



MT. EPHRAIM AVENUE (CR 605) PEDESTRIAN ROAD SAFETY AUDIT

Camden City, New Jersey

June 2013

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Executive Summary

At the same time that total crash fatalities have decreased both in New Jersey and across the country, the pedestrian crashes and fatalities of that total have been increasing in the Garden State. The federal government has been watching these trends through the Pedestrian Safety Focus States and Cities program.¹ In this effort, they are working to reduce pedestrian deaths by providing extra resources on focus cities and states where pedestrian fatalities and/or fatality rates are highest. In 2011, the Federal Highway Administration (FHWA) included New Jersey in the program. In response to this distinction, DVRPC coordinated with FHWA-NJ on a Pedestrian Road Safety Audit (RSA) in Camden City.

This document is the final report for the Mt. Ephraim Avenue Pedestrian RSA. A pedestrian RSA is an effective way of identifying pedestrian safety issues, evaluating risks, and brainstorming appropriate countermeasures. The audit process employs a dynamic and intensive short-term approach that taps into the collective knowledge of local and subject-matter experts using crash data and a walking survey of the corridor. The result—detailed in this report—is a summary of the corridor’s safety history and a listing of needed improvements organized by aerial view maps.

Mt. Ephraim Avenue (CR 605) was identified through a network screening of county-route corridors that had a high pedestrian crash history. This was performed by Rutgers University’s Center for Advanced Infrastructure and Transportation using Plan4Safety, a database analysis and mapping tool. A short list of the most critical corridors was discussed with the appropriate county representatives, and the selected corridor was Mt. Ephraim Avenue, from Ferry Avenue north to Haddon Avenue. During the five-year analysis period, there were 362 total crashes, including 28 pedestrian crashes and 13 bicyclist crashes along the 1.43-mile stretch.

This project represents a step toward implementation of the Delaware Valley Regional Planning Commission’s (DVRPC’s) Safety Action Plan and the New Jersey Department of Transportation’s (NJDOT’s) Strategic Highway Safety Plan (SHSP). The RSA event was conducted during Fiscal Year 2012 as part of DVRPC’s Office of Transportation Safety and Congestion Management’s annual work program.

The audit was conducted on Wednesday, June 13, 2012. The preaudit and postaudit meetings were held at the Camden County Resource Center, 2600 Mt. Ephraim Avenue, Suite 105, Camden, NJ 08104. Among the audit team of 16 participants were representatives from Camden City, Camden County, NJDOT, New Jersey Transit, FHWA-NJ, and other agencies. See Appendix A for the list of audit team members.

Site-specific issues, organized by subareas, are discussed in the Findings and Recommendations chapter. Each subarea is represented graphically on an aerial view map, with a corresponding table to assist the reader in locating identified safety needs and the recommended improvement. Also, a short listing of audit team priority items is included in the section preceding the graphics and tables.

¹Cities were identified as pedestrian focus cities if they had more than 20 average annual pedestrian fatalities or a pedestrian fatality rate greater than 2.33 per 100,000 population (the annual national average number of pedestrian fatalities is 20 and the average national rate of pedestrian fatalities is 2.33 per 100,00 population). States with a focus city were automatically identified as focus states. http://safety.fhwa.dot.gov/ped_bike/ped_focus/

The recommendations herein were developed collaboratively with roadway owners and local stakeholders from the study task force; DVRPC served as facilitator. The study partners expressed an interest in implementing many of the recommendations, as time and funds allow. Several of the maintenance items, some of which are low cost, can be addressed without additional engineering. The county indicated that most of the striping and pavement issues will be addressed during the next scheduled repaving of the corridor; a date was not yet set at the time of this document's publication.

Introduction

As the final report for the Mt. Ephraim Avenue Pedestrian RSA, this document represents a step toward implementation of DVRPC's *Safety Action Plan* (DVRPC #12030, 2012). The RSA process identifies safety issues through an intensive and collaborative forum and uses brainstorming and local knowledge to enhance analysis findings in developing a range of improvement ideas. The NJDOT Bureau of Safety Programs assisted by providing crash rate information and summaries, in addition to staff support at the audit event. DVRPC conducted additional analysis using GIS and Plan4Safety.

Corridor Selection

DVRPC worked with the Rutgers University Center for Advanced Infrastructure and Transportation (CAIT) using Plan4Safety, NJDOT's crash database decision support tool, to identify county route corridors with a concentration of pedestrian crashes in DVRPC's four-county New Jersey subregion. Eligible corridors were identified in each county, but the corridors with the greatest concentrations were in Camden County, and specifically in Camden City. After a vetting round with county partners, Mt. Ephraim Avenue—the second highest pedestrian crash corridor in Camden County—was selected.

What is a Pedestrian Road Safety Audit?

Following the basic structure of a traditional RSA, the pedestrian RSA is a pedestrian-focused formal safety performance examination of an existing or future road or intersection by a multidisciplinary audit team. Road safety audits can be used on any size project, from minor maintenance to megaprojects, and can be conducted on facilities with a history of crashes, or during the design phase of a new roadway or planned upgrade. DVRPC uses the tool mostly on roadways of five miles in length or less, where there is a demonstrated history of crashes.

For the Mt. Ephraim Avenue corridor, the team utilized the *Pedestrian Road Safety Audit Guidelines and Prompt Lists* (FHWA-SA-07-007, 2007) as a resource. This guide gives RSA teams a better understanding of the needs of pedestrians of all abilities and presents an overview of how pedestrians should be considered in the RSA process.

For each RSA, emphasis is placed on identifying low-cost, quick-turnaround safety improvements, though not excluding strategies that are more complex. Implementation of improvement strategies identified through this process in New Jersey may be eligible for Local Federal Aid Safety Funds. Because the RSA process is adaptable to local needs and conditions, recommendations can be implemented as time and resources permit.

The audit event has three basic components:

- ▶ Preaudit – the audit team reviews location characteristics and crash analysis;
- ▶ Field visit – the audit team walks the corridor to examine conditions along the corridor; and
- ▶ Postaudit – the audit team shares findings and develops a list of problems and potential strategies.

Prior to the audit, DVRPC collects and analyzes relevant data, including crash concentrations and pedestrian crash locations, corridor-wide crash summaries, daytime and nighttime roadway video, traffic volume data, and aerial photographs. DVRPC staff also conducts a preaudit field visit to examine existing conditions. The identified crash concentrations served as the focus areas during the audit of the Mt. Ephraim Avenue study area. All maps used during the audit event are included in the presentation that is found in Appendix C.

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

The Mt. Ephraim Avenue Pedestrian RSA Event

The one-day pedestrian road safety audit was conducted on Wednesday, June 13, 2012. The preaudit and postaudit meetings were held at the Camden County Resource Center, 2600 Mt. Ephraim Avenue, Suite 105, Camden, NJ 08104. Among the audit team of 16 participants were representatives from Camden City, Camden County, NJDOT, New Jersey Transit, and FHWA-NJ, among other agencies, with DVRPC serving as facilitator. See Appendix A for the list of audit team members.

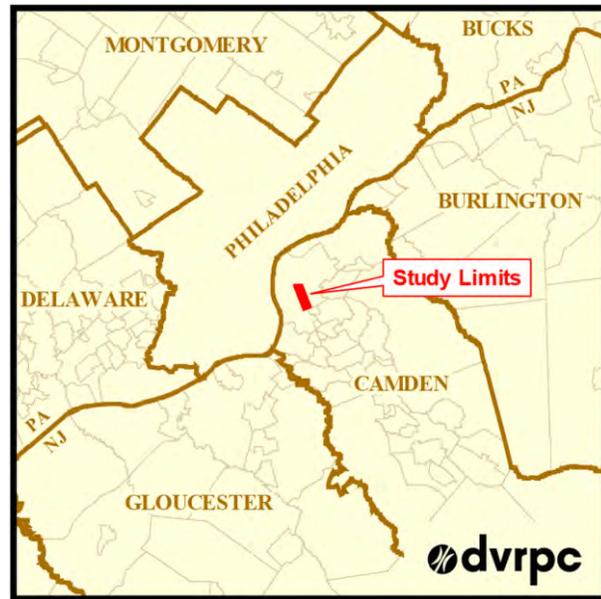
The preaudit meeting—an overview of the study area and an examination of crash history—began at 8:30 AM. Next was the field visit, when the audit team walked the entire corridor to examine conditions and identify pedestrian safety issues. After lunch, the team returned to the meeting room for the postaudit session, in which problems were defined and countermeasures discussed.

Corridor Description and Analysis

Study Location

Mt. Ephraim Avenue (County Route 605) serves as a main street and important connector in Camden City, Camden County, New Jersey (see Figure 1). Philadelphia, Pennsylvania lies west of the study area beyond the Delaware River, and Pennsauken Township, New Jersey is to the north. The study area is the entire length of Mt. Ephraim Avenue: 1.43 miles from the intersection of County Route 603 (Ferry Avenue) north to County Route 561 (Haddon Avenue) (see Figure 2). The study area begins at the northwestern edge of Woodlynne Borough and passes north through Camden City, serving the neighborhoods of Whitman Park to the east and Liberty Park to the west: a densely developed urban environment. The frontage along the corridor is a mix of commercial with residential uses, with a very active street life.

Figure 1: Regional Setting

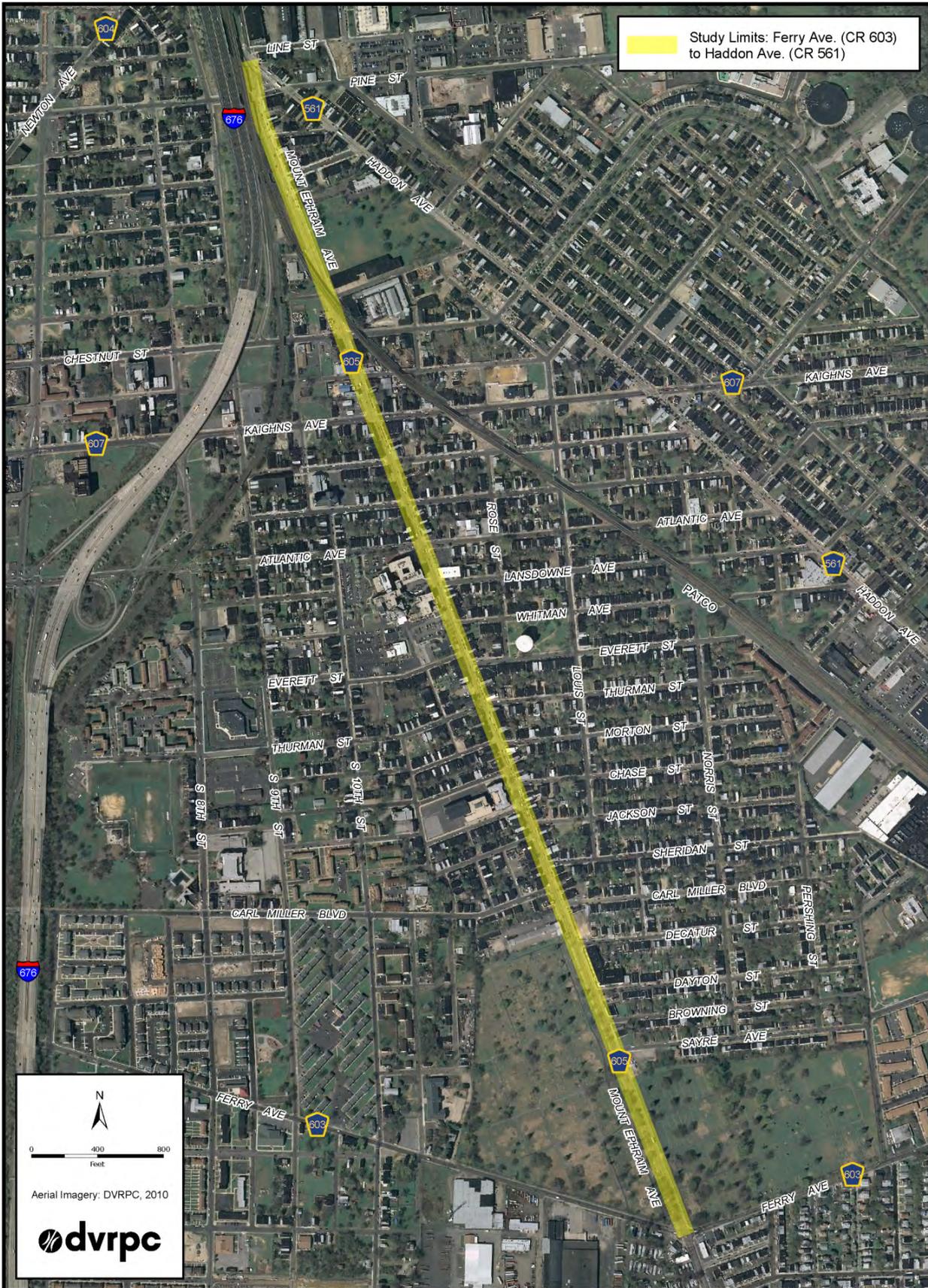


Roadway Characteristics

Mt. Ephraim Avenue is classified as an urban principal arterial and has a posted speed limit of 35 mph. It is a two-way street with a north/south orientation. From the intersection of County Route 603 (Ferry Avenue) to Decatur Street, an approximate length of 0.35 miles, Mt. Ephraim Avenue has a four-lane cross-section with no barrier median and no shoulder. This is the widest roadway section of the study area. From Decatur Street north to County Route 561 (Haddon Avenue), the corridor has a two-lane cross-section with on-street parking. There are no bike lanes or shoulders that could serve as de facto bike lanes because of parallel-parked vehicles. Sidewalks are consistently available, though many sections are in disrepair and obstructions and tripping hazards were found throughout.

The study area has eight signalized intersections and 22 unsignalized intersections. Access to adjoining roadways in the study area is predominantly unrestricted except at one-way streets. In addition to the connections with Ferry Avenue at the southern end of the corridor and Haddon Avenue at the northern end, County Route 607 (Kaighns Avenue) intersects the corridor at about 0.4 miles south of Haddon Avenue. Kaighns Avenue provides a direct connection to the US 30 and US 130 interchange known as Airport Circle, located east of the study area. Taking Kaighns Avenue west provides indirect access to I-676, which connects to both the Ben Franklin and Walt Whitman bridges.

Figure 2: Mt. Ephraim Avenue Pedestrian Road Safety Audit Study Area



Traffic Volumes

Existing Annual Average Daily Traffic (AADT) volumes were used for total vehicle movements (gathered from DVRPC and NJDOT). Turning movement counts were collected by DVRPC at three intersections within the corridor section where the highest concentration of pedestrian crashes were recorded. Pedestrian and bicyclist movements were also collected for this RSA: three pedestrian count locations and two bicyclist count locations. These counts can be found on Figure 3: Traffic Volumes.

Traffic volume south of Sayre Avenue is approximately 12,000 vehicles per day, on average. Traffic volume near Thurman Street, near the center of the study area, is approximately 11,500 vehicles per day, on average. Traffic volume north of Kaighns Avenue is approximately 10,500 vehicles per day, on average. Pedestrian volume near Everett Street, near the center of the study area, is approximately 753 people on the southbound side and 659 people on the northbound side. Pedestrian volume near East Chestnut Street, in the northern section of the study area, is approximately 200–300 people per direction. Near Spruce Street, in the northernmost section of the study area, approximately 271 people were recorded on the northbound side and 166 on the southbound side. Total bicyclist volume near Sayre Avenue is approximately 20, with nearly equal travel in both directions. Near Spruce Street, total bicyclist volume is approximately 21, with nearly equal travel in both directions.

Peak hour turning movement volumes were collected at three intersections located within those corridor sections where the highest concentrations of both total crashes and pedestrian and bicyclist crashes were identified: Sheridan Street, Jackson Street, and Everett Street. Each of these intersections has offset intersection legs. The identified peak hours were 8:00–9:00 AM for all three, 5:00–6:00 PM for Sheridan and Jackson Streets, and 4:00–5:00 PM for Everett Street. Of the three, the Sheridan Street intersection had the highest overall intersection volumes at 1,446 vehicles in the AM, and 2,136 in the PM period. Next was Jackson Street with an AM count of 859 and 1,158 in the PM. Everett Street's total was less than half of that at Sheridan Street. Turning movement count diagrams can be found in Appendix C.

Transit Service

The study corridor is well served by transit, which provides the residents several travel options (see Figure 4: Transit Network). The NJ Transit Route 400 bus has approximately 16 bus stops in Camden along the study corridor on its route from Sicklerville in southeastern Camden County, to Philadelphia, PA. This is the only bus route that runs along the entire length of Mt. Ephraim Avenue. Headways range between 5- and 20-minute intervals on weekdays and up to an hour at night. The NJ Transit Route 453 bus runs along the southernmost segment of the corridor entering at Carl Miller Boulevard, then follows Mt. Ephraim Avenue south, where it turns left to leave the study corridor via Ferry Avenue. This connecting service provides a link to the Ferry Avenue PATCO Station. Although Ferry Avenue Station lies outside the study area, it is still in walking distance to census tracts that are included in the study area.

Several other bus routes cross the corridor, including two that cross along Kaighns Avenue, the 452 and 460, and three that cross the northernmost terminus of the study corridor along Haddon Avenue: 403, 451, and 460. And one route, the 460 bus travels parallel to Mt. Ephraim Avenue along South 9th street two blocks to the west.

Figure 3: Traffic Volumes

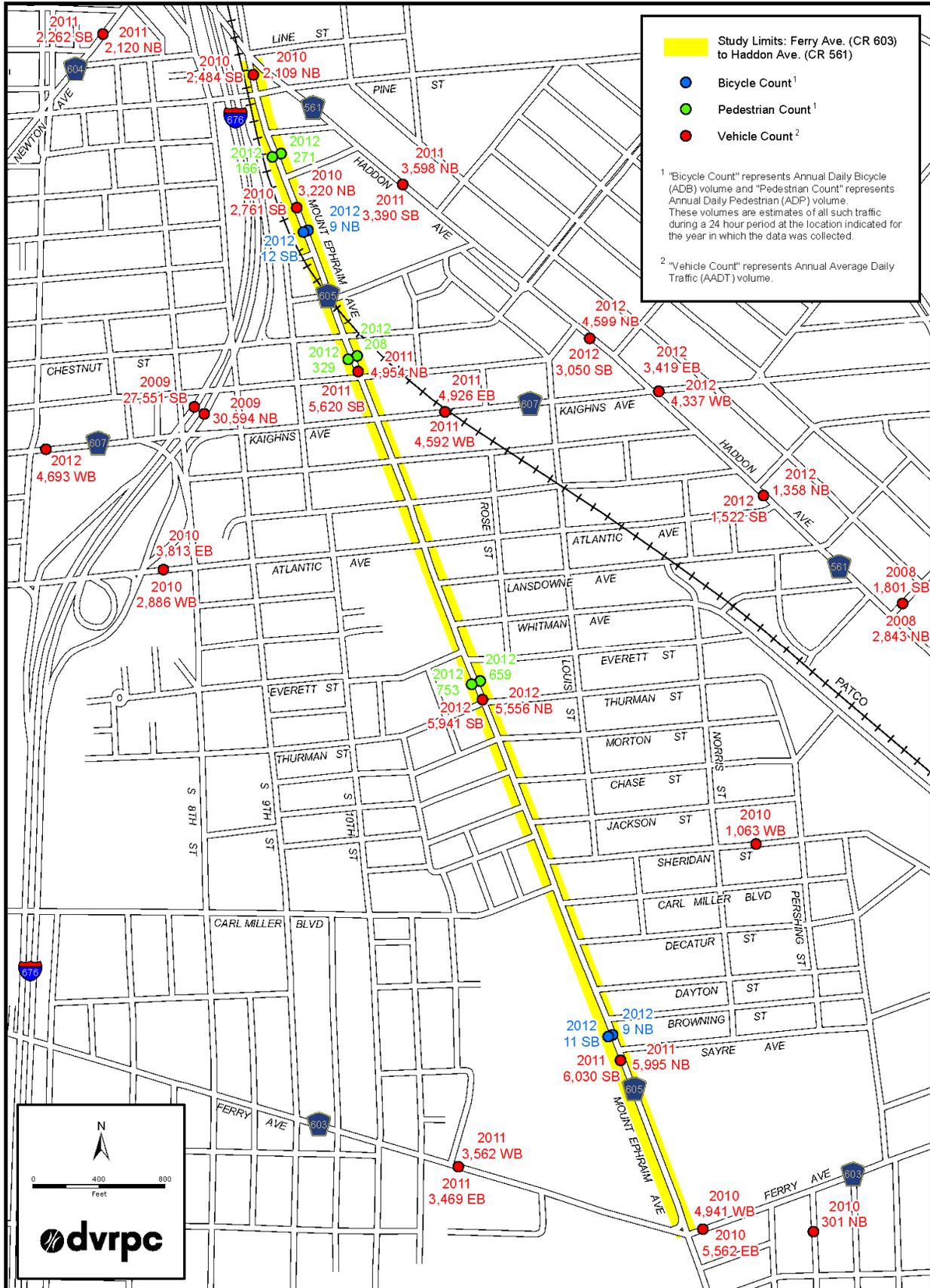


Figure 4: Transit Network



Environmental Justice Technical Analysis

What is Environmental Justice?

Title VI of the Civil Rights Act of 1964 and the 1994 President’s Executive Order on Environmental Justice (#12898) state that no person or group shall be excluded from participation in, or denied the benefits of, any program or activity utilizing federal funds. Each federal agency and Metropolitan Planning Organization (MPO) is charged with evaluating their plans and programs for environmental justice (EJ) sensitivity, including expanding their outreach efforts to low-income, minority, and other disadvantaged populations, as part of the United States Department of Transportation’s certification requirements.

Year 2010 Census Data for Degrees of Disadvantage

The quantitative methodology used to identify disadvantaged groups in the Delaware Valley is documented in the original report “...and Justice for All”: DVRPC’s Strategy for Fair Treatment and Meaningful Involvement of All People (September 2001, #01022), and subsequent updates rely primarily on available U.S. Census data. The most recent update to this report includes seven degrees of disadvantage (DOD): minorities, Hispanics, the elderly (ages 75 and older), carless households, impoverished households, female head of household with child, and limited English proficiency households.

A total of all persons in each demographic group—DOD—in the nine-county region is divided by the total nine-county population to obtain a regional threshold, or average. This average is used to determine if the DODs within a given census tract meet or exceed the regional average. Each DOD within a census tract that meets or exceeds the regional average indicates the presence of a sensitive demographic population at the census tract level, making it an “environmental justice area.”

Characteristics of the Study Area Census Tracts

Table 1 below provides a DOD summary by census tract. The EJ area is located in one county, two municipalities, and involves five census tracts representing 15,501 residents. Qualifying census tracts have Mt. Ephraim Avenue as its border, or are intersected by the corridor. These tracts are predominately dense urban residential, with a mix of retail and commercial uses along the corridor’s frontage. The densest development is found in the center of the corridor, and very low development density is found at the northern- and southernmost ends of the study area where cemeteries are located.

Table 1: Degrees of Disadvantage by Census Tract

Tracts	DODs Exceeding Regional Average	Combined Tract Population	Percent of Total Tract Population
0	0	0	0%
0	1 or 2	0	0%
0	3 or 4	0	0%
4	5 or 6	13,475	87%
1	7	2,026	13%

Source: DVRPC, 2013

Four of the five study area tracts have either five or six degrees of disadvantage represented, and one tract contained all seven degrees of disadvantage.

All five study area census tracts exceeded the regional thresholds for the following demographics:

- ▶ Non-Hispanic Minority (highest tract at 77 percent; regional threshold = 27 percent)
- ▶ Households in Poverty (highest tract at 71 percent; regional threshold = 12 percent)
- ▶ Female Head of Household with Child (highest tract at 43 percent; regional threshold = 9 percent)
- ▶ Hispanic (highest tract at 43 percent; regional threshold = 8 percent)
- ▶ Limited English Proficiency (highest tract at 17 percent; regional threshold = 3 percent)

Of the four tracts that contained five degrees of disadvantage, the demographics that did not exceed the regional thresholds include elderly over 75 years of age and carless households. Only one tract in the study area exceeded the regional threshold for all seven degrees of disadvantage.

Safety Implications of the EJ Evaluation

The purpose of an EJ evaluation in an RSA is to consider factors other than roadway design and condition that may influence the frequency and severity of crashes—specifically, in this case, pedestrian crashes—and to identify especially vulnerable populations. DVRPC’s EJ process determined that the five census tracts comprising the study corridor exceeded the regional threshold for at least five of the seven degrees of disadvantage, and in most tracts by two or three times the average. Pedestrian crash frequency is typically higher in the urban areas of the Delaware Valley, especially in places where the demographics resemble Camden City.

Camden City is plagued by many urban ills, with poverty being one of its most pervasive problems. Urban poverty typically correlates with lower education levels, high immigrant populations that often have limited English proficiency, single mother heads of households, all of which were found in the audit study area. A 2010 study by the National Center for Biotechnology Information (National Library of Medicine) on the relationship of pedestrian injuries to socioeconomic characteristics found that “...pedestrian crashes are four times more frequent in poor neighborhoods and that neither age of the population, education, English language fluency, nor population density explained the effect of poverty.”²

Infrastructure

Despite the poorly maintained pedestrian environment having many examples of ADA non-compliance, Mt. Ephraim Avenue does have sidewalks, crosswalks, and some curb ramps, features that many suburban and rural locations lack. This indicates that infrastructure is only one component of a safe pedestrian environment.

Improvements to the pedestrian infrastructure can serve as a catalyst for improved safety by raising the profile of the pedestrian and providing for safe passage by foot, which may be lacking or missing. The best designed facilities also modify driver behavior by helping to establish a pedestrian environment where drivers must slow down and be cognizant of the pedestrians sharing the facility. These benefits are typically shared

²The relationship of pedestrian injuries to socioeconomic characteristics in a large Southern California County, 2010. www.ncbi.nlm.nih.gov/pubmed/20872307

with bicyclists, though providing a dedicated right-of-way is the best way to accommodate bicyclists of all skill levels.

Data-Driven Approach to Crime and Traffic Safety (DDACTS)

An increased police presence consistently enforcing traffic laws for both drivers and pedestrians is an effective companion strategy to support improving the physical environment. Although a crime analysis was not a part of this RSA, the Mt. Ephraim Avenue corridor may also benefit from a hybrid crash and crime analysis approach called DDACTS. The National Highway Traffic Safety Administration (NHTSA) describes DDACTS as a model that “integrates location-based crime and traffic data to establish effective and efficient methods for deploying law enforcement and other resources, by using geomapping to identify areas that have high incidences of crime and crashes.”³ DDACTS draws on the deterrent of highly visible traffic enforcement and the knowledge that crime often involves the use of motor vehicles.

³Data-Driven Approaches to Crime and Traffic Safety. <http://www.nhtsa.gov/ddacts>

Crash Findings

Corridor-wide Crash Findings

The analysis used for the Mt. Ephraim Avenue Pedestrian RSA was based solely on reportable crashes, excluding those classified as non-reportable. Reportable crashes result in a fatality, injury, and/or property damage of \$500 or more, determined by the reporting police officer.

Corridor-wide crash characteristics that exceeded the 2010 statewide average for all county routes are discussed in the appropriate subcategory where applicable. This information, provided by the New Jersey Department of Transportation Bureau of Transportation Data and Safety, includes a note explaining that, although crashes are declining corridor-wide over the five-year study period, a year-by-year comparison may show reductions in various categories each year that are normalized over the five-year period.

Chronology

According to the NJDOT crash database, there were 362 reportable crashes during the five-year analysis period of 2006–2010. As shown in Table 2, crashes have decreased by approximately 50 percent since 2006—a significant reduction. The highest totals were recorded in 2006 and 2007, and the decline began starting with 2008. This trend is consistent with both the regional and national crash trends.

Table 2: Crashes by Year

Year	Crashes	Percent of Total
2006	93	26%
2007	93	26%
2008	72	20%
2009	63	17%
2010	41	11%
Total	362	

Source: DVRPC, 2013

Examining concentrations by month over the five-year period, the total ranged between 28 and 31 crashes in most months. The low point was 23 in June, and the high was 40 crashes in April. Crashes were steady in January and February and increased through March to the peak in April. This may be related to increased springtime activity as the weather becomes more favorable. By day of week, crash totals were also fairly evenly spread, with 25 being the mean. Sundays were the only anomaly, with 44 recorded crashes.

Regarding hour of the day, 50 percent of the crashes occurred from 12 noon through the 6 PM hour, with a lower but steady number of crashes occurring into the evening.

Severity

Regarding severity, there were two fatal crashes that killed two people, 139 injury crashes that left 206 people injured, and 221 property-damage-only (PDO) crashes (see Table 3).

Table 3: Severity Level of All People Injured Plus Pedestrians and Bicyclists

Severity	All People	Pedestrians	Bicyclists
Unknown	2	1	0
Killed	2	1	0
Incapacitated	7	2	1
Moderate Injury	30	7	2
Complaint of Pain	169	19	8

Source: DVRPC, 2013

One of the fatal crashes resulted in the death of a pedestrian, and 28 more pedestrians were injured, with the majority complaining of pain. No bicyclists were killed, but 11 were injured, eight of whom recorded complaint of pain.

Both the fatal and injury crash percentages of the Mt. Ephraim Avenue corridor exceeded the 2010 state-wide averages for county routes. A year-by-year comparison to statewide averages would reveal fluctuations that may be somewhat normalized by using five years of data.

Collision Type

The three highest collision type concentrations were rear-end (31 percent), right-angle (19 percent), and same-direction sideswipe crashes (14 percent) (see Table 4: Collision Type on next page). Rear-end and right-angle crashes can be common in urban corridors having a high density of intersecting side-streets that become points of conflict as drivers enter and exit the roadway. The availability of on-street parking along most of the corridor contributes to the percentages of same-direction sideswipe and struck parked vehicle crashes (9 percent), which, when combined, account for 23 percent of the crash total. Same-direction sideswipe, struck parked vehicle, and backing crashes exceeded the statewide average, though none by more than three percentage points.

Both pedestrian and bicyclist crashes were about four times the statewide averages in each of those collision type categories. The 28 pedestrian crashes were 7.7 percent of the total, as compared to the 2010 county route average of 1.9 percent, and bicyclist crashes were 3.6 percent while the statewide average was 0.9 percent. As stated earlier, these percentages are typically higher in urban areas, and as was described in the Environmental Justice evaluation, pedestrian crashes correlate strongly with economically challenged urban areas. This is to say that the problem is more acute in such environments, and that they are good places to start when seeking to improve safety, highlighting the need for physical improvements combined with education, policy, and enforcement initiatives.

Table 4: Collision Type

Collision Type	Count	Percentage
Same Direction (Rear-End)	110	31%
Right Angle	68	19%
Same Direction (Sideswipe)	50	14%
Struck-Parked-Vehicle	31	9%
Pedestrian	28	8%
Left Turn/U-Turn	20	5%
Backing	18	5%
Hit-Fixed-Object	12	3%
Pedalcyclist	13	4%
Encroachment	5	1%
Opposite Direction (Sideswipe)	4	1%
Opposite Direction (Head-on)	2	.5%
Other	1	.25%

Source: DVRPC, 2013

Roadway Surface and Lighting Conditions

Eighty-five percent of the corridor-wide crashes occurred on dry road surface conditions, 12 percent on wet surface, and the remainder on snowy or icy surface conditions (see Table 5: Road Surface and Illumination). This distribution suggests that road surface was not a factor contributing to crash frequency. Light condition is less typical in that only 63 percent of the total occurred in daylight, and 34 percent occurred at night. According to the 2010 statewide average for county routes, daylight crashes typically account for 71 percent of all crashes. Mt. Ephraim Avenue's overrepresentation may be related to poor lighting and increased nighttime activity. No other overrepresentations of note were identified.

Table 5: Road Surface and Illumination

Category	Condition	Crashes	Percentage
Road Surface	Dry	308	85%
	Wet	42	12%
	Snowy	6	2%
	Ice	5	1%
	Unknown	1	0.28%
Illumination	Daylight	229	63%
	Dusk	6	2%
	Night	122	34%
	Dawn	2	1%
	Unknown	3	1%

Source: DVRPC, 2013

Corridor-wide Summary

Table 6 highlights significant data indicators considered in the corridor-wide analysis. Although crashes declined steadily between 2006 and 2010, pedestrian and bicyclist crashes remained a problem, as well as nighttime and injury crashes.

Table 6: Corridor-wide Statistics Summary

Issue	Mt. Ephraim Avenue
Five-year crash trend ('06–'10)	Down
Highest crash months	March, April
Highest crash days	Sunday (twice the number of Friday crashes)
Hourly crash trends	Midday, PM rush hour
Collision type overrepresentations	Same-direction sideswipe, struck-parked-vehicle, left/U-turn, backing, pedestrian, bicyclist
Injury crashes	Overrepresented
Surface condition and illumination	85% dry/34% nighttime
Noteworthy pre-crash actions	Stopped in traffic, making a left turn, parked

Source: DVRPC, 2013

Analysis by Cross-Section Geometry

The Mt. Ephraim Avenue crash experience was also considered according to crash rate⁴ by cross-section geometry which yielded two analysis sections: 1) southern section: mile post 0.01–0.42, and 2) northern section: mile post 0.42–1.43. NJDOT provided crash rates and crash summaries for each section and statewide average crash rates per cross-section geometry for comparison based on a three-year crash history ('08–'10). Section 1—four or more lanes, no median, and no shoulder—had a crash rate of 10.12, almost double the statewide average of 5.95. Section 2—two lanes, no shoulder—had a crash rate of 21.92, five times the statewide rate of 4.04. As cautioned by our NJDOT Bureau of Transportation Data and Safety colleagues, crash rates calculated for roadway sections of less than one mile may yield higher than anticipated results. This evaluation is a standard procedure for comparing a roadway section to statewide averages of like cross-section types for context. The crash trend on Mt. Ephraim Avenue is significant for its context and is especially concerning given the number of pedestrian crashes. A map of the crash rate sections is available in the PowerPoint presentation included in Appendix C.

Crash Frequency by Mile Post

The crash frequency by mile post map (Figure 5) depicts a bar graph representing crash concentrations by mile post aligned with an aerial view map of the corridor. Crashes are coded to a two-decimal place tolerance, which allows for locating crashes within approximately 50 feet of one another. This map allows the RSA team to identify sections of the study corridor that may need additional consideration.

This map shows that the single highest concentration mile post location was 1.40 (about 27 crashes), within the catchment area of the CR 561 (Haddon Avenue) intersection. This is just north of one of two low crash

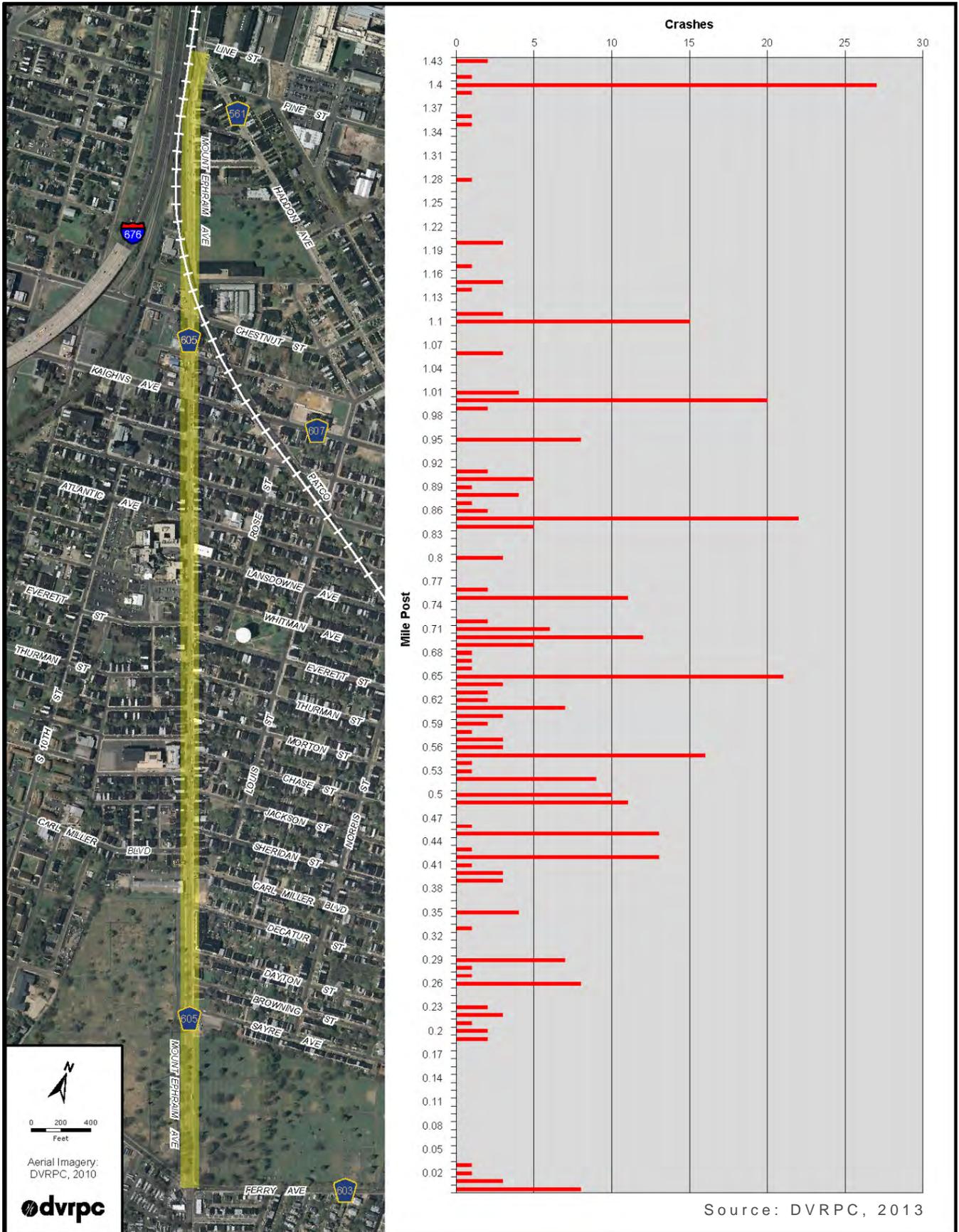
⁴Crash rate: crashes per million vehicle miles traveled.

concentration areas, both at the corridor's two cemeteries. The first, in the southern end of the study area, is the Evergreen/New Camden Cemetery between Ferry Avenue and Sayre Avenue, and the second, in the north end, is the Old Camden Cemetery between Mt. Vernon Avenue and Division Street.

The highest concentration area is within the two-lane section between Carl Miller Boulevard and Whitman Avenue (about 0.35 miles). This is also the corridor's most densely populated and developed section. This map exemplifies the correlation of higher development densities with higher crash frequency, but there is more to consider than just increased exposure because of higher levels of pedestrian activity and many turning opportunities.

Just by the fact that a location is urban and densely developed does not necessarily mean that crashes will be more common. The state of repair of the transportation infrastructure, the details of the roadway design, law enforcement presence, and the state of the local economy, among other things, are all factors contributing to the crash experience.

Figure 5: Crash Frequency by Milepost



Source: DVRPC, 2013

Pedestrian and Bicyclist Crashes

The primary focus of this road safety audit was pedestrian crashes and the pedestrian environment of the study corridor. Although road safety audits typically consider pedestrian issues, the Mt. Ephraim Avenue Pedestrian RSA study team concentrated on safety from the pedestrian's perspective in all three components of the audit process. Also important was the condition of the bicycling environment and the location and circumstances of each bicycle crash, as well as the pedestrian crashes. Although unique, walking and biking issues are often related in how these modes interact with vehicle traffic and how they must navigate the system.

Pedestrian Crash Statistics and Findings

There were 28 pedestrian crashes in the study corridor, representing eight percent of the five-year total of all crashes (see Figure 6: Bicyclist and Pedestrian Crash Concentrations). These crashes, similar to the corridor-wide crash trend, have declined from seven in 2006 to three in 2010. With force reductions in the Camden City police department in recent years (according to audit team members and recent news), it is possible that these reductions may be partly due to underreporting; this may also have affected the corridor-wide crash totals. This is an important consideration since the pedestrian crashes and fatalities in the state of New Jersey have increased in recent years (141 in 2010, and 143 in 2011), while total crash deaths have declined. Despite the drop in pedestrian crashes, the average share of pedestrian crashes for all county routes in the state is about two percent annually,⁵ thus Mt. Ephraim Avenue remains overrepresented. Of the 28 pedestrian crashes, one resulted in a fatality and 27 were injury crashes.

In an effort to learn more about the pedestrian crashes and to better identify improvement opportunities, the crashes were analyzed as a subset, as well as part of the corridor-wide total. The following findings should be noted:

- ▶ 12 occurred at an intersection, and 16 were between intersections (midblock);
- ▶ 32 percent involved a driver making a left turn;
- ▶ 10 crashes involved a hit and run situation;
- ▶ 82 percent occurred on dry road surface, meaning that inclement weather was not a contributing factor;
- ▶ 50 percent occurred at night (7 PM to midnight), well above the corridor-wide total crash percentage of 34 percent;
- ▶ 29 percent occurred on Saturdays;
- ▶ Victims' ages: 6–17 (four crashes), 18–64 (21 crashes), unknown age (3 crashes).

⁵<http://www.state.nj.us/transportation/refdata/accident/10/ARDSMRPT02.2010.pdf>

Bicyclist Crash Statistics and Findings

There were 13 bicyclist crashes, representing four percent of the five-year total of all crashes on the corridor. These crashes followed no real trend by year but saw a spike of five in 2008, and the remaining four years had either three or one in each. The average share of bicyclist crashes for all county routes in the state is about one percent annually,⁶ thus Mt. Ephraim Avenue is again overrepresented.

Of the 13 bicyclist crashes, none resulted in a fatality, 11 were injury crashes, and two were property damage only. As done with the pedestrian crashes, the bicyclist crashes were analyzed as a subset, as well as part of the corridor-wide total in an effort to identify improvement opportunities. The following findings should be noted:

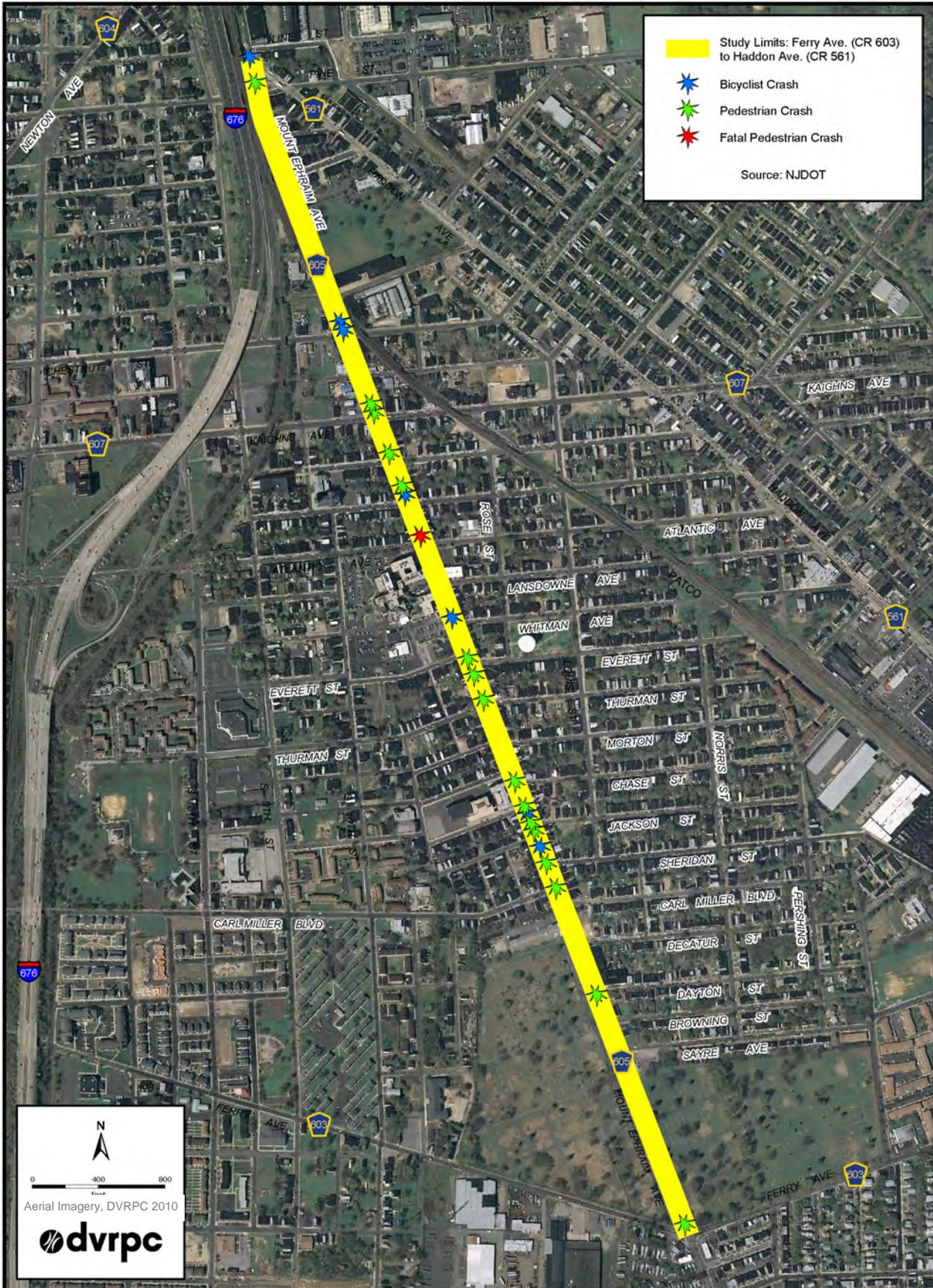
- ▶ Nine occurred at an intersection, and four were between intersections (midblock);
- ▶ “Driver going straight” was the most common pre-crash action in 46 percent of the crashes;
- ▶ Four crashes involved a hit and run situation;
- ▶ All 13 crashes occurred on dry road surface, thus weather was not a factor;
- ▶ Almost half (46 percent) of the crashes occurred at night (6 PM–1 AM)—as with the pedestrian crashes, this is well above the corridor-wide total nighttime crash percentage of 34 percent;
- ▶ Most crashes occurred on Saturdays (5 = 38.5 percent), as did the pedestrian crashes;
- ▶ Victims ages: 12–17 (1 crash), 18–64 (11 crashes), unknown (1 crash).

Pedestrian and Bicyclist Crash Concentrations

Pedestrian crash concentration areas were identified through the mapping process. Along the stretch of Mt. Ephraim Avenue between Carl Miller Boulevard and Jackson Street, there were 14 pedestrian crashes and three bicyclist crashes. This segment is 0.12 miles long and had 50 percent of the pedestrian crashes and 23 percent of the bicyclist crashes. Within this concentration, nine of the 14 crashes occurred on the one-block stretch from Sheridan Street to Jackson Street (one-way eastbound). This section of the corridor is predominantly retail and home to Bonsall Elementary School, which is located on the north side Jackson Street.

⁶<http://www.state.nj.us/transportation/refdata/accident/10/ARDSMRPT02.2010.pdf>

Figure 6: Bicyclist and Pedestrian Crash Concentrations



Findings and Recommendations

The following section summarizes the findings, potential strategies, and priorities of the Mt. Ephraim Avenue Pedestrian RSA in Camden City, New Jersey, using tables and corresponding maps. The table for each section shows site-specific safety issues and potential strategies, general ratings for difficulty to implement, proposed safety benefits, and responsible agency. An aerial map indicating the relative location of each identified issue (where possible) is paired with each table.

DVRPC uses the following general descriptions to characterize each of the three ratings associated with the “difficulty to implement” category:

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

The following abbreviations are used in the tables: SB—southbound, NB—northbound, WS—west side, ES—east side, NS—north side, SS—south side, SW—southwest, SE—southeast, TBD—to be determined, ADA—Americans with Disabilities Act, RRFB—Rectangular Rapid Flashing Beacon, HAWK—High-Intensity Activated crossWalk beacon.

Yellow highlighting identifies those issues that have a low rating for difficulty to implement. These improvements can typically be addressed through maintenance, or without beginning a new planning or engineering effort. It is expected that implementing these recommendations will improve the safety and operations along the study corridors. Note that potential strategies that call for further study do have a safety benefit because they are the next step toward a more detailed and appropriate safety improvement. Given fiscal constraints, recommendations may be considered one at a time or in small groups.

Being the roadway owner, Camden County should use the findings of the RSA as a guide for designing improvements to address these issues. Whereas the RSA findings are numerous, Camden County should use its experience in safety engineering to determine which issues from the table will yield the highest safety benefit given limited funds.

Audit Team Priorities

The audit process provides an opportunity for the audit team members to advocate for what they consider the single most important issue to be addressed as a result of the audit. These items are important because they are endorsed by individuals who spent the day familiarizing themselves with the corridor’s statistics, listening to the perspectives of the local participants including local police, and experiencing the issues first-

hand having walked the entire corridor during the field visit. Camden County, the roadway owner, is encouraged to consider the following items both in follow-up maintenance work, and to give them a high priority when doing long-term planning for the corridor:

- ▶ Re-stripe all pavement markings: centerline, edge line, stop bars, shoulders, crosswalks (where existing), no parking zones at corners, school zones, and lane designation;
- ▶ Replace and/or upgrade all signs where needed;
- ▶ Upgrade pedestrian environment to meet ADA standard, including installing or repairing curb ramps, installing missing crosswalks, widening sidewalks, adjusting cross slopes, and installing pedestrian countdown timers per new MUTCD recommendations;
- ▶ Address the issues identified at the intersection of Mt. Ephraim and Haddon Avenues (see panel discussion in Panel 8);
- ▶ Upgrade all drainage inlets to bike-safe inlets.

Road Owner Response

An important part of the audit process is the road owner's response: an acknowledgment of the audit's findings and recommendations, and their planned follow-up. Camden County delivered their response following the finalization of the findings and recommendations table.

In responding to the RSA's findings, the road owner must bear in mind all the competing objectives involved when implementing the recommendations, and foremost among them is available resources. Because the audit process generated a long and wide-ranging list of improvements, the road owner is expected to implement as time and funds allow in coordination with other projects and priorities. The safety issues table should feed development of long-term improvement projects and serve as a punch list of maintenance tasks. As mentioned, items highlighted in yellow are considered low difficulty to implement and will produce a high safety benefit. These should be priority items.

Camden County's response sheet indicated that "although the difficulty to implement something might be low and easily accomplished through maintenance, at this time the County is not in a position (financially) to be able to commit a time frame for when these improvements will be implemented." The complete response sheet, found in Appendix B, lists items from the corridor-wide list that will be addressed during regularly scheduled maintenance, including the following:

- ▶ Replace drainage grates where needed;
- ▶ Repaint all line striping;
- ▶ Repave the roadway;
- ▶ Address all sign issues;
- ▶ Address crosswalk issues and make curb ramps ADA compliant.

DRVPC was fortunate to have worked closely with Camden County on the selection of the audit corridor, and as an audit team member, and will continue to collaborate with them on securing federal safety funds to implement audit recommendations.

Figure 7: Panel 1 (Ferry Avenue intersection and north to cemetery)

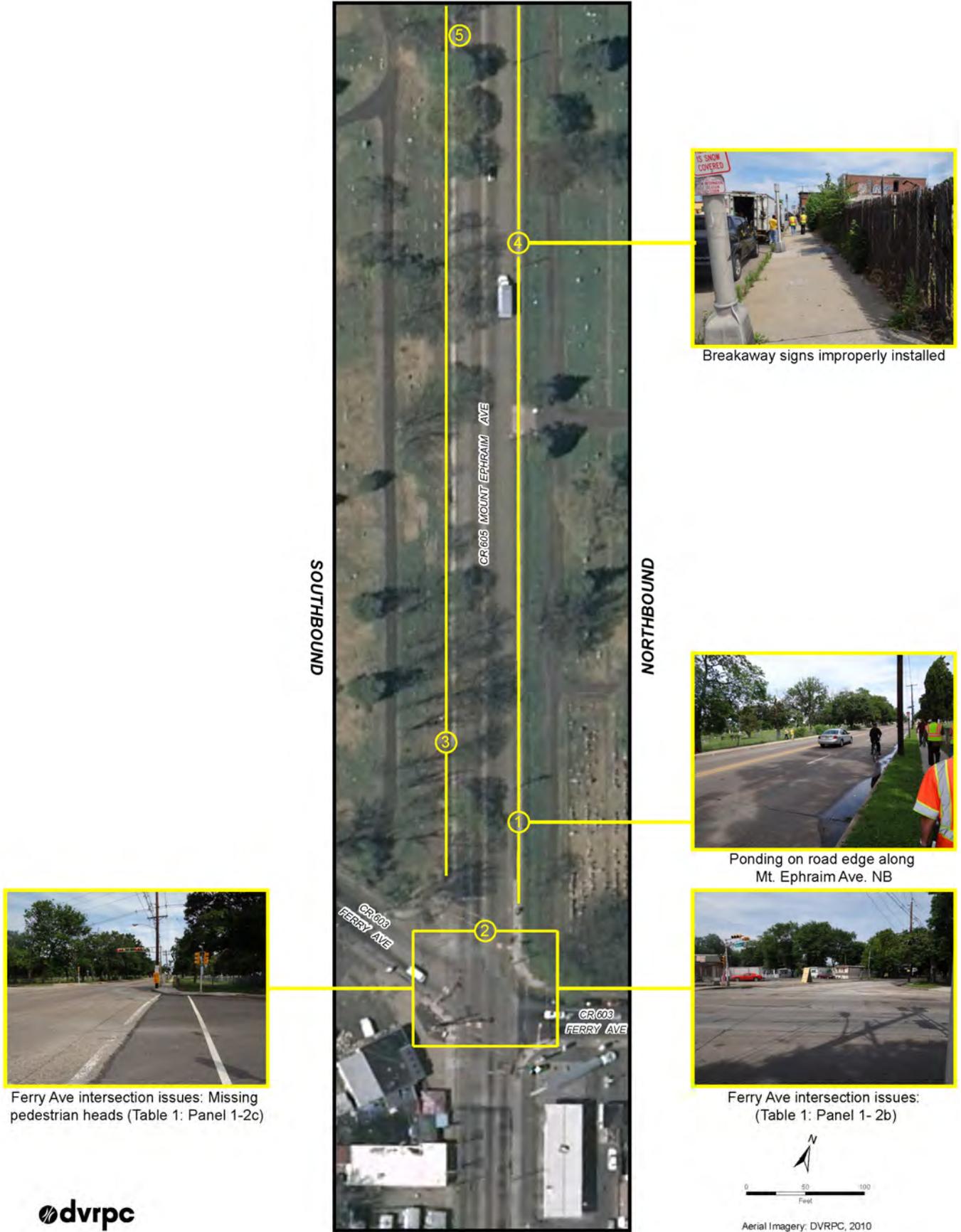


Table 7: Panel 1 (Ferry Avenue intersection and north through cemetery)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 1</p> <ol style="list-style-type: none"> Ponding on road edge along Mt. Ephraim Ave. NB; Ferry Ave. intersection issues: <ol style="list-style-type: none"> Double yellow striping does not line up for approaches of Ferry Ave.; Mt. Ephraim Ave. SB right turn to Ferry Ave. WB is very wide with an eased curve which makes the pedestrian crossing very long, ADA ramp on that corner has steep slope; Missing pedestrian heads; Only one cobra-light for entire intersection may not be adequate lighting; SW & SE corner properties have duplicate access points; Pavement condition is poor in the intersection and approaches, pot holes and ruts creating a hazard for bicyclists (and possibly automobile); Sidewalk condition poor with some obstruction along SB; Breakaway signs improperly installed; Size of speed limit sign appears inadequate, too small. 	<ol style="list-style-type: none"> Address during repaving project; Ferry Ave. intersection improvements: <ol style="list-style-type: none"> Stripe elephant tracks (skip lines) through the intersection to better guide drivers; Consider installing additional concrete to extend the sidewalk which will force drivers to slow down when turning and shorten the crossing distance for pedestrians; Install pedestrian signal heads with countdown timers; Review lighting standards and consider adding lighting to meet code standard and improve visibility; Consider access management plan which will restrict the number and size of commercial property driveways to reduce conflict points (if adopted soon, may be effective in changing the access situation at the property on SE corner which is currently closed); Spot fix worst locations in advance of a corridor-wide repaving; Work with property owners to address sidewalk; Identify specific signs and reinstall; Check sign against standard, replace if non-standard. <p>**Panel-wide recommendation: consider road diet from 4-to-2 w/parking and bike lane, or other configuration.</p>	<p>Medium</p> <p>Low</p> <p>Medium</p> <p>Medium</p> <p>Low</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Low</p> <p>Low</p>	<p>Medium</p> <p>High</p> <p>High</p> <p>High</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>High</p> <p>High</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County/City of Camden</p> <p>Camden County</p> <p>City of Camden</p> <p>Camden County</p> <p>Camden County</p>

Source: DVRPC, 2013

Figure 8: Panel 2 (Sayre Avenue to Dayton Avenue)

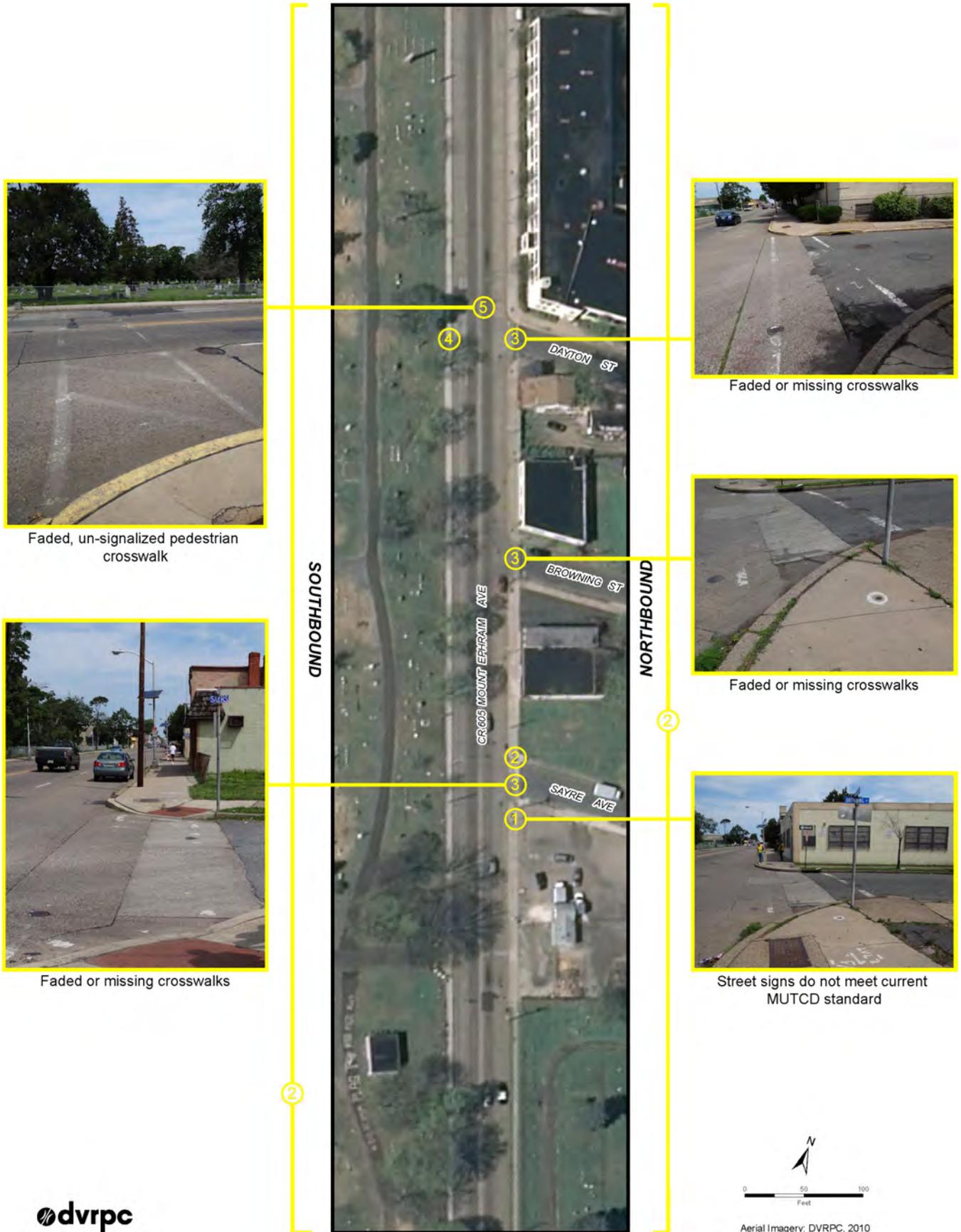


Table 8: Panel 2 (Sayre Avenue to Dayton Avenue)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 2</p> <ol style="list-style-type: none"> Street signs (first in the corridor going north) don't meet current MUTCD standard; There is a great distance between the signalized pedestrian crossings at Ferry Ave. and Carl Miller Blvd. which encourages midblock crossings; At all three cross streets in the panel there are faded or missing crosswalks; Opposite Dayton St. on Mt. Ephraim SB there is a broken light pole base in sidewalk that is collecting trash and impeding walking; There is a faded, un-signalized pedestrian crosswalk over Mt. Ephraim Ave. on the north side of Dayton St. 	<ol style="list-style-type: none"> Upgrade signs to standard; Consider installation of an un-signalized crossing with proper signs and possibly complimentary improvements (e.g.: HAWK, RRFB, etc.) at Sayrs Ave. which is midway between signals, and there is also a bus stop at that location; Res-stripe or replace faded side street crosswalks; Remove damaged fixture; Relocate this crossing to Sayrs Ave. on the south side of the intersection, add new crossing to south side of Dayton St. 	<p>Low</p> <p>Medium</p> <p>Low</p> <p>Low</p> <p>Medium</p>	<p>High</p> <p>High</p> <p>High</p> <p>Medium</p> <p>Medium</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p>

Source: DVRPC, 2013

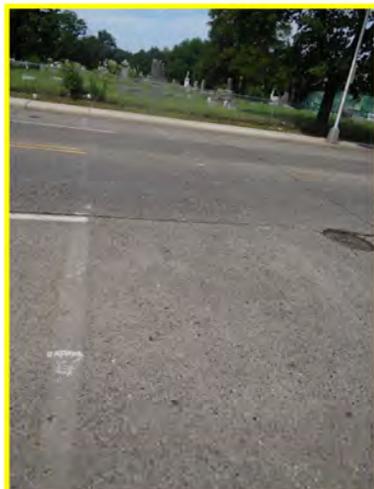
Figure 9: Panel 3 (Decatur Street to Jackson Street)



No school zone signs or any markings or flashing beacons, also missing school crossing signs



Various tripping hazards impede safe walking



Faded crosswalk over Mt. Ephraim Avenue



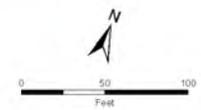
Somewhat erratic pedestrian behavior



Faded striping and missing pedestrian heads



Missing signs and pavement markings. NE



Aerial Imagery: DVRPC, 2010

Table 9: Panel 3 (Decatur Street to Jackson Street)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 3</p> <ol style="list-style-type: none"> Missing signs and pavement markings for the transition from four to two lanes NB in vicinity of Decatur St., and SB at Carl Miller Blvd.; At Decatur St. crosswalk over Mt. Ephraim Ave. is faded, there is also bus stop there and damaged shelter on NB side; Faded striping and missing pedestrian heads for crossing Carl Miller Blvd., missing crosswalks on the SS of intersection over Mt. Ephraim Ave.; Various tripping hazards including a broken light pole base, impede safe walking, specifically located in the vicinity of Carl Miller Boulevard and Sheridan Street along Mt. Ephraim Ave. SB; HL Basal K-8 school along Mt. Ephraim Ave. SB at Jackson St. has no school zone signs or any markings or flashing beacons, also missing school crossing signs; Somewhat erratic pedestrian behavior, mid-block crossings and disregard for established crossings, all within the corridor area containing the most pedestrian crashes. 	<ol style="list-style-type: none"> Add appropriate striping with gore area for the transition from the four-lane cross-section to two-lane cross-section, add appropriate signs, and consider gateway treatment; Upgrade to continental striping and add pedestrian crossing signs, consider adding complimentary improvements (e.g.: HAWK, RRFB), and remove damaged shelter; Re-stripe crosswalk or post for no crossing (less desirable-last resort); consider no turn on red from Mt. Ephraim Ave. SB to Carl Miller Blvd. WB; Repair sidewalk as needed and remove obstructions; Investigate school route traffic control plan to find out which are the school routes (for guidance, see http://mutcd.fhwa.dot.gov/htm/2009r12/part7/bar7a.htm) then upgrade all with continental crossings, pedestrian signal heads with countdown timers, and establish school zone limits and mark and sign as needed (consider flashing beacon and school zone speed limit); Consider crime and crash data approach (DDACTS - see corridor-wide) in collaboration with Camden City Police—this would be a focus area. 	<p>Low/Medium</p> <p>Low/Medium</p> <p>Low/Medium</p> <p>Low</p> <p>Medium</p> <p>High</p> <p>High</p>	<p>High</p> <p>High</p> <p>High</p> <p>Medium</p> <p>High</p> <p>High</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County/City of Camden</p>

Source: DVRPC, 2013

Figure 10: Panel 4 (Chase Street to Everett Street)



Exposed wiring creating a potential hazard for pedestrians



Car parked in crosswalk of intersection between signals at Everett St.



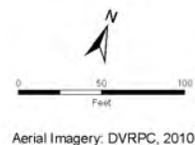
Lighting pole in sidewalk obstructing the path



Missing pedestrian heads for crossing the side streets



Pedestrian heads misaligned at Chase St crossing Mt. Ephraim Ave to the school, and over Chase St. Pavement markings are missing.



Aerial Imagery: DVRPC, 2010

Table 10: Panel 4 (Chase Street to Everett Street)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 4</p> <ol style="list-style-type: none"> Continuation of #5 in Panel 3 regarding school related issues <ol style="list-style-type: none"> The pedestrian heads are misaligned at Chase St. crossing Mt. Ephraim to the school, and over Chase St. Pavement markings are missing; "Do not block intersection" sign may be inadequate; Missing pedestrian heads for crossing the side streets; Lighting pole in sidewalk obstructing the path (may not be passable by person in wheel chair); At Everett St. the traffic signals are misaligned with the appropriate lanes; At Everett St. exposed wiring along SB side of Mt. Ephraim Ave. creating a potential hazard for pedestrians; Car parked in crosswalk of intersection between signals at Everett St. 	<ol style="list-style-type: none"> Addressing school zone issues <ol style="list-style-type: none"> Realign the pedestrian heads for better visibility by pedestrians Re-stripe all faded or missing pavement markings; Consider upgrade to "Don't Block The Box" with corresponding pavement markings; Replace as part of corridor-wide improvement; Short term: negotiate with utility to company to adopt policy of not obstructing the sidewalk in the future, Long term: relocate pole; Investigate the misalignment and make appropriate changes; Contact utility company to address the problem; Enforce parking restrictions. 	<p>Low/Medium</p> <p>Low</p> <p>Low</p> <p>Medium</p> <p>Medium/High</p> <p>Medium</p> <p>Low</p> <p>Medium</p>	<p>Medium</p> <p>High</p> <p>High</p> <p>High</p> <p>High</p> <p>TBD</p> <p>Medium</p> <p>Medium</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County/City of Camden</p> <p>Camden County/Camden Police</p>

Source: DVRPC, 2013

Figure 11: Panel 5 (Whitman Avenue to Mechanic Street)

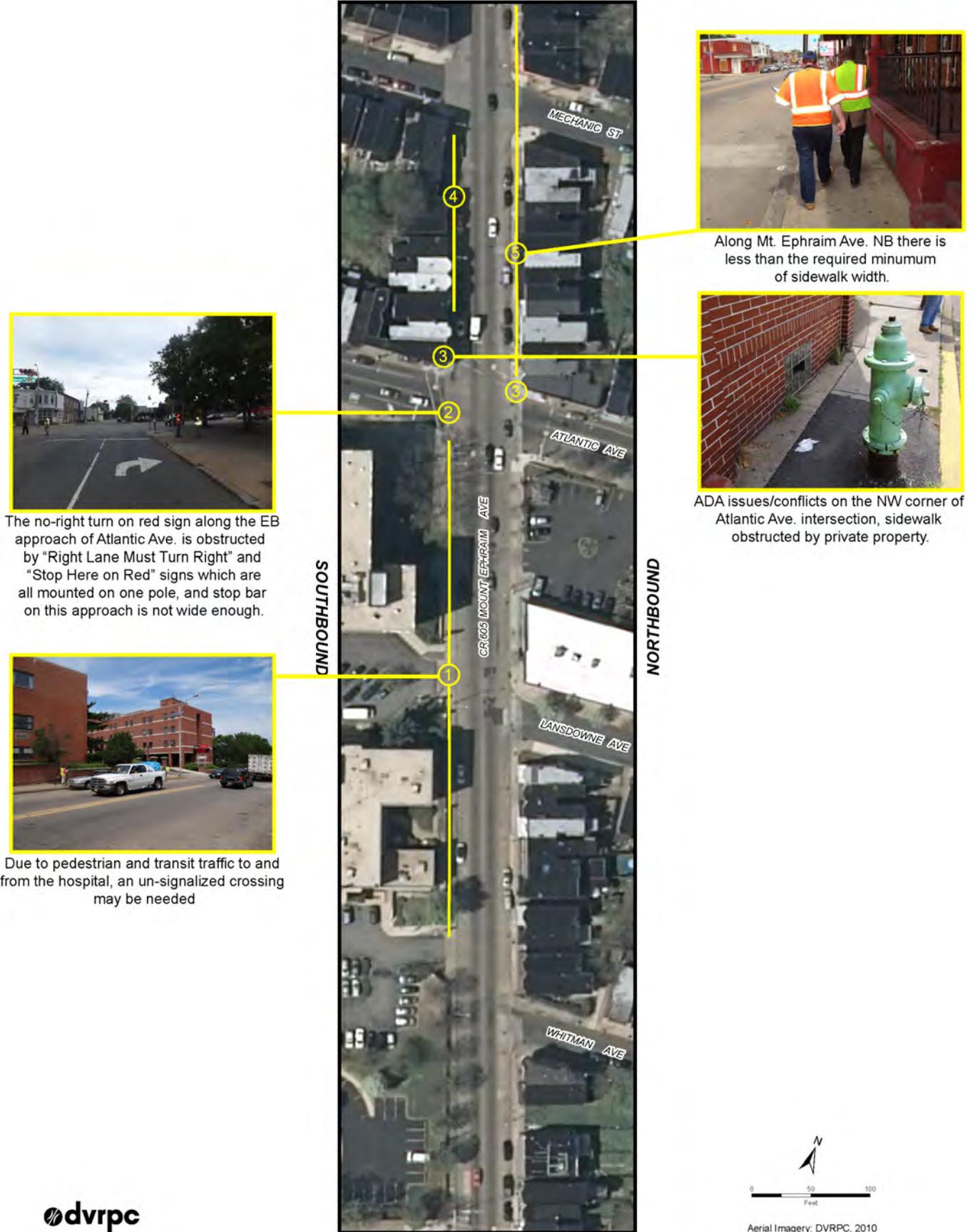


Table 11: Panel 5 (Whitman Avenue to Mechanic Street)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 5</p> <p>1. Due to pedestrian and transit traffic to and from the hospital, an un-signalized crossing may be needed;</p> <p>2. The no-right turn on red sign along the EB approach of Atlantic Ave. is obstructed by "Right Lane Must Turn Right" and "Stop Here on Red" signs which are all mounted on one pole, and stop bar on this approach is not wide enough;</p> <p>3. ADA issues/conflicts on the NW corner of the Atlantic Ave. intersection, sidewalk obstructed by private property and utility pole;</p> <p>4. More basement access problems on sidewalk between Atlantic Ave. and Mechanic St. SB side;</p> <p>5. Along Mt. Ephraim Ave. NB there is less than the required minimum of sidewalk width.</p>	<p>1. Consider un-signalized crossing over Mt. Ephraim near the hospital (requires further study to determine need, placement, and type);</p> <p>2. Consider mounting signs on overhead structure and arrange properly; upgrade/restripe the stop bar;</p> <p>3. Investigate if this is a private or public property issue and address accordingly;</p> <p>4. Approach the property owners concerning the appropriate repair, use enforcement if possible;</p> <p>5. Approach the property owners concerning the appropriate repair, use enforcement if possible.</p>	<p>Medium</p> <p>Low/Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>	<p>Medium</p> <p>High</p> <p>Medium</p> <p>Medium</p> <p>Medium</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County/City of Camden</p> <p>City of Camden</p> <p>City of Camden</p>

Source: DVRPC, 2013

Figure 12: Panel 6 (Liberty Street to Sycamore Street)



Poor visibility of pedestrians in Mt. Ephraim Ave. crosswalk on SS of intersection for drivers on Kaighns Ave. EB turning right onto SB Mt. Ephraim Ave.



Missing pedestrian heads at Kaighns Ave. for crossing Kaighns Ave., pedestrian heads and push buttons are misaligned for crossing Mt. Ephraim Ave.

There are no SB photos of less than minimum width sidewalks

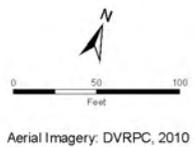


Table 12: Panel 6 (Liberty Street to Sycamore Street)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 6</p> <ol style="list-style-type: none"> Along Mt. Ephraim Ave. SB there is less than the minimum sidewalk width due to residential encroachment; Excessive curb cuts for residential uses creates unnecessary conflict points; Missing pedestrian heads at Kaighns Ave. for crossing Kaighns Ave., pedestrian heads and push buttons are misaligned for crossing Mt. Ephraim Ave.; Poor visibility of pedestrians in Mt. Ephraim Ave. crosswalk on SS of intersection for drivers on Kaighns Ave. EB turning right onto SB Mt. Ephraim Ave.; At Mt. Ephraim Ave. and Kaighns Ave. intersection, crosswalk on ES crossing over Kaighns Ave. is far back from pedestrian path of travel; South of Sycamore St. drivers are parking on the sidewalk along Mt. Ephraim Ave. SB; Sycamore St. WB is missing a stop sign. 	<ol style="list-style-type: none"> Approach the property owners concerning the appropriate repair, use enforcement if possible; Consider instituting an access management plan (see corridor-wide recommendations); Replace missing pedestrian signal heads with countdown timers; realign heads and push buttons; Conduct investigation into the obstructed sight lines, formulate a project if the problem can't be solved through low cost safety improvement; Realign crosswalk with pedestrian travel path; Enforce parking restrictions; Replace missing sign. 	<p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Low</p> <p>Medium</p> <p>Low</p>	<p>Medium</p> <p>Medium/High</p> <p>High</p> <p>TBD</p> <p>High</p> <p>Medium</p> <p>High</p>	<p>City of Camden</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden Police</p> <p>Camden County</p>

Source: DVRPC, 2013

Figure 13: Panel 7 (Chestnut Street to Walnut Street)

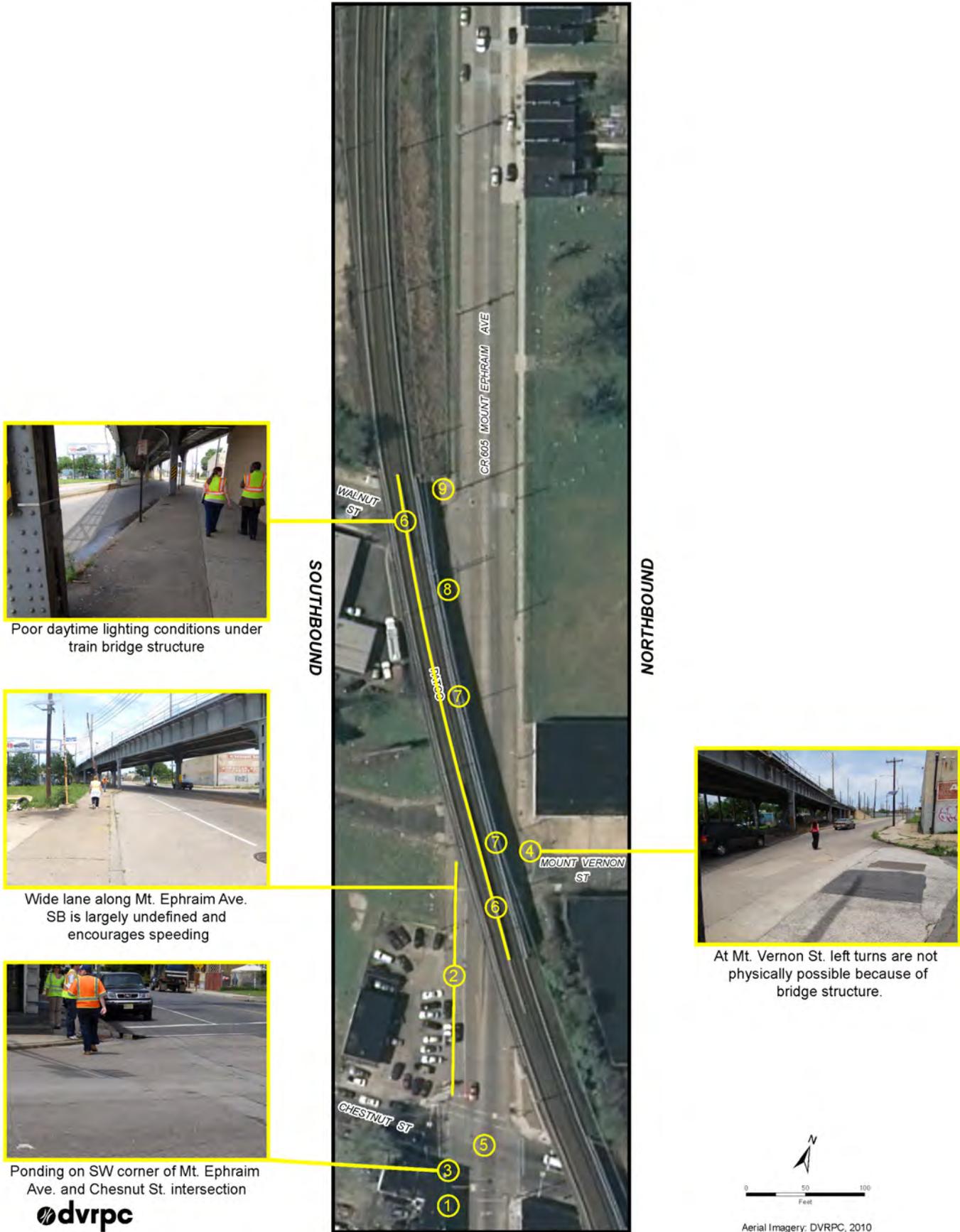


Table 13: Panel 7 (Chestnut Street to Walnut Street)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 7</p> <ol style="list-style-type: none"> Far-side bus stop on along Mt. Ephraim Ave. SB at Chestnut St. may be safer if relocated; Wide lane along Mt. Ephraim Ave. SB is largely undefined and encourages speeding; Ponding on SW corner of Mt. Ephraim Ave. and Chestnut St. intersection; At Mt. Vernon St. left turns are not physically possible because of bridge structure; Missing pedestrian heads at all approaches to intersections; Poor daytime lighting conditions under train bridge structure; Missing "Keep Right" signs at bridge structure both on Mt. Ephraim Ave. NB and SB; Sinking sidewalk near Walnut St. along Mt. Ephraim SB; Curb face missing at drainage inlet on NW corner of Walnut St. intersection. 	<ol style="list-style-type: none"> Near-side bus stop would be safer than the existing far-side stop; Re-stripe to establish appropriate lane width, consider striping a gore area to fill unused space, consider traffic calming; Address during scheduled repaving; Install proper signs to inform drivers; Install pedestrian signal heads with countdown timers where needed; Work with bridge owner to improve lighting condition; Install missing signs; Approach the property owners concerning the appropriate repair, use enforcement if possible; Spot fix if hazard is deemed immediate, or address during corridor-wide drainage inlet improvement as part of paving project. 	<p>Medium</p> <p>Low</p> <p>Medium</p> <p>Low</p> <p>Medium</p> <p>Medium</p> <p>Low</p> <p>Medium</p> <p>Medium</p>	<p>Medium</p> <p>High</p> <p>Medium</p> <p>High</p> <p>Medium</p> <p>Medium</p> <p>High</p> <p>TBD</p> <p>Medium</p>	<p>NJ Transit</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County/DRPA</p> <p>Camden County</p> <p>City of Camden</p> <p>Camden County</p>

Source: DVRPC, 2013

Figure 14: Panel 8 (Spruce Street to Haddon Avenue)



Haddon Ave. SB needs better lane designation prior to the bridge



Mt. Ephraim Ave. NB has missing left turn arrow



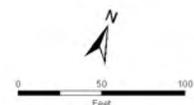
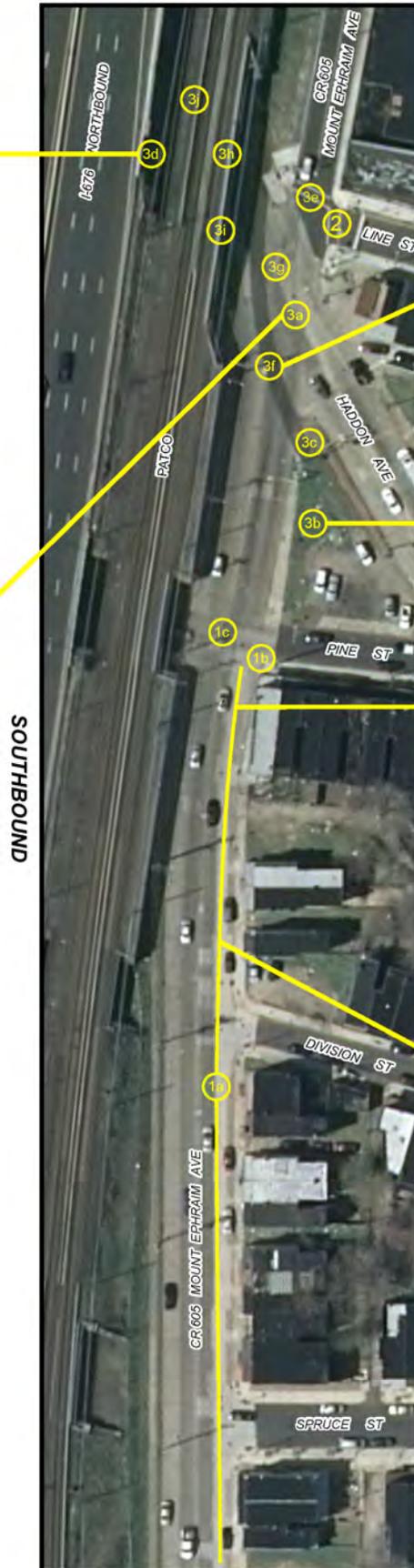
Undeveloped property on SE corner has overgrown vegetation and deteriorated sidewalks



Missing stop bars and crosswalks at Mt. Ephraim Ave. NB, missing pedestrian heads and curb ramps



Mt. Ephraim Ave. NB lane extra wide and results in less than adequate sidewalk up to Pine St. and forces pedestrians and wheel chair users into street, this is a hazard and an ADA compliance issue.



Aerial Imagery: DVRPC, 2010

Table 14: Panel 8 (Spruce Street to Haddon Avenue)

Site-Specific Issue	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>Panel 8</p> <p>1. Issues at and in the vicinity of the Pine St. intersection:</p> <p>a. Mt. Ephraim Ave. NB lane extra wide and results in less than adequate sidewalk up to Pine St. and forces pedestrians and wheel chair users into the street, this is a hazard and an ADA compliance issue;</p> <p>b. Sight distance on the Pine St. WB approach is compromised (view of Mt. Ephraim Ave. NB traffic) due to residence encroaching on SE corner;</p> <p>c. On Mt. Ephraim Ave. NB at Pine St. the queued traffic in the through lane obstructs the left turn lane traffic's view of pedestrians crossing;</p> <p>2. Missing one-way sign for Line St., and missing pedestrian heads;</p> <p>3. Issues at and in the vicinity of the Haddon Ave. intersection:</p> <p>a. Missing stop bars and crosswalks at Mt Ephraim Ave. NB and Haddon Ave. NB, missing pedestrian heads and curb ramps;</p> <p>b. Undeveloped property on SE corner has overgrown vegetation and deteriorated sidewalks;</p> <p>c. Very high number of right angle crashes (recommend signal upgrade and complete intersection overhaul);</p> <p>d. Haddon Ave. SB needs better lane designation prior to the bridge;</p> <p>e. Non-standard lane use sign on Mt. Ephraim Ave. NB;</p> <p>f. Mt. Ephraim Ave. NB had missing left turn arrow (signal upgrade);</p> <p>g. Dual left turn permitted (typically not recommended) from Mt. Ephraim Ave. NB to Haddon Ave. WB;</p> <p>h. Under PATCO train bridge, missing lighting, which is inconsistent with the I-676 overpass;</p> <p>i. Collapsed inlet on Haddon Ave SB,</p> <p>j. Guide rail under bridge is damaged.</p>	<p>1. Intersection area improvements (a, b & c): Widen the sidewalk and re-stripe the lane to narrow this area back down to one lane, this will provide needed sidewalk, it will calm traffic, improve the sight-line for crossing pedestrians;</p> <p>2. Replace missing sign and install pedestrian signal heads with countdown timers;</p> <p>3. Haddon Ave. intersection improvements: The audit team identified many safety, and safety-related operational issues at this general location, and with the intersection specifically. It is recommended that the needed striping and signing issues identified be addressed in the short term, and that the intersection signal upgrade and associated operational issues be addressed as part of a separate project. This intersection handles significant traffic and has unusual geometry and conditions due to the rail bridge.</p>	<p>High</p> <p>Medium</p> <p>Low/High</p>	<p>High</p> <p>Medium</p> <p>High</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County</p>

Source: DVRPC, 2013

Table 15: Corridor-wide Issues and Strategies

Corridor-wide Issues	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>1. Drainage inlets are not bicycle-safe, and many are clogged and deteriorating;</p> <p>2. The no-parking areas along curbs back from intersections were not properly marked, or yellow paint was faded, and was often being ignored or not enforced, other intermittent parking violations also observed;</p> <p>3. Roadway: pavement condition is poor, rutted, pot holes, sinking and heaving sections, all combined compromise safety for drivers and bicyclists (occasional spot fixes were noted but very infrequent);</p> <p>4. Sidewalk issues:</p> <ol style="list-style-type: none"> Sidewalk condition (intermittently) is poor, broken and deteriorated sections, present safety concerns; Sidewalk obstructions (utility access panels, building encroachment, hydrants, basement access doors damaged and/or replaced with plywood) compromise width and may be non-compliant with the ADA standards; <p>5. Utility poles in vehicular clear zone create potential hit-fixed-object (HFO) hazards (team member said all minimum distances were met);</p> <p>6. All pavement markings including double yellow lines, edge-lines, stop bars, road legends are faded or missing entirely;</p> <p>7. Most signs were faded, damaged, not retro-reflective, and not break-away, many improperly placed lacking consistency, there is sign clutter, and the one-way streets were missing proper signs;</p>	<p>1. Replace each outdated inlet with bicycle-safe inlet, can be done gradually through maintenance, or as part of repaving project;</p> <p>2. Short Term: upgrade the parking space markings on street parking areas to meet standards, and specifically delineate statutory parking restrictions around marked, as well as unmarked crosswalks at signalized and un-signalized intersections;</p> <p>Long Term: consider instituting parking by permit for residential areas, and increase enforcement;</p> <p>3. Repave entire corridor;</p> <p>4. Investigate which properties are considered public responsibility and address through a repair schedule, at private property locations approach the property owners and enforce codes where possible;</p> <p>5. Consider increasing minimum clear zone for all future repairs or installations, amend policy;</p> <p>6. Re-stripe entire corridor;</p> <p>7. Conduct sign inventory and replace, repair or upgrade all signs;</p>	<p>Low/Medium</p> <p>ST: Low/L.T: High</p> <p>Medium</p> <p>Medium</p> <p>Medium</p> <p>Low</p> <p>Low</p> <p>Low</p>	<p>High</p> <p>Medium</p> <p>High</p> <p>Medium</p> <p>Low</p> <p>High</p> <p>High</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County/City of Camden</p> <p>Camden County</p> <p>Camden County</p> <p>Camden County</p>

Source: DVRPC, 2013

Corridor-wide Issues	Potential Strategy	Difficulty to Implement	Estimated Safety Benefit	Responsible Agency
<p>8. Pedestrian issues:</p> <p>a. Pedestrian crossings over Mt. Ephraim Ave. have missing or faded striping, curb ramps were more prevalent but often misaligned (despite recent signal upgrades);</p> <p>b. Pedestrian crossings over minor cross streets have missing or faded crosswalk striping and some missing curb ramps;</p>	<p>8. Improvement suggestions::</p> <p>a. Upgrade crosswalks to continental-style for all crossings over Mt. Ephraim Ave., and install or repair ADA compliant curb ramps where needed;</p> <p>b. Install curb ramps where needed and re-stripe the crosswalk (continental may or may not be needed);</p>	<p>Low/Medium</p> <p>Low/Medium</p>	<p>High</p> <p>High</p>	<p>Camden County</p> <p>Camden County</p>
<p>9. Bicyclist accommodations are missing throughout the corridor (no bike lanes, no sharrows, no share the road signs) there were 13 bicyclist crashes during the study period;</p> <p>10. Transit issues were identified throughout the corridor, including parking in the bus stops, and non-compliance of bus zones;</p> <p>11. Traffic speeds and driver behavior is erratic and potentially dangerous.</p>	<p>9. Investigate minimum lane widths required for accommodating bicyclists (may not be enough space for lanes, but possibly sharrows and or bike sharing signs), consider new change to roadway as part of repaving and/or corridor-wide re-striping;</p> <p>10. Inventory bus stops and consider changing stop placements to increase sight distance, boards and alights, and transit rider safety;</p> <p>11. Consider spot treatments of traffic calming, increased enforcement, and a long-term approach employing Data Driven Approaches to Crime and Traffic Safety (DDACTS) in coordination with the Camden City Police Department.</p>	<p>Low</p> <p>Medium</p> <p>Medium</p>	<p>TBD</p> <p>Medium</p> <p>TBD</p>	<p>Camden County</p> <p>Camden County</p> <p>Camden County/Camden Police</p>

Source: DVRPC, 2013

Conclusion

The Mt. Ephraim Avenue Pedestrian RSA was conducted to identify issues that compromise the walking and biking environment, making it undesirable and potentially dangerous to pedestrians and bicyclists. The team identified a long list of issues from the field visit, as well as many practical short- and long-term improvements during the post-audit.

The recommendations documented in this report are designed to improve safety for those using Mt. Ephraim Avenue. Some of the strategies identified can be implemented through routine maintenance; all will be constrained by available time and budgetary priorities. The audit process and the resulting final document highlight the safety issues posed to pedestrians and bicyclists and present the needed improvements by location organized for systematic implementation by the roadway owner.

When it comes to improving safety, engineering strategies alone only go so far. This is especially true when trying to address pedestrian safety in an economically challenged location like Camden City, as demonstrated in the Environmental Justice analysis. Education, with support from a targeted enforcement campaign, is an effective approach for addressing the driver behaviors that lead to crashes. In addition, policy actions can provide the legal weight needed to motivate people to be safer and more conscientious drivers, as well as pedestrians and bicyclists. Employing a multipronged approach that includes engaging the appropriate stakeholders is an effective course of action to advance the goal of improved safety on the corridor. Those stakeholders are the roadway owners (Camden County), the police department, and the Office of the Mayor of Camden.

It is recommended that the issues highlighted in yellow (from the preceding section) be implemented first because they are typically easier to implement and are projected to have a medium or high safety benefit. Many of these items are low-cost safety improvements, such as signs and pavement markings, and can be implemented through the existing maintenance schedule.



Audit Team

Name	Agency
Gary Chambers	Camden County Engineering
Andrew Levecchia	Camden County Improvement Authority
Uzo Ahirakwe	City of Camden Planning and Engineering
Officer Vallen	City of Camden Police
Regina Moore	DVRPC
Kevin Murphy	DVRPC
Dan Nemiroff	DVRPC
Donald Powers	DVRPC
Caroline Trueman	FHWA – NJ
Jay Wolf	New Jersey State Police
Ray Reeve	NJ Division of Highway Traffic Safety
Virgilio Tan	NJDOT Bureau of Transportation Data and Safety
Beth Waltrip	NJTransit
Sally Karasov	Rutgers University TSRC
Andy Kaplan	Rutgers University TSRC
Jennifer Marandino	South Jersey Transportation Planning Organization



Road Owner Response

Camden County Response to Mt. Ephraim Avenue Pedestrian RSA

Corridor-wide Issues

Although the difficulty to implement something might be low and easily accomplished through maintenance at this time the County is not in a position (financially) to be able to commit a time frame for when these improvements will be implemented.

The responses below indicate if we agree or disagree with the assessment but should in no way be perceived as a commitment to the implementation of such suggestions.

Rather than focus on each individual item Panel by Panel, I am focusing on the eleven (11) Corridor-wide Issues.

Corridor-wide Issues

1. Agree – drainage inlets can be updated and replaced during the next regularly scheduled maintenance event.
2. Although the line striping issues can and will be addressed during the next regularly scheduled maintenance event, the County does not enforce or delineate statutory parking restrictions, as these issues are a municipal responsibility.
3. Agree - Roadway pavement conditions are poor and will be added to the next regularly scheduled maintenance event for this corridor.
4. Sidewalk issues – the county does not maintain sidewalk issues on any county highway. Sidewalk maintenance is the responsibility of the municipality.
5. The movement and replacing of utility poles is a very expensive task. The benefit is low; therefore, unless the county receives funding for the complete reconstruction of the highway, this is a task that is a low priority for the county.
6. Agree – all road striping will be updated during the next regularly scheduled maintenance event for this corridor.
7. Agree – all signage issues will be addressed during the next regularly scheduled maintenance event for this corridor.
8. Agree – all crosswalk and ADA-compliant curb ramps will be updated during the next regularly scheduled maintenance event for this corridor. Please note that the county does not promote the use of, nor will it maintain any mid-block crosswalks. If a municipality is interested in a mid-block crosswalk, several steps are required by the county concluding with a Freeholder Resolution dedicating all responsibilities of the mid-block crosswalk to the municipal entity.

9. Agree – the county agrees with the assessment but cannot define a course of action until a full engineering review of the corridor is completed to determine if the cart way can be redesigned to accommodate a bike lane.

10. Transit issues along the corridor are not the responsibility of the County. Placement of bus stops and shelters is the sole responsibility of the municipality.

11. Agree – traffic enforcement is not something that Camden County is responsible for, and this issue will have to be addressed by the municipality or new Metro Division of the Police force.





Mt. Ephraim Avenue (CR 605) Pedestrian Road Safety Audit

Camden City, NJ



Wednesday, June 13, 2012

DVRPC – Delaware Valley Regional Planning Commission

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



Audit Team Introductions

- Name
- Affiliation



Mt. Ephraim Avenue (CR 605)

- **Why this route?**
 - High pedestrian-crash county route corridor
 - Identified in a network screening performed by Rutgers TSRC using Plan4Safety
 - Response to New Jersey's pedestrian crash trend
- **Collaboration among:**
 - FHWA-NJ
 - NJDOT
 - Camden County Planning & Engineering
 - City of Camden
 - DVRPC's Office of Transportation Safety and Congestion Management



RSA Schedule

1. **Pre-Audit Meeting - 8:30 AM**
 - Analyze and discuss study area crash data and related safety issues
2. **Field Visit**
 - Foot survey of the corridor to identify safety issues and examine conditions
 - Lunch
3. **Post Audit Meeting**
 - Define problems
 - Brainstorm improvement ideas
 - Wrap up by 4:30 PM



What is a Road Safety Audit?

- Federal Highway Administration Road Safety Audit Video



What is a Pedestrian RSA?

- An RSA is a safety performance examination of an existing or future road or intersection by an independent, multidisciplinary audit team
- A Pedestrian RSA considers pedestrian (and bicyclists) crashes, and their circumstances, more closely



History of RSAs

- First used in the United Kingdom in 1980s
- Australia and New Zealand have used RSAs since the 1990s
- Formal practice in the United States began in 1997 when the Federal Highway Administration sponsored a pilot program in 13 states
- Pedestrian-specific RSAs even more recent (NJ 70 Ped RSA: 2008)
- FHWA-sponsored Ped RSA held at DVRPC on May 1, 2012



Benefits

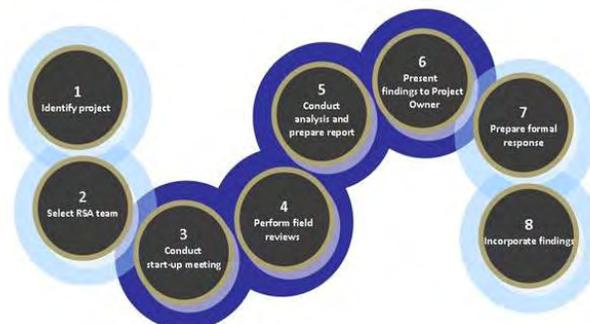
- Adaptable to local needs and conditions
- Short term
- Recommendations can be implemented in small stages as time and resources permit
- An audit can be performed during any stage of a project



How are RSAs conducted?

Responsibilities

- RSA Team
- Design Team / Project Owner



Source: VHB

Audit Team

- FHWA-NJ
- NJDOT Bureau of Safety Programs
- Camden County Planning & Engineering
- City of Camden
- City of Camden Police Department
- New Jersey Division of Highway Traffic Safety
- Rutgers Transportation Safety Resource Center
- NJ Transit
- Bicycle Coalition of Greater Philadelphia
- Cross County Connection TMA
- South Jersey Transportation Planning Organization
- DVRPC
 - Office of Safety & Cng Mgmt, and Office of Transit, Bike and Ped Plng



Audit Materials

- Location Maps/Aerials
- Crash Data
 - Data Summaries
 - Analysis
- Traffic Counts
 - AADTs
 - Turning Movement Counts
- Checklist
- Field Note Sheets



Study Area: Mt. Ephraim Avenue

Land Use

- Dense urban environment
- Mix of commercial and residential on street front
- Serves as main street for larger residential area
- Very active street life
- Urban hills



Operational Characteristics

Roadway

- 1.43 miles
- Two-way street
- Orientation: North-south
- Ferry Ave. to Decatur St.:
 - 4 lanes, no shoulder
- Decatur St. to Haddon Ave.:
 - 2 lanes, parking
- Sidewalks throughout
- No bike lanes
- Speed limit: 35 mph
- 35 Intersections:
 - 8 signalized intersections
 - 22 unsignalized



Traffic Volumes

AADTs

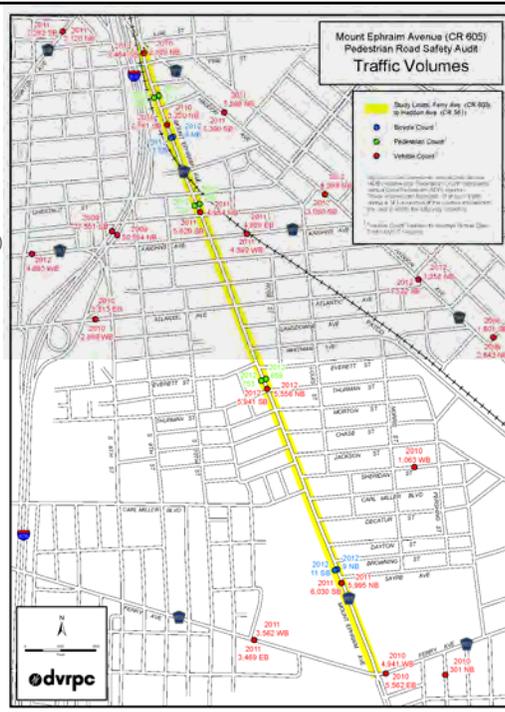
- South of Sayre Ave.: aprx 12,000 vehicles per day (VPD)
- Center of corridor near Thurman St.:11,500 VPD
- North of Kaighns Ave.: aprx. 10,500 VPD

Pedestrian Volumes

- Near Everett St.: aprx. 700 people per direction
- Near E Chestnut St.: aprx. 200 – 300 people per direction
- Near Spruce St.: aprx. 271 people northbound, 166 southbound

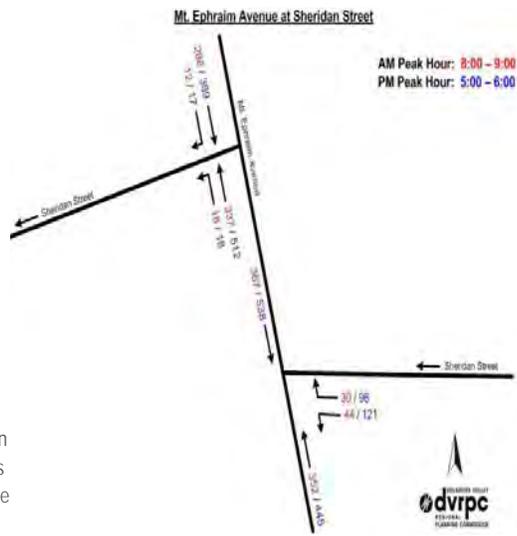
Bicyclist Volumes

- Near Sayre Ave.: aprx. 20 total volume
- Near Spruce St.: aprx. 21 total volume



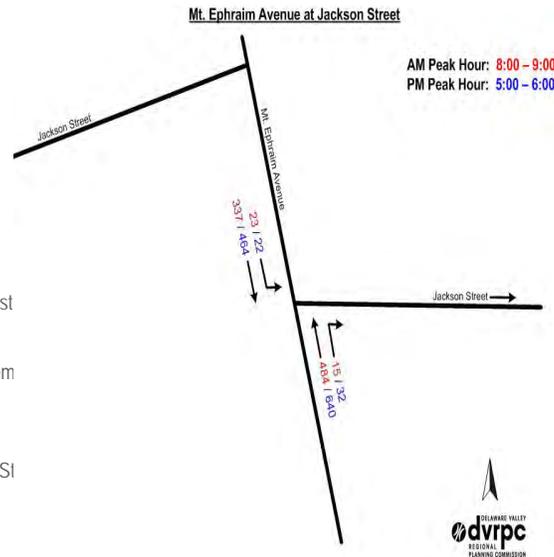
Peak Hour Turning Movement Counts at Sheridan Street

- Intersection volumes (combined)
 - AM = 1,446 vehicles
 - PM = 2,136 vehicles
- Higher volumes
 - Mt. Ephraim Avenue through movements, especially in the PM
- Higher volumes
 - < 50 vehicles turning in and out of Sheridan Ave. in the AM. Higher turning movements made from Sheridan Street (eastside) in the PM



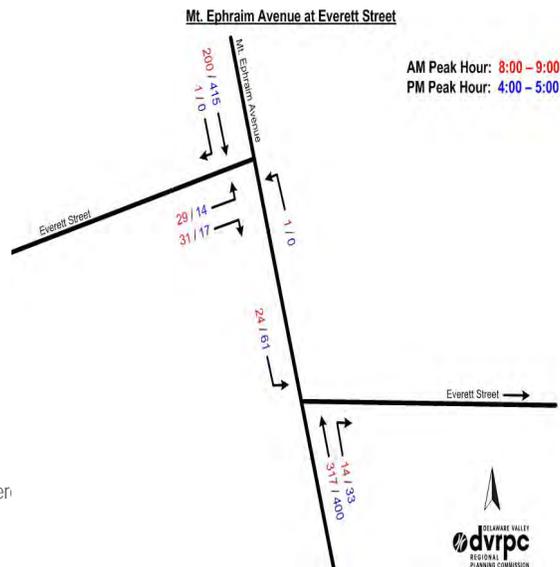
Peak Hour Turning Movement Counts at Jackson Street

- Intersection volumes (combined)
 - AM = 859 vehicles
 - PM = 1,158 vehicles
 - No counts taken at Jackson St. west
- Higher volumes
 - Mt. Ephraim Avenue through movement especially in the PM
- Lower volumes
 - < 50 vehicles turning into Jackson St



Peak Hour Turning Movement Counts at Everett Street

- Intersection volumes (combined)
 - AM = 617 vehicles
 - PM = 940 vehicles
- Higher volumes
 - Mt. Ephraim Avenue through movements, especially in the PM
- Higher volumes
 - < 50 vehicles turning in and out of Everett Street
 - Barely any vehicles turning onto Everett Street (westside)



Transit

Buses along the corridor

NJ Transit 400 Bus

- Follows Mt. Ephraim Ave through the entire study length on its route from Sicklerville to Philadelphia
- Runs at 5-20 minute intervals on weekdays and up to an hour at night
- Hours of operation are from 4:47 AM to 3:22 AM
- Ridership in May 2011 was 5,247 on weekdays, 3,715 on Saturday, and 2,307 on Sunday. This is an increase over the 4,595 recorded on weekdays in 2004.
- There are aprx.16 route 400 Bus stops in the study area

NJ Transit Bus 453

- Runs only in the southernmost section with two stops in the study area

Buses crossing the corridor

- NJ Transit 452 and 460 Buses cross the corridor at Kaighns Avenue

Rail

- The PATCO High Speed Line-no at grade crossings
- Closest station: Ferry Avenue (outside study area)



Crash Data

Reportable crashes

- Reportable criteria: personal injury, or minimum \$500 of property damage, determined by officer on the scene

Data Analysis Period

- 2006 – 2010

NJDOT Bureau of Safety Programs

- Police reports, details sheets, crash rates

Corridor-wide Crash Findings

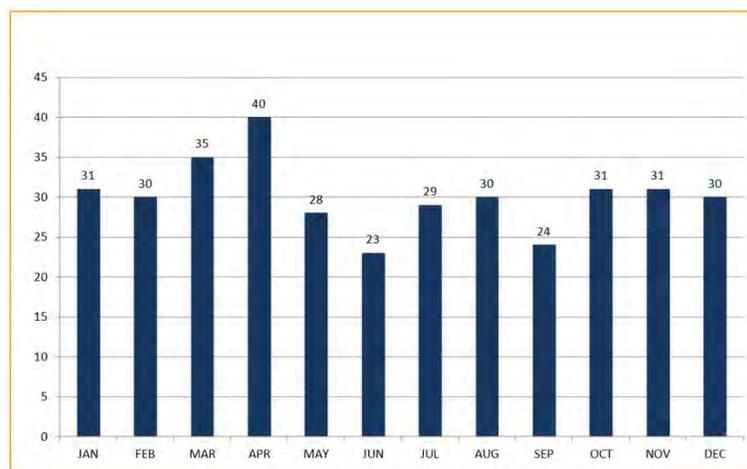
YEAR

	Reportable	
YEAR	TOTAL	PERCENTAGE
2006	93	26%
2007	93	26%
2008	72	20%
2009	63	17%
2010	41	11%
Total	362	



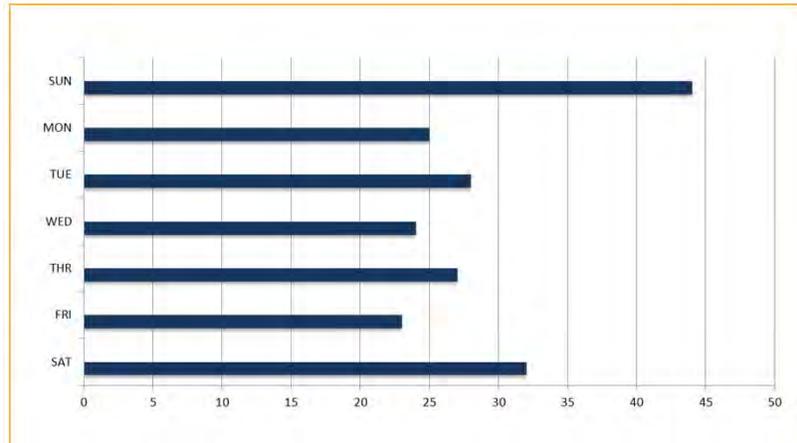
Corridor-wide Crash Findings

MONTH OF YEAR



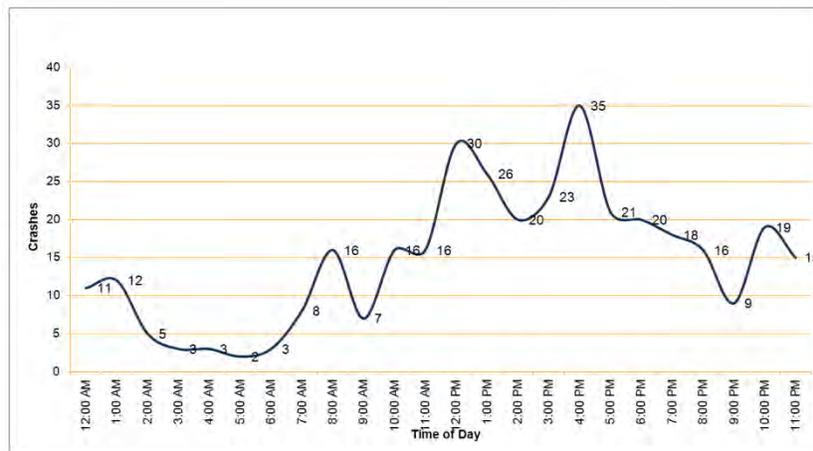
Corridor-wide Crash Findings

DAY OF WEEK



Corridor-wide Crash Findings

TIME OF DAY



Corridor-wide Crash Findings

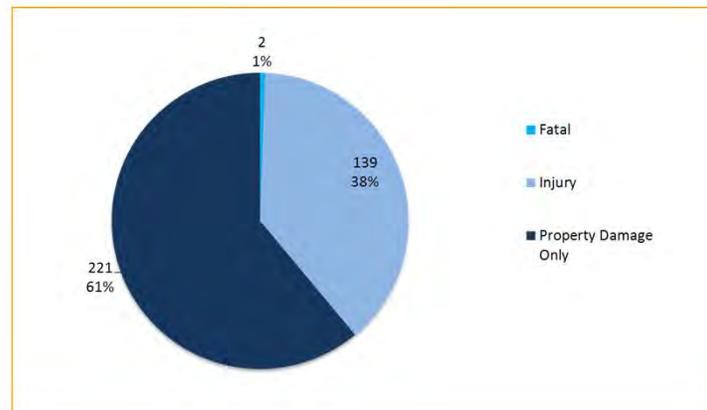
COLLISION TYPE

	Total Crashes	Percentage
Same Direction (Rear End)	110	31%
Right Angle	68	19%
Same Direction (Sideswipe)	50	14%
Struck Parked Vehicle	31	9%
Pedestrian	28	8%
Left Turn/U Turn	20	5%
Backing	18	5%
Fixed Object	12	3%
Pedalcyclist	13	4%
Encroachment	5	1%
Opposite Direction (Sideswipe)	4	1%
Opposite Direction (Head-on)	2	.5%
Other	1	.25%



Corridor-wide Crash Findings

CRASH SEVERITY



Corridor-wide Crash Findings

ENVIRONMENTAL CONDITIONS

		Total Crashes	Percentage
Road Surface	Dry	308	85%
	Wet	42	12%
	Snowy	6	2%
	Ice	5	1%
	Unknown	1	0.28%
Illumination	Daylight	229	63%
	Dusk	6	2%
	Night	122	34%
	Dawn	2	1%
	Unknown	3	1%



Corridor-wide Crash Findings

DRIVER PRE-CRASH ACTIONS

	Total Crashes	Percentage
Going Straight Ahead	286	41.5%
Stopped in Traffic	100	14.5%
Making Left Turn	64	9.3%
Slowing or Stopping	57	8.3%
Parked	40	5.8%
Starting in Traffic	38	5.8%
Making Right Turn (not on red)	34	4.9%
Backing	20	2.9%
Changing Lanes	10	1.5%
Starting from Parking	10	1.5%
Passing	7	1.0%



Corridor-wide Crash Findings

SUMMARY

Issue	Mt. Ephraim Ave.
Five-year trend	Down
Highest Crash Months	March, April
Highest Crash Days	Sunday (2x Friday)
Daily Trends	Midday, PM rush hour
Collision Type Overrepresentations	SDSS, Parked Vehicle, LT-UT, Backing, Ped, Bike
Injury Crashes	Over-represented
Surface Cond./Illumination	Dry / 34% Nighttime
Pre-crash Actions of Note	Stopped in traffic, Making a left turn, Parked



Crash Rates by Cross-section Type

Summary

- Crash Rate – crashes per million vehicle miles traveled
- Compared to the statewide crash rates for like facilities
- Three-years of data: 2008-2010

Two Cross-section Types

1. 4 or more lanes, no median, no shoulder, crash rate = 10.12
2. 2 lanes, no shoulder, crash rate = 21.92

Considerations

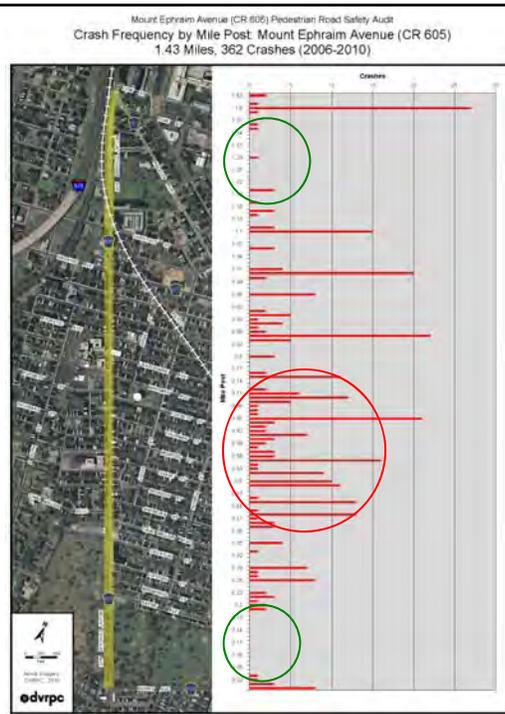
- Rates are effected by land use, e.g. parking
- Short sections of roadway typically have higher rates



Crash Frequency by Mile Post

Summary:

- Highest concentration: within the 2-lane section, specifically between Carl Miller Blvd. and Whitman Ave.
- Lowest concentrations (2):
 - Evergreen/New Camden Cemeteries frontage – north of Ferry Ave. to Carl Miller Blvd.
 - Old Camden Cemetery/PATCO – Mt. Vernon Ave. to Division St.
- Observation
 - Higher land use density coincides with crash frequency on study corridor



Pedestrian Crashes

Summary:

- 28 pedestrian crashes
 - 1 fatal (Atlantic Ave.)
 - 27 injury crashes
 - 12 at intersection, 16 between
 - Making left turn (driver) – 32%
 - Hit and run = 10
 - 82% on dry surface
 - 50% at night (7PM – midnight)
 - 29% on Saturdays
 - Victim ages:
 - 6-17 = 4
 - 18-64 = 21
 - Unknown = 3
 - Drop in 2010



Bicyclist Crashes

Summary:

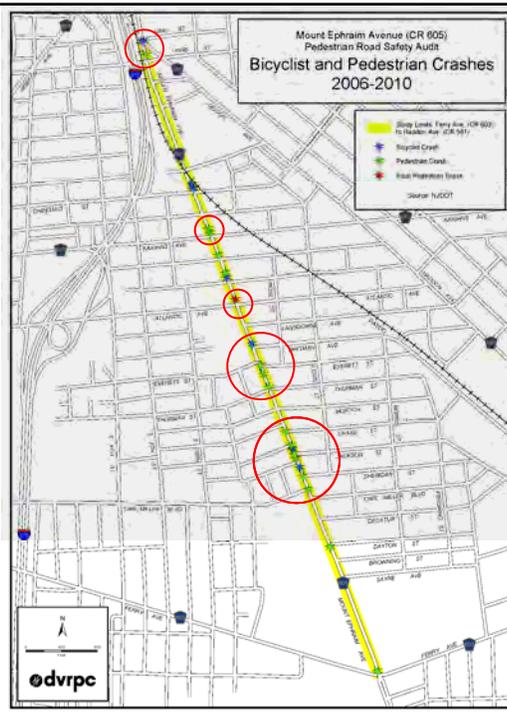
- 13 bicyclist crashes
 - 11 injury crashes
 - 2 PDO
 - 9 at intersection, 4 between
 - Going straight (driver) – 46%
 - Hit and run = 4
 - All on dry surface
 - 46% at night (6PM – 1AM)
 - 38.5% (5) on Saturdays
 - Victim ages:
 - 12-17 = 1
 - 18-64 = 11
 - Unknown = 1
 - Drop in 2010



Bicyclist and Pedestrian Crash Concentration Areas

Observations:

- Several concentration areas, though not isolated to single intersections
- One major concentration area: Carl Miller Blvd. To Chase St.
- Bicyclist crashes - more of a corridor-wide problem, smaller concentrations do exist



Reportable Crash Clusters by Total Crashes and Ped/Bike Concentration

Summary:

- 5 Clusters
- Clusters represent 62% of all crashes (362)
- Cluster 3 – 1 fatal crash
- Includes 81% of all ped crashes, 62% of all bike crashes
- Highest concentration of ped and bike crashes in Cluster 1: Carl Miller Blvd. to Chase St. = 15 peds, 4 bikes
- Lowest concentration of ped and bike crashes in Cluster 3: Atlantic Ave. intersection = 1 ped (fatal)
- Clusters 1 and 2 combined = 71% of all pedestrian crashes

(cluster summary sheets in binder)
(see walking maps & data)



Risk: Location of Pedestrian Crashes

- Midblock (27%)
- Intersections (33%)



- Nearly 60%
- Along roadway
- Off-road facilities

Midblock-related
Intersection-related

Crash Type	Percent
Midblock dart/dash	13.3
Other midblock	13.2
Other intersection	10.1
Vehicle turning at intersection	9.8
Not in road	8.6
Walking along roadway	7.9
Miscellaneous	7.8
Intersection dash	7.2
Backing vehicle	6.9
Driver violation at intersection	5.1
Working/playing in roadway	3.0
Disabled vehicle related	2.4
Driverless vehicle	2.1
Other vehicle-specific	1.9
Bus-related	0.9

Source: VHB

Crosswalks and Pedestrian Signals

Well designed and properly located crosswalks and signals:

- Inform motorists of the location of a pedestrian crossing
- Inform pedestrians where to cross
- Consider needs of users with disabilities
- Made with high-visibility markings
- Easily understood
- Use countdown timers
- Provide adequate crossing time



Source: VHB

Signal Timing and Phasing

- Walk Signal and Clearance Interval
 - Revisions to the MUTCD
 - Average walking speed reduced- 4 ft/s to 3.5 ft/s
- Longer Cycle Lengths
 - Increase delay
 - Reduce likelihood that pedestrians will wait
- Signal Phasing
 - Left-turn conflicts with permissive phasing
 - Potential for long delay or confusion with split phasing

Source: VHB



Features that Affect Bicyclists

- Uneven surfaces, pavement deterioration
 - Impact bicyclists more than motorist
 - Can throw rider off balance
- Raised utility covers and drainage grates, openings perpendicular to direction of travel
- Traffic speed
- Traffic volume
- Parking
- Bus activity
- Pedestrians



Source: VHB

Pedestrian RSA Guidelines

The *Pedestrian RSA Prompt Lists* are a useful tool for RSA teams to:

- Review prior to field visits
- Take along in the field
- Write RSA report

(FHWA Master Prompt List in binder)



Source: VHB

Field Visit Itinerary

- Start at southern end
 - Ferry Avenue intersection
- Stop at northern end
 - Haddon Avenue intersection



Field View Checklist

- Drainage
 - Inlets bicycle compatible
- Public utilities
- Does placement obstruct sight line, or pedestrian path
- Access management
 - Driveway spacing, redundancy
- Lighting
- Driver expectation
 - Sight distance adequate for pedestrians
 - Street signs visible
- Transit considerations
- Pedestrian crossings
 - Curb ramps in place
 - Crosswalks adequately marked
- Pavement markings and lane delineation



Field View

- Material
 - Notes sheet
 - Aerial maps
- Vests



Nighttime Video



Post Audit Analysis

- Debriefing from field visit
- Define the problems
- Next steps
- Target finish: 4:30 PM



QUESTIONS ?



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Abstract: This report documents the process and findings of the Mt. Ephraim Avenue Pedestrian Road Safety Audit undertaken by the Delaware Valley Regional Planning Commission (DVRPC). The report details safety issues identified by the audit team at the study location and remedial strategies to address them. The goal of this audit was to identify safety issues and generate improvement recommendations for the study area in an effort to reduce crashes and improve walking and biking. Emphasis is placed on identifying low-cost, quick-turnaround safety projects to address the identified issues, where possible. This project represents a step toward implementation of DVRPC's Safety Action Plan. Implementation of improvement strategies may be eligible for Local Federal Aid Safety Funds.

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