Pedestrian Safety Study

US 13 and US 40

New Castle County, Delaware

Prepared for:
Delaware Department of Transportation

By
Urban Engineers

April, 2009

Executive Summary

During 2006, the State of Delaware experienced an unusually high number of pedestrian fatalities. Research conducted by DelDOT's Division of Planning identified several corridors within New Castle County with unusually high concentrations of pedestrian crashes including the US 13 corridor between DE 273 (Frenchtown Road) and Saienni Boulevard and the US 40 corridor between US 13 and Buckley Boulevard. These two corridors were identified for further investigation.

The purpose of this study was to evaluate existing pedestrian accommodations for these two corridors, during typical weekday and weekend conditions. This evaluation included an extensive data collection effort, including crash data, pedestrian observations and counts, intersection turning movement counts, physical inventory, DART ridership information and general observations of traffic operations and pedestrian activity and an in-depth investigation to identify problem locations, underlying deficiencies and opportunities for improvements. This report contains the results of the investigation and proposed short and long term recommendations for improvements to the study area.

Pedestrians were observed crossing both highways at and between intersections and traveling in the shoulders along the length of US 13 and US 40 in the study area. There were a number of pedestrian travel routes that were noted during observations, including pedestrians originating from the area of Llangollen Boulevard crossing US 13, walking across a dirt path to US 40, crossing the railroad tracks and continuing across US 40 in the vicinity of Wilton Boulevard.

Detailed police crash reports were provided by DelDOT for all types of crashes occurring within the study area for the time period covering March 2005 to March 2008. Each crash report was reviewed and included on a detailed crash diagram. This information was then combined with a previous study conducted by DelDOT for pedestrian related crashes for the time period 2003-2006. In total there were 24 pedestrian related crashes between 2003 and 2008 of which 10 resulted in a pedestrian fatality.

The highest number of crashes at an individual location occurred at the intersection of US 13 and DE 273 (65 crashes). The majority of these crashes are rear-end and side-swipe type crashes which are typical for a signalized intersection with intermittent congestion. The next highest cluster occurred in the vicinity of the Firehouse at Stevens Drive where 57 crashes were recorded over the three year time period. Again, the majority of these crashes were rear-end collisions

On US 40, the highest number of crashes occurred at the intersection with Wilton Boulevard. This is also the location with the highest number of pedestrian related crashes. There was one pedestrian fatality and two injuries at the intersection, and a fatality and injury (resulting from one crash) near the intersection, at the entrance to Wal-Mart. Three of the four pedestrian crashes at

the intersection occurred after dark and three were designated as improper crossing, or failure to yield to a driver.

FHWA's Pedestrian Safety Index (Ped ISI) and Bicycle Safety Index (Bike ISI) were used to examine the level of safety for pedestrians and bicyclists at each intersection in the study area. The ISI's produce safety index scores, with the high scores indicating greater priority for in-depth safety assessments. The calculations are based on existing conditions such as lane numbers, speed, signals, bike lanes, and other circumstances relevant to pedestrian and bicyclist safety. The lowest ISI for pedestrians was at the intersections of US 13 with Schafer Blvd and Buena Vista Dr while the highest were at the intersection of US 13 with US 40 and US 13 with DE 273. For bicyclists all of the ISI values were three or more (on a scale of 1(safest) -6(least safe), with a three at the intersection of US 40 and Fir Ave and the highest ISI in the study area (5.2) at the intersection of US 13 and DE 273.

Recommendations are presented as short and long-term improvements. Short-term improvements are those that potentially could be implemented during upcoming construction projects in the area. Long-term improvements are those that would require additional study, coordination, public notification and/or additional funding resources.

Recommended short-term improvements include the addition of signalized pedestrian accommodations to the intersection of US 13 and DE 273, and US 13 and Stevens Avenue. Also, expansion of the existing pedestrian facilities at the intersections of US 40 and Wilton Boulevard and US 13 with Llangollen Boulevard. Recommended long-term improvements include sidewalk improvements, further study of the intersection of US 40 and Fir Avenue, modifications to the bus routes to include a "loop" on US 13 between DE 273 and US 40 and median fencing to discourage pedestrians from crossing the highway at mid-block locations.

Table of Contents

List of Photos

List of Tables

List of Figures

1. Introduction

During 2006, the State of Delaware experienced an unusually high number of pedestrian fatalities. Research conducted by DelDOT's Division of Planning identified several corridors within New Castle County with unusually high concentrations of pedestrian crashes including the US 13 corridor between DE 273 (Frenchtown Road) and Saienni Boulevard and the US 40 corridor between US 13 and Buckley Boulevard. A study area map is provided in ***Figure 1***. These two corridors were identified for further investigation.

US 13 north of the intersection with US 40 is an eight-lane divided highway with a grass median. This portion of the corridor is almost entirely commercial. At the intersection with US 40, US 13 splits with four lanes continuing on US 13 and four lanes on US 40. South of the US13/US40 split, land uses transition to mixed land uses including high density residential and strip commercial.

Photo 1 : US 13 & US 40 Split

The purpose of this study was to evaluate existing pedestrian accommodations for these two corridors, during typical weekday and weekend conditions. This evaluation included an extensive data collection effort and an in-depth investigation to identify problem locations, underlying deficiencies and opportunities for improvements. This report contains the results of the investigation and proposed short and long term recommendations for improvements to the study area.

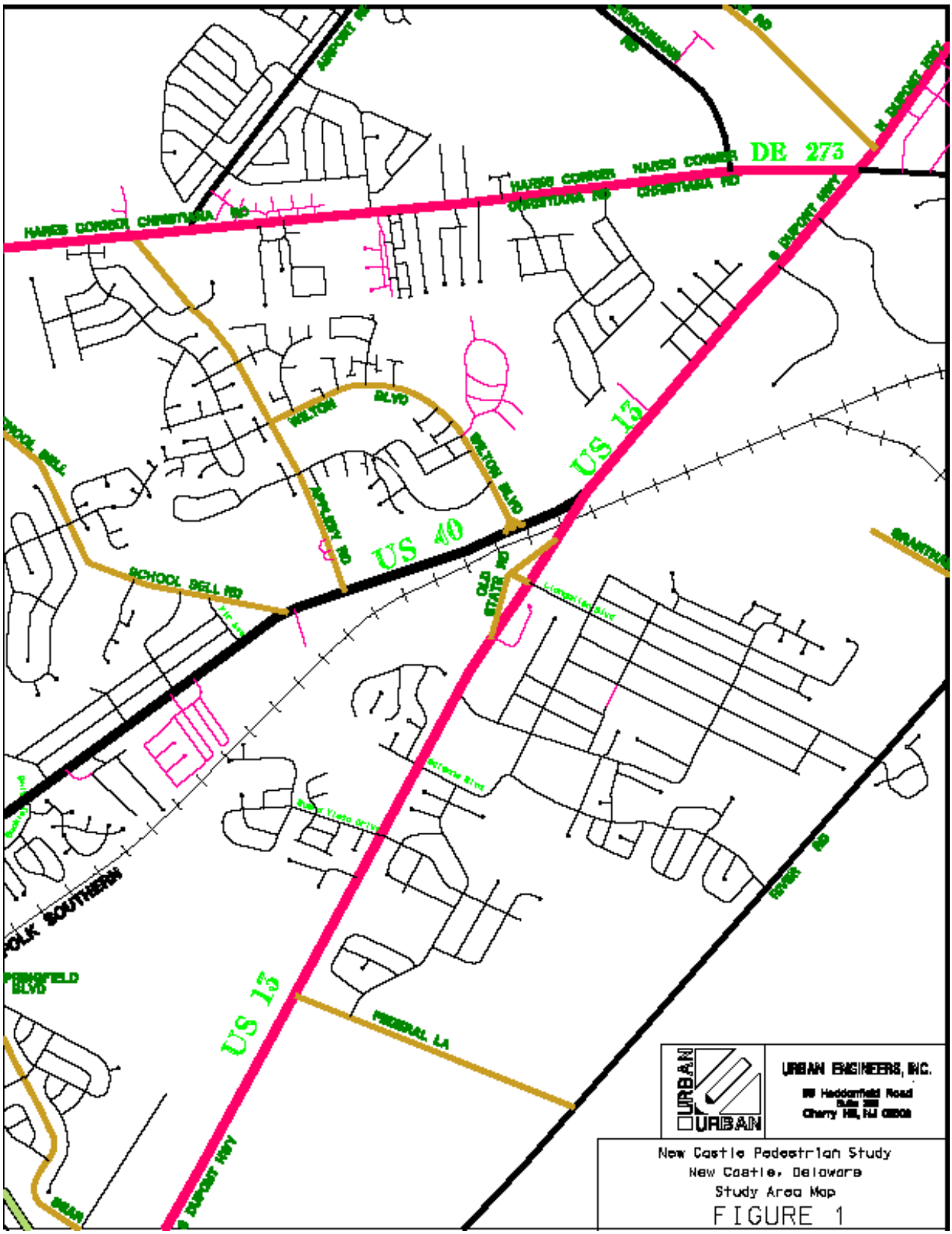


Figure 1: Study Area Map

2. Data Collection

In order to gain a better understanding of the study area, an extensive data collection effort was performed. This effort included crash data, pedestrian observations and counts, intersection turning movement counts, physical inventory, DART ridership information and general observations of traffic operations and pedestrian activity. These efforts were performed during average weekdays as well as on an average Saturday in spring and early summer of 2008.

a) Pedestrian Observations

Pedestrian observations were conducted along both corridors to gain a perspective on the nature of typical pedestrians and motorists in this area. These observations were conducted during typical weekdays as well as on a typical Saturday. Pedestrians were observed at intersections, between intersections and along worn pathways. The reaction of motorists and the operation of pedestrian signals were also observed when applicable. Detailed information and a quantitative analysis of these observations are provided in ***Section 4***.

b) Crash Data

Vehicular crash data was compiled for the US 13 corridor as well as the US 40 corridor for a three-year period between March 2005 and March 2008. Additional pedestrian crash information was added as information became available. The results of this analysis are provided in ***Section 5*** of this report.

c) Intersection Turning Movement Counts

Manual vehicular turning movement counts as well as pedestrian counts were conducted on a typical weekday from 6:00 am to 8:00 pm at the following intersections:

- US 13 & DE 273 (Frenchtown Road)
- US 13 between 2nd and 3rd Avenues
- US 13 & Stevens Avenue (At the Firehouse)
- US 13 & Llangollen Boulevard
- US 13 & Schafer Boulevard
- US 13 & Saienni Boulevard
- US 13 & Buena Vista Drive
- US 40 & Wilton Boulevard
- US 40 & Buckley Boulevard
- US 40 & School Bell Road
- US 40 & Fir Avenue

Manual vehicular turning movement counts and pedestrian counts were also conducted on a typical Saturday from 10:00 am to 7:00 pm at the following intersections:

- US 13 & Buena Vista Drive
- US 40 & Wilton Boulevard
- US 13 & Llangollen Boulevard
- US 13 & Schafer Boulevard
- US 13 & Stevens Avenue (At the Firehouse)

For the purposes of determining the peak hours, the study area was divided into three sections – US 13 north of US 40, US 13 south of US 40, and US 40. The weekday peak traffic hours were determined for each of the three sections. Detailed pedestrian volumes and peak hour traffic volumes are provided in ***Appendix A***.

d) Physical Inventory

Physical inventory including sidewalks, signs, pedestrian crosswalks, accessible ramps, shoulder widths, speed limits, street lighting, pedestrian traffic generators, bus stops and bus stop accommodations were identified along both corridors. The items from this inventory were all studied and observed for functionality during pedestrian observations. A qualitative analysis and results are provided in ***Section 6*** of this report.

e) Ridership Information

Ridership data for the bus routes through the study area was provided by DART and is provided in ***Appendix A***.

3. Roadway and Site Characteristics

a) US 13 north of US 40:

This section of US 13 has four travel lanes per direction. The travel lanes are twelve feet wide and the shoulder widths vary from zero to eighteen feet in some areas. Along this section of the corridor, sidewalk is sporadic and there are no pedestrian crossing facilities.

Traveling from north to south, the first intersection in the study area is US 13 & DE 273 (Frenchtown Road). At this intersection there are four thru lanes with two exclusive left-turn lanes and one right-turn lane on the northbound approach, as well as double left-turn lanes on every other approach. There are no pedestrian crosswalks or push buttons at this intersection.

The section of US 13 between DE 273 (Frenchtown Road) and US 40 has multiple left-turn and U-turn access points in the grass median for side street and business access. At the intersections with 2nd Ave, 3rd Ave, and the firehouse, US 13 has U-Turn movements with semi-actuated signals. None of these signals have pedestrian push buttons and there are no pedestrian crosswalks along this section of US 13.

b) US 13 south of US 40

US 13 south of US 40 is a four-lane highway (two lanes per direction), divided in some areas by a raised concrete median or a grass median. This section is a mostly residential area with some strip commercial. The travel lanes are twelve feet wide and the shoulder widths vary from zero to twenty feet.

At each intersection on the northbound side of US 13 there are two thru lanes with one exclusive right turn lane and a left turn lane. For each intersection on the southbound side of US 13, there are two thru lanes and one left turn lane. At the intersection with Buena Vista Drive US 13 has an additional right turn lane on its southbound side (***Photo 2***).

Photo 2 : US 13 & Buena Vista Drive

At the intersection of US 13 and Llangollen Boulevard, there is a pedestrian crosswalk with pedestrian signal heads on the north side of the intersection. There is also an unofficial worn pedestrian path leading from behind the new commercial strip-mall at this intersection across a grassy area and railroad tracks to the intersection of US 40 and Wilton Boulevard (see ***Photo 3***). Asphalt sidewalks exist on the east side of US 13 in this area between Llangollen Boulevard and the Beaver Brook Shopping Center at Saienni Boulevard, where pedestrian crosswalks and signal heads are located on the south side of the intersection.

Photo 3: Pathway leading to US40 and Wilton Boulevard

c) US 40 from US 13 to Buckley Boulevard

This section of roadway is a four-lane (two lanes per direction) highway divided by a grass median. Along this section of US 40 there are many commercial and residential buildings within walking distance of the highway. The travel lanes are twelve feet wide and the shoulder widths vary from zero to eleven feet.

At the intersection with Wilton Boulevard, the eastbound traffic lanes consist of two thru lanes and two left turn only lanes. The westbound traffic lanes have two thru lanes, one U-turn lane and one right turn only lane. Crosswalks exist across the Wilton Boulevard approach and on the west side of the intersection. Each crosswalk has pedestrian push buttons and pedestrian signal heads. The unofficial pedestrian path leading from the US 13 and Llangollen Boulevard intersection leads directly to the south side of this intersection (***Photo 4***). There are no sidewalks on this side of the intersection. Sidewalks are located on Wilton Boulevard, and along the north side of US 40.

Photo 4: Crosswalk on west side of the intersection

The intersection of US 40 with School Bell Road has two thru lanes for eastbound and westbound, a left-turn only lane for the eastbound traffic, and a left-turn only lane and right-turn only lane for the westbound traffic. Sidewalks exist along the north side of US 40 in this section and connect to a sidewalk along the west side of School Bell Road. There is a crosswalk across the School Bell Road approach as well as across US 40 on the west side of the intersection.

The section of US 40 between School Bell Road and Buckley Boulevard has many side streets with turning access through the grass median. US 40 has two thru lanes and shoulders in both directions with left turn and U-turn lanes at spot locations. There are no crosswalks or sidewalks in this section of US 40.

At the signalized intersection of US 40 and Buckley Boulevard, there are two thru lanes, a left-turn only lane and a right-turn only lane on each of the US 40 approaches and a left-turn only lane, thru lane and a right-turn only lane on the Buckley Boulevard approach. The 4th leg of the intersection is the private access point for a business with a shared lane. There are pedestrian crosswalks and signal heads across each approach of US 40 as well as across the Buckley Boulevard approach. There is a covered bus stop on the south-east corner of the intersection.

4. Pedestrian Observations

a) US 13 north of US 40:

Pedestrian activity was documented along this section of US13. There was a total of 22 (18 on the north side, 4 on the south side) pedestrians observed crossing US 13 at DE 273 (Frenchtown Road) and 21 crossing DE 273 (13 on the west side and 8 on the east side) during the weekday count period. (***Figure 2***)

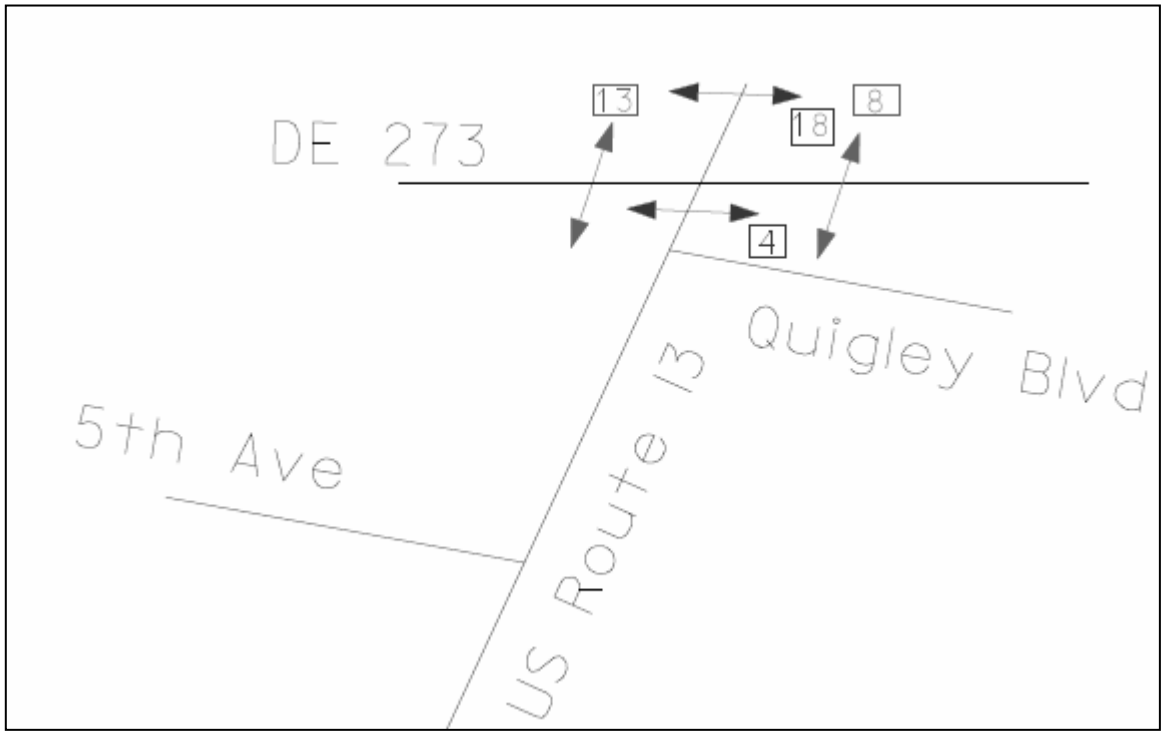


Figure 2: Weekday Pedestrian Crossings at US 13 and DE 273

Pedestrians were observed traveling in the northbound and southbound shoulders along this section of US 13 (***Photo 5***). A particular travel route that was noted was pedestrians originating from the area of Llangollen Boulevard traveling northbound in either shoulder, navigating through the US 13/40 intersection, and continue northbound in the grass median until a break in southbound or northbound traffic occurs for them to cross to a shoulder. It was observed that many pedestrians were using this movement to arrive at either the Motel 6 on the southbound side of US 13 or Hooters restaurant on the northbound side of US 13. Some pedestrians were observed continuing north towards the DE 273 intersection in the grass median. Weekday pedestrian movements for this location are provided in ***Figure 3***.

Photo 5: Pedestrian walking on southbound shoulder of US 13, north of the US 13/40

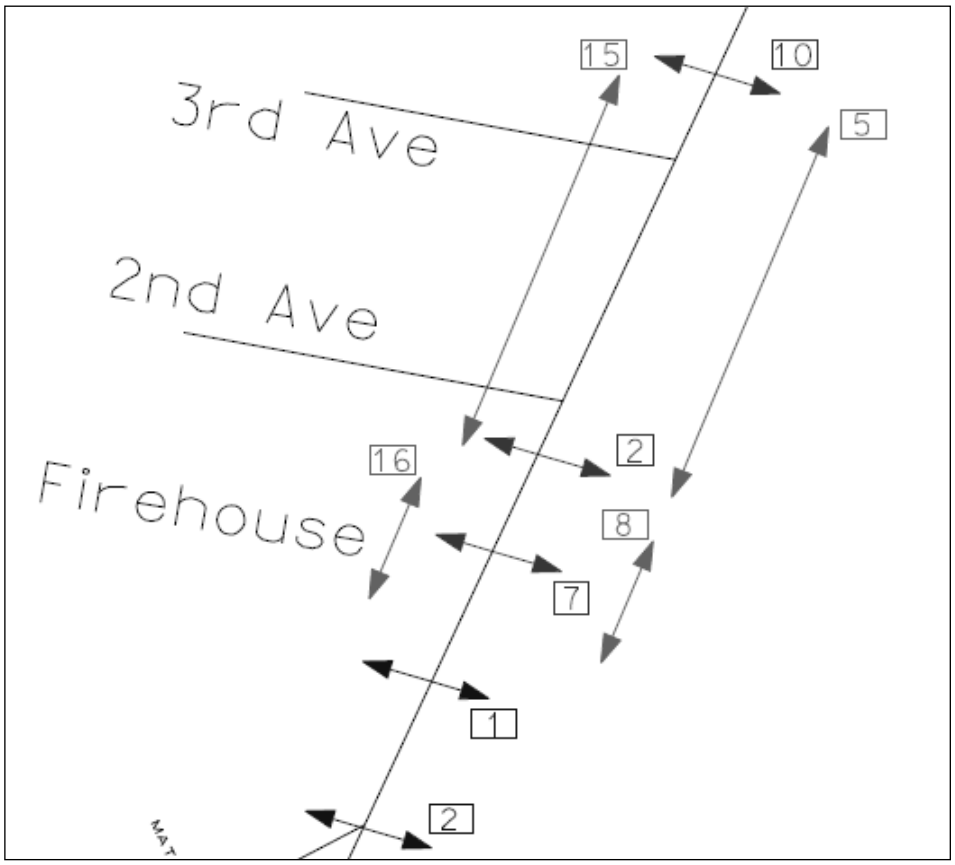


Figure 3: Weekday Pedestrian Activity on US 13 between US 40 and 3rd Avenue

A particular example of the pedestrian activity can be seen in ***Photo 6***. During the mid-day peak period, children were observed crossing US 13 just north of the US 13 & US 40 split. It was noted that at the time ***Photo 6*** was taken, traffic was observed to be very heavy.

Photo 6: Children crossing US 13 north of the US 13/40 split

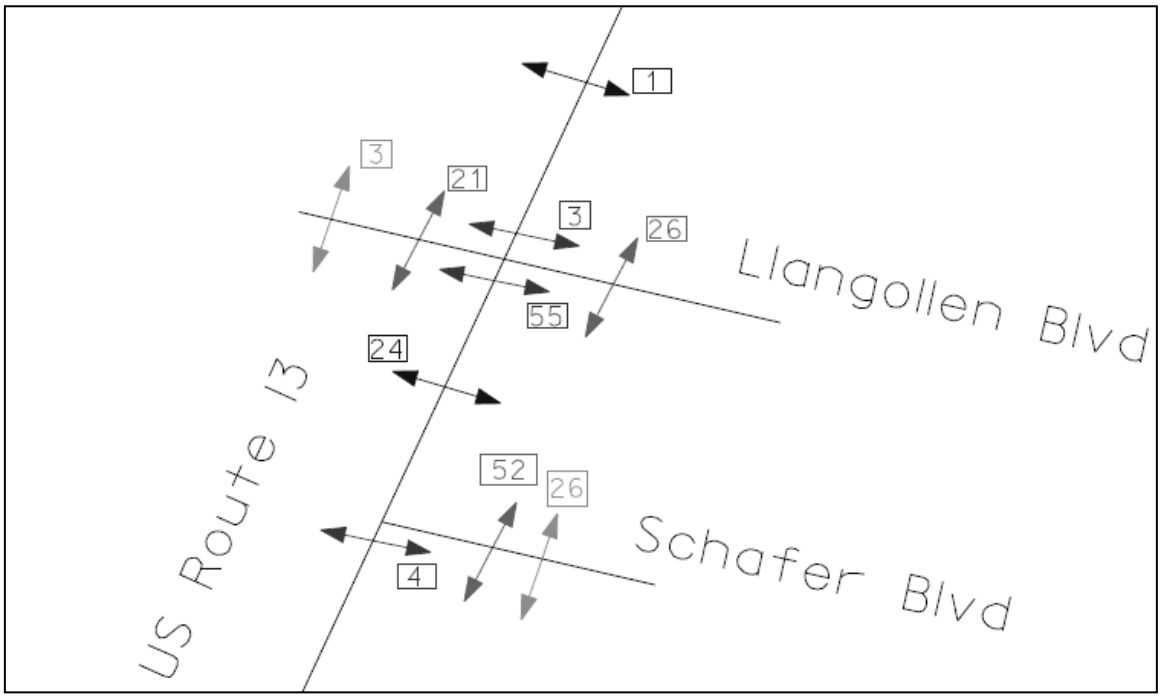
The children waited in the northbound shoulder for approximately two minutes before finding a gap in traffic. The two children on foot ran to the grass median for safe passage. The child on the bicycle appeared hesitant and waited approximately two more minutes for a longer gap in traffic and eventually joined the other children in the grass median.

It took over six minutes for the children to cross US 13 from the northbound to southbound shoulder. The children continued to a general store on the southbound side of US 13.

b) US 13 South of US 40:

At the intersection of US 13 & Llangollen Boulevard, there is a crosswalk on the west side of the intersection, connected to a new sidewalk on the west side of US 13. There is a covered bus stop approximately 200 feet from the south-east corner of this intersection. There is a walkway connected to steps to the adjacent apartment complex. There are no crosswalks on the south or east sides of the intersection. There were 55 pedestrians counted crossing US 13 on the south side of the intersection. There were only 3 pedestrian seen using the crosswalk on the north side. (***Figure 4***)

Figure 4: Weekday Pedestrian Activity on US 13 between US 40 and Schafer Boulevard



It appeared that the majority of these pedestrians crossed US13 and continued on a worn pathway behind the strip-mall to the intersection of US 40 and Wilton Boulevard, where the pedestrians would cross US 40 and continue towards Wal-Mart. Many of the same pedestrians were observed returning via the same route later in the day. This was observed during both weekday and weekend operation.

Photo 7: Pedestrian with baby stroller crossing US 13 at Llangollen Blvd

Approximately 0.4 miles south of the intersection of US 13 and Llangollen Boulevard, US 13 intersects with Schafer Boulevard at a T-intersection. Schafer Boulevard leads to a residential area and has is excess of 100 vehicles turning to and from US 13 during the peak hours. There was also a high number (52) of pedestrians observed crossing Schafer Boulevard at the intersection, and an additional 26 crossing Schafer midblock between the apartment complex and the stripmall (***Figure 4***). It was noted that most of these pedestrians were going to the general store and the liquor store in the stripmall and returning to the apartment complex. These observations were noted during both the weekday and weekend counts.

The next intersection to the south is located at Saienni Boulevard. This is a signalized intersection with a pedestrian crosswalk on the south side of the intersection. There were 25 pedestrians observed crossing US 13 in the vicinity of Saienni Boulevard (***Figure 5***). The crosswalk on the south side was used by 10 pedestrians, 4 crossed on the north side and 11 crossed in front of the bus stop.

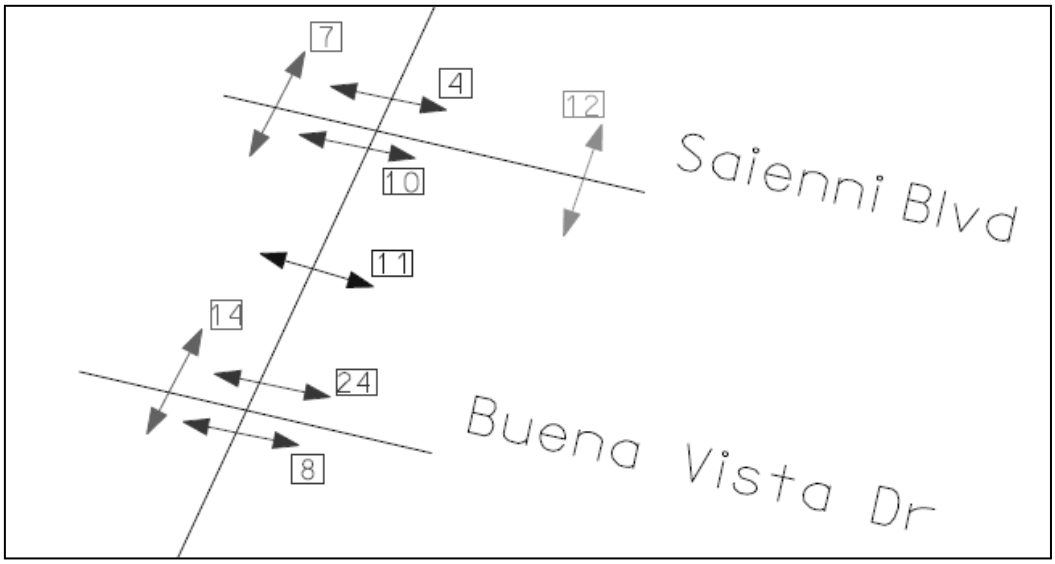


Figure 5: Weekday Pedestrian Activity on US13 between Saienni Blvd and Buena Vista Drive

A DART bus stop is located on the west side of US 13 approximately 300 feet south of the intersection. A sidewalk connects the bus stop to the intersection with Saienni Boulevard, but does not continue to connect to the intersection with Buena Vista Drive. Pedestrians were observed continuing past the end of the sidewalk across a grassy area in the direction of Buena Vista Drive.

The intersection of US 13 and Buena Vista Drive is an unsignalized intersection with U-Turn lanes in the median for US 13 traffic. Vehicles on Buena Vista Drive are not permitted to turn left onto US 13. There are sidewalks on the east leg of Buena Vista Drive, as well as on the south-west corner. There are two bus stops located near the intersection, a covered bus stop on the north-east corner and a regular stop on the south-west corner. Although there are no crosswalks at this intersection, there were a significant number of pedestrians (22) observed crossing both US 13 and Buena Vista Drive (***Figure 5***) including a man in a wheelchair (***Photo 8***).

Photo 8: Man in wheelchair crossing US 13 near Buena Vista Drive

Most of the pedestrian activity at this intersection involved individuals walking to and from the residential areas. It appeared that pedestrians were using Buena Vista Drive to access the Beaver Brook Shopping Center located at Saienni Boulevard. These observations were noted during both weekday and weekend operation.

c) US 40 from US 13 to Buckley Boulevard

At the intersection of US 40 with Wilton Boulevard, there is a pedestrian crosswalk across Wilton Boulevard as well as across US 40 on the west side of the intersection. Many of the pedestrians mentioned previously originating at US 13 and Llangollen Boulevard, were observed crossing US 40 at Wilton Boulevard. 25 pedestrians used the crosswalk on the west side, while 29 pedestrians crossed on the east side of the intersection where there is no crosswalk (***Figure 6***). Based on observations in the field, the pedestrians cross over the railroad tracks, wait in the shoulder or walk eastbound while waiting for a gap in traffic then proceed to walk or run across US 40 towards Wal-Mart. These

pedestrians were observed returning later via the same route. These movements were observed during both weekday and weekend data collection efforts.

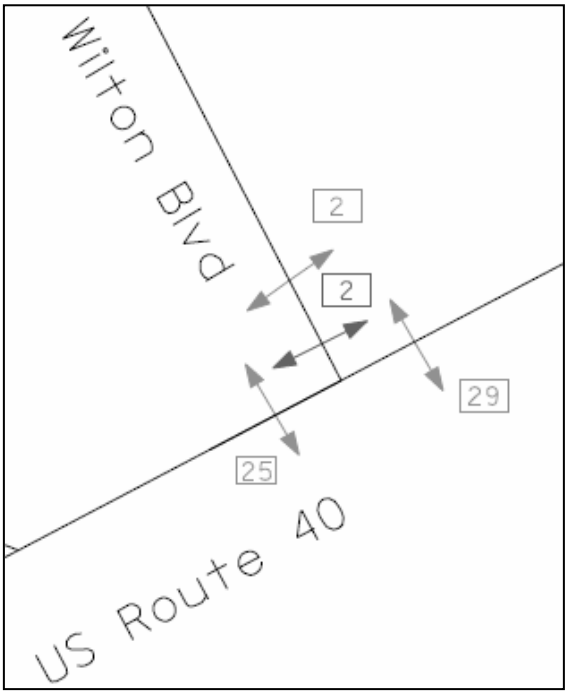


Figure 6: Weekday Pedestrian Activity on US 40 at Wilton Boulevard

Photo 9: Crosswalk on west side of US 40 and Wilton

Minimal pedestrian activity was observed along US 40 between Wilton Boulevard and School Bell Road. At the intersection of US 40 and School Bell Road (***Photo 10***), recently completed work has provided crosswalks on the south side of US 40, as well as across School Bell Road. Over the course of a day, three

pedestrians were observed crossing US 40 on the crosswalk (***Figure 7***). No pedestrians were seen crossing outside of the crosswalk at this location.

Photo 10: Intersection of US 40 and School Bell Road

The intersection of US 40 and Fir Avenue is an unsignalized T-intersection about 600 feet west of School Bell Road. There is a sidewalk on the south side of US 40, but there are no striped crosswalks. Covered bus stops are located on both sides of US 40. Over the course of a day, eleven pedestrians were observed crossing US 40 at this location (***Figure 7***).

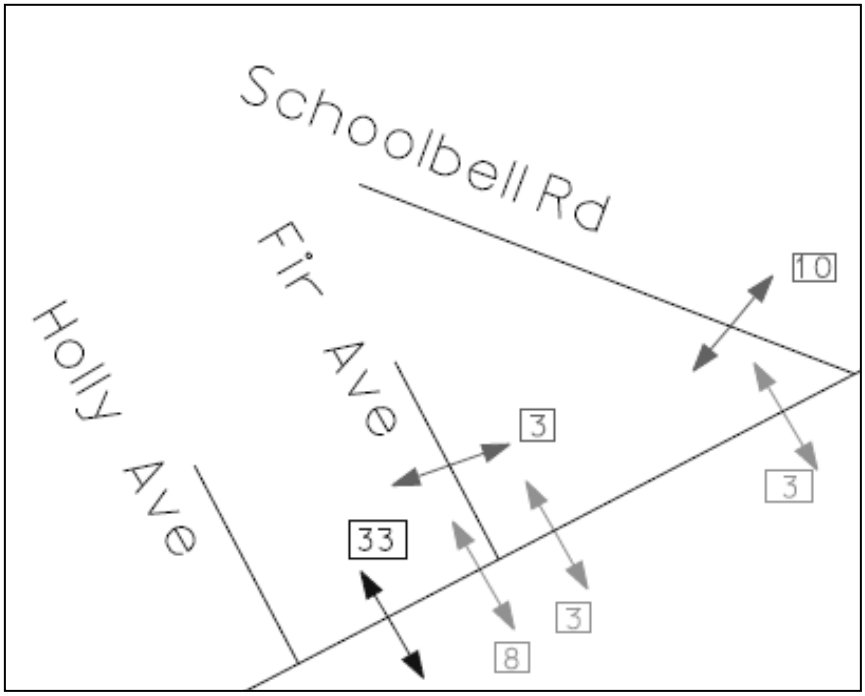


Figure 7: Weekday Pedestrian Activity on US 40 between School Bell Road and Holly Ave.

Photo 11: Intersection of US 40 and Fir Avenue

A total of 33 pedestrians were observed crossing US 40 mid-block between Fir Avenue and Contractors way (approximately 100-200 west of Fir Avenue). Based on observations, most of these pedestrians were going to and from the convenience store on the westbound side of US 40 (***Photo 12***).

Photo 12: Convenience Store on US 40 near Fir Avenue

Occasional pedestrian activity was observed both between Fir Avenue and Buckley Boulevard and at Buckley Boulevard (***Figure 8***) which is located approximately a half mile west of Fir Avenue. The intersection of Buckley Boulevard is a signalized intersection with crosswalks provided on all approaches. Buckley Boulevard is located at the western end of the study area on US 40 (***Photo 13***).

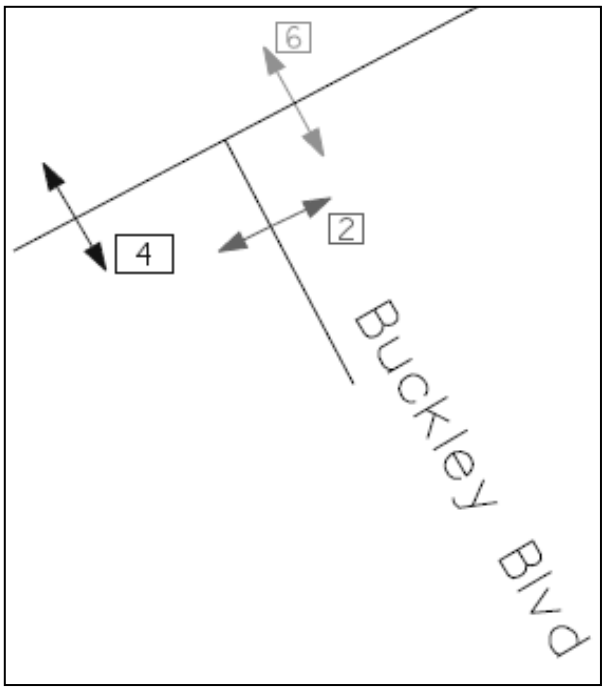


Figure 8: Weekday Pedestrian Activity at US 40 and Buckley Boulevard

Photo 13: Intersection of US 40 and Buckley Boulevard

.

5. Crash Data Summary and Analysis

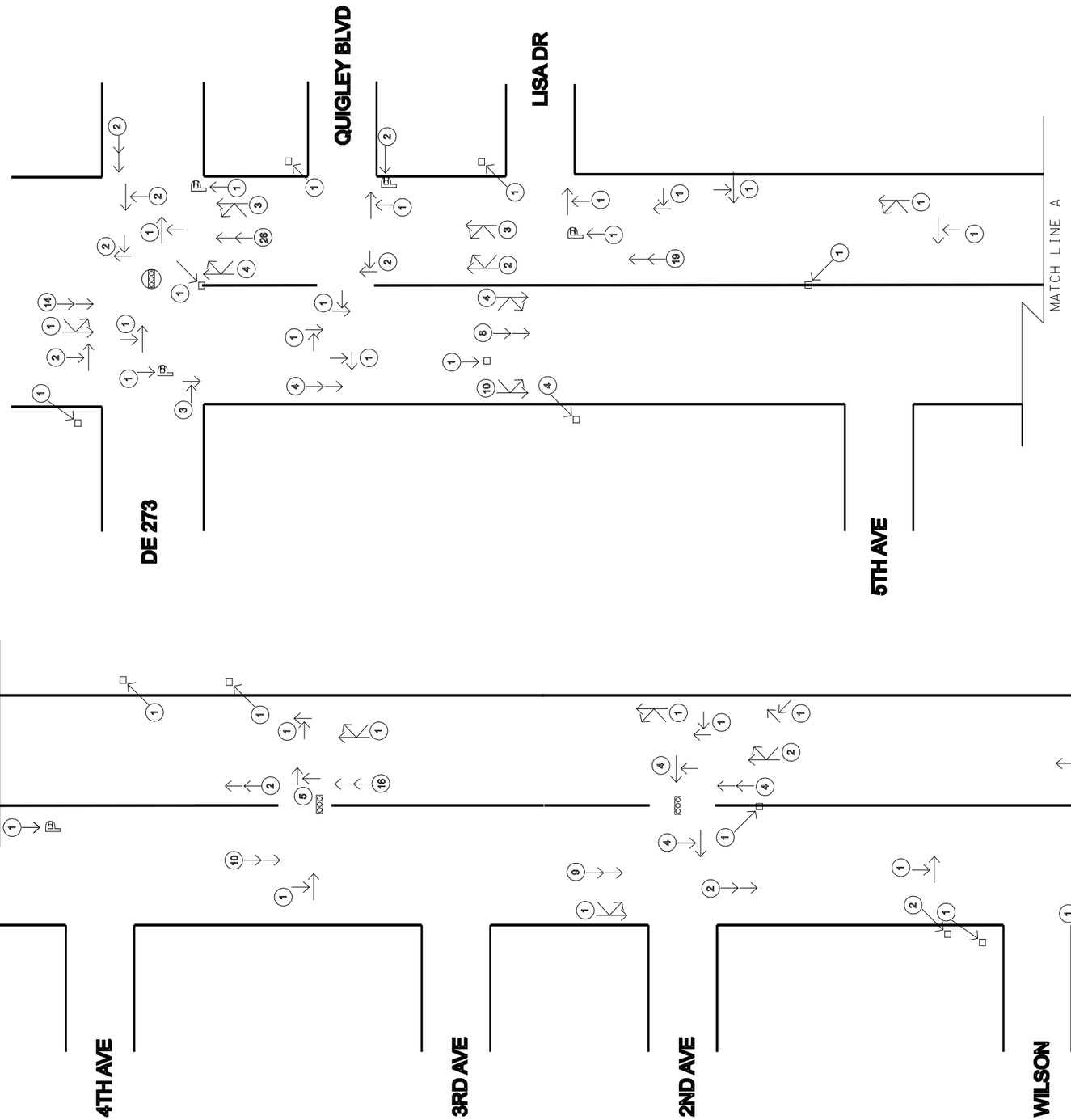
a) Vehicular Crashes

DelDOT provided the detailed police crash reports for crashes occurring within the study area for the time period covering March 2005 to March 2008. Each crash report was reviewed and included on a detailed crash diagram. Crashes grouped by crash type are shown on ***Figures 9A-9C***. Detailed crash information by type and year for the time period are provided in ***Appendix B***.

The highest number of crashes (65) at an individual location occurred at the intersection of US 13 and DE 273 (***Figure 9A***). The majority of these crashes were rear-end and side-swipe type crashes which are typical for a signalized intersection with intermittent congestion. The next highest cluster occurred in the vicinity of the Firehouse at Stevens Drive (***Figure 9A***) where 57 crashes were recorded over the three year time period. Again, the majority of these crashes were rear-end collisions and may be related to congestion from the intersection with US 40. On US 13, south of US 40, the highest crash clusters occurred at the intersections with Llangollen Boulevard (33), and Saienni Boulevard (27). See ***Figure 9B*** for details.

On US 40, the highest number of crashes (49) occurred at the intersection with Wilton Boulevard. This is also the location with the highest number of pedestrian related crashes. There were 26 crashes over the three year period at the intersection of US 40 with Fir Avenue (***Figure 9C***). These crashes included eleven angle crashes. There were no pedestrian related crashes at this intersection, however this is a location with high pedestrian activity.

Photo 14: US 40 East of Wilton Boulevard



N

NOT TO SCALE

LEGEND:

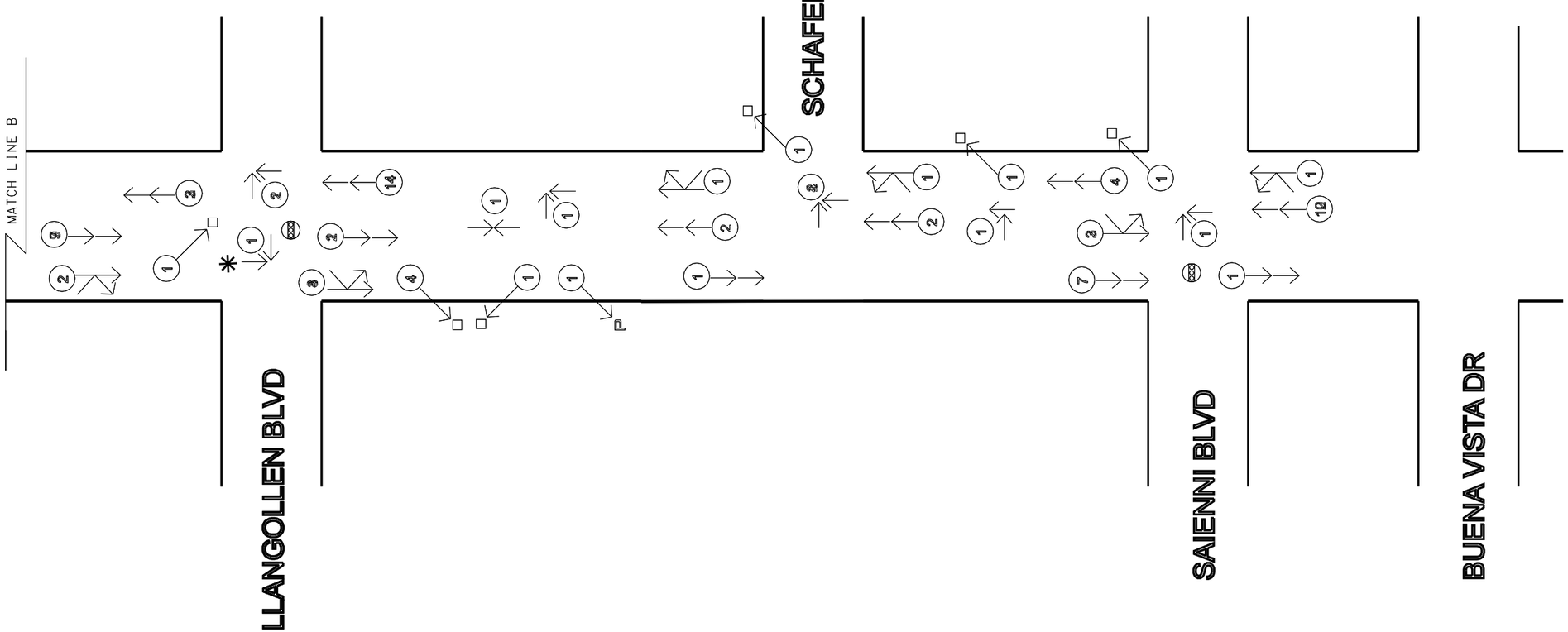
- Sideswipe
- Angle Collision
- Hit Pedestrian
- Rear-End
- Hit Fixed Object
- Head-On Collision
- Half Signalized Intersection
- Signalized Intersection
- Fatality

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Study Area Accidents by Type
March 2005- March 2008
Figure 9A

N

NOT TO SCALE

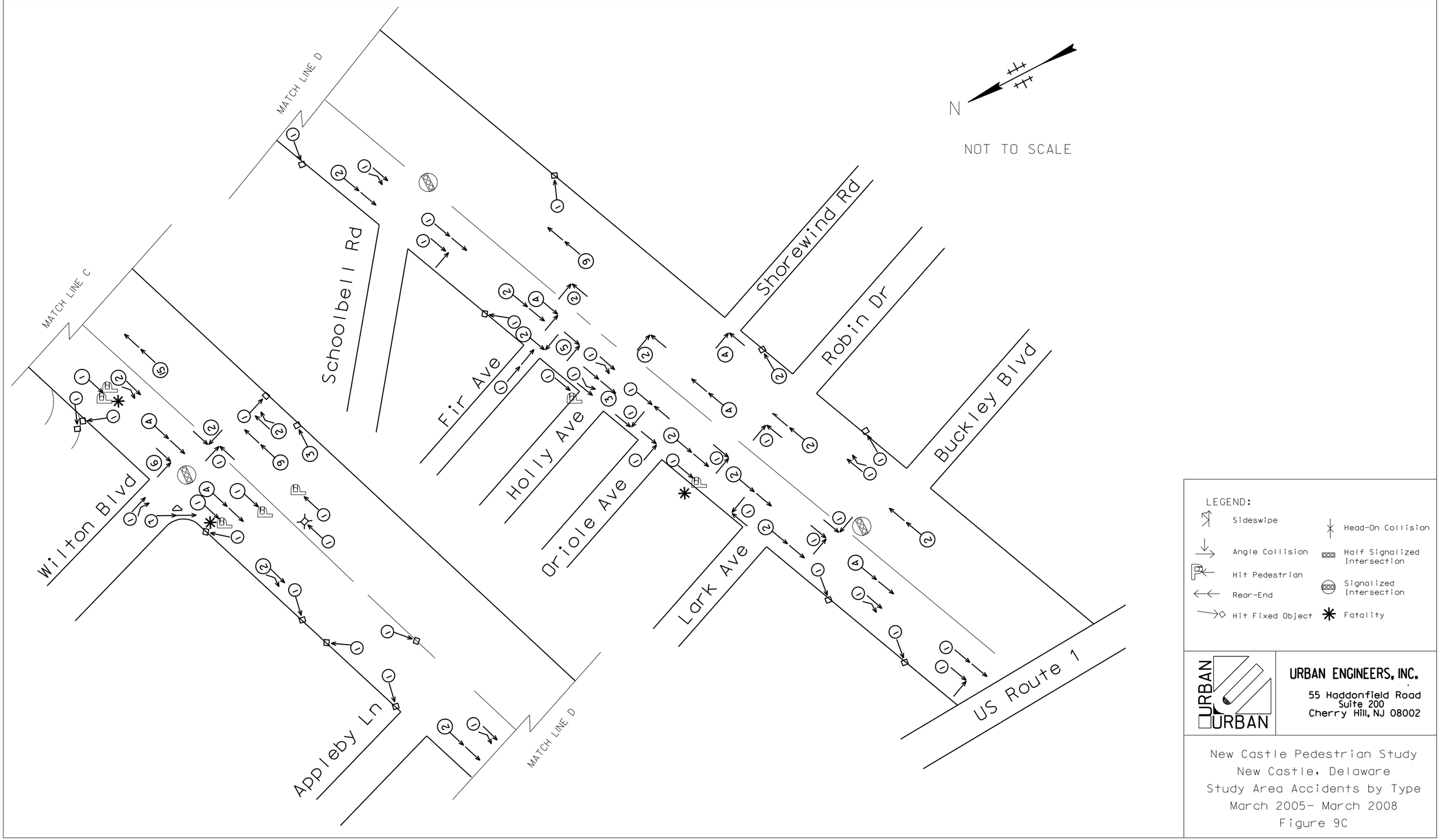


LEGEND:

- Sideswipe
- Angle Collision
- Hit Pedestrian
- Rear-End
- Hit Fixed Object
- Head-On Collision
- Half Signalized Intersection
- Signalized Intersection
- Fatality

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Study Area Accidents by Type
March 2005- March 2008
Figure 9B



URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Study Area Accidents by Type
March 2005- March 2008
Figure 9C

b) Pedestrian Crashes

A previous study conducted by DelDOT's Division of Planning (see ***Appendix C*** for details) identified the study area corridors as having an unusually high number pedestrian crashes. Pedestrian crash information included in the previous studies covered the time period from 2003 up to and including October 2006. In addition to this information, crash reports were also provided by DelDOT for the period March 2005 to March 2008. The pedestrian related crashes covering the entire period between 2003 and 2008 are shown on ***Figure 10***. Detailed crash information was not available for every crash, including the most recent which occurred on the evening of November 9, 2008 on US 13 Northbound, near the intersection with Lisa Drive.

There were a total of 24 pedestrian related crashes reported in the study area. Of these, 14 resulted in injuries, nine resulted in fatalities, and one involved a both a fatality and an injury (***Figure 10***). Each of the crashes are identified on ***Figure 10*** with a number or a letter designation. Detailed crash reports were available for the numbered crashes.

US 13 North of US 40: Along this section of roadway, there were twelve pedestrian related crashes, four of which resulted in fatalities. Detailed reports are available for six of the injury related crashed, but were not available for the crashes involving fatalities. There were two crashes in 2007, and four in 2006. Four of the crashes involved pedestrians attempting to cross US 13. Only two of the six crashes occurred during daylight hours. The following is a summary of each available crash report by number designation:

> Crash 1 occurred in 2007 during daylight hours at the intersection of US 13 and DE 273. The pedestrian was attempting to cross US 13 on the south side of the intersection when he stepped out between stopped vehicles in the northbound through lanes and was struck by a vehicle in the northbound right turn lane.
>
> Crash 2 occurred in 2007 in the early morning hours before sunrise. The pedestrian was attempting to cross US 13 on the north side of the intersection with DE 273 when he was struck by a vehicle traveling southbound. Police reports indicate the pedestrian may have been under the influence of some type of drug.
>
> Crash 3 occurred in 2006 during daylight hours on the northbound side of US 13 at a car dealership driveway just south of the intersection with DE 273. The bicyclist was traveling southbound in the northbound shoulder when he was struck a vehicle exiting the driveway of the Acura dealership.
>
> Crash 4 occurred in 2006 after dark on US 13 Northbound, south of Quigley Boulevard. The bicyclist was traveling northbound on the shoulder when he was struck by the vehicle as it exited a driveway.
>
> Crash 5 occurred in 2006 after dark. It was raining at the time of the collision. The pedestrian was attempting to cross the southbound lanes of

US 13 in the vicinity of 5th avenue when she was struck by a vehicle traveling southbound.

Crash 6 occurred in 2006 at 4AM in foggy weather conditions on US 13 just north of the US 40 split. The pedestrian was walking northbound on US 13 and attempted to cross the northbound lanes. The driver of the vehicle was traveling northbound did not see the pedestrian and struck him from behind.

US 13 South of US 40: Along this section of roadway, there were four pedestrian related crashes, one of which resulted in a fatality. A detailed report is available for one of the crashes.

Crash 7 occurred in 2005, after dark, on the southbound side of US 13, just south of Llangollen Boulevard. The pedestrian was walking on the southbound shoulder, when according to witnesses, the vehicle swerved off the road. The driver did not stop, but was later located based on witness information. The victim suffered minor injuries.

US 40 West of US 13: Along this section of roadway, there were eight pedestrian related crashes, five of which resulted in a fatality. Detailed reports were available for six of the crashes.

Crash 8 occurred in 2007 after dark on the westbound side of US 40 approaching the intersection of Wilton Boulevard. Three pedestrians were attempting to cross the westbound lanes of US 40 from the grass median in the vicinity of the Wal-mart Driveway. The vehicle was traveling westbound on US 40 when the collision occurred. One pedestrian was fatally injured, and a second suffered serious injuries.

Crash 9 occurred in 2005 after dark just east of the intersection of US 40 and Wilton Boulevard. The pedestrian was attempting to cross the eastbound lanes of US 40 from the grass median when he was struck by a vehicle traveling eastbound.

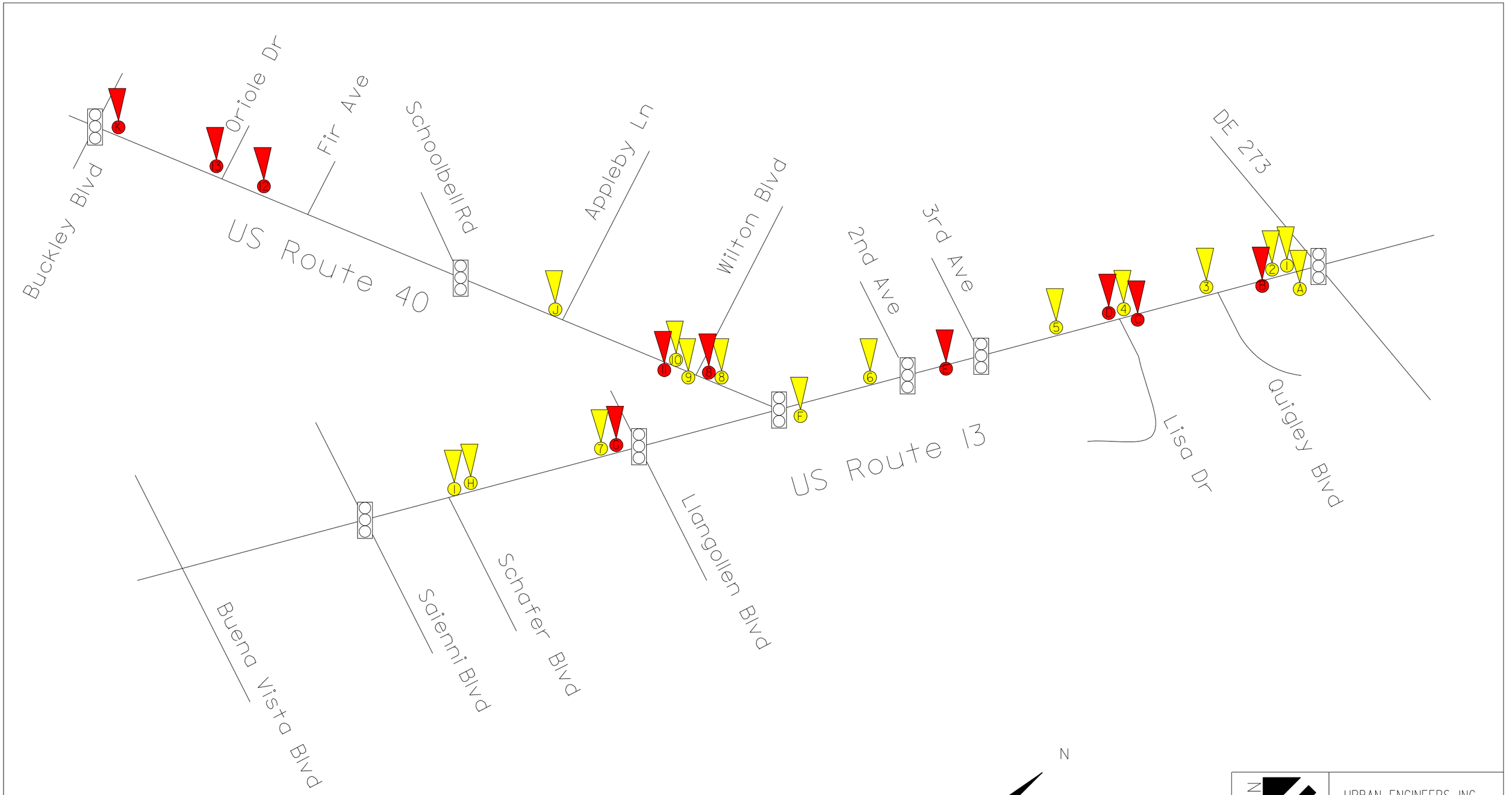
Crash 10 occurred in 2005, after dark near the intersection of US 40 and Wilton Boulevard. The pedestrian was stuck while attempting to cross US 40. The vehicle did not stop, and information related to the crash is limited.

Crash 11 occurred in 2008 in the early evening, after dark immediately west of the intersection of US 40 and Wilton Boulevard. The pedestrian walked into the path of a vehicle traveling westbound on US 40. The pedestrian was stuck by the vehicle and died from his injuries.

Crash 12 occurred in 2006 in the early morning hours before dawn on US 40 about 500 feet west of Fir Avenue. The victim was standing in the shoulder when the vehicle traveling westbound weaved onto the shoulder and struck him. The driver of the vehicle attempted to leave the scene but was stopped by a state trooper. The victim died from his injuries.

Crash 13 occurred in 2007 on US 40 westbound after dark. The pedestrian was attempting to cross US 40 approximately 200 feet west of Oriole Drive when he was struck by a vehicle traveling westbound. The driver of the vehicle did not stop. The victim died from his injuries.

Summary: Of the 13 crashes for which detailed reports were available, eleven of the crashes occurred after dark. There were three in 2005, five in 2006, four in 2007 and one in 2008. Nine of the crashes involved a pedestrian crossing the highway, two involved bicyclists in the shoulder hit by vehicles existing driveways, and two involved pedestrians in the shoulder of the roadway.



LEGEND:

1 Pedestrian Injury

2 Pedestrian Fatality

N

NOT TO SCALE

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Pedestrian Crashes 2005-2008

FIGURE 10

c) ***Bicycle and Pedestrian Safety Index Analysis***

Pedestrian activities were observed at and between the study area intersections. Details of the activity are covered in ***Section 2: Data Collection*** and ***Section 4: Pedestrian Observations***.

FHWA's Pedestrian Safety Index (Ped ISI) and Bicycle Safety Index (Bike ISI) were used to examine the level of safety for pedestrians and bicyclists at each intersection in the study area. The ISI's enable users to identify intersection crossings (for pedestrians) and approach legs (for bicyclists) that should be prioritized for safety improvements. The ISI's produce safety index scores, with the high scores indicating greater priority for in-depth safety assessments. The calculations are based on existing conditions such as lane numbers, speed, signals, bike lanes, and other circumstances relevant to pedestrian and bicyclist safety. The results of this analysis are presented ***Tables 1 and 2***.

The lowest ISI for pedestrians was at the intersections of US 13 with Schafer Blvd and Buena Vista Dr while the highest were at the intersection of US 13 with US 40 and US 13 with DE 273. For bicyclists all of the ISI values were three or more (on a scale of 1(safest) -6(least safe), with a three at the intersection of US 40 and Fir Ave and the highest ISI in the study area (5.2) at the intersection of US 13 and DE 273.

Photo 15: A pedestrian crossing US 13 in traffic

Table 1: Pedestrian Intersection Safety Index (ISI)							
Least Safe Ranking	**Intersection**	**Signal**	**# of Lanes**	**Speed (mph)**	**ADT (1,000's)**	**Commercial Area (y/n)**	**ISI***
1	US 13 & US 40	1	8	50	80	y	**4.8**
2	US 13 & DE 273	1	8	50	75	y	**4.8**
3	US 13 & Stevens Ave	0	8	50	78	y	**4.4**
4	US 13 & 2nd/3rd Sts.	0	8	50	78	y	**4.4**
5	US 40 & Wilton Blvd	1	4	50	30	y	**3.2**
6	US 40 & Fir Ave	0	4	50	30	y	**3.0**
7	US 13 & Saienni Blvd	1	4	50	43	n	**3.0**
8	US 13 & Llangollen Blvd	1	4	50	43	n	**3.0**
9	US 40 & Schoolbell Rd	1	4	50	30	n	**2.9**
10	US 40 & Buckley Blvd	1	4	50	30	n	**2.9**
11	US 13 & Schafer Blvd	0	4	50	43	n	**2.8**
12	US 13 & Buena Vista Dr	0	4	50	43	n	**2.8**
* Safety Index values are between 1 (safest) and 6 (least safe)							

Table 2: Bicycle Intersection Safety Index (ISI)

Least Safe Ranking	Intersection	Main ADT	Main HISP	Turn Veh	RTL	BL	Cross ADT	Signal	Parking	RT Cross	Cross Lanes	LT Cross	Thru ISI*	RT ISI*	LT ISI*	Average ISI*
1	US 13 & DE 273	75	1	1	1	0	20	1	0	0	4	12	**6.0**	**3.6**	**6.0**	**5.2**
2	US 13 & US 40	80	1	1	1	0	28	1	0	0	4	5	**6.0**	**3.8**	**5.5**	**5.1**
3	US 13 & 2nd/3rd Sts.	78	1	1	1	0	0	0	0	0	0	6	**4.1**	**3.1**	**5.3**	**4.2**
4	US 13 & Stevens Ave	78	1	1	1	0	0	0	0	0	0	5	**4.1**	**3.1**	**5.0**	**4.1**
5	US 13 & Llangollen Blvd	43	1	1	1	0	1	1	0	0	2	6	**4.1**	**2.5**	**4.9**	**3.8**
6	US 13 & Saienni Blvd	43	1	1	1	0	1	1	0	0	2	6	**4.1**	**2.5**	**4.9**	**3.8**
7	US 40 & Buckley Blvd	30	1	1	1	0	1	1	0	0	0	6	**3.8**	**1.8**	**4.6**	**3.4**
8	US 13 & Buena Vista Dr	43	1	1	1	0	0	0	0	0	0	6	**3.4**	**2.2**	**4.5**	**3.3**
9	US 40 & Wilton Blvd	30	1	1	1	0	0	1	0	0	0	6	**3.6**	**1.8**	**4.6**	**3.3**
10	US 40 & Schoolbell Rd	30	1	1	1	0	0	1	0	0	0	6	**3.6**	**1.8**	**4.6**	**3.3**
11	US 13 & Schafer Blvd	43	1	1	1	0	0	0	0	0	0	5	**3.4**	**2.2**	**4.1**	**3.2**
12	US 40 & Fir Ave	30	1	1	1	0	0	0	0	0	0	6	**3.2**	**1.8**	**4.1**	**3.0**

* Safety Index values are between 1 (safest) and 6 (least safe)

Main HISP	Main Street speed limit >35 mph
Turn Veh	Presence of Turning Vehicle traffic across the path of through cyclists
RTL	Number of right-turn traffic lanes on main street approach
BL	Bike Lane
Cross ADT	Cross-street traffic
Signal	Signalized intersection?
Parking	Presence of on-street parking
RT Cross	Number of traffic lanes for cyclists to cross to make a right turn
Cross Lanes	Number of through lanes on cross street
LT Cross	Number of traffic lanes for cyclists to cross to make a left turn

6. Recommended Improvements

The purpose of this study was to evaluate existing pedestrian accommodations for the two corridors, during typical weekday and weekend conditions. This evaluation included an extensive data collection effort and an in-depth investigation to identify problem locations, underlying deficiencies and opportunities for improvements. The following recommendations focus on the locations with highest pedestrian activity, and pedestrian related crashes. A graphic depicting the recommended improvements can be seen on the Proposed Short-Mid-term Improvements, ***Figures 11A-G***.

a) Short-Term Improvements

Short-term improvements are those that potentially could be implemented during upcoming construction projects in the area. These projects include scheduled pavement and rehabilitation of US 13 and an intersection redesign at US 13 and Llangollen Boulevard.

Intersection of US 13 and DE 273: This is a very wide intersection with long crossing distances for pedestrians. As previously discussed pedestrians were documented crossing US 13 both near to and at the intersection. Both the pedestrian and bicyclists safety index evaluation identified this location as being the least safe in the study area. There were four crashes involving pedestrians including one fatality at the intersection. Based on this evaluation, the installation of crosswalks and pedestrian push buttons are recommended for this location. However, due to the volume of traffic processed at this intersection, particularly during peak periods, an analysis was conducted to determine the impact of a pedestrian phase during the AM and PM peak hours. The results of this analysis are provided in ***Table 3***.

Table 3: Analysis Results for Intersection of US 13 and DE 273

Scenario	Without Peds		With Ped Activity Every Cycle		With Observed Ped Activity		
	CMV	LOS	CMV	LOS	% Act	CMV	LOS
AM Peak	1539	E	1735	F	5	1549	E
PM Peak	1738	F	1877	F	5	1745	F

Due to geometric restrictions on the north side of the intersection as well as to minimize the impact to the traffic operations a crosswalk on US 13 with a two-phase pedestrian crossing, including a median refuge area, is proposed for the south side of the intersection. This improvement is currently in the design phase.

Intersection of US 13 and Stevens Avenue (Firehouse): This intersection is located just north of the US 13 and US 40 split. It currently has a partial signal with emergency pre-emption for the fire house. There is no pedestrian crosswalk or push buttons. As discussed in ***Section 5***, there were two crashes near the intersection involving crossing pedestrians, one of which resulted in a pedestrian

fatality. A significant amount of pedestrian activity was also documented at and near this intersection. Recommendations for this location include the installation of a pedestrian crosswalk and adjustments to the signal to accommodate pedestrian actuation.

Intersection of US 13 and Llangollen Boulevard: The existing US 13 crosswalk is not utilized at this location due mostly to the origin and destinations of the pedestrians crossing. In order to improve pedestrian safety and to accommodate the large number of crossing pedestrians, it is proposed to provide crosswalks on all approaches to the intersection. In addition, to provide safe movement of pedestrians from the adjacent bus-stop on the south side of the intersection, sidewalk and railings are proposed connecting the bus-stop to the crosswalk. A traffic analysis was conducted to determine the impact of the change to the pedestrian phase during the AM and PM peak hours. The results of this analysis are provided in ***Table 4***

Table 4: Analysis Results for Intersection of US 13 and Llangollen Boulevard

Scenario	Without Peds		With Ped Activity Every Cycle		With Observed Ped Activity		
	CMV	LOS	CMV	LOS	% Act	CMV	LOS
AM Peak	1812	F	2292	F	0	1812	F
PM Peak	1367	D	1799	F	36	1523	E

These improvements are currently in the design phase to be completed during an upcoming pavement rehabilitation project.

Intersection of US 13 and Saienni Boulevard: The existing facilities at this intersection include a pedestrian crosswalk on the south side of the intersection. Due to the volume of pedestrians crossing at this location, as well as the adjacent intersection of US 13 and Buena Vista Drive, crosswalks are proposed for all approaches. A traffic analysis was conducted to determine the impact of the change to the pedestrian phase for the AM and PM peak hours. The results of this analysis are provided in ***Table 5.***

Table 5: Analysis Results for Intersection of US 13 and Saienni Boulevard

Scenario	Without Peds		With Ped Activity Every Cycle		With Observed Ped Activity		
	CMV	LOS	CMV	LOS	% Act	CMV	LOS
AM Peak	1494	E	1997	F	3	1509	E
PM Peak	1204	C	1512	E	10	1235	C

US 40 and Wilton Boulevard: This location had the highest number of pedestrian crashes within the study area. There was a pedestrian fatality in 2008 at the intersection, as well as another fatality in 2007 close to the intersection (at the Wal-Mart entrance). The number of pedestrians crossing at or near this location is the second highest in the study area (US 13 and Llangollen has the highest

number of pedestrians). Most of these pedestrians are not using the crosswalk on the west side, instead choosing to cross on the east side about 100-200 feet from the intersection. The proposed improvements for this intersection include crosswalks and pedestrian facilities on all three approaches, extending pork chop islands for increased visibility, additional lighting as well as fencing in the median between this intersection and the median barrier at the intersection of US 13 and US 40 to discourage J-walking. A traffic analysis was conducted to determine the impact of the change to the pedestrian phase for the AM and PM peak hours. The results of this analysis are provided in ***Table 6.***

Table 6: Analysis Results for Intersection of US 40 and Wilton Boulevard

Scenario	**Without Peds**		**With Ped Activity Every Cycle**		**With Observed Ped Activity**		
	CMV	**LOS**	**CMV**	**LOS**	**% Act**	**CMV**	**LOS**
AM Peak	998	A	1277	C	20	1054	B
PM Peak	1230	C	1531	E	28	1314	D

During the course of this study, a lighting analysis was conducted and an additional luminaire arm was added to the southeast corner of the intersection in June 2008 to improve pedestrian visibility.

Lighting Improvements: As there are multiple improper crossing locations along both corridors, a lighting analysis could be conducted to examine the benefit of additional lighting for these locations in an effort to make the pedestrians more visible to the drivers.

b) Long- Term Improvements

Long-term improvements are those that would require additional study coordination, public notification and/or funding resources. These improvements include the following:

US 40 and Fir Avenue: The majority of crossing pedestrians seen walking along or crossing US 40 west of Wilton Boulevard were seen in the vicinity of Fir Avenue. A total of 44 pedestrians were counted crossing near this location. In addition, as shown in the crash analysis there were eleven angle crashes in the time period 2005-2008 and one pedestrian fatality a few hundred feet from the intersection. Angle crashes are a type of crash that can be addressed with the installation of a signal. Based on the available information, a traffic signal may be warranted for this intersection. However, further study is required to determine if a signal is warranted. If it is found that a signal is warranted, pedestrian crosswalks and pushbuttons are recommended.

US 13 and Buena Vista Dive: DART riders using the bus stop on the southbound side of US 13 near Buena Vista Drive could be serviced by the bus stop at the intersection with Saienni Boulevard. Consolidating these stops and providing the

connecting sidewalk should encourage pedestrians to use the pedestrian crosswalk at the signal. In addition, the bus stop on the northbound side of the intersection could be moved closer to Saienni Boulevard to again encourage use of the crosswalk.

Sidewalk Improvement Project: Throughout the study area along both corridors sidewalks are intermittent, disconnected and some are non-compliant with ADA guidelines. A sidewalk improvement project is recommended to connect existing sidewalks, improve existing sidewalks and tighten up driveway radii to shorten pedestrian crossing distances and reduce the entering and exiting speeds of vehicles. In addition, as new development occurs, and as roadway improvement projects are undertaken, sidewalks should be installed where feasible.

US 13 between US 40 and DE 273: In an effort to discourage pedestrians from crossing midblock on US 13, fencing or barriers along the medians could be considered. Fencing is typically used to deter pedestrians from crossing roads, railroad tracks, and other similar situations. Although, no studies examining their effectiveness could be located, fencing can be an attractive solution for deterring pedestrians, and therefore more accepted by the community. This recommendation on the use of fencing to deter pedestrians from crossing at midblock locations is pending further investigation.

Some examples of fencing are shown below, along with links to further information.

http://www.decksfenceandconcrete.com/fence_types.html

http://www.scottfenceusa.com/

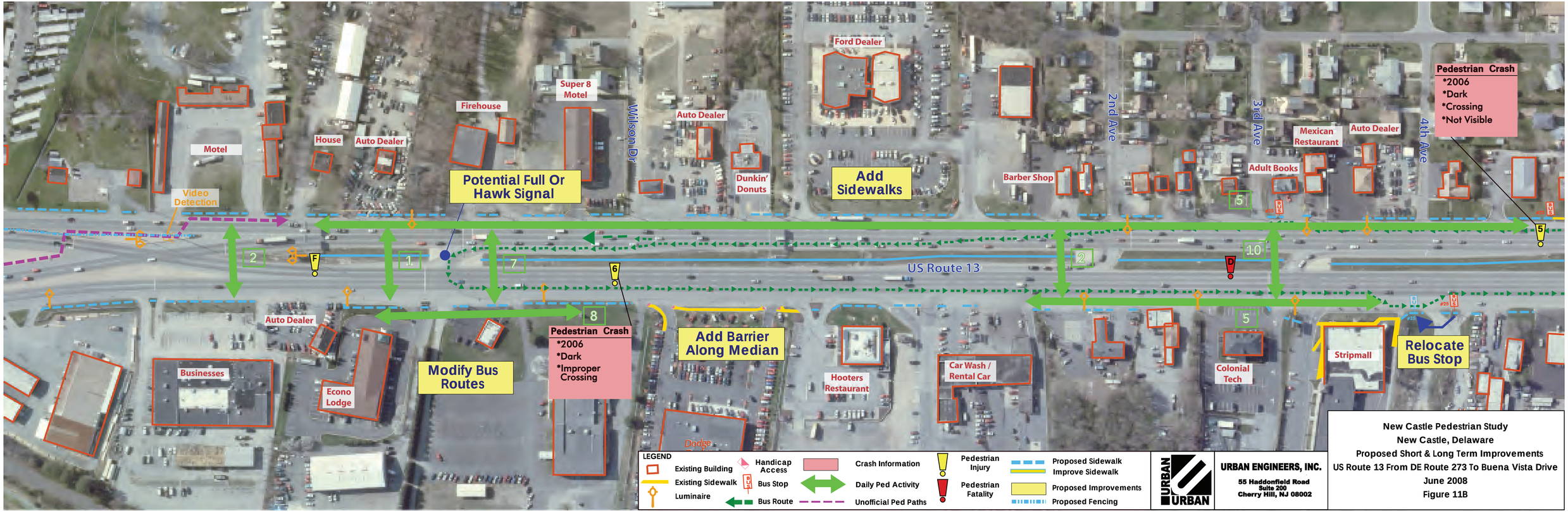
http://www.govsupply.com/Products/Fence/Classic.cfm

Bus Route Modification: The proposed modification would effect bus routes #25 southbound and northbound. The route change for a southbound bus would involve stopping at all of the existing southbound stops between DE 273 and US 40, then making a u-turn to stop at all of the northbound stops as far as DE 273. The bus would then do another u-turn move and continue southbound on the original route. The northbound re-route would operate similarly. Rerouting the buses to create a "loop" could serve two purposes. The first, to reduce the amount of people needing to cross US 13 when embarking or disembarking from the buses. Secondly, it would provide an internal route for a pedestrian wanting to travel from one end of the study area to the other, and to the opposite side of US 13.

SEE FIGURE 11B

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 13 From DE Route 273 To Buena Vista Drive
June 2008
Figure 11A

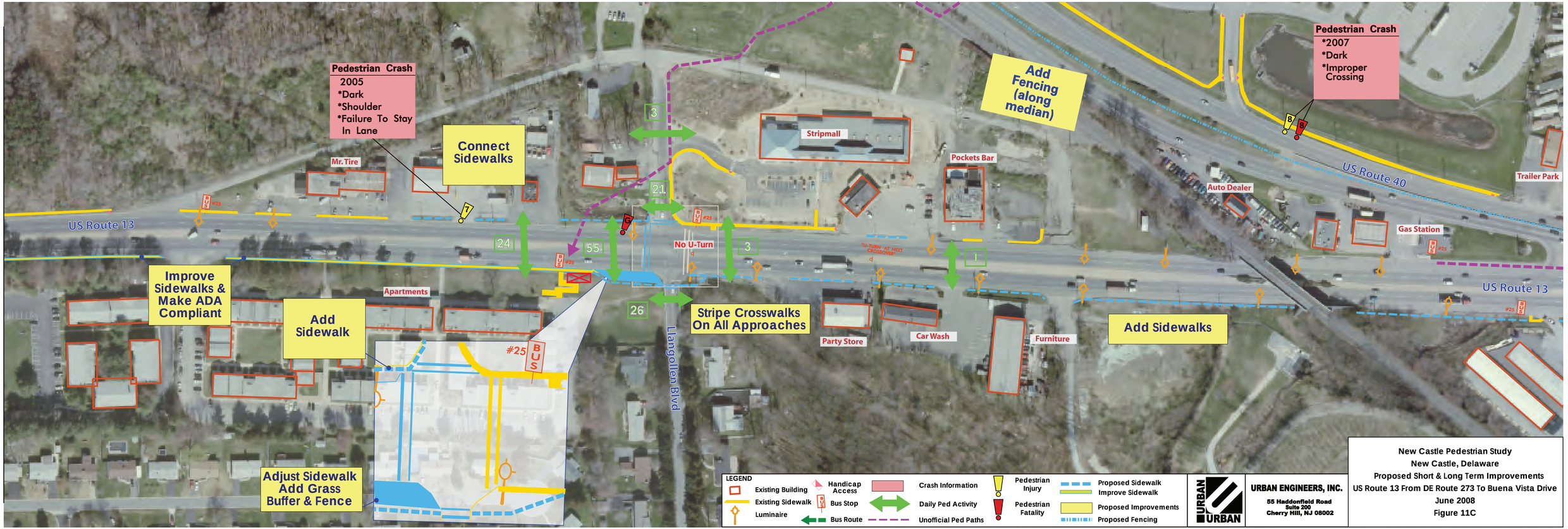


SEE FIGURE 11C

SEE FIGURE 11A

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 13 From DE Route 273 To Buena Vista Drive
June 2008
Figure 11B



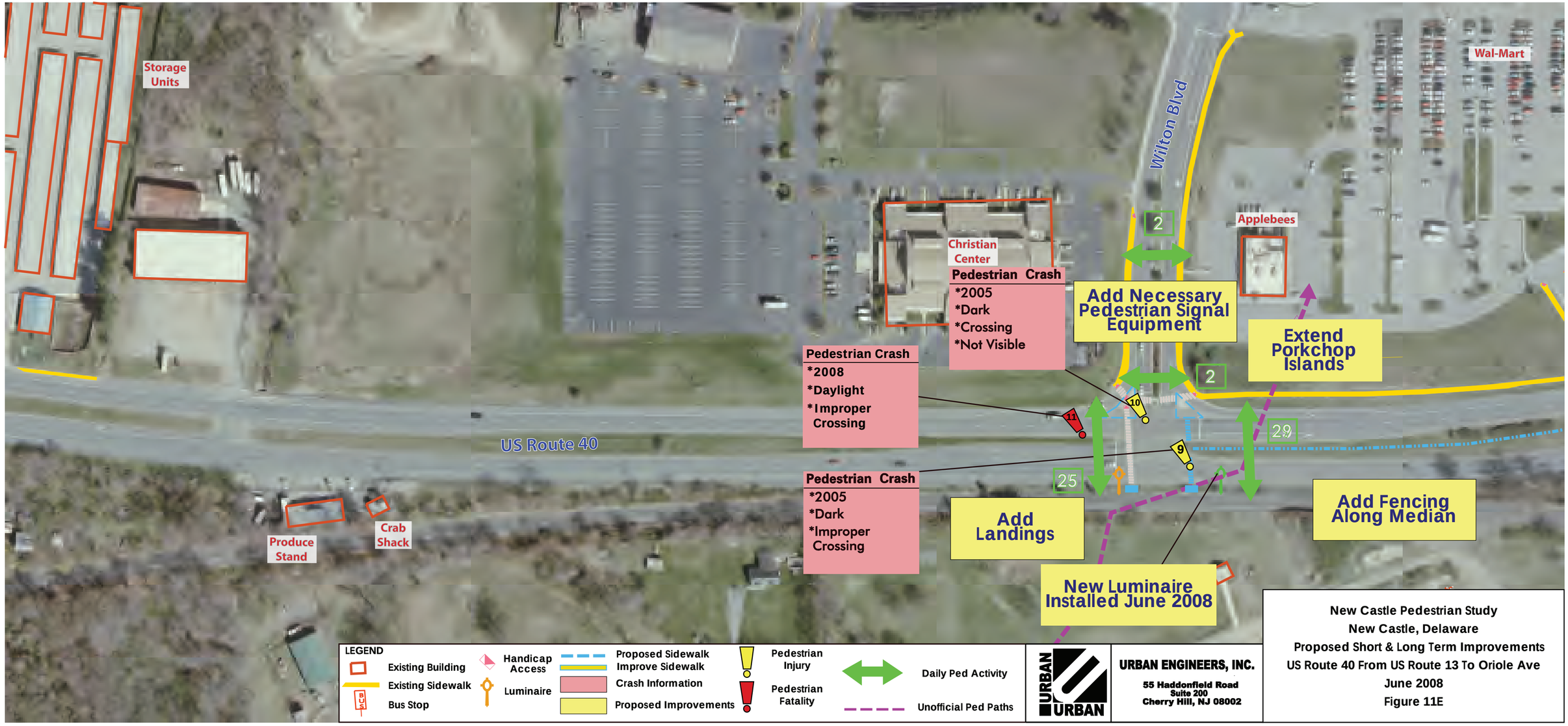
URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 13 From DE Route 273 To Buena Vista Drive
June 2008
Figure 11C

SEE FIGURE 11C

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 13 From DE Route 273 To Buena Vista Drive
June 2008
Figure 11D



SEE FIGURE 11F

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

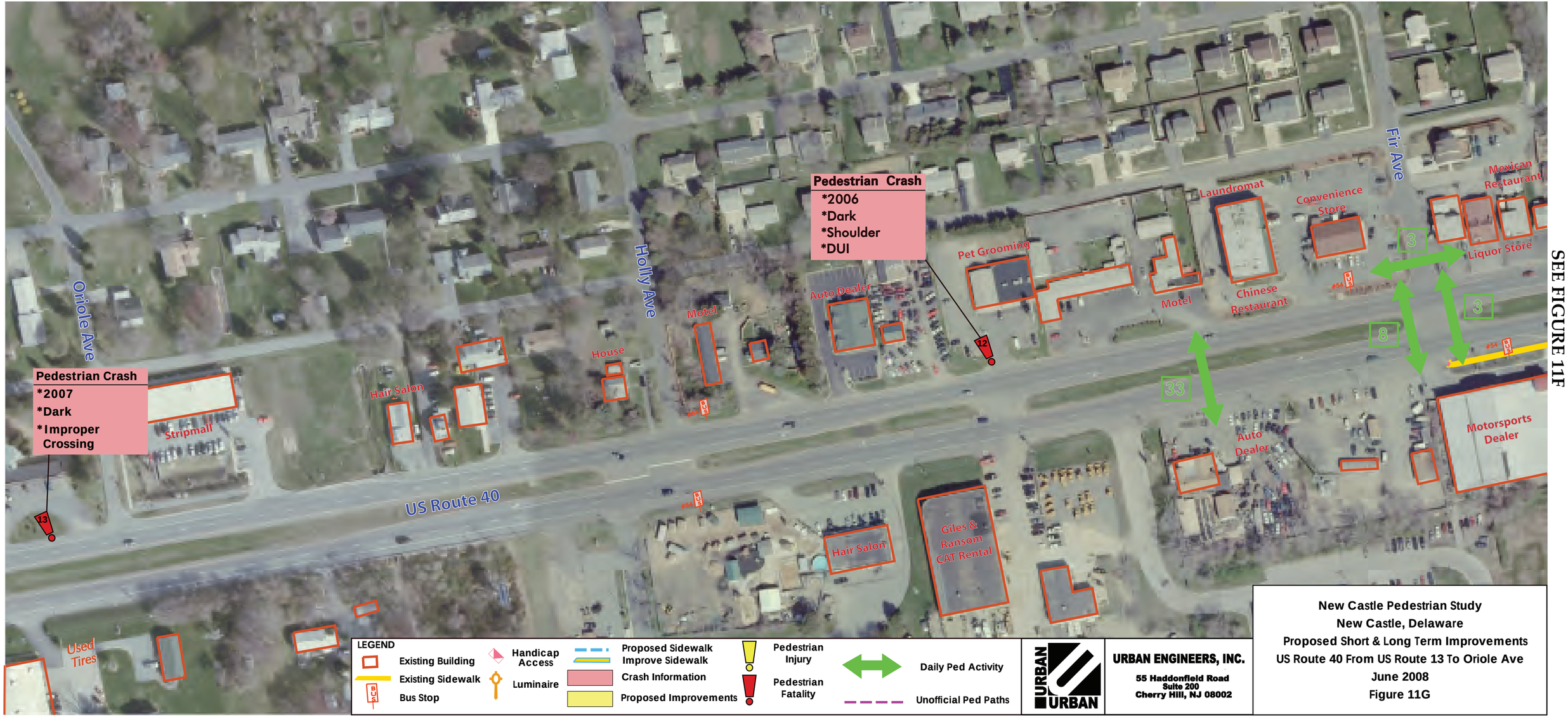
New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 40 From US Route 13 To Oriole Ave
June 2008
Figure 11E

SEE FIGURE 11G

SEE FIGURE 11E

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 40 From US Route 13 To Oriole Ave
June 2008
Figure 11F

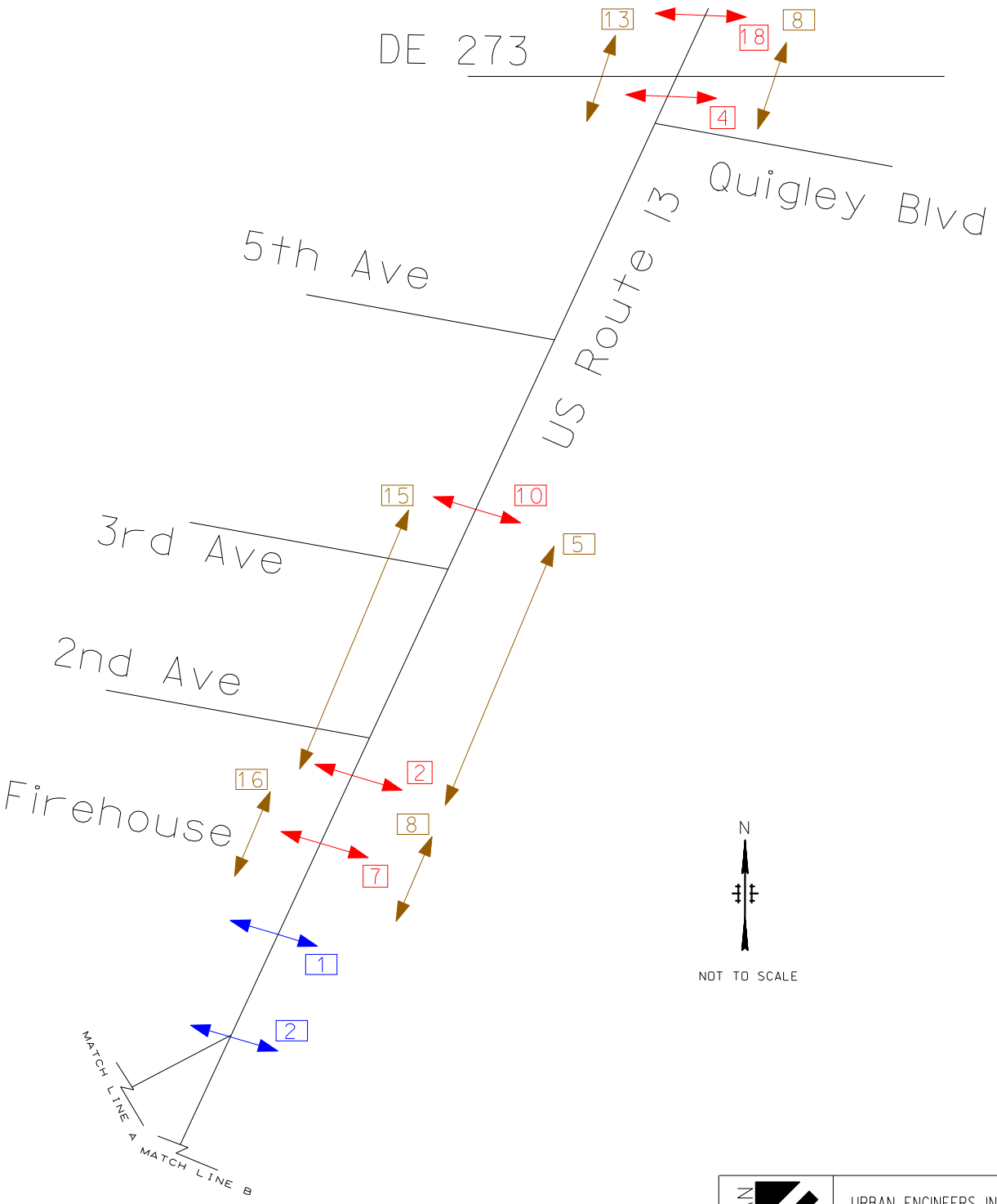


SEE FIGURE 11F

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

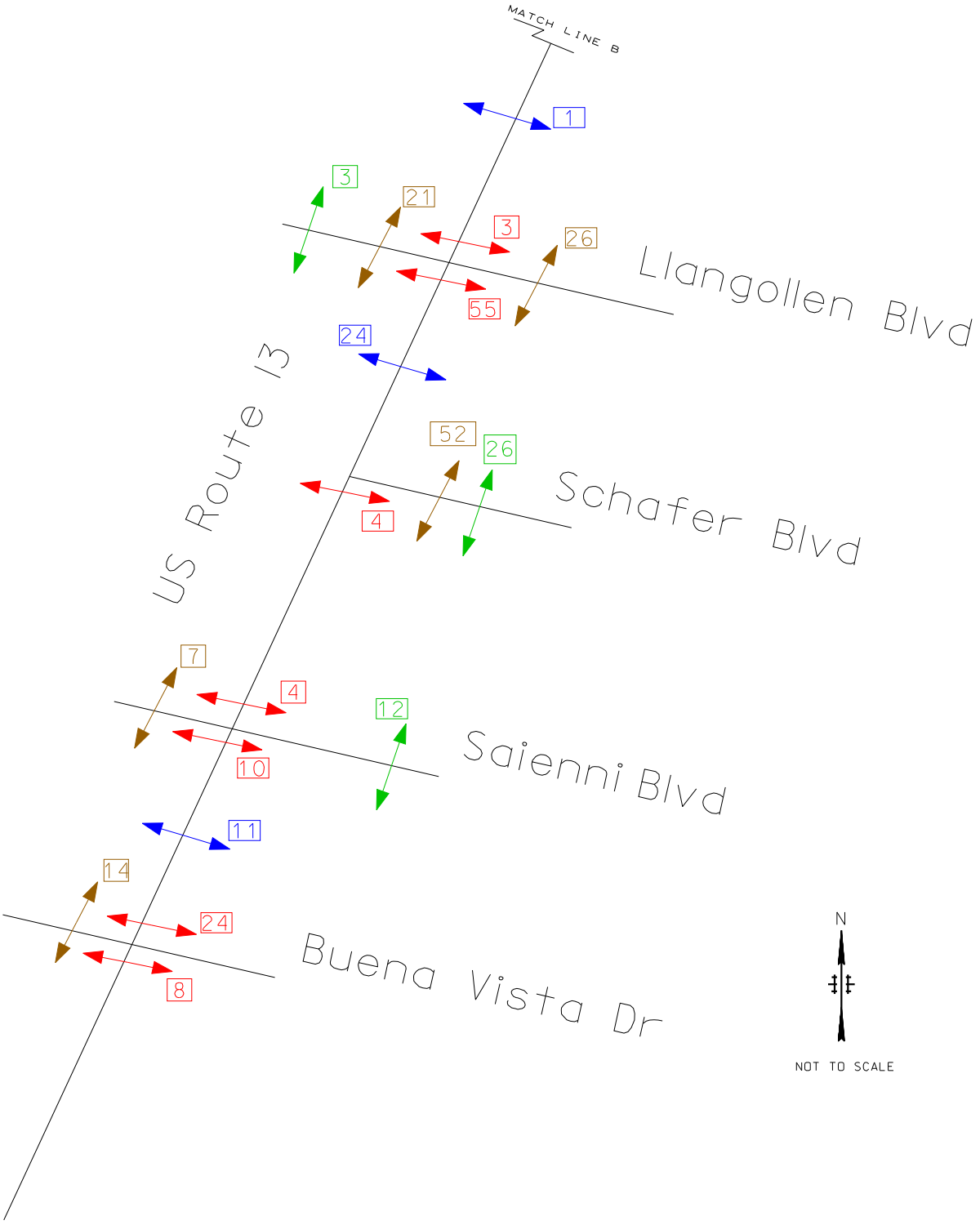
New Castle Pedestrian Study
New Castle, Delaware
Proposed Short & Long Term Improvements
US Route 40 From US Route 13 To Oriole Ave
June 2008
Figure 11G

Appendix A: Data Collection



URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Average Weekday Pedestrian Activity
APPENDIX A – 01



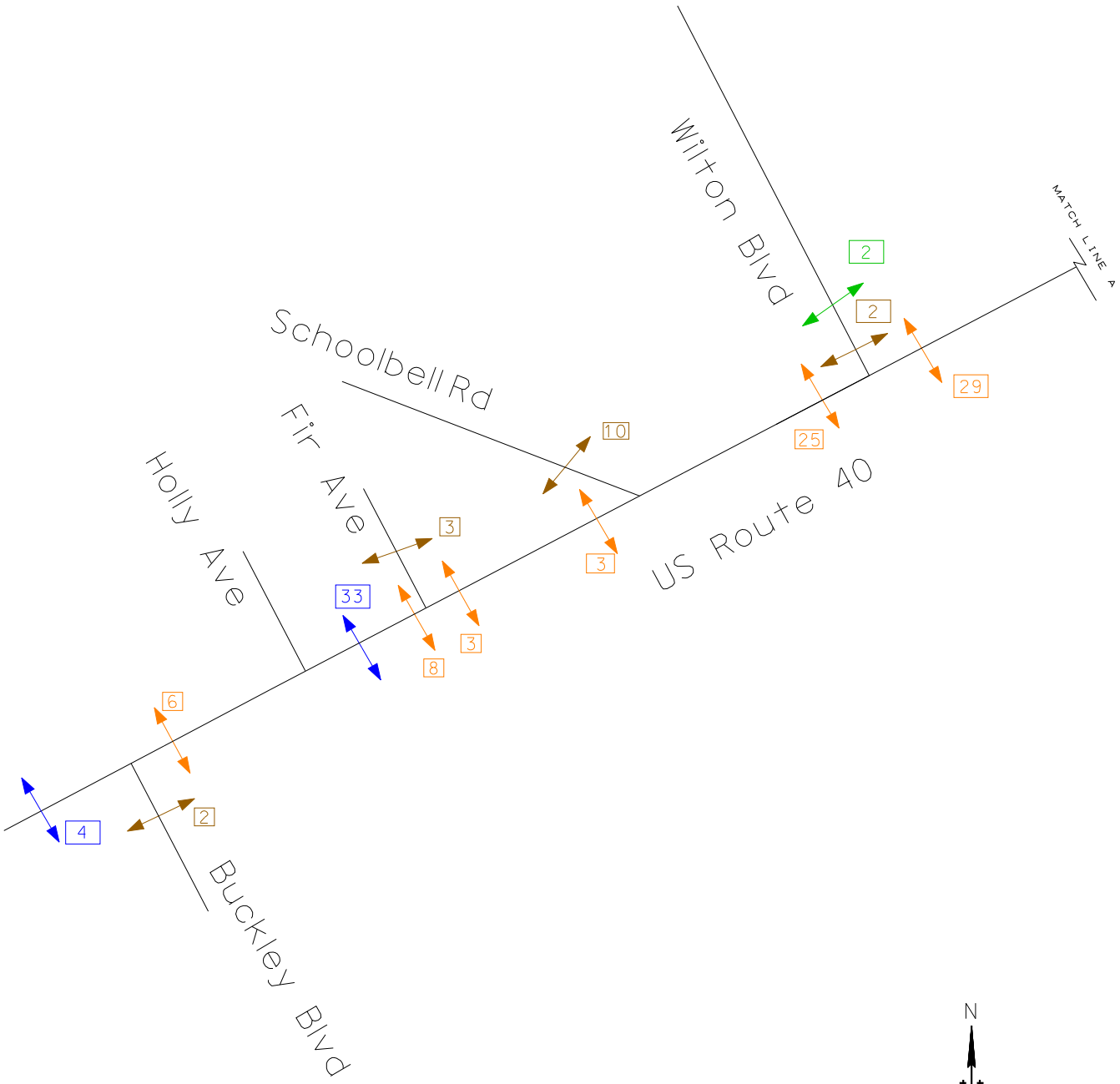
LEGEND:

- Pedestrian activity crossing US 13
- Pedestrian activity crossing side street
- Pedestrian activity crossing midblock US 13
- Pedestrian activity crossing midblock side street

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Average Weekday Pedestrian Activity

APPENDIX A – 02



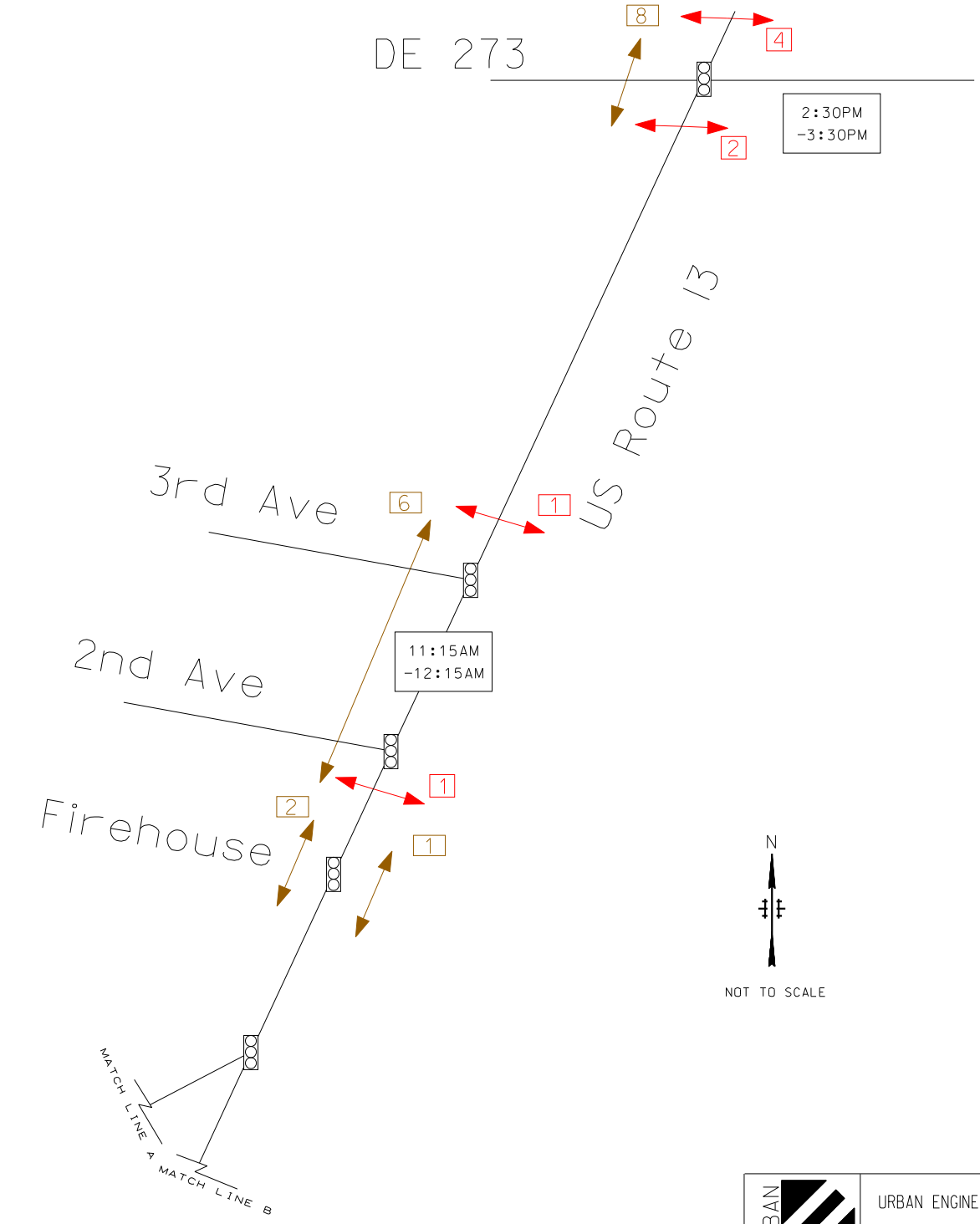
LEGEND:

- Pedestrian activity crossing US 40
- Pedestrian activity crossing side street
- Pedestrian activity crossing midblock US 40
- Pedestrian activity crossing midblock side street

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Average Weekday Pedestrian Activity

APPENDIX A – 03



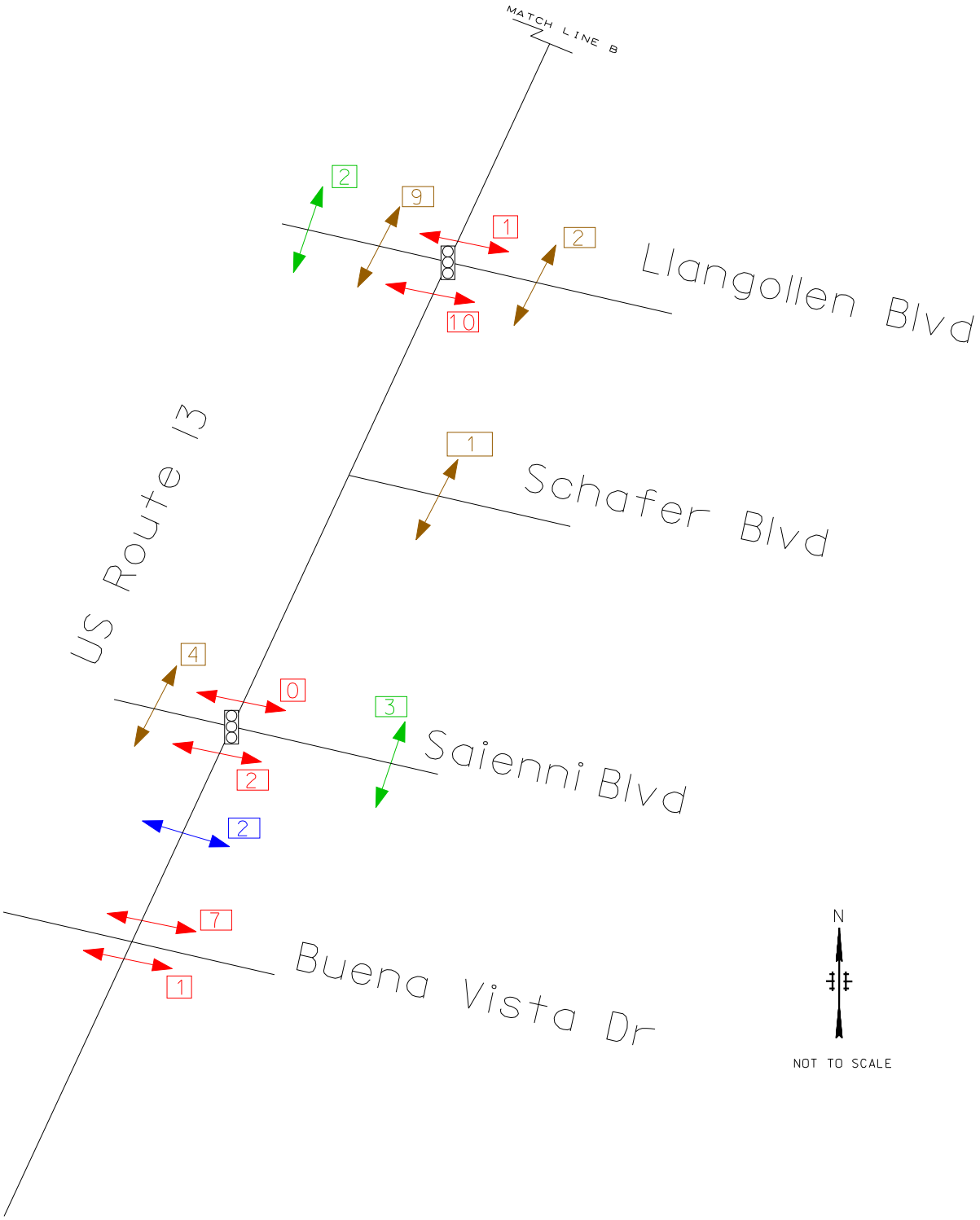
LEGEND:

- Pedestrian activity crossing US 13
- Pedestrian activity crossing side street
- Pedestrian activity crossing midblock US 13
- Pedestrian activity crossing midblock side street

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday Pedestrian Activity
At Indicated Peak Hour

APPENDIX A – 04



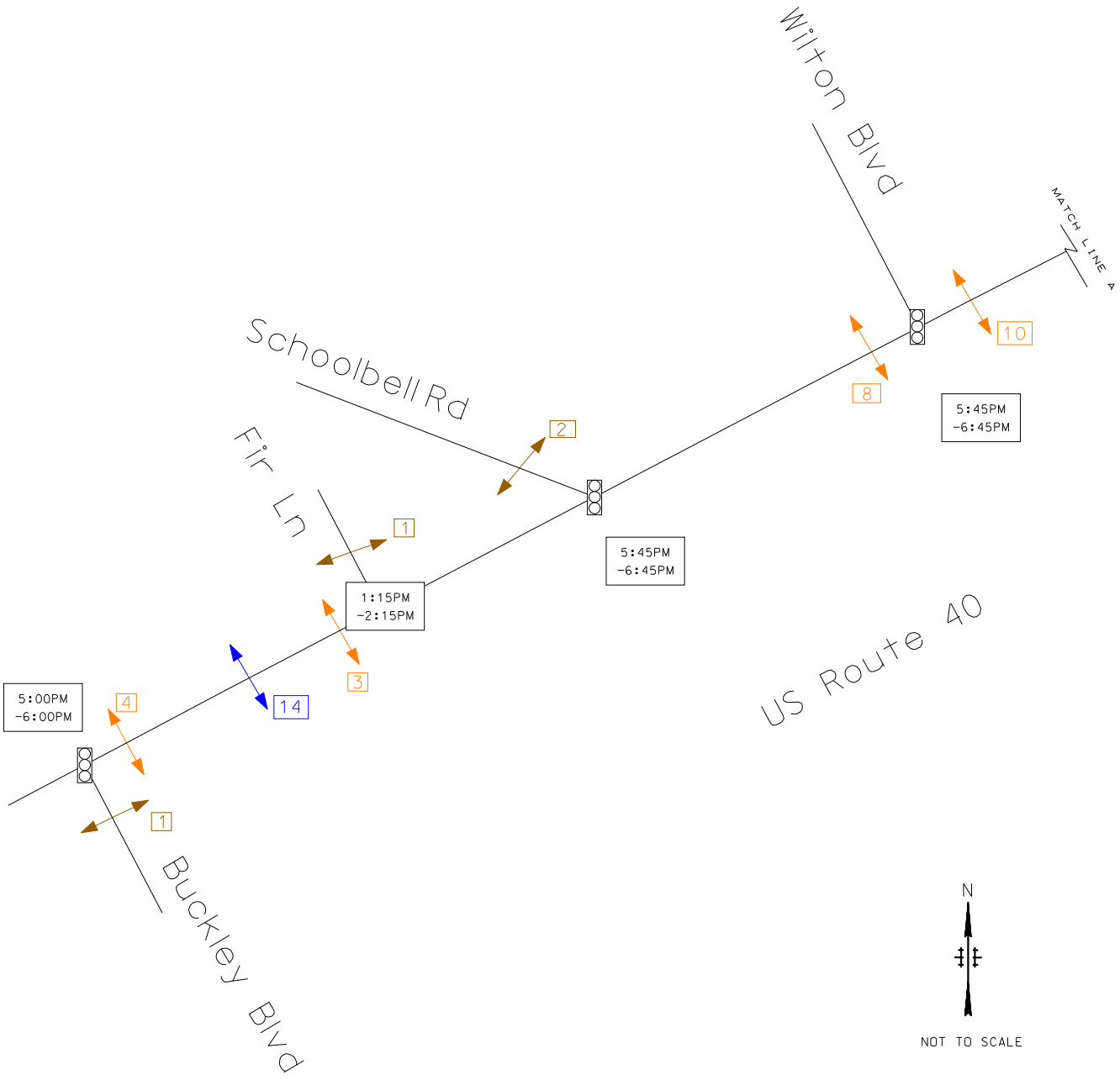
LEGEND:

- Pedestrian activity crossing US 13
- Pedestrian activity crossing side street
- Pedestrian activity crossing midblock US 13
- Pedestrian activity crossing midblock side street

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday Pedestrian Activity
At Daily Peak Hour (4:15pm)

APPENDIX A – 05



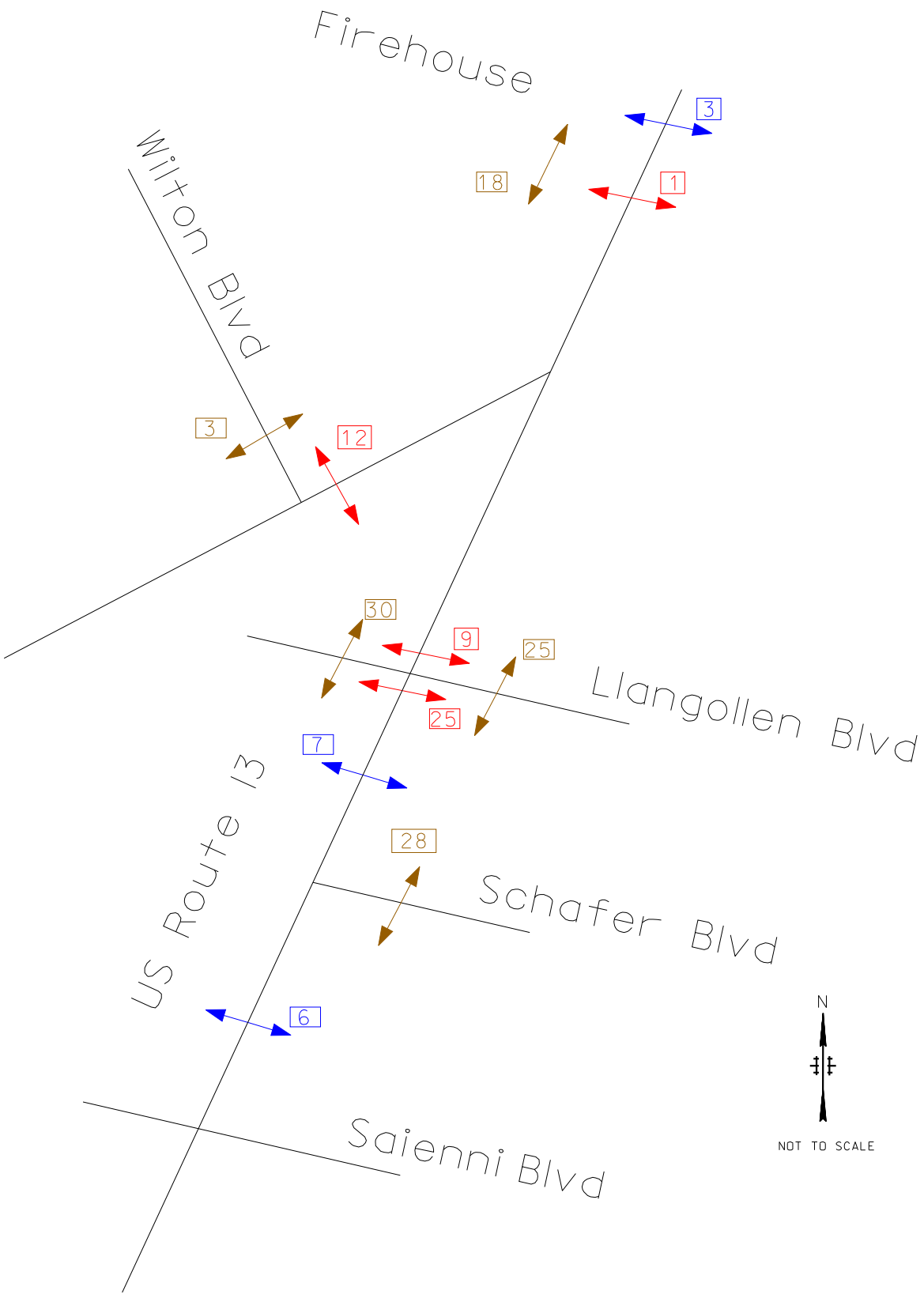
LEGEND:

- Pedestrian activity crossing US 40
- Pedestrian activity crossing side street
- Pedestrian activity crossing midblock US 40
- Pedestrian activity crossing midblock side street

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday Pedestrian Activity
At Indicated Peak Hour

APPENDIX A – 06



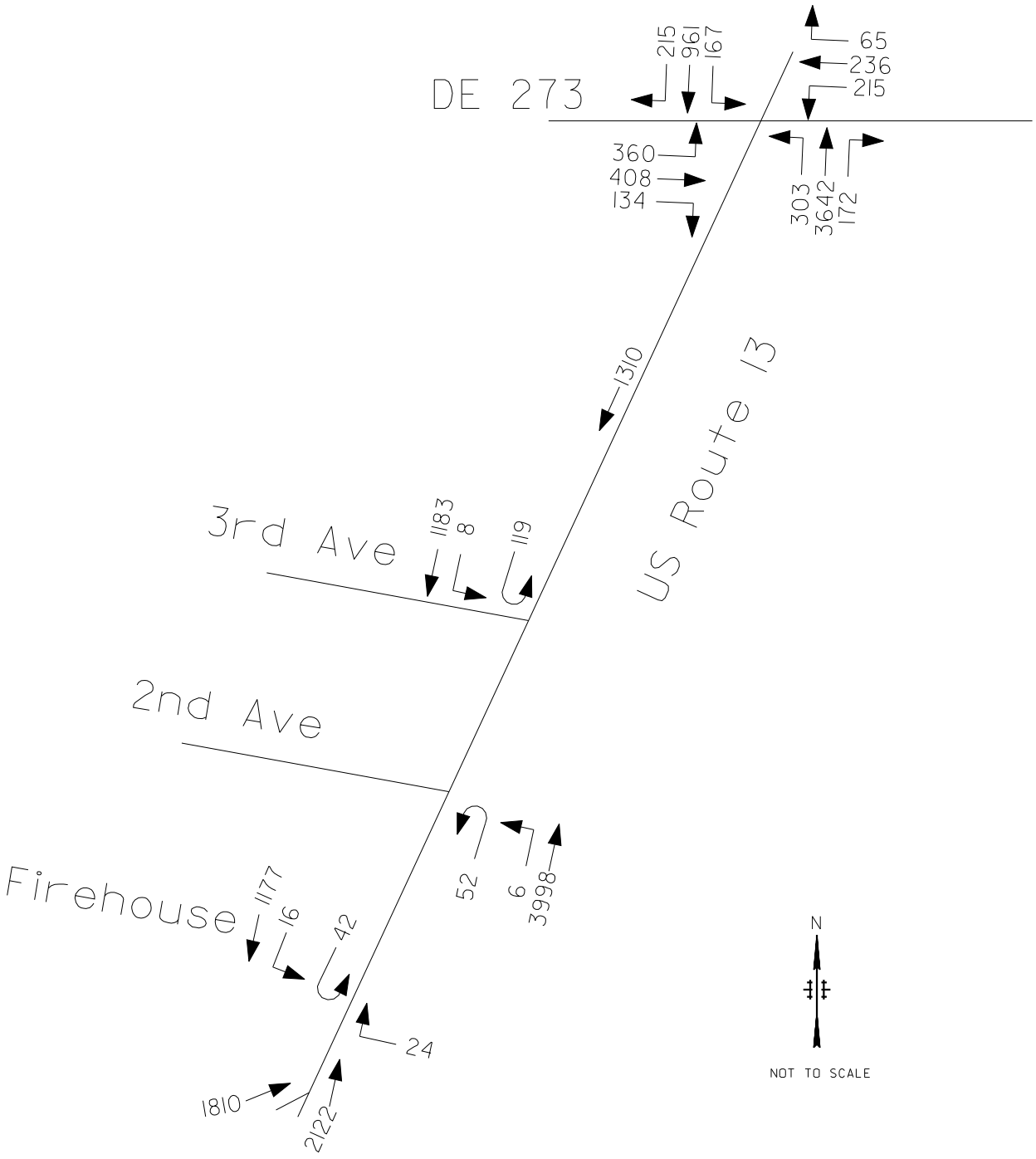
LEGEND:

- Pedestrian activity crossing US 13
- Pedestrian activity crossing side street
- Pedestrian activity crossing midblock US 13
- Pedestrian activity crossing midblock side street

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Average Weekend Pedestrian Activity

APPENDIX A - 07



LEGEND:

U-TURN

RIGHT TURN

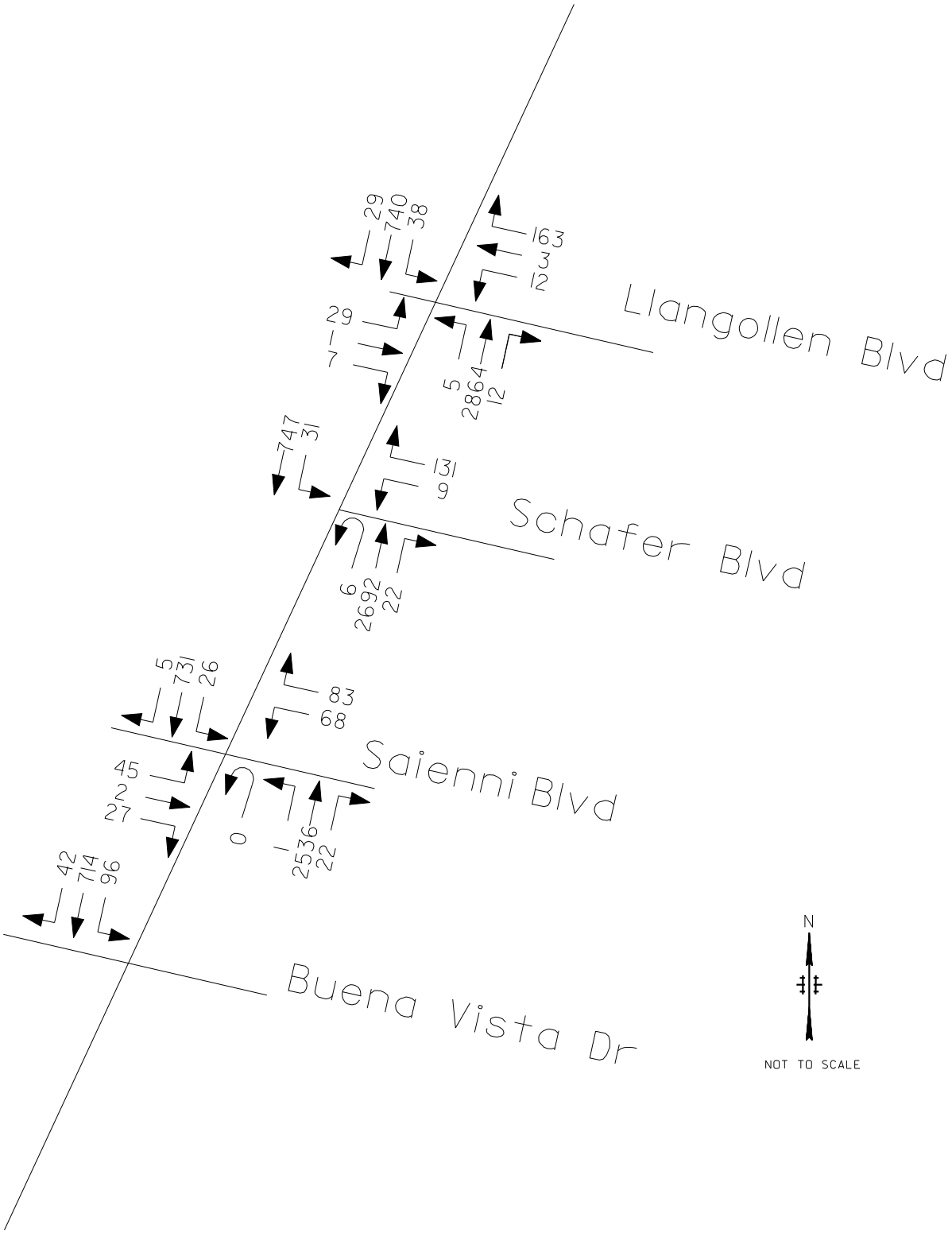
LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday AM Peak Hour Volumes (6:45 AM)

APPENDIX A – 08



LEGEND:

U-TURN

RIGHT TURN

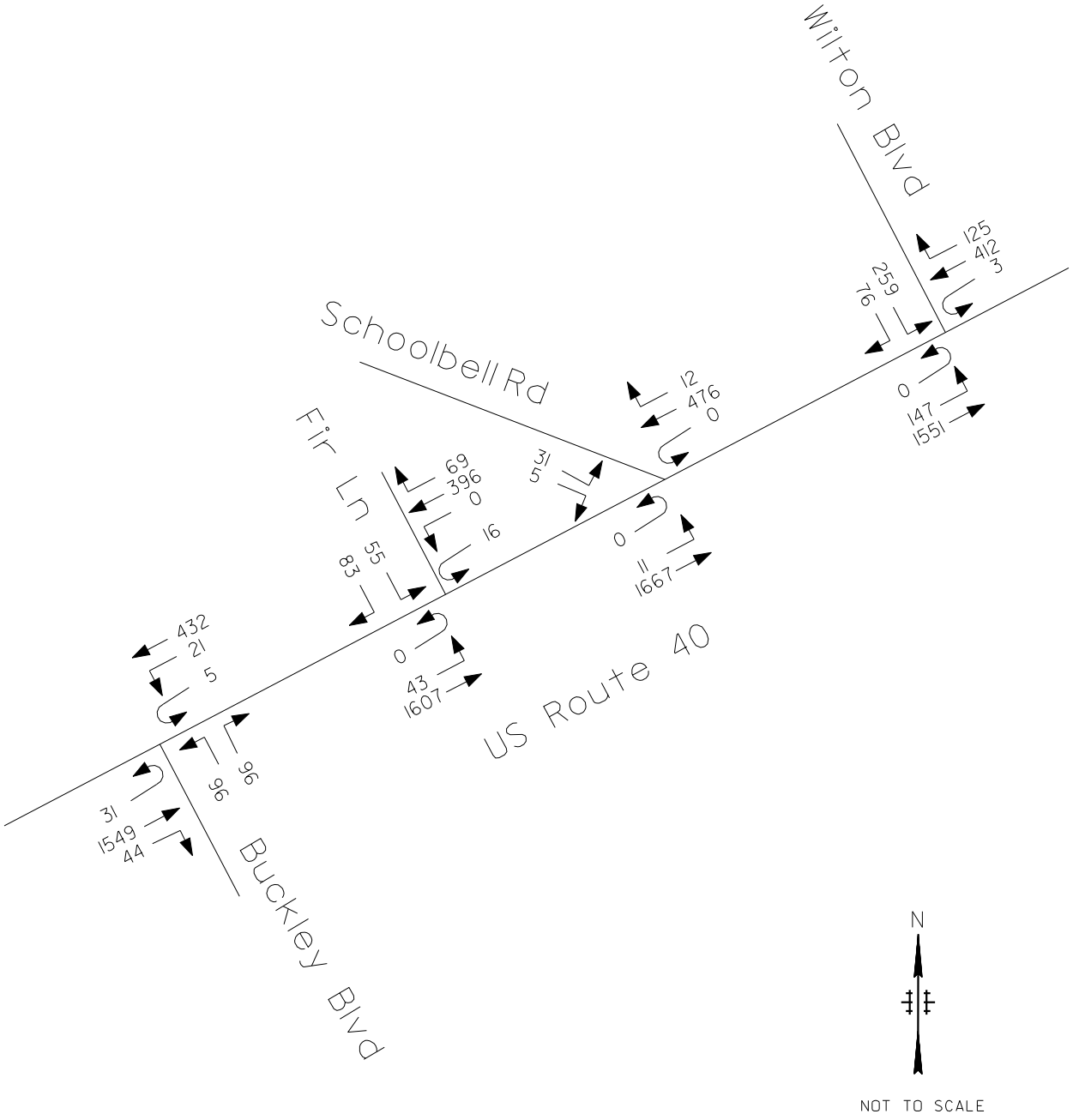
LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday AM Peak Hour Volumes (6:45 AM)

APPENDIX A – 09



LEGEND:

U-TURN

RIGHT TURN

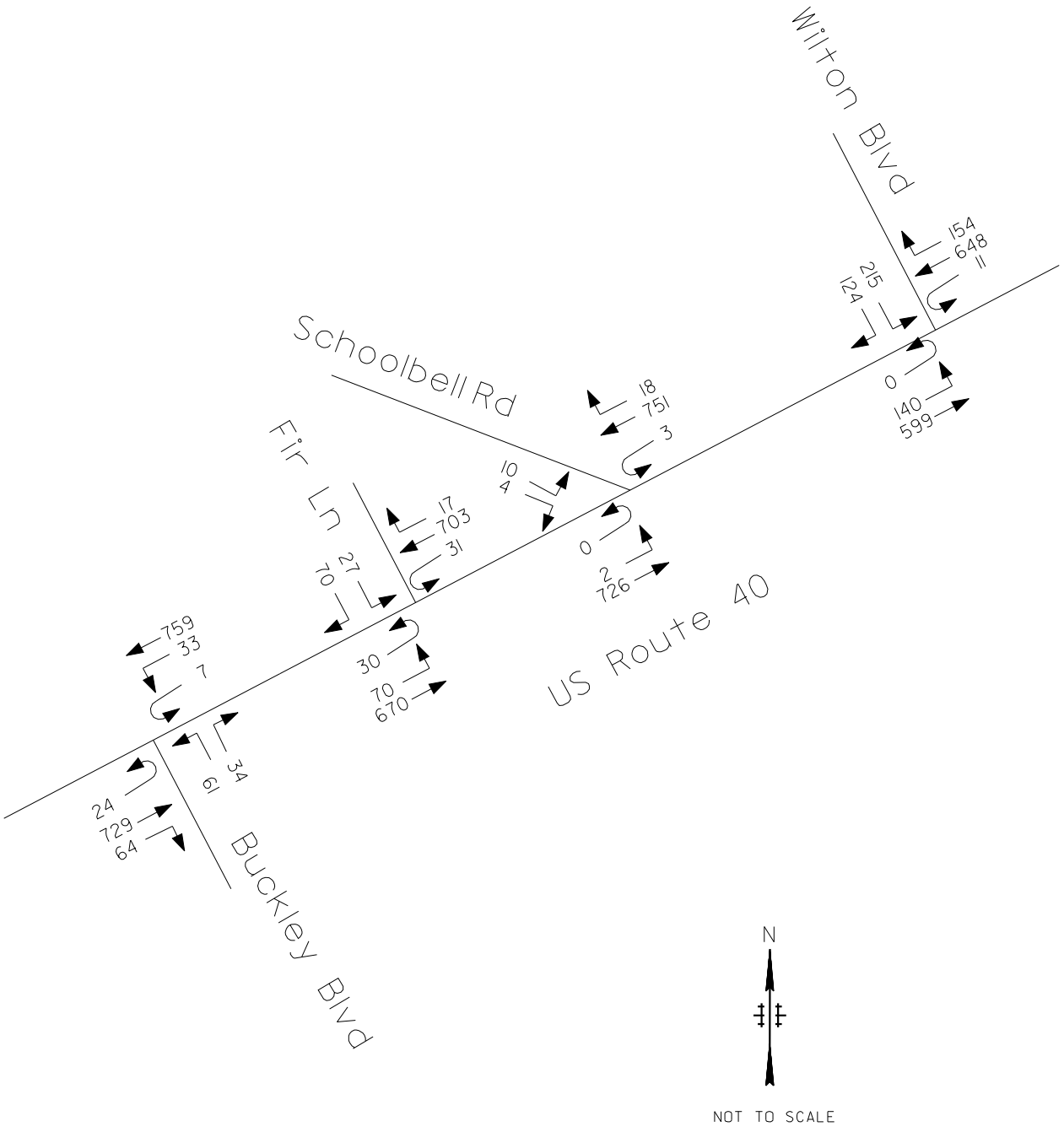
LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday AM Peak Hour Volumes (7:30 AM)

APPENDIX A – 10



LEGEND:

U-TURN

RIGHT TURN

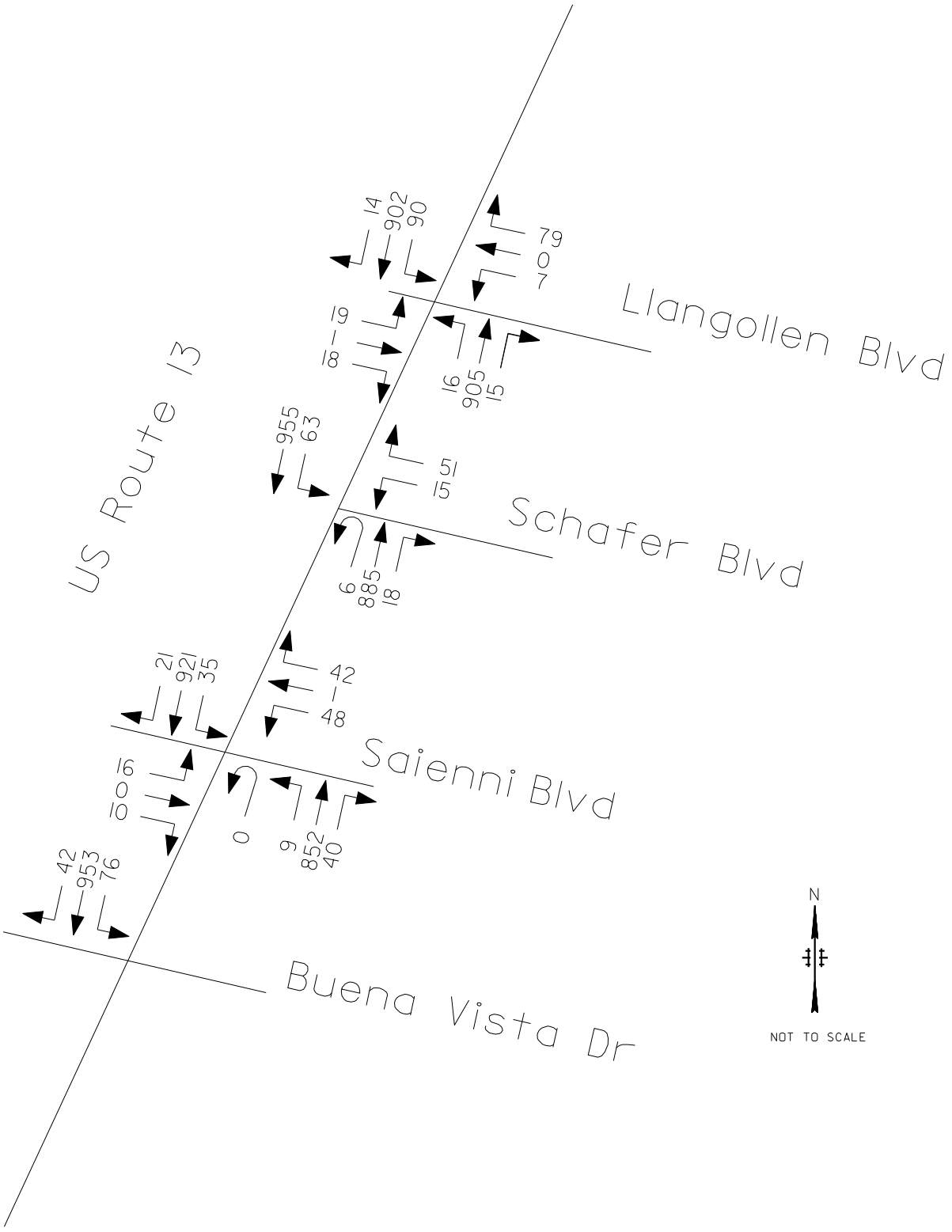
LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday Volumes
Mid-day Peak Hour (11:45 AM)

APPENDIX A – 11



LEGEND:

U-TURN

RIGHT TURN

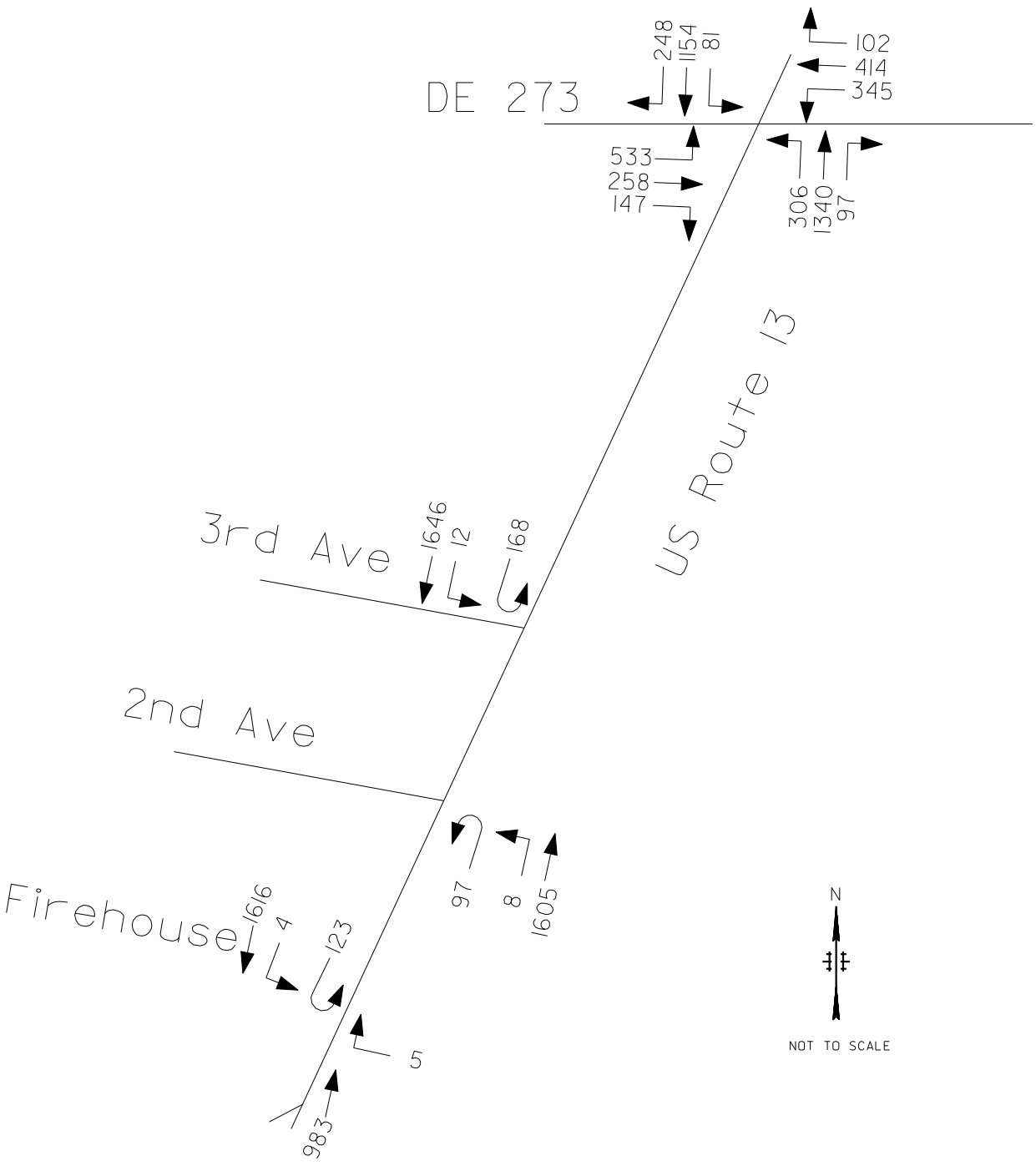
LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday Volumes
Mid-day Peak Hour (11:45 AM)

APPENDIX A – 12



LEGEND:

U-TURN

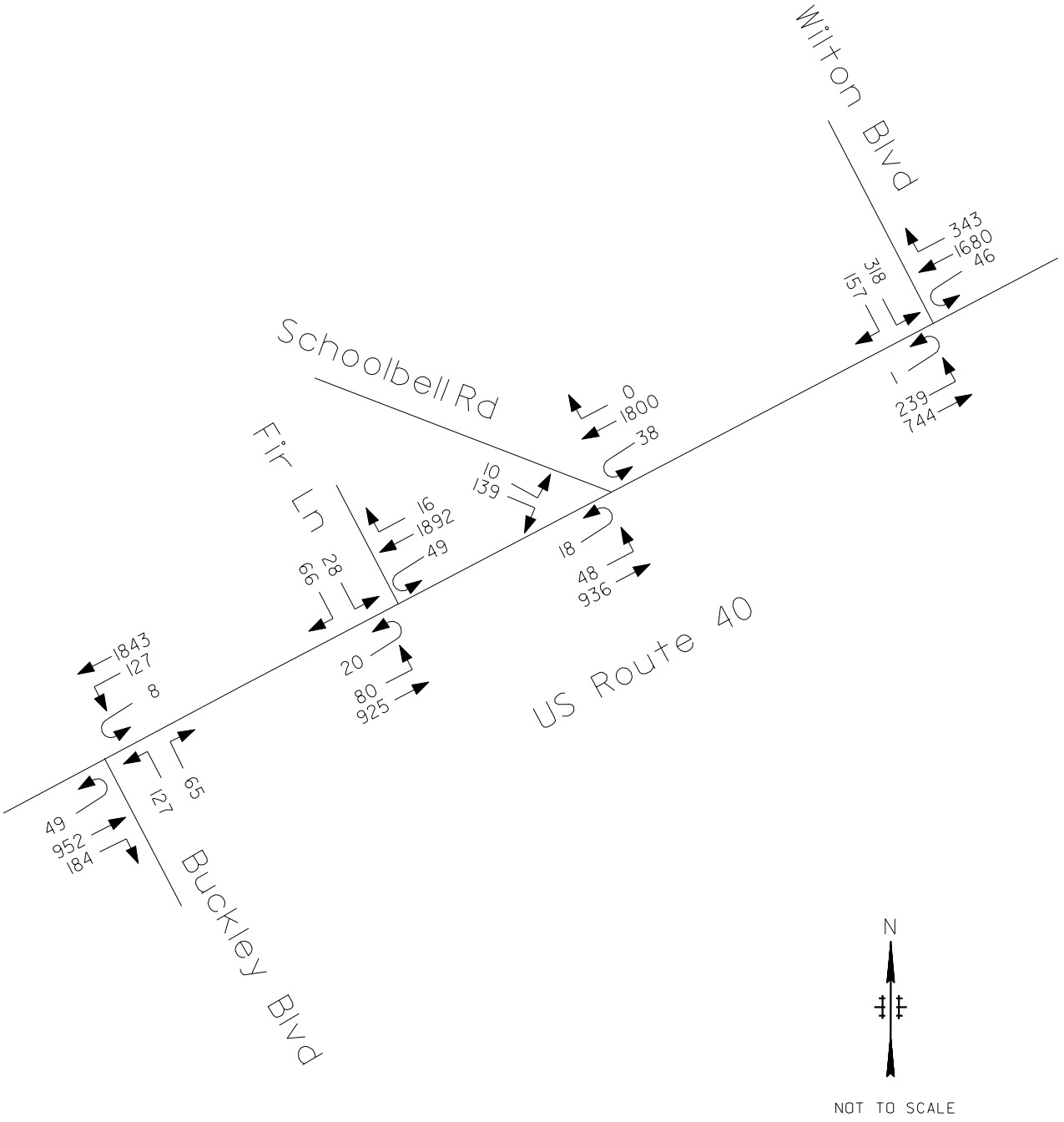
RIGHT TURN

LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday Volumes
Mid-day Peak Hour (11:45 AM)



LEGEND:

U-TURN

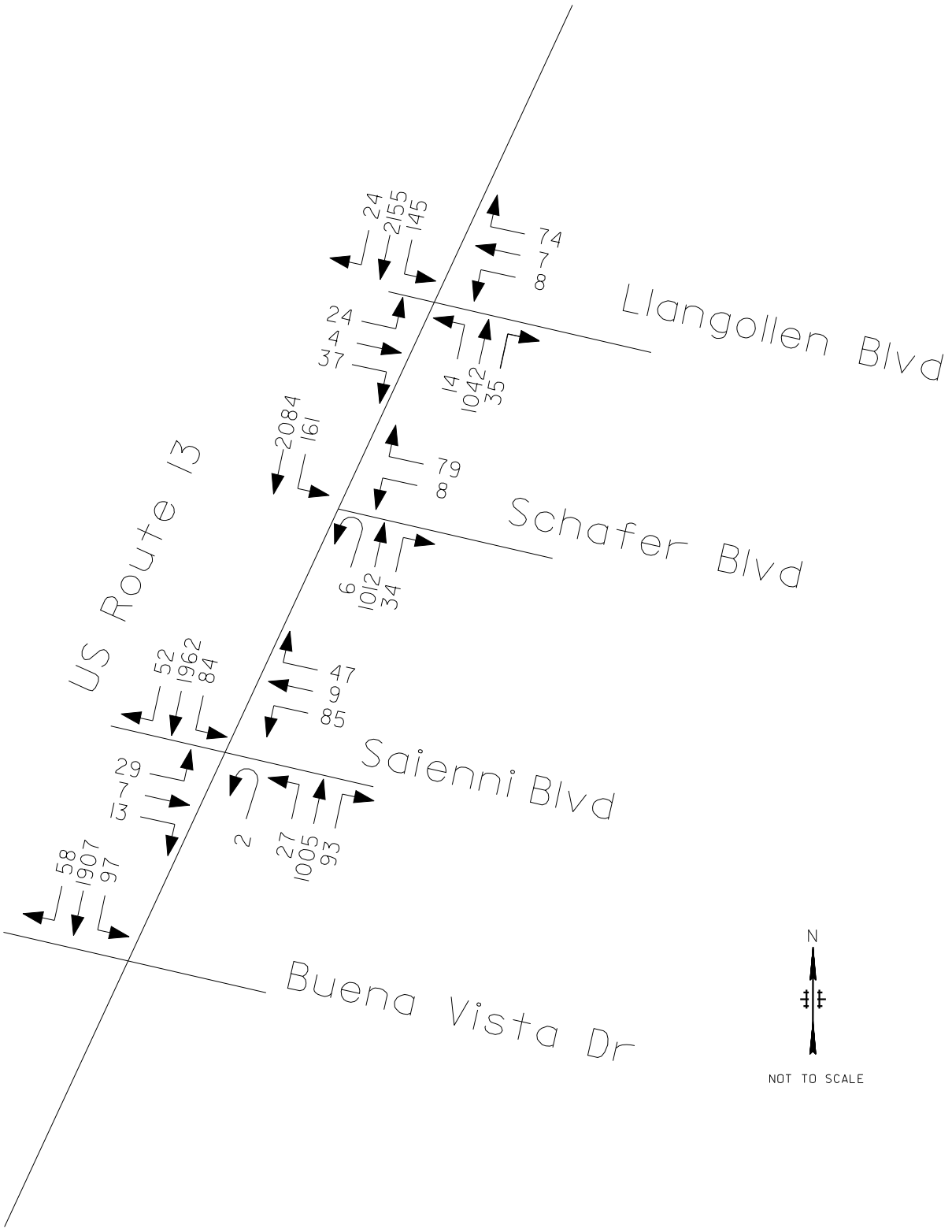
RIGHT TURN

LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday PM Peak Hour Volumes (5:00 PM)



LEGEND:

U-TURN

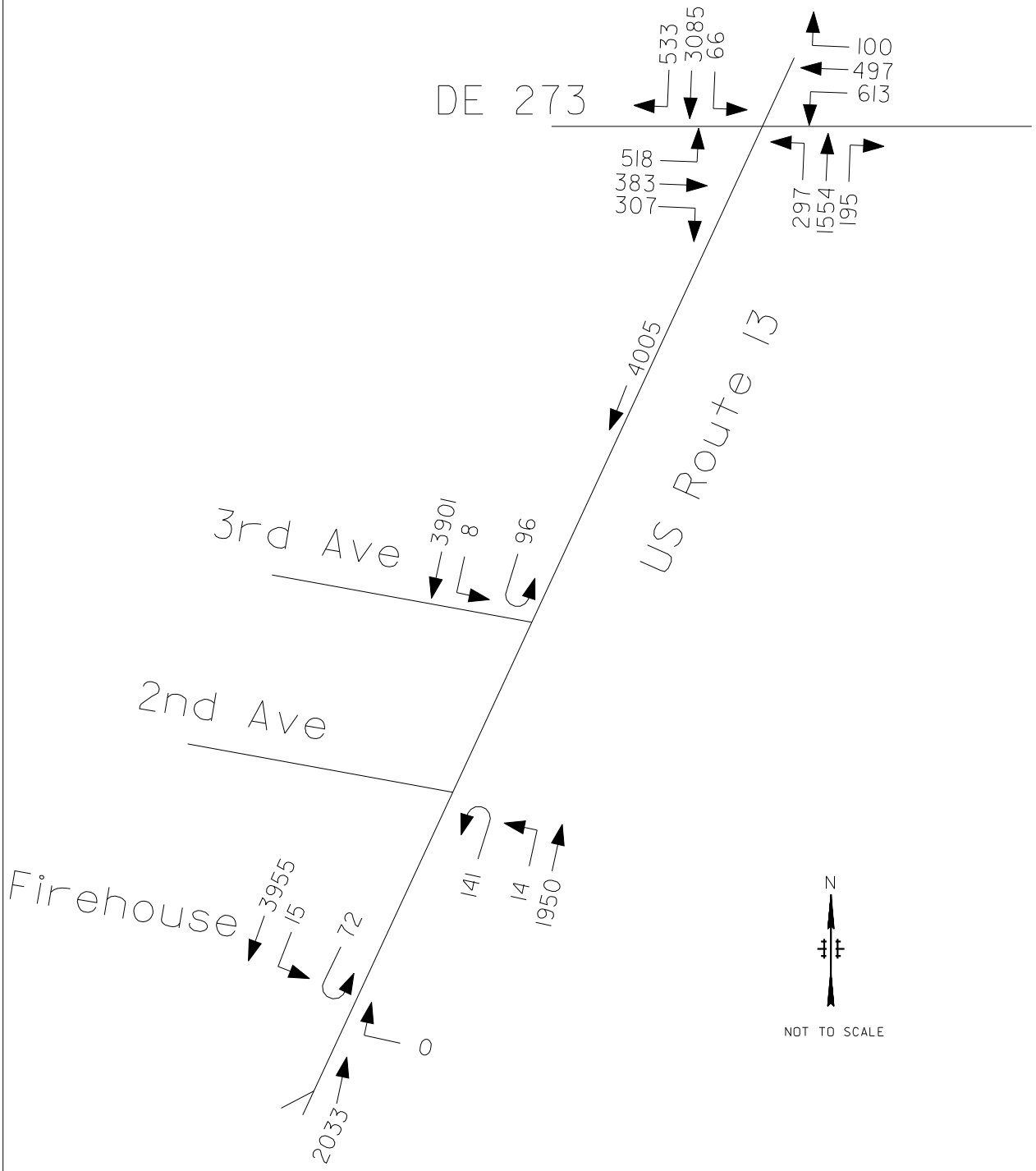
RIGHT TURN

LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday PM Peak Hour Volumes (4:45 PM)



LEGEND:

U-TURN

RIGHT TURN

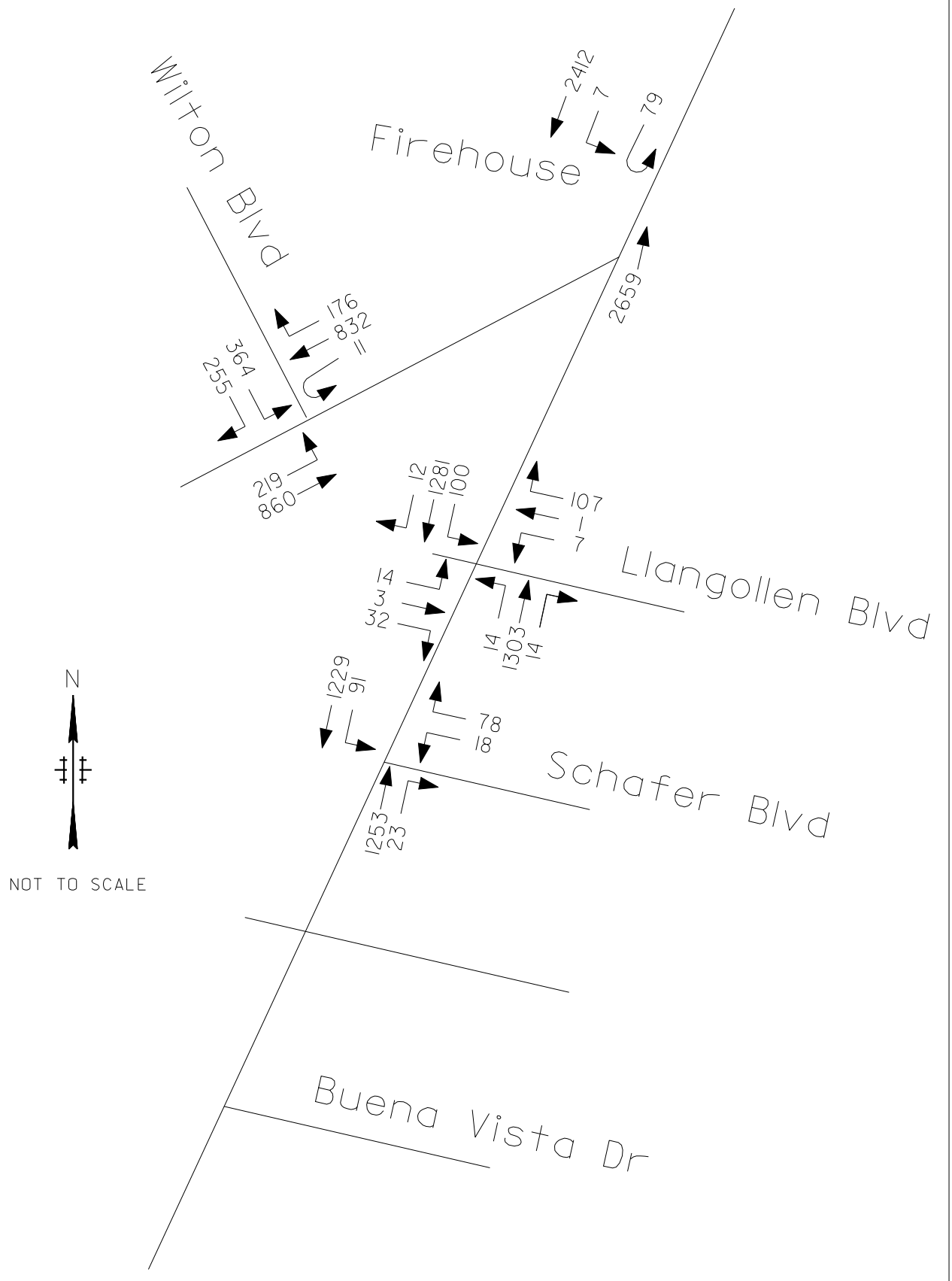
LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Weekday PM Peak Hour Volumes (4:45 PM)

APPENDIX A – 16



LEGEND:

U-TURN

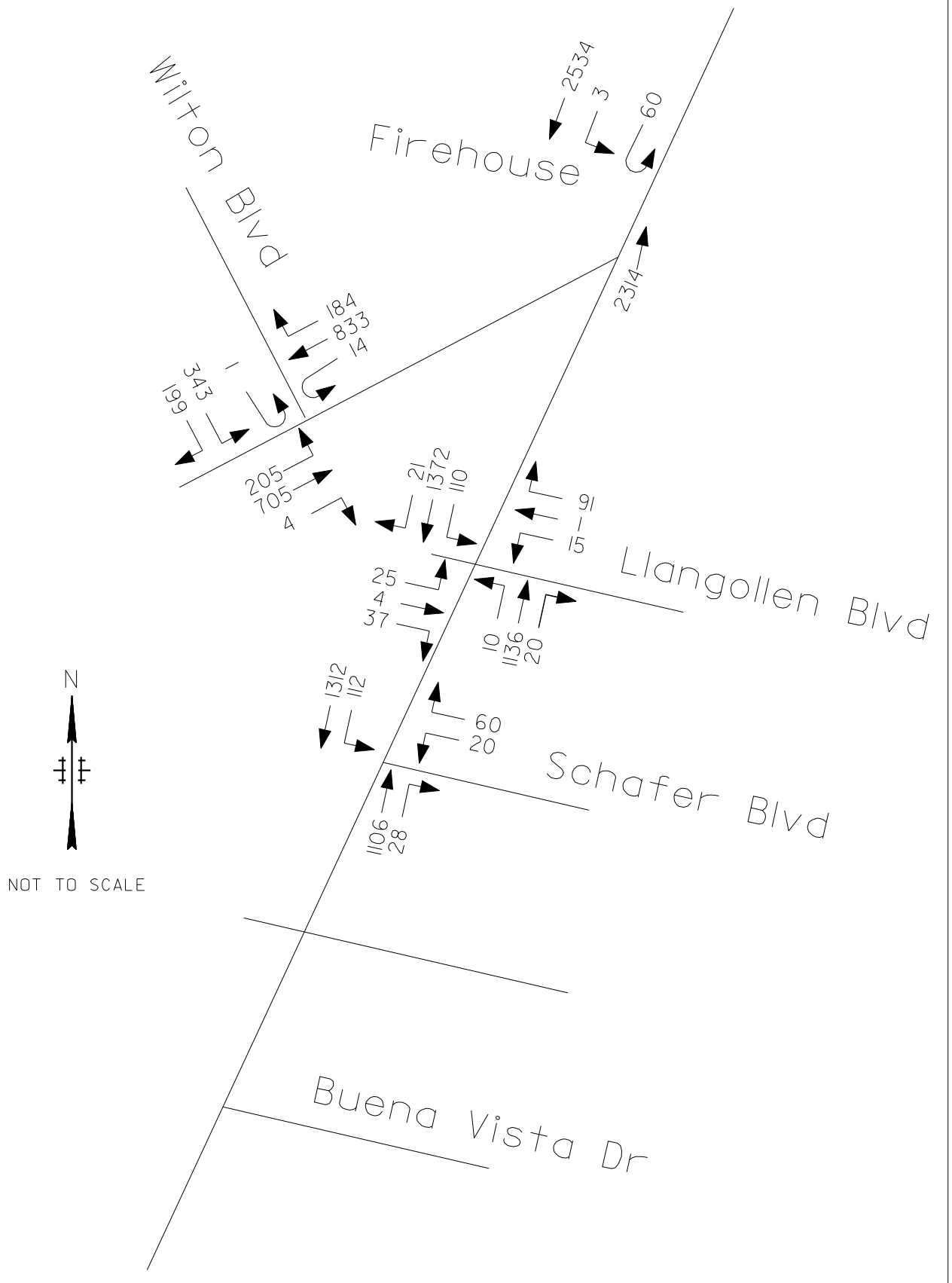
RIGHT TURN

LEFT TURN

THRU TRAFFIC

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Saturday AM Peak Hour Volumes (11:45 AM)



LEGEND:

U-TURN

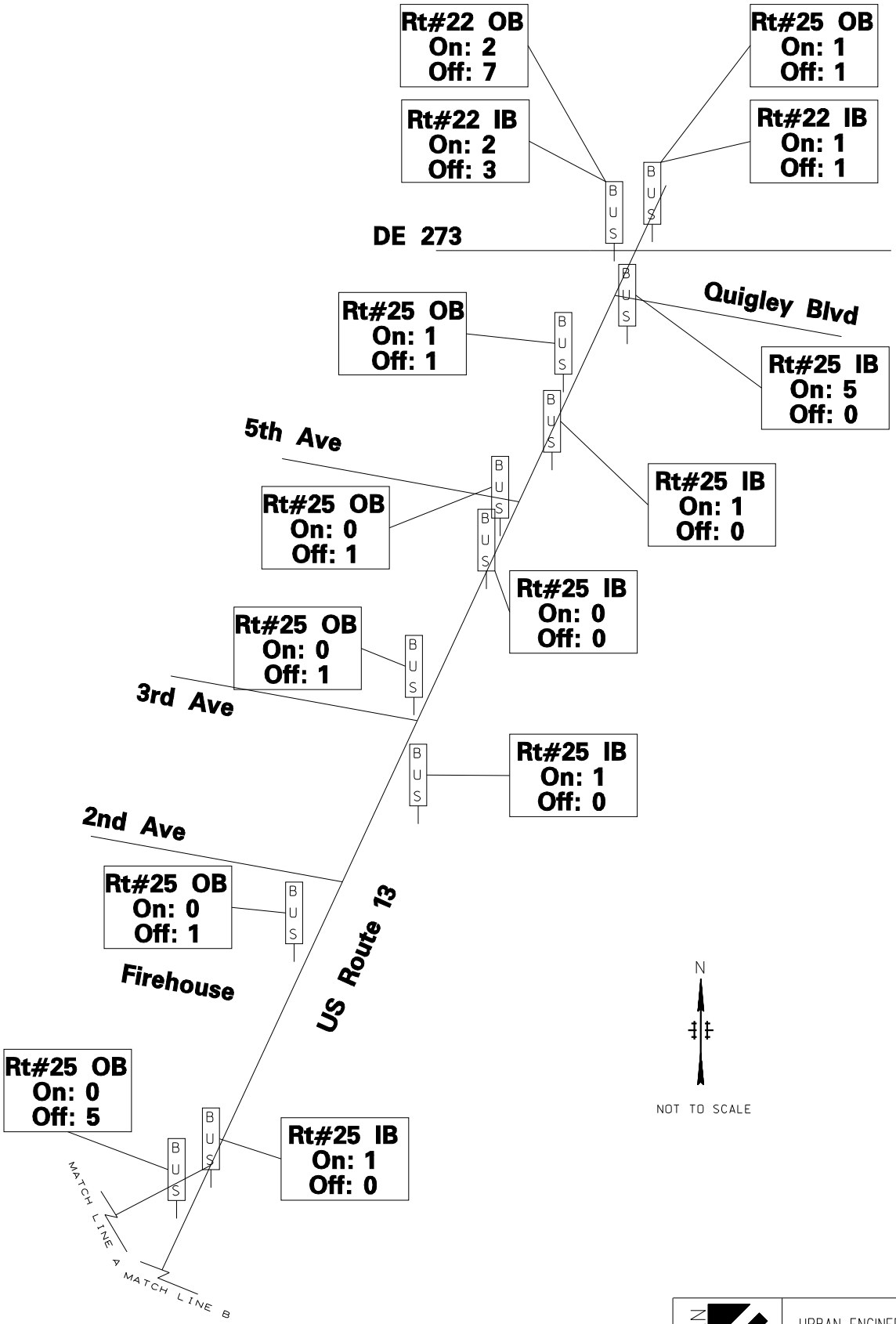
RIGHT TURN

LEFT TURN

THRU TRAFFIC

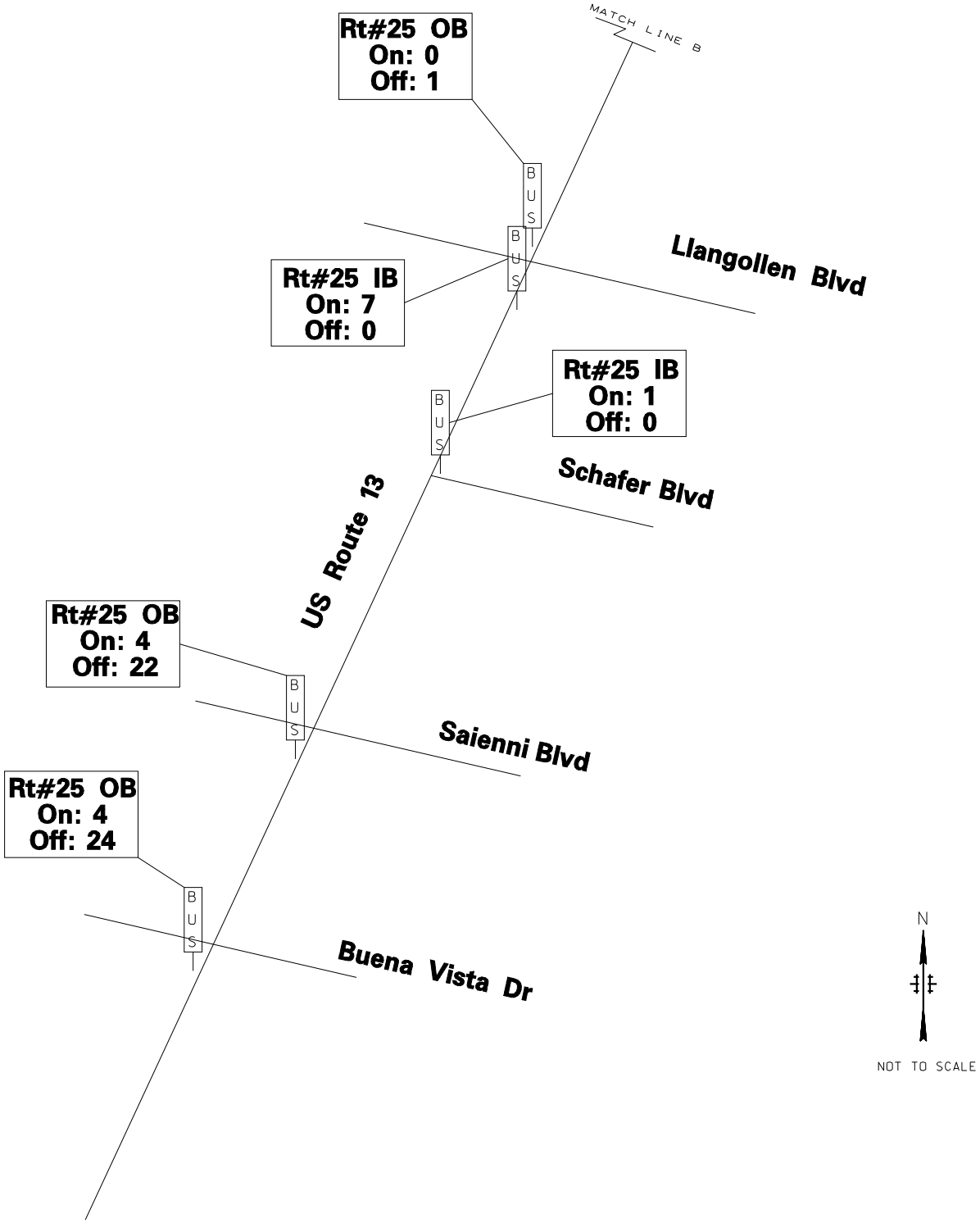
URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Saturday PM Peak Hour Volumes (3:15 PM)



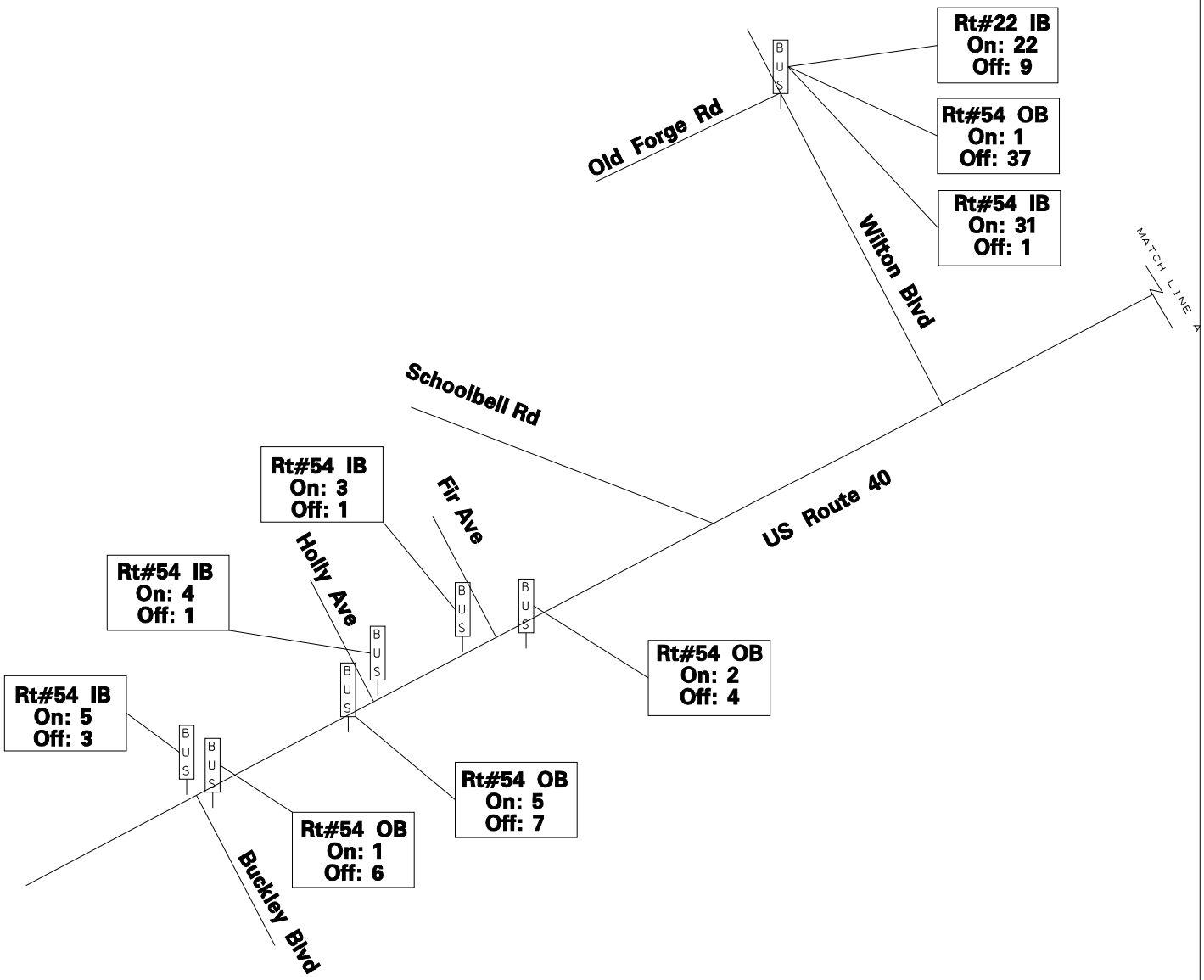
URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
DART Average Weekday Ridership



URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
DART Average Weekday Ridership



URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
DART Average Weekday Ridership

Bus Stop Activity Report

Route: 22 Service:Wkdy Direction:OUTBOUND

Ridership activity for current Line/Direction only. **Total Trips:23 Trips Checked:23 Total Checks:68**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
2111-KING ST & 10TH ST	282	6	306	287
KS08-KING ST & 8TH ST	31	3	335	34
KS06-KING ST & 6TH ST	8	1	342	9
KS05-KING ST & 5TH ST	8	2	349	9
KS03-KING ST & 3RD ST	17	4	361	21
2WKI-2ND ST & KING ST	2	2	362	4
MSML-MARKET ST & SHIPLEY ST/ ROSA PK DR	14	1	375	15
MS0A-MARKET ST & A ST	5	1	379	6
DSHO-DUPONT HWY & HOWARD ST	2	5	376	8
DPJC-DUPONT HWY @ JAMES COURT IND PK	2	1	377	3
DSMI-DUPONT HWY & OP MILLSIDE RD	1	6	372	6
DSHE-DUPONT HWY & HESSLER INDUS PK	2	22	352	23
DSME-DUPONT HWY & OP MEMORIAL DR	10	10	351	19
DSCO-DUPONT HWY & COUNTY POLICE BL	0	7	345	7
DSAL-DUPONT HWY & CHAPMAN-NISSAN	0	3	342	3
DSGR-DUPONT HWY & OP GRACELAWN MEM PK	2	3	342	5
DSLO-DUPONT HWY & LOVELACE AVE	3	2	342	5
DSCE-DUPONT HWY & CENTRAL AVE	0	3	340	3
D0HE-DUPONT HWY & HEALTH SOC SVC	1	18	323	18
DSMC-DUPONT HWY & MCMULLEN AVE	0	6	317	6
DSCA-DUPONT HWY & CARVEL AVE	1	8	310	9
D0BC-DUPONT HWY & BACON AVE	4	27	287	32
DSJE-DUPONT HWY & JEFFERSON AVE	5	3	288	8
D0RO-DUPONT HWY & ROOSEVELT AVE	2	2	288	4
D0HA-DUPONT HWY & HARRISON AVE	0	7	281	7
DSGA-DUPONT HWY & GARFIELD AVE	1	6	276	7
DSBA-DUPONT HWY & BASIN RD	3	12	267	14
DSNC-DUPONT HWY & NCC AIRPORT	0	4	263	4
DAIR-DUPONT HWY & NCC AIRPORT-SITE	0	5	258	5
DSDU-DUPONT HWY & DUTCH PANTRY	2	3	257	5
SSAR-SUNSET BLVD & ARBYS REST	13	12	258	24
SSBJ-SUNSET BLVD & BJS	2	7	253	10
FWFA-FRENCHTOWN RD @ FARMERS MKT ENT	0	8	245	8
DSOC-DUPONT HWY & OLD CHURCHMANS RD	2	14	233	16
FWDU-CHRISTIANA RD & DUPONT HWY	2	7	227	9
FWCH-CHRISTIANA RD & CHURCHMANS RD	0	12	216	12
FWNC-CHRISTIANA RD & N CST SQUARE MALL	6	32	190	37
FWRA-CHRISTIANA RD & FRESCONI DR	0	10	181	10
FWPL-CHRISTIANA RD & PLEASANT PL	0	6	175	6
F0RO-CHRISTIANA RD & OP ROBERT LN	0	2	173	2
FWED-CHRISTIANA RD & EDINBURGH DR	0	4	170	4
FWGE-CHRISTIANA RD @ GTOWN APTS EAST Q1	2	6	166	8
FWFR-CHRISTIANA RD & OP FREEDOM TRAIL	3	5	164	8
FWGW-CHRISTIANA RD @ GTOWN APTS WEST 112	2	5	160	7
FWAR-CHRISTIANA RD @ AIRPORT RD NS	1	11	151	12
ASFR-APPLEBY RD & FRENCHTOWN RD	4	7	148	11
A0WI-APPLEBY RD & WINBURNE DR	0	8	139	8
ASGR-APPLEBY RD & GRIFFITH DR	0	4	135	4
ASWI-APPLEBY RD & WILTON BLVD	3	15	123	17
SubTotals	448	354		802
Totals				

Stop	On	Off	On Board	Total
OEAP-OLD FORGE RD & APPLEBY RD	4	14	114	18
OEJE-OLD FORGE RD & JENNINGS CT	2	3	113	5
O0MA-OLD FORGE RD & OP MARLBOROUGH C	1	9	105	9
OECH-OLD FORGE RD & OP CHELTON APT	0	51	54	51
SubTotals				
Totals	455	431		886

Bus Stop Activity Report

Route: 22 Service:Wkdy Direction:INBOUND

Ridership activity for current Line/Direction only. **Total Trips:24 Trips Checked:24 Total Checks:66**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
OECH-OLD FORGE RD & OP CHELTON APT	64	5	104	69
WWOL-WILTON BLVD & OLD FORGE RD	22	9	117	31
WWST-WILTON BLVD & STONEBRIDGE BLVD	27	5	138	32
W1CA-WILTON BLVD & OP CANDLEWICK CT	14	2	150	15
WWAN-WILTON BLVD & ANDOVER CT	19	2	167	22
WWED-WILTON BLVD & EDINBURGH DR	6	2	171	9
WWDA-WILTON BLVD & DARIEN CT	4	0	175	4
WWRI-WILTON BLVD & RIDLEY CT	9	2	182	11
WWBE-WILTON BLVD & BERKLEY WAY	6	0	187	6
WWAY-WILTON BLVD & APPLEBY RD	9	0	196	9
ANSA-APPLEBY RD & SAYBROOK WAY	6	1	200	7
A1WI-APPLEBY RD & OP WINBURNE DR	3	0	203	3
ANFR-APPLEBY RD & FRENCHTOWN RD	3	1	205	3
FECO-CHRISTIANA RD & COMMUNITY PLAZA	15	9	211	25
FECP-CHRISTIANA RD & C PLAZA GAS STAT	7	2	217	9
FEFR-CHRISTIANA RD & FREEDOM TRAIL	9	2	224	10
FEGE-CHRISTIANA RD & OP GEORGETOWN APTS	13	1	236	14
F1ED-CHRISTIANA RD & EDINBURGH DR	15	3	247	18
F1RO-CHRISTIANA RD & ROBERT LN	1	0	248	1
FEME-CHRISTIANA RD & MELANIE DR	0	1	247	1
FERA-CHRISTIANA RD & RAMBLETON DR	3	2	248	5
FESQ-CHRISTIANA RD & OP NC SQUARE MALL	30	1	276	31
FECH-CHRISTIANA RD & CHURCHMANS RD	12	4	284	16
FEDU-CHRISTIANA RD & DUPONT HWY	2	3	283	5
FEFA-FRENCHTOWN RD & OP FARMERS MARKET	5	1	287	5
SNBJ-SUNSET BLVD & BJS	10	6	291	16
SNAR-SUNSET BLVD & ARBYS REST	14	9	296	23
DNFR-DUPONT HWY & FRENCHTOWN RD	1	1	296	1
DNFA-DUPONT HWY & FARMERS MARKET	1	1	296	1
DNSC-DUPONT HWY & SCHOOLHOUSE LN	1	0	297	1
D1GE-DUPONT HWY & OP GRTR WILM AIR	3	2	299	5
D1PE-DUPONT HWY & PENN MART SHOP C	13	8	304	22
DNBA-DUPONT HWY & BASIN RD	6	5	305	11
DNLI-DUPONT HWY & OP LINCOLN AVE	8	2	311	10
DNJA-DUPONT HWY & JACKSON AVE	8	2	317	10
DNHA-DUPONT HWY & HARRISON AVE	7	0	324	8
DNRO-DUPONT HWY & ROOSEVELT AVE	3	2	326	5
DNST-DUPONT HWY & STAHL AVE	14	5	335	19
DNBO-DUPONT HWY & BOULDEN BLVD	38	18	354	57
DN95-DUPONT HWY & I-295	1	4	351	6
DNRA-DUPONT HWY & RAMADA INN ENT	1	1	352	2
DNGR-DUPONT HWY & GRACELAWN MEM PK	4	3	352	6
DNAL-DUPONT HWY & OP CHAPMAN-NISSAN	3	3	352	6
D1WI-DUPONT HWY & WILDEL AVE	3	1	353	4
DNME-DUPONT HWY & MEMORIAL DR	22	12	363	35
DNCH-DUPONT HWY & CHRISTIANA PLAZA	15	3	376	18
DNMI-DUPONT HWY & MILLSIDE RD	6	2	380	9
DNHO-WALNUT ST & HOWARD ST	2	4	378	6
2WFR-2ND ST & FRENCH ST	1	45	334	46
SubTotals	488	199		687
Totals				

Stop	On	Off	On Board	Total
2WKI-2ND ST & KING ST	1	4	331	5
2WSH-2ND ST & SHIPLEY ST	1	7	325	8
ON04-ORANGE ST & 4TH ST	1	33	294	35
ON05-ORANGE ST @ 5TH ST	3	23	273	25
ON08-ORANGE ST & 8TH ST	1	37	237	38
ON09-ORANGE ST & 9TH ST	8	35	209	43
2111-KING ST & 10TH ST	7	167	50	174
SubTotals				
Totals	509	505		1014

Bus Stop Activity Report

Route: 23 Service:Wkdy Direction:OUTBOUND

Ridership activity for current Line/Direction only. **Total Trips:16 Trips Checked:14 Total Checks:17**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
2111-KING ST & 10TH ST	97	0	100	97
KS08-KING ST & 8TH ST	9	2	106	11
KS06-KING ST & 6TH ST	6	0	112	6
KS05-KING ST & 5TH ST	1	2	111	3
KS03-KING ST & 3RD ST	6	1	116	7
MSML-MARKET ST & SHIPLEY ST/ ROSA PK DR	1	1	116	2
MS0A-MARKET ST & A ST	0	4	112	4
DSHO-DUPONT HWY & HOWARD ST	2	1	113	3
DPJC-DUPONT HWY @ JAMES COURT IND PK	0	1	112	1
DSMI-DUPONT HWY & OP MILLSIDE RD	1	0	112	1
B0NE-BASIN RD & OP NEWS JOURNAL	0	6	107	6
COBA-COMMONS BLVD & BASIN RD TIME PT	0	1	106	1
CORW-COMMONS BLVD & READS WAY	7	8	105	15
RW01-READS WAY & BLDG ONE	0	7	98	7
RENO-READS WAY & 31 READS WAY	0	4	95	4
REWI-READS WAY & WILMINGTON TRUST	0	4	91	4
C0EA-COMMONS BLVD & OP EASTER SEALS	3	3	91	6
ASSC-AIRPORT RD & OP SCHLEY RD	1	2	90	3
ASMO-AIRPORT RD & MOWERY RD	1	1	90	2
ASCH-AIRPORT RD & CHURCHMANS RD	0	7	83	7
ASCY-AIRPORT RD & CHERRY RD	0	1	82	1
ASCA-AIRPORT RD @ CAWDOR LN	0	2	80	2
ESCH-EDINBURGH DR @ CHIMING RD	1	9	72	9
ESFR-EDINBURGH DR & OP FREEPORT RD	0	0	72	0
ESFO-EDINBURGH DR & FORREST CIR	0	0	72	0
E0FR-EDINBURGH DR & FRENCHTOWN RD	0	0	72	0
FWED-CHRISTIANA RD & EDINBURGH DR	0	0	72	0
FWGE-CHRISTIANA RD @ GTOWN APTS EAST Q1	0	0	72	0
FWFR-CHRISTIANA RD & OP FREEDOM TRAIL	0	0	72	0
FWGW-CHRISTIANA RD @ GTOWN APTS WEST 112	0	0	72	0
FWAR-CHRISTIANA RD @ AIRPORT RD NS	0	0	72	0
ASFR-APPLEBY RD & FRENCHTOWN RD	0	0	72	0
A0WI-APPLEBY RD & WINBURNE DR	0	0	72	0
ASGR-APPLEBY RD & GRIFFITH DR	0	0	72	0
ASWI-APPLEBY RD & WILTON BLVD	0	0	72	0
OEAP-OLD FORGE RD & APPLEBY RD	0	0	72	0
OEJE-OLD FORGE RD & JENNINGS CT	0	0	72	0
O0MA-OLD FORGE RD & OP MARLBOROUGH C	0	0	72	0
OECH-OLD FORGE RD & OP CHELTON APT	0	0	72	0
WWOL-WILTON BLVD & OLD FORGE RD	0	0	72	0
WWST-WILTON BLVD & STONEBRIDGE BLVD	0	0	72	0
W1CA-WILTON BLVD & OP CANDLEWICK CT	0	0	72	0
WWAN-WILTON BLVD & ANDOVER CT	0	0	72	0
WWED-WILTON BLVD & EDINBURGH DR	0	0	72	0
WWDA-WILTON BLVD & DARIEN CT	0	0	72	0
WWRI-WILTON BLVD & RIDLEY CT	0	0	72	0
WWBE-WILTON BLVD & BERKLEY WAY	0	0	72	0
WWAY-WILTON BLVD & APPLEBY RD	0	0	72	0
ANSA-APPLEBY RD & SAYBROOK WAY	0	0	72	0
SubTotals	133	64		197
Totals				

Stop	On	Off	On Board	Total
A1WI-APPLEBY RD & OP WINBURNE DR	0	0	72	0
ANFR-APPLEBY RD & FRENCHTOWN RD	0	0	72	0
FWAP-CHRISTIANA RD & OP APPLEBY RD	0	0	72	0
FWWE-CHRISTIANA RD & OP WEDGEFIELD DR	0	0	72	0
D7PA-DEL RT 7 & DEL RT273 P-N-R	4	15	61	19
D7BA-DEL RT 7 & OLD BALTIMORE PK	0	5	57	5
W0OL-W MAIN ST & OLD BALTIMORE PK	3	4	55	7
W0CH-W MAIN ST & CHRIS SAL ELEM S	4	2	57	5
CTCE-CHRISTIANA TOWN CTR OP BOSCOVS	0	10	48	10
UNPN-UNIVERSTIY PLZ & BURLINGTON FAC	0	11	37	11
UNPS-UNIVERSITY PLZ & ACME MARKET	0	10	28	10
CWLA-CHAPMAN RD & OP LAWRENCE RD	0	8	20	8
WACH-WAKEFIELD DR & CHAPMAN RD	0	2	19	2
WADE-WAKEFIELD DR & DELMARVA	0	2	17	2
WAAV-WAKEFIELD DR & ADVANTA	0	5	12	5
CWRE-CHAPMAN RD & REGAL BLVD	0	0	12	0
CWSA-CHAPMAN RD & SANDLEWOOD APTS	0	1	11	1
CSC-COMPUTER SCIENCE CORP ON-SITE	0	1	10	1
SubTotals				
Totals	143	136		279

Bus Stop Activity Report

Route: 23 Service:Wkdy Direction:INBOUND

Ridership activity for current Line/Direction only. **Total Trips:17 Trips Checked:13 Total Checks:21**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
CSC-COMPUTER SCIENCE CORP ON-SITE	0	0	1	0
CHSA-CHAPMAN RD & SALEM CHURCH RD	0	0	1	0
CERE-CHAPMAN RD & OP REGAL BLVD	1	0	1	1
CERI-CHAPMAN RD & OP RESIDENCE INN	1	0	2	1
WAAV-WAKEFIELD DR & ADVANTA	5	0	7	5
CEWA-CHAPMAN RD & WAKEFIELD DR	3	0	9	3
CELA-CHAPMAN RD & LAWRENCE RD	0	1	8	1
UNSA-UNIVERSITY PLZ & ACME MARKET	8	1	15	9
UNSJ-UNIVERSITY PLZ & BURLINGTON FAC	10	0	25	10
CTCW-CHRISTIANA TOWN CTR OP BOSCOVS	11	0	36	11
WECH-W MAIN ST & OP CHRIS SALEM ES	7	1	41	8
WEOL-W MAIN ST & OLD BALTIMORE PK	2	0	43	2
D7OB-DEL RT 7 & OLD BALTIMORE PIKE	3	0	46	3
D7PA-DEL RT 7 & DEL RT273 P-N-R	12	1	57	13
FEWE-CHRISTIANA RD & WEDGEFIELD DR	0	0	58	0
ASFR-APPLEBY RD & FRENCHTOWN RD	0	0	58	0
A0WI-APPLEBY RD & WINBURNE DR	0	0	58	0
ASGR-APPLEBY RD & GRIFFITH DR	0	0	58	0
ASWI-APPLEBY RD & WILTON BLVD	0	0	58	0
OEAP-OLD FORGE RD & APPLEBY RD	0	0	58	0
OEJE-OLD FORGE RD & JENNINGS CT	0	0	58	0
O0MA-OLD FORGE RD & OP MARLBOROUGH C	0	0	58	0
OECH-OLD FORGE RD & OP CHELTON APT	0	0	58	0
WWOL-WILTON BLVD & OLD FORGE RD	0	0	58	0
WWST-WILTON BLVD & STONEBRIDGE BLVD	0	0	58	0
W1CA-WILTON BLVD & OP CANDLEWICK CT	0	0	58	0
WWAN-WILTON BLVD & ANDOVER CT	0	0	58	0
WWED-WILTON BLVD & EDINBURGH DR	0	0	58	0
WWDA-WILTON BLVD & DARIEN CT	0	0	58	0
WWRI-WILTON BLVD & RIDLEY CT	0	0	58	0
WWBE-WILTON BLVD & BERKLEY WAY	0	0	58	0
WWAY-WILTON BLVD & APPLEBY RD	0	0	58	0
ANSA-APPLEBY RD & SAYBROOK WAY	0	0	58	0
A1WI-APPLEBY RD & OP WINBURNE DR	0	0	58	0
ANFR-APPLEBY RD & FRENCHTOWN RD	0	0	58	0
FECO-CHRISTIANA RD & COMMUNITY PLAZA	0	1	57	1
FECP-CHRISTIANA RD & C PLAZA GAS STAT	0	0	57	0
FEFR-CHRISTIANA RD & FREEDOM TRAIL	1	0	58	1
FEGE-CHRISTIANA RD & OP GEORGETOWN APTS	0	0	58	0
ENFR-EDINBURGH DR & FRENCHTOWN RD	0	0	58	0
ENFO-EDINBURGH DR & FORREST CIR	0	0	58	0
E1FR-EDINBURGH DR & FREEPORT RD	0	0	58	0
ENCH-EDINBURGH DR OPP CHIMING RD	13	4	67	17
ANPR-AIRPORT RD & PRESTWICK DR	6	3	70	9
AICH-AIRPORT RD & CHURCHMANS RD	0	2	68	2
ANMO-AIRPORT RD & OP MOWERY RD	4	1	71	4
ANSC-AIRPORT RD & SCHLEY RD	2	0	73	2
A1EA-COMMONS BLVD & EASTER SEALS	1	1	74	2
COPE-COMMONS BLVD & OP READS W ENT	3	0	77	3
SubTotals	91	15		106
Totals				

Stop	On	Off	On Board	Total
RE92-READS WAY & BLDG 92	3	1	79	4
RE42-READS WAY & BLDG 42	1	0	79	1
RE01-READS WAY & OP ONE READS WAY	10	1	88	10
C1RW-COMMONS BLVD & OP READS E ENT	5	4	89	9
BNNE-BASIN RD & NEWS JOURNAL	6	0	95	7
MECH-MARYLAND AVE & OP CHESTNUT ST	2	7	90	8
ON02-ORANGE ST & 2ND ST	1	6	85	7
ON04-ORANGE ST & 4TH ST	2	5	82	7
ON05-ORANGE ST @ 5TH ST	2	4	79	6
ON08-ORANGE ST & 8TH ST	3	8	74	11
ON09-ORANGE ST & 9TH ST	2	17	59	18
2111-KING ST & 10TH ST	2	56	5	58
SubTotals				
Totals	128	123		251

Bus Stop Activity Report

Route: 54 Service:Wkdy Direction:OUTBOUND

Ridership activity for current Line/Direction only. **Total Trips:19 Trips Checked:19 Total Checks:96**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
2111-KING ST & 10TH ST	17	0	30	17
KS08-KING ST & 8TH ST	5	0	34	5
KS06-KING ST & 6TH ST	0	0	34	0
KS05-KING ST & 5TH ST	1	0	35	1
KS03-KING ST & 3RD ST	1	0	36	1
MSML-MARKET ST & SHIPLEY ST/ ROSA PK DR	0	0	36	0
MS0A-MARKET ST & A ST	0	0	35	0
DSHO-DUPONT HWY & HOWARD ST	0	0	35	0
DPJC-DUPONT HWY @ JAMES COURT IND PK	0	0	35	0
DSMI-DUPONT HWY & OP MILLSIDE RD	0	0	35	0
CHMN-CHRISTIANA MALL & P-N-R	19	14	40	33
CHRI-CHRISTIANA MALL & OP NORTH ENT	67	1	106	68
CRCS-CHRISTIANA RETAIL CTR @ PIER 1	1	1	106	2
ACWB-MALL ACCESS RD & OLD BALTIMORE PK	1	1	106	2
OBEB-OLD BALTIMORE PK & EDGEBROOK WAY	2	1	107	3
OBBR-OLD BALTIMORE PK & BROWNS LN	1	1	107	2
D7OB-DEL RT 7 & OLD BALTIMORE PIKE	4	2	109	6
D7PA-DEL RT 7 & DEL RT273 P-N-R	5	4	110	9
D7DE-DEL RT 7 & DELDOT NORTH	2	3	108	5
D7RI-DEL RT 7 & RIVERS END DR	0	2	107	2
RIPE-RIVERS END DR & PROVIDENCE DR E	1	1	107	2
RIBE-RIVERS END DR & BELLTOWN TERR	2	2	107	4
RISI-RIVERS END DR & OP SILVER RUN TR	1	3	105	5
RINE-RIVERS END DR & NEWTON DR	1	1	104	2
RIPW-RIVERS END DR & PROVIDENCE DR W	1	3	101	4
RITR-RIVERS END DR & TREELANE DR	0	2	100	2
RISM-RIVERS END DR & SMALLEY DAM RD	3	4	99	7
SMTA-SMALLEYS DAM RD & TAYLOR DR	1	6	95	7
SOSM-SONGSMITH DR & SMALLEYS DAM RD	2	11	86	12
SOHI-SONGSMITH DR & HIGHLAND WAY	1	5	82	6
SOIR-SONGSMITH DR & IRIS LANE	1	3	80	4
SOLI-SONGSMITH DR & LILAC LANE	2	3	79	4
SOHO-SONGSMITH DR & HONEYSUCKLE DR	0	2	78	2
SOGS-SONGSMITH DR & GOVERNORS SQ ENT	3	5	76	8
GSKM-GOVERNORS SQUARE @ KMART ENT	6	13	69	18
40GS-US RT40 & OP GOVERNORS SQ ENT	5	6	67	10
40BU-US RT40 & BUCKLEY BLVD	1	6	62	7
40FA-US RT 40 & FAIRWINDS TP	5	7	60	12
40FI-US RT 40 & OP FIR AVE	2	4	58	6
WWOL-WILTON BLVD & OLD FORGE RD	1	37	21	37
SubTotals				
Totals	162	154		315

Bus Stop Activity Report

Route: 54 Service:Wkdy Direction:INBOUND

Ridership activity for current Line/Direction only. **Total Trips:18 Trips Checked:18 Total Checks:91**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
WWOL-WILTON BLVD & OLD FORGE RD	31	1	47	31
WWST-WILTON BLVD & STONEBRIDGE BLVD	8	3	53	11
W1CA-WILTON BLVD & OP CANDLEWICK CT	5	1	57	6
WWAN-WILTON BLVD & ANDOVER CT	2	2	58	4
WWED-WILTON BLVD & EDINBURGH DR	3	2	59	5
WWDA-WILTON BLVD & DARIEN CT	1	1	60	2
WWRI-WILTON BLVD & RIDLEY CT	3	0	62	3
WWBE-WILTON BLVD & BERKLEY WAY	2	1	63	4
ASWI-APPLEBY RD & WILTON BLVD	4	2	66	6
40WF-US RT 40 & FIR AVE	3	1	68	4
40HO-US RT 40 & HOLLY AVE	4	1	71	6
40BK-US RT40 & OP BUCKLEY BLVD	5	3	74	8
GSFA-GOVERNORS SQ ON SITE	11	11	75	22
SOMC-SONGSMITH DR & MCMULLEN CIR	6	3	77	9
SOPE-SONGSMITH DR & PENMAN DR	5	0	82	5
SOBL-SONGSMITH DR & BLATTY PL	1	1	81	2
SESM-SONGSMITH DR & SMALLEYS DAM RD	17	5	93	22
SMVI-SMALLEYS DAM RD & VICTORIA BLVD	6	2	97	7
SMWO-SMALLEYS DAM RD & WOLF DR	3	1	98	4
RESM-RIVERS END DR & SAMLLEYS DAM RD	4	2	101	6
RETR-RIVERS END DR & TREELANE DR	4	0	104	4
REPW-RIVERS END DR & OP PROVIDNC DR W	3	1	105	4
RESI-RIVERS END DR & SILVER RUN TR	2	1	106	3
REBE-RIVERS END DR & OP BELLTOWN TERR	1	0	107	2
REPR-RIVERS END DR & OP PROVIDNC DR E	1	0	108	2
D7RV-DEL RT 7 & OP RIVERS END DR	2	0	109	2
D7CH-DEL RT 7 & CHRISTIANA MEADW	2	2	109	4
D7SB-DEL RT 7 @ SCHOOL BELL RD	0	2	107	3
D7PA-DEL RT 7 & DEL RT273 P-N-R	5	6	106	11
D7BA-DEL RT 7 & OLD BALTIMORE PK	2	2	106	4
OBPA-OLD BALTIMORE PK & PATTERSON DR	1	1	107	3
OLED-OLD BALTIMORE PK & OP EDGEBROKE WAY	0	2	105	2
ACEB-MALL ACCESS RD & OLD BALTIMORE PK	0	0	105	0
CRCN-CHRISTIANA RETAIL CTR OP PIER 1	0	4	101	4
CHMA-CHRISTIANA MALL & NORTH ENT	4	59	46	63
CHMN-CHRISTIANA MALL & P-N-R	1	25	21	26
MECH-MARYLAND AVE & OP CHESTNUT ST	0	1	21	1
ON02-ORANGE ST & 2ND ST	0	1	20	1
ON04-ORANGE ST & 4TH ST	0	2	18	3
ON05-ORANGE ST @ 5TH ST	0	0	18	0
ON08-ORANGE ST & 8TH ST	0	2	16	2
ON10-ORANGE ST & 10TH ST	0	1	15	1
2111-KING ST & 10TH ST	1	5	11	6
SubTotals				
Totals	155	162		317

Bus Stop Activity Report

Route: 25 Service:Wkdy Direction:OUTBOUND

Ridership activity for current Line/Direction only. **Total Trips:25 Trips Checked:23 Total Checks:54**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
2111-KING ST & 10TH ST	263	11	278	274
KS08-KING ST & 8TH ST	27	2	303	29
KS06-KING ST & 6TH ST	9	1	311	10
KS05-KING ST & 5TH ST	14	0	325	14
KS03-KING ST & 3RD ST	30	2	353	32
MSML-MARKET ST & SHIPLEY ST/ ROSA PK DR	13	0	366	14
MS0A-MARKET ST & A ST	4	4	366	9
DSHO-DUPONT HWY & HOWARD ST	5	1	370	6
DPJC-DUPONT HWY @ JAMES COURT IND PK	1	4	367	5
DSMI-DUPONT HWY & OP MILLSIDE RD	1	10	359	11
DSHE-DUPONT HWY & HESSLER INDUS PK	1	14	346	15
DSME-DUPONT HWY & OP MEMORIAL DR	7	17	336	25
DSCO-DUPONT HWY & COUNTY POLICE BL	1	3	334	4
DSAL-DUPONT HWY & CHAPMAN-NISSAN	0	6	329	6
DSGR-DUPONT HWY & OP GRACELAWN MEM PK	2	4	326	6
DSLO-DUPONT HWY & LOVELACE AVE	1	5	322	6
DSCE-DUPONT HWY & CENTRAL AVE	2	8	316	10
D0HE-DUPONT HWY & HEALTH SOC SVC	1	10	308	11
DSCA-DUPONT HWY & CARVEL AVE	2	16	293	18
D0BC-DUPONT HWY & BACON AVE	10	18	286	28
DSJE-DUPONT HWY & JEFFERSON AVE	4	6	284	10
D0RO-DUPONT HWY & ROOSEVELT AVE	1	2	283	4
D0HA-DUPONT HWY & HARRISON AVE	2	7	277	9
DSGA-DUPONT HWY & GARFIELD AVE	1	7	271	8
DSBA-DUPONT HWY & BASIN RD	2	18	255	20
DSNC-DUPONT HWY & NCC AIRPORT	1	11	245	12
DAIR-DUPONT HWY & NCC AIRPORT-SITE	0	5	240	5
DSDU-DUPONT HWY & DUTCH PANTRY	4	7	237	11
DSOC-DUPONT HWY & OLD CHURCHMANS RD	1	3	235	5
FEFA-FRENCHTOWN RD & OP FARMERS MARKET	0	21	214	21
SSAR-SUNSET BLVD & ARBYS REST	6	21	200	27
SSBJ-SUNSET BLVD & BJS	0	4	196	4
AMAZ-FRENCHTOWN RD & AMAZON.COM ON SITE	0	24	172	24
FWFA-FRENCHTOWN RD @ FARMERS MKT ENT	0	0	172	0
D0FR-DUPONT HWY & FRENCHTOWN RD	1	1	172	2
DSDE-DUPONT HWY & DELVAL HYDRAULIC	0	1	171	2
DSKN-DUPONT HWY & KNIGHT INN MOTEL	1	1	171	2
DS05-DUPONT HWY & 5TH AVE	0	1	170	1
DS03-DUPONT HWY & 3RD ST	0	1	170	1
DSWI-DUPONT HWY & WILSON DR	0	1	169	1
DS40-DUPONT HWY & US RT 40	0	5	165	5
DSLL-DUPONT HWY & OP LLANGOLLEN	0	1	164	1
MSWR-MENDELL PL & WERDEN DR	0	4	160	4
MSSA-MENDELL PL & SAIENNI BLVD	0	8	152	8
SWMA-SAIENNI BLVD & OP MAPLE CT APTS	0	8	144	8
SWDU-SAIENNI BLVD & DUPONT HWY	4	32	116	35
DSMP-DUPONT HWY @ MALLARD POINTE	1	8	109	9
DSBV-DUPONT HWY @ BUENA VISTA DR	4	24	89	27
DSVI-DUPONT HWY & VINWAY RD	0	12	77	12
SubTotals	430	379		809
Totals				

Stop	On	Off	On Board	Total
TYBT-TYBOUTS CORNER & P-N-R	0	37	40	37
S9GL-SR9 @ GOVERNOR LEA RD	0	4	36	4
WHS9-WRANGLE HILL RD @ VALERO	0	1	35	1
WHPR-WRANGLE HILL & P-N-R	0	5	30	5
SubTotals				
Totals	430	426		856

Bus Stop Activity Report

Route: 25 Service:Wkdy Direction:INBOUND

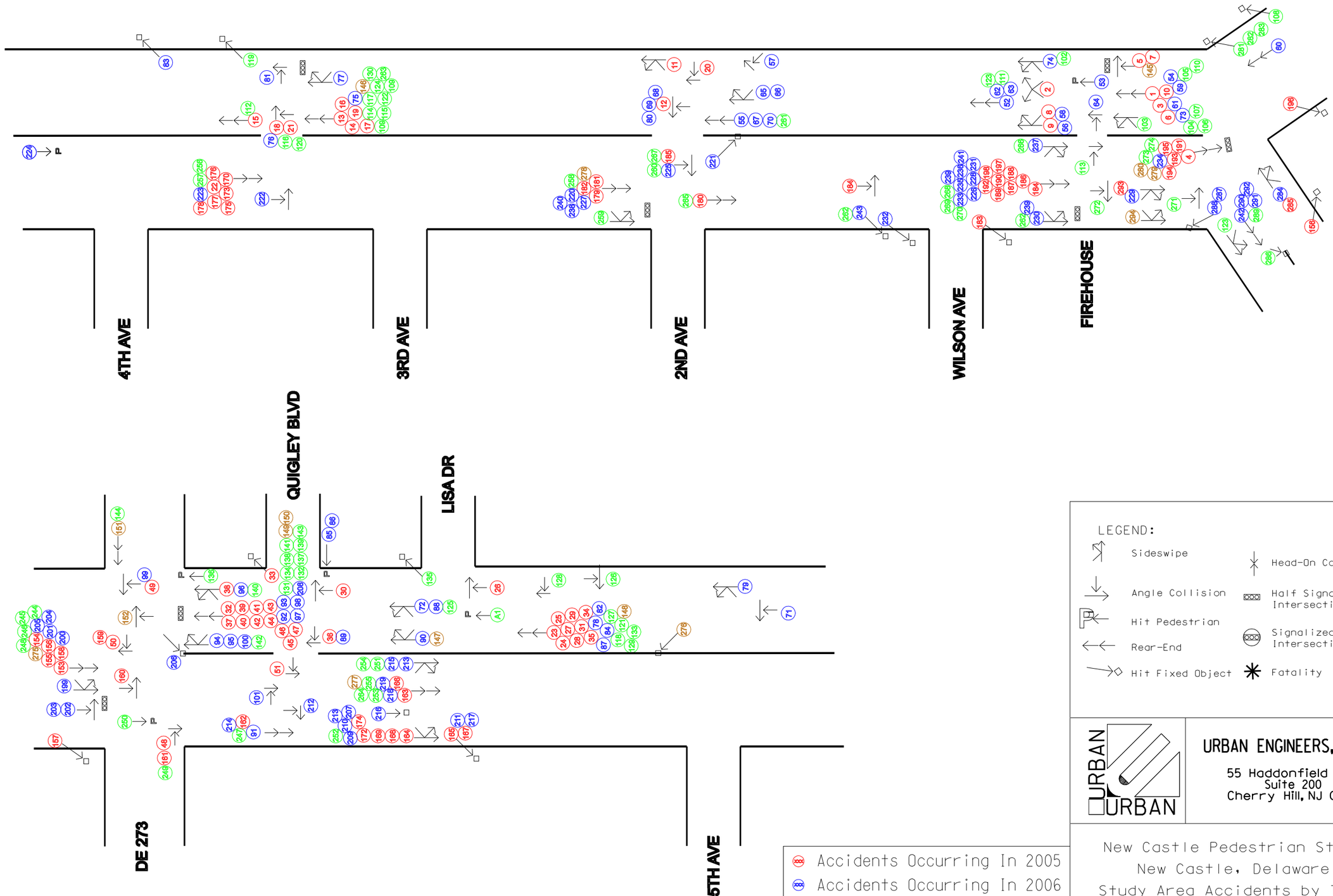
Ridership activity for current Line/Direction only. **Total Trips:25 Trips Checked:18 Total Checks:34**

All stops for current Line/Direction listed. **Count Mode: Average by number of check**

Stop	On	Off	On Board	Total
WHPR-WRANGLE HILL & P-N-R	1	0	23	1
S72V-SR 72 OP. VALERO	2	0	25	2
SR9G-SR9 OP GOVERNOR LEA RD	1	0	26	1
TYBT-TYBOUTS CORNER & P-N-R	18	9	35	27
DNVI-DUPONT HWY & OP VINWAY RD	13	0	48	13
DNBV-DUPONT HWY & HEDDINGTON DR	48	0	95	48
SEDU-SAIENNI BLVD & DUPONT HWY	20	4	111	24
SEPA-SAIENNI BLVD & MAPLE COURT	2	0	113	2
MNSA-MENDELL PL & SAIENNI BLVD	3	0	116	3
DHPV-DUPONT HWY @ PINE VALLEY APTS	1	0	117	1
DNLB-DUPONT HWY @ LANGOLLEN BLVD	7	0	124	7
DN84-DUPONT HWY & 84 LUMBER	1	0	125	1
DNNU-DUPONT HWY & NUR TEMPLE	1	0	125	1
DN03-DUPONT HWY & OP 3RD AVE	1	0	126	1
DN05-DUPONT HWY & OP 5TH ST	0	0	126	0
DNGE-DUPONT HWY & PIER 13 RESTAURANT	1	0	127	1
DNQU-DUPONT HWY & QUIQLEY BLVD	5	0	132	5
QUAR-QUIGLEY BLVD & ACURA	1	0	133	1
QUAT-QUIGLEY BLVD & ATT	0	0	134	0
QUAC-QUIGLEY BLVD & ACTION CLEANING	0	0	134	0
QUPO-QUIGLEY BLVD & POST OFFICE	1	0	134	1
QUBL-QUIGLEY BLVD & BLEVINS DR	0	0	134	0
FEFA-FRENCHTOWN RD & OP FARMERS MARKET	0	0	135	0
AMAZ-FRENCHTOWN RD & AMAZON.COM ON SITE	11	6	139	17
FWFA-FRENCHTOWN RD @ FARMERS MKT ENT	0	0	139	0
SNBJ-SUNSET BLVD & BJS	2	0	141	2
SNAR-SUNSET BLVD & ARBYS REST	12	3	150	14
DNFR-DUPONT HWY & FRENCHTOWN RD	0	0	150	0
DNFA-DUPONT HWY & FARMERS MARKET	0	0	150	0
DNSC-DUPONT HWY & SCHOOLHOUSE LN	1	1	150	2
D1GE-DUPONT HWY & OP GRTR WILM AIR	3	2	150	5
D1PE-DUPONT HWY & PENN MART SHOP C	0	4	147	4
DNBA-DUPONT HWY & BASIN RD	8	6	148	14
DNLI-DUPONT HWY & OP LINCOLN AVE	2	3	147	5
DNJA-DUPONT HWY & JACKSON AVE	5	2	150	7
DNHA-DUPONT HWY & HARRISON AVE	8	1	157	9
DNRO-DUPONT HWY & ROOSEVELT AVE	5	1	161	6
DNST-DUPONT HWY & STAHL AVE	4	2	163	6
DNBO-DUPONT HWY & BOULDEN BLVD	24	6	181	29
DN95-DUPONT HWY & I-295	0	0	181	0
DNRA-DUPONT HWY & RAMADA INN ENT	3	0	183	3
DNGR-DUPONT HWY & GRACELAWN MEM PK	1	2	183	3
DNAL-DUPONT HWY & OP CHAPMAN-NISSAN	2	1	184	3
D1WI-DUPONT HWY & WILDEL AVE	0	0	184	0
DNME-DUPONT HWY & MEMORIAL DR	22	2	203	23
DNCH-DUPONT HWY & CHRISTIANA PLAZA	6	0	209	6
DNMI-DUPONT HWY & MILLSIDE RD	6	1	214	7
DNHO-WALNUT ST & HOWARD ST	2	7	208	9
2WFR-2ND ST & FRENCH ST	1	20	190	21
SubTotals	252	84		336
Totals				

Stop	On	Off	On Board	Total
2WKI-2ND ST & KING ST	0	15	175	15
2WSH-2ND ST & SHIPLEY ST	1	6	169	7
ON04-ORANGE ST & 4TH ST	2	15	157	17
ON05-ORANGE ST @ 5TH ST	2	7	152	9
ON08-ORANGE ST & 8TH ST	9	22	139	31
ON09-ORANGE ST & 9TH ST	8	17	130	25
2111-KING ST & 10TH ST	1	124	8	125
SubTotals				
Totals	275	289		564

Appendix B: Crash Data



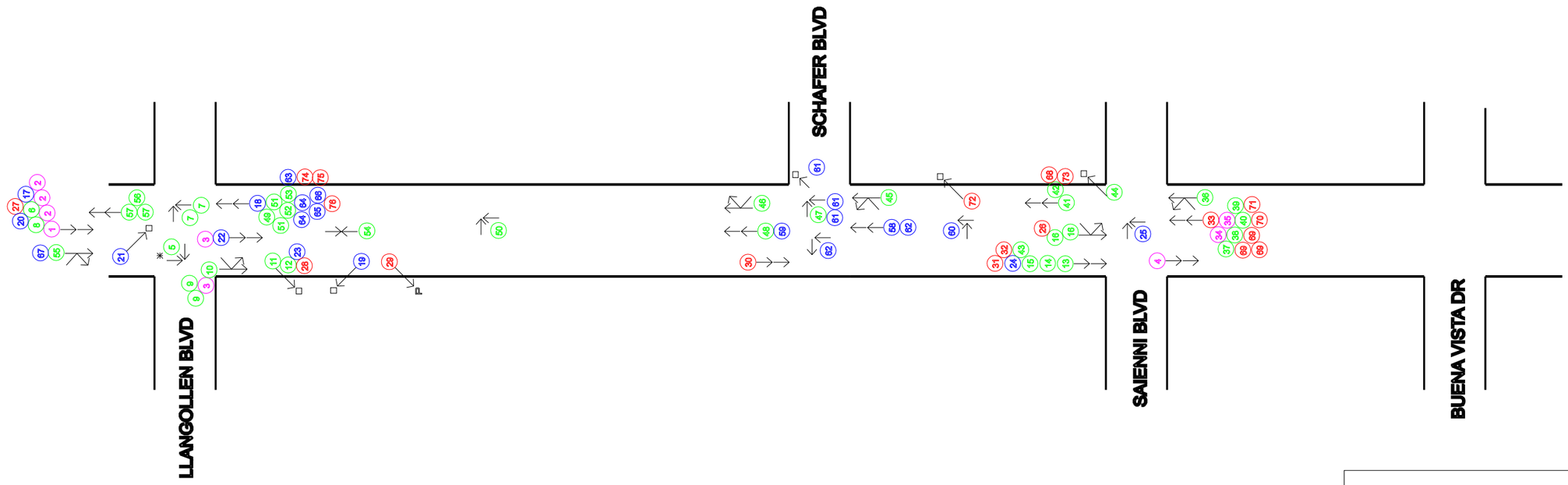
LEGEND:

- Sideswipe
- Angle Collision
- Hit Pedestrian
- Rear-End
- Hit Fixed Object
- Head-On Collision
- Half Signalized Intersection
- Signalized Intersection
- Fatality

Accidents Occurring In 2005
Accidents Occurring In 2006
Accidents Occurring In 2007
Accidents Occurring In 2008

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Study Area Accidents by Type
March 2005- March 2008
APPENDIX B - 01



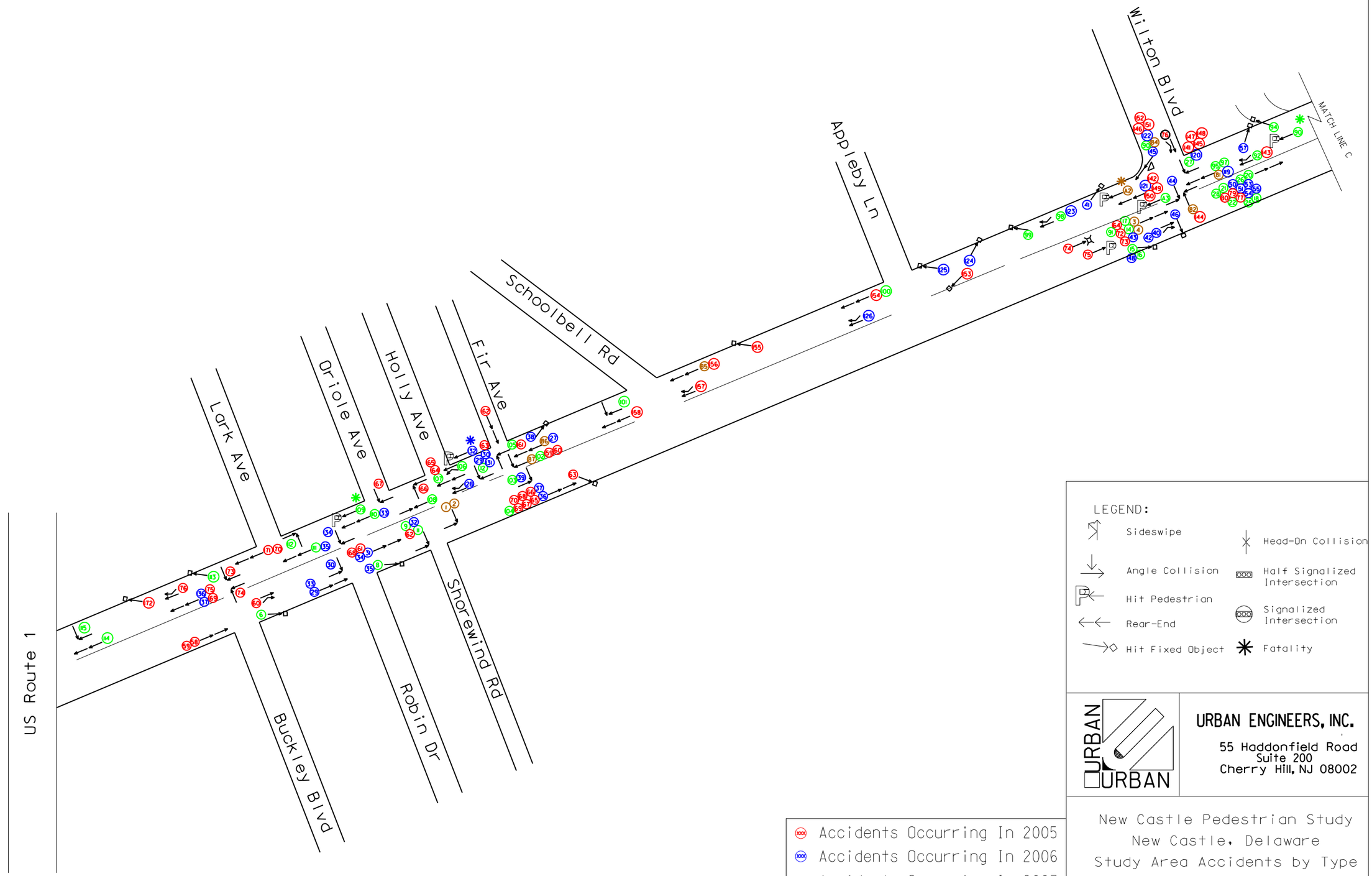
LEGEND:

- Sideswipe
- Head-On Collision
- Angle Collision
- Half Signalized Intersection
- Hit Pedestrian
- Signalized Intersection
- Rear-End
- Hit Fixed Object
- Fatality

Accidents Occurring In 2005
Accidents Occurring In 2006
Accidents Occurring In 2007
Accidents Occurring In 2008

URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Study Area Accidents by Type
March 2005- March 2008
APPENDIX B - 02



URBAN ENGINEERS, INC.
55 Haddonfield Road
Suite 200
Cherry Hill, NJ 08002

New Castle Pedestrian Study
New Castle, Delaware
Study Area Accidents by Type
March 2005- March 2008
APPENDIX B - 03

Appendix C: Previous Studies

Behavioral Analysis as Part of Pedestrian Accident Monitoring

Stephen Bayer

Abstract: DelDOT planners have developed a comprehensive pedestrian accident analysis process examining incident trends at statewide and local levels. This process integrates standard data from multiple agency sources; the process provided the Department unprecedented levels of detail regarding spatial and temporal incident trends generating both interesting findings and potential to improve project prioritization. This process was unique in that it allowed staff to identify and quantify both the physical and behavioral factors associated with pedestrian accidents.

Initial steps involved importing data sources into a GIS-template. Data included State and local police accident information, a shapefile of Census data, and a road inventory database containing detailed information on features, amenities, and conditions within the State-maintained right-of-way in Delaware (comprising 90%+ of all roads).

The second step was conducting a series of cross tabulations comparing the type, location, and frequency of the geocoded accident locations against various Census information to determine which, if any, statically-valid indicators appeared when compared with state averages.

Further analysis was conducted to characterize the nature, contributing factors, and circumstances of selected pedestrian accidents based upon detailed information from police reports coded in a matrix format. In certain cases pedestrian accident rates were 400% above statewide rates. In other cases distinct themes emerged such as: crossing movements at intersections or mid-block locations, children darting into roads, and alcohol-impaired pedestrians.

Conclusions indicate high frequency locations that may justify improved pedestrian facilities. Causal/locations analysis also showed that non-construction remedies (school safety education, police patrols, ect.) could be effective in some areas.

INTRODUCTION:

During 2006 the state of Delaware experienced an unusually high number of pedestrian fatalities. In an effort to better understand the situation DelDOT's Planning department initiated an analysis to identify the location of pedestrian accidents throughout the state. As the study

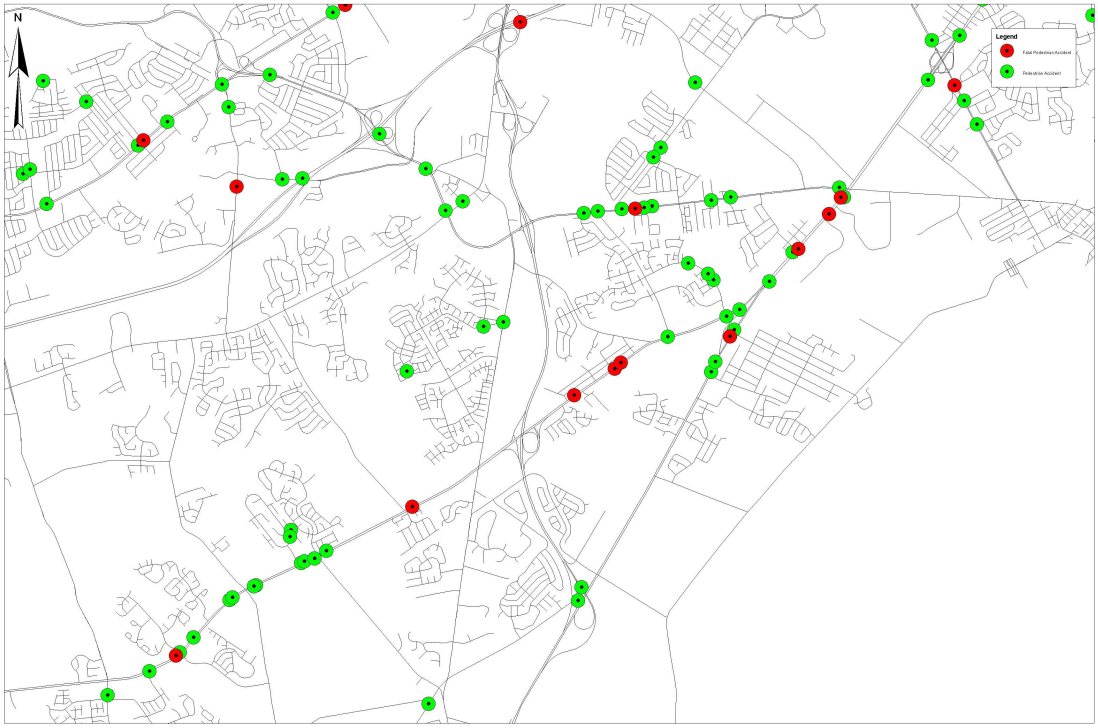
progressed more information was sought regarding the human behaviors and physical characteristics associated with pedestrian accidents in certain locations.

PROCESS:

Research began with the Departments accident inventory system. This system catalogues accident reporting information provided by state and local police departments. Pedestrian accidents were selected from the overall inventory and mapped into an ArcGIS. An additional separation was made within the pedestrian accident field to differentiate between fatal and non-fatal accidents. The resulting GIS maps identified several corridors within the northernmost county (New Castle) with unusually highly concentrated clusters of pedestrian accidents (Fig 1, Fig 2)

Figure 1-Wilmington Pedestrian Accidents

Figure 2-New Castle Pedestrian Accidents



Once high frequency locations (HFL) were identified DelDOT planners attempted to identify and quantify the human behaviors associated with accidents in these locations. Additionally, an attempt to determine the physical nature of these locations (i.e. the presence or absence of sidewalks and crosswalks) was initiated.

Determining behaviors:

In order to determine the human behaviors associated with accidents within HFL police reports associated with such accidents were gathered from Department records. All State and the vast majority of municipal police reports included a narrative section where the reporting officer describes the location, circumstances, and events leading up to and following an accident. These descriptions included a text account of events from those involved, a record of the reporting officers findings, and in some instances diagrams of varying levels of detail.

In order to characterize and categorize accidents with consistency a coding matrix was developed (Fig. 3).

Figure 3-Pedestrian Accident Coding Matrix

	Crossing	Work Zone	Child Darting	Exiting Vehicle	Bus Stop	Out of Roadway	Walking in Shoulder	Extenuating
Involve Alcohol								
-Pedestrian								
-Driver								
Involve Drugs								
-Pedestrian								
-Driver								

This matrix allowed analysts to categorize accidents by type (i.e. crossing movements, children darting into the roadway, chemically impaired persons, ect.) and tabulate their frequency. In order to thematically display the types of accident causes occurring in HFL charts depicting accident causes were added to the GIS display of the subject areas (Figure 4, 5).

Figure 4- Wilmington Pedestrian Accidents w/Accident Cause Graphs

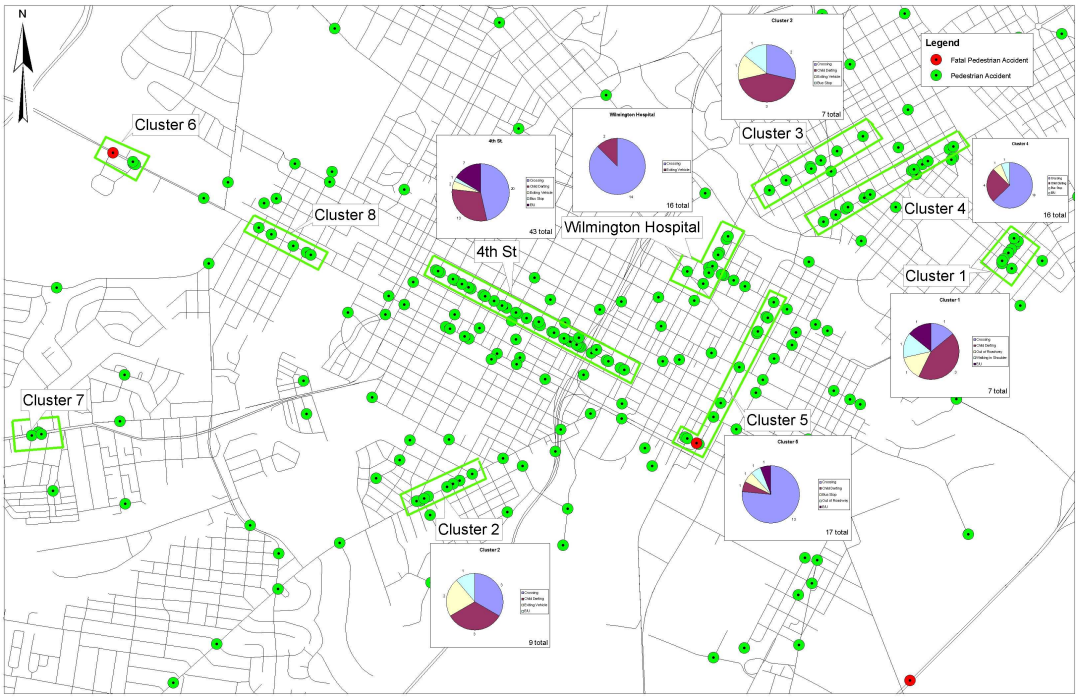
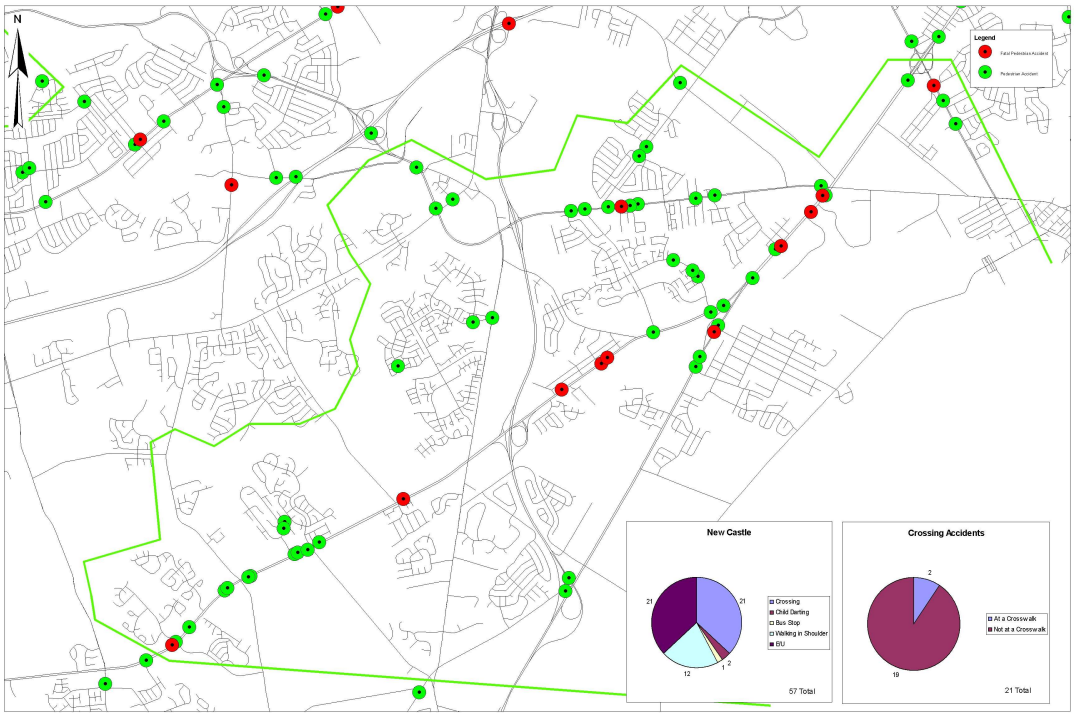


Figure 5- New Castle Pedestrian Accidents w/Accident Cause Graphs



Identifying physical characteristics:

Once tabulation of behaviors was completed additional information on the physical characteristics of HFL was sought. This information was gathered from an existing Departmental roadway information database (INFORM) as well as field visits to HFL.

The INFORM data detailed to analysts which locations did and did not have facilities such as crosswalk or sidewalks. This information was juxtaposed to the previously created maps identifying accident locations. Additionally, field visits to HFL allowed the analysts to measure and photograph subject areas. During these visits the analysts were able to locate transit stops and adjacent land uses.

Once facilities information was known an additional component was added to the pedestrian accident matrix (Fig. 6). Accidents involving crossing movements were then re-examined to determine if they occurred at intersections and, if so, whether crosswalks were present or not.

Figure 6-Pedestrian Accident Coding Matrix

	Crossing	Work Zone	Child Darting	Exiting Vehicle	Bus Stop	Out of Roadway	Walking in Shoulde	Extenuating
At an Intersection								
-At a Crosswalk								
-Not at a Crosswalk								
Midblock								
-At a Crosswalk								
-Not at a Crosswalk								
Involve Alcohol								
-Pedestrian								
-Driver								
Involve Drugs								
-Pedestrian								
-Driver								

Demographic information:

With a clear picture of the location, physical characteristics and behavioral trends associated with HFL accidents analysts then sought to retrieve demographic information on the areas surrounding HFL. General data was gathered from the U.S. Census website. Additionally, data compiled by the Wilmington Area Planning Council (WILMAPCO) was gathered. The WILMAPCO data proved to be especially useful as it identified low-income and minority populations (Environmental Justice populations) at the Census Block level. When demographic information was overlaid within the HFL map it was revealed that many HFL were within Environmental Justice communities (Figure 7, 8).

Figure 7-Wilmington Pedestrian Accidents w/Accident Cause Graphs and EJ Populations

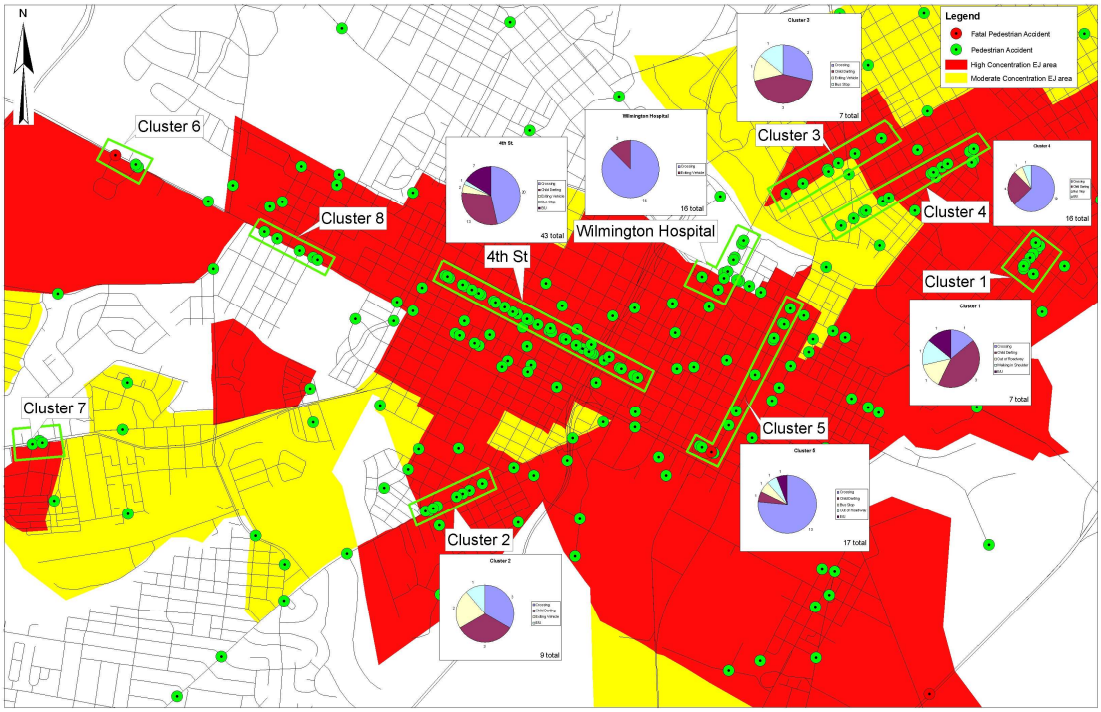
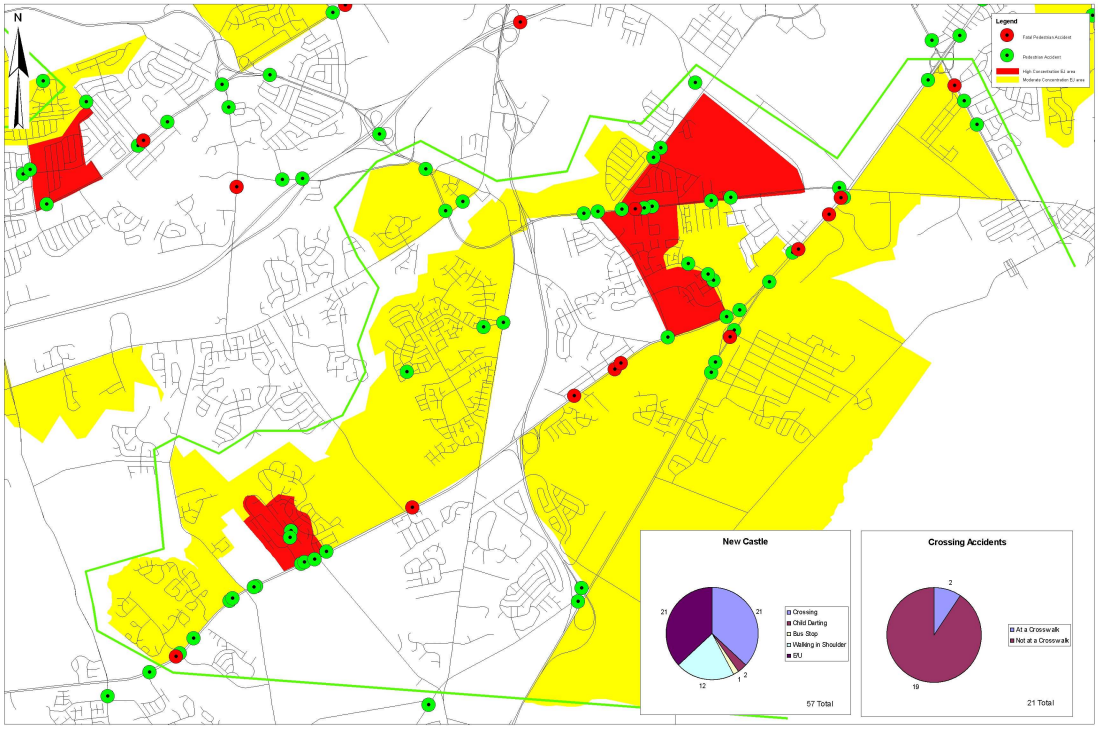


Figure 8- New Castle Pedestrian Accidents w/Accident Cause Graphs and EJ Populations



CONCLUSIONS:

Based on the information gathered and analysis conducted DelDOT administrators, engineers, and planners are now better able to understand the location, mechanics, and circumstances associated with pedestrian accidents throughout the state. Particularly valuable will be the behavioral circumstances characterization. Understanding the reason(s) pedestrian accidents are happening within a given area will allow specific and targeted remedies commensurate to the cause to be employed.

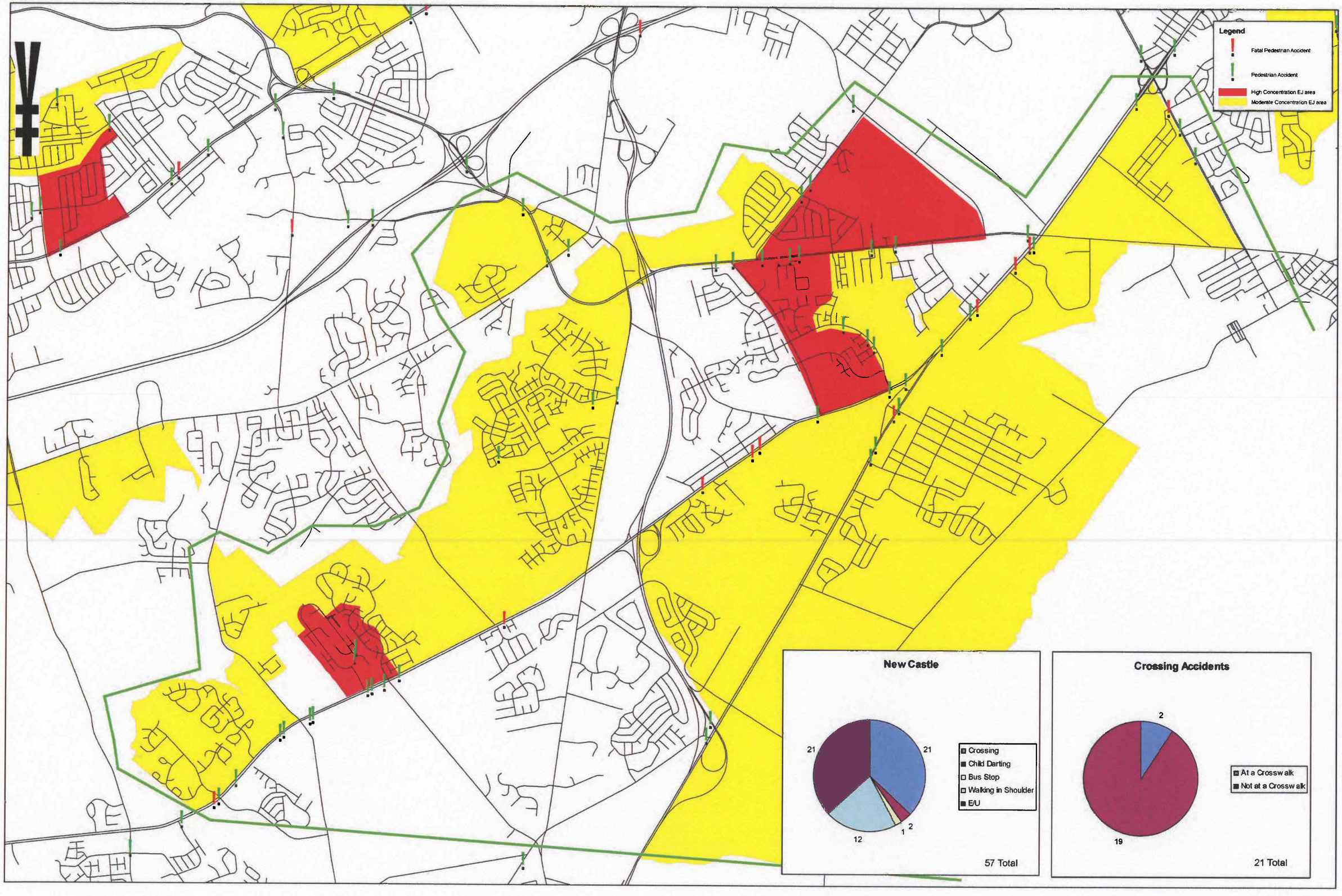
ACKNOWLEDGEMENTS:

The author of this paper wishes to thank the following individuals for their assistance, expertise, and contributions to the development of this paper:

Mr. Anthony Aglio, Bicycle and Pedestrian Coordinator, DelDOT
Mr. Mike DuRoss, Transportation Planner, DelDOT
Mr. Mike DelTufo, GIS Administrator, DelDOT
Ms. Donna L. Robinson, Accident Data Coordinator, DelDOT
Mr. William Swiatek, Transportation Planner, WILMAPCO

AUTHORS INFORMATION:

Stephen Bayer
Project Planner
Delaware Department of Transportation
P.O. Box 778 800 S. Bay Rd.
Dover, DE 19903
p(302) 760-2118
f(302) 739-2511
Stephen.Bayer@state.de.us


Legend
Fatal Pedestrian Accident
Pedestrian Accident
High Concentration EJ area
Moderate Concentration EJ area
New Castle
21
21
12
1
2
Crossing
Child Darting
Bus Stop
Walking in Shoulder
E/U
57 Total
Crossing Accidents
2
19
At a Crosswalk
Not at a Crosswalk
21 Total

ROUTE 40 CORRIDOR IMPROVEMENTS

WILTON/LLANGOLLEN PEDESTRIAN ACCESS STUDY UPDATE

ROUTE 40 CORRIDOR IMPROVEMENTS

Background

- A 13-year old pedestrian was struck by a motor vehicle and killed on August 1, 2007 while crossing US 40 from Llangollen to the Wilton Boulevard area.
- Crash data indicates three additional pedestrian crashes have occurred in this area since 2002.

ROUTE 40 CORRIDOR IMPROVEMENTS

Existing Conditions

- There is an existing signalized pedestrian crossing at US 40 and Wilton Boulevard and US 13 and Llangollen Boulevard.
- There are no pedestrian facilities along US 40 or US 13 between Llangollen Boulevard and Wilton Boulevard.

ROUTE 40 CORRIDOR IMPROVEMENTS

Existing Conditions

- Field observations indicate that a significant number of pedestrians originate from the residential development in the area around Llangollen Boulevard.
- Field observations also demonstrate that most pedestrians cross US 40 and the railroad illegally in the area of the Wilton Boulevard intersection.

Existing Conditions

ROUTE 40 CORRIDOR IMPROVEMENTS

Existing Conditions

ROUTE 40 CORRIDOR IMPROVEMENTS

Existing Conditions

ROUTE 40 CORRIDOR IMPROVEMENTS

Existing Conditions

ROUTE 40 CORRIDOR IMPROVEMENTS

Existing Conditions

ROUTE 40 CORRIDOR IMPROVEMENTS

ROUTE 40 CORRIDOR IMPROVEMENTS

Goal

- Develop and evaluate options to provide safer pedestrian access between Wilton Boulevard and Llangollen Boulevard.

ROUTE 40 CORRIDOR IMPROVEMENTS

Proposed Options

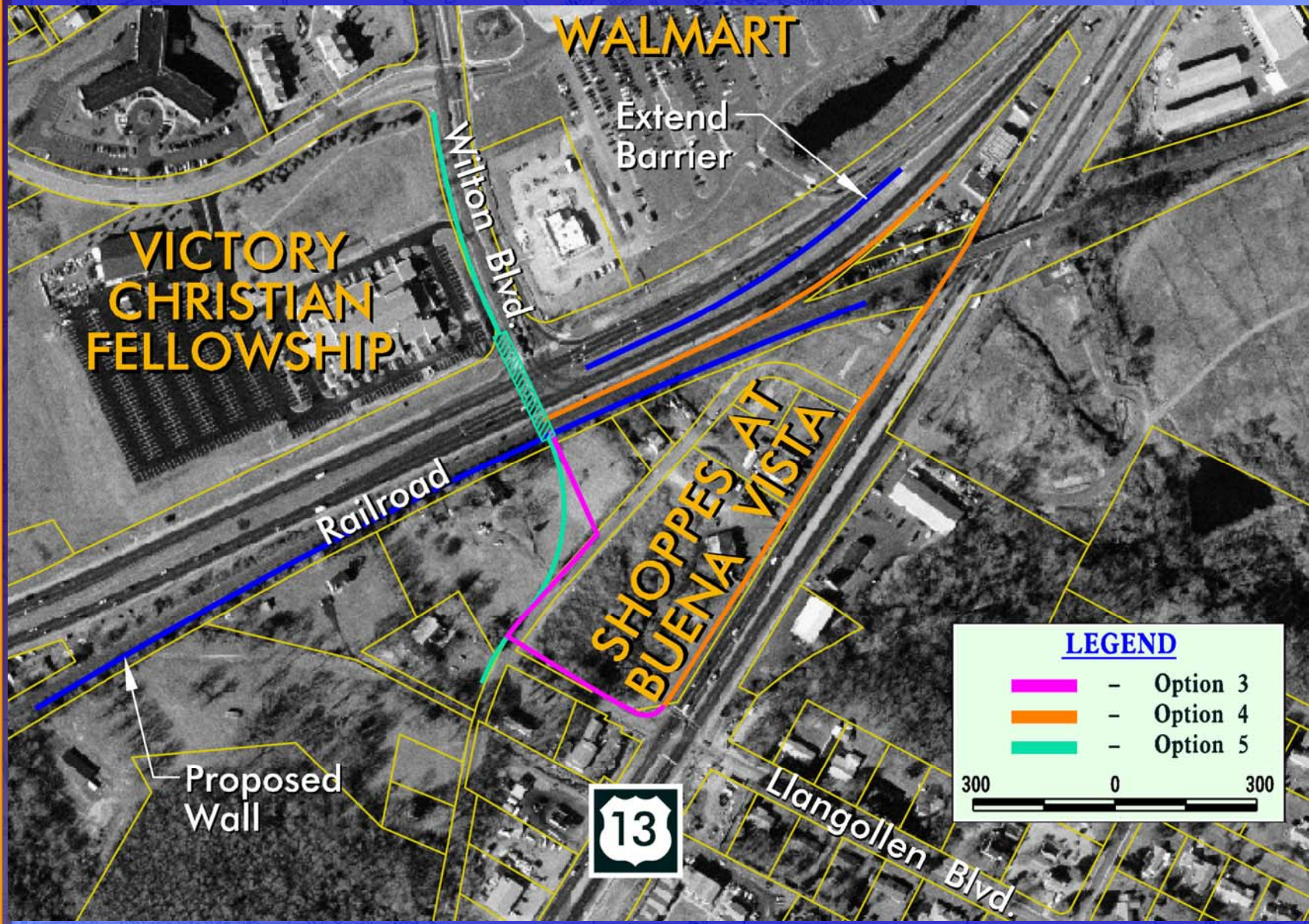
- Option 1 - Do nothing
  - No cost
  - No safety benefit
- Option 2 - Improve lighting and signing
  - Cost = $250,000 - $300,000
  - 4 reported crashes since 2002 occurred in dark, unlit conditions
- Option 3 - At-grade railroad crossing
  - Cost = $3.0 - $3.5 million
  - Regulatory Issues
    - Not supported by Uniform Delaware Code or FHWA
    - ADA compliance
    - Operation and maintenance
  - Requires median and railroad barrier
  - R/W impacts
  - More convenient

ROUTE 40 CORRIDOR IMPROVEMENTS

Proposed Options

- Option 4 - At-grade improvements – redirecting pedestrians
  - Cost = $2.5 - $3.0 million
  - Requires median and railroad barrier
  - Need for additional signalized crossing of US 40
  - ADA compliance
  - Less convenient (approximately 1,300 feet longer)
- Option 5 - Pedestrian Overpass/Underpass
  - Cost = $7.0 – $9.0 million
  - Constructability/Maintenance
  - R/W, utility and visual impacts
  - Drainage
  - Inconvenient with security concerns

ROUTE 40 CORRIDOR IMPROVEMENTS



ROUTE 40 CORRIDOR IMPROVEMENTS

PATH FORWARD

- Develop more detailed cost estimates for all proposed options
- Compute benefit/cost ratios
- Evaluate feasibility of proposed options