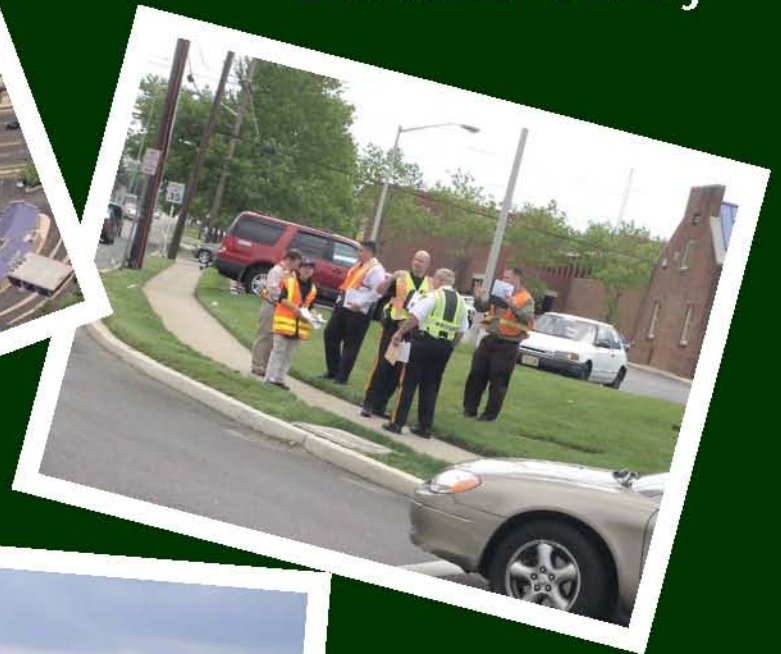


Intersection Road Safety Audit

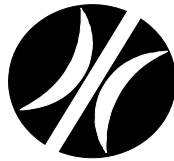
NJ 47 Delsea Drive & Cooper Street

Deptford Township,
Gloucester County



July 2008

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.



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

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

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NJ 47 DELSEA DRIVE and COOPER STREET (CR 534) INTERSECTION ROAD SAFETY AUDIT

1.0 BACKGROUND

This document represents the final report for the NJ 47 Delsea Drive and Cooper Street (CR 534) and Intersection Road Safety Audit. This project represents a step towards implementation of the Delaware Valley Regional Planning Commission's (DVRPC) Regional Safety Action Plan. Improving the design and operation of intersections is a priority area for both engineering and enforcement disciplines, as documented in the Plan. DVRPC has been coordinating with the Pennsylvania Department of Transportation to address corridors on the District 6 Safety Plan since fiscal year 2007. In fiscal year 2008, intersection road safety audits were conducted in New Jersey as part of Transportation Safety Planning in DVRPC's planning work program. The New Jersey road safety audits concentrated on intersections located on county and/or local roads. Implementation of improvement strategies identified through this process may be eligible for Local Federal Safety funds.

The goal of this project is to improve and promote transportation safety on the region's roadways while maintaining mobility; and the main objective is to address the safe operation of the roadway and ensure a high level of safety for all road users. The road safety audit program is conducted to generate improvement recommendations and countermeasures for roadway segments demonstrating a history of, or potential for, a high incidence of motor vehicle crashes. The emphasis is placed on identifying low-cost, quick-turnaround safety projects to address issues where possible, while not excluding more complex projects.

1.1 The Audit

A road safety audit (RSA) is a formal safety performance examination of an existing or future road or intersection by an audit team. Road safety audits can be used on any size project, from minor maintenance to mega projects. There are eight major steps involved in conducting a road safety audit, but these can be simplified into a three-step process: identify the corridor/intersection and the audit team; conduct the RSA and report on the findings; and follow-up on RSA findings where feasible. There are major benefits to the road safety audit: it is a proactive tool, not solely dependent on crash data; it is a planning tool for identifying safety issues to be considered in improvement projects; it can determine whether or not the needs of all road users are adequately met; it is adaptable to local needs and conditions; and its recommendations can be implemented in stages as time and resources permit.

Prior to the road safety audit activities on site, DVRPC collected, reviewed, and analyzed relevant data (video of roadway under different conditions, traffic volume data, turning movement counts, maps, aerial photographs, and crash data). Collision

diagrams, showing crash type and crash location, were produced using police crash reports.

The road safety audit was conducted on Thursday, May 22, 2008. The day began in the morning with the pre-audit meeting that involved the definition of a road safety audit and how it differs from the corridor study process, the required steps of an audit, the presentation of the site issues, and an exchange of ideas and knowledge of the roadway. A video showing the site under nighttime conditions was also shown. The field view followed, during which the audit team—comprised of state and local officials and other stakeholders—walked the site, observed conditions, and identified transportation safety issues. See Appendix A for the list of audit team members. The postaudit meeting followed and was spent discussing the findings from the field view, identifying strategies to address issues, and determining priorities.

1.2 Overview of the Study Area

The study area consists of the signalized intersection of NJ 47 (Delsea Drive) and CR 534 (Cooper Street) and the approaches leading up to the intersection, located in Deptford Township, Gloucester County. CR 534 has a functional class designation of urban principal arterial and runs in an east-west direction. It provides direct access to downtown Woodbury, where it intersects NJ 45 a few miles west of the study area. East of the study area, Cooper Street connects with several major roads in Gloucester County, including CR 544 (Clemens Bridge Road), CR 621 (Almonesson Road), and NJ 41(Hurville Road). Cooper Street carries a significant volume of traffic between the Deptford Mall and Woodbury. Land use along Cooper Street is a mix of commercial, residential, and community uses.

Both the eastbound and westbound approaches of CR 534 are three lanes, with a dedicated left-turn lane, a through lane and a shared thru/right-turn lane. The speed limit at the intersection is 45 MPH and there are no shoulders along either Cooper Street approach.

NJ 47 has a functional class designation of urban minor arterial and runs in a south-north direction. In its 75.19 miles of length, NJ 47 stretches from Wildwood in Cape May County to Brooklawn in Camden County, traversing Cumberland and Gloucester counties. South of the study area in Deptford Township, NJ 47 connects with several major roads, including CR 665 (Cattell Road), CR 647 (Bank Bridge Road/Fox Run Road), and NJ 55. North of the study area, also in Deptford Township, NJ 47 connects with CR 646 (Deptford Avenue/Turkey Hill Road) and CR 644 (Tacoma Boulevard/Cobblestone Road), and I-295 in Westville Borough.

At the study area intersection, both the northbound and southbound NJ 47 approaches are three lanes: a dedicated left-turn lane, a through lane, and a channelized right-turn lane separated by a raised triangular median. The speed limit at the intersection is 40 MPH. There are no shoulders along the NJ 47 approaches to the intersection.

The land use in the area immediately surrounding the study intersection is commercial. The businesses situated on the southeast and southwest corners of the intersection each have driveway access to both NJ 47 and Cooper Street, which are set back a considerable distance from the intersection stop bar, but still within the approaches. The businesses situated on the northeast and northwest corners of the intersection have driveway access to both NJ 47 and Cooper Street within the intersection approaches, which are located very close to the stop bars. In addition, both businesses have a second driveway onto NJ 47. When combined each of these establishments have three defined access points to the intersection.

The neighboring area of the study intersection is mixed commercial and residential. The study intersection provides access for these residential areas to the retail establishments located primarily along both NJ 47 and Cooper Street in the vicinity of the intersection. A more concentrated commercial/retail area is located just northwest of the study intersection, where existing commercial will soon be joined by a Walmart store that is slated to open during the summer of 2008. Outside of the intersection, in the remaining three quadrants, the land use is primarily single-family detached housing and some multi-family housing.

The NJ Transit route 408 bus (Millville/Glassboro/Philadelphia) travels along NJ 47 and stops at the study intersection. The route 408 bus provides access to Center City Philadelphia, the Walter Rand Transportation Station, and the Vineland Transportation Center, and it also connects with other transit routes. This bus makes 17 northbound trips to Philadelphia and 21 southbound trips to Millville per weekday. The NJ Transit 455 bus (Paulsboro/Cherry Hill Mall) travels along Cooper Street and stops at the study intersection. The study intersection is a transfer point between the 455 and 408 buses. The 455 also serves the Deptford Mall on its way between Paulsboro/National Park and Kingston Estates, eventually turning around at the Cherry Hill Mall. This bus makes 17 southbound trips to Paulsboro and 17 northbound trips to Cherry Hill per weekday.

1.3 Crash Data

According to the New Jersey Department of Transportation's crash database, there were 67 reportable crashes at the study intersection between 2004 and 2006. Reportable crashes are crashes that may result in injury, fatality, or property damage of \$500.00 or more. A comprehensive analysis of the crash data is shown in *Appendix C*. There were 25 crashes recorded in 2004 (37.3%), 17 in 2005 (25.4%), and 25 in 2006 (37.3%).

By far the most predominant collision type was rear-end crashes, with 26, or 38 percent, of the total. Rear-end crashes occurring at or near intersections may be related to congestion, which was reported to be a problem along NJ 47 northbound especially in the morning. Angle and left-turn crashes were the second and third most common crash types, with 14 and 12, respectively. Both rear-end and left-turn crashes exceeded statewide county route crash percentages for calendar year 2006. There was one

pedestrian crash in the study area and no bicycle crashes. Regarding severity, there were no fatal crashes, 15 injury crashes, and 52 property-damage-only crashes.

When analyzing crash frequency by month for the three year period, May and October had the highest frequency of crashes with 11 each. October's high may be related to the changing weather conditions associated with the fall season. January, April, June, and August all had between 6 and 8 crashes. The remaining six months had between two and four crashes each. Regarding time of day, the evening commute hours of 5:00 PM and 6:00 PM had the highest concentration of crashes, at 17, or 25 percent. During the late morning to late afternoon (11:00 AM to 4:00 PM), there were 19 crashes.

Seventy-four percent of the total number of crashes occurred on dry road surface conditions, and over 23 percent on wet road surface, marginally exceeding the statewide average of 19.67 percent. The majority of crashes occurred during the daylight (70%), with almost six percent during dusk or dawn, which is higher than the statewide average of 3.85 percent.

2.0 FINDINGS AND RECOMMENDATIONS

Typically, signal work, signs, and striping are considered quick-turnaround, low-cost safety improvements. It is important to note that quick turnaround implies that an improvement can be implemented without much additional planning and does not require environmental clearance or right-of-way acquisition (projects of that nature may take several years). Those identified as requiring a low level of effort can typically be implemented within a year, or even as quickly as a few months.

Through discussions with the audit team members representing the New Jersey Department of Transportation (NJDOT), it became apparent that some improvements, mainly signal work, require additional data and engineering work, plus local support in the form of a municipal board resolution. Acquiring these necessary items can delay the implementation of signal improvements, but they can still be completed in a much shorter time frame than any improvement requiring a medium or high level of effort to implement.

Another area of discussion among study team members was the appropriateness of upgrading the existing pedestrian crosswalk striping (two single strip paint lines) to continental style striping (horizontal striping that is installed perpendicular to the pedestrian path). Continental striping is the standard in many urban areas and is widely regarded as being very effective in establishing the pedestrian right-of-way and raising the profile of pedestrians to motorists.

According to the audit team members representing NJDOT's Traffic Investigations and Engineering division, the existing crosswalk meets their standard and upgrading would require further evaluation. In addition, the department prefers to reserve continental crosswalks for more urbanized areas, or places where pedestrian conflicts are more common, in an effort to preserve their effectiveness. The recommendation to upgrade the crosswalks will not be included in the table that follows in an effort to remain in concert with NJDOT priorities. However, the purpose of the road safety audit is to identify any and all improvements deemed necessary to create an increase in safety, even if the recommendation exceeds a standard. Although motorists are expected to yield to pedestrians in the crosswalk, it is widely held that improving the pedestrian environment through tactile treatments and increased pedestrian priority is the best way to protect pedestrians and to ease travel by foot.

As a result it was recommended that the clearance time for the pedestrian phase be evaluated and possibly increased. At a minimum this improvement should be implemented due to the considerable crossing distance over Cooper Street.

Lastly, because this intersection is under jurisdiction of the state, Gloucester County, and Deptford Township, responsibility for the implementation of improvements falls on more than one entity. This requires some coordination. DVRPC will provide data and planning services where necessary to facilitate the timely implementation of improvements.

The following pages summarize the findings and recommendations of the CR 534 Cooper Street and NJ 47 Delsea Drive Intersection Road Safety Audit. Shaded areas represent recommended strategies requiring a low level of effort for implementation with a high level of potential safety benefits.

*All photographs in this document were taken by DVRPC staff in 2008.

ACCESS MANAGEMENT/GEOMETRY IMPROVEMENT

Dunkin' Donuts

Issue

- The high volume of traffic generated by this business warrants consideration of an access management plan. The drive-through window queue backs up into the Cooper Street access during the morning hours.

Potential Improvement Strategies

- Quantify the access movements to determine turn volumes. Coordinate with adjacent land owners to consider shared access driveways (where possible). Apply a no-left-turn restriction (where appropriate).

Level of Effort

High

Potential Safety Benefit

High



Issue

- Left turns onto Cooper Street eastbound are problematic due to compromised sight distance caused by queuing Cooper Street westbound traffic. Drivers attempting this left turn must often rely on a “wave-on” from waiting motorists, which is an inherently unsafe practice.

Potential Improvement Strategies

- Make Cooper Street access right-in right-out only, and force Cooper Street eastbound access via the NJ 47 southbound left-turn lane. The left turn from this approach has a dedicated signal phase, making it safer than the left turn out of the parking lot onto Cooper Street eastbound, which requires crossing four lanes of traffic.

Level of Effort

Medium

Potential Safety Benefit

High



Issue

- NJ 47 northbound access located closest to the intersection allows for a potentially unsafe movement—Cooper Street eastbound traffic uses the left-turn lane to NJ 47 northbound and then makes a quick right into this access. This move is especially hazardous to pedestrians and is an unsafe and unnecessary movement since access to NJ 47 can be gained at another point located further away from the intersection.

Potential Improvement Strategies

- Close access from NJ 47 closest to the intersection.

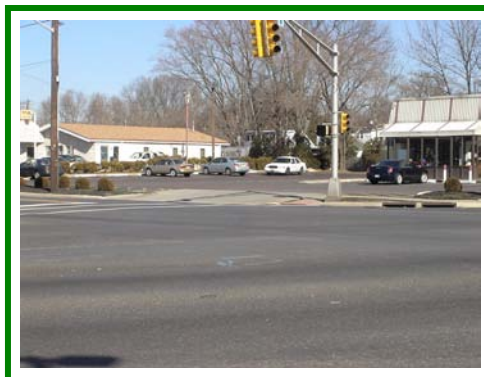
Level of Effort

Medium

NOTE: Cooperation on the part of the businesses will determine the level of effort in each access change.

Potential Safety Benefit

High



Exxon

Issue

- Left turns are problematic out of the driveway onto NJ 47 located closest to the intersection due to poor sight distance. Left turns are further complicated due to the driveway's close proximity to the traffic signal and the channelized right-turn lane.

Potential Improvement Strategies

- Make access closest to intersection right-in right-out only.

Level of Effort

Medium

NOTE: Cooperation on the part of the businesses will determine the level of effort in each access change.

Potential Safety Benefit

High



SIGNS

Issue

- There is no advance notice of upcoming merge (lane drop) along Cooper Street westbound on the west side of the intersection, only on the east side at the lane drop.

Potential Improvement Strategies

- Add merge-ahead (lane drop) sign with distance to merge point in feet indicated on the sign to better prepare motorists; install before merge point according to MUTCD specification.

NOTE: There is already sign clutter in this area; additional signs may have a negative effect (too many messages on an approach may confuse motorists). NJDOT TE&I will investigate.



Level of Effort

Low

Potential Safety Benefit

Medium

Issue

- Guide/route/destination signs missing on Cooper Street westbound approach to intersection.

Potential Improvement Strategies

- Replace signs and mount according to MUTCD guidance.



Level of Effort

Low

Potential Safety Benefit

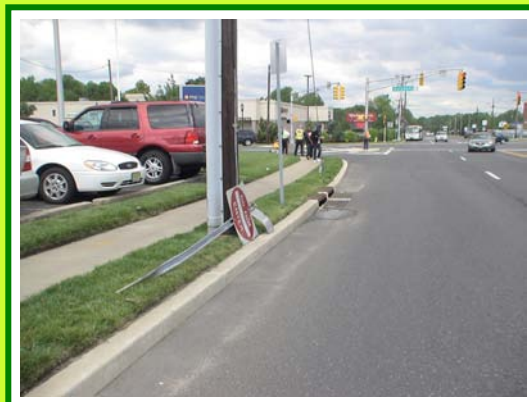
High

Issue

- Missing do-not-enter” sign for opposite direction traffic to remind them not to turn left into the channelized right turn lane.

Potential Improvement Strategies

- Replace sign and mount according to MUTCD.



Level of Effort

Low

Potential Safety Benefit

High

Issue

- Stop sign posted on Cape May Avenue at intersection with Cooper Street is damaged.

Potential Improvement Strategies

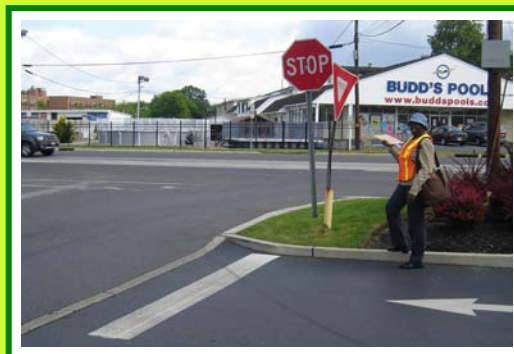
- Replace sign and mount according to MUTCD.

Level of Effort

Low

Potential Safety Benefit

High



Issue

- The pole of the yield-to-pedestrians sign located in the channelized right-turn lane on the NJ 47 southbound approach is being inappropriately used to post other signs. This creates a distraction and minimizes the effects of the yield-to-pedestrians sign.

Potential Improvement Strategies

- Make yield-to-pedestrian sign exclusive by removing the other unauthorized signs from the post.

Level of Effort

Low

Potential Safety Benefit

High



PEDESTRIAN AMENITIES

Issue

- Pedestrian buttons and associated instructions are somewhat confusing.

Potential Improvement Strategies

- Upgrade information placards where appropriate.

Level of Effort

Low

Potential Safety Benefit

Medium



Issue

- Missing curb ramps (1. N-S over Cooper Street on west side of intersection; 2. E-W over NJ 47 on south side of intersection). Other curb ramps are not ADA compliant (e.g., SE corner-in front of PNC Bank).

Potential Improvement Strategies

- Upgrade crosswalks with ADA compliant curb ramps.

Level of Effort

Medium

Potential Safety Benefit

High



Issue

- Pedestrian push button for crossing Cooper Street S-N on east side is misaligned to the east.

Potential Improvement Strategies

- Relocate closer to the crosswalk for benefit of the pedestrian.

Level of Effort

Low

Potential Safety Benefit

Medium



Issue

- Missing sidewalk connection between the senior center and the intersection crossings.

Potential Improvement Strategies

- Install sidewalks and other pedestrian amenities between the senior center and the intersection.

Level of Effort

High

Potential Safety Benefit

High



Issue

- Missing sidewalks between transit stop and intersection (along NJ 47 SB, north of gas station).

Potential Improvement Strategies

- Install sidewalks and other pedestrian amenities between transit stops and the intersection to facilitate safer crossings.

Level of Effort

High

Potential Safety Benefit

High



Issue

- Missing sidewalk connection between intersection and pizza shop along the Dunkin Donuts frontage.

Potential Improvement Strategies

- Replace missing sidewalk to establish pedestrian right-of-way through donut shop parking lot.

Level of Effort

Medium

Potential Safety Benefit

High



Issue

- Tree located on the southeast intersection quadrant (in front of bank) obstructs sight distance of and for pedestrians at the channelized right-turn lane.

Potential Improvement Strategies

- Trim vegetation to improve sight distance.

Level of Effort

Low

Potential Safety Benefit

High



Issue

- Some sidewalk blocks are cracked and/or heaving (at various locations including curb ramps), creating a tripping hazard.

Potential Improvement Strategies

- Repair sidewalks where needed.

Level of Effort

Medium

Potential Safety Benefit

Medium



Issue

- An electrical wire was discovered hanging low over the sidewalk along NJ 47 NB just north of the Dunkin' Donuts parking lot.

Potential Improvement Strategies

- Remove or relocate the wire out of the pedestrian way.

Level of Effort

Low

Potential Safety Benefit

High



SIGNALS/OPERATIONS

Issue

- High left-turn volumes, limited left turn green time along Cooper Street to NJ 47 (both directions), and a lack of gaps in oncoming traffic seem to be factors contributing to the number of left-turning vehicles observed waiting to turn left at the end of the cycle.

Potential Improvement Strategies

- Consider extending left-turn protected phase and the left-turn lanes for Cooper Street.

Level of Effort

Medium

Potential Safety Benefit

High



Issue

- Peak period congestion delays traffic and may result in rear-end crashes (rear-end crashes represented 38.8% of the total).

Potential Improvement Strategies

- Examine progression and coordination to address traffic flow, considering signals within one-half mile of the intersection.

NOTE: Coordination for NJ 47 should be reviewed by the state. Coordination for Cooper Street should be reviewed by the county.

Level of Effort

Low to Medium

Potential Safety Benefit

High



Issue

- Intersection clearance time may be inadequate based on field visit and crash data.

Potential Improvement Strategies

- Conduct signal optimization. Evaluate the safety benefits, and the impacts to level of service, of increasing the clearance phase.

NOTE: NJDOT TE&I need a letter of concurrence from Deptford Township before signal investigations can begin.

Level of Effort

Low to Medium

Potential Safety Benefit

High



DRAINAGE

Issue

- Pooling and mud/debris at pedestrian curb ramps (all four intersection quadrants).

Potential Improvement Strategies

- Fix pavement inconsistencies at curb ramps to prevent pooling during rain events and subsequent mud and debris.

Level of Effort

Medium

Potential Safety Benefit

High



Issue

- Uneven pavement at select drainage grates.

Potential Improvement Strategies

- Reset drainage grates to prevent tripping hazards.

Level of Effort

Low

Potential Safety Benefit

High



Issue

- Some drainage grates within close proximity of the intersection were cluttered with debris.

Potential Improvement Strategies

- Coordinate with municipal/county maintenance departments to keep drainage grates free of debris to prevent flooding.

Level of Effort

Low

Potential Safety Benefit

Medium

CHANNELIZED RIGHT-TURN ISLANDS

Issue

- Missing yield sign within the channelized right-turn lane of NJ 47 northbound to Cooper Street eastbound for motorists.

Potential Improvement Strategies

- Replace yield sign for NJ 47 NB right-turn slip ramp.
- Replace damaged yield sign for NJ 47 SB right-turn slip ramp.
- Install “saw tooth” yield pavement markings for the NJ 47 right-turn slip ramps to complement the yield signs.

Level of Effort

Low

Potential Safety Benefit

High

TWO-WAY LEFT-TURN LANE ON COOPER STREET

Issue

- Two-way left-turn is reportedly being misused as a through lane. Motorists commonly enter the lane well in advance of the left-turn opportunity, sometimes to avoid congestion in the through lanes. A safety issue is presented when motorists enter the two-way left-turn lane at an appropriate location to make a turn and collide with motorists already in that lane.

Potential Improvement Strategies

- Develop an access management plan that prohibits travel along the sections of the two-way left-turn lane where no access points exist. This can be accomplished via striping, rumble strips, or a hard/planted median.

Level of Effort

Low, Medium, or High (depending on improvement)

Potential Safety Benefit

High



TRANSIT STOPS

Issue

- Lack of adequate shoulder for buses to pull off (especially NJ 47 southbound) for boarding passengers. Motorists often go around these buses into the oncoming traffic lane instead of waiting.

Potential Improvement Strategies

- Consider relocating bus stop or implementing a roadway treatment to discourage motorists from performing this unsafe movement.

Level of Effort

Medium

Potential Safety Benefit

Medium



3.0 CONCLUSIONS

As discussed earlier, the road safety audit program is conducted to generate improvement recommendations and countermeasures for roadway segments or intersections demonstrating a history of or potential for a high incidence of motor vehicle crashes. The safety issues identified during the audit and documented in this report, along with the recommended strategies, should improve the overall safety of the study area. Many of the strategies identified can be implemented through routine maintenance. The full impact of the improvement strategies will be realized when they are combined, but time and budget constraints may dictate when remedial strategies are implemented.

Engineering strategies alone will not eliminate the traffic safety issues identified at the study area intersection. Therefore, enforcement and education are necessary components to address the human behavioral aspects to effectively reduce the number of crashes. Policy or legislative issues may also be relevant in addressing safety concerns. Thus, engaging the appropriate stakeholders is important especially since this intersection is comprised of a state route and a county route, and each entity has different responsibilities.

APPENDIX A

Audit Team

CR 534 Cooper Street and NJ 47 Delsea Drive - Intersection Road Safety Audit

Audit Team

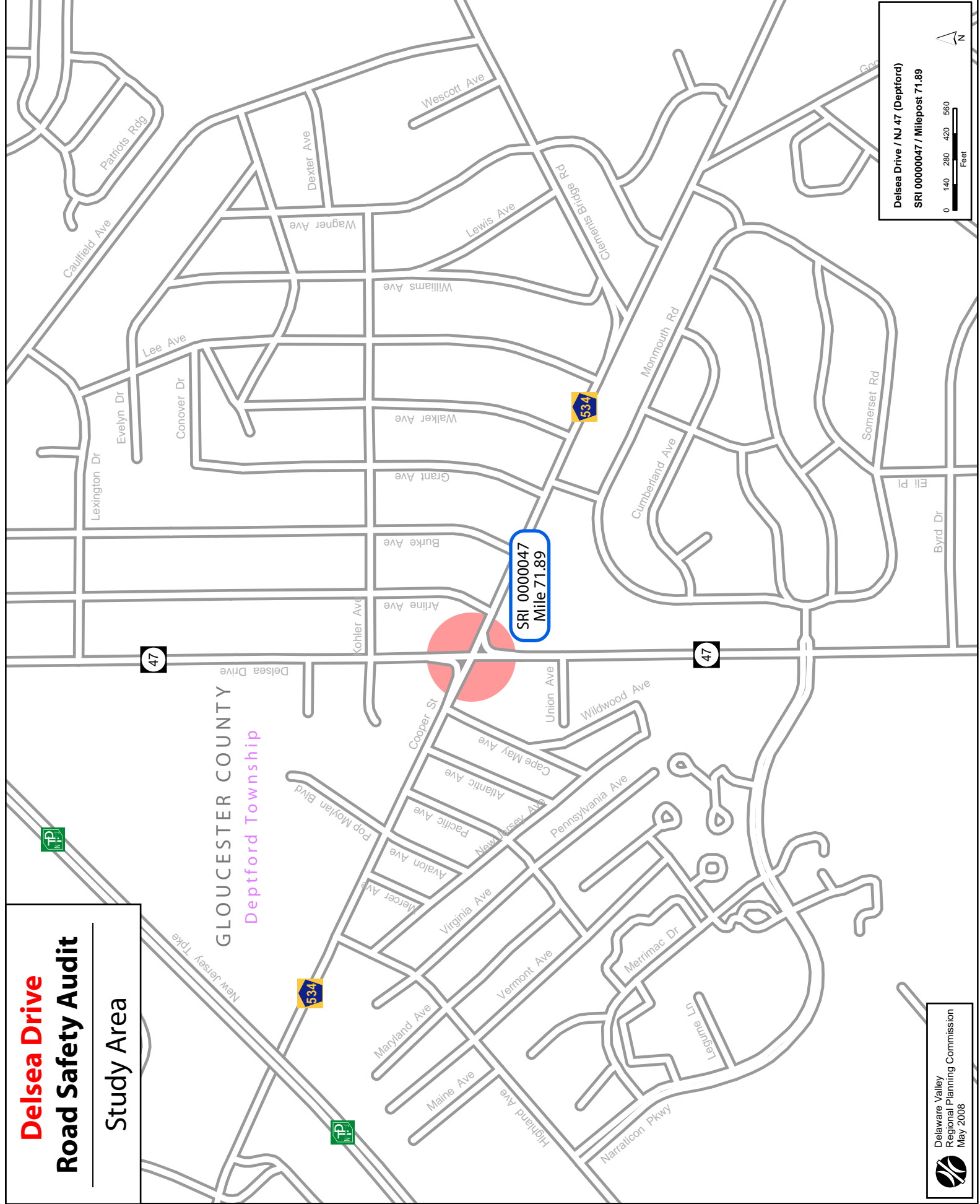
Name	Organization
Rosemarie Anderson	Delaware Valley Regional Planning Commission
Donald Banks	Deptford Township
John Bryson	Federici & Akin, Consultants
Tina Deng	NJDOT Bureau of Traffic Engineering & Investigations
Dan Lisanti	NJDOT Bureau of Traffic Engineering & Investigations
Regina Moore	Delaware Valley Regional Planning Commission
Kevin Murphy	Delaware Valley Regional Planning Commission
David Raso	Deptford Township Police Department
Ray Reeve	New Jersey Department of Highway Traffic Safety
Michael Taylor	Deptford Township Police Department
Vincent Voltaggio	Gloucester County Department of Engineering

APPENDIX B

Maps

Delsea Drive Road Safety Audit

Study Area



Delsea Drive / NJ 47 (Deptford)
SRI 00000047 / Milepost 71.89

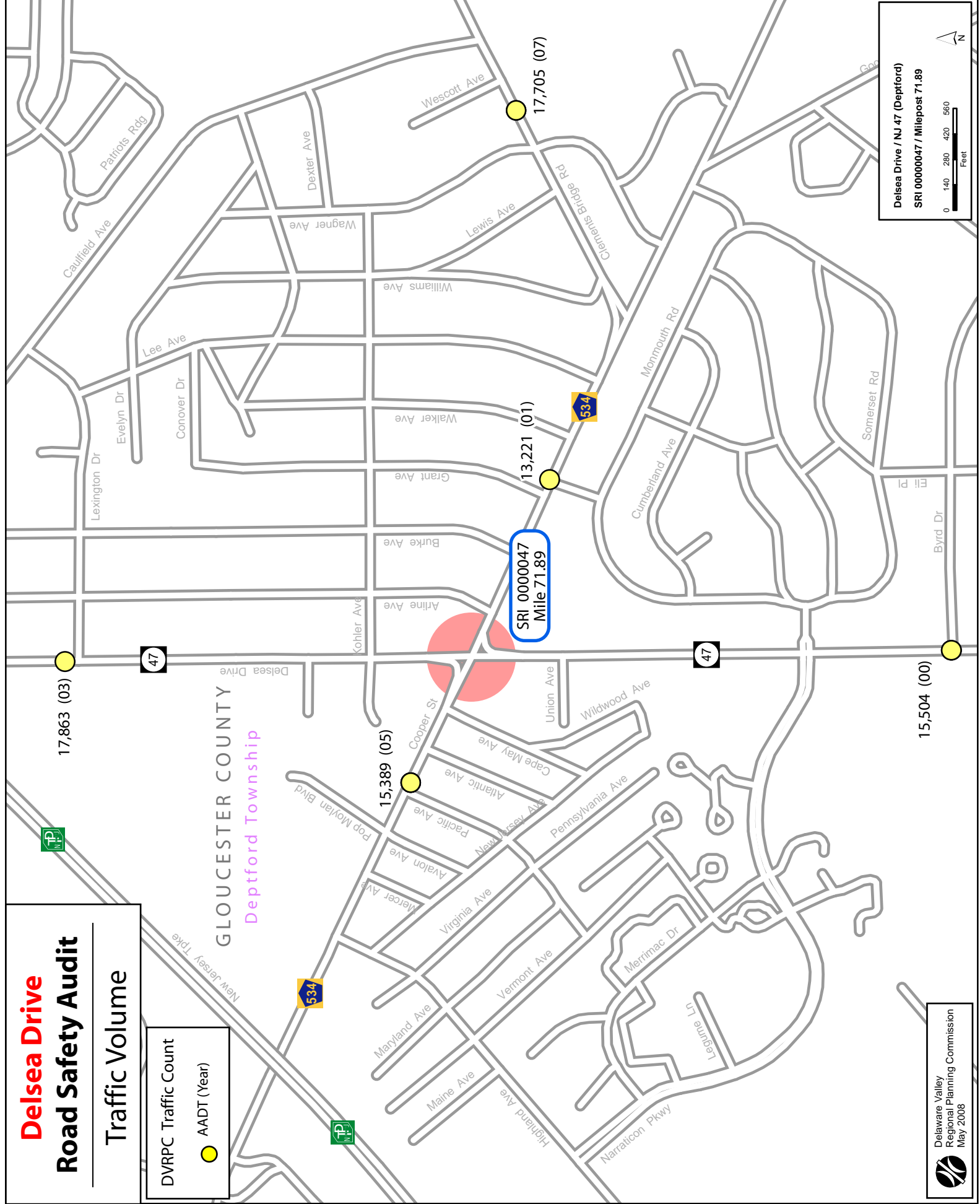
Delsea Drive Road Safety Audit

Traffic Volume

DVRPC Traffic Count

● AADT (Year)

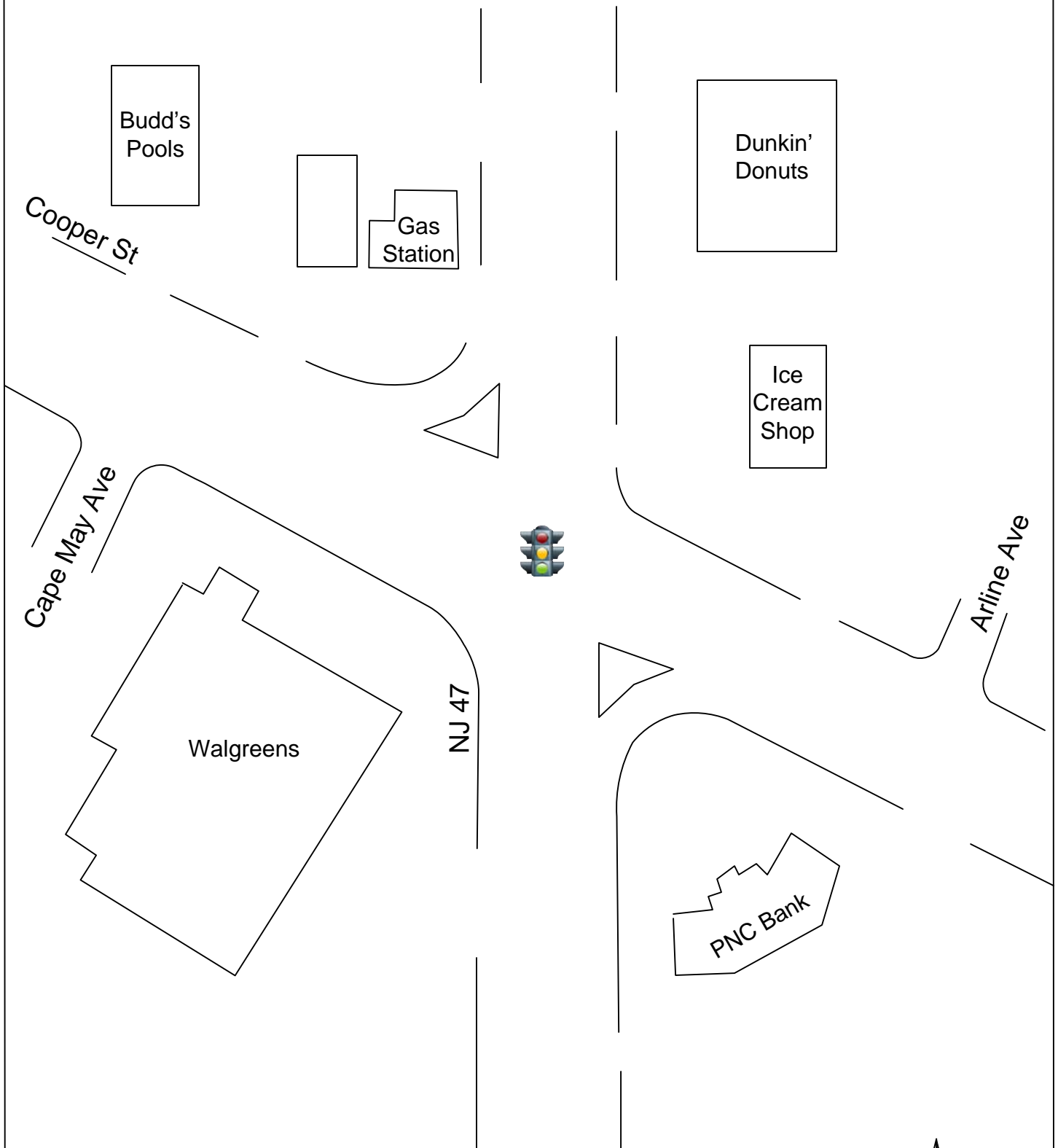
Delsea Drive / NJ 47 (Deptford)
SRI 0000047 / Milepost 71.89



GLOUCESTER COUNTY
Deptford Township

Delaware Valley
Regional Planning Commission
May 2008

NJ 47 Delsea Drive and CR 534 Cooper Street Intersection Walking Diagram



Source: DVRPC
July 2008


SCHEMATIC NOT TO SCALE

APPENDIX C

Traffic Data

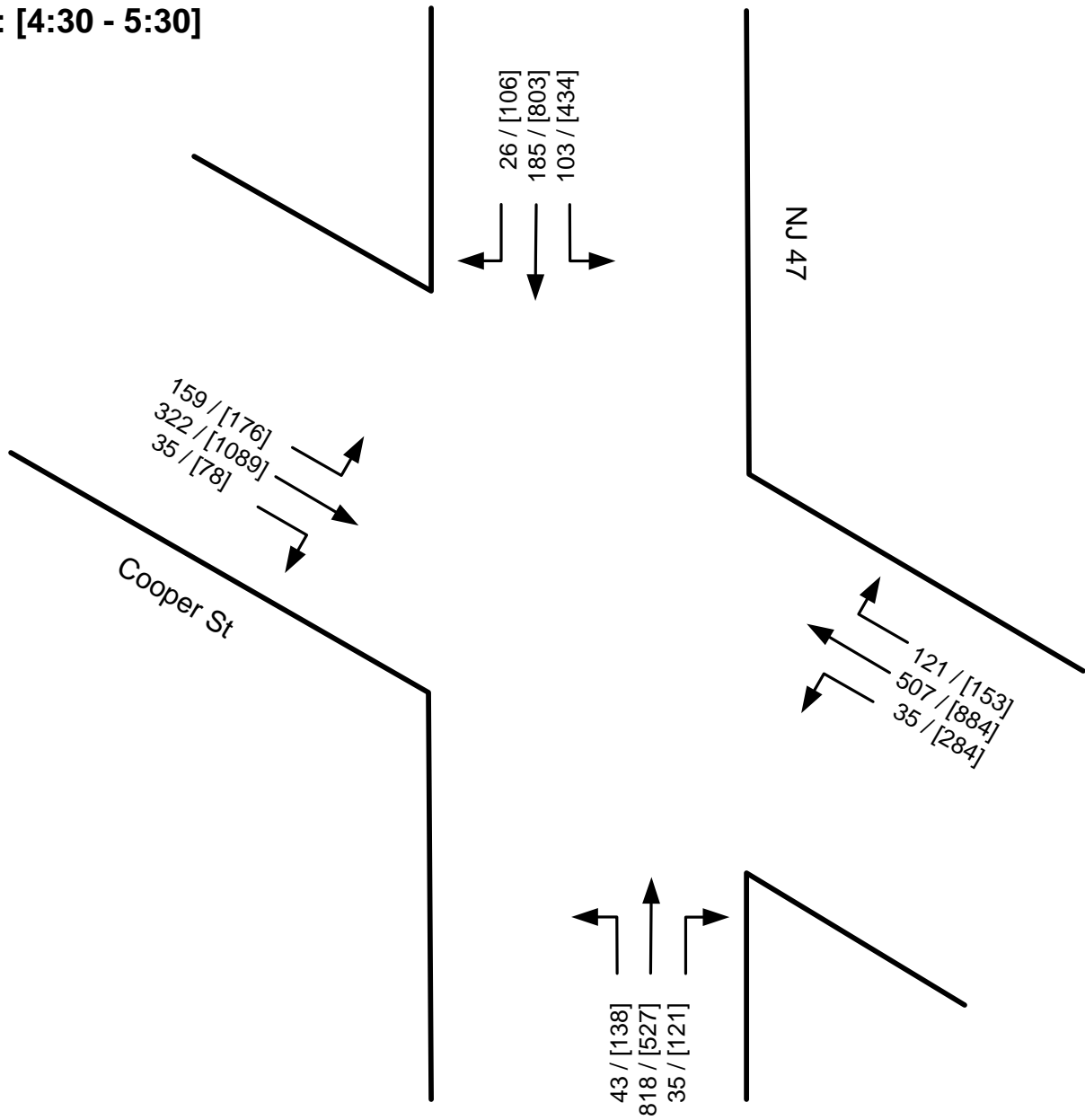
NJ 47 Delsea Drive and CR 534 Cooper Street Intersection.

Peak Hour Turning Movement Counts AM & [PM]

Peak Hours

AM: 6:15 - 7:15

PM: [4:30 - 5:30]

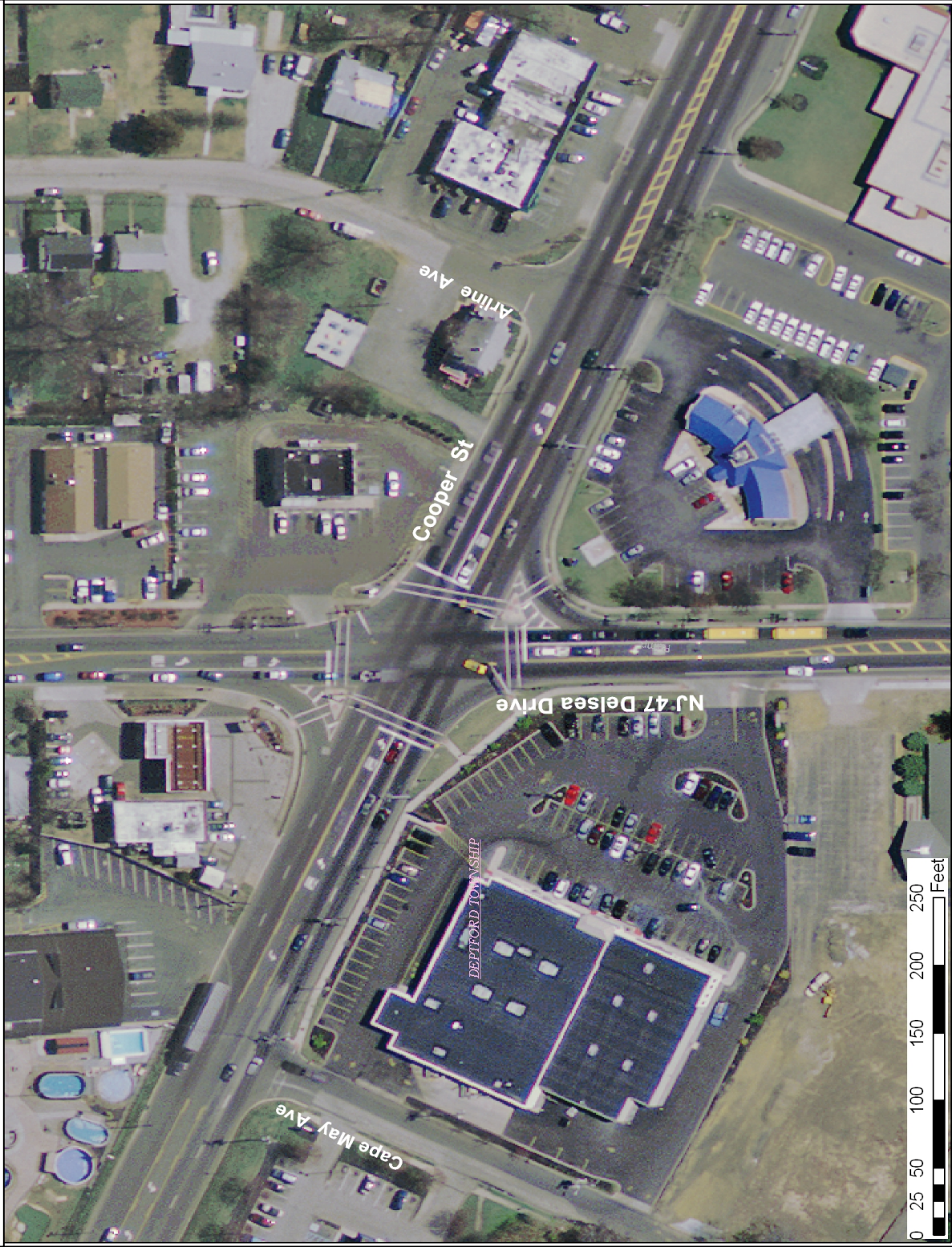


SCHEMATIC NOT TO SCALE



Delaware Valley Regional Planning Commission
May 2008

NJ 47 Delsea Drive and Cooper Street Intersection



Total Crashes 2004 - 2006	
COLLISION TYPE	
Rear-end	26
Angle	14
Left Turn	12
Same Dir Side Swipe	7
Opp Dir Side Swipe	4
Hit Fixed Object	2
Head On	1
Hit Pedestrian	1
Total	67
LIGHTING CONDITION	
Day	47
Dusk/Dawn	4
Night	16
Total	67
ROAD SURFACE	
Dry	50
Wet	16
Ice/Snow	1
Total	67
SEVERITY	
Fatalities	0
Major Injury	0
Moderate Injury	8
Minor Injury	7
PDO	52
Total	67

Crash Cluster Location

Delaware Valley
Regional Planning Commission
May 2008

Crash Summary: 2004 - 2006

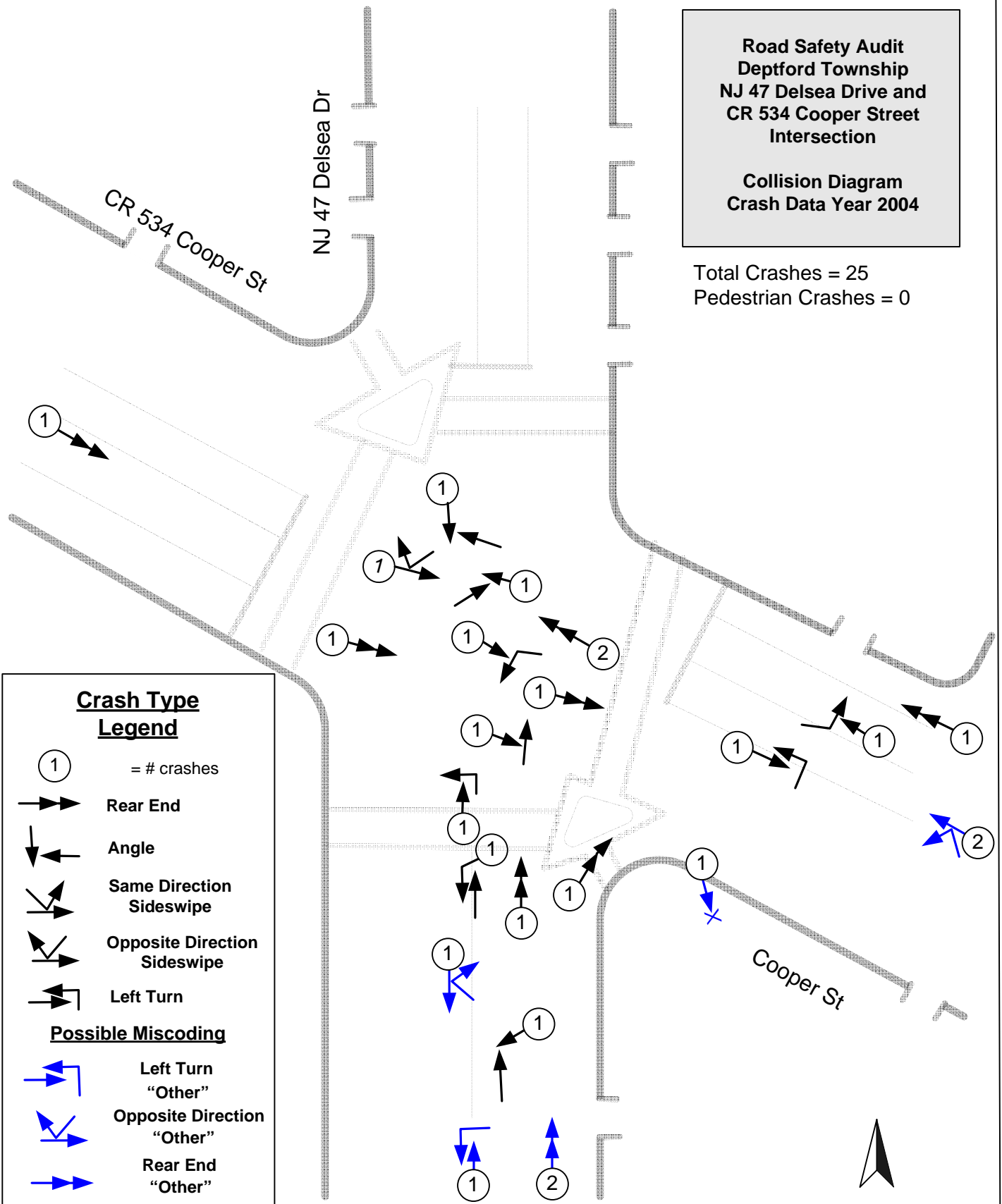
Collision Type	2004		2005		2006		Total		2006 Statewide County Road Percentage
	25 crashes		17 crashes		25 crashes		67 crashes		
	Crash	%	Crash	%	Crash	%	Crash	%	
Angle	4	16.00%	4	23.53%	6	24.00%	14	20.90%	18.09%
Head On	~	~	1	5.88%	~	~	1	1.49%	3.73%
Hit Fixed	1	4.00%	1	5.88%	~	~	2	2.99%	11.89%
Hit Pedestrian	~	~	1	5.88%	~	~	1	1.49%	1.89%
Left Turn	6	24.00%	3	17.65%	3	12.00%	12	17.91%	7.89%
Opposite Direction Side Swipe	2	8.00%	~	~	2	8.00%	4	5.97%	~
Rear End	10	40.00%	5	29.41%	11	44.00%	26	38.81%	30.32%
Same Direction Side Swipe	2	8.00%	2	11.76%	3	12.00%	7	10.45%	11.45%
Intersection Type									
At Intersection	9	36.00%	8	~	6	24.00%	23	34.33%	39.52%
Not at Intersection	16	64.00%	9	~	19	76.00%	44	65.67%	60.45%
Severity Type									
Fatality	~	~	~	~	~	~	~	~	0.27%
Injured	4	16.00%	5	29.41%	6	24.00%	15	22.39%	29.16%
Property Damage Only	21	84.00%	12	70.59%	19	76.00%	52	77.61%	70.57%
Lighting Condition									
Day	19	76.00%	10	58.82%	18	72.00%	47	70.15%	70.25%
Dusk/Dawn	2	8.00%	1	5.88%	1	4.00%	4	5.97%	3.84%
Night	4	16.00%	6	35.29%	6	24.00%	16	23.88%	25.49%
Road Surface Condition									
Dry	18	72.00%	12	70.59%	20	80.00%	50	74.63%	77.54%
Wet	6	24.00%	5	29.41%	5	20.00%	16	23.88%	19.67%
Ice/Snow	1	4.00%	~	~	~	~	1	1.49%	2.13%

Source: DVRPC

**Road Safety Audit
Deptford Township
NJ 47 Delsea Drive and
CR 534 Cooper Street
Intersection**

**Collision Diagram
Crash Data Year 2004**

Total Crashes = 25
Pedestrian Crashes = 0



**Crash Type
Legend**

- ① = # crashes
- Rear End
- Angle
- Same Direction Sideswipe
- Opposite Direction Sideswipe
- Left Turn

Possible Miscoding

- Left Turn "Other"
- Opposite Direction "Other"
- Rear End "Other"
- Same Direction "Rear End" "Angle"
- Hit Fixed Object "Head On"

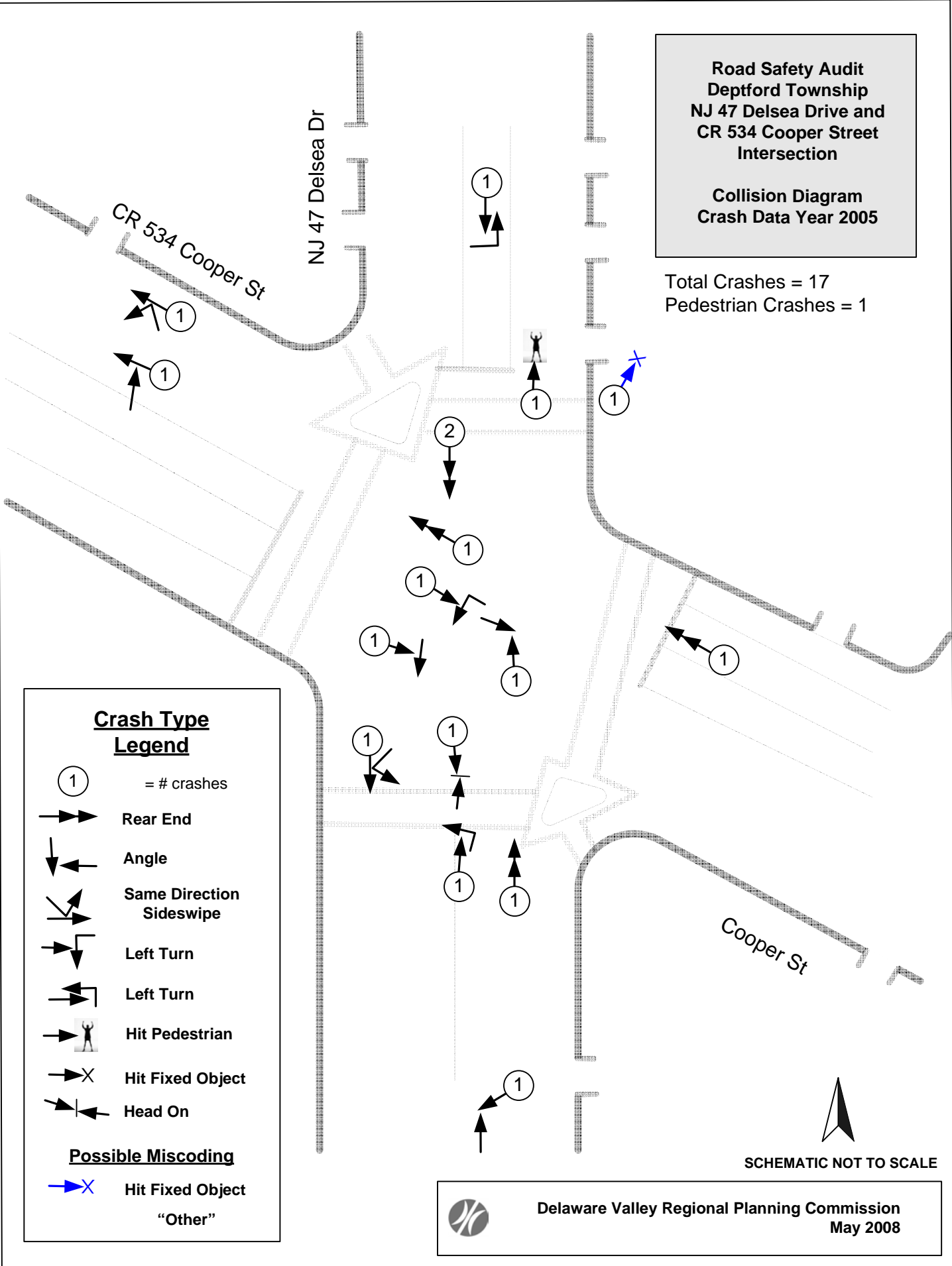
SCHMATIC NOT TO SCALE

 Delaware Valley Regional Planning Commission
May 2008

**Road Safety Audit
Deptford Township
NJ 47 Delsea Drive and
CR 534 Cooper Street
Intersection**

**Collision Diagram
Crash Data Year 2005**

Total Crashes = 17
Pedestrian Crashes = 1



**Crash Type
Legend**

- ① = # crashes
- Rear End
- ↔ Angle
- ↘↗ Same Direction Sideswipe
- ↔⊥ Left Turn
- ↔⊥ Left Turn
- ⊥ Hit Pedestrian
- ⊥ Hit Fixed Object
- ↔↔ Head On

Possible Miscoding

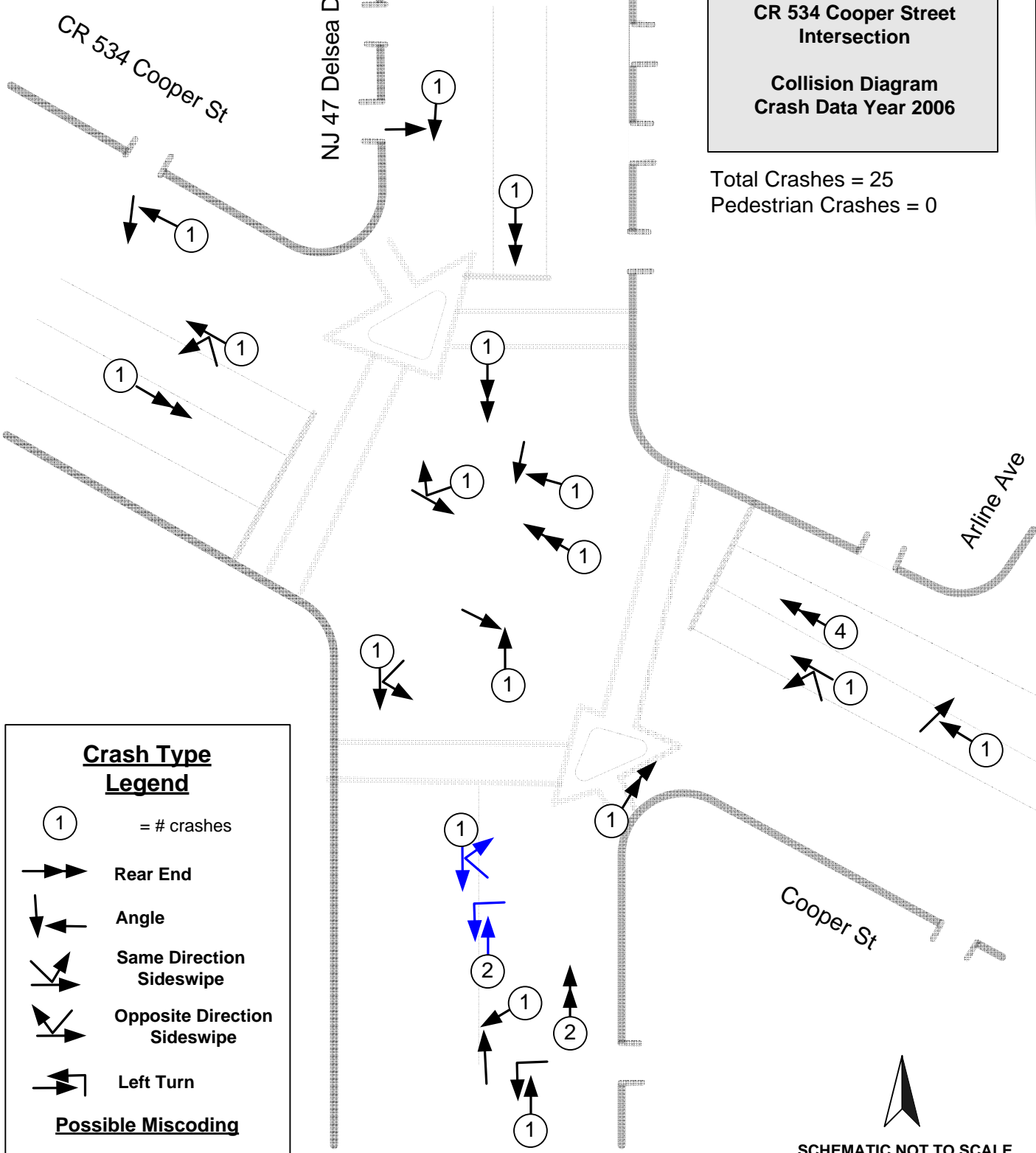
- ⊥ Hit Fixed Object
- “Other”

SCHEMATIC NOT TO SCALE

**Road Safety Audit
Deptford Township
NJ 47 Delsea Drive and
CR 534 Cooper Street
Intersection**

**Collision Diagram
Crash Data Year 2006**

Total Crashes = 25
Pedestrian Crashes = 0



**Crash Type
Legend**

① = # crashes

- Rear End
- Angle
- Same Direction Sideswipe
- Opposite Direction Sideswipe
- Left Turn

Possible Miscoding

- Left Turn "Other"
- Opposite Direction "Other"



SCHMATIC NOT TO SCALE



Delaware Valley Regional Planning Commission
May 2008

APPENDIX D

Checklist

CHECKLIST

Audit Team Member _____

GENERAL ISSUES

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Drainage	Do drainage items seem to be adequate?		
	Are drainage items clear of debris?		
2 Landscaping	Is landscaping in accordance with guidelines (sight distance, clearances, etc.)?		
3 Public Utilities	Are boxes, poles, and/or posts located in a safe position?		
	Do the above items interfere with sight distance?		
4 Access Management	Are there locations at and near the intersection where access management is problematic?		
5 Lighting	Is lighting needed in the vicinity of the intersection?		

ALIGNMENT AND CROSS SECTION

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Visibility	Are sight distances adequate for the speed of traffic approaching the intersection?		
	Is adequate sight distance provided at intersection?		
2 Driver Expectation	Are there any sections of the intersection that may cause driver confusion, such as:		
	a. Is alignment of roadway clearly defined?		
	b. Are crossroads or hidden driveways properly signed near the intersection?		
	c. Do streetlight and tree lines conform to the road alignment?		
3 Widths	Are all the traffic lanes and roadway widths adequate?		

INTERSECTION

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Location	Are there any roadside objects nearby that would intrude on driver's line of sight?		
	Is the intersection adequate for all vehicular movements?		
2 Controls	Are pavement markings and intersection control signing satisfactory?		
	Are there any pedestrian signals?		
3 Signage	Is the intersection appropriately signed?		
	Are there advance warning signs indicating the intersection?		
	Are signs appropriately located and of the appropriate size?		
4 Layout	Is the intersection layout obvious to all users?		
	Is the alignment of curbs satisfactory?		
	Are turning radii and tapers appropriate?		
	Are there driveways located at or near the intersections?		
5 Transit	Are there bus stops located near the intersections?		
	a. If so, are the bus stops near side or far side?		
6 Turn Lanes	Do the channelized right-turn lanes on NJ 47 cause any problems with merging traffic on CR 534?		

TRAFFIC SIGNALS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Signal Operation	Are traffic signals operating correctly (e.g., clearance time)?		

2 Signal Heads and Visibility	Are traffic signals clearly visible to approaching motorists?		
	Are signal heads adequately placed so as not to cause driver confusion?		
	Are the signals post mounted, wire mounted, or mast arm mounted?		
	Are signal-ahead warning signs needed?		
	Is the number of signal heads adequate?		
	Are the signal heads too small for motorists to notice?		
	Are the signals hard to see due to sun glare?		

PEDESTRIANS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Land Use Factors	Are there schools or other pedestrian generators nearby?		
2 Facilities at NJ 47 and CR 534 Intersection	Are crosswalks provided at the intersection?		
	a. If so, are the crosswalks clearly marked?		
	Are the pedestrian ramps adequate?		
	Are there pedestrian signals located at intersection?		
	Is the intersection clearly delineated for the visually impaired?		
	Is there adequate drainage at the intersection?		
3 Area Near the NJ 47 and CR 534 Intersection	Is the speed limit appropriate for all road users?		
	Are there safety concerns for pedestrian walking near intersection?		
4 Lighting	Is the sidewalk in the vicinity near the intersection adequately lit for pedestrians to see and feel safe?		

	Are there dark places or hiding places that represent a personal security issue?		
	Are the pedestrian crosswalks adequately lit for pedestrians and motorists?		
5 Visibility and Sight Distance	Are pedestrians waiting to cross visible to motorists?		
	Can pedestrians see approaching vehicles?		
	Are there temporary or permanent obstructions near crosswalks (e.g., vegetation, fences, etc.)		

BICYCLISTS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
	Are there share-the-road signs posted?		
	Is the road surface of suitable quality for bicyclists?		

TRANSIT

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Buses	Are bus stops located at or near the intersection of NJ 47 and CR 534?		

SIGNAGE, PAVEMENT MARKINGS, DELINEATION AND LIGHTING

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Signage	Are there signs missing from key locations?		
	Are signs easy to understand?		
	Are the correct signs used for each situation? And is each sign necessary?		
	Are signs effective for all likely conditions (i.e., day, night, oncoming headlights, etc.)?		
	Is there sign clutter at the intersection?		
	Are all necessary regulatory, warning, and direction signs in place? Are they conspicuous?		
	Are they redundant?		

	Are traffic signs in their correct locations and properly positioned with respect to lateral clearance and height?		
	Are signs placed so as to restrict sight distance, particularly for vehicles?		
	Do sign supports conform to guidelines?		
2 Pavement Markings and Delineation	Do existing pavement markings need to be repainted?		
	Do raised pavement markers need to be installed at the approach of the intersection?		
	Are pavement markings easily visible and effective for all likely conditions (i.e., at night, day, inclement weather, etc.)?		

PAVEMENT

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Pavement Defects	Is the pavement free of defects (i.e., excessive roughness, potholes) that could result in safety problems?		
2 Ponding	Is the pavement free of areas where ponding may occur, resulting in a safety problem?		

APPENDIX E

Response Sheet

**NJ 47 DELSEA DRIVE AND COOPER STREET
DEPTFORD, NJ
INTERSECTION ROAD SAFETY AUDIT**

RESPONSE SHEET

INTERSECTION ISSUES	IMPROVEMENT STRATEGIES	Decision: Agree/Reject	Planned Completion Date	Comments
<p>Access Management/Geometry Improvement Dunkin' Donuts</p> <ul style="list-style-type: none"> The high volume of traffic generated by this business warrants consideration of an access management plan. Drive-through window queue backs up into the Cooper Street access during the morning hours. 	<ul style="list-style-type: none"> Quantify the access movements to determine turn volumes. Coordinate with adjacent land owners to consider shared access driveways (where possible). Apply no-left-turn restriction (where appropriate). 			
<ul style="list-style-type: none"> Left turns onto Cooper Street eastbound are problematic due to compromised sight distance caused by queuing Cooper Street westbound traffic. Drivers attempting this left turn must often rely on a “wave-on” from waiting motorists, an inherently unsafe practice. 	<ul style="list-style-type: none"> Make Cooper Street access right-in right-out and force Cooper Street eastbound access via NJ 47 southbound left-turn lane. The left turn from this approach has a dedicated phase, making it safer than the left turn out of the parking lot onto Cooper Street eastbound, which requires crossing four lanes of traffic. 			
<ul style="list-style-type: none"> NJ 47 northbound access located closest to the intersection allows for a potentially unsafe movement–Cooper Street eastbound traffic uses the left-turn lane to NJ 47 northbound and then makes a quick right into this access. This move is especially 	<ul style="list-style-type: none"> Close access from NJ 47 closest to the intersection. NOTE: Cooperation on the part of the businesses will determine the level of effort in each access change. 			

INTERSECTION ISSUES	IMPROVEMENT STRATEGIES	Decision: Agree/Reject	Planned Completion Date	Comments
<p>hazardous to pedestrians and is an unsafe and unnecessary movement since access to NJ 47 can be gained at another point located further away from the intersection.</p>				
<p>Exxon Gas Station</p>				
<ul style="list-style-type: none"> Left turns are problematic out of the driveway onto NJ 47 located closest to the intersection due to poor sight distance. Left turns are further complicated due to the driveway's close proximity to the intersection and channelized right-turn lane. 	<ul style="list-style-type: none"> Make access closest to intersection right-in right-out only. <p>NOTE: Cooperation on the part of the businesses will determine the level of effort in each access change.</p>			
<p>Signs</p>				
<ul style="list-style-type: none"> There is no advance notice of upcoming merge (lane drop) along Cooper Street westbound on the west side of the intersection. 	<ul style="list-style-type: none"> Add merge-ahead (lane drop) sign with distance to merge point in feet indicated on the sign to better prepare motorists; install before merge point according to MUTCD specification. <p>NOTE: There is already sign clutter in this area; additional signs may have a negative effect (too many messages on an approach may confuse motorists). NJDOT TE&I will investigate</p>			
<ul style="list-style-type: none"> Guide/route/destination signs missing on Cooper Street westbound approach to intersection. 	<ul style="list-style-type: none"> Replace signs and mount according to MUTCD guidance. 			
<ul style="list-style-type: none"> Missing "do-not-enter" sign for opposite direction traffic to remind them not to turn left into the channelized right-turn lane. 	<ul style="list-style-type: none"> Replace sign and mount according to MUTCD guidance. 			

INTERSECTION ISSUES	IMPROVEMENT STRATEGIES	Decision: Agree/Reject	Planned Completion Date	Comments
<ul style="list-style-type: none"> Stop sign posted on Cape May Avenue at intersection with Cooper Street is damaged. 	<ul style="list-style-type: none"> Replace sign and mount according to MUTCD. 			
<ul style="list-style-type: none"> The pole of the yield-to-pedestrians sign located in the channelized right-turn lane on the NJ 47 southbound approach is being inappropriately used to post other signs. This creates a distraction and minimizes the effects of the yield-to-pedestrians sign. 	<ul style="list-style-type: none"> Make yield-to-pedestrian sign exclusive by removing the other unauthorized signs from the post. 			
Pedestrian Amenities				
<ul style="list-style-type: none"> Pedestrian buttons and associated instructions are somewhat confusing. 	<ul style="list-style-type: none"> Upgrade information placards where appropriate. 			
<ul style="list-style-type: none"> Missing curb ramps (1. N-S over Cooper Street on west side of intersection; 2. E-W over NJ 47 on south side of intersection). Other curb ramps are not ADA compliant (e.g., SE corner-in front of PNC Bank). 	<ul style="list-style-type: none"> Upgrade crosswalks with ADA compliant curb ramps. 			
<ul style="list-style-type: none"> Pedestrian push button for crossing Cooper Street S-N on east side is misaligned to the east. 	<ul style="list-style-type: none"> Relocate closer to the crosswalk for benefit of the pedestrian. 			
<ul style="list-style-type: none"> Missing sidewalk connection between the senior center and the intersection crossings. 	<ul style="list-style-type: none"> Install sidewalks and other pedestrian amenities between the senior center and the intersection. 			
<ul style="list-style-type: none"> Missing sidewalks between transit stop and intersection (along NJ 47 SB north of gas station). 	<ul style="list-style-type: none"> Install sidewalks and other pedestrian amenities between transit stops and the intersection to facilitate safer crossings. 			

INTERSECTION ISSUES	IMPROVEMENT STRATEGIES	Decision: Agree/Reject	Planned Completion Date	Comments
<ul style="list-style-type: none"> Missing sidewalk connection between intersection and pizza shop along the Dunkin Donuts frontage. 	<ul style="list-style-type: none"> Replace missing sidewalk to establish pedestrian right-of-way through donut shop parking lot. 			
<ul style="list-style-type: none"> Tree located on the southeast intersection quadrant (in front of bank) obstructs sight distance of and for pedestrians at the channelized right-turn lane. 	<ul style="list-style-type: none"> Trim vegetation to improve sight distance. 			
<ul style="list-style-type: none"> Some sidewalk blocks are cracked and/or heaving (at various locations including curb ramps), creating a tripping hazard. 	<ul style="list-style-type: none"> Repair sidewalks where needed. 			
<ul style="list-style-type: none"> An electrical wire was discovered hanging low over the sidewalk along NJ 47 northbound just north of the Dunkin' Donuts parking lot. 	<ul style="list-style-type: none"> Remove or relocate the wire out of the pedestrian way. 			
<p>Signals/Operations</p> <ul style="list-style-type: none"> High left-turn volumes, limited left turn green time along Cooper Street to NJ 47 (both directions), and a lack of gaps in oncoming traffic seem to be factors contributing to the number of left-turning vehicles observed waiting to turn left at the end of the cycle. Peak period congestion delays traffic and may result in rear-end crashes (rear-end crashes represented 38.8% of the total). 	<ul style="list-style-type: none"> Consider extending left-turn protected phase and the left-turn lanes for Cooper Street. 			
<ul style="list-style-type: none"> Peak period congestion delays traffic and may result in rear-end crashes (rear-end crashes represented 38.8% of the total). 	<ul style="list-style-type: none"> Examine progression and coordination to address traffic flow (optimization), considering signals within one-half mile of the intersection. <p>NOTE: Coordination for NJ 47 should be</p>			

INTERSECTION ISSUES	IMPROVEMENT STRATEGIES	Decision: Agree/Reject	Planned Completion Date	Comments
<ul style="list-style-type: none"> Intersection clearance time may be inadequate based on field visit and crash data. 	<p>reviewed by the state. Coordination for Cooper Street should be reviewed by the county.</p> <ul style="list-style-type: none"> Evaluate the impacts on level of service and the safety benefits of increasing the clearance phase. <p>NOTE: NJDOT TE&I must receive a letter of concurrence from Deptford Township before signal investigations can begin.</p>			
<p>Drainage</p> <ul style="list-style-type: none"> Pooling and mud/debris at pedestrian curb ramps (all four intersection quadrants). Uneven pavement at select drainage grates. Some drainage grates within close proximity of the intersection were cluttered with debris. 	<ul style="list-style-type: none"> Fix pavement inconsistencies at curb ramps to prevent pooling during rain events and subsequent mud and debris. Reset drainage grates to prevent tripping hazards. Coordinate with municipal/county maintenance departments to keep drainage grates free of debris to prevent flooding. 			

INTERSECTION ISSUES	IMPROVEMENT STRATEGIES	Decision: Agree/Reject	Planned Completion Date	Comments
<p>Two-way Left-turn Lane on Cooper Street</p> <ul style="list-style-type: none"> Two-way left-turn is reportedly being misused as a through lane. Motorists commonly enter the lane well in advance of the left-turn opportunity, sometimes to avoid congestion in the through lanes. A safety issue is presented when motorists enter the two-way left-turn lane at an appropriate location to make a turn and collide with motorists already in that lane. 	<ul style="list-style-type: none"> Develop an access management plan that prohibits travel along the sections of the two-way left-turn lane where no access points exist. This can be accomplished via striping, rumble strips, or a hard/planted median. 			
<p>Transit Stops</p>				
<ul style="list-style-type: none"> Lack of adequate shoulder for buses to pull off (especially on NJ 47 southbound) for boarding passengers. Motorists often go around these buses into the oncoming traffic lane instead of waiting. 	<ul style="list-style-type: none"> Consider relocating bus stop or implementing a roadway treatment to discourage motorists from performing this unsafe movement. 			
<p>Channelized Right Turn Islands</p>				
<ul style="list-style-type: none"> Missing yield sign within the channelized right-turn lane of NJ 47 northbound to Cooper Street eastbound for motorists. 	<ul style="list-style-type: none"> Replace yield sign for NJ 47 northbound right-turn slip ramp Replace damaged yield sign for NJ 47 southbound right-turn slip ramp. Install “saw tooth” yield pavement markings for the NJ 47 right-turn slip ramps to complement the yield signs. 			

Title of Report: INTERSECTION ROAD SAFETY AUDIT – NJ 47 DELSEA DRIVE AND COOPER STREET, DEPTFORD TOWNSHIP, GLOUCESTER COUNTY

Publication No.: 08047

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Geographic Area Covered: The study area consists of the signalized intersection of NJ 47 Delsea Drive and Cooper Street in Deptford Township, Gloucester County, New Jersey.

Key Words: Road, safety, audit, crashes, injuries, fatalities, issues, strategies, traffic signal, coordination, engineering, enforcement, education, stakeholders, prioritize, intersection, speed limit, traffic volumes, stakeholders, audit team, geometry, pavement markings, ADA, signs, crosswalk, sidewalk, curb ramp.

ABSTRACT: This report documents the process and findings of the NJ 47 Delsea Drive and Cooper Street Intersection Road Safety Audit (RSA) undertaken by the Delaware Valley Regional Planning Commission (DVRPC). The report details safety issues identified by the audit team at the study location and remedial strategies to address them. The goal of the audit is to generate improvement recommendations and countermeasures for the study intersection in an effort to reduce the incidence of motor vehicle crashes. Emphasis is placed on identifying low-cost, quick turnaround safety projects to address the identified issues where possible. This project represents a step towards implementation of the Delaware Valley Regional Planning Commission's Regional Safety Action Plan. Improving the design and operation of intersections is a priority area for both the engineering and enforcement disciplines as documented in the Plan. Improvement strategies may be eligible for Local Federal Safety Funds for implementation.

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