I-95 Road Safety and Operations Audit (RSOA)

I-95 BUCKS COUNTY FROM PA 63 TO PA 332

May 2013

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

pennsylvania DEPARTMENT OF TRANSPORTATION

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

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

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Executive Summary

Upon request from the Federal Highway Administration (FHWA) and the Pennsylvania Department of Transportation (PennDOT), the Delaware Valley Regional Planning Commission (DVRPC) conducted a first-ever, hybrid Road Safety and Operations Audit (RSOA) on the Delaware County section of I-95. Building on the success of that event, the FHWA recommended a second RSOA, this time on a 15-mile section of I-95 in Bucks County.

DVRPC's I-95 Bucks County RSOA is a hybrid of the standard Road Safety Audit (RSA) and DVRPC's US 202, Section 200 Transportation Operations Audit. This format is an evolution of the RSA process, designed to make efficient use of resources and of the team members' limited time. An RSOA is an effective way of identifying crash-causing trends and operations concerns, as well as brainstorming appropriate countermeasures, utilizing an approach that promotes transportation safety while maintaining mobility. This document is the final report for the I-95 Bucks County RSOA. This project represents a step toward implementation of DVRPC's *2012 Transportation Safety Action Plan: Improving Transportation Safety in the Delaware Valley* (August 2012, #12030), and PennDOT's Strategic Highway Safety Plan (SHSP).

The driving force behind the I-95 RSOAs was the FHWA's desire to assess sections of I-95 in concert with the multi-decade I-95 Corridor Reconstruction Project currently underway. PennDOT has developed a strategy to address the 51 miles of I-95 through Pennsylvania by dividing it into five smaller and more manageable subsections. These subsections are identified as Sectors A through E according to priority, A being the highest priority. Because the Bucks County portion of I-95 is an even lower-priority sector than the Delaware County section, and not slated for work to begin until 2030 or later, an audit was recommended as a proactive strategy to identify and address as many immediate safety and operational issues as possible, focusing on low-cost improvements.

Several sections of I-95 in Bucks County were included on the PennDOT District 6-0 2008 High Crash Location (HCL) list. Of the 377 high crash locations identified statewide by PennDOT, 209 were within District 6-0, 12 were on interstate highways, and, of those, two were on I-95 in Bucks County. This segment was also the site of five fatal crashes that claimed the lives of five people during the analysis period of 2008 through 2010.

The I-95 Bucks County RSOA event was conducted on Thursday, May 26, 2011. The audit team of 12 participants included representation from the FHWA (Harrisburg and Philadelphia, Pennsylvania, offices), PennDOT District 6-0 (Traffic, Safety, Traffic Freeway Management, and Maintenance divisions), Pennsylvania State Police, Bristol Township and Middletown Township Police Departments, Bucks County Planning Commission, Bucks County Transportation Management Association, and DVRPC. See Appendix A for the full list of audit team members.

On June 2, 2011, a follow-up meeting of the audit team was held to prioritize problem locations, sketch out improvement strategies, and complete the audit response sheet. This meeting was attended by most of the audit event attendees as well as additional PennDOT personnel.

One location the audit team discussed at length is the 1.25-mile long (northbound and southbound) I-95 segment at the Street Road interchanges. This stretch of I-95 is of interest because of a development project that is currently on hold.

Another location of special concern is the half-mile segment of I-95 northbound between the Street Road and Bristol interchanges. This segment was chosen for further analysis because it contains the two highest crash segments on the corridor, has recurring congestion, and is in the area of influence of a high-volume interchange.

Eighty-seven site-specific safety and operational issues, and seven corridor-wide issues, were identified by the team during the audit. They are divided by northbound or southbound direction of travel and are organized by aerial panel map and discussed in Chapter 3, “Findings and Recommendations.” Each panel is represented graphically on an aerial-view map and has a corresponding table. This layout is designed to assist the reader in locating identified safety issues and implemented improvements.

Some of the recommended improvements have been implemented since the completion of the audit event, which can be attributed to the hard work and collaboration between the various PennDOT District 6-0 offices. Each of the following low-cost improvements is listed on the table in Chapter 3 and identified on the corresponding maps: new line striping, missing signs replaced, repaired guide rail, vegetation obscuring sight distance trimmed, and sun glare screens installed. Long-term issues identified include: inadequate shoulders, insufficient off-ramp storage capacity, merge area problems, closely spaced exits and on-ramps, and recurring peak-period congestion.

Introduction

As the final report for the I-95 Bucks County RSOA, this document represents a step toward implementation of PennDOT's SHSP and DVRPC's Safety Action Plan. The RSOA process utilizes a nontraditional approach to address crash and operations problems through an intensive, collaborative forum. With assistance from PennDOT District 6-0, DVRPC utilized crash data summaries and crash record resumes from the Pennsylvania Crash Data Analysis and Retrieval Tool (CDART) for the crash analysis portion of the audit.

State departments of transportation are required to develop an SHSP in order to draw on federal safety funds according to the former Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). This act has since been replaced by new legislation called Moving Ahead for Progress in the 21st Century (MAP-21).

In Pennsylvania, each PennDOT district office is required to develop its own safety plan that is incorporated in the state's SHSP. Over the last four fiscal years, DVRPC has been coordinating with PennDOT District 6-0 to conduct road safety audits on corridors identified on their Section 148 Highway Safety Improvement Program (HSIP) that are eligible for dedicated funding but not already programmed. To date, over 20 corridors in the bi-state DVRPC region have been addressed in urban, suburban, and rural settings. The I-95 Bucks County RSOA is the second event on an interstate highway conducted by DVRPC, building on the implementation success of the I-95 Delaware County RSOA of 2010.

What Is an RSOA?

An RSOA is a formal safety and operations performance examination of an existing or future road or intersection by a multi-disciplinary audit team. Road safety and operations audits can be used on a variety of projects, though the format was created for use on a controlled access highway.

A primary objective of the RSOA is to generate improvement recommendations for roadway segments demonstrating a history of, or potential for, a high frequency of motor vehicle crashes or an identifiable pattern of crash types. Emphasis is placed on identifying low-cost, quick-turnaround safety and operations improvements to address issues where possible, though not excluding more complex, longer-term strategies. Implementation of improvement strategies identified through this process may be eligible for HSIP funds. The RSOA process is adaptable to local needs and conditions, and recommendations can be implemented incrementally as time and resources permit.

The Bucks County RSOA draws on DVRPC's experience with the I-95 RSOA in Delaware County, and two other DVRPC efforts: (1) the US 202, Section 200 Transportation Operations Audit (2010, #10041), and (2) the Transportation Systems Management and Operations (TSM&O) study for I-95 in Delaware County (2009, #08085). Outcomes of the TSM&O study include the establishment of official PennDOT detour routes and an Incident Management Task Force (IMTF).

Prior to the one-day audit event, DVRPC collected and analyzed relevant data, including crash concentration area and corridor-wide crash summary analyses, crash rates, daytime and nighttime video of the roadway, traffic volume data, congestion data, travel-time data, and aerial photographs. DVRPC staff also conducted a pre-audit field visit to examine conditions and take photographs.

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

- Pre-audit: The study team reviews location characteristics, crash analysis, and other transportation data.
- Field visit: The study team examines conditions along the corridor via windshield survey.
- Post-audit: The study team shares observations from the field visit, develops a list of problems and potential strategies, and discusses priorities.

Following the event, DVRPC staff compiled the identified problems and potential strategies into a matrix and sent it to the audit team for review. Then the table was revisited at a meeting on June 2, 2011 (one week after the audit event), to complete the response sheet, further develop strategies, and prioritize the issues.

The I-95 Bucks County Audit Event

The one-day audit was conducted on Thursday, May 26, 2011. The pre-audit and post-audit meetings were held at the Bristol Township Municipal Building in West Bristol, Pennsylvania. The audit team of 12 participants included representation from local, county, regional, state, and federal levels. See Appendix A for the full list of audit team members.

The pre-audit meeting—an overview of the study area and an examination of crash history—began at 8:00 AM. Next was the field visit for which the audit team drove through the corridor and examined conditions to identify safety and operational issues, including stops at key locations to discuss identified issues. After lunch, the team returned for the post-audit session where problems were defined and countermeasures considered.

Corridor Description and Analysis

Study Location

The study area consists of approximately 15 miles of I-95 within Bucks County, from the City of Philadelphia in the south to just north of Exit 49 at PA 322 (see Figure 1 on this page, and Figure 2 on the following page for a detailed study area map). This stretch of I-95 is an important link between Philadelphia, its northern suburbs, and the Trenton–Princeton region in central New Jersey. Heavy volumes and recurring peak-period congestion are characteristic of this stretch, as it provides access to both downtown Philadelphia and Trenton for many Bucks County commuters. Additionally, it is a major artery for through traffic seeking destinations beyond the Delaware Valley.

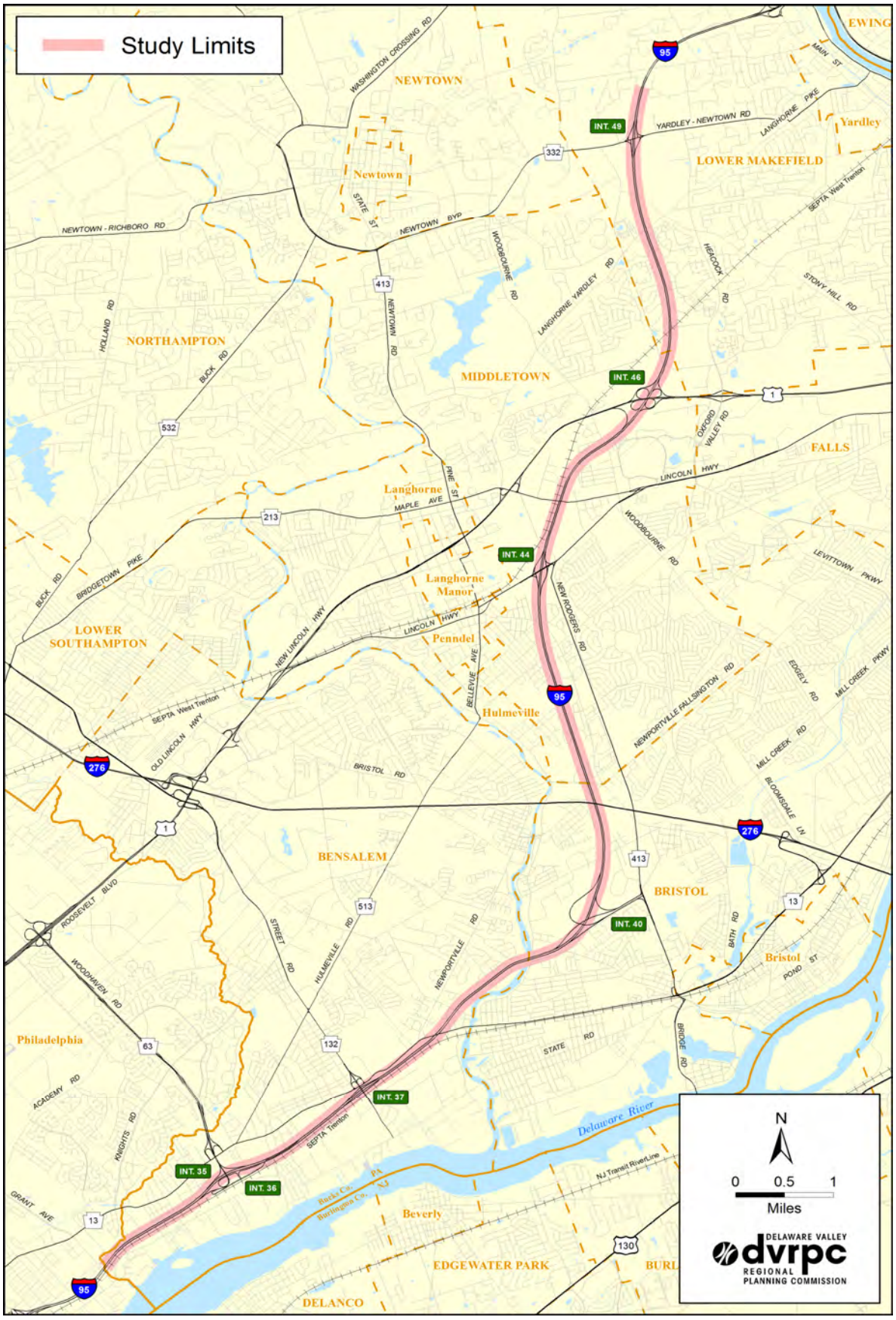
Figure 1: Regional Setting

Roadway Characteristics

I-95 is classified as an urban interstate. The corridor study segment is a six-lane cross section between exits 35 and 40, and four lanes between exits 40 and the New Jersey State Line. The study segment has cable median barriers from Exit 40 north through Exit 49 and guide rail barriers along its length; shoulder width varies throughout the study area. The alignment of I-95 includes both horizontal and vertical curves.

Depending on the location, the speed limit is either 55 or 65 miles per hour. Within the study area there are seven interchanges that serve as key linkages to other important facilities, including: PA 63-Woodhaven Road, PA 132 (Street Road), PA 413, PA` 13, and US 1. There are also direct northbound and southbound connections to the Southeastern Pennsylvania Transportation Authority (SEPTA) Cornwells Heights Regional Rail Station located adjacent to the PA 63-Woodhaven Road interchange. This station is equipped with a park and ride facility.

Figure 2: Study Area



Traffic Volumes

Volume data from Traffic.com was used for the audit. The continually collected data was normalized by DVRPC to determine annual average daily traffic (AADT). Traffic volumes varied, with higher numbers of vehicles found toward the southern end of the study segment, closer to Philadelphia. Near I-95's interchange with PA 132-Street Road, approximately 47,000–49,000 vehicles traveled in each direction per day on average in 2009. This number dropped slightly from just over 50,000 vehicles in 2007. Further north, near the US 1 interchange, 28,000–30,000 vehicles traveled in each direction in 2009, down from 30,000–32,000 in 2007.

The elevated traffic levels from PA 63 southward can be attributed to Route 63's role in morning and evening commuting, and to its connection to US 1 and further to I-276 PA Turnpike via US 1. This interchange adds southbound traffic as commuters enter I-95 bound for Philadelphia and siphons off northbound traffic as others leave I-95 to reach suburban-area destinations.

Exit 40 provides access to the Burlington-Bristol Bridge. Traffic volumes dropped in the northbound direction beyond the interchange according to the 2009 traffic count. In the same area, approximately 20,000 cars were added in the southbound direction. Figure 3 on the following page depicts AADT volumes for the study corridor.

Operations Studies

DVRPC's *Transportation Operations Master Plan* (July 2009, #09049) outlines a long-range vision of transportation operations for the DVRPC Region. This vision establishes a plan of where Intelligent Transportation Systems (ITS) infrastructure, emergency service patrols, and Incident Management Task Forces should be deployed in the region. Although many other operational considerations may apply to the I-95 Bucks County RSOA study corridor, the following specific operational strategies have been identified:

- Primary Coverage for ITS Infrastructure: full closed-circuit television (CCTV) camera coverage, variable message signs (VMS), incident detection, and travel-time detectors;
- Full Coverage for Emergency Service Patrol (ESP): 24 hours a day, seven days a week;
- Development of an IMTF; and
- Integrated Corridor Management (ICM) for Freeways: optimize travel in the corridor by coordinating traffic and transit on expressways and arterials.

The most recent Congestion Management Process (CMP) also addresses transportation operations within the Bucks County section of I-95 and is discussed later in this document.

Figure 3: Annual Average Daily Traffic Volumes

Incident Management

There are multiple entities responsible for incident management in the study corridor. The Pennsylvania State Police patrol the entire section of I-95 in Bucks County. Other emergency responders and service providers include the local fire departments, police (traffic safety) departments, emergency medical services departments, local towing companies, Bucks County Emergency Management Agency, PennDOT Maintenance Department, and the PennDOT Regional Traffic Management Center (RTMC).

PennDOT has established seven official detour routes for I-95 in Bucks County. These are generally interchange-to-interchange detours that include primary and secondary routes. Three of the routes utilize US 13, while the others use PA 413, US Business 1, or PA 332. Access to detour route information and maps can be gotten via the Interactive Detour Route Mapping (IDRuM) web-based application developed by DVRPC (www.idrum.us).

PennDOT also deploys Emergency Service Patrols (ESPs) on I-95 in Bucks County. The ESPs are a fleet of service trucks used to assist motorists, free of charge, when their vehicles have suffered a mechanical failure, flat tire, or a minor incident. ESP operators also provide vital assistance to emergency responders at incidents by removing debris from the highway, relocating the involved vehicles (if necessary), and using arrow boards for traffic control and scene safety. Along I-95 from Woodhaven Road to the Scudder Falls Bridge, there is one ESP truck that patrols during the morning peak hours (5:30 AM to 9:30 AM) and one truck that patrols during the evening peak hours (3:30 PM to 7:30 PM).

ITS Infrastructure

The 2009 American Recovery and Reinvestment Act (ARRA) included an ITS infrastructure deployment project in Bucks County on I-95, US 1, and PA 63-Woodhaven Road. The ARRA project included fiber-optic communication systems and video sharing through the Bucks County Emergency Management Agency, which includes video display in the 9-1-1 dispatch center and a video wall in the Emergency Operation Center. The ARRA project also provided CCTV cameras, VMS, and incident/travel-time detectors along the roadside to help determine travel times, which are then posted on the DMS signs.

These ITS devices were operational as of spring 2011 (post audit). There are now 24 CCTV cameras that are evenly distributed along I-95, and thirteen VMSs. They are operated by PennDOT from the RTMC in King of Prussia, which serves the five southeastern counties in Pennsylvania. The operators monitor traffic conditions, assist in incident management, and disseminate traveler information to the public. It is staffed 24 hours a day, seven days a week.

CMP

The CMP is a systematic way to analyze the multimodal regional transportation network and manage congestion. The CMP identifies congested corridors, subdivides them into subcorridors, and recommends improvement strategies. The CMP analysis includes criteria for reducing congestion and increasing reliability.

The study segment of I-95 is within CMP Corridor 4, 1-95, Subcorridors 4A and 4B (of four total subcorridors), which includes all of I-95 through Pennsylvania between New Jersey and Delaware. Most of

the study area is low-density suburban development, a land use type that can induce traffic congestion even on local roads.

As mentioned earlier, the study corridor includes a commuter train line operated by SEPTA that connects Philadelphia with Trenton, New Jersey, and points beyond. It traverses the Delaware River over a railroad bridge that also serves important freight rail traffic in the region. Some appropriate strategies identified to manage congestion include the usage of ITS, ICM, incident management, and ITS improvements to aid traveler information and improve traffic flow.

Travel Time and Congestion

Travel times are dependent on the level of traffic congestion as well as distance traveled and road type. As congestion increases on a roadway, travel times increase. Data for this analysis was obtained from the I-95 Corridor Coalition's Vehicle Probe Project. It uses data gathered from global positioning system (GPS)-enabled devices and other sources to provide historic and real-time speed and travel-time data.

For the I-95 RSOA, two summary measures were calculated using two years of weekday data. The results of the analysis are that travel-time delays due to congestion were relatively low in the study corridor compared to some other corridors in the Delaware Valley. However, there was congestion at the edges and just outside the study limits to the north and south (see Figure 4 and Figure 5).

The measures for the RSOA were calculated for 7:00 to 8:00 AM and 5:00 to 6:00 PM, as these were the peak hours based on a sample of typical traffic volume data. The analysis was done for weekdays in 2009 and 2010. The two measures are:

- Duration of Congestion, which represents the number of minutes during the peak hour that a roadway segment had congested conditions, is defined as speeds that fall below 70 percent of the reference speed. The reference speed is the historic average speed for that segment of road.
- Travel Time Index (TTI), represents how much the actual travel time exceeds the reference travel time. In other words, a TTI value of >1 means that it took longer to travel that road segment during the peak hour than it would have at a different time of day based on historic travel times. A larger TTI value means longer travel-time delay.

In the north and south congested areas, 10.1 to 19.5 minutes per hour were congested on average weekdays in 2009 and 2010. The amount of congestion tapered off toward the middle, with the exception of elevated congestion levels around the US 1 interchange in the morning. In the afternoon there were elevated travel times and congestion going in both directions in the south, while the road cleared in the north at this time. The congested areas have TTIs ranging from 1.26 to 1.5, while the clear areas in the center of the study area have TTIs of 1.0 to 1.25. Figure 4 depicts a section of the study corridor and its corresponding travel-time information.

Specific conclusions from the analysis are:

- During the AM peak hour, travel-time delays occur just south of the PA 63 interchange on I-95 southbound and just north of the PA 332 interchange on I-95 northbound. During the PM peak hour, moderate travel-time delays occur just south of the PA 63 interchange on both directions of I-95.
- The Duration of Congestion measure shows reduced speeds in the same places that travel-time delays appear. This measure, however, also shows some minor congestion extending to the south of the PA

Figure 4: Travel Time and Congestion – AM

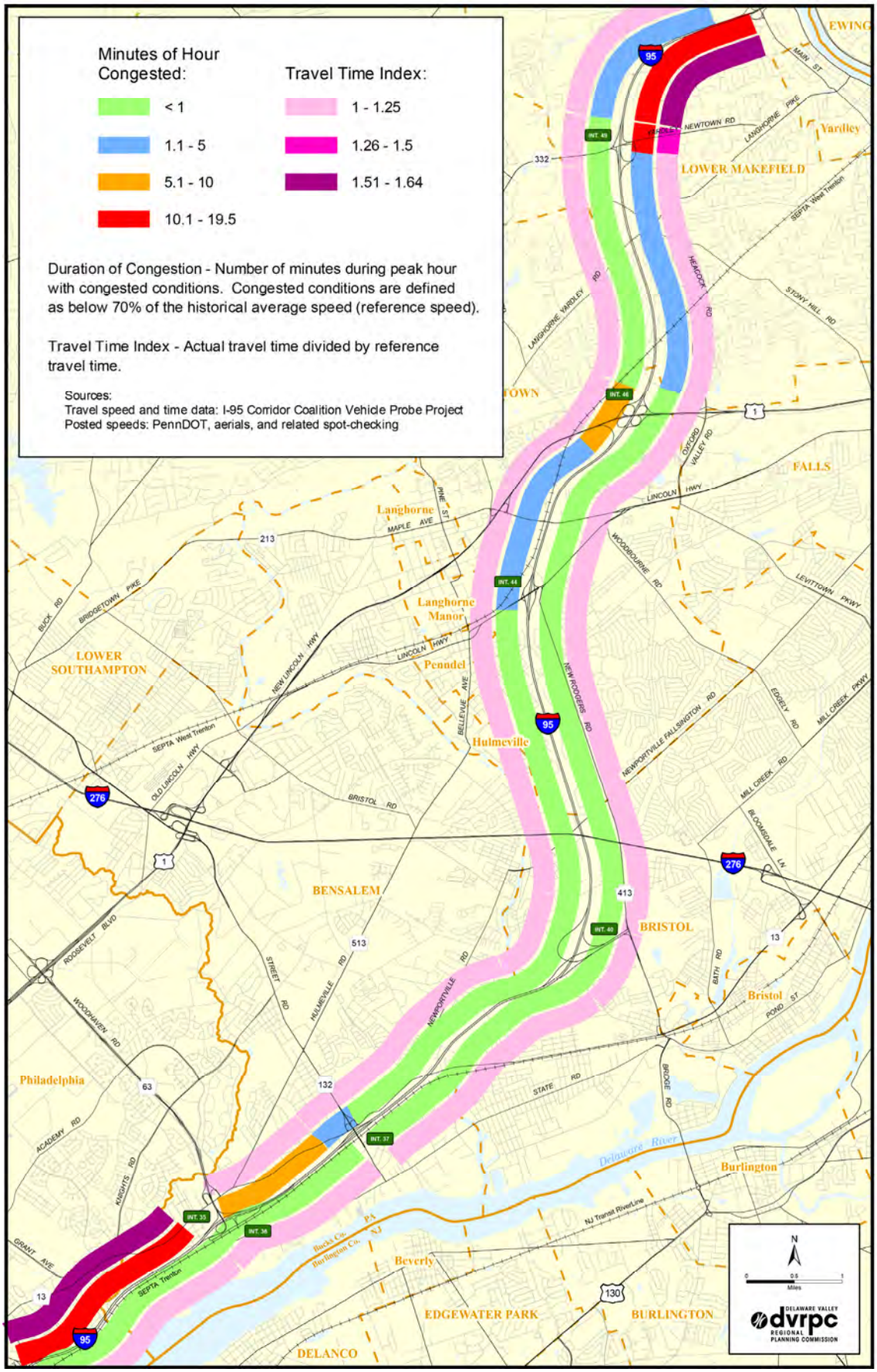
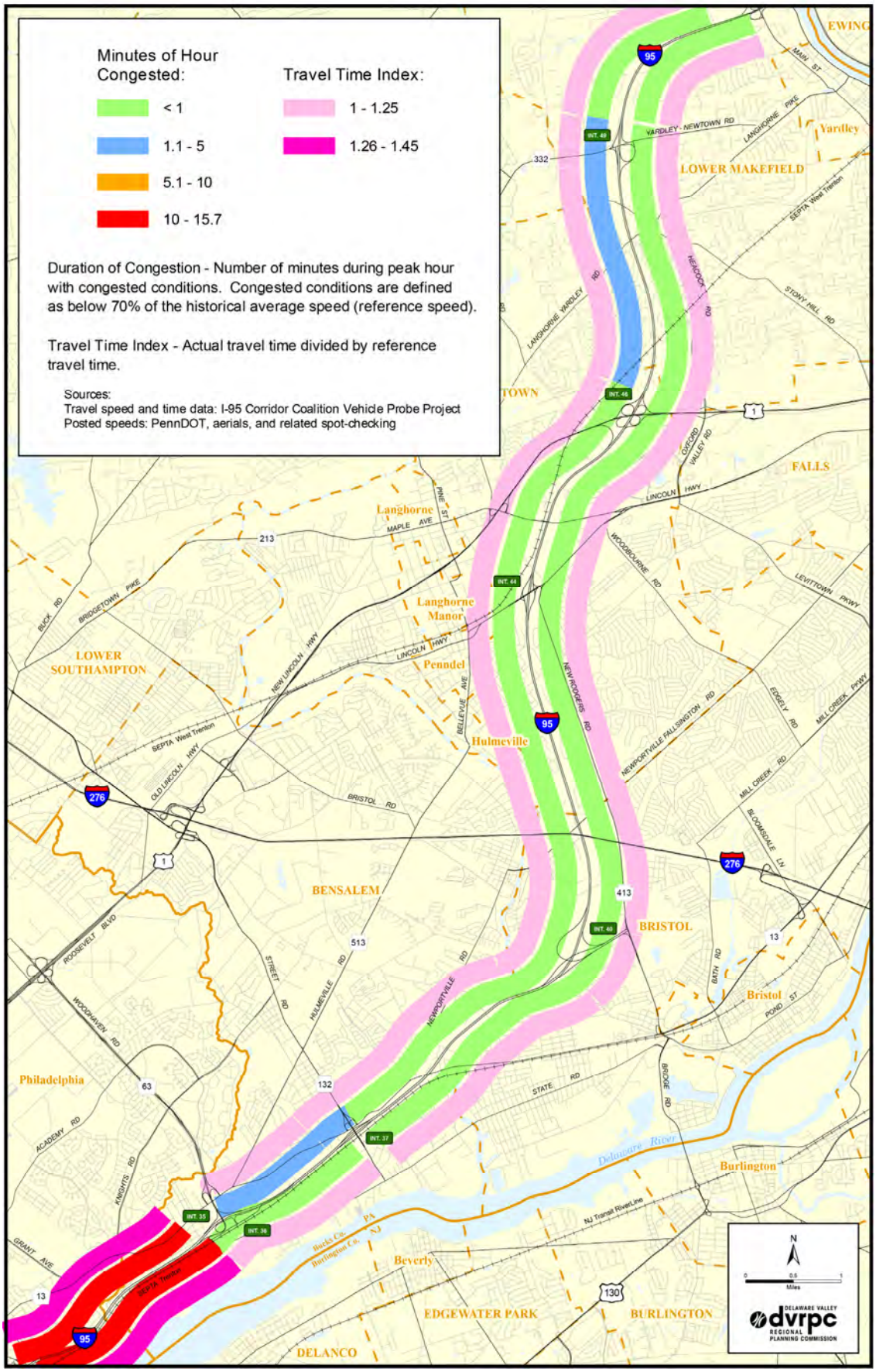


Figure 5: Travel Time and Congestion – PM



- 332 interchange on I-95 northbound during the AM peak hour. Minor congestion also appears during the PM peak hour on I-95 southbound just north of PA 63 and just south of PA 332.
- Because I-95 is the principal north–south artery in southeastern Pennsylvania, congestion on it is a concern. High traffic volumes, especially at peak hours, mean congestion impacts many thousands of people. Data from the north and south ends of the study area show the most congestion. Congestion near the border of New Jersey can be explained partially by a bottleneck created by the Scudder Falls Bridge over the Delaware River. Congestion at the south end is due to the high volume of commuters traveling to and from Philadelphia.

Crash Findings

Chronology

According to the PennDOT crash database, there were 493 reportable crashes during the three-year study period of 2008–2010 along the study area section of I-95 in Bucks County. Reportable crashes in Pennsylvania are crashes that result in a fatality, injury, or require a vehicle be towed from the scene. A comprehensive summary of the corridor-wide crash data is shown in Appendix C. A similar number of crashes occurred in 2009 and 2010, while a significantly lower number occurred in 2008. There were 144 reportable crashes in 2008 (29 percent), 175 in 2009 (35 percent), and 174 in 2010 (35 percent). While the numbers varied by year, they were evenly distributed in both directions.

Crashes varied by month, day of the week, and time of day. By month, the fewest crashes occurred in April, May, and June (33 each), while December had the highest number (56). The remainder of the year followed a similar pattern, with the highest number of crashes generally occurring in autumn and winter. By weekday, Sunday had the fewest crashes, with 62 total average crashes. Friday had the highest number with 77 followed by Tuesday with 76. The remaining days had average crash totals around 70. Concerning time of day, crashes were more frequent during typical rush-hour periods, with a rise in crashes especially in the evening between 4:00 PM and 7:00 PM. Crashes were more common during the evening rush in the northbound lanes but more common during the morning rush in the southbound lanes.

Severity

In terms of severity, the crashes can be divided into three major classes: fatal, injury, and property damage-only. Of the total crashes, there were five fatal crashes that claimed five lives (three northbound and two southbound), 217 injury crashes that injured 295 people, and 271 property damage-only crashes. Of those injured, 15 were major, 31 moderate, 143 minor, and 106 considered “unknown severity.” There were another 43 people affected whose condition was coded as “unknown if injured”; this number was excluded from the injured person’s total.

Collision Type

Of the collision types, hit-fixed-object (HFO) crashes were predominant at 51 percent. The next two most frequent types were rear-end (27 percent) and same-direction sideswipe (8 percent) crashes. These three classifications accounted for approximately 86 percent of the total. Of the HFO crashes, 185 involved

hitting a guide rail, while 15 hit a guide rail end, and 15 hit the embankment. All of these collision types are common on limited-access facilities.

Road Surface, Weather, Light Condition

The majority of crashes occurred during ideal weather conditions, with 73 percent of the crashes taking place on dry road surface conditions and 78 percent during clear weather. Conversely, about 17 percent of the crashes occurred on wet road surfaces (snow, ice, etc. were much lower percentages) and 17 percent while raining. More crashes occurred during daylight than any other time of day, with 49 percent, while 13 percent occurred with street lights on, and the remainder were under dark conditions (38 percent). Daylight-condition crashes typically account for over 70 percent of the crash total. These unusual proportions may be related to the extended rush-hour periods, especially during the winter months.

PennDOT 2010 High Crash Locations

The Bucks County section of I-95 contained two roadway segments identified on the PennDOT 2010 HCL list—another reason for conducting an RSOA on this section. These high crash segments, which are both in the southbound direction, include the entire length of the roadway from interchange 37 (PA 132) to the Bucks County line with Philadelphia. Each of these segments was the site of a single fatal crash during the five-year analysis period used by PennDOT in determining the HCL list.

Segment Analyses

The corridor was also examined for crash concentrations by roadway segment and by direction of travel, due to it being a divided highway. The length of each segment is, on average, about one half of a mile. In geographic information systems (GIS), the crashes were summarized by segment and overlaid with major injury and fatal crash symbols to aid in identifying particularly problematic segments. Coinciding with the traffic volume and congestion trends, the crashes were most concentrated in the segments located in the vicinity of the Street Road interchange (Exit 37), and further south to the Philadelphia line. These concentrations also contain the two roadway sections identified on the PennDOT 2010 HCL list.

This data was then compared with an overlay of PennDOT's 2011 Crash Cluster analysis. From this, the most interesting discovery was the prevalence of HFO crash clusters in the corridor section between Exit 40 and the Philadelphia line (in addition to other cluster types of lower concentrations).

A more in-depth analysis was performed on two sections of I-95. The first stretch comprises I-95 northbound and southbound in the vicinity of the Street Road Interchange. It involves one interchange and contains four segments with crash rates between 1.58 and 2.38 crashes per million vehicle miles traveled. Combined, there were 95 crashes northbound and southbound during the analysis period. By collision type, 26 crashes were HFO and 18 were rear-end crashes in the northbound direction. One major injury was recorded but no fatalities. Southbound, there were 15 HFO crashes and 24 rear-end crashes. There were no fatalities, but three people had major injuries.

The second section comprises I-95 northbound between the Street Road and Bristol interchanges. This stretch is approximately one half of a mile long and contains one segment with a crash rate of 1.92. Within

this area there were 22 crashes during the study period. Of these crashes, 11 were HFO, five were rear-end, and five were same-direction sideswipe. None of these crashes resulted in fatalities or major injuries.

2011 PennDOT Crash Clusters

Utilizing 2011 cluster data provided by PennDOT's Central Office, DVRPC mapped the crash clusters identified along the study corridor (see Appendix C for cluster maps). Six cluster types were represented in the study area:

- HFO crashes;
- hit-bridge crashes;
- hit-tree crashes;
- tractor-trailer crashes;
- snow-condition crashes; and
- rain-condition crashes.

These clusters result from a database algorithm based on statewide standards. This information was presented to the RSOA team for consideration when discussing crash trends and operational issues. Each of the clusters is listed in the Findings and Recommendations tables found in the next chapter.

Findings and Recommendations

Priorities

The priorities meeting held one week following the audit event involved a small number of key audit team members and those PennDOT officials responsible for setting priorities for I-95 in Bucks County. At this meeting, each identified issue was reviewed and an appropriate action identified, including the associated time frame in which it was to be addressed. As with every RSA (or RSOA), the highest priority was placed on addressing safety issues that could be accomplished in the short term, using existing contracts and/or maintenance where possible. As a result of the hard work of those responsible, 49 issues were addressed in the year following the audit event, including construction items: pavement edge repairs, paint restriping, and replacement or repair of missing or damaged signs.

Also completed were additional investigations into crash clusters identified by PennDOT's Central Office. This was a necessary second step to better understand the circumstances that created the clusters because causation was not able to be determined during the audit event or at the priorities meeting. Details of each item are discussed in the following tables.

In addition to high-priority lower-cost improvements, the group also identified three longer-term high-priority items for the corridor:

- Establish an IMTF for the study corridor.
- Identify and establish dedicated enforcement locations in collaboration with the Pennsylvania State Police.
- Extend the service hours of the ESP.

One of these items has already been accomplished. An IMTF to increase coordination of incident management efforts and share resources for the benefit of improved safety is now in place. This task force was established in April 2012 and currently meets on a quarterly basis. It is referred to by its members as the Bucks County (I-95/US 1) IMTF.

In several instances in the following tables, the road owner has responded that the identified issue will be addressed as part of the I-95 Corridor Reconstruction Project, currently underway. Due to the breadth and complexity of this effort, and because the Bucks County portion of I-95 is not slated for work to begin until 2030 or later, this RSOA was conducted as a proactive strategy to identify and address low-cost safety and operational issues, and to identify longer-term improvements that are better addressed as part of the larger effort.

Issues and Strategies Matrix

The following section summarizes the findings, potential strategies, and priorities for the Bucks County I-95 RSOA. The table for each section shows site-specific safety issues and corresponding potential strategies, general ratings for difficulty to implement, proposed safety and operational benefits, plus the road owner's response. Also provided is a corresponding aerial map indicating the relative location (where possible) of each identified issue. Any improvement that has been completed or addressed since the audit event is in orange text. Please note that the following abbreviations are used in the tables: short term (ST), long term (LT), Manual on Uniform Traffic Control Devices (MUTCD).

Regarding difficulty to implement, PennDOT uses the following general descriptions to characterize each of the three ratings:

- Low: can be accomplished through maintenance;
- Medium: requires use of existing or new contract, some engineering; funding may be readily available; and
- High: longer-term project, full engineering, may require right-of-way acquisition and new funding.

It is expected that implementing these recommendations will improve the overall safety and operations of the roadway. Note that potential strategies that call for further study do have a safety benefit in that they are the next step toward a more detailed and appropriate safety improvement. Given fiscal constraints, recommendations may have to be considered one at a time or in small groups. Being the road owner, PennDOT District 6-0 will use the findings of the RSOA as a guide for designing improvements to address these issues and will determine the priorities and implementation schedule, given limited safety funds.

PennDOT Crash Clusters

For this audit, PennDOT provided the latest available crash cluster information. DVRPC mapped these six clusters and presented them to the RSA team for consideration during the audit event and follow-up priorities meeting. During the summer of 2012, PennDOT conducted a Level Two evaluation for each cluster in the study area and reported back to DVRPC with the results. Of the six clusters, two were found in multiple sections along the study corridor: HFO crash cluster and tractor-trailer crash cluster. The results of the Level Two investigations for these clusters are described in detail below and referenced in the tables that follow. The remaining clusters, which are not found in multiple panels, are addressed within their respective tables.

- **HFO cluster** found in Panels 1A–5: Level Two evaluation revealed that driving too fast for conditions or speeding were contributing factors in most of the HFO cluster crashes, and the object hit was typically a guide rail. ST: Enhance enforcement. LT: Widen shoulder as part of I-95 Corridor Reconstruction Project.
- **Tractor-trailer cluster** found in Panels 1A and 2: Level Two evaluations revealed that driver error and speeding were contributing factors in most of the truck cluster crashes. No action at this time.

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Figure 6: Panel 1A (Philadelphia municipal line to Tennis Avenue)

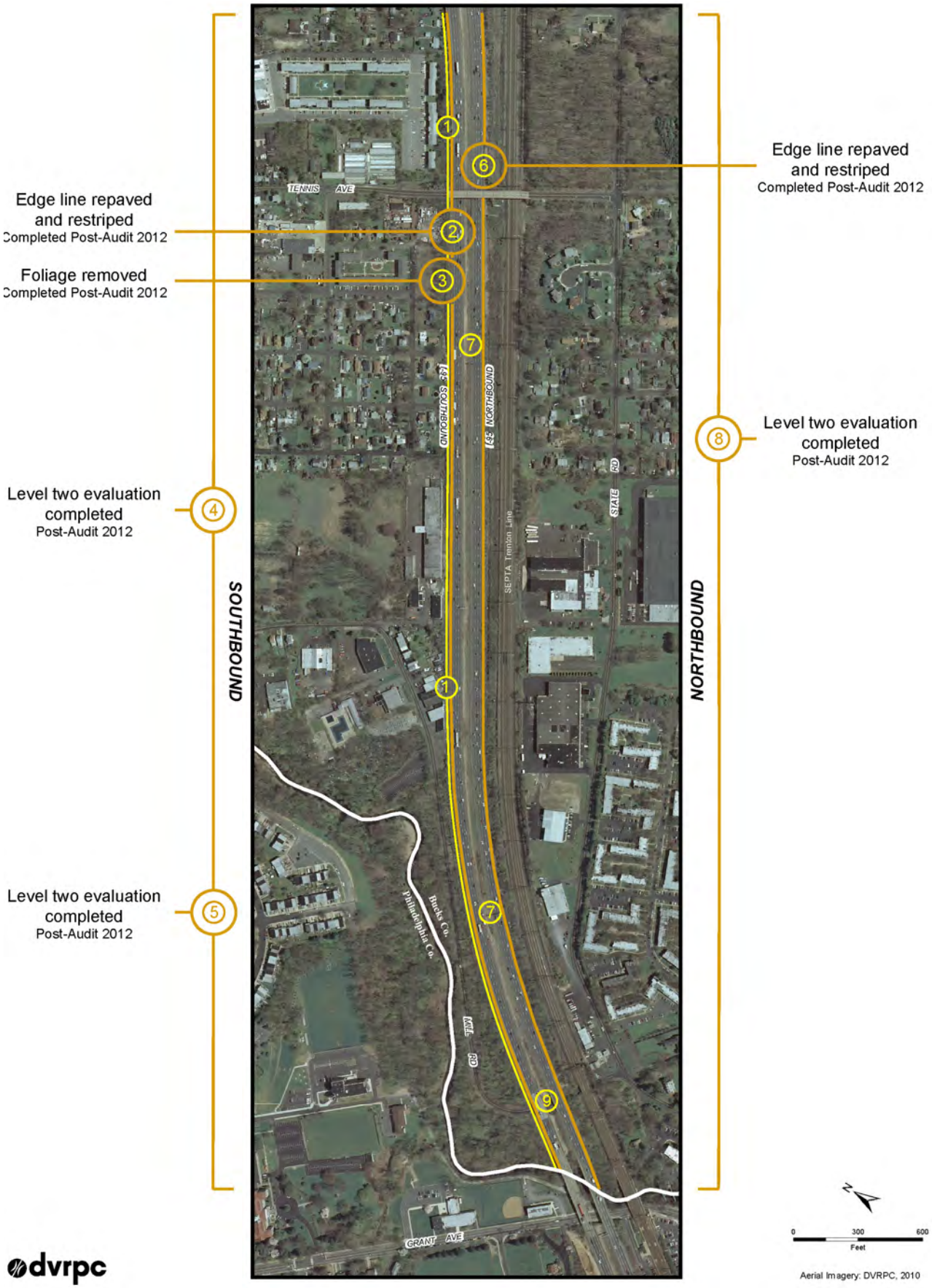

Table 1: Panel 1A (Philadelphia municipal line to Tennis Avenue)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 1A SOUTHBOUND	SOUTHBOUND				
1. Guide rail appears too low along entire panel;	1. Raise guide rail where needed;	*Medium*	*Medium*	*Low*	1. Corridor-wide issue that will be addressed as part of the I-95 Corridor Reconstruction Project;
2. Roadway pavement edge and edge line striping are intermittently deteriorated;	2. Repair (possible crack sealing) and restripe edge line, LT: consider resurfacing schedule;	*Low*	*High*	*Low*	2. Completed spring 2012;
3. Vegetation growing over noise wall onto roadway-side of wall; several roadway signs obscured by vegetation;	3. Remove vegetation through maintenance contract where signs or noise walls are obscured or present other sight distance issues;	*Low*	*High*	*Low*	3. Completed spring 2012;
4. Hit Fixed Object (HFO) cluster identified along entire panel (Note: vehicles begin to slow down significantly beyond this location);	4. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	4. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
5. Tractor-trailer cluster identified along entire panel;	5. Evaluate cluster for causes (level two investigation);	*Low*	*NA*	*NA*	5. Level two evaluation: no action at this time;
NORTHBOUND	NORTHBOUND				
6. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	6. Repair (possible crack sealing) and restripe edge line, LT: consider resurfacing schedule;	*Low*	*High*	*Low*	6. Completed spring 2012;
7. Green sign sheeting is peeling on several roadway signs;	7. Repair or replace signs as needed;	*Medium*	*High*	*Medium*	7. A contract is in place but may need to be re-bid because of scheduling/performance issues, this will delay implementation;
8. HFO cluster identified along entire panel;	8. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*Low*	8. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
9. Shoulder narrows over bridges (problem is SB and NB over Mill Rd at mile 33).	9. Add signs to warn of shoulder narrowing (clearance marker, etc.) at beginning of bridge parapets.	*Low / Medium*	*Medium*	*Low*	9. Will be investigated in the fall of 2012.

Figure 7: Panel 1 (interchange 35, Woodhaven Road and Cornwells Heights Park and Ride)

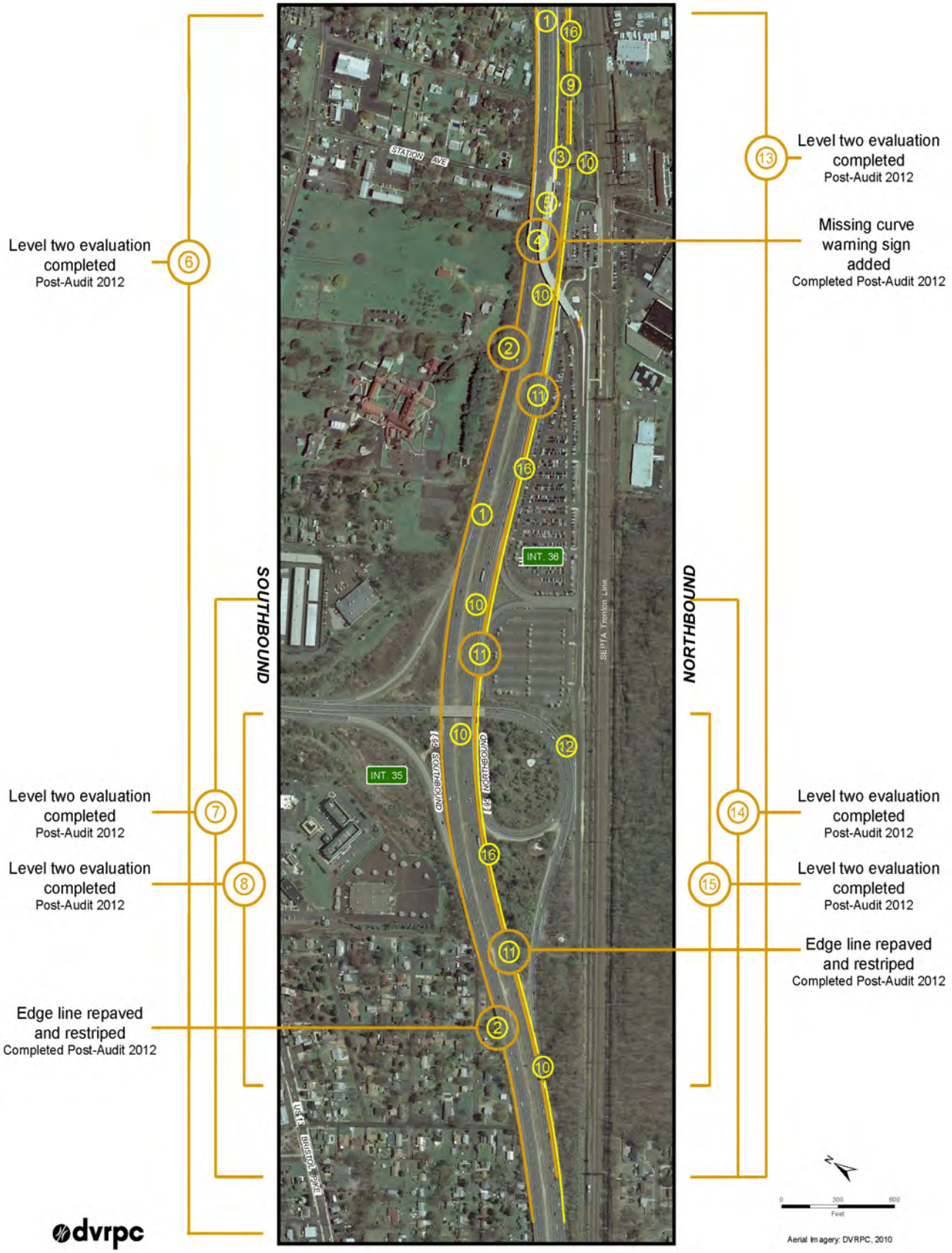

Table 2: Panel 1 (interchange 35, Woodhaven Road and Cornwells Heights Park and Ride)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 1 SOUTHBOUND	SOUTHBOUND				
1. Green sign sheeting is peeling on several roadway signs;	1. Repair or replace signs as needed;	*Low*	*Med*	*Low*	1. A contract is in place but may need to be rebid because of scheduling/performance issues, this will delay implementation;
2. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	2. Repave and restripe edge line;	*Medium*	*High*	*Low*	2. Completed spring 2012;
3. The Cornwells Heights park and ride lot exit-only lane is being misused as a passing lane;	3. Add chevron gore pavement markings and possibly rumble strips to further designate lane purpose;	*Medium*	*High*	*Low*	3. Gore area striping will be considered in fall of 2012, rumble strips will require further evaluation;
4. Deceleration lane to park and ride lot missing curve warning signs;	4. Add missing curve warning sign;	*Low*	*Medium*	*Low*	4. Completed summer 2012;
5. Missing exit sign for park and ride lot;	5. Add exit sign; supplement signage with pavement legends designating park and ride only lane;	*Low*	*Medium*	*Low*	5. Will be investigated in the fall of 2012;
6. Hit Fixed Object (HFO) cluster identified along entire panel;	6. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	6. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
7. Snow condition crash cluster identified within panel;	7. Evaluate cluster for causes (level two evaluation);	*Low*	*NA*	*NA*	7. Level two evaluation: maintenance performed during snow conditions as needed, no further action;
8. Hit tree crash cluster location within this panel;	8. Evaluate cluster for causes (level two evaluation);	*Low*	*NA*	*NA*	8. Level two evaluation: all crashes occurred at infield location beyond clear zone, which already has improved signage, no further action;
9. During rainstorms ponding occurs near the center and left lanes at the Cornwells Heights park and ride exit in the area of mile marker 35.2 and extends down into the gore area;	9. Investigate drainage issue and remediate.	*Medium*	*High*	*High*	9. Requires new pavement contract and will be considered in next fiscal year;
NORTHBOUND	NORTHBOUND				
10. Green sign sheeting is peeling on several roadway signs;	10. Repair or replace signs as needed;	*Low*	*High*	*Low*	10. A contract is in place but may need to be re-bid because of scheduling/performance issues, this will delay implementation;

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
11. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	11. Repave and restripe edge line;	*Medium*	*High*	*Low*	11. Completed spring 2012;
12. Ramp to PA 63 is site of rollover crashes, large trucks are especially susceptible;	12. ST: Install transverse rumble strips in advance of the curve; LT: Install electronic system for warning of speeds and roll over;	*Medium /High*	*High*	*High*	12. Will be investigated in the fall of 2012;
13. HFO crash cluster identified along entire panel;	13. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	13. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
14. Snow condition crash cluster identified within panel;	14. Evaluate cluster for causes (level two evaluation);	*Low*	*NA*	*NA*	14. Level two evaluation: maintenance performed during snow conditions as needed, no further action;
15. Hit tree crash cluster location within this panel;	15. Evaluate cluster for causes (level two evaluation);	*Low*	*NA*	*NA*	15. Level two evaluation: all crashes occurred at infield location beyond clear zone, which already has with improved signage, no further action;
16. Shoulders are less than 8 feet wide.	16. Widen shoulder.	*High*	*High*	*Medium*	16. Corridor-wide issue that will be addressed as part of the I-95 Corridor Reconstruction Project.

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Figure 8: Panel 2 (interchange 37, PA 132 Street Road)

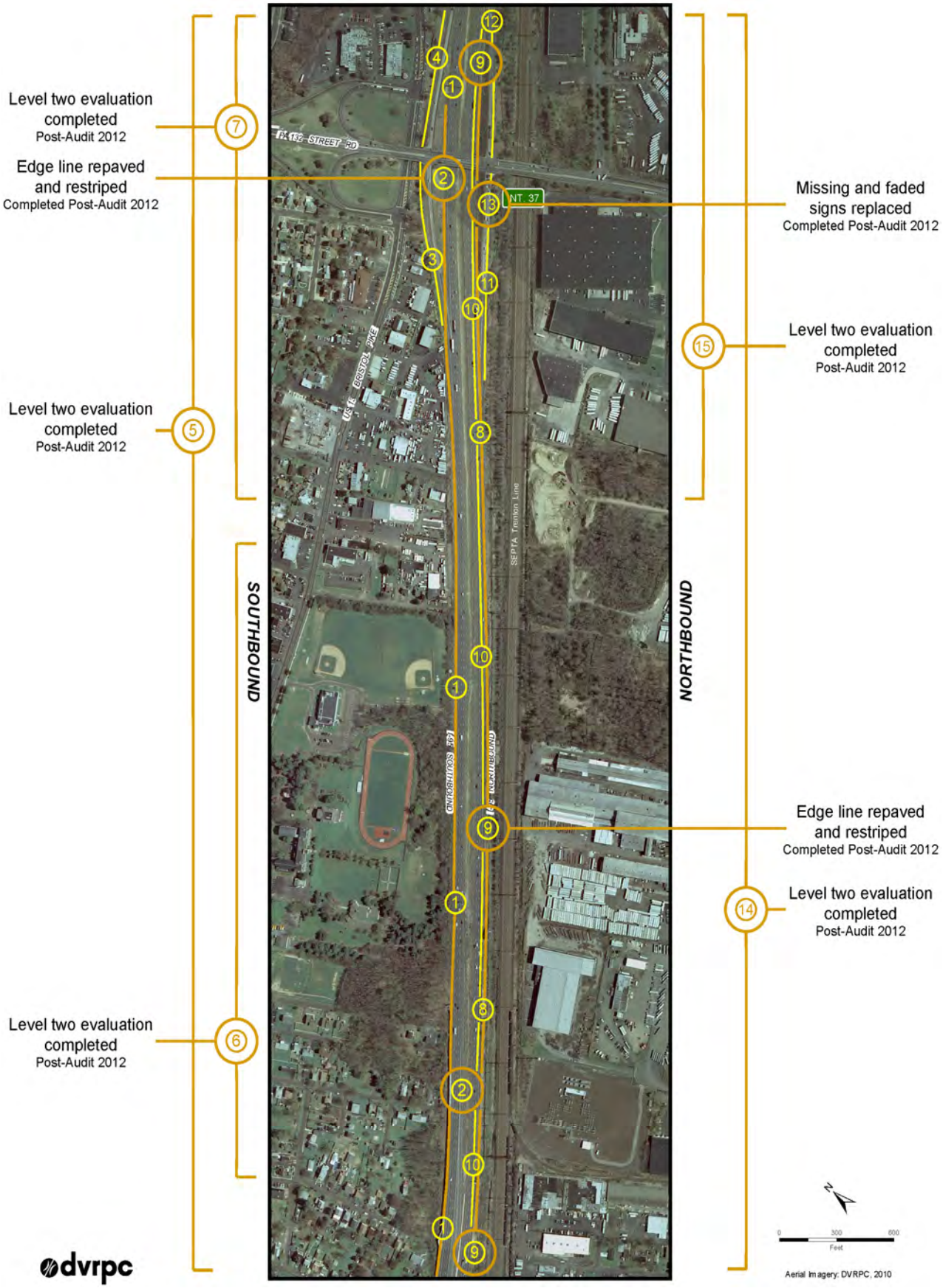

Table 3: Panel 2 (interchange 37, PA 132 Street Road)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 2 SOUTHBOUND 1. Green sign sheeting is peeling on several roadway signs;	SOUTHBOUND 1. Repair or replace signs as needed;	*Low*	*High*	*Medium*	1. A contract is in place but may need to be rebid because of scheduling/performance issues, this will delay implementation;
2. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	2. Repave and restripe edge line;	*Low*	*High*	*Low*	2. Completed spring 2012;
3. SB on-ramp to I-95 appears to have a short acceleration lane;	3. Investigate ramp length at I-95 SB off-ramp and lengthen with striping if appropriate;	*Medium*	*Medium*	*High*	3. Will be included as part of TIP project grouping;
4. Capacity issue on ramp causing stacking to overflow onto main line; (no signal where ramp meets PA 132), left turns from ramp onto PA 132 are unprotected making it difficult and exacerbates the ramp back-up; sight distance issue also; Note: The following existing conditions may have safety implications: heavy truck use, congestion and subsequent delay issues.	4. ST: Study left-turn prohibition and implement to address sight distance and congestion problems; LT: Study completed ("Waterside" & "The Landings" developments-TIS) to investigate proper traffic congestion mitigation and intersection treatment (which includes signalization);	*Medium*	*High*	*High*	4. ST: District will consider interim improvements, LT: improvements will be implemented as part of development project (project still on hold as of 2013 publication);
5. Hit Fixed Object (HFO) cluster identified along entire panel;	5. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	5. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
6. Rain condition crash cluster identified within panel;	6. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*Medium*	6. Level two evaluation: driving too fast for conditions was a contributing factor in each cluster crash. This section of I-95 will continue to be monitored as part of the wet pavement crash cluster annual program;
7. Tractor-trailer crash cluster location within this panel;	7. Evaluate cluster for causes (level two evaluation);	*Low*	*NA*	*NA*	7. Level two evaluation: no action at this time;
NORTHBOUND 8. Green sign sheeting is peeling on several roadway signs;	NORTHBOUND 8. Repair or replace signs as needed;	*Low*	*High*	*Low*	8. A contract is in place but may need to be re-bid because of scheduling/performance issues, this will delay implementation;

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
9. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	9. Repave and restripe edge line;	*Low*	*High*	*Low*	9. Completed spring 2012;
10. Shoulders are less than 8 feet wide;	10. Widen shoulder;	*High*	*High*	*High*	10. Corridor-wide issue that will be addressed as part of the I-95 Corridor Reconstruction Project;
11. Guide rail is too low along I-95 NB exit ramp to Street Road;	11. Investigate guide rail;	*Medium*	*Medium*	*Low*	11. Corridor-wide issue that will be addressed as part of the I-95 Corridor Reconstruction Project;
12. NB on-ramp from Street Road appeared short;	12. Investigate ramp length;	*Medium*	*High*	*High*	12. Will be included as part of TIP project grouping;
13. Along NB off-ramp to Street Road there were two sets of trailblazer signs (PA 132 and I-95) that were faded and nearly illegible;	13. Replace faded and missing signs;	*Low*	*High*	*Low*	13. Replaced in March of 2012;
14. HFO cluster identified along entire panel;	14. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	14. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
15. Tractor-trailer crash cluster location within this panel.	15. Evaluate cluster for causes (level two evaluation); Note: Work zone crashes may be due to previous Street Road construction causing ramp traffic to back up onto I-95 NB.	*Low*	*NA*	*NA*	15. Level two evaluation: no action at this time.

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Figure 9: Panel 3 (north of interchange 37, PA 132 Street Road)

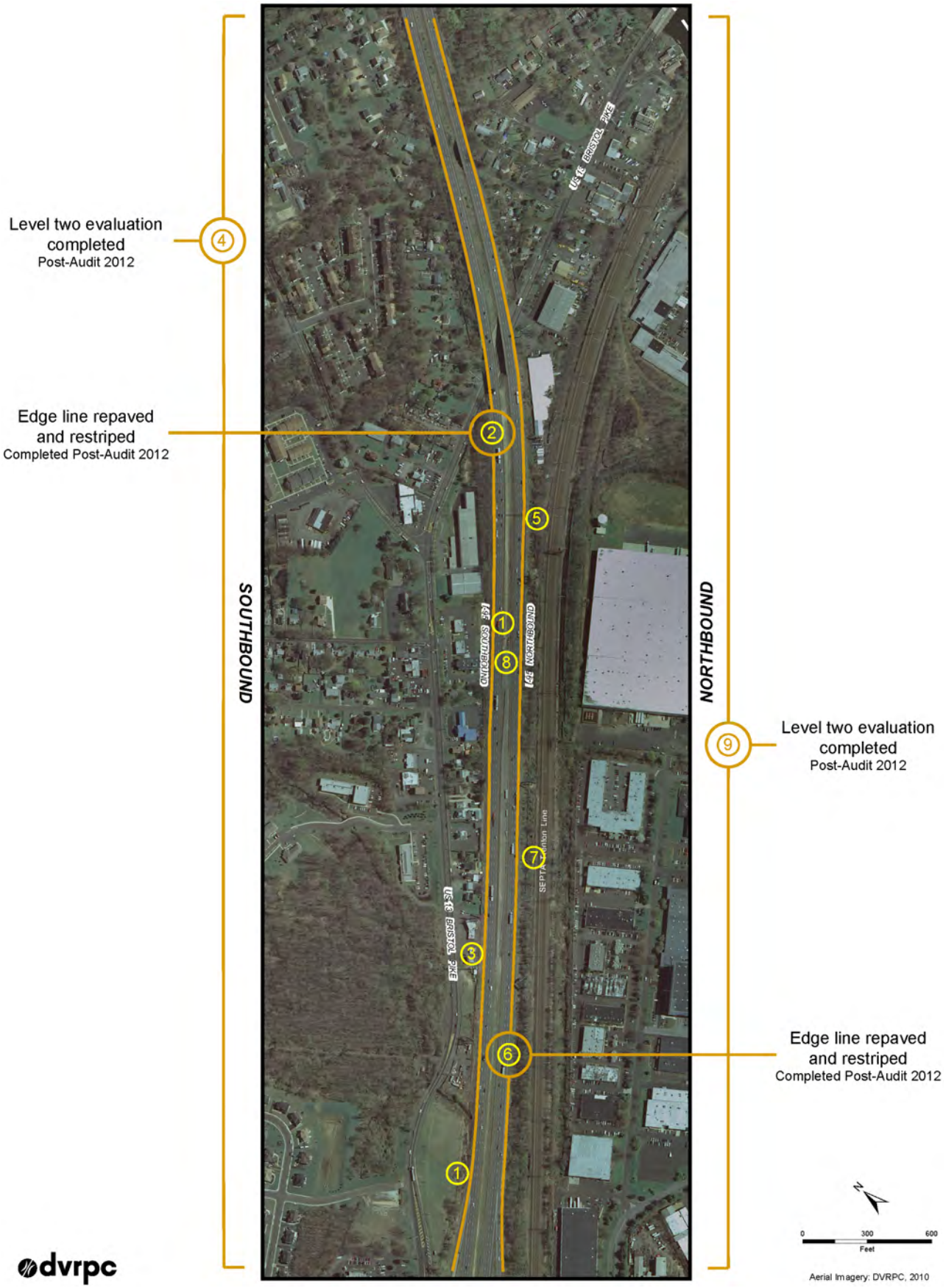

Table 4: Panel 3 (north of interchange 37, PA 132 Street Road)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 3					
SOUTHBOUND	SOUTHBOUND				
1. Green sign sheeting is peeling on several roadway signs;	1. Repair or replace signs as needed;	*Low*	*High*	*Low*	1. A contract is in place but may need to be rebid because of scheduling/performance issues, this will delay implementation;
2. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	2. Repave and restripe edge line;	*Low*	*High*	*Low*	2. Completed spring 2012;
3. Blue logo signs obscured by foliage;	3. Contact PA tourism office to clear foliage around signs;	*Low*	*Medium*	*Low*	3. District liaison will contact tourism office;
4. Hit Fixed Object (HFO) cluster identified along entire panel;	4. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*Medium*	4. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
NORTHBOUND	NORTHBOUND				
5. Green sign sheeting is peeling on several roadway signs;	5. Repair or replace signs as needed;	*Low*	*High*	*Low*	5. A contract is in place but may need to be rebid because of scheduling/performance issues, which will delay implementation;
6. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	6. Repave and restripe edge line;	*Low*	*High*	*Low*	6. Completed spring 2012;
7. No guide rail just north of Street Road exit after the tree line ends;	7. Investigate need for guide rail;	*Medium*	*Medium*	*Low*	7. Will be addressed in fall of 2012 or spring of 2013;
8. Vegetation blocking DMS signs in median;	8. Remove vegetation using maintenance contract;	*Low*	*High*	*Low*	8. Will be addressed in fall of 2012 or spring of 2013;
9. HFO cluster identified along entire panel.	9. Evaluate cluster for causes (level two evaluation).	*Low*	*Medium*	*High*	9. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project.

Figure 10: Panel 4 (north over Neshaminy Creek into Bristol Township)

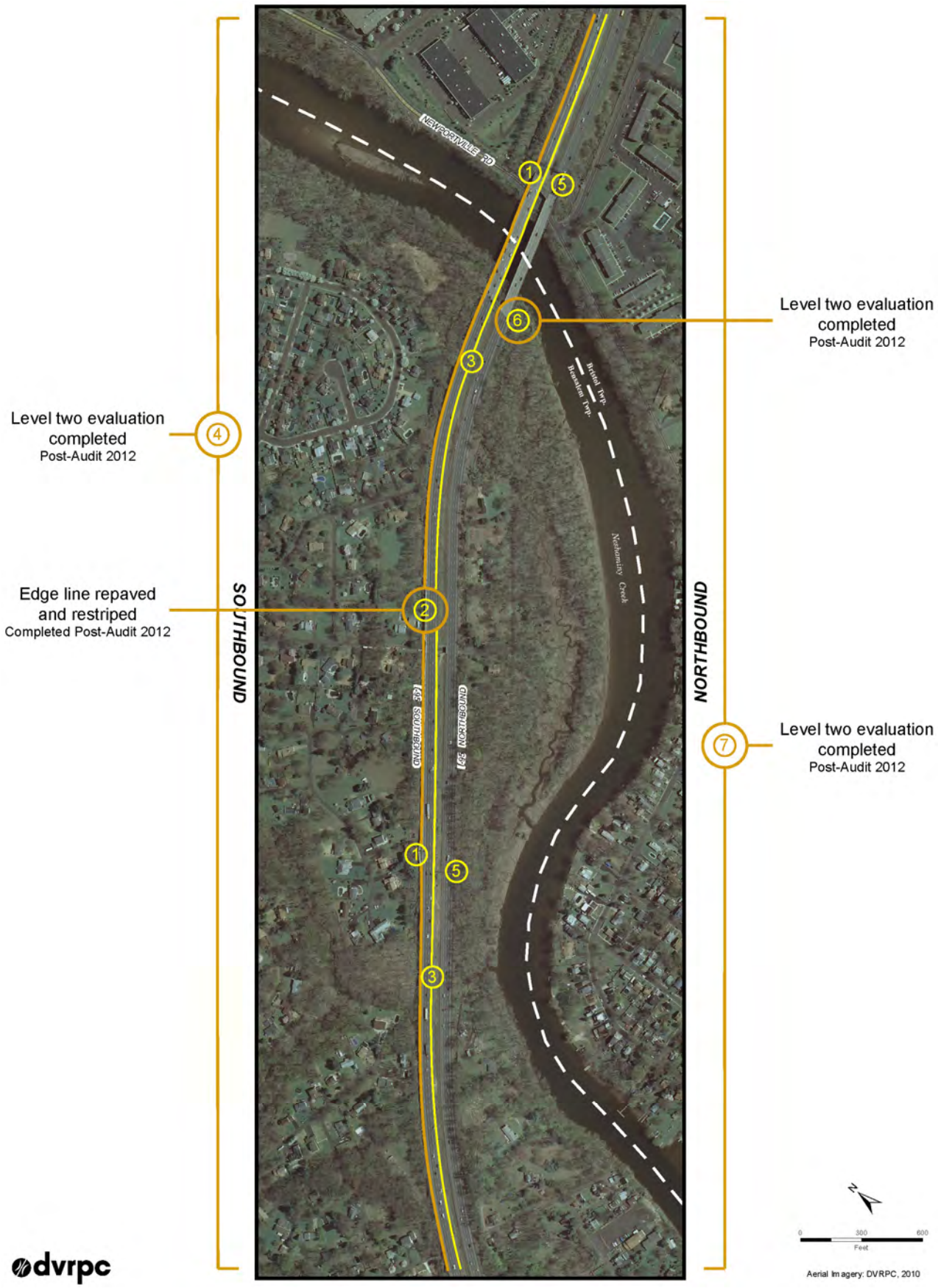

Table 5: Panel 4 (north over Neshaminy Creek into Bristol Township)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 4					
SOUTHBOUND	SOUTHBOUND				
1. Green sign sheeting is peeling on several roadway signs;	1. Repair or replace signs as needed;	*Low*	*High*	*Low*	1. A contract is in place but may need to be rebid because of scheduling/performance issues, this will delay implementation;
2. Roadway pavement edge is intermittently deteriorated and edge line striping is deteriorated;	2. Repave and restripe edge line;	*Low*	*High*	*Low*	2. Completed spring 2012;
3. Pavement in front of the median guide rail appears to drop off in front of the guide rail;	3. Investigate pavement slope;	*Medium*	*High*	*Low*	3. Corridor-wide issue will be addressed as part of the I-95 Corridor Reconstruction Project;
4. Hit Fixed Object (HFO) cluster identified along entire panel;	4. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	4. Level two evaluation-ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
NORTHBOUND	NORTHBOUND				
5. Green sign sheeting is peeling on several roadway signs;	5. Replace damaged signs;	*Low*	*High*	*Low*	5. A contract is in place but may need to be rebid because of scheduling/performance issues, this will delay implementation;
6. Hit bridge cluster identified at bridge over Neshaminy Creek may be related to snow and ice condition;	6. Investigate reflectors around bridge;	*Low*	*NA*	*NA*	6. Level two evaluation: data error occurred in the cluster analysis; problem unsubstantiated, no further action;
7. HFO cluster identified along entire panel.	7. Evaluate cluster for causes (level two evaluation).	*Low*	*Medium*	*High*	7. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project.

Figure 11: Panel 5 (interchange 40, PA 413)

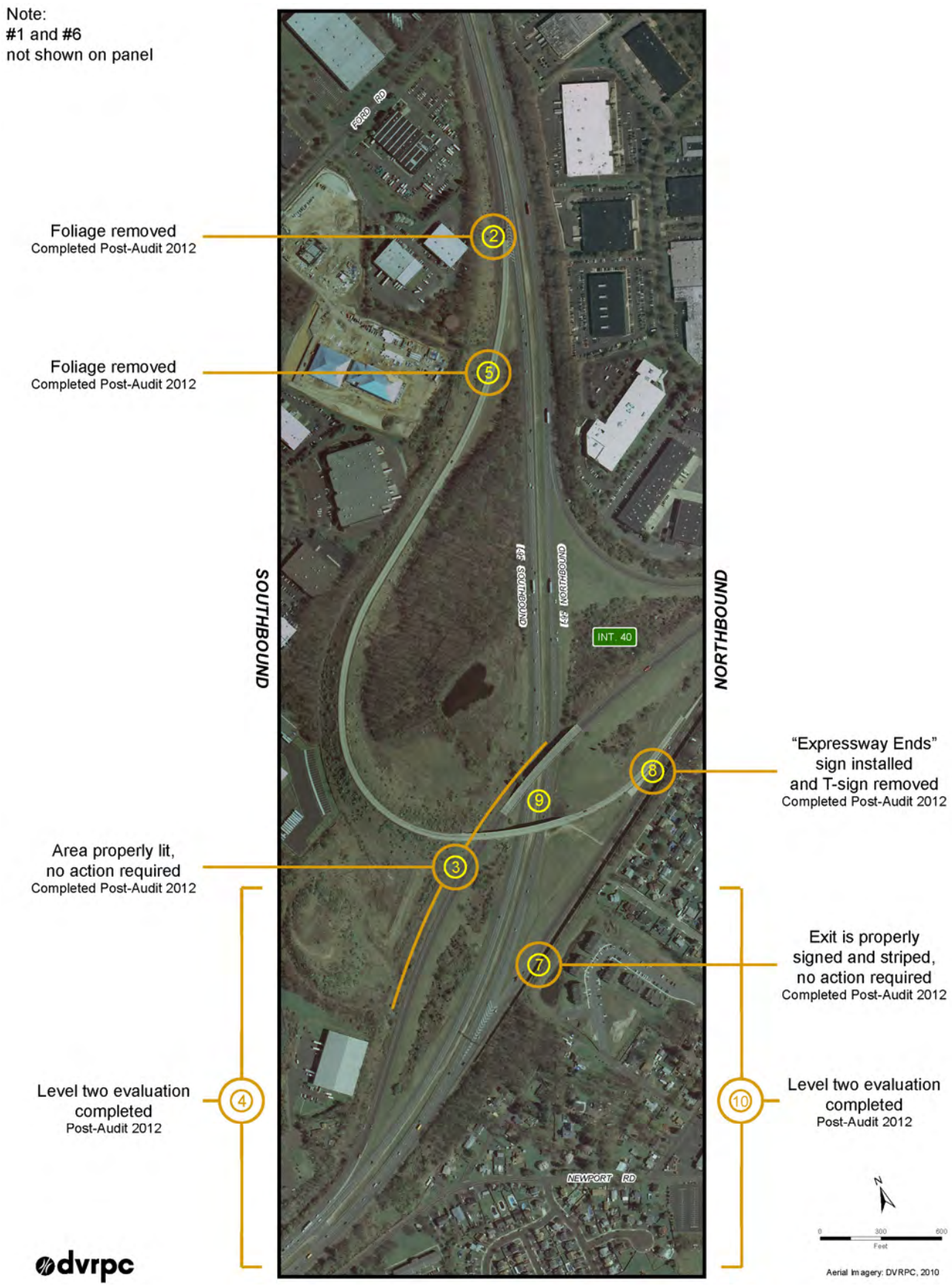

Table 6: Panel 5 (interchange 40, PA 413)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	*Road Owner Response*
Panel 5 SOUTHBOUND	SOUTHBOUND				
1. Green sign sheeting is peeling on several roadway signs;	1. Repair or replace signs as needed;	*Low*	*High*	*High*	1. A contract is in place but may need to be rebid because of scheduling/performance issues, this will delay implementation;
2. Directional signage for off-ramp blocked by trees;	2. Remove foliage within maintenance contract;	*Low*	*High*	*Low*	2. Completed spring 2012;
3. Missing reflective markers on ramp from PA 413 to I-95 SB;	3. Reflective markers not required because high mast lighting in place;	*Low*	*High*	*Medium*	3. No action required;
4. Hit Fixed Object (HFO) cluster identified along the southern end of the panel;	4. Evaluate cluster for causes (level two evaluation);	*Low*	*Medium*	*High*	4. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project;
5. At the I-95 SB off-ramp, trees blocking sight distance along the curve;	5. Remove foliage;	*Low*	*High*	*Low*	5. Completed spring 2012;
NORTHBOUND	NORTHBOUND				
6. Green sign sheeting is peeling on several roadway signs;	6. Repair or replace signs as needed;	*Low*	*High*	*Low*	6. A contract is in place but may need to be re-bid because of scheduling/performance issues, which will delay implementation;
7. There are exit signs for PA 413 at the two-mile and one-mile locations in advance of the exit, but additional exit-only signs are needed, and signs in the gore area are missing (team also described current signing as confusing);	7. Investigate PA 413 off-ramp signing and possibly add pavement markings sign improvements, and consider adding large single arrows on pedestal as part of signal permit where ramp meets PA 413 for clarity);	*Medium*	*Medium*	*Medium*	7. Exit is properly signed and striped, no action required (may be considered during the I-95/ Turnpike Interchange Project);
8. At ramp to PA 413 a sign is missing from right hand side to indicate end of expressway;	8. Install "Expressway Ends" sign and remove existing T-sign with flashers which creates a fixed object hazard;	*Low*	*High*	*Low*	8. Completed in May of 2012;
9. Ice on bridges presents safety issue;	9. Check for existing signs and if none, install current MUTCD compliant warning sign in advance of bridge;	*Low*	*Medium*	*Low*	9. District 6-0 will investigate in 2013;
10. HFO cluster identified along the southern end of the panel.	10. Evaluate cluster for causes (level two evaluation.	*Low*	*Medium*	*High*	10. Level two evaluation—ST: enhance enforcement, LT: widen shoulder as part of I-95 Corridor Reconstruction Project.

Figure 12: Panel 6 (north over I-276 into Middletown Township)

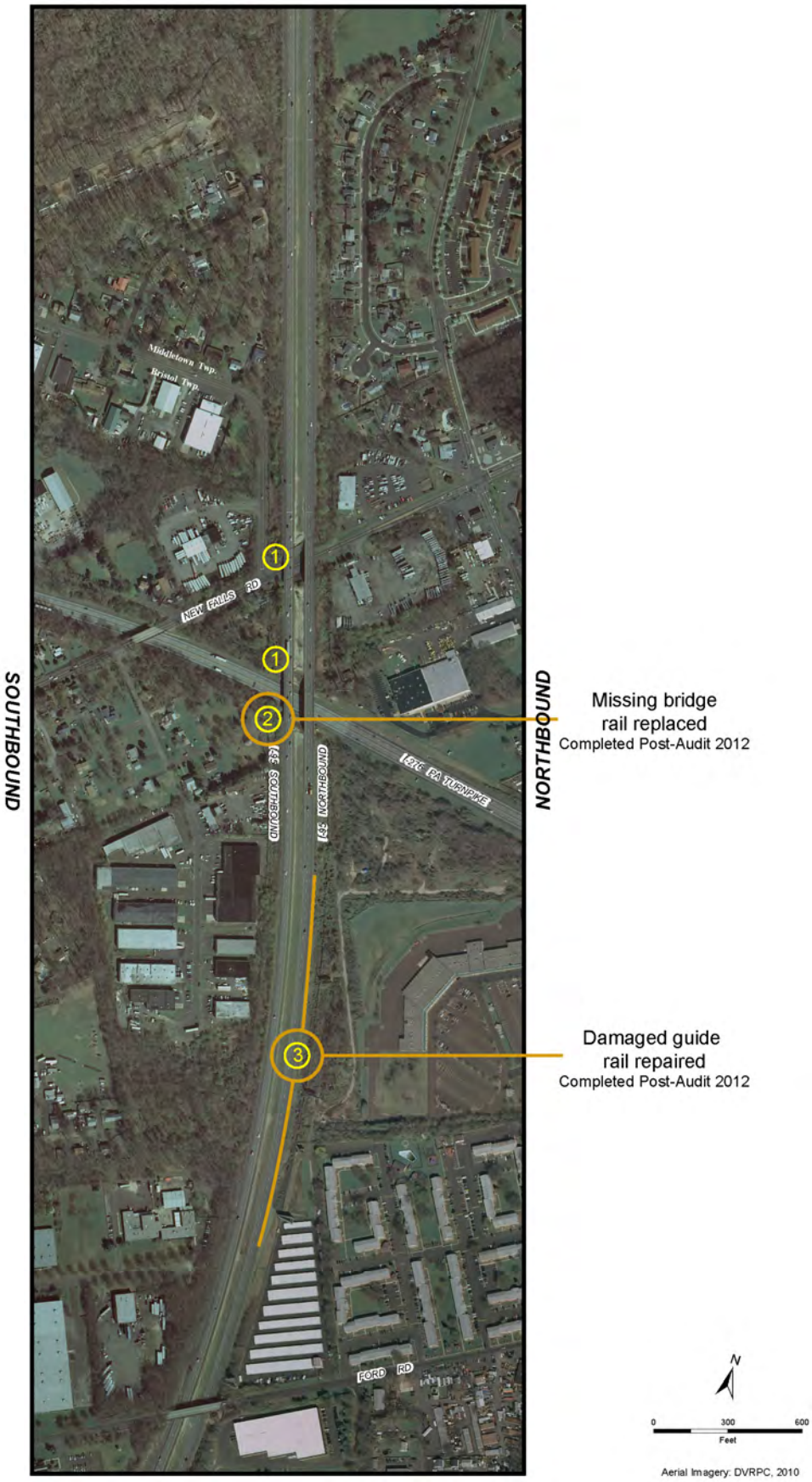

Table 7: Panel 6 (north over I-276 into Middletown Township)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 6 SOUTHBOUND 1. Redundant guide rail seems unnecessary around bridges; 2. At I-276 SB aluminum bridge rail is missing which presents a "snag" issue"; NORTHBOUND 3. Damaged guide rail north of Ford Road along median side.	SOUTHBOUND 1. Investigate crash implications of double guide rail; 2. Replace missing bridge rail; NORTHBOUND 3. Repair damaged guide rail.	*Medium* *Low* *Low*	*Medium* *Low* *Medium*	*Low* *Low* *Low*	1. Corridor-wide issue will be addressed as part of the I-95 Corridor Reconstruction Project; 2. Bridge guide rail replaced under maintenance contract during 2012; 3. Guide rail repaired under maintenance contract during 2012.

Figure 13: Panel 7 (north of I-276 to Trenton Road)

dvrpc

Table 8: Panel 7 (north of I-276 to Trenton Road)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 7 SOUTHBOUND/NORTHBOUND 1. At the Middletown turnaround (located on the southern end of Panel 7) the slope is uneven, making it difficult to pull out into traffic SB due to the grade differential between the opening and the travel lanes; NORTHBOUND 2. I-95 NB delineators are knocked down (approx. 1 mile before Exit 44).	SOUTHBOUND/NORTHBOUND 1. ST: Add strip of asphalt (or other treatment) to ease transition entering SB, LT: Investigate turnaround for opportunities to adjust pavement and slope (CW); NORTHBOUND 2. Replace missing delineators.	*Low/Medium (depending on maintenance priorities)* *Low*	*Low* *High*	*Low* *Medium*	1. Will be investigated in the fall of 2012 or spring of 2013; 2. Will be addressed during 2013 fiscal year.

Figure 14: Panel 8 (Trenton Road north to interchange 44, US 1)

Table 9: Panel 8 (Trenton Road north to interchange 44, US 1)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 8 NORTHBOUND 1. Damaged guide rail between Durham Road and the Mill Creek Bridge along NB side.	NORTHBOUND 1. Repair damaged guide rail.	*Low*	*Medium*	*Low*	1. Guide rail repaired under maintenance contract during 2012.

Figure 15: Panel 9 (north under PA 123 Old Lincoln Highway overpass)

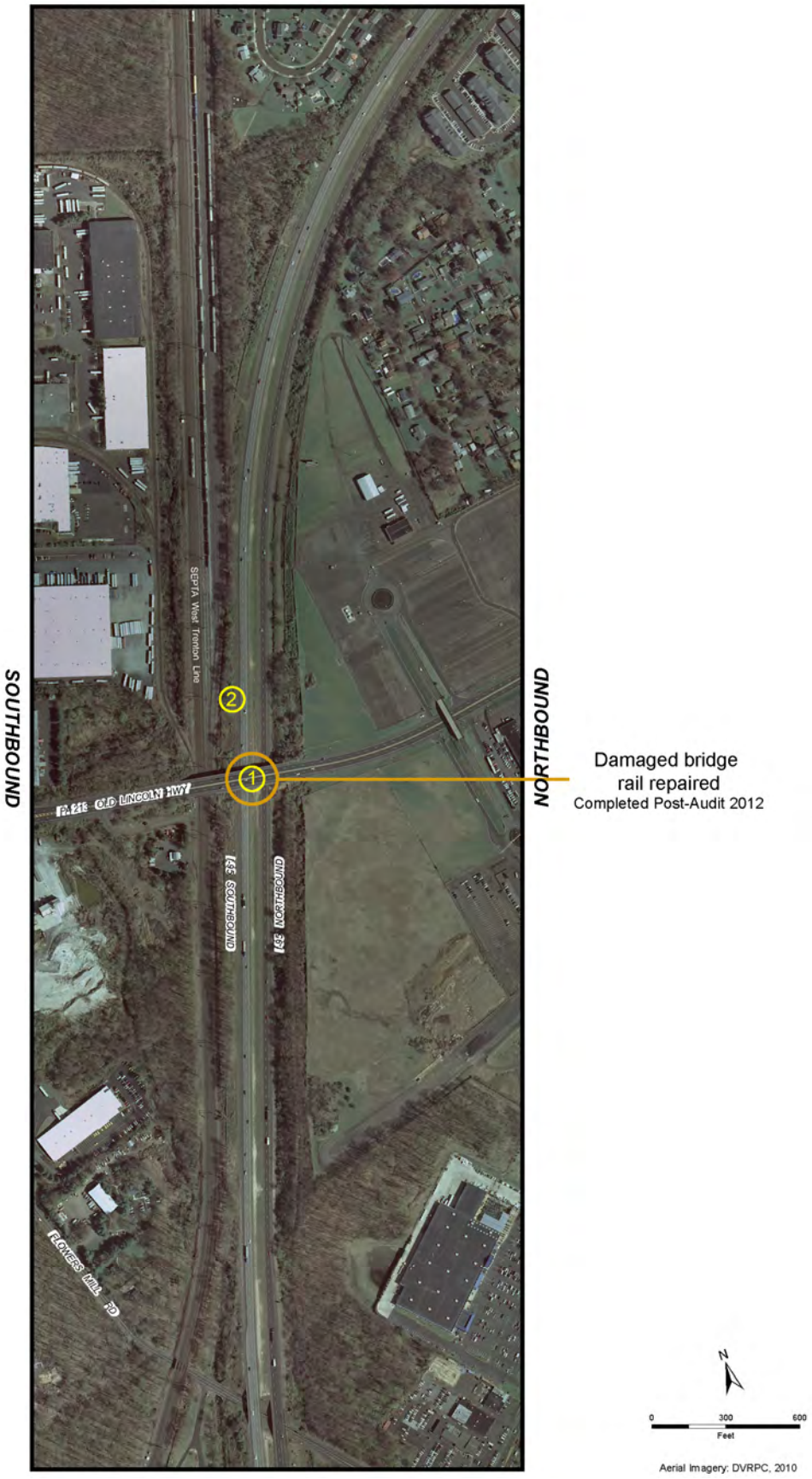

Table 10: Panel 9 (north under PA 123 Old Lincoln Highway overpass)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Panel 9 SOUTHBOUND/NORTHBOUND 1. Bridge rail damage over Old Lincoln Highway; SOUTHBOUND 2. Exit 44 signs along I-95 SB blocked by trees at Old Lincoln Highway and at second location approx. one mile south of there.	SOUTHBOUND/NORTHBOUND 1. Repair damaged bridge rail; SOUTHBOUND 2. Remove foliage from both locations.	*Medium* *Low*	*Medium* *High*	*Low* *Low*	1. Bridge guide rail repaired under maintenance contract during 2012; 2. Will be addressed in the fall of 2012.

Figure 16: Panel 10 (interchange 46, US 1 Lincoln Highway)

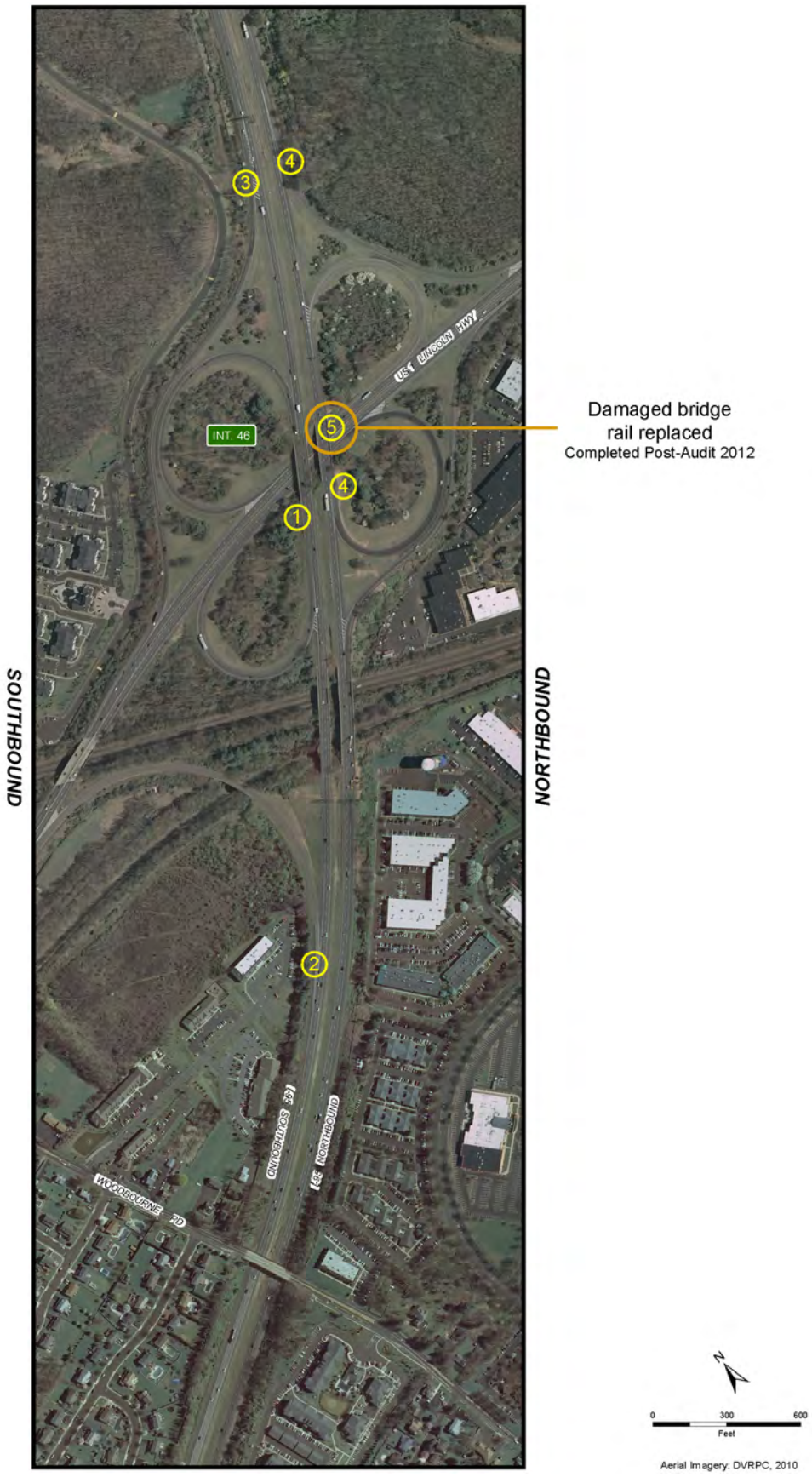

Table 11: Panel 10 (interchange 46, US 1 Lincoln Highway)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	*Road Owner Response*
Panel 10 SOUTHBOUND	SOUTHBOUND				
1. Weave area provides short on-ramp for I-95 SB from US 1 SB (non-reportable crashes noted at this location);	1. Investigate weave area and ramp length;	*High*	*High*	*High*	1. Recommended for consideration as part of the I-95 Corridor Reconstruction Project;
2. Short acceleration lane from US 1 NB to I-95 SB;	2. Maximize the acceleration lane length, taking over the shoulder and building a parallel design on the ramp;	*Medium*	*High*	*High*	2. Will be included as part of TIP project grouping in a future round;
3. Gore area pavement deterioration along I-95 SB at exit 46B;	3. Repair deteriorated pavement;	*Low*	*Medium*	*Medium*	3. Will be included in a future pavement contract;
NORTHBOUND	NORTHBOUND				
4. Missing merge signs from US 1 in both directions to I-95 NB, and some ramps missing advisory speed signs;	4. Investigate and replace missing merge signs and missing advisory speed signs;	*Low*	*High*	*Medium*	4. On work order, to be completed fall 2012;
5. Mainline median side bridge rail damaged near US 1 along I-95 NB.	5. Replace damaged bridge rail.	*Low*	*Medium*	*Low*	5. Bridge guide rail replaced under maintenance contract during 2012.

Figure 17: Panel 11 (north of interchange 46, US 1, into Lower Makefield Township)

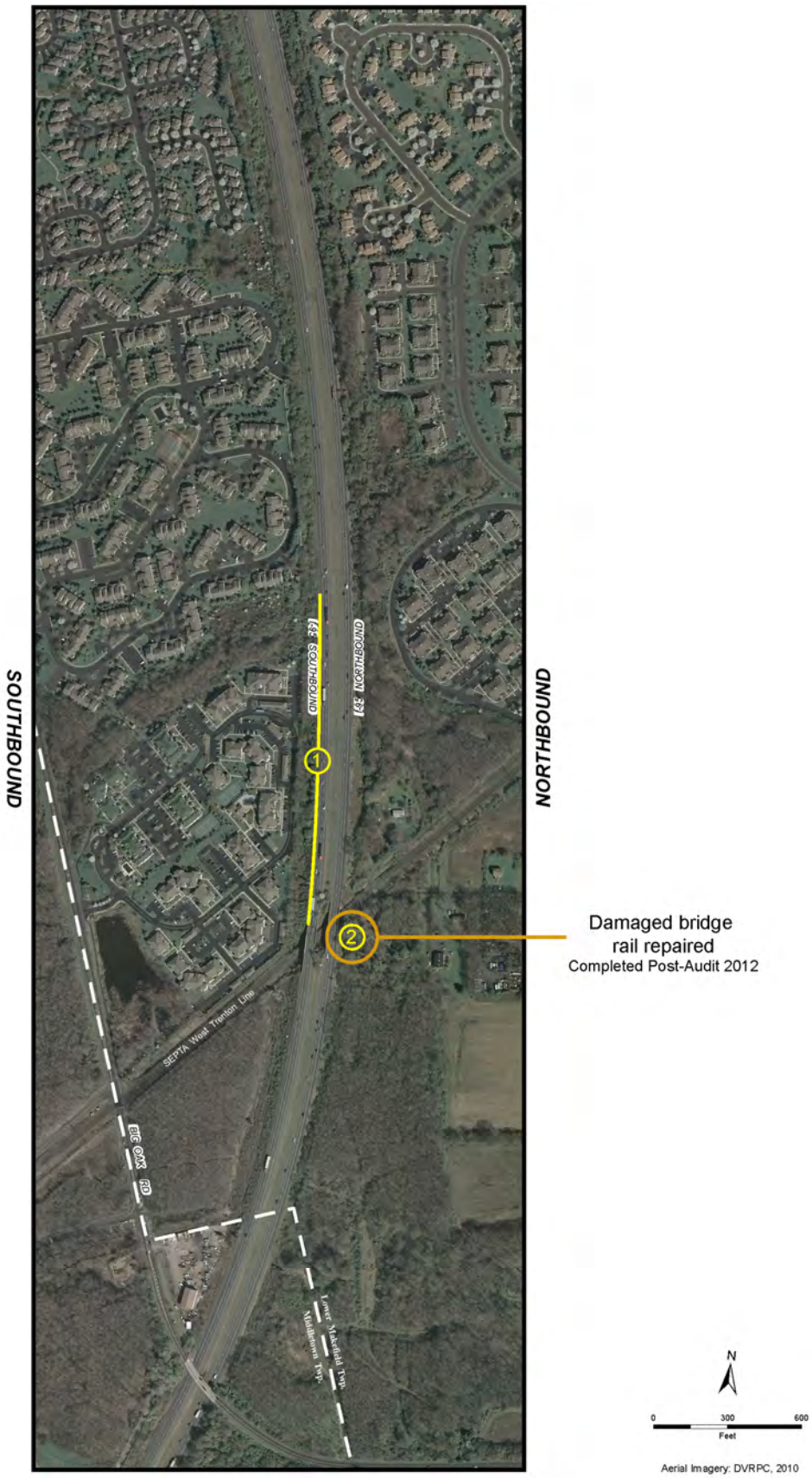

Table 12: Panel 11 (north of interchange 46, US 1, into Lower Makefield Township)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	*Road Owner Response*
Panel 11 SOUTHBOUND 1. North of the SEPTA line, considerable vegetation growth; NORTHBOUND 2. Along the shoulder side, (right side) the bridge rail is damaged at SEPTA line.	SOUTHBOUND 1. Remove vegetation through maintenance contract; NORTHBOUND 2. Repair damaged bridge rail.	*Low* *Medium*	*High* *Medium*	*Low* *Low*	1. Will be addressed in the fall of 2012; 2. Bridge guide rail repaired under maintenance contract during 2012.

Figure 18: Panel 12 (north over Yardley-Langhorne Road)

dvrpc

Table 13: Panel 12 (north over Yardley-Langhorne Road)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	*Road Owner Response*
Panel 12 NORTHBOUND 1. Along I-95 NB at Stony Hill Bridge, the old guide rail needs to be moved to the roadside and tied into the guide rail for ITS device.	NORTHBOUND 1. Relocate guide rail.	*Low/Medium*	*Medium*	*Low*	1. Guide rail relocated under maintenance contract during 2012.

Figure 19: Panel 13 (interchange 49, PA 332 Newton-Yardley Road)

dvrpc

Table 14: Panel 13 (interchange 49, PA 332 Newton-Yardley Road)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	*Road Owner Response*
Panel 13 SOUTHBOUND 1. Short acceleration lane for SB on-ramp;	SOUTHBOUND 1. Investigate opportunity to maximize ramp length;	*Medium*	*High*	*High*	1. Will be included as part of TIP project grouping in a future round;
NORTHBOUND 2. Missing advisory speed sign on NB off-ramp;	NORTHBOUND 2. Replace missing advisory speed sign;	*Low*	*High*	*Medium*	2. Completed spring 2012;
3. Missing curve warning sign on NB off-ramp, posts are there but with no signs on them;	3. Replace missing curve warning sign;	*Low*	*High*	*Medium*	3. Completed spring 2012;
4. Missing PA 332 route sign where the NB off-ramp intersects PA 332;	4. Replace missing route sign;	*Low*	*High*	*Medium*	4. Completed by district maintenance spring 2012;
5. On 332 WB over I-95, there is a missing overhead lane control sign (contact township for replacement).	5. Replace missing overhead lane control sign.	*Low*	*High*	*Medium*	5. Township responsibility will be considered in a future fiscal year.

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Estimated Operational Benefit	Road Owner Response
Corridor-Wide Issues					
1. The Bucks County section of 1-95 does not have 1/10 mile marker signs consistently throughout;	1. Add 1/10 mile marker signs to compliment the mile markers;	*Medium*	*High*	*High*	1. Include in an interim project combined with other corridor-wide TIP improvements or as funds become available;
2. Outer and inner guide rail appears too low along most of the corridor, presenting a safety issue;	2. Conduct detailed evaluation to quantify extent of the problem;	*Medium*	*High*	*NA*	2. District will conduct detailed evaluation when time and resources permit. Guide rail height standards have changed, which presents an opportunity to address the problem corridor-wide (TIP project will be needed to address the issue for the entire corridor);
3. Sloped bridge abutments may present a crash problem for vehicles that run off the road;	3. Conduct detailed evaluation to quantify extent of the problem (measure distance from roadway edge);	*Medium*	*TBD*	*NA*	3. District will conduct level two evaluation when time and resources permit;
4. Redundant guide rail behind cable barrier (e.g.: at Flowers Mill Road);	4. Investigate this situation during detailed guide rail evaluation;	*Medium*	*Low*	*NA*	4. (see #2 above)
5. Few locations currently exist for police to conduct speed enforcement;	5. Work with PA State Police to identify candidate locations for development of enforcement pull-outs;	*Medium*	*Medium*	*Medium*	5. PA State Police will contact PennDOT to discuss next steps;
6. Delaware County section of I-95 has an incident management task force, but this section does not;	6. Establish and maintain a task force to increase coordination and share resources for the benefit of improved safety;	*Low*	*High*	*High*	6. Implemented since the audit event;
7. Emergency Service Patrol (ESP) currently has limited service hours on the Bucks County section of I-95.	7. Extend ESP service hours on high travel days (e.g.: Thanksgiving, etc.).	*Medium*	*High*	*High*	7. PennDOT will investigate need and funding options.

Conclusions

The safety and operational recommendations identified during the audit and documented in this report were designed to improve safety and mobility for users of the highway. Many of the strategies identified can be implemented through routine maintenance. The full impact of the improvement strategies will be realized when they are combined, but time and budget constraints will dictate the implementation schedule.

Several of the crash cluster locations discussed during the RSOA process have been investigated by PennDOT's District 6-0 office since the audit event. These are examples of identified issues that required further study, for which District 6-0 conducted Level Two safety evaluations. HFO clusters—the most commonly found cluster in the study area—were identified in six of the 14 panels from the southern end of the study area uninterrupted through to Exit 40 (Bristol), in both northbound and southbound directions. District 6-0 concluded that driving too fast for conditions or speeding were contributing factors in these cluster crashes, and the object hit was typically a guide rail. A corridor-wide engineering solution to widen the shoulders to increase recovery time is recommended for consideration during the I-95 Corridor Reconstruction Project. Increased enforcement was recommended to slow drivers through this section as a short-term improvement.

Similar to the Delaware County I-95 RSOA, many short-term improvements have been implemented since the audit event, and additional analyses have been performed. Low-cost items such as foliage removal for improved sight distance, and pavement edge repair and edge line restriping, have been completed by county maintenance or through existing maintenance contracts. A high level of coordination between PennDOT offices was the key to expediting these improvements.

Longer-term engineering improvements may require new contracts and a more comprehensive planning and engineering approach. Some of these items have been recommended for consideration under the I-95 Corridor Reconstruction Project.

Engineering strategies alone will not eliminate the traffic safety issues identified along the study corridor. Education, with support from a targeted enforcement campaign, is an effective approach for addressing the driver behaviors that lead to crashes. Policy or legislative actions can provide the legal weight needed to motivate people to be safer, more conscientious drivers. Thus, employing a multi-pronged approach and engaging the appropriate stakeholders will be the most effective courses of action to further advance the goal of improved safety on I-95 in Bucks County.

APPENDIX A

Audit Team

Name	Agency
Sgt. Chris Burns	Bristol Township Police Department
Richard G. Brahler	Bucks County Planning Department
William D. Rickett	Bucks County Transportation Management Assoc.
Kevin Murphy	DVRPC: Safety and Congestion Management
Chris King	DVRPC: Transportation Operations Management
Mike Castellano	FHWA: Pennsylvania
Carmine Fascina	FHWA: Philadelphia
Lorraine Ryan	PennDOT: District 6-0 Maintenance
Ron Notar	PennDOT: District 6-0 Maintenance Project Coordinator
Calvin Morrison	PennDOT: District 6-0 Maintenance, Bucks County
Larry Bucci	PennDOT: District 6-0 Traffic
Lou Belmonte	PennDOT: District 6-0 Traffic
Manny Anastasiadis	PennDOT: District 6-0 Traffic Freeway Management
Sgt. Brian Ianuzzi	Pennsylvania State Police: Trevose

Note: DVRPC = Delaware Valley Regional Planning Commission; FHWA = Federal Highway Administration; PennDOT = Pennsylvania Department of Transportation.

APPENDIX B

Crash Data

I-95 NB SEGMENT 340-490

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)

USER_ID/QUERY ID: c-ehe/PC20110414001

MONTH OF YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	23	25	20	14	14	19	15	25	19	27	18	29	248
PCT	9%	10%	8%	6%	6%	8%	6%	10%	8%	11%	7%	12%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	35	33	40	30	34	42	34	248
PCT	14%	13%	16%	12%	14%	17%	14%	100%

HOUR OF DAY

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CRASHES	6	10	8	13	13	8	13	16	10	6	13	14	6	9	16	17	8	6	14	8	5	15	6	8	248
PCT	2%	4%	3%	5%	5%	3%	5%	6%	4%	2%	5%	6%	2%	4%	6%	7%	3%	2%	6%	3%	2%	6%	2%	3%	100%

YEAR

	CRASHES	PCT
2008	83	33%
2009	85	34%
2010	80	32%
TOTAL	248	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	131	53%
REAR END	68	27%
SAME DIR SS	22	9%
UNKNOWN	11	4%
ANGLE	8	3%
NON COLL	8	3%
TOTAL	248	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
FATAL	3	1%
MAJOR	5	2%
MODERATE	15	6%
MINOR	57	23%
UNK SEVERITY	29	12%
UNK IF INJURED	12	5%
PDO	127	51%
TOTAL	248	100%

SEVERITY COUNT

	PERSONS
FATALITIES	3
MAJOR	5
MODERATE	20
MINOR	79
UNK SEVERITY	52
UNK IF INJURED	23

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	163	35%
TOO FAST FOR CONDITION	84	18%
CARELESS PASS/LN CHNG	53	11%
OTHER IMPROPER DRIVING	46	10%
AFFECTED PHYSICAL COND	29	6%
TAILGATING	18	4%
DRIVER WAS DISTRACTED	17	4%
SPEEDING	11	2%
UNKNOWN	10	2%
FAILR MAINT PROP SPEED	9	2%
DRIVER INEXPERIENCED	4	1%
OVER/UNDER COMP CURVE	4	1%
OTHERS	18	4%
TOTAL	466	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	265	67%
SUV	55	14%
SMALL TRUCK	29	7%
LARGE TRUCK	25	6%
VAN	18	5%
UNK VEHICLE	3	1%
MOTORCYCLE	1	0%
TOTAL	396	100%

ROAD CONDITION

	CRASHES	PCT
DRY	195	79%
WET	34	14%
SNOW	8	3%
SLUSH	4	2%
WATER	4	2%
ICE	1	0%
ICE PATCH	1	0%
OTHER	1	0%
TOTAL	248	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	131	53%
DARK	78	31%
STREET LIGHTS	24	10%
DAWN	8	3%
DUSK	4	2%
UNK LIGHTING	3	1%
TOTAL	248	100%

WEATHER

	CRASHES	PCT
CLEAR	210	85%
RAIN	25	10%
SNOW	10	4%
OTHER	2	1%
FOG	1	0%
TOTAL	248	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	206	83%
SLIPPERY ICE/SNOW	15	6%
DEER IN ROADWAY	8	3%
OTHER WEATHER COND	5	2%
WORK ZONE RELATED	5	2%
OTHER RDWY FACTOR	3	1%
OBSTACLE ON RDWY	2	1%
OTHER ENVIR FACTOR	2	1%
SUDDEN WEATHER COND	2	1%
UNKNOWN	1	0%
TOTAL	249	100%

CDART - CRASH SUMMARY REPORT (09-06)

NOTES:

1 The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

2 2011 crash records are incomplete
Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years
Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID:	DVRPC20110414001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)
Date Range:	1/1/2008 to 12/31/2010
Criteria:	

I-95 SB (SEGMENTS 341-491)

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)

USER_ID/QUERY ID: c-ehe/PC20110414001

MONTH OF YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	27	21	24	19	19	14	19	14	20	26	15	27	245
PCT	11%	9%	10%	8%	8%	6%	8%	6%	8%	11%	6%	11%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	27	31	36	36	40	35	40	245
PCT	11%	13%	15%	15%	16%	14%	16%	100%

HOUR OF DAY

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
CRASHES	7	10	7	9	7	2	6	14	11	8	7	8	10	6	14	11	10	20	15	21	8	12	10	12	245
PCT	3%	4%	3%	4%	3%	1%	2%	6%	4%	3%	3%	3%	4%	2%	6%	4%	4%	8%	6%	9%	3%	5%	4%	5%	100%

YEAR

	CRASHES	PCT
2008	61	25%
2009	90	37%
2010	94	38%
TOTAL	245	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	120	49%
REAR END	66	27%
SAME DIR SS	19	8%
UNKNOWN	14	6%
ANGLE	13	5%
NON COLL	11	4%
HEAD ON	1	0%
PEDESTRIAN	1	0%
TOTAL	245	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
FATAL	2	1%
MAJOR	5	2%
MODERATE	9	4%
MINOR	48	20%
UNK SEVERITY	33	13%
UNK IF INJURED	4	2%
PDO	144	59%
TOTAL	245	100%

SEVERITY COUNT

	PERSONS
FATALITIES	2
MAJOR	10
MODERATE	11
MINOR	64
UNK SEVERITY	54
UNK IF INJURED	20

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	154	36%
TOO FAST FOR CONDITION	108	25%
CARELESS PASS/LN CHNG	39	9%
OTHER IMPROPER DRIVING	25	6%
TAILGATING	21	5%
FAILR MAINT PROP SPEED	14	3%
AFFECTED PHYSICAL COND	13	3%
DRIVER WAS DISTRACTED	13	3%
SPEEDING	13	3%
UNKNOWN	10	2%
SUDDEN SLOWING/STOP	8	2%
IMPROPER ENTRANCE HWY	5	1%
OTHERS	6	1%
TOTAL	429	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	253	67%
SUV	49	13%
SMALL TRUCK	27	7%
LARGE TRUCK	20	5%
VAN	14	4%
UNK VEHICLE	8	2%
MOTORCYCLE	5	1%
BUS	1	0%
CONSTRUCTION	1	0%
TOTAL	378	100%

ROAD CONDITION

	CRASHES	PCT
DRY	166	68%
WET	52	21%
WATER	19	8%
ICE PATCH	3	1%
SLUSH	3	1%
SNOW	2	1%
TOTAL	245	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	109	44%
DARK	82	33%
STREET LIGHTS	38	16%
DUSK	8	3%
DAWN	5	2%
OTHER	2	1%
UNK LIGHTING	1	0%
TOTAL	245	100%

WEATHER

	CRASHES	PCT
CLEAR	174	71%
RAIN	61	25%
SNOW	8	3%
RAIN/FOG	1	0%
UNK	1	0%
TOTAL	245	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	178	71%
OTHER WEATHER COND	24	10%
DEER IN ROADWAY	16	6%
SLIPPERY ICE/SNOW	10	4%
OBSTACLE ON RDWY	5	2%
OTHER ENVIR FACTOR	5	2%
SUDDEN WEATHER COND	4	2%
OTHER RDWY FACTOR	2	1%
SUBSTANCE ON RDWY	2	1%
UNKNOWN	2	1%
ANIMAL IN RDWY	1	0%
WINDY CONDITIONS	1	0%
OTHERS	1	0%
TOTAL	251	100%

CDART - CRASH SUMMARY REPORT (09-06)

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

2 2011 crash records are incomplete

Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years

Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID:	DVRPC20110414001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)
Date Range:	1/1/2008 to 12/31/2010
Criteria:	

I-95 NB SEGMENT 340-490

Date Range: 1/1/2008 to 12/31/2010

USER_ID / QUERY ID: c-ehe/ DVRPC2011051

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)

CRASH EVENTS (number of crashes)

	2008	2009	2010	TOTAL
HIT_FIXED_OBJECT	45	53	33	131
HIT_TREE_SHRUB	2	6	6	14
HIT_POLE	2	0	0	2
HIT_GDRAIL	42	41	32	115
HIT_GDRAIL_END	3	5	2	10
HIT_BRIDGE	0	1	2	3
HIT_EMBANKMENT	4	4	3	11
HIT_BARRIER	6	9	4	19
DEER_RELATED	1	3	4	8
REAR_END	20	20	28	68
HO_OPPDIR_SDSWP	0	0	0	0
SV_RUN_OFF_RD	48	55	39	142
OVERTURNED	7	6	9	22
VEHICLE_FAILURE	4	4	6	14
PHANTOM_VEHICLE	1	2	3	6
PSP_REPORTED	83	84	80	247

DRIVER / PERSON (number of crashes)

	2008	2009	2010	TOTAL
DRINKING_DRIVER	8	9	7	24
ALCOHOL_RELATED	8	9	7	24
UNBELTED	10	12	8	30
AGGRESSIVE_DRVG	51	51	44	146
SPEEDING	5	3	3	11
NHTSA_AGG_DRIVING	3	5	6	14
SPEEDING_RELATED	28	33	28	89
TAILGATING	4	3	9	16
CURVE_DVR_ERROR	1	2	1	4
DISTRACTED	8	7	4	19
FATIGUE_ASLEEP	4	4	6	14
NO_CLEARANCE	1	0	0	1
UNLICENSED	1	0	0	1
CELL_PHONE	0	1	1	2
RUNNING_RED_LT	0	0	0	0
RUNNING_STOP_SIGN	0	0	0	0
UNDERAGE_DRNK_DRV	1	1	1	3
DRIVER_16YR	1	1	0	2
DRIVER_17YR	2	0	0	2
DRIVER_65_74YR	2	4	9	15
DRIVER_75PLUS	2	1	5	8
PEDESTRIAN	0	0	0	0

Print Date: 5/12/2011

I-95 NB SEGMENT 340-490

Date Range: 1/1/2008 to 12/31/2010

USER_ID / QUERY ID: c-ehe/ DVRPC2011051

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)

ROAD / WEATHER (number of crashes)

	2008	2009	2010	TOTAL
NON_INTERSECTION	80	81	74	235
INTERSECTION	3	4	6	13
SIGNALIZED_INT	0	0	0	0
UNSIGNALIZED_INT	3	4	6	13
STOP_CONTR_INT	1	0	1	2
CROSS_MEDIAN	0	0	0	0
SHLDR_RELATED	0	0	0	0
WORK_ZONE	1	0	11	12
LIMIT_65MPH	0	0	0	0
WET_ROAD	11	12	11	34
ICY_ROAD	1	0	1	2
SNOW_SLUSH_ROAD	0	8	4	12
ILLUMINATION_DARK	30	40	35	105

VEHICLE (number of crashes)

	2008	2009	2010	TOTAL
HVY_TRK_RELATED	10	4	11	25
MOTORCYCLE	0	0	1	1
TRAIN_TROLLEY	0	0	0	0
BICYCLE	0	0	0	0
SCHOOL_BUS	0	0	1	1
COMM_VEHICLE	10	4	12	26

SEVERITY (number of crashes)

	2008	2009	2010	TOTAL
FATAL	0	2	1	3
FATAL_OR_MAJ_INJ	2	3	3	8
INJURY	42	32	34	108
PROPERTY_DAMAGE_ONLY	41	53	45	139

Print Date: 5/12/2011

CDART - CRASH FLAG SUMMARY REPORT (10-06)

Print Date: 5/12/2011

CDART - CRASH FLAG SUMMARY REPORT (10-06)

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

2 2011 crash records are incomplete

Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years

Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID: DVRPC20110512001

User ID: c-ehe

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)

Date Range: 1/1/2008 to 12/31/2010

Criteria:

I-95 SB (SEGMENTS 341-491)

Date Range: 1/1/2008 to 12/31/2010

USER_ID / QUERY ID: c-ehe/ DVRPC2011041

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)

CRASH EVENTS (number of crashes)

	2008	2009	2010	TOTAL
HIT_FIXED_OBJECT	30	49	41	120
HIT_TREE_SHRUB	6	6	5	17
HIT_POLE	0	0	0	0
HIT_GDRAIL	22	28	20	70
HIT_GDRAIL_END	2	2	1	5
HIT_BRIDGE	0	0	1	1
HIT_EMBANKMENT	1	1	2	4
HIT_BARRIER	8	16	19	43
DEER_RELATED	3	7	6	16
REAR_END	13	24	29	66
HO_OPPDIR_SDSWP	0	1	0	1
SV_RUN_OFF_RD	35	53	45	133
OVERTURNED	9	3	5	17
VEHICLE_FAILURE	5	7	3	15
PHANTOM_VEHICLE	3	1	1	5
PSP_REPORTED	61	87	94	242

DRIVER / PERSON (number of crashes)

	2008	2009	2010	TOTAL
DRINKING_DRIVER	4	3	15	22
ALCOHOL_RELATED	4	3	15	22
UNBELTED	2	10	8	20
AGGRESSIVE_DRVG	48	68	53	169
SPEEDING	3	2	8	13
NHTSA_AGG_DRIVING	6	3	7	16
SPEEDING_RELATED	36	44	35	115
TAILGATING	4	10	6	20
CURVE_DVR_ERROR	0	0	1	1
DISTRACTED	3	6	4	13
FATIGUE_ASLEEP	0	0	2	2
NO_CLEARANCE	0	0	0	0
UNLICENSED	0	0	3	3
CELL_PHONE	0	0	0	0
RUNNING_RED_LT	0	0	0	0
RUNNING_STOP_SIGN	0	0	0	0
UNDERAGE_DRNK_DRV	0	0	1	1
DRIVER_16YR	1	0	0	1
DRIVER_17YR	1	1	1	3
DRIVER_65_74YR	3	4	6	13
DRIVER_75PLUS	1	3	0	4
PEDESTRIAN	0	1	0	1

Print Date: 5/12/2011

I-95 SB (SEGMENTS 341-491)

Date Range: 1/1/2008 to 12/31/2010

USER_ID / QUERY ID: c-ehe/ DVRPC2011041

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)

ROAD / WEATHER (number of crashes)

	2008	2009	2010	TOTAL
NON_INTERSECTION	54	79	76	209
INTERSECTION	7	11	18	36
SIGNALIZED_INT	0	0	0	0
UNSIGNALIZED_INT	7	11	18	36
STOP_CONTR_INT	0	1	1	2
CROSS_MEDIAN	0	0	0	0
SHLDR_RELATED	0	0	0	0
WORK_ZONE	0	4	2	6
LIMIT_65MPH	0	1	0	1
WET_ROAD	16	25	11	52
ICY_ROAD	0	0	3	3
SNOW_SLUSH_ROAD	1	2	2	5
ILLUMINATION_DARK	28	44	49	121

VEHICLE (number of crashes)

	2008	2009	2010	TOTAL
HVY_TRK_RELATED	6	4	9	19
MOTORCYCLE	0	3	2	5
TRAIN_TROLLEY	0	0	0	0
BICYCLE	0	0	0	0
SCHOOL_BUS	0	0	0	0
COMM_VEHICLE	6	4	9	19

SEVERITY (number of crashes)

	2008	2009	2010	TOTAL
FATAL	0	1	1	2
FATAL_OR_MAJ_INJ	2	2	3	7
INJURY	24	36	35	95
PROPERTY_DAMAGE_ONLY	37	53	58	148

Print Date: 5/12/2011

CDART - CRASH FLAG SUMMARY REPORT (10-06)

Print Date: 5/12/2011

CDART - CRASH FLAG SUMMARY REPORT (10-06)

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

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Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years

Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID: DVRPC20110414001

User ID: c-ehe

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)

Date Range: 1/1/2008 to 12/31/2010

Criteria:

I-95 NB SEGMENT 340-490

Sorted by County, Route, Number of Crashes

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)

USER ID / QUERY ID:
lbucci / 0620110524005

DISTRICT	COUNTY		ROUTE	SEGMENT	MIN OFFSET	MAX OFFSET	LENGTH	CRASHES	TOT_INJ	MAJ_INJ	FATAL	AVG ADT	CRASH RATE	HOMOG. RATE (5YR)	DELTA*
06	09	BUCKS	0095	0354	38	2625	0.50	31	34	1	0	44044	1.28	0.54	2.38
06	09	BUCKS	0095	0374	60	2577	0.50	22	7	0	0	38628	1.04	0.54	1.92
06	09	BUCKS	0095	0340	62	2583	0.50	20	25	1	0	64393	0.56	0.54	1.05
06	09	BUCKS	0095	0360	185	2575	0.50	18	12	0	0	38628	0.85	0.54	1.58
06	09	BUCKS	0095	0370	102	2010	0.50	15	12	0	0	38628	0.71	0.54	1.31
06	09	BUCKS	0095	0364	166	2210	0.50	13	7	1	0	38628	0.61	0.54	1.14
06	09	BUCKS	0095	0384	49	2731	0.54	13	8	1	0	38628	0.57	0.54	1.06
06	09	BUCKS	0095	0344	187	2510	0.50	11	2	0	0	44044	0.46	0.54	0.84
06	09	BUCKS	0095	0380	29	2390	0.45	10	6	0	0	38628	0.53	0.54	0.98
06	09	BUCKS	0095	0394	227	2563	0.51	10	7	0	0	26763	0.67	0.54	1.24
06	09	BUCKS	0095	0350	45	1690	0.50	8	3	0	0	44044	0.33	0.54	0.61
06	09	BUCKS	0095	0454	49	2219	0.55	8	5	0	0	27683	0.48	0.54	0.88
06	09	BUCKS	0095	0464	427	2578	0.50	7	1	0	2	27683	0.46	0.54	0.85
06	09	BUCKS	0095	0390	243	2559	0.50	6	2	0	0	26763	0.41	0.54	0.76
06	09	BUCKS	0095	0444	1168	2143	0.50	6	3	1	0	26986	0.40	0.54	0.75
06	09	BUCKS	0095	0410	33	700	0.50	5	4	0	0	26763	0.34	0.54	0.63
06	09	BUCKS	0095	0424	322	2147	0.50	5	2	0	0	26763	0.34	0.54	0.63
06	09	BUCKS	0095	0430	10	2230	0.44	5	0	0	0	26986	0.39	0.54	0.72
06	09	BUCKS	0095	0434	452	1050	0.53	5	2	0	1	26986	0.32	0.54	0.59
06	09	BUCKS	0095	0404	224	580	0.50	4	3	0	0	26763	0.27	0.54	0.50
06	09	BUCKS	0095	0420	579	2142	0.50	4	3	0	0	26763	0.27	0.54	0.51
06	09	BUCKS	0095	0440	85	1131	0.50	4	2	0	0	26986	0.27	0.54	0.50
06	09	BUCKS	0095	0484	322	2637	0.50	4	1	0	0	26225	0.28	0.54	0.52
06	09	BUCKS	0095	0400	213	985	0.50	3	2	0	0	26763	0.20	0.54	0.38
06	09	BUCKS	0095	0460	444	2527	0.50	3	0	0	0	27683	0.20	0.54	0.37
06	09	BUCKS	0095	0480	345	2482	0.50	3	1	0	0	26225	0.21	0.54	0.39
06	09	BUCKS	0095	0450	1033	1103	0.44	2	0	0	0	26986	0.15	0.54	0.28
06	09	BUCKS	0095	0474	5	1464	0.50	2	1	0	0	27683	0.13	0.54	0.24
06	09	BUCKS	0095	0414	2288	2288	0.50	1	1	0	0	26763	0.07	0.54	0.13

I-95 NB SEGMENT 340-490

Sorted by County, Route, Number of Crashes

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

B-12

2011 crash records are incomplete
Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years
Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

*** SPECIAL NOTE :** DELTA is calculated as CRASH RATE / HOMOG. RATE (5YR) and is an indicator of how the actual crash rate compares to average Statewide crash rates for roadway segments having similar characteristics. This value represents a valid comparison only with the assumption that crashes occuring in the segment are evenly distributed through the years within the query Date Range. Use caution when comparing actual rate to homogeneous rate when query date range is not equal to 5 years.

QUERY PARAMETERS:

Note: This report includes data for state roads only.

Query ID: 0620110524005
User ID: lbucci
Minimums: 1 Crashes / 1 AADT / 0 miles
Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0340 Offset 62 and Segment 0490 Offset 33)

Date Range: 1/1/2008 to 12/31/2010

Criteria: STATE ROAD
STATE_ROAD

I-95 SB (SEGMENTS 341-491)

Sorted by County, Route, Number of Crashes

Date Range: 1/1/2008 to 12/31/2010

USER ID / QUERY ID: lbucci / 0620110524006

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)

DISTRICT	COUNTY		ROUTE	SEGMENT	MIN OFFSET	MAX OFFSET	LENGTH	CRASHES	TOT_INJ	MAJ_INJ	FATAL	AVG ADT	CRASH RATE	HOMOG. RATE (5YR)	DELTA*
06	09	BUCKS	0095	0361	477	2397	0.50	27	21	0	0	38376	1.29	0.54	2.38
06	09	BUCKS	0095	0351	441	2460	0.49	21	13	0	1	45066	0.86	0.54	1.60
06	09	BUCKS	0095	0341	162	2489	0.50	19	17	5	0	62171	0.56	0.54	1.04
06	09	BUCKS	0095	0365	7	2512	0.50	19	12	3	0	38376	0.91	0.54	1.68
06	09	BUCKS	0095	0371	92	2452	0.49	14	3	0	0	38376	0.68	0.54	1.25
06	09	BUCKS	0095	0355	117	2505	0.50	12	8	1	0	45066	0.49	0.54	0.90
06	09	BUCKS	0095	0385	212	2094	0.53	10	2	0	1	38376	0.45	0.54	0.84
06	09	BUCKS	0095	0461	123	2471	0.49	10	5	0	0	31148	0.60	0.54	1.10
06	09	BUCKS	0095	0375	88	2019	0.51	8	12	0	0	38376	0.38	0.54	0.70
06	09	BUCKS	0095	0381	16	1800	0.49	8	4	0	0	38376	0.39	0.54	0.73
06	09	BUCKS	0095	0411	47	2295	0.50	8	6	0	0	27450	0.53	0.54	0.99
06	09	BUCKS	0095	0455	467	2349	0.55	7	3	0	0	31148	0.37	0.54	0.69
06	09	BUCKS	0095	0481	418	2358	0.50	7	2	0	0	30314	0.42	0.54	0.77
06	09	BUCKS	0095	0345	411	2612	0.51	6	6	1	0	45066	0.24	0.54	0.44
06	09	BUCKS	0095	0391	1052	2499	0.49	6	1	0	0	27450	0.41	0.54	0.76
06	09	BUCKS	0095	0445	610	2607	0.50	6	1	0	0	28300	0.39	0.54	0.72
06	09	BUCKS	0095	0485	362	1094	0.51	6	4	0	0	30314	0.36	0.54	0.66
06	09	BUCKS	0095	0401	184	1642	0.48	5	1	0	0	27450	0.35	0.54	0.65
06	09	BUCKS	0095	0405	295	1498	0.50	5	1	0	0	27450	0.33	0.54	0.62
06	09	BUCKS	0095	0415	24	2638	0.50	5	6	0	0	27450	0.33	0.54	0.61
06	09	BUCKS	0095	0425	41	2597	0.50	5	0	0	0	27450	0.33	0.54	0.61
06	09	BUCKS	0095	0465	134	2491	0.49	5	5	0	0	31148	0.30	0.54	0.55
06	09	BUCKS	0095	0475	355	2644	0.51	5	1	0	0	31148	0.29	0.54	0.54
06	09	BUCKS	0095	0435	1127	1689	0.52	4	0	0	0	28300	0.25	0.54	0.46
06	09	BUCKS	0095	0395	1011	2006	0.50	3	1	0	0	27450	0.20	0.54	0.37
06	09	BUCKS	0095	0421	53	1719	0.50	3	2	0	0	27450	0.20	0.54	0.37
06	09	BUCKS	0095	0471	996	2511	0.50	3	0	0	0	31148	0.18	0.54	0.33
06	09	BUCKS	0095	0491	8	8	0.51	3	0	0	0	30314	0.18	0.54	0.33
06	09	BUCKS	0095	0431	1003	2125	0.49	2	0	0	0	28300	0.13	0.54	0.24
06	09	BUCKS	0095	0441	182	182	0.51	1	1	0	0	28300	0.06	0.54	0.12
06	09	BUCKS	0095	0451	557	557	0.43	1	0	0	0	31148	0.07	0.54	0.13

I-95 SB (SEGMENTS 341-491)

Sorted by County, Route, Number of Crashes

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

B-14

2011 crash records are incomplete
Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years
Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

*** SPECIAL NOTE :** DELTA is calculated as CRASH RATE / HOMOG. RATE (5YR) and is an indicator of how the actual crash rate compares to average Statewide crash rates for roadway segments having similar characteristics. This value represents a valid comparison only with the assumption that crashes occuring in the segment are evenly distributed through the years within the query Date Range. Use caution when comparing actual rate to homogeneous rate when query date range is not equal to 5 years.

QUERY PARAMETERS:

Note: This report includes data for state roads only.

Query ID: 0620110524006
User ID: lbucci
Minimums: 1 Crashes / 1 AADT / 0 miles
Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0341 Offset 162 and Segment 0491 Offset 8)
Date Range: 1/1/2008 to 12/31/2010
Criteria: STATE ROAD
STATE_ROAD

I-95 NB Crash Details by Segment (340-490)

DISTRICT	COUNTY	ROUTE	SEGMENT	MIN OFFSET	MAX OFFSET	LENGTH	CRASHES	TOT_INJ	MAJ_INJ	FATAL	AVG ADT	CRASH RATE	HOMOG. RATE	DELTA*
6	BUCKS	95	354	38	2625	0.5	31	34	1	0	44044	1.28	0.54	2.38
6	BUCKS	95	374	60	2577	0.5	22	7	0	0	38628	1.04	0.54	1.92
6	BUCKS	95	360	185	2575	0.5	18	12	0	0	38628	0.85	0.54	1.58
6	BUCKS	95	370	102	2010	0.5	15	12	0	0	38628	0.71	0.54	1.31
6	BUCKS	95	394	227	2563	0.51	10	7	0	0	26763	0.67	0.54	1.24
6	BUCKS	95	364	166	2210	0.5	13	7	1	0	38628	0.61	0.54	1.14
6	BUCKS	95	384	49	2731	0.54	13	8	1	0	38628	0.57	0.54	1.06
6	BUCKS	95	340	62	2583	0.5	20	25	1	0	64393	0.56	0.54	1.05
6	BUCKS	95	380	29	2390	0.45	10	6	0	0	38628	0.53	0.54	0.98
6	BUCKS	95	454	49	2219	0.55	8	5	0	0	27683	0.48	0.54	0.88
6	BUCKS	95	464	427	2578	0.5	7	1	0	2	27683	0.46	0.54	0.85
6	BUCKS	95	344	187	2510	0.5	11	2	0	0	44044	0.46	0.54	0.84
6	BUCKS	95	390	243	2559	0.5	6	2	0	0	26763	0.41	0.54	0.76
6	BUCKS	95	444	1168	2143	0.5	6	3	1	0	26986	0.4	0.54	0.75
6	BUCKS	95	430	10	2230	0.44	5	0	0	0	26986	0.39	0.54	0.72
6	BUCKS	95	410	33	700	0.5	5	4	0	0	26763	0.34	0.54	0.63
6	BUCKS	95	424	322	2147	0.5	5	2	0	0	26763	0.34	0.54	0.63
6	BUCKS	95	350	45	1690	0.5	8	3	0	0	44044	0.33	0.54	0.61
6	BUCKS	95	434	452	1050	0.53	5	2	0	1	26986	0.32	0.54	0.59
6	BUCKS	95	484	322	2637	0.5	4	1	0	0	26225	0.28	0.54	0.52
6	BUCKS	95	420	579	2142	0.5	4	3	0	0	26763	0.27	0.54	0.51
6	BUCKS	95	404	224	580	0.5	4	3	0	0	26763	0.27	0.54	0.5
6	BUCKS	95	440	85	1131	0.5	4	2	0	0	26986	0.27	0.54	0.5
6	BUCKS	95	480	345	2482	0.5	3	1	0	0	26225	0.21	0.54	0.39
6	BUCKS	95	400	213	985	0.5	3	2	0	0	26763	0.2	0.54	0.38
6	BUCKS	95	460	444	2527	0.5	3	0	0	0	27683	0.2	0.54	0.37
6	BUCKS	95	450	1033	1103	0.44	2	0	0	0	26986	0.15	0.54	0.28
6	BUCKS	95	474	5	1464	0.5	2	1	0	0	27683	0.13	0.54	0.24
6	BUCKS	95	414	2288	2288	0.5	1	1	0	0	26763	0.07	0.54	0.13

I-95 SB Crash Details by Segment (341-491)

DISTRICT	COUNTY	ROUTE	SEGMENT	MIN OFFSET	MAX OFFSET	LENGTH	CRASHES	TOT_INJ	MAJ_INJ	FATAL	AVG ADT	CRASH RATE	HOMOG. RATE	DELTA*
6	BUCKS	95	361	477	2397	0.5	27	21	0	0	38376	1.29	0.54	2.38
6	BUCKS	95	365	7	2512	0.5	19	12	3	0	38376	0.91	0.54	1.68
6	BUCKS	95	351	441	2460	0.49	21	13	0	1	45066	0.86	0.54	1.6
6	BUCKS	95	371	92	2452	0.49	14	3	0	0	38376	0.68	0.54	1.25
6	BUCKS	95	461	123	2471	0.49	10	5	0	0	31148	0.6	0.54	1.1
6	BUCKS	95	341	162	2489	0.5	19	17	5	0	62171	0.56	0.54	1.04
6	BUCKS	95	411	47	2295	0.5	8	6	0	0	27450	0.53	0.54	0.99
6	BUCKS	95	355	117	2505	0.5	12	8	1	0	45066	0.49	0.54	0.9
6	BUCKS	95	385	212	2094	0.53	10	2	0	1	38376	0.45	0.54	0.84
6	BUCKS	95	481	418	2358	0.5	7	2	0	0	30314	0.42	0.54	0.77
6	BUCKS	95	391	1052	2499	0.49	6	1	0	0	27450	0.41	0.54	0.76
6	BUCKS	95	381	16	1800	0.49	8	4	0	0	38376	0.39	0.54	0.73
6	BUCKS	95	445	610	2607	0.5	6	1	0	0	28300	0.39	0.54	0.72
6	BUCKS	95	375	88	2019	0.51	8	12	0	0	38376	0.38	0.54	0.7
6	BUCKS	95	455	467	2349	0.55	7	3	0	0	31148	0.37	0.54	0.69
6	BUCKS	95	485	362	1094	0.51	6	4	0	0	30314	0.36	0.54	0.66
6	BUCKS	95	401	184	1642	0.48	5	1	0	0	27450	0.35	0.54	0.65
6	BUCKS	95	405	295	1498	0.5	5	1	0	0	27450	0.33	0.54	0.62
6	BUCKS	95	415	24	2638	0.5	5	6	0	0	27450	0.33	0.54	0.61
6	BUCKS	95	425	41	2597	0.5	5	0	0	0	27450	0.33	0.54	0.61
6	BUCKS	95	465	134	2491	0.49	5	5	0	0	31148	0.3	0.54	0.55
6	BUCKS	95	475	355	2644	0.51	5	1	0	0	31148	0.29	0.54	0.54
6	BUCKS	95	435	1127	1689	0.52	4	0	0	0	28300	0.25	0.54	0.46
6	BUCKS	95	345	411	2612	0.51	6	6	1	0	45066	0.24	0.54	0.44
6	BUCKS	95	395	1011	2006	0.5	3	1	0	0	27450	0.2	0.54	0.37
6	BUCKS	95	421	53	1719	0.5	3	2	0	0	27450	0.2	0.54	0.37
6	BUCKS	95	471	996	2511	0.5	3	0	0	0	31148	0.18	0.54	0.33
6	BUCKS	95	491	8	8	0.51	3	0	0	0	30314	0.18	0.54	0.33
6	BUCKS	95	431	1003	2125	0.49	2	0	0	0	28300	0.13	0.54	0.24
6	BUCKS	95	451	557	557	0.43	1	0	0	0	31148	0.07	0.54	0.13
6	BUCKS	95	441	182	182	0.51	1	1	0	0	28300	0.06	0.54	0.12

I95 sb segment 351

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0351 Offset 441 and Segment 0351 Offset 2460)

USER_ID/QUERY ID: c-ehe/PC20110506001

MONTH OF YEAR

	JAN	FEB	APR	MAY	JUN	AUG	OCT	NOV	
CRASHES	2	2	4	3	2	1	5	2	21
PCT	10%	10%	19%	14%	10%	5%	24%	10%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	2	3	4	4	1	5	2	21
PCT	10%	14%	19%	19%	5%	24%	10%	100%

HOUR OF DAY

	02	04	07	08	09	10	11	12	15	16	17	21	22	23	
CRASHES	1	2	3	1	2	1	2	1	1	2	1	1	2	1	21
PCT	5%	10%	14%	5%	10%	5%	10%	5%	5%	10%	5%	5%	10%	5%	100%

YEAR

	CRASHES	PCT
2008	7	33%
2009	10	48%
2010	4	19%
TOTAL	21	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	12	57%
REAR END	5	24%
ANGLE	2	10%
SAME DIR SS	2	10%
TOTAL	21	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
FATAL	1	5%
MODERATE	2	10%
MINOR	5	24%
UNK SEVERITY	4	19%
PDO	9	43%
TOTAL	21	100%

SEVERITY COUNT

	PERSONS
FATALITIES	1
MAJOR	0
MODERATE	2
MINOR	5
UNK SEVERITY	6
UNK IF INJURED	4

DRIVER ACTIONS

	ACTIONS	PCT
TOO FAST FOR CONDITION	13	37%
NO CONTRIBUTING ACTION	11	31%
OTHER IMPROPER DRIVING	3	9%
CARELESS PASS/LN CHNG	2	6%
TAILGATING	2	6%
AFFECTED PHYSICAL COND	1	3%
FAILR MAINT PROP SPEED	1	3%
SPEEDING	1	3%
UNKNOWN	1	3%
TOTAL	35	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	15	45%
SMALL TRUCK	5	15%
SUV	5	15%
UNK VEHICLE	3	9%
MOTORCYCLE	2	6%
VAN	2	6%
LARGE TRUCK	1	3%
TOTAL	33	100%

ROAD CONDITION

	CRASHES	PCT
WATER	8	38%
DRY	7	33%
WET	6	29%
TOTAL	21	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	12	57%
STREET LIGHTS	5	24%
DARK	2	10%
DAWN	1	5%
OTHER	1	5%
TOTAL	21	100%

WEATHER

	CRASHES	PCT
RAIN	14	67%
CLEAR	7	33%
TOTAL	21	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	9	39%
OTHER WEATHER COND	7	30%
OTHER ENVIR FACTOR	2	9%
SUBSTANCE ON RDWY	2	9%
OBSTACLE ON RDWY	1	4%
SUDDEN WEATHER COND	1	4%
UNKNOWN	1	4%
TOTAL	23	100%

CDART - CRASH SUMMARY REPORT (09-06)

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

2 2011 crash records are incomplete

Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years

Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID:	DVRPC20110506001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(S) Between Segment 0351 Offset 441 and Segment 0351 Offset 2460)
Date Range:	1/1/2008 to 12/31/2010
Criteria:	

I95 NB Segment 354

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0354 Offset 38 and Segment 0354 Offset 2625)

USER_ID/QUERY ID: c-ehe/PC20110506001

MONTH OF YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	3	5	3	2	2	3	2	1	1	3	2	4	31
PCT	10%	16%	10%	6%	6%	10%	6%	3%	3%	10%	6%	13%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	
CRASHES	4	4	3	4	5	11	31
PCT	13%	13%	10%	13%	16%	35%	100%

HOUR OF DAY

	02	03	04	06	07	08	10	11	12	13	14	15	17	18	21	22	23	
CRASHES	1	2	1	3	3	3	1	2	1	2	2	3	2	1	1	2	1	31
PCT	3%	6%	3%	10%	10%	10%	3%	6%	3%	6%	6%	10%	6%	3%	3%	6%	3%	100%

YEAR

	CRASHES	PCT
2008	6	19%
2009	9	29%
2010	16	52%
TOTAL	31	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	12	39%
REAR END	12	39%
SAME DIR SS	3	10%
ANGLE	2	6%
NON COLL	1	3%
UNKNOWN	1	3%
TOTAL	31	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
MAJOR	1	3%
MODERATE	2	6%
MINOR	9	29%
UNK SEVERITY	6	19%
PDO	13	42%
TOTAL	31	100%

SEVERITY COUNT

	PERSONS
FATALITIES	0
MAJOR	1
MODERATE	3
MINOR	15
UNK SEVERITY	15
UNK IF INJURED	2

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	34	46%
TOO FAST FOR CONDITION	13	18%
CARELESS PASS/LN CHNG	8	11%
OTHER IMPROPER DRIVING	5	7%
TAILGATING	3	4%
AFFECTED PHYSICAL COND	2	3%
DRIVER WAS DISTRACTED	2	3%
FAILR MAINT PROP SPEED	2	3%
FAILURE TO RESPOND TCD	2	3%
DRIVER INEXPERIENCED	1	1%
IMPROPER/CARELESS TURN	1	1%
UNKNOWN	1	1%
TOTAL	74	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	40	62%
SUV	11	17%
VAN	7	11%
LARGE TRUCK	4	6%
SMALL TRUCK	3	5%
TOTAL	65	100%

ROAD CONDITION

	CRASHES	PCT
DRY	22	71%
SNOW	3	10%
WET	3	10%
SLUSH	2	6%
WATER	1	3%
TOTAL	31	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	19	61%
DARK	6	19%
DAWN	2	6%
STREET LIGHTS	2	6%
DUSK	1	3%
UNK LIGHTING	1	3%
TOTAL	31	100%

WEATHER

	CRASHES	PCT
CLEAR	25	81%
SNOW	3	10%
OTHER	2	6%
RAIN	1	3%
TOTAL	31	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	23	74%
SLIPPERY ICE/SNOW	6	19%
SUDDEN WEATHER COND	1	3%
WORK ZONE RELATED	1	3%
TOTAL	31	100%

CDART - CRASH SUMMARY REPORT (09-06)

NOTES:

1

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3 Complete data years

Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID:	DVRPC20110506001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(P) Between Segment 0354 Offset 38 and Segment 0354 Offset 2625)
Date Range:	1/1/2008 to 12/31/2010
Criteria:	

SEGMENT 360 (HIGH DELTA)

Date Range: 1/1/2007 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0360 Offset 185 and Segment 0360 Offset 2575)

USER_ID/QUERY ID: c-ehe/PC20110525001

MONTH OF YEAR

	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	3	3	3	1	1	4	1	1	2	3	1	23
PCT	13%	13%	13%	4%	4%	17%	4%	4%	9%	13%	4%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	4	4	4	3	3	2	3	23
PCT	17%	17%	17%	13%	13%	9%	13%	100%

HOUR OF DAY

	00	01	02	03	04	06	07	08	10	11	12	16	17	18	22	
CRASHES	2	1	2	2	1	2	1	2	2	1	1	1	2	2	1	23
PCT	9%	4%	9%	9%	4%	9%	4%	9%	9%	4%	4%	4%	9%	9%	4%	100%

YEAR

	CRASHES	PCT
2007	5	22%
2008	8	35%
2009	7	30%
2010	3	13%
TOTAL	23	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	14	61%
REAR END	6	26%
NON COLL	1	4%
SAME DIR SS	1	4%
UNKNOWN	1	4%
TOTAL	23	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
MODERATE	2	9%
MINOR	5	22%
UNK SEVERITY	2	9%
PDO	14	61%
TOTAL	23	100%

SEVERITY COUNT

	PERSONS
FATALITIES	0
MAJOR	0
MODERATE	2
MINOR	6
UNK SEVERITY	4
UNK IF INJURED	0

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	15	38%
TOO FAST FOR CONDITION	10	25%
AFFECTED PHYSICAL COND	4	10%
OTHER IMPROPER DRIVING	3	8%
DRIVER WAS DISTRACTED	2	5%
SPEEDING	2	5%
CARELESS PASS/LN CHNG	1	3%
DRIVER INEXPERIENCED	1	3%
SUDDEN SLOWING/STOP	1	3%
TAILGATING	1	3%
TOTAL	40	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	25	74%
SUV	4	12%
SMALL TRUCK	2	6%
LARGE TRUCK	2	6%
VAN	1	3%
TOTAL	34	100%

ROAD CONDITION

	CRASHES	PCT
DRY	19	83%
ICE	2	9%
WET	2	9%
TOTAL	23	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	12	52%
DARK	10	43%
STREET LIGHTS	1	4%
TOTAL	23	100%

WEATHER

	CRASHES	PCT
CLEAR	21	91%
RAIN	1	4%
SLEET	1	4%
TOTAL	23	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	20	87%
SLIPPERY ICE/SNOW	2	9%
DEER IN ROADWAY	1	4%
TOTAL	23	100%

CDART - CRASH SUMMARY REPORT (09-06)

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REPORT PARAMETERS:

Query ID:	DVRPC20110525001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(P) Between Segment 0360 Offset 185 and Segment 0360 Offset 2575)
Date Range:	1/1/2007 to 12/31/2010
Criteria:	

I-95 SB Segement 361

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0361 Offset 477 and Segment 0361 Offset 2397)

USER_ID/QUERY ID: c-ehe/PC20110506001

MONTH OF YEAR

	JAN	FEB	MAR	MAY	JUN	JUL	AUG	OCT	NOV	DEC	
CRASHES	3	5	2	2	1	2	2	2	5	3	27
PCT	11%	19%	7%	7%	4%	7%	7%	7%	19%	11%	100%

DAY OF WEEK

	MON	TUE	WED	THR	FRI	SAT	
CRASHES	5	2	5	9	3	3	27
PCT	19%	7%	19%	33%	11%	11%	100%

HOUR OF DAY

	06	07	08	12	14	15	16	17	18	19	20	21	22	23	
CRASHES	1	2	2	1	2	1	1	2	3	4	1	3	3	1	27
PCT	4%	7%	7%	4%	7%	4%	4%	7%	11%	15%	4%	11%	11%	4%	100%

YEAR

	CRASHES	PCT
2008	6	22%
2009	8	30%
2010	13	48%
TOTAL	27	100%

COLLISION TYPE

	CRASHES	PCT
REAR END	20	74%
HIT FIX OBJ	4	15%
NON COLL	2	7%
SAME DIR SS	1	4%
TOTAL	27	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
MINOR	6	22%
UNK SEVERITY	6	22%
PDO	15	56%
TOTAL	27	100%

SEVERITY COUNT

	PERSONS
FATALITIES	0
MAJOR	0
MODERATE	0
MINOR	7
UNK SEVERITY	14
UNK IF INJURED	2

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	30	51%
TOO FAST FOR CONDITION	12	20%
OTHER IMPROPER DRIVING	4	7%
DRIVER WAS DISTRACTED	3	5%
TAILGATING	3	5%
IMPROPER ENTRANCE HWY	2	3%
AFFECTED PHYSICAL COND	1	2%
CARELESS PASS/LN CHNG	1	2%
FAILR MAINT PROP SPEED	1	2%
FAILURE TO RESPOND TCD	1	2%
SUDDEN SLOWING/STOP	1	2%
TOTAL	59	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	42	75%
SUV	9	16%
SMALL TRUCK	4	7%
LARGE TRUCK	1	2%
TOTAL	56	100%

ROAD CONDITION

	CRASHES	PCT
DRY	19	70%
WET	7	26%
WATER	1	4%
TOTAL	27	100%

ILLUMINATION

	CRASHES	PCT
DARK	11	41%
DAYLIGHT	8	30%
STREET LIGHTS	5	19%
DUSK	2	7%
DAWN	1	4%
TOTAL	27	100%

WEATHER

	CRASHES	PCT
CLEAR	20	74%
RAIN	7	26%
TOTAL	27	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	25	93%
OTHER WEATHER COND	2	7%
TOTAL	27	100%

CDART - CRASH SUMMARY REPORT (09-06)

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REPORT PARAMETERS:

Query ID:	DVRPC20110506001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(S) Between Segment 0361 Offset 477 and Segment 0361 Offset 2397)
Date Range:	1/1/2008 to 12/31/2010
Criteria:	

Segment 365 (High Delta)

Date Range: 1/1/2007 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0365 Offset 7 and Segment 0365 Offset 2512)

USER_ID/QUERY ID: c-ehe/PC20110525001

MONTH OF YEAR

	JAN	FEB	MAR	APR	MAY	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	1	2	2	4	1	4	1	1	1	1	3	21
PCT	5%	10%	10%	19%	5%	19%	5%	5%	5%	5%	14%	100%

DAY OF WEEK

	MON	TUE	WED	THR	FRI	SAT	
CRASHES	2	2	2	4	3	8	21
PCT	10%	10%	10%	19%	14%	38%	100%

HOUR OF DAY

	02	04	05	06	07	10	11	12	13	14	16	17	19	20	
CRASHES	1	1	1	3	2	2	2	3	1	1	1	1	1	1	21
PCT	5%	5%	5%	14%	10%	10%	10%	14%	5%	5%	5%	5%	5%	5%	100%

YEAR

	CRASHES	PCT
2007	2	10%
2008	6	29%
2009	7	33%
2010	6	29%
TOTAL	21	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	11	52%
REAR END	4	19%
ANGLE	2	10%
SAME DIR SS	2	10%
HEAD ON	1	5%
NON COLL	1	5%
TOTAL	21	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
MAJOR	1	5%
MINOR	5	24%
UNK SEVERITY	2	10%
PDO	13	62%
TOTAL	21	100%

SEVERITY COUNT

	PERSONS
FATALITIES	0
MAJOR	3
MODERATE	1
MINOR	6
UNK SEVERITY	2
UNK IF INJURED	1

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	14	34%
TOO FAST FOR CONDITION	14	34%
CARELESS PASS/LN CHNG	4	10%
SPEEDING	4	10%
AFFECTED PHYSICAL COND	1	2%
DRIVER WAS DISTRACTED	1	2%
FAILR MAINT PROP SPEED	1	2%
OTHER IMPROPER DRIVING	1	2%
UNKNOWN	1	2%
TOTAL	41	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	19	58%
SMALL TRUCK	5	15%
LARGE TRUCK	4	12%
SUV	4	12%
UNK VEHICLE	1	3%
TOTAL	33	100%

ROAD CONDITION

	CRASHES	PCT
DRY	11	52%
WET	5	24%
WATER	3	14%
ICE PATCH	1	5%
SLUSH	1	5%
TOTAL	21	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	14	67%
DARK	5	24%
DAWN	2	10%
TOTAL	21	100%

WEATHER

	CRASHES	PCT
CLEAR	12	57%
RAIN	8	38%
SNOW	1	5%
TOTAL	21	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	15	65%
OTHER ENVIR FACTOR	2	9%
OTHER WEATHER COND	2	9%
SLIPPERY ICE/SNOW	2	9%
OBSTACLE ON RDWY	1	4%
UNKNOWN	1	4%
TOTAL	23	100%

CDART - CRASH SUMMARY REPORT (09-06)

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REPORT PARAMETERS:

Query ID:	DVRPC20110525001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(S) Between Segment 0365 Offset 7 and Segment 0365 Offset 2512)
Date Range:	1/1/2007 to 12/31/2010
Criteria:	

I95 NB Segment 0374

Date Range: 1/1/2008 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0374 Offset 60 and Segment 0374 Offset 2577)

USER_ID/QUERY ID: c-ehe/PC20110506001

MONTH OF YEAR

	JAN	FEB	MAR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	3	2	3	2	3	1	3	2	1	1	1	22
PCT	14%	9%	14%	9%	14%	5%	14%	9%	5%	5%	5%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	2	3	1	2	1	6	7	22
PCT	9%	14%	5%	9%	5%	27%	32%	100%

HOUR OF DAY

	01	04	06	07	08	10	11	14	15	16	18	19	20	21	23	
CRASHES	1	1	1	2	1	1	2	2	3	1	1	1	1	3	1	22
PCT	5%	5%	5%	9%	5%	5%	9%	9%	14%	5%	5%	5%	5%	14%	5%	100%

YEAR

	CRASHES	PCT
2008	8	36%
2009	8	36%
2010	6	27%
TOTAL	22	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	11	50%
REAR END	5	23%
SAME DIR SS	5	23%
ANGLE	1	5%
TOTAL	22	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
MODERATE	1	5%
MINOR	2	9%
UNK SEVERITY	3	14%
UNK IF INJURED	1	5%
PDO	15	68%
TOTAL	22	100%

SEVERITY COUNT

	PERSONS
FATALITIES	0
MAJOR	0
MODERATE	1
MINOR	2
UNK SEVERITY	4
UNK IF INJURED	3

DRIVER ACTIONS

	ACTIONS	PCT
CARELESS PASS/LN CHNG	12	30%
NO CONTRIBUTING ACTION	12	30%
TOO FAST FOR CONDITION	4	10%
AFFECTED PHYSICAL COND	2	5%
DRIVER WAS DISTRACTED	2	5%
SPEEDING	2	5%
UNKNOWN	2	5%
FAILR MAINT PROP SPEED	1	3%
OTHER IMPROPER DRIVING	1	3%
SUDDEN SLOWING/STOP	1	3%
TAILGATING	1	3%
TOTAL	40	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	24	71%
SUV	4	12%
SMALL TRUCK	3	9%
LARGE TRUCK	2	6%
VAN	1	3%
TOTAL	34	100%

ROAD CONDITION

	CRASHES	PCT
DRY	18	82%
WET	3	14%
WATER	1	5%
TOTAL	22	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	11	50%
DARK	8	36%
DAWN	1	5%
DUSK	1	5%
STREET LIGHTS	1	5%
TOTAL	22	100%

WEATHER

	CRASHES	PCT
CLEAR	19	86%
RAIN	3	14%
TOTAL	22	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	21	95%
OTHER WEATHER COND	1	5%
TOTAL	22	100%

CDART - CRASH SUMMARY REPORT (09-06)

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REPORT PARAMETERS:

Query ID:	DVRPC20110506001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(P) Between Segment 0374 Offset 60 and Segment 0374 Offset 2577)
Date Range:	1/1/2008 to 12/31/2010
Criteria:	

Segments 330-340

Date Range: 1/1/2007 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(P) Between Segment 0330 Offset 340 and Segment 0340 Offset 0)

USER_ID/QUERY ID: c-ehe/PC20110525001

MONTH OF YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	2	2	2	2	3	2	8	7	1	3	4	3	39
PCT	5%	5%	5%	5%	8%	5%	21%	18%	3%	8%	10%	8%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	7	3	5	3	9	6	6	39
PCT	18%	8%	13%	8%	23%	15%	15%	100%

HOUR OF DAY

	00	01	02	03	04	05	06	07	09	10	11	12	13	14	15	16	17	18	19	20	21	
CRASHES	2	1	4	2	2	2	3	2	2	1	1	1	2	2	2	1	2	2	1	1	3	39
PCT	5%	3%	10%	5%	5%	5%	8%	5%	5%	3%	3%	3%	5%	5%	5%	3%	5%	5%	3%	3%	8%	100%

YEAR

	CRASHES	PCT
2007	12	31%
2008	10	26%
2009	6	15%
2010	11	28%
TOTAL	39	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	15	38%
REAR END	11	28%
ANGLE	5	13%
SAME DIR SS	5	13%
UNKNOWN	2	5%
NON COLL	1	3%
TOTAL	39	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
FATAL	1	3%
MODERATE	6	15%
MINOR	6	15%
UNK SEVERITY	11	28%
UNK IF INJURED	1	3%
PDO	14	36%
TOTAL	39	100%

SEVERITY COUNT

	PERSONS
FATALITIES	1
MAJOR	0
MODERATE	8
MINOR	11
UNK SEVERITY	15
UNK IF INJURED	1

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	29	36%
TOO FAST FOR CONDITION	14	18%
OTHER IMPROPER DRIVING	10	13%
CARELESS PASS/LN CHNG	8	10%
TAILGATING	4	5%
AFFECTED PHYSICAL COND	3	4%
DRIVER WAS DISTRACTED	3	4%
SPEEDING	2	3%
DRIVER INEXPERIENCED	1	1%
FAILURE TO RESPOND TCD	1	1%
ILLEGAL STOPPED ON RD	1	1%
IMPROPER ENTRANCE HWY	1	1%
OTHERS	3	4%
TOTAL	80	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	45	69%
LARGE TRUCK	6	9%
SUV	5	8%
VAN	4	6%
MOTORCYCLE	2	3%
SMALL TRUCK	2	3%
UNK VEHICLE	1	2%
TOTAL	65	100%

ROAD CONDITION

	CRASHES	PCT
DRY	35	90%
WET	4	10%
TOTAL	39	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	17	44%
DARK	15	38%
DAWN	3	8%
STREET LIGHTS	3	8%
DUSK	1	3%
TOTAL	39	100%

WEATHER

	CRASHES	PCT
CLEAR	36	92%
RAIN	3	8%
TOTAL	39	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	38	97%
OBSTACLE ON RDWY	1	3%
TOTAL	39	100%

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3 Complete data years
Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

Query ID:	DVRPC20110525001
User ID:	c-ehe
Area of Interest:	(In County 09 On State Route 0095(P) Between Segment 0330 Offset 340 and Segment 0340 Offset 0)
Date Range:	1/1/2007 to 12/31/2010
Criteria:	

Segments 331-341

Date Range: 1/1/2007 to 12/31/2010

Area of Interest: (In County 09 On State Route 0095(S) Between Segment 0331 Offset 360 and Segment 0341 Offset 370)

USER_ID/QUERY ID: c-ehe/PC20110525001

MONTH OF YEAR

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
CRASHES	1	4	4	4	2	2	9	8	6	5	7	7	59
PCT	2%	7%	7%	7%	3%	3%	15%	14%	10%	8%	12%	12%	100%

DAY OF WEEK

	SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	5	10	7	7	13	10	7	59
PCT	8%	17%	12%	12%	22%	17%	12%	100%

HOUR OF DAY

	00	01	02	04	05	06	07	08	09	11	12	13	14	15	16	17	18	19	20	21	22	23	
CRASHES	1	2	2	1	2	1	4	5	3	1	1	2	5	4	6	4	7	1	1	1	3	2	59
PCT	2%	3%	3%	2%	3%	2%	7%	8%	5%	2%	2%	3%	8%	7%	10%	7%	12%	2%	2%	2%	5%	3%	100%

YEAR

	CRASHES	PCT
2007	21	36%
2008	15	25%
2009	10	17%
2010	13	22%
TOTAL	59	100%

COLLISION TYPE

	CRASHES	PCT
HIT FIX OBJ	25	42%
REAR END	24	41%
ANGLE	4	7%
SAME DIR SS	4	7%
NON COLL	2	3%
TOTAL	59	100%

CRASH SEVERITY LEVEL

	CRASHES	PCT
FATAL	1	2%
MAJOR	2	3%
MODERATE	9	15%
MINOR	12	20%
UNK SEVERITY	3	5%
UNK IF INJURED	1	2%
PDO	31	53%
TOTAL	59	100%

SEVERITY COUNT

	PERSONS
FATALITIES	1
MAJOR	3
MODERATE	15
MINOR	25
UNK SEVERITY	3
UNK IF INJURED	2

DRIVER ACTIONS

	ACTIONS	PCT
NO CONTRIBUTING ACTION	48	37%
TOO FAST FOR CONDITION	24	18%
CARELESS PASS/LN CHNG	18	14%
TAILGATING	9	7%
OTHER IMPROPER DRIVING	8	6%
AFFECTED PHYSICAL COND	6	5%
DRIVER INEXPERIENCED	4	3%
SPEEDING	4	3%
SUDDEN SLOWING/STOP	3	2%
DRIVER WAS DISTRACTED	2	2%
FAILR MAINT PROP SPEED	1	1%
FAILURE TO RESPOND TCD	1	1%
OTHERS	2	2%
TOTAL	130	100%

VEHICLE TYPE

	VEHICLES	PCT
AUTOMOBILE	69	64%
SUV	18	17%
LARGE TRUCK	8	7%
SMALL TRUCK	7	6%
VAN	3	3%
UNK VEHICLE	2	2%
MOTORCYCLE	1	1%
TOTAL	108	100%

ROAD CONDITION

	CRASHES	PCT
DRY	53	90%
WET	5	8%
WATER	1	2%
TOTAL	59	100%

ILLUMINATION

	CRASHES	PCT
DAYLIGHT	35	59%
DARK	20	34%
DAWN	3	5%
STREET LIGHTS	1	2%
TOTAL	59	100%

WEATHER

	CRASHES	PCT
CLEAR	53	90%
RAIN	5	8%
OTHER	1	2%
TOTAL	59	100%

ENVIR/ROADWAY FACTORS

	FACTORS	PCT
NONE	53	90%
OTHER WEATHER COND	3	5%
OBSTACLE ON RDWY	1	2%
OTHER RDWY FACTOR	1	2%
WINDY CONDITIONS	1	2%
TOTAL	59	100%

CDART - CRASH SUMMARY REPORT (09-06)

NOTES:

1

The data available in this application is dynamic and should be used with care. Please take note of the following data alerts:

2 2011 crash records are incomplete
Data for the current year, 2011, is not fully represented in CDART. Crashes will be added for this year as they are made available to the Department. Include this year in queries with caution.

3 Complete data years
Complete records of reportable crashes are available in CDART for the following years: 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010

REPORT PARAMETERS:

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Criteria:	

APPENDIX C

Presentation

- RSOA Background
- Purpose and Need
- Background Data and Maps
- ITS, CMP and Travel Time Index Analysis
- Crash Analysis and Crash Maps

DVRPC – Delaware Valley Regional Planning Commission

- Metropolitan Planning Organization of the Delaware Valley serving 9 counties:
  - Bucks, Chester Delaware, Montgomery, Philadelphia
  - Burlington, Camden, Gloucester, Mercer
- Transportation Improvement Program (TIP)
  - DVRPC facilitates regional body to oversee allocation of federal transportation funds

The Aim of an RSOA is to Answer the Following Questions…

I-95 BUCKS COUNTY RSOA

- What elements of the road may present safety and operations concerns
  - To what extent?
  - To which road users?
  - Under what circumstances?
- What opportunities exist to eliminate or mitigate identified safety and operations concerns?

I-95 Bucks County RSOA Corridor Selection

I-95 BUCKS COUNTY RSOA

- Why I-95 in Bucks County?
  - Two segments from 2010 Dist 6-0 high crash list
  - Two fatal crashes – two people killed
  - Transportation operations elements
- Collaboration between:
  - PennDOT District 6-0
  - FHWA
  - DVRPC Office of Safety and Congestion Management
  - DVRPC Office of Transportation Operations Management

DVRPC: RSA + Operations = RSOA

I-95 BUCKS COUNTY RSOA

- DVRPC has conducted many RSAs throughout region
- Conducted US 202, Section 200 Transportation Operations Audit - December 2009
  - Conducted on limited access highway
  - Very similar process to RSA
- Created a unique opportunity for operations to be incorporated into the RSA process
- Successfully conducted I-95 RSOA for I-95, Delaware County in 2010

RSOA Schedule

I-95 BUCKS COUNTY RSOA

- Pre-Audit Meeting – 8:00 AM
  - What are Road Safety Audits (RSA) – video
  - Analyze and discuss crash data, operations, and other safety issues
- Field Visit
  - Windshield survey of the corridor to identify safety issues and examine conditions
- Lunch
- Post Audit Meeting – After Lunch
  - Define problems
  - Brainstorm improvement ideas
  - Wrap up by 5 PM
- Priorities Meeting – Next Week
  - Thursday June 2, 2011 – PennDOT District 6-0

What is a Road Safety Audit?

I-95 BUCKS COUNTY RSOA

- Federal Highway Administration Road Safety Audit Video

History of RSAs

I-95 BUCKS COUNTY RSOA

- First used in the United Kingdom in 1980s
- Australia and New Zealand have used RSAs since the 1990s
- Formal practice in the United States began in 1997 when the Federal Highway Administration sponsored a pilot program in 13 states

RSOA Benefits

I-95 BUCKS COUNTY RSOA

- Adaptable to local needs and conditions
- Short term
- Recommendations can be implemented in small stages as time and resources permit
- Can be performed during any stage of a project
- Collaborative efforts from a team with members of varying backgrounds and expertise

Audit Team

I-95 BUCKS COUNTY RSOA

- FHWA Harrisburg, Philadelphia
- PennDOT District 6-0 Traffic – Safety
- PennDOT District 6-0 Traffic – Freeway Management
- PennDOT District 6-0 Maintenance, Bucks County
- Bucks County Planning Commission
- Bristol Township Police Dept.
- Middletown Township of Police Dept.
- Pennsylvania State Police
- Bucks County TMA
- DVRPC: Safety, Congestion Mngmnt., and Operations

Safe 95

- Led by Representative David Steil
- Coalition of municipalities, law enforcement agencies, and emergency service personnel
- Publishes an 'Interstate 95 Safety Guide' Brochure
- Safe 95 Partners:
  - State Rep. Gene DiGirolamo
  - Bensalem Township Police
  - Bristol Township Police
  - Bucks County Planning Commission
  - Delaware River Joint Toll Bridge Commission
  - DVRPC
  - Lower Makefield Police
  - Middletown Township Police
  - PennDOT District 6-0
  - Pennsylvania Public Utilities Commission
  - Pennsylvania State Police
  - TMA Bucks
  - Upper Makefield Police

PennDOT 2010 High Crash Locations

Bureau of Highway Safety and Traffic Engineering (BHSTE)

- Identified locations with most severe highway safety needs
  - At least 5 fatal or major injury crashes over 5 years (2006-2010)
  - 5000ft segment or 500ft radius intersection
- List of top 322 crash locations statewide, 164 in Dist 6-0
- Goal for District 6-0 is to address as many of the 164 locations as possible by 2012, based on priority ranking

2010 High Crash Locations on I-95: Bucks County

I-95 BUCKS COUNTY RSOA

State Rank	County	Route	Total Fatal + Major Injury Crashes	Fatal Count	Injury Count
217	Bucks	I-95	10	1	15
293	Bucks	I-95	6	1	8

District 6-0: 2010 High Crash Locations, I-95 Bucks County

I-95 BUCKS COUNTY RSOA

I-95 Road Safety and Operations Audit:
Bucks County

PennDOT 2010 High Crash Locations: Major Injuries and Fatalities

2006 – 2010 Data:
Major Injuries: 9
Fatalities: 1
Crashes: 106

2006 – 2010 Data:
Major Injuries: 5
Fatalities: 1
Crashes: 74

Delaware River

PA
NJ
Bucks Co.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

N

0 0.5 1
Miles

2008 High Crash Locations on I-95: Bucks County

I-95 BUCKS COUNTY RSOA

State Rank	County	Route	Total Fatal + Major Injury Crashes	Fatal Count
98	Bucks	I-95	16	5
367	Bucks	I-95	5	1
284	Bucks	8005	5	3

District 6-0: 2008 High Crash Locations, I-95 Bucks County

I-95 BUCKS COUNTY RSOA

I-95 Road Safety and Operations Audit:
Bucks County

PennDOT 2008 High Crash Locations Comparison: Major Injuries and Fatalities

2003 – 2007 Data:
Major Injuries: 4
Fatalities: 1
Crashes: 11

2008 – 2010 Data:
Major Injuries: 0
Fatalities: 0
Crashes: 8

2003 – 2007 Data:
Major Injuries: 2
Fatalities: 3
Crashes: 58

2008 – 2010 Data:
Major Injuries: 1
Fatalities: 0
Crashes: 17

2003 – 2007 Data:
Major Injuries: 9
Fatalities: 5
Crashes: 200

2008 – 2010 Data:
Major Injuries: 3
Fatalities: 0
Crashes: 110

N
0 0.5 1
Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Transportation Operations Elements

Chris King

Office of Transportation Operations Management

Study Area

I-95 Road Safety and Operations Audit: Bucks County

Study Area

Study Limits

NEWTOWN
Newtown
EWING
Yardley
LOWER MAKEFIELD
NORTHAMPTON
MIDDLETOWN
Langhorne
Langhorne Manor
Penndel
Hulmeville
FALLS
LOWER SOUTHAMPTON
BENSALEM
BRISTOL
Bristol
Philadelphia
Beverly
EDGEWATER PARK
BURLINGTON
DELANCO
Burlington
Delaware River
Bucks Co. PA
Burlington Co. NJ

WASHINGTON CROSSING RD
NEWTOWN - RICHBORO RD
STATE ST
NEWTOWN BYP
WOODBOURNE RD
YARDLEY - NEWTOWN RD
LANGHORNE PIKE
MAIN ST
SEPTA West Trenton
HEACOCK RD
STONY HILL RD
LANGHORNE YARDLEY RD
HOLLAND RD
BUCK RD
NEWTOWN RD
OXFORD VALLEY RD
LINCOLN HWY
PINE ST
MAPLE AVE
BRIDGETOWN PIKE
NEW LINCOLN HWY
BELLEVUE AVE
NEW RODGERS RD
LEVITTOWN PKWY
EDGELY RD
MILL CREEK PKWY
NEWPORTVILLE FALLSINGTON RD
MILL CREEK RD
BLOOMSDALE LN
OLD LINCOLN HWY
BRISTOL RD
ROOSEVELT BLVD
WOODHAVEN RD
ACADEMY RD
KNIGHTS RD
STREET RD
HULMEVILLE RD
NEWPORTVILLE RD
BATH RD
POND ST
BRIDGE RD
STATE RD
GRANT AVE
NJ Transit RiverLine

95
INT. 49
INT. 46
INT. 44
INT. 40
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Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

DVRPC Transportation Operations Master Plan

I-95 BUCKS COUNTY RSOA

- Overview – Developed July 2009
  - Operations Goals & Objectives
  - Transportation Operations Vision
  - Projects & Programs
  - Financial Plan
- Transportation Operations Vision
  - ITS Infrastructure – *I-95 identified for primary coverage*
  - Emergency Service Patrols – *I-95 identified for full coverage*
  - Incident Management Task Forces – *I-95 / PTC corridor identified*
  - Integrated Corridor Management Plan – *I-95 is potential corridor*
  - Regional Communications Network

Operational Characteristics

I-95 BUCKS COUNTY RSOA

- Functional classification
  - Urban Interstate
- Speed limit
  - 55 - 65 mph
- Interchanges
  - 7 interchanges

- Key linkages with PA 63, Street Road, PA 413, US 13, US 1
- Direct SB connection to SEPTA Cornwells Heights Regional Rail Station / Park & Ride

Operational Characteristics

- Cross Section Geometry
  - 3 lanes by direction between exits 35 – 40
  - 2 lanes by direction between exits 40 – 45
- Cable and guide rail barriers
- Horizontal and vertical curves
- Intermittent shoulders

Average Annual Daily Traffic

I-95 Road Safety and Operations Audit: Bucks County

Annual Average Daily Traffic

Study Limits

Traffic Count Location (approximate)

32, 036 2007 Traffic Volume

31,611 2008 Traffic Volume

30,625 2009 Traffic Volume

32,036 SB
31,611 SB
30,625 SB

30,210 NB
29,573 NB
28,854 NB

31,575 SB
30,318 SB
28,970 SB

33,471 NB
32,525 NB
30,865 NB

52,346 SB
51,610 SB
48,929 SB

50,206 NB
49,025 NB
47,519 NB

89,117 SB
87,931 SB
83,969 SB

86,542 NB
84,741 NB
83,610 NB

NEWTOWN
Newtown
LOWER MAKEFIELD
NORTHAMPTON
MIDDLETOWN
Langhorne
Langhorne Manor
LOWER SOUTHAMPTON
Penndel
Hulmeville
FALLS
BENSALEM
BRISTOL
Bristol
Philadelphia
Burlington
Beverly
EDGEWATER PARK
BURLINGTON
DELANCO

WASHINGTON ST
YARDLEY - NEWTOWN RD
LANGHORNE PIKE
STATE ST
NEWTOWN BYP
WOODBOURNE RD
LANGHORNE YARDLEY RD
HEACOCK RD
STONY HILL
SEPTA West Trenton
HOLLAND RD
NEWTOWN RD
BUCK RD
PINE ST
MAPLE AVE
BRIDGETOWN PIKE
NEW LINCOLN HWY
LINCOLN HWY
OLD LINCOLN HWY
BELLEVUE AVE
NEW RODGERS RD
NEWPORTVILLE FALLSINGTON RD
EDGELY RD
MILL CREEK RD
BLOOMSDALE LN
OXFORD VALLEY RD
BRISTOL RD
BYBERRY RD
ROOSEVELT BLVD
WOODHAVEN RD
STREET RD
HULMEVILLE RD
NEWPORTVILLE RD
BATH RD
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ACADEMY RD
KNIGHTS RD
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BRIDGE RD
GRANT AVE
Delaware River
NJ Transit RiverLine
Bucks Co.
Burlington Co.
NJ

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Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

American Recovery and Reinvestment Act (ARRA) Project

I-95 BUCKS COUNTY RSOA

- I-95 Section ITB
  - ITS Devices on I-95, US 1, in Bucks County and on PA 63 (Woodhaven Road)
  - Project includes:
    - Fiber optic communication systems
    - CCTV Cameras
    - Dynamic Message Signs
    - Travel Time Information (Tag Readers)
    - Incident Detection (Vehicle Detectors)
- Project Schedule
  - Operational Spring 2011

ITS Infrastructure

I-95 BUCKS COUNTY RSOA

I-95 Road Safety and Operations Audit: Bucks County

ITS Equipment

Study Limits

ITS Equipment:

- Closed Circuit TV Camera
- Message Sign (changable, dynamic, & variable)
- Highway Advisory Radio
- Traffic Signal

Source: DVRPC, PennDOT

NEWTOWN
Newtown
LOWER MAKEFIELD
Yardley
EWING
NORTHAMPTON
MIDDLETOWN
FALLS
Langhorne
Langhorne Manor
Penndel
LOWER SOUTHAMPTON
Hulmeville
BENSALEM
BRISTOL
Philadelphia
Bristol
Burlington
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EDGEWATER PARK
BURLINGTON
DELANCO

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STONY HILL RD
HOLLAND RD
BUCK RD
NEWTOWN RD
OXFORD VALLEY RD
LINCOLN HWY
PINE ST
MAPLE AVE
BRIDGETOWN PIKE
NEW LINCOLN HWY
BELLEVUE AVE
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LEVITTOWN PKWY
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STREET RD
HULMEVILLE RD
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ACADEMY RD
KNIGHTS RD
GRANT AVE
SEPTA Trenton
NJ Transit RiverLine
Delaware River
Bucks Co.
Burlington Co.
PA
NJ

95 276 532 413 332 213 1 513 63 132 13 130

INT. 49 INT. 46 INT. 44 INT. 40 INT. 37 INT. 36 INT. 35

N

0 0.5 1 Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

Base ITS Infrastructure

I-95 BUCKS COUNTY RSOA

- Closed Circuit TV (CCTV) Cameras
- Dynamic Message Signs (DMS)
- Incident / Travel Time Detectors

Traffic Management Systems

I-95 BUCKS COUNTY RSOA

- PennDOT District 6 – Regional Traffic Management Center

Incident Management

I-95 BUCKS COUNTY RSOA

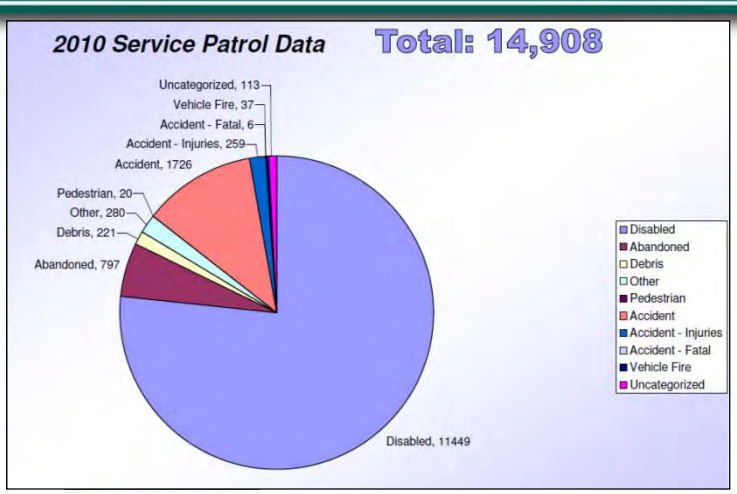
- PA State Police – Trevose Barracks patrols I-95
- Bucks County Emergency Management Agency
- Local Fire Departments
- Local Police Departments
  - Traffic Safety
- Local EMS Departments
- PennDOT TMC
- Local Towing Companies

PennDOT Emergency Service Patrol (ESP)

I-95 BUCKS COUNTY RSOA

- Zone 95-4: Covers from Woodhaven Rd to the Scudder Falls Bridge
  - 1 Truck equipped with tow dollies that can tow all wheel drive vehicles
  - Operates Monday to Friday
    - 5:30 AM to 09:30 AM
    - 3:30 PM to 7:30 PM

2010 PennDOT ESP Incident Data



Source: pennsylvania DEPARTMENT OF TRANSPORTATION

PennDOT Official Detour Routes

- 7 Detour Routes for I-95 in Bucks County
  - Generally interchange to interchange
  - 5 routes utilize either US 13, PA 413 or US 1
  - Includes primary & secondary routes
  - Potential control points

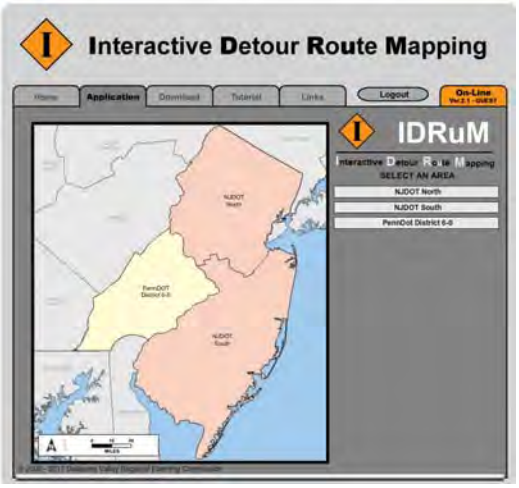
IDRuM
Interactive Detour Route Mapping

I-95 BUCKS COUNTY RSOA

DVRPC effort to create an Internet application for accessing PennDOT & NJDOT detour routes

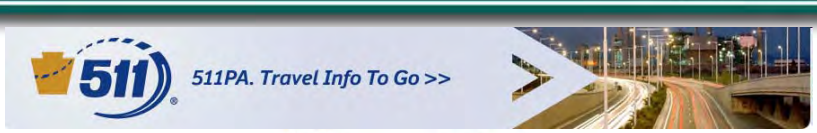
- **Simple, easy to use, "point-and-click" application**
- **4-clicks to map!**
- **Centralized location for all Official DOT detours for PA & NJ**

idrum.us



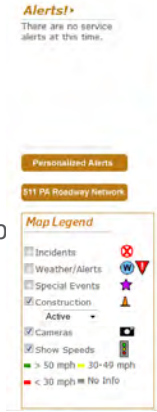
511 Traveler Information Systems

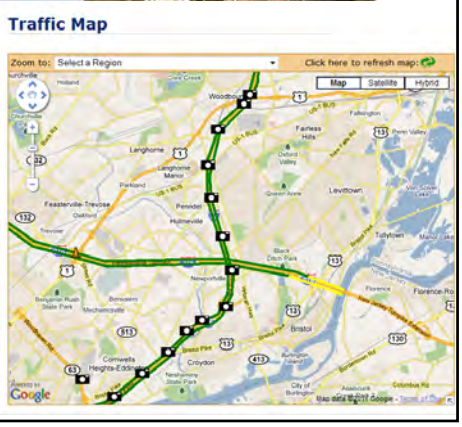
I-95 BUCKS COUNTY RSOA



www.511PA.com

- ➔ Traffic Conditions
- ➔ Traffic Cameras
- ➔ Speeds
- ➔ Weather / Alerts
- ➔ Pedestrian / Transit Info
- ➔ Travel Links





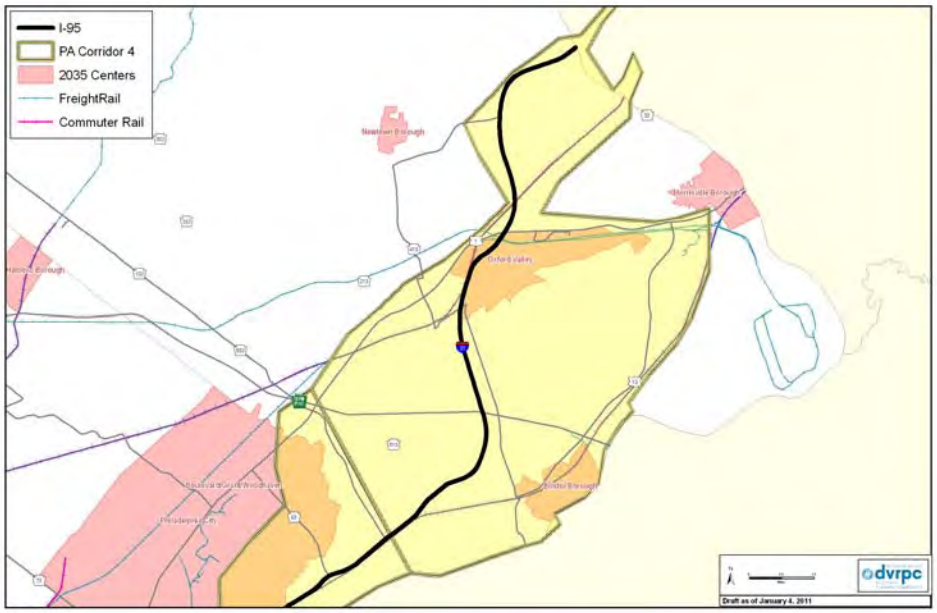
I-95 Background from CMP

CMP CONGESTION MANAGEMENT PROCESS

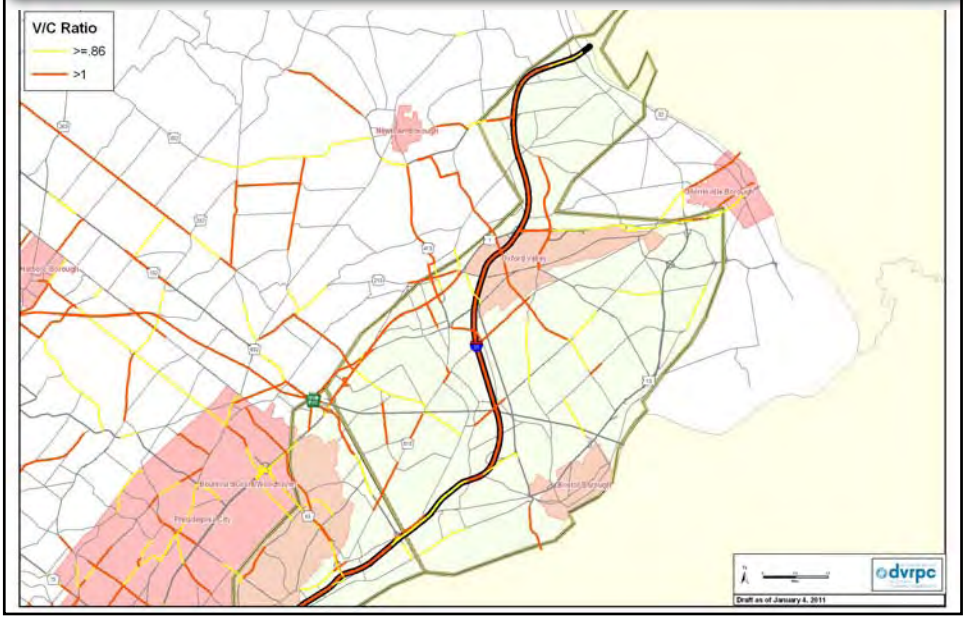
What is the CMP?

- The Congestion Management Process is a systematic way to analyze the multimodal regional transportation network and manage congestion
- It conducts analysis, identifies congested corridors, subdivides them into subcorridors, and recommends strategies

CMP PA Corridor 4: I-95 in RSOA Area



CMP High V/C Ratios Based on Traffic Counts, 5-6 PM



CMP Subcorridor Notes & Strategies

- This subcorridor includes the West Trenton/Trenton SEPTA rail bridge which serves important passenger and freight rail traffic in the region. It also includes the Morrisville Intermodal freight rail facility. Parts of this subcorridor have high concentrations of limited English proficiency populations.
- Very Appropriate Strategies
  - Intelligent Transportation Systems (ITS)
  - Integrated Corridor Management (ICM)
  - Incident Management
  - Park-and-Ride Lots
  - ITS Improvements for Transit

What is Archived INRIX Data?

- Gathered from GPS-enabled devices in commercial and private vehicles, and other sources primarily for real-time traffic reports
- Provides archived real-time speed and travel time
- Used in the I-95 Corridor Coalition Vehicle Probe Project – Coalition members receive the data for free
- PennDOT also has archived Dynac data from various types of readers on major highways

Scope of Data Gathered

- All weekdays from 2009 and 2010
- 7-8 AM and 5-6 PM
- Speeds and travel times by segment
- Reference speed based on historical data

Measures Calculated

- Duration of Congestion - Number of minutes during peak hour with congested conditions
- Travel Time Index (TTI) - Actual travel time compared to reference travel time

Introduction to Maps

- Both the Duration of Congestion and TTI are shown on the same map using different colors
- Darker colors (red and purple) indicate highest congestion
- Analysis for the two measures going northbound is on the right of I-95 and for the two measures southbound on the left
- The next slides are the AM peak hour and then the PM peak hour

I-95 RSOA: AM Peak Hour Analysis

I-95 Road Safety and Operations Audit: Bucks County

Travel Time and Congestion - AM

Minutes of Hour Congested:

- < 1
- 1.1 - 5
- 5.1 - 10
- 10.1 - 19.5

Travel Time Index:

- 1 - 1.25
- 1.26 - 1.5
- 1.51 - 1.64

Duration of Congestion - Number of minutes during peak hour with congested conditions. Congested conditions are defined as below 70% of the historical average speed (reference speed).

Travel Time Index - Actual travel time divided by reference travel time.

Sources:
Travel speed and time data: I-95 Corridor Coalition Vehicle Probe Project
Posted speeds: PennDOT, aerials, and related spot-checking

NEWTOWN
Newtown
EWING
Yardley
LOWER MAKEFIELD
MIDDLETOWN
FALLS
Langhorne
Langhorne Manor
Penndel
LOWER SOUTHAMPTON
Hulmeville
BENSALEM
BRISTOL
Bristol
Philadelphia
Burlington
Beverly
EDGEWATER PARK
BURLINGTON
DELANCO

95 INT. 49 INT. 46 INT. 44 INT. 40 INT. 37 INT. 36 INT. 35
1 13 63 130 132 213 332 413 513 532 276
YARDLEY NEWTOWN RD
LANGHORNE PIKE
MAIN ST
STATE ST
NEWTOWN BYP
WOODBOURNE RD
LANGHORNE YARDLEY RD
HEACOCK RD
STONY HILL RD
SEPTA West Trenton
NEWTOWN RD
OXFORD VALLEY RD
LINCOLN HWY
PINE ST
MAPLE AVE
BUCK RD
BRIDGETOWN PIKE
NEW LINCOLN HWY
BELLEVUE AVE
NEW RODGERS RD
LEVITTOWN PKWY
EDGELY RD
MILL CREEK PKWY
NEWPORTVILLE FALLSINGTON RD
MILL CREEK RD
BLOOMSDALE LN
OLD LINCOLN HWY
BRISTOL RD
ROOSEVELT BLVD
STREET RD
HULMEVILLE RD
NEWPORTVILLE RD
BATH RD
POND ST
WOODHAVEN RD
ACADEMY RD
KNIGHTS RD
BRIDGE RD
STATE RD
GRANT AVE
Delaware River
Bucks Co. PA
Burlington Co. NJ
NJ Transit RiverLine

N
0 0.5 1
Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

I-95 RSOA: PM Peak Hour Analysis

Conclusions from INRIX Analysis

- ➔ Overall, congestion and travel time delays are mild
- ➔ Highest Duration of Congestion and TTI values found near Route 63 interchange and Route 132 interchange
- ➔ AM peak hour slightly more congested than PM peak hour

I-95 Road Safety and Operations Audit: Bucks County

Travel Time and Congestion - PM

Minutes of Hour Congested:

- < 1
- 1.1 - 5
- 5.1 - 10
- 10 - 15.7

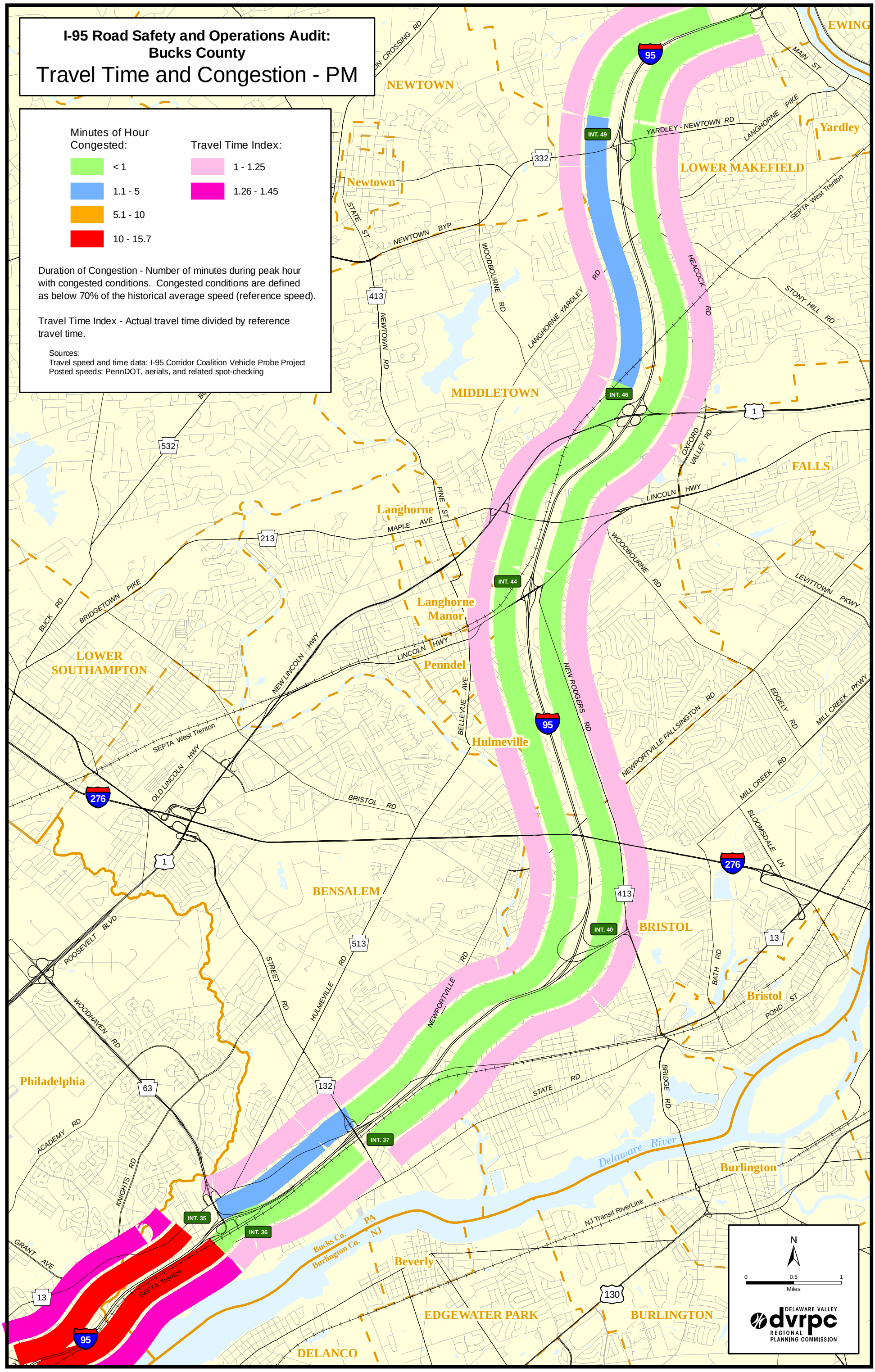
Travel Time Index:

- 1 - 1.25
- 1.26 - 1.45

Duration of Congestion - Number of minutes during peak hour with congested conditions. Congested conditions are defined as below 70% of the historical average speed (reference speed).

Travel Time Index - Actual travel time divided by reference travel time.

Sources:
Travel speed and time data: I-95 Corridor Coalition Vehicle Probe Project
Posted speeds: PennDOT, aerials, and related spot-checking



CMP Contact Information

I-95 BUCKS COUNTY RSOA

- For more information on CMP or the analysis of archived operations data prepared as part of it, contact:
  - Zoe Neaderland, Manager or
  - Claire Beck, Intern
  - Office of Transportation Safety and Congestion Management
  - ZNeaderland@dvrpc.org
  - CBeck@dvrpc.org
  - (215) 238-2839

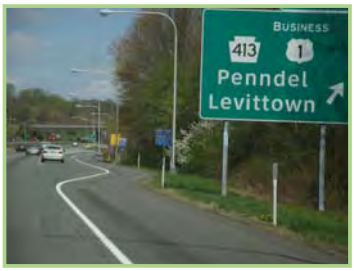
Crash Analysis

I-95 BUCKS COUNTY RSOA

Corridor-wide Crash Findings: Crash Data

I-95 BUCKS COUNTY RSOA

- Utilized PennDOT Crash Database
- Three years of data: 2008 - 2010
- 493 reportable crashes (percentages rounded)
  - 2008 144 29%
  - 2009 175 36%
  - 2010 174 35%
- Northbound: 248 crashes (50.3%)
- Southbound: 245 crashes (49.7%)



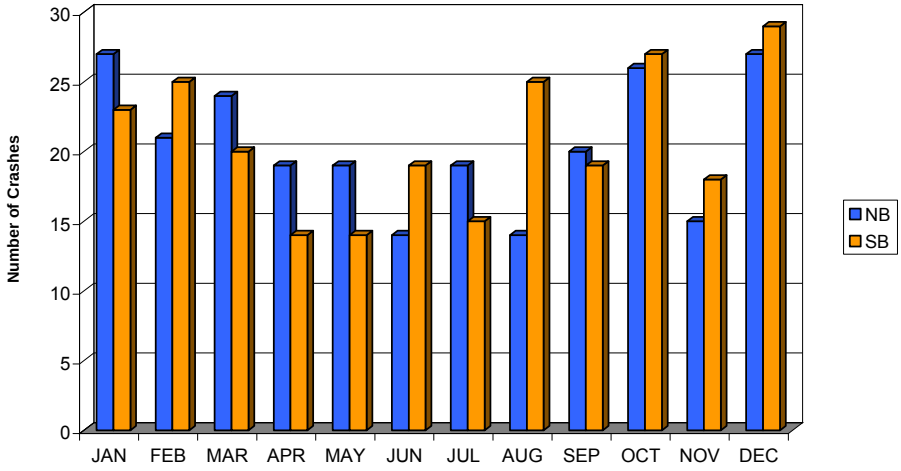
Corridor-wide Crash Findings: Collision Type

I-95 BUCKS COUNTY RSOA

	Northbound Total Crashes	Southbound Total Crashes	Percentage
Hit fixed object	131	120	51%
Rear end	68	66	27%
Same direction sideswipe	22	19	8%
Unknown	11	14	5%
Angle	8	13	4%
Non collision	8	11	4%
Head-on	0	1	<1%
Pedestrian	0	1	<1%

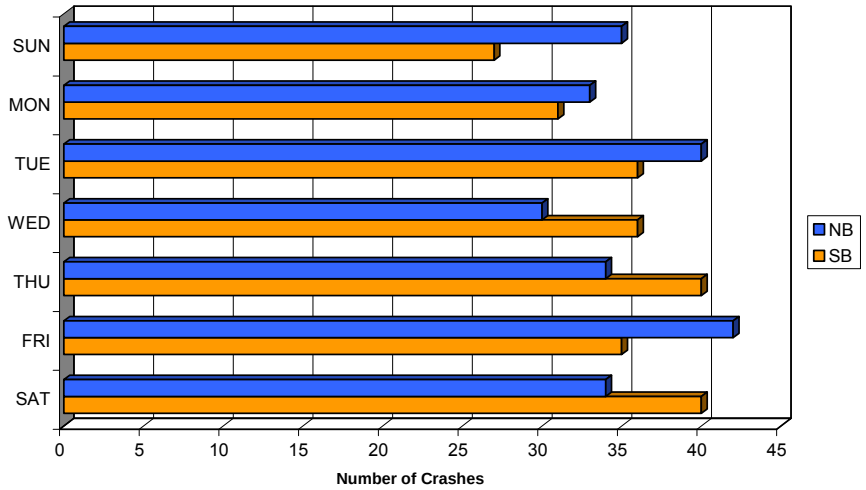
Corridor-wide Crash Findings: Month of Year

I-95 BUCKS COUNTY RSOA

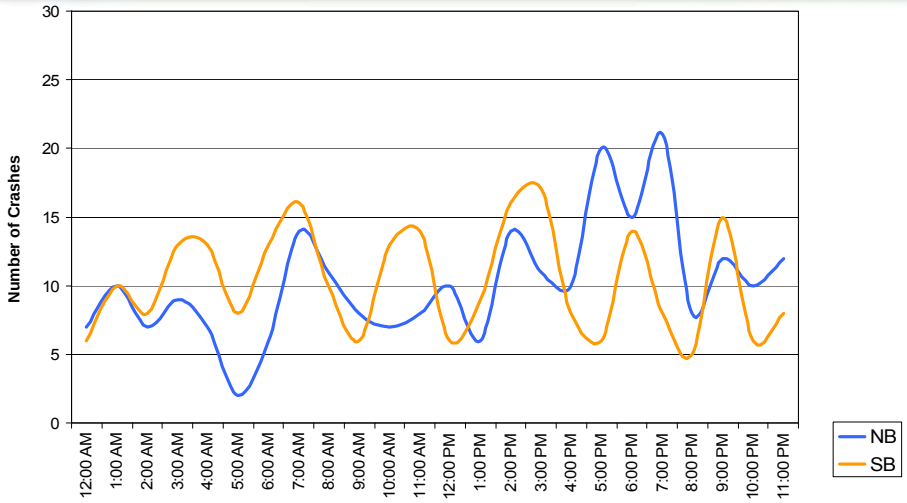


Corridor-wide Crash Findings: Day of Week

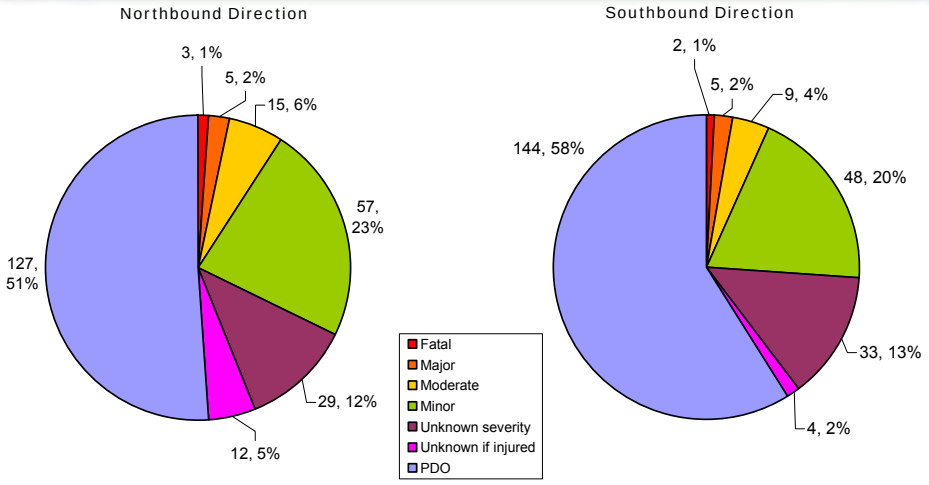
I-95 BUCKS COUNTY RSOA



Corridor-wide Crash Findings: Time of Day



Corridor-wide Crash Findings: Crash Severity Level



Corridor-wide Crash Findings: People

I-95 BUCKS COUNTY RSOA

➔ Severity Count

	Persons	
	NB	SB
➔ Fatalities	3	2
➔ Major	5	10
➔ Moderate	20	11
➔ Minor	79	64

Corridor-wide Crash Findings: Road Surface, Weather, Illumination

I-95 BUCKS COUNTY RSOA

➔ Road Surface Conditions

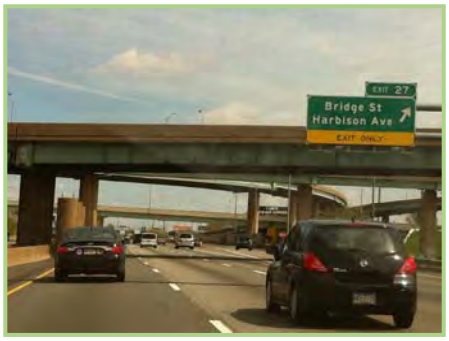
	NB	SB
➔ Dry:	195 (79%)	166 (68%)
➔ Wet:	34 (14%)	52 (21%)

➔ Weather

➔ Clear:	210 (85%)	174 (71%)
➔ Rain:	25 (10%)	61 (25%)

➔ Illumination

➔ Daylight:	131 (53%)	109 (44%)
➔ Dark:	78 (31%)	82 (33%)
➔ Street Lts:	24 (10%)	38 (16%)



Corridor-wide Crash Findings: Predominant Driver Actions

I-95 BUCKS COUNTY RSOA

➔ Predominant Driver Actions

	NB	SB
➔ No contributing action:	163 (35%)	154 (36%)
➔ Too fast for conditions:	84 (18%)	108 (25%)
➔ Careless passing/lane change:	53 (11%)	39 (9%)
➔ Other improper driving:	46 (10%)	25 (6%)
➔ Affected Physical Condition:	29 (6%)	13 (3%)

Corridor-wide Crash Findings: CDART-Crash Flag Summary Report

I-95 BUCKS COUNTY RSOA

➔ Crash Flag Summary Report

	NB	SB
➔ Hit guide rail:	115	70
➔ Hit guide rail end:	10	5
➔ Hit embankment:	11	4
➔ Unbelted:	30	22
➔ Fatigue/Asleep:	14	2
➔ Driver 75+ years:	8	4
➔ Driver 65-74 years:	15	13
➔ Driver 16-17 years:	4	4
➔ Work Zone	12	6
➔ Heavy truck related	25	19

I-95 Road Safety and Operations Audit:
Bucks County

PennDOT 2008 High Crash Locations Comparison: Major Injuries and Fatalities

2003 – 2007 Data:
Major Injuries: 4
Fatalities: 1
Crashes: 11

2008 – 2010 Data:
Major Injuries: 0
Fatalities: 0
Crashes: 8

2003 – 2007 Data:
Major Injuries: 2
Fatalities: 3
Crashes: 58

2008 – 2010 Data:
Major Injuries: 1
Fatalities: 0
Crashes: 17

2003 – 2007 Data:
Major Injuries: 9
Fatalities: 5
Crashes: 200

2008 – 2010 Data:
Major Injuries: 3
Fatalities: 0
Crashes: 110

N
0 0.5 1
Miles

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I-95 Road Safety and Operations Audit:
Bucks County

PennDOT Crash Clusters and Improvements

All improvements implemented as of Sept. 2010

Cluster:
Hit tree crashes
Improvement:
Micro-surfacing

Cluster:
Tractor-trailer crashes
Improvement:
Lane Transition on ramp to mainline

Cluster:
Hit fixed object crashes
Improvement:
Resurfacing

Cluster:
Hit guiderail crashes
Improvement:
Chevrons

Cluster:
Hit fixed object crashes
Improvement:
Sign upgrade

N

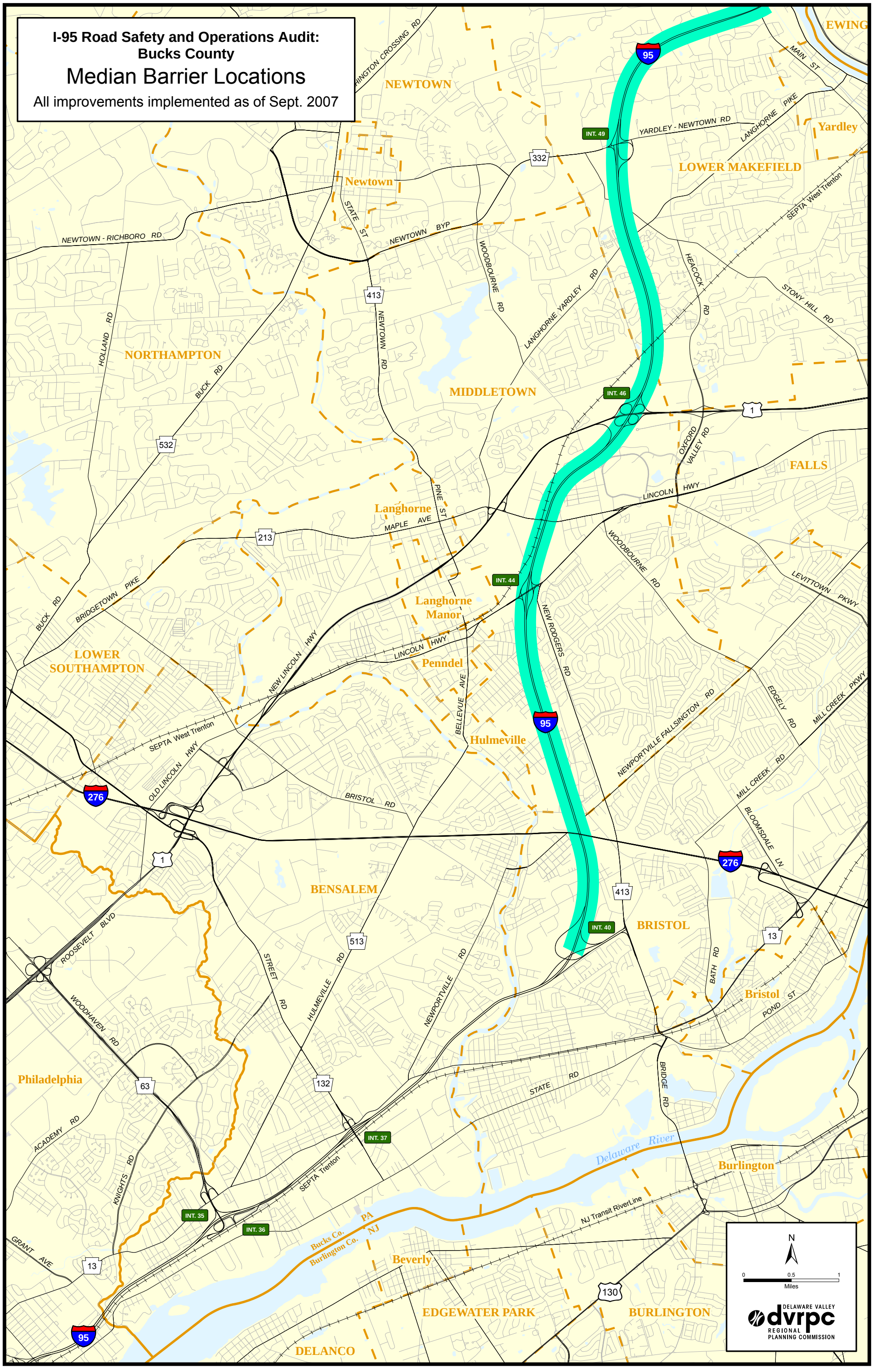
0 0.5 1 Miles

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

I-95 Road Safety and Operations Audit:
Bucks County

Median Barrier Locations

All improvements implemented as of Sept. 2007



I-95 Road Safety and Operations Audit:
Bucks County

PennDOT 2010 High Crash Locations: Major Injuries and Fatalities

2006 – 2010 Data:
Major Injuries: 9
Fatalities: 1
Crashes: 106

2006 – 2010 Data:
Major Injuries: 5
Fatalities: 1
Crashes: 74

Delaware River

PA
NJ
Bucks Co.

DELAWARE VALLEY dvrpc REGIONAL PLANNING COMMISSION

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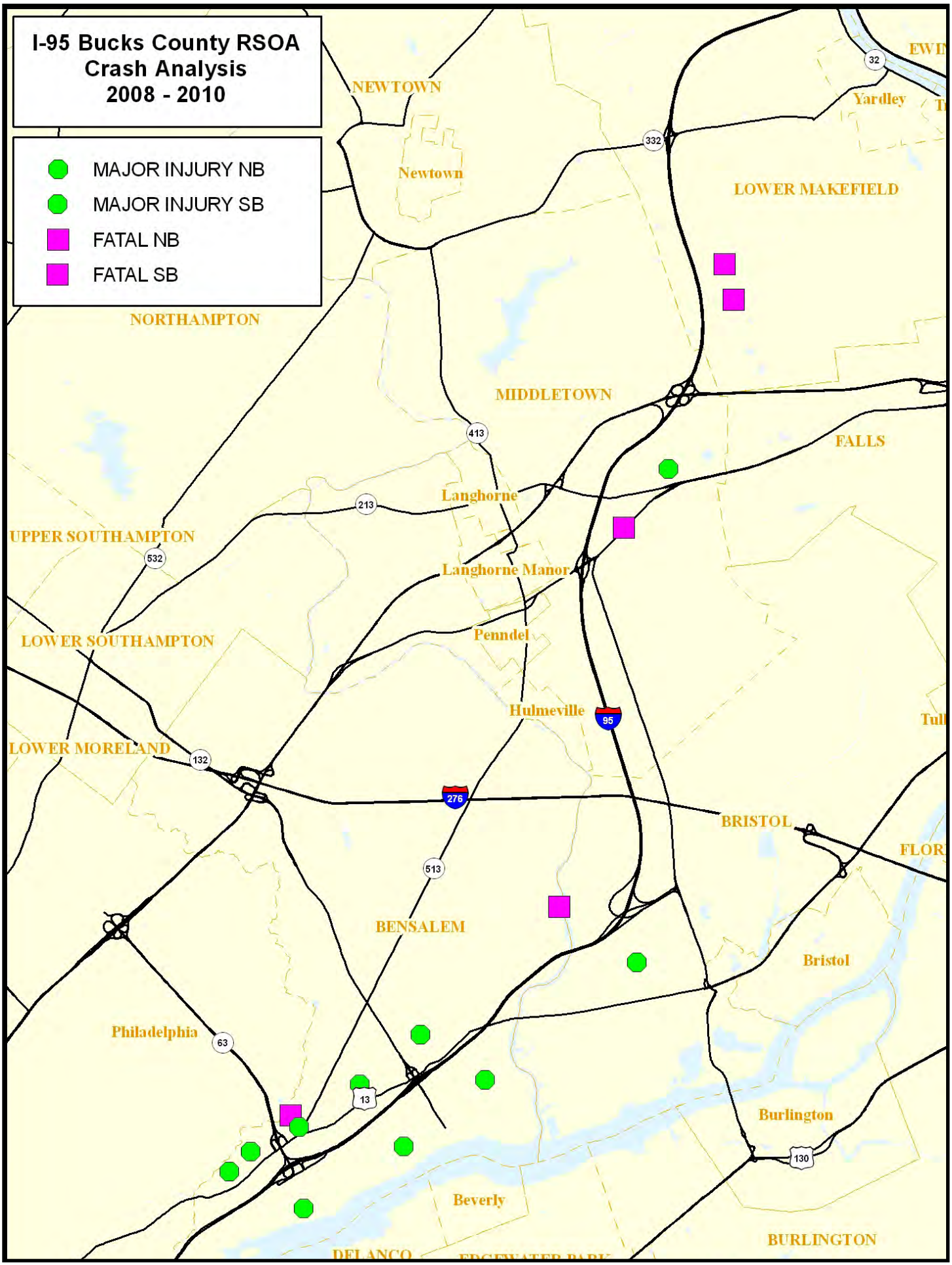
Miles


I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
MAJOR INJURY NB
MAJOR INJURY SB
FATAL NB
FATAL SB
NEWTOWN
Newtown
Yardley
LOWER MAKEFIELD
NORTHAMPTON
MIDDLETOWN
FALLS
Langhorne
UPPER SOUTHAMPTON
Langhorne Manor
LOWER SOUTHAMPTON
Penndel
Hulmeville
LOWER MORELAND
BRISTOL
BENSALEM
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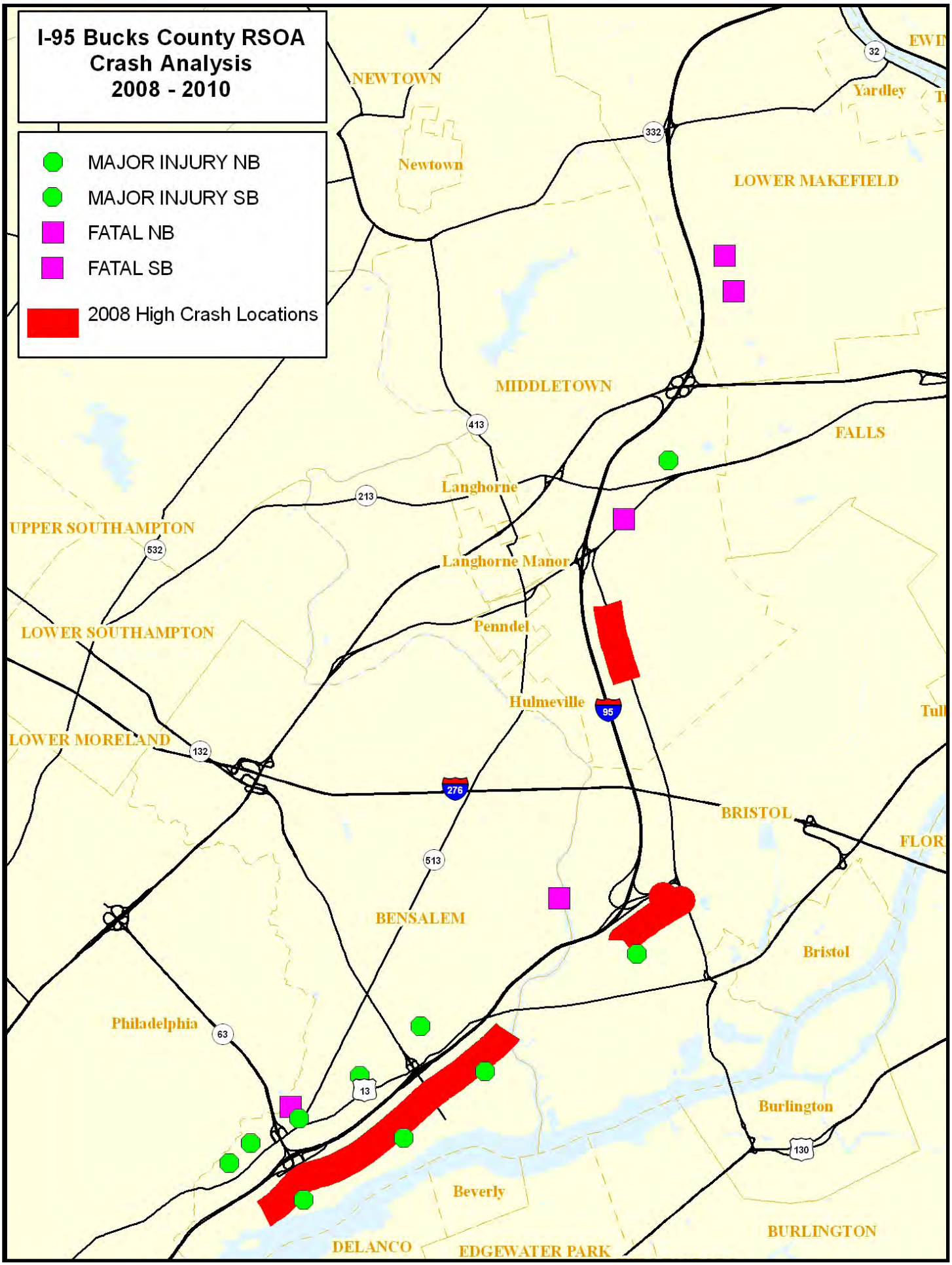
I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
MAJOR INJURY NB
MAJOR INJURY SB
FATAL NB
FATAL SB
2008 High Crash Locations
NEWTOWN
Newtown
Yardley
LOWER MAKEFIELD
MIDDLETOWN
FALLS
Langhorne
Langhorne Manor
UPPER SOUTHAMPTON
LOWER SOUTHAMPTON
Penndel
Hulmeville
LOWER MORELAND
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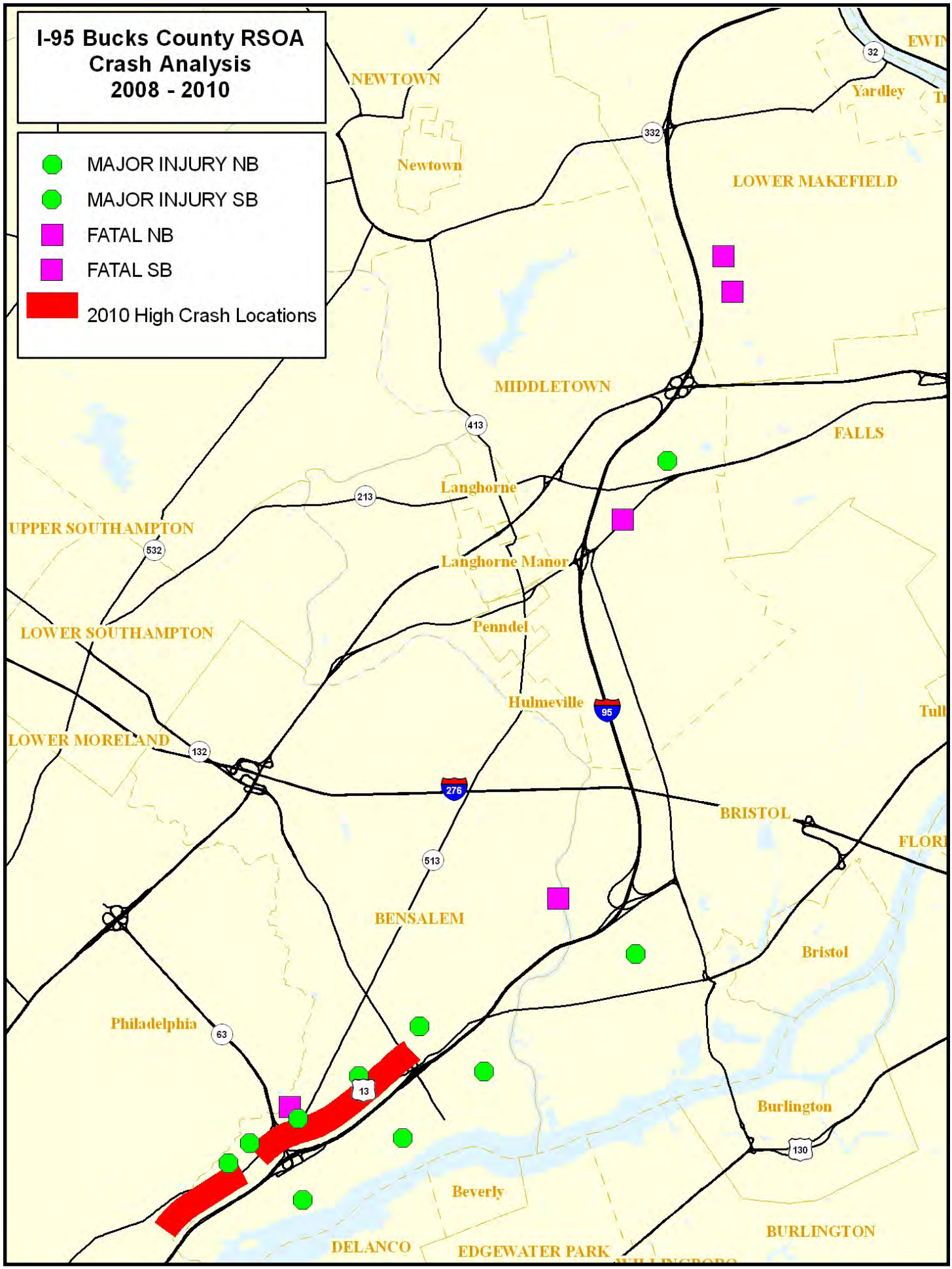
I-95 Bucks County RSOA
Crash Analysis
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MAJOR INJURY NB
MAJOR INJURY SB
FATAL NB
FATAL SB
2010 High Crash Locations
NEWTOWN
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Yardley
LOWER MAKEFIELD
MIDDLETOWN
FALLS
Langhorne
Langhorne Manor
Penndel
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LOWER SOUTHAMPTON
Hulmeville
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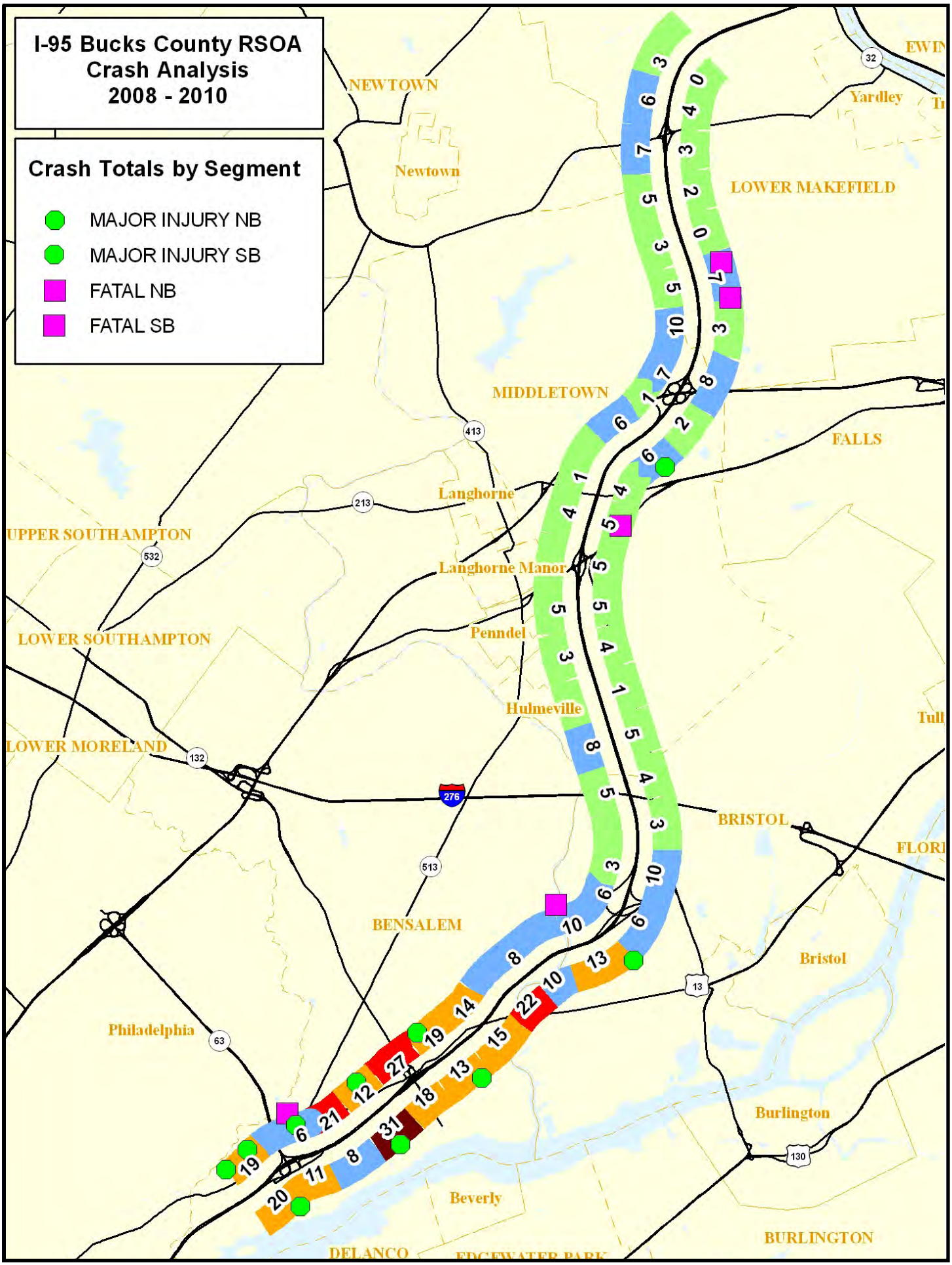
I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
Crash Totals by Segment
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MAJOR INJURY SB
FATAL NB
FATAL SB
NEWTOWN
Newtown
Yardley
LOWER MAKEFIELD
MIDDLETOWN
FALLS
Langhorne
Langhorne Manor
Penndel
Hulmeville
UPPER SOUTHAMPTON
LOWER SOUTHAMPTON
LOWER MORELAND
BENSALEM
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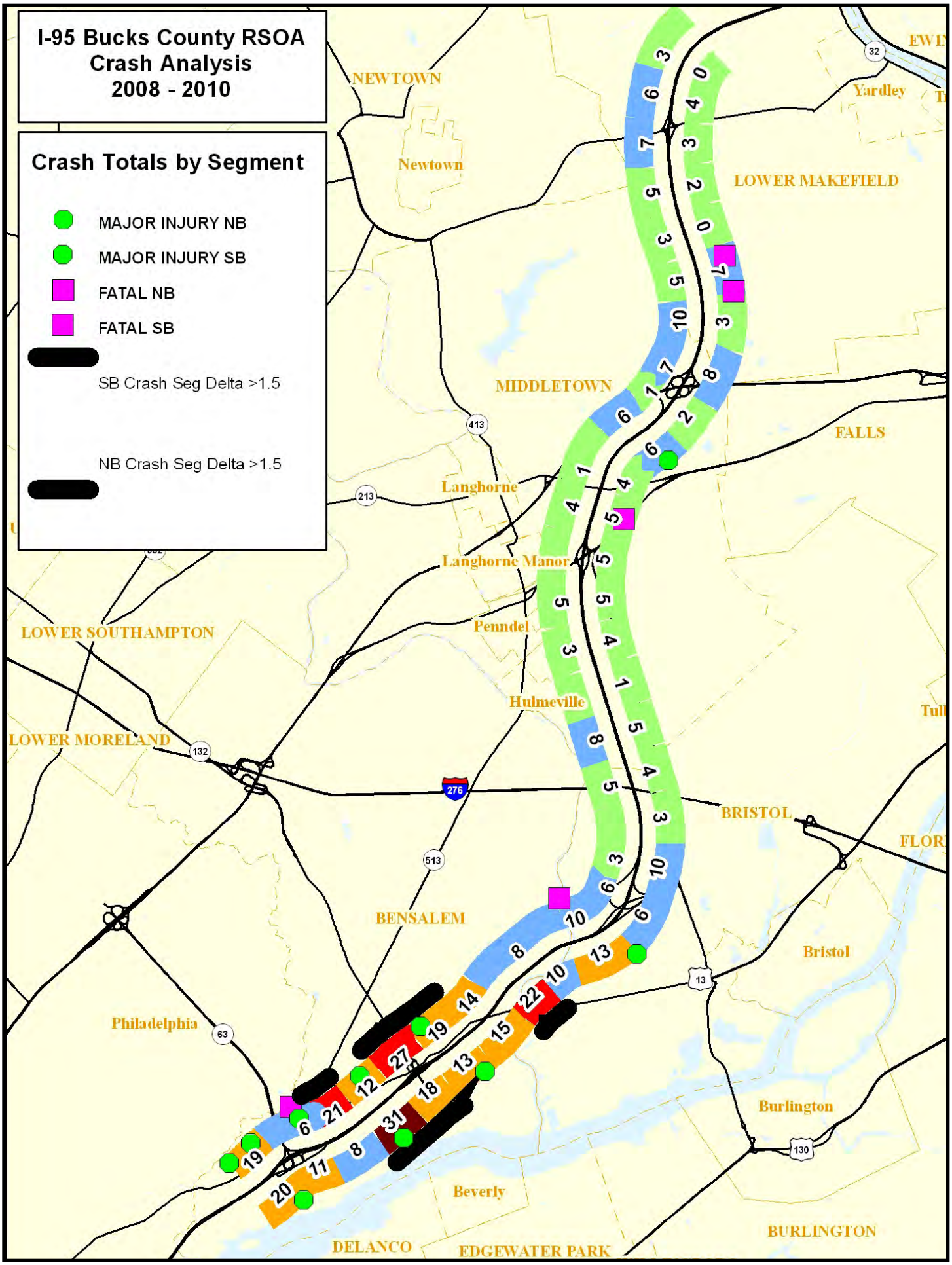
I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
Crash Totals by Segment
MAJOR INJURY NB
MAJOR INJURY SB
FATAL NB
FATAL SB
SB Crash Seg Delta >1.5
NB Crash Seg Delta >1.5
NEWTOWN
Newtown
Yardley
LOWER MAKEFIELD
MIDDLETOWN
FALLS
Langhorne
Langhorne Manor
Penndel
LOWER SOUTHAMPTON
Hulmeville
LOWER MORELAND
BRISTOL
BENSALEM
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Burlington
Beverly
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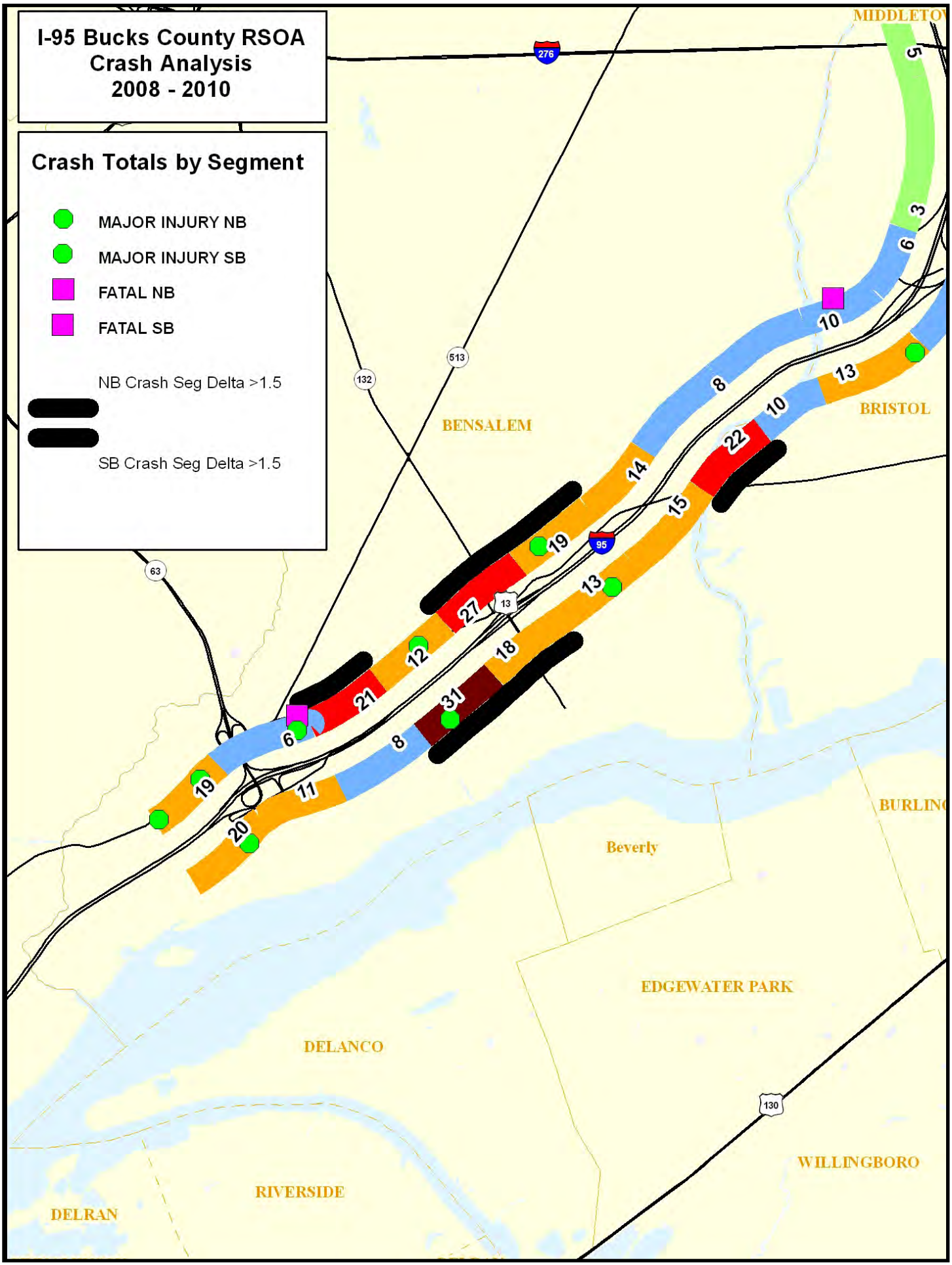
I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
Crash Totals by Segment
MAJOR INJURY NB
MAJOR INJURY SB
FATAL NB
FATAL SB
NB Crash Seg Delta >1.5
SB Crash Seg Delta >1.5
MIDDLETOWN
BENSALEM
BRISTOL
Beverly
BURLINGTON
EDGEWATER PARK
DELANCO
RIVERSIDE
DELRAN
WILLINGBORO
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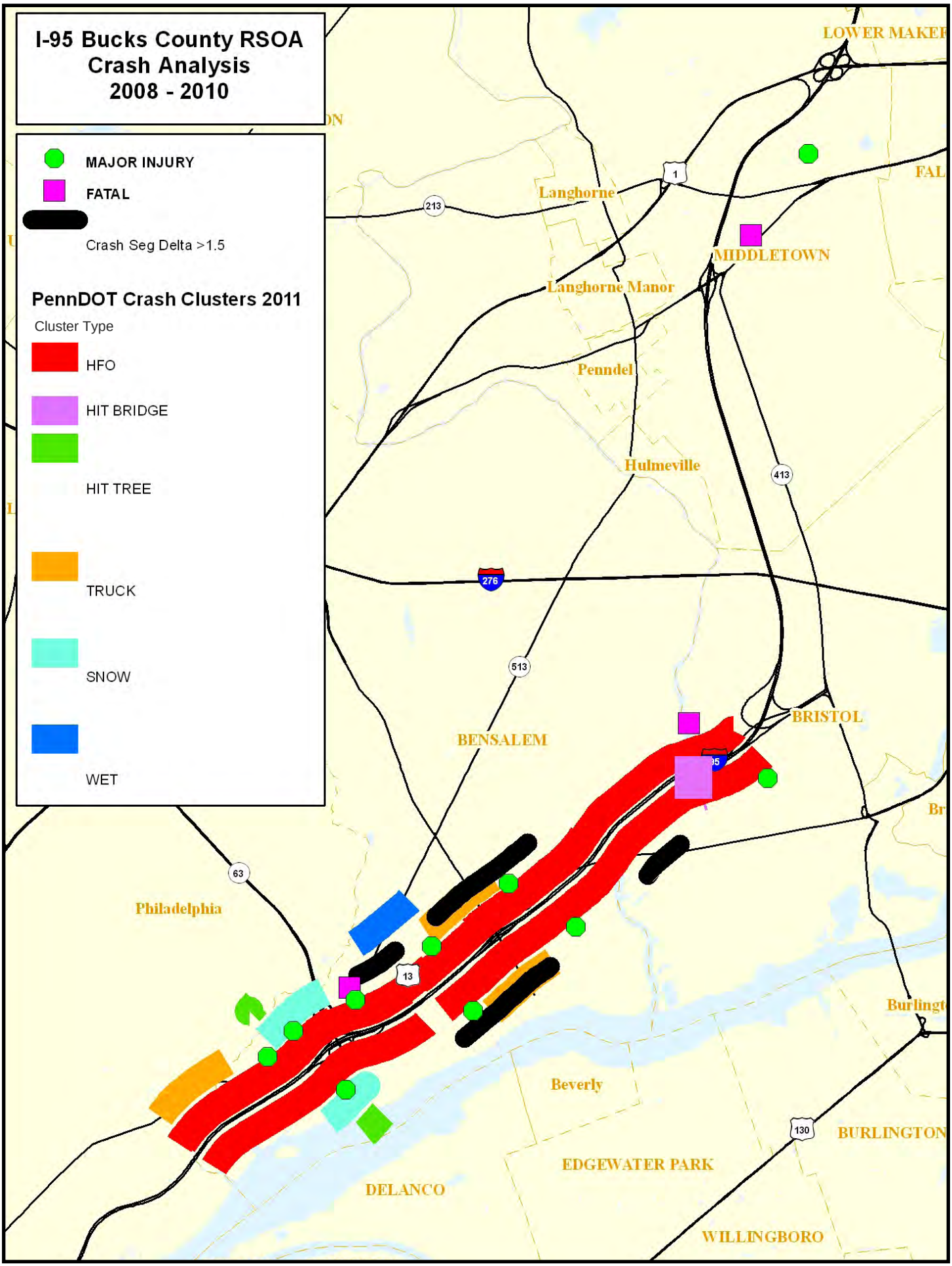
I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
MAJOR INJURY
FATAL
Crash Seg Delta >1.5
PennDOT Crash Clusters 2011
Cluster Type
HFO
HIT BRIDGE
HIT TREE
TRUCK
SNOW
WET
LOWER MAKEF
Langhorne
MIDDLETOWN
Langhorne Manor
Penndel
Hulmeville
BRISTOL
BENSALEM
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Beverly
BURLINGTON
EDGEWATER PARK
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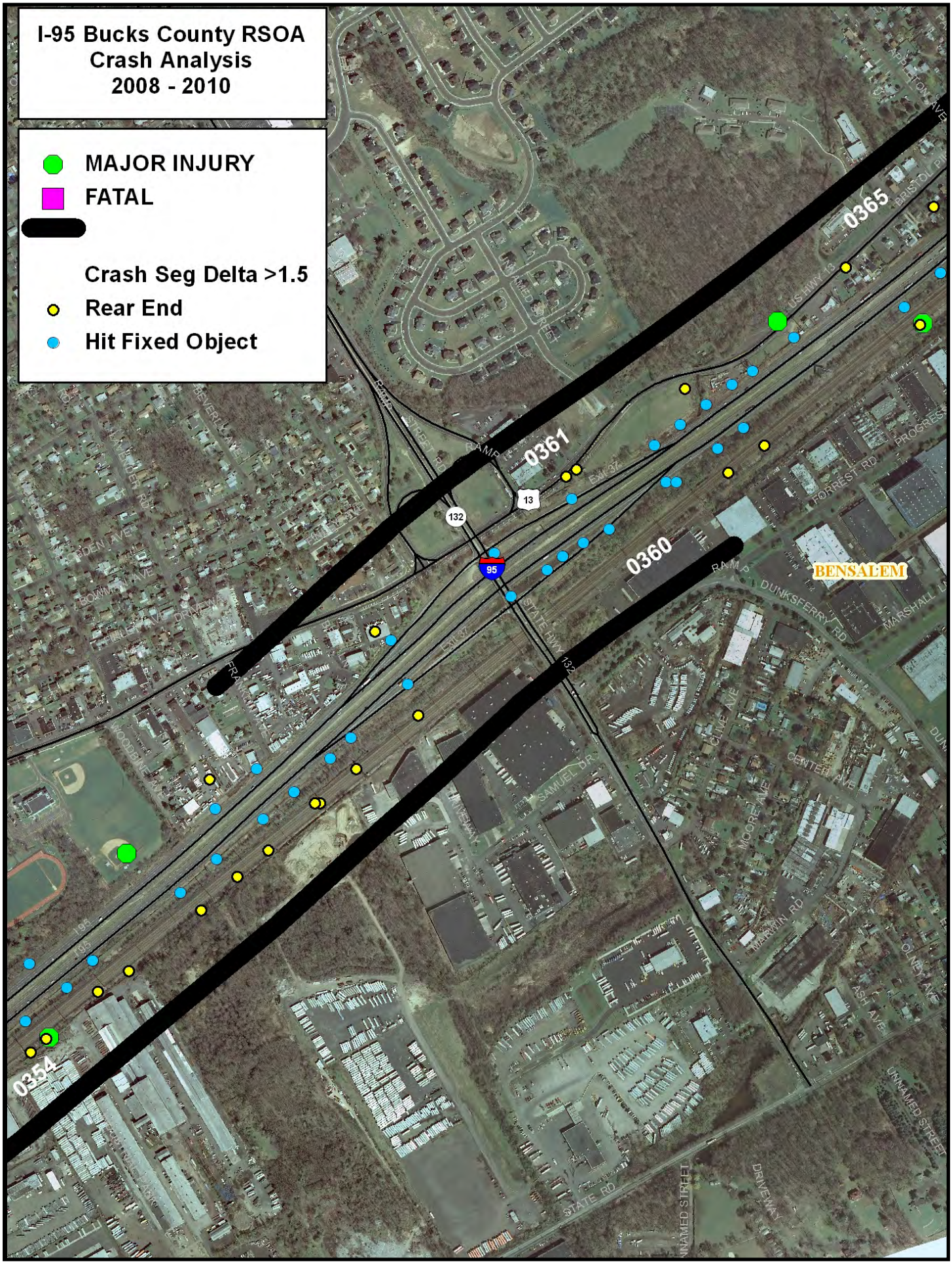
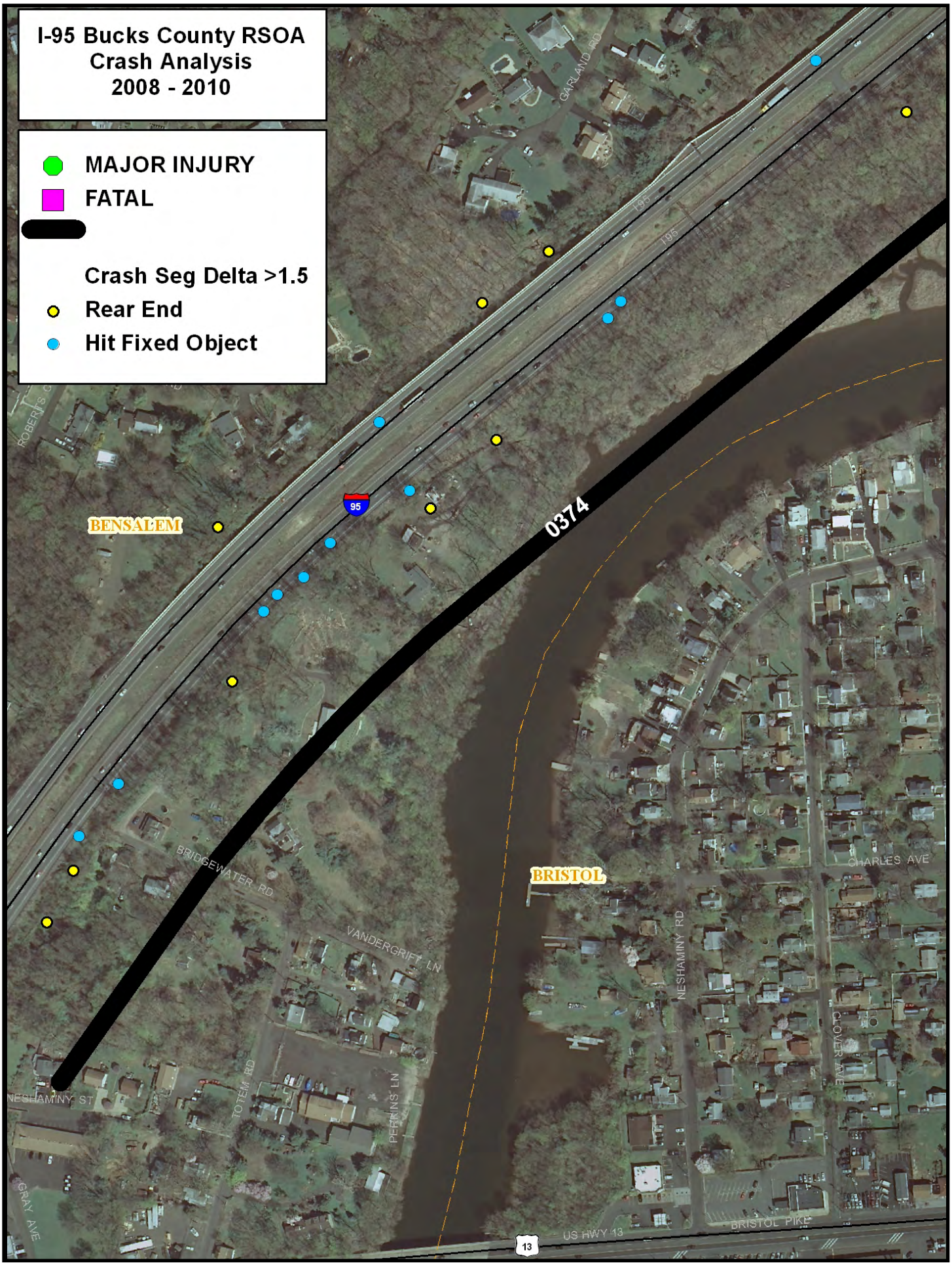

I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
MAJOR INJURY
FATAL
Crash Seg Delta >1.5
Rear End
Hit Fixed Object
0365
0361
0360
0354
95
13
132
BENSALEM
DUNKSFERRY RD
STATE HWY 132
SAMUEL DR
STATE RD
FORREST RD
MOORE AVE
CENTER AVE
MARTIN RD
OLNEY AVE
ASH AVE
PROGRESS
MARSHALL
BRISTOL PIKE
US HWY 13
RAMP
EXIT 37
I-95
DRIVEWAY
UNNAMED STREET

Crash Findings: Segment Analysis

I-95 NB/SB in vicinity of Street Road Interchange

- Aprx. 1.25 miles long
- Involves 1 interchange
- Contains 4 segments with Delta between 1.58 and 2.38
- Combined NB & SB segment total: 95 crashes

	NB	SB
HFO	26	15
Rear end	18	24
Fatalities	0	0
Major injuries	1	3


I-95 Bucks County RSOA
Crash Analysis
2008 - 2010
MAJOR INJURY
FATAL
Crash Seg Delta >1.5
Rear End
Hit Fixed Object
BENSALEM
BRISTOL
0374
95
I95
GARLAND RD
ROBERTS CT
BRIDGEWATER RD
VANDERGRIFT LN
NESHAMINY ST
TOTEM RD
PERKINS LN
GRAY AVE
NESHAMINY RD
CHARLES AVE
CLOVER AVE
BRISTOL PIKE
US HWY 13
13

Crash Findings: Segment Analysis

I-95 NB Midway between Street Road and Bristol Interchanges

- Aprx. 0.5 miles long
- Contains 1 segment with Delta of 1.92
- Combined NB segment total: 22 crashes

	NB
HFO	11
Rear end	5
Same Dir Sideswipe	5
Fatalities	0
Major injuries	0

Nighttime Video

I-95 BUCKS COUNTY RSOA

Open Discussion

I-95 BUCKS COUNTY RSOA

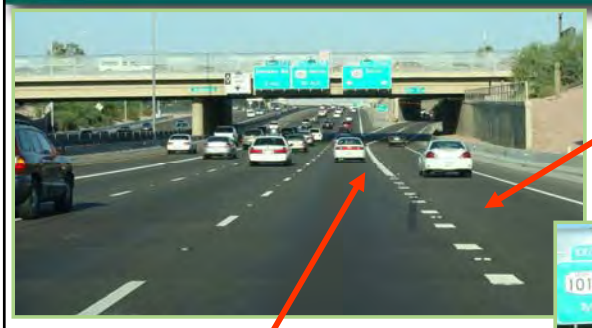
I-95 Has Diverse Users and Conditions:

I-95 BUCKS COUNTY RSOA

- Who are we designing for?
  - Everyday commuters (familiar drivers)
  - Occasional local traffic (partially familiar drivers)
  - Unfamiliar drivers
- Under what conditions?
  - Peak hour congestion
  - Late night free-flow
  - High truck volumes

Lane Drop Markings

I-95 BUCKS COUNTY RSOA



Lane Drop Marking on approach

Solid White Line around gore

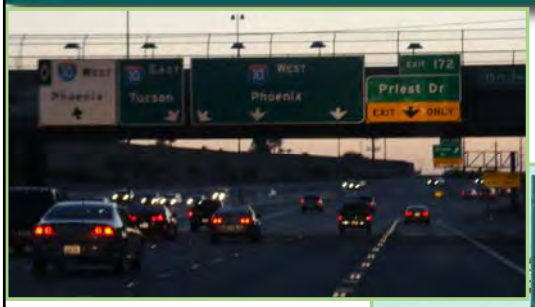
Recovery Lane

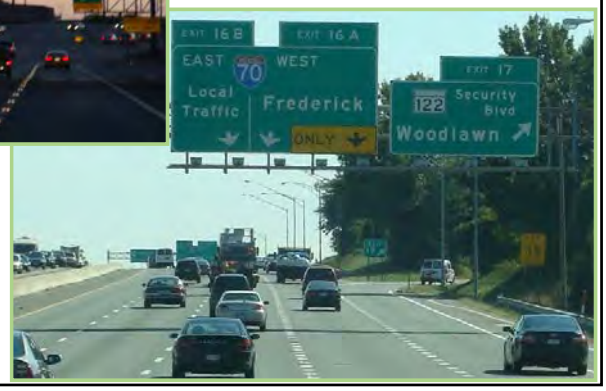
I-95 BUCKS COUNTY RSOA

Too short a recovery area

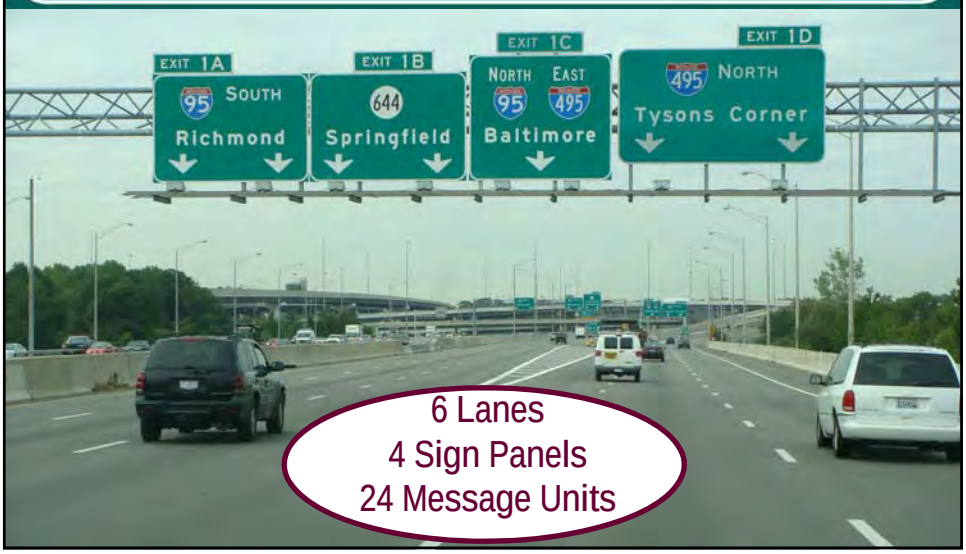
Variations in Use of Arrows

I-95 BUCKS COUNTY RSOA





Complicated Signing: Message Overload

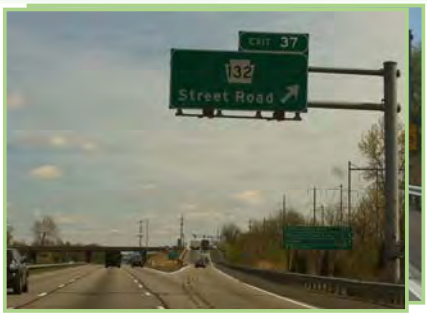


I-95 Delaware County RSOA: Corridor Wide Issues & Strategies

- Signs/Delineation
- Guide Rails
- Striping/Lane Markings
- Interchanges/Lane Storage
- Glare
- Emergency Response
- Drop-offs
- Congestion
- Maintenance
- Lighting
- Other

Field Visit Checklist

- Drainage
- Public utilities
- Merge / weave lengths
- Lighting
- Driver expectation
  - Sight distance adequate
  - All signs visible and easily understood
- Pavement markings and lane delineation



Field Visit Itinerary

Field Visit

I-95 BUCKS COUNTY RSOA

- Binder Materials
  - Notes sheet
  - Aerial maps
- Vests

Questions?

I-95 BUCKS COUNTY RSOA

Publication Title: I-95 Road Safety and Operations Audit, I-95 Bucks County from PA 63 to PA 332

Publication Number: 10024

Date Published: May 2013

Geographic Area Covered: Bucks County, Pennsylvania

Key Words: Road Safety and Operations Audit, RSOA, Crashes, Injuries, Fatalities, Issues, Strategies, Congestion, Coordination, Engineering, Enforcement, Education, Stakeholders, On-Ramp, Off-Ramp, Speed Limit, Traffic Volumes, Stakeholders, Audit Team, Geometry, Signs, Field Visit, Pavement Markings, Difficulty to Implement, Benefits.

Abstract: This report documents the process and findings of the I-95 Bucks County Road Safety and Operations Audit undertaken by the Delaware Valley Regional Planning Commission (DVRPC). The report details safety and operational issues identified by the audit team at the study location and remedial strategies to address them. Emphasis is placed on identifying low-cost, quick-turnaround improvements and safety projects to address the identified issues where possible. This project represents a step toward implementation of DVRPC's *2012 Transportation Safety Action Plan: Improving Transportation Safety in the Delaware Valley* (August 2012, #12030), and considers guidance from the *Transportation Operations Master Plan* (July 2009, #09049).

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Philadelphia PA 19106
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Internet: www.dvrpc.org


DELAWARE VALLEY
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PLANNING COMMISSION


pennsylvania
DEPARTMENT OF TRANSPORTATION


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