Area, 2008

Subwatershed Name	Acres within Study Area	Aquatic Life (general)	Recreation	Drinking Water Supply	Agricultural Water Supply	Industrial Water Supply	Fish Consumption
Rancocas Creek SW Branch (above Medford bridge)	94.9	5	5	5	2	2	3
Pennsauken Creek NB (above NJTP)	922.1	2	4A	3	3	3	3
Pennsauken Creek SB (below NJ 41)	62.4	5	4A	5	2	5	3
Pennsauken Creek NB (incl Strawbridge Lake-NJTP)	1,234.2	5	4A	5	2	2	5
Pennsauken Creek SB (above NJ 41)	2,308.6	5	4A	5	2	5	3
Pennsauken Creek NB (below Strawbridge Lake)	747.6	5	4A	5	2	2	3

Source: NJDEP, 2008

Table 6: Key to Integrated Report Sublists

Sublist	Placement Conditions
Sublist 1	The designated use is assessed and attained AND all other designated uses in the assessment unit area assessed and attained. (Fish consumption use is not factored into this determination based on EPA guidance)
Sublist 2	The designated use is assessed and attained BUT one or more designated uses in the assessment unit are not attained and/or there is insufficient data to make a determination.
Sublist 3	Insufficient data is available to determine if the designated use is attained.
Sublist 4	The designated use is not attained or is threatened; however, development of a TMDL is not required for one of the following reasons: 4A: A TMDL has been completed for the pollutant causing non attainment; 4B: Other enforceable pollution control requirements are reasonably expected to result in the conformance with the applicable water quality standard(s) in the near future and the designated use will be attained through these means; or 4C; Non-attainment is caused by something other than a pollutant.
Sublist 5	The designated use is not attained or is threatened by a pollutant or pollutants and a TMDL is required.

Source: NJDEP, 2008

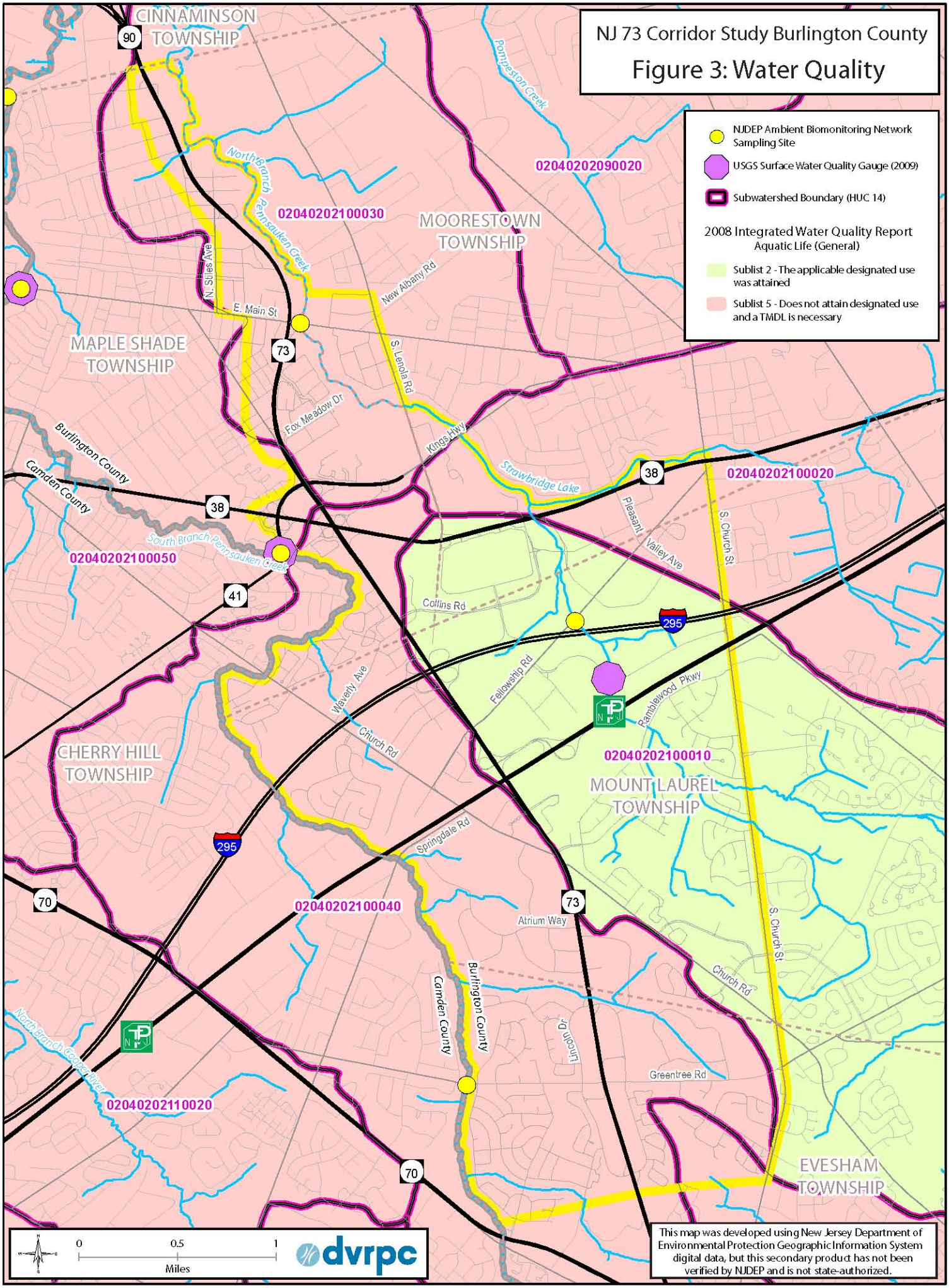

NJ 73 Corridor Study Burlington County
Figure 3: Water Quality
NJDEP Ambient Biomonitoring Network Sampling Site
USGS Surface Water Quality Gauge (2009)
Subwatershed Boundary (HUC 14)
2008 Integrated Water Quality Report
Aquatic Life (General)
Sublist 2 - The applicable designated use was attained
Sublist 5 - Does not attain designated use and a TMDL is necessary
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
02040202090020
02040202100030
02040202100020
02040202100050
02040202100010
02040202100040
02040202110020
Pompeston Creek
North Branch Pennsauken Creek
South Branch Pennsauken Creek
North Branch Rancocas Creek
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Strawbridge Lake
Pleasant Valley Ave
S. Church St
Collins Rd
Fellowship Rd
Ramblewood Pkwy
Waverly Ave
Church Rd
Springdale Rd
Atrium Way
Burlington County
Camden County
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Table 7 lists the impaired subwatersheds in the study area, the parameters that are the cause of the impairment, and the NJDEP's priority ranking of each waterbody (low, medium, or high). A ranking of "high" indicates that the waterbody is a high priority for remediation of that particular contaminant.

Table 7: Cause of Impairment and Priority Ranking of Impaired Waterbodies

Subwatershed Name	Subwatershed ID (HUC 14)	Parameter	Ranking
Rancocas Creek SW Branch (above Medford br)	02040202060080	pH	M
		Phosphorus	H
		Nitrate	M
		Total Suspended Solids	L
		E. Coli	H
		Arsenic	M
Pennsauken Creek SB (below NJ 41)	02040202100050	Phosphorus	H
		Total Suspended Solids	L
		Arsenic	M
Pennsauken Creek NB (incl Strawbridge Lake-NJTP)	02040202100020	Cause Unknown	L
		Arsenic	M
		Mercury	M
		Chlordane	M
		PCB	M
		DDT	M
		DDD	M
		DDE	M
Pennsauken Creek SB (above NJ 41)	02040202100040	Dissolved Oxygen	M
		Phosphorus	H
		Total Suspended Solids	L
		Arsenic	M
Pennsauken Creek NB (below Strawbridge Lake)	02040202100030	Cause Unknown	L
		Arsenic	M

Source: NJDEP, 2008

There are a total of eleven different causes of impairment in the subwatersheds of the study area, most of which are the result of agricultural, industrial, and residential uses. Descriptions, sources, and effects of these causes are listed in Appendix A.

Sources of Water Quality Impairment

Water resources become impaired from both direct discharges (point sources of pollution) and stormwater runoff (nonpoint sources of pollution).

Point Sources of Pollution

In New Jersey, industrial and municipal facilities and activities that discharge into surface water or groundwater are regulated by the New Jersey Pollutant Discharge Elimination System (NJPDES) program. Within the study area there are seven different facilities (point sources) with NJPDES permits to discharge into surface water, as shown in Table 8. Three of these are petroleum hydrocarbon remediation locations, two are municipal major publicly owned sewage treatment plants discharging greater than one million gallons daily (MGD), one is an industrial minor treatment plant, and one is a municipal minor publicly owned sewage treatment plant discharging less than one MGD.

Table 8: NJDPES Permits in the Study Area

NJPDES ID	Facility Name	Discharge Type
NJ0004588.001A	Akzo Chemicals Inc	IMI – Industrial minor
NJ0025071.001A	Cherry Hill Twp - Kingston	MMJ – Municipal major
NJ0024040.001A	Evesham Twp MUA - Woodstream	MMJ – Municipal major
NJG0109096.001A	Exxon S/S 3-2287	B4B – Petroleum hydrocarbon remediation
NJ0025577.001A	Maple Shade WTP - 1	MMI – Municipal minor
NJG0087041.001A	Shell S/S - Maple Shade	B4B – Petroleum hydrocarbon remediation
NJG0079880.001A	Shell S/S - Moorestown	B4B – Petroleum hydrocarbon remediation

Source: NJDEP, 2009

Although the requirements of the NJPDES program have been significant in establishing minimum control measures and regulating point sources of pollution into the water resources of the state, they are only one part of the solution for improving the water quality of the study area. A more aggressive and comprehensive approach incorporating many different structural and non-structural aspects of green infrastructure is needed to reduce stormwater flows, recharge groundwater supplies, and reduce pollutants overall.

Nonpoint Sources of Pollution

Stormwater runoff, or nonpoint sources of pollution, affects water quality to a greater degree than direct discharges. Although stormwater runoff is affected by many environmental factors, excessive impervious coverage resulting from the sprawling development patterns in the study area is a primary culprit in preventing water from infiltrating into the soil. Such surfaces disrupt

natural absorption, filtration, and recharge processes, and allow polluted water to flow rapidly into bodies of water, increasing erosion and stream bank degradation as well.

Unmanaged or poorly managed stormwater can result in stream bank erosion, stream destabilization, sedimentation, loss of groundwater recharge, loss of base flow, localized flooding, habitat modification and water quality and quantity impairment. Conversely, properly managed stormwater through properly constructed and maintained best management practices (BMPs) can remove pollutants, facilitate ground water recharge through retention and infiltration, provide base flow for surface waters, and maintain the stability and the environmental integrity of waterways and wetlands. To provide long-term protection and sustainability of ground and surface water resources, stormwater should be managed at the source or origin as an environmental resource to be protected rather than as a waste to be quickly discharged and moved downstream.

Plans to Improve Water Quality

TMDLs in the Study Area

A Total Maximum Daily Load (TMDL) is required for waterways that do not meet water quality standards after the implementation of technology-based effluent limitations. TMDLs serve as management approaches or restoration plans aimed at identifying the sources of impairment and for setting goals for load reductions in order to attain applicable surface water quality standards (SWQS).

As shown in Table 9, of the five most impaired subwatersheds, only two are being addressed by TMDL plans. The phosphorus impairment in three subwatersheds was not addressed due to an anticipated delisting, although phosphorus was still listed as a cause of impairment in 2008. The TMDL to address the impairment due to pathogens (E. coli) in one subwatershed was deferred. The two subwatersheds that are being addressed through a TMDL plan are those associated with Strawbridge Lake, discussed below.

Table 9: Status of TMDLs from the 2006 Integrated Report's Two Year TMDL Schedule (2006 - 2008)

WMA	Assessment Unit Name	Assessment Unit ID	Parameter	TMDL Name/Status	Date
19	Rancocas Creek SW Branch (above Medford br)	02040202060080	Pathogens	Deferred	
			Phosphorus	Anticipated 2008 Delisting	
18	Pennsauken Creek SB (below Rt 41)	02040202100050	Phosphorus	Anticipated 2008 Delisting for non-tidal portion	
18	Pennsauken Creek NB (incl StrwbrdgLk-NJTPK)	02040202100020	Phosphorus	Addressed in Strawbridge Lake TMDL	Adopted 6/03
18	Pennsauken Creek SB (above Rt 41)	02040202100040	Phosphorus	Anticipated 2008 Delisting	
18	Pennsauken Creek NB (below Strawbridge Lake)	02040202100030	Phosphorus	Addressed up to dam by Strawbridge Lake TMDL	Adopted 6/03

Source: NJDEP 2008

Strawbridge Lake

Strawbridge Lake, located to the northeast of the Moorestown Mall, is a long lake made up of three separate basins. It is the result of the impoundment of Hooten Creek and the North Branch of the Pennsauken Creek, which was completed in the 1930s. The lake and surrounding park are heavily used for recreational activities such as picnicking, bird watching, and fishing, although the lake is no longer stocked. A basic TMDL analysis for Strawbridge Lake was completed in 2000, and a TMDL plan was adopted in 2003 to address impairments of the lake from phosphorus and other pollutants. There were no point sources of pollution to Strawbridge Lake, and so load allocations were developed to address contributions of phosphorus from nonpoint sources.

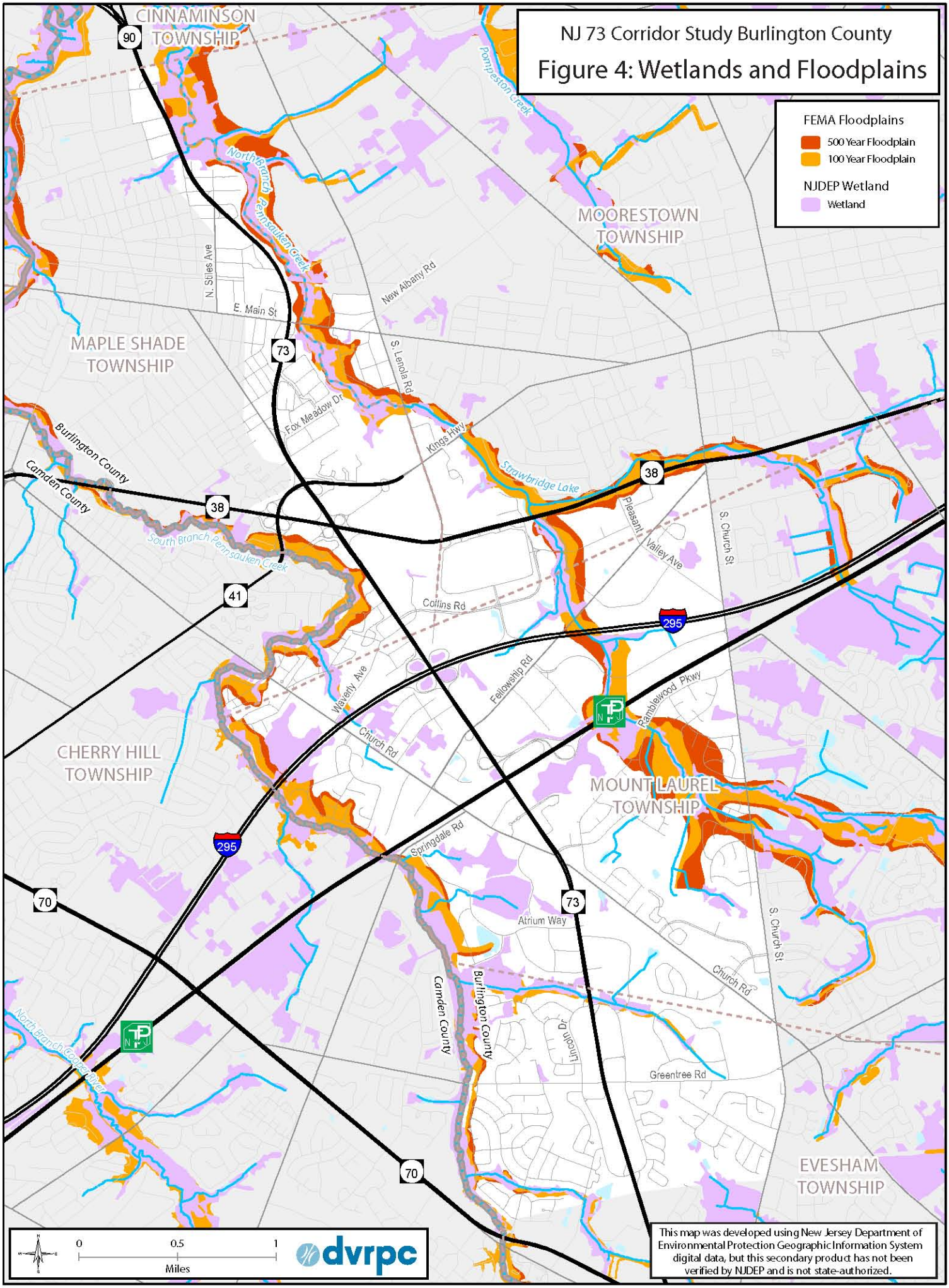
One result of the TMDL was a major restoration effort of Strawbridge Lake that involved the stabilization of over 4,000 feet of eroding shoreline using soil bioengineering techniques that created a vegetative buffer along the shore's edge. In addition, biofilter wetlands were constructed to filter sedimentation and pollutants from stormwater before the runoff enters the lake. Other actions that have been undertaken to address phosphorus pollution include the dredging of all three basins of the lake, the retrofit of commercial stormwater outfalls in a portion of the Moorestown Mall, and the passage of a Stream Corridor ordinance by Moorestown Township. This ordinance, which applies only to new development, stipulates the restoration and preservation of the vegetation in the 100-year flood plain and the development of a minimum 25 - foot vegetative buffer along streams.

The TMDL plan recommends a number of future actions to reduce phosphorus runoff into Strawbridge Lake: the retrofitting of all stormwater basins originally designed for flood reduction so that they serve as nonpoint source control basins; the preservation of forested areas with a potential evaluation of the feasibility of large-scale reforestation; and site development ordinances

that require the integration of BMPs, which can reduce nonpoint source pollutant loadings from phosphorus by 20 to 80 percent.

Recommendations for Improving Water Quality

As listed in Table 5: Water Quality of Subwatersheds within the Study Area, 2008 and depicted on Figure 3: Water Quality, five of the six subwatersheds in the study area are impaired for aquatic life. Much of this impairment is due to polluted stormwater runoff and subsequent erosion. Many of the tools available to reduce nonpoint source pollution caused by stormwater runoff are concerned with where the water flows during precipitation events. Focusing environmental remediation efforts on wetlands and floodplains within the study area, as shown in Figure 4, are strategies to improve water quality since these areas act as natural filters for pollution, in addition to retaining and slowing runoff. Stormwater management solutions in upland areas are also necessary to retain water before it reaches wetlands and floodplains.


NJ 73 Corridor Study Burlington County
Figure 4: Wetlands and Floodplains
FEMA Floodplains
500 Year Floodplain
100 Year Floodplain
NJDEP Wetland
Wetland
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Pompeston Creek
North Branch Pennsauken Creek
South Branch Pennsauken Creek
North Branch Conservation Creek
Strawbridge Lake
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Burlington County
Camden County
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Church Rd
Ramblewood Pkwy
Springdale Rd
Atrium Way
Lincoln Dr
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90
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Miles
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To improve the water quality of the study area's five severely impaired waterbodies while enhancing the aesthetics and quality of life in the study area, the following actions are recommended:

1. Stormwater basin retrofits;

2. Protection of woodlands;

3. Natural landscaping;

4. Parking lot retrofitting;

5. Riparian buffers and greenways; and

6. Residential BMPs.

Stormwater Basin Retrofits

There are a number of stormwater basins within the study area, both retention ponds and dry detention basins. Stormwater basins were constructed to control peak flows from very heavy storm events, the 10-year and above storm, and were not constructed to control smaller storms such as the 1- and 2-year storm. However, local flooding that causes streambank erosion and water quality impairment is predominantly due to small storms, which is magnified by urbanization and the conversion of naturally pervious surfaces into impervious coverage. In addition to their typical lack of effectiveness in dealing with small storms, most basins were designed strictly for flood control and do not improve water quality. Moreover, stormwater basins are not typically very attractive in character and can degrade the economic and aesthetic value of surrounding land uses.

However, ecological functionality can be incorporated into existing and future stormwater management facilities, like basins, to improve water quality, increase stormwater holding capacity from small storms, provide wetland or riparian habitat functions, and improve the area's economic and aesthetic value while simultaneously reducing maintenance costs.

Retention ponds are stormwater basins that retain a certain amount of water as a permanent pool and can appear to be artificial lakes. Existing retention ponds can be retrofitted with shoreline plantings of native vegetation, emergent wetland shelves (also known as littoral shelves), and/or floating islands. By adding wetlands functionality to an existing retention pond, stormwater runoff slowly moves through the system over the course of a few days. Sediments and other matter are retained in the pond rather than entering streams, and the indigenous wetlands vegetation and soils remove harmful nutrients through biological uptake and other natural processes.

Similarly, stormwater management and water quality improvement can be accomplished by adding wetlands functionality to detention basins, which are dry stormwater basins that are not designed to have a permanent pool. Existing dry detention basins can be redesigned to be wetland extended-detention water-quality basins by adding wetland components that provide

habitat and treat upland runoff. These features can include reinforced vegetated inlet swales, micropools, flow separation baffles, forebays, outlet water control structures, and, most importantly, a native vegetation planting plan. Retrofitting stormwater basins with tall grasses can also deter Canadian geese, which prefer short mown grass. The waste of Canadian geese contributes large amounts of E coli, phosphorus, and nitrogen into streams, which greatly impairs the water quality of the area.

Some elements of the features, plantings, and design differ between retrofitting a retention versus detention basin, although the overall goal of returning natural functions that slow and clean runoff remain the same. In addition to retrofitting stormwater basins to improve functionality and ecological health, adding trails or other public access amenities to basin areas can help improve the public health and a community's quality of life while attracting new businesses and employees. Benches or a walking trail may be added to a stormwater basin retrofit project, especially within one of the study area's many office and industrial parks, which would allow employees and the general public to access and enjoy a newly created and lushly vegetated wetland. A corporate center on Midlantic Drive in Mount Laurel Township (outside the study area) has a well-landscaped pedestrian trail around an attractive stormwater basin, and many employees walk the trail during their lunch break. As evidenced by a number of mall-walking clubs, there is local interest in recreational opportunities that provide a source of exercise and community building that could be satisfied through walking trails incorporated into stormwater basin retrofits.

Potential locations for stormwater basin retrofits in the study area include those basins (wet and dry) and artificial lakes located in the Horizon Corporate Center (six features), the Moorestown Mall area (five features), the East Gate/Mt. Laurel Business Center (one feature), the Ramblewood Country Club (three features), and the Greentree Industrial Park (two features).

Protection of Woodlands

Perhaps the most important step that can be taken to manage stormwater runoff, improve water quality, and protect overall ecological integrity is to preserve and maintain the existing forested lands. There are a number of large areas of intact woodlands, most of which happen to be wooded wetlands, as shown in Figure 5. Wetlands provide significant environmental functions, and their protection is critical for the overall social, economic, and ecological health of a community. They protect water quality by filtering pollutants, chemicals, and sediment, provide natural flood control, and provide critical habitat for animals. New Jersey Freshwater Wetlands Protection Act (N.J.S.A. 13:9B) requires the DEP to regulate nearly all activities within freshwater wetlands and wetlands transition (or buffer) areas. However, this regulatory act does not guarantee protection, and freshwater wetlands can still be disturbed (or developed) with the approval of a permit. New Jersey has a "Not Net Loss" policy that requires a developer to mitigate for the disturbance of wetlands over one acre only.

These intact forested areas, both wetlands and uplands, reduce flows of stormwater runoff, whereas their development would increase runoff. Trees also sequester carbon and add oxygen to the atmosphere, thus improving air quality and reducing greenhouse gases. The forested land

in the study area also provides natural habitat for many species, including a number of threatened and endangered animals. Developing these woodlands would therefore further imperil the survival of rare species that depend upon them, including the Eastern Box Turtle, Fowler's Toad, Cooper's Hawk, and the Great Blue Heron.

Assistance to local governments wishing to preserve their forested lands is available through the Green Communities Challenge Grant (also known as the Urban and Community Forestry Program) administered by the NJDEP Division of Parks and Forestry. These funds are used to assist a municipality in developing a Community Forestry Management Plan. With such a management plan, municipalities are then able to implement urban and community forestry projects that address program development, implementation, tree maintenance, and research projects. To receive these funds, local governments must be able to contribute a sum equal to at least half of the grant amount.

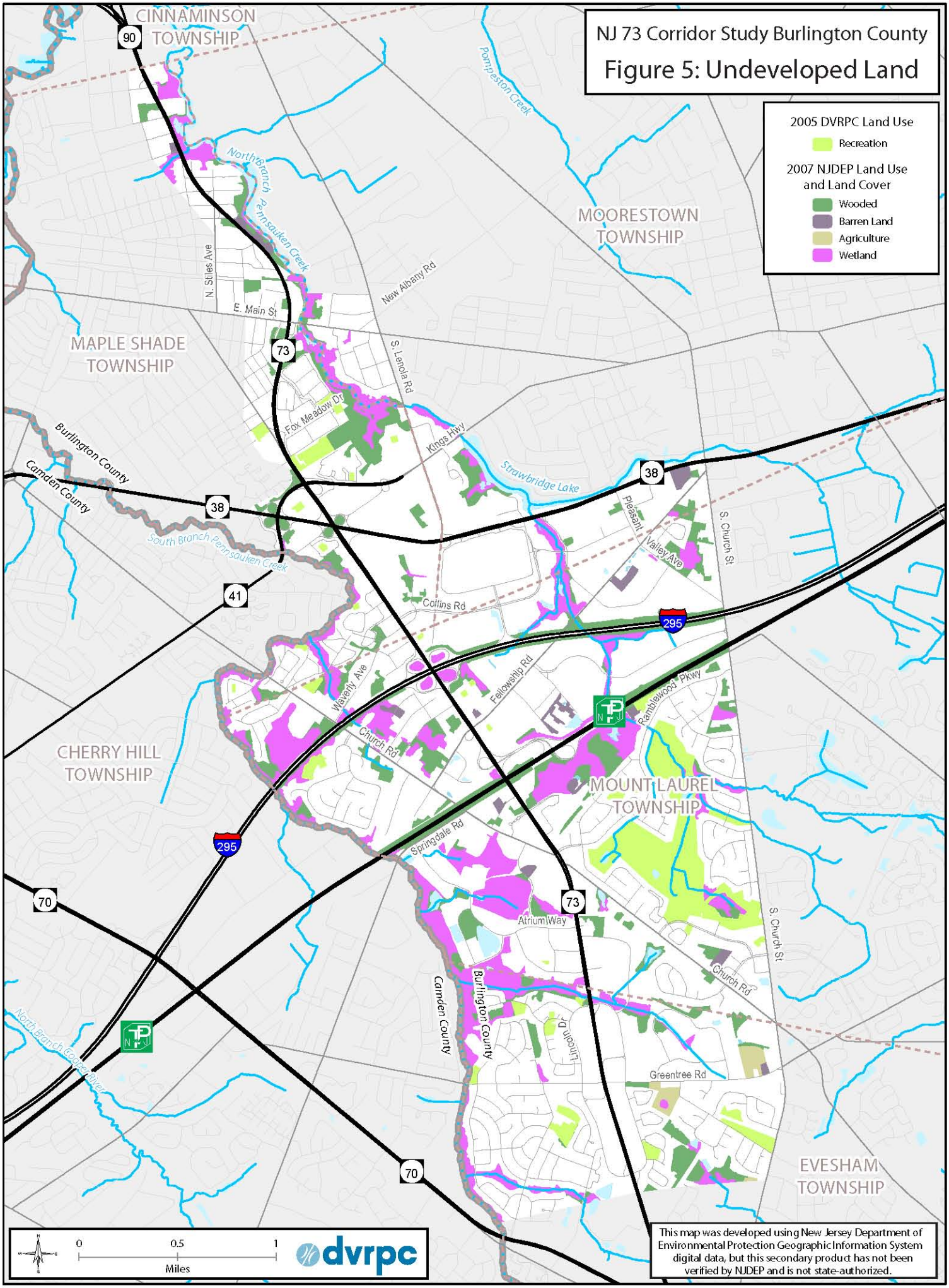
Additional funding is available to a municipality to implement forestry goals and practices once a Community Forestry Management Plan is in place through the Community Stewardship Incentive Program (CSIP) Grant, also administered by the NJDEP Division of Parks and Forestry.

Natural Landscaping

Site development standards regarding natural landscaping can be a very cost-effective way to reduce pollutants and stormwater flows while enhancing the built environment. Natural landscaping utilizes native plants that are appropriate for the area and that are suited to the soils, topography, and hydrology of the specific location. Natural landscaping requires less (or no) watering and chemical or physical maintenance, and so water resources are protected while maintenance costs are reduced. In addition, lush natural landscaping in "no-mow" zones can slow stormwater runoff and remove pollutants through biological uptake. One reason for the high levels of phosphorus in the waters of the study area is runoff of fertilizers from lawns and landscaping, and so planting natural vegetation requiring less (or no) fertilizer is crucial to protecting the highly impaired Pennsauken Creek. As with stormwater basins, un-mown natural grasses along streams can deter Canadian geese from congregating and impairing surface waters with their waste.

Particularly important due to its large turf area is the Ramblewood Country Club in Mount Laurel Township, which covers over 155 acres within the study area. The Pennsauken Creek North Branch runs directly through the golf course, and so naturalized landscaping, especially along the riparian corridor, within this golf course is critical. Stabilizing and revegetating the stream banks with native plants can help restore the natural stormwater management functions of the stream. In addition, large landscaped areas in office parks, shopping centers, and residential areas should be targeted for conversion to natural landscaping.

Both Moorestown and Evesham Townships have comprehensive and holistic landscaping ordinances that encourage indigenous species and do not permit exotic, non-native invasive plant species. Mount Laurel Township requires native vegetation for buffer areas, but does not have a comprehensive landscaping ordinance. Maple Shade Township does not have a landscaping ordinance. Evesham Township's ordinance on natural landscaping is included in Appendix B and may be used as a model ordinance for Maple Shade and Mount Laurel Townships.


NJ 73 Corridor Study Burlington County
Figure 5: Undeveloped Land
2005 DVRPC Land Use
Recreation
2007 NJDEP Land Use and Land Cover
Wooded
Barren Land
Agriculture
Wetland
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Pompeston Creek
North Branch Pennsauken Creek
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Parking Lot Retrofitting

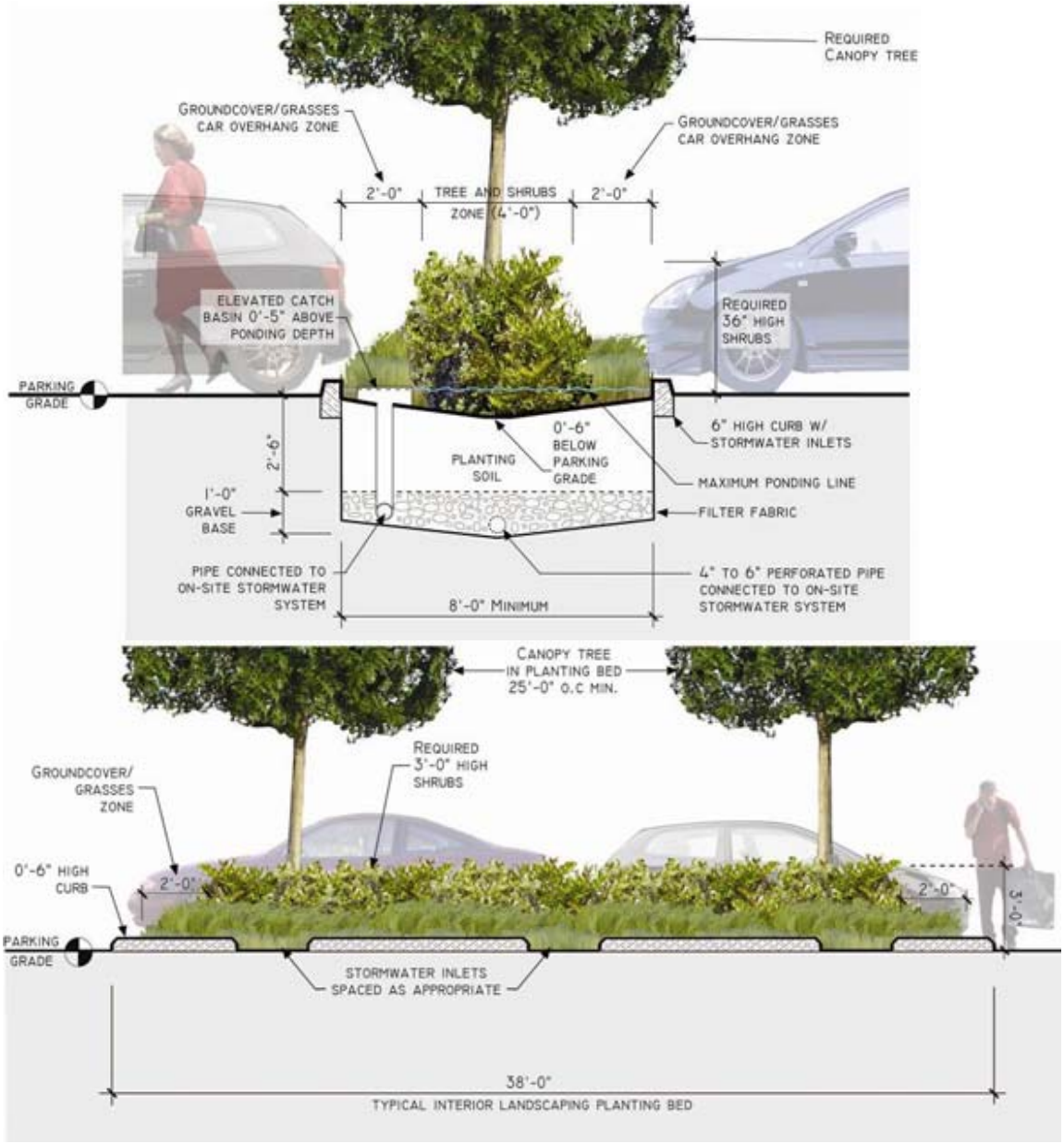
As already stated, excessive impervious coverage within the study area is a significant contributor to the impairment of Strawbridge Lake and the North and South Branches of the Pennsauken Creek. Although impervious coverage may be in the form of roads, buildings, and sidewalks, the largest contiguous areas of impervious surfaces are parking lots. Due to the many shopping centers, office and industrial parks, and hotels along the NJ 73 corridor, parking lots alone cover a significant 15 percent of the study area. The minimal amount of planted islands and buffers within and between the corridor's substantial parking lots, for instance those within and surrounding the Moorestown Mall area, are vastly insufficient compared to the hundreds of acres of impervious asphalt.

The parking lots of the Moorestown Mall and the surrounding shopping centers are directly adjacent to the impaired North Branch of the Pennsauken Creek. Retrofitting these parking lots to reduce and interrupt the impervious coverage would lessen flooding and runoff by redirecting stormwater to planted areas. Redesigning the parking lots for sustainable stormwater management would also improve the water quality of the Pennsauken Creek by reducing pollutant loads from draining into the stream. Installing stormwater BMPs such as vegetated swales, infiltration basins, and pervious pavement in existing parking lots would delay, capture, and cleanse runoff, aiding in the remediation of the polluted local water resources and recharging groundwater. The New Jersey Stormwater Best Management Practices Manual offers descriptions and technical information on the various types of BMPs that are appropriate for retrofitting parking lots.

The New York City Department of City Planning adopted required design standards for commercial and community parking lots in 2007. The typical design of a stormwater bioswale is shown in Figure 6. For parking lots of at least 18 spaces or 6,000 square feet, these standards require one street tree planted for every 25 feet of frontage as well as a seven-foot wide landscaped strip around the perimeter of the lot. Larger lots of at least 36 spaces of 12,000 square feet have an additional requirement of one shade tree for every eight spaces, located within a vegetated planting island in the interior of the lot. All landscaped areas must be designed to absorb stormwater runoff. Municipalities in the study area should consider adopting these or similar standards that commercial parking lot owners would be required to comply with when constructing or repaving parking areas. There are approximately 5,200 spaces at Moorestown Mall. Were the Mall's parking lot to follow these standards, it would be approximately 652 trees.

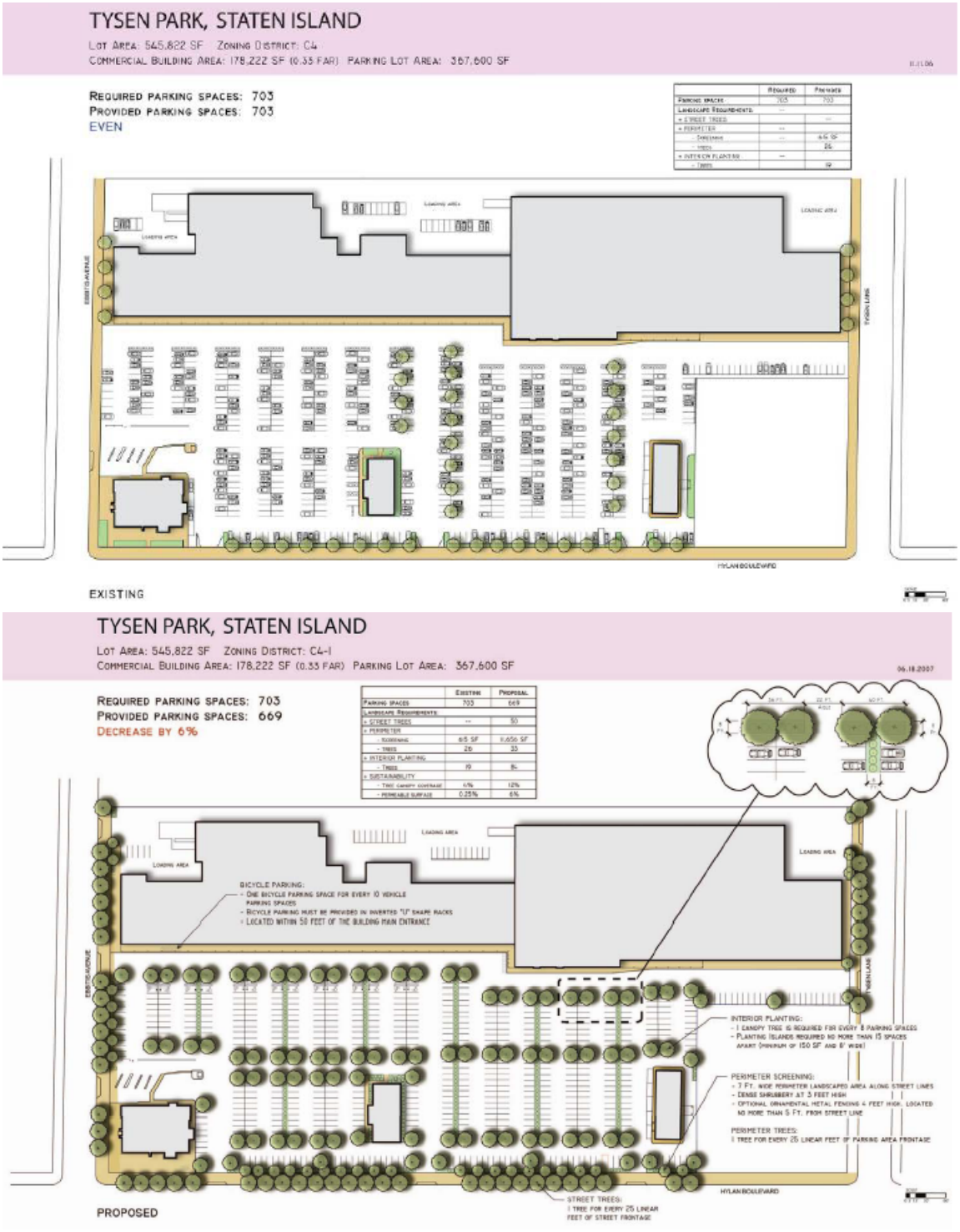
Within the study area, parking lot retrofits are most needed within and around the Moorestown Mall area, where there are large swaths of parking lots with very minimal planting areas. The Moorestown Mall parking lot has some perimeter landscaping islands, although hardly any interior landscaping. Installation of vegetated bioswales within every other column of parking stalls, as shown in the redesign plan of Tysen Park, would break up the impervious coverage and allow for the absorption of rainfall, thus reducing stormwater runoff, flooding, and water quality impairment while enhancing the parking lot with attractive natural elements. The existing and proposed designs for its parking lot are shown in Figure 7.

Figure 6: Cross-section and Side Views of a Stormwater Bioswale



Source: New York City Department of City Planning, 2009

Figure 7: Existing and Proposed Designs for Tysen Park Parking Lot



Source: New York City Department of City Planning, 2009

Riparian Buffers and Greenways

Riparian, or stream, buffers are strips of land along each side of a stream and include trees, shrubs, and other types of vegetation. When riparian buffers are maintained in their natural condition instead of being paved, mowed, or planted with agricultural crops, they serve as important filters that absorb pesticides, pathogens, fertilizer, and litter that would otherwise enter the stream and impair water quality. Protecting water quality through riparian buffers increases the available water supply and reduces the cost of water treatment. Riparian buffers also absorb and slow down the speed of runoff from flood waters, thus controlling erosion by stabilizing the streambank. The cost of maintaining riparian buffers is minimal compared to the loss of property due to flooding and erosion in the absence of riparian buffers. Vegetated riparian buffers have habitat benefits as well and protect the macroinvertebrate and fish populations in the stream. Also known as greenways, forested linear corridors such as riparian buffers serve as habitat for wildlife as well as a protective corridor for their migration and travel.

A municipality can manage its riparian landscape by creating and enforcing ordinances associated with riparian areas. A stream corridor protection ordinance ensures the maintenance of vegetated riparian buffers by requiring that development be set back from stream banks, floodplains, and wetland areas, and by limiting the use and intensity of activities within the corridor. A stream corridor protection ordinance should be adopted in combination with an outreach program that educates the community – and especially owners of riparian properties – about the importance of vegetated stream buffers. By integrating an educational component into stream protections, property owners are more likely to comply with the ordinance and the need for enforcement may be lessened.

Moorestown Township has an ordinance protecting the stream corridor (§ 180-94. Special setbacks) that not only requires that structures be set back from streams and ponds, but also enforces a comprehensive riparian buffer. Within the buffer area, there is to be no disturbance (such as grading or construction), natural vegetation is to be preserved and enhanced, and native vegetation shall be replaced where it has been removed in violation of the ordinance. Mount Laurel Township also has an ordinance regulating the buffering of watercourses and bodies of water that requires new subdivisions to be set back 50 feet from the boundary of a watercourse, although this is not as strong as a comprehensive riparian buffer ordinance. A more comprehensive ordinance for Mount Laurel Township would limit the permitted activities and uses in their riparian zones, while requiring zones to be kept in or restored to their natural state. Evesham and Maple Shade Townships do not have riparian buffer ordinances. Model ordinances for protecting stream buffers are available on the EPA website.

A greenway is a contiguous open space corridor that links natural, cultural, and recreational resources. Greenways are often implemented along creeks and streams because they help preserve environmental features and provide natural protection from flooding, improve water quality, and provide wildlife migration corridors, while enhancing quality of life. *Connections*, the long-range plan of the Delaware Valley Regional Planning Commission (DVRPC), provides a regional vision for preserving green infrastructure throughout the Delaware Valley. The greenspace network identified in *Connections* illustrates a system linking park and open spaces, natural resource areas, and population centers to enhance the recreational, ecological, scenic,

and economic vitality of the region. This network consists of 100 individually named greenspace corridors. Two proposed greenways pass through the study area along both the North and South Branches of the Pennsauken Creek. Camden County and Burlington County have also proposed collaborating on a greenway on the Pennsauken Creek near the fork of the North and South Branches, although this project is still in its very early planning stages. Future planning efforts by the municipalities to protect these proposed greenways from development will help enable their future use as trails and ecological corridors.

In addition to locating trails within protected riparian corridors, creating vegetated pedestrian and biking trails through and between the large corporate and shopping centers of the corridor would promote public health, provide an alternative mode of travel, and enhance the quality of life within the study area.

Funding for creating recreational trails is available through the National Recreational Trails Program, funded by the U.S. Federal Highway Administration and administered by the NJDEP Division of Parks and Forestry. Another funding source for environmental trail designs is through the Environmental Services Program (ESP) administered by the NJDEP Office of Local Government Assistance.

Residential BMPs

Although much of the corridor is highly concentrated with commercial and office uses, approximately one quarter of the study area is made up of single unit residential development. Although these areas do not have the wide swaths of impervious surfaces created by the parking lots and buildings of shopping centers or office campuses, they still generate a great deal of stormwater runoff that carries lawn chemicals, pet waste, automobile oil and grease, sediments, and other chemicals and pathogens into nearby streams. To address this problem, the municipalities in the corridor should encourage the use of rain gardens and rain barrels, which are the two most widely used and accepted stormwater BMPs for residential developments.

Rain gardens (like bioswales) are engineered bioretention areas with a porous surface and soils designed to allow natural infiltration of rain and snowmelt. They are typically concave in order to hold rainwater and are planted with hearty vegetation able to withstand extreme variations in root zone water content. They should be located downslope of impervious surfaces in order to capture runoff from rooftops, driveways, sidewalks, and patios. Rain barrels, or cisterns, are tanks attached to roof gutter downspouts to collect rainwater. Water from rain barrels can then be used for watering gardens and lawns, thus reducing domestic water demand. Although residents may be concerned about mosquito control, neither rain gardens or rain barrels provide breeding grounds for mosquitoes when properly designed. Mosquitoes need seven to twelve days to breed, while rain gardens are designed to retain water for only a few hours after storm events. Also, rain barrels equipped with a fine screen at the inlet will prevent mosquito breeding.

Many municipalities across the country offer rain barrel programs for their residents. Typically these programs involve an informational workshop in which residents learn about stormwater runoff, the benefits of rain barrels and designing and constructing rain gardens. Some have even offered rebates toward the cost of residential rain gardens and rain barrels.

Land Use Practices

Land Use Plans

A municipal master plan guides the decision-making process for physical and social development of a municipality. It provides the vision and rationale for the municipal zoning ordinance and guides future growth. Understanding each master plan and zoning ordinance for the study area communities is critical to ensuring that future transportation and infrastructure improvements are linked to an overall vision that supports each community and the county. In addition to local plans, regional, county, and state plans that pertain to the corridor are important for consistency. The following outlines the development patterns of the NJ 73 corridor and highlights future plans for investment in the study area communities.

Regional Policy

Connections 2035 - The Regional Plan for a Sustainable Future

As the region's long range plan, *Connections 2035 - The Regional Plan for a Sustainable Future,* provides a blueprint for the future growth of the Greater Philadelphia region. The plan sets a number of goals to ensure a sustainable future and outlines what investments and policy steps the region will need to make over the span of the plan to achieve the vision. Above all, it serves as a collective vision across municipal, county, and state boundaries for how the region should look and function in the future.

Based on the analysis of three different possible growth scenarios-Recentralization, Trend, and Sprawl - *Connections* proposes that the Recentralization scenario offers the best solutions for a sustainable future. This scenario offers a superior quality of life by increasing mobility choices, preserving more open space, and reducing demand for energy, which lowers household and business expenses. To achieve the goal of recentralization, *Connections* proposes concentrating most new growth in the form of infill and redevelopment into the region's existing developed areas.

The plan categorizes the 353 municipalities of the region as Core Cities, Developed Communities/Mature Suburbs, Growing Suburbs, or Rural Areas. Also included are specific growth areas and a hierarchy of "centers" of concentrated residential, commercial, and industrial development where future infrastructure will be supported and targeted.

The NJ 73 corridor's municipalities fall into DVRPC's Planning Areas of Developed Communities/ Mature Suburbs. These communities have already experienced most of their population and employment growth, and largely include inner-ring communities adjacent to the core cities of Philadelphia, Camden, Chester, or Trenton. The key policies for these communities focus upon stabilization and revitalization while stemming decline, via:

- Rehabilitation and maintenance of infrastructure systems and the housing stock.
- Economic development activities (such as Main Street programs).
- Streetscape and signage programs to help reinforce location advantages.

A portion of the study area is categorized as a Metropolitan Sub-Center. *Connections* also recommends several broad policies to help developed communities contribute to the goal of recentralization and reinvestment in the region's Developed Communities/Mature Suburbs and centers. These policies are particularly relevant to improving this Metropolitan Sub-Center:

- Attract new residents and jobs to the region's cities and centers.
- Restore and maintain the existing infrastructure in identified centers.
- Redevelop abandoned and underutilized brownfield and greyfield sites into thriving mixed-use areas.

Local Policy

NJ State Development and Redevelopment Plan

The State Development and Redevelopment Plan (SDRP) established statewide objectives pertaining to land use, housing, economic development, recreation, redevelopment, preservation, and infrastructure. It focused on the planning process as well as planning outcomes which support the eight statewide planning goals and overarching policies. Since the SDRP is only a policy guide for state, regional, and local agencies, ensuring implementation and compliance with all New Jersey's municipalities is done through a process called cross acceptance. It is through these measures that local municipal plans are reviewed for consistency with the State Development and Redevelopment Plan. The State Plan Policy Map illustrates the diversity of New Jersey's municipalities and provides a basis from which municipalities can grow. The study area along the NJ 73 corridor is included in the State Plan's Planning Area 1 (PA1): Metropolitan Planning Area. Such areas will provide for much of the State's future development and redevelopment through efforts such as revitalization, increased densities, mixed-use concentrations, multi-modal transportation options, residential housing variety, and the support of attractive neighborhoods with a strong and unique sense of place.

Municipal Master Plans

The master plans for each of the study area municipalities are important elements that will shape the future of the NJ 73 corridor. Based on these plans, all of the study area communities support

the revitalization of a thriving business corridor along NJ 73. Maple Shade Township's Master Plan specifically encourages the development and redevelopment of businesses along NJ 73. Zoning along the corridor within the study area currently allows appropriate uses such as retail, office, and light industrial. The desire for more development but less traffic congestion along the NJ 73 corridor is featured in many of the local Master Plans, though striking an acceptable balance between those elements is a concern for each community. Modernizing the design, safety, and function of land uses along major roadways such as NJ 73 is another goal for all study area municipalities. The Mount Laurel Master Plan specifically advocates for common entrances among commercial properties to reduce the number of access points along NJ 73. The Master Plan also supports the establishment of a network of local streets to help reduce traffic volume in residential neighborhoods. Evesham's Master Plan encourages alternative methods of circulation, including pedestrian and bikeway systems, while Moorestown's Master Plan recommends the redevelopment of the West Moorestown area. Outlined below are specific plans for investments in the study area communities.

Mobility and Community Form

NJDOT has initiated a Mobility and Community Form (MCF) program to help communities plan future transportation and land use. MCF planning looks to create better connections between the local system and the design of community facilities, buildings and open space. Benefits include economic vitality, pedestrian and bicycle access and land use patterns that support public transit, improve quality of life and foster a sustainable environment. NJ municipalities are encouraged to prepare a Mobility and Community Form Element that combines the circulation and land use elements of their master plans. This is the first step in creating an integrated development code to replace or improve traditional zoning.

Local Redevelopment Areas

Lenola Road Redevelopment Area, Maple Shade Township

In 2007, Maple Shade Township declared the 115 acres in the triangular area between NJ 38, NJ 73, and Lenola Road as an area in need of redevelopment. In accordance with the New Jersey Local Redevelopment and Housing Law, the township created and adopted a redevelopment plan for this area. The redevelopment goal for this area is to facilitate a mixture of commercial and light industrial uses, although most of the parcels are contaminated sites or closed sites with development restrictions. The redevelopment plan suggests that the current zoning of Business Development (BD) remain with the addition of a redevelopment overlay that permits additional proposed land uses to help guide future development. Additionally, all redevelopment designs must include consideration of providing a network of improvements to encourage and accommodate pedestrians and bicyclists.

West Moorestown, Moorestown Township

The intersection of Lenola Road and Camden Avenue is the center of the West Moorestown area, which serves as the western gateway to Moorestown. The Master Plan (2002) for Moorestown recognizes that this area has recently seen disinvestment, and a concentrated effort should be taken to revitalize this portion of the township. Recommendations in the master plan include the creation of a redevelopment plan and the delineation of this district as a redevelopment area. Short-term improvement strategies include streetscape enhancements.

Fellowship Road Redevelompent Area, Mount Laurel Township

The most recent Housing Element and Fair Share Plan for Mount Laurel (DRAFT 2010) evaluates the township-initiated redevelopment of the Fellowship Road site. This 48-acre area includes 92 parcels along Fellowship Road between I-295 and the New Jersey Turnpike on the west side of NJ 73. Mount Laurel officials are currently working with a potential developer to create a mixed-use project including approximately 100 affordable housing units. It is anticipated that the northern portion closer to NJ 73 will permit highway-oriented uses while the southern portion of the redevelopment area closer to Church Road will allow a mix of uses including neighborhood commercial with both market rate and affordable housing.

Historic Resources

Five historic properties fall within the NJ 73 study area. The **William Matlack house** is situated between the Fox Meadow Miniature Golf course and the off-ramp from southbound NJ 41 to NJ 73 North in Maple Shade Township. Constructed in 1751-1752, it was once home to the locally important Matlack family and is still a private residence. Although the New Jersey Historic Preservation Office had determined the house to be eligible for inclusion in the State and National Register of Historic Places, it is not yet listed. This structure is a significant remnant of the Revolutionary War period and as such is also an important part of the state initiative, *The Crossroads of the Revolution,* and a current plan by the National Parks System for a Scenic Byway related to the Revolutionary War.

Two of the seven sites in Moorestown Township listed on the State and National Registers are located very near the study area. The **Thomas French House** and the **Perkins House** are both significant due to exemplary architecture. These historic properties are located approximately a half mile apart along Camden Avenue, with the Thomas French house situated slightly west of Pleasant Valley Avenue and the Perkins House positioned at the intersection of Camden Avenue and Kings Highway. The Moorestown Historical Society also found the **Thomas Cowperthwaite House** to be eligible for listing on the State and National Register. This property is located on the northeast corner of the intersection of Kings Highway and Lenola Road and is a notable example of early American architecture, built by Quaker Cowperthwaite in 1742.

Finally, Evesham Township is home to one property within the study area that is also listed on the National Register. The **Thomas Hollinshead House**, located on West Stow Road, just west of

the office buildings lining Lincoln Drive, is a prime example of Georgian architecture, common in the mid-late 1700s.

Land Use and Zoning

Land Use

DVRPC uses aerial photographs to assist with its regional land use inventory. Updated in 2005, the land use inventory was confirmed through sites visits over the course of the study. For the purposes of this project, land use data was gathered for the area within the study area boundary only. Figure 8 displays the 2005 land use within the study area.

Considering the regional thoroughfare nature of NJ 73, it is not surprising that a third of the study area is composed of commercial land uses (20%) and their accompanying parking (13%). Single-family residential uses constitute a quarter (25%) of the corridor's land area. Over 14 percent of the study area is wooded, which is almost equal to the total amount of parking (15%) within the study area.

Land use along the NJ 73 corridor may be described as primarily large footprint office buildings and retail space, hotels, and strip shopping centers surrounded by neighborhoods of single-family detached and multi-family housing units. While the use remains similar along the length of the corridor, the building scale continues to get markedly larger as one travels south toward more recent development. Except for occasional office complexes that feature multiple buildings utilizing one shared parking area, most land uses adjacent to NJ 73 are served by individual surface parking lots with primary access along NJ 73. While neighborhood streets in the northern portion of the study exhibit a loose grid pattern, the bulk of the study area street network is less connected. Much of the southern portion of the study area is composed of large office and commercial complexes with interior road networks that lack the roadway connections to serve as parallel alternates to major highways such as NJ 73. Table 10 outlines the land use for the study area.

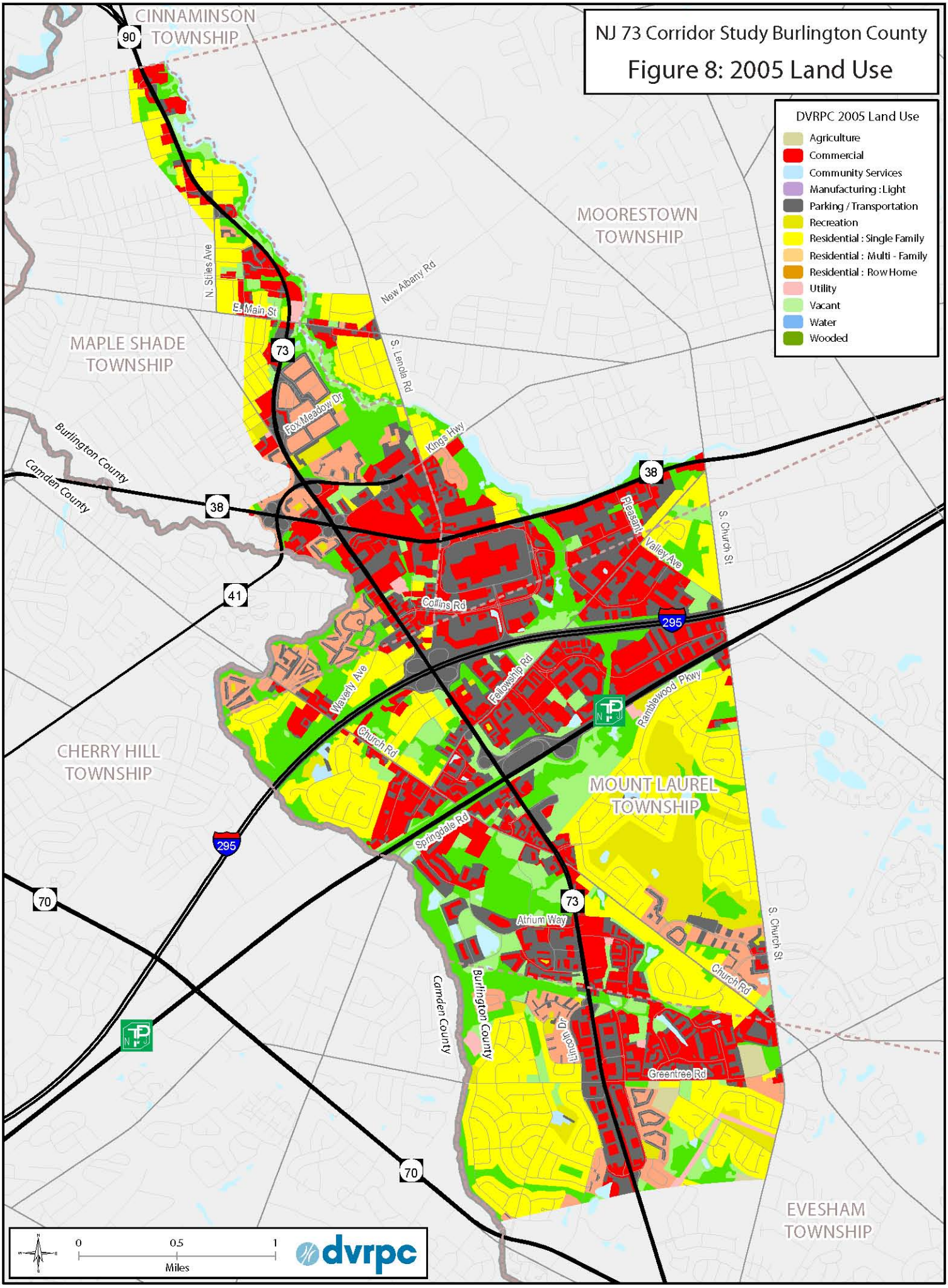

NJ 73 Corridor Study Burlington County
Figure 8: 2005 Land Use
DVRPC 2005 Land Use
Agriculture
Commercial
Community Services
Manufacturing : Light
Parking / Transportation
Recreation
Residential : Single Family
Residential : Multi - Family
Residential : Row Home
Utility
Vacant
Water
Wooded
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Burlington County
Camden County
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Ramblewood Pkwy
Church Rd
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Table 10: Study Area's Land Use (Acres)

Land Use	Evesham Township	Maple Shade Township	Moorestown Township	Mount Laurel Township	Study Area Total	
Agriculture	24.6	0.0	0.0	0.0	24.6	0.5%
Commercial	149.2	206.5	156.3	535.8	1,047.8	19.6%
Community Services	2.7	0.5	0.0	9.6	12.8	0.2%
Parking: Commercial	112.4	100.6	128.2	358.9	700.1	13.1%
Parking: Community Services	0.7	0.0	0.0	5.9	6.6	0.1%
Parking: Multi-Family	16.6	69.3	0.3	15.9	102.1	1.9%
Parking: Recreation	0.3	2.4	0.0	6.2	8.9	0.2%
Parking: Utility	0.0	0.0	0.0	0.0	0.0	0.0%
Recreation	31.9	21.7	0.0	189.2	242.8	4.5%
Residential: Multi-Family	97.9	147.2	12.7	56.8	314.6	5.9%
Residential: Single-Family Detached	387.4	146.7	123.3	672.8	1,330.2	24.8%
Transportation	14.8	89.4	18.9	202.7	325.8	6.1%
Utility	15.3	7.9	0.0	4.2	27.4	0.5%
Vacant	63.7	54.1	23.7	233.0	374.5	7.0%
Water	7.3	18.8	19.3	29.3	74.7	1.4%
Wooded	137.9	157.2	73.4	393.5	762.0	14.2%
Total	1,062.7	1,022.3	556.1	2,713.8	5,354.9	100%

Source: DVRPC, 2009

Zoning

Municipal zoning dictates what may be built in terms of form and use. In New Jersey, each municipality has local zoning control through the NJ Municipal Land Use Law, permitting the creation and enforcement of their own zoning ordinance. As such, the study area corridor includes four municipalities with thirty separate zoning districts within the study area boundary, not including overlay districts. Individually, each municipality has between six and ten zones along the study corridor. Despite the fact that most of the permitted land use along NJ 73 falls into one of three categories - residential, commercial, or industrial - the number of different zones is far greater because in many instances, there are multiple and more specific zones for the same general use. For instance, Maple Shade Township has four different commercial zones within the study area ranging from "Business Development" to "Highway Commercial," with each one describing slightly different regulatory specifications. Figure 9 shows the generalized zoning districts for the NJ 73 corridor based on existing municipal zoning. It represents an ideal rather than what currently exists on the ground.

Similar to the land use analysis for the corridor, the zoning along the bulk of the NJ 73 study area can be generalized as largely commercial surrounded by residential. Many of the commercial zones permit only one use and the residential zones typically support medium density housing. There are also limited areas in Maple Shade and Moorestown Townships where a mixture of uses are permitted (shown in Figure 9 with cross-hatching). Included in the southern portion of the study area, in Mount Laurel and Evesham Townships, is a considerable amount of light industrial zoned areas. All four townships have similar height and setback requirements for the zoning districts along NJ 73.

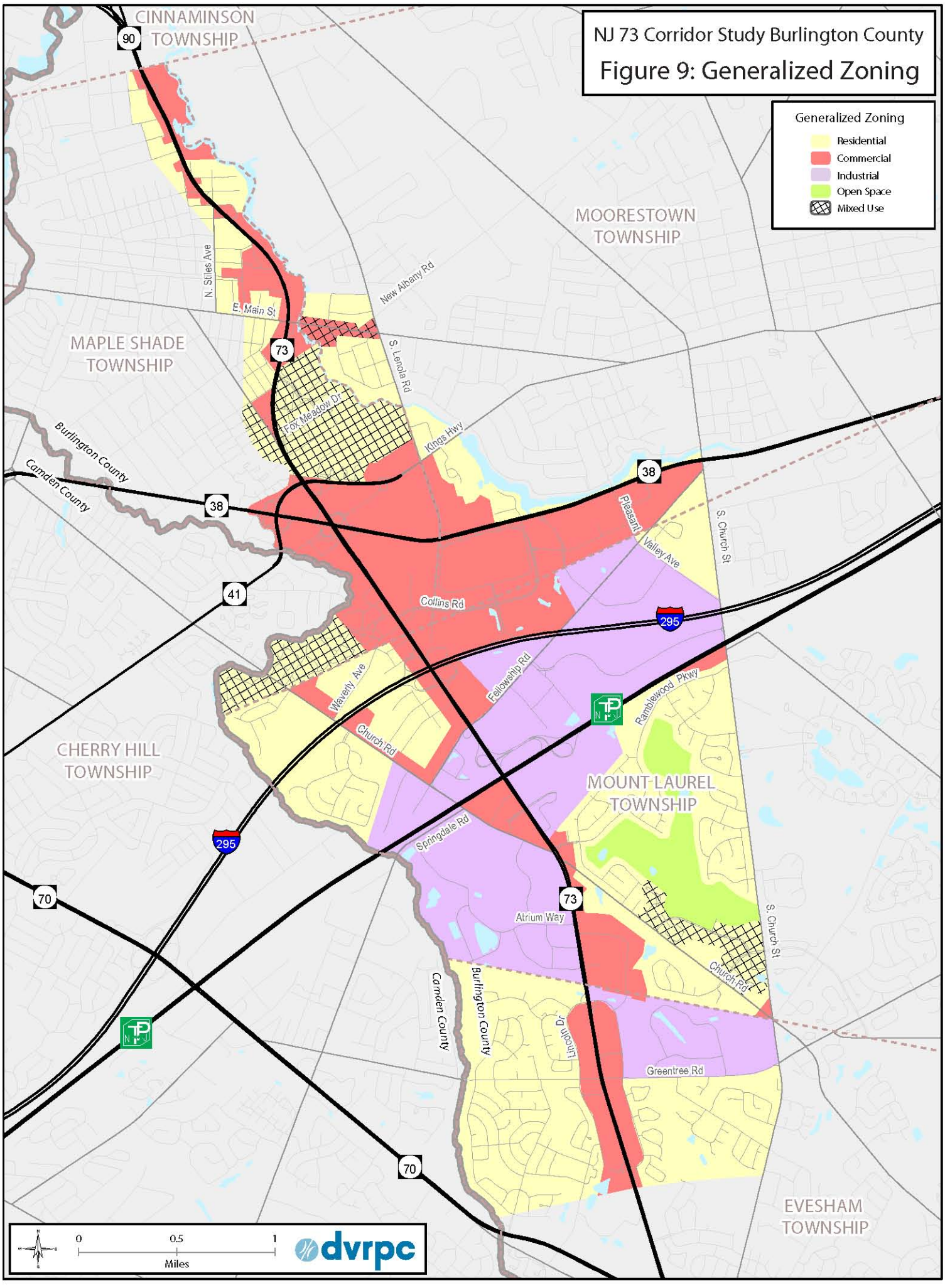
Smart Growth Zoning

Smart growth is a broad and flexible concept that is used in a variety of capacities and settings from older urban areas to new suburban subdivisions. If properly implemented, smart growth can provide communities with lower costs for infrastructure, public utilities, and improved quality of life. Smart growth is environmentally sound and encourages brownfield redevelopment, open space preservation, transit usage, and walkability.

Many current zoning codes were created using the traditional Euclidian design, which promotes large-lot and single uses. These codes are often difficult to use and focus primarily on use, leaving out other important elements of development such as form and density. Euclidian zoning codes cannot easily respond to emerging growth trends. By introducing smart growth zoning, communities will be better able to respond to new and desired land use patterns. For example, the NJ 73 study area municipalities should adopt “growth center” zoning to promote new development that is compact, has shared access points, and unique architecture that fits within the fabric of the surrounding neighborhood. Other types of smart growth zoning include transit-oriented development zoning, incentive zoning, and traditional neighborhood design (TND) zoning. As land use naturally evolves, communities may amend their zoning codes by adding overlay districts, new zones, and classifications.

Form-Based Codes

Another zoning approach is form-based codes, which establish zones based on geographic areas that may hold a variety of usage types, but are housed in buildings with a compatible scale, architecture, pedestrian, and vehicular environment. The emphasis of form-based codes is on building type, form, and design, while employing a simplified use list. Setbacks and other design standards are then applied to the building rather than the use. Form-based codes provide more flexibility about the type and combination of uses that may be built, while establishing aesthetic guidelines ensuring that each development fits in with the character and vision for the immediate area. Form-based codes provide direction on what type of development a community wants and encourages specific outcomes. These codes are visual documents and heavily utilize graphics and diagrams to show the requirements for land development specifications such as setbacks, sidewalk treatments, lighting, and parking.


NJ 73 Corridor Study Burlington County
Figure 9: Generalized Zoning
Generalized Zoning
Residential
Commercial
Industrial
Open Space
Mixed Use
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Burlington County
Camden County
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Ramblewood Pkwy
Church Rd
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Corridor Mobility and Community Issues

- Pattern of development that requires many local trips to be taken via NJ 73;
- There are several vacant and underutilized parcels and properties along NJ 73, including several known contaminated sites which are costly to develop;
- While properties along NJ 73 exhibit a mix of uses, many uses are segregated from one another and traveling between properties is difficult regardless of the mode ;
- Office park investments and amenities do not benefit the entire corridor or local neighborhoods;
- Safe bicycle and pedestrian connections are lacking along and across NJ 73, as well as between NJ 73 and local neighborhoods; and
- The corridor and its destinations are hard to navigate, especially for visitors.

Corridor Mobility and Community Principles

Each of the study area communities describes a vision for the future of NJ 73 in their master plan. However, there is no consolidated vision for the entire, multi-municipal NJ 73 corridor. Over the last few decades, development along NJ 73 has occurred independently without a comprehensive vision in mind, which only served to perpetuate sprawl. As development has outpaced transportation improvements, land use decisions along and near NJ 73 have placed growing pressure on the circulation network. While many of the corridor communities have outlined similar development patterns within their regulatory documents, specific details differ between municipalities. All of the study area communities agree that zoning for the properties adjacent to NJ 73 should be mostly commercial use, in large part retail and office developments, with multi-family housing in some areas. However, the communities along NJ 73 disagree on the concentration of these developments. Although some communities would like to see a decrease in density along NJ 73 to alleviate congestion, others are interested in concentrating dense development along NJ 73 to create a more compact and focused area of development within their municipality. While these opposing densities seem to work against one another, there are ways to guide development along NJ 73 to accommodate both the desire for focused development and a well-managed and efficient transportation system.

The corridor land use principles below aim at achieving the desired goal of creating a vibrant, attractive, and economically stable commercial corridor along NJ 73, while still maintaining a high level of mobility and safety for both regional and local travelers using all modes of transportation. These guiding principles reflect various levels of responsibility (regional, county, and local) and recognize the need for different perspectives among the study area communities. A vision for the NJ 73 corridor study area includes:

Retaining the Economic Importance of NJ 73 by Encouraging Appropriate Infill Development That Serves Regional and Local Residents and Employees

Many vacant or underutilized parcels exist along NJ 73 that will certainly be developed and/or redeveloped when the financial market is appropriate to do so. This roadway is economically important to regional and local communities as it serves both residents and employees as well as visitors and through traffic. While it is important to understand the wide breadth of the client base that NJ 73 brings to the area, long-lasting economic benefits are more likely to come from service to the more stable population of local residents and employees. By encouraging development along NJ 73 that will contribute to the revitalization of this corridor, this roadway can become an asset to local communities and as a destination for the broader region. When paired with other land use principles noted herein, any increased burden on the roadway caused by these development improvements can be managed to ensure a positive impact.

Amending the Zoning Ordinance for Parcels Along NJ 73 to Foster Mixed-Use Development

The study area currently maintains a variety of land uses, which is an asset to the corridor. However, in most cases, each parcel contains a single use with access available only from NJ 73, thus requiring patrons to travel to several different properties via NJ 73 in order to visit a variety of establishments. This activity adds unnecessary traffic to NJ 73, thereby exacerbating congestion along the roadway. By allowing and encouraging multiple land uses (such as office, retail, services and residential where appropriate) to occur on the same parcel, patrons can manage a variety of needs in fewer locations, thus requiring less of NJ 73 to accommodate short trips between multiple nearby properties. The simplest way for communities to accommodate this improvement is to amend the zoning along NJ 73 to allow each parcel to contain a variety of compatible uses rather than only one single use. The zoning code for Maple Shade Township specifically lists “combinations of any of the [allowable] uses in a single building” as an acceptable land use for all of its commercial related zones along NJ 73. Adding similar language into the zoning codes of the other study area communities would encourage mixed-use development along NJ 73.

Enhancing Properties Along NJ 73 by Encouraging Appropriate and Consistent Design Standards Across Municipal Boundaries

Common along many regional corridors, the majority of properties along NJ 73 do not exhibit high –quality design. Furthermore, the architectural style, bulk, massing, window glazing, and other design features present in each building is not consistent or coordinated along the corridor. While properties along NJ 73 may not be subjected to strict regulations such as those characteristic of historic districts, the implementation of a set of general design guidelines (bulk, massing, window glazing, and other design features) will help to develop a shared and consistent aesthetic, thus increasing the appeal of properties along NJ 73 while creating a unifying and identifiable sense of place for this roadway. Consistent design can be implemented through a special zoning overlay that details the preferred design parameters for the affected parcels along the roadway, by adding these design parameters into the current zoning specifications for the properties along NJ 73.

Each approach has distinct pros and cons, with a well-crafted overlay typically being the easiest to create, adopt, implement, and enforce. Some of the communities in the study area already include general design standards in their zoning code, which all affected municipalities could use as a starting point toward the development of common requirements.

Accommodating Visitors and Improved Safety Through the Use of Signage

The NJ 73 study area includes multiple regionally significant roadways, with numerous commercial destinations. As a result, the study area attracts many visitors. This is important because the corridor has interchanges with I-295 and the NJ Turnpike, as well as a regional shopping mall, several power centers and the largest number and concentration of hotel rooms in southern NJ outside Atlantic City, at its core. By adopting a wayfinding program that provides clear directional signage for local popular destinations, communities can increase the functionality, safety, and public image of NJ 73. Wayfinding signage can highlight the location of shopping centers, office complexes, hotels, transit stops, and roadway connections across municipal boundaries. The 2010 Manual of Uniform Traffic Devices (MUTCD) provides guidance on language, lettering size, and distance from the roadway for many types of wayfinding signs. Municipalities are encouraged to use it as a guide for all signs in their communities. To help establish a unique sense of place, municipalities along NJ 73 can create a sign district overlay to implement uniform signage along the NJ 73 corridor, across municipal boundaries.

Encouraging Connections and Improved Access Management

Many appealing places to live, work, or visit are interconnected and accessible via a variety of transportation options. However, many of the properties in the vicinity of NJ 73 are isolated and require access directly from the highway, which contributes to congestion. Communities along NJ 73 should focus on improved access management practices, while creating and maintaining an interconnected street network; both will help provide routes for local trips that reduce or eliminate the need to travel along NJ 73, while also helping to increase the sustainability of adjacent neighborhoods. Access for NJ 73 properties may be improved via consolidated access points, cross-access, and shared parking. New streets can be designed by using context-sensitive design elements to facilitate the use of sidewalks, bicycle paths, and multi-use trails, thus reducing the dependence upon private automobiles. Interconnectedness language can be included within the language of the municipal Subdivision and Land Development Ordinance (SALDO). For example; “In new residential, commercial, and mixed-use development, local street connections shall be spaced at intervals of no more than 530 feet as measured from the near side right-of-way line, except where impractical due to physical or topographic constraints.”

Improving the Multi-Modality of NJ 73

A robust pedestrian environment is vital to the revitalization of older communities. Unfortunately, NJ 73 currently provides minimal accommodation for pedestrians. Walking along and across NJ 73 is intimidating, if not treacherous, as sidewalks and buffers are lacking along many sections of the highway, and most intersections include few basic pedestrian amenities. Furthermore, other

modes of travel, cycling and transit, are also poorly accommodated. Various improvements may be provided that increase multi-modal travel without compromising the movement of vehicles and goods along this regional arterial. These include sidewalks, continental-striped crosswalks, ADA-accessible curb ramps, pedestrian countdown signals, pedestrian scale lighting, bus shelters, and bike racks.

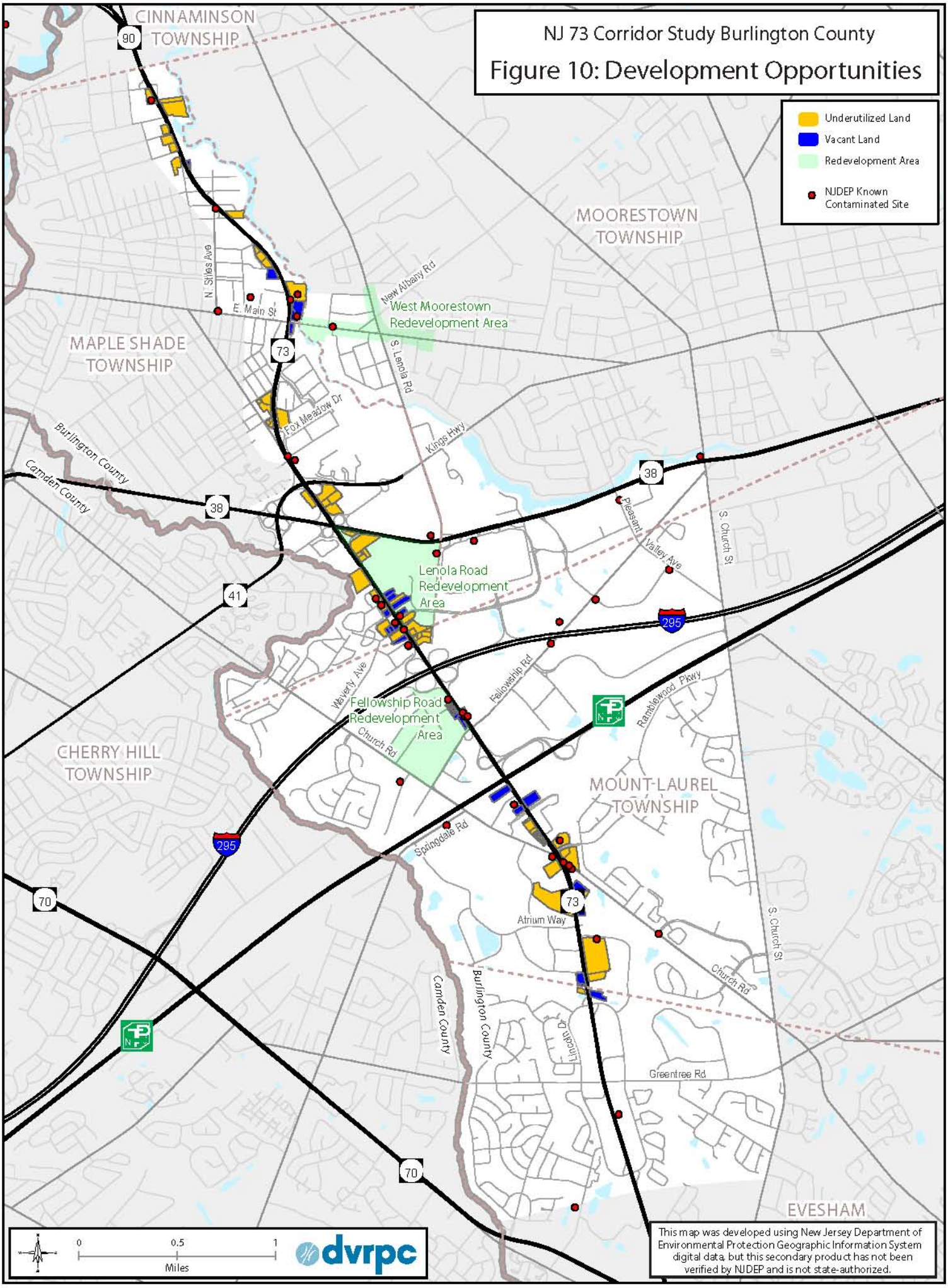
Recommendations and Implementation

The following recommendations aim to enhance the quality of life within communities along NJ 73 by providing a new and focused direction for future development and redevelopment, while also improving congestion, highway efficiency, safety, and multi-modality. The implementation of these recommendations often depends upon actions taken by a single key player, frequently the involved municipality, though it may require the cooperation of multiple partner agencies. The following recommendations represent how the land use principles and goals described earlier may address the identified land use issues at specific areas of the corridor. Potential funding sources along with contact information is provided is Chapter 6.

Focusing on Infill Develompent

As noted in the summary of land use issues along the corridor, there are multiple vacant and underutilized parcels along NJ 73 that could positively contribute to the local economy if redeveloped. Figure 10 shows the parcels along NJ 73 containing vacant or underutilized properties. These parcels were solely identified using fieldviews of the area, thus further detailed investigation is needed before redevelopment is pursued. Based on this fieldview analysis there are over fifty properties along NJ 73 considered to be vacant or underutilized. Twenty-two of these properties are vacant - either vacant lots or inactive buildings - while thirty-five properties are underutilized. For the purpose of this cursory review, underutilized parcels are defined in three ways:

- Parcels with considerable land unnecessarily dedicated to parking or other impervious surface; or
- Parcels with an economically undesirable or incompatible use such as derelict motels or gas stations; or
- Parcels that are poorly oriented and/or connected to adjacent properties, thus creating a misuse of space and resources.


NJ 73 Corridor Study Burlington County
Figure 10: Development Opportunities
Underutilized Land
Vacant Land
Redevelopment Area
NJDEP Known Contaminated Site
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM
West Moorestown Redevelopment Area
Lenola Road Redevelopment Area
Fellowship Road Redevelopment Area
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Burlington County
Camden County
Pleasant Valley Ave
S. Church St
Waverly Ave
Fellowship Rd
Church Rd
Ramblewood Pkwy
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc
This map was developed using New Jersey Department of Environmental Protection Geographic Information System digital data, but this secondary product has not been verified by NJDEP and is not state-authorized.

Within the study area there are three areas with a concentration of vacant and underutilized parcels. The first area is characterized by light industrial uses and extends primarily between the northern boundary of the study area in Maple Shade Township and the NJ 73 interchange with Main Street (CR 537). In this area, many parcels are considered to be underutilized due to the overabundance of impervious surfaces and inefficient site design. However, in many cases light industrial uses are necessary to a balanced local economy, and thus these properties may be better suited to improved site management rather than wholesale redevelopment.

A second concentration of vacant and underutilized sites exists along NJ 73 between NJ 38 and I-295. This area is characterized by an abundance of motels and retail establishments, many of which are currently abandoned, unkempt, or outdated, and thus depressing the potential amount of tax income that could be generated by these parcels. Therefore, these properties would benefit from a coordinated redevelopment plan whereby some properties could be completely redeveloped while other properties could be moderately improved, with circulation and parking being coordinated between all properties. The Lenola Road Redevelopment Area is located in this portion of the study area. Plans related to this redevelopment effort should be comprehensive and consider the inclusion and/or coordination of redevelopment of other adjacent properties where considered appropriate.

The third and final concentration of NJ 73 parcels in need of redevelopment is between the NJ Turnpike and Lincoln Drive-North. Auto-related uses and chain restaurants, both of which include vast areas of impervious surfaces in the form of parking, primarily populate this portion of the study area. In some cases redevelopment may be appropriate; however, most of these parcels represent a necessary use and positively contribute to the local economy, and as such, redevelopment may only be needed to reduce redundancy and oversaturation of a particular retail market. Overall, this area could be greatly improved with: targeted and specific property redevelopment, a broad plan for conscious and coordinated site design, and access management among adjacent parcels.

Additionally, Mount Laurel officials are currently working with a potential developer to create a mixed-use project in the Fellowship Road Redevelopment Area**.** It is anticipated that the portion of the site closer to NJ 73 will permit highway-oriented uses while the area closer to Church Road will host approximately 100 housing units. As shown in Figure 10, multiple vacant and underutilized parcels currently exist along NJ 73 within the Fellowship Road Redevelopment Area, presenting a real opportunity to begin the process of revitalization and economic development by including as many of these parcels as possible in this mixed-use project.

Known Contaminated Sites

Known Contaminated Sites include former factories, gas stations, landfills, locations of current or formerly leaking underground storage tanks, sites where chemicals or wastes were routinely discharged, and places where accidents have resulted in spills and pollution. Contamination may have affected soil, groundwater, surface water, or a combination of site conditions. The most dangerous sites from a human health standpoint may be listed on the National Priorities List (NPL), commonly referred to as Superfund sites.

As shown in Figure 10, there are also numerous Known Contaminated Sites (KCS) within the study area. As of the end of 2009, there were 45 non-residential KCS's located within the study area. They are listed in Appendix C, along with their respective lead agencies and required level of remediation. None of these sites are listed on the NPL but they do include automotive, industrial, commercial, residential, and other types of properties. In many cases a KCS corresponds to the location of a vacant or underutilized parcel. Where this exists, redevelopment may be more complicated as compliance with environmental regulations will need to be met. However, there are many funding sources available to help both the affected municipality and prospective developer shoulder the increased cost of revitalizing a contaminated site. Chapter Six contains a list of such funding sources.

Focusing on De-Malling

The largest intensity of retail stores within the study area exists at the Moorestown Mall. This Mall, built in 1964 and bounded to the north by NJ 38, to the west by Lenola Road, and to the south and east by Nixon Drive, is considered to be a regional mall, with over 1 million square feet of gross leasable area. In recent years the Moorestown Mall has become a less popular destination with an increase in vacancies. While modest updates, including increased tree coverage in the parking lot and improved passenger amenities at the main entrance's NJ Transit stop, have enhanced the shopping experience, much untapped potential remains.

The 2005 publication by DVRPC entitled "Redesigning Shopping Centers in the Delaware Valley" reviews the concept of de-malling, among other strategies for the reuse and redevelopment of underutilized parcels and greyfields. *"De-malling is a fairly new term often used by developers that defines how to recast a dying mall into something new."* The two main elements of de-malling are an exterior facelift that reconfigures the enclosed mall towards its outdoor surroundings and local streets, and the addition of new uses such as offices. Examples of successful de-malling techniques exist across the country, via a variety of approaches, some of which are provided below.

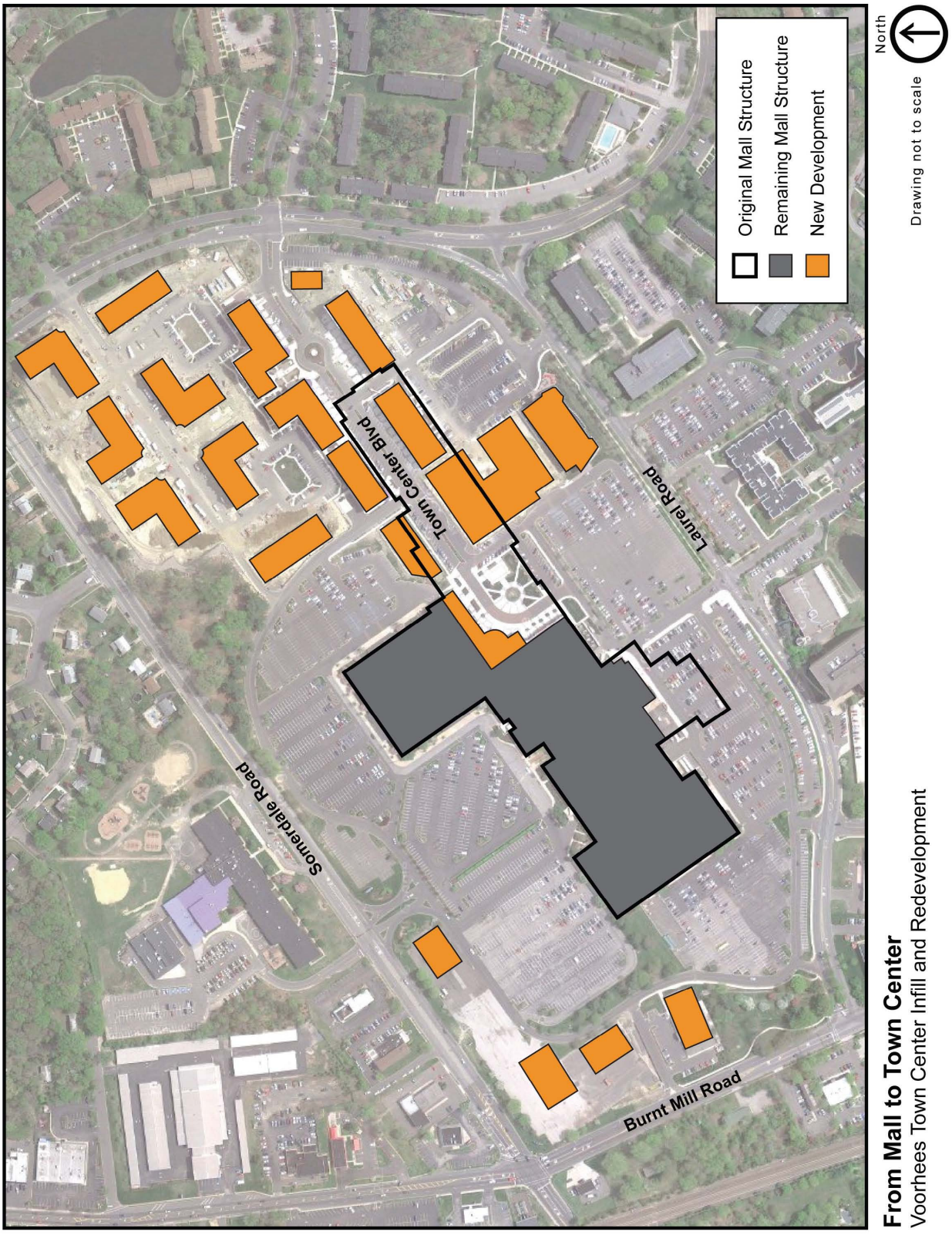
- Mix land uses to create a place where people can live, work, and play in close proximity. Mix building sizes to allow for diverse business types;
- Change the property from a single building into a "district" type of development by allowing a mixture of uses, encouraging similar architectural character, and creating a pedestrian oriented street design;
- Create a pedestrian-scale environment, including pedestrian amenities and smaller scale building facades;
- Allow a variety of parking options to accommodate different users including small surface parking lots, a parking garage, and on-street style parking. Share parking among compatible uses as much as possible to eliminate excess parking and periods of empty parking;
- Encourage landscaping to assist in stormwater management, provide shade, add aesthetic appeal, and provide public gathering spaces;

- Integrate site design with adjacent properties to allow convenient access between developments and complementary architectural design;
- Create an internal street network with smaller connecting streets in a grid pattern for both auto and pedestrian access; and
- Create a unique sense of place to provide an identity for the local community rather than solely representing a shopping destination.

The redevelopment approach suggested for Moorestown Mall is a multidisciplinary approach that incorporates improvements from a variety of perspectives. The redevelopment plan for the recently completed Voorhees Town Center (formerly the Echelon Mall) is displayed in Figure 11. The design presented in this figure demonstrates many of the primary techniques suggested as options for the future to consider for revitalization of the Moorestown Mall property.

As a result, the Moorestown Mall could have considerably less area devoted to parking than currently exists. Suggesting the addition of destinations but decreasing parking availability may seem incompatible. However, the benefit of creating a mixed-use destination that includes retail, restaurants, office/service uses, and recreation/public gathering spaces is that patrons can park once and walk throughout the site without re-parking elsewhere to access other destinations. Additionally, the peak operation for these land uses typically varies, allowing a large portion of parking to be continually overturned between office patrons during business hours and those visiting retail and restaurant establishments more significantly during the evening and on weekends. Similar plans have also worked in many other areas by including structured parking rather than relying entirely upon surface lots. Finally, as the NJ 73 corridor redevelops and additional desirable destinations arise near the mall, transit use may become a more popular and viable option for local residents, further reducing the need for parking.

Figure 11: Conceptual De-Malling Design Principles for Moorestown Mall



CHAPTER 5

Transportation Facilities

Congestion Management Process

The Congestion Management Process (CMP) advances the goals of the DVRPC long-range plan and provides strategies to mitigate congestion throughout the region. Regularly updated, it provides information on transportation system performance and identifies strategies to enhance the mobility of people and goods. In keeping with federal regulations and DVRPC policy, it first seeks to address problems through strategies other than building new Single Occupancy Vehicle (SOV) capacity. Where additions to SOV capacity are appropriate, the CMP includes supplemental strategies to attain the most long-term value from the investment. Projects that add SOV capacity must be consistent with the CMP to be eligible for federal transportation funding

Subcorridor Principles

The CMP identifies a set of congested corridors for the region. Each is divided into subcorridors where, at a regional planning scale, similar strategies are appropriate. With input from the regional CMP Advisory Committee, the CMP has identified a unique set of strategies for each subcorridor. These strategies take into consideration the Transportation Improvement Program (TIP) and other long-range plans or projects, as well as reflect the goals of relevant studies. Thus, the CMP serves as an educational resource for planners, engineers, and others, as it provides a tool to evaluate various means of reducing congestion for as long a term as possible, while being aware of budgetary constraints.

NJ 73 CMP Corridor 14A

The NJ 73 CMP Corridor 14A extends from the Tacony Palmyra Bridge to CR 544. This section of NJ 73 is urban and intersects with I-295, NJ 70, and NJ 38. The corridor and surrounding subcorridors have two or more times the average regional density of households and employment. NJ 73's configuration varies from four to eight lanes through the study area. This corridor provides north-south access in the vicinity of the Burlington/Camden county line, connecting several of the corridors that radiate out from Camden. Subcorridor characteristics include: high current VC, high future VC, and high growth in VC. The land use is commercial, retail, and office, with an infrequent mix of housing units.

Peak period congestion is a common problem at many of the intersections along NJ 73. The primary need is to address mobility and safety issues while retaining the quality of life for local residents. Projects that will be adding SOV capacity in this section of NJ 73 include the NJ 73/70 Marlton Circle Elimination and Fox Meadow Road/Fellowship Road improvements.

Highway Network

The study area is traversed by a hierarchy of highways ranging from interstate highways to local roads that provide mobility and access to vehicular, bicycle, and pedestrian traffic, as shown in Figure 12. This report focuses on traffic patterns on critical local, county, state, and interstate highways. The impact on local roads was analyzed in cases in which there is, or is expected to be, a negative impact on existing traffic patterns and volumes due to current and future development.

NJ Turnpike

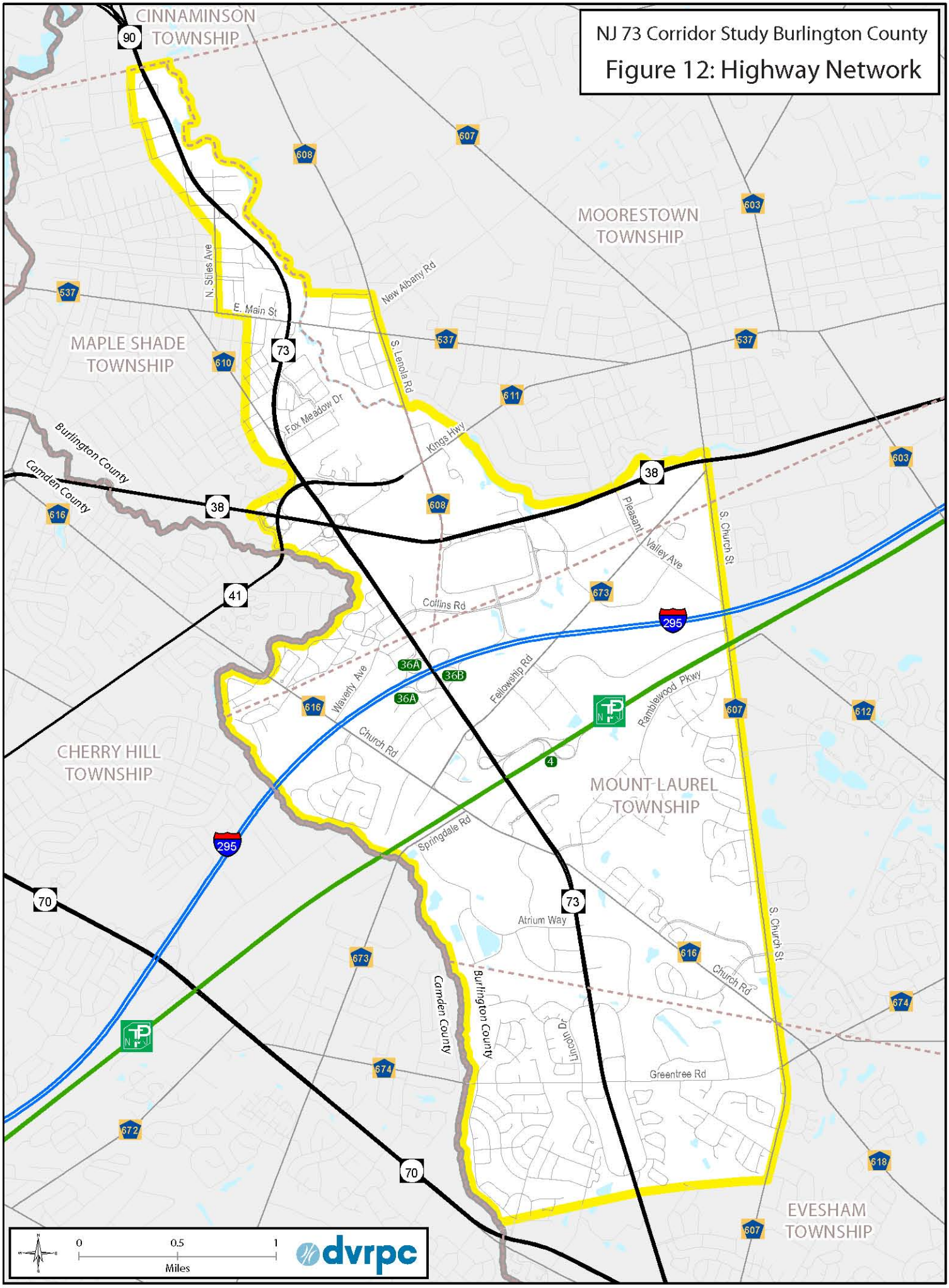
The New Jersey Turnpike (NJTP) is the only toll road in the corridor. It is a major north-south interstate highway with a full interchange (Exit #4) at NJ 73, permitting access to Pennsylvania and northern and southern New Jersey.

I-295

I-295 is a north-south urban interstate highway that bisects the NJ 73 corridor study area. It extends from US 1 in Mercer County in the north to Salem County in the south. Direct access is provided to the study area via a nearly full interchange with NJ 73 in Mount Laurel Township. On an historical note, the original southbound I-295 exit onto westbound NJ 73 was relocated through the East Gate Square power center approximately 10 years ago. This was done to improve traffic circulation on NJ 73 as well as to provide better access from I-295 to both NJ 73 and NJ 38 via Nixon Drive – Collins Road. I-295 has three lanes in each direction through the study area with a posted speed limit of 65 MPH, and carries approximately 80,000 vehicles each day.

NJ 73

NJ 73 is an Urban Principal Arterial with two to four travel lanes in each direction. Within the study area, it extends from just north of NJ 70 (MP 24.68) to the Cinnaminson border (MP 31.25) in Burlington County. The posted speed limit is generally 55 MPH. Traffic volumes or the Average Annual Daily Traffic (AADT) fluctuate along the corridor, from 85,000 vehicles between the NJTP and I-295, to 64,000 vehicles between Church Road and Howard Boulevard.


NJ 73 Corridor Study Burlington County
Figure 12: Highway Network
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Burlington County
Camden County
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Ramblewood Pkwy
Church Rd
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
70
295
4
36A
36B
537
607
608
610
611
603
616
673
612
674
672
618
0
0.5
1
Miles
dvrpc

NJ 38

NJ 38 runs perpendicular to NJ 73 and has a partial interchange with NJ 73. It is an Urban Principal Arterial that parallels I-295 within the study area. It averages two lanes in each direction with an AADT of 46,000 in 2010. Its posted speed limit within the study area is 50 MPH.

NJ 41 (King's Highway)

NJ 41 is located in the northern half of the corridor. It is an Urban Minor Arterial with a posted speed limit of 45 MPH. It has a partial interchange with NJ 38 and NJ 73, though when combined, the three closely spaced partial interchanges provide all the movements available at a full interchange. In 2008, it had an AADT of 14,000 vehicles.

CR 537 (Main Street/Camden Avenue)

This is an east-west Urban Minor Arterial with a direct connection to both directions of NJ 73. It has a travel lane in each direction and a posted speed limit of 35 to 40 MPH.

CR 673 (Fellowship Road and Springdale Road)

CR 673 is a two- to four-lane Urban Minor Arterial. As one of the few roads in the area that spans I-295, it connects NJ 38 with NJ 73 and provides direct access to several office parks, hotels, and employment centers. It is also a major conduit for vehicles traffic traveling from NJ 73 to Church Road, and points further southwest. In 2009, its AADT at the I-295 overpass was 14,000 vehicles.

CR 607 (Church Street)

This is an Urban Minor Arterial that connects US 130 to CR 537, NJ 38, NJ 70 and NJ 73. It is an alternate route to NJ 73 in Burlington County with an AADT ranging from 8,300 to 11,700. It has a total of two- to four travel lanes with a posted speed limit ranging from 30 – 45 MPH.

CR 608 (Lenola Road)

This is an Urban Minor Arterial that extends from NJ 38 to Church Street. Its width ranges from two- to four travel lanes with a posted speed limit ranging from 35 – 45 MPH.

CR 610 (Fellowship Road)

This is an Urban Collector that extends for three-quarters of a mile from CR 537 to NJ 73 in Maple Shade Township. It has a total of two travel lanes and an AADT of approximately 5,000, with a posted speed limit of 25 MPH.

CR 611 (Kings Highway)

This is an Urban Minor Arterial extending from NJ 41 in Maple Shade Township to CR 537 in Moorestown Township, a distance of 1.3 miles. This two-lane highway has a posted speed limit of 35 and 40 MPH. The AADT for this arterial is 10,388.

CR 616 (Church Road)

This is a two-lane Urban Minor Arterial with a posted speed limit of 45 MPH in the study area. It connects Mount Laurel Township to eastern Burlington County.

CR 674 (Hainesport-Mount Laurel Road)

This is an Urban Minor Arterial with two- to four travel lanes. It transitions into Greentree Road and intersects with NJ 73 within the study area. It has a posted speed limit of 45 MPH.

Crash Analysis

Between 2006 through 2008, there were 1,233 crashes within the study area on NJ 73 (MP 24.68 to MP 31.25). Of these, 68 percent or 841 were property damage-only crashes, whereas 388 or 31 percent involved injuries. These percentages are similar to the state road system's statewide average during the same three-year period. Four of the corridor's crashes involved fatalities.

As shown in Table 11, the most common type of crash was "Same Direction-Rear End" with 771 occurrences, or 63 percent of all corridor crashes. This is noticeably greater than the state road system's statewide average of 46 percent for "Rear End" crashes during the same three year period. "Same Direction-Side Swipe" constituted the second largest category, with 18 percent or 220 of the corridor's crashes; this is similar to the statewide average of 16 percent. The next largest category of crashes along the corridor was "Fixed Object" with 73 crashes or 6 percent, which is half of the statewide average of 12 percent. Lastly, there were 11 pedestrian or pedalcycle crashes along the corridor in those years; of these, two involved fatalities.

Table 11: NJ 73 Crashes, MP 24.68 to 31.25, 2006 to 2008

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Direction-Rear End	496	275	0	771	63%
Same Direction-Side Swipe	192	28	0	220	18%
Right Angle	48	18	0	66	5%
Opposite Direction-Head On/Angular	1	0	0	1	0%
Opposite Direction-Side Swipe	0	1	0	1	0%
Struck Parked Vehicle	1	0	0	1	0%
Left Turn/U Turn	23	26	0	49	4%
Backing	7	2	0	9	1%
Encroachment	1	0	0	1	0%
Overturned	0	4	0	4	0%
Fixed Object	50	21	2	73	6%
Animal	9	1	0	10	1%
Pedestrian	0	7	2	9	1%
Pedalcyclist	0	2	0	2	0%
Non-fixed Object	11	1	0	12	1%
Other	2	2	0	4	0%
Total	841	388	4	1,233	100%

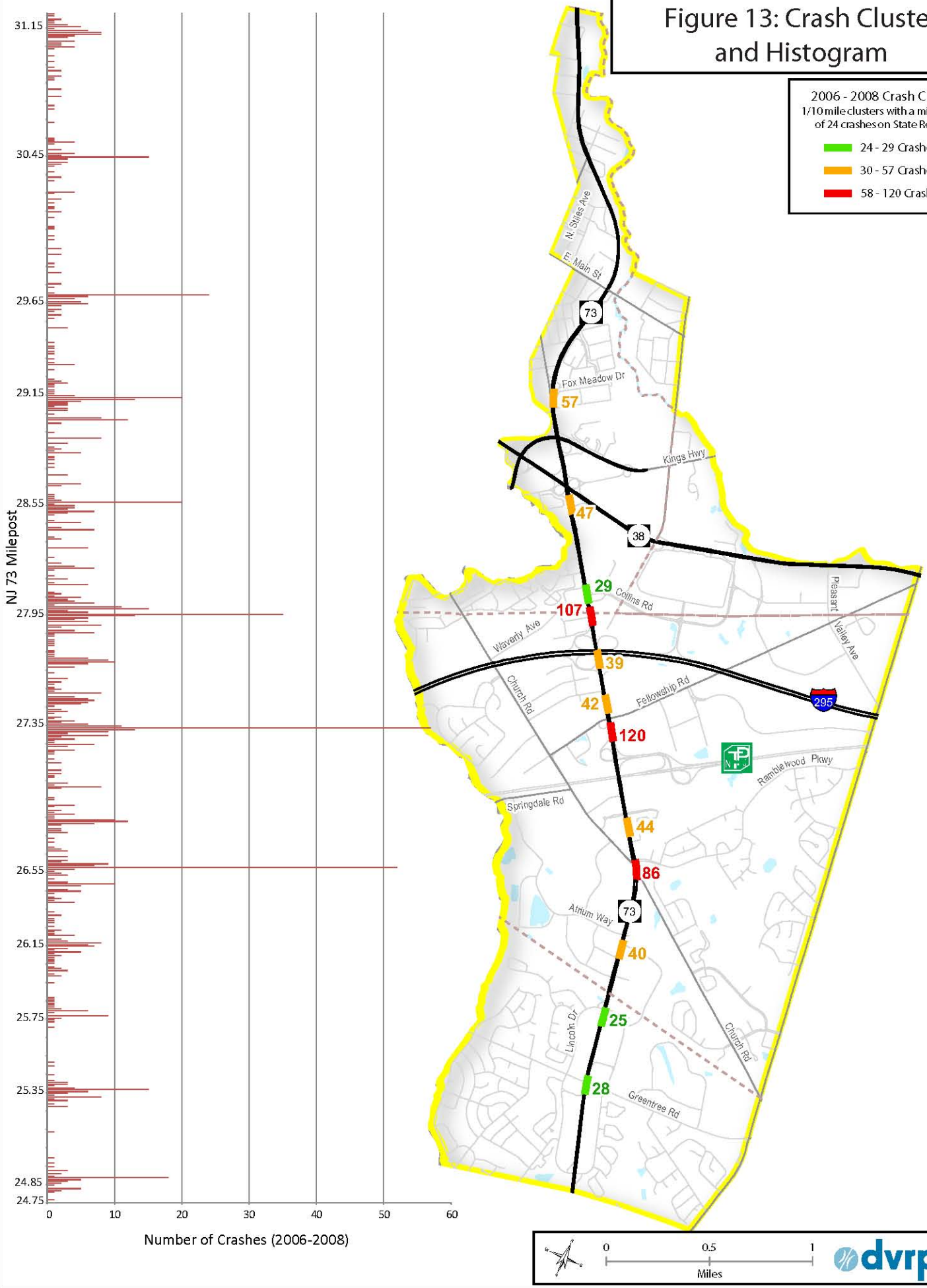
Source: DVRPC, 2010

Given the density of interstate and other regionally-significant highways within the study area, a large portion of the drivers are from out-of-state. Twenty-six percent of the crashes along NJ 73 involved out-of-state drivers, led by Pennsylvania drivers, who were involved in 19 percent of all crashes.

Twelve crash clusters were identified along the NJ 73 corridor. A crash cluster was defined as a one-tenth mile segment that experienced at least 24 crashes between 2006 and 2008. Over half of the corridor's 2006 to 2008 crashes, or 664 crashes, occurred within these 12 clusters. Ten of the crash clusters encompass a signalized intersection or grade-separated interchange, while the remaining two clusters are located at unsignalized intersections. The crash clusters and a histogram of all of the crashes along NJ 73 are shown in Figure 13. The following is a detailed examination of the six largest clusters.

NJ 73 Corridor Study Burlington County

Figure 13: Crash Cluster and Histogram



Crash Cluster #1: Fellowship Road (CR 673) and New Jersey Turnpike

One hundred and twenty crashes occurred between mileposts 27.26 and 27.36, which include the intersection of NJ 73 with Fellowship Road (CR 673), as well as the southbound NJ 73 approach to the New Jersey Turnpike on-ramp. With 66 crashes, the majority of the cluster was rear-end crashes. Of these crashes, those involving southbound traveling vehicles were more severe as over half resulted in injury. The second most frequent crash type was side-swipe, with 31 crashes or a quarter of the cluster's crashes, a greater proportion than experienced in all but one other cluster. Among almost all of the crash types, crashes occurred about equally for north- or southbound traveling vehicles. Two pedestrian and one bicyclist crash occurred at or very near this intersection, the most of any cluster. Table 12 summarizes the Fellowship Road crash cluster.

Table 12: Fellowship Road Crash Cluster

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Direction - Rear End	37	29	0	66	55%
Same Direction - Side Swipe	26	5	0	31	26%
Right Angle	7	3	0	10	8%
Struck Parked Vehicle	1	0	0	1	1%
Left Turn / U Turn	6	1	0	7	6%
Fixed Object	1	0	0	1	1%
Pedestrian	0	2	0	2	2%
Pedalcyclist	0	1	0	1	1%
Non-fixed Object	1	0	0	1	1%
Total	79	41	0	120	100%

Source: DVPRC, 2010

Crash Cluster #2: Waverly Avenue and Willow Road

NJ 73 from mile post 27.88 to 27.98 experienced 107 crashes between 2006 and 2008. This cluster includes the intersection of NJ 73 with Waverly Avenue and Willow Road, as well as with Collins Road; these intersections provide the most direct access to the Moorestown Mall from points further south, and to northbound NJ 73 from southbound I-295. The most common crash type is rear-end crashes with 63 occurrences, accounting for 59 percent of the cluster. The second highest crash type is right-angle, with 18 crashes or 17 percent of the cluster, a percentage that is the highest among all 12 clusters, and is considerably higher than its 5 percent proportion of all the crashes experienced along the NJ 73 corridor. All but one of the vehicles involved in these right-angle crashes were traveling in either the northbound NJ 73 or westbound Willow Road directions. The third most frequent crash type is side-swipe with 16 crashes or 15 percent of the cluster. Almost twice as many northbound traveling vehicles were involved in such crashes when compared to southbound vehicles. Lastly, the cluster experienced two pedestrian

crashes, one of which resulted in a pedestrian fatality. Table 13 summarizes the Waverly Avenue, Willow Road, and Collins Road crash cluster.

Table 13: Waverly Avenue and Willow Road Crash Cluster

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Direction - Rear End	41	22	0	63	58.9%
Same Direction - Side Swipe	15	1	0	16	36.4%
Right Angle	13	5	0	18	40.9%
Opposite Direction - Head On/Angular	1	0	0	1	2.3%
Fixed Object	4	1	0	5	11.4%
Animal	1	0	0	1	2.3%
Pedestrian	0	1	1	2	4.5%
Other	1	0	0	1	2.3%
Total	76	30	1	107	100.0%

Source: DVPRC, 2010

Crash Cluster #3: Church Road (CR 616) and Ramblewood Parkway

NJ 73 from mile posts 26.52 to 26.62, experienced 86 crashes between 2006 and 2008. The cluster encompasses the NJ 73 intersections with Church Road and Ramblewood Parkway. Forty-nine percent of the cluster or 42 crashes, were rear-end crashes, with frequency and severity greatest for vehicles traveling along southbound NJ 73. The second most frequent crash type was “Left Turn/U Turn,” with 20 crashes, two-thirds of which resulted in injuries. These crashes, and especially those resulting in injury, primarily involved vehicles traveling along NJ 73. The annual crash rate at this cluster has decreased by approximately 25 percent since 2006; this is most likely due to the improvements made at the intersections by NJDOT in that year. This is especially pronounced for side-swipe crashes, the cluster’s third largest crash type, whose nine crashes in 2006 were followed by only three total occurrences between 2007 and 2008. Table 14 summarizes the Church Road and Ramblewood Parkway crash cluster.

Table 14: Church Road and Ramblewood Parkway Crash Cluster

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Direction - Rear End	28	14	0	42	49%
Same Direction - Side Swipe	12	0	0	12	14%
Right Angle	7	2	0	9	10%
Left Turn / U Turn	7	13	0	20	23%
Backing	1	0	0	1	1%
Fixed Object	2	0	0	2	2%
Total	57	29	0	86	100%

Source: DVPRC, 2010

Crash Cluster #4: Fox Meadow Drive and South Fellowship Road (CR 610)

NJ 73 from mile posts 29.05 to 29.15 experienced 57 total crashes between 2006 and 2008. This cluster includes NJ 73's signalized intersection with Fox Meadow Drive and its unsignalized intersection with South Fellowship Road (CR 610). Thirty-two crashes or 56 percent of the cluster were rear-end crashes, the majority of which involved northbound NJ 73 traveling vehicles, which also involved the most injuries. The second-most prevalent crash type was right angle with nine crashes or 16 percent of the cluster's total. These crashes mostly involved vehicles traveling north and westbound through the intersection. Also, there were two pedestrian crashes, both resulting in pedestrian injuries. Table 15 summarizes the Fox Meadow Drive crash cluster.

Table 15: Fox Meadow Drive and South Fellowship Road Crash Cluster

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Direction - Rear End	22	10	0	32	56.1%
Same Direction - Side Swipe	6	1	0	7	12.3%
Right Angle	6	3	0	9	15.8%
Left Turn / U Turn	1	1	0	2	3.5%
Backing	2	1	0	3	5.3%
Fixed Object	1		0	1	1.8%
Pedestrian		2	0	2	3.5%
Non-fixed Object	1		0	1	1.8%
Total	39	18	0	57	100.0%

Source: DVPRC, 2010

Crash Cluster #5: NJ 38 Interchange

NJ 73 from mile posts 28.48 to 28.58 experienced 47 crashes between 2006 and 2008. This cluster includes the partial and unsignalized interchange with NJ 38. This is the only cluster whose most frequent crash type is side-swipe, which accounts for 47 percent of the cluster's crashes. This is likely due to the on and off-ramps with NJ 38. The second most frequent crash type is rear-end with 17 crashes or 36 percent of the cluster. For each of these crash types, the direction of travel of the involved vehicles is almost evenly split between north and southbound NJ 73. There was one pedestrian crash, which resulted in a pedestrian injury. Table 16 summarizes the NJ 38 interchange crash cluster.

Table 16: NJ 38 Interchange Crash Cluster

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Direction - Rear End	9	8	0	17	36.2%
Same Direction - Side Swipe	19	3	0	22	46.8%
Right Angle	1	0	0	1	2.1%
Fixed Object	4	1	0	5	10.6%
Pedestrian	0	1	0	1	2.1%
Other	0	1	0	1	2.1%
Total	33	14	0	47	100.0%

Source: DVPRC, 2010

Crash Cluster #6:

NJ 73 from mile post 26.75 to 26.85 experienced 44 crashes from 2006 to 2008. This cluster includes the signalized intersection of NJ 73 and Howard Boulevard. This cluster is unique because of its high proportion of injury-related crashes, greater than that of property damage-only crashes, 57 to 43 percent, respectively. Consisting of 86 percent of the cluster, or 38 crashes, the most frequent crash type is rear-ends, with 58 percent or 22 crashes resulting in injuries. Southbound traveling vehicles were more often involved in rear-ends, particularly those that resulted in injury. This may be the result of numerous access points along southbound NJ 73, in combination with a lack of appropriate acceleration and deceleration lanes, or the often present vehicle queues due to the immediately downstream intersection of NJ 73, Church Road, and Ramblewood Parkway. Table 17 summarizes the Howard Boulevard crash cluster.

Table 17: Howard Boulevard Crash Cluster

Crash Type	Crash Severity			Crash Type Total	Percent of Total
	Property Damage Only	Injury	Fatal		
Same Dir - Rear End	16	22	0	38	86%
Same Dir- Side Swipe	2	2	0	4	9%
Left Turn / U Turn	0	1	0	1	2%
Fixed Object	1	0	0	1	2%
Total	19	25	0	44	100%

Source: DVPRC, 2010

Journey to Work

Tables 18 and 19 outline the mode of travel to work for individuals that reside in the study area and those that work in the study area. Almost 8,000 residents of the study area municipalities are employed, over three-fourths of which drive to work alone. Residents of Maple Shade Township drive to work the least, with 35 percent of employees working from home or traveling to work using means other than driving alone. While two percent of Maple Shade residents use public transit for their work commute, residents in the remaining study area municipalities do not use this mode at all. There needs to be an evaluation of existing transit service to see how it can better connect trip origins to destinations. Moorestown Township employs the most workers of the study area municipalities with 42 percent of the total employment. The vast majority of employees drive alone or car pool to jobs in the study area. The 20 percent of Moorestown employees who work at home are the only employees who do so in the study area. Very few employees use public transit or walk/bike to work within the study area.

Table 18: Travel to Work, 2000

	Mode of Travel to Work for Residents of the Township										
Municipality	Employed Residents	Drove Alone		Car Pool		Public Transit		Bicycle, Walked or Other		Work at Home	
Evesham Township	4,255	2,995	70%	322	8%	0	0%	243	6%	695	16%
Maple Shade Township	930	498	54%	106	11%	15	2%	141	15%	170	18%
Moorestown Township	874	806	92%	68	8%	0	0%	0	0%	0	0%
Mount Laurel Township	1,838	1,685	92%	153	8%	0	0%	0	0%	0	0%
Study Area Total	7,897	5,984	76%	649	8%	15	0%	384	5%	865	11%

Source: DVRPC, US Census Bureau CTPP P3

Table 19: Origins of Employees, 2000

	Mode of Travel to Work for Employees in the Township										
Municipality	Employed Residents	Drove Alone		Car Pool		Public Transit		Bicycle, Walked or Other		Work at Home	
Evesham Township	875	806	92%	68	8%	0	0%	0	0%	0	0%
Maple Shade Township	680	565	83%	99	15%	6	1%	10	1%	0	0%
Moorestown Township	2,010	1,368	68%	75	4%	13	1%	147	7%	405	20%
Mount Laurel Township	1,245	1,229	99%	0	0%	0	0%	15	1%	0	0%
Study Area Total	4,810	3,968	82%	242	5%	19	0%	172	4%	405	8%

Source: DVRPC, US Census Bureau CTPP P3

Transit Analysis

Existing Conditions

The NJ 73 corridor is a fairly low-density suburban environment of separated land uses. Yet despite the dispersed nature of the corridor's destinations, most of the study area still has characteristics suitable for transit. Subareas of the corridor receive transit scores ranging from a Medium 1.23 to a Medium-High 4.34 – and values greater than one indicate transit can be viable. (These scores are calculated based on high population density, high employment density, and low vehicle ownership.)

Based on the 2000 census, transit's mode share for commute trips ranged from 2.7 percent to 5.4 percent in various study area tracts. A major reason for such low modal splits is the 60 or more minute travel times for most of the commutes by transit in the majority of study area tracts. This is a reflection of generally how sparse and infrequent that existing transit service is.

Currently, 57 percent of the study area is served by transit stops within a quarter mile walking distance. Transit available in the Route 73 corridor includes six NJ Transit bus routes, a BurLink shuttle bus, and private buses. There are also important regional rail lines within two to four miles of the corridor: PATCO and NJ Transit's River Line and Atlantic City Line travel. The existing transit options are illustrated in Figure 14, with individual routes described below, followed by an analysis of their collective coverage.

Route Descriptions

- **Route 317** is a long-distance route departing from the Philadelphia Greyhound Terminal and terminating in Asbury Park, NJ. Passengers leaving from Philadelphia are scheduled to reach Mount Laurel in the NJ 73 study area in 53 minutes. The route crosses into and through the study area via NJ 38 and makes stops at the Moorestown Mall and East Gate Square Mall. It continues to other southern New Jersey destinations, such as Moorestown Township and Mount Holly Township. Service is available on weekdays from 4:48 AM in the morning to 1:22 AM at night, and similar hours on weekends. However, the route's headways are very long: an hour and a quarter in the morning and two hours in the afternoon. These long headways discourage more casual riders from utilizing this route.

- **Route 407** links Center City Philadelphia with Moorestown Township primarily via County Route 537: Maple Avenue in Pennsauken Township, Main Street in Maple Shade and Moorestown Townships. It provides local service within Moorestown and Mount Laurel, stopping at the East Gate Mall and Business Center, Moorestown Mall, and the Fox Meadows multifamily housing complex. Its peak headways are around 35 minutes and its non-peak headways range from 40 minutes to an hour. Weekend service runs hourly. Service hours are typical except for the early end time of 8:58 PM on Sundays, and the lack of outbound service from office and commercial centers in the early morning. Also, service for the Fox Meadows apartments is very sparse, with only two stops per day.

- **Route 413** connects the Walter Rand Transportation Center in Camden with Moorestown Township, then continues east to Mount Holly Township, and then north to end at the Burlington Towne Centre River Line station. This service enters the NJ 73 study area along NJ 38, stops at the East Gate Square Mall and Business Center, and exits the study area via NJ 41/Kings Highway. Many passengers also use this route to access the Cherry Hill Mall, nearby employment and retail centers west of the study area. Peak headways are around 30-35 minutes, while off-peak and weekend headways are a full hour.

- **Route 418** is an express route that only runs four times a day, between 4:37 PM and 8:20 PM Monday through Friday. It travels between the Walter Rand Transit Center in Camden and the Trenton Transit Center. The route enters the study area via NJ 18, stops at the East Gate Square Mall, and exits the corridor via the New Jersey Turnpike.

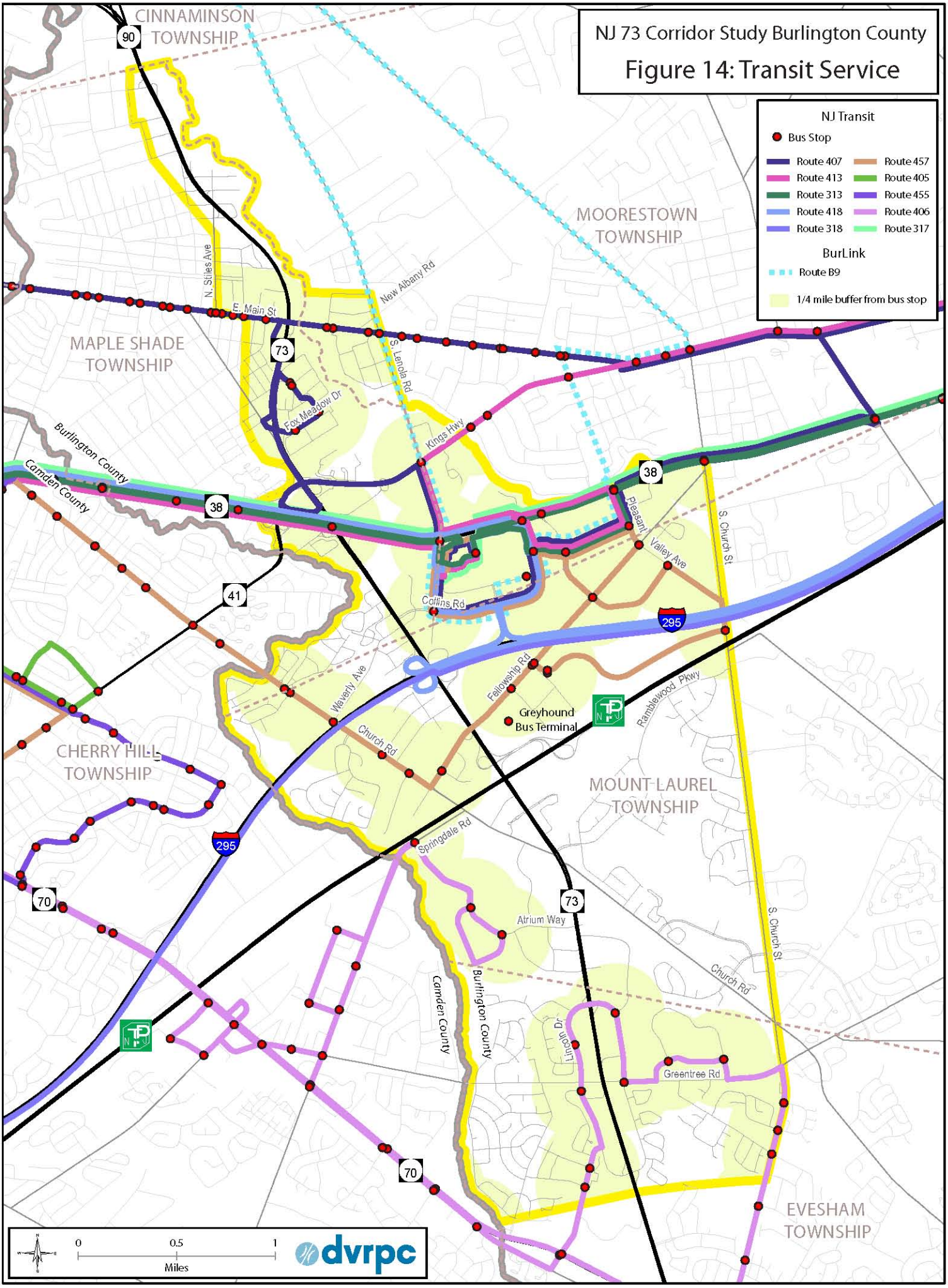
- **Route 457** starts at Camden's Walter Rand Transit Center and heads south to Gloucester City, and then east where it connects with PATCO at the Haddonfield station. The bus continues eastward through Cherry Hill, and enters the study area via Church Road (CR 616). Within the NJ 73 corridor, the bus route provides very comprehensive local service. It has stops near multifamily residential units on Church Road, strip commercial areas, office centers, the East Gate Industrial Park, and East Gate Square Mall, though it does so on a very complicated loop. Passengers often use the service to reach destinations west of the study area, particularly the Garden State Plaza shopping center. Morning headways are 30 minutes for this route, and later arrivals are hourly. Eastbound service concludes by 9:30 PM, likely because the mall closes at 9 PM. No service is provided on Sundays.

- **Route 406** connects Center City Philadelphia with the Walter Rand Transit Center in Camden before continuing east on NJ 70. The route provides access to Garden State Plaza, traverses industrial areas in Cherry Hill Township, and proceeds to the Virtua Hospital in Marlton. Several "Limited Service" extensions on the route reach into the NJ 73 study area. One branch goes north on Springdale Road (CR 673) into a residential neighborhood and the Horizon Corporate Center. Another extension travels north via Lincoln Drive to access strip developments fronting on NJ 73 and residential areas in Mount Laurel Township. Finally, limited service is provided to the south toward Berlin Township, but ends 1.8 miles short of the Atco Station of NJ Transit's Atlantic City Rail Line. Perhaps due to the many "Limited Service" extensions, headways vary quite a bit on this route. In the morning most headways are 15 to 35 minutes, in the afternoon most headways are about 40 minutes, for a period after 3 PM headways become 15 minutes, and during the evening and weekends headways become hourly.

- **BurLink Shuttle B9** is a service provided by the Cross County Connection Transportation Management Association. It operates six morning trips and six evening trips at half-hour intervals on weekdays. The service travels south from the Palmyra River Line Station, along Lenola Road (CR 608) to the East Gate Square Mall. It then travels east into western Moorestown, followed by northbound Church Street to complete a broad loop. Important destinations served include Moorestown Mall, East Gate Square Mall and Business Center, and downtown Moorestown.

- **Greyhound Buses** are available in the NJ 73 corridor at the Mount Laurel Greyhound Station. Greyhound buses from this station provide direct service to Philadelphia and New York City. The station is located just outside of the intersection of Fellowship Road and NJ 73, near Interchange 4 of the NJ Turnpike. It is across the street from two hotels, multiple office buildings, and only a half-mile from the East Gate Square Mall. However, walking to nearby destinations is discouraged by the lack of pedestrian amenities and a comprehensive street network.

- **Buses from Chinatown** provide express intercity service between Philadelphia and New York City. Their buses have been observed making informal stops on-street at the intersection of Fellowship Road and NJ 73. The vacant lot on the west side of the intersection is used as a stop for passenger pick-up; while boarding the bus occupies the outer, curb-side travel lane. This lane terminates into the Fellowship Road jughandle, thus requiring a late lane change for traffic heading to the NJTP on-ramp.


NJ 73 Corridor Study Burlington County
Figure 14: Transit Service
NJ Transit
Bus Stop
Route 407
Route 457
Route 413
Route 405
Route 313
Route 455
Route 418
Route 406
Route 318
Route 317
BurLink
Route B9
1/4 mile buffer from bus stop
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Greyhound Bus Terminal
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Burlington County
Camden County
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Church Rd
Ramblewood Pkwy
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Bus Transit Potential

The best transit service in the study area is provided at the Moorestown Mall and East Gate Square Mall. Five NJ Transit bus routes and a shuttle serve these regional centers for employment and commerce. Other land uses are also covered, though less thoroughly: commercial and office centers and multi-family residential areas are mostly served, despite a built environment that is less than conducive to walking and transit. In general, the transit services are focused on the northern area of the corridor, with only one bus route serving the Evesham Township in the southern portion of the study area.

The bus services in the NJ 73 corridor provide strong connections to external rail transit. Five of the six NJ Transit routes stop at Camden's Walter Rand Transit Center with access to the River Line and PATCO. Routes 406 and 457 stop directly at PATCO stations, and the BurLink shuttle connects with the River Line.

Despite these services, the transit service in the NJ 73 corridor is incomplete. Some areas of the corridor, such as neighborhoods with low-density housing, are not provided with nor are appropriate for transit service. Transit service is missing from the auto-oriented businesses on NJ 73 between the New Jersey Turnpike and Lincoln Drive, which are also inappropriate for transit in their current form. Other land uses may be appropriate for transit service, but are still not served. For example, areas of multifamily housing to the southwest of Moorestown Mall and north of Church Road (CR 616) are poorly served. The Route 406 "Limited" bus service in Evesham Township is insufficient to serve the residential and commercial uses in the south of the study area.

One obstacle to increased transit service in the study area is the existing road network. Streets are laid out in a poorly connected hierarchy, making certain areas inconvenient to access. The road hierarchy also results in high levels of local travel on NJ 73, resulting in extreme congestion, which would make bus service unreliable. The recommendations regarding street network connectivity, zoning, and the design of the built environment, as discussed in previous sections, will also improve the viability of public transit service.

Based on the high income levels and suburban context of the NJ 73 corridor, it appears that most of the area's residents would be considered "choice riders" who have non-transit alternatives available. To attract this demographic of riders, transit must provide not only essential functional amenities such as signage and a place to wait, but amenities to provide a comfortable experience as well. Unfortunately, bus stops in the corridor tend to be rather austere.

High-quality and informative signage is another essential element for the usability of bus services. Similar to the adjacent photograph, most NJ Transit bus stops in the corridor provide a simple bus stop sign. These signs are adequate to indicate the location of a bus stop and which routes stop there, but do not provide useful service information. They have no information on where these routes travel, when service is available, nor what the fare costs.

Source: DVRPC, 2009

Improve bus stop amenities because many bus stops around NJ 73 do not provide complete facilities to promote their use. A significant number of bus stops lack adjacent sidewalk facilities, and in many cases the necessary crosswalks and pedestrian signal timings are inadequate, if not entirely absent. Bus stops in the corridor generally do not provide pedestrian-scale lighting, an important element for vision and the perception of safety. The recommendations made elsewhere with respect to pedestrian facilities are especially critical in the vicinity of bus stops. Finally, the study area bus stops definitely do not provide the type of comfortable amenities that "choice riders" will desire. Benches and shelters are rare at corridor bus stops. Newspaper stands, garbage receptacles, and other extra features are extremely rare. In light of this, it seems likely that most bus riders in the area will be "captive riders" who are transit-dependent.

Recommended Strategies

NJ Transit should assess the potential of several improvements to existing bus service in the NJ 73 study area:

- Explore the feasibility of establishing NJ 73 as a major transit trunk line;
- Adding Route 457 service on Sundays;
- Extending Route 407 service one hour later on Sundays;
- Increasing Route 407 service to Fox Meadows apartments beyond two inbound and two outbound stops daily; and

- Connecting Route 406 service to Atco Station.

NJ Transit and Cross County Connection TMA should also evaluate the feasibility of adding new service to the underserved southern areas of the study area. Residents of multifamily housing clusters, and even lower-density neighborhoods, should be surveyed regarding their propensity to use transit and destinations they would like to see served. Evesham Township has already expressed strong interest in an expanded shuttle system, particularly one along NJ 73 with stops to connect the various shopping centers and office parks. The limited service of Route 406 is not meeting the travel needs of residents.

Municipal governments in collaboration with NJDOT should place special emphasis on pedestrian facilities in the vicinity of bus stops. As discussed in the previous section, features such as sidewalks, pedestrian-scaled lighting, continental-striped crosswalks, ADA-accessible curb ramps, countdown pedestrian signals, and adequate pedestrian crossing time are recommended. The previous recommendations regarding street network connectivity and design of the built environment will also be conducive to increased transit ridership.

NJ Transit should install bus stop signage that includes more functional information. Beyond merely stating which route serves a stop, NJ Transit should state *where* the bus travels. The signs should also include information indicating *when* bus service is available, and what the fare costs. The adjacent photo provides a good example of higher-quality passenger information by including a small schedule. Improved signs similar to this should be implemented, beginning at high-ridership bus stops in the corridor.

Source: DVRPC, 2009

In high-ridership locations, NJ Transit should also provide benches and shelters. This basic action item will do much to attract more “choice riders.” Additionally, it will contribute to an increasingly pedestrian-friendly environment in the corridor.

On the specific issue of the informal passenger boarding of the Chinatown bus at Fellowship Road, Mount Laurel Township can discourage this activity via traffic enforcement. The Township, Greyhound, and other agencies may also work with the bus operator to establish a more appropriate stop location, such as the nearby Greyhound Bus Station. This bus station could also be a location for a welcome center for tourists and visitors, considering its location as a major gateway to Burlington County.

Pedestrian and Bicycle Network

Developing and enhancing a transportation system that not only accommodates motor vehicles but also bicycles and pedestrians is essential in promoting mobility and making a more livable community. Having a safe and interconnected bicycle and pedestrian network through a series of paths, trails, and sidewalks where users can travel safely and harmoniously would improve the travel experience for these modes. By increasing the mode share for bicycle and pedestrians, there will be a corresponding reduction in traffic congestion, an increase in public health, and an improvement in the quality of living.

In preparing the bicycle and pedestrian elements of this plan, an assessment was made of current conditions and needs. Actions required to meet the study's vision and goals were identified.

Pedestrian Facilities

Protecting pedestrians from vehicular traffic is best achieved by using sidewalks and walkways to provide a separation from vehicular traffic. Sidewalks are virtually absent from NJ 73 within the study area. In fact, this facility poses many safety challenges due to high speeds and a lack of separation between vehicles and pedestrians.

Many of the adjacent arterials and collectors have no sidewalks or walkways, which discourages safe pedestrian movement. Fellowship Road/Springdale Road (CR 673), Church Road (CR 616), and Lenola Road (CR 608) are the only major arterials with a continuous sidewalk network in the corridor.

Multilane highways often result in more severe pedestrian-vehicle crashes because they are usually associated with higher speeds. NJ 73 is no exception with its multiple lanes of high-speed traffic and long crossing distance. Continental crosswalks and median refuges may assist pedestrians with crossing such roadways.

Source: DVRPC, 2007

Additionally, most land uses within the study area are auto-oriented and therefore are not easily accessible by pedestrians. Due to the particularly commercial nature of the corridor, there are sections with numerous driveways that pose a frequent hazard to pedestrians due to conflicts with entering and exiting vehicles.

Major Pedestrian Destinations

Numerous destination points within the corridor including retail, hotels, restaurants, multi-family housing, parks, and schools could be accessible by foot. To realize this potential, a comprehensive sidewalk network is necessary to accommodate and encourage pedestrian activity. A high level of connectivity that will facilitate pedestrian movement to desired destinations is paramount. These improvements would work in concert with highway improvements proposed for these areas. The section of the corridor with potentially the largest pedestrian volumes includes the segment of NJ 73 between Fellowship Road and Willow Road due to its high density of hotels, restaurants, and retail establishments.

NJ 73 at Fellowship Road

The intersection with the most pedestrian crashes in this segment is NJ 73 and Fellowship Road. Within a 1,000-foot radius of the intersection is a concentration of several hotels. These include: the Aloft, the Marriott, The Westin, Red Roof Inn, The Courtyard, Fairfield Inn, Towne Place Suites, and Econolodge. Many guests of these hotels occasionally access nearby restaurants and services by foot.

Recommended Improvements

Pedestrian safety can be enhanced by improving intersections and road segments that have current and expected future pedestrian activity. These improvements should include:

- Sidewalks along both sides of Fellowship Road (CR 673) and NJ 73 north of the intersection;
- Continental-striped crosswalks across all four approaches for greater pedestrian visibility;
- Crosswalk educational signs;
- ADA-accessible curb ramps;
- Pedestrian-actuated countdown signals for each crosswalk;
- Adequate pedestrian crossing times, assuming a 3.5 feet/second walking speed;
- Pedestrian-scale lighting at and near the intersection; and
- Add pedestrian refuge islands at the median across both NJ 73 approaches to enable safe two-stage pedestrian crossings.

NJ 73 at Waverly Avenue, Willow Road, and Collins Road

There are three hotels and dining options near this intersection along both sides of NJ 73. This location also serves as a gateway to the Mall, with corresponding heavy vehicular volumes. Two pedestrian crashes occurred at this intersection, one of which resulted in a fatality.

Recommended Improvements

- Sidewalks along both sides of NJ 73 and side streets;
- Continental-striped crosswalks across all four approaches of the signalized intersection for greater pedestrian visibility;
- ADA-accessible curb ramps;
- Pedestrian-actuated countdown signals for each crosswalk;
- Adequate pedestrian crossing times, assuming a 3.5 feet/second walking speed; and
- Pedestrian-scale lighting at and near the intersection.

NJ 73 at Fox Meadow Drive

The signalized intersection at Fox Meadow Drive links the large multi-family rental community of Fox Meadow with an active recreational facility just west of NJ 73. Improvements to pedestrian safety are therefore paramount for this location.

Recommended Improvements

- Continental-striped crosswalks across all four approaches of the signalized intersection for greater pedestrian visibility;
- ADA-accessible curb ramps;
- Pedestrian-actuated countdown signals for each crosswalk;
- Median refuges;
- Adequate pedestrian crossing times, assuming a 3.5 feet/second walking speed; and
- Pedestrian scale lighting at and near the intersection.

NJ 73 at North Stiles Avenue

This signalized intersection provides the only nearby protected pedestrian crossing of NJ 73, which bisects a single-family residential area.

Recommended Improvements

- Continental-style crosswalks across all four approaches for greater pedestrian visibility;

- Enhance the pedestrian refuge in the NJ 73 median;
- Construct bumpouts to reduce the pedestrian crossing distance, and without restricting vehicular turning radii;
- Install ADA-accessible curb ramps;
- Pedestrian-actuated countdown signals for each crosswalk; and
- Adequate pedestrian crossing times, assuming a 3.5 feet/second walking speed.

NJ 38 at Lenola Road

This intersection has a shopping center on the northeast quadrant, a regional mall (Moorestown Mall) on the southeast quadrant, a gas station on the northwest quadrant, and car dealership on the southwestern quadrant. Vehicular volumes at this intersection have a large proportion of turning movements due to these trip generators and the regional significance of these roadways. This is also a major corridor for buses, all of which are routed through the Mall's transfer point.

Recommended Improvements

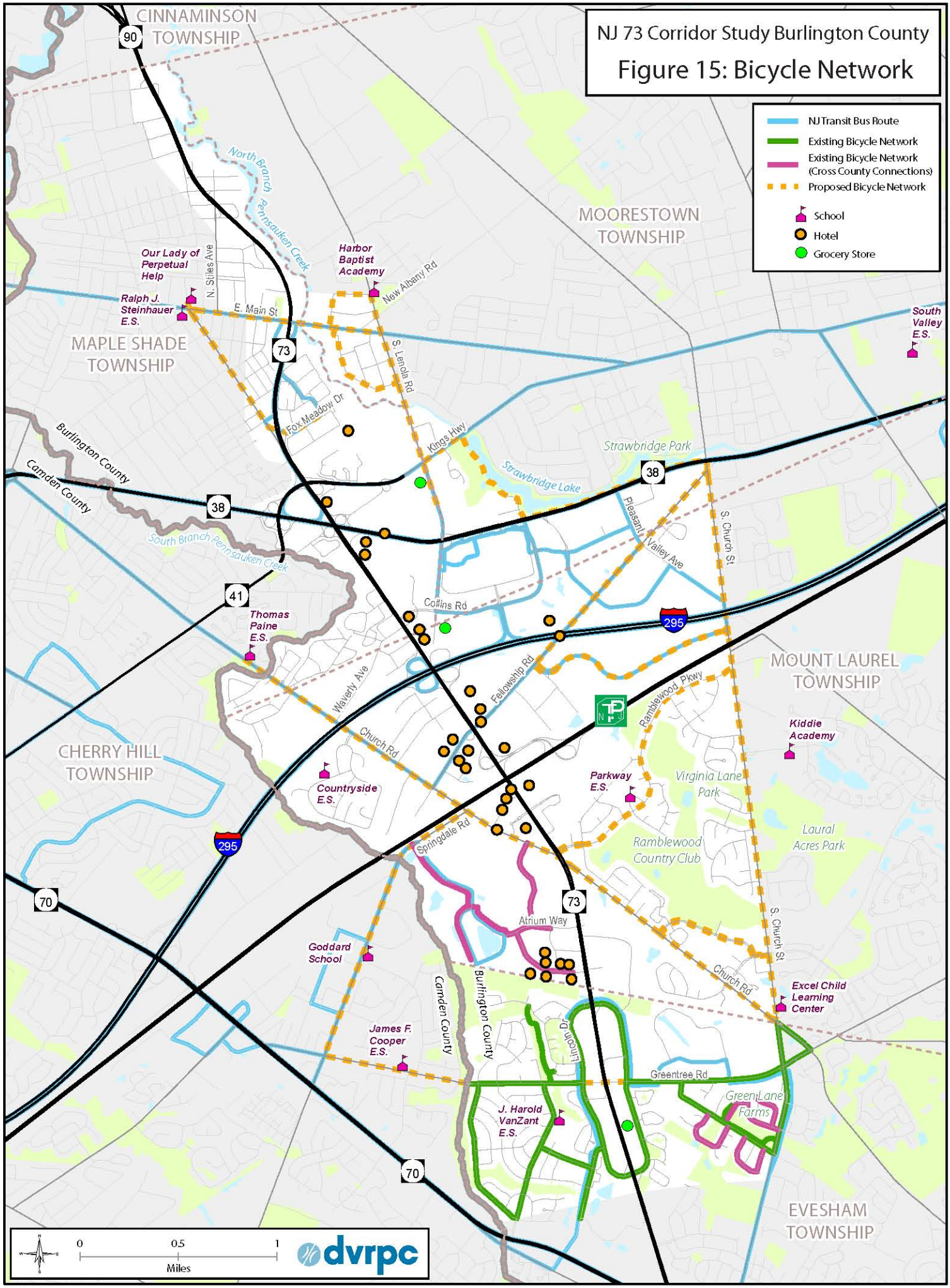
- A continental-striped crosswalk across NJ 38 for greater pedestrian visibility;
- ADA-accessible curb ramps;
- Pedestrian-actuated countdown signals for each crosswalk; and
- Adequate pedestrian crossing times, assuming a 3.5 feet/second walking speed.

In addition to the specific areas described above, in general, there is a need to improve the pedestrian environment in the vicinity of schools, recreation sites, retail, and other areas of pedestrian activity. Safe sidewalks, crosswalks, and signal timing are essential to accommodating and encouraging current and future levels of pedestrian traffic. Where feasible pedestrian pathways should have landscaped buffers and pedestrian-scale lighting.

Bicycling Facilities

The NJ 73 corridor experiences heavy vehicular volumes with numerous areas of excessive speeding due to the open nature of some roadway segments. In addition, there are no bicycle-specific accommodations along NJ 73. However, many of the intersecting streets carry significantly smaller volumes and thus may provide a suitable environment for cycling, particularly where there is adequate shoulder width that may accommodate an on-street bicycle lane.

Established bicycle routes and trails are sparse within the study area. The major concentration is in Evesham Township in the Greentree Road area, as shown in Figure 15.


NJ 73 Corridor Study Burlington County
Figure 15: Bicycle Network
NJ Transit Bus Route
Existing Bicycle Network
Existing Bicycle Network (Cross County Connections)
Proposed Bicycle Network
School
Hotel
Grocery Store
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
North Branch Pennsauken Creek
South Branch Pennsauken Creek
Burlington County
Camden County
Our Lady of Perpetual Help
Harbor Baptist Academy
Ralph J. Steinhauer E.S.
South Valley E.S.
Thomas Paine E.S.
Countryside E.S.
Goddard School
James F. Cooper E.S.
J. Harold VanZant E.S.
Kiddie Academy
Parkway E.S.
Excel Child Learning Center
Strawbridge Park
Strawbridge Lake
Virginia Lane Park
Laural Acres Park
Ramblewood Country Club
Green Lane Farms
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Ramblewood Pkwy
Church Rd
Springdale Rd
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Proposed New Bike Routes

NJDOT Bicycle Planning Guide has identified three categories of bikeways:

1. Bicycle Routes which are roadways designated for bicycle use through the installation of directional and informational signage.

2. Bicycle Lanes which are lanes designated for exclusive or preferential use by bicycles through the application of pavement striping or markings and signage.

3. Bicycle Paths which are bicycle facilities separated from motorized vehicular traffic. A bicycle path may be located within a highway right-of-way or on an independent right-of-way. A bicycle path is not a sidewalk but may be designed to permit shared use with pedestrians.

The study team has identified a potential bikeway network with new bicycle connections to major destinations and proposed improvements at conflict points. The following are some of the proposals for expansion of the bicycle network, which would include routes, lanes, and paths based on the available right-of-way within particular areas:

- Create a connection along **Greentree Road** across NJ 73 in Evesham Township. By making this link bicycle-friendly with proper signage and designating this connection as a bike route, bicycle safety and visibility would be enhanced;
- The area encompassed by **Church Road (CR 616)**, **Ramblewood Parkway**, and **Church Street (CR 607)** in Mount Laurel Township is mostly residential. Designating bike routes along these facilities would permit easier access within this residential community. In addition, Church Street provides a direct connection between NJ 38 and Greentree Road;
- **Church Road**, between NJ 73 and the Camden County line is a very straight facility with good sight distance. While this contributes to high speeds, there are shoulders present that can be utilized by bicycles. The awareness of motorists can be enhanced by having “Share the Road” signs along this route;
- **Fox Meadow Drive** and **Fellowship Road** in Maple Shade Township would be appropriate bike routes. Fellowship Road connects the adjacent residential area with the Ralph Steinhauer Elementary School in the north and the recreation area with a ball field and skate park near NJ 73 in the south. Fox Meadow Drive links the multi-family rental community of Fox Meadow to Fellowship Road, and thus with the recreation site as well; and
- Having a bike route along **Nixon Drive** would connect the Kings Highway to NJ 38 and the Moorestown Mall. In addition, it would provide a scenic ride through Strawbridge Park. Bike route signage, particularly near the intersection with the Kings Highway and NJ 38, would have to be in place to alert motorists of the presence of bicycles.

Corridorwide Enhancements

The *NJDOT Bicycle Planning Guide* has proposed several enhancements to designated bicycle facilities to improve visibility, safety and function. Many of these are appropriate for roads within the study area. These include:

- “Share the Road” signs, which are intended for use on roadways in situations in which it is determined advisable to alert motorists of the likely presence of bicycle traffic, and to alert all traffic of the need to share available roadway space;
- Striping wider outside or curb-side lanes and narrower interior lanes;
- Providing a limited paved shoulder area via the striping of a narrow travel lane. This tends to slow motor vehicle operating speeds and establish a physical space (with attendant psychological benefits) for bicycle operation;
- Where narrow bridges create a constriction, “move over” zebra striping should be used to shift traffic away from the parapet and provide space for bicycle traffic;
- Road dieting of four-lane roadways, where travel lanes are reduced from two in each direction to one with a two-way left-turn lane and shoulders; and
- Reduction of the number of travel lanes in each direction, and the inclusion or reestablishment of paved shoulders.

Overall, recommendations would strive to improve pedestrian and bicyclist mobility and safety, while recognizing the importance of active transportation and its strong impact upon the health of a community.

Access Management

Access management is a set of strategies that seeks to improve a road’s operational efficiency and safety, by addressing the interaction between vehicles traveling along the roadway and vehicles seeking to access and exit parcels located adjacent to the roadway. Strategies include maintaining the network hierarchy, limiting direct access points, separating conflict areas, and prohibiting left turns via a non-traversable median. When implemented correctly, access management may improve congestion levels, reduce the frequency and severity of crashes, improve fuel efficiency, and maintain the functionality of higher classification roadways. In addition, many of these goals may be accomplished with little costs while providing sustainable long-term benefits. Lastly, it recognizes the relationship between transportation and land use, and how the interests of both may be accomplished cohesively.

NJ 73 within the corridor is designated an urban principal arterial, a highway of regional significance, with connections to two interstates (I-295 and the NJTP), three state routes (NJ 38, NJ 41 and NJ 70), two Delaware River bridges and a number of county routes within three townships. Its primary purpose is to carry large volumes at effective speeds over a significant distance. However, it also provides access to many local commercial and residential properties, thus the need for robust and consistent access management strategies.

Access along state-controlled roads in NJ must adhere to NJDOT’s *State Highway Access Management Code*, which regulates the quantity, location, and type of permissible access points. Within the study area, NJ 73 is designated with an access level of three (3), which allows right turn ingress and egress, while left turn access is only available via jughandles at signalized

intersections. Currently, much of the corridor complies with these regulations, though at a few intersections left turns are provided via exclusive turn lanes rather than by jughandles. Future deviations from this access level will require approval from NJDOT, thus affecting which strategies to pursue for the NJ 73 corridor.

Access management strategies applicable to the study corridor include:

- Cross Access/Shared Parking – direct connections between adjacent parcels or the lack of barriers between adjacent parking lots will reduce the number of trips onto the main highway;
- Shared Access – the consolidation of driveways for a single parcel or multiple parcels will reduce the number of merging and diverging conflict points along the main highway;
- Acceleration/Deceleration Lanes – the provision of auxiliary lanes to separate merging and diverging vehicles from the main highway;
- Frontage Roads – a lower-speed road parallel to the main highway that serves as a shared driveway for multiple parcels;
- Jughandles – a ramp that converts left turn movements into through movements via a side-street, thus removing left-turning vehicles from the main highway;
- Preservation of the Functional Area of Intersections/Interchanges – limit the close proximity of access points to intersections and interchanges, thus reducing the number and density of conflict points at such locations; and
- Supporting Circulation Network – a comprehensive street network will provide alternate routes for local trips and encourage multi-modal travel, thus removing trips from the main highway;

There are multiple locations along the NJ 73 corridor that are suitable for access management strategies. These include areas with adjacent but physically separated parking lots, numerous and closely spaced access points, heavily utilized access points, intersections or interchanges with immediately adjacent access points, and areas with incomplete street networks. Figure 16 demonstrates how crossed and shared access may be incorporated into existing commercial parcels along northbound NJ 73, just south of Willow Road. Currently, these four parcels have eight unique access points along NJ 73, which can be reduced to three, with additional connections to secondary roads- Lenola Road in this instance. This principle can be applied at many locations throughout the corridor.

Additional locations suitable for access management include:

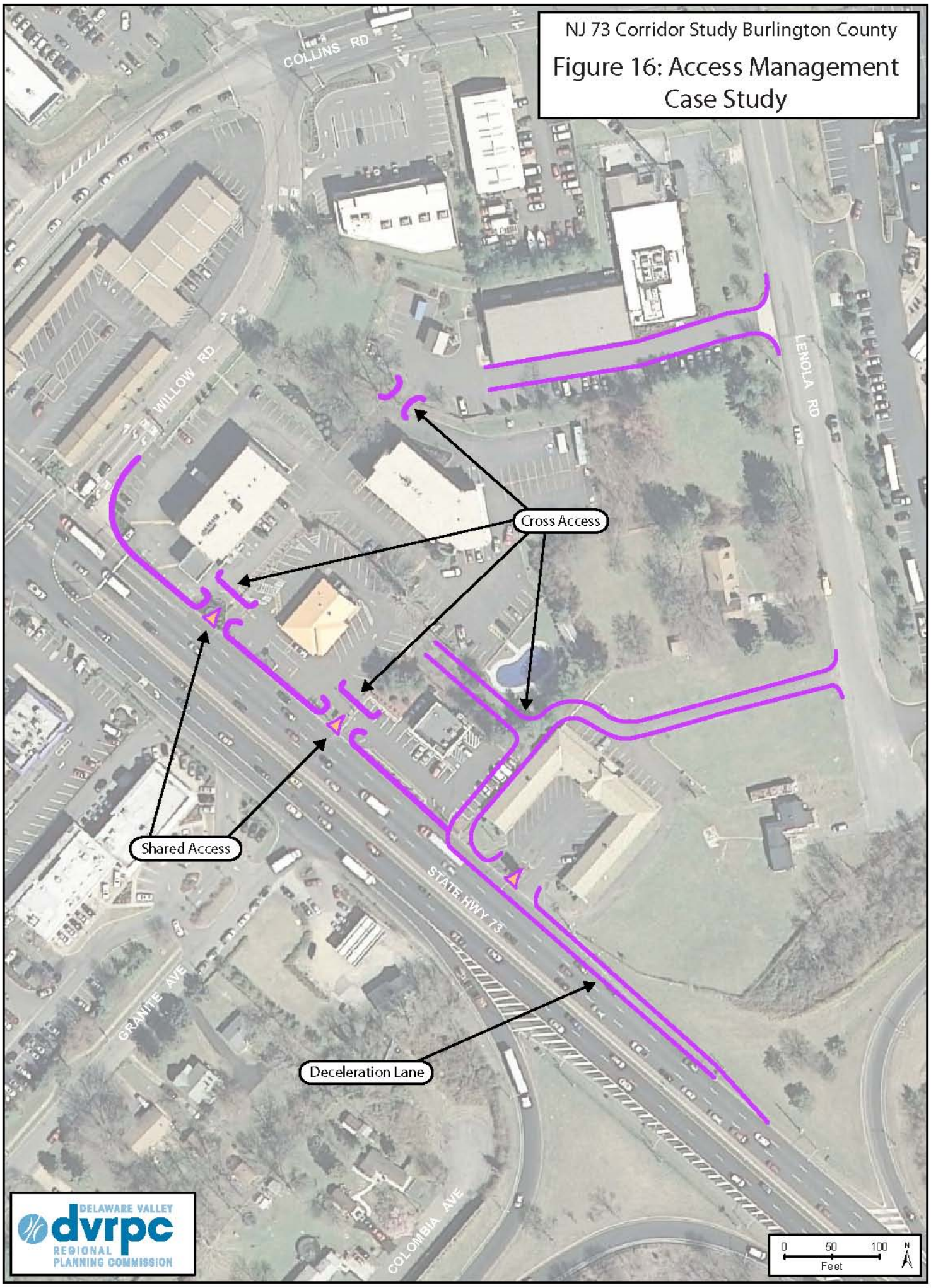
- Along southbound NJ 73, immediately north of the on-ramp to NJ 41, the Dunkin' Donuts shopping center has two access points within several feet of the on-ramp. Consider sharing or crossing access with the upstream Evergreen Circle driveway;
- Northbound NJ 73 vehicles seeking the ramp onto eastbound NJ 38 must share a travel lane with those vehicles entering and exiting adjacent businesses. An auxiliary acceleration and deceleration lane may be provided along northbound NJ 73 beginning immediately upstream

of the Lowe's driveway and past the adjacent Clover Motel and Crossroad Inn to facilitate separation of these vehicles;

- At the intersection of NJ 73 with North Stiles Avenue and Princeton Avenue, one of the Citgo gas station's driveway terminates within a few feet of the northbound NJ 73 stop bar. Relocating or consolidating this access point so that it is further away from the stop bar will preserve the intersection's functional area; and

- Commerce Parkway is sited only 300 feet away from the three-legged signalized intersection of NJ 73 and Atrium Way. Rerouting Commerce Parkway to intersect with Atrium Way will provide a direct east-west connection, thus reducing the number of trips traveling along NJ 73 to either of these side streets.

These access management strategies may be implemented over time as parcels are developed or redeveloped. To encourage their adoption, the study area municipalities will need to revise or reinforce municipal zoning regulations to allow for such strategies. In addition, ordinance revisions will provide the legal support for changes to the access of properties along NJ 73 within a given municipality. Appendix D includes a sample ordinance for a Corridor Access Management Overlay district (CAMO), which advocates for many of the discussed strategies. Lastly, municipalities should pursue strategies in a coordinated fashion in order to provide a consistent approach to access management along the corridor.


NJ 73 Corridor Study Burlington County
Figure 16: Access Management Case Study
COLLINS RD
WILLOW RD
LENOLA RD
Cross Access
Shared Access
STATE HWY 73
GRANITE AVE
Deceleration Lane
COLOMBIA AVE
DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION
0
50
100
Feet
N

In addition to recommendations for specific modes of transportation (pedestrians, bicyclists, and transit riders), issue areas throughout the NJ 73 corridor were analyzed in greater detail. These areas were evaluated for their safety, multi-modal mobility, and ability to advance smart growth principles. Site visits, traffic counts, and stakeholder familiarity were used to identify pertinent issues and priorities. As a result, specific short- to long-term recommendations were developed for each issue area. The issue areas are displayed in Figure 17.

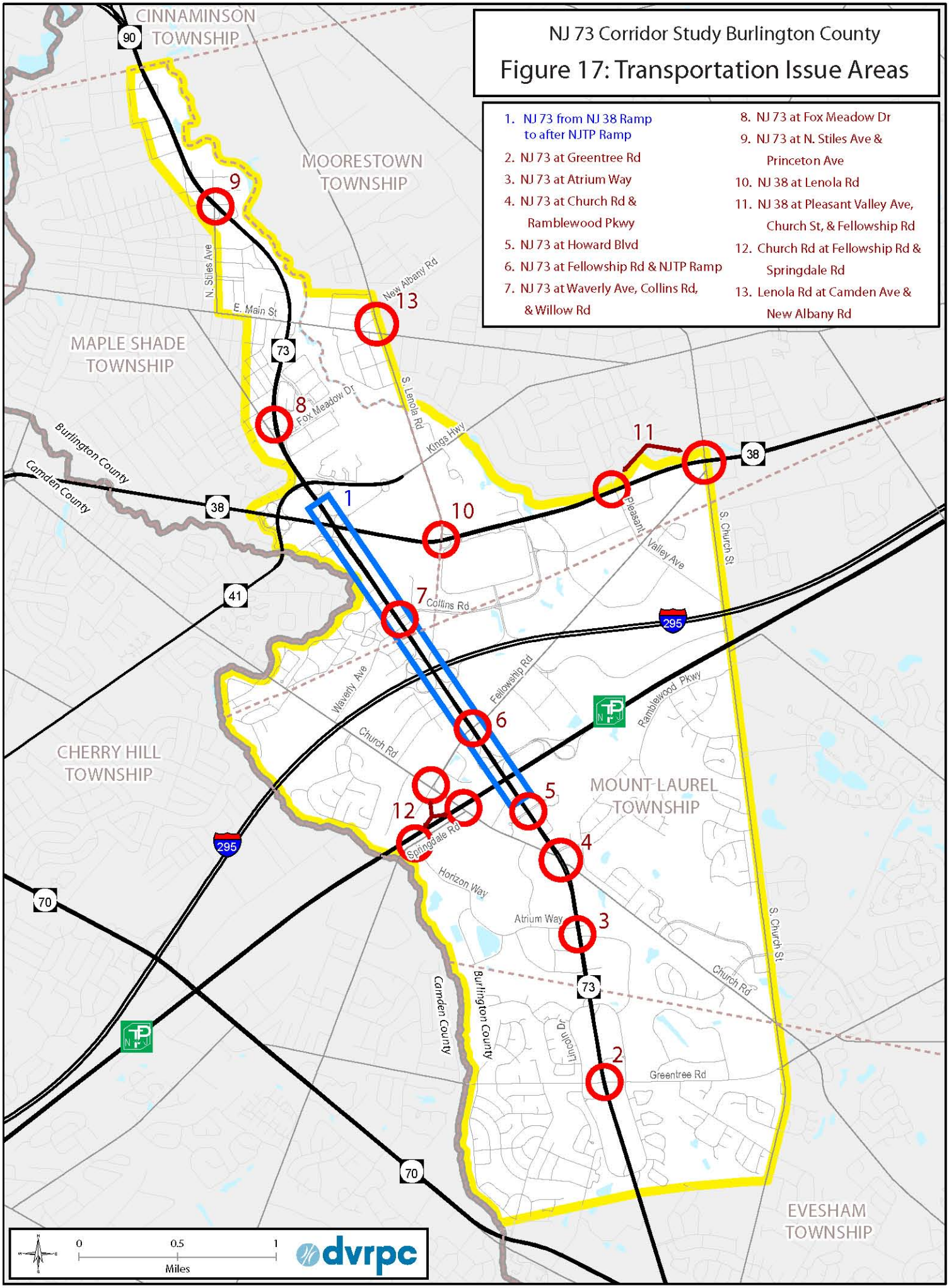
NJ 73 Arterial Analysis

1. NJ 73 from the New Jersey Turnpike to NJ 38

Of the almost 35 mile route of NJ 73 in the corridor, one of its most heavily traveled portions is the one-and-a-half mile segment from the New Jersey Turnpike (NJTP) to NJ 38, which provides the most direct connection from the NJTP and I-295 to Center City Philadelphia. In addition to the interchanges with the aforementioned interstates and NJ 38, there are two signalized intersections (Fellowship Road-CR 673 and Waverly Avenue/Willow Road), four unsignalized intersections, and numerous driveways. To accommodate these roadways and the large vehicular volume they contribute, additional auxiliary lanes are provided along certain stretches of NJ 73. However, the number of lanes is rarely consistent; there are six and seven lane changes in the north and southbound directions of NJ 73, respectively. As a result, the number of lanes per direction will vary from two to four. There are 27 driveways along northbound NJ 73, and 21 driveways along southbound NJ 73. At half of these driveways, there is a striped shoulder to assist with the separation of merging and diverging vehicles from through vehicles; however, none have a formal acceleration/deceleration lane.

The most recent volume data along NJ 73 available from NJDOT suggests that this segment is the most heavily traveled within the study area; particularly the segment between the NJTP and I-295 interchanges with an approximate AADT of 86,000. Segments along NJ 73 north of NJ 38 and south of the NJTP carried 67,000 and 32,000 vehicles, respectively. These severe variations in volume indicate that the multiple interchanges and intersections within this short distance contribute to and remove from NJ 73 a large number of vehicles. This requires numerous weaving movements on a daily basis within a constrained space.

Between 2006 and 2008, this segment of NJ 73 experienced almost 500 crashes, representing 41 percent of the corridor's crashes while only accounting for 24 percent of its mileage. Of these crashes, over 100 were sideswipes, accounting for over 50 percent of the entire corridor's crashes of this type. Half of the NJ 73 corridor's 12 crash clusters are located within this relatively short segment, including the two largest.


NJ 73 Corridor Study Burlington County
Figure 17: Transportation Issue Areas
1. NJ 73 from NJ 38 Ramp to after NJTP Ramp
2. NJ 73 at Greentree Rd
3. NJ 73 at Atrium Way
4. NJ 73 at Church Rd & Ramblewood Pkwy
5. NJ 73 at Howard Blvd
6. NJ 73 at Fellowship Rd & NJTP Ramp
7. NJ 73 at Waverly Ave, Collins Rd, & Willow Rd
8. NJ 73 at Fox Meadow Dr
9. NJ 73 at N. Stiles Ave & Princeton Ave
10. NJ 38 at Lenola Rd
11. NJ 38 at Pleasant Valley Ave, Church St, & Fellowship Rd
12. Church Rd at Fellowship Rd & Springdale Rd
13. Lenola Rd at Camden Ave & New Albany Rd
CINNAMINSON TOWNSHIP
MOORESTOWN TOWNSHIP
MAPLE SHADE TOWNSHIP
CHERRY HILL TOWNSHIP
MOUNT LAUREL TOWNSHIP
EVESHAM TOWNSHIP
Burlington County
Camden County
N. Stiles Ave
E. Main St
New Albany Rd
S. Lenola Rd
Fox Meadow Dr
Kings Hwy
Pleasant Valley Ave
S. Church St
Collins Rd
Waverly Ave
Fellowship Rd
Ramblewood Pkwy
Church Rd
Springdale Rd
Horizon Way
Atrium Way
Lincoln Dr
Greentree Rd
90
73
38
41
295
70
0
0.5
1
Miles
dvrpc

Issues

- High frequency of lane drops and additions due to the density of interchanges and signalized intersections within this short segment of NJ 73;
- Large amounts of vehicular volume concentrated within this segment of NJ 73; and
- High proportion of the corridor's crashes and crash clusters, and in particular sideswipe crashes.

Recommendations

- Add overhead lane control signage, along with destination signage. For "Exit Only" lanes at the interchanges and intersections, place a pavement marker of the destined roadway's emblem upon the relevant lane. An example is shown in Figure 18; and
- Designate the current inside travel lane per direction of NJ 73 as an "Express" through lane. It will provide motorists a travel lane dedicated to through movements that is unhindered by lane changes and the excessive acceleration and deceleration vehicles often experience along a roadway with numerous entry and exit points. The remaining lanes will continue to serve as general purpose "Local" collector-distributor lanes, with access to interchanges, intersections, and driveways. The "Express" and "Local" lanes will be separated via appropriate striping or frequently spaced physical dividers, such as flexible delineator posts as well as substantial directional signage. Assuming the implementation of recommendations for the NJ 73 and Fellowship Road intersection as shown in Figure 23, the limits of this lane separation will be from the NJTP to the NJ 38 interchange, with the only interruptions at the Fellowship Road and Waverly Avenue-Willow Road intersections. At these intersections, lane changes between the "Express" and "Local" lanes will be prohibited, and turning movements will be completed via the existing jughandles. Figure 19 displays the extent and layout of this design.

Figure 18: Photo Rendering of Pavement Markings and Express Lane Delineation along NJ 73

Source: DVRPC, 2010

NJ 73 Corridor Study Burlington County

Figure 19: Express Lane Delineation

Buffer between "Express" and "Local" lane

Conclude the northbound NJ 73 "express" lane downstream of the westbound NJ 38 off-ramp

Vehicles in the northbound "express" lane are restricted from accessing NJ 38

Begin the southbound NJ 73 "express" lane upstream of the eastbound NJ 38 on-ramp

STATE HWY 41

STATE HWY 38

A

Breakline

At signalized intersections, lane changes between "express" and "local" lanes are prohibited from NJ 73 approaches. Turning movements from side streets onto NJ 73 may access either lane type

Intersection improvements recommended for the NJ 73, Waverly Avenue, Willow Road, and Collins Road intersections

COLLINS RD

WILLOW RD

WAVERLY AVE

B

Vehicles in both "express" lanes are restricted from accessing I-295

INTERSTATE 295

C

Intersection improvements recommended for the NJ 73 and Fellowship Road intersection, and New Jersey Turnpike ramp

At signalized intersections, lane changes between "express" and "local" lanes are prohibited from NJ 73 approaches. Turning movement from side streets onto NJ 73 may access either lane type

Vehicles in both "express" lanes are restricted from accessing the New Jersey Turnpike

NEW JERSEY TURNPIKE INTERCHANGE

NEW JERSEY TURNPIKE

Begin the northbound NJ 73 "express" lane upstream of the New Jersey Turnpike on-ramp

Conclude the southbound NJ 73 "express" lane downstream of the New Jersey Turnpike off-ramp

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

0 150 300 Feet

N

NJ 73 Intersection Analysis

2. NJ 73 at Greentree Road

Existing Conditions

This is a four-legged signalized intersection, sited at the center of a large commercial area. Left turns from Greentree Road are provided via exclusive left turn lanes and protected signal phasing, whereas left turns from NJ 73 are accommodated by farside jughandles. The adjacent signalized intersections of Greentree Road with Lincoln Drive West and Lincoln Drive East are only 600 and 550 feet from NJ 73, respectively. This short distance between the signal heads of adjacent intersections affects a driver's ability to identify the appropriate signal head for their immediate intersection. In addition, the tree canopy along Greentree Road obstructs the visibility of downstream signal heads. The intersection has two parallel-striped crosswalks, across the north and southbound approaches of NJ 73, with countdown man-hand signal heads.

This intersection is the eleventh largest crash cluster along NJ 73 within the study area, with 28 crashes between 2006 and 2008. The largest crash type is "Same Direction (Rear End)," with 57 percent of the crashes. Eighty-two percent of the cluster is composed of Property Damage Only crashes, with zero fatalities.

During the morning and afternoon peak hours, the intersection operates at a LOS of C with an average delay of 30 to 34 seconds. The NJ 73 approaches experience a LOS of B or C, with about 20 seconds of average delay. The eastbound Greentree Road is the most congested during either peak hour, at a LOS of E with about 60 seconds of delay. Table 20 summarizes the delay and LOS measures at this intersection.

Table 20: NJ 73 at Greentree Road Intersection LOS

		Existing	
		Delay (sec)	LOS
AM Peak Hour	NJ 73 (NB)	19	B
	NJ 73 (SB)	18	B
	Greentree Rd (EB)	58	E
	Greentree Rd (WB)	44	D
	Total Intersection	30	C
PM Peak Hour	NJ 73 (NB)	20	B
	NJ 73 (SB)	23	C
	Greentree Rd (EB)	65	E
	Greentree Rd (WB)	44	D
	Total Intersection	34	C

Source: DVRPC, 2010

Summary

Issues:

- Driver confusion due to closely spaced signal heads;
- Visually obstructed signal heads due to overgrown tree canopy along Greentree Road; and
- Incomplete system of pedestrian crossing amenities at the intersection.

Pedestrian Recommendations:

- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown man-hand signal heads, and ADA-accessible curb ramps across all four approaches;
- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Construct raised pedestrian refuges in the median of NJ 73; and
- Complete the adjacent sidewalk network.

Highway Recommendations:

- Optically program the signal heads for the Greentree Road approaches, to minimize driver confusion; and
- Reduce the tree canopy along Greentree Road by trimming vegetation in the clear zone to improve the visibility of downstream signal heads.

3. NJ 73 at Atrium Way

Existing Conditions

Atrium Way meets NJ 73 at a large, signalized, three-legged intersection. Northbound and southbound vehicles enter from NJ 73, and eastbound vehicles enter from Atrium Way. The intersection has no westbound leg, but an unsignalized three-legged intersection 250 feet to the south at Commerce Parkway does. The Commerce Parkway approach is stop-controlled, and is accessible from northbound NJ 73 as a right-in-right-out. There is a long driveway 100 feet north of Atrium Way that gives northbound NJ 73 vehicles a one-way entrance to a TD Bank sited on the eastern edge of the intersection. The net result of this layout is that motorists from north and west of this location lack a direct route to areas east of NJ 73. Instead, these motorists must drive south to Lincoln Drive, utilize a jughandle to turn left, and then access Commerce Parkway - an additional 0.6 miles and three intersections.

There are three travel lanes for northbound NJ 73, one of which is an exclusive left turn lane. Southbound NJ 73 also has three travel lanes, with the outer lane permitting right turns. Atrium Way has two left turn lanes and one right turn lane onto NJ 73. There are inadequate amenities

for pedestrians and bicyclists at the intersection; there are no crosswalks, pedestrian signals, or sidewalks. There are wide shoulders on NJ 73, but these are unsafe for either pedestrians or bicyclists.

From 2006 through 2008, there were 40 crashes at or around this intersection, thus representing the eighth largest cluster on NJ 73 within the study area. Of these crashes, most were not at the intersection (78%), one-third produced injuries (33%), and most were rear-end crashes (68%). The 27 rear-end crashes produced injuries in 24 vehicles-a significant cause for concern. Additionally, 85 percent of vehicles involved in rear-end crashes were traveling northbound. The second highest crash type was side-swipes, with six crashes, which mostly involved northbound NJ 73 vehicles though none resulted in injuries. The third highest category was "Left/U-Turn" with just three crashes, but each produced injuries.

In the morning peak hour, the intersection operated at a LOS of D with an average overall delay of 36 seconds. In the afternoon peak hour, the intersection's LOS was B with an average overall delay of 20 seconds. The largest delays occurred on Atrium Way, with an average of 55 and 48 seconds in the morning and afternoon peak hours, respectively. Table 21 summarizes the delay and LOS measures at this intersection.

Table 21: NJ 73 at Atrium Way Intersection LOS

		Existing		Medium-Term	
		Existing Geometry		Add a Westbound 4th Leg	
		Existing Signal Timing		Split Optimized Signal Timing	
		Delay (sec)	LOS	Delay (sec)	LOS
AM Peak Hour	NJ 73 (NB)	43	D	38	D
	NJ 73 (SB)	25	C	49	D
	Atrium Way (EB)	55	D	88	F
	Atrium Way (WB)	N/A		110	F
	Total Intersection	36	D	48	D
PM Peak Hour	NJ 73 (NB)	14	B	63	E
	NJ 73 (SB)	19	B	37	D
	Atrium Way (EB)	48	D	91	F
	Atrium Way (WB)	N/A		117	F
	Total Intersection	20	B	60	E

Source: DVRPC, 2010

Land uses surrounding this intersection are mostly low-density office and commercial buildings. Specifically, there is a Cracker Barrel restaurant, a TD Bank, several car dealerships, and numerous office complexes. To the east, along Commerce Parkway, there is the Greentree Office Park, a significant employment center. All buildings are set back from the street considerably, and provide vast amounts of parking.

Figure 20 displays the recommendations for this location

Summary

Issues:

- Inaccessibility of employment centers east of NJ 73 for drivers coming from the north or west, forcing additional vehicles through Lincoln Drive and its intersections;
- Disruption of northbound traffic on NJ 73 by three access points within 400 feet, contributing to a high rate of rear-end crashes with injuries;
- Vehicular congestion during the AM peak hour; and
- Lack of pedestrian crossing amenities at the intersection.

Pedestrian Recommendations:

- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown man-hand signal heads, and ADA-accessible curb ramps across all four approaches;
- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Construct raised pedestrian refuges in the median of NJ 73 at crosswalk paths; and
- Complete the adjacent sidewalk network.

Highway Recommendations:

- Construct an extension of Atrium Way east of the intersection and connect it with Commerce Parkway. This will dramatically improve the accessibility of employment centers east of NJ 73. The land for this alignment is currently vacant;
- Adjust the lane geometry and signal timing to reflect the additional vehicular volume anticipated due to the new approach leg. The intersection's average overall delay is calculated to increase by 12 and 40 seconds during the morning and afternoon peak hour, respectively. Delay increases will be most pronounced for the Atrium Way approaches. Vehicular delay is anticipated to decrease at adjacent intersections, particularly at NJ 73 and Lincoln Drive;
- Eliminate the long driveway to TD Bank, as it will be accessible from the new road;
- Eliminate access to NJ 73 from the old alignment of Commerce Parkway. The road may be retained as an ingress-only access point ahead of the signalized intersection, or removed entirely to fully consolidate access point conflicts; and
- Install a channelized right turn lane and island for at the southbound NJ 73 approach. This will assist with separating turning vehicles from through vehicles, as well as shorten the crossing distance for pedestrians.

NJ 73 Corridor Study Burlington County

Figure 20: NJ 73 at Atrium Way Recommended Improvements

Existing Sidewalk
Proposed Sidewalk

STATE HWY 73

NEW DEVELOPMENT OPPORTUNITY

NEW DEVELOPMENT OPPORTUNITY

CRACKER BARREL

Install a channelized right turn lane and island

Construct a fourth approach leg to the existing intersection. Access will be provided for all approaches, including southbound NJ 73 via an exclusive left turn lane

TD BANK

ATRIUM WAY

Install continental-style crosswalks, push buttons, countdown man-hand signals, median refuges, and ADA-accessible curb ramps

COMMERCE PKWY

Complete the existing sidewalk network

Prohibit right turns onto northbound NJ 73 from Commerce Parkway

HOLMAN TOYOTA/SCION

STATE HWY 73

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

0 40 80 Feet

N

4. NJ 73 at Church Road (CR 616) and Ramblewood Parkway

Existing Conditions

This location is composed of two signalized intersections spaced less than 400 feet apart. The northern intersection has four approach legs (north and southbound NJ 73, eastbound Church Road, and westbound Ramblewood Parkway), whereas the southern intersection has only three approach legs (north and southbound NJ 73, and westbound Church Road). Left turns are permitted at all four of the northern intersection's approaches, while only southbound NJ 73 is provided left-turn opportunities at the southern intersection; southbound through movements are neither sign nor signal controlled, thus they serve as free movements. An east or westbound through movement along Church Road, requires two separate movements across multiple lanes and signals; one of these movements is a left turn from NJ 73, which already experiences queue spillback due to relatively short storage lengths that are limited by the close proximity of the two intersections. Despite NJDOT's construction of upstream left-turn storage lanes in 2006, queue spillback continues to occur. The signal timing for both intersections is clustered, thus they operate simultaneously and with the same timing plan, which is frequently abused by motorists familiar with the timing's use of extensive all-red phases. There are no crosswalks nor pedestrian signal heads at both intersections, and pedestrian push buttons are available for only one crossing at the northern intersection.

This location is the third highest crash cluster along NJ 73 within the study area, with 86 crashes between 2006 and 2008. The crash rate has improved since 2006, when NJDOT redesigned some of the location's approaches. From 2003 to 2006, this location experienced 33 crashes per year, but in 2007 and 2008, it averaged only 26 crashes per year. Similar to the other NJ 73 clusters, two-thirds of the crashes were property-damage-only, with the remaining third being injury-related. Unlike the other clusters, roughly half of the crashes were "at intersection" crashes, whereas only 10 percent to 25 percent of most clusters are composed of such crashes. The second highest category of crashes at this cluster is "Left/U-Turn" crashes, with 20 crashes over the three-year period.

During the morning and afternoon peak hours, both intersections operate at a LOS of F. The northern intersection operates with an overall average delay of 91 to 100 seconds. Its southbound NJ 73 and two side street approaches experience the most delay, from 105 seconds to 290 seconds; the latter represents almost three cycles of the signal plan. The southern intersection's overall average delay is 107 to 117 seconds. The most congested movements are southbound NJ 73 left turns and westbound Church Road right turns, with average delays from 286 to 481 seconds; the latter represents over four cycles of the signal plan. Tables 22 and 23 summarize the delay and LOS measures at this intersection.

A number of commercial structures are sited adjacent to these intersections. Most are set back from NJ 73 by 100 feet or greater. Three large car dealerships, including Holman Cadillac, occupy the western side of the location, and its surface parking lots continue west up to Arbor Way. The parcels at the northwest and southeast quadrants are vacant.

Figure 21 displays the long-term recommendation for this intersection.

Table 22: NJ 73 at Church Road and Ramblewood Parkway Intersection LOS, AM Peak Hour

			Existing		Short-Term						Long-Term	
			Existing Geometry		Existing Geometry		Add 2nd WB Church Rd Right-Turn Lane				Reroute EB Church Rd to Align with WB Church Rd	
			Existing Signal Timing		Additional Green Time for WB Church Rd		Existing Signal Timing		Additional Green Time for WB Church Rd		Cluster Signal Timing	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
AM Peak Hour	Northern Intersection	NJ 73 (NB)	30	C	34	C	28	C	30	C	42	D
		NJ 73 (SB)	106	F	106	F	106	F	106	F	12	B
		Church Rd (EB)	249	F	249	F	249	F	249	F	113	F
		Ramblewood Pkwy (WB)	274	F	274	F	274	F	274	F	74	E
		Total Intersection	91	F	93	F	90	F	91	F	31	C
	Southern Intersection	NJ 73 (NB)	33	C	37	D	34	C	34	C	56	E
		NJ 73 (SB Left Turn)	286	F	286	F	286	F	286	F	73	E
		NJ 73 (SB Approach)	51	D	51	D	51	D	51	D	79	E
		Church Rd (EB)	N/A		N/A		N/A		N/A		73	E
		Church Rd (WB)	470	F	285	F	21	C	12	B	86	F
		Total Intersection	107	F	81	F	40	D	39	D	71	E

Source: DVRPC, 2010

Table 23: NJ 73 at Church Road and Ramblewood Parkway Intersection LOS, PM Peak Hour

			Existing		Short-Term						Long-Term	
			Existing Geometry		Existing Geometry		Add 2nd WB Church Rd Right-Turn Lane				Reroute EB Church Rd to Align with WB Church Rd	
			Existing Signal Timing		Additional Green Time for WB Church Rd		Existing Signal Timing		Additional Green Time for WB Church Rd		Cluster Signal Timing	
			Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
PM Peak Hour	Northern Intersection	NJ 73 (NB)	41	D	47	D	41	D	41	D	69	E
		NJ 73 (SB)	105	F	105	F	105	F	105	F	21	C
		Church Rd (EB)	290	F	290	F	290	F	290	F	42	D
		Ramblewood Pkwy (WB)	184	F	184	F	184	F	184	F	29	C
		Total Intersection	100	F	103	F	100	F	100	F	44	D
	Southern Intersection	NJ 73 (NB)	26	C	26	C	25	C	25	C	49	D
		NJ 73 (SB Left Turn)	481	F	481	F	481	F	481	F	145	F
		NJ 73 (SB Approach)	130	F	130	F	130	F	130	F	76	E
		Church Rd (EB)	N/A		N/A		N/A		N/A		158	F
		Church Rd (WB)	313	F	158	F	79	E	15	B	161	F
		Total Intersection	117	F	98	F	88	F	79	E	86	F

Source: DVRPC, 2010

NJ 73 Corridor Study Burlington County

Figure 21: NJ 73 at Church Road and Ramblewood Parkway Recommended Improvements

Existing Sidewalk
Proposed Sidewalk

Prohibit northbound NJ 73 turns at the northern intersection

Complete the existing sidewalk network

Signalize the southbound NJ 73 approach at the southern intersection. This allows northbound NJ 73 left turns as well as westbound and eastbound Church Road through movements

Reconfigure eastbound Church Road to only provide left turns onto NJ 73 and through movements onto Ramblewood Parkway

Install advance signage to inform motorists of new east and westbound travel patterns due to new roadway alignment

Install continental-striped crosswalks, countdown man-hand signals, ADA-accessible curb ramps, and median refuges at intersections

Widen and reconfigure westbound Church Road to provide three entry lanes, solely utilizing existing ROW

Add an exclusive right turn lane for the northbound NJ 73 approach at the southern intersection

Construct a new 2 lane, bi-directional road connecting NJ 73 and Arbor Way

CHURCH RD
STATE HWY 73
RAMBLEWOOD PKWY
ARBOR WAY
ELLIPSE SHOPPING CENTER
ON THE BORDER
MACARONI GRILL
HOLMAN CADILLAC
BMW OF MOUNT LAUREL

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

0 50 100 N
Feet

Summary

Issues:

- Vehicular congestion during both peak hours;
- Queue spillback from the NJ 73 left turn lanes due to limited storage length;
- Division of Church Road through movements into two separate turning movements generates unsafe weaving conditions;
- High crash cluster with a large percentage of “at intersection” and “Left/U-Turn” crashes; and
- Lack of pedestrian crossing amenities at the intersection.

Pedestrian Recommendations:

- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown signal heads, and ADA-accessible curb ramps across multiple approaches at both intersections;
- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Construct raised pedestrian refuges in the median of NJ 73 when sited along a crosswalk’s path; and
- Complete the adjacent sidewalk network.

Highway Recommendations:

- Modify the signal plan to provide additional green time for westbound Church Road. Currently, during Phase C of the signal plan, this approach is stopped, despite a lack of vehicle conflicts. The timing modification would reduce the southern intersection’s overall delay by roughly 20 seconds during both peak hours, via an over two-and-a-half minute improvement for the westbound approach’s average delay;
- Utilizing existing right-of-way, reconstruct the westbound Church Road approach to provide a second approach lane at the intersection. Place lane control signage upstream to communicate the appropriate lane per destination (median lane for southbound NJ 73 and Church Road, and the curb lane for northbound NJ 73). When combined with the preceding recommendation, the southern intersection’s overall delay is reduced by roughly 40 and 20 seconds during the morning and afternoon peak hours, respectively. In comparison to existing conditions, the westbound Church Road approach improves from a LOS of F to a LOS of B, with a 95 percent reduction in average delay; and
- For the long term, construct a new eastbound Church Road approach to directly align with the existing westbound approach, thus providing simpler and direct through movements along Church Road. The new approach may originate at Arbor Way and pass through existing surface parking lots. Due to these intersection modifications, new directional signage would be employed to inform east and westbound Church Road and left-turning northbound NJ 73 motorists of the appropriate locations for completing their desired movements. In comparison to existing conditions, this alternative would reduce the northern intersection’s overall delay by about one minute during both peak hours, and improve LOS from failing to a C or D. The southern intersection would experience a 30- second improvement in overall

delay, primarily via reductions for southbound NJ 73 left turns and westbound Church Road through movements.

5. NJ 73 at Howard Boulevard

Existing Conditions

The intersection of NJ 73 and Howard Boulevard is signalized with four approach legs. The eastbound leg is the driveway to Executive Plaza, an office building. This leg operates as a right-in-right-out driveway, thus only southbound NJ 73 right turns are permitted movements into the driveway. The westbound Howard Boulevard approach carries two travel lanes: a left turn and a right turn. The southbound NJ 73 approach has two through lanes and an exclusive left turn lane. The northbound NJ 73 approach has three through lanes and an exclusive right turn lane. As a result, areas west of or along southbound NJ 73 are difficult to access for northbound vehicles, since the next left or U-turn opportunity is at Fellowship Road, 0.5 miles north of this intersection. The unsignalized intersection of NJ 73 and Clover Road, which is only 500 feet north of the Howard Boulevard intersection, is similar because it only provides for right-in-right-out access. At Howard Boulevard, the southbound NJ 73 left turns are signal protected. Pedestrian facilities are completely absent at the intersection; there are no crosswalks, pedestrian signals, or sidewalks. Shoulders exist on 73, but are unsafe for pedestrians or bicyclists.

There were a total of 44 crashes at or around this intersection from 2006 through 2008. The most prevalent type of crash was “Same Direction-Rear End” (86%), and most of the crashes took place outside of the intersection (91%). Rear-end crashes produced injuries 58 percent of the time, though more southbound vehicles were involved in injury-sustaining crashes (70%), indicating operational issues along southbound NJ 73. The second most common type of crash was side-swipes, with four crashes, all occurring in the southbound direction.

The delays experienced at the approaches and the overall intersection were relatively minor at this intersection. During the morning peak hour, the intersection’s overall LOS was B, with an average delay of 19 seconds. During the afternoon peak hour, the intersection had an overall LOS of C and an average delay of 27 seconds. Approach delays were greatest on Howard Boulevard: 42 and 39 seconds in the morning and afternoon peak hours, respectively. Table 24 summarizes the delay and LOS measures at this intersection.

The intersection provides signalized access to Howard Boulevard, which is composed of two office centers. Recently, there has been increased development along Howard Boulevard, specifically Roger’s Walk, an age-restricted community and a Super Wawa at the intersection’s northeast corner. Only Executive Plaza is sited along the intersection’s eastbound leg. Along southbound NJ 73, all of these businesses utilize separate access points from NJ 73, where only the shoulder provides for merging and diverging opportunities. Similar to the rest of the corridor, there is plentiful parking.

Figure 22 displays the long-term recommendation for this intersection.

Table 24: NJ 73 at Howard Boulevard Intersection LOS

		Existing		Short-Term		Long-Term	
		Existing Geometry		Eliminate Northbound NJ 73's Exclusive Right Turn Lane			
						Provide Full Access/Egress from Executive Plaza Driveway	
		Existing Timing		Existing Timing		Split Optimized	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
AM Peak Hour	NJ 73 (NB)	26	C	28	C	27	C
	NJ 73 (SB)	11	B	11	B	27	C
	Executive Plaza (EB)	1	A	1	A	57	E
	Howard Blvd (WB)	42	D	42	D	39	D
	Total Intersection	19	B	20	B	28	C
PM Peak Hour	NJ 73 (NB)	35	C	37	D	30	C
	NJ 73 (SB)	19	B	19	B	51	D
	Executive Plaza (EB)	19	B	19	B	55	D
	Howard Blvd (WB)	39	D	39	D	73	E
	Total Intersection	27	C	29	C	42	D

Source: DVRPC, 2010

Summary

Issues:

- Inaccessibility of office centers, businesses, and transportation facilities southwest of NJ 73 for northbound drivers, resulting in long detours;
- Disruption of southbound traffic on NJ 73 by 16 access points within under 1,900 feet, contributing to a high rate of injury-producing rear-end crashes; and
- Lack of pedestrian crossing and walking infrastructure at and near the intersection

Pedestrian Recommendations:

- Complete the adjacent sidewalk network - specifically, install sidewalks and buffers along northbound NJ 73 utilizing the ROW currently occupied by the exclusive right turn lane. This will help facilitate a connection between the Ramblewood Parkway neighborhood with local businesses and employment centers. Northbound NJ 73 right turns will be accommodated by the outer and third through lane. Turn count data indicates that up to only 26 northbound NJ 73 right turn movements during a peak hour;
- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown man-hand signal heads, and ADA-accessible curb ramps across all four approaches;

- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation; and
- Construct a raised pedestrian median refuge along the path of the crosswalk across the southern leg of the intersection.

Highway Recommendations:

- Install “signal ahead” signs on NJ 73 north of the intersection to help mitigate the frequency of rear-end crashes;
- The removal of the northbound NJ 73 exclusive right turn lane to provide ROW for buffers and sidewalks will have the additional benefit of consolidating through movements, thus potentially reducing rear-end crash frequency. Currently, southbound NJ 73 carries approximately ten percent more volume than northbound during peak hours, and does so with one less through lane. The expected impact upon vehicular delay is marginal, with a two-second increase in delay for the northbound NJ 73 approach and the overall intersection;
- Coordinate with the owners of Executive Plaza office to convert the existing driveway into a full extension of Howard Boulevard with left turn access and egress. This new public roadway would be routed through the existing parking lot and connect with Church Road, via a one-way stop-controlled intersection. This would improve access to development southwest of NJ 73;
- The increase in accessibility via the new road may introduce access points for some parcels along southbound NJ 73, thus allowing for the reduction of direct access points onto NJ 73. This will reduce the number of access point conflicts and the frequency of crashes associated with them; and
- Adjust lane controls and signal timings as appropriate for this new geometry. Access to the new intersection leg would be available by a new westbound Howard Boulevard through lane and by converting a portion of the median into an exclusive left turn lane for northbound NJ 73. This geometry, in conjunction with the aforementioned removal of the northbound NJ 73 right turn lane, will operate at a LOS of C and D, with 28 and 42 seconds of overall delay, during the morning and afternoon peak hours, respectively.

NJ 73 Corridor Study Burlington County

Figure 22: NJ 73 at Howard Boulevard Recommended Improvements

Existing Sidewalk
Proposed Sidewalk

Complete the adjacent sidewalk network

Construct a new road connecting Howard Boulevard to Church Road via existing surface parking lots

Install continental-striped cross-walks, countdown man-hand signals, ADA-accessible curb ramps, and median refuges

Eliminate the exclusive right turn lane at the northbound NJ 73 approach

Provide an exclusive left turn lane for northbound NJ 73 via the existing median

STATE HWY 73

HOWARD BLVD

CLOVER RD

CHURCH RD

EXECUTIVE PLAZA

RODEWAY INN

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

0 40 80 Feet

N

6. NJ 73 at Fellowship Road (CR 673)

Existing Conditions

This signalized intersection is the highest crash cluster within the study area. It is often highly congested, and lacks pedestrian amenities. Left turns are accommodated via exclusive left-turn lanes for all approaches except southbound NJ 73, which utilizes a far-side two-lane jughandle. An on-ramp to the New Jersey Turnpike (NJTP) is located immediately downstream of this jughandle. Both the jughandle and on-ramp are each accessed via an exit-only lane. In combination with insufficient advance signage and lane control, motorists are often confused as to which lane correctly directs them to their destination. As a result, unsafe conditions are often created from abrupt braking and weaving. In addition, the NJTP off-ramp onto northbound NJ 73 is only 600 feet upstream from this intersection. Motorists exiting the NJTP and seeking a left turn onto Fellowship Road must traverse three through lanes in this short distance to reach the exclusive left-turn lane. Despite being a high pedestrian volume location, there are few pedestrian crossing amenities at the intersection: one parallel striped crosswalk, two man-hand signal heads, and unprotected medians.

Fifty-five percent of the cluster's crashes are rear-ends, almost half of which are injury-causing. Twenty-six percent are side-swipe crashes, and occur almost equally between the north and southbound directions. Three of NJ 73's eleven pedestrian and bicyclist crashes between 2006 and 2008 occurred at or immediately near this intersection.

During the morning peak hour, the intersection's overall delay averages over two minutes, with the southbound NJ 73 approach experiencing substantial delay. During the evening peak hour, the intersection averages three minutes of overall delay, with the Fellowship Road approaches averaging over six minutes of delay per approach. For both peak hours, the intersection operates at a LOS of F, the northbound NJ 73 approach is the best-performing approach, and the worst-performing approach is the eastbound Fellowship Road approach. This latter approach carries over 400 left-turning vehicles during either peak hour, resulting in an average queue length of approximately 350 feet, about twice the length of the provided storage of 170 feet. This substantial queue overspills into the adjacent through lane, which also impedes vehicles exiting the jughandle. Table 25 summarizes the delay and LOS measures at this intersection.

The adjacent land-use is composed mainly of hotels, though the northern quadrant is home to a Lukoil gas station, and the western quadrant is composed of a Bob Evans restaurant and a vacant lot. This vacant lot serves as an informal passenger stop for New Century Travel's intercity buses between Philadelphia and New York City; in addition, numerous intercity Greyhound buses traverse this intersection to access their popular park-and-ride station off Fellowship Road.

Figure 23 displays the various recommendations for this intersection.

Table 25: NJ 73 at Fellowship Road Intersection LOS

		Existing		Medium-Term							
		Existing Geometry		Introduce a Northbound NJ 73 Exclusive Right-Turn Lane							
						Construct a Nearside Jughandle for Southbound NJ 73					
						No Change to Northbound NJ 73 Left Turn Lane		Construct a Farside Jughandle for Northbound NJ 73			
						Remove Southbound NJ 73's Outer Lane				Retain All Four Southbound NJ 73 Lanes	
		Existing Signal Timing									
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
AM Peak Hour	NJ 73 (NB)	60	E	25	C	25	C	25	C	25	C
	NJ 73 (SB)	137	F	137	F	172	F	96	F	95	F
	Fellowship Rd (EB)	274	F	274	F	274	F	274	F	274	F
	Fellowship Rd (WB)	104	F	104	F	104	F	128	F	128	F
	Total Intersection	127	F	116	F	126	F	102	F	101	F
PM Peak Hour	NJ 73 (NB)	35	C	31	C	31	C	19	B	19	B
	NJ 73 (SB)	136	F	136	F	161	F	66	E	34	C
	Fellowship Rd (EB)	420	F	420	F	420	F	420	F	420	F
	Fellowship Rd (WB)	346	F	346	F	346	F	431	F	431	F
	Total Intersection	186	F	185	F	199	F	178	F	166	F

Source: DVRPC, 2010

Summary

Issues:

- Heavy congestion during both peak hours;
- Close proximity of lane drops and on-ramps without adequate advance signage;
- High crash cluster with a large percentage of injury-causing crashes, and pedestrian-bicyclist crashes;
- Lack of pedestrian crossing amenities at the intersection; and
- Carries a high volume of intercity buses due to access to NJTP's Interchange #4.

Pedestrian Recommendations:

- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown signal heads, and ADA-accessible curb ramps across multiple approaches at both intersections; and
- Construct raised pedestrian refuges in the median of NJ 73.

Highway Recommendations:

- Install advance, overhead lane control and destination signage along southbound NJ 73, upstream of this intersection. Supplement with roadway emblem pavement markings for "Exit Only" lanes;
- Construct an exclusive right-turn lane for the intersection's northbound NJ 73 approach. The necessary lane width may be acquired from the existing shoulder and gore area. Compared to existing conditions, this recommendation would improve the intersection's overall average delay by roughly ten seconds during the morning peak hour, but remain similar for the afternoon peak hour; both peak hours would continue to experience a LOS of F;
- Relocate the jughandle for southbound NJ 73 from the far-side of the intersection to its near-side. The jughandle may intersect with Fellowship Road across from Century Parkway; the addition of this fourth approach leg may necessitate a signal warrant analysis at this location. This relocation will eliminate the interference between vehicles queuing at the intersection and those exiting the jughandle. The elimination of the jughandle-bound "Exit Only" lane along the southbound NJ 73 approach will lessen driver confusion and thus potentially reduce the potential for side-swipe and rear-end crashes. When combined with the preceding recommendation, the intersection continues to operate at a LOS of F, with overall average delays slightly worse than existing conditions, during both peak hours;
- Accommodate northbound NJ 73 left turns via a far-side jughandle instead of the current left-turn lane. This jughandle may encircle the Westin Hotel and Lukoil gas station, and intersect with Fellowship Road approximately opposite the existing driveway for the Greyhound Bus Terminal. This would reduce the potential for side-swipe crashes, as well as eliminate the signal timing's northbound lead phase. In combination with the previous recommendations,

the intersection's overall LOS would remain an F. However, its average delay would improve by 25 seconds and eight seconds from existing conditions during the morning and afternoon peak hours, respectively;

- Provide a second lane along the NJTP on-ramp from southbound NJ 73. Thus, the existing two outer lanes at the intersection's southbound NJ 73 approach may be reserved exclusively for NJTP-bound vehicles, where currently only one lane is provided. When combined with the prior three recommendations, the intersection's overall average delay decreases by 26 and 20 seconds during the morning and afternoon peak hours, respectively, but continues to experience a LOS of F; and

- Incorporate the "Express" and "Local" lanes delineation along NJ 73 as displayed in Figure 19. This delineation is only viable if the northbound NJ 73 left-turns at this intersection are accommodated via the aforementioned recommendation for a far-side jughandle.

NJ 73 Corridor Study Burlington County

Figure 23: NJ 73 at Fellowship Road Recommended Improvements

Existing Sidewalk
Proposed Sidewalk

Construct a farside jughandle to accomodate northbound NJ 73 left turns. It may intersect Fellowship Road opposite of a slightly realigned office park and Greyhound bus terminal driveway

Eliminate the farside jughandle along southbound NJ 73. Construct a near-side jughandle to accomodate south-bound NJ 73 left turns. It may intersect Fellowship Road opposite of Century Parkway

Complete the adjacent sidewalk network

Install continental-style crosswalks, push buttons, countdown man-hand signals, median refuges, and ADA-accessible curb ramps

Install an exclusive northbound NJ 73 right turn lane via an existing shoulder

Eliminate the existing exlusive northbound NJ 73 left turn lane

Provide a two lane on-ramp to the New Jersey Turnpike via existing paved areas

WESTIN HOTEL
LUKOIL
ALOFT
Greyhound Mount Laurel Bus Terminal
BOB EVANS
RED ROOF INN
COURTYARD
FELLOWSHIP RD
BEAVER AVE
CENTURY PKWY
STATE HWY 73
NEW JERSEY TURNPIKE On-Ramp
NEW JERSEY TURNPIKE INTERCHANGE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

0 75 150 N
Feet

7. NJ 73 at Waverly Avenue, Willow Road, and Collins Road

Existing Conditions

This location is the second highest crash cluster within the study area. It is encircled by hotels and eateries, and is composed of three closely spaced intersections that provide direct connections between NJ 73, I-295, and major retail destinations to the east. The three intersections are: NJ 73 at Collins Road, NJ 73 at Waverly Avenue/Willow Road, and Willow Road at Collins Road. Only the latter two are signalized. The two NJ 73 intersections are only 200 feet apart, with the third intersection only 500 feet from NJ 73. Willow Road from Collins Road to NJ 73 is one-way westbound. Conversely, eastbound traffic is accommodated via the two-way Collins Road. Thus, motorists on NJ 73 seeking to access major retail destinations at the Moorestown Mall and East Gate Shopping Center via Collins Road must first pass the signalized intersection at Waverly Avenue/Willow Road, turn onto Collins Road, then traverse the signalized intersection at Willow Road. The eastbound queues from the latter intersection frequently spill back onto northbound NJ 73 and its intersection with Waverly Avenue/Willow Road. Furthermore, the intersections experience elevated side-street volumes due to their direct connections between NJ 73, Eastgate Shopping Center, and Moorestown Mall. This is heightened by the lack of a ramp from southbound I-295 onto northbound NJ 73, which was removed during the construction of the East Gate Square Shopping Center.

This series of intersections is located within Maple Shade Township's Redevelopment Zone. Along northbound NJ 73, adjacent parcels include two hotels (Bel-Air Motor Lodge and Motel 6) and a gas station (Shell). The southbound side is composed of two eateries (Pizzeria Uno and Burger King) and an abandoned gas station. Each parcel has at least one driveway and built structures that are only minimally-to-moderately set-back from the roadway. The only pedestrian accommodations across NJ 73 are a parallel-striped crosswalk with a pair of pedestrian man-hand signal heads and push buttons.

Between 2006 and 2008, this location experienced 107 crashes, of which 30 were injury-causing, and one was fatal. 63 crashes were rear-ends, almost all occurred outside the intersection, and a third of which resulted in injury. The second highest crash type was right-angle, with 18 crashes. All but one involved vehicles traveling in the north and westbound directions. Two crashes involved pedestrians, one of which resulted in a pedestrian fatality.

The intersection of NJ 73 and Waverly Avenue/Willow Road operates at a LOS of F during both peak hours. During the morning peak hour, the least congested approach is northbound NJ 73 with 18 seconds of delay and a LOS of B; conversely, southbound NJ 73 is the most delayed with over two minutes of delay and a LOS of F. During the afternoon peak hour, northbound NJ 73 experiences the least delay, whereas eastbound Waverly Avenue is the most congested with eight minutes of delay, a direct consequence of carrying over 500 left-turning vehicles within the hour. The adjacent intersection of Willow Road and Collins Road utilizes a non-coordinated actuated timing plan. During the morning peak hour, it operates at a LOS of A with only a single approach, southbound Collins Road, generating a LOS worse than A. During the afternoon peak hour, the intersection operates at a LOS of D, with 36 seconds of overall average delay, an

amount similar to all three approaches. Tables 26 and 27 summarize the delay and LOS measures at this intersection.

Table 26: NJ 73 at Waverly Avenue, Willow Road at Collins Road Intersection LOS, AM Peak Hour

		Existing		Long-Term	
AM Peak Hour		Existing Geometry		Widen Willow Rd Approach to 5 Lanes	
		Existing Timing		Existing Timing	
		Delay (sec)	LOS	Delay (sec)	LOS
	NJ 73 (NB)	19	B	18	B
	NJ 73 (SB)	143	F	143	F
	Waverly Ave (EB)	108	F	211	F
	Willow Rd (WB)	53	D	47	D
	Total Intersection	98	F	104	F
		Existing Geometry		Add 2nd Westbound Left Turn Lane and Northbound Channelized Right Turn Lane	
		Existing Timing		Optimized Timing	
		Delay (sec)	LOS	Delay (sec)	LOS
	Willow Rd (NB)	N/A	N/A	1	A
	Willow Rd (SB)	32	C	12	B
	Collins Rd (EB)	9	A	N/A	N/A
	Collins Rd (WB)	3	A	7	A
	Total Intersection	8	A	5	A

Source: DVRPC, 2010

Table 27: NJ 73 at Waverly Avenue, Willow Road at Collins Road Intersection LOS, PM Peak Hour

		Existing		Long-Term	
PM Peak Hour		Existing Geometry		Widen Willow Rd Approach to 5 Lanes	
		Existing Timing		Existing Timing	
		Delay (sec)	LOS	Delay (sec)	LOS
	NJ 73 (NB)	19	B	20	B
	NJ 73 (SB)	32	C	32	C
	Waverly Ave (EB)	504	F	445	F
	Willow Rd (WB)	98	F	184	F
	Total Intersection	84	F	98	F
		Existing Geometry		Add 2nd Westbound Left Turn Lane and Northbound Channelized Right Turn Lane	
		Existing Timing		Optimized Timing	
		Delay (sec)	LOS	Delay (sec)	LOS
	Willow Rd (NB)	N/A	N/A	1	A
	Willow Rd (SB)	44	D	19	B
	Collins Rd (EB)	34	C	N/A	N/A
	Collins Rd (WB)	37	D	11	B
	Total Intersection	36	D	9	A

Source: DVRPC, 2010

Figure 24 displays the various recommendations for this intersection.

Summary

Issues:

- This location is composed of three closely spaced intersections, two of which are signalized. All three intersections operate in conjunction; an issue at one will directly affect the other two;
- This location's 107 crashes between 2006 and 2008 was the second highest concentration of crashes within the study area;
- The signalized intersection of NJ 73 and Waverly Avenue/Willow Road operates at a LOS of F during both peak hours. Side-street delays are particularly high during these periods;
- The adjacent land use is primarily composed of hotels and eateries; as a result, there are many pedestrians in an area with insufficient pedestrian crossing amenities; and

- There are numerous access points throughout this location, and each contributes additional congestion and conflict points for reduced operations and safety; and

Pedestrian Recommendations:

- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown signal heads, and ADA-accessible curb ramps across multiple approaches at both intersections; and
- Construct raised pedestrian refuges in the median of NJ 73.

Highway Recommendations:

- Consider widening the Willow Road approach to a five lane cross-section: two exclusive left turn lanes, a through lane, an exclusive right turn lane, and a receiving lane. Converting Willow Road to a bi-directional street will permit through movements from eastbound Waverly Avenue, thus requiring its current exclusive right turn lane to be shared with through movements. Compared to existing conditions, the intersection would continue to operate at a LOS of F with minor increases in overall delays by six and 14 seconds in the morning and afternoon peak hours, respectively; almost all of the delay increases would occur at the Waverly Avenue and Willow Road approaches. The Collins Road leg at its unsignalized intersection with NJ 73 may be converted into a one-way eastbound street that solely serves as the far-side jughandle for northbound NJ 73;
- The widening of Willow Road and conversion of Collins Road into a one-way street would allow the intersection of Collins Road and Willow Road to function as a three-legged intersection. After optimizing the current signal timing, the intersection would operate at a LOS of A during both peak hours. Compared to existing conditions, this represents a three and 27 second improvement during the morning and afternoon peak hours, respectively, with all approaches operating at a LOS of A or B. The dominant movements of westbound Collins Road left turns and northbound Willow Road right turns would be accommodated via dual left turn lanes and a channelized right turn lane, respectively;
- Consolidate driveways to improve the safety and efficiency of access points adjacent to this location. A conceptual rendering of this consolidation would reduce the number of driveways from seven to three; this is shown in Figure 16; and
- Incorporate the “Express” and “Local” lanes delineation along NJ 73 as displayed in Figure 19. This delineation and the implementation of the previous recommendations for this intersection may exist independently from one another.

NJ 73 Corridor Study Burlington County

Figure 24: NJ 73 at Waverly Avenue, Willow Road, and Collins Road Recommended Improvements

Provide an additional exclusive left turn lane and prohibit through movements for westbound Collins Road

Include a channelized right turn for the anticipated heavy northbound Willow Road right turn movement

Widen Willow Road to a five lane cross-section, including one receiving lane. Thus converting it to a two-way street

Apply access management improvements to adjacent NJ 73 and Lenola Road parcels as depicted in Figure 16

Convert Collins Road into a one-way eastbound street, to maintain a far-side jughandle for northbound NJ 73

Install continental-style crosswalks, push buttons, countdown man-hand signals, median refuges, and ADA-accessible curb ramps

Optimize the intersection's signal timing

Permit eastbound Waverly Avenue through movements via a shared through and right turn lane

STATE HWY 73

BARING AVE

COLLINS RD

WILLOW RD

NIXON DR

LENOLA RD

RAMP

STONEY RUN

WAVERLY AVE

GRANITE AVE

SHELL

BEL-AIR MOTOR LODGE

PIZZERIA UNO

MOTEL 6

BURGER KING

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

0 60 120 Feet

N

8. NJ 73 at Fox Meadow Drive

Existing Conditions

At mile post 29.12, NJ 73 is intersected by Fox Meadow Drive at a large signalized intersection. There are two approach lanes for north and southbound NJ 73, with a wide shoulder to assist with the acceleration and deceleration of vehicles accessing businesses. Left and right turns from NJ 73 are provided via near-side jughandles. The east and westbound approaches each have one shared through and right turn lane and one exclusive left turn lane; however, the intersection is currently under construction as part of TIP project DB# 94068. The construction will provide additional through lanes for north and southbound NJ 73, as well as a second left turn lane and right turn lane for the westbound and eastbound approaches, respectively. The only existing pedestrian amenity at this intersection is a parallel-striped crosswalk across the south leg, though it does not connect to a sidewalk network. However, the intersection reconstruction will add sidewalks and crosswalks across the north and west legs, but remove the existing crosswalk.

This intersection is the fourth largest crash cluster on the NJ 73 corridor. There were 57 crashes here from 2006 to 2008. The most frequent crash type was rear-ends, with 32 crashes or 56 percent of the cluster, and most of these affected northbound traveling vehicles (73%). Crash reports frequently cited driver inattention or following too closely. A significant quantity of right angle and side-swipe crashes occurred as well. Overall, 32 percent of the crashes produced injuries. This includes two pedestrian crashes.

A significant level of pedestrian travel is to be expected from the land uses adjacent to this intersection. Fox Meadow Drive mainly serves the large residential Fox Meadow apartment complex immediately east of NJ 73. On the opposite side of NJ 73, there is a park with active recreation facilities, including a baseball diamond and a skate park which attracts many youth-aged pedestrians from the apartment complex. Several commercial developments are situated along NJ 73, including a strip shopping center and a Shell gas station. Their designs are typical of the corridor's auto-oriented character: plentiful parking and large set-backs from the street.

Summary

Issues:

- Large crash cluster at and near the intersection, composed primarily of rear-end crashes;
- Inadequate pedestrian facilities at the intersection despite a large pedestrian presence; and
- Direct access points from high speed NJ 73 contributes to rear-end crashes.

Pedestrian Recommendations:

- Current construction is adding crosswalks on the north and west legs, as well as Fellowship Road, to facilitate access to recreation destinations west of the intersection. New sidewalks are being installed as well. The east and south legs are not receiving crosswalks due to high westbound left turn traffic;

- The intersection signal sequence should facilitate pedestrian crossings via pedestrian push-button actuation and countdown man-hand signal heads. Pedestrian educational signs (see Figure 25) should be installed at the push button to encourage pedestrians to use the correct crosswalk;
- Adjust signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Construct a raised pedestrian refuge in the NJ 73 median where the crosswalk passes.

Highway Recommendations:

- Indicate the prohibition of turns at the intersection for NJ 73 approach vehicles, because such movements may be completed via the near-side jughandles. This will help reduce unexpected vehicle slowing and their associated rear-end crashes;
- Consider longer yellow and all-red signal phases to assist with vehicle deceleration and intersection clearance;
- Access points along NJ 73 should have either an adjacent shoulder lane or a deceleration lane to mitigate the large speed differentials between through vehicles and vehicles entering and exiting driveways. For example, a formal deceleration lane should be employed for the Dunkin' Donuts shopping center along southbound NJ 73, immediately south of the intersection; and
- If feasible, consolidate or relocate existing NJ 73 access points to side streets. This will also help reduce accelerating and decelerating speed conflicts along NJ 73.

Figure 25: Pedestrian Educational Sign R10-3e

9. NJ 73 at North Stiles

Existing Conditions

North Stiles Avenue and Princeton Avenue intersect with NJ 73 in a six-legged intersection at mile post 30.43. Princeton Avenue's intersection legs operate as one-way streets directed away from the intersection, so the intersection has only four approach legs. Each North Stiles Avenue approach has one entry and receiving lane, while the NJ 73 approaches have two entry and receiving lanes each. NJ 73 contains a wide shoulder through most of its approaches. Direct left turns are prohibited from NJ 73 and are completed via far-side jug-handles. Right turns are also prohibited from northbound North Stiles Avenue due to its acute approach angle; they are instead accommodated via Harvard Avenue's upstream access to southbound NJ 73. There is a moderate amount of pedestrian amenities at the intersection. Sidewalks are provided on the northeast and southwest quadrants, and one 170 foot long parallel-striped crosswalk across NJ 73, with a raised median refuge.

There were 32 crashes at or around this intersection from 2006 through 2008. A majority of crashes (66%) were rear-ends, which produced most of the injury-resulting crashes. The second highest crash category was side-swipes (16%), which mainly affected northbound NJ 73 vehicles. One fatality occurred at the intersection, the result of a fixed-object crash.

Land uses around this intersection include detached single-family residential, and many auto-oriented commercial uses typical of NJ 73. Citgo and Valero gas stations occupy the east and west quadrants, respectively. The Citgo station has especially excessive access to NJ 73, with one driveway located only ten feet upstream of the northbound NJ 73 stop bar, and another curb cut onto NJ 73 that extends for 140 feet. The area's considerable residential land use is suggestive of high pedestrian traffic.

The recommendations for this location are illustrated in Figure 26.

Summary

Issues:

- Driver confusion due to the intersection's six legged layout and various turn restrictions;
- Excessive number of access points;
- High rate of rear-end crashes resulting in injuries; and
- Long, exposed pedestrian crossing distance, with incomplete pedestrian infrastructure around the intersection.

Pedestrian Recommendations:

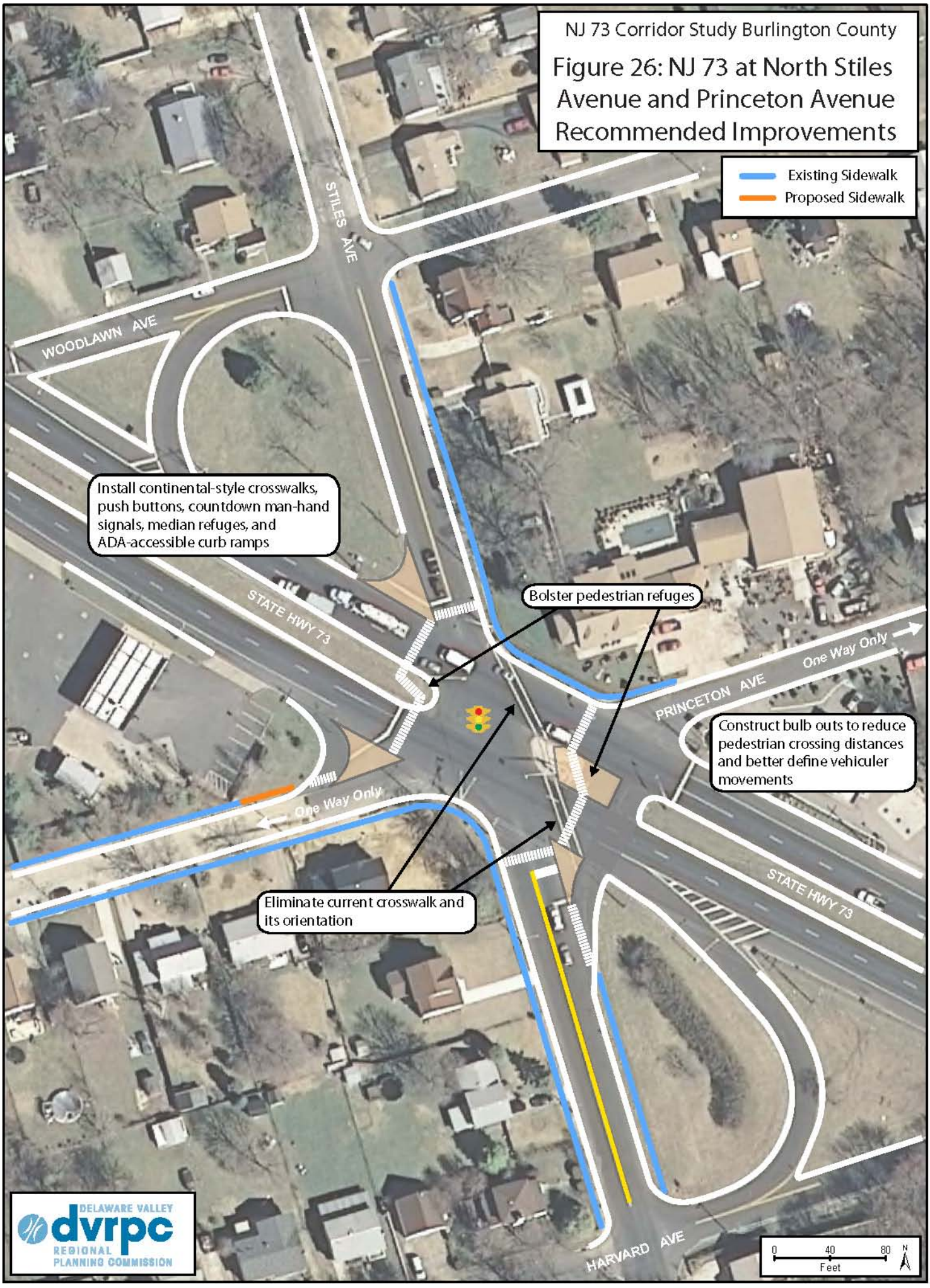
- Install continental-style pedestrian crosswalks, pedestrian push buttons, countdown man-hand signal heads, and ADA-accessible curb ramps across both legs of North Stiles Avenues, the west leg of Princeton Avenue, and along the existing NJ 73 crosswalk. The

existing crosswalk's crossing distance may be shortened by approximately 60 feet to 110 feet, via a rerouting of the crosswalk and a curb extension;

- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation;
- Bolster the raised pedestrian refuges in the median of NJ 73 with bollards and new curbing; and
- Complete the sidewalk network along the north side of NJ 73 to the east of the intersection, and the south side of NJ 73 to the west of the intersection.

Highway Recommendations:

- Apply best access management practices to reduce conflict points on NJ 73 and reduce the probability of rear-end crashes. At the various gas stations and adjacent businesses, consider elimination of redundant driveways, shortening the length of curb cuts, or consolidation of driveways.


NJ 73 Corridor Study Burlington County
Figure 26: NJ 73 at North Stiles Avenue and Princeton Avenue Recommended Improvements
Existing Sidewalk
Proposed Sidewalk
STILES AVE
WOODLAWN AVE
Install continental-style crosswalks, push buttons, countdown man-hand signals, median refuges, and ADA-accessible curb ramps
STATE HWY 73
Bolster pedestrian refuges
PRINCETON AVE
One Way Only
Construct bulb outs to reduce pedestrian crossing distances and better define vehiculer movements
One Way Only
Eliminate current crosswalk and its orientation
STATE HWY 73
HARVARD AVE
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION
0 40 80 N
Feet

NJ 38 Intersections and County Route Intersections Analyses

A 2.5 mile-long segment of NJ 38 lies within the NJ 73 corridor study area. Three major NJ 38 intersections within Moorestown Township were evaluated. These intersections include Lenola Road, Church Street/Fellowship Road, and Pleasant Valley Road. These analyses include quantification of the LOS expected for the potential improvement scenarios recommended by the draft 2010 AECOM study of NJ 38. Also, two adjacent intersections along Church Road (CR 616) were analyzed for their potential for congestion reduction via a new parallel route.

10. NJ 38 at Lenola Road (CR 608)

Existing Conditions

The intersection of Lenola Road with NJ 38 is especially congested due to its location adjacent to the Moorestown Mall, numerous shopping centers, and several business parks. Crash cluster analysis of the intersection revealed that 41 crashes occurred along Lenola Road, half of which were rear-end crashes. Twenty-nine percent or 12 crashes were right-angle crashes that occurred in the area of the intersection of Lenola Road and the westbound NJ 38 jughandle. During site visits, this intersection area was observed to be a major issue for the intersection. Drivers westbound on NJ 38 wishing to turn left onto Lenola Road must use this westbound jughandle, which intersects Lenola Road within the influence area of the Lenola Road and NJ 38 intersection. The southbound Lenola traffic is typically queued through the intersection of the jughandle, requiring motorists who wish to make left turns onto Lenola Road to wait for gaps (often courtesy gaps) in traffic to allow them to merge into the southbound lanes. Four hundred feet north of its intersection with NJ 38, Lenola Road is signalized at its intersection with the driveway to a Kmart shopping center.

Between 2006 and 2008, 38 crashes occurred along NJ 38 at or near its intersection with Lenola Road. Forty-five percent or 17 crashes were rear-ends, and 26 percent or ten crashes were side-swipes; of the latter, most occurred in the westbound direction and outside of the intersection. There were two bicycle and pedestrian crashes as well. The westbound NJ 38 outside lane drops about 300 feet downstream of the Lenola Road intersection. The existing taper is approximately 150 feet long, but should be a minimum of 540 feet for the 45 MPH roadway, according to the AASHTO *Green Book*[1]. Thirty-three pedestrians were observed crossing at the intersection during a seven-hour morning and evening peak period count. The current pedestrian accommodations include pedestrian-actuated man-hand signal heads and parallel-striped crosswalks across the east leg of the intersection. There are no sidewalks in the area of the intersection. The existing pedestrian timings are adequate for this intersection.

This intersection currently operates at a LOS E and LOS F in the AM and PM peak hours, respectively. The eastbound NJ 38 approach is the worst-performing at the intersection. The

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1 American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, 2004.

westbound jughandle intersection is showing results of LOS A and B, which tells that the LOS analysis does not quantify the issues at this location. The Kmart drive intersection currently operates at LOS A and B in the AM and PM peak hour, respectively.

Several potential improvement scenarios were analyzed at this intersection to determine if geometric or operational modifications could be made to improve the intersection. The details for each scenario and the LOS analyses are discussed below.

Potential Scenarios

Scenario #1

The first scenario eliminates the eastbound and westbound jughandles and installs left-turn lanes in the median area along both approaches of NJ 38. (The existing median width is approximately 15 feet wide, which will accommodate a 12-foot turn lane). For the analysis, 100 percent of the vehicles currently using the existing jughandles for completing a left turn movement were assumed to utilize the proposed left-turn lanes from NJ 38. Unlike the recommendations provided by AECOM for this location, a northbound channelized right turn lane is not considered for all three scenarios, due to the low volume of such movements (17 and 29 vehicles in the morning and evening peak hour, respectively).

The LOS analysis for this scenario shows that a minor decrease in delay for the overall intersection can be expected in both the AM and PM peak hours with split optimized timing. Specifically, delays are reduced for the higher volume NJ 38 approaches but larger for the Lenola Road approaches. There is no calculated improvement in delay from the existing jughandle configuration for westbound NJ 38 left turns, though this movement is much less challenging in this scenario.

Scenario #2

The second scenario includes the aforementioned elimination of the jughandles and addition of the left-turn lanes along NJ 38, but also includes striping modifications along the southbound approach of Lenola Road. Two striping modifications were considered individually: the addition of an exclusive right-turn lane and the addition of an exclusive left-turn lane. The latter provides more improvement to overall intersection LOS. This provides southbound Lenola Road approach with dual exclusive left-turn lanes, a through lane, and a through/right-turn lane.

This scenario's overall delay is five and 27 seconds less than Scenario #1's, and a 19 and 44 second reduction from existing conditions, during the AM and PM peak hours, respectively. Additionally, the queue lengths along southbound Lenola Road are also much shorter in the PM peak hour than that of scenario #1.

Scenario #3

The third scenario involves solely the modification of the westbound NJ 38 jughandle. This scenario relocates the jughandle and the traffic so that it intersects Lenola Road at the Kmart signalized intersection. This alternative's jughandle realignment will have an impact upon the Moorestown Shopping Square. Routing the jughandle between NJ 38 and the Perkins restaurant

maintains the restaurant's continuity with the remainder of the shopping center, thus allowing shared parking among all of the businesses.

The LOS results of this scenario show an improvement over existing conditions, but results in 15 seconds of additional delay during the PM peak hour compared to scenario #2.

The LOS results are shown in the tables below. Table 28 shows the LOS results for the AM peak hour, while Table 29 shows the LOS results for the PM peak hour.

The preferred recommended improvements are illustrated in Figure 27.

Summary

Issues:

- The intersection of Lenola Road and the westbound NJ 38 jughandle is too close to the signalized intersection with NJ 38. Drivers have difficulty completing left turns from the jughandle because of queues spilling back in the southbound lanes;
- The Lenola Road and NJ 38 intersection operates at LOS F in the PM peak hour;
- Multiple access drives and limited sight distance along southbound Lenola Road; and
- The outer curbside lane of westbound NJ 38 drops shortly downstream of the Lenola Road intersection and has an inadequate taper length.

Pedestrian Recommendations:

- Installation of countdown pedestrian signals, continental-style crosswalks, and ADA-accessible curb ramps for the crossing on the east side of the intersection; and
- Installation of sidewalk along northbound Lenola Road, on both sides of NJ 38.

Transit Recommendations:

- Lenola Road is used by NJ Transit buses to access the Moorestown Mall. Bus stop amenities such as shelters with benches and trash cans should be installed at peak load points along the #407 and #413 routes.

Highway Recommendations:

- Ensure that clear-sight triangles are maintained at the access drives along Lenola Road;
- Install a "Be Prepared to Stop" (W3-4) warning sign along southbound Lenola Road upstream of its intersection with NJ 38, and downstream of the existing "Signal Ahead" (W3-3) sign;
- Explore access management techniques to restrict entering and existing traffic from the drives along southbound Lenola Road, north of NJ 38;
- Lengthen the downstream westbound NJ 38 lane drop taper to 540 feet;

- As explored in Scenario #2, add eastbound and westbound left-turn lanes along NJ 38 and modify the westbound jughandle to accommodate right turns only. Left-turn lanes should be a minimum of 225 feet long to accommodate adequate storage;
- Utilize the existing gore area to restripe the southbound Lenola Road approach to include dual exclusive left-turn lanes; and
- Optimize the timing plan to include east and westbound lead left-turn phasing, and concurrent north/southbound movements with lead left-turn phasing. All left turns will only be allowed with signal protection.

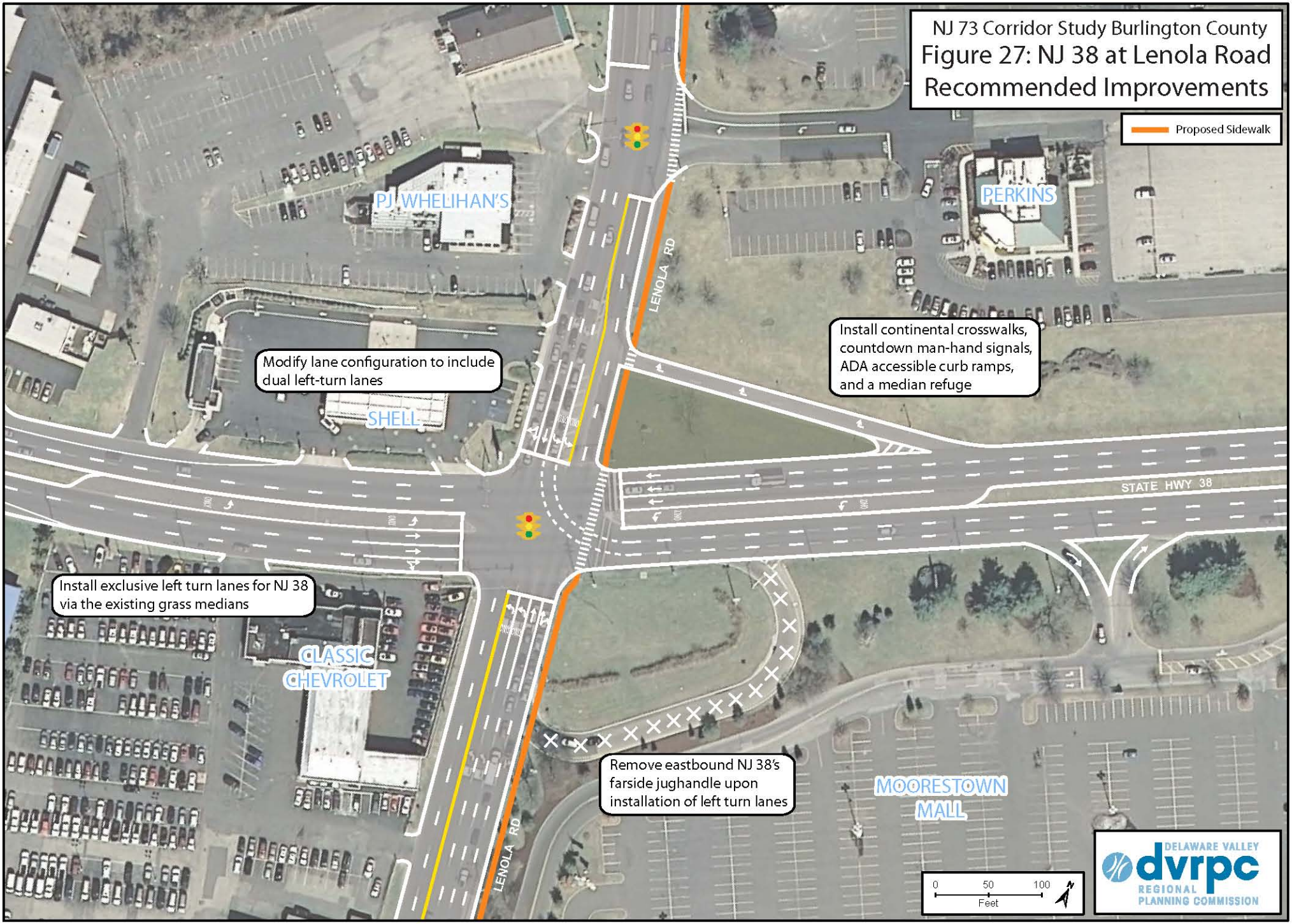

NJ 73 Corridor Study Burlington County
Figure 27: NJ 38 at Lenola Road
Recommended Improvements
Proposed Sidewalk
PJ WHELIHAN'S
PERKINS
LENOLA RD
Modify lane configuration to include dual left-turn lanes
Install continental crosswalks, countdown man-hand signals, ADA accessible curb ramps, and a median refuge
SHELL
STATE HWY 38
Install exclusive left turn lanes for NJ 38 via the existing grass medians
CLASSIC CHEVROLET
Remove eastbound NJ 38's farside jughandle upon installation of left turn lanes
MOORESTOWN MALL
LENOLA RD
0 50 100
Feet
DELAWARE VALLEY
dvrpc
REGIONAL PLANNING COMMISSION

Table 28: Lenola Road Intersections – AM Peak Hour LOS

		Existing		Medium-Term					
		Existing Geometry		Scenario #1: Replace NJ 38 Jughandles with Left Turn Lanes		Scenario #2: Same as Scenario #1 with Additional SB Left Turn Lane		Scenario #3: Reroute WB NJ 38 Jughandle	
		Existing Signal Timing (110 second cycle)		Optimized Signal Timing (110 second cycle)		Optimized Signal Timing (110 second cycle)		Optimized Signal TIming (110 second cycle)	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
AM Peak Hour	Lenola Rd (NB)	49	D	71	E	66	E	86	F
	Lenola Rd (SB)	55	E	103	F	85	F	87	F
	NJ 38 (EB)	84	F	42	D	35	C	31	C
	NJ 38 (WB)	36	D	34	C	31	C	21	C
	Total Intersection	60	E	48	D	41	D	39	D
	Lenola Rd (NB)								
	Lenola Rd (SB)								
	Jughandle (WB Left)	11	B						
	Jughandle (WB Right)	9	A	9	A	9	A		
	Total Intersection		N/A		N/A		N/A		
	Lenola Rd (NB)	2	A	2	A	1	A	2	A
	Lenola Rd (SB)	2	A	2	A	2	A	3	A
	K-Mart Dr (WB)	37	D	37	D	37	D	15	B
	Total Intersection	3	A	3	A	2	A	5	A

Source: DVRPC, 2010

Table 29: Lenola Road Intersections – PM Peak Hour LOS

		Existing		Medium-Term		Medium-Term		Medium-Term	
		Existing Geometry		Scenario #1		Scenario #1		Scenario #1	
		Existing Plan (110 second cycle)		Optimized Signal Timing (130 second cycle)		Optimized Signal Timing (120 second cycle)		Optimized Signal Timing (110 second cycle)	
		Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS	Delay (sec)	LOS
PM Peak Hour	Lenola Rd (NB)	59	E	147	F	107	F	112	F
	Lenola Rd (SB)	72	E	180	F	76	E	104	F
	NJ 38 (EB)	189	F	112	F	79	E	95	F
	NJ 38 (WB)	50	D	54	D	49	D	32	C
	Total Intersection	110	F	111	F	73	E	81	F
	Lenola Rd (NB)								
	Lenola Rd (SB)								
	Jughandle (WB Left)	13	B						
	Jughandle (WB Right)	11	B	11	A	11	B		
	Total Intersection		N/A		N/A		N/A		
	Lenola Rd (NB)	5	A	5	A	5	A	8	A
	Lenola Rd (SB)	6	A	6	A	6	A	10	A
	K-Mart Dr (WB)	58	E	60	E	60	E	44	D
	Total Intersection	11	B	11	B	11	B	19	B

Source: DVRPC, 2010

11. NJ 38 at Church Street (CR 607), Fellowship Road, and Pleasant Valley Avenue

Existing Conditions

This location is a cluster of three closely spaced signalized intersections and a jughandle. Access to both Church Street and Fellowship Road from westbound NJ 38 is provided solely at the intersection of NJ 38 and Fellowship Road. Eastbound NJ 38 left-turns are completed via a far-side jughandle at Church Street. Congestion at this location is exacerbated by driver confusion due to its atypical intersection configuration and accommodation of left turns, leading many local drivers to avoid the area and instead toward other over utilized routes and intersections. The signal timing for all three intersections operates within a single, clustered timing plan. There is a sidewalk along northbound Church Street, with curb ramps and pedestrian push buttons only at its intersection with NJ 38.

The intersection of Pleasant Valley Road and NJ 38 was analyzed as part of the potential improvement scenarios considered for the Church Street cluster of intersections. This intersection lies adjacent to the Strawbridge Lake Park, and approximately one-half mile west of the Church Street and NJ 38 intersection. The southbound approach is constructed on a bridge over the Strawbridge Lake and consists of a single approach lane. Pleasant Valley Road does not have sidewalks, with the exception of a small length along the southbound side of the structure over Strawbridge Lake. Parallel-striped crosswalks, pedestrian countdown signals, and pedestrian push buttons are present at the south and west crossings of the intersection. Eighty-nine pedestrians were observed crossing the Pleasant Valley Road intersection during a seven-hour peak period count. The existing minimum pedestrian crossing time across NJ 38 is 23 seconds, which is inadequate to cross the 100 foot long crosswalk at a rate of 3.5 feet/second.

The existing conditions at the intersection of Church Street and NJ 38 operate at a LOS F, with overall delays of over two minutes during both AM and PM peak hours. The Fellowship Road and NJ 38 intersection currently operates at an overall LOS C and LOS D in the AM and PM peak hours, respectively. The intersection of Church Street and Fellowship Road currently operates at LOS D and LOS C in the AM and PM peak hours, respectively.

The intersection of Pleasant Valley Road with NJ 38 currently operates at LOS F with overall delays of about two-and-one-half minutes during both the AM and PM peak hours. The southbound Pleasant Valley Road approach experiences the greatest delay. This single lane approach carries volumes of approximately 820 and 630 vehicles in the AM and PM peak hours, respectively. Because the approach lies on a bridge over the Strawbridge Lake, the feasibility of widening the approach to accommodate auxiliary lanes is limited.

Two alternative potential improvement scenarios were analyzed at this group of intersections. The 90, second cycle length was sustained throughout the scenarios in order to maintain signal coordination along NJ 38. The delay and LOS measurements of each scenario are shown in Tables 30 and 31.

The preferred scenario as described above is illustrated in Figure 28.

Potential Scenarios

Scenario #1

The first scenario widens the southbound approach of Church Street at its intersection with NJ 38 to accommodate left-turn storage. This scenario has no impact on the operations at Pleasant Valley Road. The widening would occur along the western edge of the southbound approach, by approximately eight feet, thus providing two 12-foot lanes: a through/right-turn lane and an exclusive left-turn lane. The analysis assumed that a 100-foot storage length would be provided along this approach.

For both AM and PM peak hours, this scenario results in a decreased average delay for both the southbound approach and the overall intersection of Church Street and NJ 38. Optimization of the intersection's signal splits results in an additional reduction in overall delay, for an overall LOS D. This optimization also reduces the overall delay at the NJ 38 and Fellowship Road intersection; however, it slightly increases the overall delay at the Church Street and Fellowship Road intersection.

Scenario #2

The second scenario includes the physical improvements from Scenario #1, but also reroutes the NJ 38 westbound left-turns at the intersection with Fellowship Road to the intersection of Pleasant Valley Road and NJ 38. As part of this rerouting, the southwest-bound lane of Fellowship Road is eliminated between NJ 38 and Church Street. This scenario removes the traffic signal at the Fellowship Road and NJ 38 intersection and extends the westbound left-turn lane at the intersection of Pleasant Valley Road and NJ 38 to 750 feet in order to accommodate the additional peak hour demand of turning vehicles. (Approximately 480 additional vehicles will make the left-turn movement in the AM and 310 vehicles in the PM). Additionally, an approximately 490-foot long acceleration lane should be provided along eastbound NJ 38 immediately downstream of its intersection with Fellowship Road to allow the northeast bound right-turning vehicles from Fellowship Road to more easily and safely merge into the adjacent traffic stream.

Compared to Scenario #1, these modifications produce very similar delay and LOS measures at the Church Street intersection with NJ 38. At the NJ 38 and Fellowship Road intersection, this scenario eliminates all eastbound NJ 38 delay, and has no impact on the northeast right turn from Fellowship Road to NJ 38 during the AM peak hour. This movement has more difficulty merging with eastbound NJ 38 traffic during the PM peak hour, resulting in additional delay for this approach. The Church Street and Fellowship Road intersection sees additional delay with split optimization of this scenario in the AM peak, due to the increase in green time for NJ 38 traffic, but is comparable to existing conditions during the PM peak hour.

At the intersection of Pleasant Valley Avenue and NJ 38, delay in the westbound direction more than triples during the morning peak hour due to the additional left-turning vehicles. The overall

intersection delay increases by one-and-a-half minutes. During the afternoon peak hour, decreased delay was calculated for the westbound NJ 38 approach, though the intersection's overall delay increases by over a half-minute.

Summary

Issues:

- The intersection is very complex; it is the junction of three roadways and a jughandle, thus resulting in three closely spaced signalized intersections;
- The NJ 38 intersections at Church Street and Pleasant Valley Road operate at LOS F in the AM and PM peak hours;
- The skewed angle of the Church Street and Fellowship Road intersection creates a long crossing distance for pedestrians;
- The Church Street intersections have pedestrian push buttons, but lack pedestrian signals, curb ramps, and high visibility crosswalks;
- The potential improvement scenarios included in the draft AECOM study for the Church Street and NJ 38 intersection impact operations at Pleasant Valley Road; and
- Pedestrian signals with countdown timers are present at the Pleasant Valley intersection, but the area lacks sidewalks, curb ramps, and high visibility crosswalks.

Pedestrian Recommendations:

- Pedestrian countdown signals, curb ramps, and continental-striped crosswalks should be installed at the two Church Street intersections; and
- The parallel-striped crosswalks over the south and west legs of the Pleasant Valley intersection should be replaced with continental-striped crosswalks, along with the installation of curb ramps and a more robust sidewalk network. The minimum pedestrian crossing time across NJ 38 should be lengthened to 29 seconds.

Transit Recommendations:

- NJ Transit buses #317 and #407 cross through the Church Street intersection along NJ 38, and the #407 and #413 make turns at Pleasant Valley Road to access the Mooretown Mall. Bus stop amenities such as shelters with benches should be installed along NJ 38 and other streets along the bus routes.

Highway Recommendations:

- Installation of a southbound exclusive left turn lane at the Church Street and NJ 38 intersection; and
- Split optimization of the traffic signal timing at the clustered intersections.

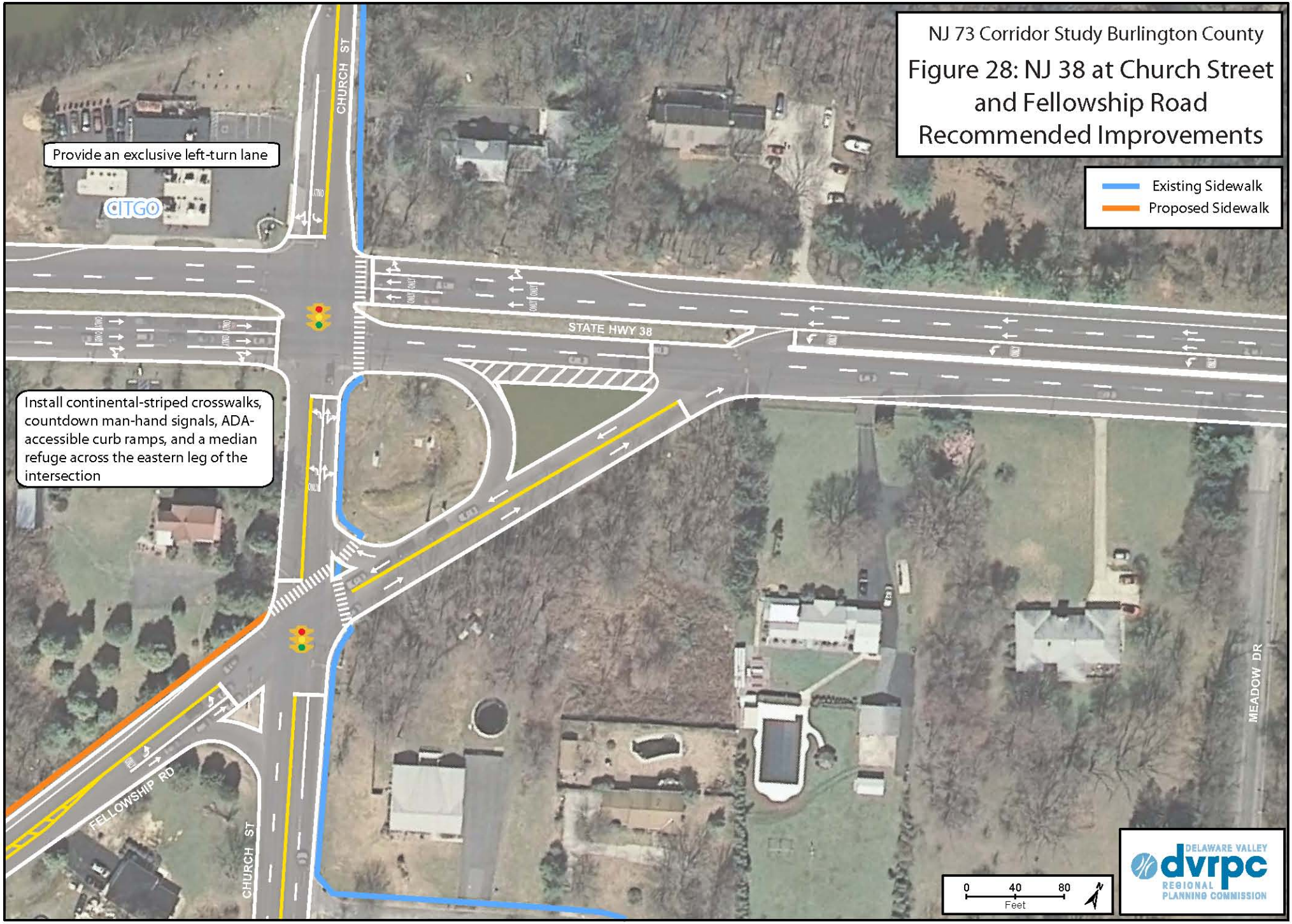

NJ 73 Corridor Study Burlington County
Figure 28: NJ 38 at Church Street and Fellowship Road Recommended Improvements
Existing Sidewalk
Proposed Sidewalk
Provide an exclusive left-turn lane
Install continental-striped crosswalks, countdown man-hand signals, ADA-accessible curb ramps, and a median refuge across the eastern leg of the intersection
CHURCH ST
STATE HWY 38
FELLOWSHIP RD
CHURCH ST
MEADOW DR
CITGO
0 40 80
Feet
DELAWARE VALLEY
dvrpc
REGIONAL PLANNING COMMISSION

Table 30: Church Street Intersections – AM Peak Hour LOS

		Existing Existing Geometry		Medium-Term Scenario #1		Medium-Term Scenario #2	
		Clustered Plan (90 second cycle)		Clustered Plan with Optimized Splits (90 second cycle)		Modified Clustered Plan with Optimized Splits (90 second cycle)	
		Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS
AM Peak Hour	Church St (NB)	31	C	35	D	35	D
	Church St (SB)	692	F	61	E	61	E
	NJ 38 (EB)	43	D	28	C	27	C
	NJ 38 (WB)	93	F	71	E	72	E
	Total Intersection	141	F	50	D	50	D
	Fellowship Rd (NB Right)	20	B	22	C	20	C
	NJ 38 (EB)	73	E	49	D	-	
	NJ 38 (WB Left)	26	C	29	C	-	
	Total Intersection	32	C	24	C	-	N/A
	Church St (NB)	64	E	94	F	94	F
	Church St (SB)	1	A	2	A	2	A
	Fellowship Rd (EB)	17	B	16	B	15	B
	Fellowship Rd (WB)	36	D	32	C	-	
	Total Intersection	39	D	51	D	57	E
	Pleasant Valley Rd (NB)	110	F	110	F	110	F
	Pleasant Valley Rd (SB)	481	F	481	F	580	F
	NJ 38 (EB)	74	E	74	E	92	F
	NJ 38 (WB)	71	E	72	E	247	F
	Total Intersection	152	F	152	F	241	F

Source: DVRPC, 2010

Table 31: Church Street Intersections – PM Peak Hour LOS

		Existing Existing Geometry		Medium-Term Scenario #1		Medium-Term Scenario #2	
		Clustered Plan (90 second cycle)		Clustered Plan with Optimized Splits (90 second cycle)		Modified Clustered Plan with Optimized Splits (90 second cycle)	
		Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS
PM Peak Hour	Church St (NB)	13	B	17	B	16	B
	Church St (SB)	802	F	126	F	104	F
	NJ 38 (EB)	85	F	44	D	46	D
	NJ 38 (WB)	68	E	37	D	44	D
	Total Intersection	168	F	50	D	50	D
	Fellowship Rd (NB Right)	28	C	37	D	40	E
	NJ 38 (EB)	118	F	63	E	-	
	NJ 38 (WB Left)	20	C	24	C	-	
	Total Intersection	53	D	32	C	-	N/A
	Church St (NB)	38	D	88	F	68	E
	Church St (SB)	9	A	11	B	10	B
	Fellowship Rd (EB)	21	C	18	B	18	B
	Fellowship Rd (WB)	82	F	49	D	-	
	Total Intersection	33	C	43	D	34	C
	Pleasant Valley Rd (NB)	162	F	162	F	208	F
	Pleasant Valley Rd (SB)	322	F	322	F	445	F
	NJ 38 (EB)	55	E	55	E	117	F
	NJ 38 (WB)	180	F	182	F	155	F
	Total Intersection	147	F	148	F	182	F

Source: DVRPC, 2010

12. Church Road (CR 616) at Fellowship Road and Springdale Road (CR 673)

This location is composed of two signalized intersections, Church Road at Fellowship Road and Church Road at Springdale Road, situated 1,100 feet apart; they are connected via Church Road and its 180-foot long three-lane bridge that spans the New Jersey Turnpike (NJTP). Both Fellowship Road and Springdale Road are designated County Route 673 (CR 673). However, since neither road crosses the NJTP, CR 673 is redirected along Church Road, where it is superseded by County Route 616. As a result, the two intersections carry a high proportion of left and right turn movements, and this segment of Church Road carries almost twice the volume of vehicles than segments immediately beyond this location. Fellowship Road does extend south past its intersection with Church Road, but terminates 1,000 feet away in a cul-de-sac. The signal timing for both intersections is coordinated with 95- and 115- second cycle lengths during the morning and afternoon peak hours, respectively. At the Fellowship Road intersection, there are parallel-striped crosswalks and pedestrian push buttons for all four approaches; however, there are no pedestrian signal heads. At the Springdale Road intersection, there is one pedestrian-actuated man-hand signal head but no other pedestrian crossing infrastructure. Sidewalks are absent from either side of the Church Road bridge.

This segment of Church Road, between and including the intersections at Fellowship Road and Springdale Road, experienced 52 crashes between 2006 and 2008. The most frequent crash type is “Same Direction - Rear End” at 37 percent or 19 crashes. The second most frequent is “Right Angle” with 25 percent or 13 crashes, and mostly involves north and westbound traveling vehicles. Over 70 percent of the crashes are property damage only, with the remainder resulting in injury, including one fatality.

During the morning peak hour, both intersections operate at a LOS of C with about 30 seconds of overall delay. The Church Road approaches experience 25 to 38 seconds of delay. During the afternoon peak hour, the Fellowship Road intersection operates at a LOS of D with 55 seconds of overall delay, and the Springdale Road intersection operates at a LOS of F with 132 seconds of overall delay. Church Road approaches experience 35 to 210 seconds of delay; the latter is due to a large volume of eastbound through vehicles at the Springdale Road intersection. During either peak hour, the Fellowship Road and Springdale Road approaches do not surpass 42 seconds of delay. Tables 32 and 33 summarize the delay and LOS measures at these intersections.

The properties adjacent to the Fellowship Road intersection and along Fellowship Road south of this intersection are mainly composed of low-rise commercial office and warehouse buildings. At the Springdale Road intersection, adjacent properties include an indoor swim club and a trash processing facility. Also, Springdale Road parallels the NJTP and is approximately 110 feet from the edge of the northbound NJTP cartway.

Figure 29 displays the long-term recommendation for this intersection.

Table 32: Church Road at Fellowship Road and Springdale Road Intersection LOS, AM Peak Hour

		Existing		Long-Term	
AM Peak Hour		Existing Geometry		New Bridge Over the NJTP, 2nd Left Turn Lane for Northbound Fellowship Road	
		Existing Timing		Protected Left Turn Phasing for Fellowship Road Approaches, Eastbound Church Road Lead, Split Optimized	
		Delay (sec)	LOS	Delay (sec)	LOS
	Fellowship Rd (NB)	40	D	56	E
	Fellowship Rd (SB)	19	B	53	D
	Church Rd (EB)	38	D	24	D
	Church Rd (WB)	30	C	25	D
	Total Intersection	31	C	40	D
		Existing Geometry		New Bridge Over the NJTP	
		Existing Timing		Northbound Springdale Road Right Turn Overlap, Split Optimized	
		Delay (sec)	LOS	Delay (sec)	LOS
	Springdale Rd (NB)	37	C	47	D
	Church Rd (EB)	25	C	5	A
	Church Rd (WB)	30	C	2	A
	Total Intersection	29	C	8	A

Source: DVRPC, 2010

Table 33: Church Road at Fellowship Road and Springdale Road Intersection LOS, PM Peak Hour

		Existing		Long-Term	
PM Peak Hour		Existing Geometry		New Bridge Over the NJTP, 2nd Left Turn Lane for Northbound Fellowship Road	
		Existing Timing		Protected Left Turn Phasing for Fellowship Road Approaches, Eastbound Church Road Lead, Split Optimized	
		Delay (sec)	LOS	Delay (sec)	LOS
	Fellowship Rd (NB)	39	D	35	C
	Fellowship Rd (SB)	20	B	169	F
	Church Rd (EB)	58	E	269	F
	Church Rd (WB)	78	E	32	C
	Total Intersection	55	D	168	F
		Existing Geometry		New Bridge Over the NJTP	
		Existing Timing		Northbound Springdale Road Right Turn Overlap, Split Optimized	
		Delay (sec)	LOS	Delay (sec)	LOS
	Springdale Rd (NB)	42	D	92	F
	Church Rd (EB)	210	F	40	D
	Church Rd (WB)	35	C	8	A
	Total Intersection	132	F	35	D

Source: DVRPC, 2010

Summary

Issues:

- Vehicular congestion during the afternoon peak hour;
- Increased volumes along this segment of Church Road because of the routing of CR 673 along CR 616 due to the former's lack of a span over the NJTP;
- Church Road, where it crosses the NJ Turnpike near Springdale Road, is deficient, and cannot accommodate peak volumes. The bridge would need to be replaced to correct existing traffic deficiencies and safety issues; and
- Lack of pedestrian infrastructure along Church Road and at both the Fellowship Road and Springdale Road intersections.

Pedestrian Recommendations:

- Provide a comprehensive sidewalk network to allow pedestrians to cross over the NJTP. An additional vehicular route over the NJTP will generate an underutilized eastbound lane along the Church Road bridge. This lane's ROW may be used to provide sidewalks along both sides of the existing bridge;

- Install pedestrian countdown man-hand signal heads, pedestrian push buttons, continental-style pedestrian crosswalks, and ADA-accessible curb ramps across all approaches at both intersections; and

- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation.

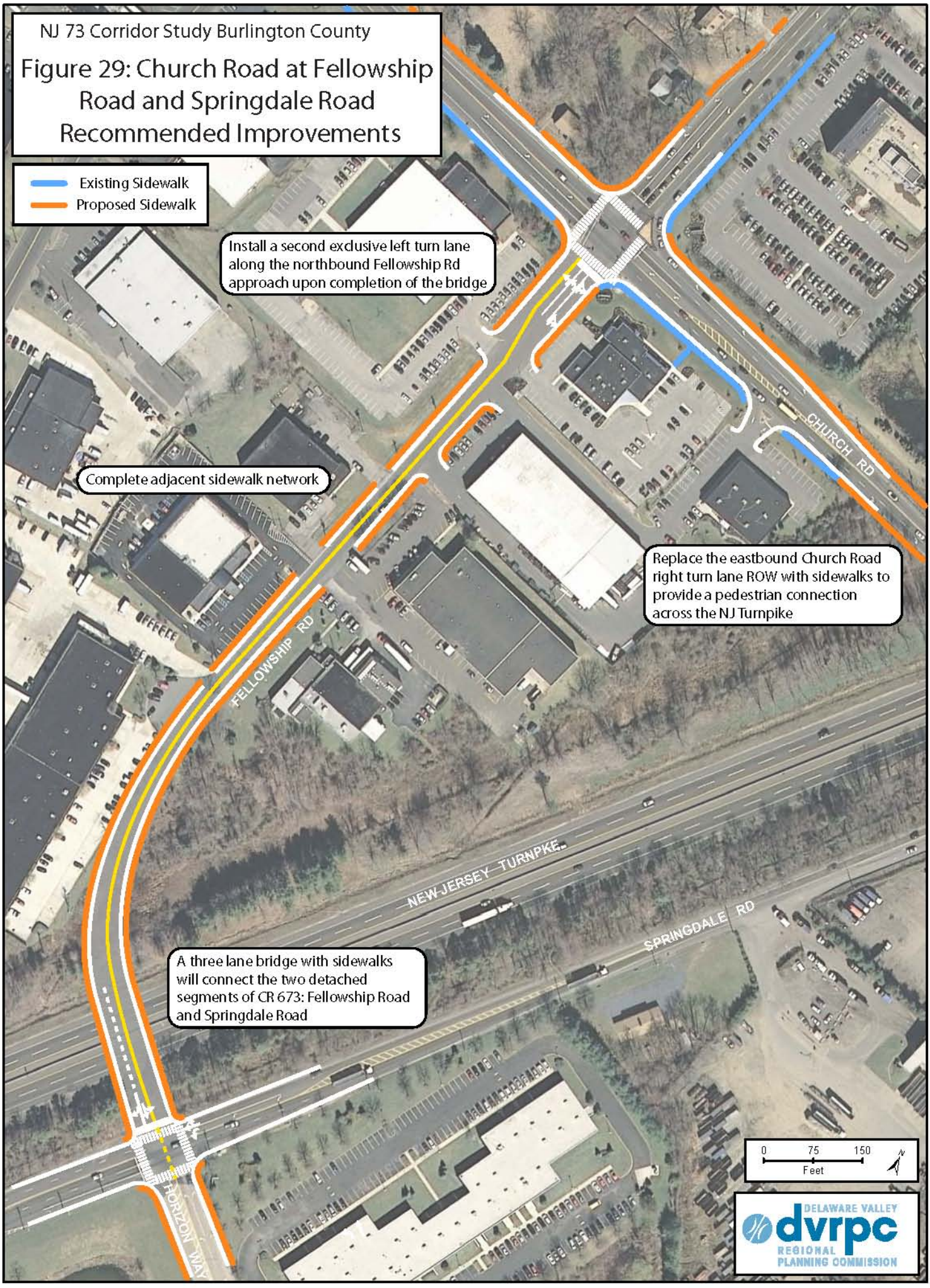
Highway Recommendations:

- Construct a three-lane (two lanes southbound, one lane northbound) bridge with shoulders and sidewalks spanning the NJTP from the intersection of Springdale Road and Horizon Way to the Fellowship Road cul-de-sac. This bridge will link the two disconnected segments of CR 673, thus reducing congestion and weaving on the Church Road bridge via a redistribution of north and south traveling vehicles. This option would also be less disruptive to traffic during construction than a reconstruction of the Church Road bridge. By connecting Fellowship and Springdale roads, current Fellowship Road driveway patterns north of the Turnpike could be consolidated to improve safety; and

- The redistribution of vehicles will affect travel patterns at the two Church Road intersections. At the intersection with Fellowship Road, with the addition of a second northbound left turn lane, overall delays are calculated to increase by nine and 113 seconds during the morning and afternoon peak hours, respectively. At the intersection with Springdale Road, despite the elimination of an eastbound lane for sidewalk ROW, overall delays are calculated to reduce by 21 and 97 seconds during the morning and afternoon peak hours, respectively. At both intersections, during either peak hour, all but one of the four Church Road approaches experience between six and 40 seconds of average delay. The eastbound Church Road approach at Fellowship Road is expected to carry additional right turns, thus increasing its average delay to 270 seconds.

NJ 73 Corridor Study Burlington County

Figure 29: Church Road at Fellowship Road and Springdale Road Recommended Improvements



13. Lenola Road (CR 608) at Camden Avenue (CR 537) and New Albany Road

Existing Conditions

This location is composed of two adjacent signalized intersections that are approximately 400 feet apart along Lenola Road. The north and southbound Lenola Road approaches at Camden Avenue provide a single approach lane to carry left turn, through, and right turn movements. As a result, there are many crashes at this intersection due to the high proportion of turning movements combined with the lack of dedicated turn lanes. This intersection's signal timing was recently retimed to reduce congestion via lead-lag operations for the Lenola Road approaches. However, site visits observed frequent left turn trapping for northbound left turning vehicles once their signal phase concluded. The intersection at New Albany Road carries a large proportion of heavy vehicles due to the proximity of industrial parks to the north and northeast of this location. It was observed that, despite stop bars set back from the intersection, heavy vehicles continue to have difficulty completing turning movements. At both intersections, there are parallel-striped crosswalks, man-hand signal heads, pedestrian push buttons, and ADA-accessible curb ramps across all four approaches.

This location experienced 35 crashes from 2006 to 2008. Almost two-thirds of these occurred at the Camden Avenue intersection, of which 41 percent or 9 crashes were "Left Turn/U Turn" crashes, the most frequent crash type at this intersection. Two pedestrian and one pedacyclist crash occurred at this location.

There are commercial establishments at all four corners of the Camden Avenue intersection, including a McDonalds and 7-Eleven, with varying degrees of setback and surface parking between buildings and the street. This intersection is within Moorestown Township's "West Moorestown" redevelopment area, which is seeking to revitalize this western gateway into the township. The intersection at New Albany Avenue is adjacent to residential homes, a religious institution, and an overflow surface parking lot. North of this location is the Jeff Young Memorial Park and further north are industrial parks along both Lenola Road and New Albany Road.

Summary

Issues:

- Lack of exclusive left turn lanes at the Camden Avenue intersection requires all movements from the Lenola Road approaches to share a single lane;
- Lead-lag signal timing encourages unsafe left turn trapping for northbound Lenola Road vehicles;
- Difficulty completing turning movements for heavy vehicles at the New Albany Road intersection; and
- Location is sited within the "West Moorestown" redevelopment area.

Pedestrian Recommendations:

- Upgrade crosswalks to continental-style crosswalks, and pedestrian signal heads to countdown man-hand hand signal heads; and
- Retime signal timing to provide adequate pedestrian crossing time (assuming a walking speed of 3.5 feet/second) upon pedestrian actuation.

Highway Recommendations:

- Explore the possibility of introducing exclusive left turn lanes for the Lenola Road approaches at the Camden Avenue intersection. The necessary ROW for these lanes may be acquired from existing surface parking adjacent to the intersection; and
- Rebuild the curb along the northeast quadrant of the New Albany Road intersection as a mountable curb. This would facilitate the turning movements for heavy vehicles. This recommendation should be based upon the ability to increase the width of the buffer via a rerouting of the sidewalk slightly further away from the road's cartway.

Implementation

This report's recommendations aim to alleviate congestion, improve highway efficiency, protect and remediate environmental resources, and enhance the quality of life within the communities along NJ 73. The implementation of these recommendations relies upon the corridor municipalities. This section summarizes each recommendation by subsection, estimates possible project costs, and identifies the responsible agency. Funding sources have also been identified for each recommendation. They are outlined by municipal, county, region, and state funding sources.

Project Recommendation Costs and Funding

The following recommendations are identified as either corridor-wide or by their specific highway segment and location as outlined in the transportation section. Applicable smart growth and environmental recommendations are included in each of the various tables.

Corridor-wide Land Use Recommendations

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate*
Encourage appropriate infill development along NJ 73 and redevelopment areas	Corridor Municipal Officials Burlington County NJDOT Developer NJ Transit	Capital Improvement Programs (CIP) Impact Fee Ordinances Business Improvement Districts Transportation Enhancements Program DVRPC's TCDI Program Tax Increment Financing (TIF)	Minimal cost to municipalities. May require planning consultant.
Revise local zoning codes to foster mixed use development			
Establish multi-municipal agreements for corridor-wide design standards			
Adopt policies to improve connections and access management			
Adopt smart growth zoning			
Improve corridor-wide signage, primarily wayfinding, to benefit visitors and highway safety			$100,000 - $200,000 corridor-wide
Feasibility study of bus service on NJ 73 north of NJ 70			

Corridor-wide Environmental Planning Recommendations

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Stormwater basin retrofits Protection of woodlands Natural landscaping Parking lot retrofits Riparian buffers and greenways Residential BMPs	Municipal Officials Burlington County Developer NJDEP	Capital Improvement Programs (CIP) Impact Fee Ordinances Transportation Enhancements Program DVRPC's TCDI Program Tax Increment Financing (TIF) New Jersey Environmental Infrastructure Financing Program Section 319(h) Nonpoint Source (NPS) Grant Program User fee financing for water	Varies by scale, minimal cost - $250,000+ per project

Evesham Township

NJ 73 at Greentree Road

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Install optical program signal heads for Greentree Road approaches	Evesham Township Burlington County NJDOT Developer	Capital Improvement Programs (CIP) Impact Fee Ordinances Business Improvement Districts Transportation Enhancements Program Home Town Streets/Safe Routes to School DVRPC's TCDI Program Tax Increment Financing (TIF)	Minimal costs due to availability of existing services
Contain the tree canopy along Greentree Road			
Install pedestrian crossing facilities (continental crosswalks, countdown signals, pedestrian education signs, curb ramps, and median refuges)			$45,000 – $60,000
Complete the adjacent sidewalk network			$49,000 – $64,000

Maple Shade Township

NJ 73 at Waverly Avenue, Willow Road, and Collins Road

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Redesign this location by widening the Willow Road approach, introducing eastbound through movements, and converting Collins Road to one-way	Maple Shade Township NJDOT Developer	Capital Improvement Programs (CIP) Impact Fee Ordinances Business Improvement Districts Transportation Enhancements Program Home Town Streets/ Safe Routes to School DVRPC's TCDI Program Tax Increment Financing (TIF)	$256,000 – $332,000. Excludes right-of-way acquisition costs.
Retime the signal timing for vehicular and pedestrian safety improvements			$5,000 – $6,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)			$75,000 – $100,000
Complete the adjacent sidewalk network			$49,000 – $64,000
Consolidate adjacent driveways for improved access management			$52,000 – $68,000

NJ 73 at Fox Meadow Drive

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Retime the signal timing for vehicular and pedestrian safety improvements	Maple Shade Township NJDOT Developer	Capital Improvement Programs (CIP) Impact Fee Ordinances Transportation Enhancements Program Home Town Streets/Safe Routes to School DVRPC's TCDI Program Tax Increment Financing (TIF)	$2,000 – $3,000
Install pedestrian crossing facilities (countdown signals, educational signs, and median refuges)			$22,000 – $28,000
Provide curb-side shoulder or deceleration lanes			$22,000 – $28,000

NJ 73 at North Stiles Avenue and Princeton Avenue

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, curb extensions, and median refuges)	Maple Shade Township Burlington County NJDOT	Capital Improvement Programs (CIP) Impact Fee Ordinances Business Improvement Districts	$90,000 – $115,000
Retime the signal timing for pedestrian safety improvements		Transportation Enhancements Program	$2,000 – $3,000
Complete the adjacent sidewalk network		Home Town Streets/Safe Routes to School	$1,000 – $2,000
Consolidate adjacent driveways for improved access management		DVRPC's TCDI Program Tax Increment Financing (TIF)	$23,000 – $29,000

Moorestown Township

NJ 38 at Lenola Road

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Add left turn lanes for NJ 38 approaches within the existing median	Moorestown Township Burlington County NJDOT Developer NJ Transit	Capital Improvement Programs (CIP) Impact Fee Ordinances Business Improvement Districts Transportation Enhancements Program Home Town Streets/Safe Routes to School DVRPC's TCDI Program Tax Increment Financing (TIF)	$25,000 – $32,000
Stripe a 2nd left turn lane for southbound Lenola Road			$1,700 – $2,200
Lengthen the westbound NJ 38 lane drop taper striping			$1,200 – $1,500
Retime the signal timing for vehicular operations and safety improvements			$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)			$37,000 – $48,000
Consolidate adjacent driveways for improved access management			$30,000 – $39,000
Add passenger amenities (e.g., shelters) at nearby NJ Transit bus stops			Minimal costs to municipalities. Requires maintenance and liability responsibilities.

NJ 38 at Pleasant Valley Avenue, Church Street, and Fellowship Road

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Install a southbound Church Street left turn lane	Moorestown Township	Capital Improvement Programs (CIP)	$85,000 – $111,000
Retime the signal timing for vehicular and pedestrian safety improvements	Burlington County	Impact Fee Ordinances Transportation Enhancements Program	$9,000 – $12,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)	NJDOT	DVRPC's TCDI Program Tax Increment Financing (TIF)	$66,000 – $86,000
Complete the adjacent sidewalk network	Developer		$9,000 – $12,000
Add passenger amenities (e.g. shelters) at nearby NJ Transit bus stops	NJ Transit		Minimal costs to municipalities. Requires maintenance and liability responsibilities.

Lenola Road at Camden Avenue and New Albany Road

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Construct left turn lanes along the New Albany Road/Lenola Road approaches.	Moorestown Township	Capital Improvement Programs (CIP)	$170,000 – $221,000
Rebuild the intersection's curb to better accommodate heavy vehicle	Burlington County	Impact Fee Ordinances	$7,000 – $9,000
Retime the signal timing for vehicular and pedestrian safety improvements	NJDOT	Business Improvement Districts	$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, and curb ramps)	Developer	Transportation Enhancements Program DVRPC's TCDI Program Tax Increment Financing (TIF)	$62,000 – $80,000

Mount Laurel Township

NJ 73 at Atrium Way

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Construct an extension of Atrium Way across NJ 73	Mount Laurel Township	Capital Improvement Programs (CIP)	$244,000 – $317,000
Install a channelized right turn lane for southbound NJ 73	NJDOT	Impact Fee Ordinances	$7,000 – $9,000
Eliminate current egress from Commerce Pkwy on NJ 73	Developer	Business Improvement Districts	$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)		Transportation Enhancements Program	$80,000 – $105,000
Complete the adjacent sidewalk network		DVRPC's TCDI Program	$46,000 – $60,000
Retime the signal timing for vehicular and pedestrian safety improvements		Tax Increment Financing (TIF)	$2,000 – $3,000

NJ 73 at Church Road and Ramblewood Parkway

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Restripe westbound Church Road approach to provide an additional right turn lane (short term)	Mount Laurel Township	Capital Improvement Programs (CIP)	$2,000 – $3,000
Redesign the intersection via a new eastbound Church Road approach (long term)	NJDOT	Impact Fee Ordinances	$314,000 – $408,000
Retime the signal timing for vehicular and pedestrian operations and safety improvements	Developer	Business Improvement Districts	$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)		Transportation Enhancements Program	$80,000 – $105,000
Complete the adjacent sidewalk network		DVRPC's TCDI Program	
		Tax Increment Financing (TIF)	$47,000 – $61,000

NJ 73 at Howard Boulevard

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Convert the driveway for Executive Plaza into a formal road connecting Church Road to NJ 73	Mount Laurel Township NJDOT Developer	Capital Improvement Programs (CIP) Impact Fee Ordinances Business Improvement Districts Transportation Enhancements Program Home Town Streets/Safe Routes to School DVRPC's TCDI Program Tax Increment Financing (TIF)	$105,000 – $136,000
Remove the curb-side lane of northbound NJ 73 and replace with sidewalks and landscaped buffers			$10,000 – $14,000
Retime the signal timing for vehicular and pedestrian operations and safety improvements			$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)			$37,000 – $48,000
Complete the adjacent sidewalk network			$65,000 – $85,000
Consolidate adjacent driveways for improved access management			$90,000 – $117,000

NJ 73 at Fellowship Road and NJTP Ramp

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Relocate the southbound NJ 73 farside jughandle to the intersection's nearside	Mount Laurel Township	Capital Improvement Programs (CIP)	$68,000 – $89,000
Replace the northbound NJ 73 left turn lane with a farside jughandle	Burlington County	Impact Fee Ordinances	$102,000 – $132,000
Formalize the shoulder of northbound NJ 73 into a right turn lane	NJDOT	Transportation Enhancements Program	$1,000 – $2,000
Install advance overhead and pavement lane control and destination signage		DVRPC's TCDI Program	$100,000 – $129,000
Retime the signal timing for vehicular and pedestrian operations and safety improvements		Tax Increment Financing (TIF)	$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, curb ramps, and median refuges)			$62,000 – $80,000

Church Road at Fellowship Road and Springdale Road

Recommendation	Responsible Agency	Possible Funding Options	Project Cost Estimate
Construct a bridge over the NJTP connecting Fellowship Road to the intersection of Springdale Road and Horizon Way	Mount Laurel Township	Capital Improvement Programs (CIP)	$10M – $13M
Retime the signal timing for vehicular and pedestrian operations and safety improvements	Burlington County	Impact Fee Ordinances	$2,000 – $3,000
Install pedestrian crossing facilities (continental crosswalks, countdown signals, and curb ramps)	NJDOT	Transportation Enhancements Program	$34,000 – $44,000
Complete the adjacent sidewalk network	Developer	DVRPC's TCDI Program	$53,000 – $69,000
	NJ Turnpike	Tax Increment Financing (TIF)	

***** Project cost estimate reflects construction cost only

Funding Programs and Tools

This section details possible funding sources, ranging from traditional economic development mechanisms available to municipalities, to competitive grant programs administered by state and regional agencies. This information was extracted from DVRPC's *Municipal Resource Guide* (www.dvrpc.org/asp/MCDResource/). If interested in any of the programs listed, please contact the agency listed.

Municipal Programs and Tools

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

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

Capital Improvement Program (CIP) sets out a municipality's plans for future capital improvements, such as roads and other public facilities. The range and scope of these vary, but most cover an immediate 5-6 year period and can be scoped for up to 20 years. A successful CIP should include a schedule of implementation with a projected budget. If a municipality's CIP is consistent with the master plan and zoning ordinance, they can be useful tools, allowing the municipality to plan for future growth and improvements and lowering costs by anticipating the future demands of the municipal infrastructure system. The CIP can also provide developers and the public with more certainty concerning future public improvements, thereby improving opportunities for participation and increasing accountability. The adoption and updating of the CIP is no small task, but should be considered an immediate priority for municipalities.

Impact Fees are paid by developers to help finance a variety of needed services and facilities that result from growth. This type of revenue provides a better quality of life for residents by financing the infrastructure needed to support additional population, employment, and development. It ultimately reduces the need to impose higher taxes on existing residents to

finance additional facilities. An impact fee ordinance requires modification to the master plan and subdivision and zoning codes.

Parkland Dedications/Fees-in-Lieu requires developers to provide open space within their development or to contribute fees-in-lieu to improve or preserve open space elsewhere. Fees-in-lieu should be outlined in the zoning and municipal subdivision code for the municipality. They are often based on the number of residential units that a particular development will introduce.

Regional Programs

Transportation and Community Development Initiative (TCDI)

Eligibility: Eligible municipalities

Purpose: Support local planning projects to improve transportation and encourage redevelopment

Terms: Grants up to $75,000 for single projects and $100,000 for multi-municipal projects; 20 percent local match required

Deadline: Approximately every two years

C: Delaware Valley Regional Planning Commission (DVRPC)

P: 215-592-1800

I: www.dvrpc.org

Transportation Enhancements Program (TE) – New Jersey

Eligibility: New Jersey local governments, counties, state or federal agencies, nonprofits

Purpose: Funds non-traditional projects designed to enhance the transportation experience, to mitigate the impacts of transportation facilities on communities and the environment, and to enhance community character.

Terms: 80 percent to 90 percent of costs can be funded

Deadline: Varies

C: Delaware Valley Regional Planning Commission (DVRPC)

P: 215.592-1800

I: www.dvrpc.org

State Programs

Brownfields Development Area (BDA) Initiative

Eligibility: New Jersey community groups and municipalities

Purpose: Project management assistance for communities impacted by multiple brownfield sites

Terms: Project manager is assigned from the Office of Brownfield Reuse

Deadline: Annual

C: New Jersey Department of Environmental Protection

P: 609-292-1251

I: www.state.nj.us/dep/rsp/brownfields/bda

Brownfield Redevelopment Incentive Program

Eligibility: New Jersey business owners and developers

Purpose: To finance Brownfield site remediation

Terms: Interim financing up to $750,000 at below-market interest rates

Deadline: Varies

C: New Jersey Economic Development Authority

P: 609-777-4898

I: www.njeda.comu

Environmental Equity Program

Eligibility: New Jersey government entities and developers

Purpose: Provides loans for site acquisition, remediation, and demolition costs for brownfield redevelopment

Terms: Vary

Deadline: Varies

C: New Jersey Redevelopment Authority

P: 609-292-3739

I: www.njra.us

Fund for Community Economic Development

Eligibility: New Jersey Community Development Organizations, developers

Purpose: To finance feasibility studies or other predevelopment activities

Terms: Vary

Deadline: Varies

C: New Jersey Economic Development Authority

P: 609-777-4898

I: www.njeda.com

Historic Site Management Grants

Eligibility: New Jersey municipalities, counties, non-profits

Purpose: Awards range from $5,000 to $50,000

Terms: Vary

Deadline: Varies

C: New Jersey Department of Community Affairs

P: 609-292-7156

I: www.state.nj.us/dca

Innocent Party Grants

Eligibility: New Jersey municipalities, counties, redevelopment entities, homeowners

Purpose: Applicant must not be responsible for contamination

Terms: Vary

Deadline: Open

C: New Jersey Economic Development Authority

P: 609-777-0990

I: www.njeda.com

Municipal Grants

Eligibility: New Jersey municipalities, counties, redevelopment entities, homeowners

Purpose: Returns contaminated and underutilized properties to productive reuse

Terms: Up to $3 million, per municipality, per year for 100 percent of costs of preliminary assessment, site investigation, remedial investigation, and remedial action

Deadline: Open

C: New Jersey Economic Development Authority

P: 609-777-0990

I: www.njeda.com

Redevelopment Investment Fund (NJRIF)

Eligibility: New Jersey municipalities, counties, non-profits, corporations

Purpose: Flexible investment fund that provides debt and equity financing for business and real estate ventures

Terms: Vary

Deadline: Varies

C: New Jersey Redevelopment Authority

P: 609-292-3739

I: www.njra.us

Redevelopment Area Bond Financing

Eligibility: New Jersey municipalities with designated redevelopment areas

Purpose: Tax-exempt bonds to fund the infrastructure and remediation components of redevelopment projects

Terms: Vary

Deadline: Varies

C: New Jersey Economic Development Authority

P: 609-777-4898

I: www.njeda.com

Smart Futures Grant

Eligibility: New Jersey local governments, counties, nonprofits

Purpose: Funds projects that balance development with the preservation of open space and environmental resources

Terms: Vary

Deadline: Annual

C: New Jersey Department of Community Affairs

P: 609-292-7156

I: www.state.nj.us/dca

Smart Growth Redevelopment Funding

Eligibility: New Jersey developers undertaking mixed-use development projects

Purpose: To finance site preparations costs such as demolition, removal of debris, or engineering

Terms: Low-interest loans and loan guarantees up to $1 million

Deadline: Varies

C: New Jersey Economic Development Authority

P: 609-777-4898

I: www.njeda.com

Special Improvement Districts: Loans and Grants

Eligibility: New Jersey municipalities

Purpose: To finance capital improvements within a designated business improvement zone

Terms: Loans up to $500,000 for capital improvements; grants up to $10,000 for technical support

Deadline: Open

C: New Jersey Department of Community Affairs

P: 609-633-9769

I: www.state.nj.us/dca

New Jersey Environmental Infrastructure Financing Program

Eligibility: New Jersey local government units

Purpose: To finance infrastructure projects to protect clean water and drinking water

Terms: Loans up to $10 million per borrower

Deadline: Annual

C: New Jersey Environmental Infrastructure Trust

P: 609-219-8600

I: www.njeit.org

Section 319(h) Nonpoint Source (NPS) Grant Program

Eligibility: Municipal planning departments or boards, health departments or Boards; County planning departments or boards, health departments or Boards; designated water quality management planning agencies; state and regional entities entirely within New Jersey; state government agencies, universities, and colleges; interstate agencies of which New Jersey is a member; watershed and water resource associations and other local nonprofit organizations.

Purpose: To finance the construction and implementation of projects that help to protect, maintain, and improve water quality

Terms: Vary

Deadline: Annual

C: New Jersey Department of Environmental Protection, Division of Watershed Management, Bureau of Watershed Planning

P: 609-984-0058

I: www.nj.gov/dep/watershedmgt

Appendix A

Water Quality Impairments

Table 34: Water Quality Impairments in Subwatersheds of NJ 73 Corridor, 2008

Contaminant	Description	Possible Sources of Entry into Water Resources	Possible Effects
Phosphorus	Chemical found in fertilizers; also used in explosives, pesticides, and other commercial uses; naturally present in low levels in the environment.	Over-fertilization and runoff of agriculture and lawns; discharge from wastewater treatment plants; septic system overflow; soil and streambank erosion; runoff from industrial or other areas.	Harmful algae blooms and aquatic "dead zones."
E. coli	Bacteria present in human and animal waste; indicator of raw sewage, which contains more harmful microbes.	Runoff of animal waste from agricultural or other uses; discharge from wastewater treatment plants; septic system overflow.	Human illnesses including bloody diarrhea, cramps, and fever.
Arsenic	Toxic chemical found in wood preservatives; also used in paints, drugs, pesticides, fertilizers, and other commercial uses; naturally present in low levels in the environment.	Runoff or discharge from agricultural and industrial uses; erosion of rocks and soils.	Cancer of the bladder, lungs, skin, kidney, nasal passages, liver, and prostate; other illnesses include nausea, vomiting, diarrhea, numbness, paralysis, and blindness.
Total suspended solids (TSS)	Solid materials suspended in water.	Runoff from agricultural or industrial uses; soil and streambank erosion; wastewater discharges.	Decrease in photosynthesis and oxygen in water, causing aquatic "dead zones."
Chlordane	Chemical compound formerly used as a pesticide (particularly for termites); banned by EPA in 1988.	Runoff from agriculture and residential areas.	Harmful effects on the nervous, digestive, and renal systems; associated with testicular and prostate cancer.
DDT (and metabolytes DDE and DDD)	Synthetic pesticide; banned by EPA in 1972.	Runoff from agriculture and residential areas.	Harmful effects on the nervous system; linked to diabetes; probable link to numerous cancers; can cause numbness, headaches, nausea, vomiting, seizures, coma, and other effects; causes eggshell thinning in birds; highly toxic to animals and insects.

Sources: NJDEP, EPA, and DVRPC, 2010

Table 34: Water Quality Impairments in Subwatersheds of NJ 73 Corridor, 2008 (continued)

Contaminant	Description	Possible Sources of Entry into Water Resources	Possible Effects
PCBs	Chemical used in many industrial processes including electrical equipment, paints, plastics, dyes, herbicides and pesticides, and other uses.	Runoff or discharge primarily from industrial uses; also from agricultural, residential, and other uses.	Strong link to cancer in humans; causes damage to the immune, reproductive, nervous, and endocrine systems.
pH	Measure of acidity.	Acid rain from atmospheric pollutants.	Affects most chemical and biological reactions; with increased acidty, water is more able to carry dissolved substances.
Nitrate	Organic compound found in all living things; present in high doses in fertilizer; present in decomposed human and animal waste.	Runoff of fertilizer from agricultural or residential uses; wastewater discharges; septic system overflow; runoff of animal waste from agricultural or other uses.	Harmful algae blooms and aquatic "dead zones;" human effects can include methemoglobinemia ("blue baby syndrome").
Mercury	Metallic chemical element; bioaccumulates in aquatic life; naturally present in low levels in the environment.	Air deposition from chlorine chemical plants and coal-fired power plants; may also be deposited by improperly disposed flourescent lights, batteries, thermometers and other mercury-containing products.	Impaired neurological development, particularly in fetuses, infants, and children; may cause deformities or death; may also impair vision, speech, hearing, and muscle weakness.
Dissolved Oxygen	Amount of gaseous oxygen dissolved in water.	Imbalances in dissolved oxygen may be caused by wastewater discharges, runoff from from agricultural or other areas, septic system overflow, and other causes.	High or low levels of dissolved oxygen may cause impairment or death in aquatic life.

Sources: NJDEP, EPA, and DVRPC, 2010

Appendix B

Evesham Township: Natural Landscaping Ordinance

Municipal Ordinance 62-56. Natural features/landscaping

A. Purpose.

1. Landscaping shall be designed with an overall concept, to integrate the various elements of the site, and to preserve and enhance the particular identity of the site, consistent with the purposes of the Municipal Land Use Law.

2. The tree protection and landscaping standards contained in this Chapter shall be applicable to all subdivisions of land and any parcels undertaking site plan activities. All parts of properties being redeveloped, renovated, improved as part of a subdivision or site plan application shall be brought into compliance with the requirements of this Chapter, to the extent possible.

3. Landscaping may include plant materials such as trees, shrubs, ground cover, perennials, annuals, and mulch. It may also include other man-made and natural elements such as rocks, land forms and berms, water, sculpture, art, walls, fences, street furnishings, and paving materials.

4. Landscaping and its maintenance should help preserve the resources of Evesham Township by utilizing such methods as planting natives, xeriscaping (using drought-tolerant plants), using drip irrigation systems and sustainable materials.

B. Landscape Plan Requirements.

1. The requirements and standards prescribed herein shall be considered the minimum requirements and standards for all Landscape and Tree Protection Management Plans as required by this Chapter. Standards established by other Township ordinances, or by state and federal rules and regulations shall apply where those standards are more restrictive than the standards set forth herein.

2. The Landscape Plans shall be prepared and sealed by a certified Landscape Architect or other similarly qualified professional acceptable to the Planning Board.

3. Landscape Plans shall be submitted with each site plan or major subdivision plan application. They shall be on the same size sheets and at the same scale as other corresponding layout plans in the set, and shall contain the following information:

a. Existing vegetation to remain, and location of proposed plantings, with transplants and compensatory plants clearly labeled.

b. Existing and proposed improvements, including structures, utilities, lighting, signage, stormwater management system strictures, pavement materials, water features, fences, walls.

c. All ground plane treatments including grass, groundcovers, and mulch beds, with beds clearly defined.

d. Existing and proposed grades, including berm contours.

e. A plant list on the same sheet, or reference to the sheet on which it appears, which contains a key or symbol reference, corresponding to labels or symbols on the plan; the proposed quantity of each plant species; the scientific and common plant names; the size of the plant at installation; the root condition; plant spacing; and any special specifications or instructions.

f. Details of the proposed method of planting, staking, and tree protection.

g. Standard planting notes, reflecting current industry standards; the guarantee period and maintenance commitment; any special planting notes.

4. Detailed planting areas, which are not clearly legible on plans at a smaller scale, shall be shown at a scale of 1" = 30' or larger, to depict the detail.

This may be necessary to communicate plantings around signage, project entries, in courtyards, tot lots, or building foundations, for example.

5. For applications in the Pinelands Area, landscaping plans shall also incorporate the elements set forth in Section 160-47D of this Code.

C. Standards for Plant Material.

1. Plant species selected shall be suitable to the site's microclimate, be appropriate for the intended function, be proportional to site features, and minimize the amount of maintenance required. Shade and street trees may be selected from the list of "Evesham Township Recommended Street Trees", found in subsection H. below. Shrubs and other plantings may be selected from those recommended in a standard reference book, such as: *Shrubs and Vines for American Gardens*, by Donald Wyman (New York: Macmillian, 1969) or other such reference acceptable to the Planning Board.

2. Plantings shall not block, impede, or interfere with the safe use, operation, or maintenance of roadways, sidewalks, sight easements, utilities, and lighting. Trees shall be offset a minimum of ten (10) feet from utility lines and fifteen (15) feet from overhead utility lines. Plantings shall not be of an invasive nature, weedy or brittle character, easily susceptible to pest infestations and for diseases, or possess hazardous characteristics (bee-attracting, poisonous, thorny) when used in areas designated for sitting or play.

3. With the exception of transplanted material, all proposed plant materials shall be nursery-grown, disease free, and shall conform to the standards listed in *American Standard for Nursery Stock*, ANSI 260.1, current edition, published by the American Nursery and Landscape Association (ANLA).

4. Plant material shall conform to the following minimum sizes and root condition:

a. Shade and street trees shall have a minimum caliper of three to three-and-one-half (3-1/2) inches, measured six (6) inches above ground level, and a minimum height of thirteen (13) to fifteen (15) feet at installation. A minimum of fifty percent (50%) of the trees shall be native to the region. Multiple trunked trees should be identified as such in the plant list. Multiple franked trees shall be counted as one (1) tree.

b. Ornamental and flowering trees shall have a minimum height of eight (8) to ten (10) feet at installation. Multiple trunked trees should be identified as such in the plant list. Multiple trunked trees shall be counted as one (1) tree.

c. Evergreen trees shall have a minimum height of six (6) feet at installation.

d. The roots of all trees shall be contained in soil, and shall be balled and burlapped, except as otherwise noted in this Chapter.

e. Upright shrubs shall be a minimum height of three (3) feet at planting. Spreading shrubs shall be a minimum of eighteen (18) inches in spread at planting.

f. Ground covers, perennials, bulbs, and annuals shall be appropriate to type.

5. A variety of plant species are encouraged to avoid monocultures, to encourage long-lived species, and to promote wildlife habitat. Tree and shrub plantings shall contain the following minimum species mix:

Number of Trees	Minimum Species
1-9	1
10-49	2
50-99	3
100-199	4
over 200	5

Number of Shrubs	Minimum Species
1-49	1
50-99	3
over 100	4

6. Other plant types, such as those marginally hardy to the area or those which have an unusual form and/or non-vegetative features, such as water or rock gardens, may be incorporated into required planting areas. However, only those plants within the feature which meet the above requirements may be counted toward satisfying the minimum planting requirements of this Chapter.

7. Guarantee and Maintenance. All landscape materials, including compensatory and transplanted trees depicted on the approved Landscape Plan, shall be financially secured, guaranteed, and maintained including, without limitation, compliance with the following:

a. All landscape improvements to be provided shall be installed and maintained by accepted practices as recognized by the American Nursery and Landscape Association. Planting and maintenance of vegetation shall include, as appropriate, but not necessarily be limited to, provisions for surface mulch, staking and guying, irrigation, fertilization, insect and disease control, pruning, mulching, weeding, and watering.

b. The Applicant shall make arrangements acceptable to the Township that all landscape improvements installed in accordance with this Chapter shall be guaranteed and maintained in a healthy and/or sound condition, or otherwise be replaced by equivalent improvements, for a period of at least two (2) years following their installation. The guarantee period shall be noted on the plans.

c. After installation and prior to commencement of the guarantee period required above, the Township shall perform an inspection of the finished site for compliance with the approved landscape plan.

Following this inspection, an As-Built Landscape Plan shall be furnished to the Township by the Applicant. Provided the finished site is found to be in compliance, the two (2) year guarantee period shall commence five (5) days from the date of inspection.

d. Plants found to be in poor health or lacking normal growth habit during the two (2) year guarantee period shall be replaced with nursery-grown plants, in accordance with the approved Landscape Plan, within sixty (60) days of being notified by the Township, or during the next planting season, if notified out of season. All replacement plants shall be subject to a new two (2) year guarantee period.

e. At any time, dead plants in hanging baskets and planters shall be replaced within ten (10) days of being notified by the Township.

f. Where accidental damage or vandalism of plants occurs, the Applicant shall replace the damaged plant material in accordance with the original or an approved modified Landscape Plan.

g. The Applicant shall be required to escrow sufficient funds for the maintenance and/or replacement of the proposed vegetation, including compensatory plantings, during the two (2) year guarantee period. The escrow amount shall be equivalent to one hundred and ten percent (110 %) of the amount of the cost estimate submitted with the approved Landscape Plan. In addition, an escrow shall be required for existing plants being disturbed by construction activities and/or transplanted plants that are being used to satisfy the minimum requirements contained in this Chapter or in Chapter 160, Zoning. This amount shall be equivalent to one hundred and ten percent (110%) of the cost of replacement with nursery-grown stock, based on the number of tree credits received for each existing tree or transplant. An escrow is not required for existing preserved trees outside the construction limits, or for transplanted material not being used to satisfy the minimum requirements of this Chapter or in Chapter 160, Zoning.

D. Site Protection.

1. Topsoil preservation. Topsoil disturbed during the course of construction shall be redistributed upon the site on all regraded surfaces so as to provide at least six (6) inches of even cover to all disturbed areas of the development and shall be stabilized by seeding or planting. No topsoil shall be removed from the site during construction unless approved by the appropriate Township officials.

2. Removal of debris. All stumps and other tree parts, litter, brush, weeds, excess or scrap building materials, or other debris shall be removed from the site and disposed of in accordance with New Jersey Department of Environmental Protection and Energy regulations. No tree stumps, portions of tree trunks, or limbs shall be buried anywhere in the development. All dead or dying trees, standing or fallen, shall be removed from the site, unless they are within a wooded area. If trees and limbs are reduced to chips, they may, subject to approval of the appropriate Township official, be used as mulch in landscaped areas. However, the chips must be treated with a high-nitrogen, liquid fertilizer and/or allowed to age prior to being used in a planting bed.

3. Slope plantings. Landscaping of the area of all cuts and fills and/or terraces shall be sufficient to prevent erosion, and all roadways slopes steeper than one (1) foot vertical to three (3) feet horizontally shall be planted with ground covers appropriate for the purpose and soil conditions, water availability, and environment.

4. Additional landscaping. All portions of a property not utilized by buildings or paved surfaces shall be landscaped utilizing combinations of existing vegetation, trees, shrubs, lawns, ground cover, mulch, fencing, rock formations, art works, and grading. In all developments, a minimum of ten (10) trees per acre shall be provided.

5. Protection of existing plantings. A tree shall be considered preserved when the area under the dripline (root zone) is not disturbed, and the tree is in a healthy condition at the end of the guarantee period. Disturbance includes earth-moving activities and the construction of all proposed improvements and utilities. Maximum effort should be made to save or relocate trees within the tree protection zone, specimen trees, plants of high quality and/or value, and plants of rare or unusual species.

a. The following conservation practices are mandatory, and shall be noted as such on the approved Tree Protection Management Plan, and employed in order to preserve existing trees.

(1) All trees, natural features, other vegetation to be preserved shall be protected from equipment damage by a four (4) foot high self-supporting, protective barrier, placed outside the dripline. The tree protection fencing shall be monitored by the Township and maintained by the Applicant while in place. It shall be removed after all earth-moving and construction activities are completed, but prior to landscaping in the vicinity of the preserved natural features.

(2) The area around the base of existing trees shall be left open. Except in the case of approved tree wells and retaining walls, no impervious cover, storage of equipment, materials, debris, or fill shall be allowed within the dripline of any existing tree or within four (4) feet of existing shrubs to remain.

(3) Heavy equipment operators shall not damage existing tree trunks and root systems by driving vehicles over the root zone of any tree to be preserved. If there is no alternative to locating a utility line within the dripline, it is strongly encouraged that tunneling, rather than trenching, be used to minimize potential damage to tree root systems. In such cases, the Township shall determine the most desirable location of the utility for the survival of the tree(s). Where trenching is unavoidable, trenched holes shall be filled with topsoil as soon as possible and tamped lightly to avoid the creation of air spaces.

(4) Any damaged tree trunks and exposed roots shall be treated according to the nature of the injury. When directed by the Township, additional treatment methods may be required, including liquid or dry fertilizer application.

(5) The crown of the tree shall be selectively thinned to compensate for root loss or damage during construction according to the ANLA's guidelines, and pruned according to the National Arborists Association's (NAA) publication "A300 Pruning Standard."

(6) Trees shall not be used for roping, cables, signs, fencing, or lighting. Nails and spikes shall not be driven into trees.

(7) Grade changes to occur at any location on the property shall not result in the alteration to soil or drainage conditions which would adversely affect existing vegetation to be retained following site preparation activities and/or site disturbance of trees, unless adequate provisions are made to protect such vegetation and its root systems.

b. At the discretion of the Township staff, a pre-construction meeting with the Applicant and/or site contractor may be required, to further determine methods to minimize tree loss.

c. The Township may, at its discretion, require that trees and shrubs which would otherwise be removed during site preparation activities be transplanted elsewhere on the site, to the extent feasible.

d. Should any existing trees on the site not scheduled to be removed be irreparably damaged during site preparation activities and, as a consequence thereof, die within two (2) years of the conclusion of site preparation activities, such trees shall be replaced with nursery-grown material, in accordance within the requirement of this Section.

E. Tree Protection Management Plan. A Tree Protection Management Plan must be submitted at the time of site plan application, pursuant to this Chapter, if there are one (1) or more live trees proposed to be cut or removed from the property. A Tree Protection Management Plan shall contain the following information on a plot plan:

1. Location of all existing or proposed buildings, driveways, grading, septic fields, easements, underground utility lines, rights-of-way, and other improvements;

2. Location of existing natural features, including wooded areas, water courses, wetlands, and floodplains.

3. The limits of the tree protection zone, according to the following distances from proposed improvements:

a. House or building = twelve (12) feet

b. Pavement (parking lot, driveway, sidewalk) = five (5) feet

c. Septic fields, underground utilities, the base of berm grading of stormwater management basins, pools, sheds, picnic shelters, and other improvements = ten (10) feet.

4. Location of all existing live trees, with trunk diameters five (5) inches or greater, measured four and one-half (41/2) feet above ground level. Each tree shall be noted by its species, size, and general health condition.

Whenever possible, the actual canopy spread shall be shown. If it must be estimated, the canopy shall equal one and one-half (1 1/2) feet of diameter per one (1) inch of trunk diameter. If the trees to be preserved are part of a wooded area, only the outermost canopy line need be shown, unless disturbance is proposed, then individual trees located within fifty (50) feet of the proposed edge of the woodland shall be shown.

5. Each tree, or mass of trees, to be removed or transplanted shall be clearly marked as such.

6. A chart tabulating the diameter inches being removed, the required diameter inches to be replaced, and the equivalent number of compensatory trees.

7. Specifications for the removal of existing trees and for the protection of existing trees to be preserved, including detail(s) of tree protection fencing, as required in subsection D.5. above.

F. Transplanted Plants.

1. On a case-by-case basis, provisions may be made for the moving of existing trees, shrubs, or other natural features to other locations on the site if requested by the Applicant or the Planning Board.

2. When used to satisfy a minimum requirement contained in this Chapter or in Chapter 160, Zoning, the transplanted plant materials shall be at least the same size as required nursery-grown material, and shall also be subject to the same protection, maintenance, and guarantee requirements of this section.

3. Transplanted material shall be handled according to the ANLA's guidelines, and pruned according to the NAA's publication "A300 Pruning Standard."

When pruning, a more conservative "crown clearing" is recommended, removing up to twenty-five (25) percent of the branches.

G. Compensatory Planting.

1. In the event that preservation of existing trees within the tree protection zone is impossible and/or relocation of improvements impractical, then compensatory planting shall be required for each live tree within the tree protection zone, and each specimen tree anywhere on the site.

2. Trunk diameters shall be measured according to the following guidelines:

a. For single-trunked shade trees, at a point four and one-half (4 1/2) feet above ground level.

b. For single-trunked ornamental trees, at a point twelve (12) inches above ground level.

c. For evergreen trees, at a point twelve (12) inches above ground level.

d. For multi-trunked trees that branch between one (1) and four and one-half (4 1/2) feet above ground level, at a point just below the split.

e. For multi-trunked trees that branch below one (1) foot above grade, the diameter shall be sixty (60) percent of the sum total of all trunks measured at a point four and one-half (4 1/2) feet above ground level.

3. Compensatory trees shall be provided in the following ratios, based on the sum total of the diameter inches of trees being removed. These standards are applicable to both deciduous and evergreen trees. Compensation is not required for shrubs, unless otherwise required by the Planning Board.

a. For trees five (5) to twenty-four (24) inches in diameter, one (1) inch of new tree caliper shall be provided for every one (1) inch of existing tree diameter cut or removed.

b. For trees twenty-four (24) inches in diameter or greater (specimen trees), two (2) inches of new tree caliper shall be provided for every one (1) inch of existing tree diameter cut or removed.

c. For existing street trees within the right-of-way, one (1) tree, with a caliper of three to three and one-half (3-3 1/2) inches, shall be replanted in the street tree-planting strip.

d. For other significant areas of woods containing deciduous trees smaller than five (5) inches in diameter, or evergreens less than six (6) feet in height, replanting shall be with seedling material, of comparable native species, placed on a ten (10) foot by ten (10) foot grid. Compensation shall be at a rate of a one (1) square foot of new planting area for one (1) square foot area of disturbance. This material may be bare root or container grown stock.

4. The number of compensatory trees should be calculated from the total diameter inches to be replaced, divided by three (3), rounded up to the next whole number.

5. Compensatory trees shall be three to three and one-half (3- 3 1/2) inches in caliper, and planted in accordance with the standards contained within subsection C above. Evergreen and ornamental trees may be substituted at a ratio of two (2) to one (1) shade tree, for up to fifty (50) percent of the requirement. Alternative types of compensatory planting may be permitted, when approved by the Planning Board.

6. Locations of compensatory trees must be clearly labeled on the Landscape Plan. They may be placed anywhere on the site, but are in addition to other required trees.

7. In the event that the Applicant establishes to the satisfaction of the Planning Board that constraints incident to the land itself (including, without limitation, extreme topography, unsuitable soils, rock outcrops, and existing dense canopy) render if impractical to the required number of compensatory trees, then, at the election of the Planning Board, the Applicant shall:

a. Install a portion of the required compensatory trees on other public lands within the Township; and/or

b. Contribute to the Township the estimated cost of those trees which cannot practically be installed on the property for later installation of trees on public lands; and/or

c. Install fewer, larger, or more valuable compensatory trees on the lot with an aggregate cost as installed and guaranteed not less than the estimated aggregate cost of the required number of compensatory trees.

Whichever alternative is elected by the Board shall serve as the basis for calculating the required financial security in conformance with subsection C.7.g. above.

H. Street Trees.

1. Street trees shall be required along all existing or proposed public or private streets when they abut or lie within the proposed subdivision or site plan, and are in addition to other required plantings.

2. Street trees shall be placed in a planting strip located between the proposed sidewalk and curb, within the right-of-way line. Where no sidewalks are proposed and are not planned in the future, the trees shall be placed five (5) feet behind the curb or edge of pavement. Street trees shall not be planted within clear sight triangles, as described in Section 62-26.

3. Street trees shall comply with the size and spacing requirements below. A minimum of fifty (50) percent of the proposed street trees shall be native to the region. Refer to "Evesham Township Recommended Street Trees" at the end of this subsection.

Tree Size (in feet)	Planting Interval (in feet)
Large trees (40+)	40
Medium-sized trees (30-40)	30
Small trees (to 30)	20

Appendix C

Known Contaminated Sites

Table 35: List of Known Contaminated Sites

PI Name	Address	PI Number	Lead Agency	Remedial Level
1201 Rt 73 Mount Laurel LLC	1201 Rte 73 & Church Rd	007823	BUST	C2
2811 Rt 73 Maple Shade LLC	Rt 73 & Regent Ave	007856	BUST	C2
3 Stiles Avenue	3 Stiles Ave	287784	BFO-S	C1
404 Route 73 South	404 S Rt 73	G000021707	BUST	C1
5044 Church Road	5044 Church Rd	G000032161	BFO-S	C2
912 Rt 73 S Mount Laurel LLC	912 Rt 73 S	007863	BUST	C2
922 Rte 73 S	922 Rte 73 S	G000038038	BUST	C2
Akzo Chemicals Inc	Rte 73 N & Pennsylvania Railroad Bridge	016580	BISR	C2
Burger King	Rte 73 & Waverly Ave	G000024407	BUST	C2
Church Road Shell	36 Church Rd S	005945	BUST	C2
Citgo (Arfa - Maple Shade)	2815 Rt 73 & Regent Rd	004981	BUST	C2
Classic Chevrolet	Rte 38 & Lenola Rd	010226	BUST	C2
Cumberland Gulf 126398	919 Rt 73 & NJ Tpke Exit 4	006750	BUST	C2
Daibes Service Station Maple Shade	Rte 73 & Waverly Ave	007444	BUST	C2
East Gate II	Nixon & Harper Drs	G000034055	BOMM	C1
Edgewater Park Amoco Inc	3101 Rt 73	001452	BOMM	C2
F&A Distributing Co TA Merchants	901 Pleasant Valley Ave	014655	BOMM	C2
Federal Express Corp	1205 Rte 73	014416	BUST	C1
GM Training Center	Rte 38 & Pleasant Valley Ave	024708	BFO-S	C2
Greentree Square Shopping Center	900 Rt 73 N	190983	BFO-S	C1
Greyhound Bus Terminal	538 Fellowship Rd	G000042244	BFO-S	C2

Source: NJDEP, 2009

Table 35: List of Known Contaminated Sites (continued)

PI Name	Address	PI Number	Lead Agency	Remedial Level
Lenola Auto Service	121 to 125 Camden Ave	030231	BOMM	C2
Lukoil #57700	921 Rt 73	007208	BUST	C2
Lukoil 57731	1110 Rt 73	024891	BUST	C2
Main St Pumping Station	Main St Treatment Plant	020239	BUST	C1
Maple Shade Shell	2890 Rt 73 N	007610	BOMM	C2
Maple Shade Township Landfill	501 Rte 73	G000005045	OBR	C3
Monarch Art Plastics Company	3838 Church Rd	G000027154	BOMM	C2
Moorestown Gas LLC	201 Rt 38 W	006585	BUST	C2
Na Var Vending	3915 Church Rd	G000037247	BFO-S	C1
NJDOT Parcel 36	Rte 73 & Church Rd	026269	BFO-S	C2
PBP Enterprises Incorporated	4102 Church Rd	G000033414	BOMM	C3
Plaza Apartments	Pine Ave	G000021895	CAS	C1
Ramblewood Cleaners @ Ramblewood Shopping Ctr	1155 Rt 73 & Ramblewood Pkwy	009483	BFO-S	C2
Ramblewood Country Club	200 Country Club Pkwy	031754	BUST	C2
Republic Services of NJ LLC	4100 Church Rd	012541	BOMM	B
Rice and Holman Ford	1301 Rte 73	003324	BOMM	C2
Route 73 & Fox Meadow Drive	Rt 73 Fox Meadow Dr	264338	BCM	C2
Shell Gas Station #100214	597 Rt 38 & Lenola Rd	005975	BOMM	C2
Shell Service Station 138434	Rt 73 S & Granite Ave	007611	BUST	C2
Stern's Mooretown Mall	Rte 38 & Lenola Rd	012457	INS	B
Sunoco 0012-2697	721 S Church St	016424	BUST	C2
Texaco Service Station	Rte 73 & Princeton Ave	005943	BFO-S	C2
Texaco Service Station #100227	Rte 73 & Collins Rd	005974	BUST	C2

Source: NJDEP, 2009

Table 36: Lead Agencies

Lead Agency		Phone
BFO-S	Bureau of Field Operations – Southern	(609) 633-1475
BISR	Bureau of Industrial Site Remediation (formerly BEECRA)	(609) 777-0899
BOMM	Bureau of Operation, Maintenance & Monitoring	(609) 964-2990
BUST	Bureau of Underground Storage Tanks	(609) 292-8761
CAS	Case Assignment Section (now BCAIN)	(609) 292-2943
INS	Initial Notice Section (now BCAIN)	(609) 292-2943
OBR	Office of Brownfields Reuse	(609) 292-1251

Source: NJDEP, 2009

Table 37: Remediation Levels

Remedial Level	Definition
B	Single Phase RA - Single Contamination Affecting Only Soils
C1	No Formal Design - Source Known or Identified-Potential GW Contamination
C2	Formal Design - Known Source or Release with GW Contamination
C3	Multi-Phased RA - Unknown or Uncontrolled Discharge to Soil or GW
CAS	Case Assignment Section (now BCAIN)
INS	Initial Notice Section (now BCAIN)
OBR	Office of Brownfields Reuse

Source: NJDEP, 2009

Appendix D

Corridor Access Management Overlay District (CAMO)

This sample Access Management Overlay District (CAMO) ordinance has been adapted from the DVRPC study, *Route 202 Section 100 Land Use Strategies Study, November 2001*. To enact such an ordinance, there needs to be a coordinated effort by a local government and the New Jersey Department of Transportation in accordance with the State Highway Access Management Code.

Section 00: Purpose

The Corridor Access Management Overlay District is designed to provide additional regulation of the use, development, and highway access of lands located along the frontage of NJ 73 in order to accomplish the following specific purposes:

- To enhance the overall function and appearance of NJ 73 as a gateway and a principal arterial highway through the community
- To minimize hazardous traffic flow conditions and confusion for drivers along NJ 73
- To make the transition between the high-speed, free-flowing driving experience of NJ 73 and the lower-speed, more restrictive driving conditions encountered on the intersecting roads, access points, and driveways as smooth as possible for highway users
- To promote the orderly and coordinated development of land along NJ 73 and to avoid the adverse effects that uncoordinated development can have on the highway
- To provide for safe, understandable, and convenient access to abutting uses without causing traffic flow problems
- To promote channeled and coordinated access along NJ 73 in order to limit conflicting turning movements, traffic congestion, and other potential vehicle hazards
- To encourage reverse-frontage and other design techniques for proposed development to be located along NJ 73 to minimize the need for additional access or intersecting roadways
- To require, as part of the development review process, related traffic control improvements (such as acceleration and deceleration lanes, traffic signalization, marginal access roads, service roads, loop roads, jug handles, turning or stacking lanes, and similar low-capital intensive improvements) and public transit enhancements (such as bus pullouts and stops) in order to minimize the effects of new development on traffic flow along NJ 73

- To provide setbacks for both principal and accessory uses, including signs, off-street parking, and loading areas to facilitate potential widening or related access improvements to primary arterials should future traffic volumes warrant such improvements
- To require, where feasible, natural features preservation in conjunction with man-made buffering in order to preserve special scenic visual environments along NJ 73
- To combine other zoning requirements as an overlay to place limitations and additional requirements upon the underlying zoning districts in order to accomplish the specific purposes described in this article to further improve the general welfare of all users of NJ 73

Section 01: District Coverage

The CAMO is defined and established as follows:

Primary Arterial Corridor Impact Area

The area extending for a distance of 200 linear feet from the center line of the right-of-way along each side of NJ 73 shall be considered the impact area.

Secondary Highway Corridor Impact Area

Where the primary arterial corridor impact area is intersected by another highway of arterial classification that is not otherwise included in the CAMO district, the following Secondary Highway Corridor Impact Area shall be defined and added to the area of the Primary Arterial Corridor Impact Area:

- From the center line of the intersecting road, the area extending for a distance of two hundred (200) linear feet along each side of the intersecting road for a distance of one-eighth of a mile (660 linear feet) along said road
- For regulatory purposes, where the component defined in subsection 1.2 occurs, all those portions of the Secondary Highway Corridor Impact Area which extend beyond the boundaries of the Primary Arterial Corridor Impact Area shall be included within the boundaries of the CAMO District. In all cases, the distances and areas defined in this section shall be plotted to include the maximum possible area consistent with the boundary definition.

Section 02: District Mapping

- The Corridor Access Management Overlay District shall be delineated on the official Zoning Map as follows:
- Those areas defined in Section 01 shall be plotted on the Zoning Map to indicate the boundaries of the CAMO. The Zoning Map shall be available in the municipal building for inspection by the public
- Any subsequent changes in the boundaries of the CAMO District because of new construction, revisions to official plans, or for any other reason shall be plotted on the Zoning

Map as amendments thereto, following consideration of the proposed revisions in the usual manner prescribed for amending the Zoning Ordinance

Section 03: Corridor Access Management Overlay District Concept

The CAMO District shall be deemed to be an overlay on any zoning district(s) now or hereafter to regulate the use of land in the municipality.

- The CAMO District shall have no effect on the permitted uses in the underlying zoning district(s), except where said uses are intended to be located within the boundaries of the CAMO District, as defined herein, and the uses are in conflict with the requirements and specific intent of this article
- In those areas of the municipality where the CAMO District applies, the requirements of the CAMO District shall supersede the requirements of the underlying zoning district(s), unless those requirements are more stringent than the requirements of this Article
- Should the CAMO District boundaries be revised, the zoning requirements applicable to the area in question shall revert to the requirements of the underlying zoning district(s) without consideration of this article
- Should the zoning classification(s) of any parcel or any part thereof on which the CAMO District applied be changed, such change(s) in classification shall not affect the boundaries of the CAMO District or its application to said parcel(s) part of the proceedings from which the changes originated

Section 04: Boundary Interpretation and Appeals Procedure

An initial determination as to whether or not the requirements of the CAMO District apply to a given parcel shall be made by the Zoning Officer.

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

Section 05: Uses Permitted in the Corridor Access Management Overlay District

The following uses shall be permitted in the CAMO District:

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

- Those portions of existing roads of a lower classification than arterial, as defined on the municipality's official map, or existing access driveways which are located within the boundaries of the CAMO, as defined in Section 01. Any improvements to these roads should comply with the requirements of this article
- Cultivation and harvesting of crops according to recognized soil conservation practices
- Pasturing and grazing of animals according to recognized soil conservation practices
- Public and private open space and recreation areas, including biking, hiking, and equestrian trails, but excluding structural development, except that which is in accordance with section 6.6 and 6.7 of this Article
- Outdoor plant nursery, orchard, woodland preservation, arboretum, and similar conservation uses, according to recognized soil conservation practices
- Forestry, lumbering, and reforestation, according to natural resources conservation practices
- Those portions of a lot in combination with contiguous lands located beyond the boundaries of the CAMO District in order to meet the yard and area requirements of the underlying zoning district(s), when uses not permitted within the CAMO District are to be located on such contiguous lands
- Subsurface utility lines
- Fences of wood, wire, or any other material, provided they are located to maintain a clear sight triangle at any intersection or access point along NJ 73 within the CAMO District
- Sidewalk, crosswalk, or passenger stop or shelter for public transportation
- Any other non-structural, principal, or accessory use permitted in the underlying zoning district(s) but excluding any extractive uses, parking and loading areas and outdoor storage areas
- Those uses permitted by right or accessory uses in the underlying zoning district(s) and existing uses made nonconforming by the adoption of this article

Section 06: Restricted Uses Permitted by Special Exception

The following restricted uses shall be permitted only as a special exception in the CAMO district, except those uses expressly prohibited.

- Above-ground utility lines
- Off-street parking areas associated with passenger stop or shelter or related public transportation facilities
- Proposed public and private roads or access driveways that are inconsistent with the development guidelines specified in Section 08
- Parking and loading areas, including above-grade, structured parking facilities

- Temporary structures, including signs and buildings, whether principal or accessory
- Permanent, freestanding structures including advertising devices or signs not exempted, with a surface of 100 square feet or less, and accessory buildings permitted in the underlying zoning district with ground coverage of no more than 150 square feet. No such uses located within the CAMO District shall exceed a height of 35 feet
- Expansion of a use rendered nonconforming by the adoption of this article
- Any other use, not specifically listed herein, which may contribute to a hazardous traffic condition or visual intrusion along NJ 73 or any other intersecting road within the CAMO District
- Those uses permitted by special exception or as conditional uses in the underlying zoning district(s)

Section 07: Prohibited Uses

The following uses shall not be permitted within the boundaries of the CAMO District.

- Junkyards, scrap yards, or similar outdoor storage uses
- Billboards or similar advertising devices or signs that exceed a surface area of 100 square feet
- Flashing signs or other advertising devices of any type or configuration
- Subdivisions and land developments composed of uses permitted in accordance with the underlying zoning district(s) that do not comply with the development regulations specified herein

Section 08: Guidelines for Subdivisions, Land Developments, and Individual Uses within the Corridor Access Management Overlay District

For any subdivision, land development, or individual uses proposed to be located within the CAMO District, the following guidelines shall apply.

8.1 Access Controls

Direct residential or nonresidential driveway access to NJ 73 or intersecting roads within the CAMO District from either a subdivision or land development or an individual use shall not be permitted, unless the following alternative development techniques are demonstrated by the applicant to be infeasible on other than purely economic grounds. The application for these techniques shall be governed by the requirements of the municipality's Subdivision Ordinance. The following alternatives are presented according to their priority in meeting the Declaration of Legislative Intent of this article.

- Access Road: Where direct driveway access is to a residential or access road parallel to NJ 73 or an intersecting road within the CAMO District, every effort should be made to minimize the number of intersections from marginal access roads within the CAMO District.
- Reverse frontage development: Where direct driveway access is to a residential or feeder road and the only access to NJ 73 or an intersecting road within the CAMO District is from one or more of said residential or feeder roads (either existing or new construction), every effort should be made to minimize the number of intersections from new roads within the CAMO District.
- Joint access, where direct driveway access from a lot or development to NJ 73 or an intersecting road within the CAMO District is provided jointly with other lots or parcels created as part of the same subdivision or land development, or with adjacent lots or parcels not part of the same subdivision of land development, a turnaround area or similar technique shall be provided on the lot.
- The minimum spacing between the center line of new and existing roads along NJ 73 or an intersecting road within the CAMO District shall be no less than 600 feet. No new access to NJ 73 shall be located closer than 100 feet to the point of an intersection of an intersecting road.
- Where direct driveway access to NJ 73 or an intersecting road within the CAMO District is unavoidable, the minimum spacing between the center line of such access driveways shall be no less than 200 feet.

8.2 Development Regulations

- The minimum setback for any proposed use within the CAMO District shall be 100 feet measured from the ultimate right-of-way line of NJ 73 and 75 feet from the ultimate right-of-way line of an intersecting road within the CAMO District.
- The minimum lot width within the CAMO District shall be 100 feet.
- No sign, except a traffic safety or directional sign, shall be located closer than 25 feet to the right-of-way line along NJ 73 or other intersecting road located within the CAMO District.
- No parking, loading, or other storage area shall be located closer than 25 feet to the ultimate right-of-way of NJ 73 or other intersecting road located within the CAMO District.

Section 09: Application Requirement for Use Permitted by Special Exception

An applicant proposing to locate a use(s) specified in Section 06 of this Article within the CAMO District shall submit the following additional information to the Zoning Board to accompany an application for a special exception.

- A plan(s) delineating the necessary information to be shown on a preliminary plan in accordance with the pertinent requirements of the municipal Subdivision Ordinance.
- A written statement justifying the need for the requested special exception.

- A landscaping plan in accordance with Section 13 of this article; or
- A plan showing existing features, vegetation, and topography, where pertinent, to justify a full or partial modification of the landscaping requirements of Section 13 of this article.

Section 10: Justification Statement for Special Exception Use(s)

An application for a special exception shall be accompanied by a written statement justifying the requested modifications from the requirements of this article, the materials required by Section 13, as well as pertinent supplementary materials. The narrative description shall contain, as a minimum, the following information:

- The relationship of the proposed action(s) to the Declaration of Legislative Intent of this article.
- A general description and map of the proposed action(s), including any proposed modifications from the standards of this article.
- A description and map of the existing natural features, vegetation, and topography of the site and their relationship to the proposed action(s).
- A general description of the alternatives considered by the applicant prior to requesting the proposed course(s) of action and proposed modification(s).

Section 11: Guidelines for Approval of Uses by Special Exception

In considering an application for a special exception, the Zoning board shall use the following guidelines.

- The consistency of the proposed special exception with the Declaration of Legislative Intent of this Article,
- The relationship of the proposed special exception to the possible functional effects on existing and proposed traffic flow, the number and location of curb cuts, and visual character of NJ 73 and any intersecting roads located within the boundaries of the CAMO District.
- The relationship of the proposed special exception to the existing topography, vegetation, and other natural features, as well as the degree to which the applicant has incorporated such features in the overall development plan.
- The degree to which the applicant has proposed mitigating actions, in accordance with the guidelines specified in Section 13 of this article, will minimize visual intrusions, traffic flow disruptions, and the number and spacing of curb cuts along NJ 73 or intersecting road(s) located in the CAMO District.

Section 12: Guidelines for Mitigating Actions within the Corridor Access Management Overlay District

The following mitigating actions shall be incorporated with the site development plan for a use proposed to be located within the CAMO District in order to minimize visual intrusions, traffic flow disruptions, and the number and spacing of curb cuts along NJ 73 or intersecting road(s) located in the CAMO District. These actions may be separate from or in combination with existing natural features, vegetation, or topography on the site in question. Applicants are encouraged to incorporate existing site features as part of any necessary mitigating actions, wherever such an approach is feasible, in order to retain the natural character of the landscape.

12.1 Landscaped Areas

- The applicant shall submit a landscape plan with the application showing all pertinent information, including the existing or proposed topography and the location, size, and species of those individual trees and shrubs to be preserved or planted, or alternatively, the general characteristics of existing vegetation masses which are to be preserved.
- Planted Areas - Along the right-of-way of NJ 73 and the intersecting road(s) located within the CAMO District, the applicant shall provide a single row of deciduous trees, at least 8 feet in height when planted and at least 40 feet in height at maturity, with a spacing of not more than 40 feet on center wherever necessary for adequate site distance.
- Mounding - Mounding is encouraged as a means of reducing visual encroachment along NJ 73 or intersecting roads within the CAMO District if such mounding shall not exceed a slope of 3:1 or interfere with sight lines.
- Shrubs and Grass - Coniferous and deciduous shrubs and grass shall be provided, as needed, to complete the landscaped area. The width of such area as measured from the ultimate right-of-way line shall not be less than 15 feet.
- Buffer Maintenance - All vegetation shall be permanently maintained and should be guaranteed for a period of two years.
- Architecture and Site Design - The applicant may demonstrate, through the submission of pertinent plans, renderings, or models, that the development of the proposed structure(s), building(s), parking area(s), or sign(s) will be accomplished in a manner that will be compatible with the NJ 73 corridor and its surroundings and that they will minimize the visual effects on both highway users and the users of the proposed development.
- Traffic Flow and Access Study - For any non-residential uses and any residential use involving more than five dwelling units, a traffic analysis and access study shall be prepared. The study shall describe and map the present and projected traffic flow patterns both with and without the proposed development based upon existing and 20-year projections. Particular attention shall be placed upon the relationships of the proposed access to NJ 73 or other intersecting roads located within the CAMO District. The source(s) for all traffic flow data, turning movements, and projects shall be clearly labeled in the submitted study. The study shall include the rationale for the access chosen as well as any alternatives rejected by the applicant.

- Driveway Spacing - Driveways should be spaced a minimum of 200 feet apart or shared with an adjacent property unless rigid adherence to this standard is determined to be either impractical or infeasible upon the written request of their applicant with the concurrence of the Township Engineer. The minimum distance of 50 feet shall be provided between an access driveway and the intersection of a public road with NJ 73. Any such minimum corner clearance access shall be restricted through their design to right turns in and out.

- Sight Distance - Adequate sight distance shall be provided at every access point and intersecting road upon review and determination by the Township Engineer.

Section 13: Uses or Structures Rendered Nonconforming by the Adoption of this Article

Following the adoption of this Article, any use or structure which is situated within the boundaries of the CAMO District and which does not conform to the permitted uses in Section 05 herein shall become a nonconforming use or structure, regardless of its conformance with the requirements of the Zoning District(s) in which it is located.

- The expansion or continuance of a nonconforming use or structure shall be governed by the requirements of article ___, Section ___ of this Ordinance. The Zoning Board shall ensure that the standards contained in Section 12 herein are applied to the expansion or continuance of said nonconforming use or structure.

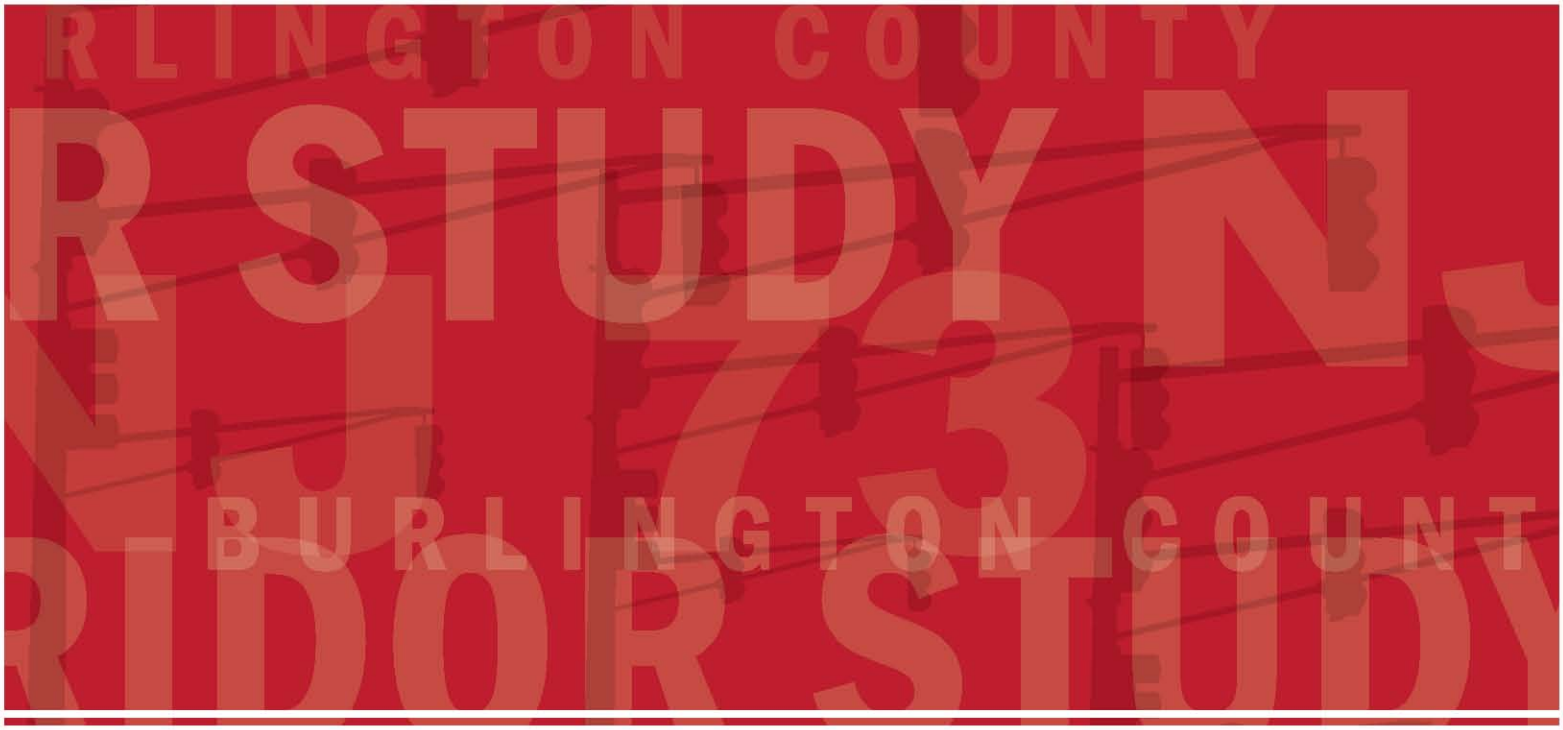
- The expansion of a nonconforming use or structure which is rendered nonconforming due to the adoption of this article shall be governed by the standards contained in Section 09, herein. The Zoning Board shall ensure that these standards are enforced.

Section 14: Appeals

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

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

- A use(s) permitted by variance shall represent the minimum relief possible to overcome the proven hardship, and the location of said use(s) within the CAMO District shall be conditioned upon the corporation of pertinent mitigating activities, as set forth in Section 13 of this article, in order to minimize the effects of encroachment along NJ 73.



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Publication Number:	10004
Publication Title:	NJ 73 Corridor Study Burlington County
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Key Words:	Access management, intersection analysis, stormwater BMP, known contaminated sites, smart growth zoning, sidewalk network, environmental justice, historic resources, local redevelopment areas, journey to work, health planning

Abstract:

This is a multi-modal study that integrates transportation and land-use, and is responsive to emerging lifestyle patterns. In an effort to preserve and improve the operating performance of the highway facility and enhance the character of the adjacent land uses, a comprehensive approach is taken where innovative land use and transportation improvements were identified while being sensitive to the natural environment. The corridor land use principles are aimed at achieving the desired goal of creating a vibrant, attractive, and economically stable commercial corridor along NJ 73, while still maintaining a high level of mobility and safety for both regional and local travelers using all modes of transportation.

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