District wide Safety Studies and Minor Design
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Task Work Order #28

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Introduction

According to the FDOT Crash Analysis Reporting System (CAR), District 7 has sustained over 2,449 pedestrian crashes from 2000 to 2005 along the District 7 State Highway Network which covers Hillsborough, Pinellas, Pasco, Hernando, and Citrus Counties. As shown in Table 1-1, Pinellas County ranks second in percentage of pedestrian crashes in District 7 and is ranked second in the total number of pedestrian crashes. Although Pasco County’s U.S. 19 has the highest number of pedestrian crashes and fatalities from 2000 – 2005 (219 crashes and 71 fatalities), in Pinellas County U.S. 19 has sustained 193 pedestrian crashes and 26 fatalities in the same period.

Table 1-1: Percentage of Pedestrian Crashes

<table>
<thead>
<tr>
<th>County</th>
<th>Total Crashes</th>
<th>Total Pedestrian Crashes</th>
<th>Total Crashes / Pedestrian Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pasco</td>
<td>14,979</td>
<td>339</td>
<td>2.26%</td>
</tr>
<tr>
<td>Pinellas</td>
<td>44,563</td>
<td>991</td>
<td>2.22%</td>
</tr>
<tr>
<td>Hernando</td>
<td>3,364</td>
<td>47</td>
<td>1.40%</td>
</tr>
<tr>
<td>Citrus</td>
<td>3,511</td>
<td>46</td>
<td>1.31%</td>
</tr>
<tr>
<td>Hillsborough</td>
<td>80,781</td>
<td>1,030</td>
<td>1.28%</td>
</tr>
</tbody>
</table>

To better understand pedestrian crash history on the U.S. 19 corridor in Pinellas County and recommend applicable countermeasure programs, this study:

- Analyzed Pedestrian Crash Trends Along the U.S. 19 corridor
- Identified High Crash Locations for Detailed Study and Evaluated Existing Infrastructure and documented Local Agency Concerns
- Drafted Pedestrian Safety Counter measures and Performed a Detailed Review
- Developed Preliminary Recommendations
- Provided Material for U.S. 19 Task Force Meetings

Study Area

The study area is located along U.S. 19 (SR 55) in Pinellas County from River Watch Boulevard in north Pinellas County to 54th Avenue South spanning 32 miles. Several communities including Tarpon Springs, Clearwater, Largo, Pinellas Park, and St. Petersburg, as illustrated in Map 1-1, are located in the U.S. 19 study area.
Chapter 1: Corridor Characteristics and Crash History

The U.S. 19 corridor in Pinellas County has more total pedestrian crashes than any other roadway within the county. Preliminary review of crashes in this corridor utilized a two step approach:

- The first step examined the pedestrian crash problem through a review of historical crash data throughout the corridor.
- The second step was the identification of high-crash locations and the assessment of pedestrian actions that may have enabled pedestrian-motor vehicle crashes.

This chapter reviews and maps different U.S. 19 roadway and pedestrian crash related characteristics at a corridor level. This analysis is organized in the following sections by roadway details, pedestrian crash history information, and demographic and socioeconomic information.

The datasets and tools used for the study include:

- FDOT U.S. 19 Pedestrian Crashes 2000 to 2005
- FDOT District 7 Pedestrian Crashes 2000 to 2005
- 2000 Census Data
- District 7 Crash Data Management System

FDOT crash data includes only crashes occurring along the State Highway System and typically is limited to long form crash data which include the most severe crashes. As such, the crash data for this study does not include most minor ‘fender-bender’ crashes and consequently the reported injury and fatality rates are higher than if all crashes within the jurisdiction were considered. That said, pedestrian crashes typically have a much higher accident severity than do non-pedestrian crashes. Likewise, non-injury pedestrian crashes tend to be underreported. Crashes that occur on frontage roads along U.S. 19 are also included in the data set.
U.S. 19 Roadway Characteristics and Traffic Operations

This section reviews existing roadway characteristics and select traffic operations data along the corridor. The following map series illustrates the existing traffic operations condition:

- Annual Average Daily Traffic (AADT) (Map 1-2)
- Posted Speed Limit (Map 1-3)
- Signalized and Grade Separated Intersection Locations (Map 1-4)
- Number of Lanes and Median Type (Map 1-5)
- Automobile Level of Service (Map 1-6)
Map 1-3: Posted Speed Limit

- Area A: South Pinellas
- Area B: North Pinellas

Posted Speed Limit:
- 35
- 40
- 45
- 50
- 55

Map showing posted speed limits in different areas of Pinellas County, including Pasco and Hillsborough counties.
Map 1-4: Signalized and Grade Separated Intersections
Map 1-5: Number of Lanes and Median Type

Number of Directional Lanes
- 2
- 3
- 4

Median Type
- Median Curb < 6" (Blue)
- Barrier Wall > 1.5' (Green)
- Curb less than 0' & Lawn (Orange)
- Curb greater than 0' & Lawn (Purple)

Area A: South Pinellas
Area B: North Pinellas

Pasco County
Pinellas County
Hillsborough County
Pedestrian Crash History

As part of this study, the Consultant entered six years of pedestrian crash records (Years 2000 to 2005) into the Pedestrian and Bicycle Crash Analysis Tool (PBCAT) to identify pedestrian crash types and contributing factors. Table 1-2 displays the different pedestrian crash types. However, since there has been a considerable number of roadway improvements along the roadway in the last six years, only the projects most recent three years (Years 2003 to 2005) of data was used to organize pedestrian crash trends. A summary of the analysis is given below:

- Of the analyzed crashes, approximately 95% of the mid-block crashes are Dash/Dart type, i.e. the pedestrian was hit by a vehicle while he/she attempted to cross the road.
- 54% of the pedestrian crashes occurred at uncontrolled crossing locations.
- Approximately 27% of the crashes occurred at signalized locations, i.e., Pedestrians at an intersection are hit either while waiting to cross or while attempting to cross the intersection. Pedestrians hit by turning vehicles are the most common crash type at signalized intersection locations.
- Approximately 19% of the crashes occurred at locations not at uncontrolled crossings or signalized locations.
- Of the crashes analyzed, nearly half of the accidents occurred at night, however, the crash reports do not report the lighting levels at the time of crash and it is not possible to judge the lighting levels at the time of crash based on the information reported in the crash report.
- There is a high occurrence of pedestrians in the 30-50 year age group in crashes.
- The impact speed is more than 35 mph for 95% of the crashes.
Pedestrian Crash Types (PBCAT)

In the 1970s, methods for typing pedestrian and bicycle crashes were developed by the National Highway Traffic Safety Administration (NHTSA) to better define the sequence of events and precipitating actions leading to pedestrian/motor vehicle crashes.¹

Looking at the hard copy crash report is the only way to definitively identify what caused a pedestrian accident. As part of this study the crash reports were reviewed to assign crash types to each crash. Table 1-2 and Map 1-8 show the accident distributions and locations by crash type.

Table 1-2: Pedestrian Crash Types

<table>
<thead>
<tr>
<th>Crash Type Group</th>
<th>Count</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dart/Dash</td>
<td>97</td>
<td>66%</td>
</tr>
<tr>
<td>Waiting to Cross</td>
<td>13</td>
<td>9%</td>
</tr>
<tr>
<td>Walking along Roadway</td>
<td>10</td>
<td>7%</td>
</tr>
<tr>
<td>Multiple Threat</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>Left Turn</td>
<td>4</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>2%</td>
</tr>
<tr>
<td>Off Roadway</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Motorist Failed to Yield</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Exiting/Entering Parked Vehicle</td>
<td>2</td>
<td>1%</td>
</tr>
<tr>
<td>Right Turn</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Pedestrian on Vehicle</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Mailbox-Related</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Disabled Vehicle-Related</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Backing Vehicle</td>
<td>1</td>
<td>1%</td>
</tr>
<tr>
<td>Insufficient Data*</td>
<td>46</td>
<td></td>
</tr>
<tr>
<td><strong>Total Typed Crashes</strong></td>
<td>193</td>
<td></td>
</tr>
</tbody>
</table>

*Some crashes could not be typed due to insufficient information

Dart/Dash accounts for the majority of crashes because most mid block related crashes are tagged as Dart/Dash.

Dart/Dash

The pedestrian walked or ran into the roadway at an intersection or mid-block location and was struck by a vehicle. The motorist’s view of the pedestrian may have been blocked until an instant before the impact. Dart/Dash primarily occurs when a pedestrian is struck while crossing a high-speed and/or high-volume arterial street.

Waiting to Cross (Non-roadway)

Pedestrian was struck while waiting to cross roadway, standing at or near curb.

Walking along Roadway

The pedestrian was walking or running along the roadway and was struck from the front or from behind by a vehicle.

Multiple Threat

The pedestrian entered the roadway in front of stopped or slowed traffic and was struck by a multiple-threat vehicle in an adjacent lane after becoming trapped in the middle of the roadway.

Left Turn (Turning Vehicle)

The pedestrian was attempting to cross at an intersection, driveway, or alley and was struck by a vehicle that was turning left.

Off Roadway

The pedestrian was standing or walking near the roadway edge, on the sidewalk, in a driveway or alley, or in a parking lot, when struck by a vehicle.

Motorist Failed to Yield

The pedestrian was struck at an unsignalized intersection or mid-block location. This could occur because the motorist fails to yield to pedestrian at two-lane, low-speed road crosswalks (or unmarked crossings) or the motorist was unwilling to yield due to high motorist speeds or high traffic volumes.

Exiting/Entering Parked Vehicle (Unique Midblock)

Pedestrian struck while getting into/out of parked vehicle.

Right Turn (Turning Vehicle)

The pedestrian was attempting to cross at an intersection, driveway, or alley and was struck by a vehicle that was turning right.

Mailbox-Related

Pedestrian struck while going to/from a private residence mailbox/newspaper box.

Disabled Vehicle-Related (Working/Playing in the road)

The pedestrian was struck while standing or walking near a disabled vehicle.

Backing Vehicle

The pedestrian was struck by a backing vehicle on a street, in a driveway, on a sidewalk, in a parking lot, or at another location.

Corridor Crash History

This section summarizes the pedestrian crash history along U.S. 19 using a series of GIS maps. These maps are crash location maps showing individual crash locations based on CAR Roadway IDs and mileposts attributes. The maps were used to identify the high crashes locations alluded to in Chapter 2.

- **Map 1-7**, Pedestrian Crashes by Injury Severity, displays the different pedestrian crash severity such as fatal, incapacitating, and non-incapacitating.

- **Map 1-8**, Pedestrian Crashes by Crash Type, displays types of crashes that pedestrians are involved in such as Dart/Dash.
Map 1-7: Injury Severity

Pedestrian Crashes
- Fatal
- Incapacitating
- Non Incapacitating
- Other

Map Areas
- Area 1
- Area 2
- Area 3
- Area 4
- Area 5
Map 1-8: Crash Type

Map Areas

Pedestrian Movement
- Backing Vehicle
- D锦/Dash
- Disabled Vehicle-Related
- Exiting/Entering Parked Vehicle
- Left Turn
- Mailbox-Related
- Motorist Failed to Yield
- Multiple Threat
- Off Roadway
- Other
- Pedestrian on Vehicle
- Right Turn
- Waiting to Cross
- Walking along Roadway
Crash Data Distributions

To better understand the pedestrian crash issues along the U.S. 19 corridor, it is helpful to see how U.S. 19 pedestrian crashes relate to District 7 pedestrian crashes overall. This section provides information on crash distributions found in the U.S. 19 crash data. U.S. 19 pedestrian crashes were compared to overall District 7 pedestrian crashes to determine if U.S. 19 pedestrian crash distributions are atypical. The charts in this section are direct outputs from the D7 Crash Data Management System (CDMS) and represent percentages of total crashes. The following comparative analyses are addressed:

- Annual Distribution (Chart 1-1), (Table 1-3)
- Monthly Distribution (Chart 1-2)
- Time of Day (Chart 1-3)
- Day of Week (Chart 1-4)
- Accident Severity (Chart 1-5)
- Site Location (Chart 1-6)
- Traffic Control (Chart 1-7)
- Intoxication (Chart 1-8)
- Lighting Condition (Chart 1-9)

Some conclusions from the comparative crash data analysis include:

- **Chart 1-1 to 1-4 Temporal Distributions**: In general the annual percentages along U.S. 19 are less than those seen district wide. Higher rates of night time crashes are observed along U.S. 19 from 9:00PM to 12:00PM along with a weekend trend with 41.4% of pedestrian crashes occurring on Friday and Saturday.

- **Chart 1-6 to 1-7 Site Location and Traffic Control**: These charts suggest that pedestrian crashes along the U.S. 19 corridor occur with greater frequency away from intersections and where no traffic control device on U.S. 19 is present. This could suggest that mid-block crossing could be an issue along the corridor.

- **Chart 1-8 Intoxication**: U.S. 19 has a slightly higher rate of Alcohol and/or Drug related crashes at 14% then district wide crashes.

- **Chart 1-9 Lighting Condition**: 47% pedestrian crashes along U.S. 19 occurred in the dark at locations with street lighting.
Chart 1-1: Annual Distribution

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Crashes</th>
<th>Total Fatalities</th>
<th>Total Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>40</td>
<td>7</td>
<td>37</td>
</tr>
<tr>
<td>2001</td>
<td>30</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>2002</td>
<td>30</td>
<td>4</td>
<td>28</td>
</tr>
<tr>
<td>2003</td>
<td>38</td>
<td>4</td>
<td>35</td>
</tr>
<tr>
<td>2004</td>
<td>28</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>2005</td>
<td>27</td>
<td>6</td>
<td>22</td>
</tr>
</tbody>
</table>

Chart 1-2: Monthly Distribution
Access Density and Pedestrian Crashes

Access density along U.S. 19 was plotted against the number of pedestrian crashes that occurred during the years 2000 through 2005. Access density was calculated by determining the number of signalized and unsignalized intersections on a mile stretch of roadway. The 32-mile section of U.S. 19 was divided into 16 equal segments of 2 miles each. The number of intersections on each of these segments, obtained from the FDOT crash database was divided by two to get the number of access points per mile (access density) for all the 16 segments. The number of pedestrian and bicycle crashes recorded in the past 6 years was plotted against the access density for each of the 16 segments (see Chart 1-10 below). This trend may show that, the higher the access density, the greater the likelihood of crash occurrence along the corridor. So more attention is needed for better access management control methods, which will not only increase the safety of motorists, but also of the pedestrians.

Chart 1-10: Access Density

\[ y = 0.1808x^2 - 1.716x + 12.932 \]
\[ R^2 = 0.7044 \]
Transit Stop Density and Pedestrian Crashes

To examine possible correlations between transit stops and pedestrian safety levels, transit stop density was calculated on the 16 segments by calculating the number of bus stops per mile. The number of pedestrian and bicycle crashes for the year 2000 to 2005 were plotted against the transit stop density (see Chart 1-11 below). A polynomial trend line shows the relationship between transit stop density and pedestrian/bicycle crashes. This relationship shows that there is a greater likelihood of pedestrian and bicycle accidents in locations with higher transit stop density. Therefore, pedestrian safety should be given more consideration in areas with high transit stop density. Improving pedestrian crossings near bus stops with higher pedestrian crossing activity can be identified with the help of PSTA transit ridership along the service routes. Also, relocation of transit stops (upstream and downstream side of the intersection) depending on the potential for safe mid-block crossing may help reduce the transit related crashes.

Chart 1-11: Transit Stop Density

\[ y = 0.1429x^2 + 0.2431x + 6.0594 \]

\[ R^2 = 0.7028 \]
Lighting Conditions and Pedestrian Crashes

Along the 32 mile stretch of U.S. 19 in Pinellas County, per FDOT crash database, during the six year period, out of 193 total pedestrian crashes, 105 occurred at night. Eighteen of these 105 crashes occurred at locations without streetlights, and the remaining 87 crashes occurred at locations where streetlights were present. Chart 1-12 shows the frequency of crashes versus lighting level (measured in lux). Illuminance is the amount of light reaching the roadway surface, measured in footcandles (lumens/ft²) or lux (lumens/m²).

Chart 1-12: Lighting Conditions

![Chart 1-12](https://example.com/chart1-12.png)

The lighting level was measured using a handheld light-meter (EXTECH 401036) fixed to the top of a vehicle (about four feet above the pavement) moving at an average speed of 30 mph. The measurement was taken in the right lane of the roadway. As shown in Chart 1-12, lighting condition at 50 crash site locations was below 10 lux. According to the preliminary measurement of lighting level on U.S. 19, night time pedestrian crashes occur more often at lower lighting level conditions as compared to higher lighting level conditions.
Demographic and Socioeconomic Distributions

Socioeconomic and demographic data can be used as an expression of pedestrian exposure. Additionally, addressing and understanding the individual's involved in a pedestrian crash may help in education and enforcement counter measures. For example, if a disproportionate amount of crash victims are school aged children, education efforts can be directed accordingly.

- Proximity to Schools of Crashes Involving School Aged Pedestrians (Map 1-9)
- Pedestrian Age (Chart 1-13)
- Pedestrian Race Distribution (Chart 1-14)
- Pedestrian Gender Distribution (Chart 1-15)
- Area Race Distribution (Table 1-4)
- Area Automobile Ownership Distribution (Table 1-5)
- Area Poverty and Education Level (Table 1-6)

Generally the U.S. 19 age distributions follow District 7 as a whole with the majority of pedestrian crash victims in the 40 to 50 year age range.

Pedestrian crashes that involve school aged children are shown in Map 1-9. Correlating proximity to schools and pedestrian age resulted in no significant comparison. To further scrutinize crashes involving school age pedestrians, crash reports were analyzed. The crash reports were reviewed specifically for pedestrian age, time of day, day of week, and circumstances of the crash. Conclusions from this review are that many pedestrian crashes involving school age children occurred well after school hours, on weekends, or on holidays when school was not in session.
Pedestrian crashes that involve school aged children are shown in Map 1-9. Correlating proximity to schools and pedestrian age resulted in no significant comparison. To further scrutinize crashes involving school age pedestrians, crash reports were analyzed. The crash reports were reviewed specifically for pedestrian age, time of day, day of week, and circumstances of the crash. Conclusions from this review are that many pedestrian crashes involving school age children occurred well after school hours, on weekends, or on holidays when school was not in session.
Chart 1-14: Pedestrian Gender

Chart 1-15: Pedestrian Race
The U.S. 19 area socioeconomic distributions did not demonstrate any significant variance from county distributions.

Table 1-4: Area Race

<table>
<thead>
<tr>
<th>Race</th>
<th>White</th>
<th>Black</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinellas</td>
<td>85.70%</td>
<td>9.13%</td>
<td>5.17%</td>
</tr>
<tr>
<td>US-19</td>
<td>88.01%</td>
<td>6.75%</td>
<td>5.24%</td>
</tr>
</tbody>
</table>

Table 1-5: Area Auto Ownership

<table>
<thead>
<tr>
<th>Auto Ownership</th>
<th>No Cars</th>
<th>One Car</th>
<th>Two Cars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinellas</td>
<td>4.22%</td>
<td>21.06%</td>
<td>15.63%</td>
</tr>
<tr>
<td>US-19</td>
<td>3.24%</td>
<td>22.17%</td>
<td>15.39%</td>
</tr>
</tbody>
</table>

Table 1-6: Area Poverty and Education Level

<table>
<thead>
<tr>
<th>Area Profile</th>
<th>Below Poverty</th>
<th>High School</th>
<th>H.S. Grad</th>
<th>College</th>
<th>College Grad</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pinellas</td>
<td>9.82%</td>
<td>11.84%</td>
<td>21.84%</td>
<td>17.85%</td>
<td>22.92%</td>
</tr>
<tr>
<td>US-19</td>
<td>9.25%</td>
<td>12.61%</td>
<td>24.91%</td>
<td>16.94%</td>
<td>20.02%</td>
</tr>
</tbody>
</table>
Chapter 2: High Crash Locations and Existing Infrastructure

The previous chapter mapped crash locations, documented traffic characteristics, and reviewed data distributions found in the overall pedestrian crash history on a corridor level. This chapter identifies those roadway segments and intersections with high crash concentrations. This chapter will also examine the existing infrastructure and planned improvements of the high crash segments along U.S. 19 to establish priorities. In addition to this, local agencies staff were contacted in order to develop a catalog of local priorities and programs/projects along the corridor.

High Crash Locations

This section identifies specific high crash locations. The high crash segments and intersections are identified in the following maps:

- High Crash Segments (Map 2-1)
- High Crash Segments Detail (Map 2-2)
- High Crash Intersections (Map 2-3)

Additionally, several tables are provided in this section to document the following high crash location sets:

- **High Pedestrian Roadway Segments: Table 2-1** – Shows sub-sections of U.S. 19 with high concentrations of pedestrian crashes. The table is ranked by number of crashes.
- **High Pedestrian Crash Intersections: Table 2-2** – Lists intersections with the highest frequency of pedestrian crashes. The table is ranked by number of crashes.
Table 2-1 High Crash Segments

<table>
<thead>
<tr>
<th>Rank</th>
<th>From St.</th>
<th>To Street</th>
<th>Length</th>
<th>Crashes</th>
<th>Fatalities</th>
<th>Injuries</th>
<th>Crashes/Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5th Ave N</td>
<td>4th Ave N</td>
<td>0.125</td>
<td>14</td>
<td>0</td>
<td>10</td>
<td>112.0</td>
</tr>
<tr>
<td>2</td>
<td>64th Ave</td>
<td>62nd Ave</td>
<td>0.125</td>
<td>11</td>
<td>1</td>
<td>9</td>
<td>88.0</td>
</tr>
<tr>
<td>3</td>
<td>14th Ave N</td>
<td>9th Ave N</td>
<td>0.33</td>
<td>13</td>
<td>0</td>
<td>10</td>
<td>41.9</td>
</tr>
<tr>
<td>4</td>
<td>10th Ave</td>
<td>6th</td>
<td>0.13</td>
<td>12</td>
<td>0</td>
<td>5</td>
<td>38.5</td>
</tr>
<tr>
<td>5</td>
<td>E Idaho St.</td>
<td>E Oakwood St.</td>
<td>0.1</td>
<td>15</td>
<td>0</td>
<td>5</td>
<td>35.0</td>
</tr>
<tr>
<td>6</td>
<td>8th Ave N</td>
<td>18th Ave N</td>
<td>0.42</td>
<td>10</td>
<td>0</td>
<td>10</td>
<td>24.3</td>
</tr>
<tr>
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<td>Past - Belleair Rd</td>
<td>0.54</td>
<td>13</td>
<td>2</td>
<td>11</td>
<td>20.4</td>
</tr>
<tr>
<td>8</td>
<td>Fairfield Ave S</td>
<td>18th Ave S</td>
<td>0.13</td>
<td>14</td>
<td>1</td>
<td>3</td>
<td>17.6</td>
</tr>
<tr>
<td>9</td>
<td>11th Ave</td>
<td>11th Ave S</td>
<td>0.2</td>
<td>5</td>
<td>2</td>
<td>5</td>
<td>10.5</td>
</tr>
</tbody>
</table>

The first step in the process of improving pedestrian safety is to identify intersections or areas where pedestrian crash issues exist. Although crashes are dispersed along the span of the corridor, a review of following maps identify areas and intersections where the crash patterns are more concentrated.

Segments are chosen by a combination of accident severity buffers and areas of crash concentration. Segments are ranked by crashes/mile.
Map 2-2: High Crash Segment Detail

Pedestrian Movement
- Backing Vehicle
- Dart/Dash
- Exiting/Entering Parked Vehicle
- Left Turn
- Multiple Threat
- Off Roadway
- Other
- Pedestrian on Vehicle
- Right Turn
- Waiting to Cross
- Walking along Roadway
- Not Coded

Severity
- Other
- Fatal
- Incapacitating Injury
- Non Incapacitating Injury
Table 2-2: High Crash Intersections

<table>
<thead>
<tr>
<th>Rank</th>
<th>Cross Street</th>
<th>Node</th>
<th>Crashes</th>
<th>Fatalities</th>
<th>Injuries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>62ND AVE N/CR 216(D)</td>
<td>1501169</td>
<td>9</td>
<td>1</td>
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</tr>
<tr>
<td>2</td>
<td>50TH AVE N</td>
<td>1501160</td>
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<tr>
<td>3</td>
<td>DARTMOUTH AVE</td>
<td>1501131</td>
<td>5</td>
<td>1</td>
<td>4</td>
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<tr>
<td>4</td>
<td>4TH AVE N</td>
<td>1501130</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>DREW ST/CR528(D)</td>
<td>1500790</td>
<td>4</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>22ND AVE N(D)</td>
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<td>3</td>
</tr>
<tr>
<td>7</td>
<td>13TH AVE N (D)</td>
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<td>28TH AVE N</td>
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<td>1</td>
<td>4</td>
</tr>
<tr>
<td>9</td>
<td>SEVILLE DR(D)</td>
<td>1501387</td>
<td>3</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>10</td>
<td>NURSERY RD/CR 474(D)</td>
<td>1501197</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

The following maps rank the top ten intersections by total pedestrian crashes and fatalities. Each crash is assigned to the nearest FDOT node, as a result, crashes may be influenced by the intersection but actually occur away from the crosswalks.

Map 2-3: High Crash Intersections
Evaluating Existing Infrastructure

This section evaluates existing infrastructure using 2004 Pinellas County digital aerial photography, obtained through the county, to review a number of factors along high crash segments, including but not limited to median type, sidewalks, bike lanes, crosswalk conditions, and number of lanes.

Segments

Table 2-3 shows the existing conditions of the high crash segments. High crash segments were broken down into sub sections if there were attributed changes along the segment. Table 2-4 shows different access conditions for the high crash segments.

Intersections

Map 2-4 illustrates the existing conditions of the high crashes intersections.
### Table 2-3: High Crash Segments Infrastructure

<table>
<thead>
<tr>
<th>Rank</th>
<th>From St.</th>
<th>To Street</th>
<th>Beg. MP</th>
<th>End MP</th>
<th>Length</th>
<th>Volume</th>
<th>Speed Limit</th>
<th>Dir. Lanes</th>
<th>Median Type</th>
<th>Sidewalks</th>
<th>Bike lanes</th>
<th>Signalized Intersections</th>
<th>Grade Separated Intersections</th>
<th>Unsignalized Intersections</th>
<th>Adjacent Land Use</th>
<th>High Crash Intersection Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5th Ave N</td>
<td>4th Ave N</td>
<td>4.753</td>
<td>4.873</td>
<td>0.12</td>
<td>43,000</td>
<td>35</td>
<td>3</td>
<td>Median Curb &lt; 6&quot;</td>
<td>Left and Right</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Commercial</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>64th Ave</td>
<td>62nd Ave</td>
<td>8.391</td>
<td>8.515</td>
<td>0.12</td>
<td>43,000</td>
<td>45</td>
<td>3</td>
<td>Median Curb &lt; 6&quot;</td>
<td>Left and Right</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Commercial</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>9th Ave N</td>
<td>10th Ave</td>
<td>5.124</td>
<td>5.189</td>
<td>0.06</td>
<td>43,000</td>
<td>35</td>
<td>3</td>
<td>Median Curb &lt; 6&quot;</td>
<td>Left and Right</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>10th Ave</td>
<td>14th Ave N</td>
<td>5.189</td>
<td>5.435</td>
<td>0.25</td>
<td>43,000</td>
<td>35</td>
<td>3</td>
<td>Curb 6&quot; &lt;&gt; &amp; Lawn</td>
<td>Left and Right</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<td>7</td>
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<td>68th</td>
<td>8.774</td>
<td>8.907</td>
<td>0.13</td>
<td>62,000</td>
<td>45</td>
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<td>Curb 6&quot; &lt;&gt; &amp; Lawn</td>
<td>Left and Right</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E Oakwood St</td>
<td>Boyer St.</td>
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<td>31.104</td>
<td>0.11</td>
<td>75,000</td>
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<td>Curb 6&quot; &lt;&gt; &amp; Lawn</td>
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<td>0</td>
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<td>0</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
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<td>E Court St.</td>
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<td>50</td>
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<td>0</td>
<td>Commercial</td>
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</tr>
<tr>
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<td>Curb 6&quot; &lt;&gt; &amp; Lawn</td>
<td>Left and Right</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>Commercial</td>
<td></td>
</tr>
<tr>
<td>6</td>
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<td>38th Ave N</td>
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<td>6.883</td>
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<td>3</td>
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<td>0</td>
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<tr>
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<td>Nursery Rd</td>
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<td>17.062</td>
<td>0.26</td>
<td>80,000</td>
<td>50</td>
<td>3</td>
<td>Curb 6&quot; &lt;&gt; &amp; Lawn</td>
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<td>Commercial</td>
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<tr>
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<td>Harn Blvd.</td>
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<td>Curb 6&quot; &lt;&gt; &amp; Lawn</td>
<td>Left and Right</td>
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<td>0</td>
<td>0</td>
<td>Commercial</td>
<td>10</td>
</tr>
<tr>
<td>8</td>
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<td>14th Ave</td>
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<td>45</td>
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</table>

Source: FDOT Crash Analysis Reporting System, District 7

### Table 2-4: Summary of Access Conditions and Crashes for High Crash Segments

<table>
<thead>
<tr>
<th>Rank</th>
<th>From St.</th>
<th>To Street</th>
<th>Beg. MP</th>
<th>End MP</th>
<th>Length</th>
<th>Volume</th>
<th>Speed Limit</th>
<th>Total Lanes</th>
<th>Access Density (per Mile)</th>
<th>Median Openings</th>
<th>Total Crashes</th>
<th>Frequency (per mile per year)</th>
<th>Total Fatalities</th>
<th>Frequency (per mile per year)</th>
<th>Street Lights</th>
<th>Night Time Crashes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5th Ave N</td>
<td>4th Ave N</td>
<td>4.753</td>
<td>4.873</td>
<td>0.12</td>
<td>43,000</td>
<td>35</td>
<td>6</td>
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<td>5</td>
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<td>62nd Ave</td>
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<td>9th Ave N</td>
<td>10th Ave</td>
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<tr>
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<td>No</td>
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<tr>
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<td>E Court St.</td>
<td>E Oakwood St</td>
<td>30.989</td>
<td>31.220</td>
<td>0.23</td>
<td>75,000</td>
<td>45 or 50</td>
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<td>Yes</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>38th Ave N</td>
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<td>6.883</td>
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<td>0.30</td>
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<td>11.858</td>
<td>12.429</td>
<td>0.57</td>
<td>50,000</td>
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<td>6</td>
<td>14</td>
<td>1</td>
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<td>Nebraska Ave</td>
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<td>27.655</td>
<td>1.00</td>
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<td>55</td>
<td>8</td>
<td>13</td>
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<td>0.33</td>
<td>Partial</td>
<td>5</td>
</tr>
</tbody>
</table>

Source: FDOT Crash Analysis Reporting System, District 7
Map 2-4: High Crash Intersection Existing Conditions

Rank 1

Rank 2

Rank 3

Rank 4

Rank 5

Rank 6

Rank 7

Rank 8

Rank 9

Rank 10
Meetings with Local Agencies

As a part of the study, Consultant staff met with different agency staff to get feedback on the top 10 high crash segments. The sections below summarize the feedback from different agencies:

Pinellas County
The Pinellas County staff expressed the following concerns and issues, many of which have already been identified in this study, related to the pedestrian safety along the roadway:

- Signing inconsistency along the roadway
- Absence of refuge islands at the intersection with free-flow right turn lanes
- Pedestrian features at the intersection of US Highway 19 and Drew Street
- Installing countdown pedestrian heads at signalized intersections
- Proper placement of bus stops along the roadway to minimize mid-block crossings
- Public awareness and education programs about pedestrian safety
- Check the possibility to introduce Lead Pedestrian Interval (LPI) signal phases along the roadway
- Check for the proper utilization of “Split Phase” at signals to reduce the delay for pedestrians to increase the usage levels of crosswalks
- Review the pedestrian counts (conducted by the County in January 2006) to evaluate the high pedestrian activity levels
- Minimizing the number of median openings and proper usage of access roads
- Enforcement to increase the “Yield to Pedestrians” at intersections and mid-block crossing locations

City of St. Petersburg
City of St. Petersburg staff expressed the following concerns and issues related to the pedestrian safety along the roadway:

- Reducing the crosswalk length at intersections by introducing bulb-out feature
- Better access control from the developments by eliminating and/or limiting access points to the developments
• Introducing refuge areas at free flow right turn locations to increase pedestrian safety at intersections
• Eliminating sidewalk gaps along the roadway
• Proper placement of bus stops along roadway to minimize mid-block crossings
• Installing countdown pedestrian heads at all signalized intersection
• Implementing “Sidewalk Maintenance” program to remove impedances on sidewalks to increase the usage levels of sidewalks
• 4-E (Engineering, Education, Enforcement and Encouragement) program implementation
• Retrofitting sidewalk with ADA ramps for better usage of sidewalk facilities
• Re-evaluating the transit stop locations along roadway based on the location of production and attractions

City of Clearwater
City of Clearwater staff expressed the following concerns and issues related to the pedestrian safety along the roadway:
• Proper signing at the intersection of US Highway 19 and Drew Street (originally at-grade intersection, now grade-separated intersection) to accommodate safe pedestrian movements at the intersection
• Filling sidewalk gaps along the roadway
• Retiming of signals with more pedestrian clearance time to accommodate safe pedestrian crossings at possible locations
• Building refuge islands and bulb-outs to reduce the crosswalk length at intersections
• Finally, Media campaign to increase the awareness to pedestrian safety and to promote pedestrian mode as an alternative mode of transportation

Programmed and Planned Improvements Review
This section will review programmed and planned improvements along the corridor relevant to pedestrian safety including but not limited to intersection projects, sidewalk projects, access management projects, and other roadway construction or traffic operations projects. Priorities are broken into two groups, those with programmed improvements and those without programmed improvements. Map 2-5
shows the high crash segments and associated work program items. Priorities can be established for segments by evaluating Map 2-5 in conjunction with the infrastructure information previously provided in this chapter. Table 2-5 and Table 2-6 prioritize the high crash segments with and without programmed improvements.

### Tables 2-5: High Crash Segments with Programmed Improvements

<table>
<thead>
<tr>
<th>Rank</th>
<th>From St.</th>
<th>To Street</th>
<th>Length</th>
<th>Crashes</th>
<th>Fatalities</th>
<th>Injuries</th>
<th>Crashes/Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>64th Ave</td>
<td>62nd Ave</td>
<td>0.125</td>
<td>11</td>
<td>1</td>
<td>8</td>
<td>88.0</td>
</tr>
<tr>
<td>4</td>
<td>70th Ave</td>
<td>68th</td>
<td>0.130</td>
<td>5</td>
<td>0</td>
<td>5</td>
<td>38.5</td>
</tr>
<tr>
<td>7</td>
<td>Harn Blvd.</td>
<td>Past - Belleair Rd</td>
<td>0.640</td>
<td>13</td>
<td>2</td>
<td>11</td>
<td>20.3</td>
</tr>
<tr>
<td>9</td>
<td>118th Ave</td>
<td>110th Ave</td>
<td>0.570</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>10.5</td>
</tr>
</tbody>
</table>

### Tables 2-6: High Crash Segments without Programmed Improvements

<table>
<thead>
<tr>
<th>Rank</th>
<th>From St.</th>
<th>To Street</th>
<th>Length</th>
<th>Crashes</th>
<th>Fatalities</th>
<th>Injuries</th>
<th>Crashes/Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5th Ave N</td>
<td>4th Ave N</td>
<td>0.125</td>
<td>14</td>
<td>0</td>
<td>10</td>
<td>112.0</td>
</tr>
<tr>
<td>3</td>
<td>14th Ave N</td>
<td>9th Ave N</td>
<td>0.310</td>
<td>13</td>
<td>0</td>
<td>10</td>
<td>41.9</td>
</tr>
<tr>
<td>5</td>
<td>E Court St.</td>
<td>E Oakwood St</td>
<td>0.200</td>
<td>7</td>
<td>0</td>
<td>6</td>
<td>35.0</td>
</tr>
<tr>
<td>6</td>
<td>38th Ave N</td>
<td>30th Ave N</td>
<td>0.490</td>
<td>12</td>
<td>1</td>
<td>9</td>
<td>24.5</td>
</tr>
<tr>
<td>8</td>
<td>Fairfield Ave S</td>
<td>18th Ave S</td>
<td>0.800</td>
<td>14</td>
<td>1</td>
<td>11</td>
<td>17.5</td>
</tr>
<tr>
<td>10</td>
<td>Alderman Rd</td>
<td>Nebraska Ave</td>
<td>1.000</td>
<td>8</td>
<td>2</td>
<td>6</td>
<td>8.0</td>
</tr>
</tbody>
</table>
Chapter 3: General Counter measures and Field Review

Based on the crash patterns identified in Chapters 1 and 2, this chapter catalogs a general set of potential pedestrian safety engineering counter measures which address the type of pedestrian crashes experienced along Pinellas County U.S. 19. Additionally, this chapter documents specific roadway infrastructure issues and provides crash history synopsis for each high pedestrian crash segment. These field reviews and crash data analyses are used in combination with the countermeasure “tool-kit” to identify possible recommendations for each segment. These general recommendations are refined in Chapter 4, to consider implementation feasibility thereby providing a preliminary set of recommendations for design consideration by District 7.

General Pedestrian Counter measures

In order to provide safe environments for pedestrians and cyclists, sight distance and visibility for motor vehicles and pedestrians must be considered. There are three broad categories for counter measures using engineering modifications:

- Measures that separate pedestrians from vehicles by time or space
- Measures that increase the visibility and conspicuity of pedestrians
- Measures that reduce vehicles speeds.

The following section builds on previous safety resource work conducted for District 7 by CUTR and discusses various pedestrian safety counter measures which may be applicable to the U.S. 19 corridor. This list of potential counter measures is not location specific and has not been scrutinized with respect to feasibility of implementation or cost/benefit considerations. Because, some of the counter measures described in this chapter are considered experimental, additional study may be necessary before they can be considered for implementation on the State Highway Network.

Reducing Pedestrian Exposure

Pedestrian accidents increase with increased exposure to vehicular traffic. Therefore measures should be taken to reduce pedestrian exposure. Exposure can be reduced by
providing walkways, sidewalks, and curb ramps. Pedestrian refuge islands and raised medians can be constructed to give the pedestrian a safe stopping point on wide roads.²

Road segments with high speeds and heavy pedestrian traffic may need an underpass or overpass to separate the pedestrians from the vehicles by space. The effectiveness of these treatments depends largely on the likelihood that they will be used by most or all pedestrians who cross the street.¹⁰ Pedestrians are also less inclined to use an overpass or underpass if they believe that they can cross the road in the same amount or less time.³ Walkways should be a part of every new and renovated roadway. Sidewalks and walkways provide a pedestrian travel space separated from vehicles while improving connectivity, mobility, and access to transit stops and other places of interest.

Curb ramps should be constructed to provide transition in elevation between the sidewalk and roadway. This is useful for people using wheelchairs, strollers, walkers, crutches, handcarts, and bicycles. Sidewalk setbacks provide a greater separation of pedestrians from vehicles. The clearly marked buffer strip between the sidewalk and roadway may also help to define sidewalk and driveway locations. Other measures to separate the vehicle and pedestrian by space include advance stop lines and pedestrian barriers and fences. Barriers and fencing prevent mid-block crossing forcing pedestrians to cross at intersections where other measures can be taken to ensure their safety. Barriers and bollards can be used where vehicles may encroach on a pedestrian area. Crossing islands and raised medians provide a place for pedestrians to stay while crossing multilane roads. These features provide a break in the road where it is safe for pedestrians to stop and wait for appropriate gaps instead of trying to run straight across several lanes. If the total length of the crosswalk is greater than 75 feet, ITE recommends the provision of a pedestrian refuge island.⁴


⁴ Institute of Transportation Engineers (1998). Design and Safety of Pedestrian Facilities, A Recommended Practice of the Institute of Transportation Engineers. Washington, D.C.
Traffic Signals and Pedestrian Signals

On U.S. 19, the highest pedestrian crash type is caused by pedestrians crossing the road. These crashes have a high frequency at both mid-block and intersection locations; however, improving pedestrian signals may help to remedy the situation. These measures separate the pedestrian from the vehicles by time. Signal enhancements may be installed to improve crossing at intersections. Enhancements such as automated pedestrian detectors, countdown signals and signal placement can also be used. Restricting right turns on red (RTOR) may be warranted if many crashes involve right turning vehicles. Otherwise caution must be taken with RTOR restrictions since some studies have shown that it may contribute to other pedestrian safety issues.\(^5\) Other measures using timing to separate the pedestrian from the vehicle include exclusive pedestrian signal phasing, and early release signal timing (leading pedestrian interval). Pedestrian signals are designed for moderate walking speeds; which means pedestrians walking at a slower pace will have difficulty crossing the road safely. Extending the pedestrian cycles may be considered to accommodate these slower walking pedestrians.

If roadway segments do not have substantial driveway or un-signalized side street traffic, Traffic signals can be used to create gaps in the traffic flow to allow pedestrians to cross at un-signalized locations between vehicle platoons. Providing pedestrian signals at intersections becomes important with multiphase traffic signals and on multiline roads. At intersections with split phases, left-turn arrows and double left or right turn lanes, it is important to have pedestrian signals to indicate to the pedestrians when it is safe to cross. In the standard concurrent timing scheme, the WALK signal appears when vehicles traveling parallel to the pedestrians get a green light, but turning vehicles may be in conflict with the pedestrians. This conflict can be remedied by leading pedestrian interval, trailing pedestrian interval, exclusive, and scramble timing. Pedestrian signals can also be installed at high-use mid-block locations.

Mid-block pedestrian signals reduce the inconvenience of walking to the nearest pedestrian signal in situations where the signalized intersection spacing is greater than 0.5 mile. Section 4D of the Manual on Uniform Traffic Control (MUTCD) states that mid-block crosswalks should not be signalized if they are located within 30 meters (100 feet) from side streets or driveways that are controlled by STOP signs or YIELD signs; and mid-block crosswalks should not be signalized if they are located within 90 meters (300 feet) from the nearest traffic control signal, unless the proposed traffic control signal will not restrict the progressive movement of traffic.6

Countdown signals may be used to let pedestrians know exactly how much time they have to cross the road. These signals are meant to increase the walking speed of a pedestrian who may be running out of time and also to stop pedestrians from entering the crosswalk if they do not have enough time. The past studies showed there was a 25 percent crash reduction by installing a countdown signals for pedestrian. The Florida Department of Transportation (FDOT) Traffic Engineering Manual states that countdown pedestrian signals should be installed on all new construction and rebuilt traffic signal installations where pedestrian signals are included. The Manual goes on to recommend the installation of countdown signals at existing locations that already have pedestrian features.

The following criteria are used to assist the District 7 Traffic Operations Engineer and the local maintaining agencies in determining the priority order of locations:

a. Pedestrian crash history
b. High percentage of older pedestrians
c. High percentage of tourist pedestrians
d. High percentage of school-age children
e. High speed roadway
f. Multi-lane and/or wide intersection

There are positive and negative impacts of countdown signals. Based on the results of a study done in Lake Buena Vista, Florida and other studies, Huang and Zegeer concluded that countdown signals are not recommended for use at standard intersections in Florida. One positive effect seen in the Huang study is pedestrians were less inclined to hurry their crossing when the flashing DON'T WALK signal appeared compared to the countdown signal. Another study in the City of Henderson, Nevada, observed that the percentage of pedestrians who pushed the call button increased after the installation of pedestrian countdown signals. The percentage of pedestrians who pushed the call button and then waited for the WALK phase also increased and the percentage of pedestrians who waited for the WALK phase without pushing the call button decreased. It was suggested that the installation of pedestrian countdown signals caused a positive change in pedestrians’ behavior.

Other signal optimization techniques that can be used are vehicle detectors to sense traffic gaps, transferring the extra time to the pedestrian phase and providing more than one crosswalk at an intersection for sequential crossings. Another signal enhancement includes automated pedestrian detectors and larger traffic signals to ensure visibility. Signals can also be placed so that a motorist cannot see signals on the cross street and creep into the crossing area in anticipation of their green signal.


Pedestrian-activated flashing beacons can be installed at the pedestrian crossing, in advance of the pedestrian crossing both overhead and side mounted. There is however, concern that the overuse of flashing beacons may reduce the effectiveness. Overhead flashing beacons have the best visibility and produce driver yield rates of 30 to 76 percent. Flashing beacons can also be used in conjunction with, or integral within, other warning signs and in the roadway pavement as in-roadway warning lights. Beacons can also have passive pedestrian detection using automated sensors.

In-pavement warning lights are mounted in the pavement near the crosswalk marking and typically protrude above the pavement. These warning lights have increased driver yielding rates of 50 to 90 percent and increase the distance that motorists first brake. Other warning signs and pavement markings are crossing flags carried by pedestrians, Yield to Pedestrian and Stop Here for Pedestrian signs and internally illuminated crosswalk signs. Fluorescent orange flags have been used in Salt Lake City, Utah mostly on low speed roads of 30 mph or less although some have been used on multi-lane, high-volume arterials. The crossing flags in Salt Lake City have showed a motorist yield rate of 46 to 79 percent.11

Three mid-block pedestrian crossing technologies developed in Europe and currently being studied in the US includes the PELICAN, TOCAN, and HAWK.

**PELICAN Traffic Signal**

In Tucson, Arizona, PELICAN crossings, **Pedestrian Light Control Activation**, were initiated by the city using the European mid-block pedestrian crossing technique of the same name. The technique incorporates a standard RED-YELLOW-GREEN signal indication method that rests in GREEN for vehicular traffic until a pedestrian wishes to cross. The signal then changes to YELLOW and then RED and a WALK light is shown to the pedestrian.

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PELICAN Pedestrian Crossing

Figure 3-1: Example of PELICAN Pedestrian Crossing

The pedestrian crosses the street in two stages, first to a median island and then along the median to a second signalized crossing point a short distance away. The pedestrian then activates a second crossing button and another crossing signal changes to RED for the traffic giving the pedestrian a WALK signal. The two crossings only delay the pedestrian minimally and allow the signal operation to fit into the arterial synchronization thus reducing the potential for stops, delays, accidents and air quality environmental issues.

Tucson’s experiences at the PELICAN crossings indicate that driver’s compliance seems as good as other traditional traffic signals. However some driver violations have been reported and noted. The device is quite effective overall in providing a safe crossing for pedestrians at mid-block crossings when the technique can be accommodated into the roadway cross-section.
TOCAN Traffic Signal

The signal system was designed similar to the European technique to provide a safe crossing for "two" groups – pedestrians and bicyclists, thus the name "TOCAN" or Two (groups) CAN, cross the roadway. A traditional signal system would be inappropriate at most locations when just a bicycle crossing is needed. In many cases, the bike route is along a residential street where the crossing of the arterial is at an irregular spacing. Thus, the installation of a traditional full signal would not allow for good signal synchronization creating excess stops, accidents, delays and air quality concerns.

TOCAN Traffic Signal

Figure 3-2: Example of TOCAN Traffic Signal

The second concern is that a traditional full signal would encourage additional traffic to cut through or along the residential street thus negatively impacting the “livability” of the street. The committee worked together to find a balance of these competing transportation objectives and reached a consensus for the design and implementation of the pedestrian-bicycle signal.
HAWK Pedestrian Flasher

The signaling system is a combination of a beacon flasher and traffic control signaling technique for marked crossings. The Tucson High-intensity Activated Crosswalk or HAWK crossing is an extension of the traditional school bus flashing warning signal when children are crossing the road and the European level or emergency crossing signal. The new edition of the Federal Highway Administration's Manual on Uniform Traffic Control Devices, 2001, recognizes the use of a flashing beacon signal in the context of use for emergency beacons. The beacon signal consists of a standard traffic signal head with a RED-YELLOW-RED lens.

The unit is normally off until activated by a pedestrian. When a pedestrian wishes to cross the street, he/she presses a button and the signal begins with a FLASHING YELLOW indication to warn the approaching drivers, just like a school bus signal. The FLASHING YELLOW is then followed by a SOLID YELLOW indication, advising the drivers to prepare to stop. The signal is then changed to a SOLID RED indication at which time the pedestrian is shown a WALK indication. The beacon signal then converts to an ALTERNATING FLASHING RED, allowing the drivers to proceed when safe, after stopping at the crosswalk.
Visibility of Pedestrians

To increase the drivers’ ability to see pedestrians, the roadway lighting intensity can be increased. About half of the U.S. 19 pedestrian crashes occurred at night. The majority of these crashes occurred when street lights were present; therefore, however, the presence of street lighting as indicated on the crash report form does not address the level of illumination provided by the lighting nor whether that lighting is appropriately designed to increase pedestrian visibility. Out of the 19 fatal pedestrian crashes on U.S. 19, 15 of those occurred in dark conditions and in 11 of these accidents the presence of street lights was noted on the crash report form.

Pedestrian visibility can also be improved by relocating bus stops from the near-side to the far-side of the intersection.9 Placing transit stops closer to the signalized intersections may encourage pedestrians to use pedestrian signals at intersections instead of crossing at mid-block locations. Near-side bus stops add to delay of vehicles12 and create traffic operations problems if right turn lanes are present, as is the

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case on along much of U.S. 19. Far side stops are a better solution since studies show they reduce the tendency for pedestrians to cross the road in front of the bus thus causing the bus to obstruct passing motorists view of the pedestrian.\textsuperscript{13}

To increase conspicuity of pedestrians, in-pavement flashing lights warning drivers when pedestrians are present could be also be used. This also creates a temporal separation since drivers will yield to pedestrians more often with these lights implemented.\textsuperscript{14} These lights can be triggered by automatic pedestrian detection or by the push button on the pedestrian signal. Special consideration should be taken for the visibility of crosswalks at night. Crosswalk markings, without related enhancements may not increase pedestrian safety; crosswalks should be used in conjunction with other treatments.\textsuperscript{10} The visibility of road enhancements should also be considered and the visibility of pedestrians on these features. Crossing islands should be illuminated and highlighted with street lights, signs and/or reflectors. Another element to the visibility of pedestrians comes with education. Pedestrians can be encouraged to wear retro-reflective materials. Law enforcement officers and community volunteers in Pinellas County have distributed flashing lights to pedestrians along U.S. 19 in an attempt to make them more visible to drivers.

\textbf{Reducing Vehicle Speeds}
Vehicle speeds affect both the severity and occurrence of pedestrian crashes. U.S. 19 is designed for speeds as high as 55 mph. According the National Highway Traffic Safety Administration (NHTSA), crash data from Florida shows that 36 percent of pedestrian accidents involving cars traveling at speeds above 46 mph resulted in fatalities, as opposed to approximately 12 percent for speeds of 31-35 mph.\textsuperscript{15} In addition

\begin{flushleft}

\textsuperscript{14} Hakkert, A.S., Gitelman, V., and Ben-Shabat (2001), An Evaluation of Crosswalk Warning Systems. Proceedings of the 80\textsuperscript{th} Annual Meeting of the Transportation Research Board, Washington D.C.

\end{flushleft}
to factoring strongly in crash severity, higher speeds also reduce the ability of motorists to react to pedestrians and potentially avoid a crash in the first place.

Lowering the speed limit would be the first approach to reducing vehicle speeds on U.S. 19. For the posted speed limits over 50 mph, 22.2 percent of pedestrian accidents resulted in fatalities according to the US DOT Fatality Analysis Reporting System (FARS) and the General Estimates System (GES). GES and FARS also shows that 26 percent of these accidents resulted in incapacitating injuries totaling almost 50 percent of crashes resulting in fatal or severe injuries to pedestrians. From Florida crash data over 60 percent of the crashes on high speed roads above 50 mph resulted in fatal and severe injuries to pedestrians; therefore, at high posted speed limits, a pedestrian has a high probability of suffering a fatal or severe injury.

Along with lowering the speed limit, police enforcement has also been used to reduce speeds; but, this has limitations. Providing a mix of enforcement and public information, along with lowering the speed limit has proven to have modest effectiveness. Apart from police enforcement, photo enforcement through Automated Speed Enforcement (ASE) can be implemented. The radar clocks vehicle speeds and photographs the vehicles going above a variable threshold.

Access Management
Techniques which can be used to improve pedestrian safety include: reducing the number of driveways, adhering to a minimum distance between driveways and providing raised medians for pedestrian refuge. Every driveway provides a vehicle/pedestrian conflict. Limiting the number of driveways limits the number of conflict points. Each driveway carries with it an operational area where drivers make decisions pertaining to that driveway. When these areas overlap, the result is many slower moving vehicles in the right lane. This can be a difficult position for pedestrians attempting to cross at mid-block because after making their way through the slower moving vehicles, they are then faced with faster moving vehicles while in the middle of the road before getting to a refuge island to access another reasonable gap. Greater driveway separations prevent the overlap of operational areas which allow pedestrians to focus on one conflict at a time.
Safety Route to Transit (SR2T)

Safety Route to Transit is a program approved by San Francisco Bay Area voters in March 2004. The $22.5 million SR2T grant was approved for round one of the program from year 2004 to 2005. Of the SR2T funds, $2.5 million are allocated directly to City CarShare projects (with $750,000 already encumbered) and the remaining $20 million will be allocated on a competitive grant basis. To be eligible, projects must have a “bridge nexus,” that is, reduced congestion on one or more state toll bridges by facilitating walking or bicycling to transit services or City CarShare pods. ¹⁶ The purpose of the program is to promote bicycling and walking to transit stations by making these important feeder trips easier, faster and safer. Bicycling and walking are cost-effective and sustainable ways to reach regional transit stations. Yet, many commuters cite safety as the main reason they drive instead.

Crash History Synopsis, Roadway Field Review, and Possible Counter measures

Each high crash segment was studied by field review staff. Appendix A includes a series of photographs and field observations which document current pedestrian conditions along Pinellas County U.S. 19. These observations were used in conjunction with the crash data history of each segment to provide a list of potential counter measures for different problem areas along U.S. 19. This information is presented in table format below.

The table summarizes the roadway segment information, crash history, and the potential counter measures based on a detailed field review of each identified study segment. Roadway segment information is found in the “Roadway Details” column, which lists information such as roadway cross sections, intersection geometry, and pedestrian features (i.e. ramps, pedestrian signals, crosswalks, signs and markings). The crash history information for each identified segment is in the “Crash History Synopsis”

column. The “Potential Counter Measures” column identifies opportunities to improve the identified segments or to improve existing work plans to improve pedestrian safety for locations where improvements are programmed.

The compiled information from the table was reviewed with the FDOT Project Manager to identify counter measures and strategies suitable for implementation as documented in Chapter 4.
<table>
<thead>
<tr>
<th>Segment</th>
<th>Roadway Details</th>
<th>Crash History Synopsis</th>
<th>Potential Counter Measures</th>
</tr>
</thead>
</table>
| **Segment 1:** 5th Avenue N to 4th Avenue N | - Length – 0.125 mile  
- Speed - 35 mph  
- Six lanes with narrow raised concrete median  
- High access density (36 access points per mile)  
- Five full median openings  
- One signalized intersection with full pedestrian features  
- Sidewalks on both sides  
- Street Lights | - Most of pedestrian accidents happened at two high ranked intersections (2, 4)  
- 13 crashes in six years, 1 fatal  
- 17.3 crashes per mile per year  
- None of the 13 crashes occurred at a crosswalk  
- 54 percent of crashes involved pedestrian alcohol  
- 8 percent of crashes involved driver alcohol  
- 69 percent of crashes occurred at night  
- Pedestrian at fault in 85 percent of crashes  
- All of the 10 crashes with known crash type information, were Dash or Dart  
- All of the 10 crashes with information on pedestrian age, were 18 or over | - Median adjacent to left-turn bays widened to maximum width possible  
- High-visibility crosswalk markings at signalized intersections  
- Yield to Pedestrian Sign for turning vehicles  
- Pedestrian alcohol awareness  
- Consolidate the driveways whenever possible |
| **Segment 2:** 64th Avenue N to 62nd Avenue N | - Length – 0.125 mile  
- Speed - 45 mph  
- Six lanes with narrow raised concrete median  
- Very high access density (40 access points per mile)  
- Five full median openings  
- Two signalized intersections with full pedestrian features | - 11 crashes in six years, 1 fatal  
- 14.7 crashes per mile per year  
- Two crashes occurred at crosswalk  
- Nine percent of crashes involved pedestrian alcohol  
- 18 percent of crashes involved driver alcohol  
- 55 percent of crashes occurred at night  | - Median adjacent to left-turn bays widened to standard six-foot  
- Tightening the turning radius at side streets and driveways  
- High-visibility crosswalk markings at signalized intersections |
<table>
<thead>
<tr>
<th>Segment</th>
<th>Roadway Details</th>
<th>Crash History Synopsis</th>
<th>Potential Counter Measures</th>
</tr>
</thead>
</table>
| Segment 3: 14th Avenue N to 9th Avenue N | • Length – 0.31 mile  
• Speed - 35 mph  
• Six lanes with narrow raised concrete median  
• High access density (45 access points per mile)  
• Three full median openings  
• Two signalized intersection with full pedestrian features  
• Sidewalks on both sides  
• Street lights | • 13 crashes in six years, none fatal  
• 7.0 crashes per mile per year  
• Two crashes occurred at crosswalk  
• Eight percent of crashes involved pedestrian alcohol  
• None of the crashes involved driver alcohol  
• 38 percent of crashes occurred at night  
• Pedestrian at fault in 38 percent of crashes  
• Six of the Nine crashes with known crash type information, were Dash or Dart  
• All of the nine crashes with information on pedestrian age, were 18 or over | • Median adjacent to left-turn bays widened to standard six-foot  
• High-visibility crosswalk markings at signalized intersections  
• Yield-to-Pedestrian sign for turning vehicles  
• Consolidate the driveways whenever possible  
• Improve drainage at 13th Ave. N.  
• Pedestrian signal was not installed properly |
| | • Sidewalks on both sides  
• Street lights | | • Yield to pedestrian sign for turning vehicles  
• Pedestrian alcohol awareness |
<table>
<thead>
<tr>
<th>Segment</th>
<th>Roadway Details</th>
<th>Crash History Synopsis</th>
<th>Potential Counter Measures</th>
</tr>
</thead>
</table>
| **Segment 4:** 70th Avenue N to 68th Avenue N | - Length - 0.13 mile  
- Speed - 45 mph  
- Six lanes with narrow raised concrete median  
- Access density of 15 access points per mile  
- One skewed signalized intersection with extra long crosswalk (Rank 7)  
- Sidewalks on both sides  
- Street lights  
- AADT is 62,000 | - Five crashes in six years, none fatal  
- 6.4 crashes per mile per year  
- None of the five crashes occurred at crosswalk  
- 20 percent of crashes involved pedestrian alcohol  
- None of the crashes involved driver alcohol  
- 40 percent of crashes occurred at night  
- Pedestrian at fault in eight percent of crashes  
- All of the three crashes with known crash type information, were Dash or Dart  
- Two of the three crashes with information on pedestrian age, were 18 or over | - Change raised median top to flat level alignment  
- Pedestrian alcohol awareness  
- Tightening the turning radius at side streets and driveways  
- Educating pedestrian safety crossing  
- Improving sight distance for right turns |
| **Segment 5:** E Oakwood Street to E Court Street | - Length – 0.33 mile  
- Speed - 45 mph between E Oakwood St. and Boyer St., and 50 mph between Boyer St. and E. Court St.  
- Eight lanes cross section  
- Very high access density (22 access points per mile)  
- One full median opening and one directional median opening | - Seven crashes in six years, none fatal  
- 5.8 crashes per mile per year  
- One of the seven crashes occurred at crosswalk  
- None of crashes involved pedestrian alcohol  
- None of the crashes involved driver alcohol  
- 14 percent of crashes occurred at night | - Yield-to-Pedestrian sign for turning vehicles  
- The transit agency should review all its stop locations to facilitate access and crossing  
- Educating pedestrian safety crossing  
- Add the extra lighting on sidewalks  
- Automatic speed control |
<table>
<thead>
<tr>
<th>Segment</th>
<th>Roadway Details</th>
<th>Crash History Synopsis</th>
<th>Potential Counter Measures</th>
</tr>
</thead>
</table>
| Segment 6: 30th Avenue N to 38th Avenue N | - One signalized intersection with full pedestrian features  
- Sidewalks on both sides  
- Street lights  
- Length – 0.50 miles  
- Speed - 40 mph  
- Six lanes with concrete median  
- Very high access density (34 access points per mile)  
- Seven full median opening  
- One signalized intersection with full pedestrian features  
- Sidewalks on both sides  
- Street lights  | - Pedestrian at fault in 57 percent of crashes  
- Three of the six crashes with known crash type information, were multiple threats  
- Five of the six crashes with information on pedestrian age, were 18 or over  
- 13 crashes in six years, 1 fatal  
- 4.4 crashes per mile per year  
- One of the 13 crashes occurred at crosswalk  
- 23 percent of crashes involved pedestrian alcohol  
- 15 percent of the crashes involved driver alcohol  
- 69 percent of crashes occurred at night  
- Pedestrian at fault in 62 percent of crashes  
- Five of the 10 crashes with known crash type information, were Dash or Dart  
- All of the 10 crashes with information on pedestrian age, were 18 or over  | - Median adjacent to left-turn bays widened to standard six-foot  
- Tightening the turning radius at side streets and driveways  
- Improve the sidewalk  
- Replace full median openings with directional median openings  
- High-visibility crosswalk markings at signalized intersections  
- Yield-to-Pedestrian sign for turning vehicles  
- Pedestrian alcohol awareness  
- Improve the street lighting  
- Educating pedestrian safety crossing |
<table>
<thead>
<tr>
<th>Segment</th>
<th>Roadway Details</th>
<th>Crash History Synopsis</th>
<th>Potential Counter Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Segment 7:</td>
<td>Length – 0.64 mile</td>
<td>12 crashes in six years, 1 fatal</td>
<td>• High-visibility crosswalk markings at signalized intersections</td>
</tr>
<tr>
<td></td>
<td>Speed - 50 mph</td>
<td>3.1 crashes per mile per year</td>
<td>• Consolidate the driveways whenever possible</td>
</tr>
<tr>
<td></td>
<td>Access density of 21 access points per mile</td>
<td>One of the 12 crashes occurred at crosswalk</td>
<td>• Pedestrian alcohol awareness</td>
</tr>
<tr>
<td></td>
<td>Sidewalks on both sides</td>
<td>Eight percent of crashes involved pedestrian alcohol</td>
<td>• Improve street lighting</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eight percent of the crashes involved driver alcohol</td>
<td>• Educating pedestrian safety crossing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>67 percent of crashes occurred at night</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pedestrian at fault in 58 percent of crashes</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eight of the 10 crashes with known crash type information, were Dash or Dart</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eight of the nine crashes with information on pedestrian age, were 18 or over</td>
<td></td>
</tr>
<tr>
<td>Segment 8:</td>
<td>Length – 0.8 mile</td>
<td>14 crashes in six years, 1 fatal</td>
<td>• Median adjacent to left-turn bays be widened to standard six-foot</td>
</tr>
<tr>
<td></td>
<td>Speed – 35 mph</td>
<td>2.9 crashes per mile per year</td>
<td>• Pedestrian alcohol awareness</td>
</tr>
<tr>
<td></td>
<td>Six lanes with narrow raised concrete median</td>
<td>One of the 14 crashes occurred at crosswalk</td>
<td>• Road Diet</td>
</tr>
<tr>
<td></td>
<td>High access density (28 access points per mile)</td>
<td>21 percent of crashes involved pedestrian alcohol</td>
<td>• Replace full median openings with directional median openings</td>
</tr>
<tr>
<td></td>
<td>Full median openings</td>
<td>Seven percent of the crashes involved driver alcohol</td>
<td>• High-visibility crosswalk markings at signalized intersections</td>
</tr>
<tr>
<td></td>
<td>Sidewalks on both sides</td>
<td>71 percent of crashes occurred at night</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pedestrian at fault in 71 percent</td>
<td></td>
</tr>
<tr>
<td>Segment</td>
<td>Roadway Details</td>
<td>Crash History Synopsis</td>
<td>Potential Counter Measures</td>
</tr>
<tr>
<td>---------</td>
<td>----------------</td>
<td>------------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Segment 9:</strong>  &lt;br&gt;118&lt;sup&gt;th&lt;/sup&gt; Avenue N to 110&lt;sup&gt;th&lt;/sup&gt; Avenue N</td>
<td>• Length – 0.57 mile  &lt;br&gt;• Speed - 55 mph  &lt;br&gt;• Six lanes with a wide raised grassy median  &lt;br&gt;• Paved shoulder at some sections  &lt;br&gt;• Missing and discontinuous sidewalks  &lt;br&gt;• Triangle channelizing medians exists at 118&lt;sup&gt;th&lt;/sup&gt;  &lt;br&gt;• Access point density of 14 access points per mile</td>
<td>• Six crashes in six years, two fatal  &lt;br&gt;• 1.8 crashes per mile per year  &lt;br&gt;• None of the six crashes occurred at crosswalk  &lt;br&gt;• 17 percent of crashes involved pedestrian alcohol  &lt;br&gt;• 17 percent of the crashes involved driver alcohol  &lt;br&gt;• 67 percent of crashes occurred at night  &lt;br&gt;• Pedestrian at fault in 67 percent of crashes  &lt;br&gt;• Four of the five crashes with known crash type information, were Dash or Dart  &lt;br&gt;• Four of the five crashes with information on pedestrian age, were 18 or over</td>
<td>• Pedestrian alcohol awareness  &lt;br&gt;• Educating pedestrian safety crossing  &lt;br&gt;• Improve street lighting  &lt;br&gt;• Install the sidewalk  &lt;br&gt;• The transit agency should review all its stop locations to facilitate access and crossing  &lt;br&gt;• Speed control</td>
</tr>
</tbody>
</table>
| **Segment 9:**  <br>118<sup>th</sup> Avenue N to 110<sup>th</sup> Avenue N | • Length – 1 mile  <br>• Speed - 55 mph  <br>• Eight bus stops on one side  <br>• 13 access points per mile | • Eight crashes in six years, two fatal  <br>• 1.3 crashes per mile per year  <br>• None of the eight crashes occurred at crosswalk | • Lower speed limit given the access density  <br>• Move bus stops closer to the intersection  <br>• Consolidate closely-
<table>
<thead>
<tr>
<th>Segment</th>
<th>Roadway Details</th>
<th>Crash History Synopsis</th>
<th>Potential Counter Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment 10:</strong></td>
<td>• Sidewalks on both sides</td>
<td>• 13 percent of crashes involved pedestrian alcohol</td>
<td>spaced stops by eliminating some stops</td>
</tr>
<tr>
<td>Alderman Road</td>
<td>• Eight lanes separated by a raised median</td>
<td>• 13 percent of the crashes involved driver alcohol</td>
<td>Pedestrian alcohol awareness</td>
</tr>
<tr>
<td>to Nebraska</td>
<td>• Some stop bars absent at driveways</td>
<td>• 63 percent of crashes occurred at night</td>
<td>Pedestrian activated signal</td>
</tr>
<tr>
<td>Avenue</td>
<td>• Pedestrian sight distance at Alderman Road is limited</td>
<td>• Pedestrian at fault in 25 percent of crashes</td>
<td>Improve pedestrian sight distance at the intersection of Alderman Rd.</td>
</tr>
<tr>
<td></td>
<td>• Faded lines at Nebraska Ave. crossing U.S. 19</td>
<td>• All of the two crashes with known crash type information, were Dash or Dart</td>
<td>Educating pedestrian safety crossing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• All of the three crashes with information on pedestrian age, were 18 or over</td>
<td>Speed control</td>
</tr>
</tbody>
</table>
Chapter 4: Preliminary Recommendations

Preliminary Recommendations

Pedestrian safety planning must include an understanding of the characteristics of travel by pedestrians. Without understanding the needs of pedestrians, pedestrian safety planning cannot be done effectively. Some of the major planning, design and policy elements that impact pedestrian safety include:

- Land Use and Access Management
- Site Design and Street Connectivity
- Street Roadway Design

Based on current planning, design and policy elements, the following issues play a key role in the pedestrian’s safety:

- Primary reasons to Cross
  - If the origin and destination are not on the same side of the roadway
  - If the sidewalk is missing along the path
- Crossing Choices – Pedestrians often optimize crossing locations based on perceived safety and convenience and will cross at locations that may not be as safe to minimize delay.
- Traffic characteristics – Speed, volume and crossing width play a role in the pedestrians’ choice to cross at a signalized controlled intersection or at mid-block location. At forced-flow locations or intersections with multiple conflicts, pedestrians may opt to cross at mid-block locations that are perceived as being safer.

Based on these items, preliminary recommendations were identified for the high crash segments on Pinellas County U.S. 19. The following table in this section of the report documents these recommendations on the specific segments to the extent that the recommendations can be implemented within the exiting right-of-way.
<table>
<thead>
<tr>
<th>Location</th>
<th>Improvement Details</th>
<th>Cost (Low/Med./High)</th>
<th>Feasibility (Low/Med./High)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Segment One - U.S. 19: 5th Avenue N to 4th Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; 5th Avenue N Intersection - Southwest Corner</td>
<td>Consolidation of Driveways reduces number of conflicts to pedestrians during their travel long the roadway</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19 &amp; 5th Avenue N Intersection - Southwest Corner</td>
<td>Reducing the driveway width can reduce the pedestrian exposure to the driveway traffic</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19: 5th Avenue N to 4th Avenue N</td>
<td>Median width can be increased from existing 4-feet to 6-feet by reducing the adjacent travel lanes by one foot</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19 &amp; 5th Avenue N Intersection</td>
<td>Crosswalk should be re-aligned and existing median nose should be extended into the crosswalk to serve as refuge island for pedestrians</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 5th Avenue N Intersection - Southeast Corner</td>
<td>Driveways located in the Southeast corner do not have any access control and installing control features (Stop Bars and Stop Signs) would improve the pedestrian conditions at this intersection</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 5th Avenue N Intersection</td>
<td>Right-turn on Red movements at this intersection should be controlled by “Yield to Pedestrian s” signs to increase the compliance rate of right-turn vehicle.</td>
<td>Low/Medium</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 4th Avenue N Intersection</td>
<td>4th Avenue N is controlled by a stop sign with no median opening. Changing the current turning radius to minimum possible radius will reduce the speed of turning vehicles and will reduce the crossing distance for pedestrians</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19: 5th Avenue N to 4th Avenue N</td>
<td>Distributing information flyers about Pedestrian Alcohol Awareness using the businesses as a distribution channel may have some positive influence on the pedestrians and drivers</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19: 5th Avenue N to 4th Avenue N</td>
<td>Multiple driveway access points to the existing Night Club can be consolidated to one Driveway access point, which will reduce the number of conflict points to be maneuvered by the pedestrians</td>
<td>Medium/High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Segment Two: 64th Avenue N to 62nd Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; 64th Avenue N</td>
<td>Stop bars are faded and need to be re-marked at this intersection. Introducing the crosswalk markings on 64th Avenue will define the pedestrian path and may assist the vehicles to stop at the intersection without blocking the pedestrian path</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 63rd Avenue N</td>
<td>Turn radii on 63rd Avenue can be reduced to minimize the pedestrian crossing width</td>
<td>Medium/High</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 62nd Avenue N</td>
<td>Re-locating the bus stop close to the intersection (NB direction) may eliminate the unwanted mid-block crossing along this section of the roadway</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19: 63rd Avenue N to 64th Avenue N</td>
<td>Business located @ 6390 U.S. 19N has multiple access points and can be consolidated into one driveway to reduce number of conflicts to pedestrians</td>
<td>Medium/High</td>
<td>High</td>
</tr>
<tr>
<td><strong>Segment 3: 14th Avenue N to 9th Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 @ 14th Avenue N</td>
<td>14th Avenue N is a stop controlled intersection and it has a full median opening, but it is too narrow to store left turning vehicles on U.S. 19 and a directional median opening is recommended to limit number of conflicts at this intersection</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19 &amp; 13th Avenue N</td>
<td>Pedestrian signal heads at the intersection are facing the wrong direction and are not visible to the pedestrians. These signal heads should be oriented in the right direction to be visible to the pedestrians to get better use</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 13th Avenue N - Northeast Corner</td>
<td>Drainage conditions are not good at the intersection and pedestrians are forced to cross the roadway using the roadway</td>
<td>Medium/High</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19 &amp; 13th Avenue N</td>
<td>Crosswalk markings at this intersection are not straight and they need to be straightened, and the median nose should be extended into the crosswalks for use by pedestrians as a refuge area during their crossing</td>
<td>Low/Medium</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 @ Wendy’s Food</td>
<td>Consolidation of driveways is possible at this business location without affecting their access</td>
<td>Medium/High</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Segment 4: 70th Avenue N to 68th Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; 70th Avenue N</td>
<td>Existing painted traffic island in the right turn lane at 70th Avenue N can be replaced with concrete median to improve the safety to pedestrians</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>Location</td>
<td>Improvement Details</td>
<td>Cost (Low/Med./High)</td>
<td>Feasibility (Low/Med./High)</td>
</tr>
<tr>
<td>----------</td>
<td>---------------------</td>
<td>----------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td><strong>Segment 4: 70th Avenue N to 68th Avenue N (CONTINUED)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; 67th Avenue</td>
<td>Turning radii at this intersection is very large which makes the pedestrians crossing width longer. If the truck traffic is not significant on 67th Avenue, the radii can be reduced to minimize the crossing width for pedestrians</td>
<td>Medium/ High</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Segment 5: E Oakwood Street to E Court Street</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; Oakwood Street</td>
<td>Stop sign is facing the wrong direction and need to be fixed to face the auto traffic instead of pedestrians. No trucks sign is facing the sidewalk instead of the roadway and needs to be oriented the right direction</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19: Oakwood Street to Court Street</td>
<td>Sidewalk is missing on some sections of this roadway segment and can be included in the work program to provide continuous sidewalks</td>
<td>Medium/ High</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 and MLK Drive</td>
<td>Adding crosswalk markings and pedestrian signal heads at this intersection will greatly enhance the pedestrian safety</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td><strong>Segment 6: 30th Avenue N to 38th Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 and 38th Avenue N</td>
<td>Crosswalk markings at this intersection are faded and need to be re-painted with high visibility paint. Some of the legs at this intersection have right-turn lanes and to eliminate the conflicts with right-turn movements, medians (refuge islands) separating the thru traffic and right turn lanes are recommended</td>
<td>Medium/ High</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 and 38th Avenue N</td>
<td>Pedestrian signal push buttons are missing and not visible to the users easily. Re-arrangement of pedestrian buttons may increase the usage levels of the pedestrian signal at this intersection</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; 30th Avenue N</td>
<td>Existing faded crosswalk markings need to be re-painted. Crosswalk markings are missing on some legs of the intersection and new markings are recommended along with count-down pedestrian signal heads</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19: 38th Avenue to 30th Avenue N</td>
<td>Considerable amount of businesses have multiple access points and these can be consolidated into a single access point. Also most of the driveways are wide and not well defined. Re-defining the driveways will help the pedestrian travel along the roadway</td>
<td>High</td>
<td>Low/ Medium</td>
</tr>
<tr>
<td><strong>Segment 7: Harn Blvd to Belleair Road</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; Harn Boulevard</td>
<td>Exiting crosswalk markings on all legs are faded and need to be re-painted</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; Belleair Road</td>
<td>Exiting crosswalk markings on all legs are faded and need to be re-painted. Pedestrian signal push buttons should be named with the local road names along with the State Road names to be able to understand by the users</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; Nursery Road</td>
<td>Exiting crosswalk markings on all legs are faded and need to be re-painted</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 &amp; Seville Road</td>
<td>Crosswalk markings are missing on Seville Road and installation of new markings recommended</td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>Segment 8: Fairfield Avenue to 18th Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 &amp; 15th Avenue S</td>
<td>Driveways are very close to the intersection and proper control features and marking are needed to avoid the conflicts between pedestrians and driveway traffic</td>
<td>Low/ Medium</td>
<td>Medium</td>
</tr>
<tr>
<td><strong>Segment 9: 118th Avenue N to 110th Avenue N</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19: 110th Avenue to 118th Avenue</td>
<td>Sidewalks are missing along this section of the roadway and can be included in the work program</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>U.S. 19 @ 116th Avenue</td>
<td>Existing painted triangle at the intersection separating the right-turn lanes and thru lanes can be replaced with concrete islands to improve the pedestrian safety</td>
<td>Medium</td>
<td>High</td>
</tr>
<tr>
<td><strong>Segment 10: Alderman Road to Nebraska Avenue</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U.S. 19 @ Alderman Road</td>
<td>“Yield to Pedestrians” signs should be placed in the right-turn only lane or in the pork chop island to increase the pedestrian awareness along this section to the road</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19 &amp; Alderman Road</td>
<td>There is limited site distance for the traffic that is making right-turn from Alderman Road on to U.S. 19. Moving the stop sign to better location that will minimize the sight distance issues</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>U.S. 19 &amp; Nebraska Avenue</td>
<td>Crosswalk markings on Nebraska Avenue are either missing or needs to be re-painted to increase the visibility of them at the intersection</td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>
General Recommendations

Balancing the mobility and accessibility on U.S. 19 is a difficult task. The speed limit is 50 or 55 mph at many segments along the corridor. The high speeds and long crossing distances at crosswalks makes pedestrian crossings more difficult, especially at non-signalized controlled mid-block locations. To improve pedestrian safety, each roadway design element (signal, crosswalks, medians, signs, etc.) was analyzed to determine if the greatest level of safety and accommodation is being provided to the pedestrian without incurring a significant loss of capacity to vehicular traffic.

At Signalized Intersections

Crosswalks: Most of the intersections on U.S. 19 are built to standards, but minor enhancements such as high-visibility markings (crosswalks marked with white longitudinal lines) or Zigzag markings at all intersections (at least at the identified top 10 intersections) may improve the visibility of crosswalks to the motorists. Furthermore, due to the vehicle speed and large size of intersections, 15- to 20-foot-wide high-visibility crosswalks should be considered instead of the existing 12-15-foot-wide crosswalks. The wider crosswalks will be more visible to motorists from a greater distance thereby increasing driver awareness of the potential presence of pedestrians. The double white line crosswalks were found at the most intersections on U.S. 19. The high-visibility marking was found at only one intersection on U.S. 19.

Pedestrian Countdown Signal: Pedestrian countdown signals tell the pedestrian how much time is left in the pedestrian clearance interval. A countdown signal has been installed at the newly modified intersection at Drew Street and U.S. 19 (see Appendix A). FDOT has aggressively installed countdown signals throughout District 7 and programmed for the replacement of existing old pedestrian heads with these newly adopted pedestrian countdown signal heads thru local agency programs. As the replacement program is in implementation in this County, all the intersections along the U.S. 19 corridor soon will be equipped with these new countdown signal heads.

Pedestrian Refuge Islands: Pedestrian refuge islands are defined as the areas within an intersection or between lanes of traffic where pedestrians may safely wait until vehicular traffic clears, allowing them to cross a street. These islands provide a resting area for pedestrians, particularly those who are wheelchair-bound, elderly, or otherwise unable to
completely cross an intersection within the allotted walk time. They also separate conflicting movements so that roadways may be crossed in stages thereby improving overall signal efficiency. The following table shows the approximate gap times needed for pedestrian crossing with and without medians and/or channelized right-turn lanes.

Table 4-1: Estimating Gap Times

<table>
<thead>
<tr>
<th>No. of Lanes</th>
<th>Width (ft)</th>
<th>Median (Y/N)</th>
<th>Channelized (Y/N)</th>
<th>Crossing Width at a Time (Ft)</th>
<th>Max. Gap Needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>96</td>
<td>N</td>
<td>N</td>
<td>96</td>
<td>27 Sec.</td>
</tr>
<tr>
<td>8</td>
<td>96</td>
<td>N</td>
<td>Y</td>
<td>72</td>
<td>21 Sec.</td>
</tr>
<tr>
<td>8</td>
<td>96</td>
<td>Y</td>
<td>Y</td>
<td>36</td>
<td>10 Sec.</td>
</tr>
<tr>
<td>6</td>
<td>72</td>
<td>N</td>
<td>N</td>
<td>72</td>
<td>21 Sec.</td>
</tr>
<tr>
<td>6</td>
<td>72</td>
<td>N</td>
<td>Y</td>
<td>48</td>
<td>14 Sec.</td>
</tr>
<tr>
<td>6</td>
<td>72</td>
<td>Y</td>
<td>Y</td>
<td>24</td>
<td>7 Sec.</td>
</tr>
</tbody>
</table>

**Leading Pedestrian Interval:** At signalized intersections, left and right turning vehicles present a danger to pedestrians crossing during the WALK interval. Crash statistics show that pedestrians are mainly vulnerable to left turning vehicles. To reduce these conflicts, one solution is to program the traffic signals to allow pedestrians to begin crossing before the vehicles traffic is given green light. This technique is commonly referred as “Leading Pedestrian Interval”. Recent research efforts (at three signalized intersections in downtown St. Petersburg, Florida) showed that this kind of treatment at signalized intersections resulted in a decrease in pedestrian/motor vehicle conflicts and an increase in the percentage of motorists that yield right of way to pedestrians. The possibility to add this technique at all signalized intersections should be evaluated with the help of local agencies and FDOT staff who are in control of these signals.

**Yield to Pedestrian Sign:** Yield to pedestrian signs can be installed to remind motorists to yield to pedestrians when making right turns on the right turn lanes. The right turn lanes and large turning radius are often provided at most intersections on U.S. 19. However, there was no regulation sign such as “Yield to Pedestrians” observed in the field.
At Mid-Block Segments

Median Widening: The median was recommended to be widened to a AASHTO standard of 4-foot width minimum and to 6 feet where possible. In south Pinellas County, in the City of St. Petersburg, some sections have narrow medians (see Appendix A for a series of pictures) and the median can be widened to a minimum of 4 feet by reducing the travels lanes by ½ to 1 feet during the re-striping of the roadway.

Pedestrian Barriers: Pedestrian barriers are the most common treatments used to prohibit mid-block crossing. Two possible pedestrian-barrier treatments are steel railings or decorative concrete planters. The steel railings have been installed along the sidewalks to separate sidewalks from the deep grade ditch. A wood fence barrier was installed along a bridge at the north of 38th Avenue N. Pedestrian barriers should be considered for installation at the segments where pedestrian crossings would be especially hazardous.

Mid-block Pedestrian Traffic Signal: Pedestrian activated signal, such as the Tucson style PELICAN crossings and High-intensity Activated Crosswalk (HAWK), can be considered for installation at the mid-block locations where the signal spacing is extensively long and pedestrian volume and number of bus stops are relatively high.

It should be noted that there are some restrictions about installing mid-block crosswalks in the MUTCD. Section 4D states that “Mid-block crosswalks should not be signalized if they are located within 30 meters (100 feet) from side streets or driveways that are controlled by STOP signs or YIELD signs; and Mid-block crosswalks shall not be signalized if they are located within 90 meters (300 feet) from the nearest traffic control signal, unless the proposed traffic control signal will not restrict the progressive movement of traffic.”

Limit Number of the Access Points: The study showed that the number of pedestrian crashes increases exponentially with the increase of access density along U.S. 19. The field reviews also found that many properties have more than one access point. With the help of access management principles, some of the un-utilized and/or under-utilized driveways can be consolidated and/or removed to eliminate pedestrian conflicts.
However, the higher access points may be directly related to higher origin and destinations resulting in more pedestrians.

**Tighter Turn Radius:** It was observed that the right turning radii are very wide at most signalized and unsignalized intersections. Figures in Appendix A shows an example of a wide turning radius along this roadway. Tightening the intersection radius has many benefits for pedestrians: it shortens the crossing distance, increases visibility of the pedestrians or the approaching motor vehicles, slows right-turning vehicles, and often makes it easier to install two ADA compliant curb ramps at each corner.

**Bus Stops:** There were eight different bus routes and numerous bus stops along U.S. 19. Most of the top 10 high crash segments have a very high bus stop density. Transit users have to cross U.S. 19 at least once per day to catch the bus at many locations. Mid-block bus stops increase the occurrence of mid-block crossing as noted in field observations which indicated that the bus passengers are unlikely to walk to the closest signalized intersection to use the crosswalk. Most of them will cross from wherever they get off the bus stop. The results of data analysis also show that a high number of pedestrian crashes are related to transit. Figures included in Appendix A of this report shows bus stops which has no connection to a sidewalk for pedestrian access. These techniques can be used to reduce transit related crashes, including:

- Consolidating closely-spaced stops;
- Improving the pedestrian crossings or moving stops to a location where it is easier to cross;
- Improving the sidewalks to provide pedestrian access to the transit stops;
- Improving the bus stops to provide a safe place to stand and wait; and,
- Providing extra lighting at or near all bus stop location for security and safety reasons.

**Improve Street Lighting:** Street lighting exist long most parts of U.S. 19. The crash data analysis shows that over 50 percent of pedestrian crashes occurred during the night and most of the crashes resulted in severe injury or fatal crashes. Additional evaluation of the night time crashes with the street lighting level shows that most of pedestrian crashes happened at the segments with a lighting level less than 10 lux. Improved street lighting may reduce the number of crashes along this roadway.
Educating Pedestrian Crossing Safety: The crash data analysis shows that a high percentage of crashes involved pedestrians using alcohol and/or pedestrian at fault in the crash. This implied that education and enforcement may be more effective than design changes along this roadway. Some of these publications have been posted on the pedestrian safety publications page at FDOT Website: http://www.dot.state.fl.us/safety/ped_bike/brochures/ped_bike_brochures_walking.htm

The “Crosswalk Safety” brochure can be distributed to pedestrians at bus stops or be distributed by the bus drivers.
Appendix A: High Crash Segment Illustrated Overview

Segment one: 5th Avenue to 4th Avenue
Dartmouth Ave

This intersection was ranked as No.2 high crash intersection. It is actually a driveway with no median opening. There is a median opening 200 ft. downstream for U-turns.

Dartmouth Ave-Median

The raised curb median is about 4 feet wide, which is less than standard width to be used as refuge area.

5th Ave N Southwest Corner

There are two wide driveways for the gas station at the southwest corner of the 5th Ave N. Intersection. A right-in and right out access control can reduce a number of conflicts at the intersection. The width of the driveway can be reduced.
The driveway is too close to the intersection. This creates many conflicts. The excessively wide driveway increases the pedestrian exposure.

Double white line crosswalk for all four directions under the control of pedestrian signals. To make the crosswalks more noticeable to motorists, high-visibility markings (crosswalks marked with white longitudinal lines) are recommended.

Even though there a crosswalk at this intersection, Pedestrian is not using the crosswalk and trying to cross where the median is located in order to use the median as refuge area when crossing. Pedestrian Refuge Island may provide a sense of safety when pedestrians crossing the intersection.
Potential conflicts with the right-turning vehicles.

Pedestrians tend to cross the street in the shortest distance.

No access control at the southeast corner of the intersection.
The grade on the sidewalk may not meet the ADA standard. Wide driveways make it unsafe to walk on the sidewalk.

The bus stop at the far side of the intersection draws many pedestrians. The driveway should be designed in a relatively flat and level alignment.

Bicyclist is using the median as refuse area while crossing the roadway, which do not have dedicated bicycle facilities.
A full median opening can be replaced with a directional median opening to limit number of the conflicts.

4th Ave. N is controlled by a stop sign with no median opening on US 19. In these situations, providing tighter radius at the intersection will shorten the crossing distance for pedestrians and slow turning vehicles.

The transit stops must provide a safe place to stand and wait. The lack of a defined waiting area is undesirable, especially for children.
Nighttime Activities

A night club was found in this segment. Pedestrian Alcohol Awareness may be needed for this segment to minimize alcohol related crashes along this section of the roadway.
Segment 2: 64th Ave to 62nd Ave

64th Ave

Faded or absent stop line for stop sign at the 64 Ave.

Full Median Opening

Full median opening next to driveway may encourage motorists to traverse three travel lanes to make a left turn. This may cause additional conflicts for pedestrians.

Raised Curb Median

The raised curb median provides a refuge for pedestrian to cross the street in the two steps.
The driveway at the 63rd St. has a wide turning radius.

Relocating the bus stop close to the intersection may eliminate the unwanted mid-block crossings at this location.

Double white line crosswalk markings exist at the intersection of 62nd Avenue.
No access control at one corner of 62nd Ave. The North bound US 19 has a relatively high grade. It may encourage speeding. Automatic speed enforcement will be needed for this segment.

Multiple driveways for one business.

14th Ave N is a stop sign controlled T-intersection with a full median opening. The vehicles from nearby driveway apparently have a sight distance problem if they stop behind the stop bar.
The full median opening is too narrow to store left turning vehicles at an angle. A directional median opening was recommended to limit number of conflicts at this intersection.

Continuous sidewalks are present on both sides.

Section of the roadway has raised curb median with landscape, which can be used as refuge area during the mid-block crossing by pedestrians.
It is a signalized intersection with full pedestrian features.

The median width is narrow due to the addition of left turn lane with in the right-of-way.

Drainage issue at the northeast corner of the intersection.
The pedestrian signal is not visible for pedestrian. The face of pedestrian signal is not 90 degree to the pedestrian.

The pedestrian signal is not visible for pedestrian crossing 13th Ave. The orientation of pedestrian signal need to be fixed at this intersection.

It can be seen from about 30 degree angle. The pedestrian signal heads can be replaced with count-down pedestrian signal heads.
This new median provides some ease in crossing the roadway with a two-stage approach.

A full median opening between 13th and 9th Ave. N.

On pavement marking (right turn only) may increase the driver’s attention and improve the compliance.
The crosswalk should be straight to minimize the crossing distance and time. Pedestrians tend to cross the street in the shortest distance. While straightening the crosswalk, existing median can be used as refuge island to split the one single crossing trip to two stage crossing trips, which needs smaller gaps.

Pedestrian like to stand on the raised median, instead of on the marked pavement. The permitted left turns created conflicts with pedestrians.

Pedestrian will use the short-cut in stead of the angle paved crosswalk.
9th Ave N

The driveway to the gas station is very close to intersection.

Bus Stops and Driveways

Bus stops should be placed at ideal locations, i.e., locations with minimum conflicts for crossing safely.

Unnecessary Curb Cut

Driveway consolidation will reduce the number of conflicts along the roadways.
A pork-chop island can help pedestrian crossing the 70th Ave safely.

Filed observations shows that the right-turn vehicles typically do not stop behind the stop bar because of sight distance issues.

The view of right turning drivers was blocked by the through vehicles. The solution would be either to move the right turn stop bar forward or prohibit right turns on red.
Pedestrian and Right Turn Conflicts

Reducing the turning radius at this side street will decrease the speed at which automobiles make right turns and it will reduce the pedestrian crossing distance.

When a pedestrian is making a mid-block crossing, grade of the raised median make him uncomfortable to split the crossing trip into two phases. Changing the raised median to a flat surface will help the pedestrian to make sue of the median as refuge area.

The driveway should be designed in a relatively flat and level alignment.
Reducing the turn radii will reduce the pedestrian exposure to the traffic while crossing the roadway. The picture shows that pedestrian crossing the side street looking left turn side because of the high turning speed of right turn vehicles.

The big turning radius make the side street is two to three times wide than its actual width.

The sight distance for right turning vehicles is insufficient at this intersection.
Segment 5: Oakwood Street to Court Street

Oakwood St.

Stop sign seems to be turned more towards the pedestrian and not the vehicles. Also, it is located after the sidewalk.

Oakwood St.

No Trucks sign faces directly to the sidewalk instead of the roadway.

A Bus Stop

Along this section, bus stop sign is missing at this location.
A Bus Stop

Sidewalk is absent at this location and concrete pad is recommended at the bus stop.

Sidewalks

The sidewalks are located far from the roadside. Additional lighting will improve safety and security.

Sidewalks

At one of the intersection, crosswalk markings are missing and adding crosswalk markings at the location will assist the motorists and pedestrians to identify their right-of-way at the intersection.
M. L. King Dr.

At the intersection of MK King Drive and US 19, there are no crosswalk markings and pedestrian signal head to assist pedestrians. Adding these two features will reduce the number of conflicts and may

Segment 6: 38th Ave to 30th Ave (Business District)

Business District

This section of the roadway is located in the City of St. Petersburg 34th Street Business District.

38th Ave N

The crosswalk markings on some legs of the intersection are faded and needs fresh markings. Some legs of the intersections have right-turan lanes and to eliminate conflicts and to reduce the crossing width by pedestrians, medians (pork-chop type) recommended between thru lanes and right-turn lanes.
Angle crosswalk increases the crossing distance and causes the sight distance problem for right turning vehicles.

Right turn vehicles will be most likely to block the crosswalk because of sight distance issues.

Missing push button to cross 38th Ave.
38th Ave N

Slightly obscured pedestrian push button and instructions.

38th Ave N

Hidden pedestrian push button to cross 34th St.

38th Ave N

Missing the push button at the intersection of 38th Ave N.
Faded crosswalk lines. Recommend to repaint the high visibility zebra crosswalk, and install a pork-chop island between the right-turn lane and the through lanes.

Installing a pork-chop island between the right turn lane and through lanes can shorten the crossing, resulting in less pedestrian exposure.

Sidewalk repair need for the northeast corner of the intersection.
38th Ave N

Faded crosswalk, Recommend to repaint the high visibility zebra crosswalk.

Crossing at Uncontrolled location

Pedestrian crossing at mid-block between stopped cars and within walking distance of the closest crosswalk.

Crossing at Mid-Block

Pedestrian trapped in-between stopped cars, trying to cross the road.
Missing stop sign.

Absant stop-line and discontinuous sidewalk. Consider using pavement marking when driveways are 36 ft or more.

Pavement Marking Need

Use pavement markings when driveways are 36ft or more. This driveway width is apparently more than 36 ft.
Missing Sidewalk

No sidewalk present forcing pedestrian to walk along road. A bus stop is also present which means there may be times when a pedestrian must wait on the side of the road without a sidewalk to stand on.

Median

Median is becoming narrow when a left turn bay is added.

Wide Driveway

Wide driveway that is not well defined.
Drainage Issues

Drainage issues at curb forced a pedestrian to walk in roadway.

Wide Open Driveway

Driveways not well defined.

Driveway

It is common to have two driveways connections for one business property.
Wide undefined driveway next to a full median opening.

Undefined wide driveway.

Faded crosswalk.
30th Ave. N

Faded crosswalk.

30th Ave. N

Faded crosswalk.

30th Ave. N

Faded crosswalks.
No crosswalk for crossing US 19 at the south of the intersection.

No crosswalk for this side of intersection. However, when a pedestrian is standing at the corner, the vehicles tend to stop behind the stop bar.

No crosswalk for this side of intersection. However, when a pedestrian is standing at the corner, the vehicles tend to stop behind the stop bar.
30th Ave. N

Mid-block Crossing

Pedestrian crossing the roadway at mid-block.

Mid-Block Crossing

Pedestrians crossing the road at amid-block.
Median

A median with a grade makes it difficult for a pedestrian to stand on it.

Right-Turn-Out-Only

Good pavement marking for Right-Turn-Out-Only.

Driveway

Wide driveway with no sign control and no pavement marking.
Bad driveway conditions and broken sidewalk needs some repairs along this section of the roadway.

Fire hydrant located in the middle of the sidewalk blocks the path for pedestrians and cyclists. Relocate fire hydrant. Using the existing right-of-way, sidewalk can be re-aligned by avoiding the fire hydrant. There are similar locations where fire hydrants are located in the middle of the sidewalk, which can be re-aligned to avoid fire hydrants in the sidewalk.

All crosswalk markings at the intersection of Harn Blvd and US 19 are faded and needs new markings.
Pedestrian signal at intersection with faded crosswalk.

Faded crosswalk at the intersection of Nursery Road.

High access density along this section of the roadway posts multiple threats to the pedestrians.
Faded crosswalk markings at the intersection of Belleair Road needs fresh markings.

Pedestrian signal push buttons at Belleair Road. The push button signs show the road name SR 5, instead of local name US 19.

Crosswalk markings are missing at the intersection of US 19 and Seville Boulevard.
Segment 8: Fairfield Ave to 18th Avenue South

18th Ave S

Narrow median along US 19. Gas station driveway located near the intersection.

The pedestrian is standing on a narrow median.

A school zone is located near the 18th Avenue South and may have good amount of pedestrian crossings during school starting and ending times.
Full Median Openings

Bicyclists crossing lanes at full median openings.

Pedestrian Crossing

Pedestrian running across roadway even though the cross walk is located a few feet from where he is crossing.

Driveway is very close to the intersection with control signs.
Zebra Crosswalks

Zebra crosswalks with pedestrian signal heads will increase the significance of crosswalk at the intersection and become more attractive by pedestrians instead of un-controlled mid-block crossings at or near the intersections.

Overpass

Overpass connects the bus stop and allows transit users to cross the road using the overpass.

Segment 9: 118th Avenue N to 110th Avenue N

110th Ave.

No sidewalk and no crosswalk available to cross at 110th Ave.
No Sidewalk

No sidewalk or concrete pad at the bus stop.

A pedestrian getting off the bus and crossing the roadway near the bus stop.

A pedestrian waiting in the median for a traffic gap to cross the second part of the roadway.
Bus stop located where no sidewalks are present. Sidewalk should be built to provide pedestrian access to all transit stops.

The right turn lane makes it unsafe to walk along the street. Providing sidewalk will increase the safety for pedestrians along this section of the roadway.

Driveway with no access control.
Bus stop located where no sidewalks are present. Pedestrians would be trapped between vehicular traffic and a ditch.

The median is narrower due to a left turn lane being added. Pedestrians standing on narrow medians don’t feel safe, especially when the vehicle speeds are above 55 mph.

Sidewalk ends abruptly at the intersection of 118th Avenue and forces the pedestrians into the travel lane.
Stop Bar for Right Turns

The stop bar was painted 5 ft ahead of through traffic to increase the sight distance for right turning vehicles.

Replacing the painted triangle with a pork-chop island may improve pedestrian safety.

The turning radius for the driveway is very large. It will increase right turn speeds and affect pedestrian safety.
Bus stops and approximately one mile long signal spacing will increase the mid-block crossing.

Bus stop located along roadway with a slope. Transit agency should review all its stop locations to facilitate access and crossings.

With no sidewalk, pedestrians will be forced to use the shoulder (if there is any) and will be walking along the roadway. Walking on the shoulder can also be dangerous with the number of larger vehicles traveling on this segment.
Segment 10: Alderman Road to Nebraska Avenue

Alderman Rd

Yield to Pedestrian Sign is recommended at the Right-turn only lane, in the pork-chop island.

A well designed crosswalk will always get better usage at any intersection. Cyclist and pedestrian using the well designed crosswalk at Alderman Road.

Pedestrian and cyclist waiting on triangle island.
Pedestrian Activities

A pedestrian used the raised median as a refuge area when crossing the wide intersection. A pedestrian refuge island provides a resting area for pedestrians.

Limited sight distance for the motorist turning right at the intersection of Alderman Road.

Signs at Alderman Road.
Recommend installing a stop sign for the driveway.

Traffic separator median width goes down from 14-feet to 4-feet when approaching the intersection.

Crosswalk markings at the intersection of US 19 and Nebraska Avenue are faded and needs to be re-marked.
The stop bar marking should be located behind sidewalk.

Drew Street had been number 5 on the high crash intersection list but has recently been modified. The Drew Street intersection is now grade-separated with a single-point urban interchange. LED count-down signals have also been installed.

High visibility markings were found to be used at the intersection of Klosterman and US 19.