

# Transportation Improvements for the Church Road (CR 616) Corridor



AUGUST 2014



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# Executive Summary

At the request of Burlington County, the Delaware Valley Regional Planning Commission (DVRPC) conducted a study to assess three improvement alternatives for the Church Road (County Route [CR] 616) corridor. The study area encompasses the Church Road corridor between NJ 41 in Cherry Hill Township, Camden County; through Maple Shade Township, Burlington County; and terminating at the NJ 73 intersection in Mount Laurel Township, Burlington County. County officials of both Burlington and Camden counties identified three aspects of the corridor for analysis in this study: one qualitatively and two quantitatively using traffic engineering software:

- multimodal travel in the Cherry Hill portion of the study corridor;
- connecting Fellowship and Springdale roads via a bridge over the New Jersey Turnpike; and
- providing a Church Road bypass of the NJ 73 intersection via Arbor and Atrium ways, including an extension of Atrium Way.

This report includes the baseline traffic data, the utilized methodologies, the alternatives explored, and the final recommendations. The next steps to advance the recommendations have been identified.

The first study aspect was an assessment of the pedestrian network along the study corridor. Completing the sidewalk network and an enhanced pedestrian crossing was recommended.

The second analysis considered the connection of Fellowship and Springdale roads via a bridge over the New Jersey Turnpike. The

findings of this analysis were supportive of the conceptual improvement, particularly related to traffic operations at the Church Road and Springdale Road intersection. Minor degradation would be realized at the Church Road and Fellowship Road intersection, but that would be offset by improvement at the Springdale Road intersection.

Finally, the third analysis considered an extension of Atrium Way between NJ 73 and Church Road to act as a bypass of the existing NJ 73 and Church Road intersections. For this, the scenario was beneficial to Church Road, but the impact to the NJ 73 and Atrium Way intersection is negative to the extent that consideration of other alternatives is warranted. A cursory analysis of one alternative, providing a dual left-turn lane from southbound NJ 73 to eastbound Church Road, was conducted for the PM peak hour. This analysis found the benefit would be similar to the original concept, though likely at a lower cost and with less impact to the environment. In summary, short of grade separating Church Road across NJ 73, there are no ideal options for providing significant improvement to these intersections. Either of the alternatives would provide some benefit, although the benefit is negligible.

## Conclusion

Based on the analysis, multimodal improvements are appropriate. Connecting Fellowship and Springdale roads would provide a benefit to traffic operations, facilitating a Church Road bypass across NJ 73 would provide a benefit to traffic operations at the existing NJ 73, and Church Road intersections but significantly degrade the NJ 73 and Atrium Way intersection. However, extending Atrium Way between NJ 73 and Church Road would provide would provide the benefit of an expanded grid network and as an alternate route. If Atrium Way is

extended, it should be complementary to other improvements at the Church Road intersections with NJ 73.

Urban Engineers, working under contract with the New Jersey Department of Transportation (NJDOT), is currently assessing other improvement alternatives for the intersection that should be considered before a preferred alternative is selected.

## CHAPTER 1:

# Purpose and Need

The Church Road (CR 616) corridor in Cherry Hill Township, Camden County; and Maple Shade and Mount Laurel townships, Burlington County, experiences recurrent congestion, particularly between Fellowship Road and NJ 73, and lacks options for multimodal travel.

County Route 673 is comprised of Fellowship Road north of the study corridor and Springdale Road to the south. Vehicles must make a left turn onto, and a right turn from, Church Road to travel through the study area on CR 673. This is due to the New Jersey Turnpike bisecting the study area, causing congestion at and between the two intersections. Additionally, a roughly 200,000-square-foot commercial development is planned for the roughly 40-acre parcel in the northwest quadrant of the Church Road and Fellowship Road intersection.

The Church Road corridor also suffers from its intersection with NJ 73 where the angle of the intersection has caused a roughly 400-foot offset between the two Church Road approaches. Two tightly spaced traffic signals on NJ 73 control the intersections. Through travel on Church Road requires a right turn on to, and a left turn from, NJ 73. Traffic operations at this intersection suffer considerably.

Finally, the western portion of the study corridor is surrounded by residential land uses and a school. Pedestrian connections are difficult due to an incomplete sidewalk network, unsignalized pedestrian crossings, and a 40-mile-per-hour (MPH) posted speed limit. The highway and surrounding land uses do not complement one another in this portion of the study corridor.

Figure 1 highlights these issues and provides a geographical context, including the location of the study area in a regional setting.

The purpose of this study is to analyze each of these issues, assess potential improvement alternatives, and provide recommendations that would enhance the study corridor, thereby improving the quality of life for the corridor's residents and visitors alike.

The study will therefore address the following needs: (1) analyze the pedestrian environment in the western portion of the study corridor; (2) assess the connection of Fellowship and Springdale roads via a bridge over the New Jersey Turnpike; and (3) assess a means for Church Road through traffic to bypass the existing NJ 73 and Church Road intersections.

## New Jersey Department of Transportation Problem Statement

The New Jersey Department of Transportation (NJDOT) uses problem statements as an early means of formally identifying congestion and safety problems along state highways. The problem statement addresses the problem and outlines the analytical aspects of identifying potential solutions. The problem statement triggers a screening process that may ultimately lead to physical improvements being capitally programmed. Within this project's study area, a problem statement exists for the NJ 73 and Church Road intersection. The Tier 1 screening resulting from this problem statement describes the issues as follows:

*The Route 73/Church Road intersection is southeast of the New Jersey Turnpike and is located at mileposts 26.47 and 26.56 on NJ 73. Church Road is discontinuous and unaligned at this intersection, and the angles of approach are narrow enough that there are two*

*intersection mileposts along NJ 73. This geometry causes extensive operational problems. This intersection is ranked #10 out of 193 high-need signalized intersections on state highways and has extensive safety problems. Delays for multiple signal cycles were observed on NJ 73 northbound and southbound and for Church Road eastbound left turns. Based on analysis provided by DVRPC, the location operates at a Level of Service (LOS) of F during peak hours, with delays for various movement phases ranging from 91 to 481 seconds, up to four times the length of the signal plan.*

As potential solutions to the congestion and safety problems at this intersection, the Tier 1 screening states the following:

*Relatively simple changes to signaling can improve the functionality of the Church Road intersection, with minimal impact to the corridor traffic. With the addition of more turn lanes, especially for left turns, further improvements are apparent. Ultimately, the solution that sees the largest improvement in LOS is the full alignment of the West and East legs of Church Road. This would be the most significant undertaking of all of the options, though the benefits would pay dramatic dividends toward improving congestion, safety, and bicycle and pedestrian accessibility.*

## Congestion Management Process

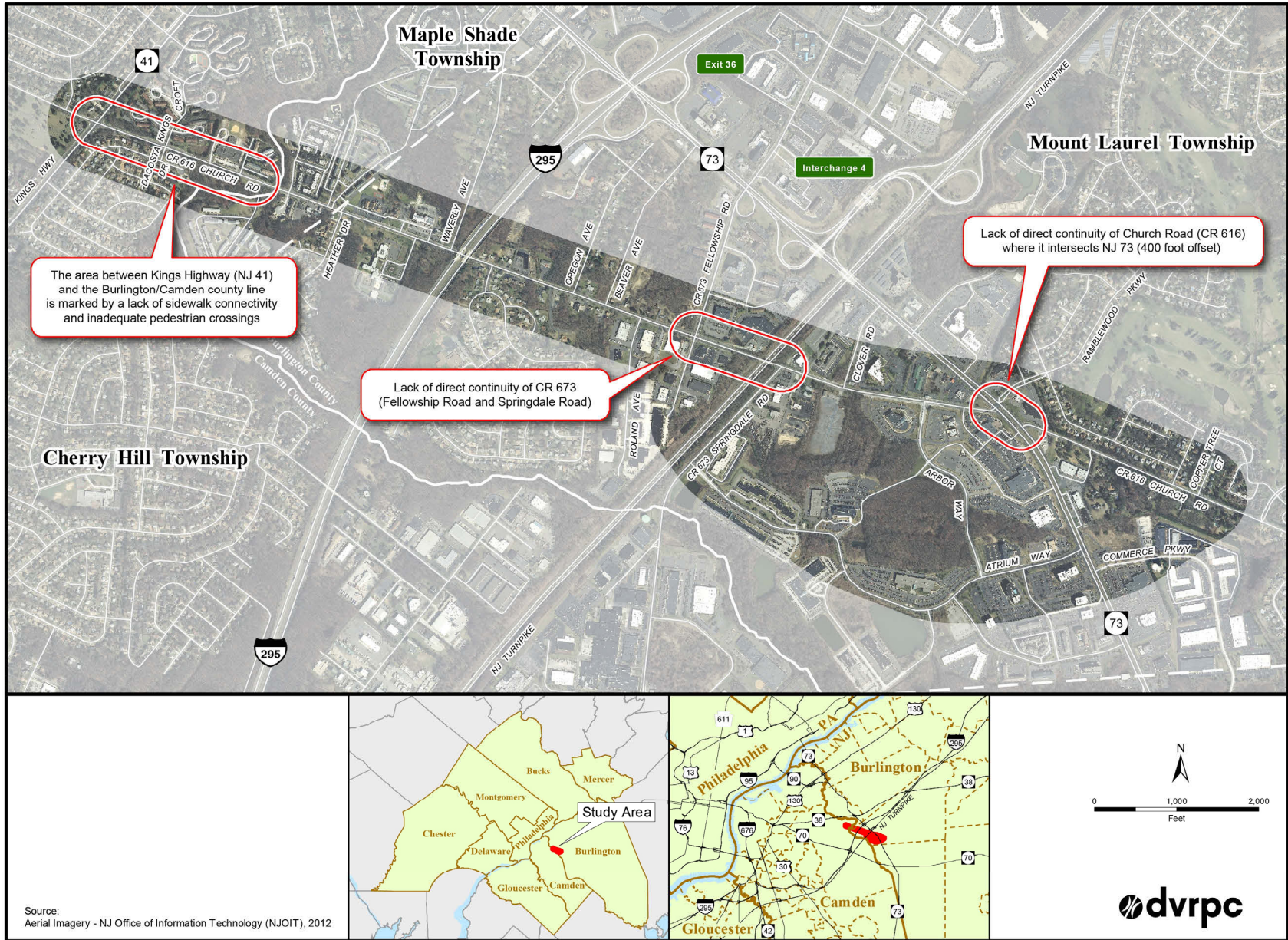
The Congestion Management Process (CMP) is required in air quality nonattainment areas, and is a mandated step in the process of obtaining state- and federal-aid transportation improvement funds. The CMP identifies strategies and actions to reduce (first), manage (second), or accommodate (last) single-occupant vehicular travel.

The study area falls into CMP Subcorridor 13A, which aligns with NJ 73 and its parallel and intersecting roads. Very appropriate strategies identified in the CMP for this subcorridor include: signal improvements,

advanced transit system management, promotion of a regional commuter benefit, and tolls/congestion pricing.



Figure 1: Study Corridor Issue Areas





## CHAPTER 2:

# Land Use and Environmental Resources

The relationship between land use and transportation facilities is central to any traffic study. The use of the land—where people live, work, and play—and its intensity is responsible for trip generation and its magnitude. The aerial spread of the uses and the transportation facilities connecting or serving the uses are responsible for how trips are made (e.g., by highway, transit, walking, etc.).

Natural resources sustain environmental functions, provide recreational opportunities, and enhance the quality of life for local residents.

## Land Use

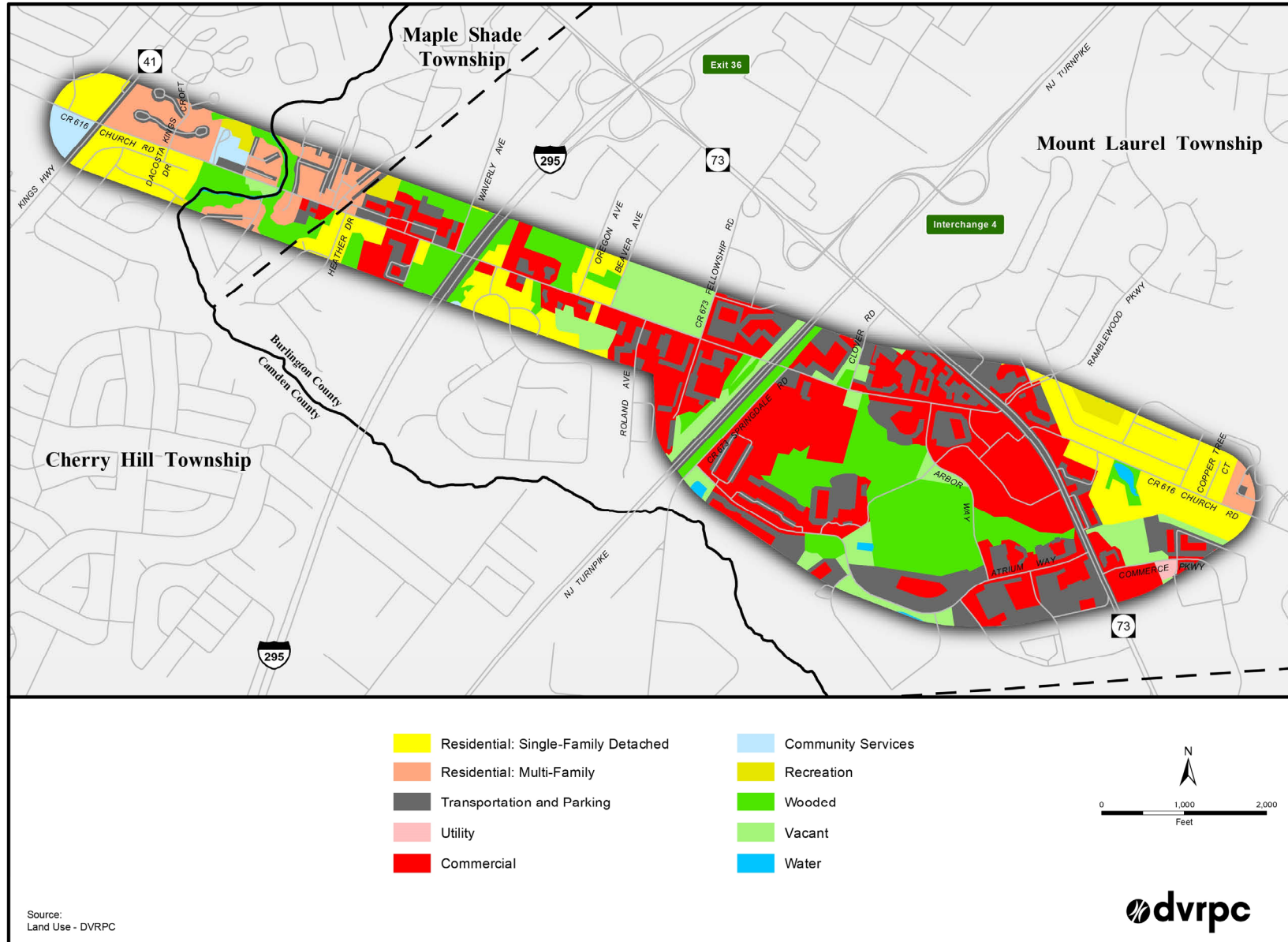
The study team utilized field surveys and geographic information systems (GIS) to inventory the study area's land use and environmental conditions. This inventory provided a baseline of current conditions. The land use inventory identified residential developments, civic institutions (schools, etc.), and open space.

Figure 2 presents the existing land uses along the study corridor to a buffer of 1,200 feet. Shown in the figure is an extensive clustering of commercial land uses along NJ 73, and a wider mix of land uses along the western portion of the study corridor. Scattered throughout the study corridor are wooded, vacant, and water-covered lands, which are all further discussed in the coming Environmental Resources section.

There is one significant development planned for the study corridor. Roughly 200,000 square feet of commercial space are planned for the

large area west of and abutting Fellowship Road, between Church Road and NJ 73. Planned are a fitness center, bank, retail space, and a Walmart store. Beyond this development, little land remains in the study area for new development. Most future changes to land uses will result from redevelopments.

Figure 2: Study Area Land Use



## Environmental Resources

A top-level analysis of the study corridor's environmental resources was undertaken for this project. Included in the analysis are wetlands and floodplains, wildlife habitats, and vegetation. While many of these aspects overlap, each is an aspect of the overall ecological health of the study corridor. Efforts should be made to avoid disturbing sensitive areas, or to mitigate the adverse impacts if avoidance is not possible.

### **Wetlands and Floodplains**

New Jersey protects freshwater wetlands under the New Jersey Freshwater Wetlands Protection Act Rules: (N.J.A.C 7:7A). The law also protects transition areas, or buffers around freshwater wetlands.

Areas naturally subject to flooding are called floodplains, or flood hazard areas. Floodplains encompass a floodway, which is the portion of a floodplain subject to high velocities of moving water, and the adjacent flood fringe, which helps to hold and carry excess water during overflow of the normal stream channel. The 100-year floodplain is defined as the land area that will be inundated by the overflow of water resulting from a 100-year flood (a flood that has a 1 percent chance of occurring in any given year).

Floodplains require mitigation in order to prevent loss to property owners, especially within the boundaries of the floodway. Equally important is the preservation of the environmentally sensitive aquatic communities that exist in floodplains.

Wetlands and floodplains in the vicinity of the study corridor are shown in Figure 3. Most are associated with the South Branch of the Pennsauken Creek, which traverses the study corridor and serves as the boundary between Camden and Burlington counties in this area.

### **Wildlife Habitats**

Wildlife habitats are important for maintaining biodiversity, ecological health, and the general quality of life for nearby residents. Areas identified by the New Jersey Department of Environmental Protection (NJDEP), as priority habitat areas for their 2012 Landscape Project are shown in Figure 4.

### **Vegetation**

Vegetation, also identified by the NJDEP Landscape Project for the study corridor is shown in Figure 5. Seven categories of vegetative cover are included in the figure, as is water coverage.

Figure 3: Wetlands and Floodplains

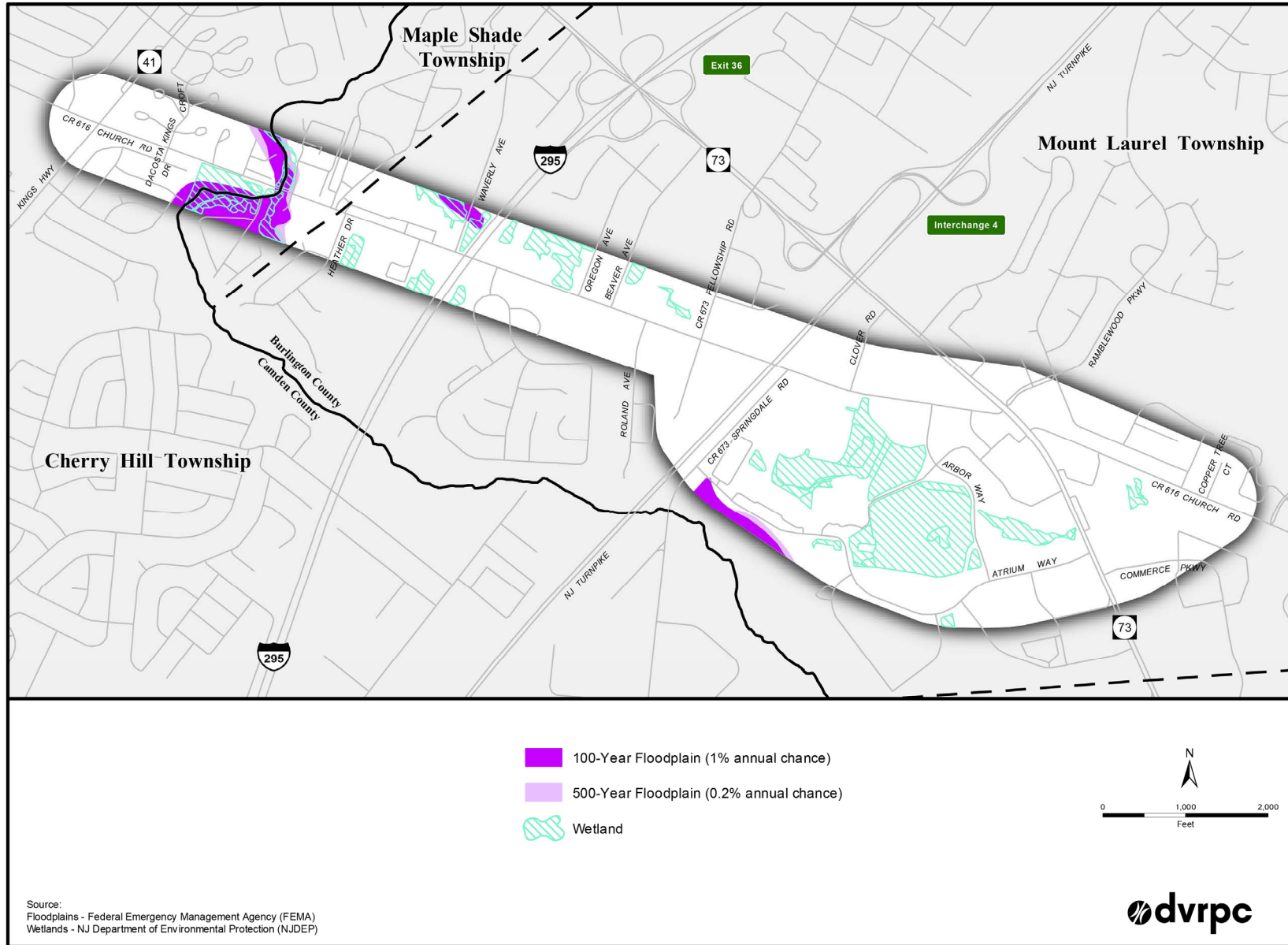


Figure 4: Landscape Project Priority Habitats

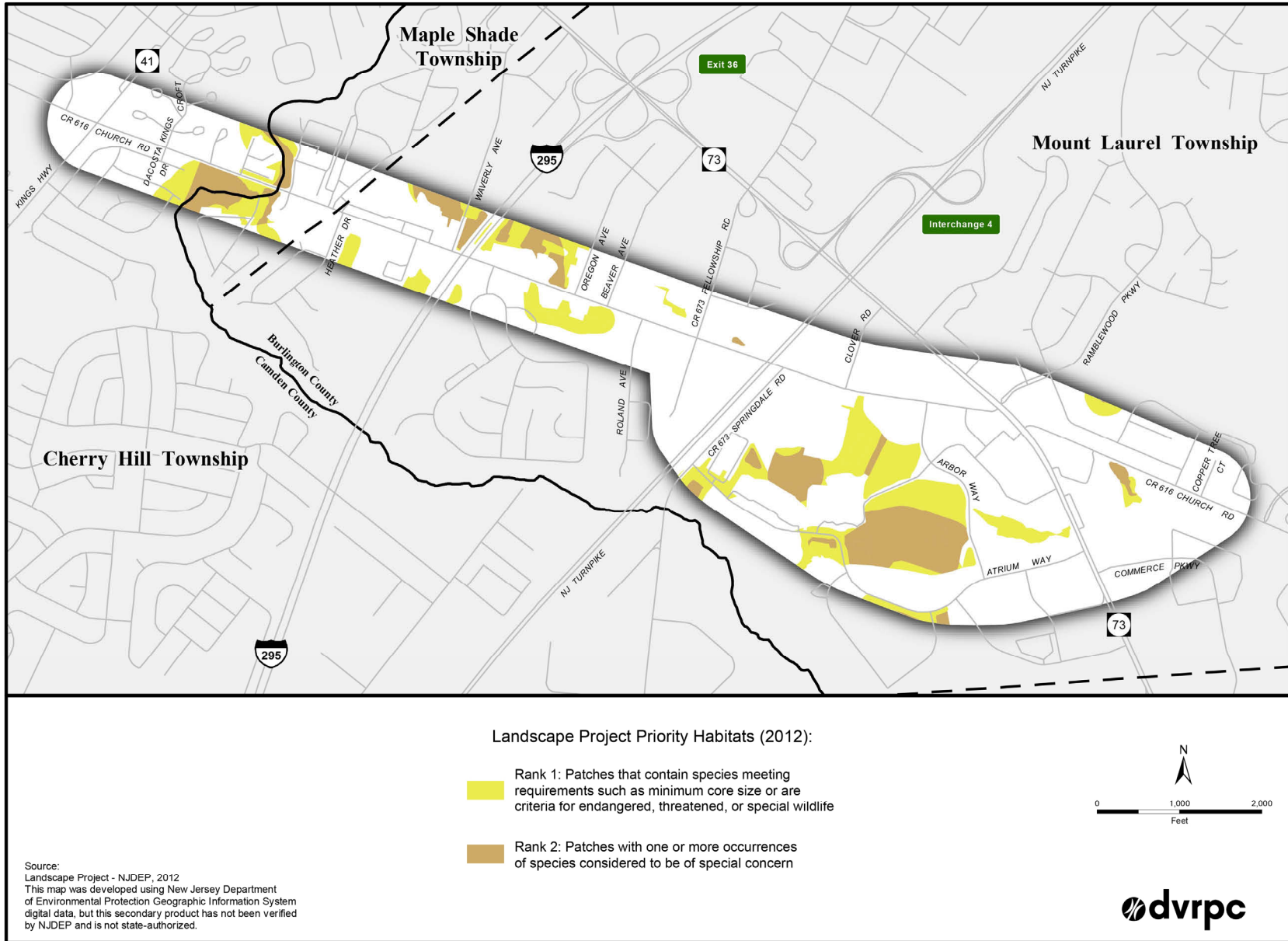
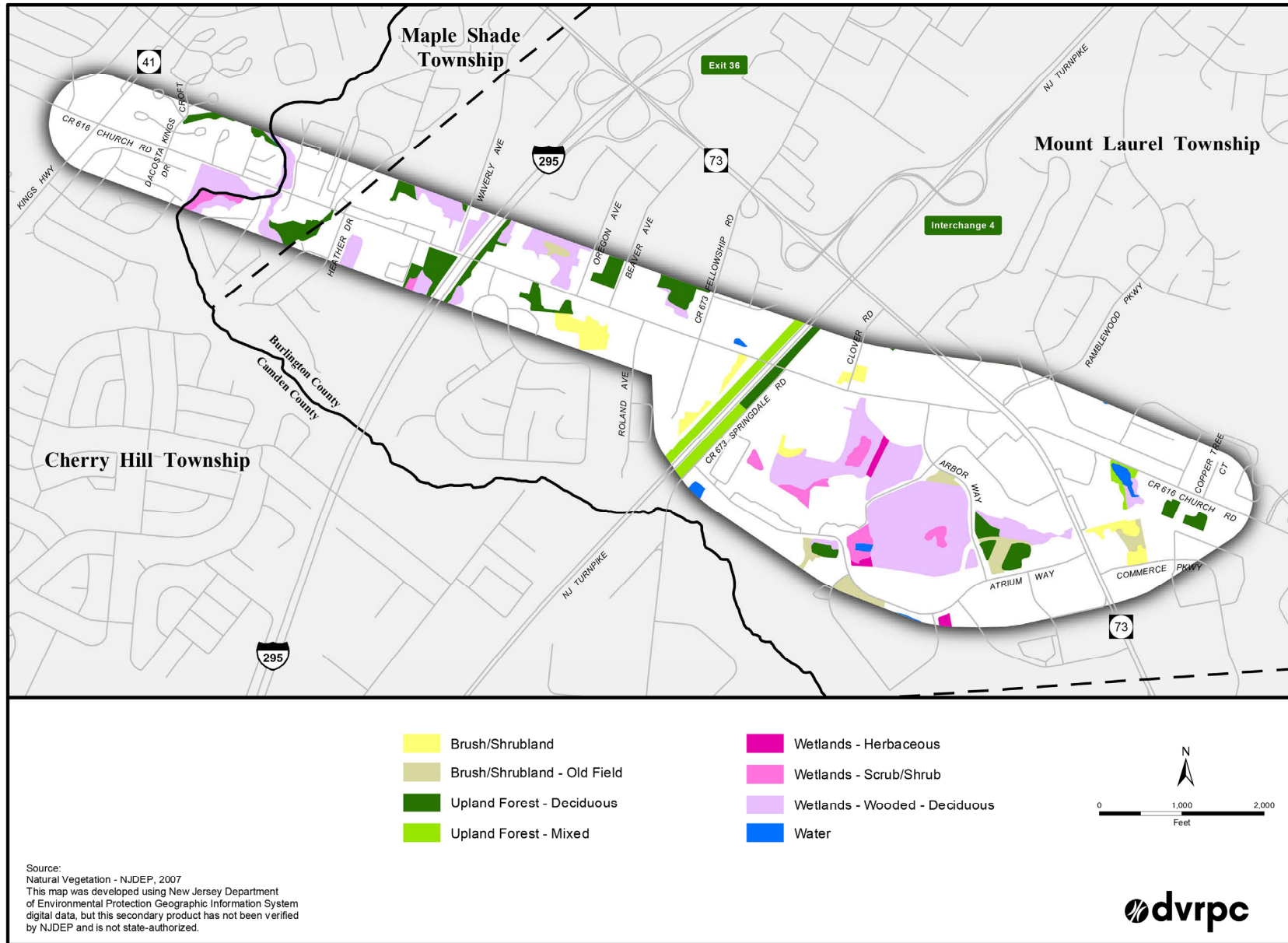


Figure 5: Vegetation





## CHAPTER 3:

# Transportation Network

The transportation network serves as the conduit for how people and goods move to, from, and through the study area. Included in the transportation network are the highways, transit services, and bicycle and pedestrian amenities. Each mode is discussed in this section.

Figure 6 is a straight line diagram for the Church Road corridor that highlights multiple aspects of the transportation network.

## Highway Network

The study area for this project is defined as Church Road between NJ 41 and NJ 73, to include a short distance of NJ 73 south to Atrium Way. Along NJ 73, outside of the study area, but relevant to the study, are interchanges with both the New Jersey Turnpike and I-295. Following are detailed descriptions of the roads of primary concern for this project. Figure 7 displays the highway network and select traffic volumes.

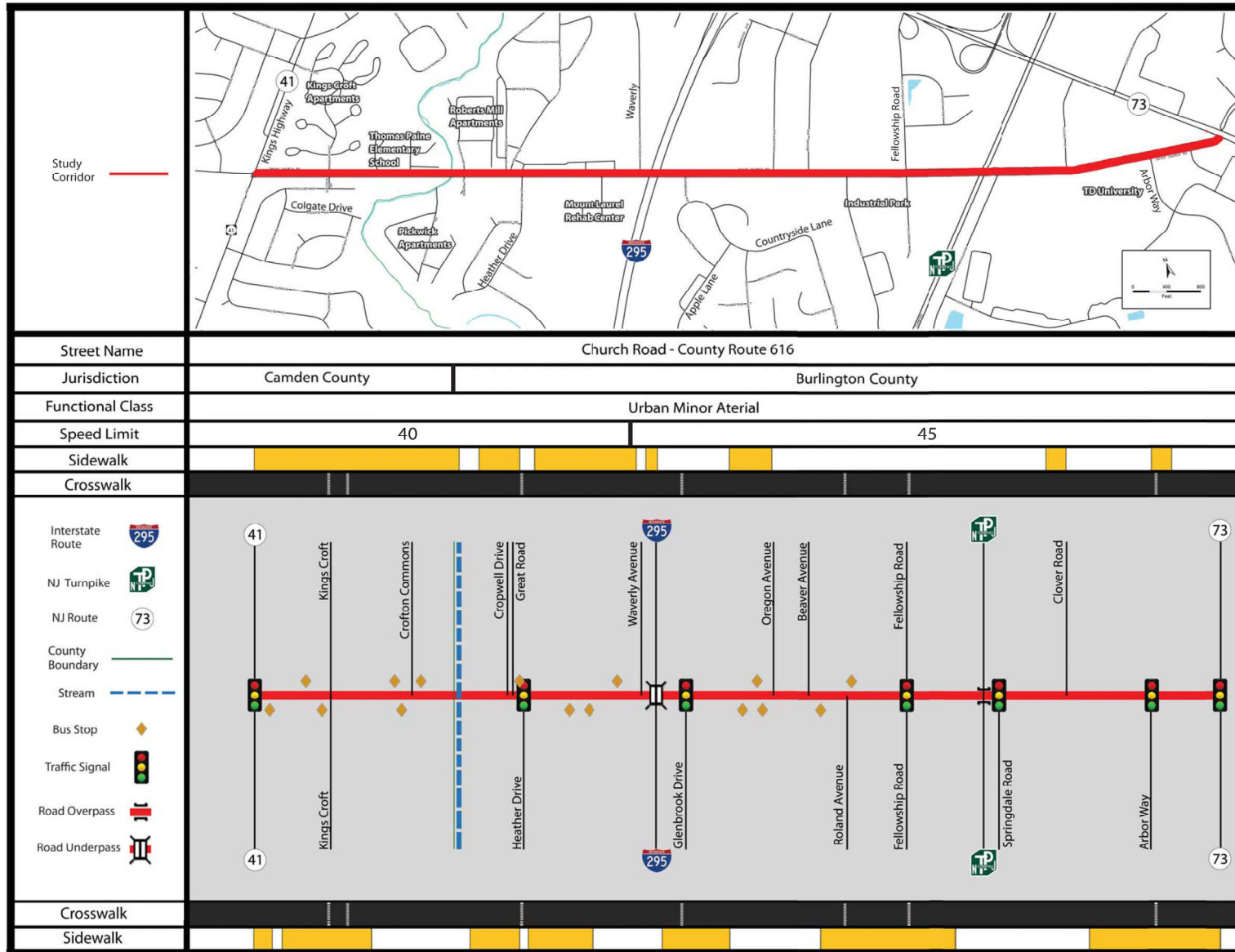
### Church Road

Church Road is designated as CR 616 for both Camden and Burlington counties. The entirety of Church Road, though not completely continuous, extends between Pennsauken Township, Camden County and Plumstead Township, Ocean County—roughly 35 miles. The lack of continuity results from several shared alignments and offset intersections. Recent traffic counts found average daily traffic volumes of roughly 20,000 near NJ 41; 26,000 between Fellowship and Springdale roads; and 14,000 near NJ 73. Church Road within the study corridor extends for 2.1 miles and has a variety of cross-sections, including (west to east):

- two travel lanes in the Camden County portion;
- two travel lanes plus a two-way left-turn lane between the county boundary and approaching Fellowship Road;
- four travel lanes plus auxiliary turning lanes through the Fellowship Road intersection;
- two travel lanes east of Fellowship Road to Clover Road; and
- three travel lanes (two eastbound) between Clover Road and NJ 73.

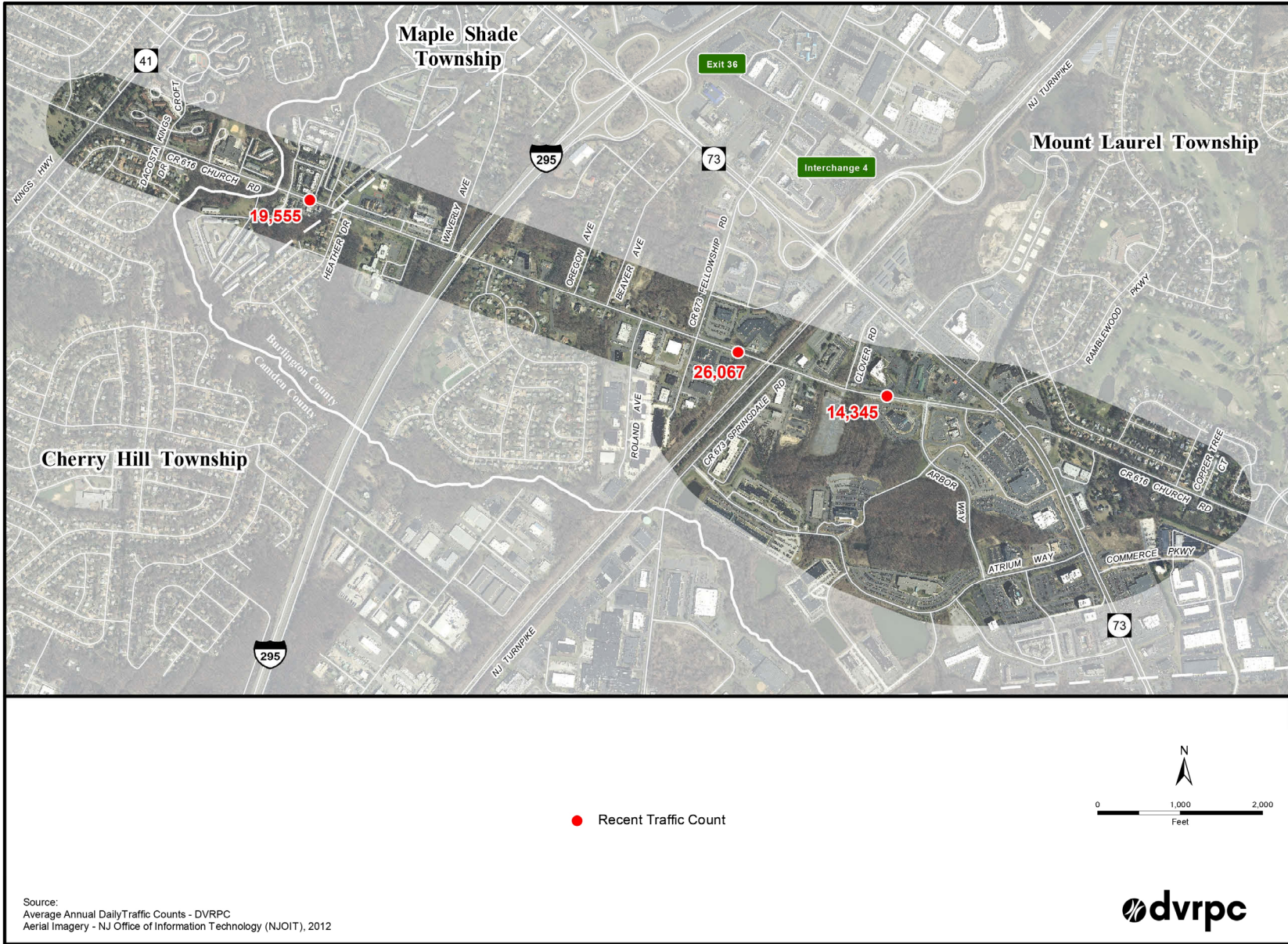
The Church Road intersection with NJ 73 is offset by approximately 400 feet. There are two traffic signals to manage this intersection, though they operate on a single timing plan.

Figure 6: Corridor Straight Line Diagram



DVRPC, 2014

Figure 7: Highway Network



Source:  
 Average Annual Daily Traffic Counts - DVRPC  
 Aerial Imagery - NJ Office of Information Technology (NJGIT), 2012



There are numerous highways that impact the study area, including two interstate highways, both of which have interchanges with NJ 73 a short distance north of the Church Road intersections. Following is a discussion of each of the highways that influence the study area.

### **New Jersey Turnpike**

The New Jersey Turnpike 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. Traffic heading to and from the corridor is influenced by this highway.

### **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. 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. While not directly connected, this interstate does have an influence on the study corridor.

### **NJ 73**

NJ 73 stretches roughly 35 miles between its intersection with US 322 in Atlantic County and the Tacony-Palmyra Bridge in Palmyra Township, Burlington County. The southbound direction has two travel lanes through the study area. The northbound direction has two travel lanes south of the eastern leg of Church Road, and three travel lanes north. A grass center median separates north- and southbound traffic. A recent traffic count in the vicinity of the Church Road intersection found an average annual daily traffic (AADT) volume of 76,000. It is classified as an urban principal arterial by NJDOT.

### **NJ 41**

NJ 41, also known as Kings Highway runs along a north-south alignment between Deptford Township, Gloucester County and Maple Shade Township, Burlington County. In the vicinity of the Church Road intersection, NJ 41 consists of four travel lanes and a center-left turn lane beyond the intersection approaches. A recent traffic count found an AADT volume of 22,000 near Church Road. It is classified as an urban minor arterial by NJDOT.

### **Important County Roads**

Several local and county roads play an important role in this project.

- Fellowship Road (CR 673) is a two- to four-lane urban minor arterial. It provides direct access to several office parks, hotels, and employment centers. It is also a major conduit for vehicle 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. It is proposed to connect directly with Springdale Road.
- Springdale Road (CR 673) is proposed to connect directly with Fellowship Road.
- Atrium Way serves an office park and is proposed to relieve pressure from the NJ 73 and Church Road intersection.
- Arbor Way connects Church Road and Atrium Way.

## Public Transportation Service

New Jersey Transit (NJT) bus route 457 operates along Church Road within the study area, and is the only regularly scheduled bus to do so. NJT bus route 406 operates in the vicinity of the study area. Following are summaries of these two routes.

### ***NJ Transit Route 457***

- provides six-day (weekdays and Saturday) service between Moorestown Mall in Burlington County and Walter Rand Transportation Center in Camden County, and includes a stop at the Haddonfield Port Authority Transit Corporation (PATCO) station;
- operates between 5:47 AM and 11:06 PM (17.3 hours) on weekdays;
- 30-minute headways during morning and evening weekday peak hours, and one-hour headways for the remainder of the service time
- one-hour headways on Saturdays between 6:45 AM and 11:03 PM; and
- provides convenient service for neighborhoods and attractions along the Church Road corridor, including Kings Croft Apartments, Mount Laurel Rehab Center, and others.

### ***NJ Transit Route 406***

- provides seven-day service between Burlington Township and Center City Philadelphia, primarily operating on NJ 70, but including a route spur that serves the business park at NJ 73 and Atrium Way;
- on weekdays roughly 10 to 30 minutes peak, and 40-minute off-peak headways between 4:37 AM and 1:09 AM; and

- offers one-hour weekend headways between 5:07 AM and 1:34 AM on Saturdays and between 5:37 AM to 10:57 AM on Sundays.

Every bus passenger is a pedestrian on one or both ends of their trip, and pedestrian amenities along the corridor are not conducive for public transportation usage, as they are incomplete. Bus stops consist of no more than simple signs that provide no information beyond the bus route served. No bus stop shelters, benches, pedestrian-scale lighting, or other bus passenger amenities are found along the corridor. DVRPC's Transit Score methodology found the feasibility of transit service to range from Low to Medium-High across the corridor—increasing from east to west. This is due to the higher-density residential populations in the western portion of the study corridor. This also suggests that ensuring an adequate pedestrian environment is appropriate to accommodate transit passengers.

## Bicycle and Pedestrian Network

Travel by nonmotorized modes along the Church Road corridor is not convenient.

An inventory of sidewalks and pedestrian crossings was conducted for this study. The results are shown in Figure 6, the straight line diagram. The inventory found that there is not consistent sidewalk coverage, which makes travel by foot difficult at best.

There currently are no bicycle lanes along the study corridor. In the Camden County portion of the study corridor the travel lanes are wide (up to 18 feet), but shoulders are not striped. In the Burlington County portion the travel lanes are striped at 10.5 feet, which provides a wide, defined shoulder space. However, there are no formal bicycle lane demarcations.

Camden County has adopted a Complete Streets policy that should, in the long term, allow for the Camden County portion of the study corridor to become more bicycle and pedestrian friendly. Cherry Hill Township has also adopted a Complete Streets policy.

The draft Camden County Bicycle Plan proposes an on-road bike lane for Church Road in the county. This would also intersect with a proposed on-road bike lane along NJ 41. A bike route was proposed for Church Road in Burlington County in the 2011 DVRPC publication, *NJ 73 Corridor Study Burlington County (#10004)*. This would provide continuity from the proposed Camden County bike lane and connect eastward to the Cross County Connections existing bicycle network along Arbor Way.

## Planned and Programmed Improvements

An important aspect of any traffic study is to know, and comprehend the impact of any planned or programmed improvements. For this study, a review of DVRPC's regional Long-Range Plan, *Connections 2040*, as well as the Transportation Improvement Program (TIP) for New Jersey, was conducted. The review found that there are no planned or programmed improvements significant to the study area. However, as part of the Lifetime Fitness development planned for the Church Road corridor, minor improvements to the Church and Fellowship roads intersection are planned, and were included in all future-year analyses.

## CHAPTER 4:

# Traffic Safety

For this project two separate tasks were completed to assess traffic safety. First, a five-year (2008–2012) crash history was reviewed for each of the six intersections analyzed for this project. Crashes, to a distance of 300 feet along each approach were considered. The total number, numbers by severity, and the predominant crash type are all mapped in Figure 8. Secondly, two intersections; Church Road and Waverly Avenue, and Church Road and Beaver Avenue, were assessed for crash experience as related to the Manual on Uniform Traffic Control Devices (MUTCD), 2009, Warrant Number 7.

Following is an intersection-by-intersection discussion as related to the first task.

### **Church Road and NJ 41 (Kings Highway)**

This intersection realized 63 crashes over the five year analysis period. Of those, one was fatal, 26 involved some degree of injury, and 36 involved only property damage. The data shows that crashes at this intersection are 15 percent more likely to involve injury than the state-wide average. Fifty of the crashes occurred on the approaches, while 13 occurred inside of the intersection. The majority, 71 percent, were rear-end crashes. Considering the severity is higher than average a Road Safety Audit may be appropriate to understand the contributing factors, and to develop a mitigation plan.

### **Church Road and Fellowship Road**

This intersection realized 46 crashes over the five-year analysis period. Of those, one was fatal, 19 involved some degree of injury, and 26 involved only property damage. The data shows that crashes at this intersection are 9 percent more likely to involve injury than the state wide average. Twenty-six of the crashes occurred on the approaches,

while 20 occurred inside of the intersection. The majority of crashes at the intersection are either rear ends or left turns. Improvements associated with the Lifetime Fitness development are planned for this intersection.

### **Church Road and Springdale Road**

This intersection realized 38 crashes over the five-year analysis period. Of those, 13 involved some degree of injury, and 25 involved only property damage. The data shows that the severities of crashes at this intersection are in line with state-wide averages. Twenty-eight of the crashes occurred on the intersection approaches, while 10 occurred inside of the intersection. The majority of crash types at the intersection are associated with either rear ends or right angles.

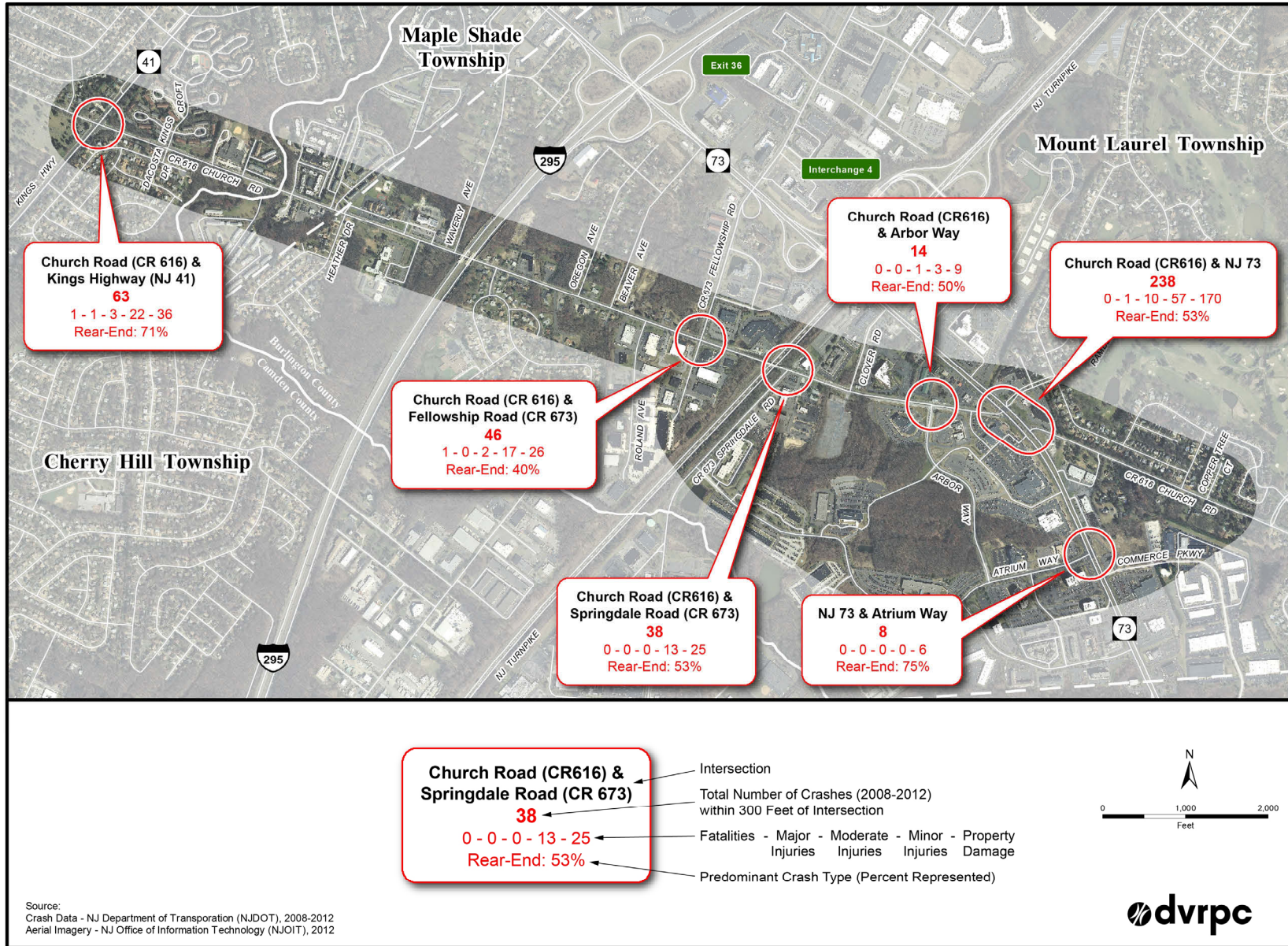
### **Church Road and Arbor Way**

This intersection realized 14 crashes over the five-year analysis period. This number is not significant.

### **Church Road and NJ 73**

This intersection includes both Church Road intersections with NJ 73, and Ramblewood Parkway. The intersection realized 238 crashes over the five-year analysis period. Of those, 68 involved some degree of injury, and 170 involved only property damage. The data shows that the severities of crashes at this intersection are in line with state wide averages. One-hundred, and fifty-eight of the crashes occurred on the intersection approaches, while 80 occurred inside of the intersection. The majority, 53 percent, were rear-end crashes.

Figure 8: Corridor Crashes (2008–2012)





### **NJ 73 and Atrium Way**

This intersection realized eight crashes over the five-year analysis period. This number is not significant.

### **Crash Experience Warrant Analysis**

According to the Crash Experience Warrant (Warrant Number 7) of the 2009 Manual on Uniform Traffic Control Devices (MUTCD) guidelines, with regard to safety, an intersection qualifies for a traffic control signal if all of three criteria are met: (A) alternative strategies have failed to reduce crash frequency, (B) crash rates are above five for any 12 month period, or (C) traffic volumes exceed an 80 percent threshold that depends on the number of lanes at the intersection.

The Waverly Avenue and Beaver Avenue intersections along the Church Road corridor were analyzed to identify if they met the crash requirement (*part B*) of the Crash Experience Warrant. Only the crash rate portion of the guidelines was addressed in this analysis, as traffic volume data along Waverly and Beaver avenues was not available. To qualify for a traffic control signal, the warrant would require either 400 vehicles per hour (v/h) along both approaches of Church Road and 120 v/h along the higher volume approach of the minor street (Waverly and Beaver) or 600 v/h along both approaches of Church Road and 60 v/h along the higher volume approach of the minor street (Waverly and Beaver). Traffic volumes along Church Road are significant enough to satisfy either option.

### Church Road and Beaver Avenue Intersection

In the five year period of analysis, from 2008 to 2012, there were 10 crashes within 200 feet of the intersection. Only one crash occurred within the intersection proper. Of the 10 crashes, three were associated with minor injuries and 6 with property damage. Over the five year analysis period, there was a single year that met the five

crash threshold of the warrant—2011. These results indicate that the crash rate at this intersection does not satisfy the Crash Experience Warrant of the MUTCD guidelines.

### Church Road and Waverly Avenue Intersection

From 2008 to 2012, there were 22 crashes within 200 feet of the intersection, of which nine were identified as occurring within the intersection proper. Three crashes were associated with minor injuries, one with moderate injury, and 18 with property damage. The crash rate at the intersection consistently met the warrant requirements between April 2008 and May 2011, but did not meet the requirements during 2012. Although the intersection met the warrant threshold for a portion of the analyzed period, the crash rate was below warrant in the most recent year and, as such, it is determined that the intersection does not currently satisfy the Crash Experience Warrant of the MUTCD guidelines.

Also to note with this intersection, it is located adjacent the I-295 overpass. There is a perceived safety issue related to sight distance constraints posed by the overpass structure. Mitigating the sight distance issue may be appropriate, and could be accomplished by a southbound right turn receiving lane, or a mirror as a more immediate measure.

### **Traffic Safety Summary**

Six intersections were assessed for general traffic safety conditions. Two intersections, Church Road and NJ 41, and Church Road and Fellowship Road, have crash severities greater than the state-wide average. Across the corridor rear-end crashes are the most common crash type. Additionally, two intersections were assessed to determine if their crash histories satisfied thresholds for traffic signals. Neither satisfied the warrant.



## CHAPTER 5:

# Improvement Analyses

Early in the course of this project the study team met with representatives of Camden and Burlington counties to define the scope of work. Accordingly, the priorities of the two counties led to three individual analysis tasks.

- Assess pedestrian mobility in the Camden County portion of the study corridor. This includes connecting the residential neighborhoods with the Thomas Paine Elementary School.
- Assess the feasibility and implications, from a traffic operations perspective, of connecting Fellowship Road with Springdale Road via a bridge over the New Jersey Turnpike.
- Assess the feasibility and implications, from a traffic operations perspective of a new, roughly 0.25-mile-long road that would allow for the bypassing of the NJ 73 and Church Road intersection for through traffic.

Each of these proposals, and the related analyses, are discussed in more detail in the remainder of this chapter.

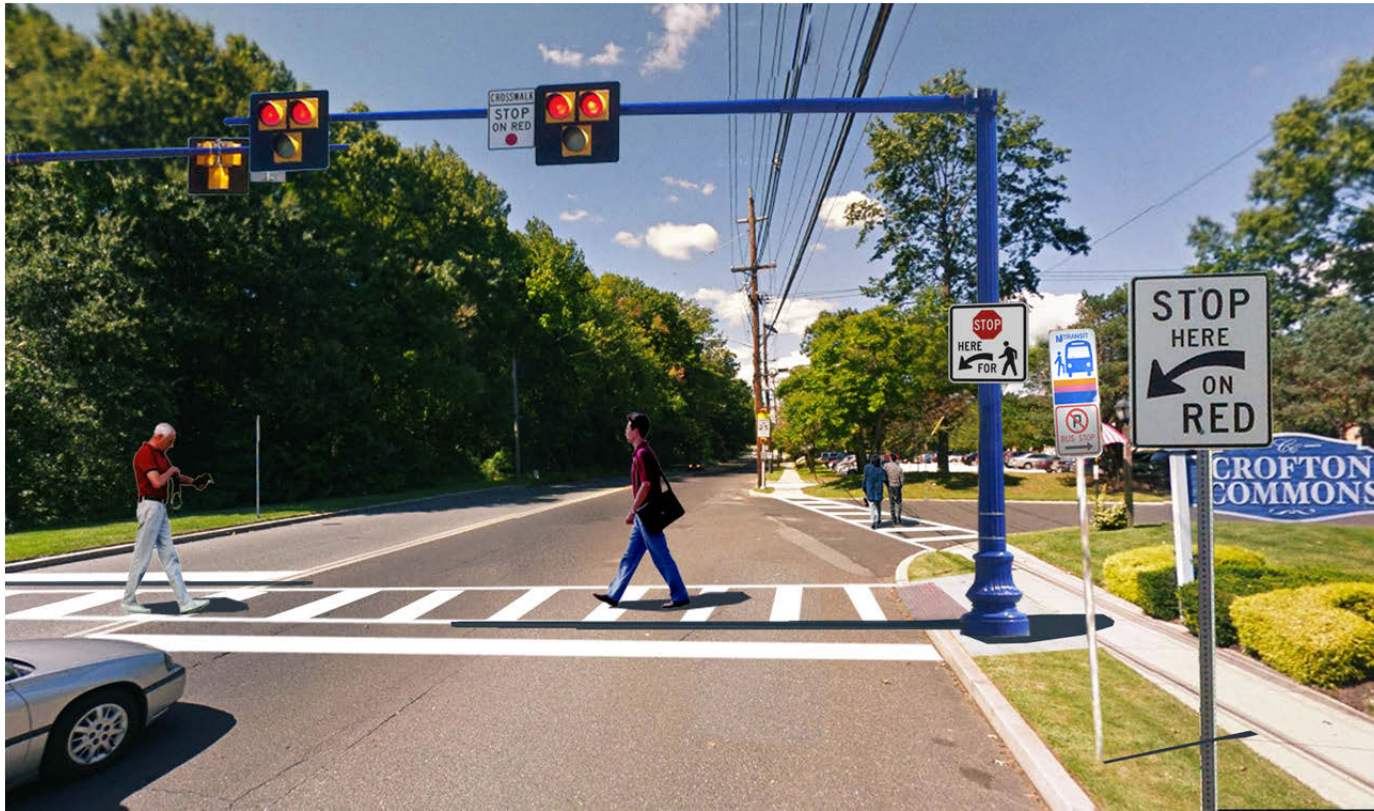
## Pedestrian Analysis

Sidewalks are critical infrastructure necessary to accommodate pedestrian mobility and safety. Sidewalks are distributed sporadically within the study corridor. As can be seen from Figure 6, sidewalks are generally concentrated in the more residential western end of the corridor. Several apartment complexes such as Kings Croft, Roberts Mill, and Pickwick apartments, as well as the Thomas Paine Elementary School are served by sidewalks. Though sidewalks were only inventoried for presence or not, Cherry Hill Township noted that several segments of sidewalks are in poor condition and are in need of

replacement. This applies to curbing as well. Gaps in the sidewalk remain and these should be filled in to form one continuous network. Sidewalks in poor condition should be replaced.

Not all bus stops in the corridor are served by sidewalks. Areas between bus stops and passenger origins or destinations should be priority areas in the completion of the sidewalk network. A 0.6 mile gap between traffic signals in the Cherry Hill Township portion of the study corridor precludes protected pedestrian crossings. In order to provide safe pedestrian crossings, crosswalks should be enhanced at locations with heavy pedestrian traffic. A most appropriate location would be the intersection of Crofton Commons and Church Road. This location would serve the Crofton Commons apartments, as well as the Thomas Paine Elementary School. It would also provide safe passage for residents of the Pickwick apartments located on the southern side. With bus stops located nearby on opposite sides of the street, this crosswalk would serve transit riders as well. Figure 9 is a conceptual design of how this crosswalk could be designed to permit safe passage for pedestrians across Church Road. A high-visibility crosswalk coupled with a Stop Here for Pedestrians sign (R1-5b) should be used to raise the visual profile of the crosswalk. A pedestrian hybrid beacon (also known as a High intensity Activated crosswalk, or HAWK) is a special type of hybrid beacon used to warn and control traffic at an unsignalized location to assist pedestrians in crossing a street or highway at a marked crosswalk. It is a pedestrian-activated warning device located on the roadside or on mast arms over midblock pedestrian crossings. The mentioned location would be ideal for a HAWK signal, though several locations between NJ 41 and Heather Drive would satisfy the need of a protected pedestrian crossing.

Figure 9: Conceptual HAWK Signal



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Accommodating bicyclists along the Cherry Hill Township portion of the study corridor is a municipal goal. In 2013 they adopted the Cherry Hill Bicycle and Pedestrian Master Plan which found this segment as “moderate” for the potential to accommodate bicyclists. The Plan suggests five foot wide bicycle lanes, four foot wide buffer zones, and 11 foot wide travel lanes. The township estimates the cost of reconfiguring this portion of Church Road to include bicycle lanes and all associated signage at 39,430 dollars (2008). Ideally the portion of the study corridor in Burlington County would be reconfigured to complement Cherry Hill Township’s planned reconfiguration.

## Traffic Operations

In 2011 DVRPC conducted the *NJ 73 Corridor Study: Burlington County*, for which DVRPC assessed several conceptual improvements similar to those analyzed for this project. The analyses conducted for this project build upon the previous work.

The potential improvements were assessed using SYCHRO traffic engineering software, with approach and intersection delay and corresponding level of service as the primary performance metrics. This was calculated for both the AM and PM peak hours. Four modeling iterations were undertaken, the first two being common between the two potential improvements.

- Existing Condition—existing infrastructure, recent traffic volumes, used to create a baseline;
- 2040 No Build—existing infrastructure, traffic volumes factored to forecasted 2040 values, and trips associated with the Fellowship Road development added;
- 2040 Build 1—traffic volumes from the 2040 no-build scenario, the proposed connection between Fellowship and Springdale roads built, and traffic volumes reflowed accordingly; and
- 2040 Build 2—traffic volumes from the 2040 no-build scenario, the proposed Church Road bypass via Atrium Way built, and traffic volumes reflowed accordingly.

At the request of Burlington County, each potential improvement was assessed independently. Table 1 presents the delay and level of service for the existing condition.

**Table 1: Existing Condition Performance Statistics (2011)**

Intersection	Approach	AM Peak Hour		PM Peak Hour	
		LOS	Delay	LOS	Delay
<b>NJ 41/ Church Road</b>	ALL	D	53.4	E	73.8
	NB	C	23.7	E	72.5
	SB	C	33.3	E	56.2
	EB	F	91.1	F	82.9
<b>Church Road/ Fellowship Road</b>	WB	F	105.7	F	103.8
	ALL	D	44.4	F	86.9
	NB	C	22.3	C	24.3
	SB	E	61.2	F	259.8
<b>Church Road/ Springdale Road</b>	EB	E	58.2	D	48.5
	WB	B	19.7	B	12.7
	ALL	C	34.3	F	84.6
	NB	D	42.2	F	159.7
<b>Church Road/ Arbor Way</b>	SB	N/A		N/A	
	EB	C	26.0	E	78.0
	WB	D	42.9	B	15.9
	ALL	A	5.6	B	15.0
<b>Church Road/ NJ 73 (North)</b>	NB	C	34.2	C	30.4
	SB	N/A		N/A	
	EB	A	4.2	A	9.6
	WB	A	4.1	A	9.0
<b>Church Road/ NJ 73 (South)</b>	ALL	F	91.0	F	100.3
	NB	C	30.4	D	41.3
	SB	F	106.3	F	104.8
	EB	F	249.0	F	289.6
<b>Church Road/ NJ 73 (South)</b>	WB	F	274.2	F	183.6
	ALL	F	110.2	F	118.5
	NB	C	33.4	C	25.5
	SB	E	57.5	F	132.7
<b>NJ 73/ Atrium Way</b>	EB	N/A		N/A	
	WB	F	470.4	F	313.4
	ALL	C	21.7	B	18.3
	NB	B	16.7	B	11.4
<b>NJ 73/ Atrium Way</b>	SB	C	25.3	B	15.9
	EB	D	44.7	D	48.5
	WB	N/A		N/A	
	ALL	C	21.7	B	18.3

DVRPC, 2014

**Explanation of Performance Measures**

**Delay**—Delay is the average amount of time, in seconds, that it takes a vehicle passing through an intersection beyond what would be experienced in a free-flow condition. The value given is the average for all vehicles completing the movement.  
**Level of Service (LOS)**—LOS are letter grades assigned to various degrees of delay. An LOS of “A” corresponds with free-, or near free-flowing conditions, while an “F” score corresponds with a breakdown in traffic flow.

## Connecting Fellowship and Springdale Roads Analysis

This conceptual improvement involves connecting Fellowship Road with Springdale Road. Figure 10 provides further detail regarding the conceptual alignment. The existing configuration precludes a direct through connection of CR 673. Traffic must traverse a short segment of Church Road to travel along CR 673, in turn creating a significant number of unnecessary turning vehicles and congestion at the two associated intersections. The conceptual improvement would provide a direct connection with a posted speed limit of 35 – 40 miles per hour.

To quantify any potential benefit associated with this improvement, two iterations of the travel simulation were conducted. The first is a 2040 no-build scenario. For this, traffic volumes are factored to forecasted 2040 values, and new trips and infrastructure improvements noted in the *Traffic Impact Study for the Proposed Retail Development, Mount Laurel Township, Burlington County, NJ* (McMahon Transportation Engineers and Planners, November 2011), commonly referred to as the Lifetime Fitness report, were added. The second scenario, 2040 Build 1, includes the same changes as noted for the no-build scenario but also includes the connection of Fellowship and Springdale roads as shown in Figure 10. Traffic that previously traveled along both Fellowship and Springdale roads was rerouted to use the new connection. For both scenarios, traffic signals are assumed to be programmed optimally. The results of these two scenarios are shown in Tables 2 (AM), and 3 (PM).

**Table 2: Build 1—AM Results**

Intersection	Approach	Existing (2011)		No Build (2040)		Build (2040)	
		LOS	Delay	LOS	Delay	LOS	Delay
Church Road/ Fellowship Road	ALL	D	44.4	C	31.8	C	32.8
	NB	C	22.3	C	33.4	D	50.4
	SB	E	61.2	E	59.3	D	43.5
	EB	E	58.2	C	29.2	C	21.3
	WB	B	19.7	B	16.0	C	22.9
Church Road/ Springdale Road	ALL	C	34.3	D	41.1	B	11.0
	NB	D	42.2	D	51.8	C	23.0
	SB	N/A		N/A		N/A	
	EB	C	26.0	C	32.4	B	12.7
	WB	D	42.9	D	47.2	A	7.0

DVRPC, 2014

**Table 3: Build 1—PM Results**

Intersection	Approach	Existing (2011)		No Build (2040)		Build (2040)	
		LOS	Delay	LOS	Delay	LOS	Delay
Church Road/ Fellowship Road	ALL	F	86.9	D	46.1	E	67.0
	NB	C	24.3	D	51.0	F	82.7
	SB	F	259.8	F	80.3	F	91.0
	EB	D	48.5	D	46.4	D	52.7
	WB	B	12.7	C	20.8	D	39.1
Church Road/ Springdale Road	ALL	F	84.6	F	82.9	B	19.8
	NB	F	159.7	F	130.7	C	24.3
	SB	N/A		N/A		N/A	
	EB	E	78.0	E	75.5	C	25.6
	WB	B	15.9	D	46.7	A	9.6

DVRPC, 2014

Occasionally no-build scenarios show improvement over existing conditions for some approaches and/or movements. Considering that a no-build scenario is often just higher traffic volumes being assigned to existing infrastructure, it is not logical. Typically there are two explanations when this occurs: (1) higher volumes are being assigned to the most accommodating movements, which brings down the average statistics; and/or (2) traffic signals are not optimally timed in the existing condition scenario. For this study there is a third reason: The Lifetime Fitness development includes several improvements to the Fellowship Road intersection. These improvements are included in both 2040 scenarios.

### **Analysis Summary**

In summary, this analysis finds that the concept would provide an overall benefit to traffic operations at the two analyzed intersections. There are no significant concerns associated with the AM peak hour. For the PM peak hour, traffic operations at the Fellowship Road intersection degrade when compared to the no-build scenario. Both future-year scenarios perform better than the existing condition, but this is due to the intersection improvements that result from the Lifetime Fitness development. Despite moderate degradation during the PM peak hour at the Fellowship Road intersection, the Springdale Road intersection traffic operations improve tremendously. Taken together, an overall benefit is realized. This is also true for the AM peak hour.

There is one additional factor that should be considered. Under this improvement scenario there will be a new approach to the intersection with Fellowship and Springdale roads. This intersection was not analyzed, though the majority of traffic is expected to travel straight through the intersection, which would fare favorably in terms of traffic operations. Vehicles currently traveling through on CR 673 traverse this intersection.

There are no known environmental impacts with this conceptual improvement; i.e., no wetlands or sensitive habitats are impacted.

Figure 10: Fellowship Road and Springdale Road Conceptual Improvement





## Realigning Church Road Analysis

The Church Road intersection with NJ 73 suffers operationally from a roughly 400-foot offset of Church Road. The offset requires two sets of traffic signals. The northern intersection has four approaches, with Ramblewood Parkway intersecting opposite Church Road. The southern intersection is a T-intersection, and left turns from Church Road are not possible, though they are accommodated by U-turns at the northern intersection. The intersection performs poorly.

Two geometric constraints hinder the operations of the intersection.

- There is insufficient left-turn storage capacity between the two intersections.
- Vehicles traveling through on Church Road must immediately cross two travel lanes before reaching the NJ 73 left-turn lane, and the left-turn lane is often already at capacity.

A significant amount of congestion is attributable to the current configuration.

The manual turning movement counts used in this analysis considered the two intersections independently. Therefore, the actual Church Road through traffic was not quantified. To overcome this, project staff observed peak-hour traffic to quantify Church Road through traffic. Based on the observations, an average of 30 percent of vehicles turning left onto Church Road from NJ 73 came from Church Road. This was true for both directions.

Burlington County officials developed a conceptual improvement and redesign of the intersection to overcome some of the traffic operations challenges faced by the current configuration. A graphic rendering of the improvements is presented as Figure 11. The foremost difference between the existing configuration and the conceptual improvement is

an extension of Atrium Way across NJ 73 and connecting with Church Road. Other differences include the following.

- Westbound Church Road becomes a right-in/right-out intersection with NJ 73.
- Southbound NJ 73 left turns onto Church Road will no longer be possible.
- One of two southbound NJ 73 left-turn lanes at Ramblewood Parkway is removed.
- The Atrium Way and NJ 73, and Church Road and Tam Oshanter Road intersections both become four-way intersections.

The conceptual improvement will allow Church Road through traffic to bypass the existing intersections by using Arbor Way, Atrium Way, and the extension of Atrium Way. Ultimately the southern NJ 73 and Church Road intersection will be removed, with the exception of right-in, right-out traffic, and much of the traffic diverted to an expanded NJ 73 and Atrium Way intersection. However, based on the analyses performed, which are discussed later, maintaining the northbound NJ 73 traffic signal, transitioning to red several seconds prior to the northern intersection, may be necessary to provide gaps for traffic entering from Church Road.

The existing condition was developed for the 2011 DVRPC publication, *NJ 73 Corridor Study*, and geometric changes have been made since that report was published. Specifically, the westbound Church Road approach to NJ 73 had a second lane added. Tables 4 and 5 on page 30 show a vast improvement for this approach between the existing condition (2011) and the no-build scenario (2040). The second lane is the reason for this improvement.

Figure 11: NJ 73 and Church Road Intersection Conceptual Improvement Overview

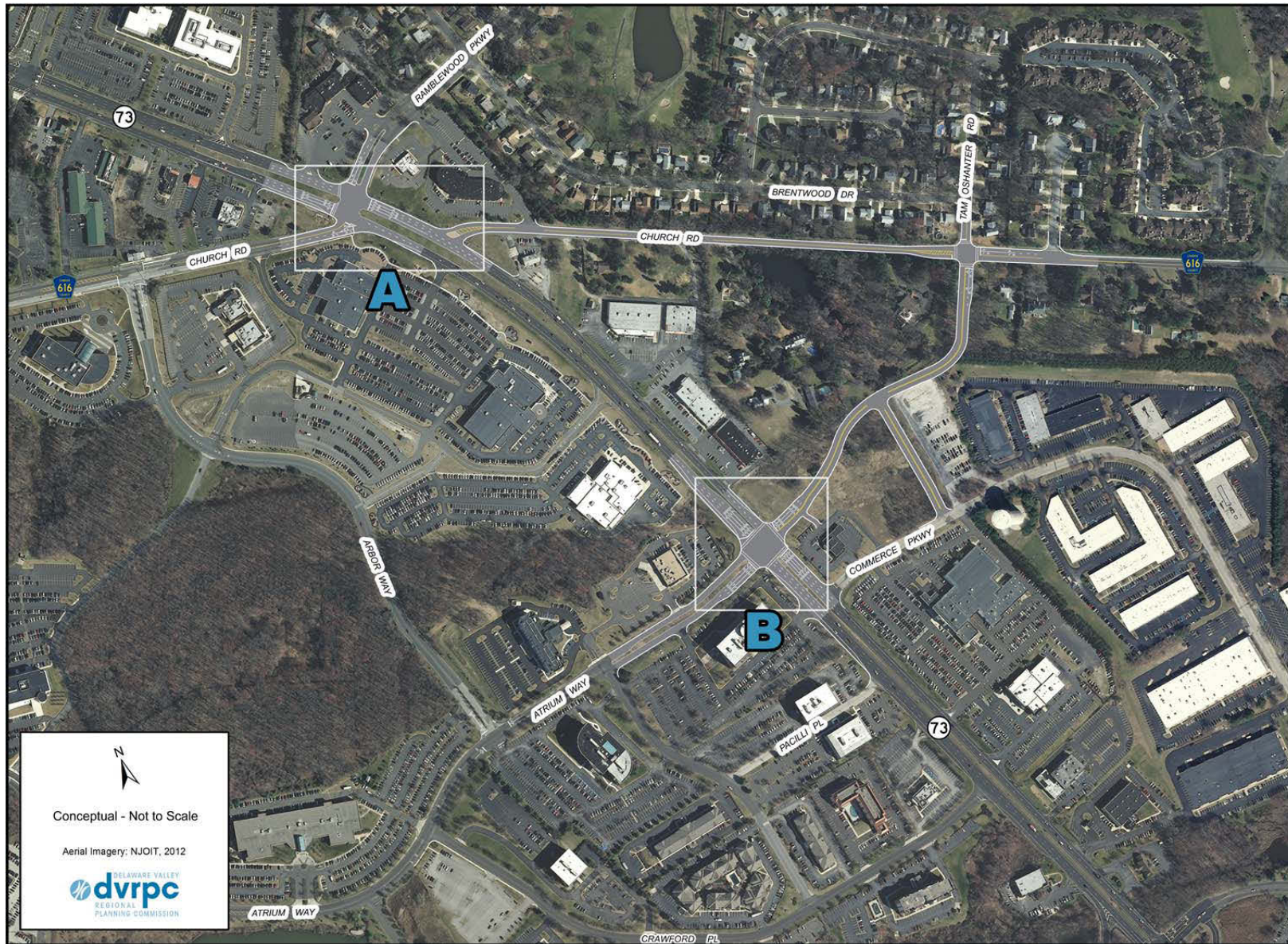
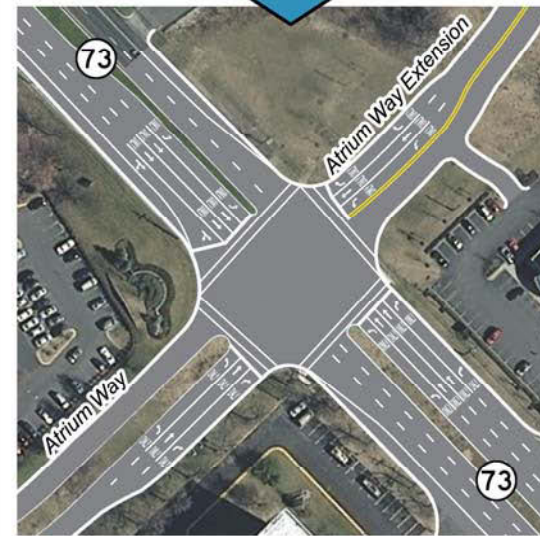
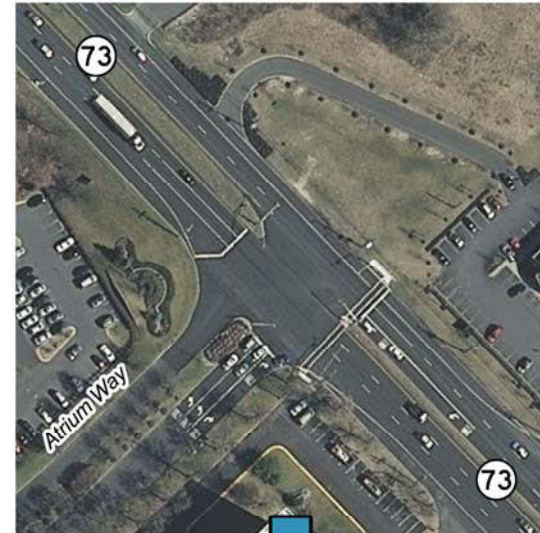


Figure 12: NJ 73 and Church Road Intersection Conceptual Improvement Detail

**A** Church Road / NJ 73 Intersection



**B** Atrium Way / NJ 73 Intersection



DVRPC, 2014

The analysis for this concept analyzed the existing NJ 73 and Church Road intersections, the NJ 73 intersection with Atrium Way, and the Church Road and Arbor Way intersection. Several other intersections would be impacted, albeit at a lesser degree, including Arbor Way and Atrium Way, and Atrium Way and Church Road. Tables 4 (AM) and 5 (PM) show the performance statistics for the three analysis scenarios.

The analysis assumes that all Church Road through traffic will use the new alignment, even though it would still be possible to travel through on Church Road in the westbound direction. Signing and turn restrictions may be necessary to prevent this.

**Table 4: Build 2—AM Results**

Intersection	Approach	Existing		No Build		Build	
		LOS	Delay	LOS	Delay	LOS	Delay
Church Road/ Arbor Way	ALL	A	5.6	A	4.6	A	6.1
	NB	C	34.2	C	29.0	B	18.0
	SB	N/A		N/A		N/A	
	EB	A	4.2	A	3.5	A	4.8
	WB	A	4.1	A	3.3	A	7.5
Church Road/ NJ 73 (North)	ALL	F	91.0	F	99.9	D	49.2
	NB	C	30.4	D	42.9	C	34.5
	SB	F	106.3	F	148.5	E	63.2
	EB	F	249.0	F	170.1	E	61.3
	WB	F	274.2	F	98.4	D	40.7
Church Road/ NJ 73 (South)	ALL	F	110.2	E	66.0		
	NB	C	33.4	D	47.2		
	SB	E	57.5	E	62.7	N/A	
	EB	N/A		N/A			
	WB	F	470.4	F	123.9		
NJ 73/ Atrium Way	ALL	C	21.7	C	33.9	E	61.2
	NB	B	16.7	C	34.1	E	61.4
	SB	C	25.3	C	26.4	D	51.3
	EB	D	44.7	F	94.1	F	98.2
	WB	N/A		N/A		F	113.1

DVRPC, 2014

**Table 5: Build 2—PM Results**

Intersection	Approach	Existing		No Build		Build	
		LOS	Delay	LOS	Delay	LOS	Delay
Church Road/ Arbor Way	ALL	B	15.0	C	26.4	A	9.1
	NB	C	30.4	F	120.8	B	14.9
	SB	N/A		N/A		N/A	
	EB	A	9.6	A	4.6	A	6.6
	WB	A	9.0	A	3.5	A	6.7
Church Road/ NJ 73 (North)	ALL	F	100.3	F	137.5	E	57.9
	NB	D	41.3	F	91.1	D	51.8
	SB	F	104.8	F	203.9	E	65.2
	EB	F	289.6	F	130.9	E	66.4
	WB	F	183.6	D	43.4	D	38.4
Church Road/ NJ 73 (South)	ALL	F	118.5	F	106.0		
	NB	C	25.5	D	43.2		
	SB	F	132.7	F	168.7	N/A	
	EB	N/A		N/A			
	WB	F	313.4	B	15.1		
NJ 73/ Atrium Way	ALL	B	18.3	C	27.2	F	81.0
	NB	B	11.4	C	21.1	F	96.8
	SB	B	15.9	B	11.8	D	44.8
	EB	D	48.5	F	124.1	F	163.7
	WB	N/A		N/A		F	124.6

DVRPC, 2014

### Analysis Summary

The existing configuration of the NJ 73 and Church Road intersections does not allow for efficient traffic operations. Given no improvements, conditions will continue to deteriorate in the future. The analyzed improvement found benefit at the NJ 73 and Church Road intersection, but degradation at the NJ 73 and Atrium Way intersection. For additional means of assessment, the results were formatted using alternative methods. Table 6 provides the combined average delay for north- and southbound NJ 73 traffic, which are the most heavily traveled movements. Table 7 provides the combined average delay for the three NJ 73 intersections being analyzed.

**Table 6: NJ 73 Combined Average Delay (2040)**

	Northbound		Southbound	
	AM	PM	AM	PM
<b>No Build</b>	186.2	229.0	67.2	114.2
<b>Build</b>	81.1	142.6	101.5	65.8
<b>% diff.</b>	-129.6	-60.6	33.8	-73.6

DVRPC, 2014

**Table 7: Combined Average Delay (2040)**

	AM	PM
<b>No Build</b>	199.8	270.7
<b>Build</b>	110.4	138.9
<b>% diff.</b>	-81.0	-94.9

DVRPC, 2014

The additional ways of assessing the data all prove favorable for the concept. However, the NJ 73 and Atrium Way intersection will experience considerable degradation compared to both the existing condition and no-build scenario. The intersection currently has high levels of left-turning vehicles. The additional traffic will cause the intersection to operate with an LOS “E” during the AM peak hour, and “F” during the PM peak hour. Much of the concern with the intersection focuses on the amount of green time that must be dedicated to the southbound NJ 73 protected left-turn movement. As a cursory analysis, a second southbound left-turn lane was considered, along with a second receiving lane, and was found to provide a modest benefit to the overall intersection operation.

As an alternative to this conceptual improvement, due to unfavorable operations at the NJ 73 and Atrium Way intersection, another cursory analysis was conducted for the PM peak hour that assessed adding a second southbound left-turn lane at the existing NJ 73 and Church Road intersection, along with a second receiving lane. There currently is a grass median that could potentially be used for the added lane. This concept shows a potential 152 percent improvement in average

delay for the southern NJ 73 and Church Road intersection operation during the PM peak hour. Urban Engineers is currently assessing this potential improvement, and others, in more detail for NJDOT and full performance statistics should be taken from their work. This alternative requires less right-of-way acquisition, is a less invasive alternative, and does not negatively impact the NJ 73 and Atrium Way intersection. In summary, both of the assessed improvements are incremental and do not provide the level of congestion relief that is needed at this intersection. The primary difference between the two is the level of disturbance and associated cost.

This concept does provide a benefit if accompanied by other improvements at the existing intersections. Connecting Atrium Way to Church Road expands the grid network which will provide an additional option for drivers, and may reduce congestion at the NJ 73 and Church Road intersections. However, it is not recommended as a stand-alone solution.

Neither of these conceptual improvements has significant negative environmental impact; i.e., no wetlands or sensitive habitats are impacted. However, both would require efforts to mitigate runoff associated with new impervious surface coverage.

## Summary of Improvement Analyses

For this project three unique improvements were analyzed, one qualitatively and two quantitatively.

The first was an assessment of the pedestrian network in the Camden County portion of the study corridor. Completing the sidewalk network and an enhanced pedestrian crossing were recommended.

The second analysis considered the connection of Fellowship and Springdale roads via a bridge over the New Jersey Turnpike. The findings of this analysis were supportive of the conceptual

improvement, particularly related to traffic operations at the Church Road and Springdale Road intersection. Minor degradation would be realized at the Church Road and Fellowship Road intersection, but that would be offset by improvement at the other intersection.

Finally, the third analysis considered an extension of Atrium Way between NJ 73 and Church Road to act as a Church Road bypass of the existing NJ 73 and Church Road intersections. For this, the analysis found benefit, but the impact to the NJ 73 and Atrium Way intersection is negative to the extent that alternatives should be considered. A cursory analysis of one alternative, providing a dual left-turn lane from southbound NJ 73 to eastbound Church Road, was conducted for the PM peak hour. This analysis found the benefit would be similar to the original concept, though likely at a lower cost and less impact to the environment. In summary, short of grade separating Church Road across NJ 73, there are no ideal options for providing significant improvement to these intersections. Either of the alternatives would provide some benefit, although not enough to

provide noticeable relief. However, it may provide benefit as a complementary project to other improvements at the NJ 73 and Church Road intersections.

Concurrent with DVRPC conducting this study for Burlington County, Urban Engineers is undertaking a similar project for NJDOT. As part of the analysis being conducted by Urban Engineers several improvement scenarios are being considered:

- a short-term improvement –(providing dual left turn-lanes from southbound NJ 73 to eastbound Church Road);
- providing three NJ 73 through lanes, which may be accomplished by potentially repurposing the shoulder; and
- a long-term improvement–(grade separating Church Road over NJ 73).

Results from their work are expected in August 2014.

## CHAPTER 6:

# Conclusion and Next Steps

This report is intended to provide decision makers with a set of tools that will enable them to make informed decisions on what measure should be implemented to improve multi-modal transportation in the area.

### **Responsibilities**

There are roles for the municipalities, the counties, the state, and the New Jersey Turnpike Authority to advance the recommendations of this study. The NJDOT is primary in terms of maintaining the higher-functional-class highways such as NJ 73. Municipalities make land use decisions that ultimately affect traffic volumes on adjacent highways. Municipal and county governments oftentimes design, build, and maintain local facilities that are impacted by state highways. Occasionally, developer contributions are a source of funding projects that have special impact by a development. Providing proper transportation access to a new development is often critical for the success of that development. Therefore, developers must work with the transportation providers to assure that the improvements are beneficial to the development and existing transportation infrastructure. Developers frequently design and construct highway improvements for traffic attributable to their developments or that would improve access to their site.

### **Pedestrian Improvements**

The recommended pedestrian improvements in the Camden County portion of the study corridor would need to be implemented by a combination of the local municipality (Cherry Hill Township) and Camden County. The municipality can require improvements to the pedestrian environment through the land development process as new developments are proposed. Camden County can implement these

recommendations when Church Road, being a county route, undergoes an improvement that would trigger a Complete Streets review. During such review the lack of pedestrian connectivity and safe pedestrian crossings will be apparent, and planning may begin to correct the deficiencies.

### **Connecting Fellowship and Springdale Roads**

Advancing this project will require coordination primarily between Burlington County officials and the New Jersey Turnpike Authority, as it involves a new bridge over the Turnpike. The county would need to weigh this improvement against other priorities within the county and advocate for its inclusion in the next update to the region's long-range plan, or into the TIP.

### **Improving the NJ 73 and Church Road Intersection**

While the need to improve upon the existing condition is undisputed, an efficient alternative improvement has not been identified. This project analyzed one potential solution, though the feasibility was not clear. Urban Engineers, under contract for NJDOT, is assessing two other improvement scenarios. With NJ 73 being a state road, and the higher-order road at the intersection, NJDOT will be the lead agency for any improvement. After Urban Engineers complete their project, an alternative that effectively relieves congestion without seriously impacting adjacent intersections can be identified.





# Transportation Improvements for the Church Road (CR 616) Corridor

**Publication Number:** 14012

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**Geographic Area Covered:**

Cherry Hill Township, Camden County, and Maple Shade and Mount Laurel townships, Burlington County, New Jersey

**Key Words:**

Congestion, Traffic Safety, Capacity Analysis, Alternatives Analysis, Connectivity, Land Development

**Abstract:**

The purpose of this study is to investigate and analyze improvements to the Church Road corridor in Cherry Hill, Maple Shade, and Mount Laurel townships. Analyzed were improvements to multimodal travel, specifically in the Cherry Hill portion of the study corridor; directly connecting Fellowship and Springdale roads via a bridge over the New Jersey Turnpike; and connecting Church Road across NJ 73 with a bypass consisting of Arbor and Atrium ways.

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