

July 2007

# COUNTY ROUTE

# 571

## Corridor Study

*Princeton Township  
Princeton Borough  
West Windsor Township  
East Windsor Township  
Hightstown Borough*



DELAWARE VALLEY  
REGIONAL PLANNING  
COMMISSION

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



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## **1.0 EXECUTIVE SUMMARY**

This is a transportation study of County Route (CR) 571, a vital east-west corridor for the Central Jersey region. The area studied extends from the intersection of CR 571 with NJ Route 27 in Princeton Borough eastwards, through parts of Princeton, West Windsor and East Windsor Townships, and Hightstown Borough. Though this corridor focuses on CR 571, it follows the main west-east flow of traffic with a short section on NJ Route 33 to an area east of the NJ Turnpike in the vicinity of Twin Rivers Drive in East Windsor Township. Overall, this corridor is approximately twelve miles in length.

The Central Jersey Transportation Forum (Forum) adopted a list of issue areas of concern to corridor municipalities. In addressing these concerns, the study team focused its effort on those priority areas identified by the Forum. These priority areas were analyzed and, with local input, improvement plans for these areas were developed.

The improvements are focused on remedies that can be implemented in the short term. These include those improvements that are not capital intensive, such as better signage to improve traffic flow and safety, and intersection improvements to improve mobility and reduce congestion. Long-term improvements recommended include the construction of access roads to relieve congestion along specific highway segments. Four major site-specific areas with deficiencies due to congestion, mobility and safety issues were identified. Corridor-wide improvements were also documented. These include identifying areas to make better accommodations for pedestrian and bicycle traffic within the corridor.

Specific areas of improvement that would promote better safety and mobility for road users were examined in detail. Traffic safety and mobility were addressed at the intersection of CR 571 and US 1 and short-term “quick fixes” were developed that would provide immediate relief prior to construction of the long-term Penns Neck project. Traffic counts, signal timing, roadway geometrics, and crash data were collected at several locations in order to ascertain the efficiency and safety of such road segments. The data collected was applied to various intersections within the corridor between Old Trenton Road and US 130, where a signal coordination plan was developed. A capacity analysis was performed at the area in the vicinity of Old Trenton Road. A realignment of Millstone Road was proposed and improvement to pavement markings and signage identified. The impact of a proposed Lanning Boulevard extension was analyzed and traffic flow improvement documented. An inventory of sidewalks, curbs, and shoulders was conducted along the corridor to identify pedestrian and bicyclist facilities. Based on this inventory, deficiencies were identified and improvements recommended. Overall, the research and analyses conducted by DVRPC complement the groundwork laid by local officials at the Central Jersey Transportation Forum in their initial screening.

Other transportation studies and projects recently completed or underway in the corridor were referenced in this report. This document therefore can be used as a comprehensive resource that documents current transportation initiatives within the corridor.

## **2.0 PURPOSE AND NEED**

The purpose of this effort is to study the CR 571 corridor and develop a plan identifying specific strategies that would improve mobility, reduce congestion, and improve the safety for road users.

The CR 571 corridor serves as a connector to several major roadways, including the NJ Turnpike, US 1, and US 130, and is also a major stop on the Northeast Corridor rail line. The study process included input from the five involved municipalities, as well as NJDOT, NJ Transit, the Central Jersey Transportation Forum, and Mercer County officials. In fact, the municipalities, through their work with the Forum, provided insight into specific transportation issue areas along the corridor. Furthermore, the Forum has endorsed possible solutions for such areas and for the corridor as a whole.

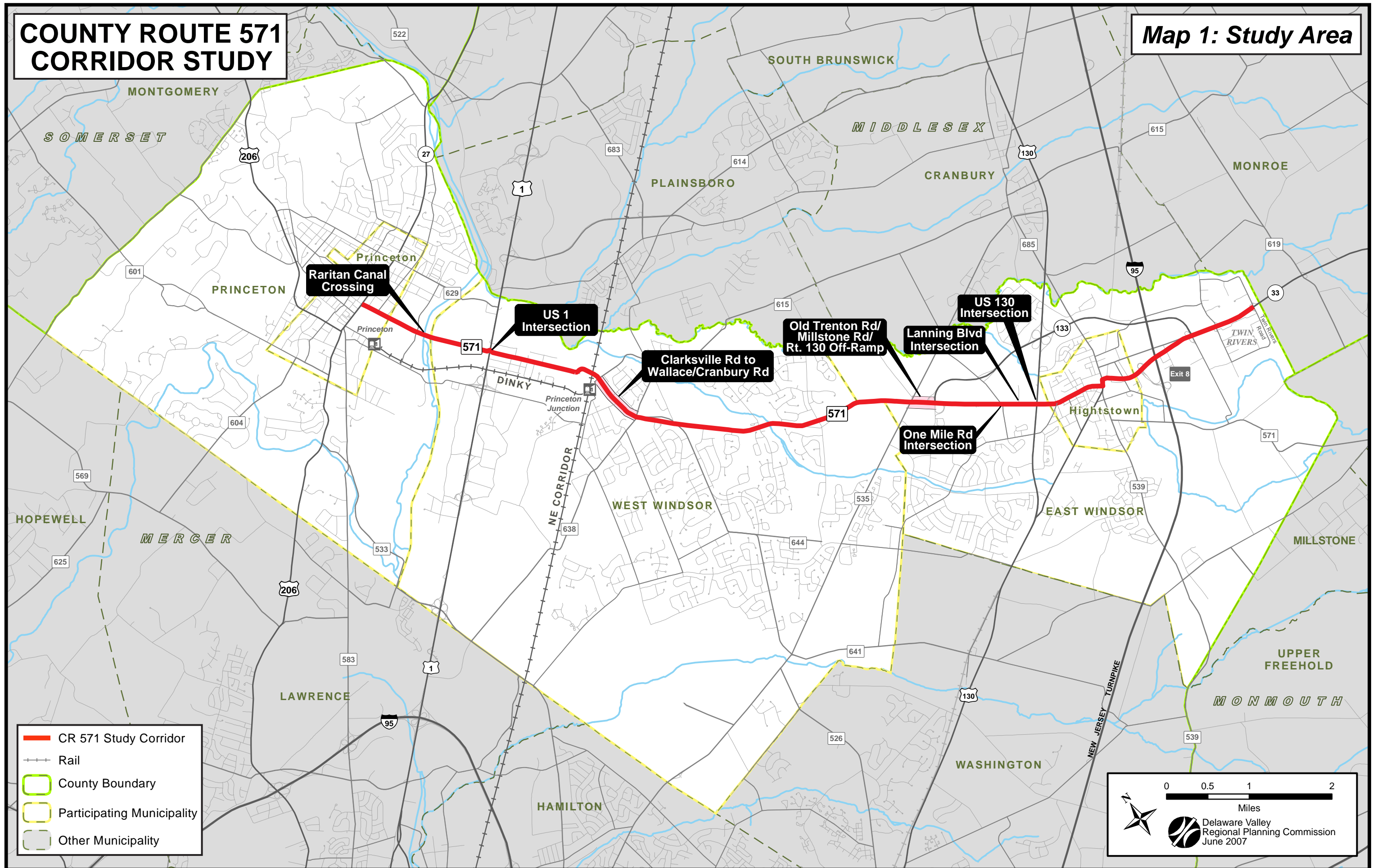
This effort is aimed at advancing the concepts developed by the Forum through detailed analyses of the issue areas and identification of practical measures to promote mobility and safe conditions along the corridor.

## **3.0 STUDY AREA DESCRIPTION**

County Route 571 is a vital east-west corridor for the Mercer County region. As shown in **Map 1**, the corridor stretches for 11.8 miles from NJ Route 27 in Princeton Borough to Twin Rivers Drive in East Windsor Township. Other municipalities within the corridor include Princeton Township, West Windsor Township, and Hightstown Borough. This route serves as a connector linking several major roadways in the area, including US 1, US 130, and the New Jersey Turnpike. This corridor also provides direct access to the Princeton Junction Train Station, which is a major stop along the Northeast Corridor rail line.

# COUNTY ROUTE 571 CORRIDOR STUDY

# Map 1: Study Area



- CR 571 Study Corridor
- Rail
- County Boundary
- Participating Municipality
- Other Municipality

0 0.5 1 2  
Miles  
Delaware Valley  
Regional Planning Commission  
June 2007

#### 4.0 TRANSPORTATION ISSUE AREAS

After meeting with stakeholders, conducting field views, and collecting CR 571 traffic and crash data, the list of projects proposed in the package to the Forum was refined to focus on a select number of priority locations and corridor-wide issues. The following is a description of the primary issue areas analyzed and the improvements proposed for those areas.

##### Princeton Township

#### 4.1 CR 571 and Raritan Canal Crossing

The Raritan Canal Tow Path is heavily used by joggers, walkers, and bicyclists. CR 571 intersects with this path at grade. Traffic along CR 571 conflicts with pedestrian and bicycle traffic along the path. A 2006 traffic count recorded an annual average daily traffic (AADT) of 13,195 for this location, and between 2002 and 2005, two noninjury crashes occurred in the vicinity of the canal crossing. The challenge is to identify ways in which the safety of pedestrians and bicyclists can be improved at this crossing.

##### Issues:

A. *Poor sight distance* – As shown in **Figure 2**, there are two paths that intersect with CR 571. The first tow path is east of the canal and the second is west of the canal. The distance from the east path to the entrance of the adjacent parking area is approximately 250 feet. The road descends at approximately a 4% grade between the parking area and the tow path. Using the American Association of State Highway Transportation Official's (AASHTO) guidelines, a “stopping sight distance” of up to 454 feet can be calculated for the intersection of the paths and CR 571. **Figure 1** below shows the formula used in the calculations and **Table 1** provides the recommended stopping sight distance based on a variety of traffic speeds.

**Figure 1 – Stopping Sight Distance Calculation**

$$1.47 \times Speed \times 2.5 \text{ sec.} + \left[ Speed^2 \div \left( 30 \times \frac{11.2 \text{ ft/sec}^2}{32.2} - Grade\% \right) \right]$$

Source: AASHTO, 2004

Grade	Speed			
	25	35	45	50
0.01	154	249	365	430
0.02	155	253	371	438
0.03	157	257	378	446
0.04	160	261	385	454

Source: DVRPC, 2007



# COUNTY ROUTE 571 CORRIDOR STUDY

## Figure 2: Raritan Canal Crossing



Proposed Crosswalk

Towpaths

Proposed Crosswalk

Stopping Sight Distance (454 ft.)

AASHTO Recommended Minimum  
Safe Breaking Distance

Elevation Contour  
(in 5 ft. intervals)

0 25 50 100  
Feet

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Orthophotography - DVRPC, Spring 2005

This distance highlighted in **Table 1** is the minimum distance needed for a driver traveling at 50 mph towards the towpath crossings to come to a safe stop after observing a pedestrian in the crossing. The AASHTO recommendation assumes a constant rate of deceleration (11.2 ft / sec <sup>2</sup>) and a reaction time of 2.5 seconds.

- B. *Missing crosswalk* – There are no crosswalks installed that would delineate the presence of pedestrian activity across CR 571.
- C. *Missing signage* – There are no signs located along CR 571 approaching the canal crossing to warn motorists of pedestrian activity.

### Recommendations:

- In an effort to improve the safety of these crossings, prominent pedestrian crosswalks should be installed at the crossing to improve visibility and safety. As depicted in **Figure 3**, it is recommended that these crosswalks be made more prominent by installing in-pavement lighting to improve the visibility of the crossing to motorists. These are small fixtures embedded in the pavement along both sides of the crosswalk that flash an amber-colored light. They are activated only when a pedestrian is crossing. An example is located on CR 571 in the vicinity of the Princeton University campus, and they are also being installed by Mercer County and Princeton Township on Harrison Street and Alexander Street at the D&R Canal tow path.

**Figure 3:** In-pavement Lighting at Crosswalk



Source: Pedestrian and Bicycle Information Center  
<http://www.walkinginfo.org/pedsmart/tlite.htm>

It is also recommended that advanced pedestrian crossing advisory signs be installed at upstream locations. It is also possible to have advanced pedestrian warning signs that flash when a pedestrian actuates the flashing crosswalk. The Pedestrian Crossing and/or PED Crossing sign (W11-2P) is typically used to alert motorists in advance of locations where unexpected entries into the roadway or shared use of the roadway by pedestrians might occur.

## **West Windsor Township**

### **4.2 CR 571 and US 1 Intersection**

The intersection of CR 571 and US 1 has high traffic volumes and a clutter of directional signs, which make navigating through this intersection very confusing and difficult. Although the Penns Neck project planned for this area will address long-term traffic issues, the improvements recommended in this document attempt to identify short-term solutions that would help to improve traffic circulation and safety.

This intersection is critical, as it connects the Princeton-Hightstown traffic onto the major arterial of US 1. US 1 has three travel lanes in the northbound and southbound direction approaching the intersection of CR 571. The approaches toward the intersection restrict left turn movements from the left lanes either northbound or southbound. The northbound and southbound roadways are separated by a concrete median barrier. The posted speed limit on US Route 1 is 55 mph in the northbound and southbound directions. The speed limit on CR 571 is posted at 50 mph. 1995 traffic counts found AADTs of 15,954 west of the intersection and 17,038 east of the intersection. Between 2002 and 2005, thirteen crashes occurred at this intersection on CR 571.

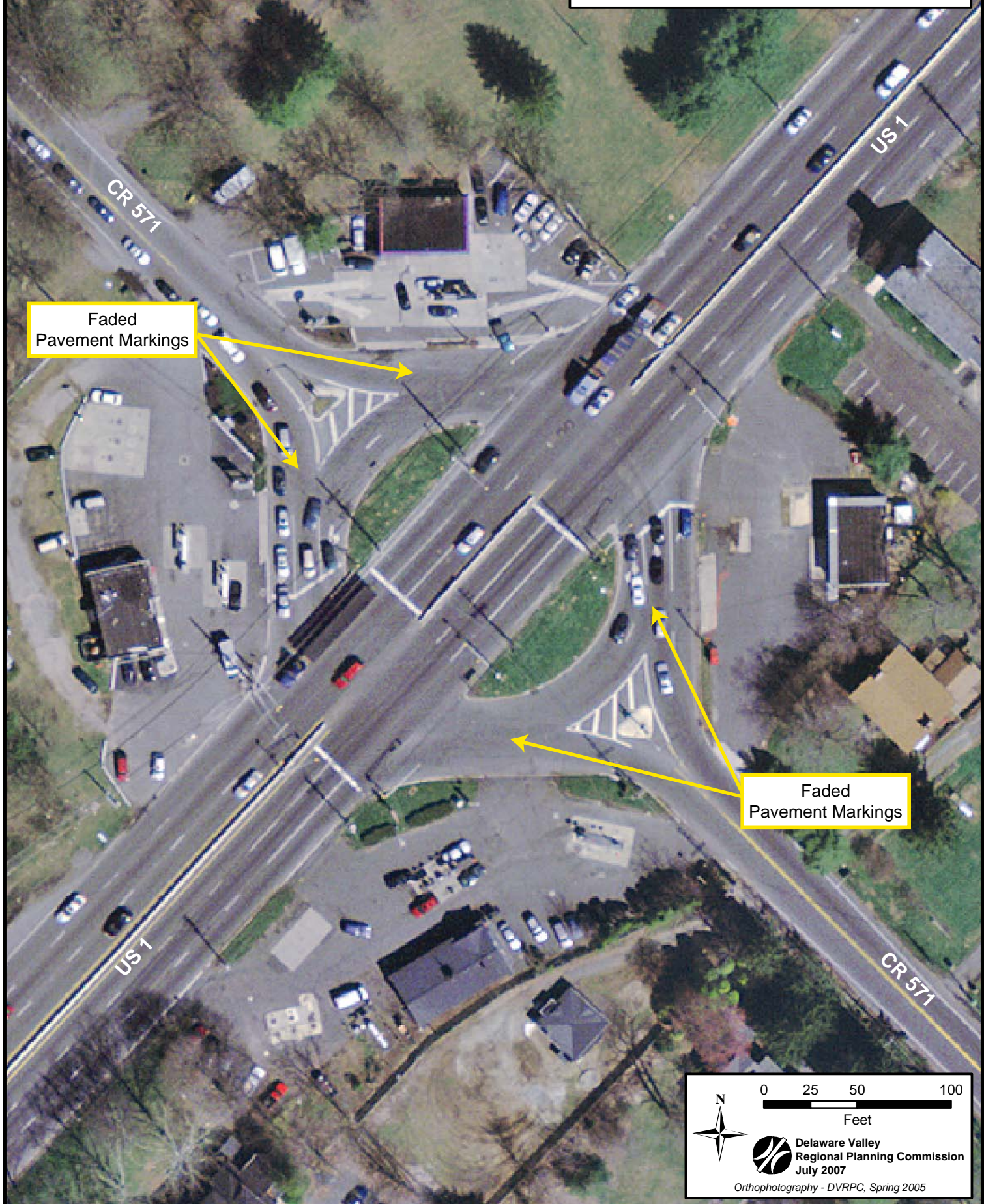
#### **Issues:**

Two major issues were identified at this location: sign clutter and faded pavement markings. Both problems cause difficult traffic movements. Northbound US 1 traffic experiences difficulty in getting to westbound CR 571 and southbound US Route 1 traffic experiences difficulty in getting to eastbound CR 571. This intersection also makes it problematic for westbound and eastbound traffic to get across the approaching traffic from US Route 1.

- A. *Faded pavement markings* – There is an absence of proper pavement markings to identify required vehicle positioning along the approaches of the intersection (**Figure 4**). This exacerbates the congestion experienced at this location since drivers cannot readily identify the appropriate lanes in which they should be positioned. This slows traffic circulation through the intersection.
- B. *Sign clutter* – As depicted in **Figure 6**, there are approximately twenty-three signs located at the approaches to this intersection. The repetition of traffic signs creates signage clutter at the intersection. Too much information listed on too many directional and destination signs makes it difficult for motorists to read and navigate safely through the intersection.

# COUNTY ROUTE 571 CORRIDOR STUDY

*Figure 4:  
CR 571 at US 1 -  
Existing Pavement Markings*



Faded  
Pavement Markings

Faded  
Pavement Markings

0 25 50 100  
Feet

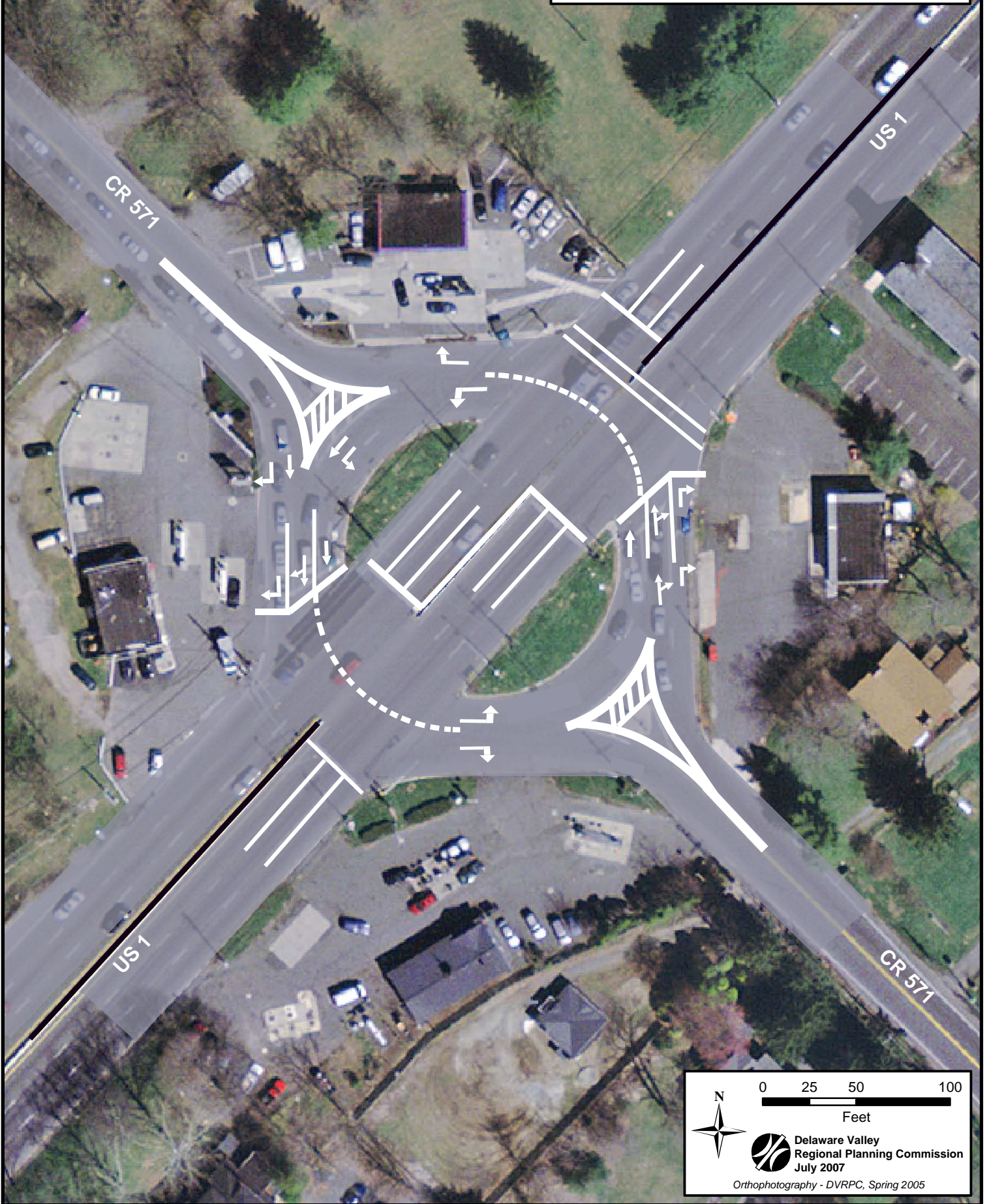
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Orthophotography - DVRPC, Spring 2005

**COUNTY ROUTE 571  
CORRIDOR STUDY**

**Figure 5:  
CR 571 at US 1 -  
Enhanced Pavement Markings**



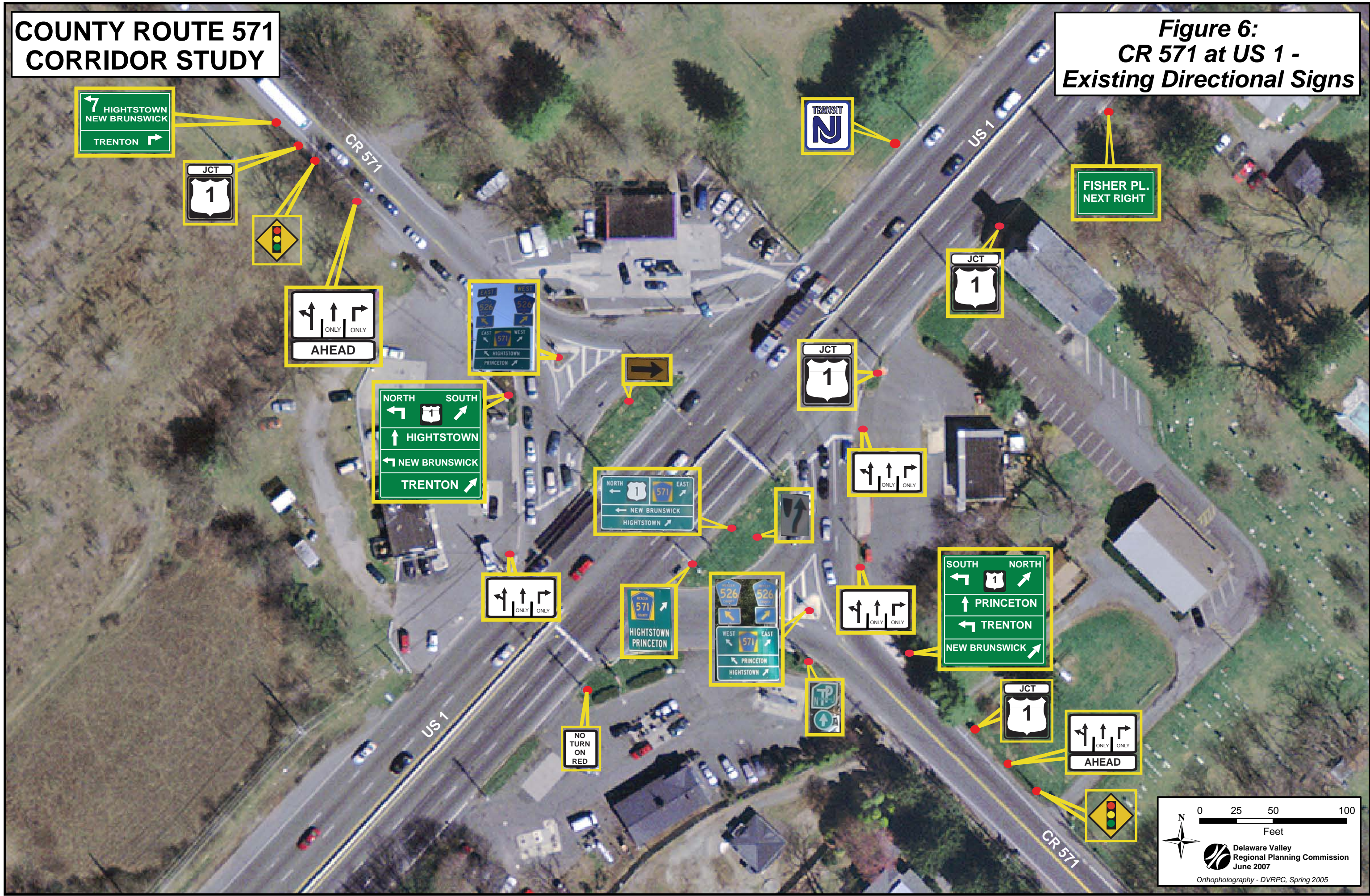
**Recommendations:**

Improvements at this intersection will improve traffic circulation by creating better traffic directional and destination guide signs along with prominent pavement markings to guide vehicles.

- *Pavement striping* – Improve existing pavement striping to enhance and improve traffic circulation by guiding vehicles through the intersection. Aside from restriping the stop bars and flared entry points at the approach of the circular intersection, as indicated in **Figure 5**, transverse and longitudinal lane markings and pavement arrows are recommended to better define and properly delineate the positioning of vehicles traveling through the intersection.
- *Sign clutter remediation* – **Figures 7** shows the recommended placement of regulatory and directional signs for this location, which will help to reduce sign clutter and confusion for motorists traveling through the intersection. As shown there is one overhead destination sign located along southbound US Route 1 approaching CR 571. There are currently eight signs posted on CR 571 approaching the US Route 1 intersection. With the proposed signage layout, there are four signs (two in each direction) that warn motorists of the traffic signal ahead and the lane configuration. It is also recommended that the existing destination signs be consolidated. A single overhead guide sign that would restrict the use of specific lanes to traffic bound for the destination(s) and/or route(s) indicated by these arrows would help to rationalize traffic flow.

# COUNTY ROUTE 571 CORRIDOR STUDY

**Figure 6:  
CR 571 at US 1 -  
Existing Directional Signs**

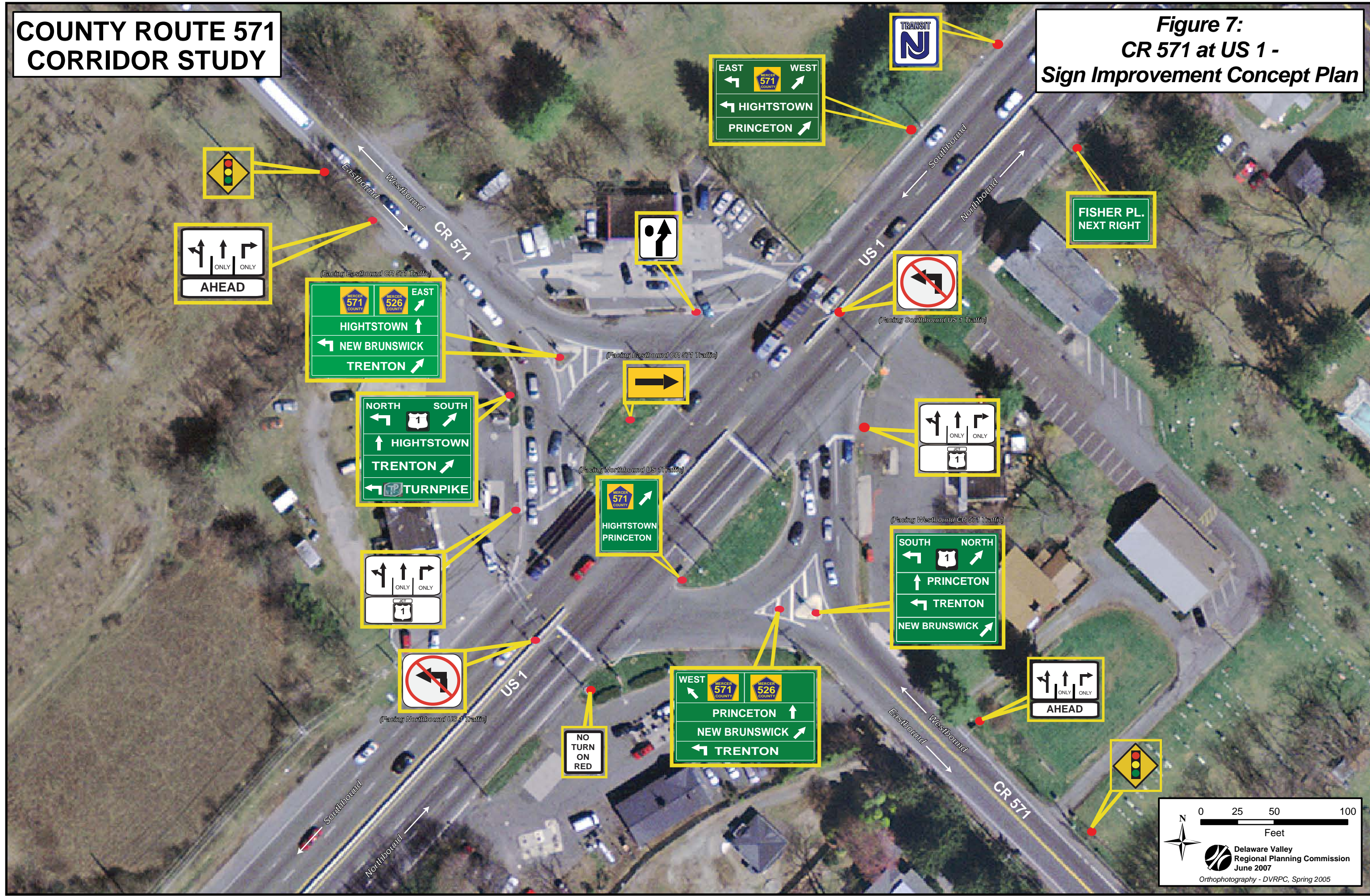


0 25 50 100  
Feet

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# COUNTY ROUTE 571 CORRIDOR STUDY

**Figure 7:  
CR 571 at US 1 -  
Sign Improvement Concept Plan**





## **East Windsor Township**

### **4.3 Old Trenton Road/Millstone Road/Route 133 Off-Ramp**

The location of CR 571 and Old Trenton Road was evaluated to improve safety and mobility for motorists traveling through this intersection. The New Jersey DOT Crash Database reported seventy-four crashes in the vicinity of this intersection for years 2002 – 2005, including one fatality. Nearly half of the crashes reported were rear end-type collisions. The scope of this analysis is to examine the weaving from Millstone Road and Route 133 to Old Trenton Road, which may contribute to the safety and mobility problems at this intersection. A 1995 traffic count east of the Route 133 intersection had an AADT of 18,283.

The intersection of CR 571 and Old Trenton Road is signalized with a protected left-turn phase for each approach. All legs of this intersection have two through lanes and one exclusive left-turn lane. With the exception of the northbound leg, there are channelized right turns on the approaches of the intersection.

Millstone Road and Old Trenton Road is a skewed unsignalized “T” intersection and lies approximately 250 feet north of the intersection with CR 571. Millstone Road is a two-lane roadway, which provides local access to an office park and a trucking company adjacent to the intersection.

The Route 133 off-ramp is located approximately 900 feet east of the CR 571 and Old Trenton Road intersection. The deceleration lane is about 200 feet in length before merging onto westbound CR 571.

#### **Issues:**

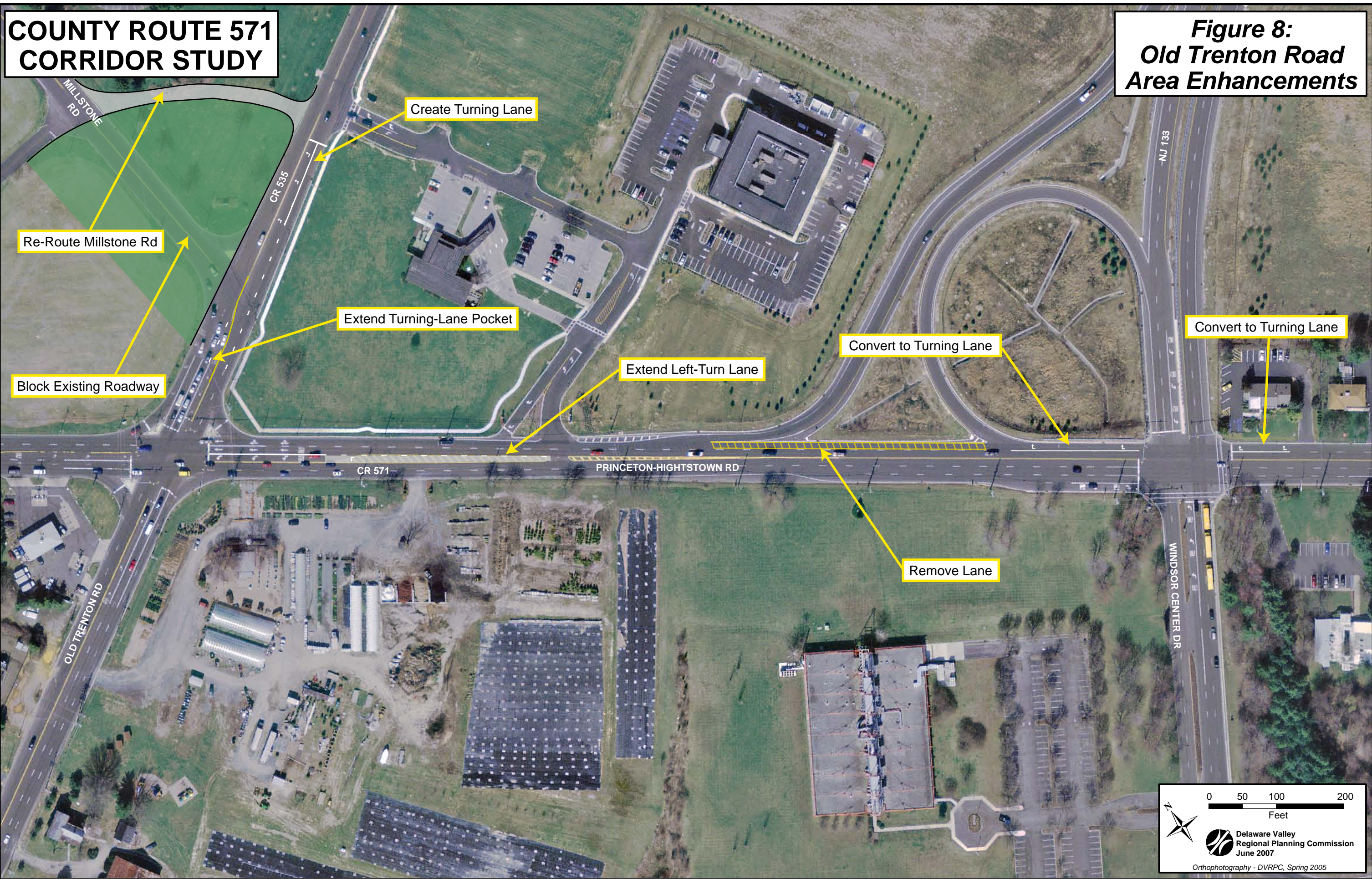
- A. The intersection of CR 571 and Old Trenton Road experiences Level of Service (LOS) D in the AM peak and F in the PM peak.
- B. Traffic exiting CR 571 westbound to northbound Old Trenton Road in the AM peak encounters difficulty making the left to westbound Millstone Road due to a short merge and insufficient storage capacity.
- C. Traffic exiting Millstone Road destined for CR 571 eastbound in the PM peak experiences difficulty crossing multiple lanes of traffic on Old Trenton Road.
- D. Traffic that exits Route 133 to CR 571 westbound and then proceeds to southbound Old Trenton Road experiences difficulty weaving into the left-turn lane due to high speeds of through traffic. The short storage lane also complicates the weave.

**Recommendations:**

- Provide for greater storage for traffic entering Millstone Road from Old Trenton Road. One method to accomplish this is by realigning Millstone Road approximately 200 feet north of its present location (**Figure 8**). This would permit the extension of the left-turn lane, thereby extending its storage capacity. The conflict with through traffic would also be minimized.
- Extend the westbound left-turn lane at CR 571/Old Trenton Road from its present 200 feet to 500 feet. This extended capacity can be gained by using the existing gore area for the left-turn lane.
- Convert the outer lane on westbound CR 571 approaching the Route 133 on-ramp to right turn only. There should be pavement markings defining this new configuration.
- Discontinue the outer through lane on westbound CR 571 for approximately 400 feet in advance of the westbound Route 133 off-ramp. This discontinuation should be indicated by a painted gore area. By narrowing the road, there will be less turbulence downstream with merging traffic from Route 133.
- Erect advanced warning signs on CR 571 westbound approaching Route 133 alerting motorists of merging traffic.

# COUNTY ROUTE 571 CORRIDOR STUDY

## Figure 8: Old Trenton Road Area Enhancements



## **East Windsor Township**

### **4.4 CR 571 and Lanning Boulevard Intersection**

The intersection of CR 571 and Lanning Boulevard was studied both for short-term improvement as well as for long-term development of the adjacent road network. Lanning Boulevard is located west of US Route 130 and forms a signalized T-intersection with CR 571. While three quadrants of this intersection are developed, the southwest quadrant is not. A southward extension of Lanning Boulevard through this parcel would provide direct access to Windsor Hights shopping center and also to US 130. The intersection's weekday peak hour turning movement counts are available in **Appendix I**. Between 2002 and 2005, thirteen crashes occurred at this intersection.

#### **Issues:**

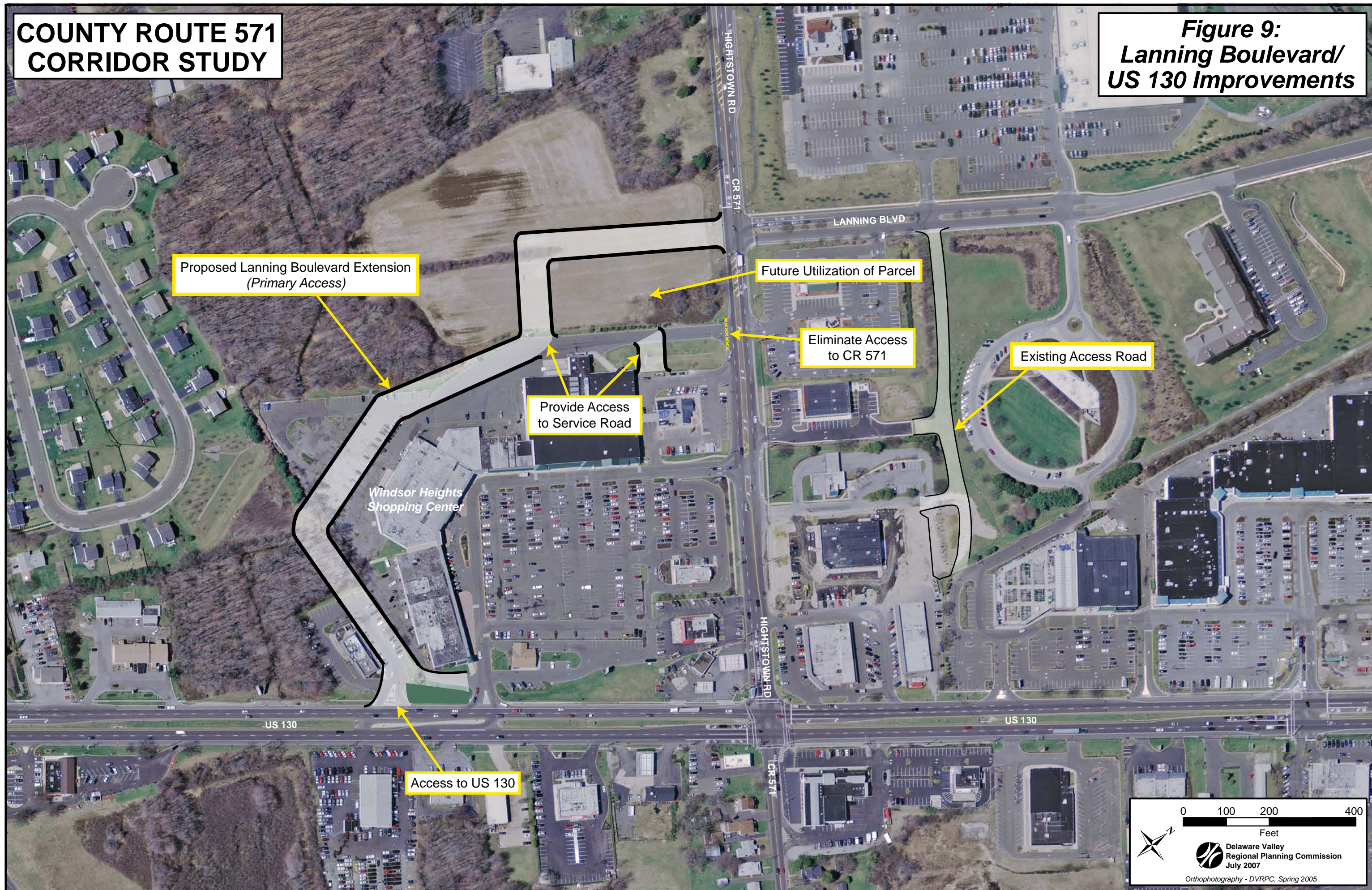
- A. The intersection currently operates at an LOS of A, with six seconds of delay, and at an LOS of C, with twenty-nine seconds of delay, during the AM and PM peak hours, respectively.
- B. Along CR 571, there are several driveway access points between Lanning Boulevard and US 130. This, combined with its close proximity to the CR 571 and US 130 intersection, has contributed to congested traffic flow in this area.
- C. If the vacant parcel to the south of the intersection is developed with its access exclusively along CR 571, congestion along CR 571 and its proximal intersections will be exacerbated.

#### **Recommendations:**

- In the long term, evaluate the potential impact of a Lanning Boulevard extension on traffic circulation at this intersection and at CR 571 and US 130. As can be seen in **Figure 9**, extension of Lanning Boulevard would provide vehicles an alternate route to access Windsor Hights shopping center. And, due to an existing service road that connects Lanning Boulevard (approximately 400 feet north of its intersection with CR 571) to commercial properties along both CR 571 and US 130, the extension of the roadway will provide an alternate means for vehicular trips for commercial properties along US 130 on either side of CR 571.

# COUNTY ROUTE 571 CORRIDOR STUDY

**Figure 9:  
Lanning Boulevard/  
US 130 Improvements**



Proposed Lanning Boulevard Extension  
(Primary Access)

Future Utilization of Parcel

Eliminate Access  
to CR 571

Existing Access Road

Provide Access  
to Service Road

Windsor Heights  
Shopping Center

Access to US 130

0 100 200 400  
Feet  
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July 2007  
Orthophotography - DVRPC, Spring 2005

**4.5 CR 571 and US 130 Intersection**

This is a four-leg signalized intersection with the dominant flow of traffic along US 130. US 130 is a divided highway with two through lanes and exclusive right- and left-turn lanes in both directions. US 130 is a major north-south truck route with direct connection to Route 133 to the north and Route 33 to the south. The approach to this intersection along eastbound CR 571 has one through, one right-, and one left-turn lane. The westbound approach leg of CR 571 has one through and right-, and one exclusive left-turn lane. The signal plan features protected left-turn phasing for both CR 571 and US 130. The most recent update of the signal plan occurred in May 2007, in conjunction with a signal coordination project along US 130. Turning movement counts of this intersection’s weekday peak hour are displayed in **Appendix I**.

Between 2002 and 2005, there have been forty-nine crashes at this intersection.

**Issues:**

- A. Large volumes of cars and trucks travel through the intersection, which leads to heavy peak hour congestion and delay.
- B. The combination of protected and permitted phases of the signal plan contributes to a consistently fluctuating and thus unpredictable pedestrian timing phase.
- C. Pedestrian crosswalk markings are inadequate at all legs.
- D. The medians along US 130 are uncurbed and in need of maintenance.
- E. A plethora of directional and regulatory signs at the intersection approach and at the intersection itself can be distracting to motorists. This could impact traffic safety at the intersection.
- F. All four corners of the intersection are occupied with commercial establishments. These are limiting factors against the potential for roadway expansion.

<b>TABLE 2 Intersection Performance for Existing and Alternative Scenarios CR 571 and US 130</b>					
<b>Scenario</b>	<b>Direction of Travel</b>	<b>Peak AM Hour and Peak PM Hour LOS with Average Delay / Vehicle</b>			
		<b>AM Peak</b>		<b>PM Peak</b>	
		<b>LOS</b>	<b>Delay (sec)</b>	<b>LOS</b>	<b>Delay (sec)</b>
<b>#1. Existing Conditions Without Pedestrian Actuation</b>	Princeton-Hightstown EB	D	51	F	290
	Princeton-Hightstown WB	F	109	F	119
	US 130 NB	E	78	F	104
	US 130 SB	D	47	F	128
	Intersection	E	71	F	169

Source: DVRPC, 2007

<b>TABLE 2 (Continued)</b>					
<b>Intersection Performance for Existing and Alternative Scenarios</b>					
<b>CR 571 and US 130</b>					
<b>Scenario</b>	<b>Direction of Travel</b>	<b>Peak AM Hour and Peak PM Hour</b>			
		<b>LOS with Average Delay / Vehicle</b>			
<b>#2. Existing Conditions With Pedestrian Actuation</b>		AM Peak		PM Peak	
		LOS	Delay (sec)	LOS	Delay (sec)
	Princeton-Hightstown EB	D	51	F	320
	Princeton-Hightstown WB	F	110	F	97
	US 130 NB	E	78	F	141
	US 130 SB	D	47	F	110
	Intersection	E	71	F	180
<b>#3. Pedestrian Actuation of a 5-Second Lead Along 571</b>		AM Peak 125s Cycle Length		PM Peak 135s Cycle Length	
		LOS	Delay (sec)	LOS	Delay (sec)
	Princeton-Hightstown EB	F	82	F	367
	Princeton-Hightstown WB	F	112	E	72
	US 130 NB	F	102	F	177
	US 130 SB	D	54	F	163
	Intersection	F	89	F	218
<b>#4. With a Lead Eastbound Phase</b>		AM Peak 140s Cycle Length		PM Peak 110s Cycle Length	
		LOS	Delay (sec)	LOS	Delay (sec)
	Princeton-Hightstown EB	D	51	F	226
	Princeton-Hightstown WB	F	104	F	269
	US 130 NB	E	68	F	136
	US 130 SB	E	64	F	100
	Intersection	E	70	F	165
<b>#5. Reassignment of EB Lanes, An Additional WB Receiving Lane, Optimization of the Signal Plan</b>		AM Peak 140s Cycle Length		PM Peak 150s Cycle Length	
		LOS	Delay (sec)	LOS	Delay (sec)
	Princeton-Hightstown EB	E	56	F	194
	Princeton-Hightstown WB	F	102	F	231
	US 130 NB	E	68	F	87
	US 130 SB	E	64	F	119
	Intersection	E	70	F	145

Source: DVRPC, 2007

<b>TABLE 2 (Continued)</b>					
<b>Intersection Performance for Existing and Alternative Scenarios</b>					
<b>CR 571 and US 130</b>					
<b>Scenario</b>	<b>Direction of Travel</b>	<b>Peak AM Hour and Peak PM Hour LOS with Average Delay / Vehicle</b>			
		<b>AM Peak 140s Cycle Length</b>		<b>PM Peak 150s Cycle Length</b>	
		<b>LOS</b>	<b>Delay (sec)</b>	<b>LOS</b>	<b>Delay (sec)</b>
<b>#6. Volume Reduction from Lanning Blvd Extension, Optimization of the Timing Plan</b>	Princeton-Hightstown EB	E	67	F	260
	Princeton-Hightstown WB	F	102	F	186
	US 130 NB	E	68	F	96
	US 130 SB	E	64	F	134
	Intersection	E	72	F	161
<b>#7. Additional WB Departure Lane, Additional EB Receiving Lane, Optimization of Timing Plan</b>	Princeton-Hightstown EB	E	62	F	172
	Princeton-Hightstown WB	E	70	F	114
	US 130 NB	D	43	F	96
	US 130 SB	C	29	F	134
	Intersection	D	47	F	133

Source: DVRPC, 2007

### Delay and LOS Analysis:

#### Scenario #1:

- This scenario documents the existing performance of the intersection, assuming there are no pedestrians actuating the pedestrian push button (PPB) in order to cross US 130.
- During the morning peak period, the worst performing approach is westbound CR 571, whereas during the afternoon peak period, the eastbound CR 571 approach experiences the most delay (290 seconds).

#### Scenario #2:

- The calculated LOS and delay is for the existing signal plan, though it assumes an actuation of the PPB fifteen times throughout the peak hour (i.e., for every other iteration of the signal timing cycle).
- There is no perceptible difference during the AM peak hour. However, for the PM peak hour, overall delay increases by eleven seconds, and it retains its existing LOS F.

#### Scenario #3:

- In order to provide a more encouraging and robust timing plan for pedestrians, a five-second pedestrian lead phase was introduced immediately preceding the CR 571 protected left-turn splits. This lead is only available if actuated via a PPB.



- The current actuated timing plan was utilized in its existing form. The new cycle lengths solely reflect the addition of the actuated five-second lead.
- Based upon a pedestrian call rate of thirty pedestrians per hour, the overall vehicular delay measure deteriorates eighteen and thirty-eight seconds for the morning and afternoon peak period, respectively.

**Scenario #4:**

- The eastbound CR 571 approach is the poorest performing approach during the afternoon peak period, and thus a protected eastbound lead phase was evaluated.
- Compared to the existing scenario without pedestrian actuation, this provides an approximate one-minute improvement for the eastbound approach. However, the opposing westbound approach suffers an increase in average delay of over two minutes.
- The intersection experiences a slight four-second decrease in overall delay; this is reflective of there being a much greater volume along the eastbound approach as opposed to the westbound approach.

**Scenario #5:**

- This alternative considers a geometric improvement to the intersection: the addition of a second receiving lane along the westbound CR 571 approach, in combination with a reassignment of the eastbound exclusive right-turn lane into a shared through and right-turn lane and an optimization of the signal timing in order to capitalize upon the increased vehicular capacity.
- During the AM peak hour, there is a marginal improvement to the overall intersection in comparison to existing nonactuation conditions. However, for the PM peak hour, there is a twenty-four-second intersection-wide improvement.

**Scenario #6:**

- The extension of Lanning Boulevard across CR 571 into a currently undeveloped parcel would also provide connectivity to US 130 at an undetermined point south of the Windsor Hights shopping center. This connectivity would provide an alternative means with which vehicles traveling along Lanning Boulevard and CR 571 may access US 130.
- The impact of this extension was evaluated utilizing DVRPC turning movement counts taken at the intersections of CR 571 at Lanning Boulevard and at US 130. At the latter location, 17% and 25% of eastbound CR 571 vehicles commit right turns during the AM and PM peak hours, respectively. When these percentages are applied to the vehicles at the eastbound and southbound approaches of the Lanning Boulevard intersection, eighty-four and 291 vehicles during the morning and afternoon peak periods, respectively, are rerouted to utilize the extension. Consequently, these vehicles are no longer considered as traveling along the CR 571 and US 130 intersection and, as a result, may be excluded from analysis.
- For the morning peak period, this potential alternative will have minimal impact on the overall operation of the intersection. This may be the result of only a small number of vehicles being rerouted, as well as the high volumes making this movement, the removal of which only highlights the heavy congestion along the remaining movements.
- For the afternoon peak period, there is an eight-second improvement in overall delay in comparison to existing nonactuation conditions.

**Scenario #7:**

- This alternative considers the impact of an additional westbound CR 571 departure lane and an additional eastbound CR 571 receiving lane. In order to maximize the benefits of an increased capacity, the existing timing plan was optimized. This scenario arose from discussions with East Windsor Township officials.
- For the morning peak period, the overall performance upgrades to a LOS of D alongside a 24 second delay reduction from existing conditions. Three of the four approaches also experience a noticeable decrease in vehicular delay. Compared to existing conditions, westbound CR 571 exhibits the greatest improvement, unsurprisingly, with a decrease of 39 seconds for a LOS of E with 70 seconds of delay. The US 130 approaches also experience improvements, with both approaches averaging a 27 second decrease in delay.
- For the afternoon peak period, the overall performance remains at a LOS of F, though vehicular delay is reduced by 36 seconds from existing conditions. Similar to the AM peak hour, three of the four approaches experience delay reductions. In comparison to existing conditions. The greatest improvement is for eastbound CR 571 with a delay reduction of approximately two minutes; however, it continues to operate at a LOS of F. This delay reduction is the result of a shorter split time for westbound CR 571, which is compensated for by its increased capacity, and as a result provides a longer split time for the opposing eastbound CR 571 approach.

**Delay and LOS Conclusions:**

- Scenario #7 provides the greatest amount of delay reduction and LOS improvement for both peak periods. However, overall operations during the afternoon peak period continue to exhibit a LOS of F. The implementation of additional departure and receiving lanes will require right-of-way acquisition, some of which is already forthcoming according to East Windsor Township.
- Scenario #5 provides the second largest reduction in delay for both peak periods, though its benefits for the AM peak hour are marginal. Furthermore, the 24 second improvement for the PM peak hour does not upgrade its LOS of F. However, the implementation of this scenario will require right-of-way acquisition and roadway widening, most notably along the receiving lanes for westbound CR 571. In addition, a greater throughput of eastbound vehicles into Hightstown Borough may have impacts which may not be compatible with the local residential community. Potential impacts include speeding and congestion, as well as a less safe and appealing pedestrian environment.
- Scenario #6 also provides a delay reduction for the PM peak hour, though of a lesser degree. However, its implementation would provide a more comprehensive circulation network amongst the immediately surrounding commercial, municipal, and residential properties. In addition, the extension would provide opportunities for future development proximal to an already existing system of transportation infrastructure.

**Recommendations:**

- Install pedestrian countdown signal indicators at all crosswalks.
- Install crosswalk pavement markings of the international style that have a prominent profile for both pedestrians and motorists.

- Construct curbing and improve grading on US 130 medians where they may be utilized as pedestrian refuge areas.
- Where possible, the median should be widened at the crosswalk to improve pedestrian safety.
- Consolidate the location and placement of regulatory and directional traffic signs in an effort to improve their effectiveness and reduce sign clutter. This signage should be placed on the signal mast arm to better direct motorists.

#### **4.6 East Windsor Traffic Signal Coordination Feasibility**

In East Windsor Township, there are six signalized intersections along a 1.5-mile stretch of CR 571 between Old Trenton Road and US 130, inclusive. From west to east, they are Old Trenton Road (CR 535), US 133, McGraw Hill Road, One Mile Road, Lanning Boulevard, and US 130. **Appendix I** displays the signal delay and total travel time for eastbound and westbound through vehicles for both the existing and coordinated conditions, and per peak hour.

##### **Issues:**

- A) All six intersections currently operate independently despite serving as a major east-west corridor for vehicular travel within Mercer County.
- B) NJDOT completed a coordination project along US 130 in May 2007. The intersection of US 130 and CR 571 was included in the NJDOT project; as a result, any retiming of this intersection must consider its impact for coordination along US 130.
- C) For the majority of the six intersections, the morning peak period's dominant flow is westbound, while the afternoon peak period's is eastbound.

##### **Conclusions:**

- A) For the morning peak period, coordination of all six signalized intersections provides a twenty-five-second improvement in total travel time for eastbound through vehicles and a seven-second improvement for westbound through vehicles.
- B) For the afternoon peak period, coordination of all six signalized intersections grants mixed results. While it provides a four-second improvement in total travel time for eastbound through vehicles (the dominant PM peak hour direction), it increases total travel time by ninety-two seconds for the opposite westbound through vehicles.

## 4.7 Pedestrian Mobility

A walkable environment can increase pedestrian activity and stimulate commercial activity in the area. It is a goal of this study to identify ways to improve pedestrian mobility.

During the Pedestrian/Bicycle Facilities Inventory, described on the following pages, Princeton and Hightstown Boroughs were noted as having considerable pedestrian activity. Additional portions of the study corridor have the potential for increased pedestrian activity, most notably the area around Princeton Junction. The following is a list of general pedestrian mobility recommendations that are based on guidelines established by the Pedestrian and Bicycle Information Center. These general guidelines should be adopted as planning and development goals for each township and borough in the study area:

- Sidewalks and walkways are pedestrian thoroughfares that provide pedestrians with space to travel within the public right-of-way that is separated from roadway vehicles. Sidewalks are important in high-traffic areas because they reduce pedestrian collisions with motor vehicles by creating a separation of both travel modes. Such facilities also improve mobility for pedestrians and provide access for all types of pedestrian travel, such as to and from home, work, parks, schools, shopping, and transit stops.
- Marked crosswalks indicate preferred locations for pedestrian crossings and help designate rights-of-way for motorists to yield to pedestrians. Marked crosswalks are desirable at some high-pedestrian volume locations to guide pedestrians along a preferred walking path. In some cases they can be raised and should often be installed in conjunction with other enhancements that physically reinforce crosswalks and reduce vehicle speeds. Marked crosswalks should be present in areas of high-pedestrian activity within the corridor.
- Adequate lighting can enhance an environment and increase comfort and safety. Without sufficient overhead lighting, motorists may not be able to see pedestrians in time to stop. In commercial areas with nighttime pedestrian activity, streetlights and building lights can enhance the ambiance of the area and the visibility of pedestrians by motorists. Adequate lighting should be considered in high-pedestrian areas of the corridor.

“Better conditions for bicycling and walking have intangible benefits to the quality of life in cities and towns. In a growing number of communities, bicycling and walking are considered as indicators of a community’s livability – a factor that has a profound impact on attracting businesses and workers as well as tourism. In cities and towns where people can regularly be seen out bicycling and walking, there is a palpable sense that these are safe and friendly places to live and visit.”

Source: Pedestrian and Bicycle Information Center

The adoption of these principles as goals in the local planning process will go a long way to enhance the pedestrian environment.

## **Pedestrian/Bicycle Facilities Inventory Background**

Increased development has greatly decreased the perceived distance between Princeton and Hightstown Boroughs. Pedestrian activity along CR 571 may have been unheard of or discouraged in the past; however, new development has created a need for a pedestrian-friendly environment along this corridor. Currently, sidewalks are present within the two boroughs, but they are not present along much of CR 571 in Princeton, West Windsor, and East Windsor Townships. DVRPC inventoried the pedestrian amenities along CR 571 between Nassau Street in Princeton and Main Street in Hightstown. Additionally, the inventory was extended to traverse Hightstown Borough for one block north on Main Street and one block east on Franklin Street (NJ 33). The inventory ended at the intersection of Broad and Franklin Streets, which was considered to be the terminus of the two-borough pedestrian connection. The intent of the inventory was to determine the location of sidewalks, the physical condition of the sidewalks, the locations of bicycle lanes, the condition of the road shoulder surface, and any other hindrances to pedestrian mobility.

## **Methodology**

On June 21 the entire length of the corridor was evaluated by DVRPC staff. Four staff members were each assigned to inventory an equal segment of the corridor from Route 27 in Princeton to Broad Street in Hightstown. Each person was instructed to assess the existing pedestrian and bicycle facilities and amenities along each roadway segment. Segments vary in length depending on the continuity of pedestrian features. The NJDOT's straight-line diagrams for this corridor were used to assist the field staff.

## **Existing Conditions**

Four criteria were used to measure overall pedestrian mobility: sidewalks, curbs, shoulders, and bike lanes. Though there are no bike lanes present in the portion of the corridor that was inventoried, several portions satisfactorily meet the remaining three criteria. The most continuous portions of sidewalks are found in the two boroughs, with the sidewalks bordering Princeton University being in the best condition. Throughout the less-developed portions, the majority of the corridor lacked several of the criteria, including large portions without any pedestrian mobility amenities at all. Though traveling the corridor between Princeton Borough and Hightstown Borough on foot or by bicycle may currently be unwise and unsafe, potential exists for a pedestrian-friendly environment.

## **Results**

The intent of this study was not a comprehensive assessment of the pedestrian environment within the corridor. No pedestrian counts were tabulated; rather, the study simply inventoried pedestrian amenities and provided a qualitative assessment of their respective conditions. The results of the inventory are displayed on the following straight-line diagrams (**Figures 10, 11, 12, and 13**). Additionally, a list of recommendations is provided to pinpoint location-specific issues and act as a guide for improving pedestrian safety and mobility within the CR 571 corridor.

**Recommendations:**

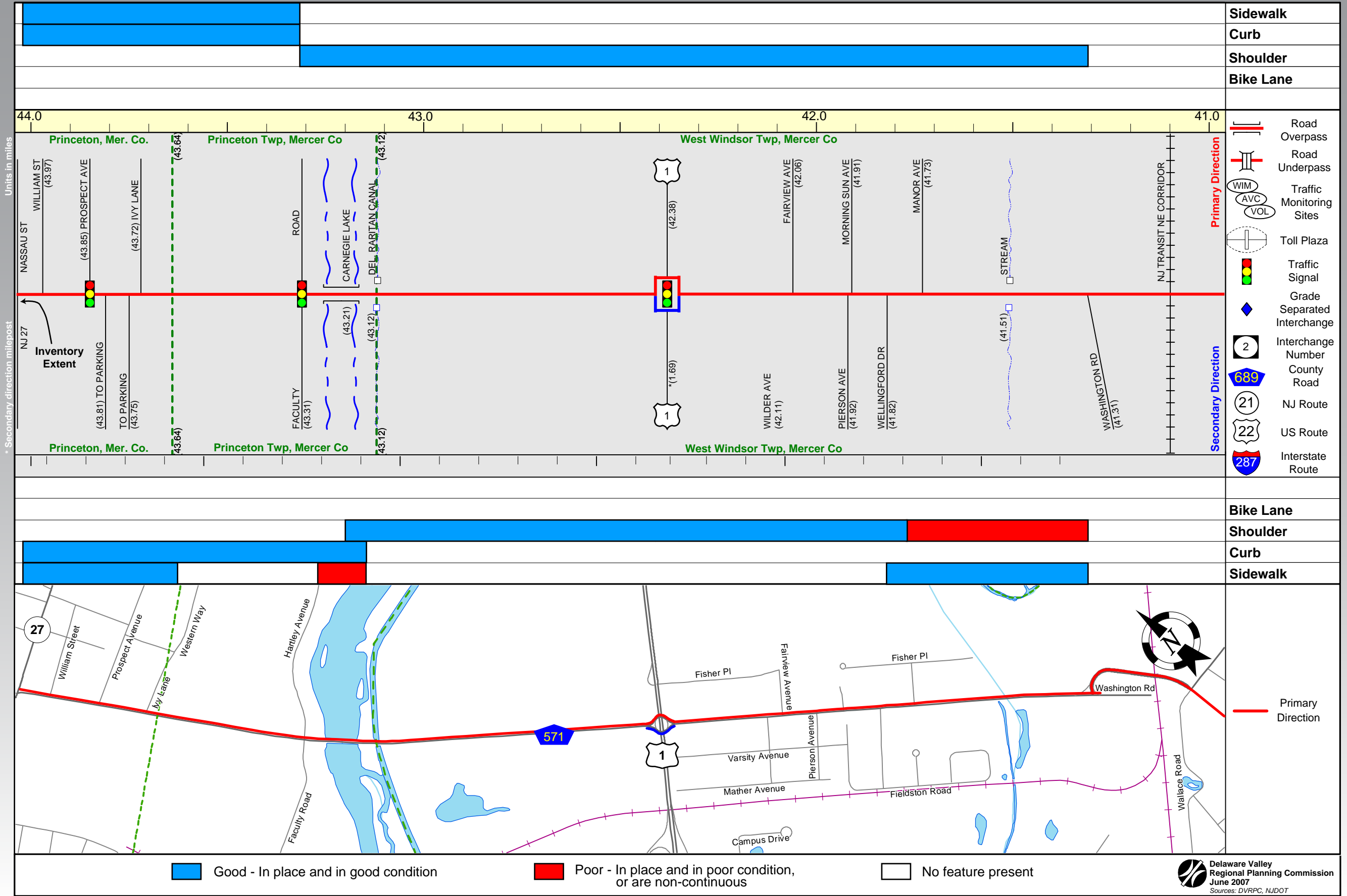
- Foremost, where a sidewalk is listed as being in poor condition, remedy the causing factors. This may involve resurfacing the sidewalk or constructing new sidewalk in the portions of the segment that are not continuous.
- Ideally, both sides of the roadway for the entire distance of the corridor should have sidewalks. However, creating a continuous sidewalk on one side of the roadway should be a minimum requirement. Ample space exists for sidewalk construction west of US 1. Many locations east of US 1 in West Windsor and East Windsor Townships may require creative solutions.
- Where possible, adequate shoulders should be constructed to act as buffers between sidewalks and travel lanes.
- No sidewalk is present on the south side of CR 571 between the Princeton Borough boundary and the tow path. A sidewalk should be constructed along this segment with priority being given to the portion between the tow path and Faculty Road due to a well-worn pedestrian path and mobility obstacles, such as elevated manholes being present.
- Construct a sidewalk between the two guardrails on the grade-separated roadway over the train tracks. This area was noted as having knee-high weeds and excessive amounts of debris and litter. An approximately three-foot deep sinkhole was noted on the north-side buffer of the overpass on the western side and needs to be repaired. Finally, crosswalks and associated advisory signs are recommended at the “T” intersection of Washington and Princeton-Hightstown Roads (CR 571 milepost 41.31).
- Install “Share the Road” signs on the segment of roadway in Hightstown Borough that is designated as a “Bike Route.”
- The pedestrian crossing signal at the US 1 – CR 571 intersection does not function properly. It is recommended that the signal be inspected and repaired, and retrofitted with a pedestrian countdown feature.
- Create a policy that directs the local road maintenance departments to make a best effort to construct adequate shoulders in conjunction with scheduled road resurfacing, where practical.
- The intersection of Rogers Avenue and Stockton Street in Hightstown Borough was noted as being difficult for pedestrians to navigate. The limited angle of Rogers Avenue allows for eastbound Stockton Street traffic to make high-speed right turns onto Rogers Avenue. It is recommended that crosswalk advisory signage and a more prominent crosswalk be installed at this intersection.

# COUNTY ROUTE 571 CORRIDOR STUDY

**Figure 10:  
Pedestrian Mobility Diagram - 1**

Mile Posts: 44.000 - 41.310

ROUTE 571 (West to East)



Units in miles  
Secondary direction milepost

- Road Overpass
- Road Underpass
- Traffic Monitoring Sites
- Toll Plaza
- Traffic Signal
- Grade Separated Interchange
- Interchange Number
- County Road
- NJ Route
- US Route
- Interstate Route

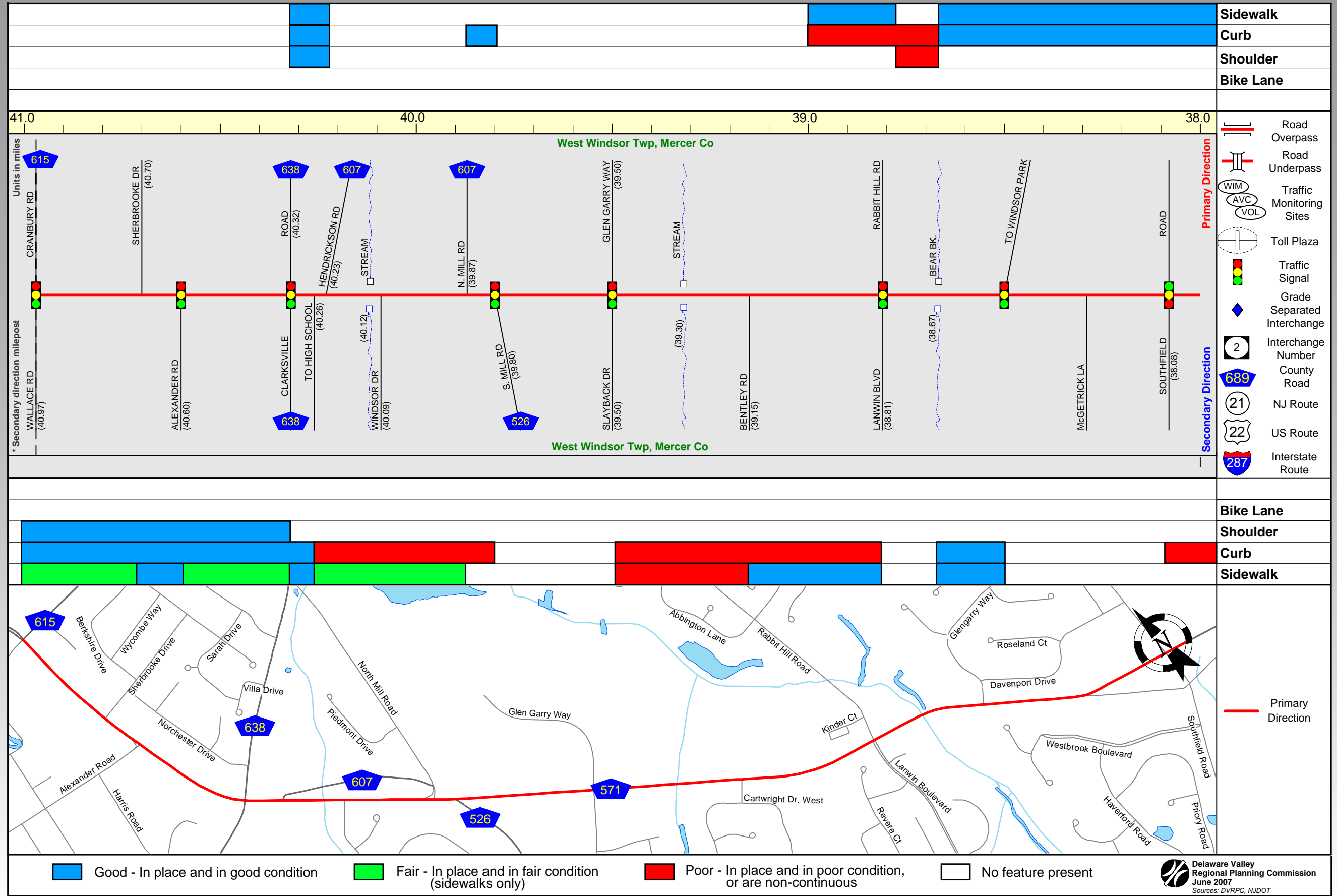
■ Good - In place and in good condition     
 ■ Poor - In place and in poor condition, or are non-continuous     
  No feature present

# COUNTY ROUTE 571 CORRIDOR STUDY

Mile Posts: 40.970 - 38.000

**Figure 11:  
Pedestrian Mobility Diagram - 2**

ROUTE 571 (West to East)



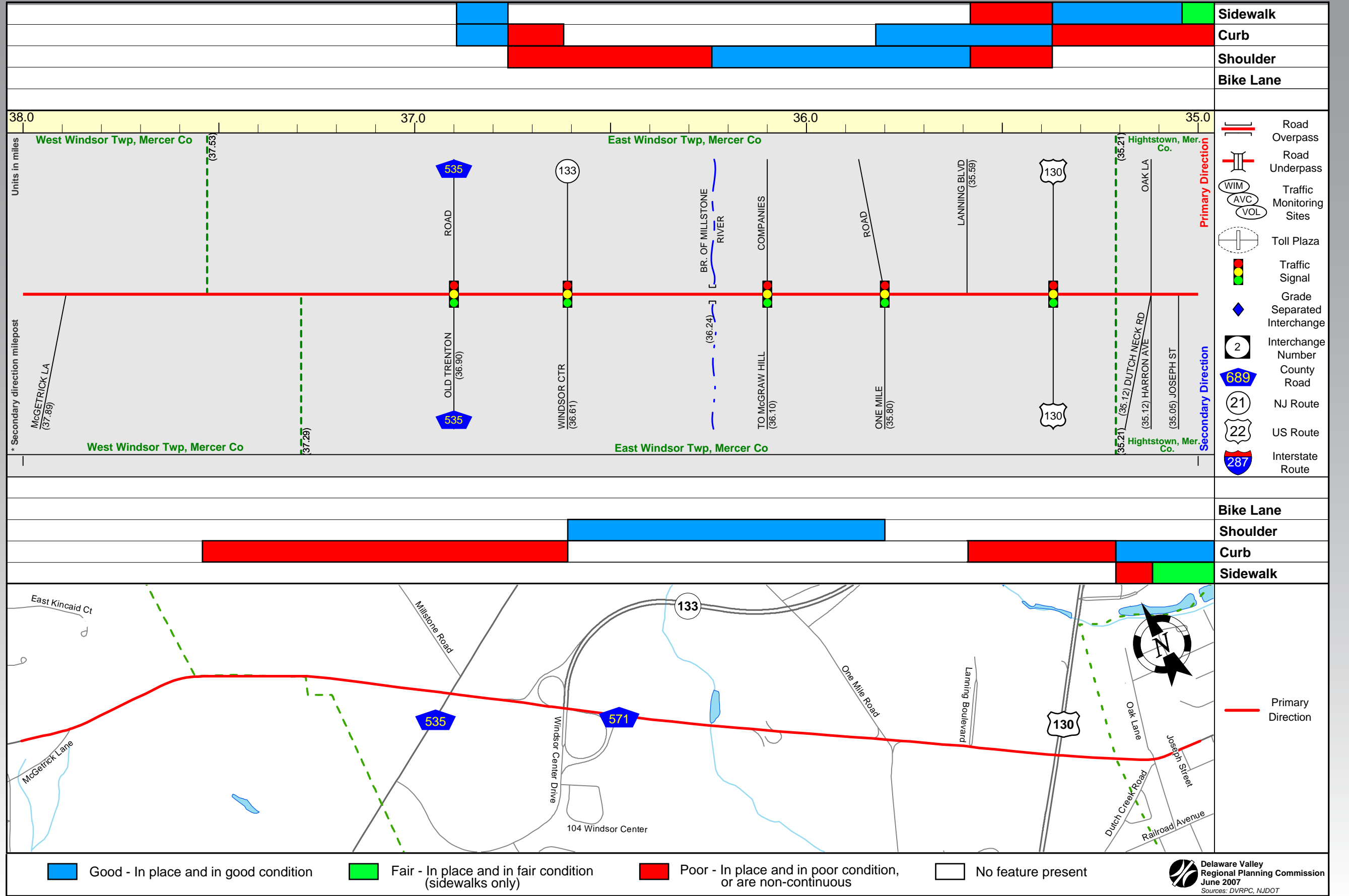


# COUNTY ROUTE 571 CORRIDOR STUDY

**Figure 12:  
Pedestrian Mobility Diagram - 3**

Mile Posts: 38.000 - 35.000

ROUTE 571 (West to East)

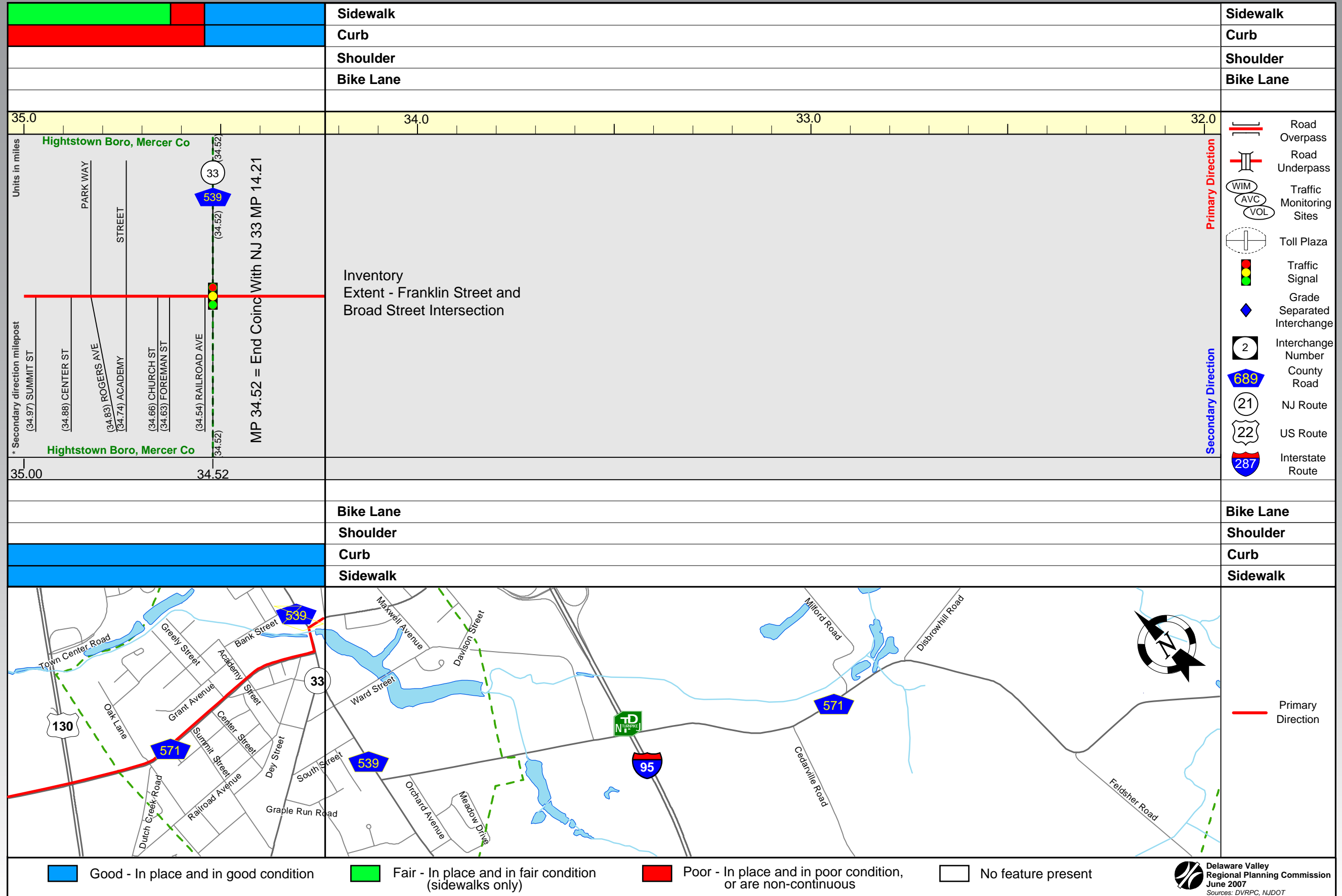


# COUNTY ROUTE 571 CORRIDOR STUDY

Mile Posts: 35.000 - 34.520

**Figure 13:  
Pedestrian Mobility Diagram - 4**

ROUTE 571 (West to East)



## 5.0 OTHER CORRIDOR-RELATED ISSUES AND PROJECTS

The following are brief descriptions of other projects that have recently been completed or have been planned for different sections of the corridor. These projects are in keeping with the goals and objectives of the CR 571 corridor study.

### 5.1 CR 571 and One Mile Road Intersection

The intersection of Princeton-Hightstown Road (CR 571) and One Mile Road was examined to address the safety and mobility issues along CR 571 with the goal of identifying potential cost-effective improvement strategies. This a four-leg signalized intersection with the One Mile Road approaches skewed at the intersection. At the intersection, both approaches of CR 571 have three travel lanes (right-turn lane, through-lane, and left-turn lane). One Mile Road contains a through lane, a left-turn lane and a channelized right-turn lane. Speed limits in all directions are 45 mph. An aerial view of the location is shown on **Figure 14**.

The dominant movements at the intersection are through movements on Princeton-Hightstown Road and these occur throughout the day. In the AM peak, westbound travel on CR 571 has the heaviest volumes, while the reverse direction contains the higher volumes during the PM peak. In the AM peak, northbound One Mile Road traffic is heavier than southbound traffic, though it is mainly balanced in the PM peak. Generally, in terms of mobility, the intersection appears to be operating efficiently. But there is a safety issue as evidenced by the type and number of crashes.

A crash analysis was performed with data collected from East Windsor Township police accident reports in an effort to identify safety problems related to the operation of the intersection. Over a three-year period from 2003-2005, the intersection had fifty-five crashes. Same direction, rear-end crashes constituted 69% of the crashes and these occurred at all legs of the intersection. This level of rear-end crash activity is usually attributed to congestion or other contributing factors, such as driver inattention and unexpected stops. There were also seven angle and six left-turn crashes over the three-year period totaling 24% of the crashes. These left-turn and angle crashes may be a result of the skewed intersection and the difficulty navigating through the intersection.

#### Issues:

- A. The geometry of this intersection at One Mile Road and the physical layout is a key contributor to the operational efficiency of the intersection. Both approaches of One Mile Road enter at an angle and are skewed. As a result there is some level of difficulty navigating the intersection for through and left-turning traffic on both approaches. Also, the geometry of the intersection does not permit the signal timing phases for One Mile Road to operate simultaneously.
- B. Traveling westbound on CR 571 from US 130, the roadway is one lane, which then converts to two through lanes, and then converts back to one though lane prior to the intersection at One Mile Road. The conversion of the right through lane into a right-turn-only lane occurs without advanced notice. This creates a problem for motorists intending to make a through movement who are caught unaware in the

- right lane when it changes abruptly into a right-turn-only lane. This causes motorists to make rapid lane changes, which result in unsafe conditions.
- C. Pedestrian and bicycle amenities are lacking both at the intersection and the nearby vicinity. The only sidewalk in the area is located on the north side of CR 571 adjacent to the shopping center, and there are no crosswalks at the intersection. At the northern leg of the intersection crossing One Mile Road, the traffic signal has a pedestrian head; however, the only push button is located on the island. To cross CR 571, the traffic signal has a pedestrian head with a push button at the curb. There are bike lanes and the narrow width of the existing shoulders is not conducive to safe bicycle travel.
- D. Due to congestion at the intersection of US 130 and Princeton-Hightstown Road, northbound left-turning traffic from US 130 tends to access westbound Princeton-Hightstown Road by using Dutch Neck Road and One Mile Road. Although this does not currently pose a major problem, as development continues and traffic volumes increase, more use will be made of this route.

### **Recommendations:**

#### Near Term Improvements

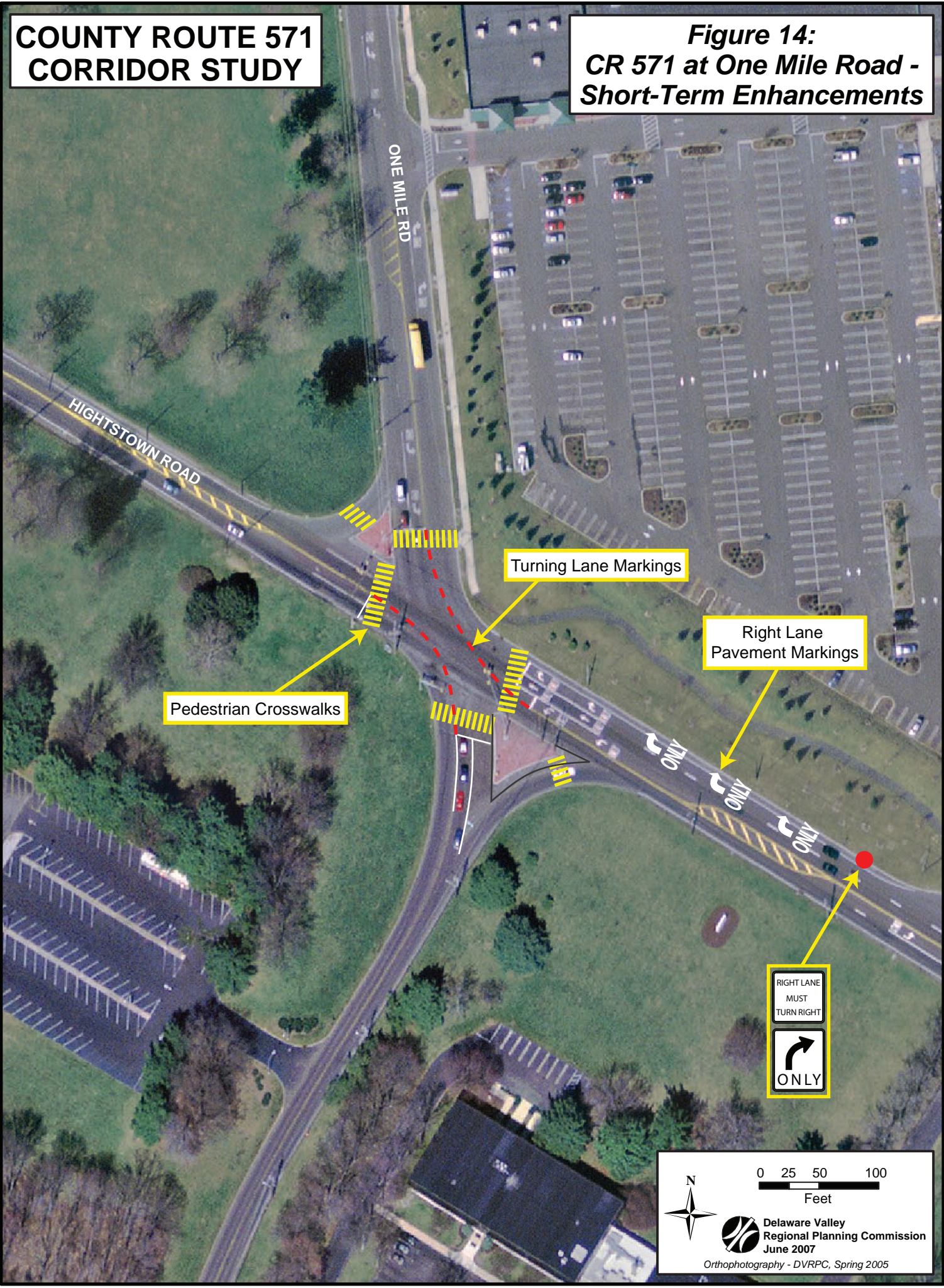
- *Right-Turn Signage* - Add an additional right-turn arrow and “only” pavement marking in the westbound Princeton-Hightstown Road right lane approach beginning just after the shopping center exit and a “Right Lane Must Turn Right” sign as shown in **Figure 13**.
- *Pavement Striping* – Improve existing pavement striping to enhance and improve traffic circulation by guiding vehicles through the intersection. Use dotted line markings to extend longitudinal lane markings through the intersection
- *Pedestrian Amenities* – Install crosswalk pavement markings for pedestrian traffic at the intersection at all four approaches and add missing pedestrian heads and push buttons to traffic signals.
- *Bicycle Amenities* – Install bike lanes in existing shoulders as appropriate.
- *Signal Timing Improvements* – Implement a fully actuated traffic signal that detects the presence of waiting traffic. Loop detectors are installed on each approach of the intersection to detect the volume of traffic present. Based on the amount of traffic, the signal provides enough time to accommodate all of the vehicles. The intent is to avoid giving the green light to an empty road while motorists on a different route are stopped. Implementing fully actuated left turns at the intersection reduces intersection delays and reduces the conflicts at the intersections.

Long-Term Improvements

- *Pedestrian Amenities* – Provide ADA accessible sidewalks along Princeton-Hightstown Road and One Mile Road to complement existing sidewalk on the north side of Princeton-Hightstown Road adjacent to the shopping center. This may require right-of-way acquisition.
- *Coordinated Signal Timing* – To fully optimize the signal at this location, an appropriate coordinated closed-loop traffic signal system along Princeton-Hightstown Road from US 130 to Old Trenton Road should be investigated. Coordination of adjacent traffic signals may improve the flow of traffic by synchronizing vehicle movement along CR 571.
- *Realignment* – Realign One Mile Road at the intersection to make the road perpendicular to Princeton-Hightstown Road. This will ease difficulty currently experienced in navigating the intersection for through and left-turning traffic on both approaches of One Mile Road. This will require some right-of-way acquisition.

# COUNTY ROUTE 571 CORRIDOR STUDY

## Figure 14: CR 571 at One Mile Road - Short-Term Enhancements



Pedestrian Crosswalks

Turning Lane Markings

Right Lane  
Pavement Markings

RIGHT LANE  
MUST  
TURN RIGHT

RIGHT LANE  
ONLY

0 25 50 100  
Feet

Delaware Valley  
Regional Planning Commission  
June 2007

Orthophotography - DVRPC, Spring 2005

## 5.2 Overview of Transit Potential within the Corridor

Increased public transit service in the CR 571 corridor is a shared goal of the five Mercer County CR 571 municipalities that participated in the CR 571 east-west existing corridors task conducted by the Central Jersey Transportation Forum (Forum) in 2006, as well as the Middlesex County municipality of Monroe Township. A transit initiative was endorsed by the full Forum that would explore a US 1-oriented bus service from Twin Rivers in East Windsor Township along NJ 33 and CR 571.

Some transit service already exists along CR 571. Communication of the transit service information is coordinated through Greater Mercer Transportation Management Association. Existing transit service includes:

- Coach USA Suburban Transit/Academy, which provides private service that stops in Twin Rivers, East Windsor, West Windsor, and Princeton on its way to New York City.
- A shuttle service is provided by East Windsor Township along the CR 571 corridor, including Hightstown, to the Princeton Junction Train Station. The township also provides other transit services for general and senior citizen use.
- Middlesex County Area Transit provides service to Monroe Township with connecting services available to various locations.
- NJ Transit runs several routes along Route 1 where it intersects with CR 571.

Steps are already underway to enhance services, partially as a result of the Forum activities and the NJ Transit Bus Rapid Transit (BRT) Alternatives Analysis Study (also completed and endorsed by the Forum in 2006). The efforts underway include the following:

- Monroe Township started new transit service for its residents in 2006 that included a route to Princeton. The Forum initiated discussions that resulted in an offer from Monroe to open the service for residents along the route through an intermunicipal agreement. As of July 2007, municipalities are at the stage of formal discussions within their boards advancing this idea.
- NJ Transit has conducted on-board surveys and is performing analyses investigating transit service on CR 571.
- West Windsor is investigating using the existing parking lot at its Community Park along CR 571 as a park-and-ride lot for commuters to the Princeton Junction Train Station with a shuttle that would serve senior citizens during off-peak hours. This municipality is also leading a visioning study for the area around the Princeton Junction Train Station that will likely result in enhanced transit service in the area.
- The Forum is expected to endorse a letter of support for pre-transit planning to be incorporated with other efforts underway in the corridor. This would include investigating appropriate locations for bus stops, seeking to protect those locations for future use, and starting now to make appropriate pedestrian, bicyclist, land use, and safety improvements.

The CR 571 corridor is an important east-west route and is part of planning the full BRT system. Transit improvements along it are important for residents and serve as an integral part of the regional transit system.

### Contact Information

- (1) Central Jersey Transportation Forum (215) 238-2839 or [www.dvrpc.org/transportation/longrange/cjtf/achievements.htm](http://www.dvrpc.org/transportation/longrange/cjtf/achievements.htm)
- (2) Greater Mercer TMA (609) 452-1491 or [www.gmtma.org/transit.htm](http://www.gmtma.org/transit.htm)
- (3) Suburban Transit Corporation (732) 249-1100 or [www.suburbantransit.com](http://www.suburbantransit.com)
- (4) East Windsor Township (609) 443-4000 extension 246 or [www.east-windsor.nj.us](http://www.east-windsor.nj.us)
- (5) Middlesex County Area Transit (800) 221-3520
- (6) NJ Transit (800) 772-2222 or [www.njtransit.com](http://www.njtransit.com)
- (7) Monroe Township Transportation (732) 521-6100 or [www.monroetwp.com/transshut.html](http://www.monroetwp.com/transshut.html)
- (8) West Windsor Township Community Development Department (609) 799-2400 or [www.westwindsornj.org](http://www.westwindsornj.org)

### **5.3 Clarksville Road to Wallace/Cranbury Road Improvements**

In 2004-2005, a concept design was developed that essentially provides a three-lane section (one lane in each direction plus a two-way-left-turn-lane center lane {TWLTL}) and five-lane width (two lanes in each direction plus a left-turn lane) at the Wallace/Cranbury Road and the Clarksville Road intersection of the corridor. This conceptual plan will be entering the scoping and preliminary engineering phase shortly, prior to final design and construction.

A comprehensive traffic analysis of the study area will be done to support public outreach, the design process, and necessary reviews and permitting processes. This effort will generally consist of traffic data collection, traffic forecasts, operational analyses, input to preliminary and final design and permitting, reports, and public outreach. The findings of the traffic analyses will be used to evaluate the operation of the proposed intersection improvements within the goals and limitations defined by the Township of West Windsor and Mercer County in prior studies.



## 6.0 IMPLEMENTATION PLAN

The *Improvements Implementation Matrix (Table 3)* can be used as a dynamic long-range tool for the systematic selection of projects to create a significantly improved transportation system within the study area. This document can serve as a punch list for the government agencies with a stake in the implementation of improvements. The recommendations listed in the matrix are in the order that they were presented in the report's text. The text generally offers a more elaborate description of each recommendation.

### Characteristics

In choosing which projects should advance first, stakeholders can be guided by the information presented in **Table 3** below. Each improvement scenario identified is evaluated in terms of project priority, cost range, and project benefits.

### Priority

Priorities are estimated in terms of three categories: high, moderate, and low. Priorities are assigned based on the perception of the extent of the problems they present for drivers, with safety being most important, but with congestion (or time delay) and mobility also being considered.

### Cost Range

Costs are also assigned to categories of high, moderate, and low. High-cost projects usually involve a major commitment from one or more funding sources, lengthy public involvement, and several years lead time in programming the required funds. They are typically large-scale, complex, or multiphased improvements and can entail the construction of new facilities. In general, a project in this category is estimated to cost in excess of \$2 million. An improvement estimated to have a moderate cost could involve a major reconstruction of an intersection, construction of a short connector road, or a widening of an existing road. In general, a project in this category is estimated to cost between \$100,000 and \$2 million. Low-cost projects can often be fast tracked with maintenance funding. They are often operational-type improvements at isolated locations and typically cost less than \$100,000. These cost ranges are generalized estimates and could be significantly changed for a specific location due to environmental, right-of-way, or other factors uncovered during detailed design of the improvement.

### Benefits

Benefits describe the kind of impact the improvement will yield, such as enhancing safety, improving mobility, or encouraging economic development.

**Table 3 - Improvements Implementation Matrix**

<b>Location</b>	<b>Improvement</b>	<b>Cost Range</b>	<b>Short term / Long term</b>	<b>Priority</b>	<b>Benefits</b>
CR 571 at Raritan Canal Crossing	Install crosswalk with in-pavement lighting	M	ST	H	Safety
CR 571 at Raritan Canal Crossing	Install crosswalk advisory signage	L	ST	H	Safety
CR 571 and US 1 Intersection	Remediate sign clutter	M	ST	H	Mobility
CR 571 and US 1 Intersection	Restripe pavement markings	M	ST	M	Safety Mobility
Old Trenton Road/Millstone Road/Route 133 Off-Ramp	Realign Millstone Road/extend left-turn lane	M	LT	M	Mobility Development
Old Trenton Road/Millstone Road/Route 133 Off-Ramp	Extend westbound left-turn lane to 500 feet	L	LT	M	Mobility Development
Old Trenton Road/Millstone Road/Route 133 Off-Ramp	Convert travel lane to right-turn only lane	M	LT	M	Mobility Development
Old Trenton Road/Millstone Road/Route 133 Off-Ramp	Discontinue use of 400 feet of travel lane	L	LT	M	Mobility Development
Old Trenton Road/Millstone Road/Route 133 Off-Ramp	Install advanced warning signs for merging traffic	L	LT	M	Mobility Development
CR 571 and Lanning Boulevard Intersection	Evaluate impact of roadway extension	M	LT	M	Mobility Development
CR 571 and US 130 Intersection	Install pedestrian countdown signals	L	ST	M	Safety
CR 571 and US 130 Intersection	Install "international style" crosswalk striping	L	ST	H	Safety
CR 571 and US 130 Intersection	Improve US 130 medians with curbs and grading	L	LT	M	Safety
CR 571 and US 130 Intersection	Widen roadway medians	L	LT	M	Safety
CR 571 and US 130 Intersection	Consolidate signage	L	ST	M	Safety Mobility
Corridor wide	Remedy sidewalks in poor condition	M	ST	H	Safety
Corridor wide	Examine feasibility of a continuous sidewalk	M	LT	H	Safety Mobility
Corridor wide	Construct road shoulders where possible	M	LT	M	Safety Mobility
Between Faculty Road and Raritan Canal	Construct a sidewalk	M	ST	H	Safety
CR 571 Railroad Overpass	Clear litter, debris, and vegetation	L	ST	H	Safety
CR 571 Railroad Overpass	Repair sinkhole	L	ST	H	Safety
CR 571 Railroad Overpass	Install crosswalk with complimentary advisory signage	L	ST	H	Safety

Source: DVRPC, 2007

**Table 3 - Improvements Implementation Matrix (Continued)**

Location	Improvement	Cost Range	Short term /		Benefits
			Long term	Priority	
Hightstown Borough	Install "Share the Road" signs	L	ST	H	Safety
CR 571 and US 1 Intersection	Add pedestrian countdown feature and inspect signal	L	ST	H	Safety
Corridor wide	Create policies regarding roadway shoulder construction	L	ST	M	Safety Mobility
Rogers Avenue and Stockton Street Intersection	Increase crosswalk presence awareness	L	ST	H	Safety
CR 571 and One Mile Road Intersection	Install right-turn only signs and striping	L	ST	M	Safety Mobility
CR 571 and One Mile Road Intersection	Restripe intersection pavement markings	L	ST	M	Mobility
CR 571 and One Mile Road Intersection	Stripe crosswalks and add missing signal heads	L	ST	M	Safety
CR 571 and One Mile Road Intersection	Install bike lanes on existing shoulders	L	ST	M	Safety Mobility
CR 571 and One Mile Road Intersection	Install a fully-actuated traffic signal	M	ST	M	Mobility
CR 571 and One Mile Road Intersection	Install ADA accessible sidewalks	M	LT	M	Safety
CR 571 and One Mile Road Intersection	Coordinate signal timing	L	LT	M	Mobility
CR 571 and One Mile Road Intersection	Realign roadway	H	LT	L	Mobility

Source: DVRPC, 2007

H = High	ST = Short Term
M = Medium	LT = Long Term
L = Low	

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# Appendix I

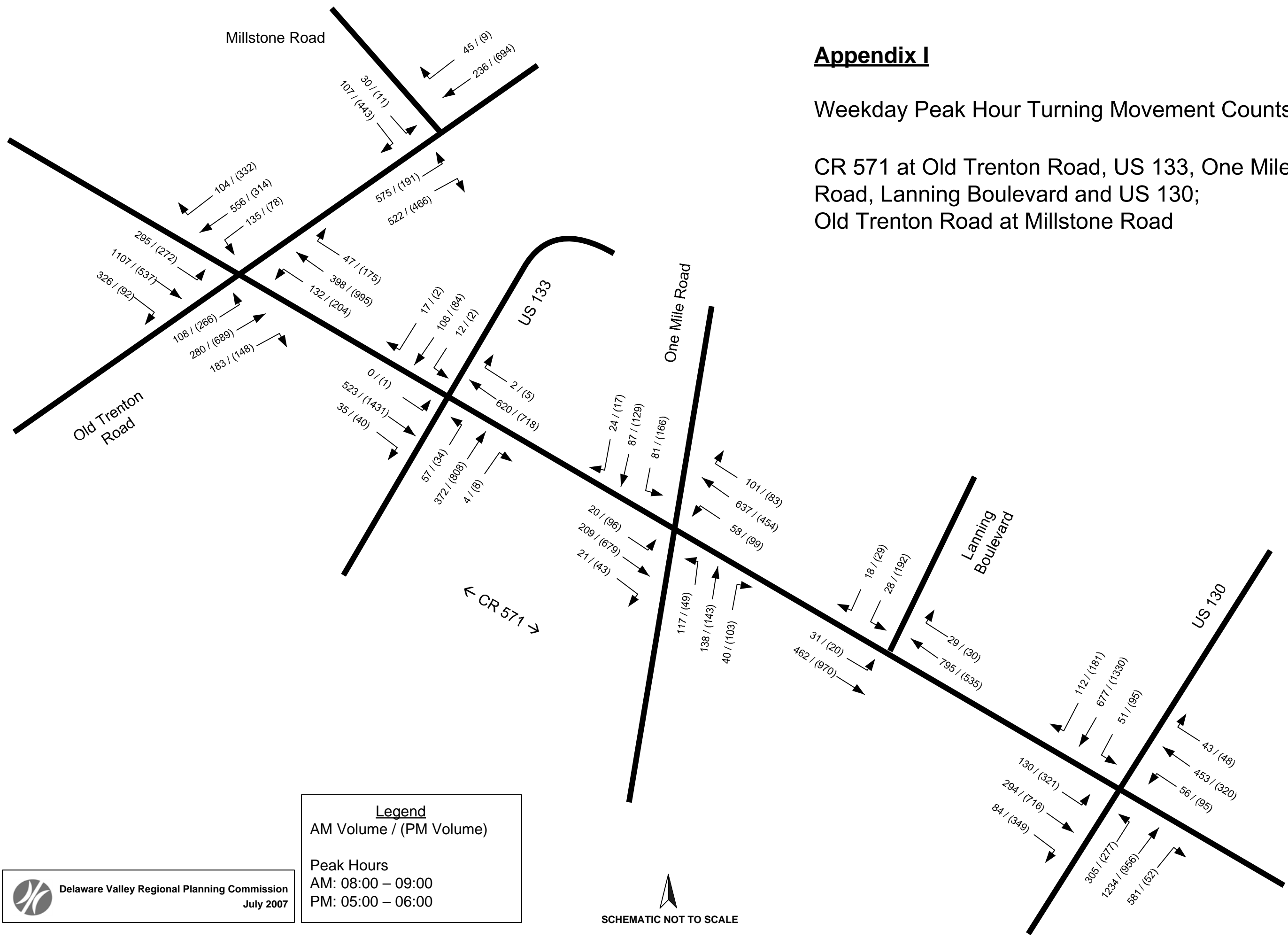
## Weekday Peak Hour Turning Movement Counts



# Appendix I

## Weekday Peak Hour Turning Movement Counts

CR 571 at Old Trenton Road, US 133, One Mile Road, Lanning Boulevard and US 130;  
 Old Trenton Road at Millstone Road



**Legend**  
 AM Volume / (PM Volume)  
 Peak Hours  
 AM: 08:00 – 09:00  
 PM: 05:00 – 06:00





## Appendix II

### East Windsor Coordination Feasibility Data

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**Appendix II**  
**East Windsor Coordination Feasibility Data**  
**CR 571: Old Trenton Road to US 130**

Peak Period and Direction	Peak AM Hour LOS with Average Delay / Vehicle						
AM Eastbound	Existing Eastbound			Retain 130 Signal Plan; All 6 Intersections Coordinated			
	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Total Travel Time % Reduction
Old Trenton		38.0	38.0		36.0	36.0	
133 On/Off-ramp	20.9	6.0	26.9	20.9	4.0	24.9	
McGraw Hill	36.0	0.0	36.0	36.0	1.0	37.0	
One Mile	21.8	10.0	31.8	21.8	5.0	26.8	
Lanning Blvd	15.1	4.0	19.1	15.1	3.0	18.1	
US 130	15.6	53.0	68.6	15.6	37.0	52.6	
Corridor	109.4	111.0	220.4	109.4	86.0	195.4	11.34%

Peak Period and Direction	Peak AM Hour LOS with Average Delay / Vehicle						
AM Westbound	Existing Westbound			Retain 130 Signal Plan; All 6 Intersections Coordinated			
	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Total Travel Time % Reduction
US 130		121.0	121.0		121.0	121.0	
Lanning Blvd	15.6	6.0	21.6	15.6	3.0	18.6	
One Mile	15.1	15.0	30.1	15.1	7.0	22.1	
McGraw Hill	21.8	5.0	26.8	21.8	8.0	29.8	
133 On/Off-ramp	36.0	8.0	44.0	36.0	6.0	42.0	
Old Trenton	20.9	16.0	36.9	20.9	19.0	39.9	
Corridor	109.4	171.0	280.4	109.4	164.0	273.4	2.50%

Source: DVRPC, 2007

**Appendix II - Continued**

<b>Peak Period and Direction</b>	<b>Peak PM Hour LOS with Average Delay / Vehicle</b>						
<b>PM Eastbound</b>	Existing Eastbound			Retain 130 Signal Plan; All 6 Intersections Coordinated			
	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Total Travel Time % Reduction
Old Trenton		24.0	24.0		39.0	39.0	
133 On/Off-ramp	20.9	15.0	35.9	20.9	10.0	30.9	
McGraw Hill	36.0	1.0	37.0	36.0	4.0	40.0	
One Mile	21.8	42.0	63.8	21.8	27.0	48.8	
Lanning Blvd	15.1	28.0	43.1	15.1	18.0	33.1	
US 130	15.6	312.0	327.6	15.6	320.0	335.6	
Corridor	109.4	422.0	531.4	109.4	418.0	527.4	

<b>Peak Period and Direction</b>	<b>Peak PM Hour LOS with Average Delay / Vehicle</b>						
<b>PM Westbound</b>	Existing Westbound			Retain 130 Signal Plan; All 6 Intersections Coordinated			
	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Calculated Segment Travel Time	Calculated Intersection Delay	Total Travel Time	Total Travel Time % Reduction
US 130		73.0	73.0		126.0	126.0	
Lanning Blvd	15.6	9.0	24.6	15.6	2.0	17.6	
One Mile	15.1	24.0	39.1	15.1	14.0	29.1	
McGraw Hill	21.8	0.0	21.8	21.8	0.0	21.8	
133 On/Off-ramp	36.0	16.0	52.0	36.0	17.0	53.0	
Old Trenton	20.9	43.0	63.9	20.9	98.0	118.9	
Corridor	109.4	165.0	274.4	109.4	257.0	366.4	-33.53%

Source: DVRPC, 2007

**Title of Report:** CR 571 Corridor Study

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**Publication No.:** 07037

**Date Published:** July 2007

**Geographic Area Covered:**

The study area includes portions of the Mercer County municipalities of Princeton Township, Princeton Borough, West Windsor Township, East Windsor Township, and Hightstown Borough.

**Key Words:**

sidewalks, directional signs, intersection analysis, crosswalks, level of service, signal coordination, sight distance, pedestrian facilities, bus transit, pavement markings

**ABSTRACT:** *This study was based on priority areas identified by the Central Jersey communities within the corridor. Detailed field views and technical analyses were conducted to identify and quantify the transportation constraints and document practical solutions. A detailed write-up of the existing conditions and recommended improvement scenarios is presented. Improvements such as roadway realignment, signal timing, improved directional and regulatory signage, better pedestrian facilities and amenities, and transit improvements have been identified and documented.*

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July 2007

# COUNTY ROUTE

# 571

## Corridor Study

*Princeton Township  
Princeton Borough  
West Windsor Township  
East Windsor Township  
Hightstown Borough*



DELAWARE VALLEY  
REGIONAL PLANNING  
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