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TRAFFIC SAFETY PLAN FOR ELDERLY PEDESTRIANS

For

Public Works Department

Miami-Dade County

By

Lehman Center for Transportation Research

Florida International University

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14. ABSTRACT (Maximum 200 words)
The Miami-Dade Public Works Department sponsored this research to investigate the safety of elderly pedestrians at road segments and intersections in Miami-Dade County. The study investigated 10 of the most dangerous locations for elderly pedestrians in Miami-Dade County. Based on this study, a series of countermeasures to help improve the safety of elderly pedestrians were presented. These countermeasures included Engineering countermeasures and non-engineering intervention methods like education and enforcement.

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Traffic Safety Plan

For Elderly Pedestrians

Final Report

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Introduction

In the increasingly complex transportation environment, walking is part of almost every trip. The walking environment, however, may present some challenges for elderly pedestrians. The dominance of vehicles with high speeds and heavy traffic volumes on the main roads place high demands on pedestrian safety, in particular to the elderly. During the past 15 years, more than 76,000 Americans have been killed while crossing or walking along a street in their community. In these statistical figures, children, seniors, and minorities have been particularly disproportionately represented. Yet, all people are likely to be impacted during the simple act of walking. These fatalities are often attributed to motorists or pedestrians errors. They usually occur on roadways that are dangerous by design: streets that have been engineered for cars, with little or no consideration for the mobility of pedestrians, people in wheelchairs, or people on bicycles **(**Michelle Ernst, Lilly Shoup 2008**)**.

According to Staplin (2001), an increasing number and percentage of senior drivers will use the Nation's highways in the future. This poses many challenges to transportation engineers to ensure system safety while increasing operational efficiency. According the Unites State Census 2000, the elderly age group included 34.7 million people, and was expected to grow to more than 36 million by 2005 and exceed 50 million by 2020.

According to the National Highway Traffic Safety Administration's (NHTSA) Fatality Analysis Reporting System (FARS), more than 9,000 pedestrians were killed in collisions with cars and trucks in 2007 and 2008, and 70,000 more suffered injuries in 2008 alone. The most dangerous metropolitan areas in the U.S. for walking in 2007-2008 included the following cities: Orlando, Tampa, Miami, Jacksonville, Memphis, Raleigh, Louisville, Houston, Birmingham and Atlanta (Michelle Ernst, Lilly Shoup 2008). Ernst and Shoup also reported that at the state and local levels, no state spent more than 5 percent of the federal transportation funds on sidewalks, crosswalks, traffic calming, speed humps, multi-use paths, or safety programs for pedestrians or cyclists. This is in spite of the increase of more than 30 percent in the total federal transportation dollars allocated to states with the passage of SAFETEA-LU in 2005.

In the State of Florida, Miami-Dade County has been experiencing a significant number of pedestrian injuries and fatalities. Figure 1 depicts the total number of pedestrian fatalities in the state of Florida, being the elderly one of the most affected segments of the population. The purpose of this study is to investigate the safety of elderly pedestrians at intersections and road segments in Miami-Dade County. To accomplish this, a two-fold approach is proposed: 1) investigate the most dangerous locations for elderly pedestrians in Miami-Dade County and 2) provide countermeasures that can help improve their safety. The countermeasures include engineering and non-engineering treatments such as education and

enforcement. The recommendations consider the needs and capabilities of elderly pedestrians, so that the proposed improvements can help improve their safety.

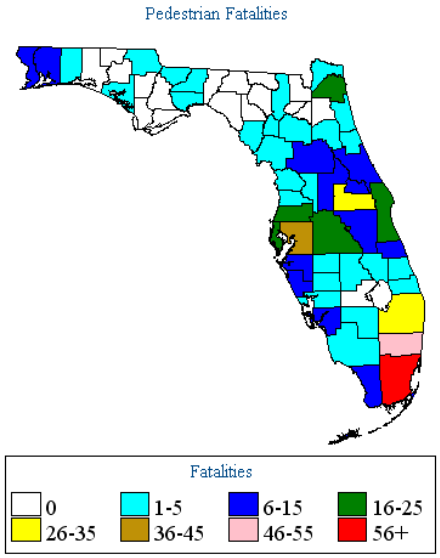

Figure 1: Average Pedestrian Fatalities by County

Source: Traffic Safety Facts Florida 2004-2008

Miami-Dade County Settings

Miami-Dade County encompasses nearly 2400 Square miles with 1/3rd of the area lying within Everglades National Park. The county is home to the City of Miami and 34 other jurisdictions. The Miami-Dade County government has responsibility for all transportation operations and improvements within the area, and works closely with the City of Miami and other local officials.

Crash Demographics in Miami-Dade County

According to the U.S. Census 2000, the population of Miami-Dade County was 2,253,362, which was about 14 percent of the Florida's total population (Miami-Dade Pedestrian Safety Project, FDOT 2005, and FDOT 2008). The population is diverse; it has a significant elderly population; it is a main tourist attraction and home to large minority populations, predominantly Hispanic (57.3 percent). In addition, the per capita pedestrian fatality and injury crash rates are very high.

Among the 82 pedestrian deaths in 1999, nearly half of the involved pedestrians were seniors. African Americans were over- represented in terms of population with a crash rate approximately 50 percent

higher than their proportion of the population, and Hispanic Americans were underrepresented with a rate less than half their proportion of the population. A study conducted by the Federal Highway Administration (FHWA) and National Highway Transportation Safety Administration (NHTSA) utilized focus groups to gather information from Hispanics regarding pedestrian behaviors, awareness of regulations, and sources of information (USDOT, FHWA, 2008).

According to a 2004 report by the Center for Applied Research and The Media Network, an average of 545 Hispanic pedestrians and 79 Hispanic bicyclists are killed in crashes with motor vehicles every year. These numbers are likely to increase as the Hispanic population in the U.S. continues to increase. Therefore, there is a clear need to include Hispanics as part of the target audience in any pedestrian/bicycle safety education program. Alcohol use in pedestrian fatalities is under-represented in Miami-Dade at only 16.8 percent, compared to 35 percent statewide (USDOT, FHWA, 2008).

In order to better understand the pedestrian crash problem in Miami-Dade County, it is necessary to understand the trends at the national, state, and county levels. Note that even though the population has been increasing in Florida and Miami-Dade County, there is a declining trend in pedestrian crashes from 2006 to 2008. This is in line with the national trend, as more crash prevention strategies are put into practice. A comparison among national, state, and local trends is depicted in Figure 2. The X-axis represents the year and the Y-axis represents the number of crashes.

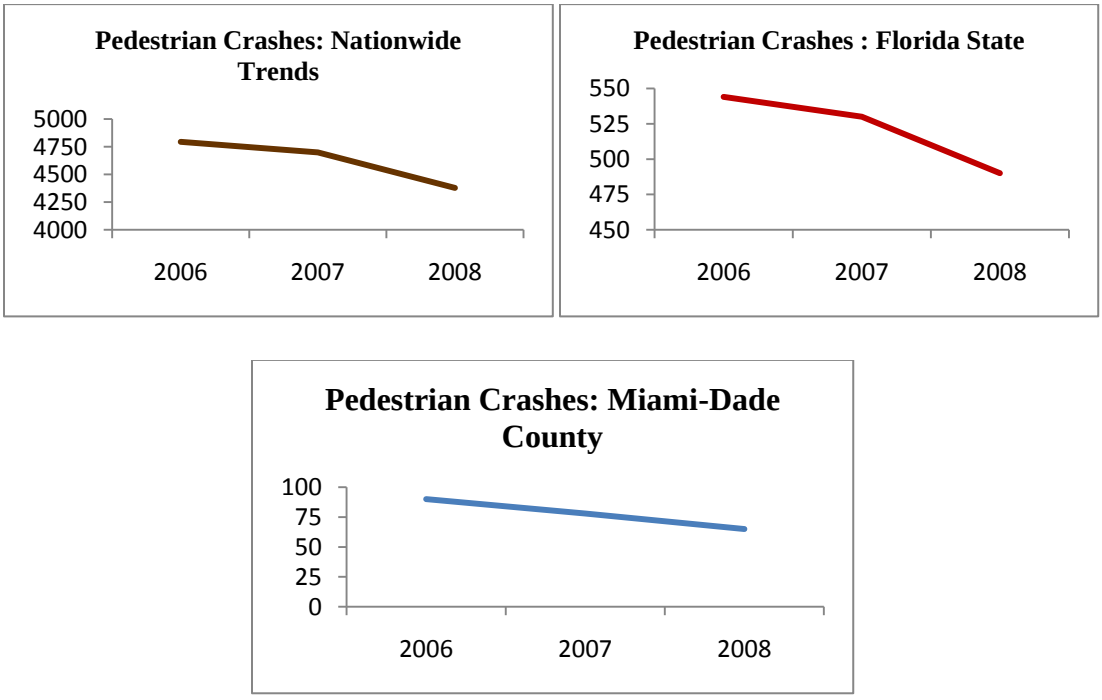

Figure 2: Pedestrian-Crash Trends

Source: Traffic Safety Facts Miami-Dade County, Florida 2004-2008

An important observation (Miami-Dade Pedestrian Safety Project, FDOT 2008) is that a little more than half of the pedestrian crashes in Miami-Dade County occurred on state or county roads, while 46 percent of the remaining crashes occurred on local roads. Because there are many more miles of local roads than state or county roads, the pedestrian crash rate per mile for state or county roads is much higher. The number of pedestrian fatalities was approximately equal for local, state and county roads, reflecting a much higher fatal crash rate per mile for state and county roads.

In regard to lighting conditions, children and seniors are more likely to be struck in daylight than pedestrians of other ages, and pedestrians age 18 to 24 have the highest incidence of nighttime collisions (Miami-Dade Pedestrian Safety Project, FDOT 2008).

Literature Review

Pedestrians-vehicle crashes are due to conflicts between pedestrians and vehicles, which result from pedestrians crossing into the path of a car or from vehicles intruding the pedestrian's area. The number of crashes involving elderly pedestrians at intersections and road segments may not only be a result of design characteristics, but also from age related deficits. Evaluation about the three general categories was explored: engineering, enforcement, and education.

Engineering strategies usually tend to help improve the street environment, while enforcement and education strategies can help improve the institutional environment, which affects the drivers and pedestrian behavior. The street environment consists of trip characteristics (e.g., origins and destinations of crossings), traffic conditions (e.g., traffic volume and speed), roadway characteristics (e.g., crosswalks and sidewalks), and control characteristics (e.g., pedestrian signalization and signage). The institutional environment consists of design standards and guidelines, pedestrian laws, pedestrians and drivers' knowledge of these laws (Xuehao Chu, 2004).

Elderly Pedestrians Characteristics

Elderly men are estimated to live an average of 6 years without driving, while women are expected to live 10 years (Foley, Heimocitz & Guralnik, 2002). Coupled with the fact that 20% of the United States will be composed of elderly pedestrians by the year 2030, ensuring the safety of elderly pedestrians should be a concern for stakeholders involved in safety-planning programs (Federal Interagency on Aging-Related Statistics, 2008).

Despite the existence of safety measures, Miami-Dade County continues to be in the top 10 counties in United States reporting pedestrian injuries (NHTSA, 2008). Although this is a concern for pedestrians in general, it is particularly relevant to elderly pedestrians. Elderly pedestrians differ from other pedestrian groups in that age related changes on cognitive, motor and sensory functioning affects the way they mobilize within the pedestrian environment (Carmeli, Coleman, Omar & Brown-Cross, 2000; Hovbrandt, Stahl, Iwarson, Horstman & Carlson, 2007; Lobjois & Cavallo, 2009).

Environmental barriers that have a negative impact on the pedestrian environment, as identified by elderly pedestrians, include high curbs, uneven pavements, narrow sidewalks and a lack of benches (Carlsson, Hovbrandt, & Iwarsson, 2008; Hovbrandt et al., 2007). Features within the pedestrian environment valued by elderly pedestrians include proper lighting, the presence of smooth crosswalks and signalized intersections (Stahl et al., 2008).

Out of all the exiting pedestrian crossing signals, older pedestrians generally favor the pedestrian countdown signals (signals that provide pedestrians with a numerical countdown on the amount of time they have to cross the road) (Stahl et al., 2008). Pedestrians tend to prefer this type of signals because they are easy to understand, provide enough time to make crossing decisions and offer an adequate time period to change their crossing decisions if required (Stahl et al., 2008).Features that promote safety include signalized pedestrian crossings, intersections that are controlled with traffic lights, wide crosswalks, enhanced signposts and one-way streets (Bernhoft & Cartensen, 2008; Stahl et al., 2008).

Zegeer et al. (2006) specifically identified that pedestrian islands and traffic signals alleviate midblock crashes (which are crashes occurring anywhere other than at the crosswalk). Pedestrian islands may reduce the risk of crashes by 40% because this feature breaks the crossings into two parts. Rather than having to find a large crossing gap between vehicles in various lanes, pedestrians can look for an appropriate gap and walk to the pedestrian island, then look for a second gap and proceed to their final crossing location. In roadways with few crossing gaps due to high traffic volumes, traffic signals provide pedestrians with the needed gaps to safely cross.

Drivers Characteristics

The cause of crashes and fatalities are usually complex and involves many factors. In general, traffic crashes are caused due to interaction of vehicle, driver, pedestrians, roadway and environment. Therefore, based on the description of crash, it is possible to identify a list of categories that influence the occurrence of fatal crashes.

Performance of driver is one of the major contributing factors for many crashes. The pre-crash driver behavior and attitude play a vital role in judging the driver's actions. These include distractions like cell phones, radios, cigarette etc; medical conditions; alcohol and drug use; inattention to the roadway and surrounding traffic; speeding; and disregarding traffic laws and/or traffic control devices, etc. In this area, human factors are the most complex and difficult to isolate, as they can be temporary in nature. From all these contributing factor, the emotional factors are the most difficult to identify, as they have the greatest number of variable attributes.

Perception and reaction time is the time it takes for the driver to perform a task in a vehicle. The change in perception-reaction time of drivers depends on the age of the individual, whether the person is tired or under the influence of alcohol or drugs, and whether the stimulus is triggered by something expected or unexpected. Older drivers have longer perception-reaction times as vision and hearing acuity are reduced with age. The time of the day also affects the driver's vision. The glare from the sunlight during the day or the glare from another vehicle can impair the driver's vision. Further, the glare recovery time also increases with age.

Drivers today face many problems while driving on congested roads and in overcrowded cities. This is often due to information overload, which occurs when our senses are loaded with vast amounts of information that need to be processed. The types of information a typical city driver needs to process to quickly react are numerous. They include traffic signs, traffic signals, detours, billboards, advertisements, horns, loud music, vehicles changing lanes, pedestrians, etc. Even with all this information, drivers are expected to be able to react quickly to an anticipated or unanticipated situation.

Vehicle Characteristics

Although a small percentage of crashes are also caused due to vehicles mechanical failures, such as tire failures, brake failures, or steering failures. The vehicle and roadway interaction such as skid resistance, which depends on the pavement's surface, play a major role in stopping the vehicle from encroaching the off-road features like shoulders, medians, and other traffic signage. The design of a vehicle can be a contributing factor in the severity of crashes. Newer vehicles may include antilock braking system; back-up sensing system; night vision / heads up display; electronic stability system; and impact absorbing interior materials.

Roadway Characteristics

Another vital factor in pedestrian-vehicle crash is the roadway's conditions: quality of pavements, shoulders, traffic control devices, intersections, and frictional forces between the pavement and the vehicle tires. In addition, fewer traffic control devices and complex intersections with excessive signage can lead to confusion, encouraging drivers to ignore them.

The road factors involved in the crashes can be due to lighting, view obstructions, ability to recognize signs and signals, pavement surface, and dimensions of traffic devices. These crashes related to road factors are dynamic in nature, as it affected by weather, lighting, roadside devices, activities, surface deposits and damage, deterioration and age of roads.

Environmental Characteristics

Climatic and environmental conditions are also important factors to be considered in crashes. The most common is weather, as it can be a contributor of pedestrian and vehicle conflicts. In addition, severe crashes can occur due to conditions like smoke or fog, which greatly reduces visibility. Similarly, glare can reduce the drivers' visibility, especially when driving against the sun. Poor mobility, visual and auditory deficits, and other problems of elderly pedestrians are other attributes involved in the pedestrian-vehicle conflict.

Behavior Compliance

Behaviors commonly related to pedestrian crossings vary from legal crossing, to crossing against the solid red signal, crossing outside of the crosswalk, and crossing midblock. A study showed that the most common illegal behavior was crossing outside of the crosswalk and the second was crossing against the pedestrian signal. Data collected from the past ten years from the identified intersections showed that nearly 60% of crashes occurred with pedestrians illegally crossing the street (King, Soole, & Ghafourian, 2009). Sisiopiku and Akin (2003) found that reported reasons for noncompliance were mainly time related. Destinations were more conveniently reached by crossing mid block or subjects did not want to wait for the light to turn green to cross.

A lack of safety knowledge was commonly found among pedestrians, especially pedestrians from other countries. Immigrant populations usually deal with language barriers, differing pedestrian norms, and different signage (Hijar, Chu, and Kraus, 2000).

Pedestrian Behaviors Related to Age

According to the literature review, age can be a factor in the increased incidence of pedestrian deaths. According to the NHTSA there are many factors that contribute to higher risk of pedestrian fatalities (NHTSA, 2001). Age is one of the factors; pedestrians over the age of 65 have the highest fatality rate of any age group. Many individuals over the age of 65 have poor health which limits their ability to drive; therefore walking is their primary means of transportation. These elderly individuals may require more time to cross any given intersection.

A study by the AAA Foundation for Traffic Safety (2007) found that elderly pedestrians took longer to cross the road than younger individuals with walking speed that varied from just over 3 feet per second to 4.5 feet per second to cross the intersection. An individual who needs more time to cross the intersection may also select larger gaps in traffic in order to cross. In addition, an older pedestrian's diminished perception of oncoming traffic speeds affect their ability to determine when to cross the street safely.

Lobjois and Cavallo (2008) showed that 70-80 year old age groups selected a greater time gap, the amount of time between oncoming cars, than younger age groups when crossing the street. This study also shows that seniors can have a difficult time calculating when they should or should not cross the street safely. This misperception is caused by a problem in processing time to arrival information. Any slight misperception of the correct safe time to cross can increase the likelihood of injuries and fatalities.

Pedestrians and Ethnicity

According to the literature, ethnicity can play a role in pedestrian deaths. "It is speculated that the link between pedestrian deaths and ethnicity is due to the fact that Latinos and African Americans are less likely to own a car and more likely to walk, bike, and/or take public transportation, resulting in greater exposure to the dangers of the streets" (Mean Streets, 2004, pg 21). It was recently reported by the Centers for Disease Control and Prevention that Latinos in Atlanta were 6 times more likely to be hit and killed while walking than Whites (Center for Disease Control, 1998).

The behaviors of the drivers as well as the behavior of the pedestrians can also impact pedestrian safety. Some drivers are careless and drive at high speeds when crossing an intersection. Running a red light, a stop sign, or driving beyond the speed limit are behaviors that should be avoided to decrease the number and severity of vehicle and pedestrian collisions.

General Safety Elements

Engineering

Width of the road

In order to accommodate the increasing traffic volume or better level of service, the major roads have been widened, but the impact of having a longer crossing distance has been overlooked by policy makers and engineers. The following are the impacts of having longer crossings: increased pedestrian exposure time; increased vehicle-pedestrian conflict; increased vehicle delay and; decreased ability of slower pedestrians to cross safely.

Speed

Driving beyond the permitted speed limit exposes pedestrians to higher crash risks. Not yielding to a pedestrian depends upon the speed and driver's behavior. Speeding affects the vision of the driver and the reaction ability to avoid a crash; it has an impact on the severity of crashes.

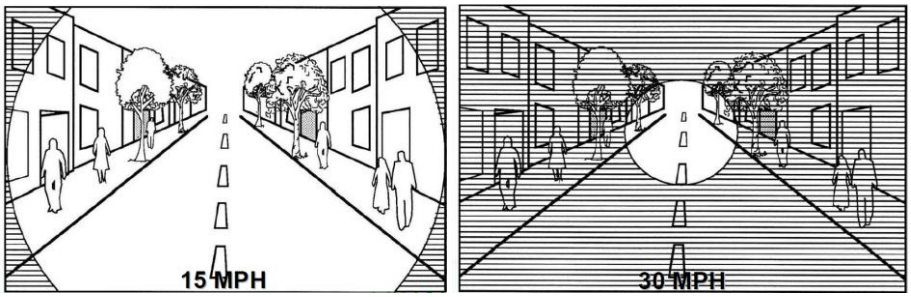

Figure 3: Drivers' field of vision & ability to see pedestrians

Source: PBIC Livable Communities Webinar Series, January 2010.

As speed increases, driver focuses less on surroundings. Also high speeds results in greater reaction and stopping distance. In Figure 3 above, a driver traveling at 15 MPH is alert to both the road and pedestrian environment. While a driver traveling at 30 MPH may be alerted to road environment, but not for pedestrian environment. Thus, in case of unexpected events occurring in the periphery, drivers in the former have more time to react and a shorter stopping distance. Crash severity often depends upon speed and the age of the pedestrian. In short, the higher the speed, the higher is the crash severity, as shown in Figure 4.

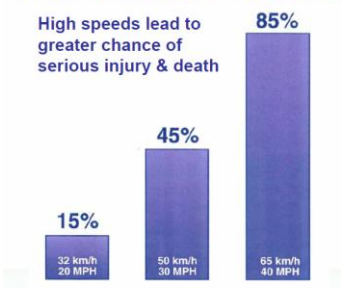

Figure 4: Speed vs. Crash Severity

Source: PBIC Livable Communities Webinar Series, January 2010.

Basic Street Crossing Safety Measures

- Crosswalks marking
- Illumination
- Signs
- Striping
- Median/refugee islands
- Signals
- Pavement condition and accessibility.

Crosswalks indicate where pedestrians should cross the road and, for drivers, they signal the possibility of pedestrians being present. Marking of crosswalks is based on the guidance on crosswalks in the Manual on Uniform Traffic Control Devices (MUTCD) 2009.

From the safety study (Zegeer et al. 2002) includes the results of compared crosswalk Marked vs. Unmarked with average daily traffic (ADT). As, crashes correlate with ADT & number of travel lanes, it has no significant difference in crashes for two-lane road. For multilane roads (3 or more lanes) –

- Under 12,000 ADT: no significant difference in crashes,
- Over 12,000 ADT w/ no median: crashes marked > crashes unmarked
- Over 15,000 ADT & w/ median: crashes marked > crashes unmarked

Figure 5 illustrates typical crosswalk markings. MUTCD has not mandated crosswalk marking, but it recommended that the crosswalk be marked at all intersections at which "substantial" conflict between vehicles and pedestrians exists. The most frequently used is composed of two parallel lines white lines. Cross-hatching may be added to provide greater focus in areas with heavy pedestrian flows.

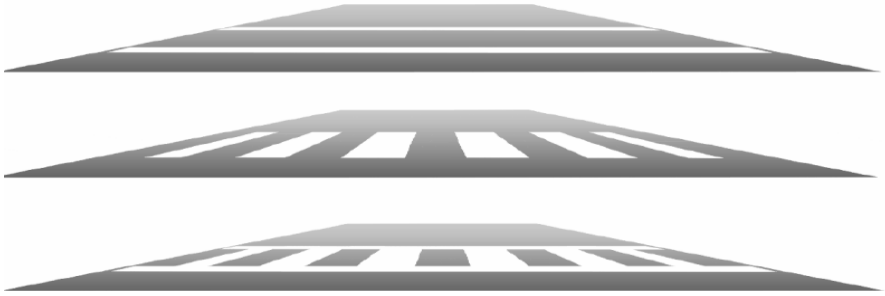

Figure 5: Types of Crosswalk Markings and Visibility

Source: PBIC Livable Communities Webinar Series, January 2010.

Pedestrians who cross streets at uncontrolled midblock locations pose a serious risk, as drivers' expectations for pedestrians crossing at midblock may be low. When traffic volumes and speeds are high, few adequate gaps may exist for pedestrians to cross the street safely. In addition, the driver may not see the pedestrian because the driver's vision is obscured by parked vehicles along the curb or by a vehicle in the curb lane that has stopped to allow the pedestrian to cross. Bus riders are twice as likely to cross mid-block resulting in a high percentage of pedestrian crashes that occur at mid-block (U.S. DOT, FHA - December 2005).

A safety study conducted by Zegeer et al. 2002 indicated that presence of median reduces crashes by 40%, pedestrians over 65 are over-represented in crosswalk crashes, and pedestrians are not less vigilant in marked crosswalks: looking behavior increased after crosswalks installed. Local agencies may paint crosswalks at midblock locations based on average daily traffic, pedestrian volumes, and other warrants. However, even if a crosswalk has been painted across the roadway, the driver may not notice the crosswalk, particularly if the markings are faded or if no pedestrian warning signs are in place. In addition, crosswalks and pedestrians can be extremely difficult to see at night.

Comparisons of crashes at midblock vs. intersections indicate pedestrians perceived a higher risk, but data is inconclusive as many other factors effect/cause crashes. Pedestrians are generally unwilling to oblige lengthy wait times at signals. They are also more likely to make "informal crossings" at wide roads (PBIC Livable Communities Webinar Series, January 2010). On average, less than half of drivers turning at intersection yielded to pedestrians in crosswalks controlled by traffic signals. The effectiveness of crosswalks can be improved with proper location, high visibility markings, illumination, signage, advance stop bars, median islands, curb extensions and, signals (PBIC Livable Communities Webinar Series, January 2010).

As per the American Association of State Highway and Transportation Officials (AASTHO) standards, devices such as bulb outs (flared curbs), curb ramps, channelized islands, pedestrian refuge islands, and

medians need to be used to shorten crossing distances, increase pedestrian and vehicle visibility, simplify the crossing task, and control vehicle paths and speeds.

Illumination

Lighting parameters impact the ability of drivers to see pedestrians. The distance at which a driver can see a pedestrian to be able to respond appropriately is known as Pedestrian visibility distance. The greater the visibility distance, the more time a driver will have to react to the pedestrian before a conflict occurs. The presence of marked crosswalks alone or with other measures is significant only when intersection or midblock have sufficient lighting. For instance in Corvallis, Oregon it was reported that up to 50% of pedestrian crashes occurred at night. However with the treatment of proper lighting, the chances of pedestrian fatalities were reduced by 42% at midblock locations and by 54% at intersections.

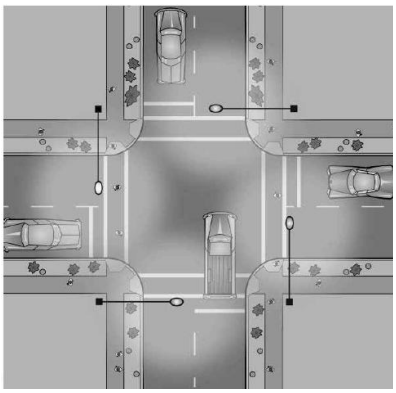

Figure 6: Illumination: Essential for any Crossing

Source: Informational Report on Lighting Design for Midblock Crosswalks, FHWA report (2008)

According to FHWA report, Informational Report on Lighting Design for Midblock Crosswalks (2008), the recommended lighting level is 20 lux at 5 feet above pavement. Crosswalks that have high ambient lighting in the background may benefit from higher vertical illuminance. Figures 7 compare the lighting design at midblock between traditional and new designs by FHWA.

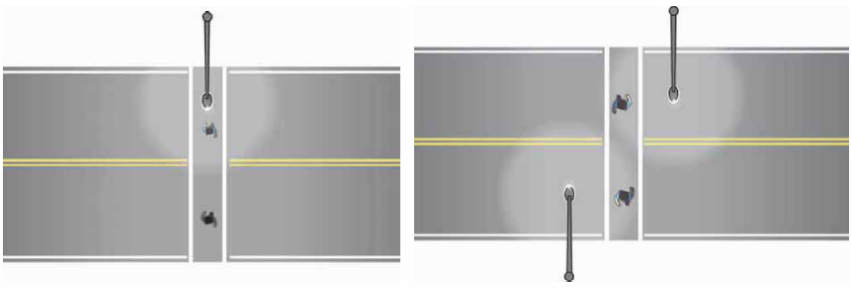

Figure 7: Traditional vs. New Design for midblock crosswalks

Source: Informational Report on Lighting Design for Midblock Crosswalks, FHWA report (2008)

Since intersection is the conflict zone for vehicles and pedestrians, along with other safety measures better lighting can be reduce the probability of crash occurrence. Figure 8 to 10 compares the lighting design at intersections between traditional and new designs by FHWA.

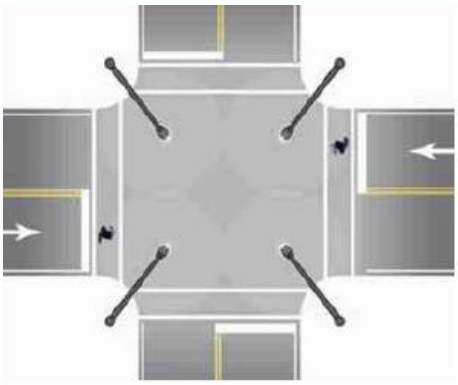

Figure 8: Traditional intersection lighting

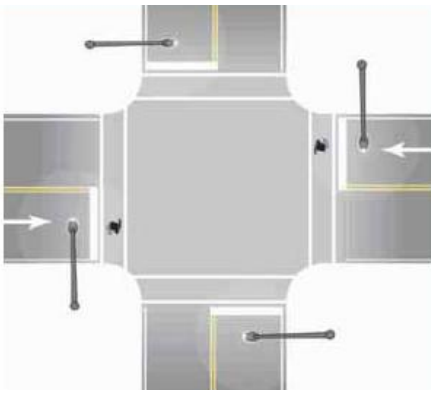

Figure 9: New Design for intersection lighting layout for crosswalks

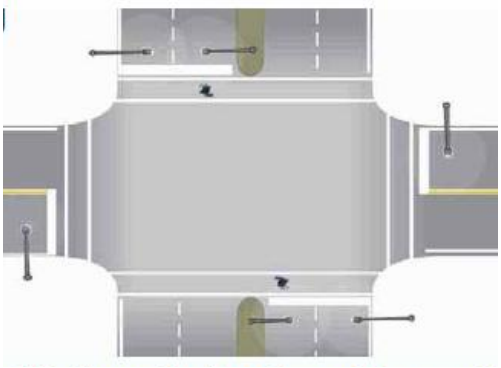

Figure 10: New design for wide roadway intersection lighting layout for crosswalks

Geometric Safe Design vs. Traffic Volume

Creating a pedestrian friendly environment at intersections could have an impact on the traffic flow at the intersection. For instance, narrowing lanes and reducing curb radii, have an impact on capacity. While narrowing lanes have a direct effect on intersection capacity, the effects of reduced curb radii are much harder to quantify.

Other factors that may affect intersection capacity include the increased number of pedestrians as result of the improved pedestrian environment and reconfiguration of the intersection. Pedestrians and vehicles must be given equal status when analyzing the options at intersections and some loss in vehicle capacity may be necessary to better accommodate pedestrians.

Turning Radii

A high percentage of crashes involve turning vehicles. Factors affecting the risk of pedestrians by right-turning vehicles include the number of turning lanes, turning volumes, and turning radius. When radii are too large, and sidewalks are placed at the back of the curb, the crossing distance and exposure time for pedestrians increases. As a general rule, corners radii should be no more than 20 – 25 ft for central business districts and residential neighborhood, and 30 ft for side streets entering major roadways (Florida Pedestrian Planning and Design Handbook, 1999).

According to the Florida Pedestrian Planning and Design Handbook, an intersection design includes the use of pedestrian design features such as vehicle barriers (bollards), landscaping, benches, or bus shelters. From the pedestrians' perspective, a common overlooked element of the design or redesign of an intersection is the provision and maintenance of adequate intersection sight distance for drivers. Therefore, the provision of adequate sight distance for pedestrians through the design process is an important element for avoiding pedestrian to vehicle conflicts.

Although a frequent problem is horizontal sight distance, vertical sight distance cannot be ignored either. For pedestrians, the problem with vertical sight distance at intersections comes from high seat position operators (e.g., truck drivers) who have their line of sight to the pedestrian standing on the curb blocked by trees, sign, or other low over hanging obstructions. As with the ground level obstructions, the designer should check to see that adequate sight lines are provided.

Right-turn-on-red

Right-turn-on-red can increase crash risk for pedestrians. Motorists who stop at the intersection and look left to see if the road is clear sometimes do not look right before turning right. Therefore, they may not see pedestrians coming from the right.

The Manual on Uniform Traffic Control Devices (2009) identifies six conditions when the NO TURN ON RED sign may be used. Three of these conditions pertain to pedestrians: (1) where an exclusive pedestrian phase, which means when vehicle movements are stopped and pedestrian crosswalks are given the WALK signal, exists; (2) where significant pedestrian conflicts result from right turn on red; and (3) where there is significant crossing activity by pedestrians who are children, seniors, or disabled.

Motorists turning right on green sometimes do not yield to pedestrians who are crossing parallel to traffic. In addition, some pedestrians may fail to watch for turning vehicles while crossing on a Walk signal. Countermeasures that can reduce pedestrian risks related to turning vehicles include smaller intersection turning radii (which force motorists to turn more slowly), intersection bulbouts (which improve sight distances between pedestrians and motorists), PEDESTRIANS WATCH FOR TURNING VEHICLES signs, and YIELD TO PEDESTRIANS WHEN TURNING signs (Zegeer et al. 2004). According to Harman Huang (2000), motorists were more likely to yield to groups than to single pedestrians.

Pedestrians Signals vs. Pedestrian Behavior

Pedestrian signals display the messages Walk (or a walking person), flashing Don't Walk (or a flashing hand), and steady Don't Walk (or a steady hand) in conjunction with vehicle signals. The Walk signal indicates that pedestrians may cross the street in the direction of the signal. The flashing Don't Walk signal means that pedestrians should not start crossing, but pedestrians already in the street should have enough time to finish crossing. The steady Don't Walk phase means that pedestrians should not be in the street.

It is well-documented that many pedestrians do not understand the meaning of the pedestrian signal indications, particularly the flashing Don't Walk. In fact, Robertson et al. found that only about half of pedestrians understand the meaning of the flashing Don't Walk display. Many pedestrians expect to see the Walk signal for their entire crossing. Upon seeing the flashing Don't Walk, some pedestrians believe that they will not have enough time to reach the opposite side of the street. Others may return to the starting side, and a few may even stop in the middle of the street (Zegeer).

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COUNTERMEASURES FOR SAFETY IMPROVEMENT

The Table 1 illustrates applicable and effective countermeasures to the objectives in order to improve pedestrian safety

Table 1: Matrix of pedestrian safety countermeasures

Objective	Countermeasures **A. Pedestrian Design Facility** 1. Crosswalk Enhancements 2. Curb Ramps 3. Landscaping Option 4. Move Poles/ Newspaper boxes at Street Corner 5. Overpasses/ Underpasses 6. Roadway Lighting 7. Sidewalks/ Walkways 8. Street Furniture 9 Transit Stop Treatment	**B. Roadway Design** 1. Add Bike Lane/ Shoulder 2. Curb Radius Reduction 3. Driveway Improvements 4. Pedestrian Crossing Islands 5. Raised Median 6. Reduce Number of Lanes 7. Right-Turn Slip Lane 8. Road Narrowing	**C. Intersection Design** 1. Modern Roundabouts 2. Red-Light Cameras	**D. Traffic Calming** 1. Chicane 2. Choker 3. Curb Extension 4. Diverters 5. Driveway/ Serpentine 6.Gateway 7. Landscaping 8. Landscaping Options 9. Mini-Circle 10. Paving Treatment 11. Pedestrian Crossing Island 12. Raised Intersection 13. Raised Pedestrian Crossing 14. Speed Hump 15. Speed Table 16. Woonerf	**E. Traffic Management** 1. Diverters 2. Full Street Closure 3. Partial street Closure 4. Pedestrian Street	**F. Signal and Signs** 1. Accessible Pedestrian Signal 2. Advanced Stop Lines 3. Pedestrian Signal Timing 4. Sign Improvement 5. Signal Enhancement 6. Traffic Signal	**G. Other Measures** 1. Identify Neighborhood 2. Pedestrian / Driver Education 3. Police Enforcement 4. School Zone Improvement 5. Speed-Monitoring Trailer
1. Reduce Speed of Motor Vehicles	8*	1, 2, 3, 6, 7, 8	1	1, 2, 3, 5, 8*, 9, 10*, 12, 13, 14, 15, 16		4, 5*	4, 5
2. Improve Sight Distance and Visibility for Motor vehicles and Pedestrians	1, 4, 6	1		3, 10, 12, 13, 15		2, 5	
3. Reduced volume of Motor Vehicles		6		16	1, 2, 3, 4		
4. Reduce Exposure for Pedestrians	5	4, 5 , 6 , 9		2, 3, 11		1, 3	
5. Improve Pedestrian Access and Mobility	1,2, 5, 7, 9	5		2, 11		1, 3, 5, 6	
6. Encourage Walking by Improving Aesthetics	3, 6, 8	5		6, 7, 10			1
7. Improve Compliance with Traffic laws			2	1, 2, 9, 14, 15			2, 3, 5
8. Eliminate Behaviors That Lead to Crashes			2	1, 2, 9, 14, 15		3	2, 3

*To be used in conjunction with other treatments

Table 2: General Countermeasures for Pedestrian Crash Patterns and their Probable Causes

Crash Pattern	Probable Cause	General Countermeasure
Pedestrian accidents at intersections	Restricted sight distance	Remove sight obstructions Install pedestrian crossings Improve/install pedestrian crossing signs Reroute pedestrian paths
	Inadequate protection for pedestrians	Add pedestrian refuge islands
	Inadequate signals	Install pedestrian signals (see MUTCD)
	Inadequate signal phasing	Add pedestrian "WALK" signal indication Change timing of pedestrian phase
	School crossing area	Use school crossing guards
Pedestrian accidents between intersections	Driver has inadequate warning of frequent mid-block crossings	Prohibit parking Install warning signs Lower speed limit* Install pedestrian barriers
	Pedestrians walking on roadway	Install sidewalks
	Long distance to nearest crosswalk	Install pedestrian crosswalk Install pedestrian actuated signals (see MUTCD)
Pedestrian accidents at driveway crossings	Sidewalk too close to traveled way	Move sidewalk laterally away from highway
Night accidents	Poor visibility	Install/improve street lighting Install/improve delineation markings Install/improve warning signs
Wet pavement accidents	Slippery pavement	Overlay existing pavement Provide adequate drainage Groove existing pavement Reduce speed limit* Provide "SLIPPERY WHEN WET" signs
* Spot speed study should be conducted to justify speed limit reduction.		

Figure 11: Hybrid Beacon Sequence

Source: PBIC Livable Communities Webinar Series, January 2010.

High Intensity Activated Crosswalk (HAWK) is included in current 2009 MUTCD, where drivers look at the hybrid beacon sequence and the pedestrians at Pedestrian heads.

Cost Comparison of Crossing treatments / Countermeasures

Tables 3 and 4 present some costs for the treatment / countermeasures of pedestrian crossings.

Table 3: Cost and Effectiveness by Type of Crossing Treatment

Crossing treatments cost comparison		
Treatment	**Cost**	**Effectiveness**
Signing	$500 – 1,000	*
High visibility markings	$2,000 – 15,000	**
Advance stop bars	$1,000 – 2,000	****
Illumination	$5,000 – 15,000	****
Median Islands	$10,000 – 30,000	****
Signals	$35,000 – 150,000	***
Over/ undercrossings	$500,000 – 2,000,000	*
Proper location	"Priceless Priceless"	*****

Source: PBIC Livable Communities Webinar Series, January 2010.

Table 4: Engineering Countermeasure Costs

Capital Cost and labour / Engineering Costs for Each Countermeasure			
Countermeasure	**Estimated Cost Per Unit**	**Estimated Installation-Engineering Cost/Unit**	**Operations/ Maintenance Needs and Other Notes**
Push Button that confirm press	$105	$535	Low level of maintenance required
Video Pedestrian Detection	$14,250	$8,500	No information on long-term maintenance. Adjusted by manufacturers
"Turning vehciles Yield to Pedestrians"symbol sign	$25	$55	Low level of maintenance required
Electronic NRTOR sign	$3,000	$700	Seemed to work wel. Use of this sign is increasing
Countdown Pedestrian Signals	$435	$45	Easy to retrofit. Easy to maintain. No issues with this device.
In-Street "Yield to Pedestrian Signd"	$225	$50	High level of damage if not on raised island.
Pedestrian Zone Signs	$25	$45	Low level of maintenance required
Speed Trailers	$25/day	$55	Workswell in Miami because of solar output
Rectanuglar LED Rapid Flashing Beacons	$9,000	Included in Equipment pricing	Installed by contractor. Required some changes to battery box. Handled by warranty.
Dynamic Lighting	$600	Included in Equipment pricing	Was not very bright. Difficult aiming it where needed
Eliminate Permissive Left Turn	$2,500	$1,500	May require change in signal head
Advanced Yield marking	$50	$150	Material has a long lifetime.
Offset Stop Lines	$50	$150	Material has a long lifetime. No grinding needed when installed on fresh pavement.

Enforcement

Traffic laws and definitions for pedestrians' traffic laws are written and enforced to create uniform and predictable movements between vehicles, and in between vehicles and pedestrians and other moving traffic. Laws may vary from state to state, but they are similar. The uniformity of this language is achieved by having each state legislature address specific laws as set forth in the Uniform Vehicle Code (UVC).

Design/Law Link

A general observation regarding motorist behavior is that most motorists fail to respect the safety and needs of pedestrians. Many pedestrians correspondingly ignore traffic law, forcing many motorists to take evasive actions. The behavior between the two groups can be and is strongly influenced by design. For example, a motorist approaching a crosswalk at low speed (below 20 mph) is likely to stop for a pedestrian wishing to cross. Motorists traveling at speeds of 30 mph or greater are likely to continue, even though the pedestrian may be clearly intending to cross. By paying closer attention to designs that elicit the best behavior of both groups, the designer may be able to create crossings that do not require signalization or other highly evasive design strategies.

Jaywalking

This commonly used word does not appear in traffic law. Generally, however, a pedestrian is breaking the law and is considered to be jaywalking when doing any of the following:

- Crossing against a red light
- Crossing not fully in a crosswalk or crosswalk area
- Crossing midblock between two adjacent signalized intersections
- Crossing diagonally
- Causing a vehicle to have to brake suddenly, creating an unsafe condition
- Crossing at grade when in the immediate presence of an overpass or tunnel, and when a vehicle has to correct for the actions of the pedestrian.

Common Motorist Violations includes speeding, failure to stop or yield to a traffic control, failure to stop or yield to a pedestrian in a crosswalk, illegal right turn on red, parking in a restricted zone, driving under influence (DUI).

Sidewalks

Where sidewalks are provided, no pedestrian shall, unless required by other circumstances, walk along and upon the portion of a roadway paved for traffic. Where sidewalks are not provided, any pedestrian walking along and upon a highway shall, when practicable, walk only on the shoulder of the left side of

the roadway, facing traffic. Sidewalks are bidirectional, and pedestrians walk both with and against traffic.

Designers need to be aware that, on multilane highways, pedestrians are not likely to cross to the other side. Sidewalks on both sides of all urban multilane roadways are essential for the safety of pedestrians and motorists.

Pedestrian Control Signals

There is widespread confusion on the use of these signal phases. According to a recent American Automobile Association financed research project, 51% of the American public does not know the meaning of a flashing DON'T WALK. A WALK phase permits pedestrians facing such a signal to cross the roadway in the direction of the signal and requires motorists to yield the right-of-way. A flashing DON'T WALK signal means that no pedestrian shall start to cross the roadway, but any pedestrian who has entered or partially entered the roadway may proceed to the far sidewalk or safety zone. A steady DON'T WALK means that no pedestrians should be in the roadway.

On Sidewalks

The driver of a vehicle shall yield the right of way to any pedestrian on a sidewalk. Since bicycles are vehicles, bicyclists must yield to pedestrians on sidewalks.

In Crosswalks

The driver of a vehicle shall stop and remain stopped to allow a pedestrian to cross the roadway within an unmarked or marked crosswalk when the pedestrian is upon or within one lane of the half of the roadway upon which the vehicle is traveling or onto which it is turning. Half of the roadway means all traffic lanes carrying traffic in one direction of travel, and includes the entire width of a one-way roadway.

Every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian or any person propelling a human-powered vehicle, and exercise proper precaution upon observing a child or any obviously confused or incapacitated person upon a roadway.

Other Drivers

Whenever any vehicle is stopped at a marked crosswalk or at any unmarked crosswalk at an intersection to permit a pedestrian to cross the roadway, the driver of a vehicle approaching from the rear shall not overtake and pass such stopped vehicle.

Pedestrians Yield the Right of Way during the following situations:

- Every pedestrian crossing a roadway at any point other than within a marked or unmarked crosswalk at an intersection shall yield the ROW to all vehicles upon the roadway.
- Between adjacent intersections at which traffic signals are in operation, pedestrians shall not cross at any place except in a marked crosswalk.
- Any pedestrian crossing a roadway at a point where a pedestrian tunnel or overhead pedestrian crossing has been provided shall yield the ROW to all vehicles upon the roadway.
- No pedestrian shall, except in a marked crosswalk, cross a roadway at any other place than by a route at right angles to the curb or by the shortest route to the opposite curb. No pedestrian shall cross a roadway intersection diagonally unless authorized by official traffic control devices.
- No pedestrian shall suddenly leave a curb or other place of safety and walk or run into the path of a vehicle which is so close that it is impossible for the driver to yield.
- No pedestrian shall enter or remain upon any bridge or approach thereto beyond a bridge signal gate, or barrier indicating a bridge is closed to through traffic, after a bridge operation signal indication has been given.
- No pedestrian shall pass through, around, over, or under any crossing gate or barrier at a railroad grade crossing or bridge while such gate or barrier is closed or is being opened or closed.

Education

Education is precautionary tool aiming to teach pedestrians and drivers about crash avoidance mechanism and right of way. Generally the opportunity to educate drivers is during driving test. In general, the drivers and pedestrians can be educated by organizing community and school workshops. In United States, most commonly pedestrians crossing the roads are the transit riders walking to bus stops or to the destinations.

The NHTSA effort in Figure 16 and Figure 17 included the following components:

- Pedestrian safety message mounted in bus and Metrorail train posters;
- Public awareness announcements about pedestrian safety broadcasted on city and county access channels in Spanish and English and on selected Spanish speaking radio stations;
- Walk Safely pedestrian brochures distributed to the Miami-Dade School Board, hospital and medical department, public library, police departments and elected officials' offices;
- Pedestrian safety workshops for older pedestrians.

- Walking Through the Years: Pedestrian Safety for Older Adults. Booklets were delivered to organizations such as the Miami-Dade school Board, hospital and medical departments, retirement homes, public libraries (similar materials were distributed in Spanish);
- Pedestrian enforcement of driver yielding behavior during 2002. Police stopped 2006 drivers for failing to yield to pedestrians.

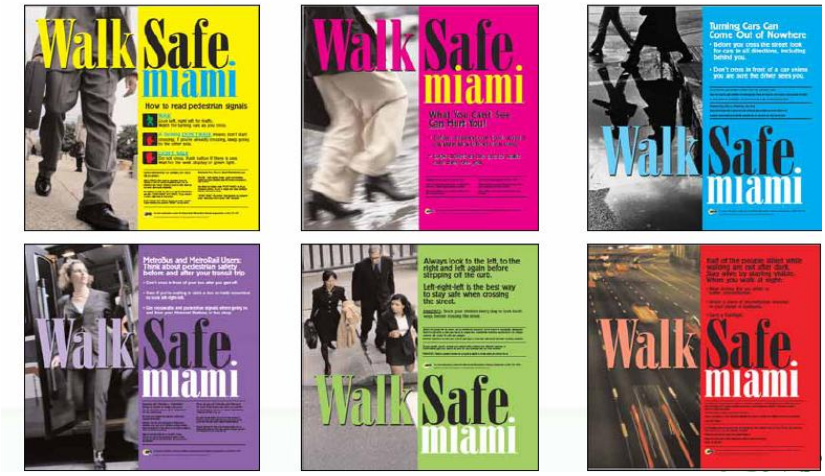


Figure 12: Education for Transit Riders

Source: PBIC Livable Communities Webinar Series, January 2010.

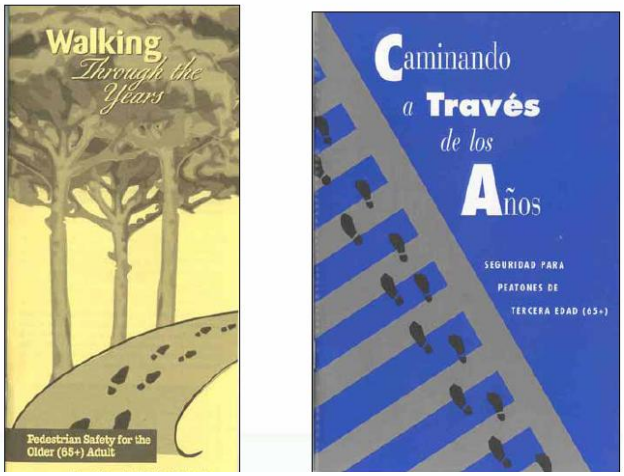


Figure 13: Education for "The Elderly"

Source: PBIC Livable Communities Webinar Series, January 2010.

Summary of various treatments to improve pedestrian safety:

1. ITS Pedestrian Signals (Scanning eyes and Countdown timer)
2. Offset Stop Lines at Traffic Signals
3. ITS Push Buttons that Confirm Placing Calls
4. ITS pedestrian Detection
5. ITS Regulation of Pedestrian Clearance Interval
6. Leading Pedestrian Phase
7. Turning Vehicles Yield to Pedestrians Sign
8. In Roadway Yield Signs (Signalized locations)
9. Eliminate Permissive Left Turns
10. ITS No RTOR Signs
11. ITS LED Transponders for the Blind
12. ITS Warning Signs that Indicate the Direction Pedestrians are Crossing
13. Smart Crosswalk Lighting
14. Advance Yield markings
15. ITS speed Warning Signs
16. In Roadway Yield Signs (uncontrolled locations)
17. Pedestrian Zone Warning Sign
18. Move back from Crosswalk
19. Increased lighting
20. Pedestrian Refuge Islands

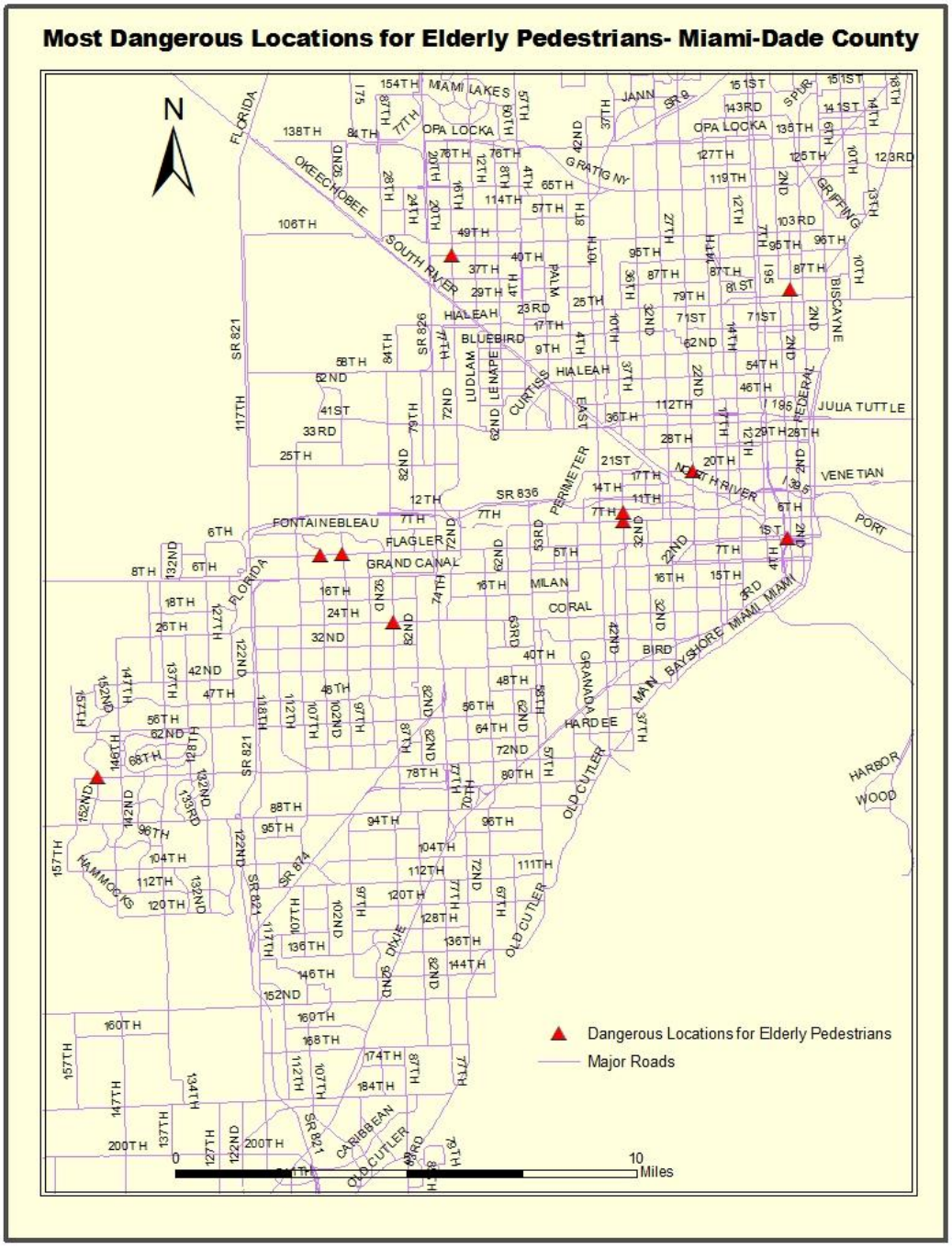
According Miami-Dade Pedestrian Safety Project, the three countermeasures proved more challenging on deploy are:

- The Electronic NRTOT sign
- The Video Pedestrian Detectors
- In Street Yield to Pedestrian Signs

Dangerous Locations for Elderly Pedestrians

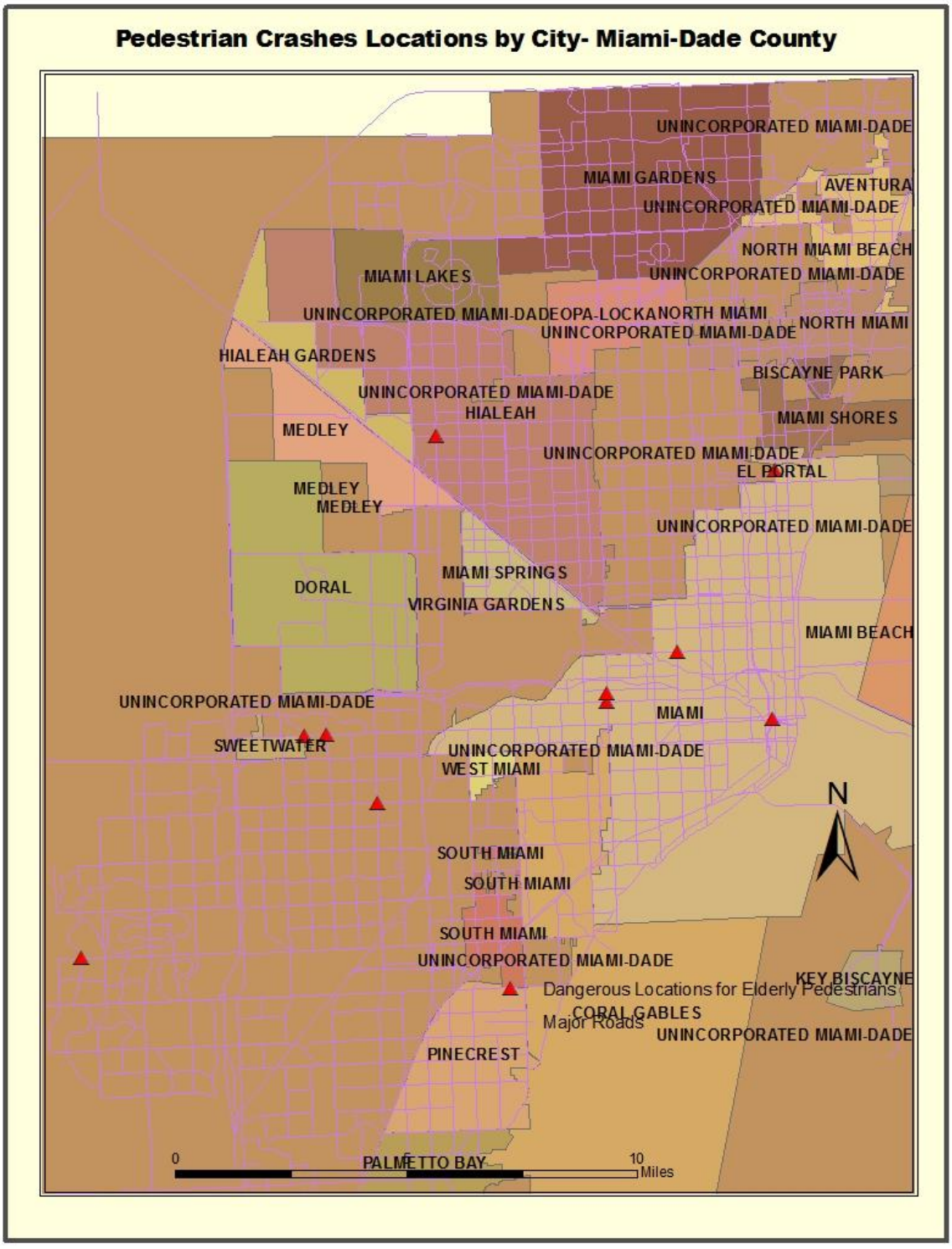
Miami-Dade County Public Works Department has identified 10 most dangerous locations for elderly pedestrians. These locations are shown in the Map 1 and are as follows:

1. WFLAGLER St & NW 97 Ave
2. W FLAGLER St & NW 102 Ave
3. SW 87 Ave & SW 24 St (Coral Way)
4. W 16 Ave & W 44 Place
5. NW 22Ave & NW 20St
6. SW 1Ave & SW 1 St
7. NW 37Ave & NW 7St
8. SW 152 Ave & SW 72 St
9. NW 37 Ave & NW 9 St
10. N Miami Ave & NW 83 St



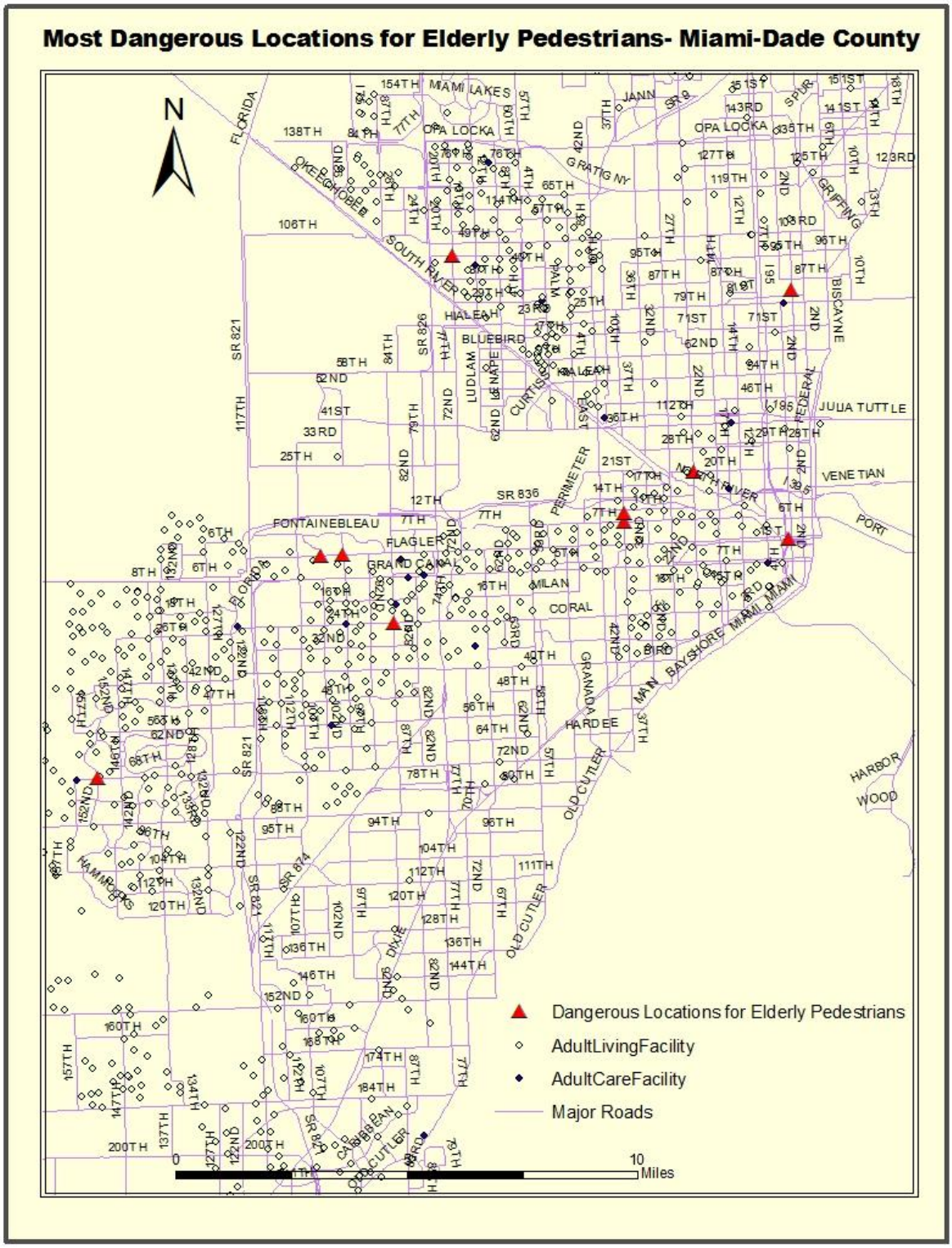
MAP 1: Showing Geographical Locations of Most Dangerous Locations for Elderly Pedestrians

The ten dangerous locations for seniors is distributed along various cities – one location in City of Hialeah, five locations in City of Miami, three locations unincorporated areas and one location in City of Sweetwater as shown in Map 2.



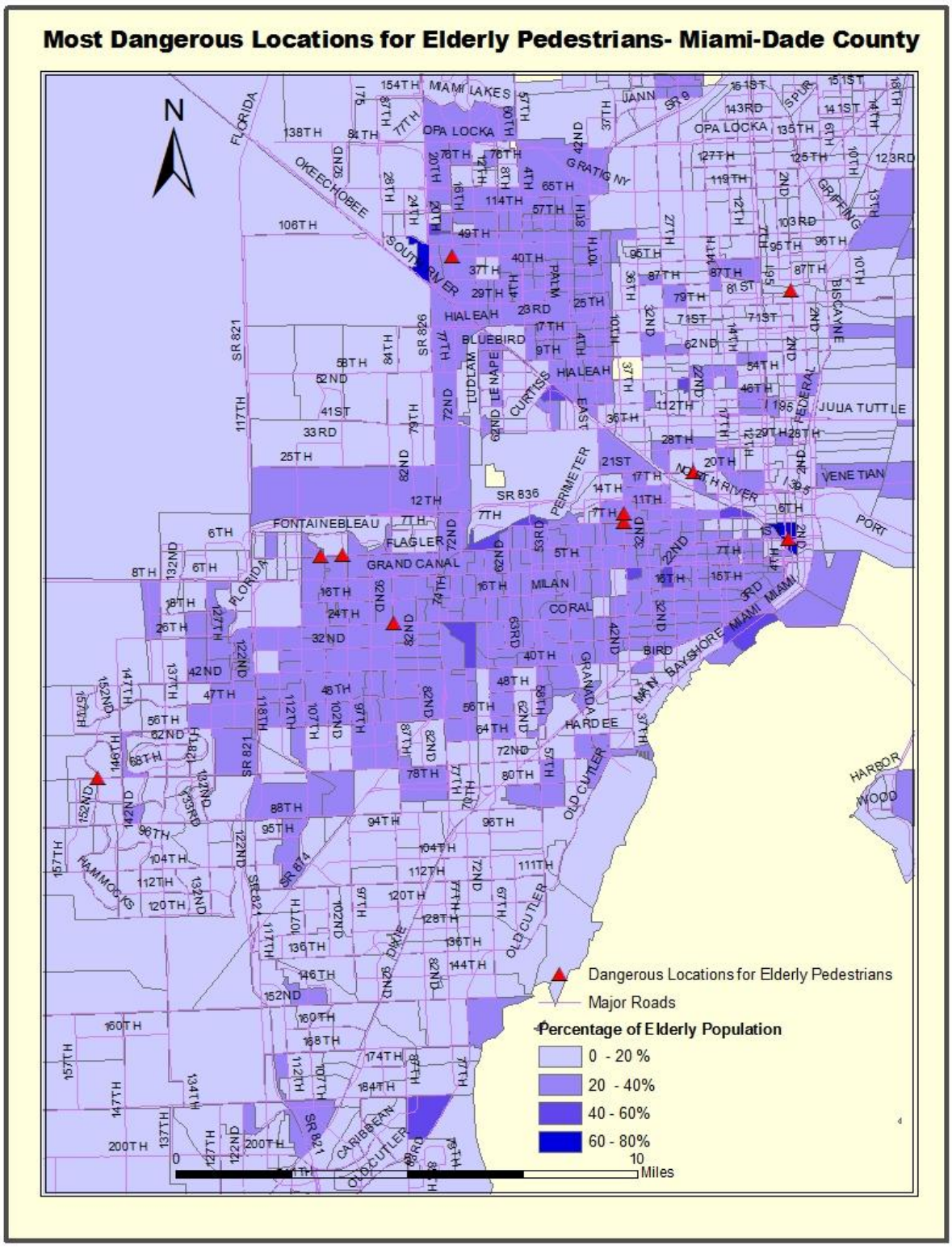
MAP 2: Showing Dangerous Locations for Elderly Pedestrians by City

Dangerous locations for elderly pedestrians are mostly located in and around the adult care facilities and adult living facilities as shown in Map 3.



MAP 3 Showing Dangerous Locations with Adult Care Facilities and Living Facilities

Mostly the percentage of elderly near these dangerous locations is 40 – 60% as shown in the Map 4.



MAP 4: Percentage of Elderly Population and Crash Locations

Field Studies

Studies on demographics and environmental factors influencing crossing locations were conducted at ten intersections with high pedestrian crashes which were identified by the Miami-Dade Public Works Department. These locations are listed in table 9. Engineering studies were carried on a total of 10 dangerous intersections for elderly pedestrians.

Demographics

A total of one hundred and nineteen pedestrians between the ages of 51 and 84 (mean = 68 years and SD = 6) took part in the study. Out of the 119 participants, 46 (39%) were female and 73 (61%) were male. While most of the participants had a Hispanic (87%) ethnic origin, ethnicity differed throughout the sample (see Table 5).

Table 5: Ethnicity of Participants

Ethnic Origin	Frequency	Percentage
Hispanic	104	87%
African American	9	8%
White	6	5%

Typical Crossing Location

54% of the pedestrians stated that they usually cross the road through a crosswalk. Conversely, 45% responded that they typically cross the road at any convenient location. The remaining stated that they usually cross the road at any convenient location as often as they do so through a crosswalk.

Environmental Factors Influencing Crossing Locations

The most influential environmental factors that impacted the decision of pedestrians to cross the road at their immediate standpoint were the location of their endpoint across the street and the complexity of traffic flow. A total of fifty-one pedestrians (43%) responded that if their endpoint is nearby, then they typically consider crossing the road at their immediate standpoint. Seventy-three (61%) participants also stated that they usually consider crossing if there is little traffic on the road and fifty-five (46%) if there is standstill traffic. While these were the most influential environmental factors that impacted the decision of pedestrians to cross the road at their immediate standpoint, other factors that were mentioned are listed in Table 6.

Table 6: Environmental Factors - Immediate Standpoint

Category	Sub-Category	Frequency	Percentage
Location of Endpoint	N/A	51	43%
Traffic Flow Complexity	Little Traffic	73	61%
	Standstill Traffic	55	46%
	Crossing Gap	53	45%
Roadway Design	Resting Spot On Roadway	34	29%
Crosswalk Complexity	Crowded With Cars	21	18%
	Crowded With Pedestrians	9	8%
Other	Running Late	7	6%
	See Bus Approaching	6	5%
	No Traffic At All	5	4%

In regards to the influential environmental factors that impacted the decision of pedestrians to cross the road through a crosswalk, the location of their endpoint across the street, the complexity of traffic flow and roadway design was the most influential. A total of fifty-five participants (46%) responded that if their endpoint is nearby, then they typically consider crossing the road through a crosswalk. Sixty-six (55%) participants also stated that they usually consider crossing if there is little traffic on the road and forty-six (39%) said they would consider crossing if there is an automatic crossing signal available. Although these were the most influential factors that impacted the decision of pedestrians to cross the road through a crosswalk, other factors that were mentioned are listed in Table 7.

Table 7: Environmental Factors – Crosswalk

Category	Sub-Category	Frequency	Percentage
Location of Endpoint	N/A	55	46%
Traffic Flow Complexity	Little Traffic	66	55%

	Standstill Traffic	44	37%
	Crossing Gap	45	38%
Roadway Design	Automatic Crossing Signal	46	39%
	Smooth Crosswalk	38	32%
	Pedestrian Operated Crossing Signal	34	29%
Observations On Other Pedestrians	N/A	17	14%
Other	Lots Of Traffic	18	15%
	Crossing Light Green	5	4%

Safety Suggestions

The most common safety suggestions that were mentioned by the participants pertained to improving education. Forty pedestrians (34%) stated that safety could be improved by lowering the speed limit of drivers, while thirty (25%) stated that pedestrian safety could be enhanced by improving the education of drivers twenty-five (21%) noted that longer crossing times could also enhance safety. Moreover, eighteen (15%) suggested that it could be enhanced by improving the education of pedestrians. While these were the top suggestions mentioned by the participants, other suggestions that were provided are listed in Table 8.

Table 8: Safety Suggestions

Suggestion	Frequency	Percentage
Increase Driver Education	30	25%
Lower Speed Limit	40	34%
Longer Crossing Times	25	21%
Increase Pedestrian Education	18	15%
Increase Police Surveillance	8	7%
More Crossing Lights	6	5%

Restrict Cell Phone Use In Drivers	5	4%
More Marked Crosswalks	21	18%
More Bus Routes	5	4%
Increase Traffic Control Measures	4	3%
Yield To Pedestrians	4	3%
Add Crossing Bridges	3	3%

A total of 757 individuals were observed crossing ten different intersections in the Miami-Dade County area, see Table 9. The sample was broken down into two groups, those whom appeared to be under the age of 65 (85%) (N=650) and those whom appeared to be over the age of 65 (15%) (N=119). The majority of the observations were recorded at SW 1st /SW 1st Ave located in downtown Miami and SW 97th Ave/Flagler St, located near a middle school.

Table 9: Number of Observations per Location

Intersections	**Number of Observations**	**Percentages (%)**
1. NW 97th Ave/Flagler St	111	14.7
2. NW 102 Ave/Flagler St	21	2.8
3. SW 87 Ave/SW 24 ST	53	7.0
4. W 16 Ave / W 44 Place	84	11.1
5.NW 22 Ave / NW 20 ST	48	6.3
6.SW 1 Ave /SW 1 ST	298	39.4
7. SW 152 Ave/ SW 72 St	40	5.3
8. NW 37 Ave/ NW 7th St	56	7.4
9. NW 37 Ave/ NW 9 St	11	1.5
10. N Miami Ave/ NW 83 St	35	4.6
Total	757	100.0

Pedestrian behaviors were registered with a checklist comprised of categories that include: 1) Crosswalk 2) Crossing outside but within 20 ft, of the crosswalk; 3) Crossing midblock, 4) Crossing against red signal 5) Crossing against flashing red hand from the pedestrian signal. It was also noted if medians were present and if they were used. A total of 440 individuals (58.1%) used the crosswalk. There were 229 individuals (30.3%) who crossed midblock (Table 10).

Table 10: Overall Observed Behaviors

Behaviors	**Number of Observations**	**Percentages (%)**
Used crosswalk	440	58.1%
Crossed Mid block	229	30.3 %
Crossed Outside Crosswalk	87	11.5%

There were five intersections (Intersections: 1, 3, 4, 5 and 8 listed above) where there was a median present. When a median was present in an individual intersection, 128 pedestrians (16.9%) used the median to cross the intersection, pedestrians were most likely to cross against red pedestrian signal N= 196 (25.9%).

Senior Pedestrians

Within the ten different intersections 106 senior pedestrians were also observed. See Table 11 for number of senior pedestrians observed at individual intersections.

Table 11 Number of seniors per Intersection

Intersections	# of Senior Pedestrians
1. NW 97th Ave/Flagler St	2
2. NW 102 Ave/Flagler St	2
3. SW 87 Ave /SW 24 ST	15
4. W 16 Ave / W 44 Place	30
5.NW 22 Ave / NW 20 ST	9

6.SW 1 Ave /SW 1 ST	0
7. SW 152 Ave/ SW 72 St	12
8. NW 37 Ave/ NW 7th St	14
9. NW 37 Ave/ NW 9 St	3
10. N Miami Ave/ NW 83 St	19
Total	106

A total of 50 senior pedestrians (46 %) used the crosswalk and 35 senior pedestrians (32%) crossed midblock. Table 12 describes the behaviors observed by senior pedestrians at ten intersections.

Table 12: Senior Pedestrian Behaviors

Behaviors	**Number of Seniors**	**Percentages (%)**
Used Crosswalk	49	46%
Crossed Midblock	34	32%
Crossed Outside Crosswalk (20 ft.)	23	22%

Table 13: Observed behavior within the ten different intersections

	44 Pl/ W 16 Ave N=84	SW 1 St/ SW 1 Ave N=298	SW 97 Ave/ Flagler St N=111	SW 102 Ave/ Flagler St N=21	SW 24St/ SW 87Ave N=53	NW 37 Ave/ NW St N=56	NW 20 St/NW 22 Ave N=48	SW 152 Ave/ SW 72 St N=40	N Miami Ave/ NW 83 St N=11	NW 37 Ave/ NW 9 St N=36
Used Crosswalk	31.0 %	94.6%	12.6%	57.1%	50.9%	44.6%	58.3%	15%	0	55.6%
Crossed Midblock	60.7%	0.3%	87.4%	33.3%	39.6%	32.1%	18.8%	17.5%	100%	8.3%
Crossed Outside Crosswalk	8.3%	5.0%	0	9.5%	9.4%	23.2%	20.8%	47.5%	0%	5.6%

(within 20 ft)										
Median Present	YES	NO	YES	YES	YES	NO	NO	YES	NO	NO
Median Present and Used	20.2%	0	86.5%	14.3%	22.6%	0	0	0	0	0
Crossed vs. Red	11.9%	51.0 %	0	33.3%	9.4%	10.7%	33.3%	17.5%	0%	11.1%
Crossed vs. Flashing Red	1.2%	5.0%	0	0	1.9%	1.8%	4.2%	2.5%	0%	5.6%

Senior vs. Younger Pedestrians

A total of 391 younger pedestrians (40.4%) (Younger = observed to be less than 65 years old) used the crosswalk when crossing the intersections compared to 38% of the senior group. Also, a total of 35 senior pedestrians (27.3%) crossed midblock compared with the nearly 20% of the younger group that crossed at midblock. See Table 14.

Table 14: Senior vs. Younger Pedestrian Behaviors

Behaviors	Number of senior pedestrians	% of senior pedestrians	Number of younger pedestrians	% of younger pedestrians
Used Crosswalk	49	38.3%	391	40.4%
Crossed Midblock	35	27.3%	190	19.6%
Crossed Outside Crosswalk	19	14.8%	54	5.6%
Median Present and Used	10	7.8%	118	12.2%
Crossed vs. Red	12	9.4%	195	20.1%
Crossed vs. Flashing Red	3	2.3%	20	2.1%

Findings

The locations had several common pedestrian safety and operational issues, some of them are addressed through engineering, education and enforcement at the end of this study. These locations also had the following behavior-related concerns in common

- Motorist failing to yield to pedestrians in crosswalks
- Motorists running red signals, particularly those making turns on red;
- Pedestrians walking or running into the street at midblock in front of on-coming traffic.
- Pedestrians crossing against the traffic signal or at midblock.
- Unaccompanied young school children walking to school and crossing wide streets.
- Faded road markings
- Tires marks on the road
- Stop line nearer to crosswalk

W FLAGLER St & NW 97 Ave

At this intersection all the corners are connected with ADA ramps, but lacks proper pedestrian crosswalks at midblock and sidewalk along the lake and NW 97Ave.

Figure 14: Jaywalking in front of the school NW97 Ave

Figure 15: Jaywalking to the median near NW 97 Ave - Flagler St.

Figure 16 - 17: Pedestrian and right turning vehicle conflict on the crosswalk

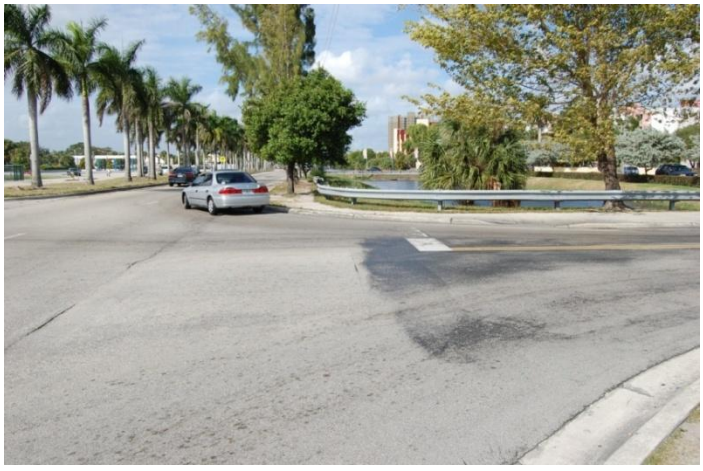


Figure 18: Lacks Pedestrian Connectivity at Midblock

Figure 19: Jaywalking at Midblock NW 97 Ave.

Figure 20: Jaywalking near School on NW 97 Ave.

Figure 21: Sidewalk NW 97 Ave near shopping complex is not connected to sidewalk on W. Flagler St.

Figure 22: Jaywalking at night

Figure 23: Poor lighting condition

Figure 24: Vehicles encroaching crosswalk

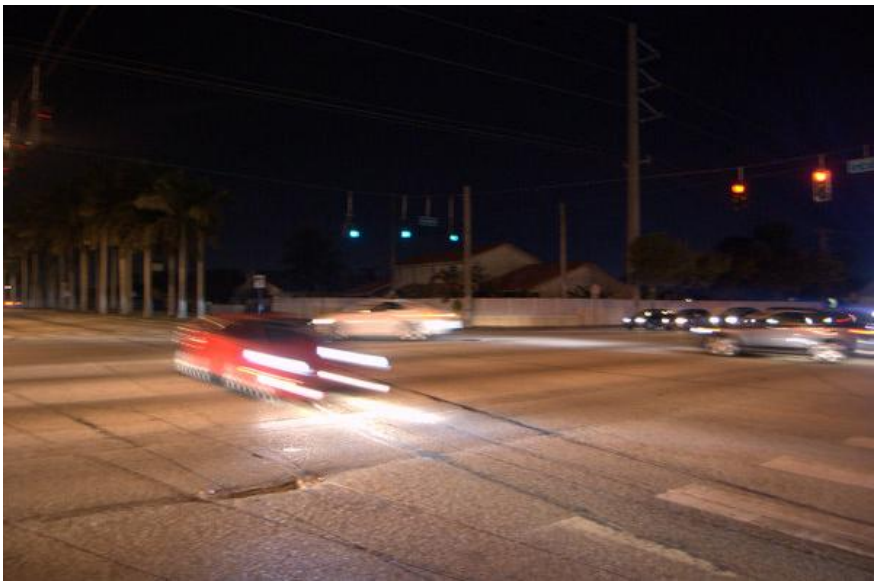


Figure 25: Poor Pavement Condition

Figure 26: Deteriorating condition of Sidewalk

W FLAGLER & NW 102 Ave

Figure 27: Wide Intersection at West Flagler Street and 102 Ave.

Figure 28: Faded Crosswalk markings

Figure 29: High probability for vehicles to encroach crosswalk – Close to stop line

Figure 30: Obstruction along sidewalk – Forces pedestrians to walk on the pavement

Figure 31: Good distance between crosswalk and stop line.

Figure 32: Transit Riders – Jay walking at West Flagler Street and 102 Ave.

Figure 33: Lacks Maintenance – Branches obstructing view to Pedestrian Signal Head at West Flagler Street and 102 Ave.

Figure 34: Lighting at West Flagler Street and 102 Ave Intersection

SW 87 Ave & SW 24 St (Coral Way)

Figure 35: Vehicles Turning Right on Red at SW 87th Ave and SW 24th St (Coral way)

Figure 36: Wide turning radius and Stop line closer to the crosswalk.

Figure 37: Short clearance distance between crosswalk and stop line

Figure 38: Transit Riders waiting at Stop for gap to cross SW 24th St (Coral way)

Figure 39: Lacks sufficient lighting on crosswalks at SW 87th Ave and SW 24th St (Coral way)

Figure 40: Pedestrian-vehicle conflict at SW 87th Ave and SW 24th St (Coral way)

Figure 41: Lacks crosswalk connection to the east of SW87thAve and SW 24th St (Coral way) Intersection

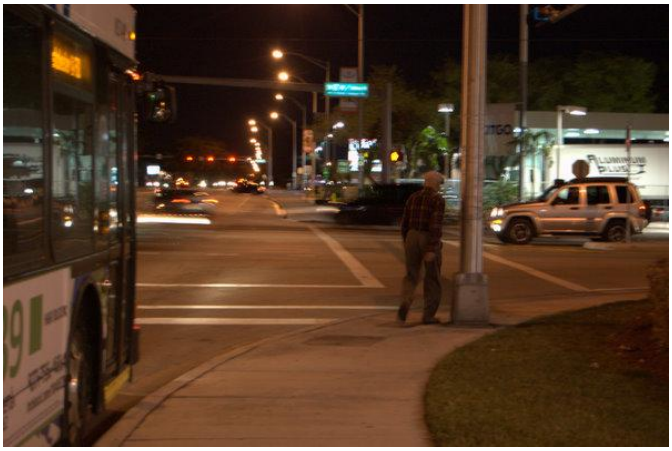


Figure 42: Elderly transit rider at intersection

Figure 43: Missing Sign and button for pedestrian signal

W 16 Ave & W 44 Place

Figure 44: Faded crosswalk and road markings

Figure 45: Pedestrian in conflict with left turning vehicle at W 16 Ave and W 44 Place

Figure 46: Elderly Pedestrians Jaywalking at W 16 Ave and W 44 Place

NW 22 Ave & NW 20St

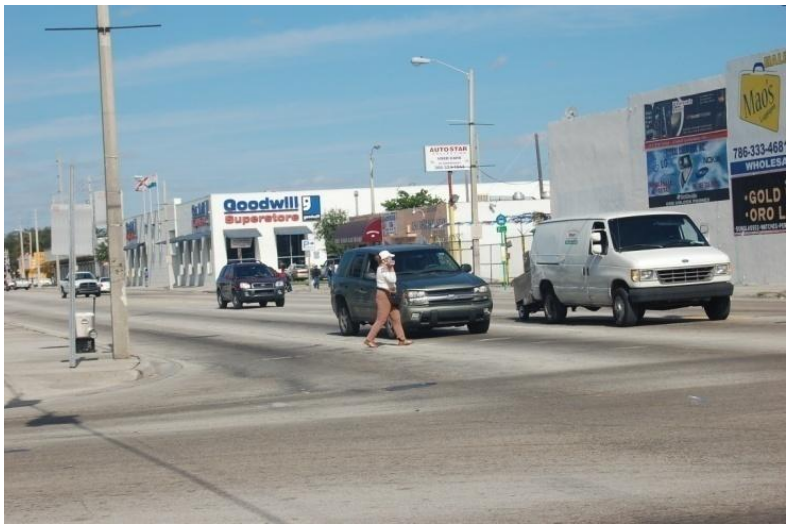


Figure 47: Pedestrians Jaywalking and faded road markings at NW 22 Ave and NW 20 St

Figure 48: heavy Truck Traffic and low raise sidewalks at NW 22 Ave and NW 20 St

Figure 49: Faded road markings at NW 22 Ave and NW 20 St

Figure 50: Sidewalks at NW 22 Ave and NW 20 St

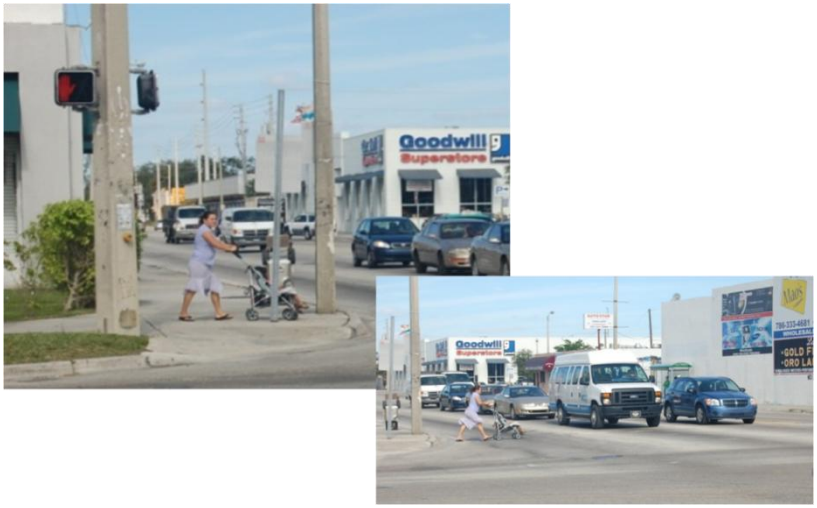


Figure 51: Lacks alignment of ADA ramps crossing at NW 20 St

Figure 52: Jaywalking observed at NW 22 Ave and NW 20 St

Figure 53: Lacks proper maintenance of infrastructure.

Figure 54: Missing signs at NW 22 Ave and NW 20 St

Figure 55: Lacks proper maintenance of infrastructure at NW 22 Ave and NW 20 St

SW 1 Ave & SW 1St

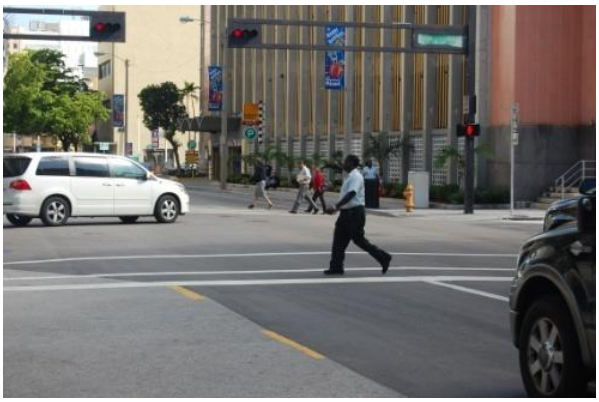


Figure 56: Jaywalking at SW 1 Ave and SW 1 St

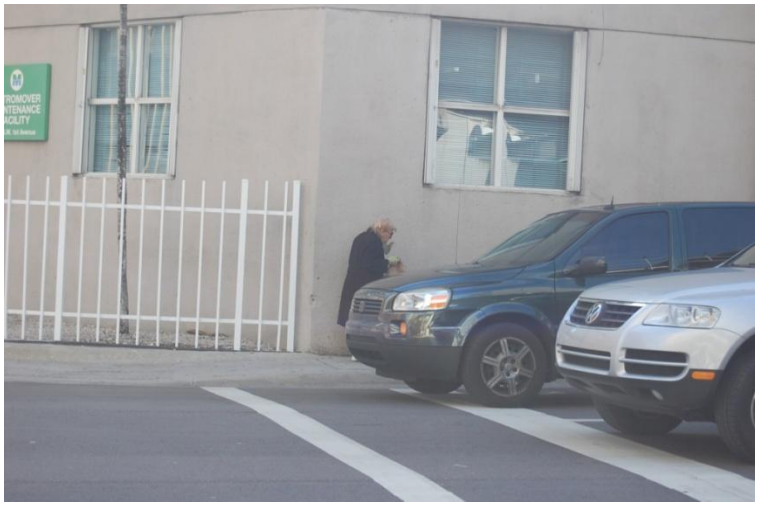


Figure 57: Narrow sidewalk at SW 1 Ave and SW 1 St

Figure 58: Stop line close to crosswalk at SW 1 Ave and SW 1 St

Figure 59: Faded crosswalk at SW 1 Ave and SW 1 St

Figure 60: Walking against the pedestrian signal at SW 1 Ave and SW 1 St

Figure 61: Graffiti on sign boards at SW 1 Ave and SW 1 St

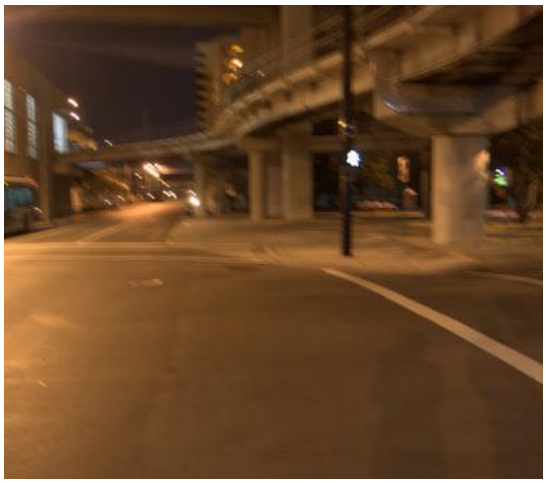


Figure 62: Sidewalks should be expanded to align with road at SW 1 Ave and SW 1 St

NW 37 Ave & NW7St

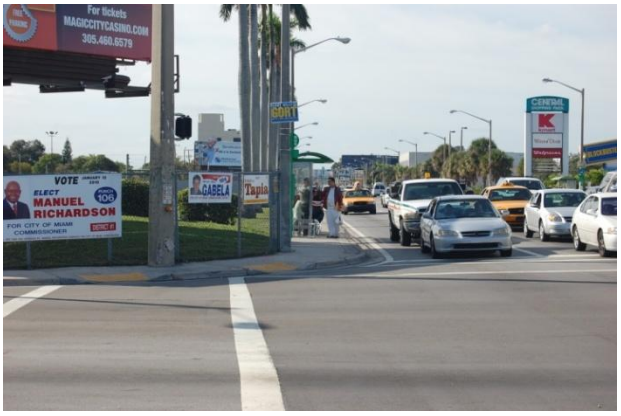


Figure 63: Missing pedestrian signal leg to cross East of NW 37 Ave at NW 37 Ave and NW 7St

Figure 64: Missing pedestrian signal leg to cross North of NW 7 St at NW 37 Ave and NW 7St

Figure 65: Missing pedestrian signal leg to cross east of NW 37 Ave at NW 37 Ave and NW 7St

Figure 66: Stop line closer to the pedestrian crosswalk at NW 37 Ave and NW 7St

Figure 67: Vehicles turning right on red at NW 37 Ave and NW 7St

SW 152 Ave & SW 72St

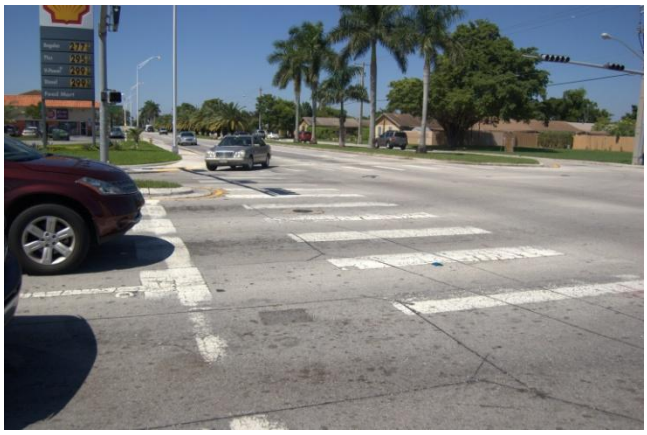


Figure 68: Stop line closer to pedestrian crosswalk

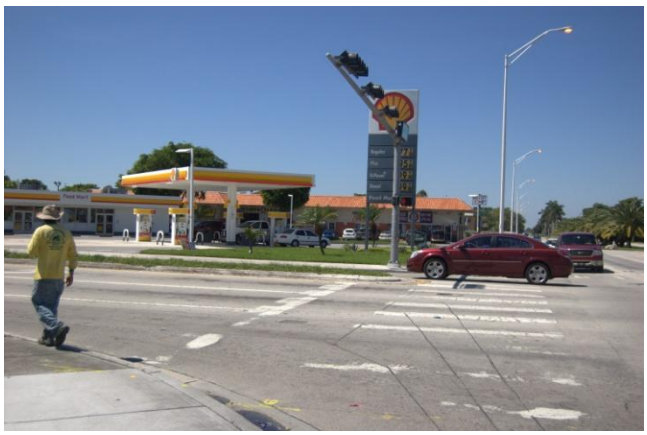


Figure 69: Faded Pedestrian crosswalk markings

Figure 70: Jay walking observed at the intersection

Figure 71: Right turn on red observed at SW 152 Ave & SW 72 ST

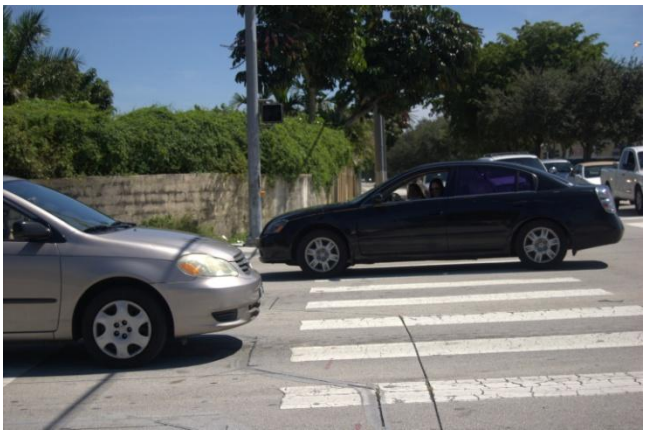


Figure 72: Drivers not stopping behind stop bar

Figure 73: Improper lighting condition

Figure 74: Carts left on the pedestrian sidewalk

NW 37 Ave & NW9St

Figure 75: Parking on the road at NW 9 ST

Figure 76: Lacks proper maintenance

Figure 77: Jay walking observed at the intersection

Figure 78: No protection for pedestrians crossing NW 9 ST

Figure 79: No markings on the crosswalk

Figure 80: Broken light observed at intersection

Figure 81: Improper lighting condition at the intersection

N Miami Ave & NW83St

Figure 82: Faded line markings and stop line along NW 83 ST

Figure 83: Lacks proper maintenance

Figure 84: ADA Ramp missing at one corner of NW 83 ST

Figure 85: Low turning radius

Figure 86: Road Pavement along NW 83 ST

Figure 87: Jay walking observed at the intersection

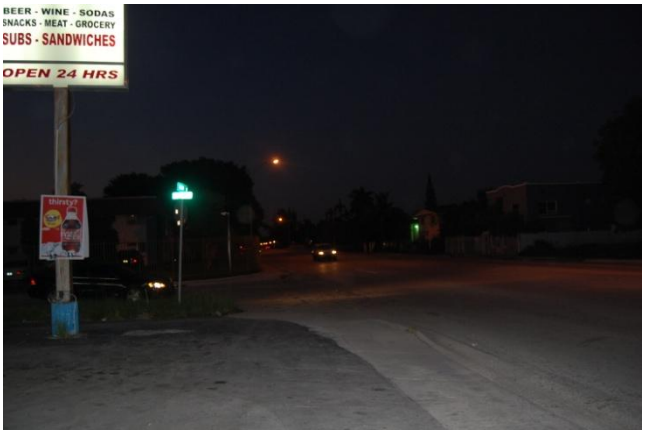


Figure 88: Improper lighting at the intersection

Common Safety Issues

The following are the most common safety issues at these dangerous locations:

- Motorist failing to yield to pedestrians in crosswalks
- Motorists running red signals
- Pedestrians walking or running into the street at midblock
- Pedestrians crossing against the traffic signal
- Faded road markings
- Tires marks on the road
- Stop line nearer to crosswalk

Safety Issues by Intersection

1. W FLAGLER St & NW 97 Ave
    - Faded road markings
    - Absence of Sidewalks along traffic flow from SW to NW.
    - Jaywalking at near intersection and near school to parking lot
    - High-volume of traffic on West Flagler
    - High Pedestrian activity
    - Adjacent land use - Commercial complex and School
    - Absence of Streetlights on the sidewalks from NW to SW traffic flow.
    - Lacks pedestrians walking environment on sidewalks
    - Cracks in sidewalk and iron rod pointing out from concrete.
    - Speeding Vehicles on 97 Ave
    - Nearer stop line to the crosswalks. Vehicles on the crosswalk on Red Signal.
    - Pedestrians crossing Midblock

2. W FLAGLER St & NW 102 Ave
    - Faded road markings
    - Jaywalking at near intersection and
    - High Pedestrian activity
    - Bicycle activity observed at night

- Improper Lighting
- Tree / plant branches obstructing the pedestrian signal.
- Lacks wider sidewalks and obstructed sidewalks
- Speeding of vehicles from 102 Ave.
- High-volume of traffic on West Flagler
- Lacks pedestrians walking environment
- Wide opening to Gas station near intersection. Turning traffic from on 102 Ave. entering the gas station with high speed - Pedestrians at risk on sidewalk.
- Pedestrians crossing Midblock
- Stop line nearer to crosswalk marking on 102 Ave arriving from south to North.
- Vehicles on the crosswalk on Red Signal.

3. SW 87 Ave & SW 24 St (Coral Way)
    - High volumes of Traffic observed at day and night
    - Wide intersection
    - Jaywalking at day and night
    - Significant pedestrian activity
    - Commercial activity on the four corners.
    - Stop line close to crosswalk
    - Turning traffic on Red signal. Vehicles on crosswalk during Red signal.
    - On-going improvement to sidewalks
    - Speeding of vehicles travelling Thru and Turning Traffic
    - More crossing time for seniors and people with disabilities
    - Improper lighting
    - Low pedestrian activity during night.
    - Most of the pedestrians are from transit.
    - Street vendors during night

4. W 16 Ave & W 44 Place
    - High traffic volume
    - High pedestrian activity
    - Lacks pedestrian walking environment
    - High Jaywalking activity near intersection

- Stop line nearer to crosswalk
- Turning traffic on Red signal. Vehicles on crosswalk during Red signal.
- Wide turning radius
- Mixed activity of residential and commercial around the intersection.
- Faded road marking
- Pedestrians crossing Midblock
- Drunken Pedestrian jaywalking
- Damaged pavement and curbs

5. NW 22 Ave & NW 20 St
    - Faded road marking
    - Pedestrians crossing Midblock
    - High Jaywalking activity near intersection
    - High Pedestrian Activity
    - Bicyclist present in the night
    - High traffic volume and High truck volumes during day and night
    - Lower surface sidewalks
    - Street vendors
    - Lacks pedestrian walking environment on crosswalk
    - As markings were faded, No Stop line was traced.
    - Turning traffic on Red signal. Vehicles on crosswalk during Red signal
    - Pavement rut and crack has been observed
    - Insufficient Street lighting
    - Lacks maintenance to signage

6. SW 1 Ave & SW 1 St
    - Located in Downtown
    - High Pedestrian activity and traffic volume
    - Stop line close to crosswalk
    - Most of the pedestrians are transit riders
    - High activity of buses near intersection
    - One-way street from West to East towards Biscayne Bay Blvd.

- Lacks pedestrian walking environment
- Homeless present along the street during night.
- Cracked sidewalks.

7. NW 37 Ave & NW 7 St
    - High Pedestrian activity and traffic volumes observed both day and night
    - High-speed vehicles
    - Stop line near crosswalk
    - Lacks pedestrian walking environment
    - Stop line nearer to crosswalk
    - Wide turning Radius
    - Turning traffic on Red signal. Vehicles on crosswalk during Red signal
    - Majority Commercial Activity near intersection
    - Missing Walk-Phase Signal heads for segments

8. SW 152 Ave & SW 72 St
    - Low Pedestrian activity and traffic volumes observed both day and night
    - Stop line near crosswalk
    - Faded Pedestrian crossings
    - Wide turning radius
    - No speed limit sign on West side of intersection
    - Jay walking at day and night
    - Faded Pedestrian crossings
    - Drivers drove fast along NW 72 St
    - Time on the countdown timer is too low to cross the intersection
    - Drivers don’t stop behind stop bar
    - Elderly pedestrians uses carts from the nearby shopping complex
    - Turning traffic on Red signal. Vehicles on crosswalk during Red signal
    - Poor lighting
    - Entrance to gas station is too wide

9. NW 37 Ave & NW 9 St
    - Jay walking at day and night

- No markings on the Pedestrian crosswalk
- High Pedestrian activity
- ADA ramp missing
- Faded No Stopping and Standing sign board
- Low pedestrian activity at crosswalk
- No speed limit sign
- Broken lights

10. N Miami Ave & NW 83 St
    - ADA Ramp missing
    - No Street markings
    - Pedestrian crossing is missing
    - High speed vehicles
    - Jay walking is observed during day time
    - Low pedestrian activity
    - No stop bar on NW 83 St
    - Poor lighting

Long-Term Considerations

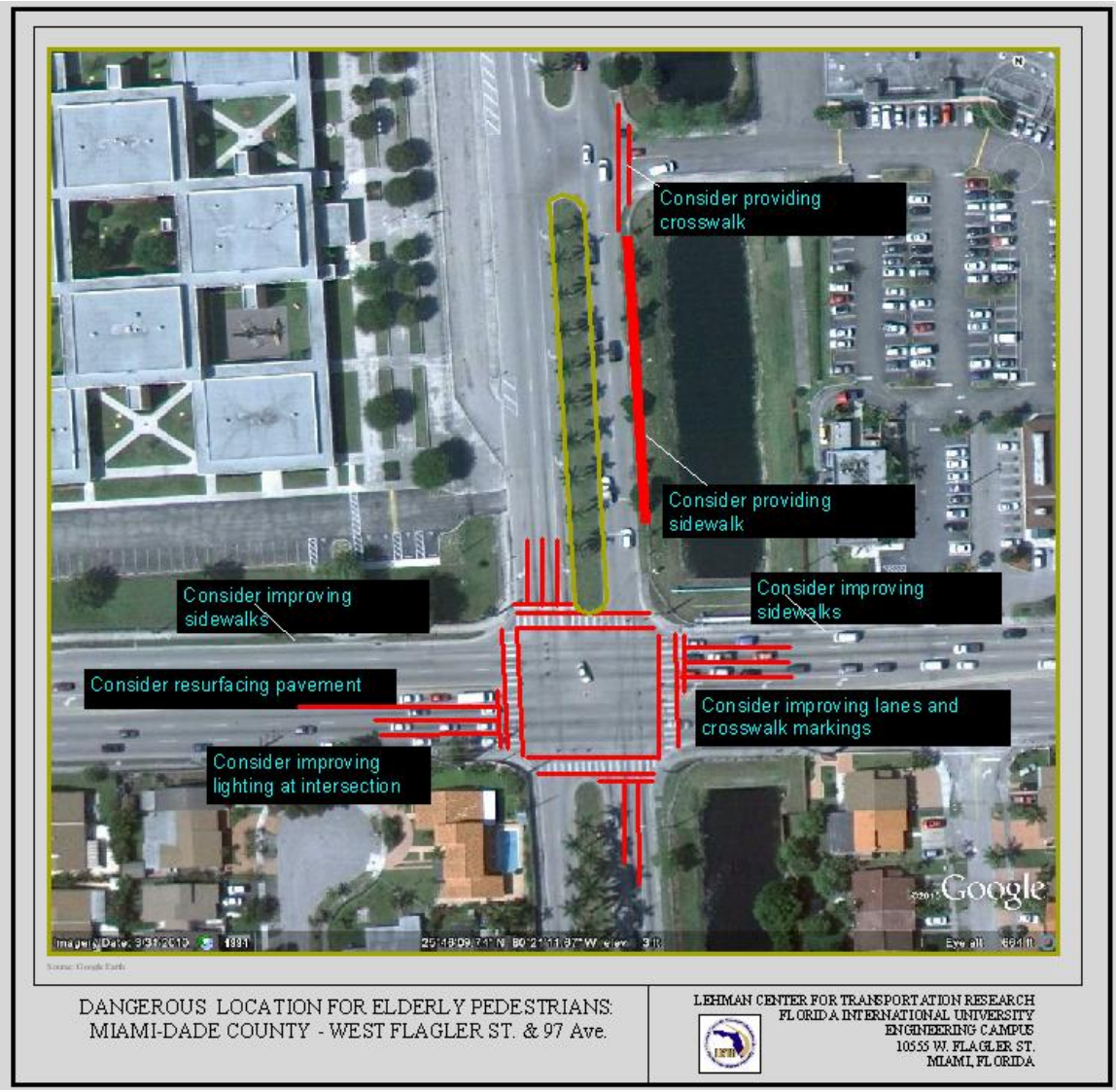
1. A prohibition of Right-Turn-On-Red should be considered at those intersections where pedestrian volumes are significant and field studies suggest treatment.
2. Install two pedestrian curb ramps per corner as near as possible to the pedestrian push buttons, to aid the handicapped, sight impaired, persons with strollers, etc. in crossing at crosswalks. A single ramp design is not desirable as it will direct pedestrians into through traffic.
3. Medians are recommended whenever the crossing distance exceeds 60ft to provide a refuge for slow or late crossing pedestrians. Push buttons should be installed in the median and handicap ramps or a full cut should be provided through the median. Refuge islands should preferably be at least 6 ft and in no case less than 4 ft wide to keep island users, particular those in wheelchairs propelled by attendants, from projecting into traffic lanes. Pedestrian signals should be timed to allow adequate time for pedestrians to cross the full width of the street. This is because placing push buttons in the median may encourage the use of quicker walking speed for design. This

means the pedestrian would have to wait an entire cycle to finish crossing the street. In this case, the pedestrians may choose to cross against a red light.

4. If the distance between the pedestrian signals across road is greater than 60 ft, another pedestrian signal should be installed in the median if possible. This will enable the elderly and sight impaired pedestrians to see the signal head.
5. Where possible, move existing and install new drainage structures out of the curb radius to prevent pedestrians from design-induced tripping.
6. Parking should be prohibited with in 60 ft of the approach to, and 30 ft on the departure from, a signalized intersection. Vehicles parked close to an intersection block a driver's view of pedestrians.

Countermeasures

W FLAGLER St & NW 97 AVE



Engineering

- Consider providing sidewalk along NW 97 Avenue next to the Shopping Complex
- Consider an Engineering study for installation of crosswalk to cross NW 97 Avenue near school as many pedestrians were observed jay walking
- Consider providing a crosswalk along NW 97 Avenue in front of Shopping Complex
- Consider to provide lighting on the sidewalk along NW to SW traffic flow
- Consider extension of the median, in order to provide protected pedestrian crosswalk (pedestrian refuge islands)

- Consider installing signs relating to pedestrians
- Improve street lighting at intersection and along sidewalks
- Consider resurfacing pavement
- Fix streetlights that are not working

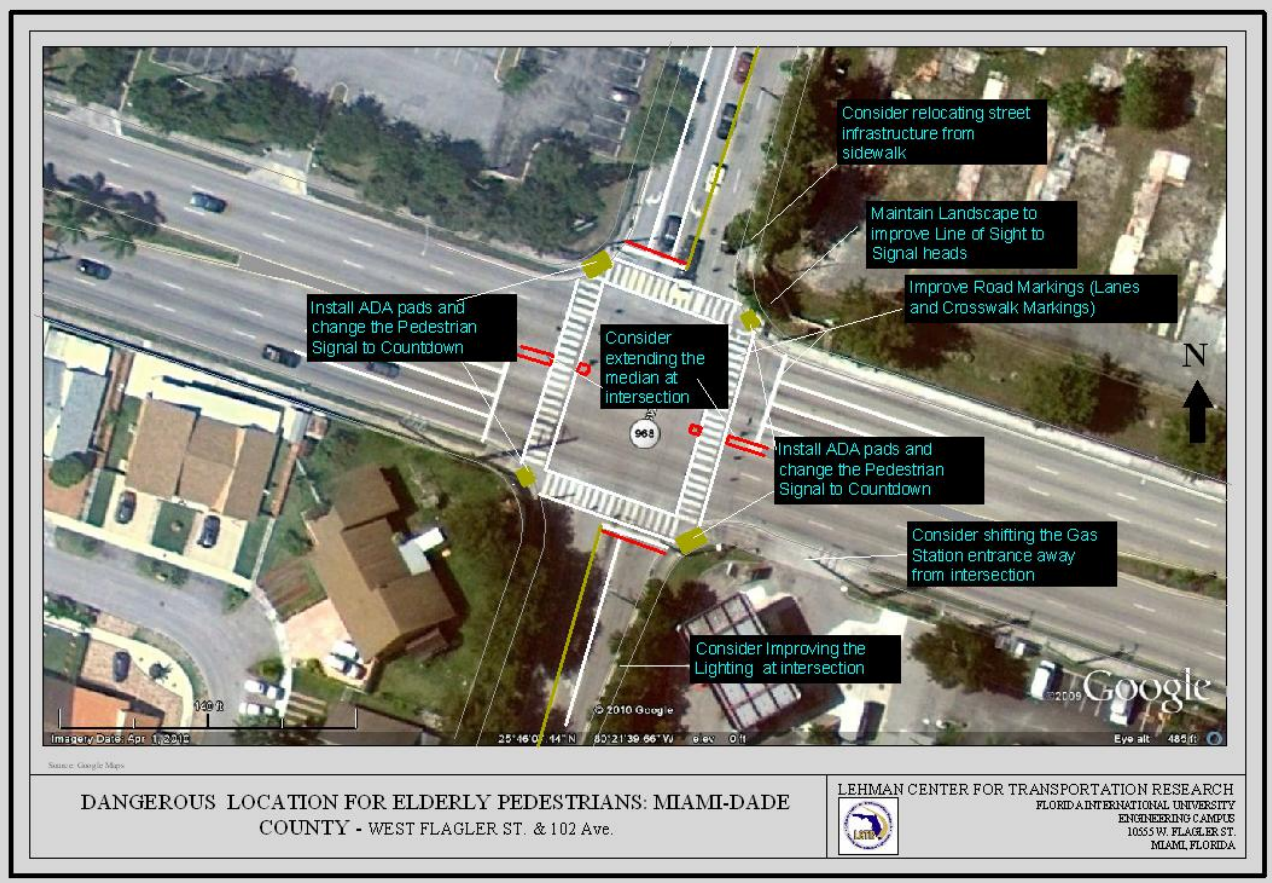
Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing educational information at bus stops
- Education through media
- Neighborhood education on pedestrian safety

Enforcement

- Pedestrians Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits (ITS Speed Warning Signs)

W FLAGLER ST & NW 102 AVE



Engineering

- Consider shifting the entrance of the Gas station away from the intersection to prevent turning cars entering directly into the gas station
- Consider an Engineering study for installation of crosswalk to cross NW 102 Avenue as pedestrians were observed jay walking
- Consider improving lighting on sidewalks
- Recommended to improve crosswalk and lane markings
- Consider extension of the median, in order to protect pedestrians in the crosswalk
- Consider midblock crosswalks between 102 Ave and 97 Ave on West Flagler
- Trim the trees and plants obstructing the view of pedestrian signal

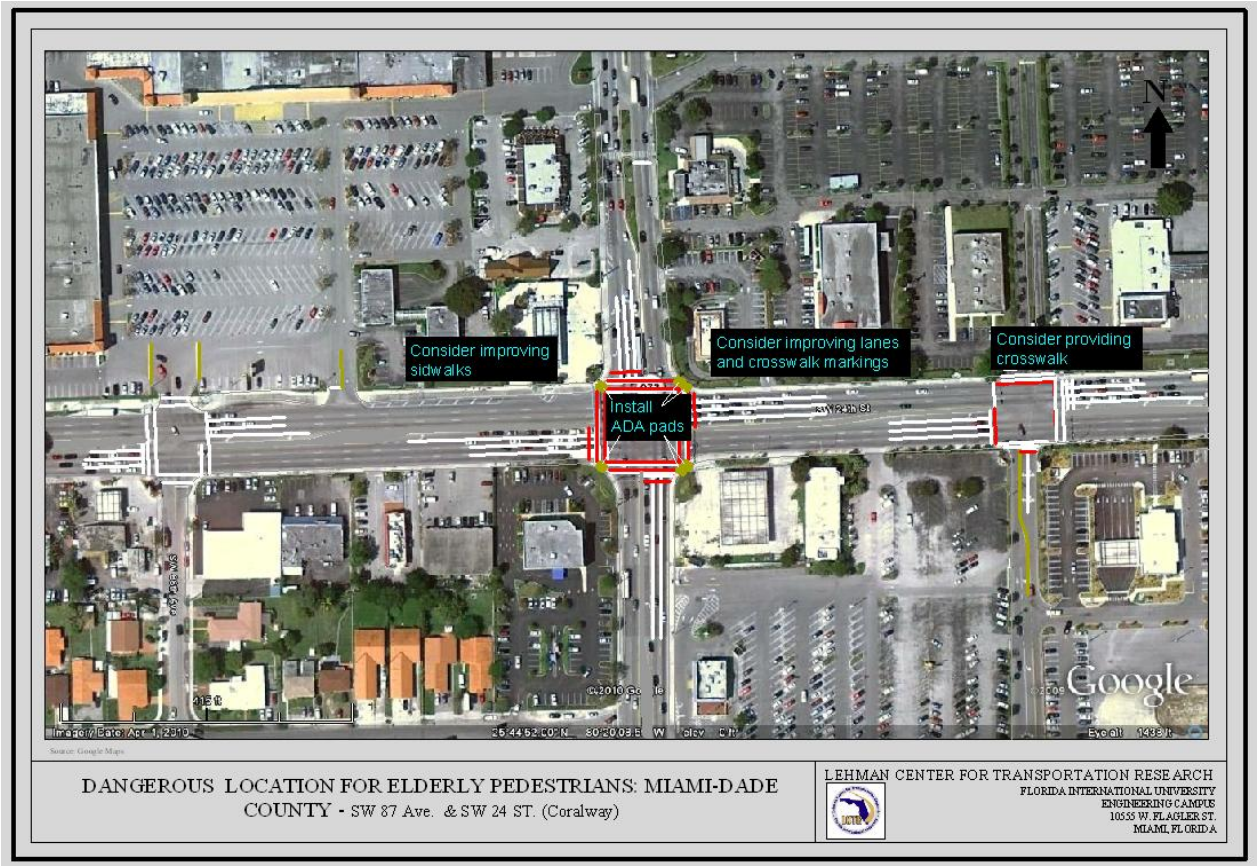
Education

- Educating pedestrians and drivers
- Educating transit riders
- Educating information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrian
- Drivers should be within posted speed limits

SW 87 AVE & SW 24 ST (Coral Way)



Engineering

- Consider providing a crosswalk to cross SW 24 Street at SW 24 Street and SW 82 Avenue intersection. Crosswalk exists on three sides of the intersection and is missing on one side
- Consider installing missing sign and push button for pedestrian signal
- Improve crosswalks and lane markings
- Consider the extension of the median, in order to protect pedestrians in the crosswalk
- Recommended to provide pedestrian refuge island
- Improve lighting at intersection
- Consider repairing sidewalk and curbs
- Consider resurfacing the pavement
- Consider pedestrian signal timing study
- Consider pedestrian pavement treatment for crosswalk

Education

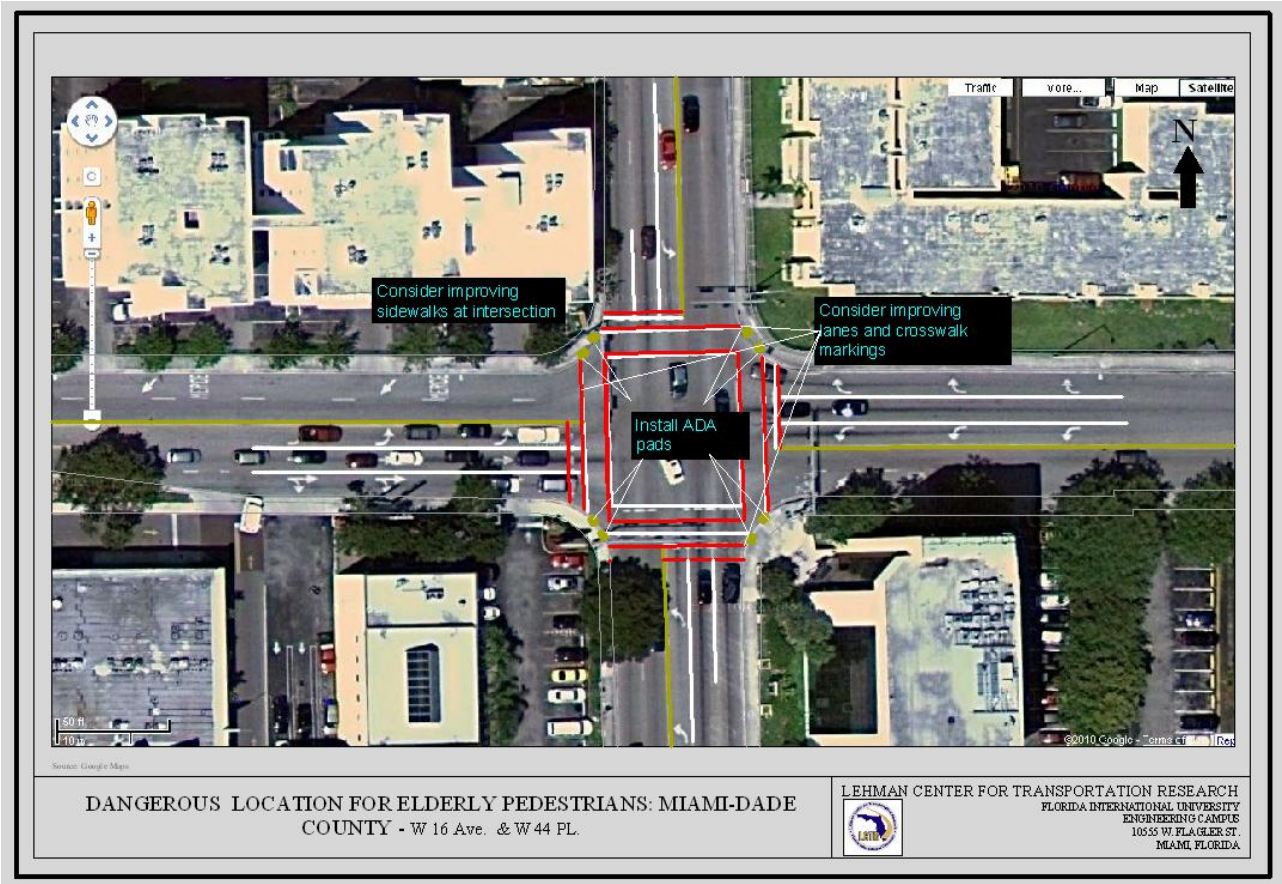
- Educating pedestrians and drivers
- Educating transit riders

- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrian
- Drivers should be within posted speed limits (ITS Speed Warning Signs)

W 16 AVE & W 44 PLACE



Engineering

- Recommended to improve crosswalks and lane markings
- Improve lighting at intersection
- Consider improving curbs and pavement
- Consider installing ADA pads

Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits
- Educate pedestrians about drunken jaywalking

NW 22 AVE & NW 20 ST

Engineering

- Consider installing missing sign-panel for push-button
- Improve crosswalks and lane markings
- Recommended to provide pedestrian refuge island
- Consider raising sidewalks with ADA accessibility
- Consider aligning ADA ramp with the crosswalk at the SE corner of the intersection along NW 22 Avenue
- Improve street lighting at intersection
- Consider resurfacing the pavement

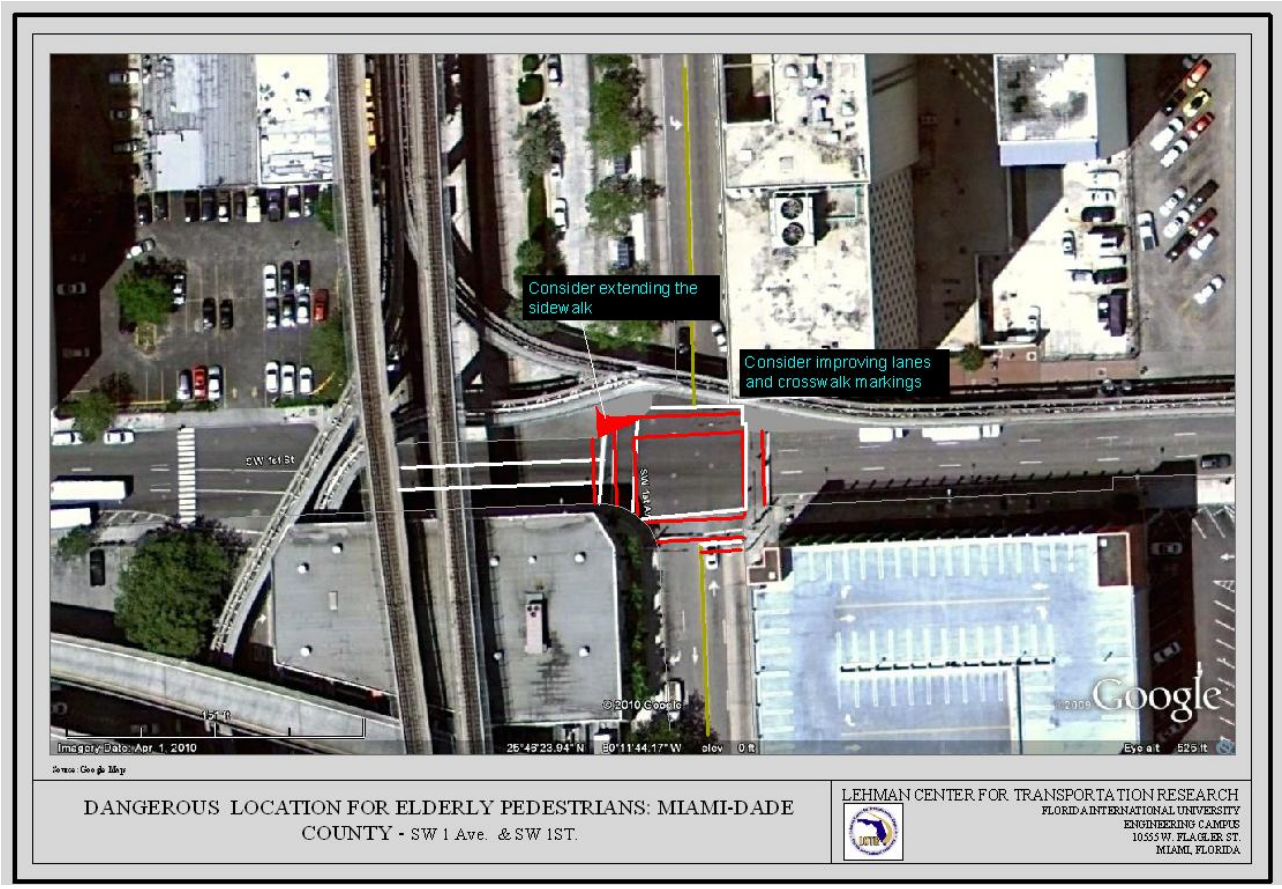
Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits (ITS Speed Warning Signs)

SW 1 AVE & SW 1 ST



Engineering

- Improve street lighting at intersections
- Improve crosswalks and lane markings
- Recommended to extend the curb to the west of SW 1 AV & SW 1 ST to align with road approximately 6ft

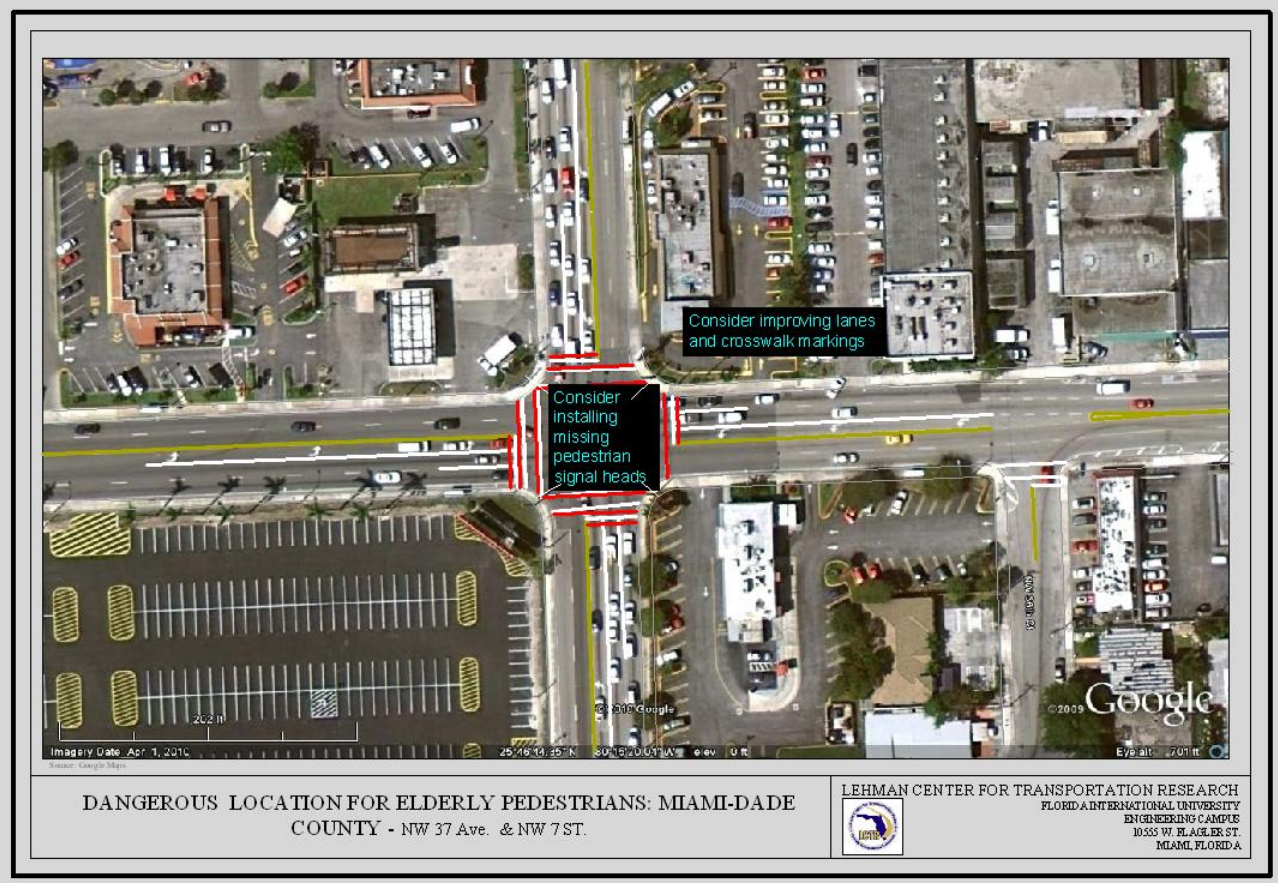
Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits
- Remedies required to improve the perception of safety for pedestrians and transit riders

NW 37 AVE & NW 7 ST



Engineering

- Consider providing refuge or pedestrian island on NW 7 St
- Consider improving crosswalks and lane markings on NW 7 St
- Install missing pedestrian signal heads as noticed from field visit in the Figure 67 to 71.
- Improved street lighting at intersections

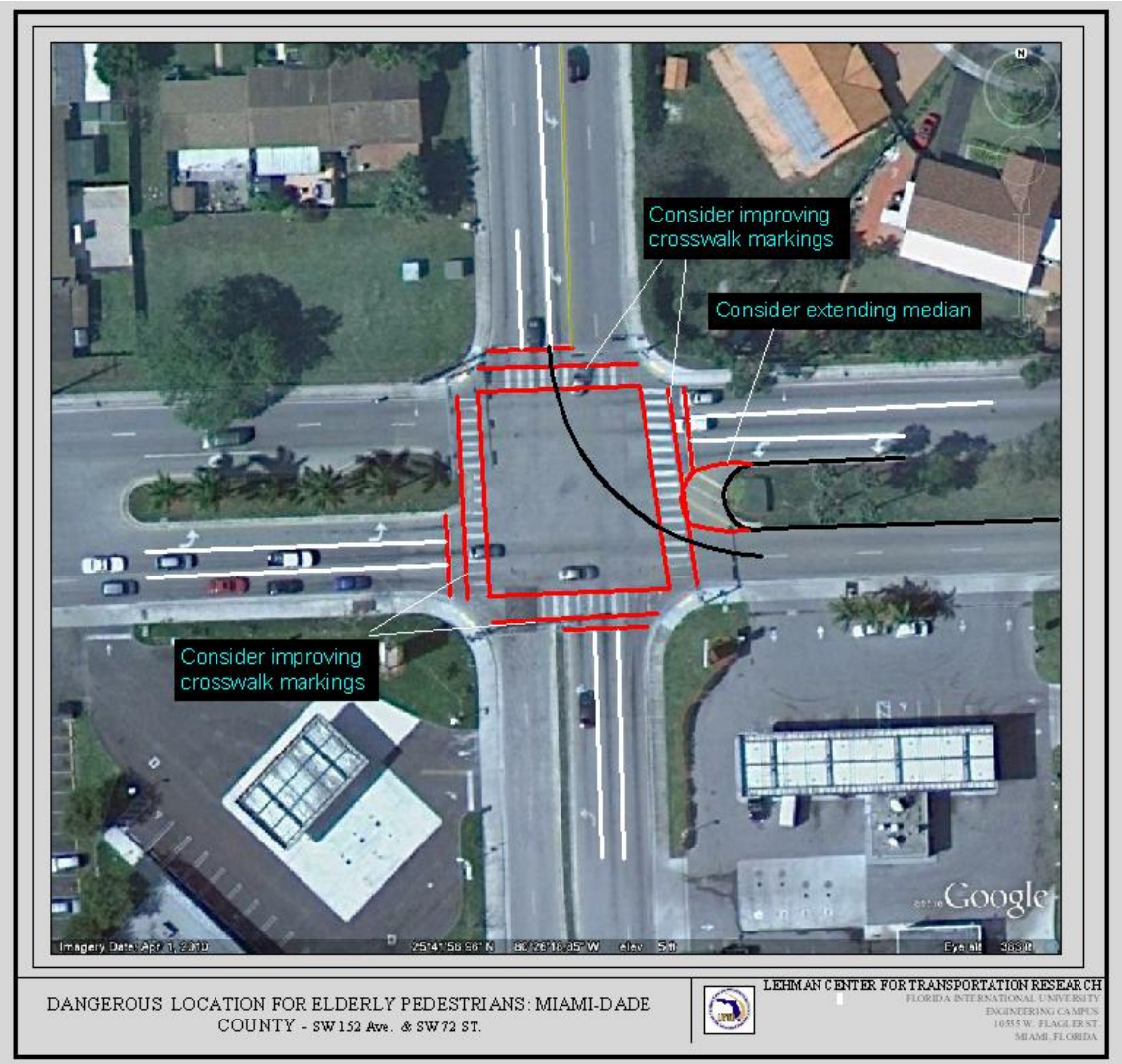
Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits

SW 152 AVE & SW 72 ST



Engineering

- Consider extending median on East side of NW 72 ST
- Improve crosswalk markings
- Consider installing speed limit sign on the West side of the intersection
- Consider improving pedestrian walk times in the pedestrian countdown timer for all the approaches of the intersection
- Consider mid-block crosswalks
- Consider providing mid-block crosswalks along SW 152 Ave and SW 72 Ave
- Improve lighting on North side of SW 152 Ave

Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits (ITS Speed Warning Signs)
- Drivers should stop behind the stop line

NW 37 AVE & NW 9 ST

Engineering

- Consider providing markings on the crosswalk
- Consider a pedestrian signal warrant analysis to install crosswalk south of the existing crosswalk somewhere between NW 7 Street and NW 9 Street connecting two shopping complexes.
- Consider installing speed limit signs along NW 37Ave
- Improve lighting at the intersection

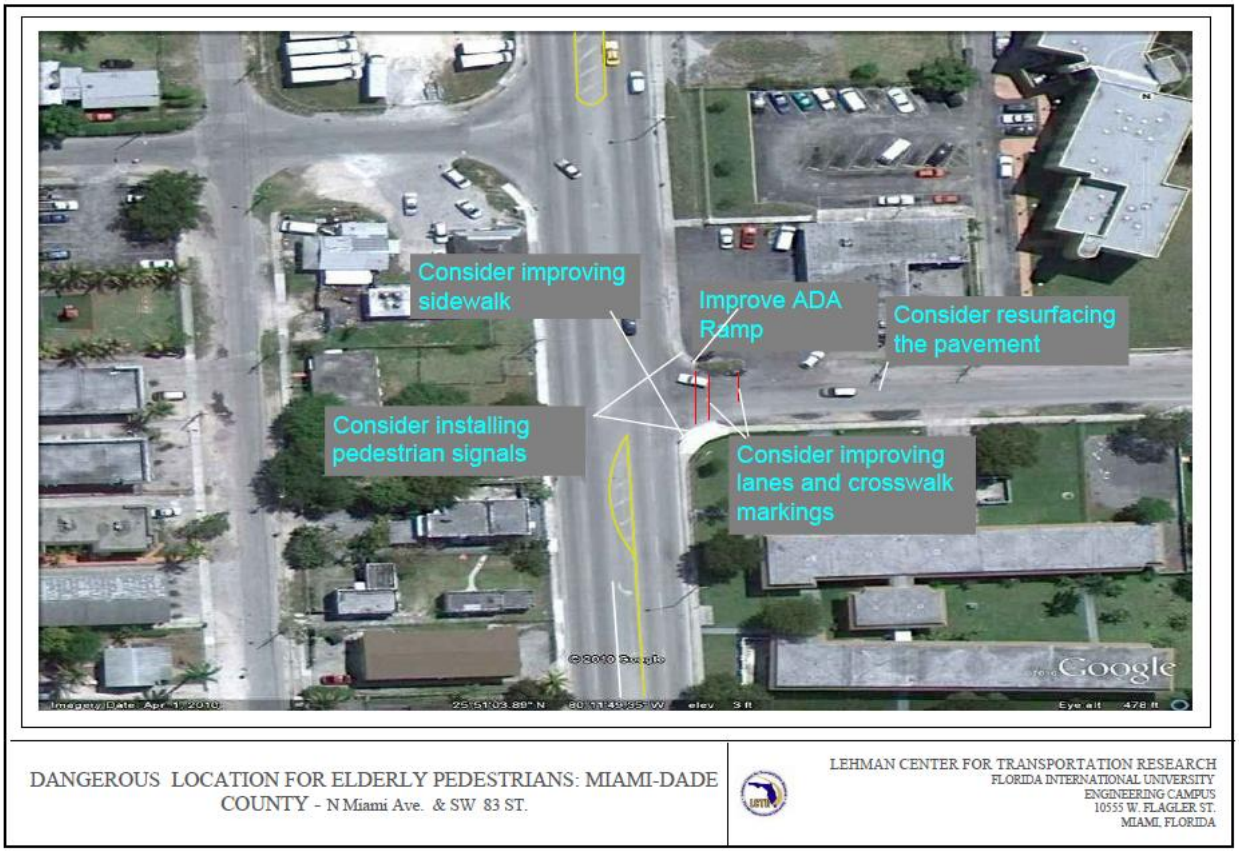
Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits (ITS Speed Warning Signs)
- No parking on the road along NW 9 ST

N MIAMI AVE & NW 83 ST



Engineering

- Align ADA ramps with the crosswalk
- Consider improving stop line marking
- Provide crosswalk and lane markings
- Consider installing speed limit sign along N Miami Avenue
- Consider resurfacing the pavement along NW 83 ST
- Consider repairing sidewalks on SW corner of N Miami Avenue
- Improve lighting at the intersection
- Consider a pedestrian signal warrant analysis to install pedestrian signals at the intersection

Education

- Educating pedestrians and drivers
- Educating transit riders
- Providing information at bus stops
- Education through media

Enforcement

- Crossing at marked crosswalks
- Yield for Pedestrians
- Drivers should be within posted speed limits (ITS Speed Warning Signs)

Conclusion and Recommendation

As Miami-Dade County is known for seniors, Hispanics and tourists, it has to put special emphasis on prioritizing pedestrian safety and improvements of intersections based on seniors, tourists, and pedestrian volumes. The safety at intersections can be enhanced by improving crosswalk markings, illumination, signs, striping, median/refugee islands, sidewalks, signals, and pavement condition and accessibility.

Short term (Low-cost)	Long term
• Painted Extension of Medians (Refuge Islands) • Painted crosswalks and lane markings near intersection • Install speed limit signs • Move stop line away from crosswalk • Improve lighting at intersections • Maintenance of street infrastructure and landscaping • Install and align ADA pads with crosswalks • Education • Enforcement	• Raised refuge Islands and sidewalks • Traffic signal improvements • Signal timing studies (protected left turns, no right turn on red, pedestrian walk time) for pedestrian safety • Install pedestrian signals • Pedestrian crossing – Pavement treatment • Pedestrian traffic studies • Improved infrastructure for pedestrian safety • Education • Enforcement

References

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Appendices

Appendix I

Pedestrian Crossing Decisions Questionnaire

1. What is your gender? _____ M _____ F
   ¿Cuál es su sexo? _____ M _____ F

2. What is your age? _____
   ¿Cuál es su edad? _____

3. What is your ethnic origin? _____ American Indian _____ Asian or Pacific Islander
   ¿Cuál es su origen étnico? ____ Indio Americano _____ Asiático o del Pacífico

   _____ African American _____ White, non-Hispanic

   _____Afro-americano _____ Blanco, no-hispano

   _____ Mexican, Hispanic _____Puerto Rican, Hispanic

   _____ Mejicano, hispano _____ Puertoriqueño, hispano

   _____Cuban, Hispanic _____Central or South American

   _____ Cubano, Hispano ____ Centro o sudamericano

   _____ Caribbean excluding Cuban or Puerto Rican

   _____ Caribeño, excluyendo Cubano o Puertorriqueño

4. Where were you born? _____United States Other Country_____
   ¿Donde nació? _____Estados Unidos _____ Otro país

5. Are you a resident of Miami? Yes_____ No_____ If not, where are you from? _____
   ¿Es usted un residente de Miami? Sí ____ No ____ Si no, ¿dónde reside? _____

6. How often do you cross this intersection?_____
   ¿Con qué frecuencia usted cruza esta intersección?

7. Where are you coming from?_____
   ¿De dónde usted viene? _____

8. Where are you going across the street?_____
   ¿A dónde usted va al cruzar la calle? _____

9. What is the purpose of this trip?_____ _
   ¿Cuál es el propósito de cruzar la calle? _____

10. Where do you typically cross this intersection? _____ at any convenient location _____ at the crosswalk
    ¿Dónde usted acostumbra cruzar esta intersección? ___ en cualquier sitio que sea conveniente

    ____ en el paso de peatones

11. What influences your decision to cross at your immediate standpoint?
    ¿Qué influye en su decisión de cruzar esta intersección en el lugar que usted esta parado

inmediatamente?

- If other pedestrians do so_____
- Si otros peatones lo hacen ____
- If the desired endpoint is near the elected crossing point _____
- Si el destino final está cerca del punto donde cruzé
- If there is little traffic on the roadway_____
- Si hay poco tránsito en la calle
- If there is standstill traffic on the roadway_____
- Si el tránsito está parado en la calle
- If an adequate crossing gap between vehicles is seen_____
- Si hay espacio para cruzar entre los vehículos
- If there is a resting spot in the middle of the roadway (such as a median or island) _____
- Si hay un lugar para descansar cerca del centro de la calle tal como un mediano o una isla
- If the crosswalk is overcrowded with other pedestrians_____
- Si hay muchas personas en el paso de peatones
- If vehicles are standing on the crosswalk_____
- Si hay vehículos estacionados en el paso de peatones
- Other influences_____
- Otras influencias_____

12. What influences your decision to cross at the crosswalk?
¿Qué influye su decisión para cruzar en el paso de peatones?

- If other pedestrians do so_____
- Si otros peatones lo hacen ____
- If the desired endpoint is near a crosswalk_____
- Si el destino final está cerca del punto donde cruzé
- If there is little traffic on the roadway_____
- Si hay poco tránsito en la calle
- If there is standstill traffic on the roadway_____
- Si el tránsito está parado en la calle
- If an adequate crossing gap between vehicles is seen_____
- Si hay espacio para cruzar entre los vehículos
- If the crosswalk is smooth_____
- Si el paso de peatones es liso o libre de hoyos
- If the crosswalk is coordinated through an automatic pedestrian crossing signal_____
- Si el paso de peatones está coordinado con una seňal automática para cruzar
- If the crosswalk is coordinated through a pedestrian operated crossing signal_____
- Si el paso de peatones está coordinado con una seňal operada por el peatón para facilitar el cruzar
- Other influences_____
- Otras influencias_____

How often do you cross somewhere other than the designated crosswalk?_____

¿Con qué frecuencia usted cruza en algún lugar en vez del paso de peatones designado?

13. What suggestions would you have for making this intersection safer for pedestrians?
¿Qué sugiere usted para hacer esta intersección más segura para los peatones?

_____

Appendix II

Review Existing Pedestrian Safety Campaign Materials

Item Code	Item Description	Item Type
AZ01	Pedestrian Safety: Looking Through the Eyes of a Child	PowerPoint CD
AZ02	"Guardians of the Future" Yellow/White Crosswalks	2 videos
AZ03	Phoenix Police Department Photo and Red Light PSAs, School Zone PSA	Video
AZ04	Phoenix School Traffic Safety Summit Meeting	Binder
AZ05	"Phoenix Handbook for Adult School Crossing Guards"	Brochure
AZ06	City of Phoenix Street Transportation Department	Folder of materials
CA01	Santa Ana Pedestrian Safety Project	Toolkit, Video
CA02	"Crossing Safely is a Two-Way Street"	English and Spanish posters
CA03	"Why People Don't Walk and What City Planners Can Do About It"	Newsletter
CO01	"Share the Road" TV Spots	Video
CO02	"Share the Road"	Audio Cassette
CO03	City of Boulder "Pedestrian Crossing Treatment Warrants"	60 page volume
CO04	City of Boulder and Boulder Valley School District "Safe Access to Schools Program"	Program Development Report
CO05	"Bicycling and Walking in Colorado: Economic Impact and Household Survey Results"	Booklet
CO06	Administration of Bicycle Events on Colorado Roads	Instruction Guide
CO07	"Colorado Bicycling Manual: A Guide for Using Roads and Trails"	Booklet
CO08	Bicycling in Colorado Rules of the Road	Wallet card
CO09	CODOT "Share the Road"	Bumper sticker
CO10	Colorado Bicycling Map	Fold-out map
CO11	"Share The Road"	Bus ads
CO12	"Feet First"	Assorted materials
CT01	"Heads Up! Cross Safely"	Leaflet
CT02	"Deadly by Design" The Connecticut Department of Transportation's Fatal Neglect of Pedestrian Safety	Article
FL01	FL DOT "Listen to Ed. Drive With Your Head" PSAs	Video
FL02	FL DOT Children's Safety Village	Video
FL03	FL DOT "Crosswalk Safety"	Brochure
FL04	"Be Safe Be Seen" Flashing Item	2" button
FL05	"Look Left Right Left"	Small brochure
FL06	"Be Safe Be Seen" Item	Zipper pull
FL07	Walk Florida "Wanted: Walkable Communities"	Brochure

FL08	FL DOT "Close Your Eyes Now, Cross the Street"	Brochure
FL09	"Share the Road"	Brochure
FL10	"Walking Is… For You!" Tips for Senior Adults	Brochure
FL11	"Walk Alert: Pedestrian Safety for Seniors"	Brochure
FL12	"Walk Alert: Stop, Look Left-Right-Left"	Brochure
FL13	"Walking for Fun and Fitness in Florida"	Brochure
FL14	"Walk Florida" FDOT	Retro-reflective sticker
FL15	"Florida Bicycle Law Enforcement Guide"	Brochure
FL16	"Dead End"	Brochure
FL17	"Foot Traffic"	Poster
FL18	FL DOT "Close Your Eyes Now, Cross the Street"	Poster
FL19	"See and Be Seen at Crosswalks"	Poster
FL20	"Giving Mobility to the Pedestrian"	Poster
FL21	"Law Enforcement Guide"	Guide book
FL22	"I Yield to Pedestrians"	Bumper sticker
KS01	Kansas Bicycle Safety Program	Application Form
MA01	Boston Pedestrian Protection Program	Audio CD
MA02	BPHC "Walk This Way"	Video
MA03	Boston Pedestrian Protection Program Item	Orange vest
MA04	Safety Strip & Safety Laces	Shoelaces and armband
MA05	Walk Boston "Community Walking Resource Guide"	85 page guide
MA06	"Improving Pedestrian Access to Transit: An Advocacy Handbook"	65 page handbook
MA07	"A Pedestrian Perspective on the Central Artery Project in Downtown Boston"	Booklet
MA08	Walk Boston "Walkable Communities: 5 Steps to Making Your Community Safe and Convenient for People on Foot"	Brochure
MA09	"Safer Routes to Schools Program" Interim Report	Booklet
MA10	"Streetscape Guidelines for Boston's Major Roads"	Booklet
MA11	Boston Pedestrian Protection Program "Community Safety Action Kit"	Booklet
MA12	BPHC "Walk This Way"	Radio PSA
MA13	"Fast Facts"	Leaflet
MA14	"Crunch. Thwak. Thud."	Poster
MA15	"I Was Jaywalking When it Hit Me"	Poster
MA16	"Cambridge: Traffic Calming Works!"	Brochure
MD01	"Drive Smart" PSA	Video
MD02	"Game Over" PSA	Video
MD03	"Walk Smart, Drive Smart"	Bumper sticker
MD04	"Walk Smart, Drive Smart"	Bookmark
MD05	"Drive Smart: Watch for Pedestrians/Watch for Cars"	Leaflet

MD07	"Walk Smart, Drive Smart"	Billboards
MD06	"These Streets are Made for Traveling…"	Brochure
NA01 National	National Congress of Pedestrian Advocates "Resources" CD-ROM	CD-Rom
NA02 National	"Safe Kids: The Walkability Check"	Brochure
NA03 National	"National Strategies for Advancing Child Pedestrian Safety" NHTSA, CDC	Booklet
NA04 National	"Walk Alert: Pedestrian Safety"	Brochure
NA05 National	"Walk Alert: Pedestrian Safety for Older Adults"	Brochure
NA06 National	Rural Youth Injury Highlights	Article
NJ01	"Walking Away: The New Jersey Department of Transportation's Fatal Neglect of Pedestrian Safety"	Article
NJ02	"Funding Bicycle and Pedestrian Projects in New Jersey"	Guide
NJ03	"Pedestrian Safety Progress in NJ Cities	Article
NJ04	"Traffic Calming"	Report
NV01	Pedestrian Safety PSAs	Video
OR01	"Roundabouts"	Brochure
SC01	SCDOT "Pedestrian Road Show"	CD-Rom
TN01	"I'm Street Smart!"	Book cover
TN02	Safe Kids Children's Activities	Coloring book pages, activities
WA01	"A Guidebook for Student Pedestrian Safety"	Report
WA02	"Bicycle Commute Guide"	Booklet
WA03	"Recommendations to Reduce Pedestrian Collisions"	Booklet
WA04	"Look Again! Pedestrian Safety Demonstration Project	Bookmark
WA05	"Bee a Safe Ped"	Brochure
WA06	"Look Again! Shoreline Pedestrian Safety Demonstration Project	Brochure
WA07	"Best Foot Forward"	Newsletter
WA08	Pedestrian Safety and Fact Information for Washington State"	Flyer
WA09	"Statewide Strategies to Reduce Pedestrian Collisions, 1999"	Article
WI01	Madison Police Dept. Pedestrian Safety PSA	Video
WI02	Wisconsin DOT Pedestrian Safety PSAs	Video
WI03	WisDOT "We Do" PSA	Video
WI04	"Pedestrians and Bicyclists: Points of Law Every Driver Must Know"	Brochure
WI05	Madison Police Department Survey	Survey
WI06	"Bicycle Laws of Wisconsin"	Brochure
WI07	"School Zone Safety"	Brochure
WI08	"'Blades are Sharp. Stay In Line"	Brochure
WI09	"Road sharing: Street Smarts in the 90's"	Brochure
WI10	"NOT!"	Bookmark

WI11	"Drive 25 Pedestrian Zone"	Yard sign
WI12	"Pedestrian Safety: Everyone's Responsibility"	Brochure
WI13	Madison Police Department	Media Materials
WY01	WYDOT "Walking to Safety"	Brochure

Appendix III

Summary of Florida's traffic laws that pertain to pedestrian travel

Although drivers are required to exercise care to avoid pedestrians, pedestrians are also subject to traffic laws.

Definitions

(Section 316.003(6), (28), and (47), F.S.)
CROSSWALK: (a) That part of a roadway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway, measured from the curbs or, in the absence of curbs, from the edges of the traversable roadway, or (b) Any portion of a roadway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.

PEDESTRIAN: Any person afoot.

Comment: Pedestrians are understood to include: "a person afoot, in a wheelchair, on skates, or on a skateboard" (definition of "pedestrian" in the Manual on Uniform Traffic Control Devices).
SIDEWALK: That portion of a street between the curb line, or the lateral line, of a roadway and the adjacent property lines, intended for use by pedestrians.
Comment: The lateral line of the roadway is the edge of the roadway. A street's public right-of-way reservation typically includes width for sidewalks and utilities. Unpaved sidewalks (beaten paths or other firm surfaces) may be practical for some pedestrian use, but generally do not meet technical provisions for "accessible [pedestrian] routes" or "accessible trails" as described in federal accessibility standards and guidelines.

Duties of pedestrians and nearby drivers
Pedestrian use of streets and highways (Sections 316.130(3), (4), and (18); 316.2065(12), F.S.)

- Where sidewalks are provided, no pedestrian shall, unless required by other circumstances, walk along and upon the portion of a roadway paved for vehicular traffic.

- Where sidewalks are not provided, a pedestrian walking along and upon a highway shall, when practicable, walk only on the shoulder on the left side of the roadway in relation to the pedestrian's direction of travel, facing traffic which may approach from the opposite direction.
- No person upon roller skates, or riding in or by means of any coaster, toy vehicle, or similar device, may go upon any roadway except while crossing a street on a crosswalk; and, when so crossing, such person shall be granted all rights and shall be subject to all of the duties applicable to pedestrians.

  Comment: Sidewalks in the legal sense (see definition above) exist on most streets in settled areas, but are not necessarily paved. Encroaching vegetation, cracks and upheaval caused by tree roots, illegally parked vehicles and other circumstances can make even paved sidewalks impractical to use at points and inaccessible for those with mobility impairments. Where sidewalk areas have been left unpaved, natural vegetation or landscaping, wet or muddy conditions, nearby ditches, and hazards hidden in grass or under plant litter (wasp nests, sharp objects, tripping hazards, etc.) can similarly make pedestrian use impractical.

  When such circumstances occur on a road without curbs, pedestrians traveling along the road should use the left shoulder, the graded area adjacent to the traveled way on the left side. Where such circumstances occur on a street with curbs, there is no shoulder per se, but the customary rule for pedestrians to travel on the left side of the roadway, so as to face any traffic approaching in the adjacent lane, is still applicable when practicable. A driver and a pedestrian who face each other are generally more aware of each other and crash risk is therefore reduced for pedestrians who travel on the left. (Note: because of their much greater speeds and other differences in operating characteristics, cyclists do not enhance their safety by following this rule. On the contrary, it increases a cyclist's crash risk. Roadway cyclists are required to travel on the right.)
- No pedestrian shall walk upon a limited access facility (freeway or interstate highway) or a ramp connecting a limited access facility to any other street or highway.

Standing in the roadway (Section 316.130, F.S.)

- No person shall stand in the portion of a roadway paved for vehicular traffic for the purpose of soliciting a ride, employment, or business from the occupant of any vehicle.
- No person shall stand on or in proximity to a street or highway for the purpose of soliciting the watching or guarding of any vehicle while parked or about to be parked on a street or highway.

Crossing a roadway mid-block, not in a crosswalk

(Section 316.130(7), (10), (11) and (12), F.S.)

- A pedestrian crossing a roadway at any point other than a (marked or unmarked) intersection crosswalk or a marked mid-block crosswalk shall yield to all vehicles on the roadway.
- A pedestrian crossing a roadway at a point where a pedestrian tunnel or overhead pedestrian crossing has been provided shall yield the right-of-way to all vehicles upon the roadway.
  Comment: Since, at mid-block locations without crosswalks, a crossing pedestrian's duty to yield is already established by the provision paraphrased above this one, the only effect of this provision is at intersection crossings where a pedestrian tunnel or overpass has been provided.
- A pedestrian may not cross between adjacent signalized intersections.
  Comment: Adjacent signalized intersections are generally found in central business districts, less commonly in suburban areas.

Except in a marked crosswalk, a crossing pedestrian must cross at right angles to the edge of the roadway, or by the shortest route to the opposite side.

Crossing a roadway in an unsignalized crosswalk (marked or unmarked crosswalk at an intersection, or crosswalk marked mid-block) (Section 316.130(7), (8), (9) and (14), F.S.)

- The driver of a vehicle at any crosswalk where a sign so indicates shall stop and remain stopped to allow a pedestrian to cross a roadway when the pedestrian is in the crosswalk or steps into the crosswalk and is upon the half of the roadway upon which the vehicle is traveling or when the pedestrian is approaching so closely from the opposite half of the roadway as to be in danger.
- When traffic control signals are not in place or in operation and no sign indicates otherwise, the driver of a vehicle shall yield, slowing down or stopping if need be to so yield, to a pedestrian crossing the roadway within a crosswalk when the pedestrian is upon the half of the roadway upon which the vehicle is traveling or when the pedestrian is approaching so closely from the opposite half of the roadway as to be in danger.
- No pedestrian shall suddenly leave a curb or other place of safety and walk or run into the path or a vehicle which is so close that it is impossible for the driver to yield.
  Comment: A pedestrian who sets foot in a (marked or unmarked) crosswalk where traffic signals are not in place, or are in place but not operating, obliges an approaching driver to yield the right of way, so long as it is feasible for the driver to do so. The driver's duty to yield applies regardless of whether the crossing location is controlled by any signs (Stop or Yield). Yielding may take the form of slowing or stopping; safe yielding requires stopping (and waiting) if the

crossing pedestrian is in the driver's lane, in the lane into which the driver is turning, or in an adjoining lane.

- When a vehicle is stopped at a crosswalk to permit a pedestrian to cross the roadway, the driver of any other vehicle approaching from the rear shall not overtake and pass such stopped vehicle. *Comment: When one driver stops to let a pedestrian cross, the stopped vehicles may screen the pedestrian from the view of an approaching driver, and also screen the approaching vehicle from the pedestrian's view. The law therefore requires a driver approaching a vehicle stopped at a crosswalk from the rear to assume that a pedestrian may be crossing, even when none can be seen at the moment. A violation of this rule can cause serious injury because the overtaking driver is traveling at speed. To reduce this risk, seasoned pedestrians pause to scan the next traffic lane before advancing beyond the outside edge of any "screen".*
- A pedestrian may not cross an intersection diagonally except where and when crossing is authorized by official traffic control devices

Crossing a roadway in a signalized crosswalk (Section 316.075, F.S., and Manual on Uniform Traffic Control Devices)

Respective rights of way and duties of pedestrians and drivers at signalized locations depend on the signal indications that are illuminated.

1. **Red indication-**
    - pedestrian: Unless otherwise directed by a pedestrian control signal (see below), pedestrians facing a steady red signal shall not enter the roadway.
    - driver: must stop before the stop line or, if none marked, the crosswalk or, if none marked, the intersection. (If a crosswalk is present) the driver must remain stopped before the crosswalk to allow a pedestrian, with a permitted signal, to cross a roadway when the pedestrian is in the crosswalk or steps into the crosswalk and is upon the half of the roadway upon which the vehicle is traveling or when the pedestrian is approaching so closely from the opposite half of the roadway as to be in danger.
    - driver on a one-way street who intends to turn left onto another one-way street: must stop on red, and may then make a left turn into the intersection on a one-way street (except where this is prohibited by a sign), but must yield to pedestrians and other traffic proceeding in accordance with the signal at the intersection**.**

2. **Green indication-**
    - pedestrian: A pedestrian facing a green signal, except when the sole green signal is an arrow signal, may proceed across roadway in any marked or unmarked crosswalk (i.e., in the direction controlled by the signal face), unless directed otherwise by a pedestrian control signal (see below).
    - driver: Vehicular traffic facing a circular green signal may proceed cautiously straight through or turn right or left unless a sign at such place prohibits either such turn, but shall yield the right-of-way to pedestrians lawfully within the intersection or an adjacent crosswalk.
    - Vehicular traffic facing a green arrow signal may cautiously enter the intersection to make the movement indicated by such arrow, but must yield to pedestrians lawfully within an adjacent crosswalk.

      Comment: Yielding may take the form of stopping or slowing; safe yielding requires stopping (and waiting) if the crossing pedestrian is in the driver's lane, in the lane into which the driver is turning, or in an adjoining lane. A pedestrian is considered to be lawfully within a crosswalk if he started crossing in it when it was legal to do so, and is finishing crossing without undue delay. A driver facing a green arrow signal displayed by a properly operating signal should not ordinarily encounter a pedestrian in a parallel crosswalk. However, a driver facing either type of green indication may need to wait for a pedestrian to finish crossing in the crosswalk immediately before him.
3. **Steady yellow indication-**
    - pedestrian: A pedestrian facing a steady yellow signal indication is thereby advised that there is insufficient time to cross the roadway before a red indication is displayed, and no pedestrian shall then start to cross the roadway.
    - driver: Vehicular traffic facing a steady yellow signal indication is thereby warned that the related green movement is being terminated.

      Comment: For a driver still waiting in the intersection to make a permitted left turn, the duty to yield to a lawfully crossing pedestrian (described for green indication above) still applies, since the yellow signal interval functions as the termination of the green movement.

4. **Pedestrian control signals-**

For pedestrians the directions of a pedestrian control signal supersede those of the associated traffic signal. Pedestrian control signals may also be used at mid-block locations. The meanings of the symbolic signal indications (or of the word messages still displayed on some older pedestrian signal heads) are not described in Florida Statutes. They are described in the Manual on Uniform Traffic Control Devices.

- Steady WALKING PERSON (or "WALK") indication: pedestrian facing the signal indication is permitted to start to cross the roadway in the direction of the signal indication. Pedestrian shall yield the right-of-way to vehicles lawfully within the intersection at the time that the WALKING PERSON signal indication is first shown.
- Flashing UPRAISED HAND (or "DON'T WALK") indication: pedestrian shall not start to cross the roadway in the direction of the signal indication, but any pedestrian who has already started to cross on a steady WALKING PERSON ("WALK") signal indication shall proceed out of the traveled way.
- Steady UPRAISED HAND (or "DON'T WALK") indication: pedestrian shall not enter the roadway in the direction of the signal indication.
  Comment: At some locations a slower walker (who entered the crosswalk during the WALKING PERSON indication) may not have reached the far side of the roadway when the steady UPRAISED HAND indication is first displayed. However, some crossing time still remains. Per the Manual on Uniform Traffic Control Devices, the pedestrian clearance time is comprised of three intervals: the pedestrian change interval (during which a flashing UPRAISED HAND indication is displayed), the yellow change interval (when the steady UPRAISED HAND is displayed and the traffic signal for the parallel vehicular movement displays a yellow indication), and any read clearance ("all red") interval. The pedestrian clearance time should be sufficient to allow a pedestrian crossing in the crosswalk who left the curb or shoulder during the WALKING PERSON indication to travel at a walking speed of 1.2 m (4 ft) per second to at least the far side of the traveled way or to

a median of sufficient width for a pedestrian to wait.

Many pedestrian signal heads now incorporate countdown pedestrian signals. These signals count the seconds remaining n the pedestrian change interval (flashing UPRAISED HAND displayed). At the end of this interval, the countdown signal briefly displays zero and the steady UPRAISED HAND indication is displayed. As explained above, some time still remains in the pedestrian clearance time.

Crossings by visually or mobility impaired pedestrians (Sections 316.1301 and 316.1303, F.S.)

When a pedestrian is trying to cross a public street or highway, guided by a dog guide or carrying in a raised or extended position a white cane or walking stick, an approaching driver is obliged to bring his vehicle to a full stop before arriving at such intersection or place of crossing and, before proceeding, shall take such precautions as may be necessary to avoid injuring such pedestrian.

- Only a blind person may carry a white cane or walking stick in a raised or extended position on a public street or highway.
- If a mobility-impaired person (using a guide dog or service animal, a walker, a crutch, an orthopedic cane, or a wheelchair), is in the process of crossing a roadway at an intersection, a driver approaching the intersection must stop before arriving at the intersection and take reasonable precautions to avoid injuring such a pedestrian.

Other duties of drivers

Stopping at sidewalk before entering roadway (Section 316.125, F.S.)

- The driver of a vehicle emerging from an alley, building, private road or driveway within a business or residence district shall stop the vehicle immediately prior to driving onto a sidewalk or onto the sidewalk area extending across the alley, building entrance, road or driveway, or in the event there is no sidewalk area, shall stop at the point nearest the street to be entered where the driver has a view of approaching traffic thereon and shall yield to all vehicles and pedestrians which are so close thereto as to constitute an immediate hazard.

Driving on a sidewalk (Section 316.1995, F.S.)

- No person shall drive any vehicle other than by human power upon a bicycle path, sidewalk, or sidewalk area, except upon a permanent or duly authorized temporary driveway.

Not to stop, stand, or park a vehicle on a sidewalk or crosswalk (Section 316.1945(1) (a) 2, 4, F.S.)

- Except when necessary to avoid conflict with other traffic, or in compliance with law or the directions of a police officer or official traffic control device, no person shall stop, stand, or park a vehicle on a sidewalk or on a crosswalk.

Not to stand or park a vehicle within 20 feet of an intersection crosswalk (Section 316.1945(1) (b) 3, F.S.)

- Except when necessary to avoid conflict with other traffic, or in compliance with law or the directions of a police officer or official traffic control device, no person shall stand or park a vehicle, whether occupied or not, except momentarily to pick up or discharge a passenger or passengers, within 20 feet of a crosswalk at an intersection.

Driver duty to exercise care (Section 316.130(15), F.S.)

- Notwithstanding other provisions of this chapter, every driver of a vehicle shall exercise due care to avoid colliding with any pedestrian or any person propelling a human-powered vehicle and give warning when necessary and exercise proper precaution upon observing any child or any obviously confused or incapacitated person.

Driving speeds (Sections 316.183, 316.185, F.S.)

- No person shall drive a vehicle on a highway at a speed greater than is reasonable and prudent under the conditions and having regard to the actual and potential hazards then existing. In every event, speed shall be controlled as may be necessary to avoid colliding with any person, or vehicle on or entering the highway in compliance with legal requirements and the duty of all persons to use due care.

- The driver of every vehicle shall drive at an appropriately reduced speed when approaching and going around a curve; approaching a hill crest; traveling upon any narrow or winding roadway; and when any special hazard exists with respect to pedestrians or other traffic or by reason of weather or highway conditions.
- The fact that a driver is traveling at less than the speed limit does not relieve him of the duty to reduce speed in such conditions. A driver must reduce speed as necessary to avoid colliding with any person legally present on the street.

Miscellaneous prohibited pedestrian actions (Section 316.130(16) and (17), F.S.)

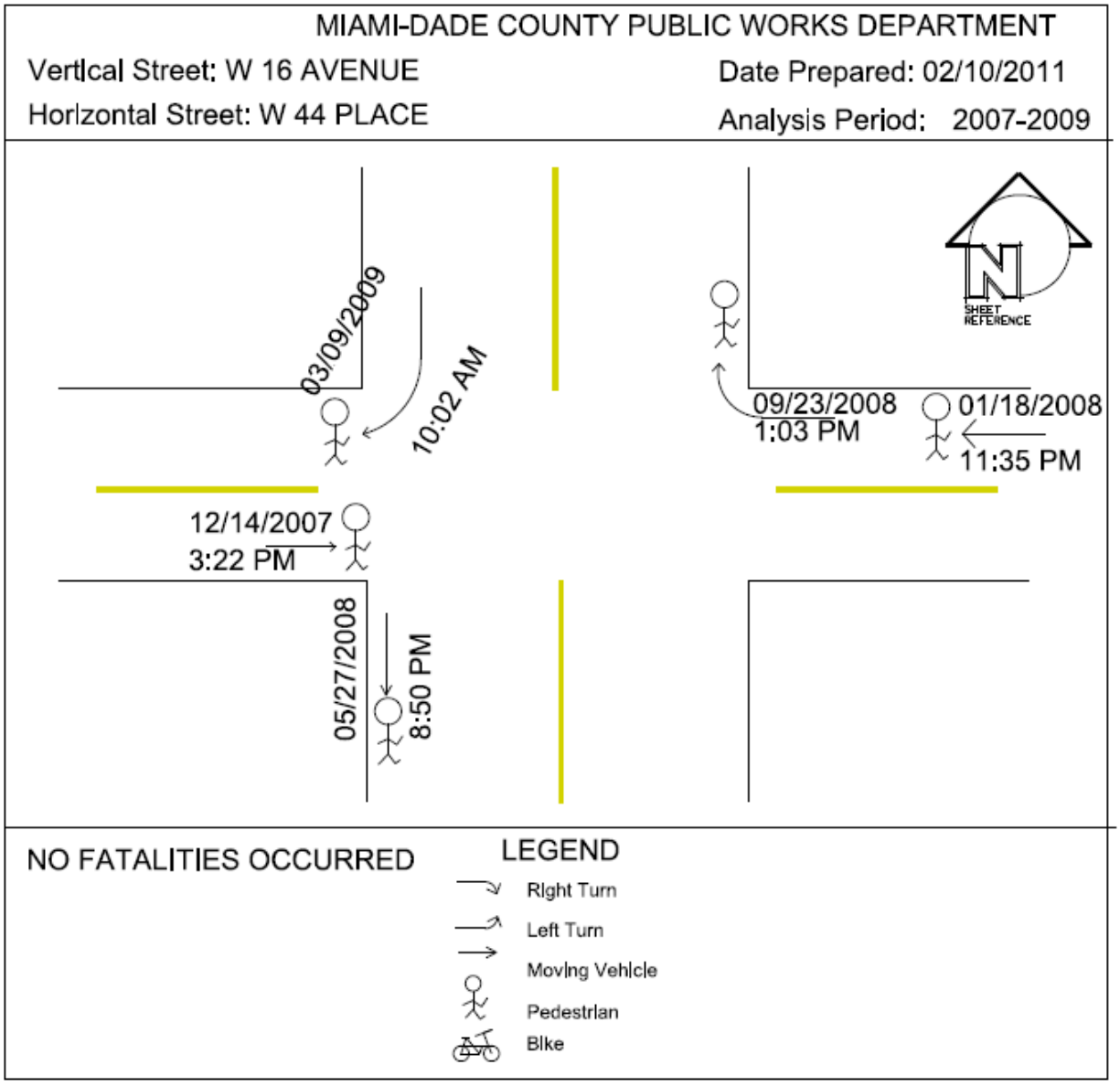
No pedestrian shall enter or remain upon any bridge or bridge approach, beyond the bridge signal, gate, or barrier after a bridge operation signal indication has been given.

No pedestrian shall pass through, around, over, or under any crossing gate or barrier at a railroad grade crossing or bridge while such gate or barrier is closed or is being opened or closed.

No pedestrian may jump or dive from a publicly owned bridge.

Appendix IV

Collision Diagrams



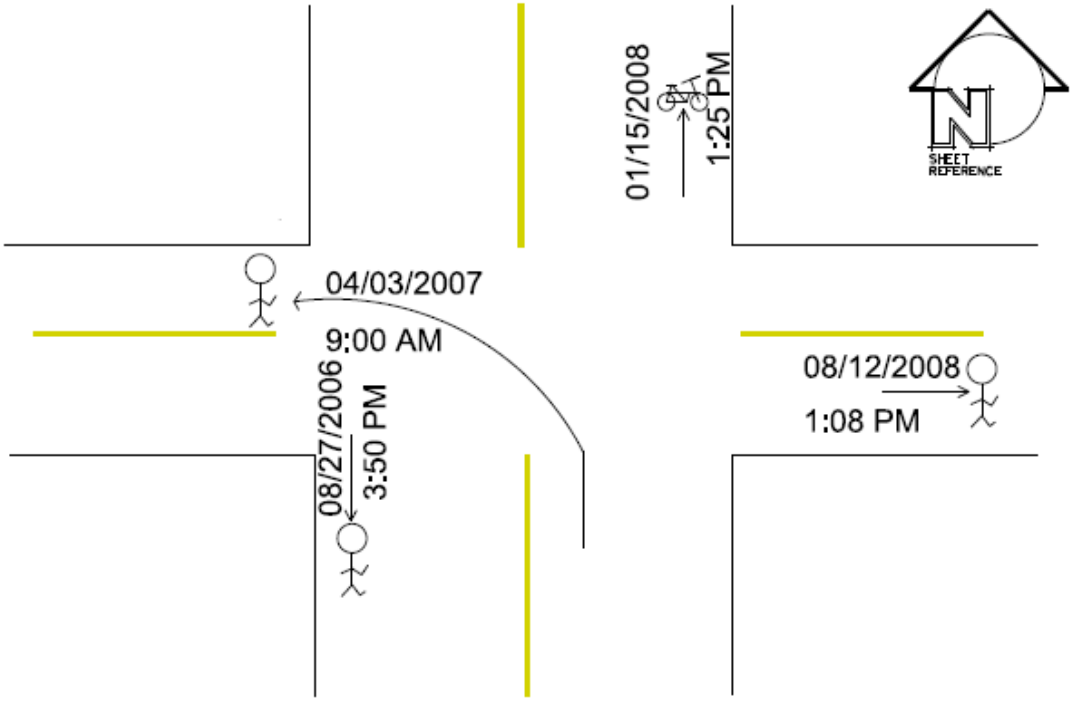
MIAMI-DADE COUNTY PUBLIC WORKS DEPARTMENT

Vertical Street: NW 22 AVENUE

Horizontal Street: NW 20 STREET

Date Prepared: 02/01/2011

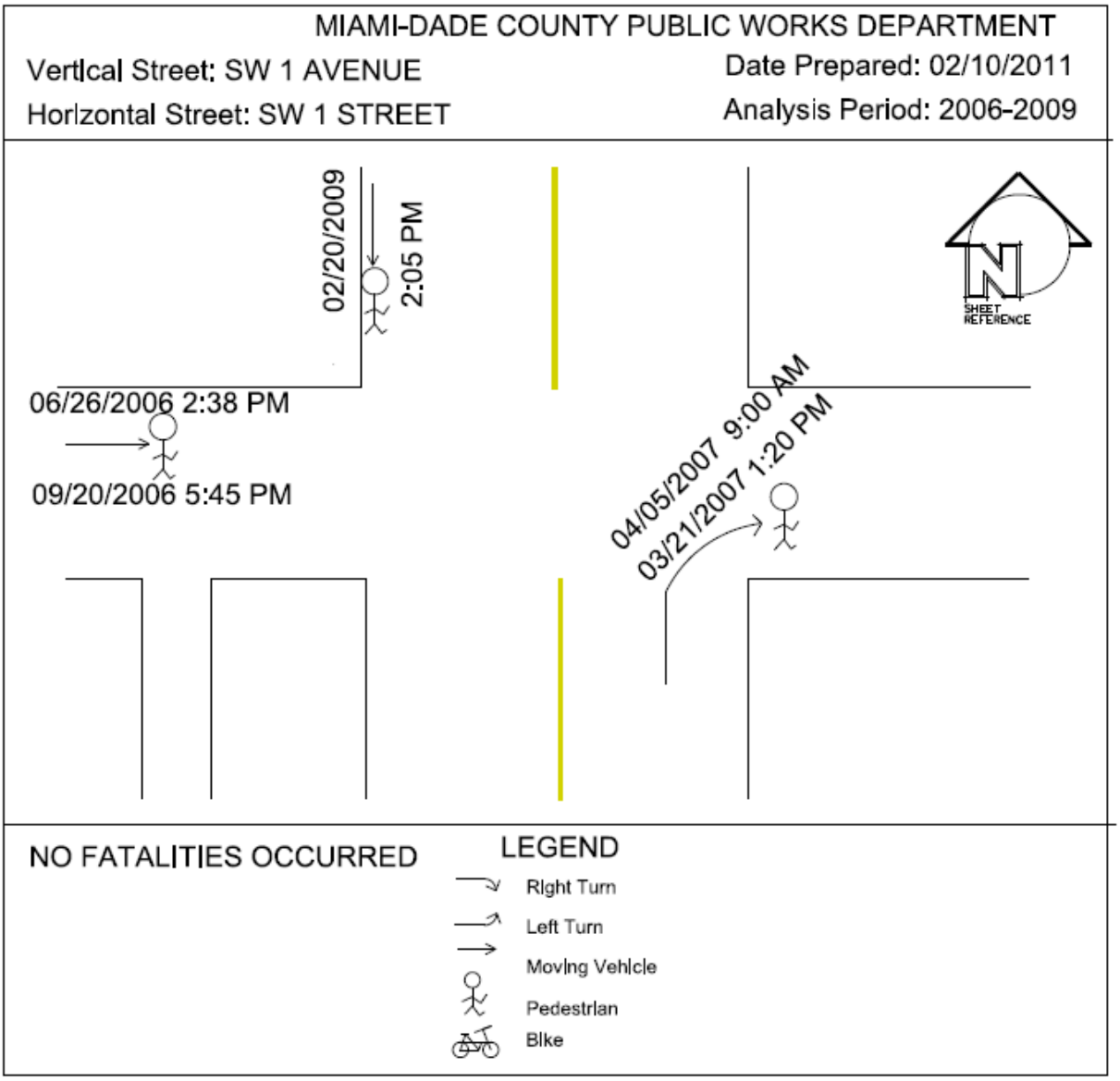
Analysis Period: 2006-2008



NO FATALITIES OCCURRED

LEGEND

- Right Turn
- Left Turn
- Moving Vehicle
- Pedestrian
- Bike


MIAMI-DADE COUNTY PUBLIC WORKS DEPARTMENT
Vertical Street: SW 1 AVENUE
Horizontal Street: SW 1 STREET
Date Prepared: 02/10/2011
Analysis Period: 2006-2009
02/20/2009
2:05 PM
SHEET REFERENCE
06/26/2006 2:38 PM
09/20/2006 5:45 PM
04/05/2007 9:00 AM
03/21/2007 1:20 PM
NO FATALITIES OCCURRED
LEGEND
Right Turn
Left Turn
Moving Vehicle
Pedestrian
Bike

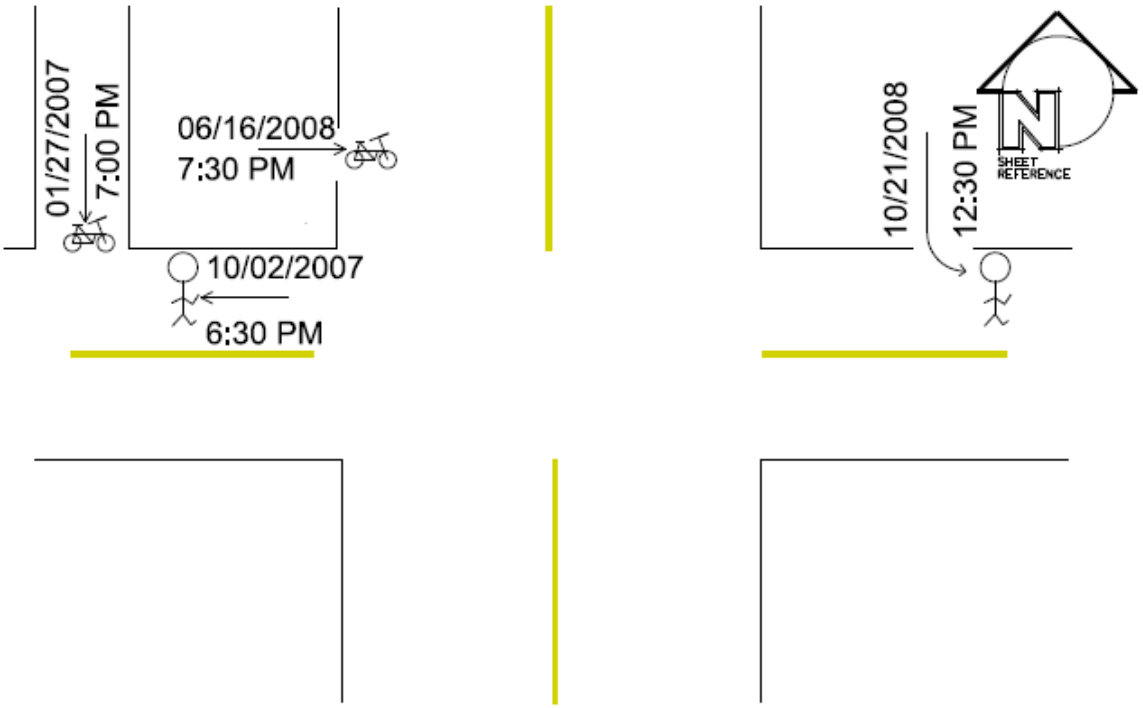
MIAMI-DADE COUNTY PUBLIC WORKS DEPARTMENT

Vertical Street: NW 37 AVENUE

Horizontal Street: NW 7 STREET

Date Prepared: 02/10/2011

Analysis Period: 2007-2008



NO FATALITIES OCCURRED

LEGEND

Right Turn

Left Turn

Moving Vehicle

Pedestrian

Bike

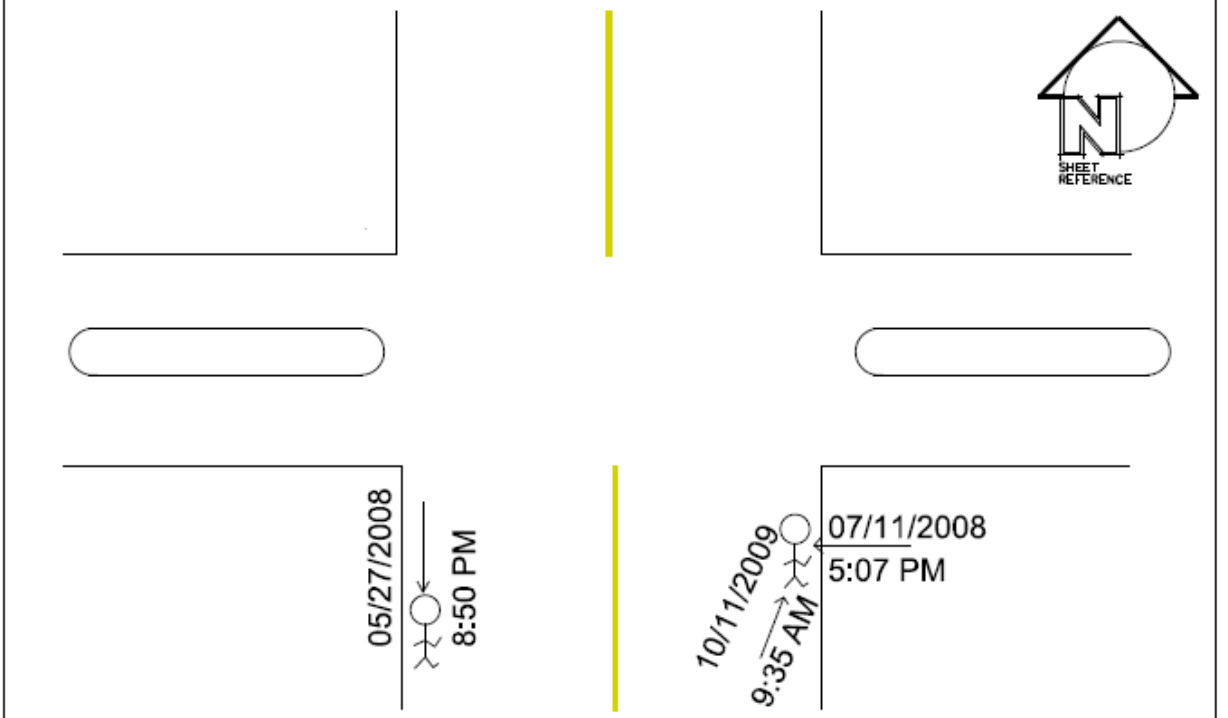
MIAMI-DADE COUNTY PUBLIC WORKS DEPARTMENT

Vertical Street: SW 152 AVENUE

Horizontal Street: SW 72 STREET

Date Prepared: 02/10/2011

Analysis Period: 2008-2009



NO FATALITIES OCCURRED

LEGEND

Right Turn

Left Turn

Moving Vehicle

Pedestrian

Bike

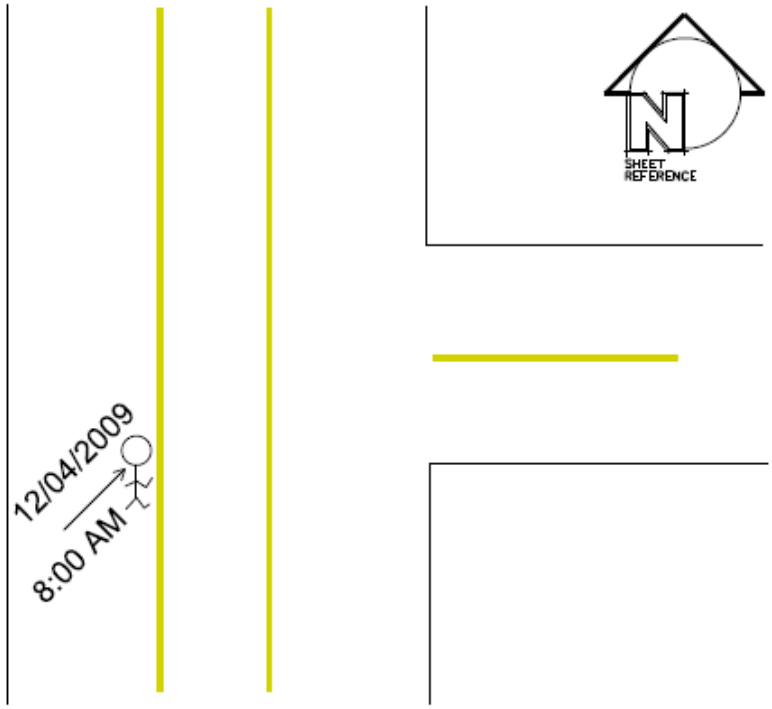
MIAMI-DADE COUNTY PUBLIC WORKS DEPARTMENT

Vertical Street: NW 37 AVENUE

Horizontal Street: NW 9 STREET

Date Prepared: 02/10/2011

Analysis Period: 2009



NO FATALITIES OCCURRED

LEGEND

Right Turn

Left Turn

Moving Vehicle

Pedestrian

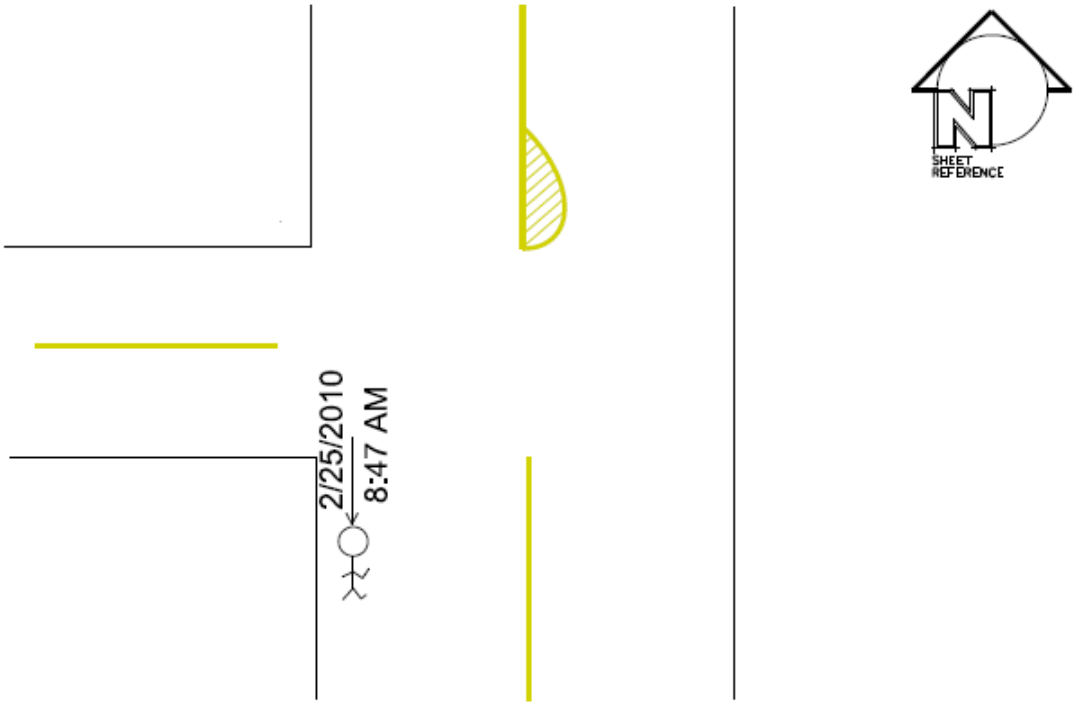
MIAMI-DADE COUNTY PUBLIC WORKS DEPARTMENT

Vertical Street: N MIAMI AVENUE

Horizontal Street: NW 83 STREET

Date Prepared: 02/01/2011

Analysis Period: 2010



FATALITIES OCCURRED

2/25/2010 8:47 AM

LEGEND

Right Turn

Left Turn

Moving Vehicle

Pedestrian