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DELAWARE VALLEY
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REGIONAL
PLANNING COMMISSION

JANUARY 2010

CR 534
BLACKWOOD-CLEMENTON RD

Road Safety Audit

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

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

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Executive Summary

This document is the final report for the CR 534 (Blackwood-Clementon Road) Road Safety Audit (RSA). This project represents a step towards implementation of the Delaware Valley Regional Planning Commission's (DVRPC) Safety Action Plan. In fiscal year 2009, two RSAs were conducted on New Jersey's county route system as part of DVRPC's Transportation Safety Program. These RSAs improve and promote transportation safety on the region's roadways while maintaining mobility. An RSA is an effective way of identifying crash-causing issues and effective solutions utilizing a nontraditional approach.

The RSA process began by identifying a hierarchy of county routes ranked by crash frequency. County-specific and regionwide lists of five-mile county route segments were distributed to county partners. Each county recommended candidates from the list for consideration in the program. DVRPC staff collaborated with the Camden County Planning and Engineering departments to hone in on the section of CR 534 (Blackwood-Clementon Road) chosen for the audit. The five-mile section of this route that resulted from the initial analysis ranked highest in crash frequency for the three-year period of 2005–2007. Camden County recommended a 1.9 mile subsection that is a high priority corridor for the county. The Laurel Road intersection, located at the east end of the study area, had been upgraded prior to the audit. Although data was gathered for this location, the audit team did not concentrate on this location due to the recent upgrades.

The CR 534 RSA was conducted on Wednesday, June 3, 2009. The pre-audit and post-audit meetings were held at the Camden County Department of Public Works, 2311 Egg Harbor Rd, Lindenwold, New Jersey. Due to the short length of the study corridor, the audit was able to be completed in one day. The audit team of 10 participants included representation from the Camden County Department of Public Works (planning and engineering departments), New Jersey Department of Transportation (NJDOT) Bureau of Safety Programs, New Jersey Division of Highway Traffic Safety (NJDHTS), Gloucester Township Police, Federal Highway Administration (FHWA), and DVRPC. The Bicycle Coalition of Greater Philadelphia was invited but unable to attend. See Appendix A for the list of audit team members.

One of the locations that the audit team spent a good deal of time discussing is at the western end of the study corridor where Blackwood-Clementon Road meets Erial Road and the NJ 42 interchange. These intersections are closely spaced—within an 800-foot span. There is a heavy flow of traffic from NJ 42 southbound to Camden County College which is located south of the study area and accessible via Erial Road. This traffic exits NJ 42, turns right onto Blackwood-Clementon Road eastbound, then turns right onto Erial Road southbound. Of the four focus areas this location had the highest concentration of crashes. The main problems are high speed, lack of lane delineation, and the short length of the road segment between the off-ramp and the Erial Road intersection. In addition, sight distance is compromised for NJ 42 off-ramp traffic as well as for pedestrians crossing Erial Road along eastbound CR 534. The recommendations for this location are comprehensive, including better lane delineation, traffic calming, improved sight distance, and pedestrian crossing improvements. This location will also benefit from a NJDOT project currently examining this NJ 42 interchange.

Regarding corridor-wide problems, signal coordination was identified as missing for most of the signals along the corridor. Signal placement and fixture types were inconsistent causing visual clutter and confusion. The study recommends that a signal inventory be undertaken to address these issues comprehensively. Additionally, pedestrian access is not consistently available throughout the corridor. Specific locations and improvement recommendations are discussed in Chapter 3.

The recommendations herein were developed collaboratively with roadway owners and local stakeholders from the study task force; DVRPC served as facilitator. The study partners have expressed interest in implementing many of the recommendations as time and funds allow. Many of the maintenance items, which are typically low cost, can be addressed without additional engineering.

CHAPTER 1

Introduction

As the final report for the CR 534 (Blackwood-Clementon Road) RSA, this document represents a step towards implementation of DVRPC's Regional Safety Action Plan. The RSA process utilizes a nontraditional approach to address crash problems through an intensive and collaborative forum. The Blackwood-Clementon Road RSA is one of two RSAs conducted on New Jersey's county route system as part of DVRPC's FY 2009 transportation safety work program. Since NJDOT focuses mainly on the state system routes, DVRPC's focus on county routes in New Jersey gives attention to corridors that are regionally significant but not typically considered by the state.

Using Plan4Safety, DVRPC queried NJDOT's crash database for a list of county-specific five-mile county route segments that experienced a high crash frequency during the three-year study period. The section of Blackwood-Clementon Road that resulted from this analysis ranked number one in crash frequency in the county. Camden County recommended a 1.9 mile subsection of the five-mile corridor to complement work completed on adjacent sections of Blackwood-Clementon Road.

What is a Road Safety Audit (RSA)?

An RSA is a formal safety performance examination of an existing or future road or intersection by a multi-disciplinary audit team. Road safety audits can be used on any size project, from minor maintenance to mega-projects, and can be conducted on facilities with a history of crashes, or during the design phase of a new roadway or planned upgrade. To date DVRPC has mostly used the tool on roadways of five miles in length or less where there is a demonstrated history of crashes.

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 frequency of motor vehicle crashes, or an identifiable pattern of crash types. The emphasis is placed on identifying low-cost, quick-turnaround safety improvements to address issues where possible, though not excluding more complex strategies. Implementation of improvement strategies identified through this process may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented incrementally as time and resources permit.

Prior to the one-day audit event, DVRPC collects and analyzes relevant data, including: crash cluster and corridor-wide crash summary analyses, daytime and nighttime video of the roadway, traffic volume data, intersection turning movement volume data, and aerial photographs. DVRPC staff also conducts a pre-audit field visit to examine conditions and take photographs. The identified crash clusters became focus areas during the audit of CR 534.

The audit event has three basic components which the audit team participates in:

- Pre-audit – the study team reviews location characteristics and crash analysis;
- Field visit – the study team examines conditions along the corridor, preferably on foot; and
- Post-audit – the study team shares findings, and develops a list of problems and potential strategies.

Following the event, DVRPC staff compiles the identified problems and potential strategies into a matrix. This document is sent back to the audit team for verification. Upon approval from the team, the matrix is incorporated into a technical report. This is then distributed to all audit participants and coordinating agencies for advancement to the implementation stage.

The CR 534 (Blackwood-Clementon Road) Audit Event

The one-day road safety audit was conducted on Wednesday, June 3, 2009. The pre-audit and post-audit meetings were held at the Camden County Department of Public Works, 2311 Egg Harbor Rd, Lindenwold, New Jersey. The audit team of 10 participants included representation from local, county, regional, state, and federal levels. The Bicycle Coalition of Greater Philadelphia was invited but unable to attend. See Appendix A for the list of audit team members.

The pre-audit meeting—an overview of the study area and an examination of crash history—began at 8:30 AM. A video showing the corridor under nighttime conditions was also shown. Next was the field visit, when the audit team walked the corridor and examined conditions to identify safety issues. After lunch the team returned to the meeting room for the post-audit session where problems were defined and countermeasures discussed.

CHAPTER 2

Corridor Description and Analysis

Study Location

The study area consists of approximately 1.9 miles of CR 534 from the NJ 42 interchange to the Laurel Road intersection, all within Gloucester Township, New Jersey. This stretch of Blackwood-Clementon Road is predominantly commercial. The strip developments and shopping plazas are broken up by a few sections of open space; i.e., preserved land and sports fields. No residential units front Blackwood-Clementon Road in the study section.

Roadway Characteristics

CR 534 (Blackwood-Clementon Road) is classified as an urban principal arterial. The corridor study section has a five-lane configuration throughout most of its length; two travel lanes per direction with a two-way-left-turn-lane (TWLTL) and no shoulders. Toward the eastern end of the study section the roadway transitions to three through lanes westbound; eastbound is unchanged and the TWLTL remains. During the audit process it was not immediately apparent why this extra capacity was added. Blackwood-Clementon Road's horizontal alignment is straight. There is a very gentle rise and fall of grade within the study limits. The speed limit is posted at 40 MPH. There are eight signalized intersections and multiple driveways along this section. Sidewalks are consistently available through most of the five-lane cross-section, but several missing links were found. Sidewalk conditions vary from newly installed to needing maintenance. There are missing sections at the following locations:

- Between the two legs of Erial Road – westbound
- Between Peters Lane and Woodlane Drive – westbound
- Between Little Gloucester Road and the shopping center access – eastbound, westbound
- Between the shopping center access and Millbridge Road – westbound
- Between Millbridge Road and College Drive – eastbound

Traffic Volumes

Total volume counts were taken for the audit in the spring of 2009. The resulting data shows consistent traffic volumes along the corridor. This section of Blackwood-Clementon Road has an average annual daily traffic (AADT) count of 25,000 to 28,000 with nearly equal volumes by direction. AADTs can be found in Appendix B.

Turning movement counts were taken at three signalized locations: 1) at CR 706 (Erial Road) 2) at Kelly Driver Lane and 3) at CR 759 (Little Gloucester Road). Erial Road, located at the western end of the study corridor, provides access to Camden County College and carries a significant volume of traffic between Blackwood-Clementon Road and the school. Left turns from Erial Road northbound to Blackwood-Clementon Road westbound, and right turns from Blackwood-Clementon Road eastbound to Erial Road southbound, rival through movements along Blackwood-Clementon Road and are by far the heaviest turn movements at this intersection. This is because of Erial Road's proximity to NJ 42 which carries the lion's share of college-bound motorists according to the study team. The peak hours were identified as 7:15 – 8:15 AM and 6:00 – 7:00 PM. Turning movement counts for the intersection can be found in Appendix C.

At the Little Gloucester Road intersection, the combined northbound and southbound through traffic volumes are equal to about half the volume of through traffic on Blackwood-Clementon Road. These higher numbers may reflect Little Gloucester's alignment as a north-south cross-county route. The peak hours were identified as 8:00 – 9:00 AM and 4:45 – 5:45 PM. Little Gloucester Road also provides access to a shopping center which may contribute to the late morning and early evening peaks. Turning movement counts for the intersection can be found in Appendix D.

The Kelly Driver Lane intersection has only one dominant turn movement: Kelly Driver Lane southbound left turn onto Blackwood-Clementon Road eastbound. This movement averages about 160 vehicles per peak hour, while the remaining turns from all approaches experience less than 90 movements per peak hour. The peak hours were identified as 8:00 – 9:00 AM (same as Little Gloucester Road) and 6:00 – 7:00 PM. Turning movement counts for the intersection can be found in Appendix F.

Transit Service

There is only one transit route that passes through the study area. The NJ Transit #459 bus follows a roughly north-south alignment and serves the study corridor along Blackwood-Clementon Road between Cherrywood Drive and Laurel Road. Marked bus stops can be found at the Millbridge Road, Kelly Driver Lane, and Laurel Road intersections. According to NJ Transit's ridership data collected in July of 2007, the #459 bus carries an average of 849 passengers per weekday, 442 passengers on Saturdays, and drops to 198 on Sundays.

Crash Findings

According to the NJDOT crash database, there were 428 reportable crashes from 2005 to 2007 along the study area section of CR 534 (Blackwood-Clementon Road). Reportable crashes are crashes that result in a fatality, injury, and/or property damage of $500 or more. A comprehensive analysis of the corridor-wide crash data is shown in Appendix B. Of the three-year total, 160 crashes occurred in 2005 (37.4%), 126 in 2006 (29.4%), and 142 in 2007 (33.2%).

When analyzing crash frequency by month, the fewest crashes occurred in August (25), and May had the highest number with 44. Despite this wide disparity, the remainder of the year was fairly consistent, hovering around 35 per month on average. Crashes were somewhat evenly distributed between Monday and Friday with the fewest occurring on Tuesdays (55) and the most on Fridays (75). The lowest overall total was recorded on Sundays (36) representing eight percent of the total. This corridor is a heavily traveled commuter route and generates a significant amount of retail traffic. When considering crashes by time of day, the distribution favors the nine-hour period from 11:00 AM to 7:00 PM when 63 percent of the crashes occurred. Comparatively speaking, there is a noteworthy spike in crashes during the morning commute at 7:00 AM; 22 crashes were recorded.

Road surface and light condition crash distributions were mostly consistent with state averages for county routes. The percentage of dusk and nighttime crashes each exceeded the state average by just over two percent. These numbers may be related to lighting conditions along the corridor. Regarding severity, there was one fatal crash. One hundred forty-five crashes (33.8%) involved an injury, while the remaining 282 crashes resulted in property damage only (65.8% of the total).

Several collision types exceeded state averages along the study corridor for the three-year analysis period. Comparing corridor crash statistics with state averages puts the crash experience in perspective and allows for examination of over-representations by category.

The most common collision type along the corridor was rear-end crashes, accounting for 40.4 percent, which was above the state average of 30.6 percent. Rear-end crashes tend to be common along signalized roadways, especially those with recurring congestion. Angle collisions (22.4%) were second most common and were just above the state average of 19.6 percent. Angle crashes involved drivers traveling in angular directions to one another, e.g. northbound collides with westbound. This collision type often occurs when a driver leaves a business driveway and collides with a driver traveling in the through lane. The Blackwood-Clementon Road corridor has a fair number of driveways, some of which may be duplicative. This issue and its related crash implications are discussed further in the corridor-wide issues table.

The third most common crash type was left-turn / u-turn representing 14.9 percent of the total. Though not very significant in total number, they were almost triple the state average of 5.66 percent. There are locations along the study corridor where permissive left turns are

allowed. This can be addressed by making left turns protected only, but the deterioration in level of service is sometimes a trade-off for the safety benefit.

Seven pedestrian and five bicycle crashes were recorded during the study period. Although the bicycle crash percentage is only slightly higher (1.17%) than the state average (0.96%), bicycle as well as pedestrian crashes are of great concern because they typically result in an injury. In the absence of volume counts for these modes, crash frequency serves as an indicator of usage. Although the sidewalks are less than ideal in some locations, pedestrian crashes most commonly occur when attempting to cross the street, especially at unsignalized intersections or at mid-block. Given the five-lane cross-section of Blackwood-Clementon Road, the probability for an incident increases. Because the signals are located so far apart, pedestrians often resort to crossing directly to their destination rather than going out of their way to utilize a crosswalk or access a signalized intersection. This is discussed in the corridor-wide issues table. Although no obvious trend was identified to explain the number of bicycle crashes, implementing amenities for bicyclists (signs and striping) helps to make drivers aware of the multimodal nature of the road.

CHAPTER 3

Findings and Recommendations

The following section summarizes the findings, recommendations, and priorities for the CR 534 (Blackwood-Clementon Road) RSA. The tables show corridor-wide and site-specific safety issues and recommendations. Addressing these recommendations will contribute to the overall safety of the roadway. High priority recommendations are highlighted in yellow. Given fiscal constraints, they may have to be considered one at a time or in small groups. Coordination and collaboration is required among the Camden County departments.

Table 1: Corridor-wide Issues and Strategies

Corridor-wide Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
Cross Section Geometry			
1. The three-lane westbound sections found in part of the corridor may be unnecessary capacity according to the turning movement and AADT counts. This extra pavement creates a perception that higher speeds are appropriate. Also, a permissive left turn over three lanes of traffic increases the potential for crashes.	1. Consider conversion from three lanes back to two lanes. The benefits are many: provides consistency, eliminates unnecessary weaving without reducing capacity (since capacity is seemingly adequate with two through lanes), complies with NJDOT policy by eliminating permissive left turn movements across three oncoming lanes.	Medium	High
Signals			
1. Most of the signals are not coordinated; addition of coordination may improve flow and increase safety.	1. Use signal coordination and optimization software to test the benefits of creating a coordinated signal network.	Medium	High
2. Signals aren't properly aligned with lanes which may be confusing to motorists and contributes to the pervasive visual clutter along the corridor.	2. Where needed and according to engineering standards, move misaligned signal heads to their proper place to provide consistency and predictability along the corridor.	High	Medium
3. There is a demonstrated correlation between the signals that allow permissive left turns and left turn crashes along the corridor (NJDOT policy is to allow only protected left turns across three oncoming lanes).	3. Evaluate each signal where permissive left turns are allowed in order to measure the effects on level of service that result from changing to protected left turn only. Conduct left turn conflict analysis. Consider safety benefits of protected left turns as the highest priority in this effort.	Medium	High

Table 1 (continued)

Corridor-wide Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
Signs			
1. Sign clutter is pervasive along the corridor (especially where retail is concentrated), which is confusing and sends mixed messages.	1. Where necessary, eliminate duplicate signs and ensure proper placement of regulatory signs.	Low	Medium
2. Lane markings and roadside signs are not always matched (Erial Rd).	2. Identify mismatched lane markings and signs and upgrade to make consistent.	Low	Medium
Striping/Roadway Markings			
1. Select locations of failing pavement markings were identified.	1. Identify deficient locations and upgrade with retro-reflective materials.	Low	High
2. Raised Pavement Markers (RPMs) are missing from the majority of the corridor.	2. Replace or add RPMs where needed to better delineate lanes for increased safety.	Low	High
Pedestrian Environment			
1. Sidewalks are discontinuous, with many missing sections; maintenance and repair are needed.	1. Identify missing links and coordinate with landowners and Camden County to develop a plan for repair or replacement.	Medium	Medium
2. Crosswalk striping is not consistent.	2. Upgrade all pedestrian crossings to continental style.	Low	High
3. Crossings are often very long, and in some cases signal plans provide inadequate time to cross.	3. Evaluate all crosswalk timings to ensure adequate pedestrian phasing.	Low	High
4. Pedestrian crossing warning signs (for motorists) are inconsistently available.	4. Identify crossings where warning signs are missing or inadequate, and add as appropriate.	Low	High
5. Pedestrian signal heads and push buttons need to be reviewed for consistency, timing, and visibility.	5. Inventory all pedestrian signal heads and repair or replace as needed, using countdown timers throughout.	Medium	High
Bicyclist Environment			
1. No accommodations are available for bicycles, and no feasible alternate route is provided.	1. Reallocate lane markings to include 5' bike lanes where feasible.	High	High
2. Dedicated right turn lanes conflict with bicycle traffic.	2. Bike lanes, if implemented, should be placed to the left of right turn lanes and utilize green crossover lanes at the conflict points.	High	High

Table 1 (continued)

Corridor-wide Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
Visibility			
1. The east-west orientation of Blackwood-Clementon Road results in sun glare which compromises drivers' ability to see.	1. Install signal head back-plates to reduce sun glare.	Low	High
2. The corridor has both conventional and LED signal types. At some locations the signals may be more effective as LEDs instead of conventional.	2. Identify each conventional, and combination conventional and LED signal heads; evaluate safety benefits of each and consider upgrading all to LEDs.	High	High
3. Vegetation is overgrown and obstructing sight lines at various locations.	3. Trim vegetation corridor-wide and set-up a maintenance schedule (see vegetation issues identified in the site specific location narrative).	Low	High
4. Based on nighttime video the corridor lacks effective lighting.	4. This corridor is a candidate for a highway lighting design plan.	Medium	High
Drainage			
1. Pedestrian ramps and storm inlets show signs of gathering water and flooding. Weeds and trash are collecting along the road edge.	1. Clear all debris from drainage inlets and along the roadway edge, and clean out the drain sumps to ensure maximum drainage capacity. Coordinate with the county to revisit or create a maintenance schedule	Low	Medium
2. The corridor has several bicycle un-friendly drainage grates.	2. Upgrade old style drainage grates to the bicycle friendly style.	Low	High
Traffic Speed - Context			
1. Speed limit is posted at 45 MPH, although the observed average speed appeared to be higher. Combined with the multi-lane configuration, these elements create a less than desirable pedestrian environment.	1. Identify corridor locations where pedestrian activity is likely to be high (bus stops, retail destinations, etc.); consider pedestrian improvements and context sensitive solutions.	Medium	High
2. The two-way-left-turn-lane (TWLTL) is unnecessary in several locations because there are no driveways or cross streets onto which one can turn left.	2. Consider median striping and/or hard-scape in those locations where the TWLTL is serving no purpose to prevent misuse, reduce speeding, and improve operations.	Low	High

Table 1 (continued)

Corridor-wide Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
3. Speed spiking/aggressive driving is reportedly common along this corridor. This may be exacerbated by the very wide roadway.	3. Continue local law enforcement's efforts to address speeding and aggressive driving; consider media campaign to highlight law enforcement's efforts and educate motorists about the dangers of speeding and aggressive driving.	Low	Medium
Driveways 1. Redundant driveways and inconsistent width of driveways create unnecessary opportunities for conflicts.	1. County should coordinate with the state on the development of a corridor access management plan; work with property owners to modify access points which are unnecessarily wide or duplicative. Consider utilizing existing frontage road as access alternative.	Medium	High

Source: DVRPC

Table 2: Site-Specific Issues and Strategies

Site-Specific Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
Erial Road – NJ 42 (vicinity)			
1. Vegetation is obstructing sight lines for NJ 42 southbound off ramp traffic merging with CR 534 eastbound traffic.	1. Cut back all brush/vegetation obstructing sight lines.	Low	High
2. Three potential conflict points at the off-ramp.	2. Consider a redesign of the off-ramp intersection which improves sight-distance and increases safety. *Note: NJDOT has a redesign project currently underway.	Medium	High
3. Three-way weave of thru/off ramp/Erial Rd eastbound traffic under the NJ 42 overpasses is problematic due to high speeds, lack of lane delineation, and the short length of the road segment between the off ramp and the Erial Rd intersection.	3. Consider a redesign and new lane delineation for this stretch between the off-ramp and the Erial Rd intersection. Ideas include channelizing the NJ 42 off ramp traffic under the NJ 42 overpass, and re-striping the 46+ feet of pavement to better accommodate the various movements and address weave problems.	High	High
4. Congestion at the NJ 42 southbound off ramp to CR 534 backs up onto the NJ 42 through lane due to the intersection's inability to process the volume of off ramp traffic efficiently during the evening peak period.	4. A new traffic signal is currently being designed for the off ramp and CR 534 intersection which will address this issue. It is recommended that vacant land within the off ramp be utilized to widen the intersection approach to accommodate dedicated right turns.	Low	High

Table 2 (continued)

Site-Specific Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
5. Speed of traffic on eastbound Blackwood-Clementon Rd at the merge point seems excessive based on field observations, increasing the crash probability.	5. Implement traffic calming measures for eastbound Blackwood-Clementon Rd traffic to slow vehicles as they enter the area of the NJ 42 off ramp. This will increase reaction time and smoother merging.	Medium	High
6. Bicyclists and pedestrians are poorly accommodated at this location. For example, there are no crosswalks across the NJ 42 off-ramp lanes.	6. Install continental style crosswalks across the ramp lanes, upgrade the pedestrian path which connects the western part of the corridor to the eastern part, and include bicycle priority (bike lanes or sharrows). This will better connect the residential and commercial sections that are currently separated by the NJ 42 interchange.	Low	High
7. Missing left turn storage for eastbound Blackwood-Clementon Rd traffic turning left to access NJ 42 northbound.	7. Accommodate these turns in the redesign of the section of Blackwood-Clementon Rd between the NJ 42 off-ramp and the Erial Rd intersection.	Medium	High
8. At the signalized Erial Rd intersection the pedestrian crosswalk over Erial Rd along eastbound Blackwood-Clementon Rd signals people to cross even though right turns onto Erial Rd from eastbound Blackwood-Clementon Rd are allowed to go—this presents a pedestrian-vehicle conflict. RSA team members also discovered that the sight distance is compromised, making it difficult for right-turning motorists to see pedestrians in advance of the crosswalk. The "walk" phase of the pedestrian signal creates a false sense of security for pedestrians, and safety is further compromised by poor sight distance. School and pedestrian signs are a mix of yellow and fluorescent green which contributes to the visual clutter, lessening the effect of the signs. Sign height is also substandard as some signs were placed too low and may create an obstruction for pedestrians.	8. Even though a safer crossing is available several hundred feet further south on Erial Rd, it is a poor alternative for walkers along this stretch of Blackwood-Clementon Rd. Improvement ideas include: 1) slowing the right-turning vehicles to increase reaction time, 2) changing the location of the crosswalk to improve visibility of the crossing pedestrians, 3) changing the signal cycle to include a dedicated pedestrian phase to eliminate potential conflicts with right-turning vehicles, 4) changing the dual right turns to a single dedicated right turn lane, and 5) adding a sign warning eastbound CR 534 traffic turning right onto Erial Rd southbound that they must yield to pedestrians in the crosswalk (this improvement can be combined with any of the listed improvements in 1 - 4). Design and placement of all signs needs to be revisited and upgraded to standard where necessary. *Note: Township/County/State/FHWA have agreed to work together to address multi-jurisdictional issues here. *Note: Check existing intersection signal design for MUTCD compliance.	Medium	High

Table 2 (continued)

Site-Specific Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
Little Gloucester Rd			
1. Pedestrian crossing time was observed to be inadequate.	1. Re-evaluate the pedestrian crossing priority and pedestrian amenities at this intersection.	Low	High
2. Broken pedestrian signal head on the southwest intersection corner.	2. Repair or replace non-working signal head.	Medium	Medium
3. Signal layout does not meet standard.	3. Evaluate signal layout and redesign as appropriate.	Medium	Medium
Cherrywood Dr to Millbridge Rd			
1. High left-turn crash frequency from eastbound Blackwood-Clementon Rd to Millbridge Rd. At this location eastbound left-turning vehicles have a protected/permitted movement— left turns not accommodated by the protected phase must make a permissive movement to crossover three oncoming lanes.	1. Evaluate this signal to measure the effects on level of service that result from changing the left turn to protected only. Consider the safety benefits of protected left turns as the highest priority in this process.	Medium	High
2. Secondary signal heads are greatly misaligned with travel lanes.	2. Relocate signal heads to appropriate lanes and upgrade to standard where necessary.	Medium	High
3. Crosswalks from south side to north side lead to nowhere, as there is no sidewalk provided along the westbound side of Blackwood-Clementon Rd.	3. To provide corridor-wide pedestrian access add sidewalk where missing in this vicinity.	High	High
4. Mix of conventional and programmable signal heads for the intersection approach may be confusing to motorists, because the conventional signal is visible from farther away than the programmable – making the effect of the programmable null.	4. Replace the five-section vertical programmable signal head on the mast arm with the “doghouse” style signal assembly. Make all signals facing the inside approaches at these intersections programmable.	High	High
5. Timing of these closely spaced signals may be contributing to the rear-end crash frequency.	5. Revisit signal timing plan to examine coordination and optimization of two signals for improved flow.	Medium	High
6. Vegetation is obscuring the pedestrian signal heads.	6. Trim brush/vegetation where necessary.	Low	High
7. Millbridge Rd provides access to 800 apartment units and 200+ homes, and Cherrywood Dr also has several housing units. Accordingly, both intersections are major access points to important destinations.	7. The land uses served by these intersections warrants a comprehensive evaluation of bicycle and pedestrian needs to foster transportation alternatives between the residential and retail uses.	Medium	High
8. The pedestrian push button at northeast corner of CR 534 & Cherrywood Drive intersection is not working.	8. Replace or repair the pedestrian push button. *Note: Cherrywood Dr and Millbridge Rd signals are slated to get Red Light Running cameras during 2009.	Low	Medium

Table 2 (continued)

Site-Specific Issue	Potential Strategy	Level of Effort	Estimated Safety Benefit
Kelly Driver Ln			
1. Broken pedestrian button on the northwest intersection corner.	1. Repair or replace damaged button.	Low	Medium
2. No left-turn protection for left turns from westbound Blackwood-Clementon Rd and a significant number of left-turn crashes.	2. Examine the effects on LOS when the westbound left turn movement is eliminated, or both left turns (east and westbound) are made protected only. Currently the protected/permissive left turn movement eastbound does not conform to NJDOT policy as it allows permissive left turns across three traffic lanes.	Medium	High
3. Secondary signal heads are greatly misaligned with travel lanes.	3. Relocate signal heads to appropriate lanes and upgrade to standard where necessary.	Medium	High
4. Intersection is actuated but there may be a detection problem.	4. Check to make sure signal actuation is operating properly (consider this when evaluating the effects of a protected left turn).	Low	High
5. The Shop Rite grocery store served by this intersection is a major trip generator. One bike and one pedestrian crash were recorded here during the analysis period. Pedestrian crossing time was observed to be inadequate.	5. Re-evaluate the pedestrian crossing priority and the bicycle and pedestrian amenities at this intersection.	Low	High

Source: DVRPC

CHAPTER 4

Conclusions

The RSA is conducted to generate improvement recommendations and countermeasures for roadway segments or intersections demonstrating a history of, or potential for, motor vehicle crashes. The safety recommendations, identified during the audit and documented in this report, should improve the 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 the implementation schedule.

Engineering strategies alone will not eliminate the traffic safety issues identified along the study corridor. Education, with support from a targeted enforcement campaign, is an effective approach for addressing the driver behaviors that lead to crashes. Policy or legislative actions can provide the legal weight needed to motivate people to be safer, more conscientious drivers. Thus, employing a multi-pronged approach and engaging the appropriate stakeholders will be the most effective course of actions to advance the goal of improved safety on Blackwood-Clementon Road.

APPENDIX A

Audit Team

Audit Team

Name	Agency	E-mail
Anthony O'Toole	Camden County Department of Public Works	aotoole@camdencounty.com
Caroline Truemen	Federal Highway Administration	Caroline.Trueman@dot.gov
Curt Noe	Camden County Department of Public Works	curtnoe@camdencounty.com
Kevin Murphy	DVRPC	kmurphy@dvrpc.org
Lt. Edward Bryant	Gloucester Township Police Department	ebryant@glotwp.com
Ray Reeve	New Jersey Division of Highway Traffic Safety	Raymond.Reeve@lps.state.nj.us
Regina Moore	DVRPC	rmoore@dvrpc.org
Sophia Azam	NJDOT Bureau of Safety Programs	Sophia.Azam@dot.state.nj.us
Yosy Cosme	NJDOT Bureau of Safety Programs	Yosy.Cosme@dot.state.nj.us
Zoe Neaderland	DVRPC	zneaderland@dvrpc.org

APPENDIX B

Corridor-wide Data

Study Area Map

Traffic Volume Map

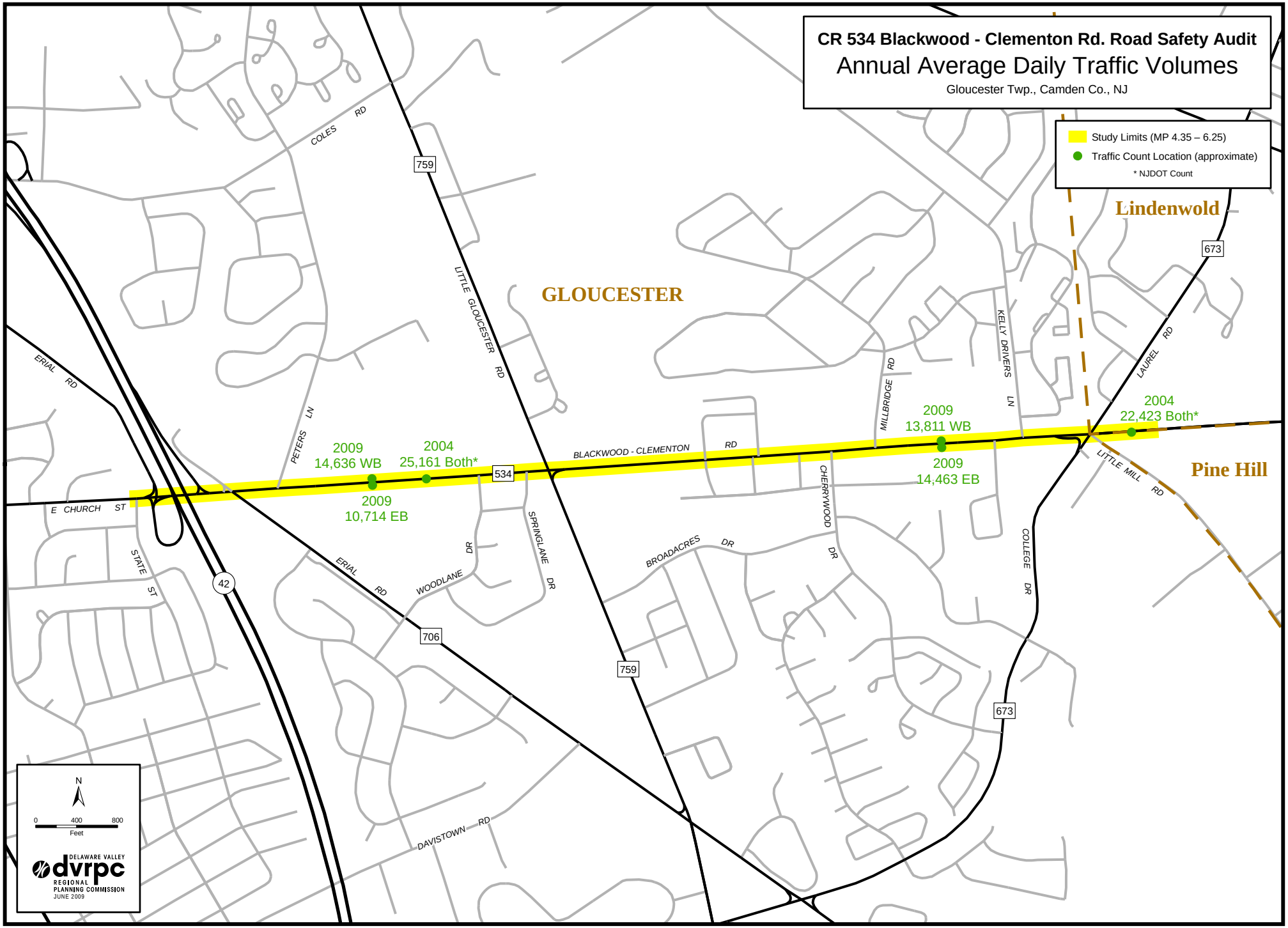
Transit Network

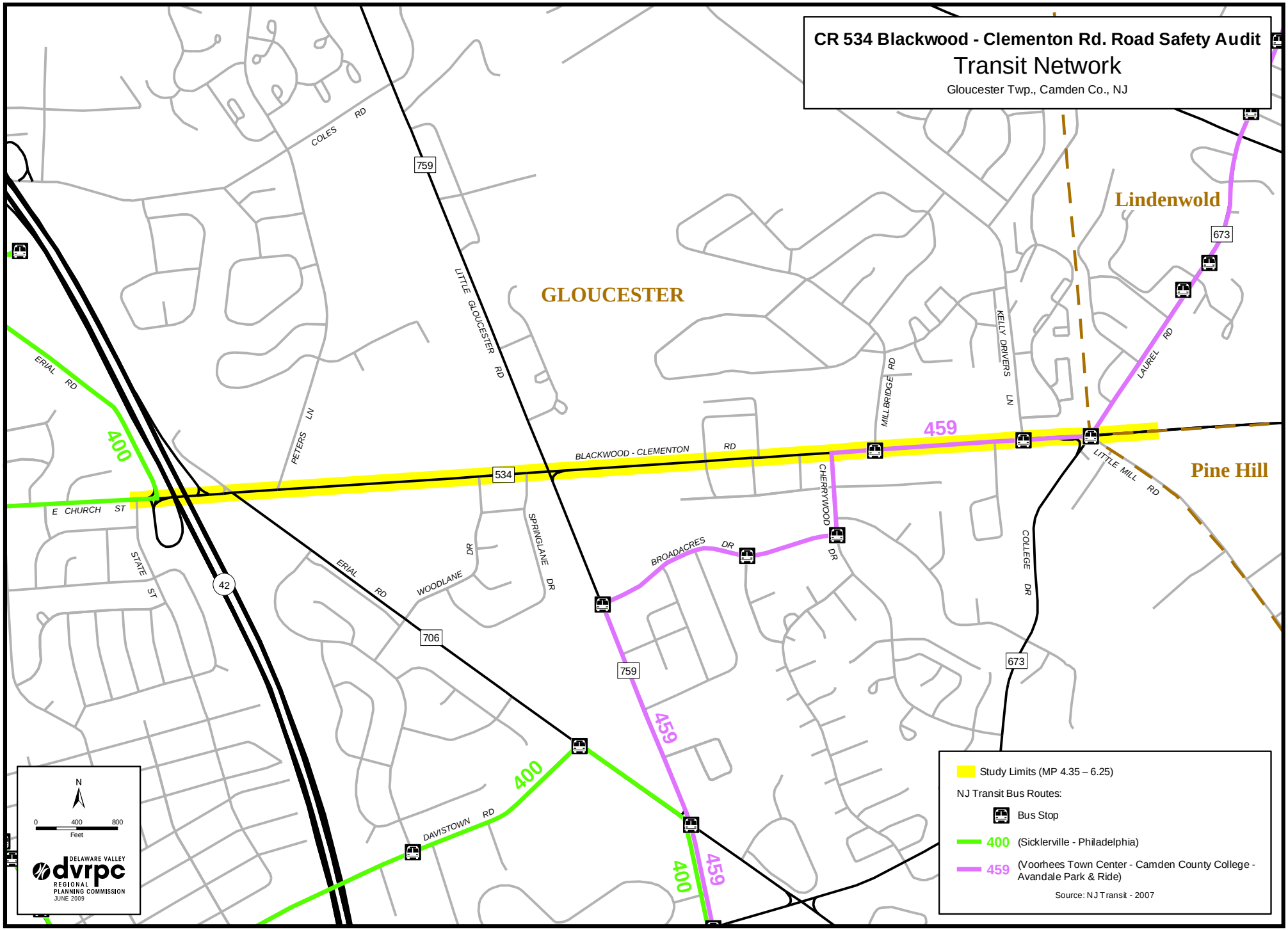
Crash Summary

Crashes by Mile Post

Site Photos


CR 534 Blackwood - Clementon Rd. Road Safety Audit
Study Area
Gloucester Twp., Camden Co., NJ
Study Limits (MP 4.35 – 6.25)
GLOUCESTER
Lindenwold
Pine Hill
BLACKWOOD - CLEMENTON RD
534
759
673
706
42
COLES RD
LITTLE GLOUCESTER RD
PETERS LN
ERIAL RD
E CHURCH ST
STATE ST
SPRINGLANE DR
WOODLANE DR
BROADACRES DR
CHERRYWOOD DR
COLLEGE DR
MILLBRIDGE RD
KELLY DRIVERS LN
LAUREL RD
LITTLE MILL RD
DAVISTOWN RD
N
0 400 800
Feet
Aerial Imagery: NJOIT, 2007
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION
JUNE 2009


CR 534 Blackwood - Clementon Rd. Road Safety Audit
Annual Average Daily Traffic Volumes
Gloucester Twp., Camden Co., NJ
Study Limits (MP 4.35 – 6.25)
Traffic Count Location (approximate)
* NJDOT Count
GLOUCESTER
Lindenwold
Pine Hill
2009
14,636 WB
2004
25,161 Both*
2009
10,714 EB
2009
13,811 WB
2009
14,463 EB
2004
22,423 Both*
BLACKWOOD - CLEMENTON RD
534
759
673
706
42
COLES RD
LITTLE GLOUCESTER RD
ERIAL RD
PETERS LN
MILLBRIDGE RD
KELLY DRIVERS LN
LAUREL RD
LITTLE MILL RD
E CHURCH ST
STATE ST
WOODLANE DR
SPRINGLANE DR
CHERRYWOOD DR
BROADACRES DR
COLLEGE DR
DAVISTOWN RD
N
0 400 800
Feet
DELAWARE VALLEY
dvrpc
REGIONAL
PLANNING COMMISSION
JUNE 2009


CR 534 Blackwood - Clementon Rd. Road Safety Audit
Transit Network
Gloucester Twp., Camden Co., NJ
GLOUCESTER
Lindenwold
Pine Hill
BLACKWOOD - CLEMENTON RD
534
759
673
706
42
459
400
COLES RD
LITTLE GLOUCESTER RD
PETERS LN
ERIAL RD
E CHURCH ST
STATE ST
WOODLANE DR
SPRINGLANE DR
MILLBRIDGE RD
KELLY DRIVERS LN
LAUREL RD
CHERRYWOOD DR
BROADACRES DR
COLLEGE DR
LITTLE MILL RD
DAVISTOWN RD
N
0 400 800
Feet
DELAWARE VALLEY
dvrpc
REGIONAL PLANNING COMMISSION
JUNE 2009
Study Limits (MP 4.35 – 6.25)
NJ Transit Bus Routes:
Bus Stop
400 (Sicklerville - Philadelphia)
459 (Voorhees Town Center - Camden County College - Avandale Park & Ride)
Source: NJ Transit - 2007

CRASH SUMMARY

County Route 534 MP 4.35 - 6.25
Gloucester Township and Lindenwold - Pine Hill Boroughs, Camden County
01/01/2005 THRU 12/31/2007

TOTAL CRASHES: 428

SEVERITY	COUNT	% OF TOTAL	2007 Average
Fatal	1	0.23%	
Injury	145	33.88%	28.29%
Property Damage	282	65.89%	
Total	**428**		

INTERSECTION	COUNT	% OF TOTAL	2007 Average	**
At Signalized Intersection	122	28.50%	14.74%	
At Unsignalized Intersection	76	17.76%		
Between Intersections	230	53.74%		F
Railroad Crossing	0	0.00%		
Total	**428**			

COLLISION TYPE	COUNT	% OF TOTAL	2007 Average	**
Same Dir.-Rear End	173	40.42%	30.63%	
Same Dir.-Sideswipe	47	10.98%		
Angle	96	22.43%	19.58%	
Head On	1	0.23%		
Parked Vehicle	1	0.23%		
Left Turn / U Turn	64	14.95%	5.66%	
Backing	5	1.17%		
Encroachment	2	0.47%	0.41%	
Overturned	1	0.23%		
Fixed Object	17	3.97%		
Animal	1	0.23%		
Pedestrian	7	1.64%		F
Pedalcycle	5	1.17%	0.96%	
Non-Fixed Object	6	1.40%	0.41%	
Unknown	1	0.23%	0.09%	
Other	1	0.23%		
Total	**428**			

SURFACE CONDITION	COUNT	% OF TOTAL	2007 Average	**
Dry	326	76.17%	75.43%	F
Wet Surface	91	21.26%	19.00%	
Snow	10	2.34%	2.10%	
Ice	1	0.23%		
Unknown	0	0.00%		
Other	0	0.00%		
Total	**428**			

LIGHT	COUNT	% OF TOTAL	2007 Average	**
Day	291	67.99%		
Dusk	19	4.44%	2.60%	
Night	115	26.87%	24.80%	F
Dawn	2	0.47%		
Unknown	1	0.23%		
Total	**428**			

Note:
The 2007 average reflects all crashes recorded on the county route system during that year. It is standard practice to use only the most recent year of statewide data when making a comparison since yearly fluctuations regarding system-wide data are typically insignificant.

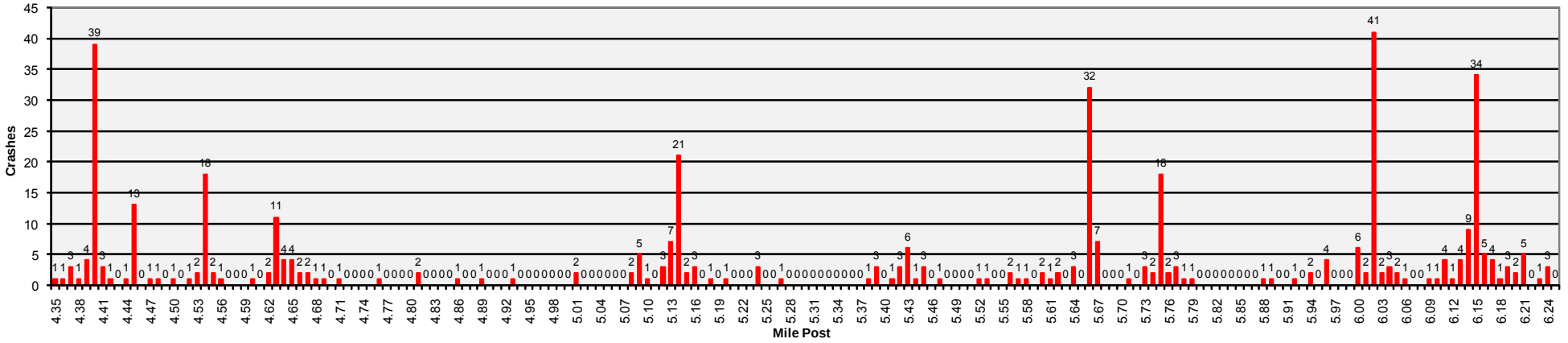
Length of Segment 1.9 miles
Number of Years 3

** These columns indicate the number of fatal crashes in each accident category.

Source: DVRPC, NJDOT

CR 534 Blackwood - Clementon Rd. Road Safety Audit

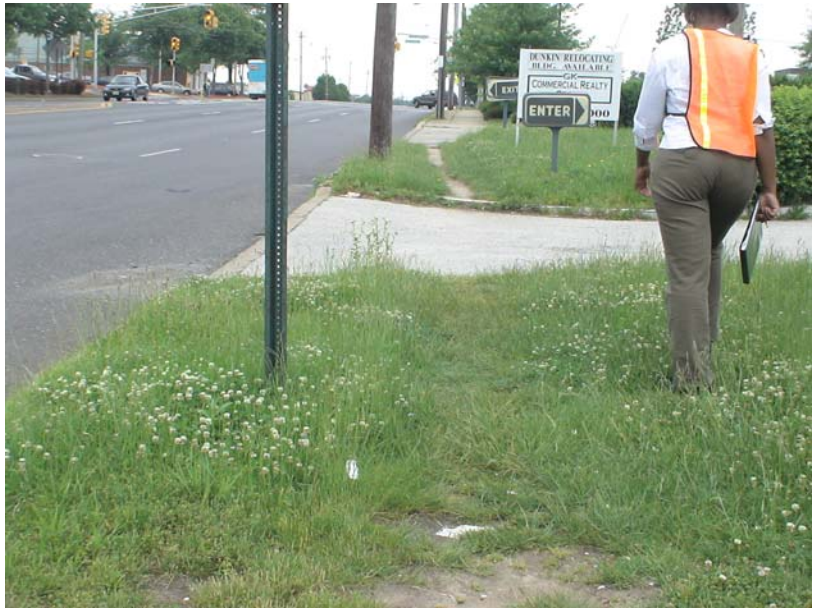
Crashes by Mile Post: 2005 - 2007



Cross Section Geometry

Signals

Pedestrian Environment



Bicyclist Environment

Visibility

Driveways


SUNOCO


BEGIN
CENTER LANE
ONLY


BEGIN
CENTER LANE
ONLY
ROAD WORK
1500 FT

1-A

APPENDIX C

CR 534 (Blackwood-Clementon Road) in the Vicinity of Erial Road (east and west) and NJ 42 Interchange

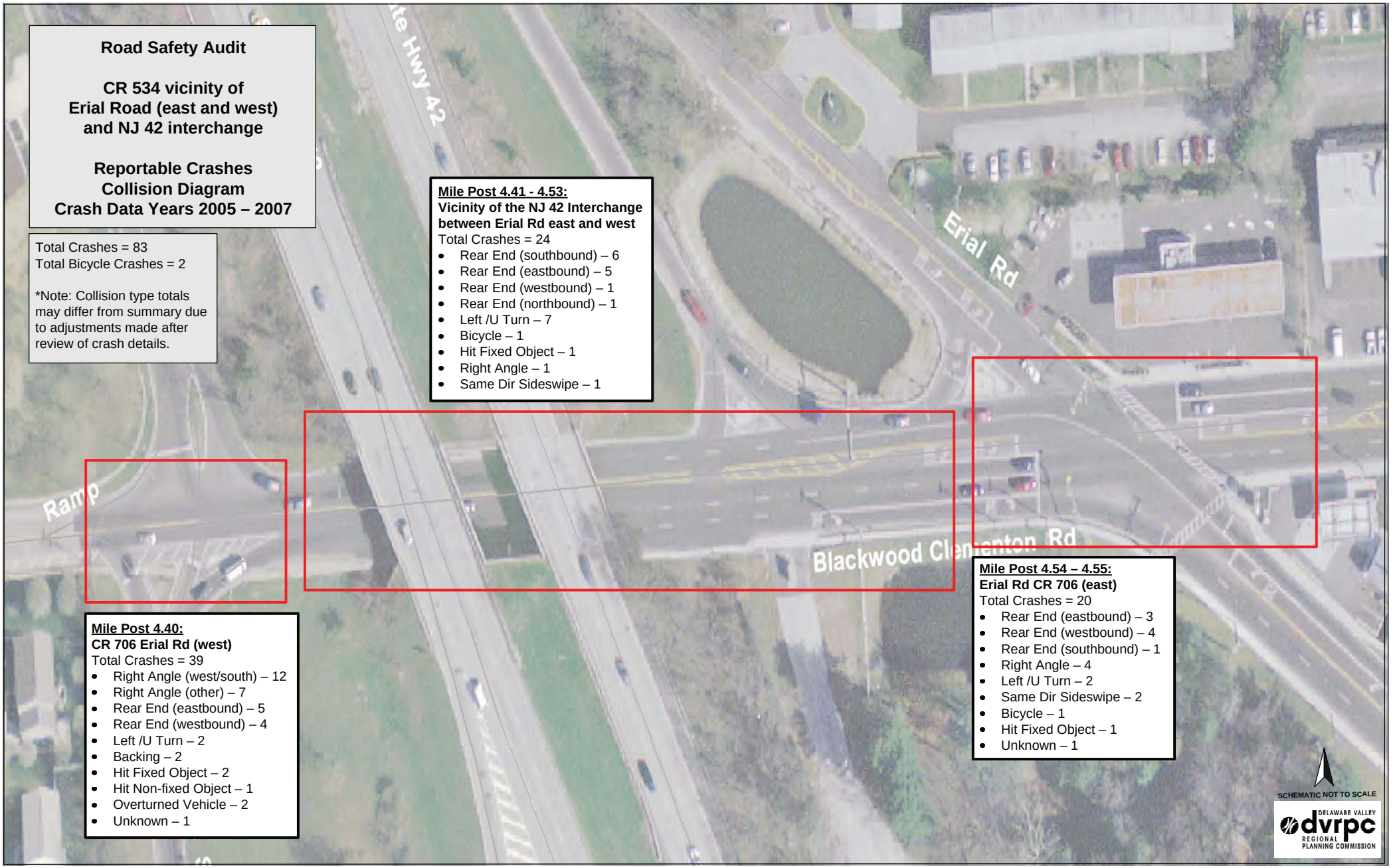
Location-Specific Data

Aerial Map with Crashes

Crash Summary

Turning Movement Counts

Site Photos


Road Safety Audit
CR 534 vicinity of
Erial Road (east and west)
and NJ 42 interchange
Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007
Total Crashes = 83
Total Bicycle Crashes = 2
*Note: Collision type totals may differ from summary due to adjustments made after review of crash details.
Mile Post 4.41 - 4.53:
Vicinity of the NJ 42 Interchange between Erial Rd east and west
Total Crashes = 24
Rear End (southbound) – 6
Rear End (eastbound) – 5
Rear End (westbound) – 1
Rear End (northbound) – 1
Left /U Turn – 7
Bicycle – 1
Hit Fixed Object – 1
Right Angle – 1
Same Dir Sideswipe – 1
Erial Rd
Ramp
Blackwood Clementon Rd
Mile Post 4.40:
CR 706 Erial Rd (west)
Total Crashes = 39
Right Angle (west/south) – 12
Right Angle (other) – 7
Rear End (eastbound) – 5
Rear End (westbound) – 4
Left /U Turn – 2
Backing – 2
Hit Fixed Object – 2
Hit Non-fixed Object – 1
Overturned Vehicle – 2
Unknown – 1
Mile Post 4.54 – 4.55:
Erial Rd CR 706 (east)
Total Crashes = 20
Rear End (eastbound) – 3
Rear End (westbound) – 4
Rear End (southbound) – 1
Right Angle – 4
Left /U Turn – 2
Same Dir Sideswipe – 2
Bicycle – 1
Hit Fixed Object – 1
Unknown – 1
SCHEMATIC NOT TO SCALE
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit
CR 534 Blackwood Clementon Rd

CR 706 Erial Rd and NJ 42 Interchange Area
MP 4.40 - 4.55
Crash Years: 2005 - 2007

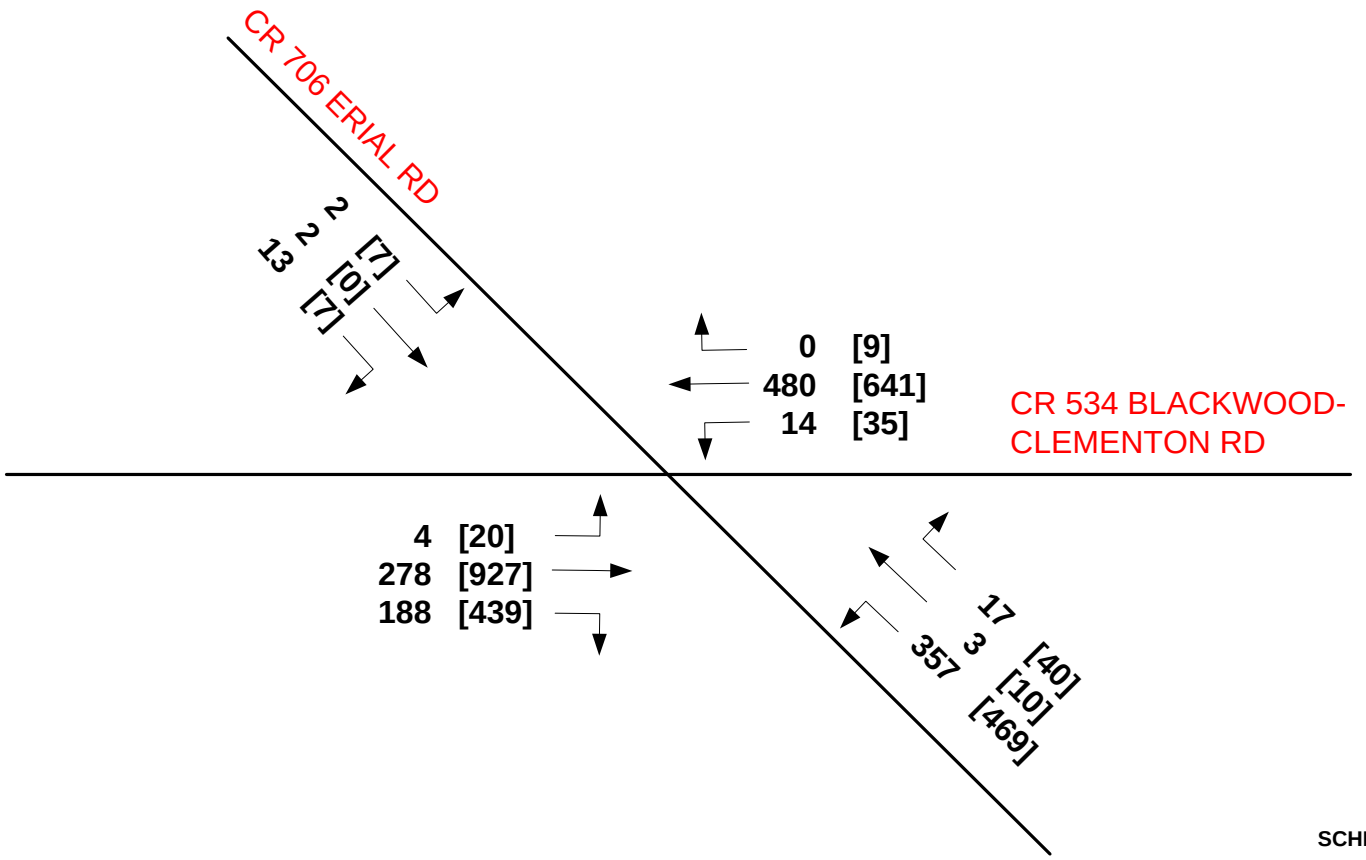
Category	Total	% of Total
Same Direction (Rear End)	30	36.1%
Same Direction (Side Swipe)	5	6.0%
Right Angle	27	32.5%
Opposite Direction		0.0%
Struck Parked Vehicle		0.0%
Left Turn/U Turn	11	13.3%
Backing	2	2.4%
Encroachment		0.0%
Overturned	1	1.2%
Fixed Object	4	4.8%
Animal		0.0%
Pedestrian		0.0%
Pedalcyclist	2	2.4%
Non-fixed Object	1	1.2%
Railcar - Vehicle		0.0%
Unknown		0.0%
Other		0.0%
	83	100.0%
At Intersection	60	72.3%
Not at Intersection	23	27.7%
At or Near Railroad Crossing		0.0%
	83	100.0%
Day	61	73.5%
Dusk	5	6.0%
Night	17	20.5%
Dawn		0.0%
Other/Unknown		0.0%
	83	100.0%
Fatality		0.0%
Injury	25	30.1%
Property	58	69.9%
	83	100.0%
Dry	67	80.7%
Wet	15	18.1%
Snowy	1	1.2%
Icy		0.0%
Other		
	83	100.0%

*Note: Collision type totals may differ from diagram due to adjustments made after review of crash details.

CR 534 Blackwood-Clementon Rd and CR 706 Erial Rd Intersection

Peak Hour Turning Movement Counts

Peak Hours
AM: 7:15 - 8:15
PM: [6:00 - 7:00]
May 2009



SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Vicinity of Erial Road (east and west) and NJ 42 Interchange

Vicinity of Erial Road (east and west) and NJ 42 Interchange

APPENDIX D

CR 534 (Blackwood-Clementon Road) at CR 759 (Little Gloucester Road)

Location-Specific Data

Aerial Map

Collision Diagram

Crash Summary

Turning Movement Counts

Site Photos

2. CR 534 Blackwood-Clementon Rd at CR 759 Little Gloucester Rd

Mile Post 5.12 – 5.16

COLLISION TYPE	
Rear-end	16
Left Turn / U Turn	9
Right Angle	5
Sideswipe	5
Hit Pedestrian	1
Total	**36**
INTERSECTION	
At Intersection	18
Not at Intersection	18
Total	**36**

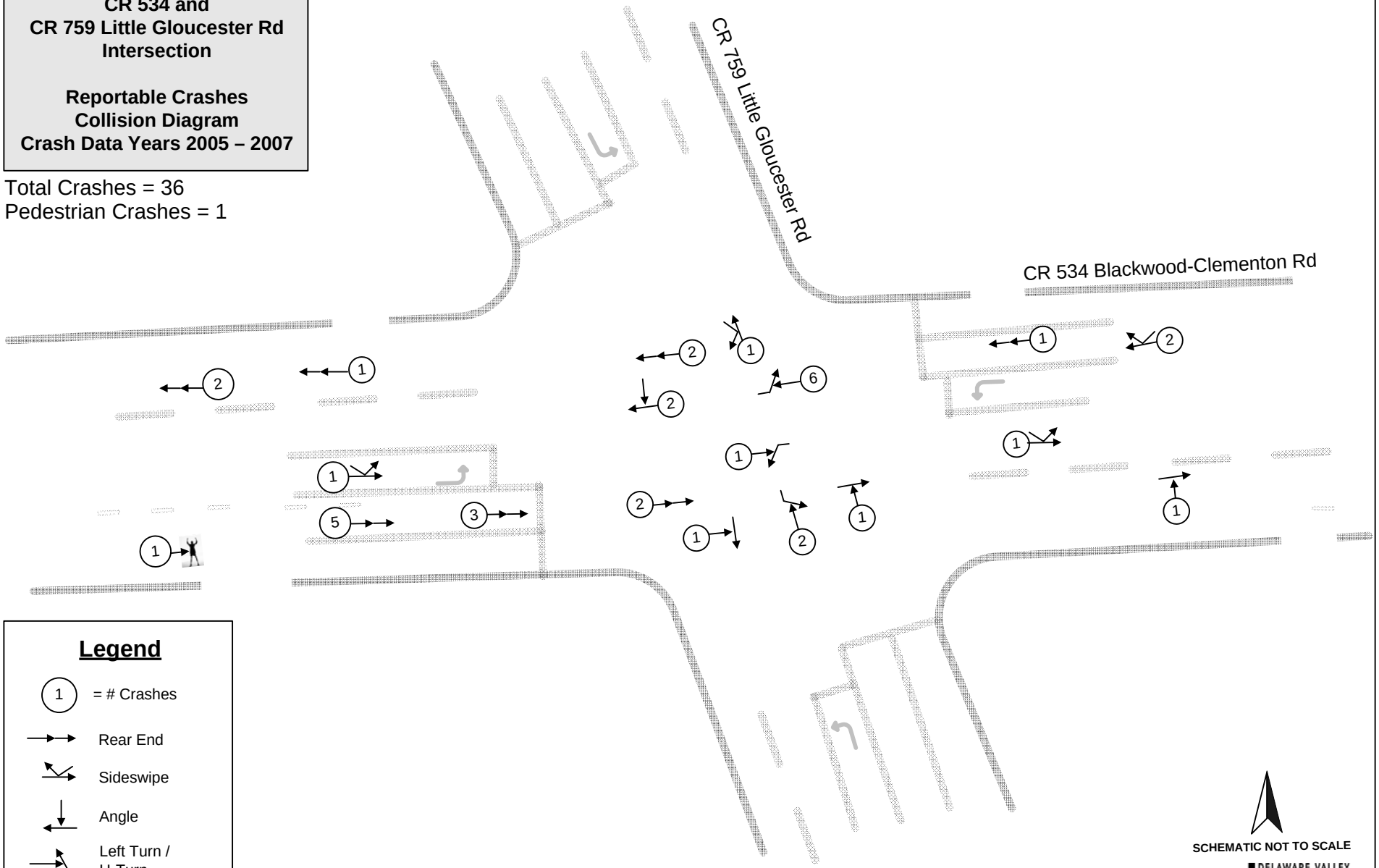
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit

CR 534 and
CR 759 Little Gloucester Rd
Intersection

Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007

Total Crashes = 36
Pedestrian Crashes = 1



Legend

- (1) = # Crashes
- Rear End
- Sideswipe
- Angle
- Left Turn / U-Turn
- Hit Pedestrian

SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit
CR 534 Blackwood Clementon Rd

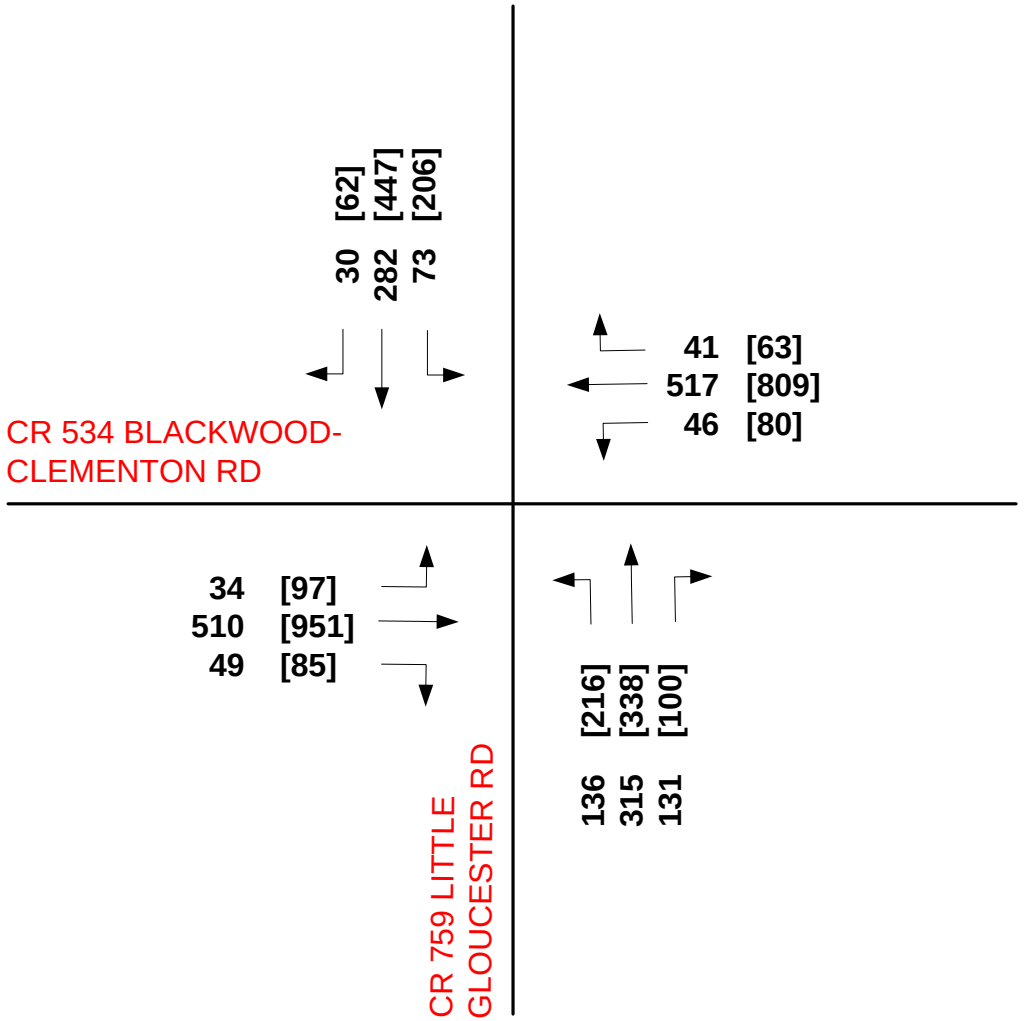
CR 759 Little Gloucester Rd
MP 5.12 - 5.16
Crash Years: 2005 - 2007

Category	Total	% of Total
Same Direction (Rear End)	16	44.4%
Same Direction (Side Swipe)	4	11.1%
Right Angle	5	13.9%
Opposite Direction	1	2.8%
Struck Parked Vehicle		0.0%
Left Turn/U Turn	9	25.0%
Backing		0.0%
Encroachment		0.0%
Overturned		0.0%
Fixed Object		0.0%
Animal		0.0%
Pedestrian	1	2.8%
Pedalcyclist		0.0%
Non-fixed Object		0.0%
Railcar - Vehicle		0.0%
Unknown		0.0%
Other		0.0%
	36	100.0%
At Intersection	18	50.0%
Not at Intersection	18	50.0%
At or Near Railroad Crossing		0.0%
	36	100.0%
Day	28	77.8%
Dusk		0.0%
Night	8	22.2%
Dawn		0.0%
Other/Unknown		0.0%
	36	100.0%
Fatality		0.0%
Injury	11	30.6%
Property	25	69.4%
	36	100.0%
Dry	27	75.0%
Wet	6	16.7%
Snowy	3	8.3%
Icy		0.0%
Other		
	36	100.0%

CR 534 Blackwood-Clementon Rd and CR 759 Little Gloucester Rd Intersection

Peak Hour Turning Movement Counts

Peak Hours
AM: 8:00 - 9:00
PM: [4:45 - 5:45]
May 2009



SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

At CR 759 (Little Gloucester Road)

APPENDIX E

CR 534 (Blackwood-Clementon Road) from Cherrywood Drive to Millbridge Road

Location-Specific Data

Aerial Map

Collision Diagram

Crash Summary

Turning Movement Counts

Site Photos

3. CR 534 Blackwood-Clementon Rd from Cherrywood Dr to Millbridge Rd

Mile Post 5.66 – 5.76

COLLISION TYPE	
Rear-end	37
Left Turn / U Turn	12
Sideswipe (same dir)	6
Hit Fixed Object	4
Right Angle	2
Bicycle	2
Hit Pedestrian	1
Opp Dir Sideswipe	1
Total	**65**
INTERSECTION	
At Intersection	33
Not at Intersection	32
Total	**65**

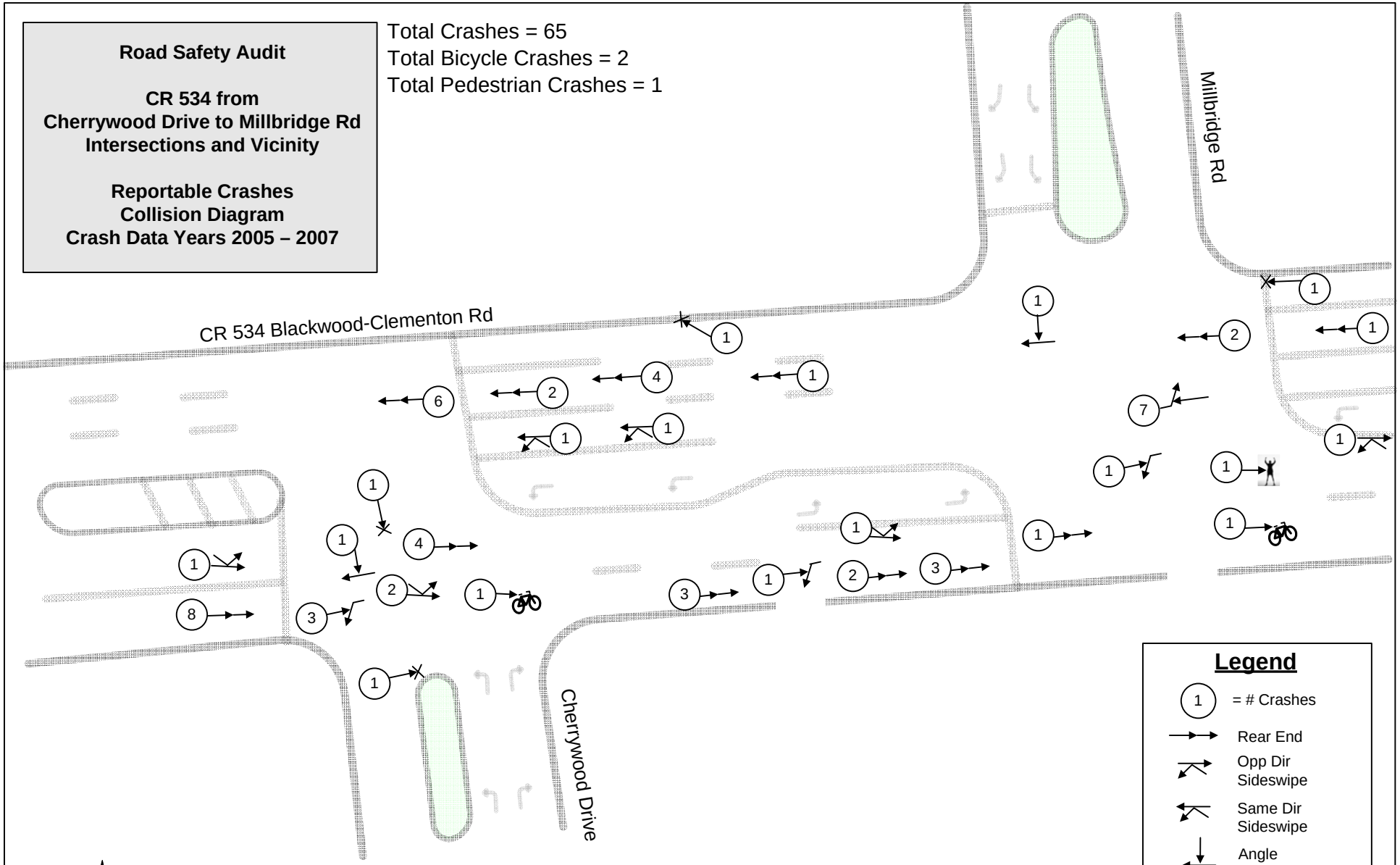
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit

CR 534 from
Cherrywood Drive to Millbridge Rd
Intersections and Vicinity

Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007

Total Crashes = 65
Total Bicycle Crashes = 2
Total Pedestrian Crashes = 1



SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit
CR 534 Blackwood Clementon Rd

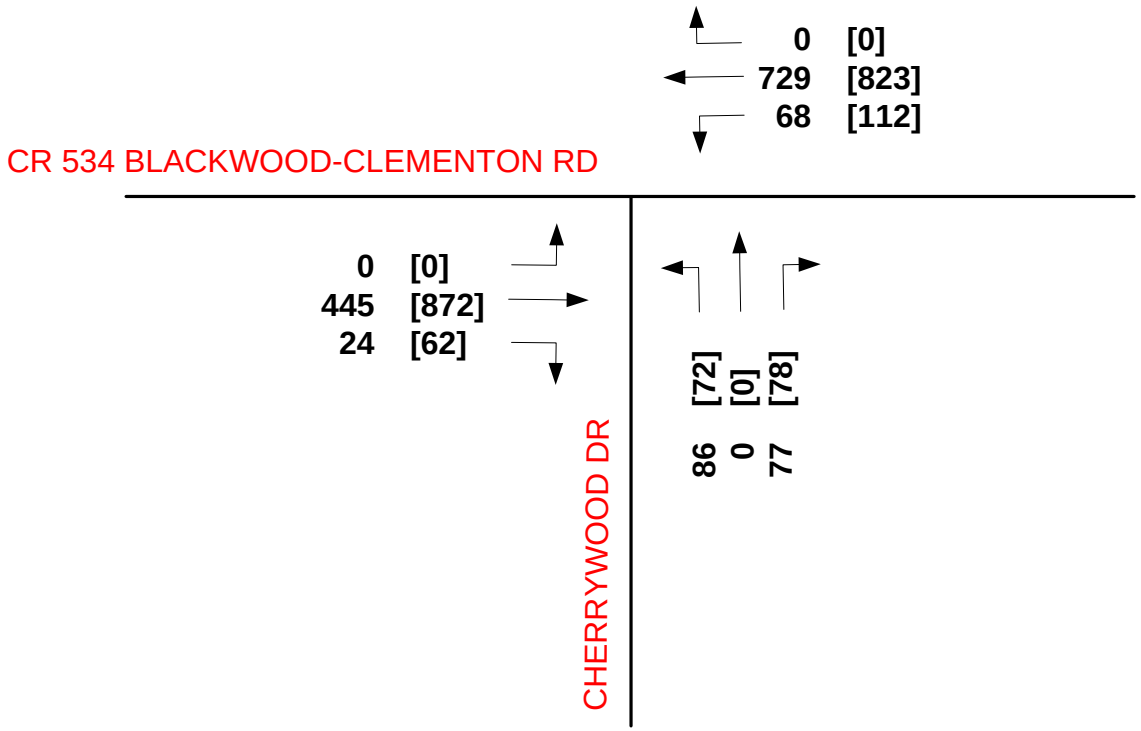
Cherrywood Dr to Millbridge Rd
MP 5.66 - 5.76
Crash Years: 2005 - 2007

Category	Total	% of Total
Same Direction (Rear End)	37	56.9%
Same Direction (Side Swipe)	6	9.2%
Right Angle	2	3.1%
Opposite Direction	1	1.5%
Struck Parked Vehicle		0.0%
Left Turn/U Turn	12	18.5%
Backing		0.0%
Encroachment		0.0%
Overturned		0.0%
Fixed Object	4	6.2%
Animal		0.0%
Pedestrian	1	1.5%
Pedalcyclist	2	3.1%
Non-fixed Object		0.0%
Railcar - Vehicle		0.0%
Unknown		0.0%
Other		0.0%
	65	100.0%
At Intersection	33	50.8%
Not at Intersection	32	49.2%
At or Near Railroad Crossing		0.0%
	65	100.0%
Day	51	78.5%
Dusk	2	3.1%
Night	12	18.5%
Dawn		0.0%
Other/Unknown		0.0%
	65	100.0%
Fatality		0.0%
Injury	26	40.0%
Property	39	60.0%
	65	100.0%
Dry	48	73.8%
Wet	14	21.5%
Snowy	2	3.1%
Icy	1	1.5%
Other		
	65	100.0%

CR 534 Blackwood-Clementon Rd and Cherrywood Dr Intersection

Peak Hour Turning Movement Counts

Peak Hours
AM: 7:45 - 8:45
PM: [4:45 - 5:45]
May 2009



SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

From Cherrywood Drive to Millbridge Road

APPENDIX F

CR 534 (Blackwood-Clementon Road) at Kelly Driver Lane

Location-Specific Data

Aerial Map

Collision Diagram

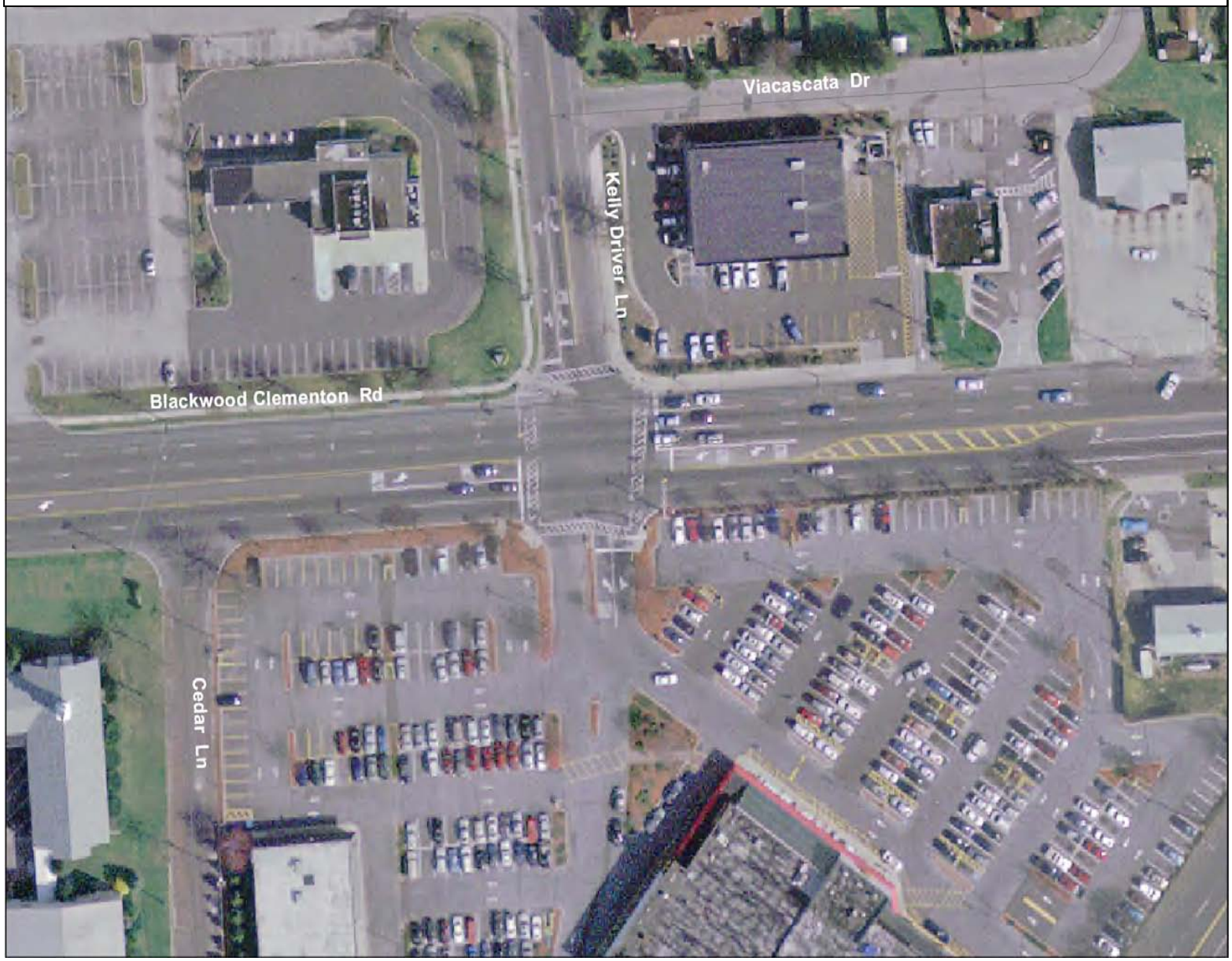
Crash Summary

Turning Movement Counts

Site Photos

4. CR 534 Blackwood-Clementon Rd at Kelly Driver Ln

Mile Post 6.0 – 6.04



COLLISION TYPE	
Rear-end	20
Right Angle	14
Left Turn / U Turn	11
Sideswipe (same dir)	4
Hit Non-fixed Object	1
Hit Fixed Object	1
Hit Pedestrian	1
Bicycle	1
Encroachment	1
Total	**54**
INTERSECTION	
At Intersection	34
Not at Intersection	20
Total	**54**

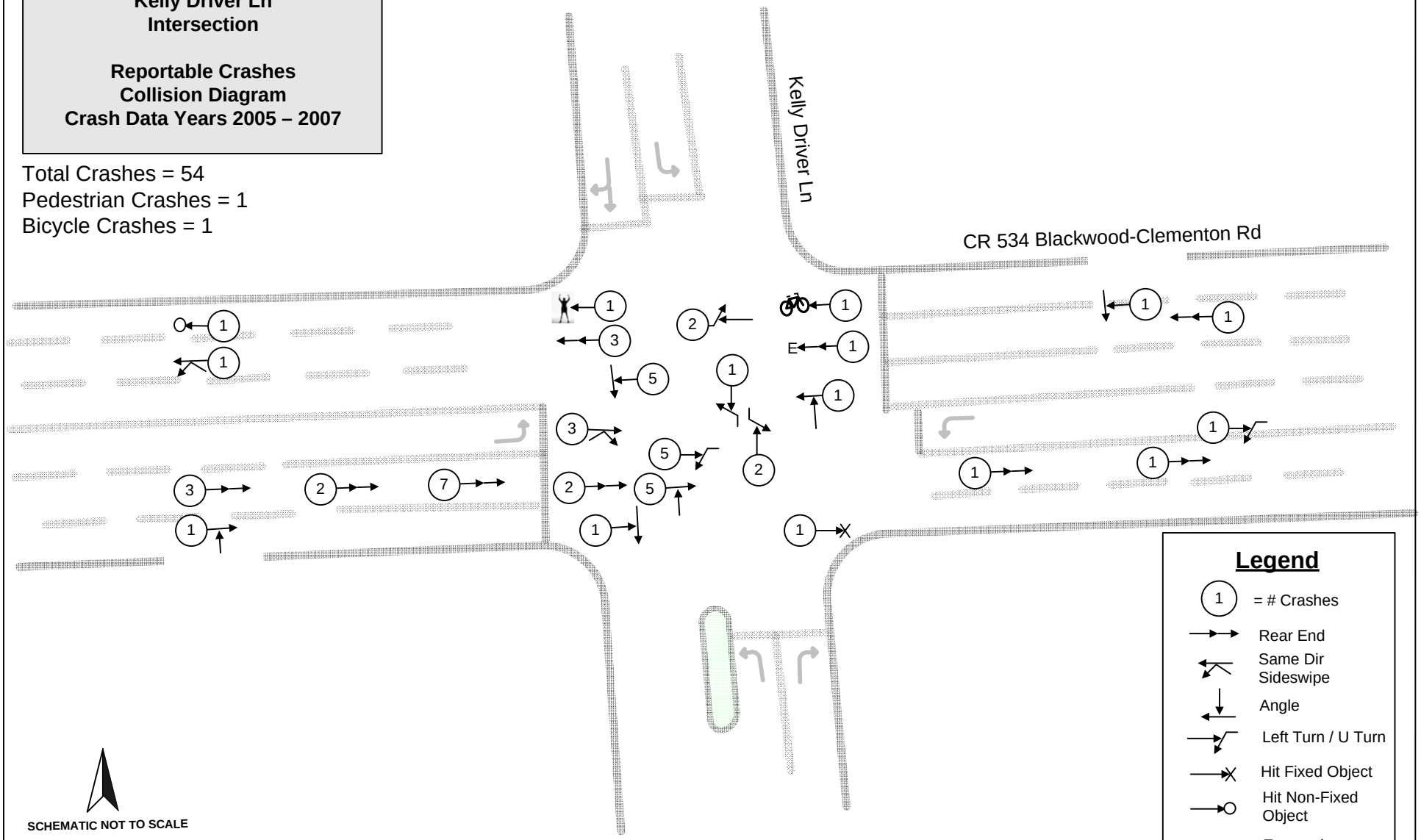
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit

CR 534 and
Kelly Driver Ln
Intersection

Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007

Total Crashes = 54
Pedestrian Crashes = 1
Bicycle Crashes = 1



SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit
CR 534 Blackwood Clementon Rd

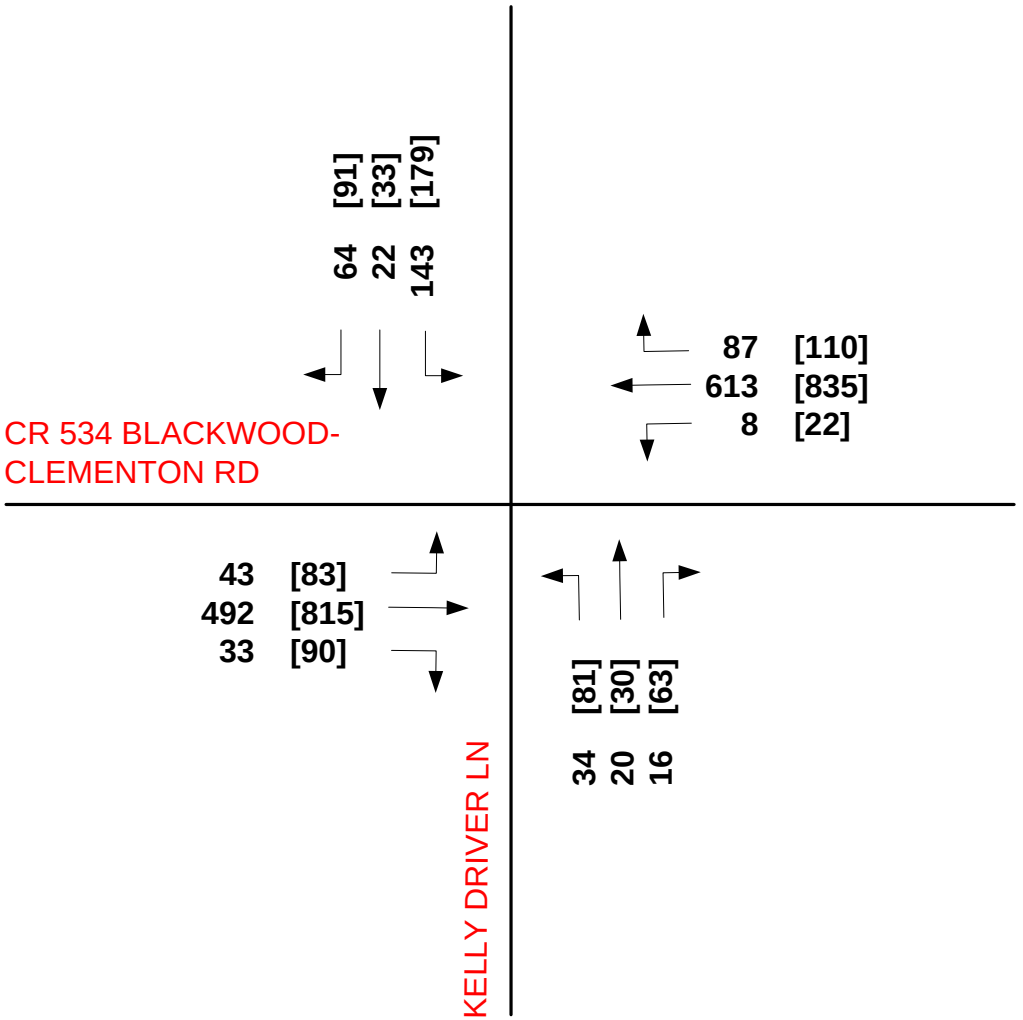
Kelly Driver Ln
MP 6.0 - 6.04
Crash Years: 2005 - 2007

Category	Total	% of Total
Same Direction (Rear End)	20	37.0%
Same Direction (Side Swipe)	4	7.4%
Right Angle	14	25.9%
Opposite Direction		0.0%
Struck Parked Vehicle		0.0%
Left Turn/U Turn	11	20.4%
Backing		0.0%
Encroachment	1	1.9%
Overturned		0.0%
Fixed Object		0.0%
Animal		0.0%
Pedestrian	1	1.9%
Pedalcyclist	1	1.9%
Non-fixed Object	1	1.9%
Railcar - Vehicle		0.0%
Unknown		0.0%
Other	1	1.9%
	54	100.0%
At Intersection	34	63.0%
Not at Intersection	20	37.0%
At or Near Railroad Crossing		0.0%
	54	100.0%
Day	28	51.9%
Dusk	4	7.4%
Night	22	40.7%
Dawn		0.0%
Other/Unknown		0.0%
	54	100.0%
Fatality		0.0%
Injury	23	42.6%
Property	31	57.4%
	54	100.0%
Dry	44	81.5%
Wet	10	18.5%
Snowy		0.0%
Icy		0.0%
Other		
	54	100.0%

CR 534 Blackwood-Clementon Rd and Kelly Driver Ln Intersection

Peak Hour Turning Movement Counts

Peak Hours
AM: 8:00 - 9:00
PM: [6:00 - 7:00]
May 2009



SCHEMATIC NOT TO SCALE

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

At Kelly Driver Lane

APPENDIX G

CR 534 (Blackwood-Clementon Road) at CR 673 (Laurel Avenue / College Drive)

Location-Specific Data

Aerial Map

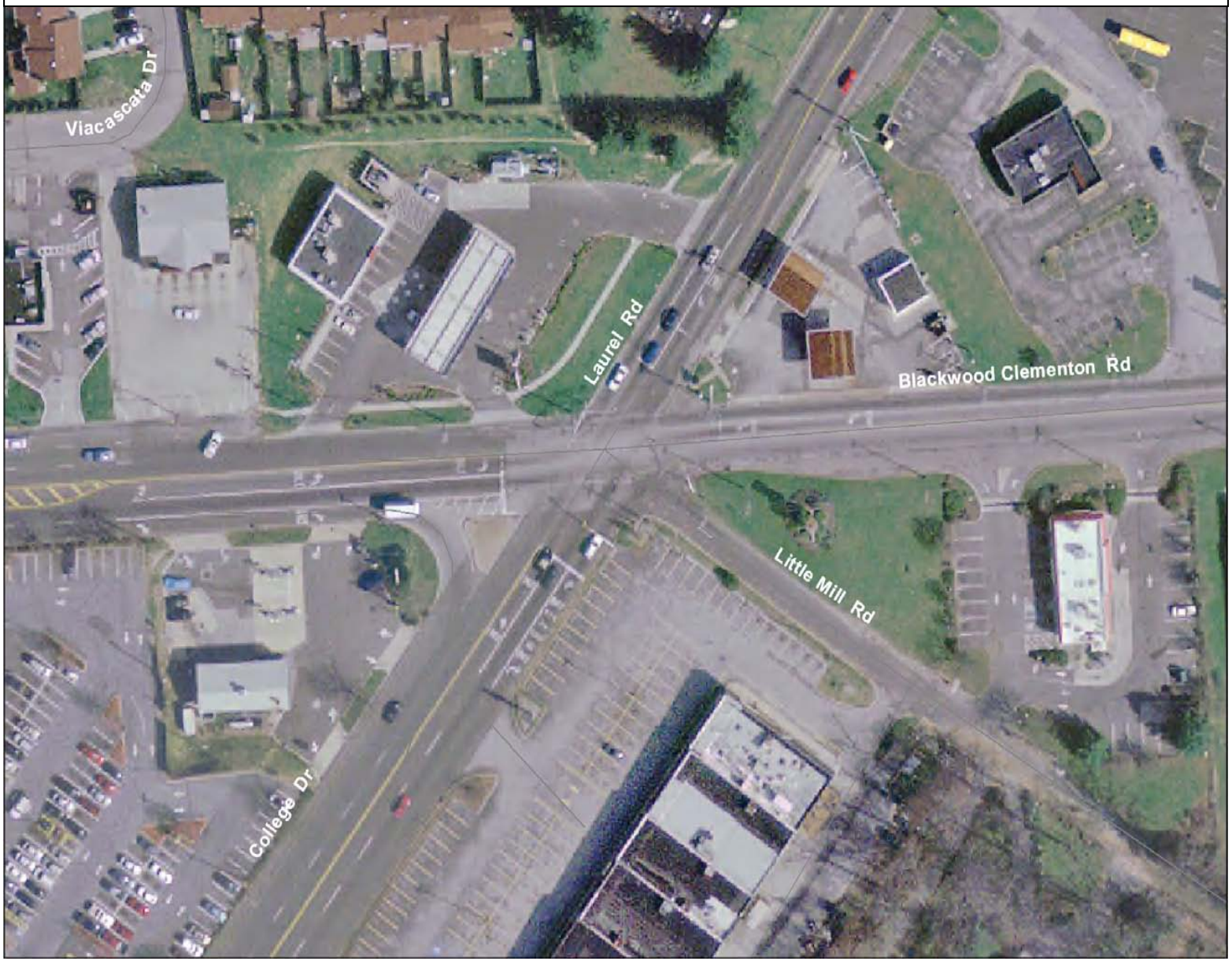
Collision Diagram

Crash Summary

Site Photos

5. CR 534 Blackwood-Clementon Rd at CR 673 Laurel Ave / College Dr

Mile Post 6.13 – 6.17



COLLISION TYPE	
Right Angle	20
Sideswipe	12
Rear-end	9
Left Turn / U Turn	6
Backing	2
Hit Fixed Object	1
Hit Non-fixed Object	1
Total	**51**
INTERSECTION	
At Intersection	26
Not at Intersection	25
Total	**51**

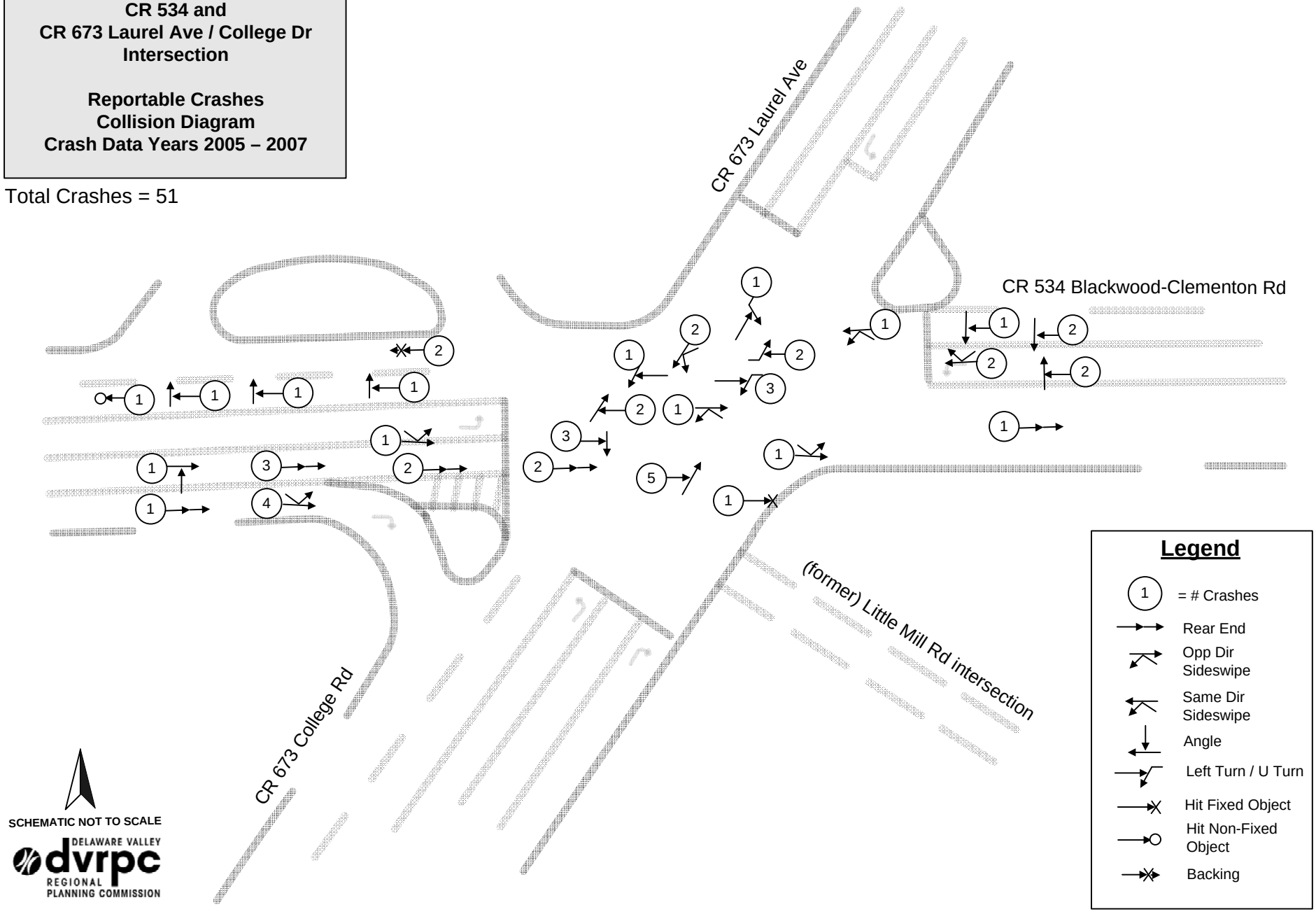
DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Road Safety Audit

CR 534 and
CR 673 Laurel Ave / College Dr
Intersection

Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007

Total Crashes = 51



Road Safety Audit
CR 534 Blackwood Clementon Rd

CR 673 Laurel Ave / College Dr
MP 6.13 - 6.17
Crash Years: 2005 - 2007

Category	Total	% of Total
Same Direction (Rear End)	9	17.6%
Same Direction (Side Swipe)	12	23.5%
Right Angle	20	39.2%
Opposite Direction		0.0%
Struck Parked Vehicle		0.0%
Left Turn/U Turn	6	11.8%
Backing	2	3.9%
Encroachment		0.0%
Overturned		0.0%
Fixed Object	1	2.0%
Animal		0.0%
Pedestrian		0.0%
Pedalcyclist		0.0%
Non-fixed Object	1	2.0%
Railcar - Vehicle		0.0%
Unknown		0.0%
Other		0.0%
	51	100.0%
At Intersection	26	51.0%
Not at Intersection	25	49.0%
At or Near Railroad Crossing		0.0%
	51	100.0%
Day	30	58.8%
Dusk	1	2.0%
Night	19	37.3%
Dawn	1	2.0%
Other/Unknown		0.0%
	51	100.0%
Fatality		0.0%
Injury	13	25.5%
Property	38	74.5%
	51	100.0%
Dry	35	68.6%
Wet	16	31.4%
Snowy		0.0%
Icy		0.0%
Other		
	51	100.0%

At CR 673 (Laurel Avenue / College Drive)

Publication Title:	CR 534 (Blackwood-Clementon Road) Road Safety Audit
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Key Words: Road safety audit, RSA, crashes, injuries, fatalities, issues, strategies, traffic signal, coordination, engineering, enforcement, education, stakeholders, prioritize, intersection, speed limit, traffic volumes, stakeholders, audit team, geometry, pavement markings, signs, crosswalk, sidewalk, curb ramp, two-way-left-turn-lane, CR 534, Blackwood-Clementon Road

Abstract: This report documents the process and findings of the CR 534 (Blackwood-Clementon Road) 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 area 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 DVRPC's Regional Safety Action Plan. Implementation of improvement strategies may be eligible for Local Federal Safety Funds.

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