EVALUATION OF HIGH CRASH LOCATIONS (DARK CRITERIA) STUDY



LOCATION #2: US ROUTE 9 MILEPOST 5.80 to 7.19 November 2012





EXECUTIVE SUMMARY

The Hazard Elimination Program (HEP) site selection process was used to determine ten (10) roadway segments within the state of Delaware that meet the following crash history criteria:

- Dark crash Critical Ratio greater than one (1); and
- Ten (10) or more accidents occurring in the three (3) year study period within a one (1) mile roadway segment.

US Route 9 (County Seat Highway, Sussex Road 28), from Milepost 5.80 to 7.19 was one of the sites selected for further study based on dark crash and total crash history.

The evaluation and recommendations for US 9 (County Seat Highway, Sussex Road 28), beginning at Milepost 5.80, approximately 0.3 miles west of DE Route 20 (Concord Road / Hardscrabble Road, Sussex Road 20), and ending at Milepost 7.19, approximately 0.3 miles east of Asbury Road (Sussex Road 446) in Sussex County, Delaware, are included in this report. This study includes the following tasks:

- Reviewed crash history;
- · Reviewed existing conditions;
- Identified specific sites where crashes are occurring; and
- Provided recommendations to improve conditions.

Police crash reports were analyzed to identify high crash sites along US Route 9 from Milepost 5.80 to 7.19. The crash patterns at one (1) site, US Route 9 and DE Route 20 (Concord Road / Hardscrabble Road, Sussex Road 20) intersection, garnered evaluation for potential nighttime safety improvements.

The study concluded that roadway lighting is warranted at the intersection of US Route 9 and DE Route 20. In addition to the roadway lighting, other non-lighting improvements were recommended including replacing a damaged street name blade and restriping stop bars and lane markings on some of the approaches at the intersection.

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1. INTRODUCTION

The purpose of this study was to evaluate locations with the highest ratios of crashes occurring during dark conditions throughout the state of Delaware. The study included reviewing crash history and existing conditions of the locations, identifying specific sites where crashes are occurring and providing recommendations to improve conditions.

The study included three parts:

Part 1: Location Selection – The Hazard Elimination Program (HEP) site selection process was used to determine ten (10) locations statewide with a dark crashes Critical Ratio greater than one and ten (10) or more crashes occurring in the three year study period within a one-mile roadway segment. Results from the location selection process were reviewed in coordination with DelDOT. Corridors that were already part of an ongoing HSIP or HEP project were not included in this study. The Critical Ratio methodology was used in the location selection process. The list of statewide 1.0 mile corridors ranked by Critical Ratio is included in **Appendix C**.

Part 2: Evaluation – After the list of the top ten locations was approved by DelDOT, initial review was performed for each selected location. The evaluation included field visits to the sites; collecting information on existing roadway and traffic conditions; crash analysis; preliminary lighting evaluation; and this report. The report includes existing lighting analysis; concept lighting improvement alternatives; other signing, striping and signal recommendations in accordance with the Delaware Strategic Highway Safety Plan (SHSP), particularly related to dark crashes; potential design/implementation issues, and identification of the need for more detailed studies (Phase II studies).

Part 3: Coordination – When possible, DelDOT-approved recommendations will be coordinated for inclusion into the construction of ongoing projects. (HEP, Pavement & Rehabilitation, PD, etc.)

The location selection process resulted in a list of ten locations, including US 9 (County Seat Highway, Sussex Road 28) from milepost 5.80 to 7.19. There are no previous studies related to this roadway segment.

Study Area Characteristics

The study area includes US 9 (County Seat Highway, Sussex Road 28), beginning at Milepost 5.80, approximately 0.3 miles west of DE Route 20 (Concord Road / Hardscrabble Road, Sussex Road 20), and ending at Milepost 7.19, approximately 0.3 miles east of Asbury Road (Sussex Road 446) in Sussex County, Delaware.

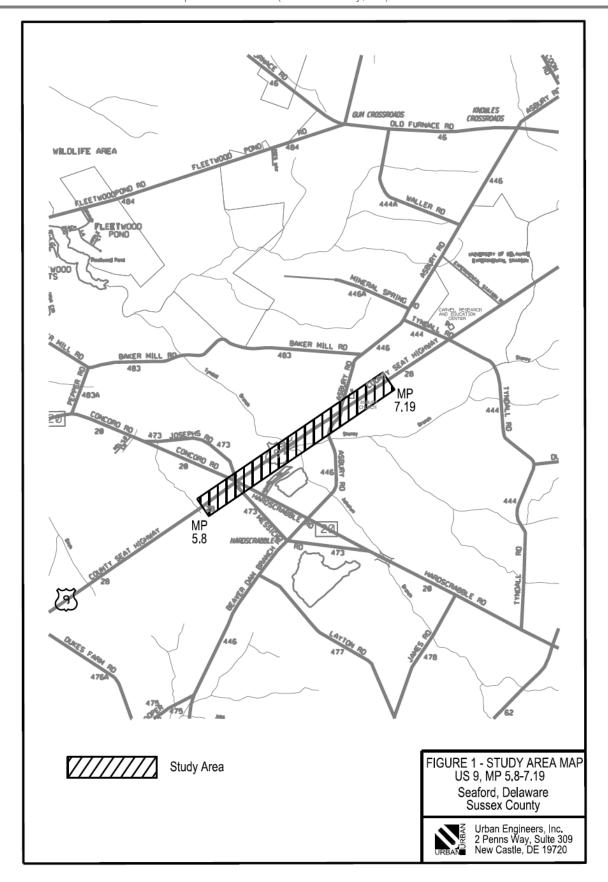
In the vicinity of the site, US Route 9 is an undivided, two-lane roadway. The posted speed limit is 50 miles-per-hour. The road is classified as a minor arterial roadway throughout the project area. The road experienced ADTs of 6,887 vehicles west of DE Route 20 and 6,170 vehicles east of DE Route 20 in 2011.

There is a shoulder along US Route 9 in both directions throughout the project area except near the US Route 9 and DE Route 20 signalized intersection.

Raised pavement markers are present on US Route 9 throughout the project area.

Based on visual inspection, it appears there are no signs with Type IX or XI sheeting at this location. Most signs appear to have Type III or Type IV sheeting.

A study area map is provided in Figure 1.



2. CRASH DATA SUMMARY AND ANALYSIS

Police crash reports were analyzed to identify high crash sites along US Route 9 from Milepost 5.80 to 7.19. This evaluation was based on crash data during the three year period from May 13, 2008 to May 13, 2011.

A total of eighteen (18) crashes occurred along US Route 9 from Milepost 5.80 to 7.19 during the evaluation period. Five (5) of the crashes resulted in personal injuries (28%). Run-off-the-road collisions with fixed objects made up 6 of the 18 crashes (33%). Rear-end and angle collisions each made up 4 of the 18 crashes (22%).

Of the 18 crashes, 12 (67%) occurred during dark conditions.

Appendix A shows the crash data summary.

The crash patterns at the following site garnered evaluation for potential nighttime safety improvements:

US Route 9 and DE Route 20 intersection.

Appendix B shows the crash diagram for this intersection.

There were no other crash patterns identified within this roadway segment.

Site #1: US Route 9 @ DE Route 20 Intersection (M.P. 6.10)

There were five (5) total crashes at the US Route 9 and DE Route 20 intersection during the evaluation period. Four (4) of these five (5) crashes (80%) occurred during dark conditions.

This site was selected for further evaluation based on the crash history.

3. SITE CHARACTERISTICS

An initial field visit was conducted to collect information on existing conditions including: roadway geometry, signage, striping, signal poles locations, and utility pole locations.

Site #1: US Route 9 (County Seat Highway, Sussex Road 28) @ DE Route 20 (Concord Road / Hardscrabble Road, Sussex Road 20) Intersection (M.P. 6.10)

US Route 9 and DE Route 20 intersection is located at Milepost 6.10 of US Route 9. The intersection is signalized and there is no existing street lighting. There are two (2) span wire poles on each the southwest corner and the northeast corner. The approaches along US Route 9 have one (1) left-turn lane, one (1) through lane and one (1) right-turn lane. The approaches along DE Route 20 have one (1) left-turn lane and one (1) shared through-right lane. All right-turns are channelized.

Existing sidewalk is located on the southeast corner. Raised curb extends approximately one-hundred and fifty (150) feet back of the intersection on all approaches. There are no existing crosswalks present at the intersection. Yield signage is located at each corner for right-turn vehicles. Yield pavement markings are only located for vehicles entering US Route 9 from DE Route 20.

There are four (4) driveways for a business on the southeast corner. There are two (2) residential driveways near the intersection:

- Approximately 150 feet north of the intersection along northbound DE Route 20; and
- Approximately 100 feet west of the intersection along eastbound US Route 9.



Photo 1: Facing East on US Route 9 approaching DE Route 20



Photo 2: Facing West on US Route 9 approaching DE Route 20

Photo 1 and Photo 2 show the eastbound and westbound approaches along US Route 9.



Photo 3: US Route 9 (County Seat Highway) @ DE Route 20 (Concord Road / Hardscrabble Road) Intersection

Photo 3 shows the driveways near the intersection mentioned above.

4. LIGHTING WARRANT EVALUATION

The DelDOT Lighting Guidelines contain the conditions for determining if lighting is warranted at a given site. A warrant analysis for the US Route 9 and DE Route 20 intersection is included below.

Site #1: US Route 9 @ DE Route 20 Intersection (M.P. 6.10)

Section 2.3, *Lighting Warrants*, of the DelDOT Lighting Guidelines states that lighting shall be installed at "intersections of U.S. Routes with Delaware Routes (Does not include Alternate or Business Routes)."

Section 2.3, *Lighting Warrants*, of the DelDOT Lighting Guidelines states that lighting should be installed at "locations where crash patterns indicate that lighting may reduce crashes and where the percentage of nighttime accidents is 40 percent or greater."

Crash Patterns

The Crash Data Summary and Evaluation showed that there were five (5) total crashes at this intersection during the three (3) year evaluation period. Four (4) of these crashes occurred during dark conditions.

The following list shows the circumstances surrounding each dark crash at the intersection:

- A driver falling asleep and the vehicle running-off-road;
- A farm tractor drifting left of center hit sign in median;
- A vehicle passing at a high rate of speed and the passed vehicle running-off-road;
- Rear-end

None of the dark crashes involved collisions between US Route 9 traffic and DE Route 20 traffic.

Percentage of Nighttime Accidents

Eighty (80) percent of the crashes at the site occurred during dark conditions. The crash history at this intersection is higher than 40%, which meets the conditions for a location where lighting "should be installed," as per Section 2.3 of the DelDOT Lighting Guidelines.

Roadway Characteristics

The intersection legs include a US Route (US Route 9), and a Delaware State Route (DE Route 20). Therefore, the intersection meets the conditions for a location where lighting "shall be installed," as per Section 2.3 of the DelDOT Lighting Guidelines.

Lighting Warrant Results

Lighting is warranted at this intersection due to the roadway classifications (U.S. Route and Delaware Route) that intersect each other as per Section 2.3 of the DelDOT Lighting Guidelines. Also, this site has greater than 40% of crashes occurring during dark conditions which meets the lighting warrant for where lighting "should be installed."

5. RECOMMENDED IMPROVEMENTS AND PROJECT COORDINATION

Recommendations are included below, and recommended improvements are summarized in the following table.

Based on the crash history, existing conditions and lighting warrant analysis it is recommended to implement lighting at the US Route 9 and DE Route 20 signalized intersection.

Site #1: US Route 9 @ DE Route 20 Intersection (M.P. 6.10)

Roadway Lighting

Intersection lighting is warranted at this intersection as per Section 2.3 of the DelDOT Lighting Design Guidelines. Installing roadway lighting at the intersection will also increase visibility and reduced nighttime crashes will be expected. Therefore roadway lighting is recommended.

The intersection should be evaluated for simple or complex intersection lighting as per Section 4.3.2 of the DelDOT Lighting Design Guidelines. The intersection geometry indicates that simple intersection lighting may be applicable to this intersection; however, the speed of vehicles on US Route 9 (50 miles per hour speed limit), nighttime crash rate, and channelized turn lanes indicate that complex intersection lighting may be more appropriate. Complex intersection lighting typically includes two (2) lights on the approaches to the intersection, and one (1) luminaire after the intersection. Simple intersection lighting is limited to the area enclosed by the stop bars and crosswalks at the intersection, and does not typically include approach lighting.

Utility pole located on the southeast corner of the intersection should be the first option explored during the roadway lighting design process. Installing utility company-owned cutoff cobrahead luminaires on this pole should be investigated. Photometric calculations should be performed to determine the appropriate wattage of the luminaires to achieve standard lighting levels as stated in the DelDOT Lighting Design Guidelines.

Other Improvements

Replace the damaged street name blade located on the pole in the median of southern leg of the intersection. **Photo 4** shows the damaged street blade.

Restripe stop bars, arrows, islands, and lanes on all approaches except southbound approach at the intersection. Much of the existing striping is worn out at the intersection. **Photo 5**, **Photo 6** and **Photo 7** show the existing striping conditions at eastbound US Route 9, westbound US Route 9 and northbound DE Route 20.



Photo 4: Damaged Street Name Blade at Southern Leg of US Route 9 and DE Route 20 Intersection



Photo 5: Existing Stop Bar on Eastbound US Route 9 Approach at US Route 9 and DE Route 20 Intersection



Photo 6: Existing Stop Bar on Westbound US Route 9 Approach at US Route 9 and DE Route 20 Intersection



Photo 7: Existing Stop Bar and Shark Teeth Markings on Northbound DE Route 20
Approach at US Route 9 and DE Route 20 Intersection

Recommended Improvements

Site	Recommended Improvement	
#1. US 9 @ SR 20 Intersection (MP 6.10)	Evaluate for simple or complex intersection lighting as per Section 4.3.2 of the DelDOT Lighting Design Guidelines. Utility pole located on the southeast corner of the intersection should be the first option explored during the roadway lighting design process. Installing utility company-owned cutoff cobrahead luminaires on this pole should be investigated.	
intersection (wir 0.10)	Replace the damaged street name blade located on the pole in the median of southern leg of the intersection.	
	Restripe stop bars, arrows, islands, and lanes on all approaches	
	except southbound approach at the intersection. Much of the existing striping is worn out at the intersection.	

APPENDIX A: Crash Data Summary

Delaware Crash Analysis Reporting System (CARS)

Crash Study Time Period: Study Period from 05-13-2008 to 05-13-2011

Query Type: roadBuffer

Description: S28 US 9 County Seat Highway

MP 5.80-7.19

Study Requested By:LDStudy Generated By:tdtsswnNumber of Crashes:18Includes Non-Reportable Crashes:N

Study Code:



State of Delaware Crash Study Summary

Study Period from 05-13-2008 to 05-13-2011

Summary				
	# of Crashes			
Total Crashes	18			
Fatal Crashes	0			
Total Alcohol- Related Crashes	4			
Total Non Alcohol- Related Crashes	13			
Total Fatalities	0			
Total Pedestrian Fatalities	0			
Total Pedestrian Injuries	0			
Total Pedestrian Crashes	0			
Total Motorcycle Crashes	0			
Total Pedalcyclist Crashes	0			

Classification			
# of Crashes % of Total Crashes			
Non- Reportable	0	0.00%	
Reportable	13	72.22%	
Personal Injury	5	27.78%	
Fatality	0	0.00%	
Total	18		

Manner Of Impact			
	# of Crashes	% of Total Crashes	
Front to rear	4	22.22%	
Front to front	1	5.56%	
Angle	4	22.22%	
Sideswipe, same direction	0	0.00%	
Sideswipe, opposite direction	0	0.00%	
Rear to side	1	5.56%	
Rear to rear	0	0.00%	
Other	1	5.56%	
Unknown	1	5.56%	
Not a collision between two vehicles	6	33.33%	
Total	18		

	Alcohol Related Crashes by Classification					
	Non-reportable Reportable Personal Injury Fatality Total					
Alcohol Related	0	2	2	0	4	
Non-Alcohol Related	0	11	2	0	13	
Total	otal 0 13 4 0 17					

		Manner of Impact	By Classification		
	Non-Reportable	Reportable	Personal Injury	Fatality	Total
Front to rear	0	3	1	0	4
Front to front	0	1	0	0	1
Angle	0	1	3	0	4
Sideswipe, same direction	0	0	0	0	0
Sideswipe, opposite direction	0	0	0	0	0
Rear to side	0	1	0	0	1
Rear to rear	0	0	0	0	0
Other	0	1	0	0	1
Unknown	0	1	0	0	1
Not a collision between two vehicles	0	5	1	0	6
Total	0	13	5	0	18

"Disclaimer for CARS: Crash data and associated police reports are intended for DelDOT use only and shall not be transmitted, copied, distributed or provided to any entity other than DelDOT unless written approval is received from the DelDOT Legal Section. Police reports are the property of the Delaware State Police."

Day Of Week				
	# of % of Tot Crashes Crashe			
Sunday	0	0.00%		
Monday	2	11.11%		
Tuesday	1	5.56%		
Wednesday	4	22.22%		
Thursday	4	22.22%		
Friday	2	11.11%		
Saturday	5	27.78%		
Total	18			

Time Of Day (AM)			
	# of Crashes	% of Total Crashes	
00:00 - 00:59	1	5.56%	
01:00 - 01:59	1	5.56%	
02:00 - 02:59	0	0.00%	
03:00 - 03:59	1	5.56%	
04:00 - 04:59	1	5.56%	
05:00 - 05:59	1	5.56%	
06:00 - 06:59	0	0.00%	
07:00 - 07:59	1	5.56%	
08:00 - 08:59	0	0.00%	
09:00 - 09:59	0	0.00%	
10:00 - 10:59	0	0.00%	
11:00 - 11:59	0	0.00%	
Total	6		

	Time Of Day (PM)			
		# of Crashes	% of Total Crashes	
	12:00 - 12:59	0	0.00%	
	13:00 - 13:59	0	0.00%	
	14:00 - 14:59	1	5.56%	
	15:00 - 15:59	1	5.56%	
	16:00 - 16:59	0	0.00%	
	17:00 - 17:59	3	16.67%	
	18:00 - 18:59	0	0.00%	
	19:00 - 19:59	2	11.11%	
	20:00 - 20:59	0	0.00%	
	21:00 - 21:59	2	11.11%	
	22:00 - 22:59	0	0.00%	
	23:00 - 23:59	3	16.67%	
	Total	12		
_	Unknown Time	0		

Surface Conditions			
	# of Crashes	% of Total Crashes	
Dry	13	72.22%	
Wet	4	22.22%	
Snow	0	0.00%	
Ice/Frost	1	5.56%	
Sand	0	0.00%	
Water (standing,mo	0	0.00%	
Slush	0	0.00%	
Oil	0	0.00%	
Mud, Dirt, Gravel	0	0.00%	
Other	0	0.00%	
Unknown	0	0.00%	
Total	18		

Lighting Conditions									
	# of Crashes	% of Total Crashes							
Daylight	5	27.78%							
Dawn	1	5.56%							
Dusk	0	0.00%							
Dark-Lighted	0	0.00%							
Dark-Not Lighted	12	66.67%	-						
Dark- Unknown Lighting	0	0.00%							
Other	0	0.00%							
Unknown	0	0.00%							
Total	18								

We	ather Condition	ons
	# of Crashes	% of Total Crashes
Clear	10	55.56%
Cloudy	2	11.11%
Fog, Smog, Smoke	1	5.56%
Rain	4	22.22%
Sleet, Hail (freezing rain or drizzle)	0	0.00%
Snow	0	0.00%
Blowing Snow	0	0.00%
Severe Crosswinds	0	0.00%
Blowing Sand, Soil, Dirt	0	0.00%
Other	1	5.56%
Unknown	0	0.00%
Total	18	

	First Harmful Event				
	# of Crashes	% of Total Crashes			
Overturn/Rollover, Non-Collision	0	0.00%			
Fire/Explosion, Non-Collision	0	0.00%			
Immersion, Non-Collision	0	0.00%			
Jackknife, Non-Collision	0	0.00%			
Cargo/Equipment Loss or Shift, Non-Collision	0	0.00%			
Fell/Jumped From Motor Vehicle, Non-Collision	0	0.00%			
Thrown or Falling Object, Non-Collision	0	0.00%			
Other Non-Collision, Non-Collision	0	0.00%			
Pedestrian, Collision With Person, Motor Vehicle, or Non-Fixed Object	0	0.00%			
Pedalcycle, Collision With Person, Motor Vehicle, or Non-Fixed Object	0	0.00%			
Railway Vehicle (train, engine), Collision With Person, Motor Vehicle, or Non- Fixed Object	0	0.00%			
Animal, Collision With Person, Motor Vehicle, or Non-Fixed Object	2	11.11%			
Motor Vehicle in Transport, Collision With Person, Motor Vehicle, or Non-Fixed Object	9	50.00%			
Legally Parked Motor Vehicle, Collision With Person, Motor Vehicle, or Non- Fixed Object	0	0.00%			
Struck by Falling, Shifting Cargo or Anything Set in Motion by Motor Vehicle, Collision With Person, Motor Vehicle, or Non-Fixed Object	0	0.00%			
Work Zone / Maintenance Equipment, Collision With Person, Motor Vehicle, or Non-Fixed Object	0	0.00%			
Other Non-Fixed Object, Collision With Person, Motor Vehicle, or Non-Fixed Object	1	5.56%			
Impact Attenuator/Crash Cushion, Collision With Fixed Object	0	0.00%			
Bridge Overhead Structure, Collision With Fixed Object	0	0.00%			
Bridge Pier or Support, Collision With Fixed Object	0	0.00%			
Bridge Rail, Collision With Fixed Object	0	0.00%			
Cable Barrier, Collision With Fixed Object	0	0.00%			
Culvert, Collision With Fixed Object	0	0.00%			
Curb, Collision With Fixed Object	1	5.56%			
Ditch, Collision With Fixed Object	0	0.00%			
Embankment, Collision With Fixed Object	0	0.00%			

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Guardrail Face, Collision With Fixed Object	0	0.00%
Guardrail End, Collision With Fixed Object	0	0.00%
Concrete Traffic Barrier, Collision With Fixed Object	0	0.00%
Other Traffic Barrier, Collision With Fixed Object	0	0.00%
Tree (standing), Collision With Fixed Object	2	11.11%
Utility Pole, Collision With Fixed Object	1	5.56%
Light Support, Collision With Fixed Object	0	0.00%
Traffic Sign Support, Collision With Fixed Object	0	0.00%
Overhead Sign Support, Collision With Fixed Object	0	0.00%
Traffic Signal Support, Collision With Fixed Object	0	0.00%
Fence, Collision With Fixed Object	0	0.00%
Mailbox, Collision With Fixed Object	0	0.00%
Other Post, Pole or Support, Collision With Fixed Object	0	0.00%
Other Fixed Object (wall, building, tunnel, etc.), Collision With Fixed Object	2	11.11%
Illegally Parked Motor Vehicle, Collision with person, vehicle, or object not fixed	0	0.00%
Stopped Motor Vehicle, Collision with person, vehicle, or object not fixed	0	0.00%
Unknown, Collision With Fixed Object	0	0.00%
Total	18	

Primary Contributing Circumstance									
	# of Crashes	% of Total Crashes							
Speeding	0	0.00%							
Failed to yield right of way	0	0.00%							
Passed Stop Sign	0	0.00%							
Disregard Traffic Signal	0	0.00%							
Wrong side or wrong way	0	0.00%							
Improper passing	0	0.00%							
Improper lane change	1	5.56%							
Following too close	1	5.56%							
Made improper turn	0	0.00%							
Driving under the influence	0	0.00%							
Driver inattention, distraction, or fatigue	4	22.22%							
Driving in a careless or reckless manner	0	0.00%							
Driving in an aggressive manner	0	0.00%							
Improper backing	0	0.00%							
Other improper driving	0	0.00%							
Mechanical defects	0	0.00%							
Animal in Roadway - Deer	0	0.00%							
Animal in Roadway - Other Animal	0	0.00%							
Other environmental circumstances - weather, glare	0	0.00%							
Roadway circumstances - debris, holes, work zone	0	0.00%							
Other	0	0.00%							
Unknown	0	0.00%							
Total	6								

Driver Contributing Circumstance								
	# of Drivers	% of Total Drivers						
No Contributing Action		0.00%						
Failed to yield right of way		0.00%						
Ran Red Light		0.00%						
Ran Stop Sign		0.00%						
Disregard other traffic sign		0.00%						
Disregard other road markings		0.00%						
Exceeded authorized speed limit		16.67%						
Driving too fast for conditions		16.67%						
Made an improper turn		0.00%						
Improper backing		0.00%						
Wrong side or wrong way		66.67%						
Followed too closely		0.00%						
Failure to keep in proper lane		0.00%						
Ran off roadway		0.00%						
Operating vehicle in erratic, reckless, careless, negligent or aggressive manner		0.00%						
Swerving or avoiding due to wind, slippery surface, vehicle, object, non-motorist in roadway, etc.		0.00%						
Over-correcting/over-steering		0.00%						
Improper Passing		0.00%						
Other Contributing Action		0.00%						
Unknown		0.00%						
Total								

CTY	RD	MP	C-MP	DIR	COMP/HQ#	Date	Time	Day	Fat	Inj	AL	LC	WC	SC	FHE	РС	Class	MOI
200	2008																	
S	28	6.09	6.09	5	0508031961	7/7/08	1713	2	0	0	N	01	01	01	13		03	03
S	28	6.57	6.57	5	0408052330	10/25/08	1915	7	0	0	N	05	04	02	31		02	00
S	28	6.88	6.88	5	0408054952	11/10/08	1728	2	0	0		05	01	01	13		03	01
S	20	7.43	7.43	5	0408058329	12/2/08	0030	3	0	0	Υ	05	01	01	13		02	01
200	2009																	
S	28	6.09	6.09	5	0509038982	8/7/09	2340	6	0	0	Υ	05	03	01	13		02	01
S	28	6.17	6.17	5	0509023535	5/23/09	0320	7	0	0	N	05	01	01	40		02	00
S	28	6.21	6.21	5	0509006468	2/11/09	0534	4	0	2	Υ	05	01	01	32		03	00
S	28	6.27	6.27	5	0509000336	1/2/09	2150	6	0	0	N	05	88	04	40		02	00
S	28	6.27	6.27	5	0509020758	5/9/09	1918	7	0	0	Υ	01	02	01	13		03	03
S	28	6.73	6.73	5	0409051829	10/14/09	2123	4	0	0	N	05	04	02	12		02	00
S	28	6.97	6.97	5	0409061559	12/9/09	2310	4	0	0	N	05	01	01	12		02	00
S	28	6.09	6.09	5	0509057251	11/14/09	0128	7	0	0	N	05	04	02	31		02	99
201	0																	
S	00020	7.42			0510020180	4/29/10	0723	5	0	0	N	01	01 -	01	13	07	02	03
S	00028	6.09			0510003695	1/23/10	2349	7	0	0	N	05	01 -	01	24	11	02	88
S	00020	7.42	7.42	3	0510034260	7/8/10	1441	5	0	0	N	01	02 -	01	13	11	02	06
S	00028	6.62			0510018935	4/21/10	1531	4	0	3	N	01	04 -	02	13	11	03	03
S	00020	7.42			0510010623	3/4/10	1715	5	0	0	N	02	01 - 01	01	13	08	02	01
201	1														-			
S	00028	6.09	6.09	3	0411020939	5/12/11	0406	5	0	0	N	05	01 -	01	17	11	02	02

Report generated by tdtsswn at 2011-05-20 11:52:00.167

Report Legend

Cty - County

Rd - Maintenance Road

MP - Milepoint

C-MP - Continuous Milepoint

Dir - Direction of Highway

COMP/HQ# - Complaint Number/Headquarters Number

DAY - Day Of Week Code

Fat - Fatality

Inj - Injury

AL - Alcohol Involved

LC - Lighting Condition

WC - Weather Condition

SC - Surface Condition

MHE - Most Harmful Event

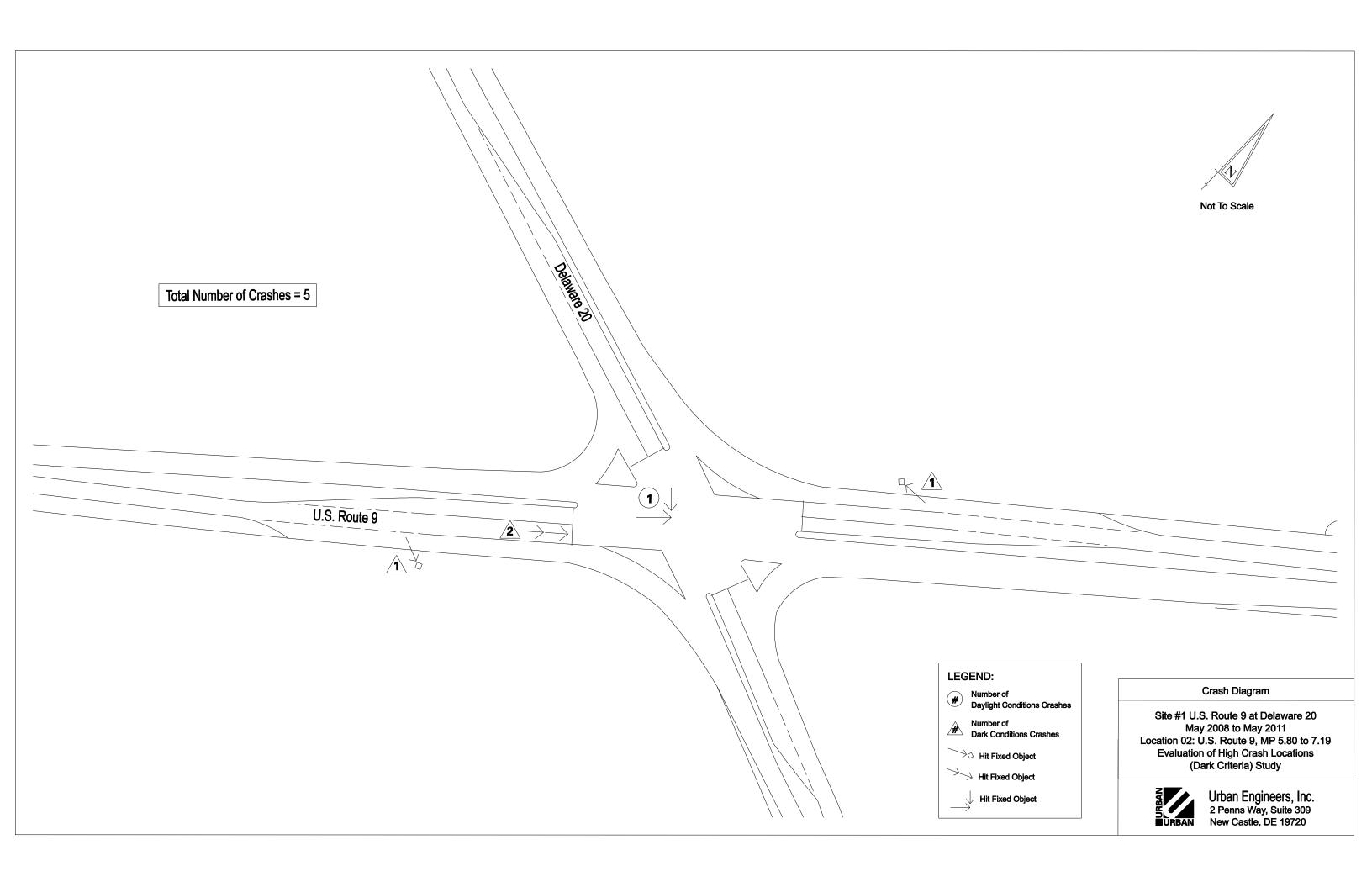
PC - Primary Contributing Circumstance

Class - Report Classification

MOI - Manner of Impact

APPENDIX B: Crash Diagrams

Site #1: US Route 9 (County Seat Highway) @ DE Route 20 (Concord Road / Hardscrabble Road) Intersection



APPENDIX C: Statewide 1.0 Mile Corridors Ranked by Critical Ratio

Delaware - Statewide Accident Date Range 01/01/2007 - 12/31/2009

Interval Length 1.0 mile

Rank	Crit. Ratio	County	Road	Road Name	Beg MP	End MP	# Accs	Notes
1	10.12	1	355D	Harmony Road	0	0.05	1	<10 accidents - Did not meet criteria
2	5.93	1	34H	US 13	0	0.1	1	<10 accidents - Did not meet criteria
3	4.48	1	367	Welsh Tract Road	0	0.99	19	Location #1
4	4.48	1	367	Welsh Tract Road	0.1	1.09	19	Location #1
5	4.01	1	367	Welsh Tract Road	0.2	1.19	17	Location #1
6	4.01	1	367	Welsh Tract Road	0.3	1.29	17	Location #1
7	3.78	1	367	Welsh Tract Road	0.4	1.39	16	Location #1
8	3.76	1	367	Welsh Tract Road	0.4	1.49	16	Location #1
9	3.70	3	199	Fowlers Beach Road	1.2	2.15	4	<10 accidents - Did not meet criteria
10	3.6	1	11A	Delaware Park Road	0	0.15	4	<10 accidents - Did not meet criteria
11	3.56	3	246	Albury Avenue	0.9	1.89	7	<10 accidents - Did not meet criteria
12	3.55	3	199	Fowlers Beach Road	1.1	2.09	4	<10 accidents - Did not meet criteria
13	3.55	3		Fowlers Beach Road		2.09	6	<10 accidents - Did not meet criteria
14	3.51	3	396		1.8	2.79	6	
			396	CD 40	1.9			<10 accidents - Did not meet criteria
15	3.46	2	14	SR 42	3	3.91	5	<10 accidents - Did not meet criteria
16	3.43	1	31A	Old Limestone Road	0	0.31	1	<10 accidents - Did not meet criteria
17	3.43	3	14C		0	0.29	1	<10 accidents - Did not meet criteria
18	3.27	3	60	SR 54	3.1	4.09	7	<10 accidents - Did not meet criteria
19	3.27	3	60	SR 54	3.2	4.19	7	<10 accidents - Did not meet criteria
20	3.27	3	60	SR 54	3.3	4.29	7	<10 accidents - Did not meet criteria
21	3.25	1	38	St. Andrews School Road	0	0.99	7	<10 accidents - Did not meet criteria
22	3.23	2	429	Mechanic Street	3.1	4.09	6	<10 accidents - Did not meet criteria
23	3.23	2	429	Mechanic Street	3.2	4.19	6	<10 accidents - Did not meet criteria
24	3.23	2	429	Mechanic Street	3.3	4.29	6	<10 accidents - Did not meet criteria
25	3.18	1	429	Mechanic Street	3.8	4.79	7	<10 accidents - Did not meet criteria
26	3.14	2	14	SR 42	2.9	3.89	5	<10 accidents - Did not meet criteria
27	3.09	2	14	SR 42	2.8	3.79	5	<10 accidents - Did not meet criteria
28	3.05	2	14	SR 42	2.7	3.69	5	<10 accidents - Did not meet criteria
29	3.05	3	246	Albury Avenue	1	1.99	6	<10 accidents - Did not meet criteria
30	3.04	2	14	SR 42	2.6	3.59	5	<10 accidents - Did not meet criteria
31	3.02	1	367	Welsh Tract Road	0.6	1.59	13	Location #1
32	3.02	3	396		2.2	3.16	5	<10 accidents - Did not meet criteria
33	3	3	542A		0	0.18	1	<10 accidents - Did not meet criteria
34	2.93	3	396		2	2.99	5	<10 accidents - Did not meet criteria
35	2.93	3	396		2.1	3.09	5	<10 accidents - Did not meet criteria
36	2.83	1	355B		0	0.26	1	<10 accidents - Did not meet criteria
37	2.83	3	361	West Avenue	2.3	3.29	8	<10 accidents - Did not meet criteria
38	2.81	1	12A	Farrand Drive Ext.	0	0.1	2	<10 accidents - Did not meet criteria
39	2.8	3	60	SR 54	4.8	5.79	6	<10 accidents - Did not meet criteria
40	2.8	3	60	SR 54	4.9	5.89	6	<10 accidents - Did not meet criteria
41	2.8	3	60	SR 54	5	5.99	6	<10 accidents - Did not meet criteria
42	2.79	3	361	West Avenue	2.2	3.19	8	<10 accidents - Did not meet criteria
43	2.78	3	361	West Avenue	2.1	3.09	8	<10 accidents - Did not meet criteria
44	2.75	3	261	1100(11001100	1.1	2.09	8	<10 accidents - Did not meet criteria
45	2.71	1	429	Mechanic Street	3.7	4.69	6	<10 accidents - Did not meet criteria
46	2.71	3	544		0.2	1.19	6	<10 accidents - Did not meet criteria
47	2.69	1	224	Upper Snuffmill Road	0.2	0.95	6	<10 accidents - Did not meet criteria
48	2.69	1	429	Mechanic Street	3.6	4.59	6	<10 accidents - Did not meet criteria
49	2.69	2	429	Mechanic Street	2.8	3.79	5	<10 accidents - Did not meet criteria
50	2.69	2	429	Mechanic Street	2.9	3.89	5	<10 accidents - Did not meet criteria
51	2.69	2	429	Mechanic Street	3	3.99	5	<10 accidents - Did not meet criteria
52								
	2.66	3	199	Fowlers Beach Road	0.8	1.79	3	<10 accidents - Did not meet criteria
53	2.66		199	Fowlers Beach Road	0.9	1.89	3	<10 accidents - Did not meet criteria
54	2.66	3	199	Fowlers Beach Road	1	1.99	3	<10 accidents - Did not meet criteria
55	2.65	1	315A		0	0.08	1	<10 accidents - Did not meet criteria
56	2.65	3	261	Ct. James Observing Dec.	1.2	2.19	7	<10 accidents - Did not meet criteria
57	2.58	1	318A	St. James Church Road	0	0.24	1 -	<10 accidents - Did not meet criteria
58	2.58	3	246		0.5	1.49	5	<10 accidents - Did not meet criteria
59	2.58	3	544	A.I. A	0.1	1.09	6	<10 accidents - Did not meet criteria
60	2.56	3	246	Albury Avenue	0.6	1.59	5	<10 accidents - Did not meet criteria
61	2.55	2	127		0	0.41	1	<10 accidents - Did not meet criteria
62	2.55	3	246	Albury Avenue	0.7	1.69	5	<10 accidents - Did not meet criteria
63	2.55	3	246	Albury Avenue	0.8	1.79	5	<10 accidents - Did not meet criteria
64	2.55	3	246	Albury Avenue	1.1	2.09	5	<10 accidents - Did not meet criteria

Delaware - Statewide Accident Date Range 01/01/2007 - 12/31/2009

Interval Length 1.0 mile

Rank	Crit. Ratio	County	Road	Road Name	Beg MP	End MP	# Accs	Notes
65	2.55	3	261		1	1.99	8	<10 accidents - Did not meet criteria
66	2.51	3	28	US 9	6	6.99	14	Location #2
67	2.5	2	295		0	0.99	3	<10 accidents - Did not meet criteria
68	2.5	2	295		0.1	1.09	3	<10 accidents - Did not meet criteria
69	2.46	3	361	West Avenue	1.9	2.89	8	<10 accidents - Did not meet criteria
70	2.44	2	88		0.2	1.19	4	<10 accidents - Did not meet criteria
71	2.43	2	14	SR 42	2.4	3.39	4	<10 accidents - Did not meet criteria
72	2.43	2	14	SR 42	2.5	3.49	4	<10 accidents - Did not meet criteria
73	2.42	2	88		0.3	1.29	4	<10 accidents - Did not meet criteria
74	2.4	2	88		0.4	1.39	4	<10 accidents - Did not meet criteria
75	2.4	3	544		0.3	1.29	5	<10 accidents - Did not meet criteria
76	2.38	2	14	SR 42	2.3	3.29	4	<10 accidents - Did not meet criteria
77	2.37	1	454	Sawmill Branch Road	0.5	1.46	3	<10 accidents - Did not meet criteria
78	2.37	3	28	US 9	5.9	6.89	13	Location #2
79	2.35	1	275	Golden Ring Road	1.4	2.39	8	<10 accidents - Did not meet criteria
80	2.35	3	275	Golden Ring Road	1.5	2.49	8	<10 accidents - Did not meet criteria
81 82	2.35 2.34	2	261 88		0.9 0.5	1.89 1.49	8	<10 accidents - Did not meet criteria <10 accidents - Did not meet criteria
83	2.34	3	396		1.7	2.69	4	<10 accidents - Did not meet criteria
84	2.34	3	60	SR 54	3	3.99	5	<10 accidents - Did not meet criteria
85	2.34	3	60	SR 54	3.4	4.39	5	<10 accidents - Did not meet criteria
86	2.34	3	60	SR 54	3.5	4.49	5	<10 accidents - Did not meet criteria
87	2.34	3	60	SR 54	3.6	4.59	5	<10 accidents - Did not meet criteria
88	2.34	3	60	SR 54	3.7	4.69	5	<10 accidents - Did not meet criteria
89	2.34	3	60	SR 54	3.8	4.79	5	<10 accidents - Did not meet criteria
90	2.34	3	60	SR 54	5.1	6.09	5	<10 accidents - Did not meet criteria
91	2.32	3	361		2	2.99	7	<10 accidents - Did not meet criteria
92	2.31	2	271		3.1	4.01	2	<10 accidents - Did not meet criteria
93	2.28	1	260	Brecks Lane Road	0	0.57	2	<10 accidents - Did not meet criteria
94	2.28	2	384		3	3.99	7	<10 accidents - Did not meet criteria
95	2.27	2	88		0.1	1.09	4	<10 accidents - Did not meet criteria
96	2.22	1	429	Mechanic Street	3.5	4.49	5	<10 accidents - Did not meet criteria
97	2.22	2	207		2.9	3.89	4	<10 accidents - Did not meet criteria
98	2.22	2	207		3	3.99	4	<10 accidents - Did not meet criteria
99	2.21	1	429	Mechanic Street	3.3	4.29	5	<10 accidents - Did not meet criteria
100	2.21	1	82	SR 1	5.5	6.49	12	Location #3
101	2.19	3	261		0.8	1.79	8	<10 accidents - Did not meet criteria
102	2.17	1	275	Golden Ring Road	1.6	2.59	7	<10 accidents - Did not meet criteria
103	2.17	1	469	Black Diamond Road	0.4	1.39	3	<10 accidents - Did not meet criteria
104	2.17	1	469	Black Diamond Road	0.5	1.49	3	<10 accidents - Did not meet criteria
105 106	2.17 2.17	1	469	Black Diamond Road	0.6 0.7	1.59 1.69	3	<10 accidents - Did not meet criteria
106	2.17	3	469	Black Diamond Road US 9	9.1	10.09	13	<10 accidents - Did not meet criteria Location #4
107	2.15	2	28 30	Main Street	1.5	2.49	9	<10 accidents - Did not meet criteria
109	2.15	2	429	Maii Street	2.7	3.69	4	<10 accidents - Did not meet criteria
110	2.15	2	429		3.4	4.39	4	<10 accidents - Did not meet criteria
111	2.15	2	429		3.4	4.59	4	<10 accidents - Did not meet criteria
112	2.15	3	353		2.3	3.29	3	<10 accidents - Did not meet criteria
113	2.15	3	525		1.8	2.79	7	<10 accidents - Did not meet criteria
114	2.15	3	525		1.9	2.89	7	<10 accidents - Did not meet criteria
115	2.15	3	525		2	2.99	7	<10 accidents - Did not meet criteria
116	2.15	3	525		2.1	3.09	7	<10 accidents - Did not meet criteria
117	2.15	3	525		2.2	3.19	7	<10 accidents - Did not meet criteria
118	2.14	3	28	US 9	6.1	7.09	12	Location #2
119	2.14	3	361		2.4	3.39	6	<10 accidents - Did not meet criteria
120	2.13	1	452	Fieldsboro Road	0	0.99	3	<10 accidents - Did not meet criteria
121	2.13	1	452	Fieldsboro Road	0.1	1.09	3	<10 accidents - Did not meet criteria
122	2.13	1	452	Fieldsboro Road	0.2	1.19	3	<10 accidents - Did not meet criteria
123	2.13	1	452	Fieldsboro Road	0.3	1.29	3	<10 accidents - Did not meet criteria
124	2.13	1	452	Fieldsboro Road	0.4	1.39	3	<10 accidents - Did not meet criteria
125	2.13	1	452	Fieldsboro Road	0.5	1.49	3	<10 accidents - Did not meet criteria
126	2.13	1	452	Fieldsboro Road	0.6	1.59	3	<10 accidents - Did not meet criteria
127	2.13	2	30	Main Street	1.6	2.59	9	<10 accidents - Did not meet criteria
128	2.13	3	353		2.4	3.39	3	<10 accidents - Did not meet criteria

Delaware - Statewide Accident Date Range 01/01/2007 - 12/31/2009

Interval Length 1.0 mile

Rank	Crit. Ratio	County	Road	Road Name	Beg MP	End MP	# Accs	Notes
129	2.12	2	8	US 113	9.6	10.59	13	Location #5
130	2.12	3	24	SR 24	18.2	19.19	7	<10 accidents - Did not meet criteria
131	2.12	3	24	SR 24	18.4	19.39	7	<10 accidents - Did not meet criteria
132	2.12	3	24	SR 24	18.5	19.49	7	<10 accidents - Did not meet criteria
133	2.11	3	246	Albury Avenue	0.3	1.29	4	<10 accidents - Did not meet criteria
134	2.11	3	261		1.3	2.29	5	<10 accidents - Did not meet criteria
135	2.11	3	353		2.1	3.09	3	<10 accidents - Did not meet criteria
136	2.11	3	477		0	0.99	3	<10 accidents - Did not meet criteria
137	2.1	1	26	Old Baltimore Pike	2.5	3.49	21	Location #6
138	2.1	3	48		7.2	8.19	7	<10 accidents - Did not meet criteria
139	2.1	3	48		7.3	8.29	7	<10 accidents - Did not meet criteria
140	2.1	3	48		7.4	8.39	7	<10 accidents - Did not meet criteria
141	2.1	3	48		7.5	8.49	7	<10 accidents - Did not meet criteria
142	2.1	3	48		7.6	8.59	7	<10 accidents - Did not meet criteria
143	2.1	3	48		7.7	8.69	7	<10 accidents - Did not meet criteria
144	2.1	3	48		7.8	8.79	7	<10 accidents - Did not meet criteria
145	2.1	3	48		7.9	8.89	7	<10 accidents - Did not meet criteria
146	2.1	3	48		8	8.99	7	<10 accidents - Did not meet criteria
147	2.09	2	30	Main Street	0.7	1.69	7	<10 accidents - Did not meet criteria
148	2.09	3	246	Albury Avenue	0.4	1.39	4	<10 accidents - Did not meet criteria
149	2.09	3	28	US 9	8.9	9.89	12	Location #4
150	2.07	3	246	Albury Avenue	1.8	2.7	3	<10 accidents - Did not meet criteria
151	2.07	3	326	State Street	0.8	1.79	8	<10 accidents - Did not meet criteria
152	2.06	2	188		0	0.32	1	<10 accidents - Did not meet criteria
153	2.06	3	353		2	2.99	3	<10 accidents - Did not meet criteria
154	2.06	3	353		2.5	3.49	3	<10 accidents - Did not meet criteria
155	2.05	1	26	Old Baltimore Pike	2.8	3.79	21	Location #6
156	2.05	3	594		0	0.99	6	<10 accidents - Did not meet criteria
157	2.04	2	30	Main Street	0.4	1.39	7	<10 accidents - Did not meet criteria
158	2.04	3	246		1.2	2.19	4	<10 accidents - Did not meet criteria
159	2.04	3	28	US 9	9	9.99	12	Location #4
160	2.04	3	544		0.4	1.39	4	<10 accidents - Did not meet criteria
161	2.03	2	303		1.2	2.19	2	<10 accidents - Did not meet criteria
162	2.02	1	301	Thompson's Station Road	0.3	1.29	9	<10 accidents - Did not meet criteria
163	2.02	1	301	Thompson's Station Road	0.4	1.39	9	<10 accidents - Did not meet criteria
164	2.02	2	54	Main Street	0.1	1.09	6	<10 accidents - Did not meet criteria
165	2.02	2	54	Main Street	0.2	1.19	6	<10 accidents - Did not meet criteria
166	2.02	2	54	Main Street	0.3	1.29	6	<10 accidents - Did not meet criteria
167	2.02	2	54	Main Street	0.4	1.39	6	<10 accidents - Did not meet criteria
168	2.02	2	54	Main Street	0.5	1.49	6	<10 accidents - Did not meet criteria
169	2.01	3	28	US 9	5.8	6.79	11	Location #4
170	2.01	3	488		2.8	3.79	4	<10 accidents - Did not meet criteria
171	2.01	3	488		2.9	3.89	4	<10 accidents - Did not meet criteria
172	2	1	82	SR 1	5.6	6.59	12	Location #3
173	2	1	9	SR 52	3.2	4.19	16	Location #7
174	2	2	8	US 113	9.7	10.69	12	Location #5
175	1.99	3	361		1.8	2.79	7	<10 accidents - Did not meet criteria
176	1.99	3	479A		0	0.6	2	<10 accidents - Did not meet criteria
177	1.98	1	26	Old Baltimore Pike	2.6	3.59	20	Location #6
178	1.98	1	26	Old Baltimore Pike	2.9	3.89	20	Location #6
179	1.98	1	9	SR 52	3.1	4.09	16	Location #7
180	1.98	2	325	Big Oak Road	1.4	2.39	4	<10 accidents - Did not meet criteria
181	1.98	2	73	North Street	4.3	5.29	7	<10 accidents - Did not meet criteria
182	1.98	3	207		1.3	2.29	7	<10 accidents - Did not meet criteria
183	1.98	3	353		1.9	2.89	3	<10 accidents - Did not meet criteria
184	1.98	3	544		1	1.99	2	<10 accidents - Did not meet criteria
185	1.97	1	26	Old Baltimore Pike	2.7	3.69	20	Location #6
186	1.97	2	30	Main Street	1.4	2.39	8	<10 accidents - Did not meet criteria
187	1.97	3	2	US 13	3.6	4.59	18	Location #8
188	1.96	1	383	Church Road	0.4	1.37	8	<10 accidents - Did not meet criteria
189	1.96	2	303	Main Street	0.4	1.29	7	<10 accidents - Did not meet criteria
190	1.96	2	384	IVIAITI OLI EEL	3.1	4.09	6	<10 accidents - Did not meet criteria
191	1.96	3	16	SR 16	25.8	26.79	5	<10 accidents - Did not meet criteria
		3	16					
192	1.96	3	10	SR 16	25.9	26.89	5	<10 accidents - Did not meet criteria

Delaware - Statewide

Accident Date Range 01/01/2007 - 12/31/2009

Interval Length

1.0 mile

Rank	Crit. Ratio	County	Road	Road Name	Beg MP	End MP	# Accs	Notes
193	1.96	3	16	SR 16	26	26.99	5	<10 accidents - Did not meet criteria
194	1.96	3	16	SR 16	26.1	27.09	5	<10 accidents - Did not meet criteria
195	1.96	3	353		2.6	3.59	3	<10 accidents - Did not meet criteria
196	1.95	2	73	North Street	4.2	5.19	7	<10 accidents - Did not meet criteria
197	1.95	3	326	State Street	0.7	1.69	8	<10 accidents - Did not meet criteria
198	1.94	1	32	US 40	4.2	5.19	25	Location #9
199	1.94	2	73	North Street	4.4	5.39	7	<10 accidents - Did not meet criteria
200	1.94	3	213	Walnut Street	8.1	9.09	5	<10 accidents - Did not meet criteria
201	1.94	3	484		2.7	3.69	4	<10 accidents - Did not meet criteria
202	1.92	1	17	SR 92	0	0.99	17	Location #10