SEPTEMBER 2006

UPDATED SEPTEMBER 2008

DELAWARE'S STRATEGIC HIGHWAY SAFETY PLAN

A cooperative multi-agency plan for improving safety and reducing fatalities on Delaware's highways

September 2006

Updated September 2008

DelDOT
Delaware Department of Transportation

TABLE OF CONTENTS

LIST OF APPENDICES

INTRODUCTION

In 1998, after noticing that efforts in reducing fatalities were stalling, the American Association of State Highway and Transportation Officials (AASHTO) initiated the Strategic Highway Safety Plan and encouraged various state agencies involved in highway safety to coordinate to develop innovative strategies to reduce fatalities on America's highways. A state Strategic Highway Safety Plan (SHSP) is currently a Federal requirement of SAFETEA-LU and is a major component of the Highway Safety Improvement Program (HSIP). The purpose of an SHSP is to identify the State's key safety needs and guide investment decisions to achieve significant reductions in highway fatalities and serious injuries on all public roads. An SHSP is a statewide-coordinated safety plan that provides a comprehensive framework, identifies specific goals and objectives for reducing highway fatalities and serious injuries on all public roads, and integrates the four E's - engineering, education, enforcement and emergency medical services (EMS).

Goal: Reduce nationwide fatality rate to 1.0 per 100 million vehicle miles traveled

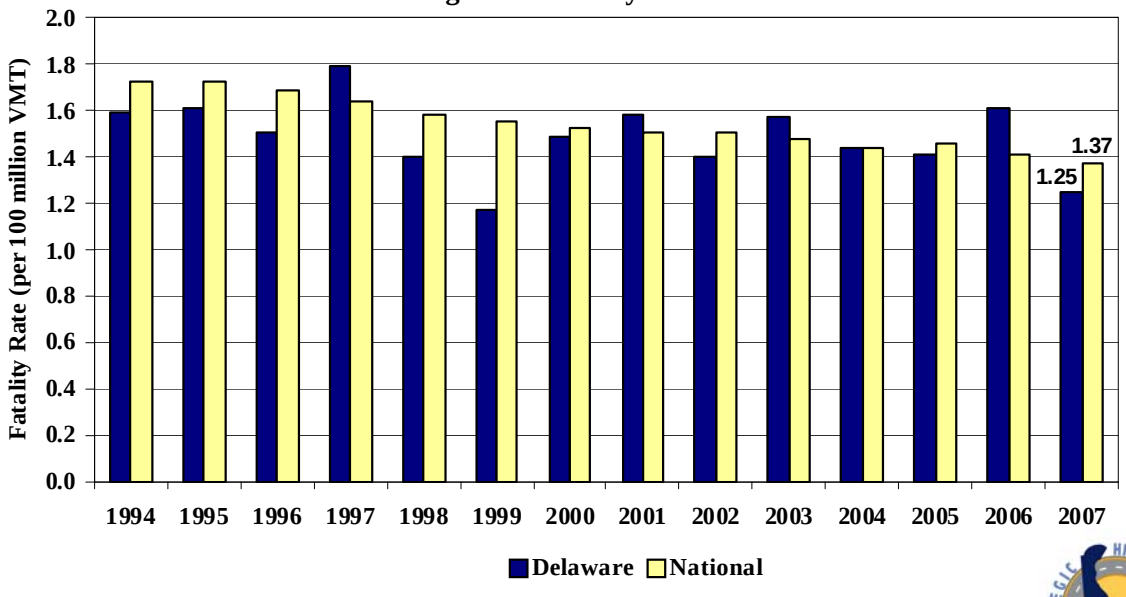
In September 2003, U.S. Department of Transportation set a goal to reduce the nationwide fatality rate to 1.0 per 100 million vehicle miles traveled by the year 2008. The 100 million vehicle miles traveled (VMT) benchmark is used to level the comparison of crash rates between each state. As shown in Figure 1, the 2007 national fatality rate per 100 million vehicle miles traveled was 1.37, down from 1.58 in 1998, which shows a steady decline in fatality rates since the SHSP was initiated.

Delaware's current fatality rate ranges from 1.25 - 1.57 per 100 million VMT

While Delaware's fatality rates peaked in 1997 and 2006, Delaware's fatality rate decreased to 1.25 in 2007, the lowest rate since 1999. The fatality rate per 100 million vehicle miles traveled in Delaware ranged from 1.25 to 1.57 between 2004 and 2007, exceeding the nationwide goal.

Travel in Delaware continues to increase, especially in the beach areas and in New Castle County. With this additional travel growth and the congestion it brings, providing safer roads becomes more challenging. Unlike many states, Delaware Department of Transportation (DelDOT) maintains nearly 90 percent of the state's roadways. DelDOT and the Department of Safety and Homeland Security, which includes the Office of Highway Safety (OHS) and the Delaware State Police (DSP), recognized that through coordinating with each other they could more effectively counteract the expected growth in fatalities, and could work collectively towards achieving the nationwide goal.

Figure 1 - Fatality Rates



Working with the Federal Highway Administration (FHWA) and National Highway Traffic Safety Administration (NHTSA), Delaware's coordinating agencies have established the following Mission and Vision Statements for their Strategic Highway Safety Program:

> *Mission Statement: The Delaware Strategic Highway Safety Program aims to eliminate fatalities on Delaware's roadways through a multi-agency approach that utilizes education, enforcement, engineering, and emergency service strategies.*
>
> *Vision Statement: The goal of Delaware's Strategic Highway Safety Program is to reduce the number of traffic fatalities to 100 or fewer per year, or to achieve a fatality rate of 1.0 per 100 million vehicle miles traveled.*

FEDERAL LEGISLATION AND PROGRAMS

Several federal laws and programs have supported the conception of the Strategic Highway Safety Program and may be used to sustain its existence. The Highway Safety Act of 1966 (Public Law No. 89-564), enacted by Congress on September 9, 1966, was the first major effort at the Federal level to reduce the number and severity of highway-related crashes. The primary purpose of this legislation was to provide for a coordinated national highway safety program through financial assistance to the States to accelerate highway traffic safety programs. Subsequently, the Highway Safety Act of 1973 established categorical funding for five specific program areas: highway-rail crossings, high hazard locations, pavement marking demonstration programs, elimination of roadside obstacles, and the Federal-aid safer roads demonstration. The Surface Transportation Assistance Act of 1978 consolidated these programs into the Highway-Rail Grade Crossings and Hazard Elimination Programs. To ensure that these programs are carried out in an organized, systematic manner where the greatest benefits can be achieved, a formalized Highway Safety Improvement Program (HSIP) was established.

The National Highway Traffic Safety Administration (NHTSA) administers the State and Community Highway Safety Grant Program (U.S.C. Title 23, Section 402) which is funded through the Highway Trust Fund. This program provides funding for highway safety programs that are determined to be effective in reducing crashes, injuries, and fatalities.

The Transportation Equity Act for the 21st Century (TEA-21) was enacted June 9, 1998, as Public Law 105-178. TEA-21 authorized the Federal surface transportation programs for highways, highway safety, and transit. In July 2005, Congress enacted the Safe, Accountable, Flexible, and Efficient Transportation Equity Act-A Legacy for Users (SAFETEA-LU), and President Bush signed it on August 10, 2005. SAFETEA-LU extends most of the current structure of federal highway safety funding as outlined in the Transportation Equity Act of the 21st Century (TEA-21). The legislation provides federal funding for a variety of behavioral highway safety priority areas in addition to the Section 402 State and Community Highway Safety Grant Program, including occupant protection, traffic records, impaired driving, motorcycle safety, and other priority areas.

SAFETEA-LU requires that each state have a *Strategic Highway Safety Plan* by October 1, 2006 in order to be eligible for full funding apportionments. Crash data must be used to identify safety problems and assist with countermeasure analyses. The plan should identify and analyze highway safety problems, and provide programs and strategies to reduce these identified safety problems. The plan must be evaluated regularly to ensure data accuracy and priority of improvements. The Delaware coordinating agencies agreed to update the Delaware SHSP biannually. This document serves as Delaware's first biannual update.

PROGRAM STRUCTURE

DelDOT, OHS, and the DSP worked together to develop Delaware's SHSP. The program followed the basic steps outlined by AASHTO's "Strategic Highway Safety Plan Model Implementation Process". Data analyses were performed to create the program's mission and vision statements and identify the program's emphasis areas. The group reviewed existing Delaware programs, potential solutions proposed in the National Comprehensive Highway Research Project (NCHRP) 500-series Reports developed by the Transportation Research Board specifically for the 22 key emphasis areas identified by the Strategic Highway Safety Program, and solutions proposed by other states and selected a list of solutions to address Delaware's emphasis areas.

DATA REVIEW

For the initial 2006 SHSP, state crash statistics for a three (3) year period, January 2001 through December 2003, were reviewed to narrow AASHTO's 22 emphasis areas down to a reasonable number for further consideration. The coordinating agencies selected emphasis areas with a higher corresponding fatal crash (fatality) rate in Delaware as compared to the national averages as shown in Table 1. National statistics were obtained from the National Highway Traffic Safety Administration's 2003 Fatality Analysis Reporting System (FARS). Additional areas were then selected where data was missing or where agencies knew problems existed based on recent experience. Once the key emphasis areas were selected, additional data analyses were conducted to better define the nature and magnitude of the problem and to identify potential solutions.

In 2007, the Strategic Highway Safety Program coordinating agencies met to review updated crash data available for AASHTO's 22 emphasis areas. Updated Delaware crash data for the three year period between January 2004 and December 2006 were compared to 2005 national crash data obtained from FARS and to the previous three-year period of crash data (January 2001 through December 2003). Detailed national crash data for 2007 was not available at the time of this update; therefore, 2007 crash data (both national and Delaware) was not included in the data review. Each emphasis area was then reevaluated based on the updated crash data. Although the data indicated a reduction in fatal crash rates in several current Delaware key emphasis areas, the SHSP coordinating agencies decided to keep all current key emphasis areas to continue these downward trends.

Four of the AASHTO emphasis areas that were not previously selected as Delaware key emphasis areas showed either an increase in the Delaware fatal crash (fatality) percentage (as compared to the older crash data) or a decline in the national percentage which put Delaware's percentage above the national rate (Sustaining Proficiency in Older Drivers, Ensuring Safer Bicycle Travel, Motorcycle Safety, and Improving Design and Operation of Highway Intersections). However, the crashes associated with these emphasis areas are already being addressed by a current Delaware emphasis area or the raw crash numbers for the emphasis area are very low as compared to existing emphasis areas; therefore, no additional emphasis areas were added.

DELAWARE'S KEY EMPHASIS AREAS

Delaware's current key emphasis areas, including both national and Delaware crash data, are summarized in Table 1.

Table 1 – Delaware's Key Emphasis Areas

Emphasis Area	2003 National Percentage[1]	2001 - 2003		2005 National Percentage[1]	2004 - 2006	
		Delaware Percentage[2]	Delaware Fatal Crashes[2]		Delaware Rate[2]	Delaware Fatal Crashes[2]
1. Curbing Aggressive Driving	41%	48%	179	39%	47%	181
2. Reducing Impaired Driving	17%	26%	96	19%/39% [4]	17%/38% [4]	67/143 [4]
3. Increasing Seatbelt Usage and Improving Airbag Awareness [3]	58%	61%	195	51% [3]	54% [3]	168 [3]
4. Making Walking and Street Crossing Safer	10%	12%	46	12%	15%	56
5. Making Truck Travel Safer	12%	14%	51	13%	14%	52
6. Keeping Vehicles on the Roadway	42%	37%	137	42%	37%	140
7. Minimizing the Consequences of Leaving the Road	42%	37%	137	42%	37%	140
8. Designing Safer Work Zones	3%	Unknown	Unknown	2%	2%	7
9. Improving Information and Decision Support Services	N/A	N/A	N/A	N/A	N/A	N/A

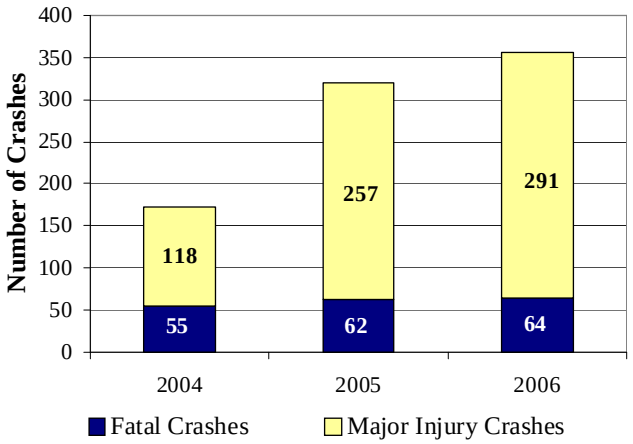
[1]National percentage of fatal crashes in this emphasis area based on FARS data
[2]Delaware percentage of fatal crashes in this emphasis area based on DelDOT crash data
[3]Includes percentages and numbers of fatalities rather than fatal crashes; based on data from OHS' FY 2008 Highway Safety Plan
[4]Fatal crashes involving an impaired driver/Fatal crashes involving alcohol

EMPHASIS AREA #1: CURBING AGGRESSIVE DRIVING

Due in part to increasing congestion and driver frustration, aggressive driving has become a serious problem on the nation's highways. Inconsistent classification of aggressive driving, and what behaviors constitute aggressive driving, often makes it difficult to quantify the number of nationwide crashes attributed to aggressive driving. Delaware State Law Title 21, Chapter 41 defines aggressive driving as violating three or more of the following:

- Obedience to traffic-control devices
- Obedience to traffic control signals
- Overtaking on the right
- Following too closely
- Yielding to the right-of-way
- Failure to use turn signals
- Obedience to STOP signs and YIELD signs
- Overtaking and passing school buses
- Exceeding speed restrictions and specific speed limits

Figure 2 - Aggressive Driving Crashes



To identify crashes attributed to aggressive driving, crash data were reviewed for the following driver behaviors:

- Speeding
- Following too closely
- Improper lane changes
- Improperly passing
- Failing to obey traffic control devices
- Failing to yield right-of-way
- Operating vehicle in erratic, reckless, careless, negligent or aggressive manner

Figure 3 - Aggressive Driving Crashes by At-Fault Driver Gender

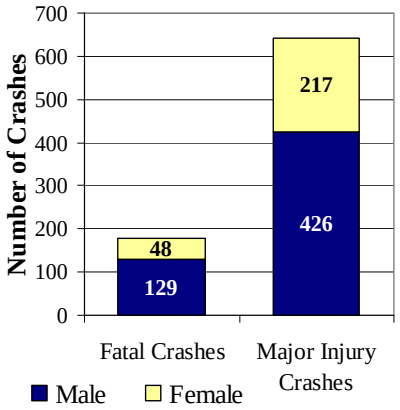
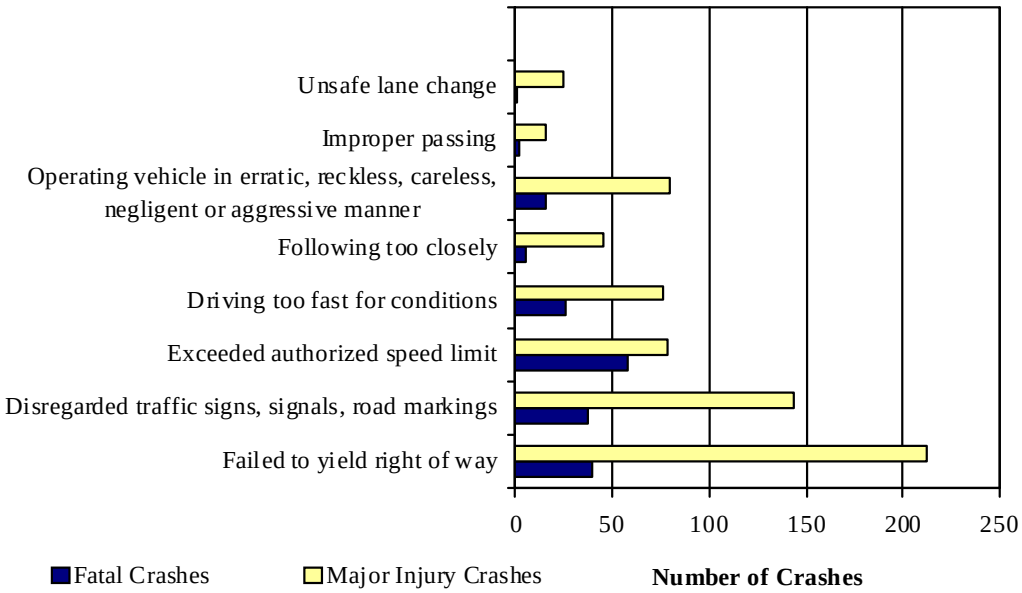


Figure 4 - Aggressive Driving Factors



According to *NHTSA's Traffic Safety Facts 2005* (including "driving too fast for conditions", "failure to yield right-of-way", "operating vehicle in erratic, reckless, careless or negligent manner", and "failure to obey traffic signs, signals, or officer" driver-related factors), 39 percent of drivers involved in nationwide fatal crashes in 2005 demonstrated aggressive driving behaviors, while 47 percent of Delaware's total fatal crashes reported between January 2004 and December 2006 demonstrated aggressive driving behaviors. These statistics show that aggressive driving continues to be a problem on Delaware's roadways.

Forty-five percent of Delaware's fatal crashes attributed to aggressive driving involve speeding. Delaware fatal and major injury crashes involving aggressive driving have more than doubled in the three year study period, from 173 crashes in 2004 to 355 in 2006. Further analysis showed that males were responsible for approximately 71 percent of aggressive driving-related fatal crashes and approximately 64 percent of aggressive driving-related major injury crashes. The under 21 years old age group has the highest number of fatal crashes involving aggressive driving, while the 25 to 34 year old age group has the highest number of major injury crashes involving aggressive driving. The time period that has the highest number of crashes involving aggressive driving is 3 PM to 6 PM.

Figure 5 - Aggressive Driving Crashes by Age of At-Fault Driver

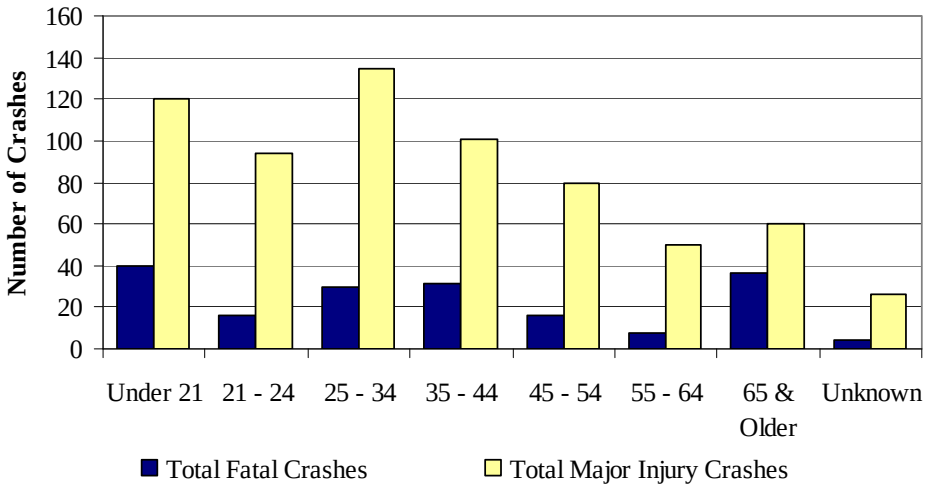


Figure 6 - Aggressive Driving Crashes by Time of Day

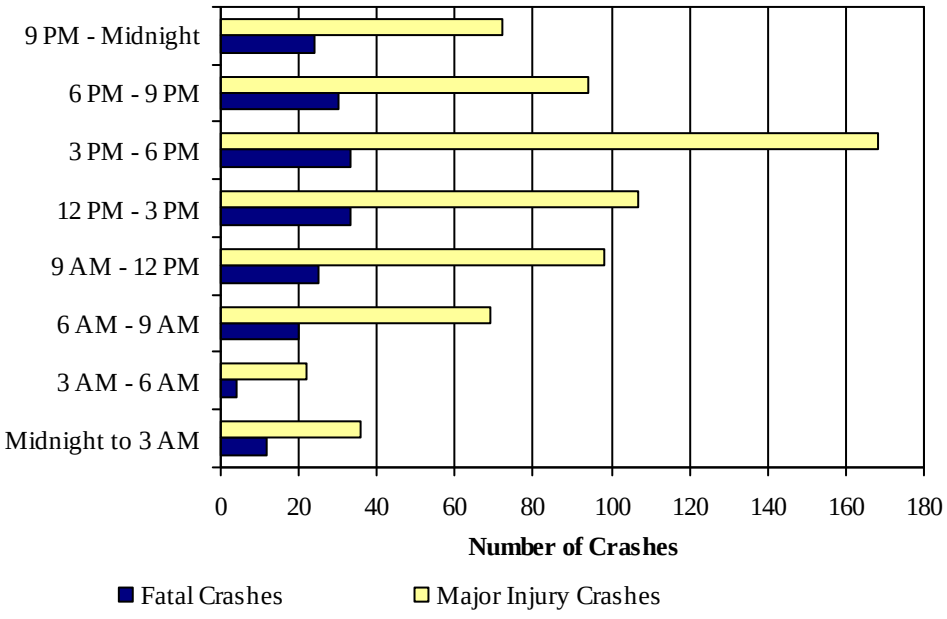
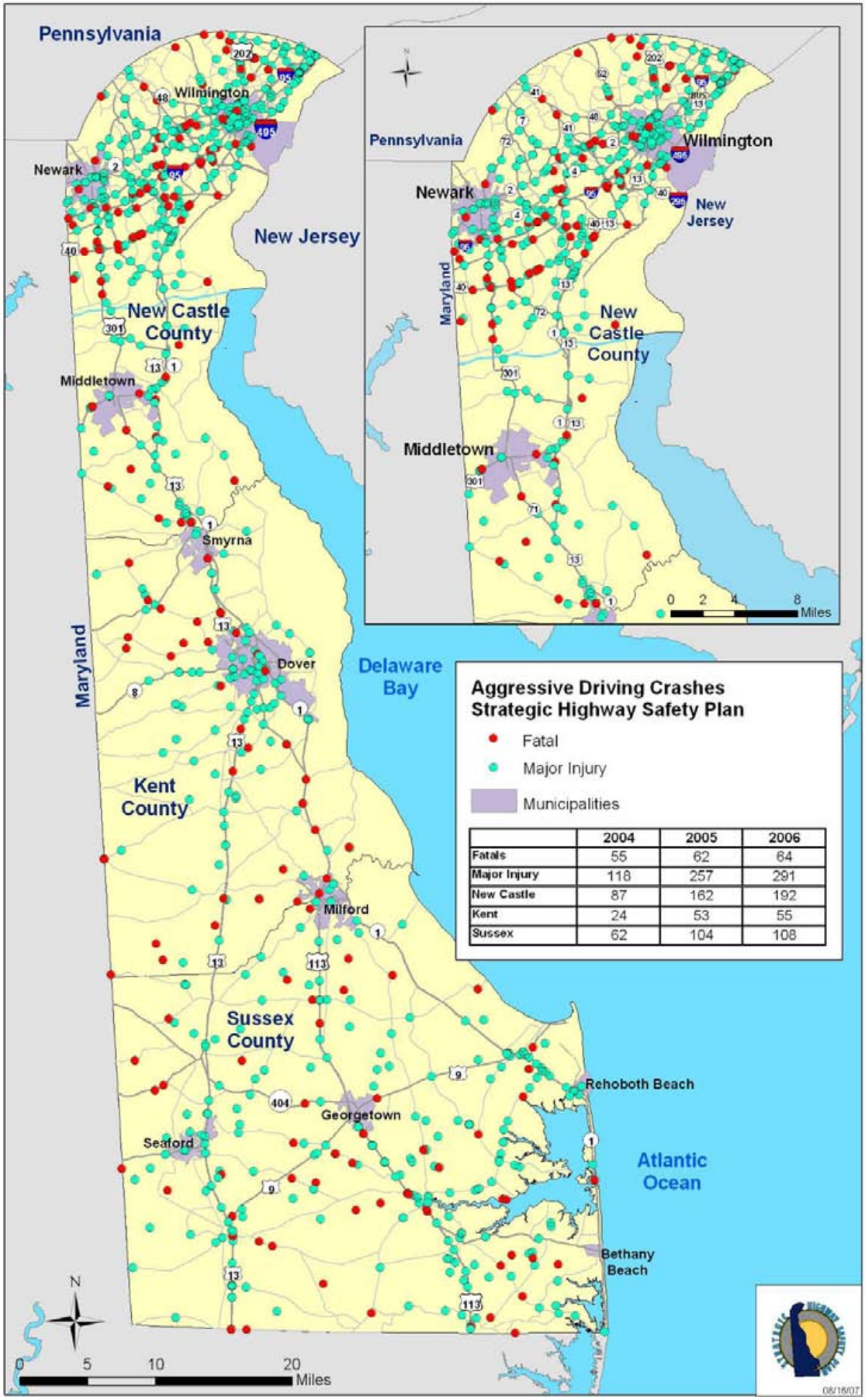


Figure 7 – Aggressive Driving Crashes

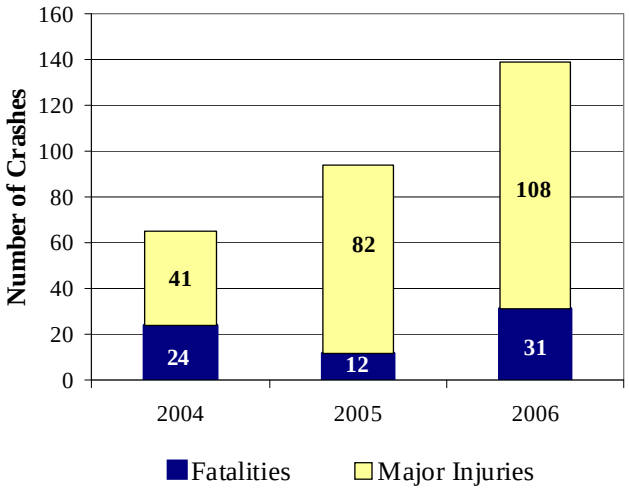


	2004	2005	2006
Fatals	55	62	64
Major Injury	118	257	291
New Castle	87	162	192
Kent	24	53	55
Sussex	62	104	108

EMPHASIS AREA #2: REDUCING IMPAIRED DRIVING

Impaired driving has been a nationwide problem for decades. All states now have a 0.08 Blood Alcohol Content (BAC) DUI law, which helps to deter drinking and driving, but more can be done to discourage and prevent driving under the influence. In Delaware, impaired driving, which includes driving under the influence of alcohol and/or drugs, was a contributing cause in 17 percent of all fatal crashes that occurred between January 2004 and December 2006. Between January 2001 and December 2003, 27 percent of all fatal crashes in Delaware involved driving under the influence, which shows that Delaware's rates have decreased since the previous study period. According to *NHTSA's Traffic Safety Facts 2005*, 19 percent of drivers involved in nationwide fatal crashes in 2005 were driving while under the influence; therefore, Delaware's rates are currently below the national average.

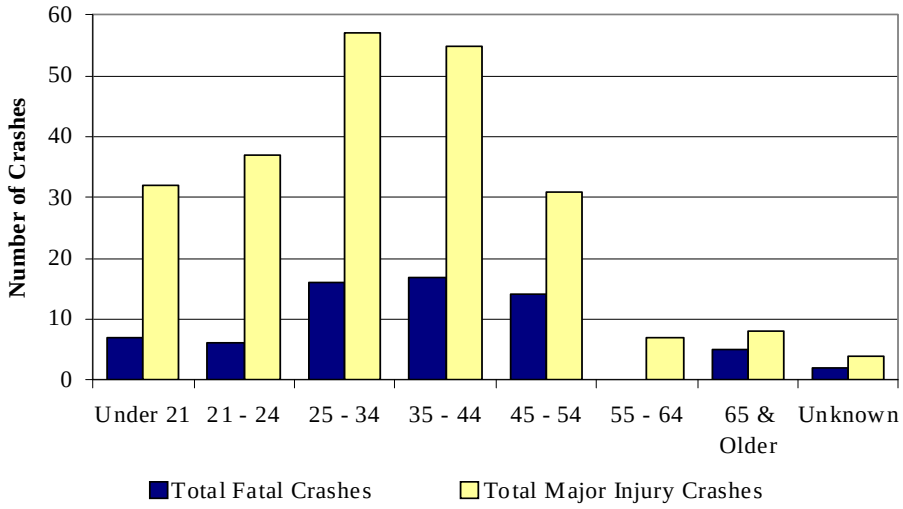
Figure 8 - Impaired Driving Crashes



The National Highway Traffic Safety Administration (NHTSA) defines "alcohol-related" crashes as those where at least one person in the crash had been drinking. In Delaware, 38 percent of fatal crashes between January 2004 and December 2006 were alcohol-related, whereas, the corresponding national rate was 39 percent in 2005. In comparison, 42 percent of fatal crashes in Delaware between January 2001 and December 2003 were alcohol-related.

Although Delaware's 2004 to 2006 percentages fall just below the corresponding nationwide levels, impaired driving still accounts for a significant portion of fatal and major injury crashes in the state. The 25 to 34 year old and 35 to 44 year old age groups have the highest number of crashes involving impaired driving. Additionally, 10 and 14 percent of fatal and major injury crashes involving impaired driving were caused by impaired drivers who were under 21 years old, respectively. These statistics indicates that young adults are unaware of, or disregard, the consequences of driving while impaired. Enforcement and educational campaigns are needed to discourage underage drinking.

Figure 9 - Impaired Driving Crashes by Age of At-Fault Driver



EMPHASIS AREA #3: INCREASING SEATBELT USAGE

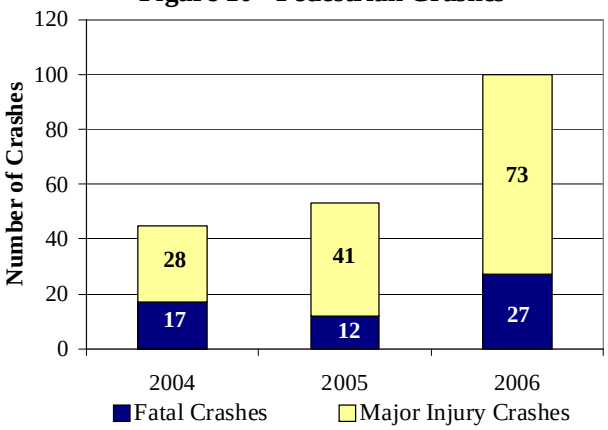
While seatbelts have been in vehicles since the 1950s, usage did not increase until mandatory use laws were passed in the 1980s. Initial laws allowed police officers to enforce seatbelt use only if the vehicle was pulled over for another traffic violation. These laws are known as "secondary" laws. More recently, many states have turned to "primary enforcement" laws which allow law enforcement officials to stop a vehicle for a seatbelt use violation. Delaware's secondary seatbelt law was upgraded to a primary enforcement law in 2003. The National Cooperative Highway Research Program (NCHRP) Report 500: Volume 11 states that primary seatbelt laws are more effective than secondary seatbelt laws, which typically only increase usage to 50 percent.

In 2006, nationwide seatbelt usage was up to 81 percent. Studies conducted by the Office of Highway Safety in 2006 indicate a Delaware statewide use of 86 percent. Although Delaware's usage rate exceeds the nationwide rate, the coordinating agencies agreed that with additional public awareness and heightened enforcement, Delaware could further increase the rate of usage and, in doing so, contribute to a reduction in fatalities. Delaware's Office of Highway Safety's 2007 Highway Safety Plan indicates that 54 percent of those killed in vehicle crashes were not using a restraint system, whereas the national percent of those killed while not wearing a restraint system was 51 percent. In comparison, Delaware's 2005 Highway Safety Plan indicated that 61 percent of those killed in vehicle crashes were not using a restraint system, which indicates that Delaware's rate of fatalities involving motorists not using a restraint system is declining.

EMPHASIS AREA #4: IMPROVING PEDESTRIAN SAFETY

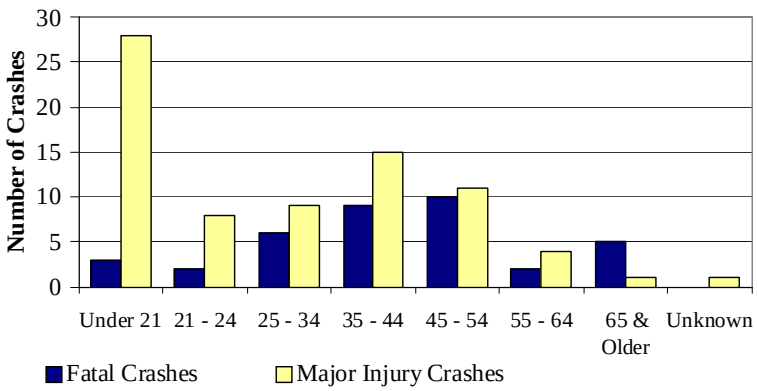
Nationwide trends indicate a decrease in pedestrian fatalities and crashes, but experts believe this can be attributed to the decline in the number of pedestrians. Many pedestrians consider safety, in addition to infrastructure and proximity of destination, when deciding to consider walking as a transportation alternative. Therefore, improving pedestrian safety can contribute to increasing pedestrian activity and, in the process, reduce congestion on national roadways.

Figure 10 - Pedestrian Crashes



In 2005, 12 percent of all fatal crashes nationwide involved pedestrians. In Delaware, for the study period of January 2004 to December 2006, 15 percent of all fatal crashes involved pedestrians, which exceeds nationwide levels. The number of fatal pedestrian crashes in Delaware increased from 17 crashes in 2004 to 27 crashes in 2006. Further analysis showed that 39 percent of Delaware pedestrian-related fatal crashes involved an impaired pedestrian. In New Castle County, many of the pedestrian fatal crashes occurred along major corridors that include commercial properties on both sides of the roadway. Approximately 90 percent of the pedestrian fatal and

Figure 11 - Pedestrian Crashes by Pedestrian Age



major injury crashes occurred mid-block and only 10 percent of the fatal and major injury crashes involving pedestrians occurred at intersections. The greatest number of pedestrian fatal crashes involved pedestrians between the ages of 45 and 54 years old; however, the greatest number of pedestrian-related major injury crashes involved pedestrians under the age of 21.

In comparison, between January 2001 and December 2003, 12 percent of all fatal crashes in Delaware involved pedestrians. Additionally, 26 percent of Delaware's pedestrian-related fatal crashes that occurred during the same study period were alcohol-related. These statistics show that Delaware's rate of fatal crashes involving pedestrians is increasing along with the rate of fatal pedestrian crashes involving impaired pedestrians.

Figure 12 - Pedestrian Crashes Involving Impaired Pedestrians

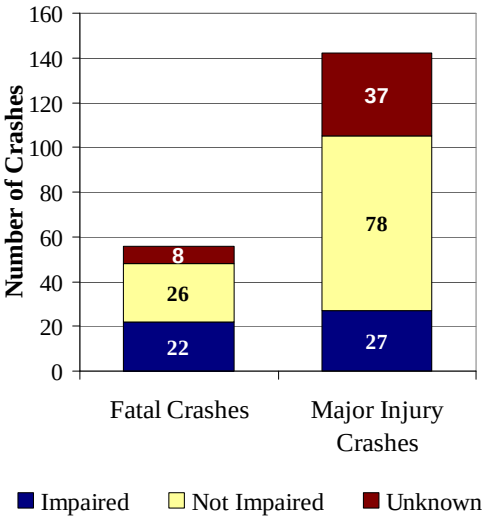


Figure 13 - Pedestrian Crash Location

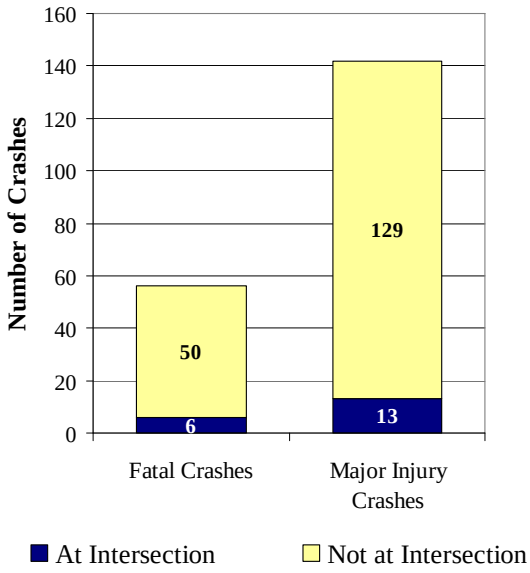


Figure 14 - Pedestrian Crash Location

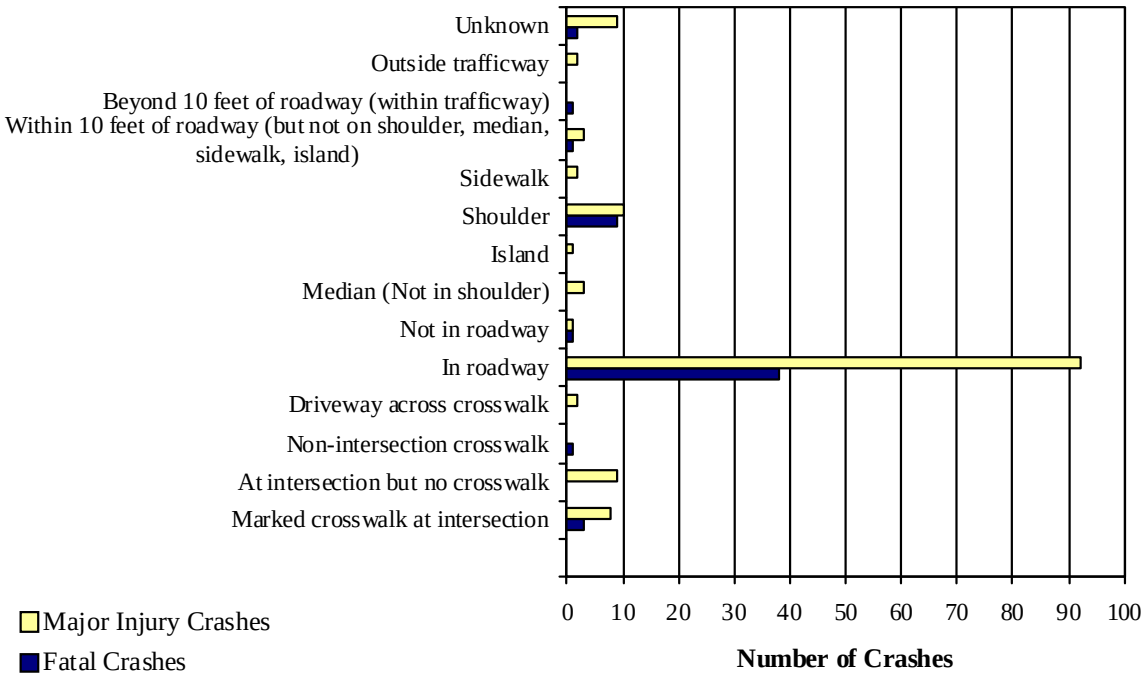
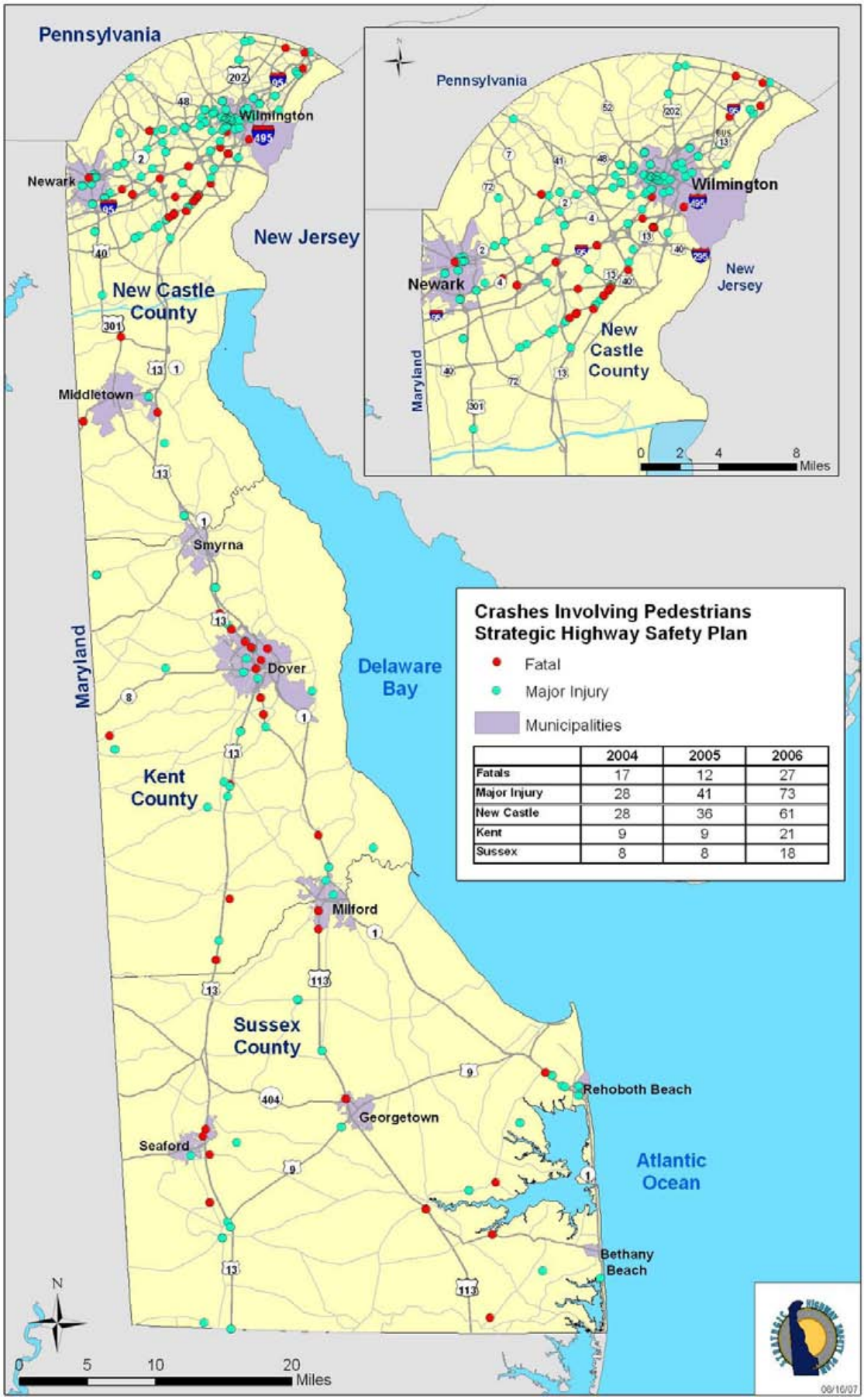


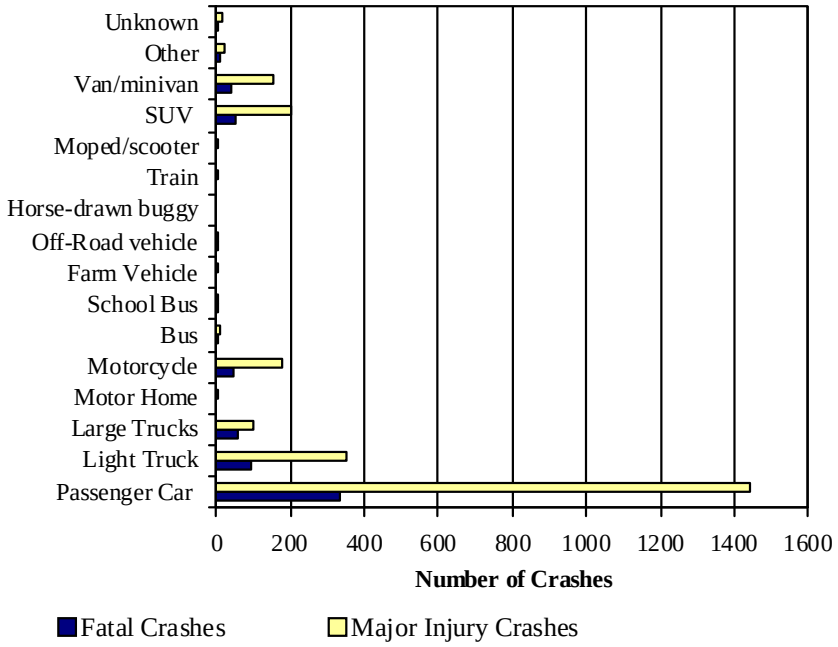
Figure 15 – Pedestrian Crashes



EMPHASIS AREA #5: MAKING TRUCK TRAVEL SAFER

Due to the size and weight of large trucks, crashes involving these types of vehicles result in major injuries or fatalities more often than crashes involving smaller vehicles. According to NHTSA, truck drivers are less likely than other motorists to be cited for driver-related moving violations. Additionally, studies indicate that truck drivers exceed posted speed limits by fewer miles per hour than other drivers; however, fatalities are more likely if a large truck is involved in a crash.

Figure 16 - Crashes by Vehicle Type



Delaware's crash data for the study period from January 2004 to December 2006 indicate that 14 percent of fatal crashes involved a large truck, in contrast to 7 percent of major injury crashes. National statistics in 2005 indicate that 13 percent of fatal crashes involved a heavy vehicle. Of the fatal crashes involving large trucks, 48 percent occurred in New Castle County, the only county in Delaware with interstates. Additionally, the highest number of fatal crashes involving large trucks occurred between 12 PM and 3 PM. Figure 18 indicates that a high percentage of crashes involving large trucks occurred along the interstates in New Castle County.

Figure 17 - Heavy Truck Crashes by Time of Day

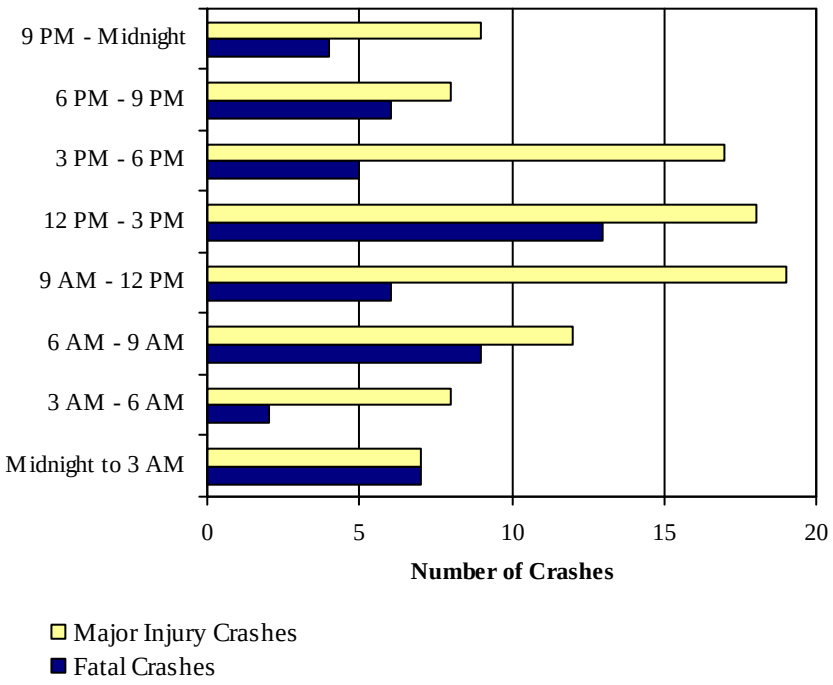
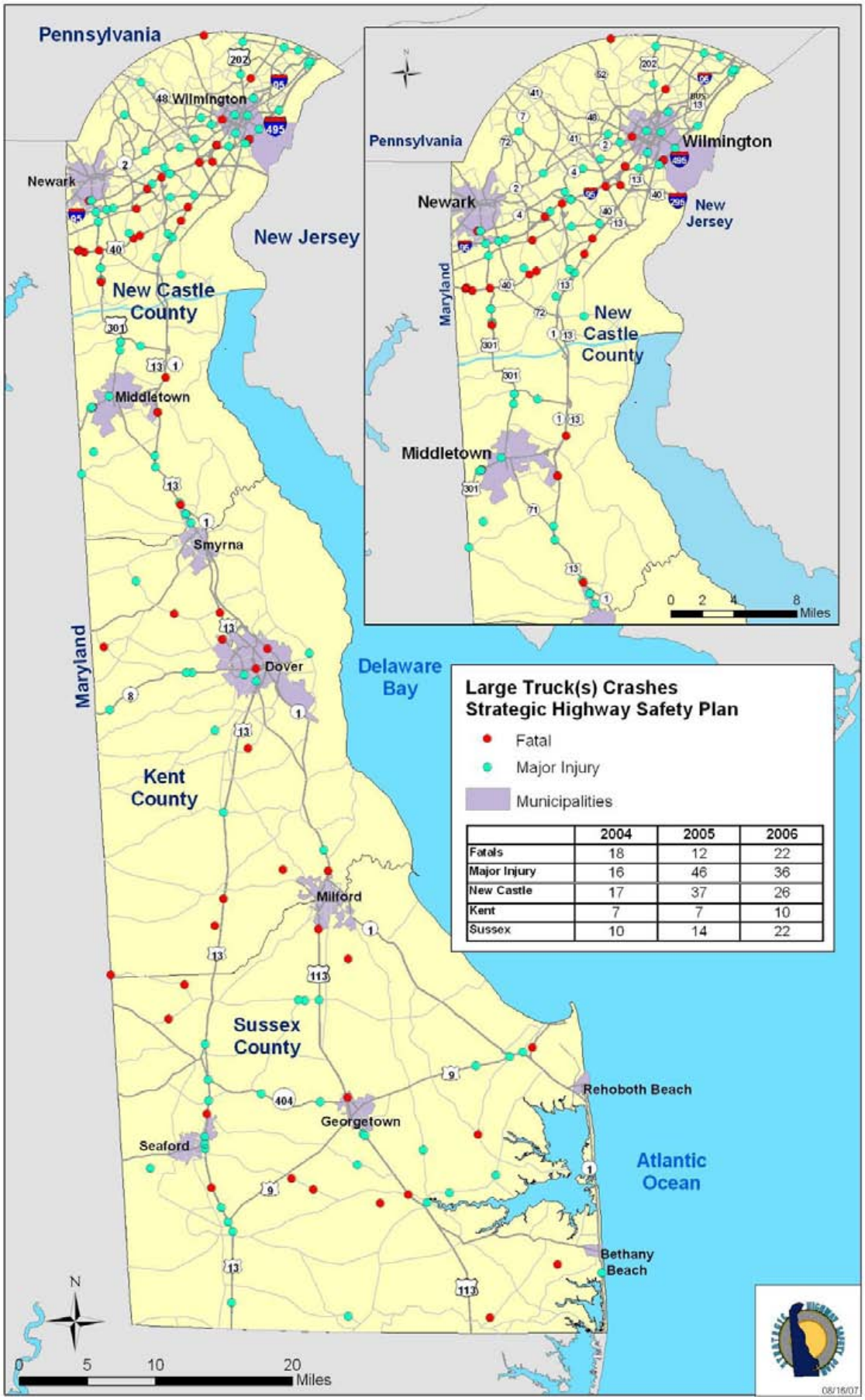


Figure 18 – Crashes Involving Large Trucks



	2004	2005	2006
Fatals	18	12	22
Major Injury	16	46	36
New Castle	17	37	26
Kent	7	7	10
Sussex	10	14	22

EMPHASIS AREA #6: KEEPING VEHICLES ON THE ROADWAY

Run-off-road crashes are crashes that involve vehicles that exit the travel way. Run-off-road crashes may then involve vehicles striking one or multiple objects located outside the travel way such as trees, utility poles, ditches, and bridge abutments. Typically, these crashes involve a single vehicle; therefore, strategies should focus on the initial action during the crash that caused the driver to leave the travel way.

The majority of fatal run-off-road crashes in Delaware that occurred between January 2004 and December 2006 resulted in vehicles striking a tree, or hitting utility poles or lighting supports. According to *NHTSA's Traffic Safety Facts 2005*, 42 percent of nationwide fatal crashes were run-off-road crashes, while 37 percent of Delaware's fatal crashes were run-off-road crashes. The surface condition during the time of the crash does not seem to contribute to the fatal run-off-road crashes in Delaware since 78 percent of run-off-road fatal crashes occurred on dry pavement. While the 25 to 34 year old age group was responsible for the highest percentage (23 percent) of fatal run-off-road crashes, drivers under 21 were involved in 18 percent of fatal run-off-road crashes. Additionally, alcohol was a factor in 56 percent of the fatal run-off-road crashes in Delaware. Twenty-eight percent of fatal run-off-road crashes involved speeding. Although Delaware's percentage of run-off-road crashes is less than the national rate, run-off-road crashes represent a large portion of all fatal crashes.

Figure 19 - Run-off-Road Crashes by Surface Condition

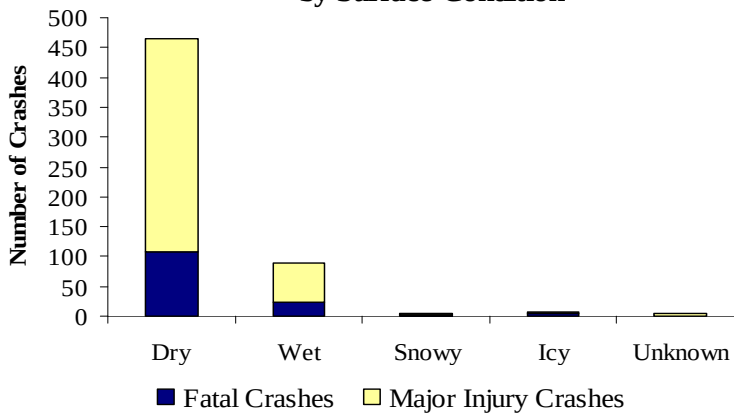
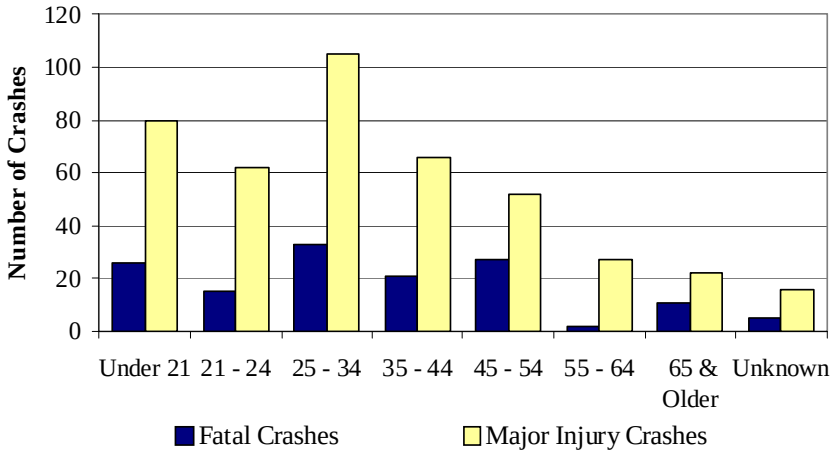


Figure 20 - Run-off-Road Crashes by Age of Driver At-Fault



EMPHASIS AREA #7: MINIMIZING THE CONSEQUENCES OF RUN-OFF-ROAD CRASHES

This emphasis area relates to emphasis area #6 - Keeping Vehicles on the Roadway. As stated, to address run-off-road crashes, the SHSP should consider the initial action during the crash that caused the driver to leave the travel way; however, to address the consequence of run-off-road crashes, the SHSP should focus on the harmful event that occurred as a result of leaving the roadway (e.g., striking a utility pole, overturning, etc.). The majority of fatal run-off-road crashes in Delaware that occurred between January 2004 and December 2006 resulted in vehicles striking a tree, or hitting utility poles or lighting supports. Table 2 shows the percentages of first harmful event/object struck of the total number of run-off-road crashes. As shown, 75 percent of run-off-road crashes involved vehicles striking a fixed-object and 45 percent of run-off-road crashes involving vehicles striking a tree, utility pole, or light support. Additionally, 12 percent of run-off-road crashes involve vehicles overturning.

Table 2 – First Harmful Event/Objects Struck in Run-off-Road Crashes

First Harmful Event/Object Struck	National Percentage of Fatal Crashes[1]	Delaware Percentage of Fatal Crashes[2]
Bridge, Culvert	5%	2%
Ditch, Embankment, Curb	21%	9%
Guardrail, Median Barrier	10%	9%
Mailbox	2%	4%
Overturn	26%	12% [3]
Tree	19%	26% [3]
Utility Pole, Light Support	6%	19% [3]
Other Fixed-Object	11%	6%
Other/Unknown (not fixed-object)	-	12%

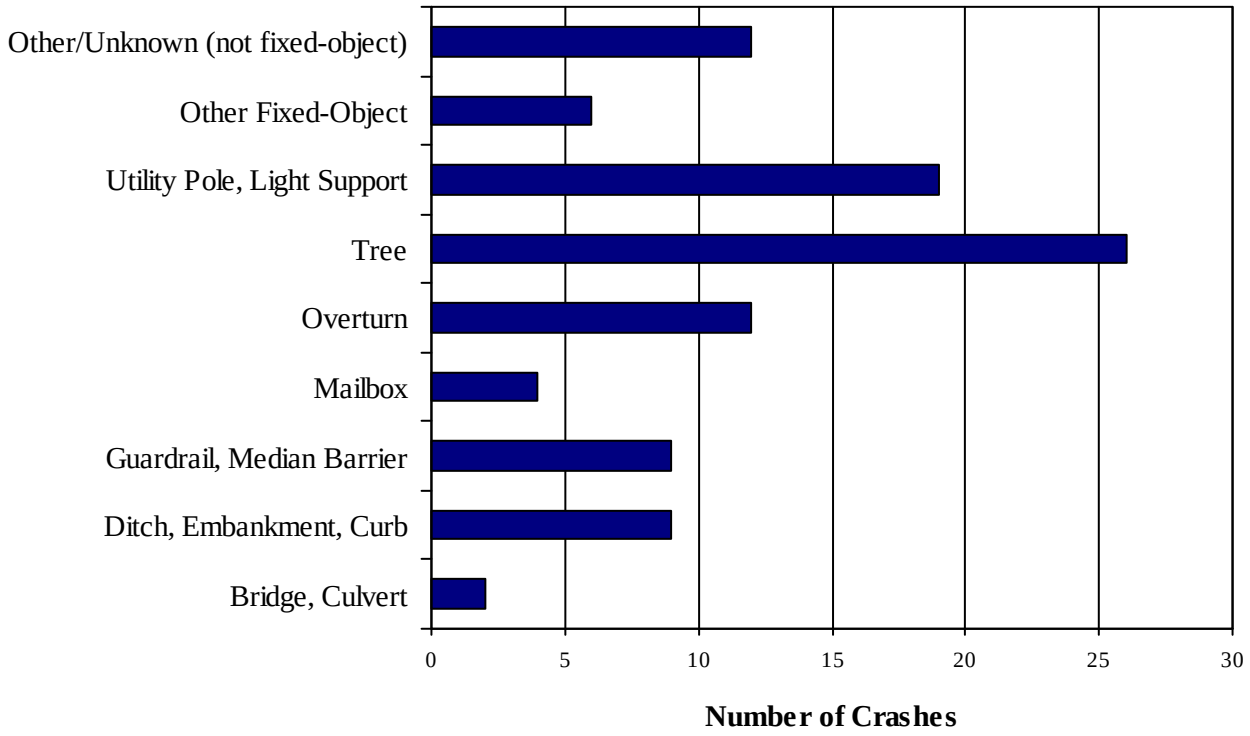
[1] National percentage of fatal run-off-road crashes involving this first harmful event based on FARS data
[2] Delaware percentage of fatal run-off-road crashes involving this first harmful event/object struck based on DelDOT crash data
[3] Delaware high-occurrence percentage

Utility poles and trees represent two large, unforgiving objects that are often difficult to remove from the edge of roads; therefore, separating these obstructions from the traveling public must be considered as a mitigation strategy.

AASHTO's *Roadside Design Guide* prioritizes how to address roadside obstacles as follows:

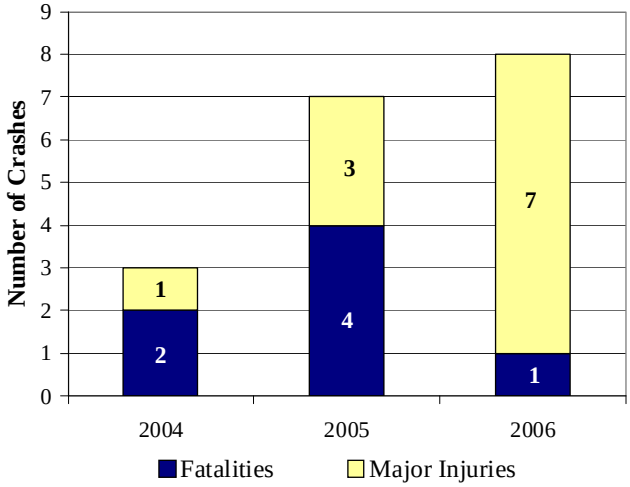
1. Remove the obstacle.
2. Redesign the obstacle so it can be safety traversed.
3. Relocate the obstacle to a point where it is less likely to be struck.
4. Reduce impact severity by using an appropriate breakaway device.
5. Shield the obstacle with a longitudinal traffic barrier designed for redirection or use a crash cushion.
6. Delineate the obstacle if the above alternatives are not appropriate.

Figure 21 - Fatal Run-off-Road Crashes by First Harmful Event/Object Struck



EMPHASIS AREA #8: DESIGNING SAFER WORK ZONES

Figure 22 - Designing Safer Work Zones



Due to the inherent dangers and complexity of work zones, drivers need to be more cautious and aware of their surroundings when traveling through work zones. Nationally, crash data related to work zones is not available. Although Delaware's former manual crash reporting format did not include work zone crash data, the current automated crash reporting system includes this information. During the study period between January 2004 and December 2006, 7 fatal crashes (2 percent of all fatal crashes) and 11 major injury crashes (1 percent) occurred in Delaware work zones. While national data is not currently available for comparison purposes, DelDOT continues to make work zone safety a priority in its planning process. As part of this emphasis area, Delaware plans to develop, implement, and enforce more effective work zone policies and procedures, increase work zone visibility, increase public awareness of work zones and their safety issues, and improve data collection and analyses.

EMPHASIS AREA #9: IMPROVING INFORMATION AND DECISION SUPPORT SERVICES

Traffic safety data is the primary source of information about the traffic safety environment, human behavior and vehicle performance. Therefore, in order to address safety problems, timely, accurate, complete, uniform, integrated and accessible data is required. The effectiveness of informed decision making requires sound research, programs and policies, and is directly dependent on data availability and quality. The Traffic Records Coordinating Committee (TRCC) is the primary point of leadership, planning, policy setting and accountability for Delaware's Traffic Safety Information System. The TRCC was established to coordinate actions among state agencies and to commit the resources necessary for the integration and sharing of safety related data. In June 2007, the TRCC approved the Delaware Traffic Information System Strategic Plan to set a framework for improving all aspects of traffic safety information and data. In June 2008, the TRCC updated Delaware's Traffic Information System Strategic Plan to reflect the current goals and objectives of the TRCC.

The lack of an integrated data traffic crash collection system has hampered the Delaware's ability to utilize comprehensive traffic safety data when making resource allocation decisions. In February 2008, the TRCC approved the implementation of a new crash system, named E-Crash, to replace the current Traffic and Criminal Software (TraCS) system. E-Crash is under development by Delaware Justice Information System (DelJIS) and Delaware State Police (DSP). The new E-Crash system will have many advantages over the current TraCS system and will be a component of DelJIS's Law Enforcement Investigative Support System (LEISS) system, which handles all criminal reporting. With the use of E-Crash, as well as Criminal and Highway Analysis Mapping for Public Safety (CHAMPS), a GIS-based mapping tool, and Crash Outcome Data Evaluation System (CODES), Delaware plans to link medical and injury data, adjudication, and DMV records with crash data for highway safety and injury control decision making.

STRATEGY SELECTION

General Strategies: A list of general strategies to mitigate crashes in each of the key emphasis areas was considered by combining NCHRP recommended strategies and those strategies proposed by other states with existing Strategic Highway Safety Plans. These strategies were then compared to existing Delaware programs and a combination of strategies was selected from the combined resources. A comprehensive list of general strategies is included in the Table 3.

Critical Strategies: General strategies were combined with similar strategies to avoid redundancies and a list of critical strategies was developed based on Delaware's available resources. These critical strategies, along with a detailed summary of each, are included in Appendix A.

PERFORMANCE MEASURES

Recognizing the diversity of the critical strategies, the coordinating agencies will review overall reductions in fatal crashes in future years. The diverse and complex nature of the strategies makes it difficult to determine which strategy or strategies most effectively reduce the number of fatal crashes, particularly because crashes may fall into several different emphasis areas and strategies. For example, a fatal crash may involve a large truck whose driver was not wearing a seatbelt and drove off the road and struck a tree. This example of a crash may have been addressed by several different strategies from several different emphasis areas.

GENERAL STRATEGIES

Table 3 – General Strategies for Delaware's Key Emphasis Areas

Emphasis Area	Objective	Strategies
Aggressive Driving	Conduct Outreach	Increase high visibility education, especially among high-risk groups (i.e. 25-34 year old drivers and teen drivers)
		Emphasize aggressive driving factors separately (i.e. speeding, illegal passing, red light running, etc.)
	Educate Young Drivers	Ensure Driver Education teachers incorporate aggressive driving traits, factors, and risks in lesson plans
		Combine classroom safety education and behind-the-wheel education
		Strengthen graduated driver's licensing program through legislative action
	Educate High-Risk Drivers - Especially 25 - 34 Year-Old Drivers	Ensure Defensive Driving Class addresses aggressive driving traits, factors, and risks
		Emphasize aggressive driving factors separately (i.e. speeding, illegal passing, red light running, etc.)
	Improve Compliance	Increase enforcement resources to better address aggressive driving problems at high crash locations
		Promote the use of 911 to report aggressive driving
		Evaluate automated speed enforcement systems, especially for school and work zones
		Provide law enforcement with tools, such as radar, necessary to reduce aggressive driving
	Limit Occurrence	Conduct judicial outreach to promote consistency in verdicts and sentencing
		Increase the fine structure and penalties for aggressive driving
		Conduct targeted enforcement at high-crash locations and for high-risk driving populations with tendency to drive aggressively
	Improve Driver Consistency	Coordinate traffic signals, where possible
		Improve incident management and notify public of incidents and potential delays
Impaired Driving	Conduct Outreach	Increase high visibility public information and education, especially among high risk groups
		Educate servers and liquor store workers on identifying impaired persons and discouraging such persons from driving
		Include impaired driving awareness in drivers education programs
		Advertise Designated Driver Program in bars near the University of Delaware
	Deter Impaired Driving with Increased Enforcement	Conduct target enforcement at locations with a history of impaired driving and for driving populations with high incidence
		Provide impaired driving equipment and technology in all police vehicles
	Enact Legislative Revisions	Strengthen DUI laws to increase fines and penalties for offenses
		Enact open container law
	Enhance Processing of Impaired Driver-Related Cases	Conduct judicial outreach to provide consistency in verdicts and sentencing
		Enhance prosecutor's ability to present the strongest case for impaired driving offenses
		Maintain contracts with private substance abuse prevention agencies for impaired driving offences

GENERAL STRATEGIES

Emphasis Area	Objective	Strategies
Seatbelt Usage	Conduct Outreach	Increase risk perception by publicizing information about enforcement initiatives
		Implement seatbelt awareness campaigns
	Increase Seatbelt Use through Enforcement	Conduct high visibility enforcement campaigns to maximize use
	Enact Legislation	Restructure penalty, including fines, to increase compliance
		Remove seatbelt "assessment" provision, which can reduce the penalty
Pedestrian Safety	Improve Compliance	Increase pedestrian-related enforcement
	Conduct Outreach	Increase education to improve vehicle-pedestrian right-of-way and responsibilities
		Include pedestrian right-of-way issues in drivers education courses
		Participate in health and safety fairs
	Improve Engineering Design to Emphasize Pedestrian Crossings	Consider sidewalk and bike lane improvements in all new projects and review pedestrian crossings at high crash locations
		Provide consistent pedestrian crossing designs
		Improve design to focus on sight distance to crosswalks and warning signs
Large Truck Crashes	Conduct Outreach	Increase public awareness of truck travel and truck blind spots
	Improve Data	Establish uniform data reporting requirements
	Improve Driver Compliance	Conduct judicial outreach to promote consistency between verdicts
		Strengthen commercial vehicle laws and penalties to encourage compliance
		Allocate resources to provide portable truck inspection equipment and safe areas for temporary inspection/weigh stations
		Increase enforcement of truck travel laws
		Construct weigh-in-motion detectors along heavily traveled truck routes
Run-off-road Crashes	Consistently Implement Policies and Technologies to Keep Vehicles on the Road	Install rumble strips in known high-crash locations
		Implement new delineator guidance
		Implement guidance to use wider edge lines in known high-crash locations
		Develop standards for using skid resistant surfaces, including how and when to test pavements
		Improve shoulder maintenance standards and practices
Consequences of Run-off-road Crashes	Eliminate Roadside Obstacles	Strive to maintain clear zone requirements
		Reevaluate tree guidance to proactively plan and design for impacted trees
	Delineate Roadside Obstacles	Install delineators or reflectors on trees often struck or shield the tree(s)
		Restructure utility permitting to require companies to delineate poles for future projects
		Improve guidelines for when to use guardrail, attenuators, and delineators for utility poles
Work Zone Safety	Improve Driver Compliance with Existing Laws	Increase law enforcement and police presence within work zones
		Consider using automated speed enforcement within work zones

GENERAL STRATEGIES

Emphasis Area	Objective	Strategies
	Improve Work Zone Awareness	Implement work zone safety guidelines as mandated by FHWA's *Final Rule*
		Increase contractor penalties for non-compliance with the DelDOT MUTCD and other safety requirements
		Improve "basic" (i.e. equipment, materials, specifications, training) maintenance of traffic safety issues
	Improve Work Zone Operations	Train workers, inspectors, and law enforcement on work zone procedures to achieve consistency
Traffic Crash Data	Improve Traffic Crash Data Accuracy, Uniformity, and Timeliness	Conduct enforcement training to establish uniform reporting
		Provide training for data analysts and users
		Automate data collection to enhance accurate crash location system
	Improve Traffic Records Accessibility	Integrate data systems
		Create query tools
		Continue linkage of crash, hospital discharge, and EMS data through CODES
		Promote public use and accessibility of traffic crash data

Appendix A: Delaware's Critical Strategies

CRITICAL STRATEGY #1

Create a communications/public relations plan to conduct media outreach to raise public awareness of key traffic safety issues (i.e. aggressive driving, impaired driving, seatbelt use, pedestrian safety, truck travel, and work zone safety).

Goal	Develop consistent public information messages to maximize public awareness of highway safety issues.
Strategy Description	The strategy is intended to raise public awareness of the leading causes of crashes and how to prevent them. By alerting the public to the pervasiveness of these emphasis areas, the SHSP team hopes to curb dangerous driving behaviors. Outreach formats may include billboard, radio and television advertisements, developing a visual to convey the extensive nature of the problem, and establishing memorable slogans or phrases to enhance awareness. Furthermore, this strategy should streamline several statewide programs that address similar issues, including pedestrian safety and aggressive driving. Currently, several programs are in place to provide pedestrian safety messages; however, the messages are inconsistent.
Supporting Data **(January 2004 to December 2006)**	• Forty-seven percent of total fatal crashes involved aggressive driving behaviors. Males were responsible for approximately 71 percent of aggressive driving-related fatal crashes and approximately 64 percent of aggressive driving-related major injury crashes. The under 21 year old age group has the highest number of fatal crashes involving aggressive driving, while the 25 to 34 year old age group has the highest number of major injury crashes involving aggressive driving. The time period that has the highest number of crashes involving aggressive driving is 3 PM to 6 PM. • Impaired driving accounts for 17 percent of all fatal crashes. While the 35 to 44 year old age group has the highest percentage of fatal crashes involving impaired drivers at 25 percent, the 25 to 34 year old age group had the highest percentage of major injury crashes involving impaired drivers at 25 percent. Additionally, 10 and 14 percent of fatal and major injury crashes involving impaired driving were caused by impaired drivers who were under 21 years old, respectively. • Delaware's Office of Highway Safety's 2008 Highway Safety Plan indicates that 54 percent of those killed in vehicle crashes were not using a restraint system. • Fifteen percent of all fatal crashes involved pedestrians. Thirty-nine percent of pedestrian-related fatal crashes involved an impaired pedestrian. Approximately 90 percent of pedestrian fatal and major injury crashes occurred mid-block. The greatest number of pedestrian fatal crashes involved pedestrians between the ages of 45 and 54 years old; however, the greatest number of pedestrian-related major injury crashes involved pedestrians under the age of 21.

CRITICAL STRATEGY #1 **Create a communications/public relations plan to conduct media outreach to raise public awareness of key traffic safety issues (i.e. aggressive driving, impaired driving, seatbelt use, pedestrian safety, truck travel, and work zone safety).**	
Target(s)	• Increase safety awareness among drivers with poor driving behaviors that often contribute to fatal crashes • Unify the message presented by several existing programs to provide efficient and effective guidance to the public • Create an online survey to assess the public's understanding of the safety risks associated with selected emphasis areas, especially aggressive driving, impaired driving, and seatbelt use
Expected Effectiveness	Public information and education campaigns can significantly increase awareness and help reduce unsafe driving behaviors. Additionally, public information and education campaigns are proven to be more effective when used in combination with targeted enforcement.
Keys to Success	Public information campaigns must be tailored to ensure that they are reaching the identified high-risk driving audience identified by crash data analysis. The messages need to be clear and concise and convey how to make Delaware's roadways safer, as well as identify the consequences of unsafe driving behaviors.
Appropriate Measures and Data	While direct measures of effectiveness are difficult to obtain, a decrease in crashes attributed to these poor driving behaviors will support the strategy.
Potential Obstacles	• Creating and/or obtaining quality media material that will impact driver behavior • High cost of television/radio advertisement/billboards/internet
Responsible Agency	OHS (lead), DelDOT, OEMS, DSP

CRITICAL STRATEGY #2

Provide adequate resources to allow state and local law enforcement agencies to perform targeted traffic enforcement, including aggressive driving, impaired driving, seatbelt use, pedestrian safety, truck travel, and work zones.

Goal	Conduct enforcement activities at high crash locations on particular days of the week and times of the day, as warranted by the data.
Strategy Description	The intent of this strategy is to encourage state and local agencies to provide funding and other resources needed to enable police agencies to perform essential traffic enforcement. Often, understaffed and underfunded police agencies are forced to cutback on traffic enforcement in order to meet other responsibilities considered a higher priority (i.e., homeland security, responding to domestic calls, etc.). By providing funding for additional traffic enforcement, police can prevent crashes by discouraging poor driver behaviors or by apprehending offenders before a crash occurs. Support of national enforcement mobilizations will be incorporated into the enforcement strategy, as necessary.
Supporting Data **(January 2004 to December 2006)**	• Forty-seven percent of total fatal crashes involved aggressive driving behaviors. Males were responsible for approximately 71 percent of aggressive driving-related fatal crashes and approximately 64 percent of aggressive driving-related major injury crashes. The under 21 year old age group has the highest number of fatal crashes involving aggressive driving, while the 25 to 34 year old age group has the highest number of major injury crashes involving aggressive driving. The time period that has the highest number of crashes involving aggressive driving is 3 PM to 6 PM. • Impaired driving accounts for 17 percent of all fatal crashes. While the 35 to 44 year old age group has the highest percentage of fatal crashes involving impaired drivers at 25 percent, the 25 to 34 year old age group had the highest percentage of major injury crashes involving impaired drivers at 25 percent. Additionally, 10 and 14 percent of fatal and major injury crashes involving impaired driving were caused by impaired drivers who were under 21 years old, respectively. • Delaware's Office of Highway Safety's 2008 Highway Safety Plan indicates that 54 percent of those killed in vehicle crashes were not using a restraint system. • Fifteen percent of all fatal crashes involved pedestrians. Thirty-nine percent of pedestrian-related fatal crashes involved an impaired pedestrian. Approximately 90 percent of pedestrian fatal and major injury crashes occurred mid-block. The greatest number of pedestrian fatal crashes involved pedestrians between the ages of 45 and 54 years old; however, the greatest number of pedestrian-related major injury crashes involved pedestrians under the age of 21.

CRITICAL STRATEGY #2 **Provide adequate resources to allow state and local law enforcement agencies to perform targeted traffic enforcement, including aggressive driving, impaired driving, seatbelt use, pedestrian safety, truck travel, and work zones.**	
Target(s)	• Reduce crashes that occur due to poor driver behaviors (i.e., speeding, impaired driving, fatigued driving, etc.) • Deter pedestrian-vehicle crashes by enforcing pedestrian safety laws • Discourage impaired pedestrians from making illegal crossings • Decrease the severity of a crash by increasing seatbelt use by vehicle occupants
Expected Effectiveness	With continual and consistent law enforcement, traffic behaviors have been shown to improve; therefore, increasing traffic enforcement will reduce crashes in the areas and corridors of enforcement.
Keys to Success	In order to reduce fatal and major injury crashes, a comprehensive outreach campaign targeting high-risk populations is needed in combination with the targeted enforcement activity.
Potential Obstacles	• Obtaining resources and manpower to conduct targeted enforcement, especially considering the number of competing programs • Implementation can only occur once funding to law enforcement agencies has been identified • Often, budgets are set for an entire year, limiting increased traffic enforcement until the following fiscal year
Appropriate Measures and Data	While direct measures of effectiveness are difficult to obtain, a decrease in crashes in areas or corridors with increased enforcement will support the strategy.
Responsible Agency	DSP, local law enforcement agencies, and OHS
Organizational, Institutional, and Policy Issues	The public, as well as the government, must be educated on the importance of providing high levels of traffic enforcement.
Training and Other Personnel Needs	Coordinate specialized law enforcement training, as necessary, to include impaired driving enforcement training.

CRITICAL STRATEGY #3 **Initiate discussions with agencies that provide drivers education to consider program improvements to include a curriculum addressing emphasis areas related to driver behavior.**	
Goal	Initiate discussions with the Department of Education, Insurance Commissioner's Office, and Division of Motor Vehicles.
Strategy Description	This strategy is intended to update drivers' education programs by emphasizing particular high-risk driver behaviors that have become more prevalent in recent years, such as aggressive driving and impaired driving. Both the graduated driver's licensing program and defensive driving classes need to highlight factors associated with aggressive and impaired driving, seatbelt usage, and other emphasis areas related to driver behavior.
Supporting Data **(January 2004 to December 2006)**	• Forty-seven percent of total fatal crashes involved aggressive driving behaviors. Males were responsible for approximately 71 percent of aggressive driving-related fatal crashes and approximately 64 percent of aggressive driving-related major injury crashes. The under 21 year old age group has the highest number of fatal crashes involving aggressive driving, while the 25 to 34 year old age group has the highest number of major injury crashes involving aggressive driving. The time period that has the highest number of crashes involving aggressive driving is 3 PM to 6 PM. • Impaired driving accounts for 17 percent of all fatal crashes. While the 35 to 44 year old age group has the highest percentage of fatal crashes involving impaired drivers at 25 percent, the 25 to 34 year old age group had the highest percentage of major injury crashes involving impaired drivers at 25 percent. Additionally, 10 and 14 percent of fatal and major injury crashes involving impaired driving were caused by impaired drivers who were under 21 years old, respectively. • Delaware's Office of Highway Safety's 2008 Highway Safety Plan indicates that 54 percent of those killed in vehicle crashes were not using a restraint system.
Target(s)	Reduce fatal crashes caused by high-risk driving behaviors associated with identified emphasis areas.
Expected Effectiveness	A reduction in crashes related to aggressive driving and impaired driving is expected, in addition to an increase in seatbelt use.
Keys to Success	For this strategy to be successful, it is necessary to establish effective lines of communication to clearly outline improvements to the driver education curriculum.
Potential Obstacles	• Obtaining support from drivers education officials • Obtaining resources to implement recommendations
Appropriate Measures and Data	Implementation of revisions/improvements to the drivers' education curriculum will support the strategy.
Responsible Agency	OHS, DSP, and DelDOT

CRITICAL STRATEGY #4 **Support legislative action to strengthen aggressive driving, impaired driving, commercial vehicle, and occupant protection laws.**	
Goal	Promote legislation that reduces fatal and serious personal injury crashes, especially crashes relating to aggressive driving, impaired driving, and occupant protection.
Strategy Description	By increasing the penalty and/or fine structure associated with these driving offenses and by removing potential legislative loopholes, the SHSP hopes to deter motorists from driving irresponsibly. Currently, the primary seatbelt law in Delaware is a civil offense, meaning violating drivers are cited with a $25 fine, but they do not incur any points associated with the offense. The law includes an assessment penalty, which allows judges to modify the fine for failure to comply with occupant protection laws.
Supporting Data **(January 2004 to December 2006)**	• Forty-seven percent of total fatal crashes involved aggressive driving behaviors. Males were responsible for approximately 71 percent of aggressive driving-related fatal crashes and approximately 64 percent of aggressive driving-related major injury crashes. The under 21 year old age group has the highest number of fatal crashes involving aggressive driving, while the 25 to 34 year old age group has the highest number of major injury crashes involving aggressive driving. The time period that has the highest number of crashes involving aggressive driving is 3 PM to 6 PM. • Impaired driving accounts for 17 percent of all fatal crashes. While the 35 to 44 year old age group has the highest percentage of fatal crashes involving impaired drivers at 25 percent, the 25 to 34 year old age group had the highest percentage of major injury crashes involving impaired drivers at 25 percent. Additionally, 10 and 14 percent of fatal and major injury crashes involving impaired driving were caused by impaired drivers who were under 21 years old, respectively. • Fourteen percent of fatal crashes involved a large truck, in contrast to 7 percent of major injury crashes. Of the fatal crashes involving large trucks, 48 percent occurred in New Castle County, the only county in Delaware with interstates. Additionally, the highest number of fatal crashes involving large trucks occurred between 12 PM and 3 PM. • Delaware's Office of Highway Safety's 2008 Highway Safety Plan indicates that 54 percent of those killed in vehicle crashes were not using a restraint system.
Target(s)	Deter harmful driving behaviors by threatening an offender's driving privileges and increasing penalties for violators.
Expected Effectiveness	Past studies indicate that open container laws can reduce alcohol-involved fatal crashes by 3.7 to 4.8 percent. Additional studies have shown that states with primary seatbelt laws experience higher usage rates than those states with

CRITICAL STRATEGY #4 **Support legislative action to strengthen aggressive driving, impaired driving, commercial vehicle, and occupant protection laws.**	
	secondary seatbelt laws.
Keys to Success	In order for laws to be effective at deterring irresponsible or reckless driving behavior, they must be strictly enforced; otherwise, these behaviors are unlikely to improve. Furthermore, driving laws must be upheld consistently by judges and prosecutors to maximize their effectiveness.
Potential Obstacles	The Delaware State legislature has been reluctant to pass an open container law.
Appropriate Measures and Data	While direct measures of effectiveness are difficult to obtain, the number of fatal and major injury crashes should be monitored after implementation of new driving laws related to these emphasis areas. In particular, a decrease in the number of crashes involving aggressive driving, impaired driving, and commercial vehicles, in addition to the number of persons wearing a seatbelt, will support this strategy.
Responsible Agency	OHS (lead), DSP, DelDOT, OEMS
Training and Other Personnel Needs	The public will need to be educated regarding any changes in the driving laws. Additionally, active public education and enforcement will be needed in order to make these laws effective.
Legislative Needs	• Enact an open container law • Increase seatbelt and aggressive driving-related fines

CRITICAL STRATEGY #5 **Improve driver expectancy by reducing driver frustration.**	
Goal	Manage the highway system more efficiently.
Strategy Description	Use new and existing intelligent transportation systems effectively to relieve congestion and driver frustration (e.g., coordinating traffic signals along congested corridors will reduce travel times and delays). Reducing frustration caused by the driving environment should eliminate or lessen a major contributor to aggressive driving.
Supporting Data (January 2004 to December 2006)	Forty-seven percent of total fatal crashes involved aggressive driving behaviors. Males were responsible for approximately 71 percent of aggressive driving-related fatal crashes and approximately 64 percent of aggressive driving-related major injury crashes. The under 21 year old age group has the highest number of fatal crashes involving aggressive driving, while the 25 to 34 year old age group has the highest number of major injury crashes involving aggressive driving. The time period that has the highest number of crashes involving aggressive driving is 3 PM to 6 PM.
Target(s)	• Provide up-to-date information to drivers in order to keep motorists informed of roadway conditions and allow them to make appropriate decisions • Coordinate signals and improve signal timing, especially along heavily traveled corridors, to reduce vehicle delay and driver frustration • Provide uniform traffic control devices including signing, signal timing, and pavement markings
Expected Effectiveness	While no existing studies quantify the impacts that improving the driving environment has on aggressive driving, ITE advocates initiatives such as signal coordination to reduce congestion and its related frustrations (see *NCHRP Report 500 Vol. 1*).
Keys to Success	For this strategy to be successfully, it is necessary to ensure law enforcement, EMS, and DelDOT coordinate their efforts to improve incident management and to obtain adequate personnel to address issues and maintain consistent traffic control devices.
Potential Obstacles	Lack of adequate resources
Appropriate Measures and Data	Performance can be measured by reductions in the frequency of both aggressive driving-related citations and behaviors, and aggressive driving-related crashes.
Responsible Agency	DelDOT (lead), DSP, EMS
Organizational, Institutional, and Policy Issues	New policies may need to be developed to identify high aggressive driving areas and to determine which response(s) prove to be most effective.
Issues Affecting Implementation Time	Depending upon the scope of the areas considered for improvement and the complexity of the improvements, the implementation timeframe will vary.
Training & Other Personnel Needs	Train DelDOT staff and obtain adequate resources to hire additional staff.

CRITICAL STRATEGY #6 **Develop an open forum with the judicial branch to discuss the processing of impaired driving (DUI) cases and commercial vehicle cases.**	
Goals	Consistently and successfully adjudicate impaired driving and commercial vehicle judicial cases.
Strategy Description	Due to the complexity of Driving Under the Influence (DUI) and commercial vehicle cases, verdicts often vary and as a result some officers may be discouraged from pursuing these types of cases. Many drivers do not appreciate the potential dangers and consequences they, and other motorists, pedestrians, and bicyclists, face when driving while impaired. This strategy is intended to compel people to reconsider their actions before driving under the influence by emphasizing that they will be punished when caught. When the courts suspend, reduce, or eliminate traffic charges for impaired drivers and commercial vehicle drivers, especially repeat offenders, a message is sent to the driver and the rest of the public that the actions are tolerable. The purpose of this strategy is to inform the public that they will be held responsible for their actions.
Supporting Data **(January 2004 to December 2006)**	• Impaired driving accounts for 17 percent of all fatal crashes. While the 35 to 44 year old age group has the highest percentage of fatal crashes involving impaired drivers at 25 percent, the 25 to 34 year old age group had the highest percentage of major injury crashes involving impaired drivers at 25 percent. Additionally, 10 and 14 percent of fatal and major injury crashes involving impaired driving were caused by impaired drivers who were under 21 years old, respectively. • Fourteen percent of fatal crashes involved a large truck, in contrast to 7 percent of major injury crashes. Of the fatal crashes involving large trucks, 48 percent occurred in New Castle County, the only county in Delaware with interstates. Additionally, the highest number of fatal crashes involving large trucks occurred between 12 PM and 3 PM.
Target(s)	Police officers often face significant challenges with impaired driving cases in court. Unlike other traffic violations, violators tend to hire attorneys and prepare rigorous defenses for impaired driving offenses. By presenting consistent, thorough evidence, consistently severe verdicts can be delivered to discourage this behavior. For example, Arizona recently developed a PowerPoint presentation that the police agencies use in court to reduce the complexity of impaired driving trials. The presentation includes all the relevant case evidence, including photos of the offender at the time of the offense.
Expected Effectiveness	Through consistent enforcement and prosecution, drivers will change their behaviors due to a high risk of being penalized. States with "Administrative License Revocation," which authorizes police officers to confiscate the license of an impaired driver, have experienced a 13 percent decline in fatal crashes involving drivers with a blood alcohol content greater than 0.10 (see *NCHRP Report 500 Vol. 16*).

CRITICAL STRATEGY #6 **Develop an open forum with the judicial branch to discuss the processing of impaired driving (DUI) cases and commercial vehicle cases.**	
Keys to Success	Court and DSP support of a revised evidence presentation is needed for the success of this strategy.
Appropriate Measures and Data	Effectiveness can be evaluated by the following: • Increase in the percentage of impaired driving cases that result in the maximum penalty(ies) assessed by the courts • Reduction in the number of crashes involving impaired driving
Responsible Agency	OHS (lead)
Training and Other Personnel Needs	Active communication with the judicial system is needed to improve the processing of impaired driving cases. Additionally, possible judicial and prosecution training may be necessary.

CRITICAL STRATEGY #7 **Improve pedestrian crossings design.**	
Goal	Incorporate pedestrian facilities in the design of all projects to reduce the potential for pedestrian crashes.
Strategy Description	Pedestrians are not always considered during the early stages of transportation projects. While it is difficult to quantify, inadequate pedestrian facilities and safety perception can often discourage pedestrians from walking.
Supporting Data **(January 2004 to December 2006)**	Fifteen percent of all fatal crashes involved pedestrians. Additionally, 39 percent of pedestrian-related fatal crashes involved an impaired pedestrian. Approximately 90 percent of pedestrian fatal and major injury crashes occurred mid-block. The greatest number of pedestrian fatal crashes involved pedestrians between the ages of 45 and 54 years old; however, the greatest number of pedestrian-related major injury crashes involved pedestrians under the age of 21.
Target(s)	Using a number of engineering treatments, this strategy aims to reduce pedestrians' exposure to traffic and to increase their visibility when crossing roadways. Where appropriate, traffic calming may be used to improve pedestrian safety, such as in neighborhoods and on lower speed roadways.
Expected Effectiveness	Implementing appropriate guidelines and modifying design criteria and processes may involve simply implementing existing treatments such as sidewalks and crosswalks, providing pedestrian refuges within medians, etc. Furthermore, pedestrian-related crashes can be reduced by eliminating conflicts between pedestrians and left-turning vehicles through the use of protected-only left-turn phasing. The following types of treatments have been proven effective and typically experience the following crash reductions: • Sidewalks – 50 to 90 percent crash reduction • Protected-only left-turn phasing with pedestrian phasing – 50 percent crash reduction
Potential Obstacles	• Obtaining capital improvement funding • Providing adequate "walk" time for pedestrians may deteriorate capacity at intersections
Appropriate Measures and Data	The effectiveness of this strategy can be measured by monitoring pedestrian crashes.
Responsible Agency	DelDOT (lead), OHS, DSP
Organizational, Institutional, and Policy Issues	Additional design policies and procedures may need to be implemented to include the consideration of pedestrian-friendly alternatives and the various treatments available.
Training and Other Personnel Needs	Provide training for designers.

CRITICAL STRATEGY #8 **Develop consistent design and maintenance of shoulders.**	
Goal	Reduce the consequences of run-off-road crashes.
Strategy Description	Providing a wider and smoother shoulder area will increase the probability that an errant vehicle in the shoulder can recover safely.
Supporting Data **(January 2004 to December 2006)**	Thirty-seven percent of fatal crashes were run-off-road crashes, of which, 78 percent occurred on dry pavement. While the 25 to 34 year old age group was responsible for the highest percentage (23 percent) of fatal run-off-road crashes, drivers under 21 were a factor in 18 percent of fatal run-off-road crashes. Alcohol was a factor in 56 percent of fatal run-off-road crashes.
Target(s)	Improve the recovery ability for vehicles in the shoulder, especially those vehicles that continue off the roadway and strike an object or overturn.
Expected Effectiveness	The *NCHRP Report 500* indicates flattening side slopes can reduce single-vehicle crashes by 8-percent to 27-percent. Minnesota safety and maintenance experts indicate that maintaining even gravel shoulders can prevent up to 15 percent of run-off-road crashes.
Keys to Success	Consistent application of improved shoulders throughout Delaware's roadway network, beginning with critical areas with a known safety problem, is vital to success of this strategy.
Potential Obstacles	Cost of implementing improvements statewide; however, impacts may be minimized by initially focusing on areas with known safety problems.
Appropriate Measures and Data	The effectiveness of this strategy can be determined by monitoring crash rates, especially run-off-road crash rates and their severity.
Responsible Agency	DelDOT
Organizational, Institutional, and Policy Issues	Establish guidelines for design, construction, and consistent maintenance of shoulders.
Training and Other Personnel Needs	Train inspectors and designers to effectively build and maintain shoulders, particularly during pavement rehabilitation projects.

CRITICAL STRATEGY #9 **Develop guidance for testing pavement and determining when to use skid resistant pavement.**	
Goal	Establish procedures to determine the skid resistance of pavement.
Strategy Description	Skidding occurs when the frictional demand exceeds the frictional force between the tire and the pavement. Typically, skidding occurs during wet surface conditions, but it can also occur during dry surface conditions, especially on older pavements. While many factors affect skid resistance, such as pavement age, structural condition, and traffic volume, the most influential variable contributing to the friction force is speed; therefore, high speed roadways need more frequent pavement testing and stronger pavement surfaces.
Supporting Data (January 2004 to December 2006)	Thirty-seven percent of fatal crashes were run-off-road crashes, of which, 16 percent occurred on wet pavement. While the 25 to 34 year old age group was responsible for the highest percentage (23 percent) of fatal run-off-road crashes, drivers under 21 were involved in 18 percent of fatal run-off-road crashes. Alcohol was a factor in 56 percent of fatal run-off-road crashes.
Target(s)	Improve areas where skidding is determined to be a problem, during either wet or dry pavement conditions, but primarily areas where skidding results in run-off-road crashes and rear end collisions.
Expected Effectiveness	Studies for skid resistant treatment have shown results including a 50-percent reduction in wet pavement crashes and a 20-percent reduction in total crashes. According to *NCHRP Report 500*, while the reduction in run-off-road crashes is not conclusive, it appears that skid resistant treatment will reduce these types of crashes by at least the same as for total crashes (a 20-percent reduction).
Keys to Success	Regularly scheduled evaluations of pavement conditions are necessary to monitor skid resistance. These evaluations need to include details of the treatment, the before and after crash experience, and the average rainfall. In order to simplify the evaluation process, spot checks may need to target pavement areas prone to friction failure.
Potential Obstacles	This strategy will require a strong commitment and adequate targeting of areas in poor condition.
Appropriate Measures and Data	Effectiveness will be determined by monitoring the before and after crash rates.
Responsible Agency	DelDOT (some coordination with other agencies may be necessary)
Organizational, Institutional, and Policy Issues	This strategy requires DelDOT to develop guidance on skid resistance testing.
Issues Affecting Implementation Time	Depending on which treatment is necessary, the implementation time varies.
Training and Other Personnel Needs	DelDOT employees will need to be aware of the new guidance and trained on how to select appropriate locations.

CRITICAL STRATEGY #10 **Install and utilize cost effective lane departure improvements.**	
Goal	Implement rumble strip and raised pavement markers (RPMs) guidance to reduce run-off-road crashes.
Strategy Description	Several improvements and strategies can work together to prevent or reduce the severity of run-off-road crashes and combined strategies may be more effective in some situations than individual strategies. These strategies may include installing delineators, wider edgelines, and/or RPMs to highlight the edge of pavement, or installing delineators, reflective tape, shields or guardrail to delineate/shield/protect trees and/or utility poles within the clear zone. Many run-off-road crashes occur due to inattentiveness or drowsiness. Rumble strips alert drivers that they are either approaching the edge of the road or crossing the centerline, and potentially allow drivers to regain control of their vehicle before a crash.
Supporting Data **(January 2004 to December 2006)**	Thirty-seven percent of fatal crashes were run-off-road crashes, of which, 16 percent occurred on wet pavement. While the 25 to 34 year old age group was responsible for the highest percentage (23 percent) of fatal run-off-road crashes, drivers under 21 were involved in 18 percent of fatal run-off-road crashes. Alcohol was a factor in 56 percent of fatal run-off-road crashes. Seventy-five percent of fatal run-off-road crashes involved vehicles striking a fixed-object and 45 percent of run-off-road crashes involving vehicles striking a tree, utility pole, or light support. Additionally, 12 percent of run-off-road crashes involve vehicles overturning. Twenty-eight percent of fatal run-off-road crashes involved speeding.
Target(s)	• Rumble strips warn inattentive and/or drowsy drivers that they are leaving the travel lanes, either off the edge of road or crossing into oncoming traffic. • By increasing the visibility of the edge of roadway and the visibility of obstacles located along the edge of roadway, drivers should better navigate difficult sections of roadway and avoid run-off-road crashes.
Expected Effectiveness	The effectiveness of this strategy will depend on the specific strategy chosen and whether the strategy was used in an appropriate location. Past studies indicate the following: • Early studies indicate that post-mounted delineators on rural two-lane curves lead to a 15-percent reduction in run-off-road crashes. • According to a NYDOT study, wider edge lines may result in a 10 to 15 percent decrease in run-off-road crashes. • NYDOT found that, if applied at high crash locations, RPMs can reduce fixed-object and run-off-road crashes by approximately 19 percent. • Past studies have found that shoulder rumble strips cause a 20 to 30-percent reduction in the number of run-off-road crashes. The installations of centerline rumble strips have shown a 30-percent reduction of head-on and run-off-road crashes.

CRITICAL STRATEGY #10 **Install and utilize cost effective lane departure improvements.**	
Keys to Success	Lane departure improvements need to be tested on an experimental basis, particularly in areas where drivers need additional guidance.
Potential Obstacles	• Damage to delineators and pavement markings caused by snow plows may affect their effectiveness and cause maintenance concerns. • Rumble strips may cause problems for bicyclists and motorcyclists. • Roadway and shoulder width, as well as surface type, may prohibit rumblestrip installation at some locations. • Noise caused by vehicles driving over rumble strips near residential areas must be considered prior to installation.
Appropriate Measures and Data	The effectiveness of this strategy can be determined by monitoring before and after run-off-road crash rates.
Responsible Agency	DelDOT, DelDOT Maintenance
Organizational, Institutional, and Policy Issues	Revise on-call contract language to address response time for repairing damaged delineators.
Issues Affecting Implementation Time	As relatively inexpensive treatments, both rumble strips and delineators should be installed within a short timeframe.
Training and Other Personnel Needs	Train designers to use best practices in locating devices. Train maintenance and construction on when and how to use delineators and devices.

CRITICAL STRATEGY #11 **Delineate objects located outside the travel way that may be struck by a run-off-road vehicle.**	
Goal	Reduce the severity of run-off-road crashes.
Strategy Description	While it would be ideal to remove the object(s) struck during a collision, available resources limit the likelihood of eliminating all objects located outside the travel way. This strategy aims to reduce the impact of a run-off-road event by delineating or removing fixed objects located near the travel way, especially those objects that crash data indicate are struck frequently.
Supporting Data **(January 2004 to December 2006)**	Thirty-seven percent of fatal crashes were run-off-road crashes, of which, 16 percent occurred on wet pavement. While the 25 to 34 year old age group was responsible for the highest percentage (23 percent) of fatal run-off-road crashes, drivers under 21 were involved in 18 percent of fatal run-off-road crashes. Alcohol was a factor in 56 percent of fatal run-off-road crashes. Seventy-five percent of fatal run-off-road crashes involved vehicles striking a fixed-object and 45 percent of run-off-road crashes involving vehicles striking a tree, utility pole, or light support. Additionally, 12 percent of run-off-road crashes involve vehicles overturning. Twenty-eight percent of fatal run-off-road crashes involved speeding.
Target(s)	By increasing the visibility of obstacles located along the edge of roadway, drivers should be able to better navigate difficult sections of roadway and avoid impact with these roadside obstacles. Initially, this strategy aims to delineate objects with the highest frequency of being struck.
Expected Effectiveness	While the effectiveness of delineating roadside objects is still being studied by AASHTO, this strategy is expected to reduce fixed-object crashes by providing additional guidance cues and possibly providing "safer escape route" information to drivers off the roadway *(NCHRP Report 500 Vol. 16).*
Keys to Success	For the success of this strategy, using crash data to most effectively determine what locations and objects warrant delineation is very important.
Potential Obstacles	If delineated objects continue to be struck, simply replacing the delineators will not resolve the safety problem and other measures should be considered. Maintenance of delineators continuously struck may require additional staff and time. Removal of objects that are struck can be costly and difficult.
Appropriate Measures and Data	The effectiveness of this strategy can be determined by monitoring the before and after run-off-road crash rates.
Responsible Agency	DelDOT

CRITICAL STRATEGY #12 **Implement work zone safety guidelines.**	
Goal	Implement DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines*.
Supporting Data **(January 2004 to December 2006)**	Work zones demand additional attention by motorists, which can create a problematic situation for both workers and motorists alike. In order to enhance driver awareness, standard work zone treatments need to be implemented to notify drivers that they are approaching and are within work zones. Strategies may include establishing more effective day and night work zone operation review procedures, developing more effective public information guidelines, and demonstrating more advanced technology applications for work zones. Seven fatal crashes (2 percent of all fatal crashes) and 11 major injury crashes (1 percent) occurred in work zones.
Target(s)	By increasing work zone visibility and awareness, motorists should drive more cautiously in these vulnerable areas, reducing the likelihood of a crash.
Expected Effectiveness	FHWA's *Work Zone Best Practices Manual* summarizes some of the benefits associated with various work zone treatments and strategies. Quantifying the effectiveness is difficult, especially for public awareness campaigns that may be used to encourage drivers to recognize the risks associated with work zones.
Keys to Success	Coordination between DelDOT, law enforcement, and contractors, in understanding the importance of providing safe work zones and notifying the public of the risks associated with them, is necessary for this strategy to be successful.
Appropriate Measures and Data	The effectiveness of this strategy can be measured by monitoring work zone crashes, fatalities and injuries
Responsible Agency	DelDOT, DSP, and OHS
Organizational, Institutional, and Policy Issues	This strategy requires implementation of DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines* and development and adoption of guidelines in compliance with FHWA's Final Rule on Temporary Traffic Control Devices.
Issues Affecting Implementation Time	DelDOT's *Work Zone Safety and Mobility Procedures and Guidelines* are applicable to projects that have a preliminary plan date after October 12, 2007.
Training and Other Personnel Needs	DelDOT construction inspectors, DelDOT Maintenance, DelDOT Designers, DelDOT Planning, and law enforcement agencies will need training on the new policies and how these best practices will be implemented.

CRITICAL STRATEGY #13 **Develop an integrated traffic crash data collection system to increase accuracy, uniformity, completeness, integration, accessibility and timeliness.**	
Goal	Create and implement E-Crash, an integrated traffic crash data collection system for use by all Delaware law enforcement agencies and the traffic safety community.
Strategy Description	Improve crash data accuracy, uniformity, completeness, integration, accessibility and timeliness, by implementing the recommendations outlined in the Traffic Records Coordinating Committee Strategic Plan.
Supporting Data	Crash data is the backbone of highway safety programs and the Strategic Highway Safety Program depends on the quality and availability of data to make informed program decisions and implement appropriate strategies. Inaccurate and incomplete crash data hampers all highway safety program planning.
Target(s)	While this strategy does not address a specific crash type, accurate and timely crash data can better enable users to identify emphasis areas and high crash locations to apply resources. The system should include automated data collection, automated query tools, and integrated data between agencies and users.
Expected Effectiveness	Although the exact impact on reducing fatal crashes is difficult to estimate, better data will improve the state agencies' ability to effectively allocate resources to known crash problems and locations.
Keys to Success	All responsible agencies and end users must coordinate efforts to ensure that all the necessary data is collected in a consistent manner so that it can be used to improve traffic safety decision making.
Potential Obstacles	• Coordinating agencies that may be resistant to change • Providing adequate resources • Training officers about the importance of completing the crash forms thoroughly
Responsible Agency	DSP, DelJIS (with support from OHS, DelDOT, EMS, and DMV)
Training and Other Personnel Needs	Staff (including police officers, data managers, and data users) will need to be trained in collecting, managing, and using the new crash data system.

Appendix B: Glossary of Terms

AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
BAC	Blood Alcohol Content
CHAMPS	Criminal and Highway Analysis Mapping for Public Safety
CODES	Crash Outcome Data Evaluation System
DelDOT	Delaware Department of Transportation
DelJIS	Delaware Judicial Information System
DMV	Division of Motor Vehicles
DSP	Delaware State Police
DUI	Driving Under the Influence
FARS	Fatality Analysis Reporting System
FHWA	Federal Highway Administration
LEISS	Law Enforcement Investigative Support System
NCHRP	National Comprehensive Highway Research Project
NHTSA	National Highway Traffic Safety Administration
OEMS	Office of Emergency Medical Services
OHS	Office of Highway Safety
RPM	Raised Pavement Marker
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act- A Legacy for Users (Enacted August 10, 2005)
TEA-21	Transportation Equity Act for the 21st Century
TraCS	Traffic and Criminal Software
VMT	Vehicle Miles Traveled

Questions or requests for copies of this document should be directed to:

Delaware Department of Transportation
dot-public-relations@state.de.us
P.O. Box 778
Dover, DE 19903