



Delaware Valley
Regional Planning
Commission

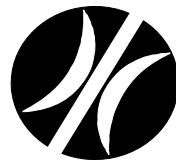
JUNE 2008



MARKET STREET

Road Safety Audit

Created in 1965, the Delaware Valley Regional Planning Commission (DVRPC) is an interstate, intercounty and intercity agency that provides continuing, comprehensive and coordinated planning to shape a vision for the future growth of the Delaware Valley region. The region includes Bucks, Chester, Delaware, and Montgomery counties, as well as the City of Philadelphia, in Pennsylvania; and Burlington, Camden, Gloucester and Mercer counties in New Jersey. DVRPC provides technical assistance and services; conducts high priority studies that respond to the requests and demands of member state and local governments; fosters cooperation among various constituents to forge a consensus on diverse regional issues; determines and meets the needs of the private sector; and practices public outreach efforts to promote two-way communication and public awareness of regional issues and the Commission.



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

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The crash data used in this report was provided by the Pennsylvania Department of Transportation for the Delaware Valley Regional Planning Commission's traffic safety related transportation planning and programming purposes only. The raw data remains the property of the Pennsylvania Department of Transportation and its release to third parties is expressly prohibited without the written consent of the Department.

All photographs in this report were taken by DVRPC staff in May 2008

1.0 BACKGROUND

Road safety audit is a formal safety performance examination of an existing or future road or intersection by an independent, qualified audit team. It qualitatively estimates and reports on potential road safety issues and identifies opportunities for improvements in safety for all road users. It can be performed during any or all stages of a project.

This document represents the final report for the Market Street, Philadelphia Road Safety Audit. The goal of this project is to improve and promote transportation safety on the region's roadways while maintaining mobility. The main objective is to address the safe operation of the roadway and ensure a high level of safety for all road users. The road safety audit program is conducted to generate improvement recommendations and countermeasures for roadway segments demonstrating a history of, or potential for a high incidence of motor vehicle crashes. The emphasis is placed on identifying low cost, quick turnaround safety projects to address the issues where possible but will not exclude the more complex projects.

From the outset of this program in Fiscal Year 2007, there has been coordination between Delaware Valley Regional Planning Commission (DVRPC) and Pennsylvania Department of Transportation (PennDOT) in identifying candidate projects for this program. In the past the program has concentrated on corridors in the

PennDOT's District 6 Safety Plan identified under Section 148 Planned Safety Projects and eligible for Highway Safety Improvement Program funding. For these Road Safety Audits the emphasis has been switched to address corridors identified in Pennsylvania's Top 5 Percent Report. This was an opportunity to analyze corridors that were already on the plan and eligible for dedicated funding.

Pennsylvania Top 5 Percent

In accordance with Section 148 (c) (1) (D) of Title 23 of the United States Code entitled Highway Safety Improvement Program Reporting 5 Percent Report States are required to prepare an annual report that describes not less than 5 percent of their public road locations exhibiting the most severe safety needs as a condition for obligating HSIP funds. The intent of this provision is to raise public awareness of the highway safety needs and challenges in the states.

In developing the report Pennsylvania concentrated on state-owned roads only. For 2007 the state identified 335 locations, 17 made up the top five percent. Of those 17 locations, 10 were located in DVRPC's Pennsylvania region. Seven were located in Philadelphia, two in Bucks County, and one in Delaware County.

With the objective of reducing fatalities, PennDOT's methodology in preparing the list is presented in **Table 1**.

Table 1: Pennsylvania Five Percent Methodology

1. Our approach to identifying the number of locations to include in the 5% list was to identify at least the top 5% of the locations on a State's hazardous locations list (which is based primarily on fatalities and serious injuries).
2. Having an objective of reducing fatalities, locations were only considered which have a history of major injury or fatal crashes in order to minimize the effect of a large number of low severity crashes on location selection.
3. In order to identify not only priority road segments but also intersections which have a high number of severe crashes, two sub lists were generated: an intersection and non-intersection priority list.
4. In the production of the standard cluster list, it is desirable to look at segments of roadway which are long enough to allow reasonable project lengths. As such, clusters were generated with minimum lengths of 5000 feet.
5. For intersections, consideration should be given to approaches to intersection points. As such, the radius of consideration was set to 500 feet.
6. For intersection and non-intersection locations, 5 years of crash data were evaluated (2001-2005). Locations having an average of more than one fatal or major-injury crash per year in the 5000 foot minimum, or 500 foot radius, were considered for the evaluation of rank. Locations not meeting these parameters were not considered hazardous locations for this exercise. This resulted in 335 locations of varying lengths.
7. The cluster parameter was set to 5 fatal or major-injury crashes in 5 years within 5000 feet. CDART has dynamic clustering capabilities. CDART moves along a roadway until it encounters the first fatal or major-injury crash. Then it looks ahead 5000 feet to determine if at least 5 select crashes occurred in that length. If so, it moves to the second crash and measures another 5000 feet to inspect. Thus the cluster may be a short distance if 5 crashes are grouped together or it may be very long if the concentration of select crashes persists through a corridor.
8. The two "cluster" lists were generated statewide.
9. For the ranking of non-intersection clusters, we assume that project cost is no consideration.
10. The first ranking round sorted the list in descending order according to the number of major injury or fatal crashes in 5 years at each location.
11. Once the standard cluster location was ranked, the intersection cluster was evaluated to determine if any intersection clusters were not included in the segment ranges of the standard cluster list. Intersections which were not on the standard cluster list were added to the list according to the number of fatal or major injuries occurring at the intersection.
12. This list was ranked.
13. The second ranking round sorted the list in descending order according to the fatal and major-injury crash rate (which normalizes for traffic volume). This list was ranked.
14. The third ranking round sorted the list in descending order according to the number of fatalities. This list was ranked.
15. Next, all three ranking numbers were summed for each location for a total ranking. Then the list was sorted according to the total ranking number.
16. So by the above-stated criteria, for 2007, the PA state hazardous locations list has 335 locations. The top 5% are the top 17 locations.
17. These 17 locations are described in Table format on the FHWA safety webpage.
18. Nine locations have an existing project in process. Some projects are on the TIP with HSIP funding or other funding sources. A road safety audit was funded by an MPO. A low-cost safety improvement project was completed with 100% state safety money.
19. Eight locations are not currently planned for projects. The Department will begin investigating these locations to determine what hard-side or soft-side countermeasures may be applicable and determine any impediments to implementation.

Source: <http://safety.fhwa.dot.gov/fivepercent/07pa.htm>

1.1 The Audit

Road safety audits can be used on any size project, from minor maintenance to mega-projects. There are eight major steps involved in conducting a road safety audit but these can be simplified in a three step process – identify the corridor or intersection and audit team; conduct the RSA and report on the findings; and follow-up on RSA findings where feasible. Major benefits of road safety audits include – it is a proactive tool, not solely dependent on crash data; it is a planning tool to identify safety issues to be considered in improvement projects; it can determine if the needs of all road users are adequately met; it is adaptable to local needs and conditions; and recommendations can be implemented in small stages as time and resources permit.

Prior to the road safety audit activities on site, DVRPC collected, reviewed and analyzed relevant data (video of roadway under different conditions, traffic volume data, turning movement counts, maps, aerial photographs, and crash data). Using the crash data, collision diagrams were produced which showed the crashes and types for locations where they occurred.

The Road Safety Audit was conducted on May 8, 2008. The day began with a Pre-Audit meeting that involved the definition of road safety audit and how it differs from the corridor study process; the required steps of an audit; presentation of the site issues; and an exchange of ideas and knowledge of the roadway. A video showing the site under night time conditions was also shown. The field view followed where the audit team, made up of state

and local officials and other stakeholders, walked the site and identified transportation safety issues. See **Appendix B** for the list of audit team members. The post-audit meeting followed and was spent discussing the findings from the field view, identifying strategies to address issues and determining priorities.

1.2 Overview of the Study Area

The study area is 13 city blocks along Market Street (SR003) between Front Street and Juniper Street in Center City Philadelphia, see Study Area map in **Appendix C**. Market Street, is functionally classified as a principal arterial and represent a significant east-west spine of downtown City of Philadelphia. It extends from Front Street west to Upper Darby Township in Delaware County where it transitions into West Chester Pike.

In Center City, Market Street passes through the neighborhoods of Olde City, Independence Mall, Market East, and borders the neighborhoods of Hahnemann and Rittenhouse Square East, as well as Logan Square and Rittenhouse Square West. In the West Philadelphia section, Market Street passes through the neighborhood of University City and borders the neighborhoods of Powelton Village/ Saunders Park and Spruce Hill, Dunlap and Walnut Hill, Haddington and Cobbs Creek. In the Upper Darby section, Market Street passes through the neighborhood of Millbourne.

The land use in the study area is a mixture of commercial, office, and community uses. In the Olde City neighborhood there is a large commercial, restaurant,

and entertainment district which transitions into office uses moving west. The Franklin's Court Museum is located in this section of Market Street. In the Independence Mall neighborhood, Market Street crosses through the Independence National Historical Park. The Independence Visitors Center is located along the street and the National Constitution Center is one block north. The Gallery at Market East shopping mall, the Pennsylvania Convention Center, the Market East Transportation Center, and several office building are all located in the Market East area of the study corridor.

The number of travel lanes varies throughout the study corridor. Between Front Street and 2nd Street, Market Street is two lanes in the eastbound direction, an exclusive left-turn and a shared through/right-turn lane. Through traffic accesses the I-95 southbound ramp at this location. The westbound movements along Market Street in this section are done via a bridge from Chestnut Street and Penn Landing. Market Street between 2nd Street and 5th Street is two lanes in each direction with parking on both sides of the road. Here there is a narrow brick median and sidewalks and crosswalks are of red brick. At the intersections of Market and 5th Streets and Market and 6th Streets there are additional designated left-turn lanes. From 7th Street to Juniper Street there is no median and left-turns are not permitted. At the intersection of 7th there is a westbound exclusive right-turn lane. From 7th Street to Juniper Street, the number of lanes is two westbound lanes with the right lane designated for buses, bicycles, and right-turns only. In the eastbound direction there are three lanes with the

right lane dedicated to buses, bicycles, and right-turn use.

Parking is not permitted in this area of the study corridor but there are cut-outs in the curb for temporary loading and unloading along Market Street in designated areas. There are a total of 18 intersections in the study area, 14 of which are signalized and the remaining four are "T" intersections. Except for Front Street all the signalized side streets are one-way. The speed limit is 25 MPH.

Average annual daily traffic (AADT) volumes were recorded on Market Street over several years. Overall traffic volumes on Market showed an increase in the eastern section of the corridor between 2001 and 2007 and a decrease in the middle and western section of the corridor during the same time period. As shown on the traffic volume map in **Appendix C**, in 2007 eastbound traffic volumes ranged from 10,740 between Front and 2nd Streets to 11,760 between 9th and 10th Streets while westbound volumes were 4,313 at 2nd Street and 8,990 between 9th and 10th Streets. Traffic volumes as high as 18,765 were recorded at Juniper Street in 2001 eastbound, and 13,449 in 2002 westbound.

Manual turning movement counts were taken at six intersections in the study corridor – Front Street, 2nd Street, 5th Street, 8th Street, 11th Street and 13th Street. Counts were taken between 6:00 AM and 9:00 AM for the morning peak period and 4:00 PM and 7:00 PM for the afternoon peak period. The corridor-wide morning peak hour was 8:00 AM to 9:00 AM and the afternoon peak hour was 4:30 PM to 5:30 PM. For all intersections the

dominant movements were the through movements on Market Street except 2nd Street during the morning where the dominant movement is the southbound through. Of intersections for which there are turning movement counts 8th Street shows the heaviest traffic volumes. At the 5th Street intersection there were heavy left-turn movements during both peak hours along with heavy northbound through movement. The entrance to the Ben Franklin Bridge is north of this intersection. The I-95 southbound ramp experienced high traffic volumes especially during the afternoon peak hour from both eastbound Market Street and Front Street. The turning movement diagram is available in **Appendix D**.

Pedestrian

On the week of June 18, 2007 The Center City District conducted pedestrian counts on Market Street. Three of the locations for which counts were recorded were the 200, 900, and 1300 blocks of Market Street. Overall, moving from east to west the pedestrian volumes increased. This is in direct correlation with land uses and land use density in the corridor. Pedestrian counts were taken over a three hour period between 11:30 AM and 2:30 PM. Pedestrian activity shows a hourly average from 848 pedestrians in the 200 block to 1,857 pedestrians in the 1300 block. The full counts are available in **Appendix D**.

Transit

Market Street in the area of the study is one of the busiest transit routes in the nation. There are several transit routes that travel along the study corridor. In addition to a rapid transit line and several bus routes,

there are the Market East Regional Rail Station on the corridor and the Greyhound Bus Terminal located one block north.

The Market–Frankford Line, a rapid transit line, which begins at the 69th Street Terminal in Upper Darby, and terminates at the Frankford Transportation Center in Frankford, travels underground along Market Street and has five subway stations located along the study area.

The PATCO Speedline, a rapid transit system operated by the Port Authority Transit Corporation, runs between Philadelphia and New Jersey. It runs underground in Philadelphia and stops along the study area at 8th and Market Streets. The line operates 24 hours a day with frequent service during peak periods.

There are several SEPTA and NJ Transit bus routes that travel along the study area. SEPTA westbound routes include 38, 44, 61, 121, 17, 33, 62 buses and eastbound 17, 33, 44, 48, 62, 121 buses. These bus routes provide service to and from neighborhoods in south, north, and northwest Philadelphia as well as Montgomery County. New Jersey Transit bus routes which serve the study corridor include the 400, 402, 403, 404, 405, 406, 407, 408, 409, 410, 412, and 413. These bus routes provide passenger transportation to locations within Burlington, Mercer, Gloucester, Cumberland, Camden, and Salem Counties.

The Philadelphia PHLASH, a trackless trolley, connects several key tourist locations throughout Center City. There are stops located on the eastbound and

westbound portions of Market Street along the study area. There is service approximately every 12 minutes daily from 10 AM to 6 PM.

1.3 Crash Data

According to PennDOT crash records there were 147 reportable crashes occurring in the study area between 2005 and 2007. Of these crashes there were two fatal crashes, 135 crashes with varying levels of severity and 10 crashes in which there were property damage only. One hundred and seventy-four persons either lost their lives or were injured in these crashes.

Crashes involving pedestrians accounted for 47 percent of the total crashes during the study period. Angle (29) rear-end (24) and same direction sideswipe (13) crashes accounted for approximately 43 percent of the crashes occurring during the study period. The majority of the crashes occurred when the road surface was dry (80%) and during clear weather (81%).

Looking at crash occurrence by month of the year there were no clear trend but January had the highest number of crashes at 19 and April, July, and November had 15 crashes each. December had the lowest number of crashes occurring at 8. Considering crashes by day of the week, Friday had the highest number of crashes, 27; this is 18 percent of the crash total. Tuesday, Monday, Saturday, and Wednesday had 25, 24, 23, and 22 crashes, respectively. Sunday had the lowest number of reportable crashes with 8 (5%).

During the work day crashes were at their highest. Crashes occurred most frequently between 8:00 AM and 6:00 PM with highest during that period around 3:00 PM and the lowest around 1:00 PM. The full crash data is shown in **Appendix D**.

Due to the abundance of non-reportable crashes along this corridor an analysis was conducted. Non-reportable crash records were obtained from the City of Philadelphia Streets Department. The information gleaned from these reports was not as comprehensive as from the reportable crash reports. There were 909 non-reportable crashes occurring in the study area between 2005 and 2007. Of 909 non-reportable crashes only 65 percent (592) had information for an analysis.

Same direction sideswipe crashes were the most dominant crash type of the non-reportable crashes. They represented approximately 60 percent of the total. Rear-end and hit-parked vehicle crashes were the next highest with 132 and 60 crashes, respectively of the 592 non-reportables. Eleven crashes involved a pedestrian. Collision diagrams are available for the reportable and non-reportable crashes in **Appendix D**.

2.0 FINDINGS AND RECOMMENDATIONS

The following represents the findings and recommendations of the Market Street Road Safety Audit. Shaded areas represent strategies requiring a low level of effort for implementation with high potential safety benefits.

CORRIDOR-WIDE SAFETY ISSUES

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
<p><u>Pavement markings:</u></p> <ul style="list-style-type: none"> • faded at crosswalks; • poor quality; • lack retro-reflectivity; and • Most side streets in the corridor have no lane lines or directional pavement markings for motorists' guidance. 	<ul style="list-style-type: none"> • Conduct an inventory of pavement markings in the corridor. • Re-stripe Market Street (lane lines, crosswalks, etc.) with a more durable material (thermal epoxy) with reflectivity. • Stripe the side streets as appropriate. 	Low	High
<p><u>Sidewalks:</u></p> <ul style="list-style-type: none"> • brick and concrete slabs are loose or missing; • curb ramps are crumbling and in some cases are not ADA compliant, • broken curbs in sections; • steel grates around trees are uneven; and • some trees (between 10th and 11th Streets) do not have grates and creates drop offs and presents tripping hazard for pedestrians. 	<ul style="list-style-type: none"> • Coordinate with Street Departments, Center City District and property owners to repair, replace and upgrade as appropriate. • Make steel grates flush with the sidewalk. • Replace steel grates around the trees and make flush with sidewalk. 	Low	High
		Low	High
		Low	High

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
<p><u>Brick Crosswalks:</u></p> <ul style="list-style-type: none"> • utilities in crosswalks are not flush, presents a tripping hazard; • the brick treatment provides no skid resistant and difficult for the wheelchair bound to navigate; • some of the bricks are loose; • bricks are not highly visible; and • crosswalk is not delineated per MUTCD standards. 	<ul style="list-style-type: none"> • Replace the brick in the crosswalks - tire grip or stamped asphalt. • Add a minimum of 2 lines to delineate crosswalk per MUTCD standards. 	<p style="text-align: center;">Medium</p> <p style="text-align: center;">Low</p>	<p style="text-align: center;">High</p> <p style="text-align: center;">High</p>
<p><u>Jay walking:</u></p> <ul style="list-style-type: none"> • This is common in the corridor 	<ul style="list-style-type: none"> • Enforce existing jaywalking statutes. 	<p style="text-align: center;">Medium</p>	<p style="text-align: center;">High</p>
<p><u>Pedestrian/vehicle turning conflicts:</u></p> <ul style="list-style-type: none"> • There are pedestrian/vehicle turning conflicts at the Market Street intersections due to the high pedestrian volumes. 	<p>Consider retiming the traffic signal to include:</p> <ul style="list-style-type: none"> • a lead pedestrian phase; or • determine if pedestrian scrambles for the intersections is an appropriate and effective treatment and implement accordingly. 	<p style="text-align: center;">Low</p> <p style="text-align: center;">Medium</p>	<p style="text-align: center;">High</p> <p style="text-align: center;">High</p>
<p><u>All-red Signal Timing:</u></p> <ul style="list-style-type: none"> • The all-red signal timing phase for Market Street is too short for clearance. 	<ul style="list-style-type: none"> • Increase the all-red phase. 	<p style="text-align: center;">Low</p>	<p style="text-align: center;">High</p>
<p><u>Pedestrian Crossing Timing:</u></p> <ul style="list-style-type: none"> • Inadequate time for pedestrians to cross Market Street after count down start (8 seconds). 	<ul style="list-style-type: none"> • Increase the pedestrian count down timing. 	<p style="text-align: center;">Low</p>	<p style="text-align: center;">High</p>

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
<p><u>Pedestrian signal heads:</u></p> <ul style="list-style-type: none"> Some cross street intersections do not have pedestrian count down signal heads. 	<ul style="list-style-type: none"> Install pedestrian signal heads with man/hand indication and countdown timing. Provides consistency for the pedestrian throughout the corridor. 	Medium	High
<p><u>Traffic signal heads:</u></p> <ul style="list-style-type: none"> The signal heads on side streets are post mounted; this creates difficulty for some motorists. 	<ul style="list-style-type: none"> Mount side street signal heads on overhead mast arms. 	Medium	High
<p><u>Bus lanes:</u></p> <ul style="list-style-type: none"> poorly marked; not highly visible; and mis-used – vehicles parked in the bus lanes. 	<ul style="list-style-type: none"> Draft and implement a pavement marking plan and delineation for bus lane. Add “no standing anytime” signs for bus lanes. 	Low	High
	<ul style="list-style-type: none"> Coordinate with SEPTA police and Philadelphia Parking Authority (PPA) for enforcement on “no parking” in the lanes. 	Low Medium	High High
<p><u>Bicyclists:</u></p> <ul style="list-style-type: none"> These road users are traveling on the roadway center lines between opposite direction traffic. 	<ul style="list-style-type: none"> Install centerline rumble strip to deter this practice. <p><u>Two different patterns are needed – one section is a 4-foot brick median</u></p>	Medium	High
<p><u>Deliveries:</u></p> <ul style="list-style-type: none"> Delivery trucks are double parked on Market Street – disrupts the flow of traffic 	<ul style="list-style-type: none"> Convert specified curbside parking to loading areas during specific times of the day. 	Medium	High

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
<u>Speed Limit:</u> <ul style="list-style-type: none"> The 25 MPH speed limit needs to be reinforced. 	Conduct an inventory to determine locations: <ul style="list-style-type: none"> Consider adding 25 MPH pavement marking to reinforce the speed limit; and Examine the viability of object marker type (orange diamond) speed limit signs. 	<p style="text-align: center;">Low</p> <p style="text-align: center;">Low</p>	<p style="text-align: center;">High</p> <p style="text-align: center;">High</p>
<u>Sidewalk Newspaper Boxes:</u> <ul style="list-style-type: none"> The newspaper boxes are blocking the visibility of pedestrians near the curb ramps (intersections of Market Street with Juniper, 13th, and 2nd Streets. 	<ul style="list-style-type: none"> Relocate the newspaper boxes from curb ramps. 	Low	Medium
<u>Drainage:</u> <ul style="list-style-type: none"> Water pools at the curb ramps. 	<ul style="list-style-type: none"> Conduct an inventory of ponding areas, and coordinate with Philadelphia Street Department and Center City District to correct the drainage problem at these locations. 	Medium	High
<u>Access at Side Streets and Alleys:</u> <ul style="list-style-type: none"> The smaller alleys and side streets in the historic area lacked curb ramps or had curbs ramps which did not comply with ADA. 	<ul style="list-style-type: none"> Consider making the crossings level with the sidewalk (raised crosswalk) with ramps for vehicular traffic. 	Medium	High
<u>Bus Stops:</u> <ul style="list-style-type: none"> Frequent bus stops on every block. 	<ul style="list-style-type: none"> Coordinate with SEPTA and NJ Transit to consider less frequent stops matched with connection points. 	Medium	Medium

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
<p><u>“Do not Block the Box” Signs:</u></p> <ul style="list-style-type: none"> • “Do not Block the Box” signs are inconsistent (style and location). 	<ul style="list-style-type: none"> • Determine the safety effects of these signs and address accordingly. 	Medium	N/A
<p><u>Sideswipe Crashes:</u></p> <ul style="list-style-type: none"> • A large number of non-reportable sideswipe crashes occurs in the corridor (weaving, congestion, double parking). 	<ul style="list-style-type: none"> • Consider the application of a highly visible thermoplastic dashed rumble stripped lane lines that provide delineation at all times of the day and an audible noise/vibration when traveled over. 	Medium	High

SITE SPECIFIC ISSUES

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
Front Street:			
<ul style="list-style-type: none"> There are no warning signs posted for the geometry prior to entering the I-95 ramp. 	<ul style="list-style-type: none"> Post a sign denoting sharp bend for the I-95 on ramp. 	Low	High
<ul style="list-style-type: none"> There is evidence of vehicle difficulty in negotiating the ramp to I-95 	<ul style="list-style-type: none"> Redesign the ramp entrance with modification to the existing wall and curbing to enable better turns 	Medium	High
<ul style="list-style-type: none"> Pavement is in poor condition at the entrance to the ramp. 	<ul style="list-style-type: none"> Repave the area. 	Low	High
<ul style="list-style-type: none"> Lack of advance directional signs for I-95. 	<ul style="list-style-type: none"> On Market Street eastbound install advance directional signs for I-95 South with lane designation. 	Low	Medium
<ul style="list-style-type: none"> Based on traffic volumes and turning movements, lane assignments between Front and 2nd Street should be revised. 	<ul style="list-style-type: none"> Re-designate lanes to a shared through/left-turn lane and a right-turn only lane. 	Low	Medium
<ul style="list-style-type: none"> Front Street changes at Market Street from 2-way to the south of the intersection to one-way to the north with no distinguishing pavement marking. 	<ul style="list-style-type: none"> Add a double yellow line on Front Street to the south of the intersection to guide motorists and reinforce the change in traffic pattern. 	Low	Medium
<ul style="list-style-type: none"> Front Street to the north of the intersection; there are no warning signs at the parking lot driveway to the north of the intersection. 	<ul style="list-style-type: none"> Add a "no right-turn" sign for vehicles exiting this parking lot on Front Street. 	Low	High

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
Between Front Street and 2nd Street:			
<ul style="list-style-type: none"> “Welcome to Penns Landing” sign on the ramp gives motorists mixed signal especially since there are no directional signs for motor vehicles destined for Penns Landing. 	<ul style="list-style-type: none"> Add a keep right sign on the gore area of the ramp. 	Low	High
	<ul style="list-style-type: none"> Post directional signs for Penns Landing. 	Low	High
	<ul style="list-style-type: none"> Add arrow pavement markings on the ramp. 	Low	High
2nd Street:			
<ul style="list-style-type: none"> Trees near the SEPTA “L” station are impeding pedestrian travel. 	<ul style="list-style-type: none"> Remove the trees near the SEPTA entrance. 	Low	Medium
<ul style="list-style-type: none"> Illegal U-turns being made from the Penns Landing ramp to Market Street eastbound. 	<ul style="list-style-type: none"> Coordinate with City of Philadelphia for enforcement of the “No U-turn” sign. 	Low	Medium
<ul style="list-style-type: none"> Buses and other vehicles are running the red light. 	<ul style="list-style-type: none"> Employ photo-enforcement with red light running camera. 	Medium	High
	<ul style="list-style-type: none"> Check change in clearance interval (CCI) for signal operation. Coordinate with SEPTA police to enforce red light running by the buses. 	Medium	High
<ul style="list-style-type: none"> Large trucks and buses have difficulty making right-turns from 2nd Street onto Market Street. They do so using Market Street eastbound left lane. 	<ul style="list-style-type: none"> Prohibit parking close to the intersection. Restrict WB-60 trucks (tractor w/53-foot trailers) or develop truck route and sign accordingly. 	Low	High
3rd Street:			
<ul style="list-style-type: none"> Café tables on the southeast corner of the intersection are too close to the crosswalks. 	<ul style="list-style-type: none"> Coordinate with business owners and Center City District to keep the area clear of obstructions to pedestrians. 	Low	Low

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
4th Street:			
<ul style="list-style-type: none"> Hump in the brick crosswalk, on the northeast corner crossing Market Street. 	<p>See corridor-wide issues on Brick Crosswalks.</p>		
<ul style="list-style-type: none"> On the northwest corner of the intersection, heavy bus stop heavily used by passengers. 	<ul style="list-style-type: none"> Upgrade passenger amenities at the bus stop (seats, etc.). 	Low	Low
Between 4th Street and 5th Street:			
<ul style="list-style-type: none"> Construction closes sidewalk on the south side of Market Street. 	<ul style="list-style-type: none"> Provide a safe temporary sidewalk for pedestrians or an on-street refuge with jersey barriers as part of the maintenance protection of traffic (MPT) for the work zone. 	Medium	High
	<ul style="list-style-type: none"> Provide “sidewalk closed ahead” sign at the intersection of 4th Street and Market Street to allow pedestrian to cross at the intersection. 	Low	High
<ul style="list-style-type: none"> Conflicting parking signs on the north-side of Market Street. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority to modify existing signs to prevent the confusion of motorists. 	Low	Medium
5th Street:			
<ul style="list-style-type: none"> High left-turns from eastbound Market Street backs up into the 6th Street intersection and blocks through traffic. 	<p>Perform an in-depth traffic analyses to:</p> <ul style="list-style-type: none"> Consider eliminating the westbound left-turn lane at 6th Street to increase 5th Street left-turn storage; or 	Low	High
		Low	High

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
5th Street (continued)			
	<ul style="list-style-type: none"> Consider converting the eastbound center through lane to a shared through/left-turn lane. 		
<ul style="list-style-type: none"> Pedestrians conflicts with the eastbound left-turning traffic from Market Street. 	<ul style="list-style-type: none"> Consider instead of the existing left-turn lead retime the traffic signal to accommodate a left-turn lag. 	Low	High
Between 5th Street and 6th Street:			
<ul style="list-style-type: none"> "Phlash" buses and trolleys parked on Market Street are obstructing the flow of traffic. 	<ul style="list-style-type: none"> Create a pull-off area for these vehicles. 	Medium	High
6th Street:			
<ul style="list-style-type: none"> The "Duck" sign is located in the travel way on the northeast corner of the intersection. 	<ul style="list-style-type: none"> Coordinate with business owner and Center City District to prevent signs placed in the roadway. 	Low	Medium
7th Street:			
<ul style="list-style-type: none"> Left-turns are prohibited from Market Street eastbound to 7th Street northbound. This is a main connecting roadway to I-95, I-676, and the Ben Franklin Bridge. 	<ul style="list-style-type: none"> Allow left-turns at the intersection and add signs for I-95, I-676, and the Ben Franklin Bridge. <u>This will alleviate the congestion and conflicts at the 5th Street intersection.</u> 	Low	High
8th Street:			
<ul style="list-style-type: none"> The "one-way" sign on the southwest corner of the intersection is blocked by trees. 	<ul style="list-style-type: none"> Trim the trees to allow motorists to see the signs. 	Low	High

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
Between 8th Street and 9th Street:			
<ul style="list-style-type: none"> A stand pipe is located in the middle of the sidewalk surrounded by 3 bollards; presents hazard for pedestrians. 	<ul style="list-style-type: none"> Prominently delineate to enhance the visibility for pedestrian. 	Low	High
	<ul style="list-style-type: none"> Remove the standpipe if feasible. 	High	High
9th Street:			
<ul style="list-style-type: none"> Traffic is very heavy, took a bus 3 cycles to cross through the intersection. Vehicles are parked illegally; double parking is prevalent. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce "No Parking" areas. 	Low	High
<ul style="list-style-type: none"> Pedestrian crosswalk sign posted on 9th Street north of the intersection, there is no crosswalk. 	<ul style="list-style-type: none"> Stripe a crosswalk across 9th Street in this location. Heavy pedestrian activity. 	Low	High
Between 9th Street and 10th Street:			
<ul style="list-style-type: none"> Historic sign is blocking "bus/bike lane" sign. 	<ul style="list-style-type: none"> Relocate the sign as appropriate to make it visible to motorists. 	Low	Medium
10th Street:			
<ul style="list-style-type: none"> On eastbound Market Street, trees are blocking signal and street name signs on the mast arm. 	<ul style="list-style-type: none"> Trim trees. 	Low	High
<ul style="list-style-type: none"> On the north side of 10th Street, lane markings have faded. 	<ul style="list-style-type: none"> Re-stripe pavement markings as appropriate. 	Low	High
Between 10th Street and 11th Street:			
<ul style="list-style-type: none"> Open doors of the "Underground" business obstruct pedestrian movement. 	<ul style="list-style-type: none"> Coordinate with the business owner and the Center City District. 	Low	Low

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
Between 10th Street and 11th Street (continued):			
<ul style="list-style-type: none"> Vehicles are parked in the passenger loading areas; creates a double parking situation for loading and unloading vehicles. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce passenger loading areas. 	Medium	High
11th Street:			
<ul style="list-style-type: none"> Large number of utility manholes with vehicles maneuvering to avoid them (in the travel lanes and crosswalks) 	<ul style="list-style-type: none"> Coordinate with utility companies to combine utility access and make flush with pavement. 	High	High
<ul style="list-style-type: none"> New Jersey Transit buses using the farside bus stop had buses backing into the intersection and blocking traffic flow. 	<ul style="list-style-type: none"> Relocate the bus stop further from intersection. 	Low	High
<ul style="list-style-type: none"> At the northwest corner the red LED signal head had black spots. 	<ul style="list-style-type: none"> Perform maintenance and replace LED bulbs. 	Low	High
12th Street:			
<ul style="list-style-type: none"> On the southwest corner the 3-section signal head is blocking the pedestrian signal head. 	<ul style="list-style-type: none"> Relocate the signal heads as appropriate. 	Low	High
<ul style="list-style-type: none"> On the eastside of 12th Street, work zone closed sidewalk and one lane. There is no notice of closures. 	<ul style="list-style-type: none"> Install signs warning roadway users of closure. 	Low	High
Between 12th Street and 13th Street:			
<ul style="list-style-type: none"> On the south side of Market Street, the pavement markings and signs were unclear around the loading zone/pull off area. 	<ul style="list-style-type: none"> Pavement markings to be addressed with corridor-wide issues. Post sign to clearly direct motorists. 	Low	Medium

<u>Safety Issues</u>	<u>Potential Strategies</u>	<u>Level of Effort</u>	<u>Potential Safety Benefit</u>
13th Street:			
<ul style="list-style-type: none"> On the southwest corner of the intersection a vendor is located in the bus stop. 	<ul style="list-style-type: none"> Relocate vendor. 	Low	Low
Between 13th Street and Juniper Street:			
<ul style="list-style-type: none"> Vehicles are parked in the bus lane in front of Macy's. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce "No Parking" areas. 	Medium	High
Juniper Street:			
<ul style="list-style-type: none"> Vehicles parked in the northbound Juniper Street right-turn lane. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce "No Parking" areas. 	Medium	High
	<ul style="list-style-type: none"> Add signs approaching Juniper for lane designation and direction. 	Low	High
<ul style="list-style-type: none"> On Juniper Street north of the intersection there are no pavement markings. Making the turn onto Juniper the white line and the double yellow striping do not match up. Crosswalk pavement markings are worn. 	<ul style="list-style-type: none"> Redesign the pavement markings for greater clarity and safety. Use stamped concrete or other durable treatment for the crosswalks. 	Medium	High
<ul style="list-style-type: none"> Pavement in poor condition. 	<ul style="list-style-type: none"> Repave the roadway. 	High	High
<ul style="list-style-type: none"> News stand on the northeast corner of the intersection blocks the pedestrian view of oncoming vehicles. 	<ul style="list-style-type: none"> Relocate the news stand. 	Medium	High

The following is the order of priority for implementation as agreed by the audit team:

1. Pedestrian safety
 - 1.1. Educating the public
 - 1.2. Crosswalks upgrade
 - 1.3. ADA compliance
 - 1.4. Sidewalks maintenance
2. Enforcement for the double parking along the corridor (especially in the bus lanes)
3. Operational improvements at 5th Street and Market Street intersection (with recommended improvement at 7th Street)
4. Defining, signing, and striping bus lane
5. Resurfacing and re-striping Market Street
6. Signal upgrade
7. Redesign the entrance to I-95 southbound on-ramp
8. Eliminate conflicting signage
9. Improve the signage to Penns Landing

A scope of work and cost estimate has been prepared for identified priority strategies for implementation and is shown in **Appendix A**

3.0 CONCLUSION

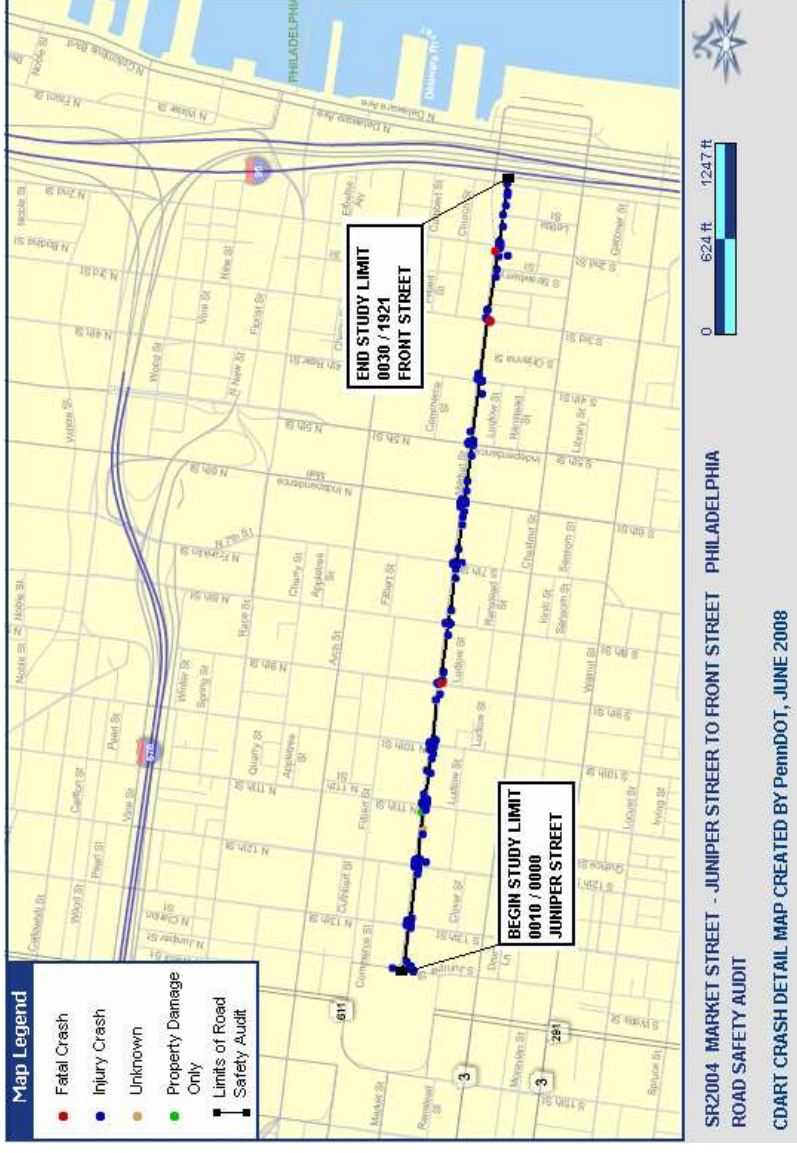
As discussed earlier, the road safety audit program is conducted to generate improvement recommendations and countermeasures for roadway segments or intersections demonstrating a history of, or potential for a high incidence of motor vehicle crashes. The safety issues identified during the audit, and documented in this report, along with the recommended strategies, should improve the overall safety of the study corridor. Some of the strategies identified can be implemented through routine maintenance. The full impact of the improvement strategies will be realized when they are combined, but time and budget constraints may dictate when remedial strategies are implemented. The City of Philadelphia Streets Department under the Center City Southeast project has plans to upgrade the traffic signals along Market Street from the 5th Street intersection to Juniper Street. This upgrade will include new controllers and incident management camera. Additionally, the audit

team was informed that there were plans to re-stripe Market Street. There should be coordination between the Streets Department and PennDOT to ensure cohesiveness between the plans of the Streets Department for Market Street and recommendations from this road safety audit.

Engineering strategies alone will not eliminate the traffic safety issues identified in the study corridor. Therefore, enforcement and education are necessary components to address the human behavioral aspects to effectively reduce the number of crashes occurring. As seen in the priority list education was in the number 1 priority and enforcement was number 2. Engaging the appropriate stakeholders is important as coordination and collaboration is the key to making the corridor safer for all users.

APPENDIX A
Scope of Work
&
Cost Estimates

This appendix was prepared by the Pennsylvania Department of Transportation District 6 Office



Project Purpose:

The purpose of this project is to reduce the number of crashes and related injuries and severity of the crashes which occur along the approximate one mile section of Market Street, between Juniper Street and Front Street, in the City of Philadelphia. The anticipated benefits of this project are:

- Minimization of the number of vehicle/pedestrian crashes.
- Minimization of the number of vehicular crashes, specifically angle, sideswipe, and rear-end type crashes.

Project Scope:

The scope of work for this project was developed from the Road Safety Audit which was conducted in May 2008 and undertaken by DVRPC in conjunction with the Pennsylvania Department of Transportation. A more detailed description of the scope of work is included in the attached cost estimate, and is summarized below:

- Install pedestrian signals and other pedestrian amenities (crosswalks, signing, etc) throughout the corridor.
- Restripe Market Street and side streets with a more durable (thermal epoxy) material.
- Install centerline rumble strips.
- Improve drainage problems along the corridor.
- Inventory and replace signs as necessary.
- Upgrade pedestrian amenities at bus facilities.

This traffic and engineering study is confidential pursuant to 75 Pa.C.S. §3754 and 23 U.S.C.§409 and may not be disclosed or used in litigation without written permission from PennDOT.

Benefit-to-Cost Ratio Calculation

The estimated benefit, in terms of crash reductions, for this project is \$833,000 per year. See attached sheet Titled “Market Street HSIP Benefit Calculations”.

The estimated cost for the above scope of work is \$5.6 million. See the attached ”Cost Estimate Sheet” (three pages). Assuming a 20-year life cycle for this safety project, the annual cost of the project is \$280,000.

The project will have an annual benefit-to-cost ratio of \$833,000:\$280,000 or 3 to 1.

MARKET STREET HSIP BENEFIT CALCULATIONS

Crashes: 2003 through 2007

Crash Type	# of Crashes	Average Cost per Crash ¹	Total Costs
Angle	48	\$ 76,035	\$ 3,649,680
Rear End	36	\$ 39,403	\$ 1,418,508
Pedestrian	111	\$214,683	\$23,829,813
Sideswipe	35	\$ 65,301	\$ 2,285,535
Hit Fixed Object	6	\$ 93,009	\$ 558,054
Head On	5	\$248,122	\$1,240,610
Other	1	\$ 39,706	\$ 39,706
Total	242	Total 5 Year Cost	\$33,021,906
		Average Annual Cost	\$6.6 million

¹ From CDART: Accident Cost by Category Report for Accidents in Years 2003 to 2007.

The total cost of pedestrian crashes along Market Street is \$23.8 million. According to an FHWA report, entitled Desktop Reference for Crash Reduction Factors (September 2007), improving pavement friction and installing pedestrian countdown signal heads will reduce pedestrian crashes by between 10% and 25%. If we conservatively assume that pedestrian crashes will be reduced by 17.5% (an average of the two rates), our estimated benefit over five years, in terms of pedestrian crash reductions, will be \$23.8 million × 17.5% ÷ 5 years or \$833,000 per year.

ENGINEER'S PRELIMINARY OPINION OF COST FOR CONSTRUCTION
 Market Street

Note: This cost estimate is based on recommendations in the Safety Report. No plans were used to create this cost estimate.

DISCLAIMER: McMahon prepared this preliminary cost estimate based on field observations only and in no way should this estimate be considered a final cost estimate. The estimated costs are subject to change based on field conditions, local or regional differences, changes to the plans and/or changes to the unit costs. Final costs are dependant on actual bids from contractors. McMahon will **not** be held responsible for any discrepancies between this cost estimate and bid costs. This estimate includes only an estimate for utility relocations. Actual costs will be determined by the owner of the utility. This estimate does not include the cost of Right-of-Way of Easement acquisition, if necessary.

ITEM #	DESCRIPTION	UNIT	QUANTITY	UNIT COST	TOTAL
0203-0001	Class 1 Excavation	CY	4,000	\$40.00	\$160,000.00
0309-0530	Superpave, HMA Base Course, PG 64-22, 3 to 10 Million Design ESALS, 25 mm Mixture, 8" Depth	SY	5,000	\$32.00	\$160,000.00
0350-0108	Subbase (No. 2A), 8" Depth	SY	5,000	\$15.00	\$75,000.00
0409-0581	Superpave, HMA Wearing Course, PG 64-22, 3 to 10 million Design ESALS, 9.5 mm mixture, 1.5" Depth, SRL-E	SY	5,000	\$10.00	\$50,000.00
0409-6550	Superpave, HMA Binder Course, PG 64-22, 3 to 10 million Design ESALS, 19 mm mixture, 2.5" Depth	SY	5,000	\$12.00	\$60,000.00
0630-0001	Plain Cement Concrete Curb	LF	1,500	\$35.00	\$52,500.00
0676-0001	Plain Cement Concrete Sidewalk	SY	2,500	\$60.00	\$150,000.00
0686-0020	Mobilization	LS	1	\$200,000.00	\$200,000.00
0810-0022	Select Tree Trimming	EACH	39	\$300.00	\$11,700.00

This traffic and engineering study is confidential pursuant to 75 Pa.C.S. §3754 and 23 U.S.C. §409 and may not be disclosed or used in litigation without written permission from PennDOT.

APPENDIX B
Audit Team

**DELAWARE VALLEY REGIONAL PLANNING COMMISSION
MARKET STREET ROAD SAFETY AUDIT**

AUDIT TEAM

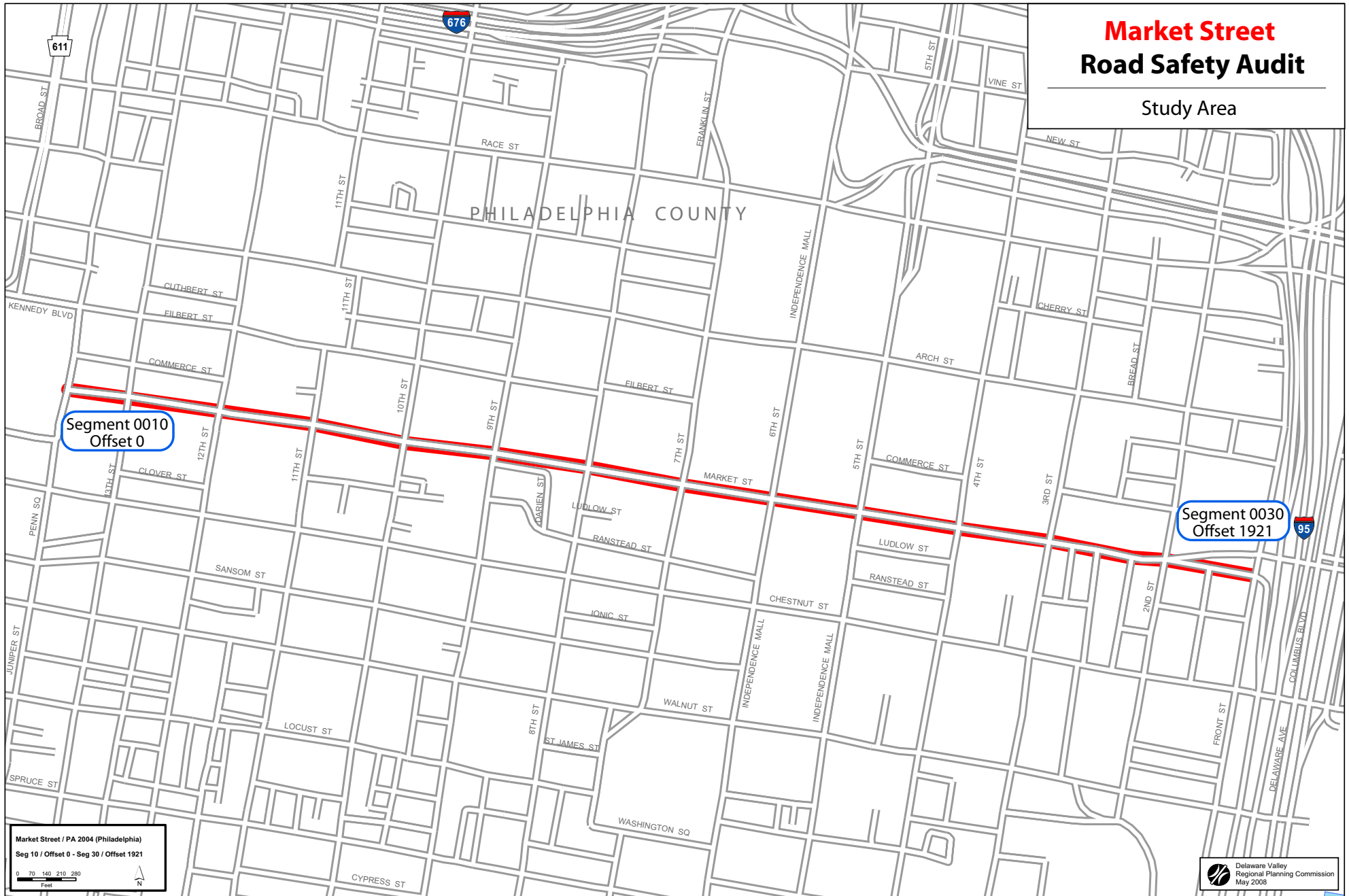
Name	Organization
Rosemarie Anderson	Delaware Valley Regional Planning Commission
Larry Bucci	Pennsylvania Department of Transportation
Michael Castellano	Federal Highway Administration
Phil Devlin	Philadelphia Police Department
Jim Diamond	Philadelphia Police Department
Joe Fiocco	McMahon Associates (PennDOT Consultants)
Joseph Hacker	Delaware Valley Regional Planning Commission
Caroline Johnson	Philadelphia Planning Commission
Regina Moore	Delaware Valley Regional Planning Commission
Kevin Murphy	Delaware Valley Regional Planning Commission
Dan Nemiroff	Delaware Valley Regional Planning Commission
Tanya Rothe	Southeast Pennsylvania Transportation Authority
Derrick Sexton	Delaware Valley Regional Planning Commission
Deborah Schaaf	Philadelphia Planning Commission
Mark Washington	City of Philadelphia Streets Department

APPENDIX C

Maps

Market Street Road Safety Audit

Study Area



Market Street / PA 2004 (Philadelphia)
Seg 10 / Offset 0 - Seg 30 / Offset 1921

0 70 140 210 280
Feet

N

Delaware Valley
Regional Planning Commission
May 2008

APPENDIX D

Traffic Data

MARKET STREET ROAD SAFETY AUDIT

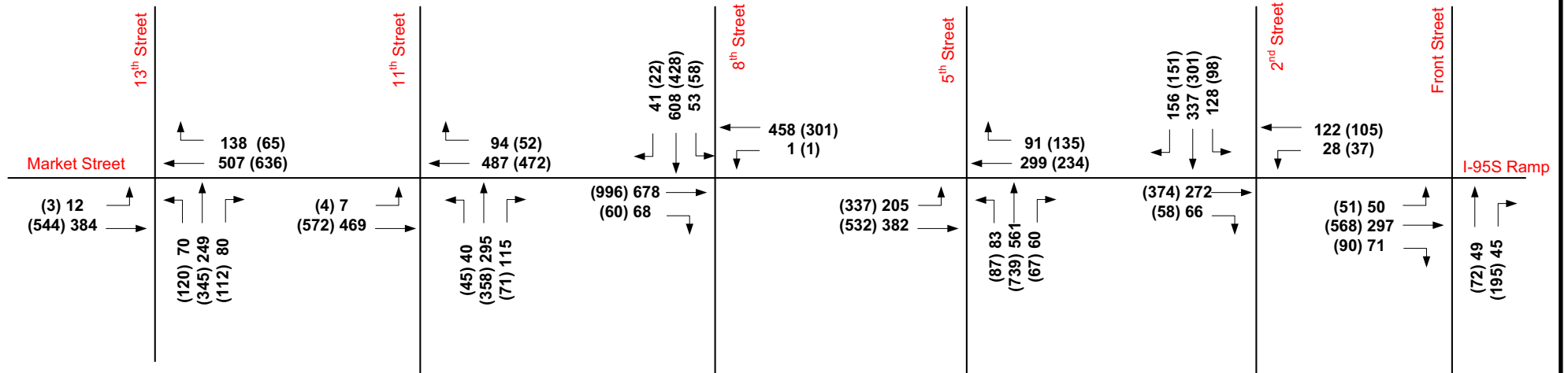
Existing Peak Hour Turning Movement Counts

Peak Hours

AM: 8:00 - 9:00

PM: 4:30 - 5:30

AM (PM)




SCHEMATIC NOT TO SCALE

Location	200 BLOCK OF MARKET (OLD CITY)
-----------------	--------------------------------

Date	6/18/2007
11:30 - 11:45	156
11:46 - 12:00	208
12:01 - 12:15	216
12:16 - 12:30	200
12:31 - 12:45	230
12:46 - 1:00	228
1:01 - 1:15	215
1:16 - 1:30	263
1:31 - 1:45	217
1:46 - 2:00	181
2:01 - 2:15	197
2:16 - 2:30	232

Temperature (Approx)	70's
Skies	Partly Cloudy
Other weather comment	
Rain (yes/no)	no

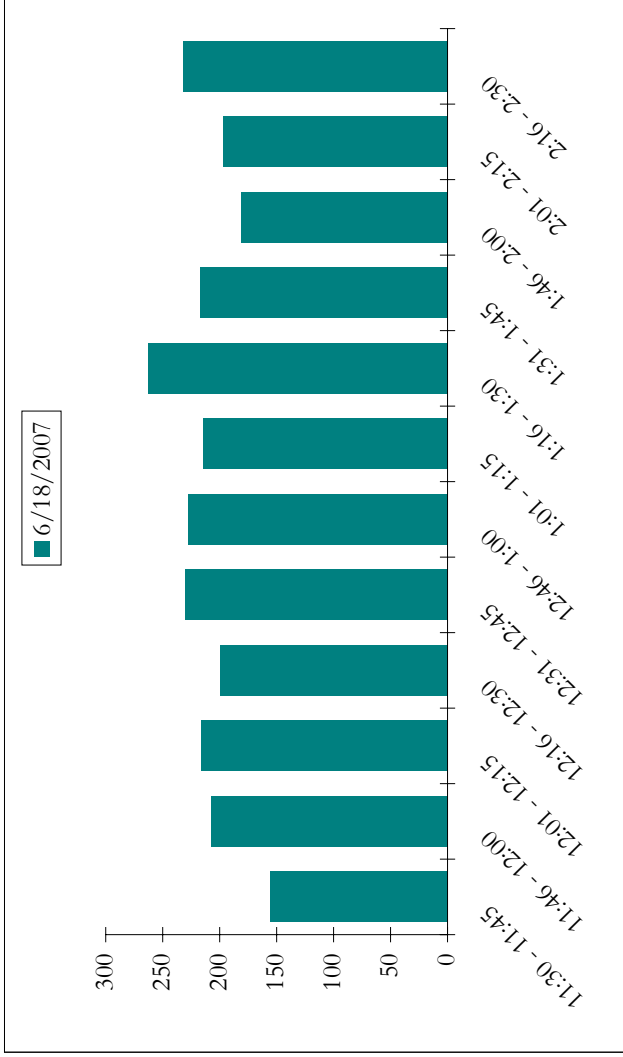
780

Total Pedestrians	2,543
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936

Hourly Average	848
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827



Location	900 BLOCK MARKET (CONVENTION CENTER)
-----------------	--------------------------------------

Date	6/19/2007
11:30 - 11:45	371
11:46 - 12:00	409
12:01 - 12:15	456
12:16 - 12:30	441
12:31 - 12:45	478
12:46 - 1:00	508
1:01 - 1:15	489
1:16 - 1:30	566
1:31 - 1:45	479
1:46 - 2:00	449
2:01 - 2:15	422
2:16 - 2:30	364

Temperature (Approx)	90's
Skies	sunny
Other weather comment	
Rain (yes/no)	

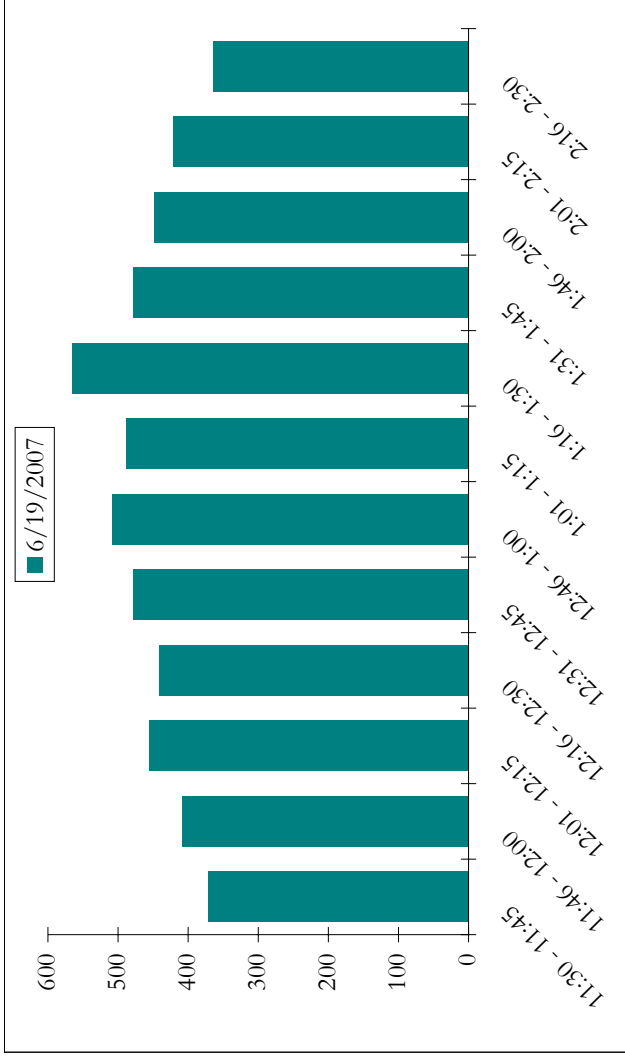
1,677

Total Pedestrians	5,432
--------------------------	-------

2,041

Hourly Average	1,811
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1,714



Location	1300 BLOCK MARKET (CONVENTION CENTER)
-----------------	---------------------------------------

Date	6/21/2007
11:30 - 11:45	427
11:46 - 12:00	434
12:01 - 12:15	503
12:16 - 12:30	464
12:31 - 12:45	526
12:46 - 1:00	474
1:01 - 1:15	502
1:16 - 1:30	474
1:31 - 1:45	548
1:46 - 2:00	430
2:01 - 2:15	462
2:16 - 2:30	327

Temperature (Approx)	80's
Skies	sunny
Other weather comment	
Rain (yes/no)	no

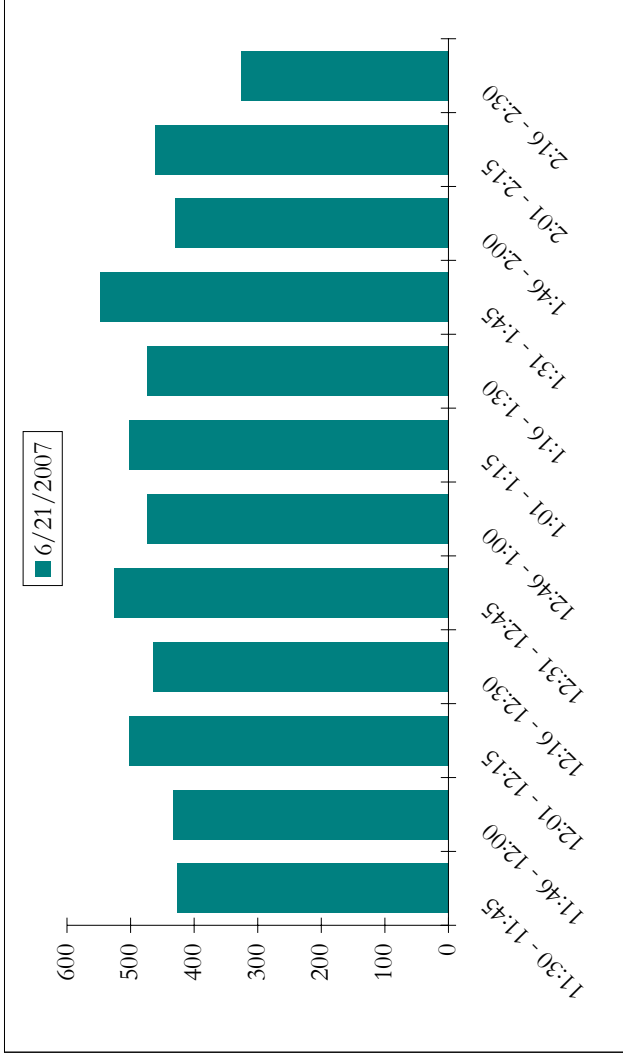
1,828

Total Pedestrians	5,571
--------------------------	-------

1,976

Hourly Average	1,857
-----------------------	-------

1,767



Location	1600 BLOCK MARKET (MARKET WEST / PARKWAY)
-----------------	---

Date	6/22/2007
11:30 - 11:45	566
11:46 - 12:00	636
12:01 - 12:15	728
12:16 - 12:30	741
12:31 - 12:45	699
12:46 - 1:00	844
1:01 - 1:15	850
1:16 - 1:30	779
1:31 - 1:45	663
1:46 - 2:00	676
2:01 - 2:15	565
2:16 - 2:30	516

Temperature (Approx)	80's
Skies	sunny
Other weather comment	live music
Rain (yes/no)	no

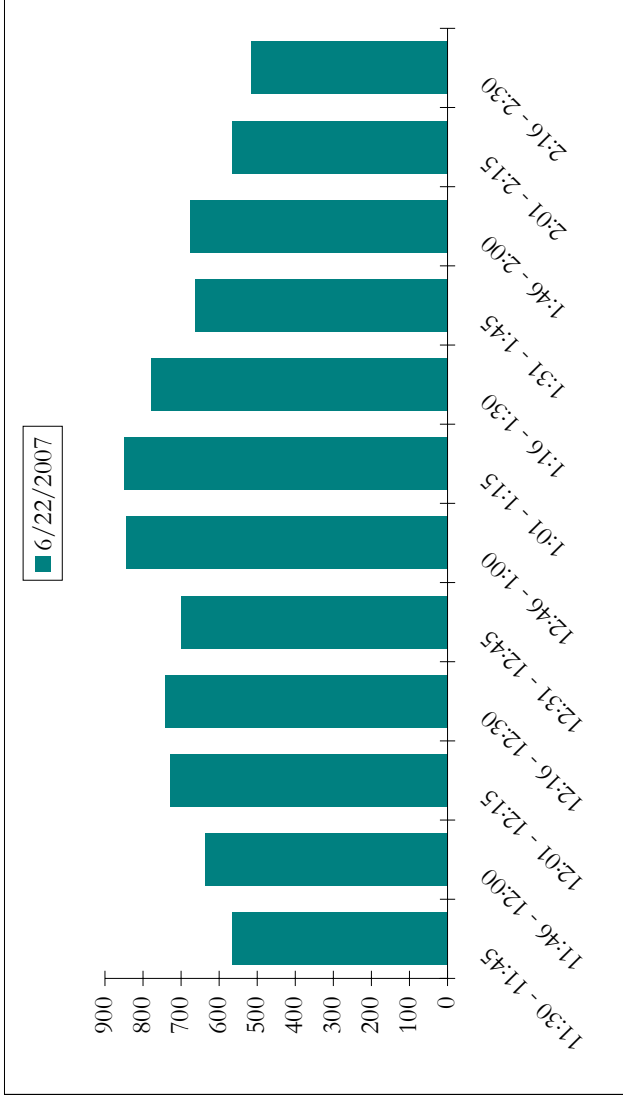
2,671

Total Pedestrians	8,263
--------------------------	-------

3,172

Hourly Average	2,754
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2,420



PHILADELPHIA CO MARKET ST 0010/0000 TO 0030/1496 3YEAR



Date Range: 1/1/2005 to 12/31/2007

USER_ID/QUERY_ID:

Ikubli/ 0620080416002

Area of (In County 67 On State Route 2004(P) Between Segment 0010 Offset 0 and Segment 0030 Offset 1496) or (In County 67

Interest: On State Route 2004(S) Between Segment 0011 Offset 0 and Segment 0031 Offset 1496)

MONTH OF YEAR													DAY OF WEEK								
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		SUN	MON	TUE	WED	THR	FRI	SAT	
CRASHES	19	10	10	15	11	9	15	11	13	11	15	8	147	8	24	25	22	18	27	23	147
PCT	12%	6%	6%	10%	7%	6%	10%	7%	8%	7%	10%	5%	100%	5%	16%	17%	14%	12%	18%	15%	100%

HOUR OF DAY																								
	00	01	02	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	99	
CRASHES	5	1	4	1	1	5	4	11	8	8	9	9	4	14	13	10	6	7	3	3	4	6	11	147
PCT	3%	0%	2%	0%	0%	3%	2%	7%	5%	5%	6%	6%	2%	9%	8%	6%	4%	4%	2%	2%	2%	4%	7%	100%

YEAR		COLLISION TYPE		CRASH SEVERITY LEVEL		SEVERITY COUNT		DRIVER ACTIONS					
	CRASHES	PCT		CRASHES	PCT		PERSONS		ACTIONS	PCT			
2005	39	26%	PEDESTRIAN	70	47%	FATAL	2	1%	FATALITIES	2	NO CONTRIBUTING ACTION	105	41%
2006	50	34%	ANGLE	29	19%	MAJOR	5	3%	MAJOR	5	UNKNOWN	52	20%
2007	58	39%	REAR END	24	16%	MODERATE	16	10%	MODERATE	17	IMPROPER/CARELESS TURN	24	9%
TOTAL	147	100%	SAME DIR SS	13	8%	MINOR	79	53%	MINOR	93	OTHER IMPROPER DRIVING	16	6%
			HIT FIX OBJ	5	3%	UNK SEVERITY	30	20%	UNK SEVERITY	42	DRIVER WAS DISTRACTED	10	3%
			OPP DIR SS	3	2%	UNK IF INJURED	5	3%	UNK IF INJURED	15	RUNNING RED LIGHT	8	3%
			HEAD ON	2	1%	PDO	10	6%			MAKING ILLEGAL U-TURN	5	1%
			NON COLL	1	0%	TOTAL	147	100%			TOO FAST FOR CONDITION	5	1%
			TOTAL	147	100%						CARELESS PASS/LN CHNG	4	1%
											CARELESS/ILLEGAL BACKING	3	1%
											TAILGATING	3	1%
											AFFECTED PHYSICAL COND	2	0%
											OTHERS	15	5%
											TOTAL	252	100%

VEHICLE TYPE		ROAD CONDITION		ILLUMINATION		WEATHER		ENVIR/ROADWAY FACTORS						
	VEHICLES	PCT		CRASHES	PCT		CRASHES	PCT		FACTORS	PCT			
AUTOMOBILE	139	62%	DRY	119	80%	DAYLIGHT	110	74%	CLEAR	120	81%	NONE	119	77%
BUS	32	14%	WET	24	16%	STREET LIGHTS	34	23%	RAIN	22	14%	OTHER WEATHER COND	10	6%
SUV	16	7%	OTHER	3	2%	DAWN	1	0%	OTHER	2	1%	SLIPPERY ICE/SNOW	7	4%
SMALL TRUCK	12	5%	ICE	1	0%	DUSK	1	0%	SLEET	1	0%	UNKNOWN	7	4%
PEDALCYCLE	10	4%	TOTAL	147	100%	UNK LIGHTING	1	0%	SNOW	1	0%	WINDY CONDITIONS	4	2%
VAN	9	4%				TOTAL	147	100%	UNK	1	0%	GLARE	2	1%
LARGE TRUCK	3	1%							TOTAL	147	100%	SUDDEN WEATHER COND	2	1%
MOTORCYCLE	2	0%										ANIMAL IN RDWY	1	0%
TOTAL	223	100%										OTHER ENVIR FACTOR	1	0%
												TOTAL	153	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 2008 crash records are incomplete
Data for the current year, 2008, 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

REPORT PARAMETERS:

Query ID: [0620080416002](#)
User ID: lkubli
Area of Interest: (In County 67 On State Route 2004(P) Between Segment 0010 Offset 0 and Segment 0030 Offset 1496) or (In County 67 On State Route 2004(S) Between Segment 0011 Offset 0 and Segment 0031 Offset 1496)
Date Range: 1/1/2005 to 12/31/2007
Criteria: STATE ROAD

NON REPORTABLE CRASH SUMMARY

FRONT STREET TO STRAWBERRY STREET

<u>Crash Type</u>	<u>No.</u>	<u>Percentage</u>
Rear End	15	21.74%
Angle	2	2.90%
Hit Pedestrian	2	2.90%
Hit Parked Vehicle	8	11.59%
Same Direction	41	59.42%
Opposite Direction Sideswipe	1	1.45%
Total	69	

BANK STREET TO 4TH STREET

<u>Crash Type</u>	<u>No.</u>	<u>Percentage</u>
Rear End	19	30.16%
Angle	3	4.76%
Hit Pedestrian	1	1.59%
Hit Parked Vehicle	6	9.52%
Same Direction	31	49.21%
Left turn	2	3.17%
Hit Fixed Object	1	1.59%
Total	63	

5TH STREET TO 8TH STREET

<u>Crash Type</u>	<u>No.</u>	<u>Percentage</u>
Rear End	43	31.39%
Angle	8	5.84%
Head On	1	0.73%
Hit Pedestrian	1	0.73%
Hit Parked Vehicle	8	5.84%
Same Direction	70	51.09%
Opposite Direction Sideswipe	4	2.92%
Left turn	1	0.73%
Hit Fixed Object	1	0.73%
Total	137	

9TH STREET TO 12TH STREET

<u>Crash Type</u>	<u>No.</u>	<u>Percentage</u>
Rear End	37	19.79%
Angle	2	1.07%
Head On	1	0.53%
Hit Pedestrian	5	2.67%
Hit Parked Vehicle	28	14.97%
Same Direction	108	57.75%
Opposite Direction Sideswipe	4	2.14%
Left turn	2	1.07%
Total	187	

13TH TO JUNIPER STREET

<u>Crash Type</u>	<u>No.</u>	<u>Percentage</u>
Rear End	18	13.24%
Angle	3	2.21%
Hit Fixed Object	2	1.47%
Same Direction	101	74.26%
Hit Pedestrian	2	1.47%
Hit Parked Vehicle	10	7.35%
Total	136	

CORRIDOR WIDE TOTALS

<u>Crash Type</u>	<u>No.</u>	<u>Percentage</u>
Rear End	132	22.30%
Angle	18	3.04%
Head On	2	0.34%
Hit Pedestrian	11	1.86%
Hit Parked Vehicle	60	10.14%
Same Direction Sideswipe	351	59.29%
Opposite Direction Sideswipe	9	1.52%
Left turn	5	0.84%
Hit Fixed Object	4	0.68%
Total	592	

1. SR 2004 Market Street from Front Street to Strawberry Street



Total
Reportable
Crashes
2005 - 2007

COLLISION TYPE	
Pedestrian	3
Angle	1
Same Dir Sideswipe	1
Hit Fixed Object	1
Total	6



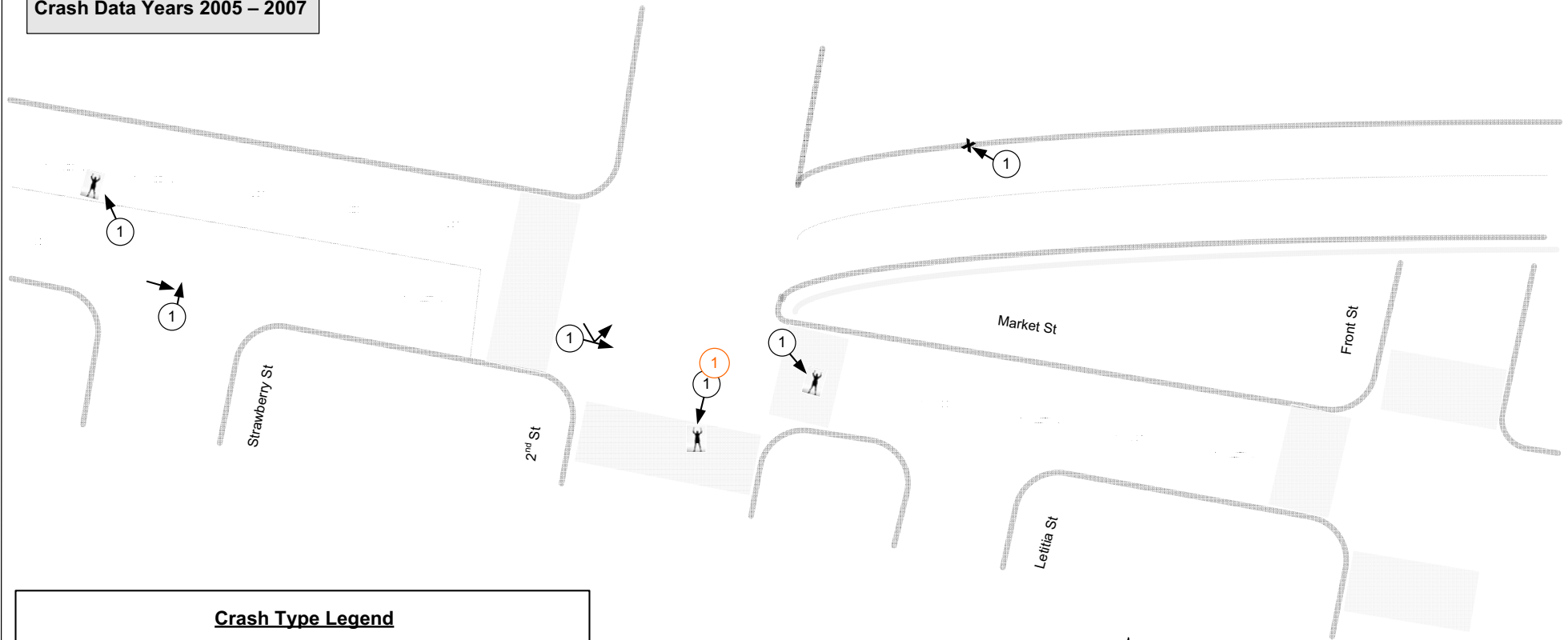
Crash Cluster Location

**Road Safety Audit
Market St, Philadelphia**

Total Crashes = 6
Pedestrian Crashes = 3

1. Front St to Strawberry St

**Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**



Crash Type Legend

- ① = # Crashes ① = # Bus Involved Crash ① = # Bicycle Involved Crash
- Rear End ↘↘ Same Direction Sideswipe
- ↘↘ Angle ↘↘ Hit Parked Vehicle
- X Hit Fixed Object →↘ Hit Pedestrian

SCHEMATIC NOT TO SCALE

Delaware Valley Regional Planning Commission
May 2008

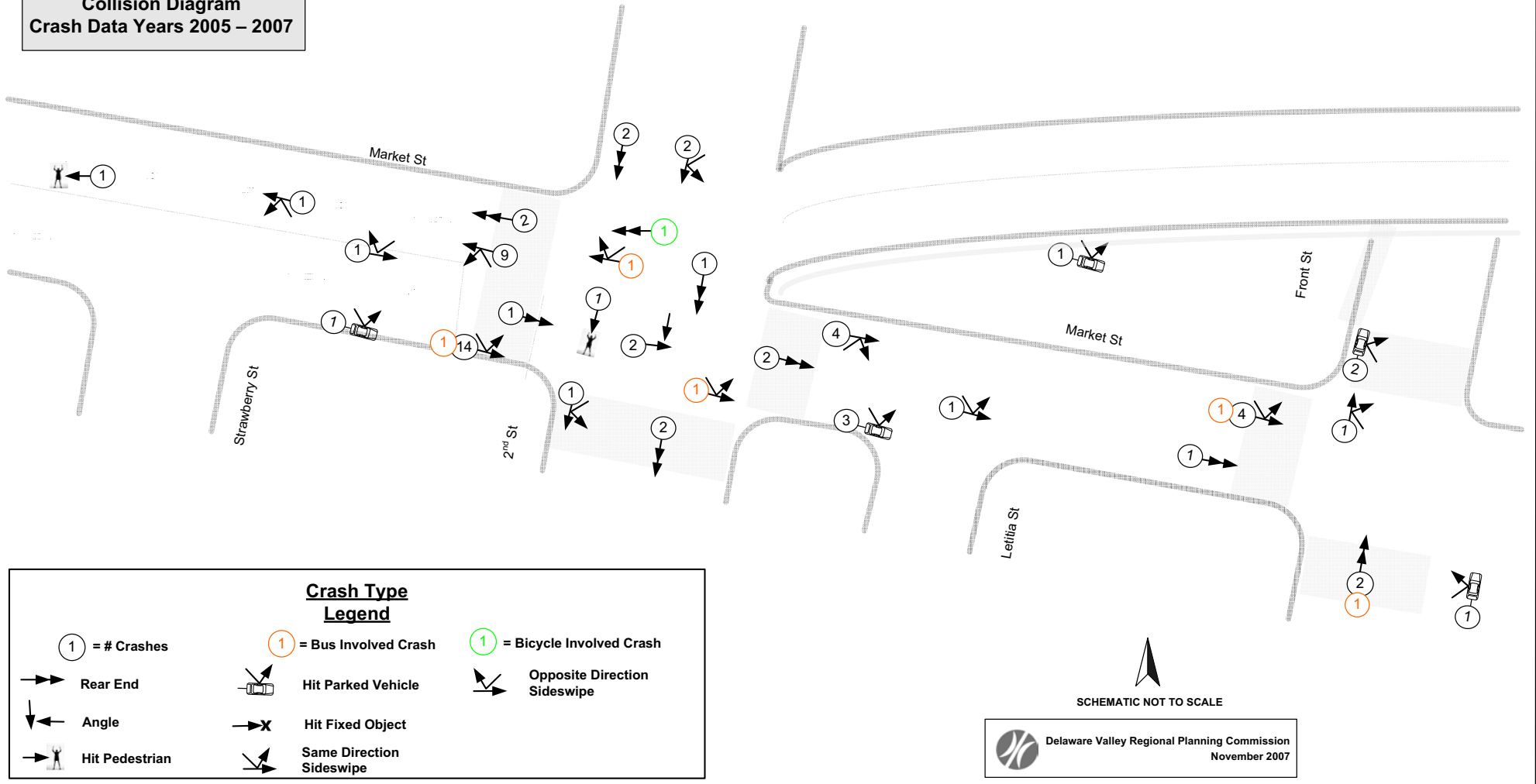
Source: PennDOT Crash Database, 2008

**Road Safety Audit
Market St, Philadelphia**

Total Crashes = 69
Pedestrian Crashes = 2

1. Front St to Strawberry St

**Non-reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**



Source: City of Philadelphia Streets Department

2. SR 2004 Market Street from Bank Street to 4th Street



Total
Reportable
Crashes
2005 - 2007

COLLISION TYPE	
Pedestrian	6
Rear-end	4
Angle	2
Other	1
Total	13



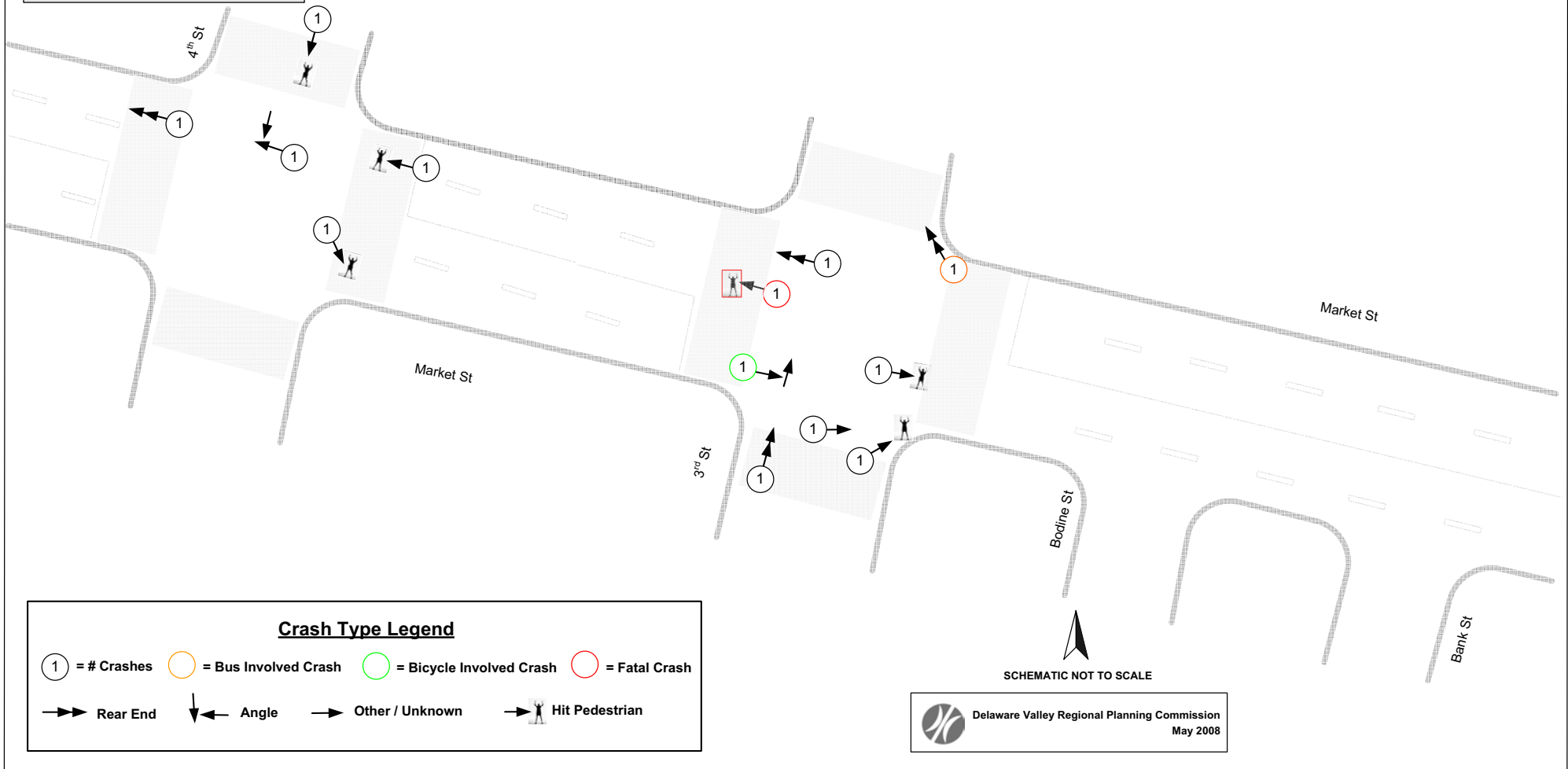
Crash Cluster Location

**Road Safety Audit
Market St, Philadelphia**

Total Crashes = 13
Pedestrian Crashes = 6

2. Bank St to 4th St

**Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

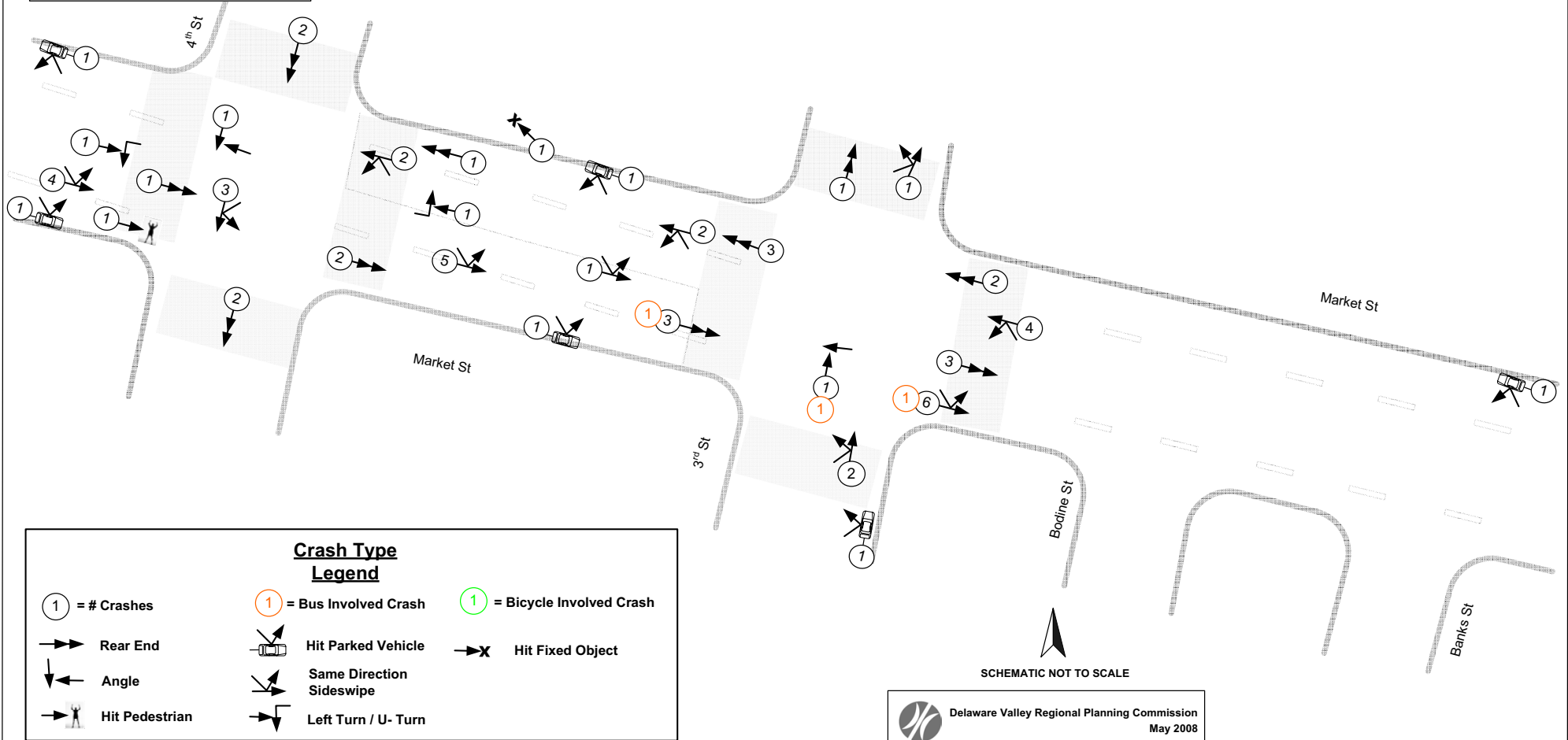


**Road Safety Audit
Market St, Philadelphia**

2. Bank St to 4th St

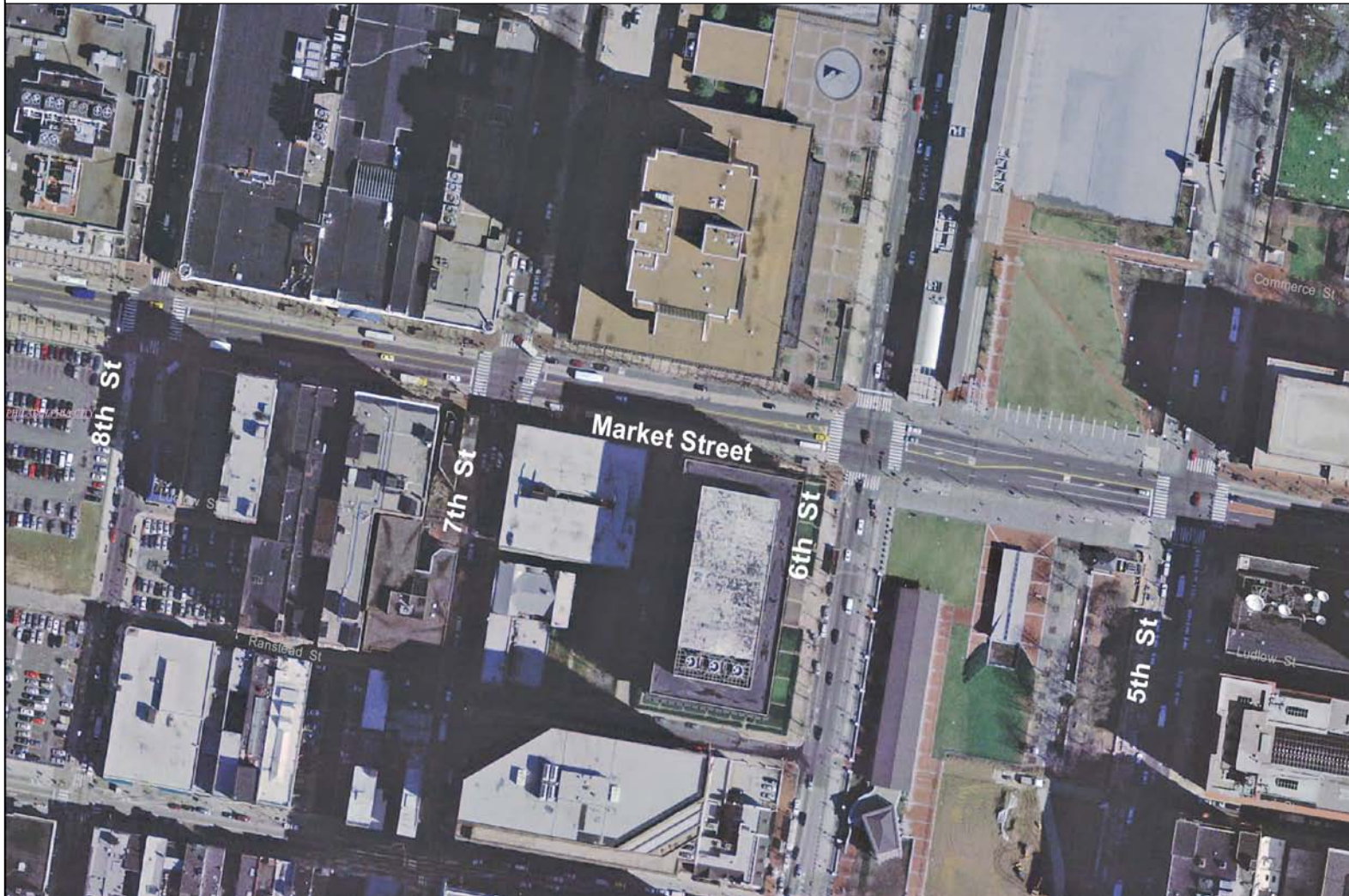
**Non-reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 63
Pedestrian Crashes = 1



Source: City of Philadelphia Streets Department

3. SR 2004 Market Street from 5th Street to 8th Street



Total
Reportable
Crashes
2005 - 2007

COLLISION TYPE	
Pedestrian	9
Angle	7
Rear-end	5
Hit Fixed Object	3
Same Dir Sideswipe	2
Opp Dir Sideswipe	1
Head On	1
Non-collision	1
Total	29



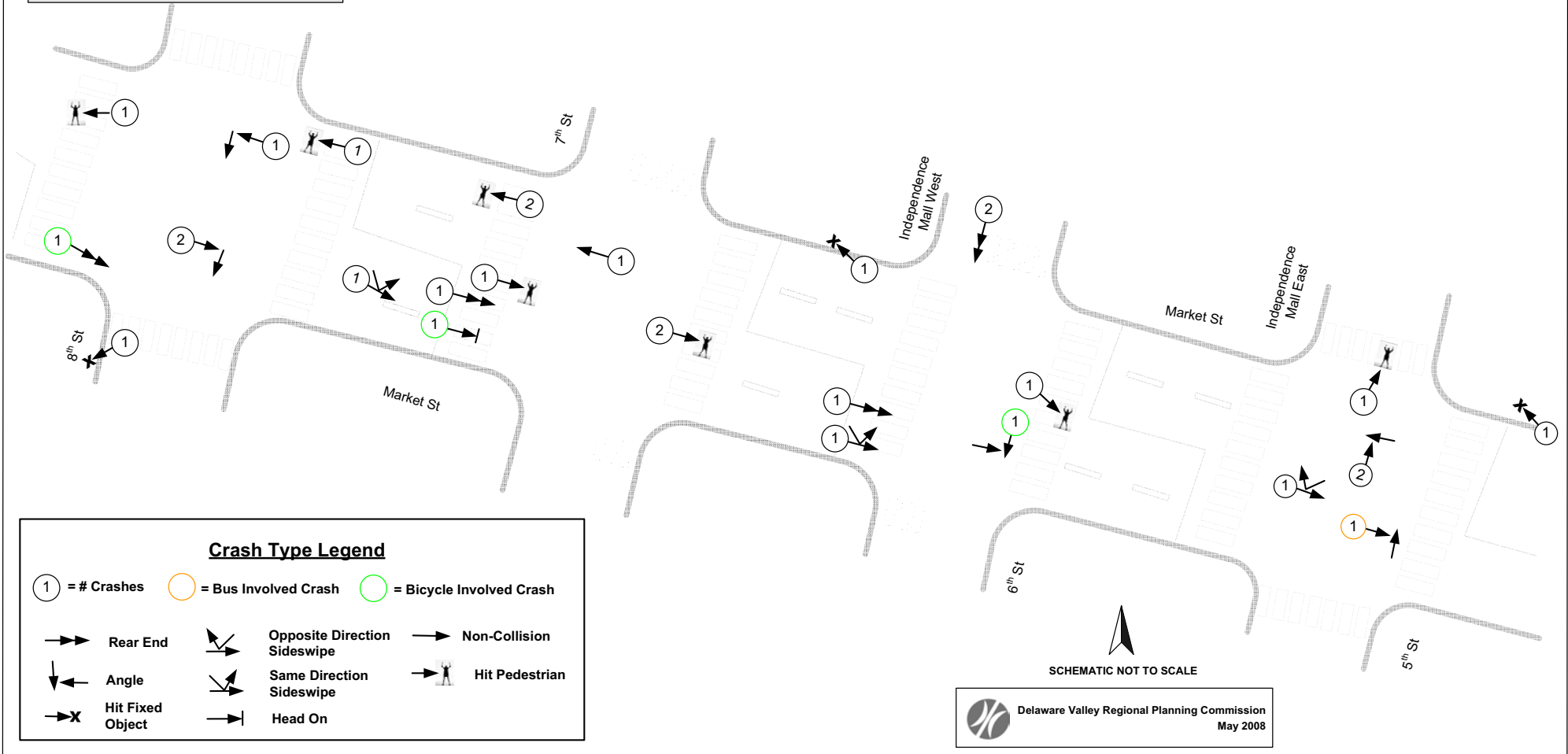
Crash Cluster Location

**Road Safety Audit
Market St, Philadelphia**

3. 5th St to 8th St

**Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 29
Pedestrian Crashes = 9



**Road Safety Audit
Market St, Philadelphia**

3. 5th St to 8th St

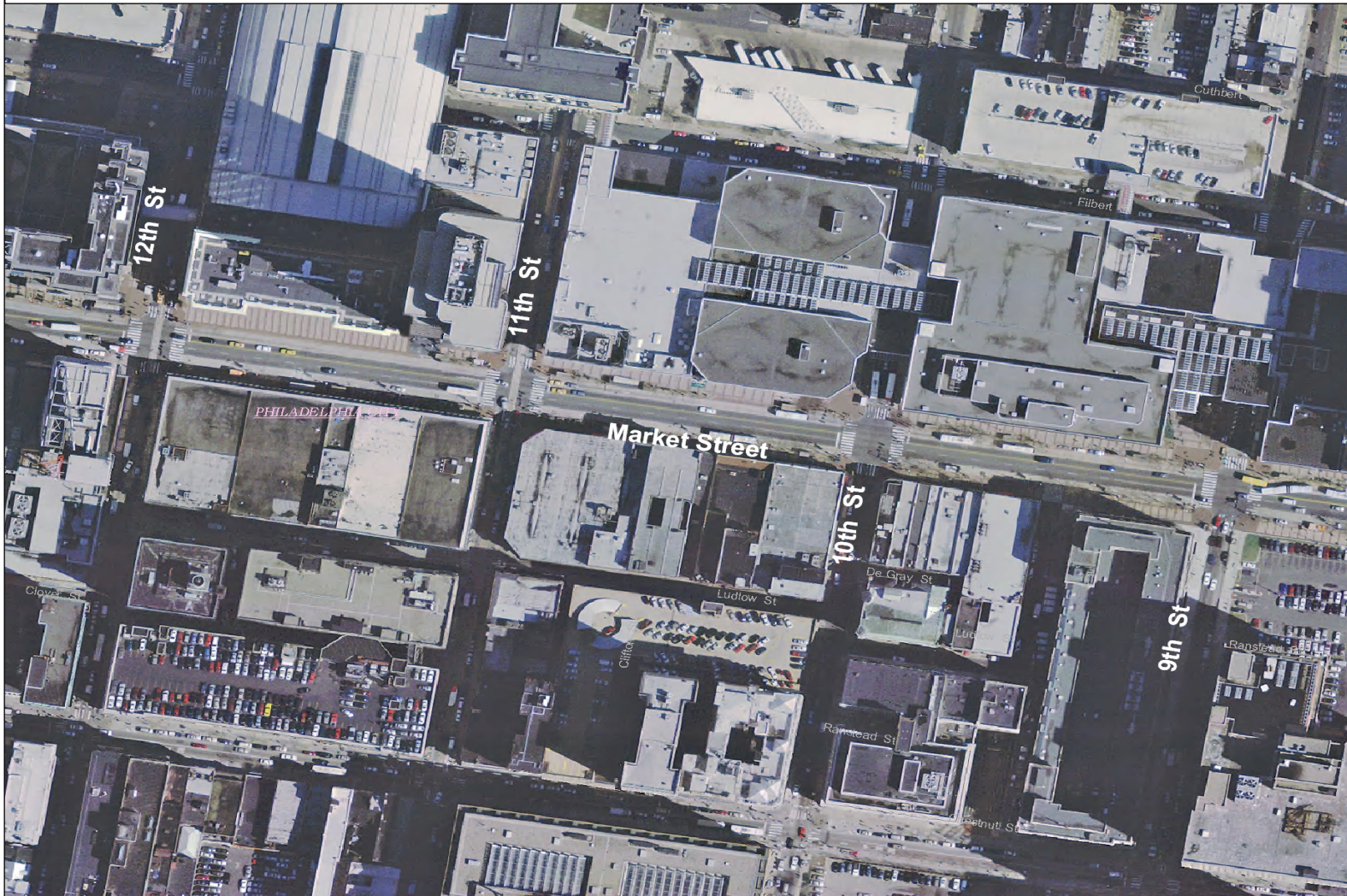
**Non-reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 138
Pedestrian Crashes = 1



Source: City of Philadelphia Streets Department

4. SR 2004 Market Street from 9th Street to 12th Street



Total
Reportable
Crashes
2005 - 2007

COLLISION TYPE	
Pedestrian	35
Rear-end	7
Same Dir Sideswipe	7
Angle	5
Hit Fixed Object	2
Head On	1
Left Turn	1
Other	1
Total	59



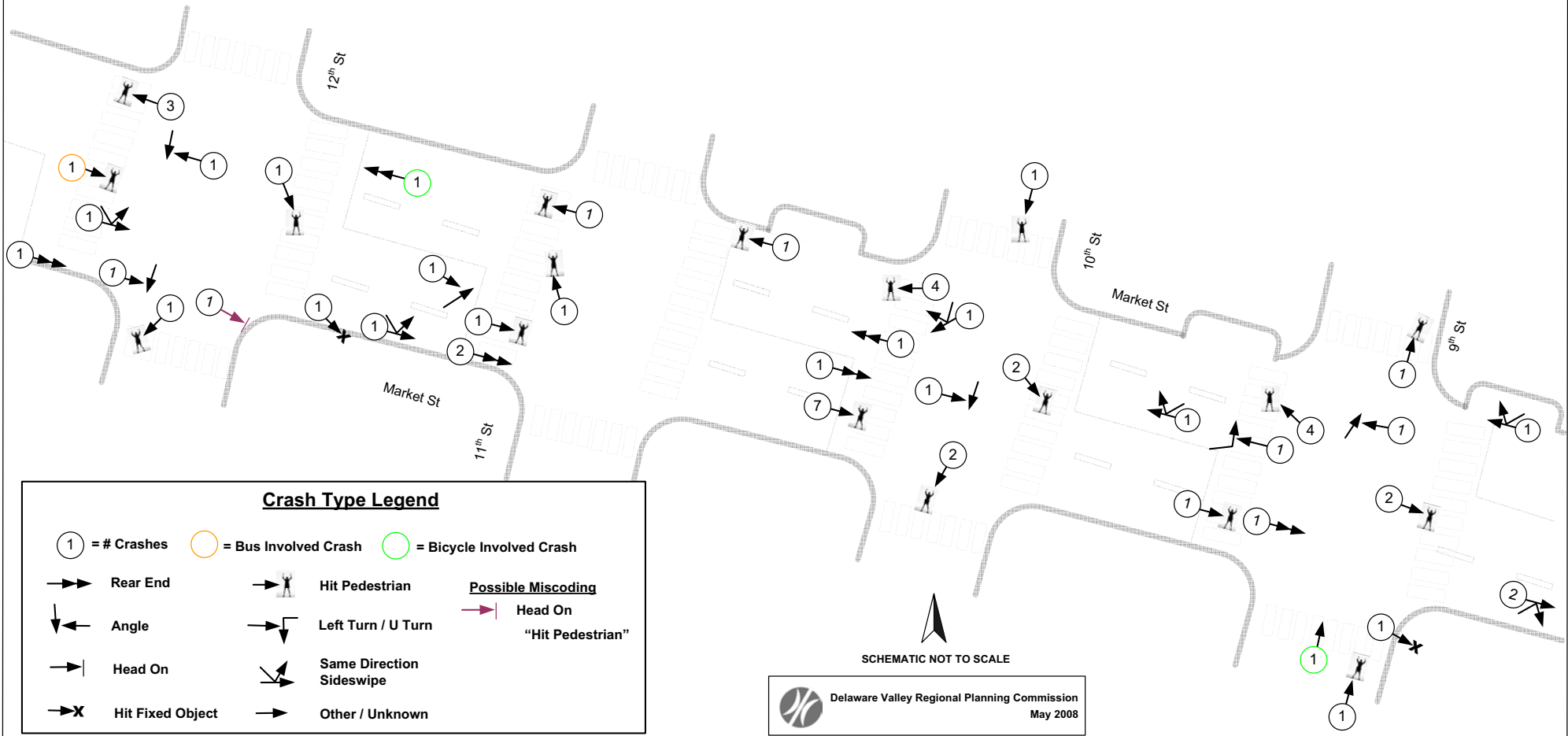
Crash Cluster Location

Road Safety Audit

4. 9th St to 12th St

**Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 59
Pedestrian Crashes = 35



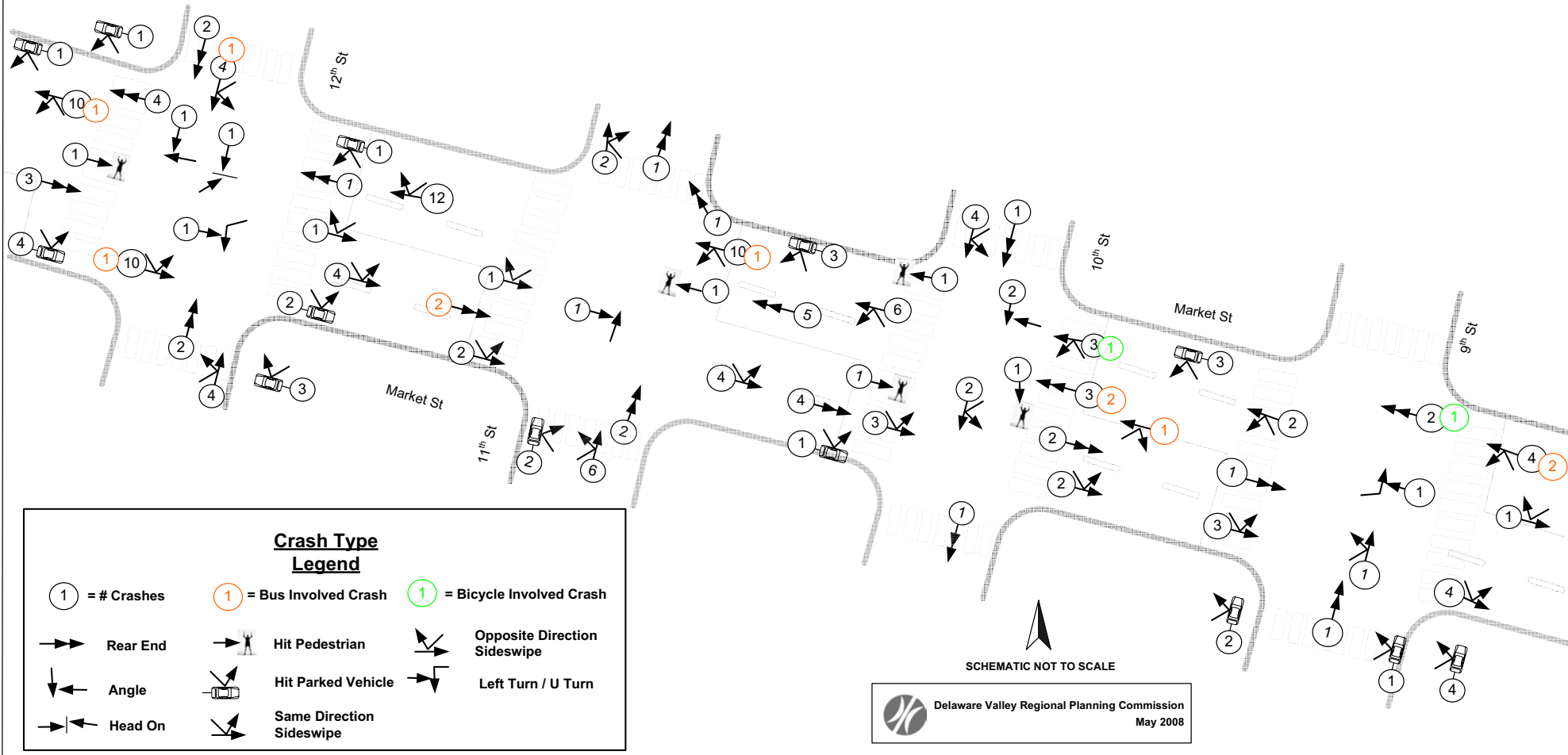
Source: PennDOT Crash Database, 2008

Road Safety Audit

4. 9th St to 12th St

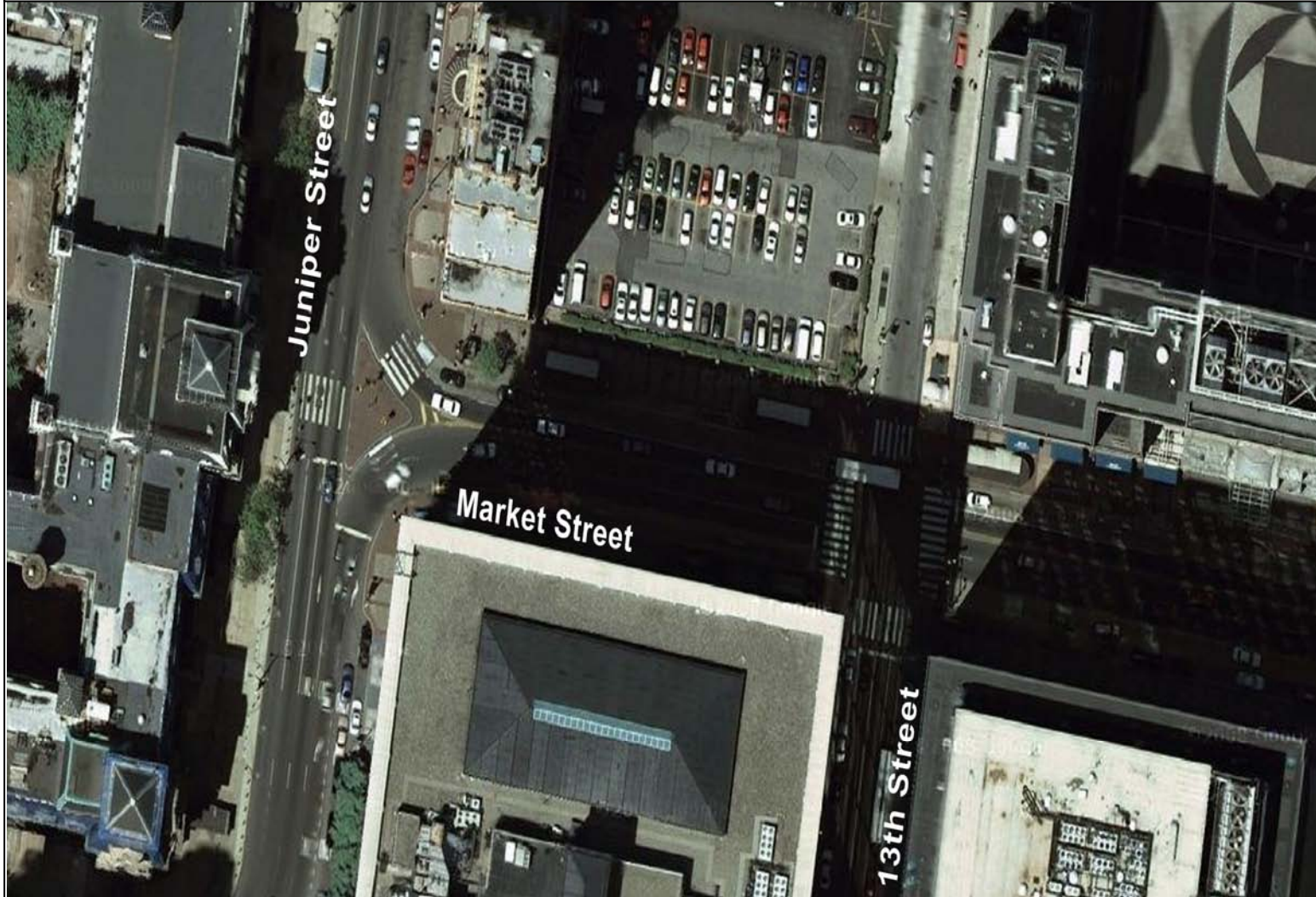
**Non-reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 187
Pedestrian Crashes = 5



Source: City of Philadelphia Streets Department

5. SR 2004 Market Street from 13th Street to Juniper Street



Total
Reportable
Crashes
2005 - 2007

COLLISION TYPE	
Pedestrian	3
Rear-end	3
Same Dir Sideswipe	2
Angle	1
Total	9



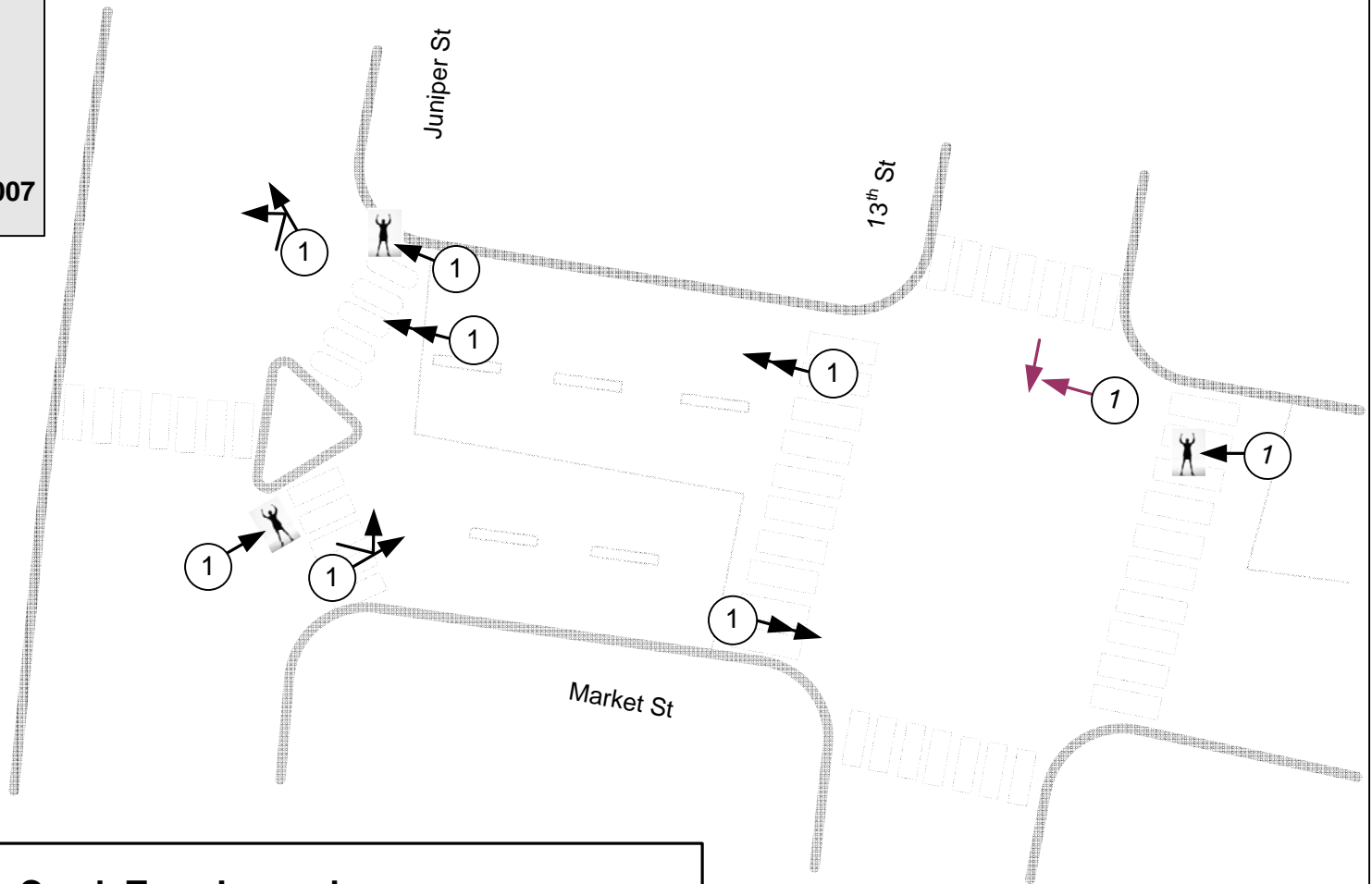
Crash Cluster Location

Road Safety Audit

5. 13th St to Juniper St

**Reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 9
Pedestrian Crashes = 3



Crash Type Legend

① = # Crashes

→→ Rear End

↘↘ Same Direction Sideswipe

Possible Miscoding

↘↘ Angle
↘↘ "Hit Pedestrian"

↓↘ Angle

→↘ Hit Pedestrian



SCHEMATIC NOT TO SCALE



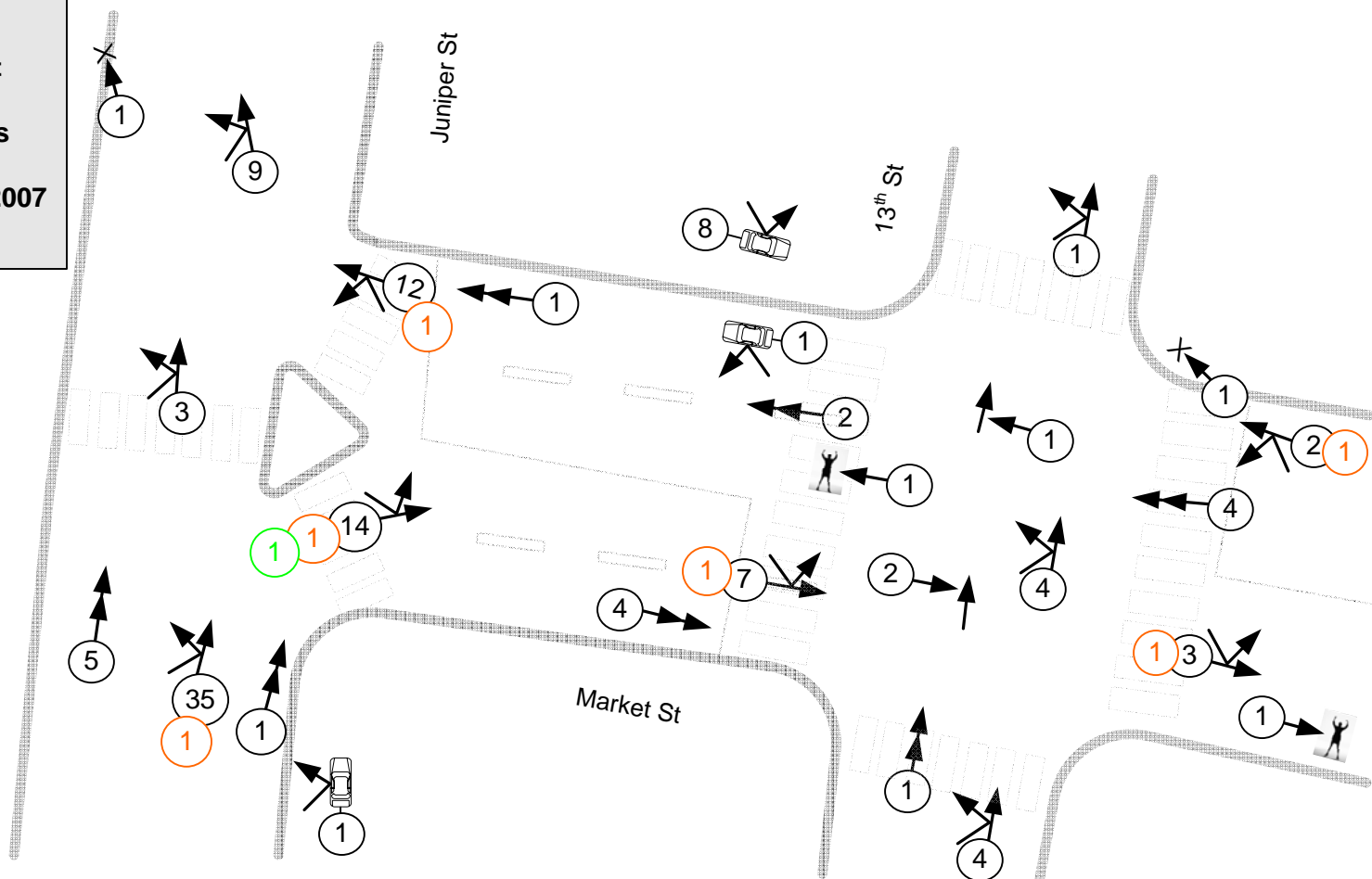
Delaware Valley Regional Planning Commission
May 2008

Road Safety Audit

5. 13th St to Juniper St

**Non-reportable Crashes
Collision Diagram
Crash Data Years 2005 – 2007**

Total Crashes = 136
Pedestrian Crashes = 2




Crash Type Legend

- ① = # Crashes ① = Bus Involved Crash ① = Bicycle Involved Crash
- Rear End →X Hit Fixed Object → Hit Pedestrian
- ↙↘ Angle ↘↘ Same Direction Sideswipe → Hit Parked Vehicle

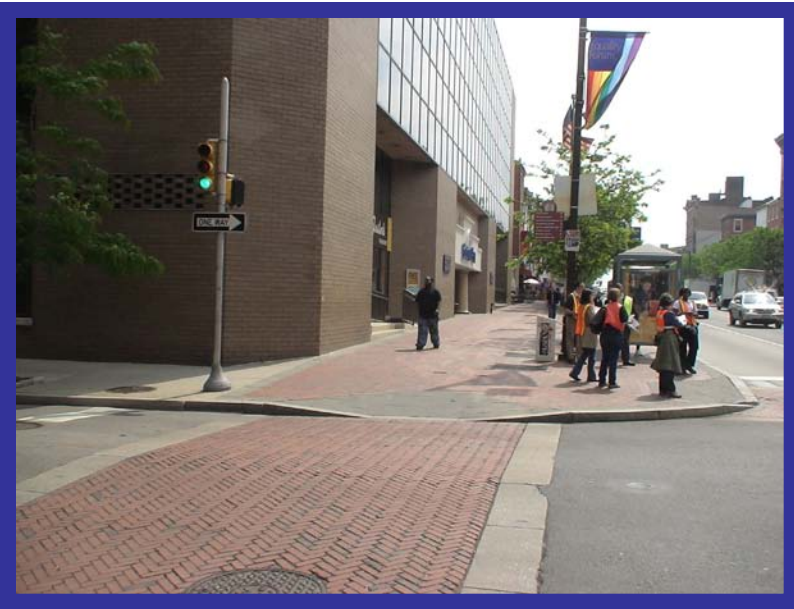


SCHEMATIC NOT TO SCALE



Delaware Valley Regional Planning Commission
May 2008

APPENDIX E
Photo Log



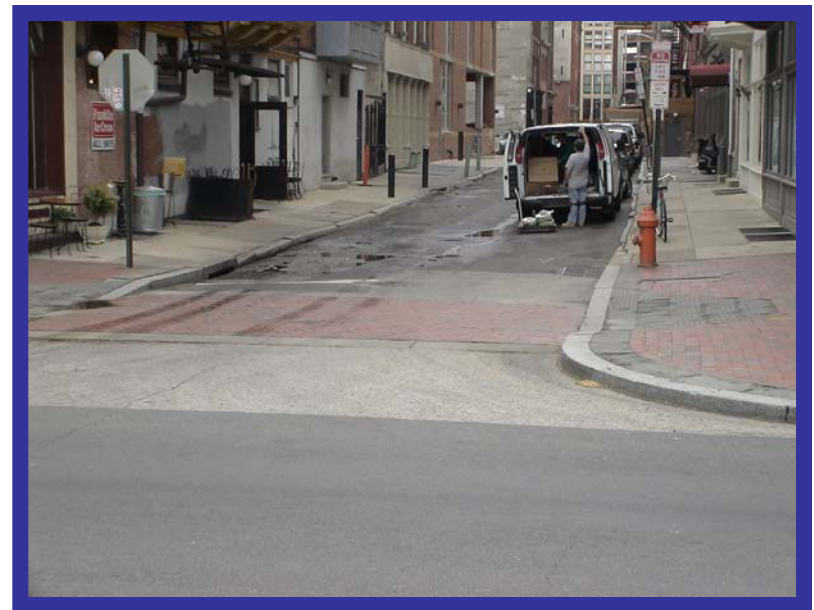
Brick crosswalk across 4th Street with concrete edge line



Crosswalk on Market Street at 11th Street



Crosswalk at South Bodine Street.
Recommend raising the crosswalk to sidewalk level



Crosswalk at South Bank Street.
Recommend raising the crosswalk to sidewalk level



Pooling at the northwest corner of the 5th Street intersection



Pooling at the bus stop near the 13th Street intersection



Pooling at the southwest corner of the 3th Street intersection



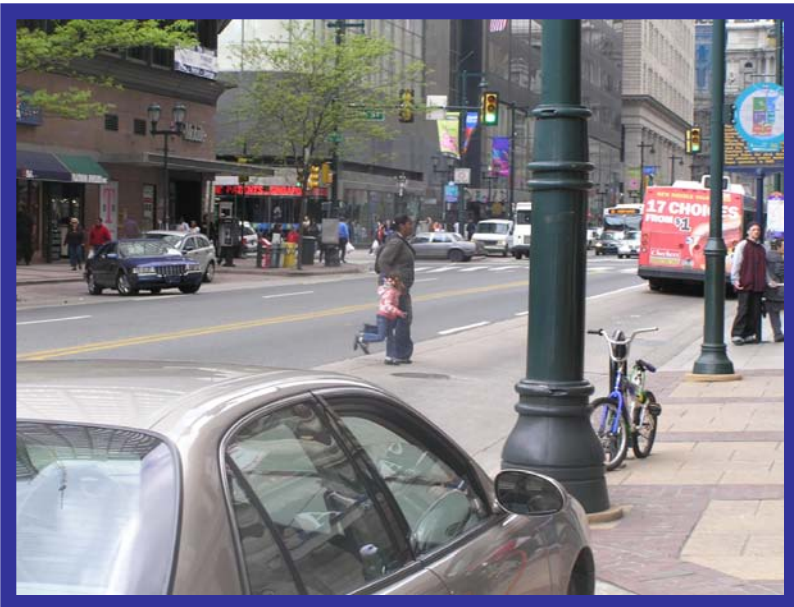
Pooling at the northwest corner of the 5th Street intersection
Pedestrian trying to cross 5th Street



Jaywalking prevalent along Market Street



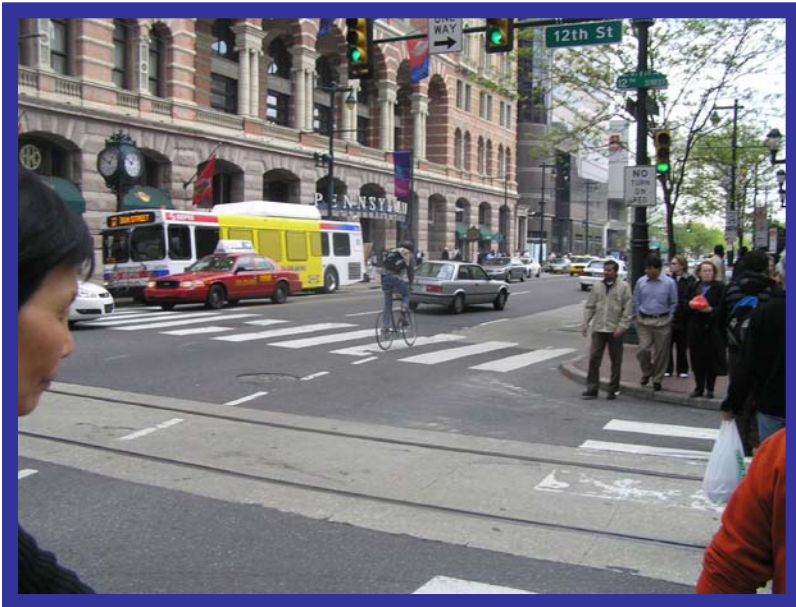
Senior walking in the travel lane along Market Street



Jaywalking prevalent along Market Street



Jaywalking prevalent along Market Street



Faded crosswalk pavement marking across 12th Street



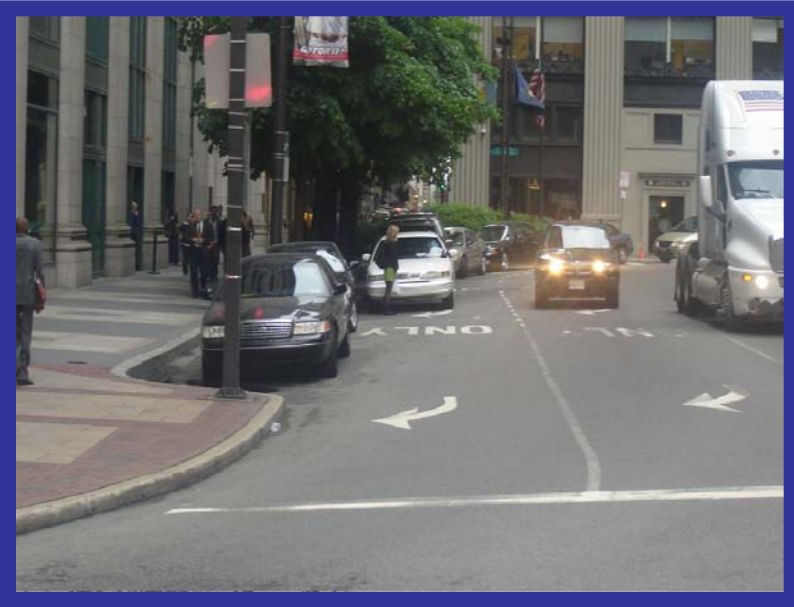
Bus lane pavement markings faded



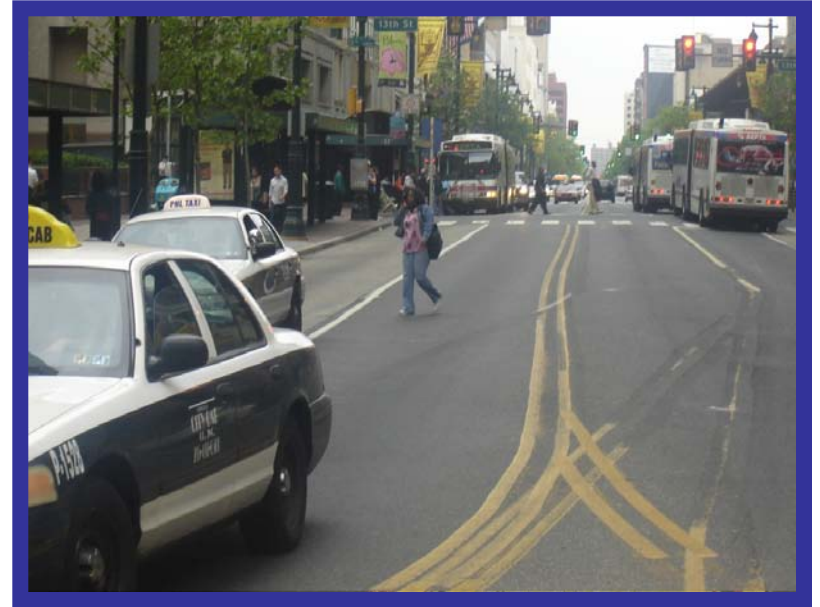
Faded crosswalk pavement marking at Juniper Street



Faded crosswalk pavement marking and deteriorating pavement at 12th Street



Faded crosswalk pavement marking and deteriorating pavement at 12th Street



Confusing pavement marking at Juniper Street



Faded crosswalk pavement marking at Juniper Street



No pavement marking to guide motorist on Juniper Street, north of Market Street



Deteriorating pavement at the entrance to I-95 southbound ramp



Deteriorating pavement between 7th and 8th Streets



Deteriorating pavement between 13th and Juniper Streets



Deteriorating pavement across 12th Street



Newspaper boxes blocking the curb ramp at 2nd Street



Damaged curb ramp common at many intersections in the corridor



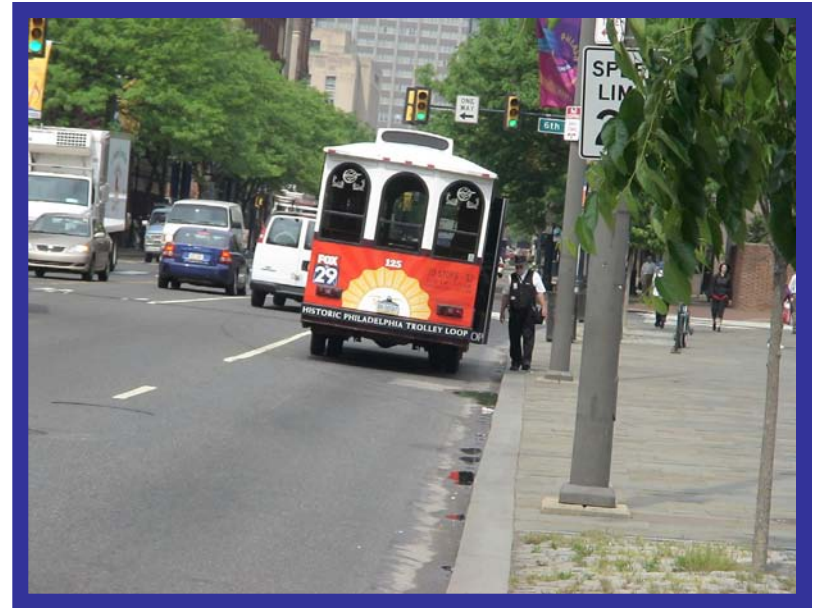
Damaged curb ramp common at many intersections in the corridor



Damaged curb between 2nd and 3rd Streets



Parked delivery truck blocking sidewalk



Trolley parked in the travel lane in front of the Visitors Center at 6th Street



Double parked delivery truck between 3rd and 4th Streets



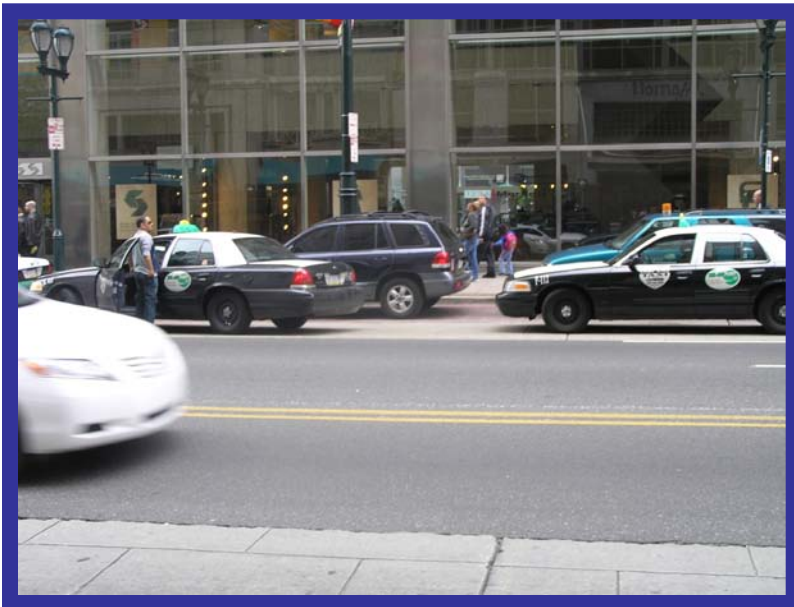
News van parked on sidewalk between 3rd and 4th Streets



Vehicles parked at the bus stop



Vehicles parked illegally in loading area forcing others to load in the travel lane



Taxis double parked in the bus lane



Taxis compete with other vehicles to park in the loading areas



Pedestrian/vehicle conflict at 13th Street



Pedestrian/vehicle conflict at 3rd Street



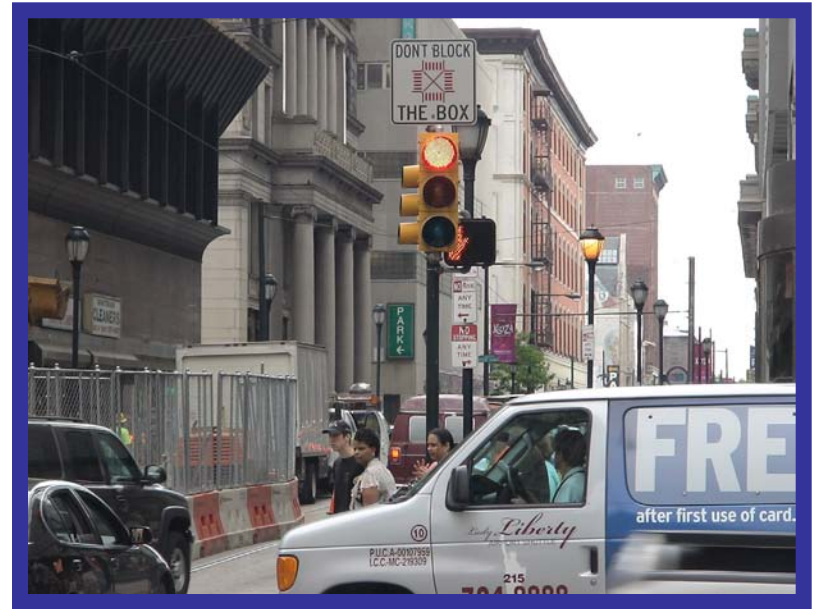
Pedestrian/vehicle conflict at 12th Street



Pedestrian/vehicle conflict at 5th Street



Pedestrian/vehicle conflict at 5th Street



Twisted traffic signal head at 13th Street



Newspaper stand blocks sight distance at Juniper Street



Pedestrian entrance to Penns Landing at 2nd Street



Loose bricks on the sidewalk



Standpipe in the middle of the sidewalk between 8th and 9th Streets



Missing brick on the sidewalk



Vent in the middle of the sidewalk between 9th and 10th Streets



Cover removed from utility shut-off access



Tree grate lifting



Brick median on Market Street between 2nd and 5th Streets
Bicyclists observed using the median as travelway



Eastbound Market Street left turning traffic backed up at the 5th Street intersection



Bicyclist using the sidewalk between 5th and 6th Streets



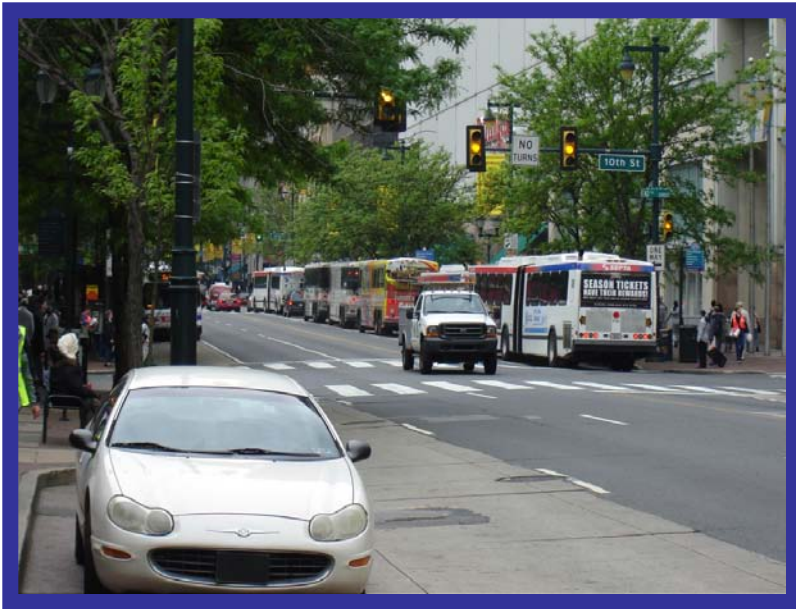
Bicyclist using the sidewalk between 7th and 8th Streets



Bicycle and pedestrian traffic at 11th Street



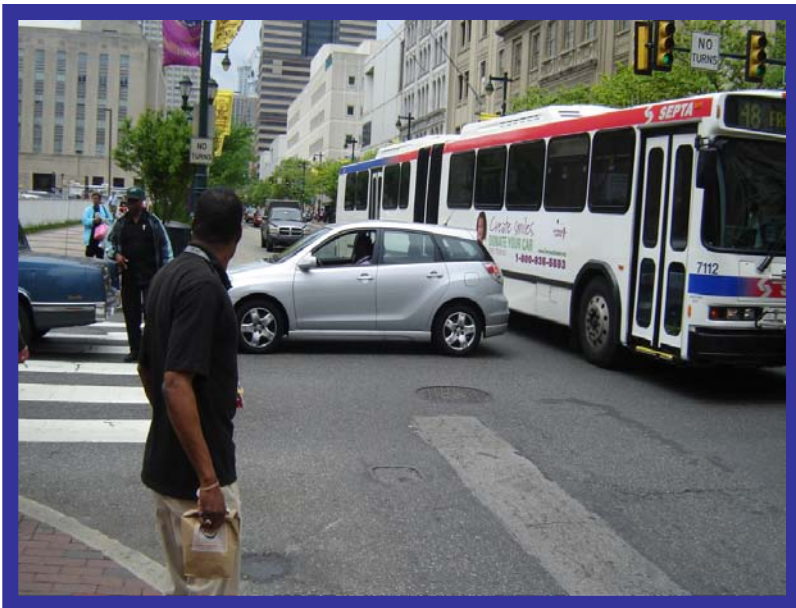
Bicycle and pedestrian traffic mix at Juniper Street



Bus traffic along westbound Market Street



Bus traffic along Market Street and its cross streets



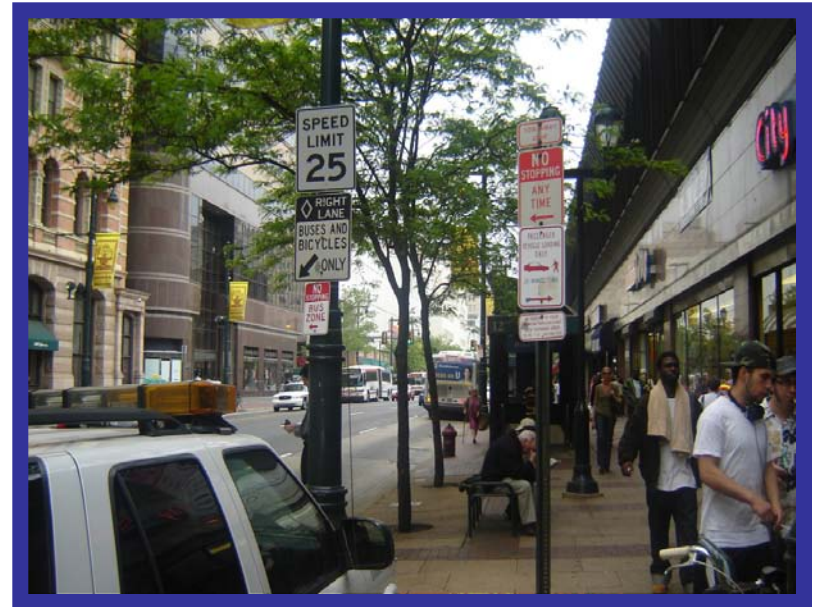
Mix of pedestrians, buses and cars at 8th and Market Streets



8th Street Station for PATCO and the Broad Street and Frankfort Subway Lines



Signs mounted too low



Signs mounted too low



Damaged signs west of 13th Street



I-95 directional sign mounted on mast arm – no previous signage



Damage to the walls of the I-95 southbound ramp



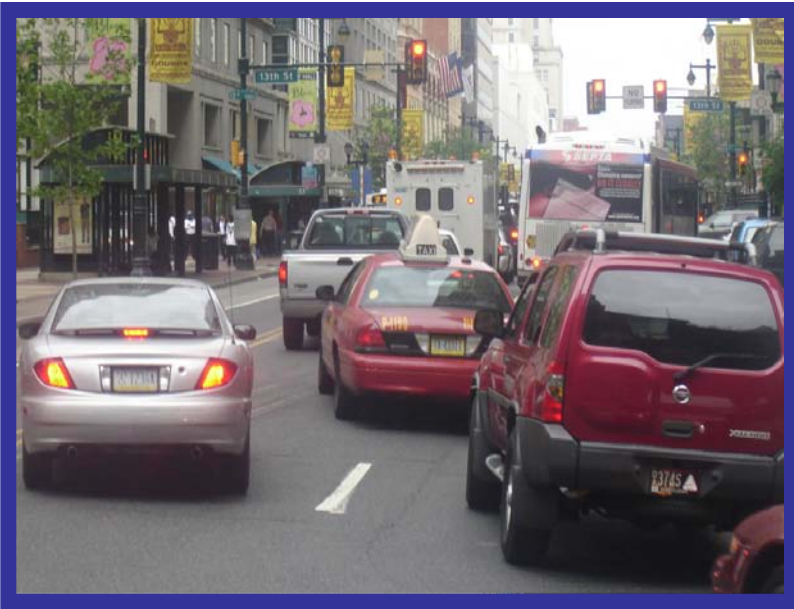
Damage to the walls of the I-95 southbound ramp



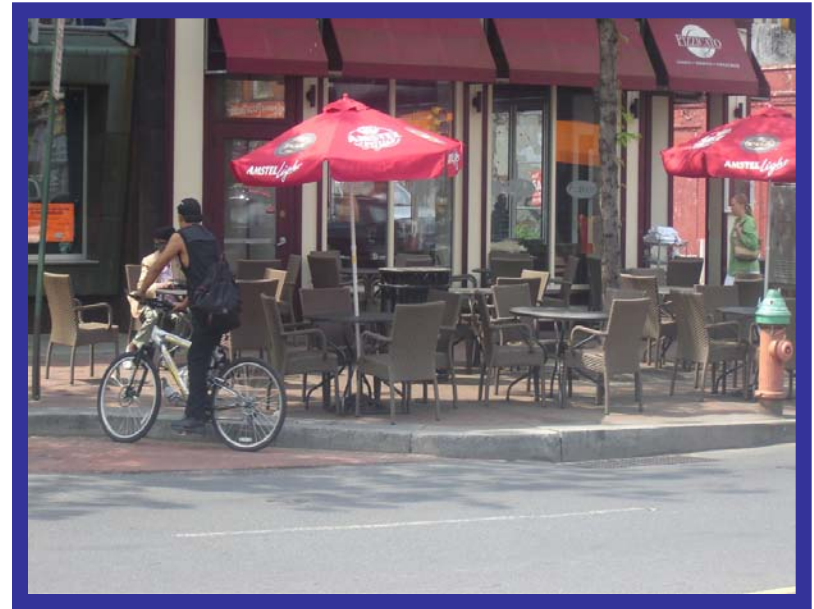
Truck making a right turn on to Market Street from southbound 2nd Street – doing so across the median into oncoming traffic. SEPTA buses which also make this turn have the same difficulty



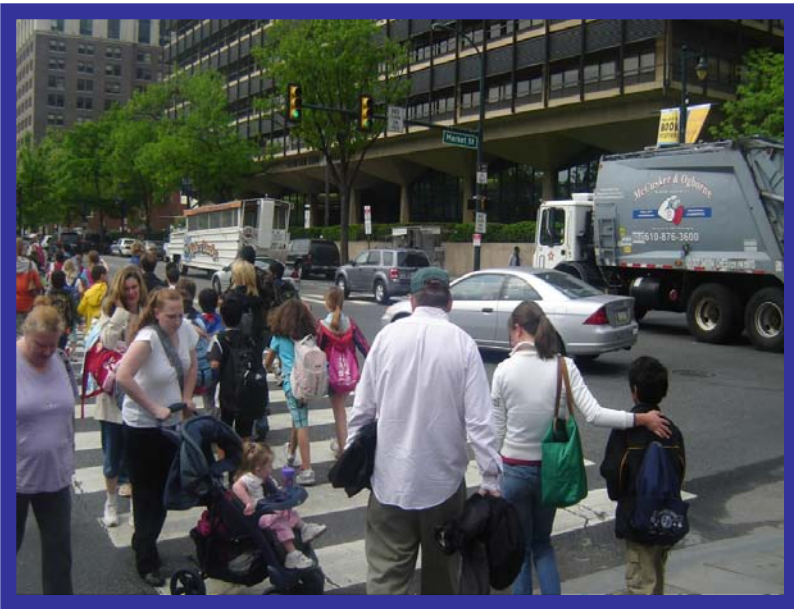
Truck making a right turn on to Market Street from southbound 2nd Street – doing so by riding the sidewalk



Confusion on eastbound Market Street from the Juniper Street turn



Sidewalk blocked by restaurant furniture



High pedestrian volumes at 6th Street



High pedestrian volumes at 10th Street

APPENDIX F

Prompt List

**DELAWARE VALLEY REGIONAL PLANNING COMMISSION
MARKET STREET ROAD SAFETY AUDIT**

PROMPT LIST

Audit Team Member _____

GENERAL ISSUES

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Drainage	Do drainage items seem to be adequate?		
	Are drainage items clear of debris?		
2 Public Utilities	Are boxes, poles, and/or posts located in a safe position?		
	Do the above items interfere with sight distance?		
3 Access Management	Are there locations where access management is problematic?		
	Are driveways placed close to crossing?		
4 Lighting	Is lighting needed in specific locations?		

ALIGNMENT AND CROSS SECTION

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Visibility	Are sight distances adequate for the speed of traffic on Market Street?		
	Is adequate sight distance provided at intersections?		

2 Driver expectation	Are there any sections of the roadway which may cause driver confusion such as:		
	a. Is alignment of roadway clearly defined?		
	b. Are crossroads or hidden driveways properly signed along corridor?		
	c. Do streetlight and tree lines conform with the road alignment?		
3 Widths	Are all the traffic lanes and roadway widths adequate?		

INTERSECTIONS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Location	Are there any roadside objects nearby which would intrude on drivers line of sight?		
	Are the intersections adequate for all vehicular movements?		
2 Controls	Are pavement markings and intersection control signing satisfactory?		
	Are there any pedestrian signals?		
3 Signage	Is the intersection appropriately signed?		
	Are signs appropriately located and of the appropriate size?		

4 Layout	Is the intersection layout obvious to all users?		
	Is the alignment of curbs satisfactory?		
	Are turning radii and tapers appropriate?		
5 Visibility, sight distance	Is sight distance adequate for all movements and all users?		
	Does a skewed intersection direct drivers focus away from crossing pedestrians?		
	Is the distance to the stop line to the crosswalk sufficient for drivers to see pedestrians?		
6 Transit	Are there bus stops located near the intersections?		
	a. If so are the bus stops near side or far side?		
7 Turn Lanes	Do the turning lanes have sufficient storage?		
	Are there locations where a left-turn lane needs to be provided?		
	Do turning vehicles pose a hazard to pedestrians?		

TRAFFIC SIGNALS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Signal Operation	Are traffic signals operating correctly? (Example clearance time)		
2 Visibility	Are traffic signals clearly visible to approaching motorists?		
3 Signal Upgrading	Do the signals need to be upgraded?		
4 Pedestrian Signal Timing	Are traffic and pedestrian signals timed so that wait times and crossing times are reasonable?		
	Is there a problem because of an inconsistency in pedestrian actuation (or detection) types?		
	Are all pedestrian signals and push buttons functioning correctly and safely?		
	Are ADA accessible push buttons provided and properly located?		
	Are there locations where a pedestrian signal is warranted?		

PEDESTRIANS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Land Use Factors	Are there schools, transit stations, or other pedestrian generators nearby?		
2 Sidewalks	Are sidewalks continuous throughout the corridor?		
	Are the sidewalks in good conditions		

	(uneven, cracked, etc.)?		
	Is walking surface adequate and well-maintained?		
	Are the sidewalks wide enough to accommodate persons using mobility aides?		
	Is the sidewalk width adequate for pedestrian volumes?		
	Are there any conflicts between bicycles and pedestrians on sidewalks?		
3 Driveways	Are the conditions at driveways intersecting sidewalks endangering pedestrians?		
	Do drivers look for and yield to pedestrians when turning into and out of driveways?		
4 Facilities at Intersections	Are crosswalks provided at intersections?		
	Are the pedestrian ramps adequate?		
	Is there any pedestrian refuge islands needed at key intersections?		
	Are there pedestrian signals located at intersections?		
	Is the intersection clearly delineated for the visually impaired?		
	Is there adequate drainage at the intersection to prevent ponding?		
5 Market Street	Is the speed limit appropriate for all road users?		

	Is there on street parking that would impede pedestrian visibility?		
	Are there safety concerns for pedestrian crossings at unsignalized intersection?		
	Are measures necessary to direct pedestrians to safe crossing points and pedestrian access?		
	Do pedestrian or driver behaviors increase the risk of a pedestrian collision?		
6 Lighting	Is the sidewalk adequately lit for pedestrians to see and feel safe?		
	Are there dark places or hiding places which represent a personal security issue?		
	Are the pedestrian crosswalks adequately lit for pedestrians and motorists?		
7 Visibility and Sight Distance	Are pedestrians waiting to cross visible to motorists?		
	Can pedestrians see approaching vehicles?		
	Are there temporary or permanent obstructions near crosswalks (parked vehicles, vegetation, fences, etc.)		
Signs and Pavement Markings	Is the visibility of signs and pavement markings adequate during the day and night?		
	Are pedestrian travel zones clearly signed and delineated?		
	Is paint on stop bars, crosswalks worn, or are signs worn, missing, or damaged?		

BICYCLISTS

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
	Are there share the road signs posted?		
	Is the road surface of suitable quality for bicyclists?		
	Are drainage grates bicycle friendly?		
	Are parked vehicles an obstruction to bicyclists?		

TRANSIT

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1	Are bus stops located at the far side or near side of the intersection?		
Buses	Is sight distance to bus stops adequate?		
	Are open sight lines maintained between approaching buses and passenger waiting and loading area?		
	Are appropriate signs and pavement markings provided for transit stops?		
	Are safe pedestrian crossings convenient for transit users?		
	Are there adequate waiting areas for pedestrians around bus stops (shelter or bench)?		

	Are bus stop locations safe for passengers boarding and disembarking the bus?		
	Is fencing needed at transit facilities?		
	Are vehicles illegally parked at bus stops?		

ON STREET PARKING

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Parking	Are there time parking restriction signs posted?		
	Does parking obstruct bicycle or through lane traffic?		
	Is parking located at the edge of intersections which could cause conflict for right-turning traffic?		
	Does parking obstruct vehicular or pedestrian movement?		

SIGNAGE, PAVEMENT MARKINGS, DELINEATION AND LIGHTING

<u>Item #</u>	<u>Description</u>	<u>Check</u>	<u>Comments</u>
1 Signage	Are there signs missing from key locations?		
	Are signs easy to understand?		

	Are the correct signs used for each situation, and is each sign necessary?		
	Are signs effective for all likely conditions (i.e. day, night, oncoming headlights etc)?		
	Are there locations where there is sign clutter?		
	Are all necessary regulatory, warning, and direction signs (including detours) in place? Are they conspicuous?		
	Are they redundant?		
	Are traffic signs in their correct locations, and properly positioned with respect to lateral clearance and height?		
	Are signs placed so as to restrict sight distance, particularly for vehicles?		
	Do sign supports conform to guidelines?		
2 Pavement Markings and Delineation	Do existing pavement markings need to be re-painted?		
	Have raised pavement markers been installed?		
	Are pavement markings easily visible and effective for all likely conditions (i.e. at night, day, inclement weather etc.)?		
	Are guide posts correctly placed, clean, and visible?		
	Are marked crosswalks wide enough?		

3 Lighting	Is appropriate lighting installed at intersections, pedestrian and bicycle crossings?		
	Are the appropriate types of poles used for all locations and correctly installed?		
	Are all locations free of any lighting which may conflict visually with signs?		

PAVEMENT

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

APPENDIX G
Response Sheet

**MARKET STREET ROAD SAFETY AUDIT
RESPONSE SHEET**

Corridor-wide Issues	Potential Strategies	<u>Decision</u> Agree/Reject	<u>Planned</u> Completion Date	<u>Comments</u>
<p><u>Pavement markings:</u></p> <ul style="list-style-type: none"> • Faded at crosswalks; • Poor quality; • Lack retro-reflectivity; and • Most side streets in the corridor have no lane lines or directional pavement markings for motorists' guidance. 	<ul style="list-style-type: none"> • Conduct an inventory of pavement markings in the corridor. • Re-stripe Market Street (lane lines, crosswalks, etc.) with a more durable material (thermal epoxy) with reflectivity. • Stripe the side streets as appropriate. 			
<p><u>Sidewalks:</u></p> <ul style="list-style-type: none"> • Brick and concrete slabs are loose or missing; • Curb ramps are crumbling and in some cases are not ADA compliant, • Broken curbs in sections; • Steel grates around trees are uneven; and • Some trees (between 10th and 11th Streets) do not have grates and creates drop offs and presents tripping hazard for pedestrians. 	<ul style="list-style-type: none"> • Coordinate with Street Departments, Center City District and property owners to repair, replace and upgrade as appropriate. • Make steel grates flush with the sidewalk. • Replace steel grates around the trees and make flush with sidewalk. 			

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<p><u>Brick Crosswalks:</u></p> <ul style="list-style-type: none"> • Utilities in crosswalks are not flush, presents a tripping hazard; • The brick treatment provides no skid resistant and difficult for the wheelchair bound to navigate; • Some of the bricks are loose; • Bricks are not highly visible; and • Crosswalk is not delineated per MUTCD standards. 	<ul style="list-style-type: none"> • Replace the brick in the crosswalks - tire grip or stamped asphalt. • Add a minimum of 2 lines to delineate crosswalk per MUTCD standards. 			
<p><u>Jay walking:</u></p> <ul style="list-style-type: none"> • This is common in the corridor 	<ul style="list-style-type: none"> • Enforce existing jaywalking statutes. 			
<p><u>Pedestrian/vehicle turning conflicts:</u></p> <ul style="list-style-type: none"> • There are pedestrian/vehicle turning conflicts at the Market Street intersections due to the high pedestrian volumes. 	<p>Consider retiming the traffic signal to include:</p> <ul style="list-style-type: none"> • a lead pedestrian phase; or • determine if pedestrian scrambles for the intersections is an appropriate and effective treatment and implement accordingly. 			

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<u>All-red Signal Timing:</u> <ul style="list-style-type: none"> The all-red signal timing phase for Market Street is too short for clearance. 	<ul style="list-style-type: none"> Increase the all-red phase. 			
<u>Pedestrian Crossing Timing:</u> <ul style="list-style-type: none"> Inadequate time for pedestrians to cross Market Street after count down start (8 seconds). 	<ul style="list-style-type: none"> Increase the pedestrian count down timing. 			
<u>Pedestrian signal heads:</u> <ul style="list-style-type: none"> Some cross street intersections do not have pedestrian count down signal heads. 	<ul style="list-style-type: none"> Install pedestrian signal heads with man/hand indication and countdown timing. Provides consistency for the pedestrian throughout the corridor. 			
<u>Traffic signal heads:</u> <ul style="list-style-type: none"> The signal heads on side streets are post mounted; this creates difficulty for some motorists. 	<ul style="list-style-type: none"> Mount side street signal heads on overhead mast arms. 			
<u>Bus lanes:</u> <ul style="list-style-type: none"> Poorly marked; Not highly visible; and Mis-used – vehicles parked in the bus lanes. 	<ul style="list-style-type: none"> Draft and implement a pavement marking plan and delineation for bus lane. Add “no standing anytime” signs for bus lanes. 			

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<u>Bus lanes continued:</u>	<ul style="list-style-type: none"> Coordinate with SEPTA police and Philadelphia Parking Authority (PPA) for enforcement on “no parking” in the lanes. 			
<u>Bicyclists:</u> <ul style="list-style-type: none"> These road users are traveling on the roadway center lines between opposite direction traffic. 	<ul style="list-style-type: none"> Install centerline rumble strip to deter this practice. <p><i><u>Two different patterns are needed – one section is a 4-foot brick median</u></i></p>			
<u>Deliveries:</u> <ul style="list-style-type: none"> Delivery trucks are double parked on Market Street – disrupts the flow of traffic 	<ul style="list-style-type: none"> Convert specified curbside parking to loading areas during specific times of the day. 			
<u>Speed Limit:</u> <ul style="list-style-type: none"> The 25 MPH speed limit needs to be reinforced. 	<p>Conduct an inventory to determine locations:</p> <ul style="list-style-type: none"> Consider adding 25 MPH pavement marking to reinforce the speed limit; and Examine the viability of object marker type (orange diamond) speed limit signs. 			

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<p><u>Sidewalk Newspaper Boxes:</u></p> <ul style="list-style-type: none"> The newspaper boxes are blocking the visibility of pedestrians near the curb ramps (intersections of Market Street with Juniper, 13th, and 2nd Streets. 	<ul style="list-style-type: none"> Relocate the newspaper boxes from curb ramps. 			
<p><u>Drainage:</u></p> <ul style="list-style-type: none"> Water pools at the curb ramps. 	<ul style="list-style-type: none"> Conduct an inventory of ponding areas, and coordinate with Philadelphia Street Department and Center City District to correct the drainage problem at these locations. 			
<p><u>Access at Side Streets and Alleys:</u></p> <ul style="list-style-type: none"> The smaller alleys and side streets in the historic area lacked curb ramps or had curbs ramps which did not comply with ADA. 	<ul style="list-style-type: none"> Consider making the crossings level with the sidewalk (raised crosswalk) with ramps for vehicular traffic. 			
<p><u>Bus Stops:</u></p> <ul style="list-style-type: none"> Frequent bus stops on every block. 	<ul style="list-style-type: none"> Coordinate with SEPTA and NJ Transit to consider less frequent stops matched with connection points. 			

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<p><u>“Do not Block the Box” Signs:</u></p> <ul style="list-style-type: none"> • “Do not Block the Box” signs are inconsistent (style and location). 	<ul style="list-style-type: none"> • Determine the safety effects of these signs and address accordingly. 			
<p><u>Sideswipe Crashes:</u></p> <ul style="list-style-type: none"> • A large number of non-reportable sideswipe crashes occurs in the corridor (weaving, congestion, double parking). 	<ul style="list-style-type: none"> • Consider the application of a highly visible thermoplastic dashed rumble stripped lane lines that provide delineation at all times of the day and an audible noise/vibration when traveled over. 			

Site Specific Issues	Potential Strategies	<u>Decision</u> <u>Agree/Reject</u>	<u>Planned</u> <u>Completion Date</u>	<u>Comments</u>
Front Street:				
<ul style="list-style-type: none"> There are no warning signs posted for the geometry prior to entering the I-95 ramp. 	<ul style="list-style-type: none"> Post a sign denoting sharp bend for the I-95 on ramp. 			
<ul style="list-style-type: none"> There is evidence of vehicle difficulty in negotiating the ramp to I-95 	<ul style="list-style-type: none"> Redesign the ramp entrance with modification to the existing wall and curbing to enable better turns 			
<ul style="list-style-type: none"> Pavement is in poor condition at the entrance to the ramp. 	<ul style="list-style-type: none"> Repave the area. 			
<ul style="list-style-type: none"> Lack of advance directional signs for I-95. 	<ul style="list-style-type: none"> On Market Street eastbound install advance directional signs for I-95 South with lane designation. 			
<ul style="list-style-type: none"> Based on traffic volumes and turning movements, lane assignments between Front and 2nd Street should be revised. 	<ul style="list-style-type: none"> Re-designate lanes to a shared through/left-turn lane and a right-turn only lane. 			
<ul style="list-style-type: none"> Front Street changes at Market Street from 2-way to the south of the intersection to one-way to the north with no distinguishing pavement marking. 	<ul style="list-style-type: none"> Add a double yellow line on Front Street to the south of the intersection to guide motorists and reinforce the change in traffic pattern. 			

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Front Street (continued):				
<ul style="list-style-type: none"> • Front Street to the north of the intersection; there are no warning signs at the parking lot driveway to the north of the intersection. 	<ul style="list-style-type: none"> • Add a “no right-turn” sign for vehicles exiting this parking lot on Front Street. 			
Between Front Street and 2nd Street:				
<ul style="list-style-type: none"> • “Welcome to Penns Landing” sign on the ramp gives motorists mixed signal especially since there are no directional signs for motor vehicles destined for Penns Landing. 	<ul style="list-style-type: none"> • Add a keep right sign on the gore area of the ramp. • Post directional signs for Penns Landing. • Add arrow pavement markings on the ramp. 			
2nd Street:				
<ul style="list-style-type: none"> • Trees near the SEPTA “L” station are impeding pedestrian travel. 	<ul style="list-style-type: none"> • Remove the trees near the SEPTA entrance. 			
<ul style="list-style-type: none"> • Illegal U-turns being made from the Penns Landing ramp to Market Street eastbound. 	<ul style="list-style-type: none"> • Coordinate with City of Philadelphia for enforcement of the “No U-turn” sign. 			
<ul style="list-style-type: none"> • Buses and other vehicles are running the red light. 	<ul style="list-style-type: none"> • Employ photo-enforcement with red light running camera. • Check change in clearance interval (CCI) for signal operation. • Coordinate with SEPTA police to enforce red light running by the buses. 			

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2nd Street (continued):				
<ul style="list-style-type: none"> Large trucks and buses have difficulty making right-turns from 2nd Street onto Market Street. They do so using Market Street eastbound left lane. 	<ul style="list-style-type: none"> Prohibit parking close to the intersection. Restrict WB-60 trucks (tractor w/53-foot trailers) or develop truck route and sign accordingly. 			
3rd Street:				
<ul style="list-style-type: none"> Café tables on the southeast corner of the intersection are too close to the crosswalks. 	<ul style="list-style-type: none"> Coordinate with business owners and Center City District to keep the area clear of obstructions to pedestrians. 			
4th Street:				
<ul style="list-style-type: none"> Hump in the brick crosswalk, on the northeast corner crossing Market Street. 	<p><i>See corridor-wide issues on Brick Crosswalks.</i></p>			
<ul style="list-style-type: none"> On the northwest corner of the intersection, heavy bus stop heavily used by passengers. 	<ul style="list-style-type: none"> Upgrade passenger amenities at the bus stop (seats, etc.). 			
Between 4th Street and 5th Street:				
<ul style="list-style-type: none"> Construction closes sidewalk on the south side of Market Street. 	<ul style="list-style-type: none"> Provide a safe temporary sidewalk for pedestrians or an on-street refuge with jersey barriers as part of the maintenance protection of traffic (MPT) for the work zone. 			

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Between 4th Street and 5th Street (continued):				
	<ul style="list-style-type: none"> Provide “sidewalk closed ahead” sign at the intersection of 4th Street and Market Street to allow pedestrian to cross at the intersection. 			
<ul style="list-style-type: none"> Conflicting parking signs on the north-side of Market Street. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority to modify existing signs to prevent the confusion of motorists. 			
5th Street:				
<ul style="list-style-type: none"> High left-turns from eastbound Market Street backs up into the 6th Street intersection and blocks through traffic. 	Perform an in-depth traffic analyses to: <ul style="list-style-type: none"> Consider eliminating the westbound left-turn lane at 6th Street to increase 5th Street left-turn storage; or Consider converting the eastbound center through lane to a shared through/left-turn lane. 			
<ul style="list-style-type: none"> Pedestrians conflicts with the eastbound left-turning traffic from Market Street. 	<ul style="list-style-type: none"> Consider instead of the existing left-turn lead retime the traffic signal to accommodate a left-turn lag. 			
Between 5th Street and 6th Street:				
<ul style="list-style-type: none"> “Phlash” buses and trolleys parked on Market Street are obstructing the flow of traffic. 	<ul style="list-style-type: none"> Create a pull-off area for these vehicles. 			

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6th Street:				
<ul style="list-style-type: none"> The “Duck” sign is located in the travel way on the northeast corner of the intersection. 	<ul style="list-style-type: none"> Coordinate with business owner and Center City District to prevent signs placed in the roadway. 			
7th Street:				
<ul style="list-style-type: none"> Left-turns are prohibited from Market Street eastbound to 7th Street northbound. This is a main connecting roadway to I-95, I-676, and the Ben Franklin Bridge. 	<ul style="list-style-type: none"> Allow left-turns at the intersection and add signs for I-95, I-676, and the Ben Franklin Bridge. <i><u>This will alleviate the congestion and conflicts at the 5th Street intersection.</u></i> 			
8th Street:				
<ul style="list-style-type: none"> The “one-way” sign on the southwest corner of the intersection is blocked by trees. 	<ul style="list-style-type: none"> Trim the trees to allow motorists to see the signs. 			
Between 8th Street and 9th Street:				
<ul style="list-style-type: none"> A stand pipe is located in the middle of the sidewalk surrounded by 3 bollards; presents hazard for pedestrians. 	<ul style="list-style-type: none"> Prominently delineate to enhance the visibility for pedestrian. Remove the standpipe if feasible. 			

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9th Street:				
<ul style="list-style-type: none"> Traffic is very heavy, took a bus 3 cycles to cross through the intersection. Vehicles are parked illegally; double parking is prevalent. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce “No Parking” areas. 			
<ul style="list-style-type: none"> Pedestrian crosswalk sign posted on 9th Street north of the intersection, there is no crosswalk. 	<ul style="list-style-type: none"> Stripe a crosswalk across 9th Street in this location. Heavy pedestrian activity. 			
Between 9th Street and 10th Street:				
<ul style="list-style-type: none"> Historic sign is blocking “bus/bike lane” sign. 	<ul style="list-style-type: none"> Relocate the sign as appropriate to make it visible to motorists. 			
10th Street:				
<ul style="list-style-type: none"> On eastbound Market Street, trees are blocking signal and street name signs on the mast arm. 	<ul style="list-style-type: none"> Trim trees. 			
<ul style="list-style-type: none"> On the north side of 10th Street, lane markings have faded. 	<ul style="list-style-type: none"> Re-stripe pavement markings as appropriate. 			
Between 10th Street and 11th Street:				
<ul style="list-style-type: none"> Open doors of the “Underground” business obstruct pedestrian movement. 	<ul style="list-style-type: none"> Coordinate with the business owner and the Center City District. 			

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Between 10th Street and 11th Street (continued):				
<ul style="list-style-type: none"> Vehicles are parked in the passenger loading areas; creates a double parking situation for loading and unloading vehicles. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce passenger loading areas. 			
11th Street:				
<ul style="list-style-type: none"> Large number of utility manholes with vehicles maneuvering to avoid them (in the travel lanes and crosswalks) 	<ul style="list-style-type: none"> Coordinate with utility companies to combine utility access and make flush with pavement. 			
<ul style="list-style-type: none"> New Jersey Transit buses using the farside bus stop had buses backing into the intersection and blocking traffic flow. 	<ul style="list-style-type: none"> Relocate the bus stop further from intersection. 			
11th Street (continued):				
<ul style="list-style-type: none"> At the northwest corner the red LED signal head had black spots. 	<ul style="list-style-type: none"> Perform maintenance and replace LED bulbs. 			
12th Street:				
<ul style="list-style-type: none"> On the southwest corner the 3-section signal head is blocking the pedestrian signal head. 	<ul style="list-style-type: none"> Relocate the signal heads as appropriate. 			

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12th Street (continued):				
<ul style="list-style-type: none"> On the eastside of 12th Street, work zone closed sidewalk and one lane. There is no notice of closures. 	<ul style="list-style-type: none"> Install signs warning roadway users of closure. 			
Between 12th Street and 13th Street:				
<ul style="list-style-type: none"> On the south side of Market Street, the pavement markings and signs were unclear around the loading zone/pull off area. 	<ul style="list-style-type: none"> Pavement markings to be addressed with corridor-wide issues. Post sign to clearly direct motorists. 			
13th Street:				
<ul style="list-style-type: none"> On the southwest corner of the intersection a vendor is located in the bus stop. 	<ul style="list-style-type: none"> Relocate vendor. 			
Between 13th Street and Juniper Street:				
<ul style="list-style-type: none"> Vehicles are parked in the bus lane in front of Macy's. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce "No Parking" areas. 			
Juniper Street:				
<ul style="list-style-type: none"> Vehicles parked in the northbound Juniper Street right-turn lane. 	<ul style="list-style-type: none"> Coordinate with Philadelphia Parking Authority and City of Philadelphia Police to enforce "No Parking" areas. Add signs approaching Juniper for lane designation and direction. 			

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Juniper Street (continued):				
<ul style="list-style-type: none"> • On Juniper Street north of the intersection there are no pavement markings. • Making the turn onto Juniper the white line and the double yellow striping do not match up. • Crosswalk pavement markings are worn. 	<ul style="list-style-type: none"> • Redesign the pavement markings for greater clarity and safety. • Use stamped concrete or other durable treatment for the crosswalks. 			
<ul style="list-style-type: none"> • Pavement in poor condition. 	<ul style="list-style-type: none"> • Repave the roadway. 			
<ul style="list-style-type: none"> • News stand on the northeast corner of the intersection blocks the pedestrian view of oncoming vehicles. 	<ul style="list-style-type: none"> • Relocate the news stand. 			

Title of Report: ***MARKET STREET, ROAD SAFETY AUDIT***

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Geographic Area Covered:

The study area consists of a 13 block corridor of Market Street in the City of Philadelphia from Front Street to Juniper Street.

Key Words:

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

ABSTRACT: This report documents the process and findings of the Market Street (SR003) Road Safety Audit (RSA) undertaken by the Delaware Valley Regional Planning Commission (DVRPC). This project reflects the collaboration between PennDOT District 6 and DVRPC to address locations in the region with safety issues, to obligate Highway Safety Improvement Program (HSIP) funding for remedial actions with the aim of making the region's roadways safer. This corridor, identified in Pennsylvania Top 5% locations in 2007, is one of seventeen locations exhibiting the most severe safety needs. The goal of the audit is to generate improvement recommendations and countermeasures for this section of Market Street to reduce the incidence of motor vehicle crashes. The emphasis is placed on identifying low cost, quick turnaround safety projects to address the issues where possible. The report details safety issues identified by the audit team along the study corridor and remedial strategies to address them. Priorities for implementation are identified. A scope of work and cost estimates are formulated for the priorities by PennDOT District 6 consultant.

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MARKET STREET

Road Safety Audit

