WORK ORDER #GPC V-27

MIAMI-DADE METROPOLITAN PLANNING ORGANIZATION

COUNTERMEASURES FOR Pedestrian and Bicycle HIGH CRASH LOCATIONS

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INTRODUCTION

Florida has been continuously ranked among the highest in terms of pedestrian and bicycle fatality rates in the United States. Miami-Dade County has had the highest number of pedestrian and bicycle crashes in Florida. Pedestrian fatalities account for over 30 percent of Miami-Dade County's total road crash fatalities, which is greater than the statewide average of approximately 20 percent. Bicycle crashes account for approximately five percent of the County's annual fatalities. Diverse factors contribute to the proportion of pedestrian and bicycle crashes in Miami-Dade County, including population growth, aggressive road users, year round warm weather conducive for walking and biking, tourists and visitors, a high percentage of elderly population, automobile oriented transportation infrastructure, and land planning and development patterns that resulted in suboptimal walking and biking conditions.

The Miami-Dade MPO's Countermeasures for Pedestrian and Bicycle High Crash Locations Study is another step of its continued effort to improve pedestrian and bicycle safety. The primary objectives of this study include the identification of locations with a high incidence of pedestrian and bicycle crashes and development of engineering and non-engineering countermeasures. Another objective is to develop an on-going process for annual crash data review. This study will complement the recent MPO studies such as the Bicycle/Pedestrian Safety Action Plan, 2040 Bicycle/Pedestrian Master Plan, Application of Innovative Strategies for Bicycle Safety and Mobility, and Safe Routes to School Infrastructure Plans.

This study was conducted in partnership of several stakeholders, including the Florida Department of Transportation (FDOT), Miami-Dade County Department of Transportation and Public Works (DTPW), City of Miami, University of Miami WalkSafe Program, Alliance for Aging, Miami-Dade Police Department, Neat Streets Miami, City of Hialeah, and Bike 305. The interim study results were presented to the Study Advisory Committee (SAC) and Local Action Team for Safer People, Safer Streets. These presentations are included in Appendix A.

Report Outline

The study results are organized under the following sections:

- Crash Data Analysis
- Evaluation of High Crash Locations
- Process Development (for on-going evaluation)
- Summary

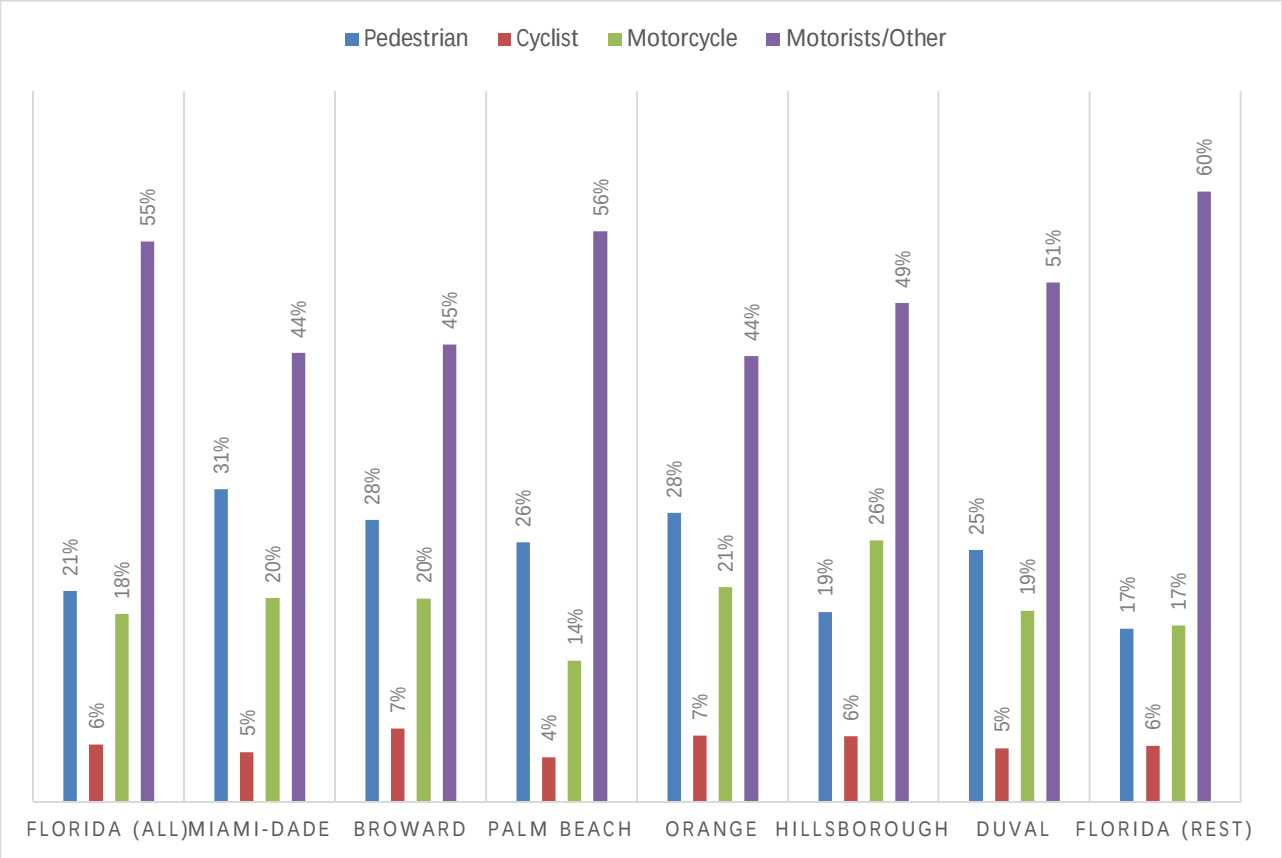
The appendix contains crash data mapping, SAC presentations, and a list of referenced documents.

CRASH DATA ANALYSIS

This assessment included pedestrian and bicycle crashes occurring over a six-year period between January 1, 2008 and December 31, 2013. The 2013 data was added after the initial database was developed for this study. The crash data was obtained by the Miami-Dade MPO from the FDOT's Unified Basemap Repository (UBR), where crash information is available as three separate GIS databases: event data, vehicle data, and occupant data. Furthermore, separate databases exist for state and non-state road crashes.

To develop an understanding of Miami-Dade County's crash data profile, fatal crashes for 2013 were compared with statewide data and with other major counties in Florida (data source: Florida Department of Highway Safety and Motor Vehicles). As shown in Figure 1, Miami-Dade County had the highest proportion of pedestrian fatalities in the state, which is approximately 10 percent greater than the statewide average (31 percent vs. 21 percent). In general, counties with large population centers and urbanized areas had a higher percentage of fatal pedestrian crashes. The proportion of Miami-Dade County's bicycle fatalities is comparable to the statewide data and other major counties.

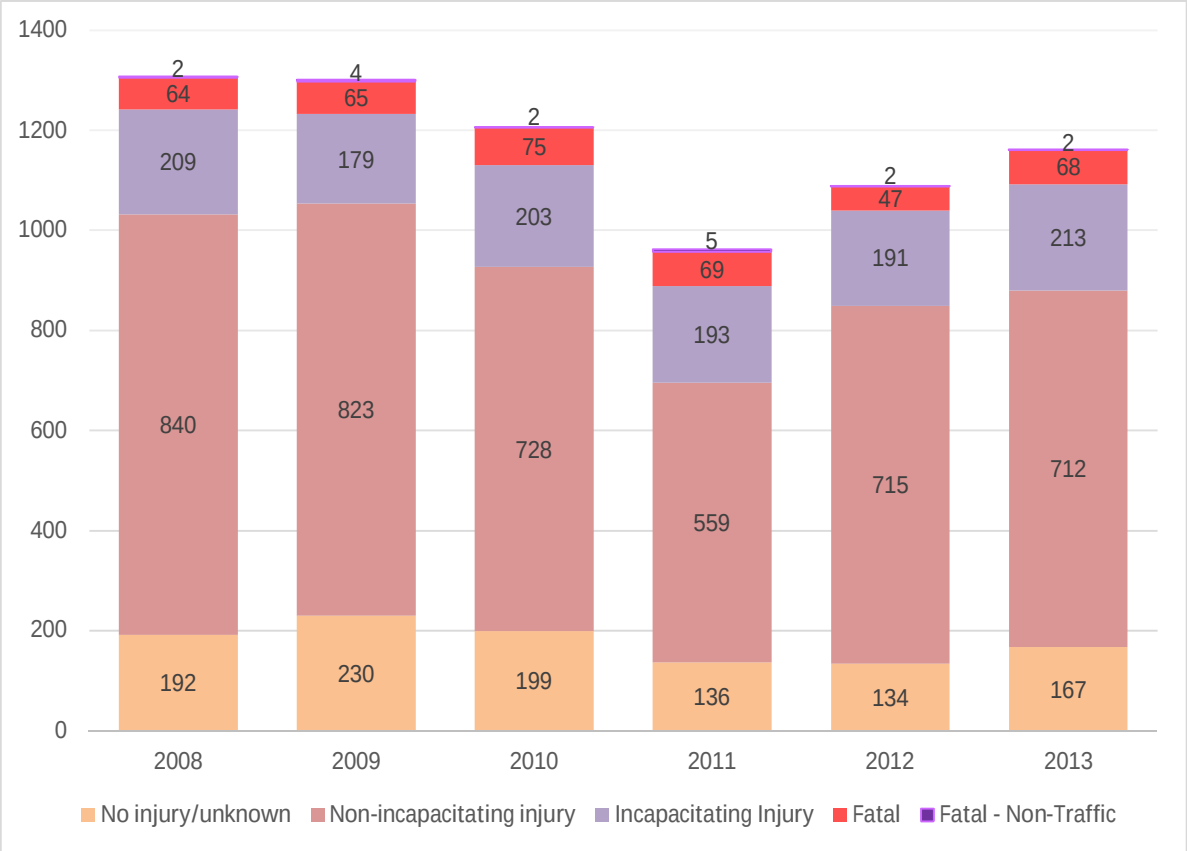
Figure 1: Comparison of Miami-Dade County Fatal Crash Data (2013)



Pedestrian Crashes

A total of 7,028 pedestrian crashes were reported in Miami-Dade County between 2008 and 2013. These crashes included 388 fatal crashes and 1,188 incapacitating injury crashes. Therefore, approximately 1 in 18 pedestrian crashes resulted in a fatality. Furthermore, approximately 1 in 4.5 pedestrian crashes resulted in a fatality or an incapacitating injury. It's important to note the increasing trend of pedestrian crashes beginning in 2012. GIS maps depicting countywide pedestrian crash data and density analysis are included as Appendix B.

Figure 2: Pedestrian Crashes by Severity



Time of Day

Table 1 provides a summary of pedestrian crashes by time of day and day of week. Weekdays had a higher frequency of crashes than weekend days. In general, the six-hour period between 3:00 pm and 9:00 pm had the highest occurrence of pedestrian crashes (40 percent of all crashes). Notable clusters of pedestrian crashes are evident between 3:00 pm and 12:00 midnight on Fridays; between 12:00 midnight and 6:00 am on Saturdays and Sundays, and between 9:00 pm and 12:00 midnight on Saturdays.

Table 1: Pedestrian Crashes by Time of Day

Day	12am - 6am	6am – 9 am	9am – 12pm	12pm – 3pm	3pm – 6pm	6pm – 9pm	9pm – 12am	Total
Monday	71	156	146	152	202	192	83	1,002
Tuesday	60	166	136	156	208	178	89	993
Wednesday	77	153	158	175	226	239	85	1,114
Thursday	76	132	131	182	220	203	97	1,041
Friday	73	163	148	174	251	245	143	1,197
Saturday	160	63	90	141	173	177	157	961
Sunday	144	42	75	84	118	149	106	718
	661	875	884	1,064	1,398	1,383	760	7,025

Note: Time of day was not listed in three crashes.

Table 2 provides a summary of fatal pedestrian crashes by time of day. There are no particular day of the week trends associated with fatal pedestrian crashes. The period between 6:00 pm and 9:00 pm had the highest frequency of fatal pedestrian crashes, followed by 9:00 pm to 12:00 noon. Overall, 66 percent of fatal pedestrian crashes occurred between 6:00 pm and 6:00 am.

Table 2: Fatal Pedestrian Crashes by Time of Day

Day	12am - 6am	6am – 9 am	9am – 3pm	3pm – 6pm	6pm – 9pm	9pm – 12am	Total
Monday	9	11	11	1	15	14	61
Tuesday	4	8	6	4	13	7	42
Wednesday	4	7	4	5	12	5	37
Thursday	7	6	8	7	20	13	61
Friday	11	10	9	2	18	12	62
Saturday	15	8	6	3	13	20	65
Sunday	15	4	9	4	15	13	60
	65	54	53	26	106	84	388

Lighting Condition

Table 3 provides a summary of pedestrian crashes by lighting condition. Approximately 62 percent of pedestrian crashes occurred during daylight conditions. However, approximately 72 percent of fatal pedestrian crashes occurred during non-daylight conditions. Only two percent of daylight crashes were fatal, whereas 10 percent of dark (lighted) crashes and 14 percent of dark (unlit) crashes were fatal. The proportion of fatal pedestrian crashes (i.e., fatal crashes/total crashes) under dark (lighted) conditions was four times greater than crashes under daylight conditions. Similarly, the proportion of fatal pedestrian crashes under dark (unlit) conditions was

six times greater than crashes under daylight conditions. Therefore, to reduce fatal pedestrian crashes, increased focus should be paid on crashes occurring under dark conditions, such as the need for enhanced street lighting in high pedestrian activity locations. Signalized intersections with a high incidence of dark condition crashes are identified in Figure 3.

Table 3: Pedestrian Crashes by Lighting Condition

Lighting Condition	No injury	Non-incapacitating	Incapacitating	Fatal	Total
Daylight	712	2,885	616	108	4,321
Dusk	34	112	29	8	183
Dawn	11	61	35	15	122
Dark (Lighted)	249	1,088	425	206	1,968
Dark (Unlit)	38	185	74	48	345
Total	1,044	4,331	1,179	385	6,939

Note: Lighting condition or severity was not listed in 89 crashes.

Crash Location

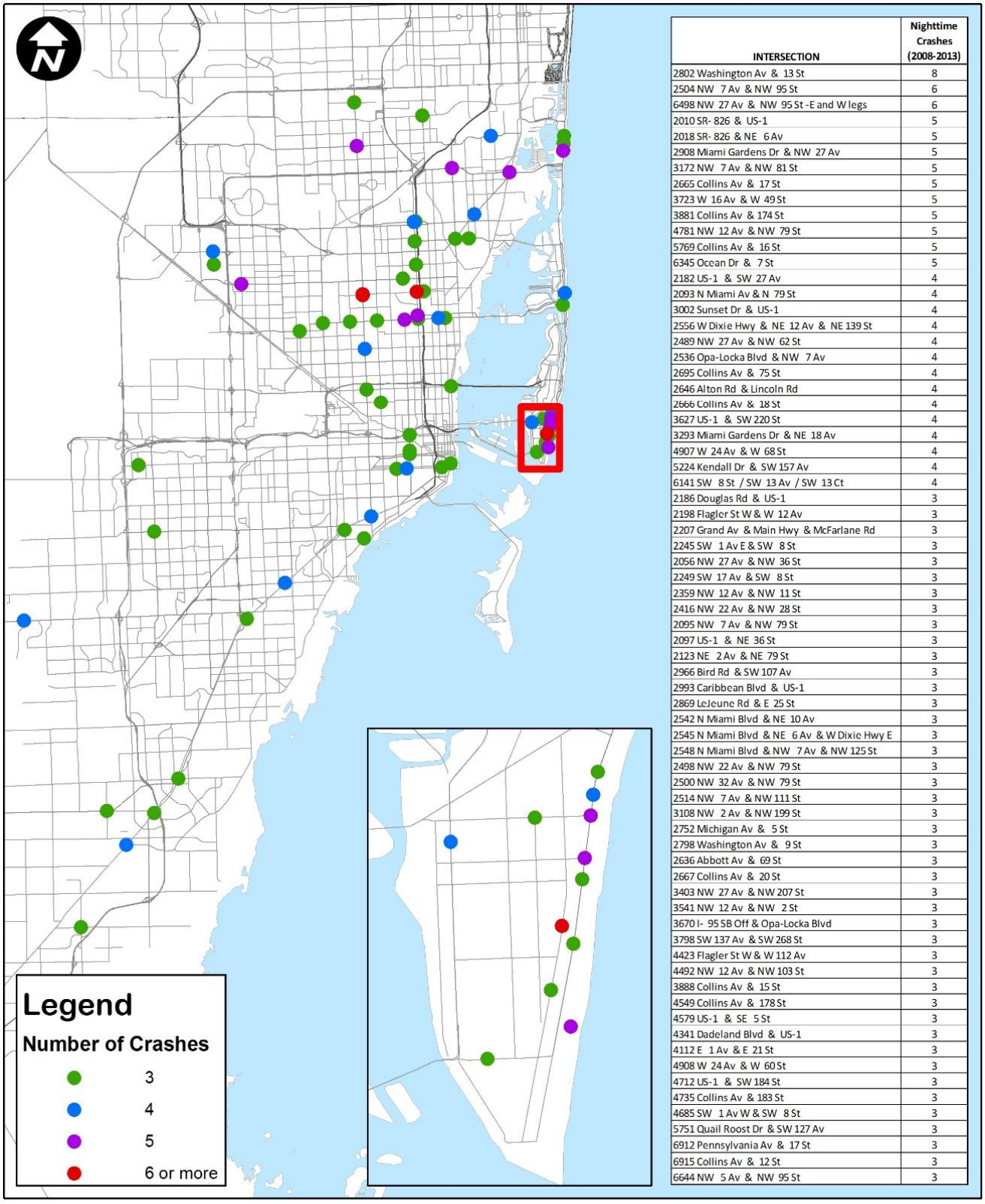
Based on the data presented in Table 4, 46 percent of pedestrian crashes occurred at intersections and 44 percent of pedestrian crashes occurred at mid-block (not at intersection) locations. However, 61 percent of fatal pedestrian crashes occurred at mid-block locations, whereas 30 percent of fatal pedestrian crashes occurred at intersections. The proportion of fatal pedestrian crashes at mid-block locations was twice greater than at intersections. Potential countermeasures include mid-block crosswalks, raised medians to facilitate staged crossing, median landscaping or fences to prevent mid-block crossing, relocate bus stops closer to crossings, signage, and education campaigns.

Table 4: Location of Pedestrian Crashes

Location	No injury	Non-incapacitating	Incapacitating	Fatal	Total
Not at intersection	458	1,823	553	238	3,072
At intersection	494	2,083	516	118	3,211
Influenced by intersection	18	121	51	15	205
Driveway access	50	233	38	5	326
Railroad	2	2	2	0	6
Ramps	7	32	11	3	53
Bus stop zone	2	10	0	1	13
Other	24	73	17	8	122
Total	1,055	4,377	1,188	388	7,008

Note: Crash location or severity was not listed in 20 crashes.

Figure 3: High Pedestrian Crashes – Dark Conditions (Three or More Crashes)



INTERSECTION	Nighttime Crashes (2008-2013)
2802 Washington Av & 13 St	8
2504 NW 7 Av & NW 95 St	6
6498 NW 27 Av & NW 95 St -E and W legs	6
2010 SR- 826 & US-1	5
2018 SR- 826 & NE 6 Av	5
2908 Miami Gardens Dr & NW 27 Av	5
3172 NW 7 Av & NW 81 St	5
2665 Collins Av & 17 St	5
3723 W 16 Av & W 49 St	5
3881 Collins Av & 174 St	5
4781 NW 12 Av & NW 79 St	5
5769 Collins Av & 16 St	5
6345 Ocean Dr & 7 St	5
2182 US-1 & SW 27 Av	4
2093 N Miami Av & N 79 St	4
3002 Sunset Dr & US-1	4
2556 W Dixie Hwy & NE 12 Av & NE 139 St	4
2489 NW 27 Av & NW 62 St	4
2536 Opa-Locka Blvd & NW 7 Av	4
2695 Collins Av & 75 St	4
2646 Alton Rd & Lincoln Rd	4
2666 Collins Av & 18 St	4
3627 US-1 & SW 220 St	4
3293 Miami Gardens Dr & NE 18 Av	4
4907 W 24 Av & W 68 St	4
5224 Kendall Dr & SW 157 Av	4
6141 SW 8 St / SW 13 Av / SW 13 Ct	4
2186 Douglas Rd & US-1	3
2198 Flagler St W & W 12 Av	3
2207 Grand Av & Main Hwy & McFarlane Rd	3
2245 SW 1 Av E & SW 8 St	3
2056 NW 27 Av & NW 36 St	3
2249 SW 17 Av & SW 8 St	3
2359 NW 12 Av & NW 11 St	3
2416 NW 22 Av & NW 28 St	3
2095 NW 7 Av & NW 79 St	3
2097 US-1 & NE 36 St	3
2123 NE 2 Av & NE 79 St	3
2966 Bird Rd & SW 107 Av	3
2993 Caribbean Blvd & US-1	3
2869 LeJeune Rd & E 25 St	3
2542 N Miami Blvd & NE 10 Av	3
2545 N Miami Blvd & NE 6 Av & W Dixie Hwy E	3
2548 N Miami Blvd & NW 7 Av & NW 125 St	3
2498 NW 22 Av & NW 79 St	3
2500 NW 32 Av & NW 79 St	3
2514 NW 7 Av & NW 111 St	3
3108 NW 2 Av & NW 199 St	3
2752 Michigan Av & 5 St	3
2798 Washington Av & 9 St	3
2636 Abbott Av & 69 St	3
2667 Collins Av & 20 St	3
3403 NW 27 Av & NW 207 St	3
3541 NW 12 Av & NW 2 St	3
3670 I- 95 SB Off & Opa-Locka Blvd	3
3798 SW 137 Av & SW 268 St	3
4423 Flagler St W & W 112 Av	3
4492 NW 12 Av & NW 103 St	3
3888 Collins Av & 15 St	3
4549 Collins Av & 178 St	3
4579 US-1 & SE 5 St	3
4341 Dadeland Blvd & US-1	3
4112 E 1 Av & E 21 St	3
4908 W 24 Av & W 60 St	3
4712 US-1 & SW 184 St	3
4735 Collins Av & 183 St	3
4685 SW 1 Av W & SW 8 St	3
5751 Quail Roost Dr & SW 127 Av	3
6912 Pennsylvania Av & 17 St	3
6915 Collins Av & 12 St	3
6644 NW 5 Av & NW 95 St	3

Posted Speed

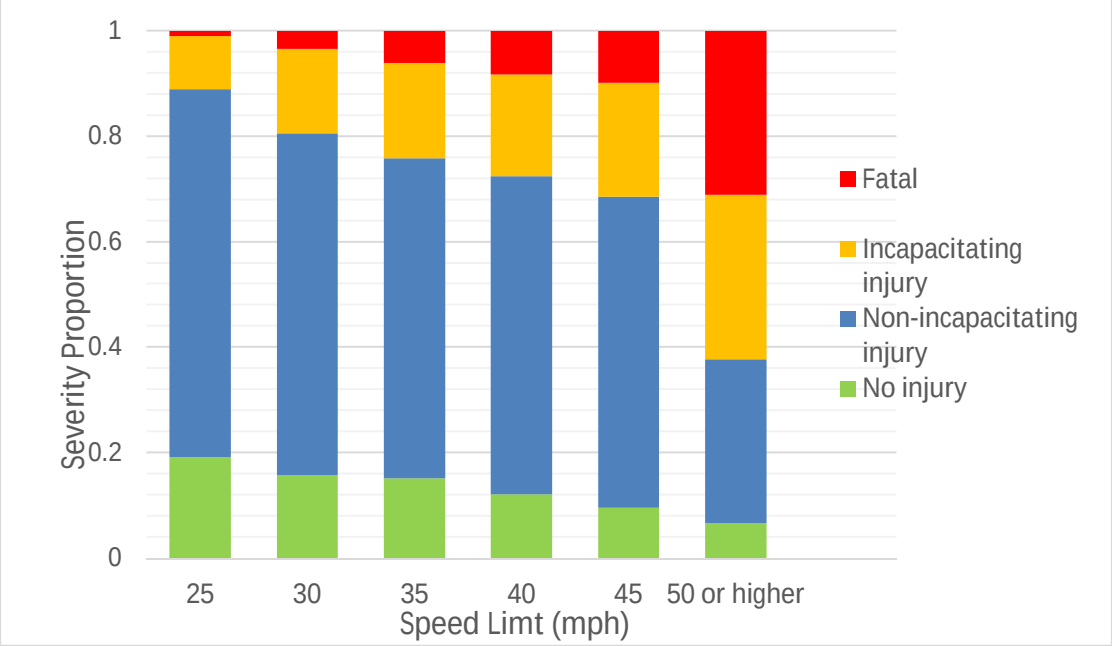
Table 5 and Figure 4 summarize pedestrian crashes based on the speed limit on the occurring street. The 30 mph streets had the highest percentage of total pedestrian crashes (37 percent). The proportion of fatal and incapacitating injury crashes increases as the speed limit increases. For example, only 3.4 percent of pedestrian crashes on 30 mph streets resulted in a fatality, whereas 9.8 percent of pedestrian crashes on 45 mph streets resulted in a fatality. Approximately 31 percent of pedestrian crashes on 50 mph or higher speed limit facilities resulted in a fatality. Note that the 50 mph or higher category includes crashes on limited access facilities.

Table 5: Pedestrian Crashes by Posted Speed

Speed Limit	No injury	Non-incapacitating	Incapacitating	Fatal	Total
25	19	69	10	1	99
30	323	1,322	329	69	2,043
35	180	716	214	72	1,182
40	170	840	270	115	1,395
45	60	367	135	61	623
50 or higher	9	42	42	42	135
Total	761	3,356	1,000	360	5,477

Note: Posted speed or injury severity was not listed in 1,551 crashes.

Figure 4: Pedestrian Crash Severity by Posted Speed



Roadway Jurisdiction

Table 6 summarizes pedestrian crashes on state and non-state roadways. The number of pedestrian crashes reported on state and non-state roads is approximately equal. However, two thirds of fatal pedestrian crashes occurred on state roads, and the proportion of fatal pedestrian crashes on state roads was twice greater than on non-state roads. To make a detailed comparison, additional factors such as pedestrian counts (exposure data), centerline miles, speeds, traffic volumes, and pedestrian facilities are needed.

Table 6: Pedestrian Crashes by State vs. Non-State Roads

	2008	2009	2010	2011	2012	2013	Total
All crashes							
State Roads	691	649	605	486	559	585	3,575
Non-state Roads	616	652	602	476	530	577	3,453
Total	1,307	1,301	1,207	962	1,089	1,162	7,028
Fatal crashes							
State Roads	45	41	46	47	30	48	257
Non-state Roads	19	24	29	22	17	20	131
Total	64	65	75	69	47	68	388

Pedestrian Action

Due to a different format of 2013 crash data, this analysis was performed using the 2008-2012 crash data. Table 7 summarizes pedestrian actions prior to the crash. Approximately 54 percent of fatal crashes and 49 percent of incapacitating injury crashes occurred when pedestrians were crossing outside of an intersection. Educational campaigns to increase pedestrian awareness of risks associated with crossing outside of designated crossings should be considered, including awareness efforts targeting transit users.

Table 7: Pedestrian Action

	No injury	Non-incapacitating	Incapacitating	Fatal	Total
Crossing not at intersection	277	940	352	130	1,699
Crossing at mid-block crosswalk	60	177	39	11	287
Crossing at intersection	480	1,075	243	64	1,862
Walking along the road	92	210	34	15	351
Working on vehicle in road	3	7	1	3	14
Working in road	10	28	8	3	49
Standing/playing in road	57	107	38	11	213
Standing in pedestrian island	7	24	5	2	38
Total	986	2,568	720	239	4,513

Note: Pedestrian action or injury severity was not listed in 1,353 crashes.

Pedestrian/Driver Impairment

Table 8 summarizes the reported impairment data. The driver impairment data is likely under reported due to incomplete information on hit and run crashes. Overall, 20 percent of reported pedestrian crashes involving an impaired pedestrian or driver resulted in a fatality. In comparison, only five percent pedestrian crashes with no reported impairment, resulted in a fatality. The highest number of impairment-related crashes was reported in Miami and unincorporated areas of the county (32 percent each), followed by Miami Beach (13 percent) and Homestead (5 percent). GIS maps depicting impairment related crash data are included as Appendix B.

Table 8: Pedestrian/Drive Impairment

	No injury	Non-incapacitating	Incapacitating	Fatal	Total
Impaired driver	16	27	22	22	97
Impaired pedestrian	16	132	75	51	274
No impairment	1,023	4,218	1,091	315	6,637
Total	1,055	4,377	1,188	388	7,008

Note: Impairment or injury severity was not listed in 20 crashes.

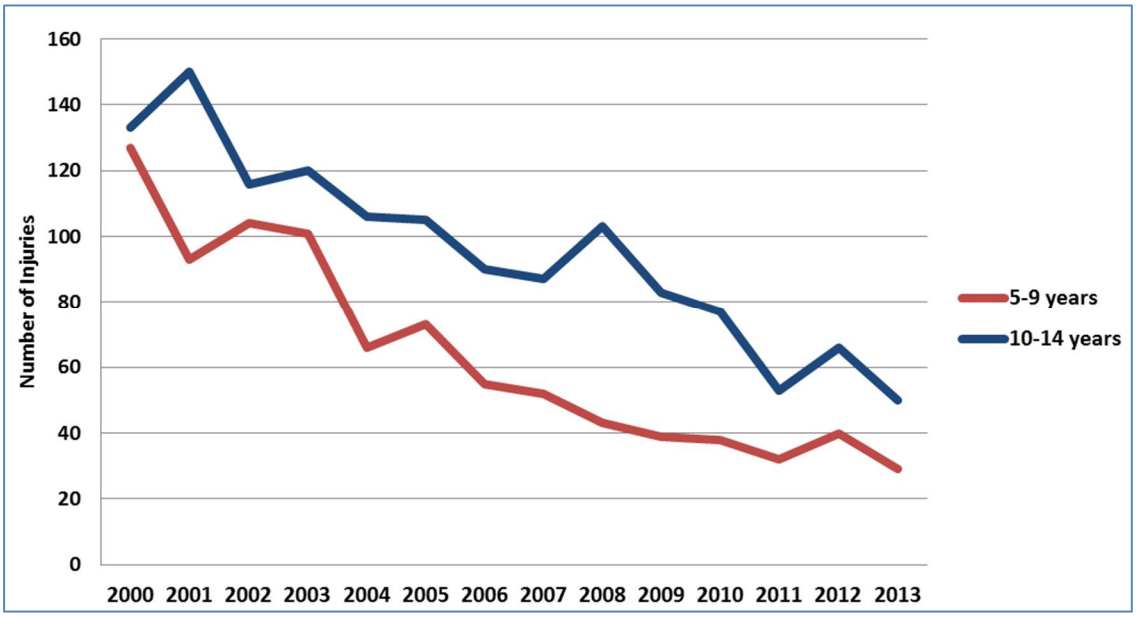
Juvenile Pedestrians

Table 9 summarizes juvenile pedestrian crashes. Overall, juvenile crashes have decreased over the six-year period. Furthermore, the fatal crash ratio for juvenile pedestrian crashes (1 in 51 crashes) is less than the fatal crash ratio for all pedestrian crashes (1 in 18 crashes). Figure 5 provides further evidence of decreasing trend of juvenile pedestrian crashes. The success of Miami-Dade County's Safe Routes to School (SRTS) program, and educational efforts by Miami-Dade Public Schools and University of Miami WalkSafe Program may have contributed to this decreasing trend of juvenile pedestrian crashes. A GIS map depicting approximate locations of juvenile pedestrian crashes is included as Appendix B.

Table 9: Juvenile Pedestrian Crashes

	No injury	Non-incapacitating	Incapacitating	Fatal	Total
2008	32	165	37	3	237
2009	32	151	26	5	214
2010	37	151	24	2	214
2011	11	109	20	4	144
2012	17	116	26	4	163
2013	18	103	27	4	152
Total	147	795	160	22	1,124

Figure 5: Miami-Dade County Juvenile Pedestrian Injuries (2000-2013)



Source: Miami-Dade MPO

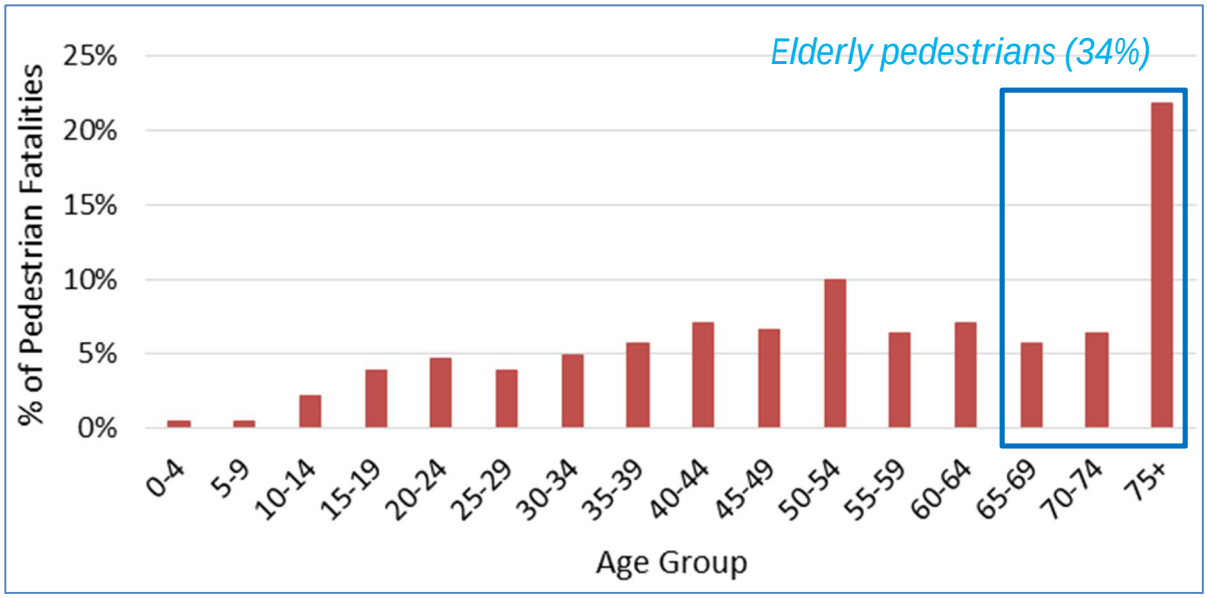
Elderly Pedestrians

Table 10 summarizes elderly pedestrian crashes and Figure 6 illustrates pedestrian age distribution for fatal crashes. Overall, the number of crashes has remained relatively consistent over the six-year period. Approximately 16 percent of total pedestrian crashes and 34 percent of fatal pedestrian crashes involved elderly pedestrians. On average, one in nine crashes involving elderly pedestrians were fatal, which is twice the overall fatal pedestrian crash ratio (one in 18 crashes). Approximately 73 percent of elderly pedestrian involved crashes occurred during daylight conditions (vs. 62 percent overall). Therefore, the reduction of crashes involving elderly pedestrians should be a priority. Safety awareness efforts targeting elderly pedestrians through the "Golden Passport" and further expansion of the "Safe Steps" program should be considered. Approximate locations of elderly pedestrian crashes are shown in a map included in Appendix B. The signalized intersections with three or more elderly pedestrian crashes are identified in Figure 7.

Table 10: Elderly Pedestrian Crashes

	No injury	Non-incapacitating	Incapacitating	Fatal	Total
2008	17	125	32	20	194
2009	27	126	27	22	202
2010	30	107	36	28	201
2011	16	76	38	23	153
2012	20	125	35	20	200
2013	16	121	41	20	198
Total	126	680	209	133	1,148

Figure 6: Pedestrian Fatality Age Distribution (2008-2013)

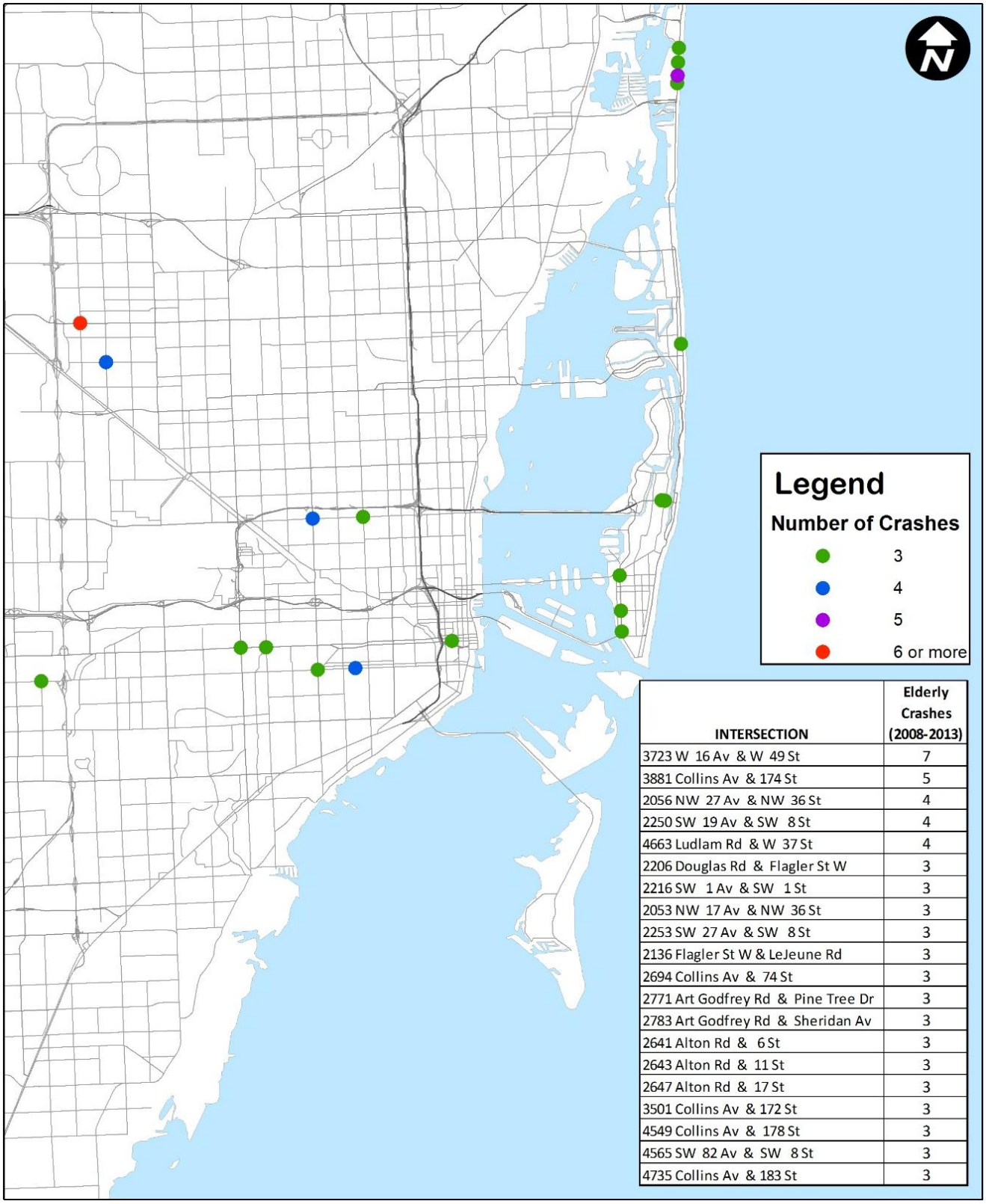


Vehicle Movement

Approximately 10 percent of pedestrian crashes involved a vehicle turning right (714 crashes), and 14 percent of pedestrian crashes involved a vehicle turning left (1,005 crashes). An analysis was performed using GIS to identify signalized intersections with three or more such crashes over the study period. The results are presented in Figures 8 and 9. The potential countermeasures are listed below.

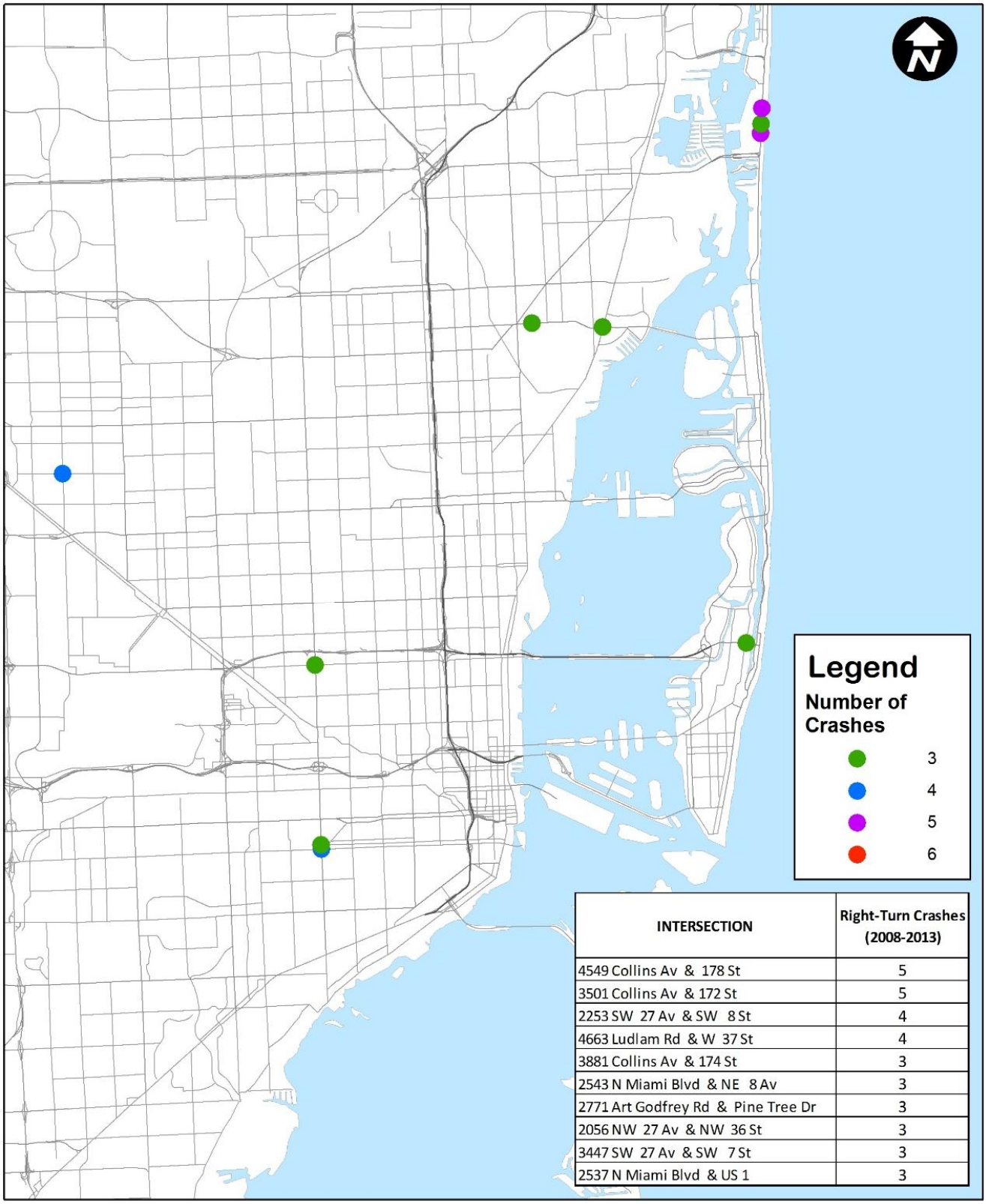
- Right-turn crashes – evaluate the need for installing "Turning Vehicles Yield to (Stop for) Pedestrians" signs, implementing leading pedestrian interval, reducing curb return radius, curb extension, or prohibiting right-turn-on-red. Maintaining clear sight lines for motorists is also important.
- Left-turn crashes – evaluate the need for installing flashing yellow arrow signal (if current operation has permissive green), "Turning Vehicles Yield to (Stop for) Pedestrian" signs, protected only left-turn phasing, and pedestrian signal actuation information signs per current MUTCD.

Figure 7: Elderly Pedestrian Crashes – High Crash Locations (Three or More Crashes)



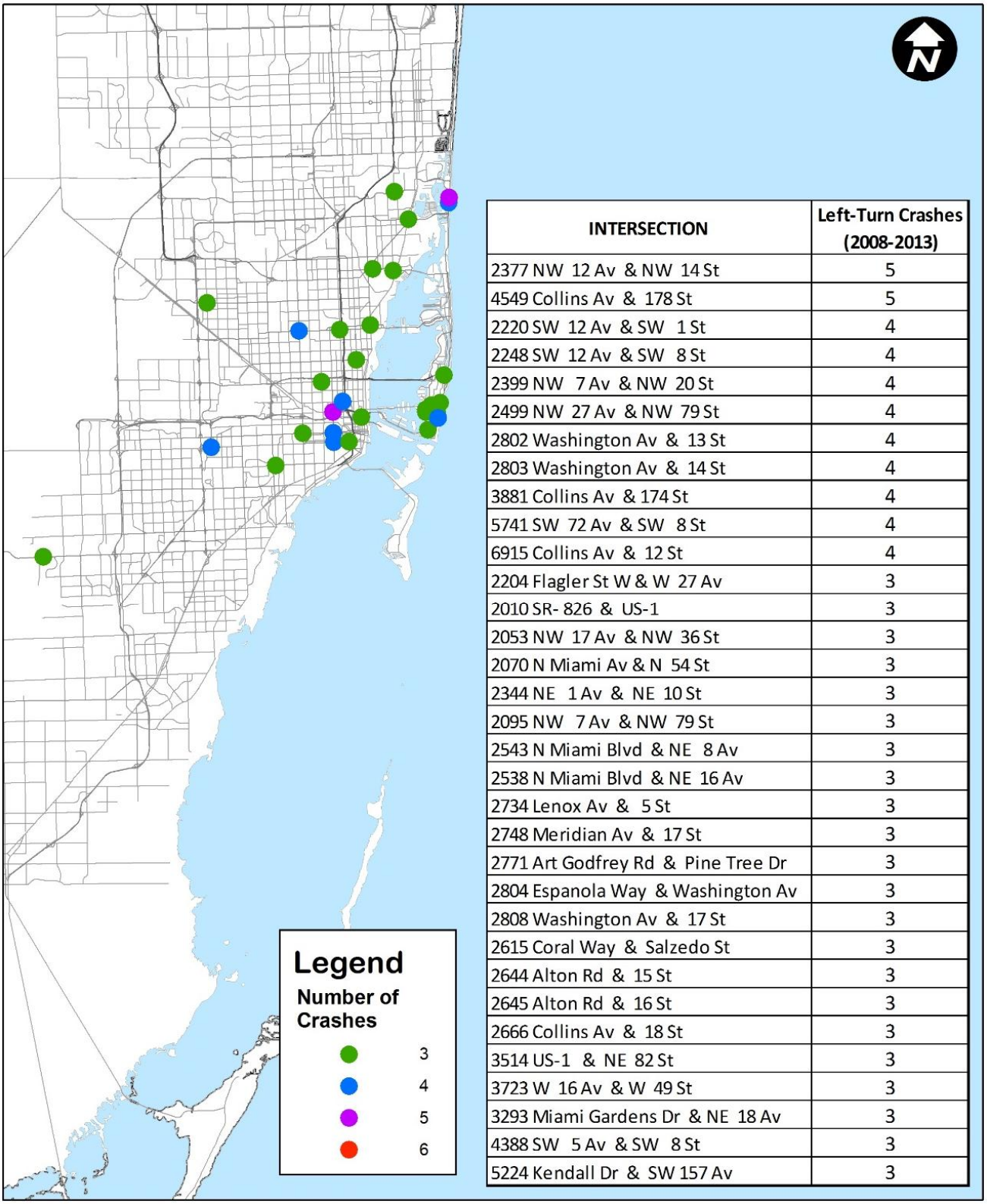
INTERSECTION	Elderly Crashes (2008-2013)
3723 W 16 Av & W 49 St	7
3881 Collins Av & 174 St	5
2056 NW 27 Av & NW 36 St	4
2250 SW 19 Av & SW 8 St	4
4663 Ludlam Rd & W 37 St	4
2206 Douglas Rd & Flagler St W	3
2216 SW 1 Av & SW 1 St	3
2053 NW 17 Av & NW 36 St	3
2253 SW 27 Av & SW 8 St	3
2136 Flagler St W & LeJeune Rd	3
2694 Collins Av & 74 St	3
2771 Art Godfrey Rd & Pine Tree Dr	3
2783 Art Godfrey Rd & Sheridan Av	3
2641 Alton Rd & 6 St	3
2643 Alton Rd & 11 St	3
2647 Alton Rd & 17 St	3
3501 Collins Av & 172 St	3
4549 Collins Av & 178 St	3
4565 SW 82 Av & SW 8 St	3
4735 Collins Av & 183 St	3

Figure 8: Pedestrian Crashes – Right-Turn Vehicles (Three or More Crashes)



INTERSECTION	Right-Turn Crashes (2008-2013)
4549 Collins Av & 178 St	5
3501 Collins Av & 172 St	5
2253 SW 27 Av & SW 8 St	4
4663 Ludlam Rd & W 37 St	4
3881 Collins Av & 174 St	3
2543 N Miami Blvd & NE 8 Av	3
2771 Art Godfrey Rd & Pine Tree Dr	3
2056 NW 27 Av & NW 36 St	3
3447 SW 27 Av & SW 7 St	3
2537 N Miami Blvd & US 1	3

Figure 9: Pedestrian Crashes – Left-Turn Vehicles (Three or More Crashes)



INTERSECTION	Left-Turn Crashes (2008-2013)
2377 NW 12 Av & NW 14 St	5
4549 Collins Av & 178 St	5
2220 SW 12 Av & SW 1 St	4
2248 SW 12 Av & SW 8 St	4
2399 NW 7 Av & NW 20 St	4
2499 NW 27 Av & NW 79 St	4
2802 Washington Av & 13 St	4
2803 Washington Av & 14 St	4
3881 Collins Av & 174 St	4
5741 SW 72 Av & SW 8 St	4
6915 Collins Av & 12 St	4
2204 Flagler St W & W 27 Av	3
2010 SR- 826 & US-1	3
2053 NW 17 Av & NW 36 St	3
2070 N Miami Av & N 54 St	3
2344 NE 1 Av & NE 10 St	3
2095 NW 7 Av & NW 79 St	3
2543 N Miami Blvd & NE 8 Av	3
2538 N Miami Blvd & NE 16 Av	3
2734 Lenox Av & 5 St	3
2748 Meridian Av & 17 St	3
2771 Art Godfrey Rd & Pine Tree Dr	3
2804 Espanola Way & Washington Av	3
2808 Washington Av & 17 St	3
2615 Coral Way & Salzedo St	3
2644 Alton Rd & 15 St	3
2645 Alton Rd & 16 St	3
2666 Collins Av & 18 St	3
3514 US-1 & NE 82 St	3
3723 W 16 Av & W 49 St	3
3293 Miami Gardens Dr & NE 18 Av	3
4388 SW 5 Av & SW 8 St	3
5224 Kendall Dr & SW 157 Av	3

Summary of Pedestrian Crash Data Analysis

Key results are summarized below.

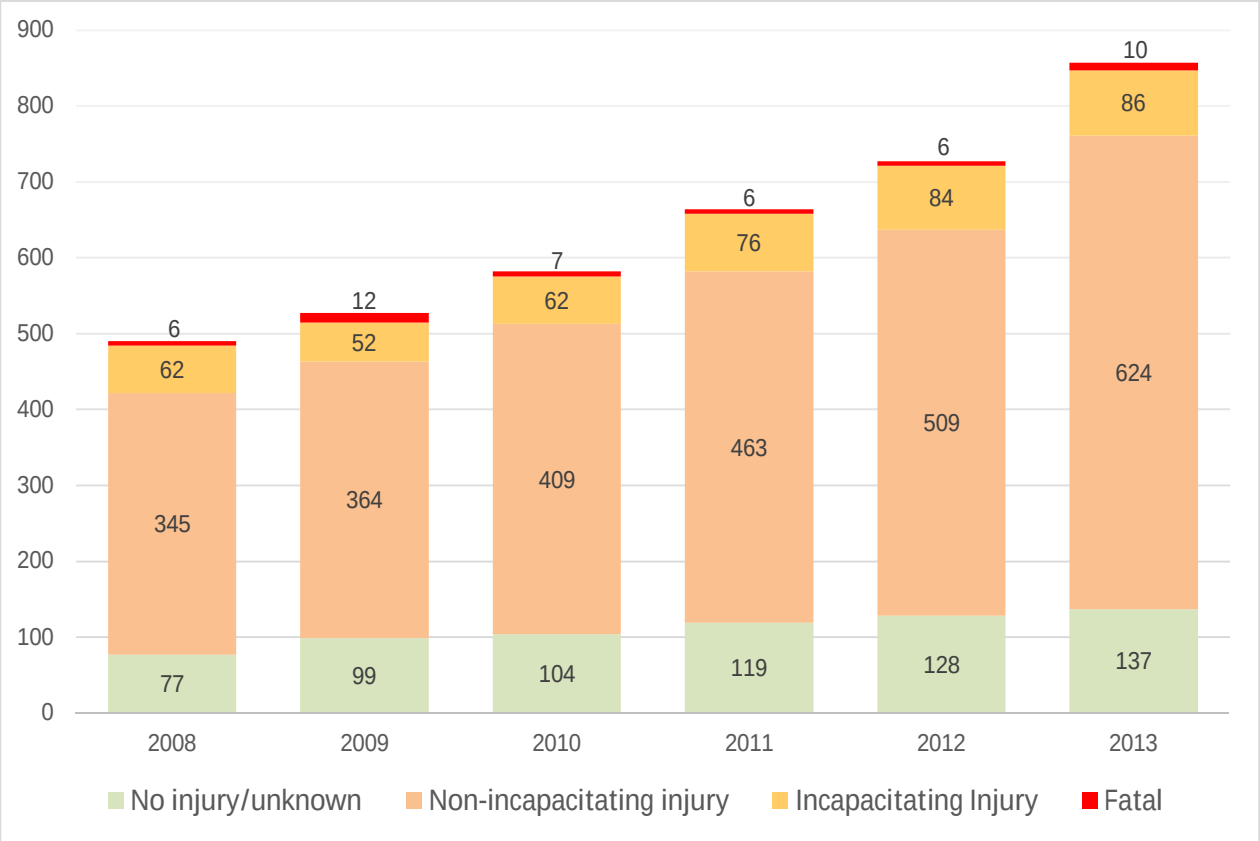
- There were 7,028 pedestrian crashes, including 388 fatal crashes between 2008 and 2013.
- On average, 1 in 18 pedestrian crashes resulted in a fatality.
- There was no overall decrease in the number of fatal and incapacitating injury pedestrian crashes between 2008 and 2013.
- Time of day patterns (total crashes)
    - Between 3:00 pm and 9:00 pm on Friday
    - Between 9:00 pm, Friday and 6:00 am on Saturday
    - Between 9:00 pm, Saturday and 6:00 am on Sunday
- Time of day patterns (fatal crashes)
    - Between 6:00 pm and midnight on all days
    - Between midnight and 6:00 am on Friday and Saturday
- Location
    - Forty six percent of total pedestrian crashes and 30 percent of fatal pedestrian crashes occurred at intersections.
    - Forty four percent of total pedestrian crashes and 61 percent of fatal pedestrian crashes occurred at mid-block locations.
- Speed limit
    - The highest frequency of pedestrian crashes (37 percent) reported on 30 mph roads.
    - The highest frequency of fatal pedestrian crashes (32 percent) reported on 40 mph roads.
    - The proportion of fatal pedestrian crashes was three times greater on 45 mph roads in comparison to 30 mph roads.
    - Thirty one percent of pedestrian crashes occurring on roads with a speed limit of 50 mph or greater resulted in a fatality.
- Lighting conditions
    - Sixty two percent of total pedestrian crashes occurred under daylight conditions.
    - Seventy two percent of fatal pedestrian crashes occurred under dark conditions (including dawn and dusk).
    - The proportion of fatal pedestrian crashes (i.e., fatal crashes/total crashes) under dark (lighted) conditions was four times greater than under daylight conditions.
    - The proportion of fatal pedestrian crashes under dark (unlit) conditions was six times greater than under daylight conditions.
- Impairment (alcohol/drug users)
    - Twenty percent fatality ratio when the driver or pedestrian was impaired vs. five percent fatality ratio when no impairment.
    - Miami had the highest number of crashes involving impaired road users, followed by Miami Beach and Homestead.

- Juvenile pedestrians
  - Sixteen percent of pedestrian crashes involved juvenile pedestrians.
  - Six percent of fatal pedestrian crashes involved juvenile pedestrians.
  - There has been a decreasing trend in crashes involving juvenile pedestrians.
  - Miami Gardens had the highest proportion of juvenile pedestrian crashes (32 percent of city's total pedestrian crashes).
- Elderly pedestrians
  - Sixteen percent of pedestrian crashes involved elderly pedestrians.
  - Thirty four percent of fatal pedestrian crashes involved elderly pedestrians.
  - One in nine crashes involving elderly pedestrians were fatal, which is twice the overall fatal pedestrian crash ratio.
  - Crashes involving elderly pedestrians have remained constant over the six-year period.
  - Sunny Isles Beach had the highest proportion of elderly pedestrian crashes (36 percent of city's total pedestrian crashes).
- Vehicle movement
  - Ten percent of pedestrian crashes involved a vehicle turning right.
  - Fourteen percent of pedestrian crashes involved a vehicle turning left.
- Crashes on state roads
  - Fifty one percent of pedestrian crashes and 66 percent of fatal pedestrian crashes occurred on state roads.
  - SR 968 (Flagler Street) had the highest pedestrian crash density (4 crashes per mile per year)
  - SR 934 (NW 74 Street/NE/NW 79 Street) had the highest fatal pedestrian crash density (0.4 crashes per mile per year)
- Crashes on non-state roads
  - Forty nine percent of pedestrian crashes and 34 percent of fatal pedestrian crashes occurred on non-state roads.
  - Washington Avenue had the highest number of pedestrian crashes (67 crashes in 6 years).
  - NW 7 Street had the highest number of fatal pedestrian crashes (6 crashes in 6 years).
- Municipalities
  - Total crashes – Miami (30 percent), Miami Beach (10 percent) and Hialeah (8 percent)
  - Fatal crashes – Miami (27 percent), Hialeah (8 percent), Miami Gardens (5 percent), and Miami Beach (5 percent)

Bicycle Crashes

A total of 3,854 bicycle crashes were reported in Miami-Dade County between 2008 and 2013. These crashes included 47 fatal crashes and 422 incapacitating injury crashes. Therefore, on average, 1 in 82 crashes involving a bicyclist resulted in a fatality. Furthermore, approximately 1 in 8 crashes involving a bicyclist resulted in a fatality or an incapacitating injury. As shown in Figure 10, the frequency of crashes gradually increased over the six year period. GIS maps depicting countywide bicycle crash data and density maps are included as Appendix C.

Figure 10: Bicycle Crashes by Severity



Time of Day

Table 11 provides a summary of bicycle crashes by time of day and day of week. The period between 3:00 pm and 6:00 pm had the highest occurrence of bicycle crashes (23 percent of all crashes). In general, weekdays had a higher number of crashes than weekends.

Table 11: Bicycle Crashes by Time of Day

Day	12am - 6am	6am – 9 am	9am – 12pm	12pm – 3pm	3pm – 6pm	6pm – 9pm	9pm – 12am	Total
Monday	15	57	73	94	147	121	30	537
Tuesday	16	92	82	102	126	110	33	561
Wednesday	25	81	84	108	153	109	45	605
Thursday	19	85	88	94	139	111	31	567
Friday	24	75	88	112	119	91	48	557
Saturday	35	52	95	85	115	84	39	505
Sunday	35	26	59	72	72	71	40	375
	169	468	569	667	871	697	266	3,707

Note: Time of day was not listed in 147 crashes.

Table 12 provides a summary of fatal bicycle crashes by time of day. The time period between 6:00 pm and 9:00 pm had the highest occurrence of fatal bicycle crashes (34 percent). Overall, 70 percent of fatal bicycle crashes occurred between 6:00 pm and 6:00 am, indicating that darker conditions are a contributory factor for fatal crashes.

Table 12: Fatal Bicycle Crashes by Time of Day

Day	12am - 6am	6am – 9 am	9am – 3pm	3pm – 6pm	6pm – 9pm	9pm – 12am	Total
Monday	0	0	1	1	4	1	7
Tuesday	0	1	2	0	1	0	4
Wednesday	2	0	0	1	1	2	6
Thursday	0	0	0	0	2	0	2
Friday	3	0	0	1	6	0	10
Saturday	0	1	1	1	2	3	8
Sunday	4	2	1	1	0	2	10
	9	4	5	5	16	8	47

Lighting Condition

Table 13 provides a summary of bicycle crashes by lighting condition. Approximately 75 percent of bicycle crashes occurred during daylight conditions. However, approximately 73 percent of fatal bicycle crashes occurred during non-daylight conditions. Only 0.4 percent of daylight crashes were fatal, whereas 2.7 percent of dark (lighted) crashes and 8.6 percent of dark (unlit) crashes were fatal. The proportion of fatal bicycle crashes (i.e., fatal crashes/total crashes) under dark (lighted) conditions was six times greater than crashes

under daylight conditions. Similarly, the proportion of fatal bicycle crashes (i.e., fatal crashes/total crashes) under dark (unlit) conditions was 21 times greater than crashes under daylight conditions. GIS maps depicting countywide bicycle crash data by lighting conditions are included as Appendix C.

Table 13: Bicycle Crashes by Lighting Condition

Lighting Condition	No injury	Non-incapacitating	Incapacitating	Fatal	Total
Daylight	510	2,047	284	12	2,853
Dusk	19	68	16	2	105
Dawn	8	33	2	2	45
Dark (Lighted)	107	475	104	19	705
Dark (Unlit)	16	77	13	10	116
Total	660	2,700	417	45	3,824

Note: Lighting condition or severity was not listed in 30 crashes.

Crash Location

Based on the data presented in Table 14, 49 percent of bicycle crashes occurred at intersections and 37 percent of bicycle crashes occurred at mid-block (not at intersection) locations. However, 55 percent of fatal bicycle crashes occurred at mid-block locations, whereas 34 percent of fatal bicycle crashes occurred at intersections. The proportion of fatal bicycle crashes at mid-block locations was twice greater than at intersections (in comparison, five percent of pedestrian crashes occurred at driveways). Also noteworthy is that approximately nine percent of bicycle crashes occurred at driveways.

Table 14: Location of Bicycle Crashes

Location	No injury	Non-incapacitating	Incapacitating	Fatal	Total
Not at intersection	228	990	162	26	1,406
At intersection	337	1,304	213	16	1,870
Influenced by intersection	14	97	20	3	134
Driveway access	67	268	24	0	359
Railroad	1	3	0	0	4
Ramps	4	21	2	0	27
Bus stop zone	2	0	0	0	2
Other	12	32	1	2	47
Total	664	2,714	422	47	3,847

Note: Crash location or severity was not listed in 7 crashes.

Posted Speed

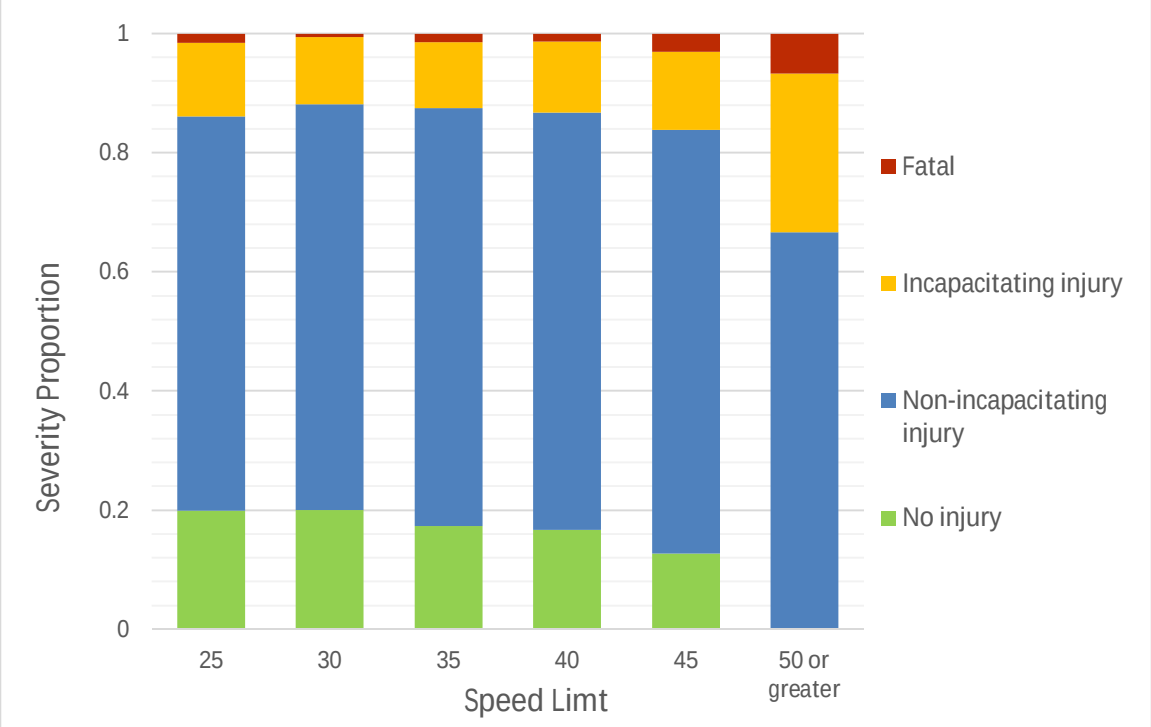
Table 15 and Figure 11 summarize bicycle crashes based on the speed limit on the occurring street. The highest number of bicycle crashes occurred on 30 mph streets. The proportion of fatal bicycle crashes increases as the speed limit increases. For example, only 0.6 percent of bicycle crashes on 30 mph streets resulted in a fatality, whereas 3.0 percent of bicycle crashes on 45 mph streets resulted in a fatality.

Table 15: Bicycle Crashes by Posted Speed

Speed Limit	No injury	Non-incapacitating	Incapacitating	Fatal	Total
25	13	43	8	1	65
30	241	811	134	7	1,193
35	111	440	69	9	629
40	121	499	85	9	714
45	48	261	48	11	368
50 or greater	0	10	4	1	15
Total	527	2,064	348	38	2,984

Note: Posted speed or injury severity was not listed in 870 crashes.

Figure 11: Bicycle Crash Severity by Posted Speed



Roadway Jurisdiction

Table 16 summarizes bicycle crashes on state and non-state roadways. Fifty five percent of total bicycle crashes and 66 percent of fatal bicycle crashes were reported on non-state roads. The proportion of fatal bicycle crashes was approximately 1.6 times greater on non-state roads than on state roads. To make a detailed comparison, additional factors such as bicycle counts (exposure data), centerline miles, speeds, traffic volumes, and bicycle facilities are needed.

Table 16: Pedestrian Crashes by State vs. Non-State Roads

	2008	2009	2010	2011	2012	2013	Total
All crashes							
State Roads	206	239	270	281	329	407	1,732
Non-state Roads	286	289	313	386	398	450	2,122
Total	492	528	583	667	727	857	3,854
Fatal crashes							
State Roads	2	7	3	1	1	2	16
Non-state Roads	4	5	4	5	5	8	31
Total	6	12	7	6	6	10	47

Age of Bicyclists

Figures 12 and 13 summarize age distribution of bicyclists involved in injury and fatal crashes. The bicyclists in the 40-54 year age group were involved in 38 percent of fatal crashes.

Figure 12: Bicycle Injury Age Distribution (2008-2013)

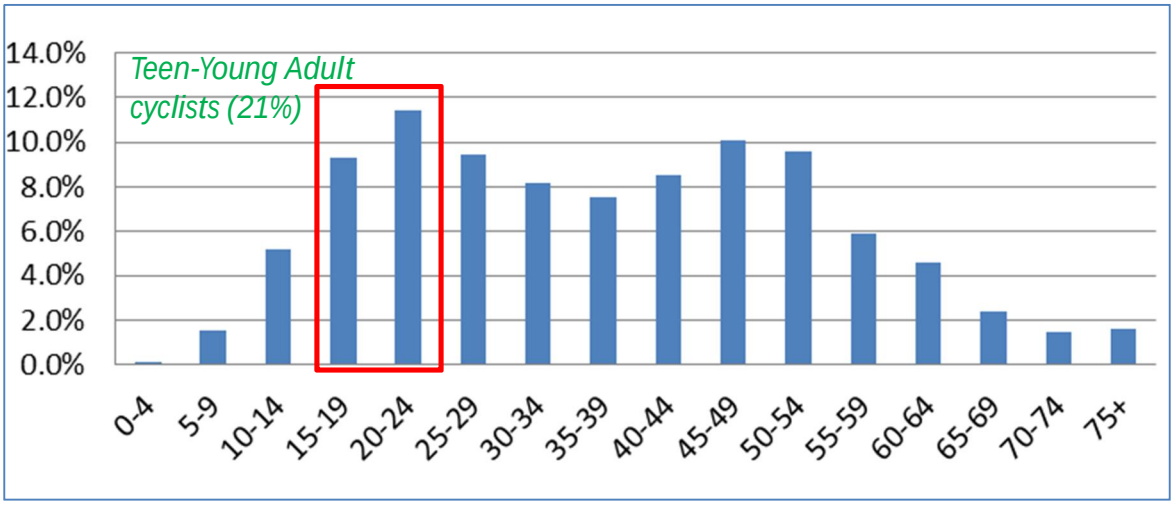
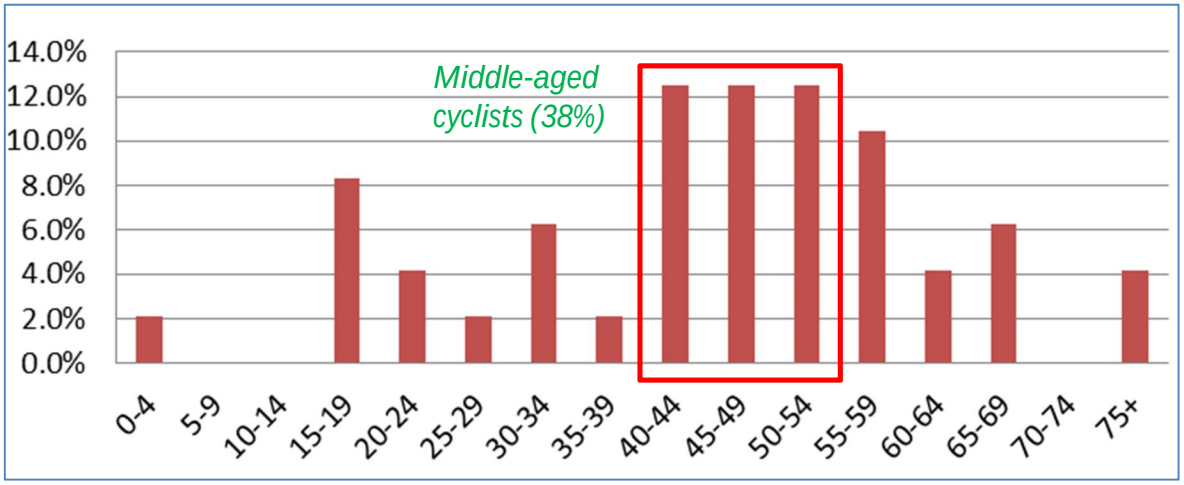


Figure 13: Bicycle Fatality Age Distribution (2008-2013)



Vehicle Movement

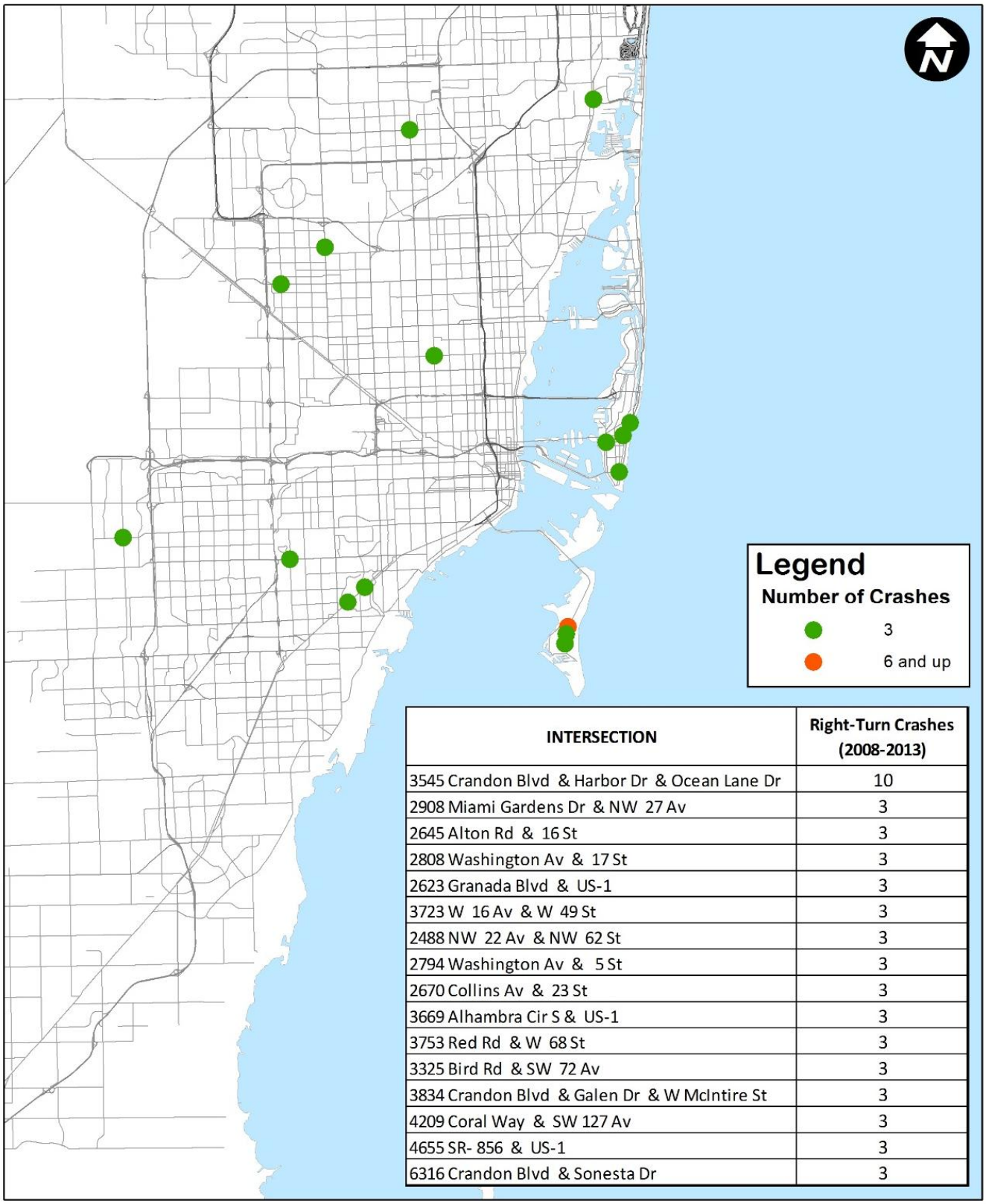
Approximately 23 percent of bicycle crashes involved a vehicle turning right (899 crashes). In addition, 432 bicycle crashes (11 percent) involved a vehicle turning left. An analysis was performed using GIS to identify signalized intersections with three or more such crashes between 2008 and 2013. The results are presented in Figures 14 and 15. The potential countermeasures are listed below.

- Right-turn crashes – evaluate the need for installing green color bike lanes within conflict zones, "Begin Right Turn Lane, Yield to Bikes," and "Turning Vehicles Yield to (Stop for) Pedestrians/Bicycles" signs (modified R10-15). Maintaining clear sight lines for motorists is also important.
- Left-turn crashes – evaluate the need for installing flashing yellow arrow signal (if current operation has permissive green).

On-Street Parking

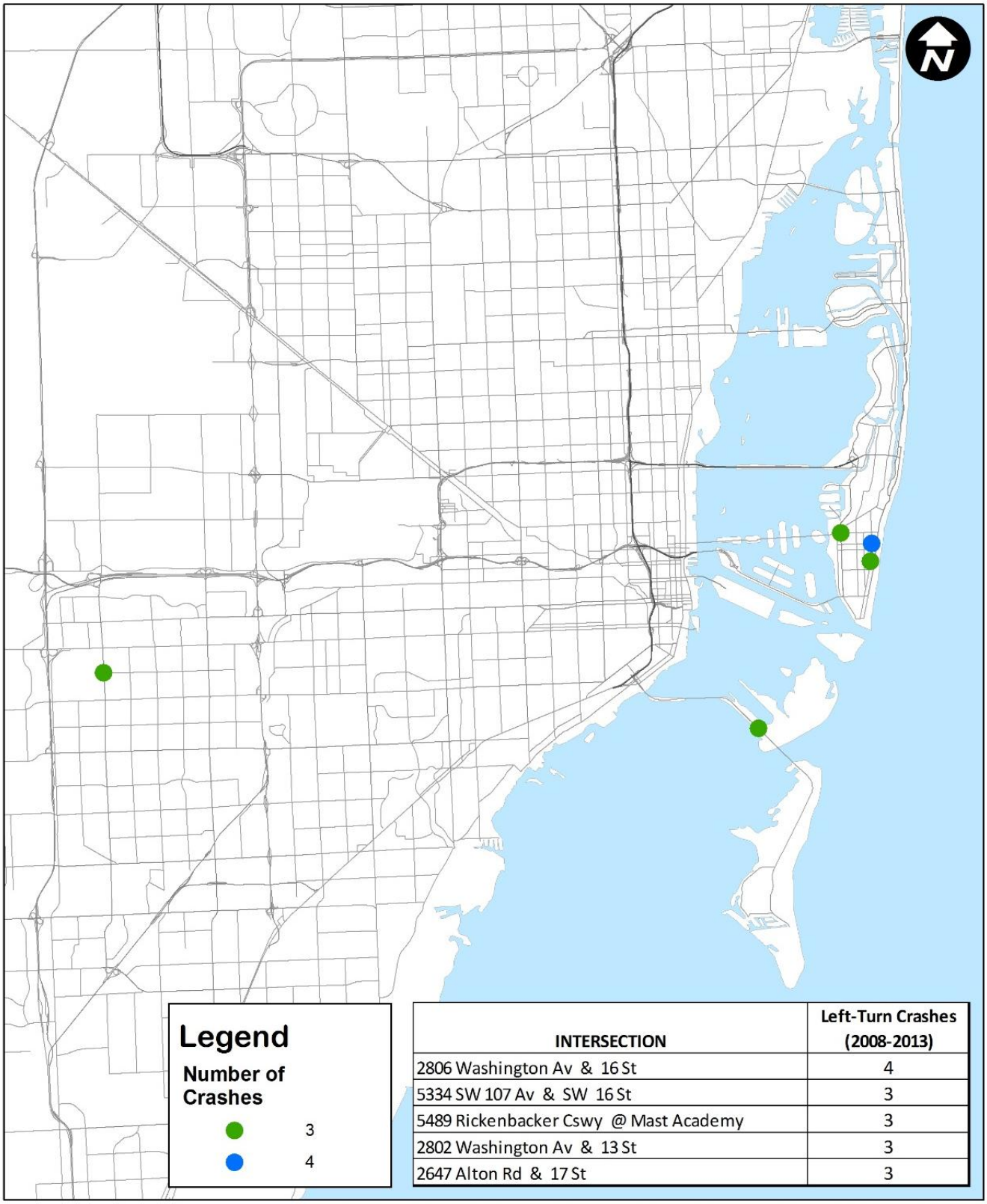
A total of 51 bicycle crashes were recorded involving parked vehicles. Twenty six of those crashes occurred in Miami Beach. As shown in Figure 16, the majority of crashes occurred along Washington Avenue and Collins Avenue in South Beach. Shared Lane Markings (Sharrows) are typically used as a potential countermeasure to reduce the potential for bicycle crashes involving parked vehicles. While Sharrow markings are provided on both streets, the markings on Collins Avenue were installed after 2013.

Figure 14: Bicycle Crashes – Right-Turn Vehicles (Three or More Crashes)



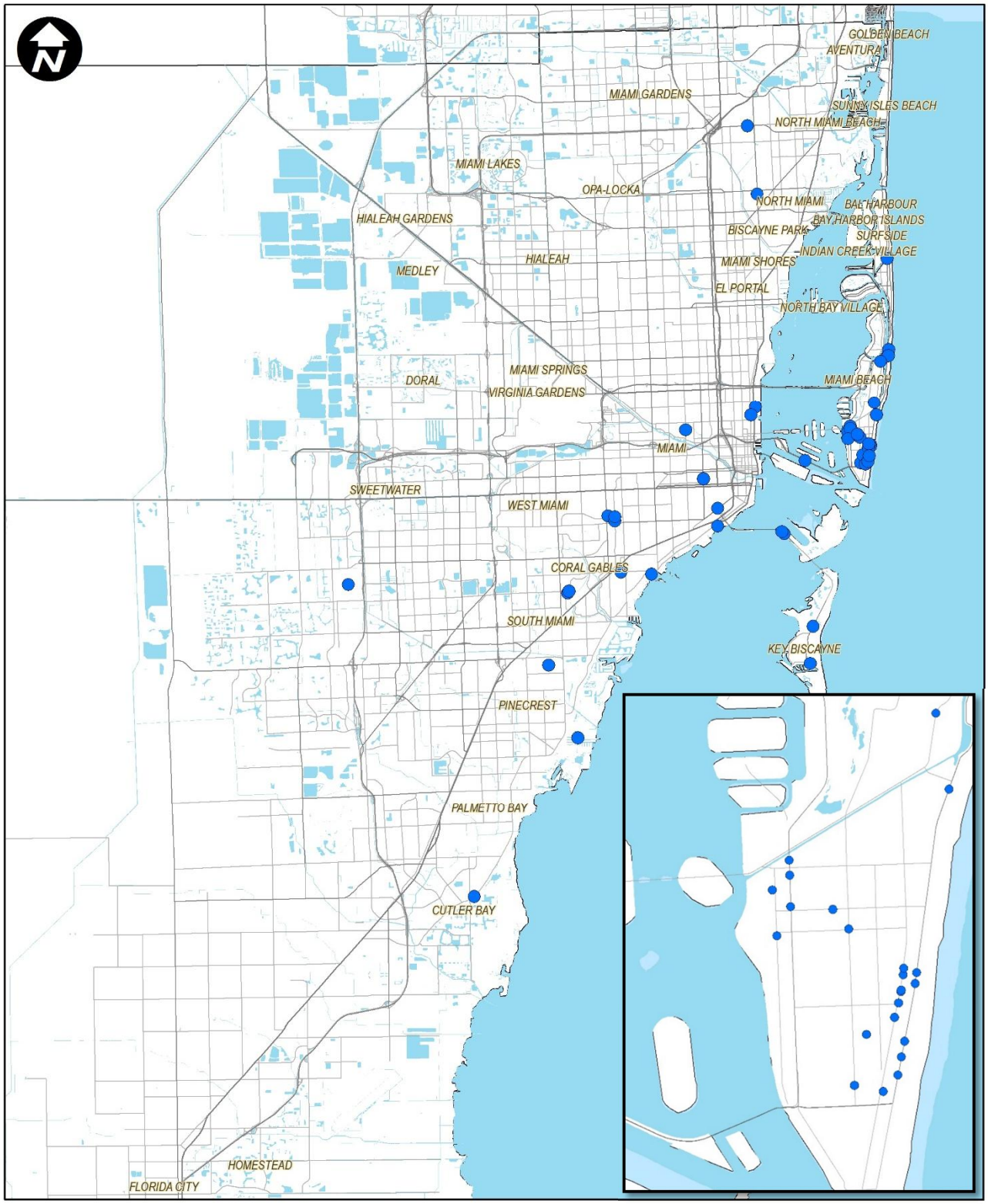
INTERSECTION	Right-Turn Crashes (2008-2013)
3545 Crandon Blvd & Harbor Dr & Ocean Lane Dr	10
2908 Miami Gardens Dr & NW 27 Av	3
2645 Alton Rd & 16 St	3
2808 Washington Av & 17 St	3
2623 Granada Blvd & US-1	3
3723 W 16 Av & W 49 St	3
2488 NW 22 Av & NW 62 St	3
2794 Washington Av & 5 St	3
2670 Collins Av & 23 St	3
3669 Alhambra Cir S & US-1	3
3753 Red Rd & W 68 St	3
3325 Bird Rd & SW 72 Av	3
3834 Crandon Blvd & Galen Dr & W McIntire St	3
4209 Coral Way & SW 127 Av	3
4655 SR- 856 & US-1	3
6316 Crandon Blvd & Sonesta Dr	3

Figure 15: Bicycle Crashes – Left-Turn Vehicles (Three or More Crashes)



INTERSECTION	Left-Turn Crashes (2008-2013)
2806 Washington Av & 16 St	4
5334 SW 107 Av & SW 16 St	3
5489 Rickenbacker Cswy @ Mast Academy	3
2802 Washington Av & 13 St	3
2647 Alton Rd & 17 St	3

Figure 16: Bicycle Crashes – On-Street Parking



Summary of Bicycle Crash Data Analysis

Key results are presented below.

- There were 3,854 bicycle crashes, including 47 fatal crashes between 2008 and 2013.
- On average, 1 in 82 bicycle crashes resulted in a fatality.
- The number of bicycle crashes increased by 74 percent between 2008 and 2013. There was no discernable change in fatal crashes during the same period.
- Time of day patterns (total crashes)
    - Between 3:00 pm and 6:00 pm on all days
- Time of day patterns (fatal crashes)
    - Between 6:00 pm and midnight on all days
- Location
    - Forty nine percent of total bicycle crashes and 34 percent of fatal bicycle crashes occurred at intersections
    - Thirty seven percent of total bicycle crashes and 55 percent of fatal bicycle crashes occurred at mid-block locations
- Speed limit
    - The highest frequency of bicycle crashes (40 percent) was reported on 30 mph roads.
    - The highest frequency of fatal bicycle crashes (29 percent) reported on 45 mph roads.
    - The proportion of fatal bicycle crashes was five times greater on 45 mph roads than on 30 mph roads.
- Lighting conditions
    - Seventy three percent of total bicycle crashes occurred under daylight conditions.
    - Seventy five percent of fatal bicycle crashes occurred under dark conditions (including dawn and dusk).
    - The proportion of fatal bicycle crashes under dark (lighted) conditions was six times greater than under daylight conditions.
    - The proportion of fatal bicycle crashes under dark (unlit) conditions was 21 times greater than under daylight conditions.
- Age of bicyclists
    - The bicyclists in the 40-54 year age group was involved in 38 percent of fatal crashes.
- Vehicle movement
    - Twenty three percent of bicycle crashes involved a vehicle turning right.
    - Eleven percent of bicycle crashes involved a vehicle turning left.
- Municipalities with the highest crashes
    - Total crashes – Miami (22 percent), Miami Beach (14 percent), Hialeah (6 percent) and unincorporated Miami-Dade County (32 percent)
    - Fatal crashes – Miami (17 percent) and unincorporated Miami-Dade County (57 percent)

- Crashes on state roads
    - SR 907 (Alton Road) and SR A1A had the highest bicycle crash density (2 crashes per mile per year)
- Crashes on non-state roads
    - Fifty five percent of total bicycle crashes and 66 percent of fatal bicycle crashes were reported on non-state roads.
    - Crandon Boulevard (48 crashes in 6 years) and Washington Avenue (40 crashes in 6 years) had the highest number of bicycle crashes

EVALUATION OF HIGH CRASH LOCATIONS

Identification of High Crash Locations

The GIS crash density maps were used to identify locations and segments with clusters of crashes. After identifying the initial list of candidate locations, three factors were utilized to develop the final list of locations: input from MPO staff, information in the FDOT work program, and review of aerials. The preliminary list of high crash locations are included in Appendix D. The selected locations for field reviews are listed in Tables 17 and 18. The majority of high pedestrian crash locations were intersections whereas the majority of high bicycle crash locations were segments. Four high pedestrian crash locations and two high bicycle crash locations selected for field reviews are located on state roads. Six high pedestrian crash locations and four high bicycle crash locations selected for field reviews are located on non-state roadways.

Table 17: High Pedestrian Crash Locations

Segment		Roadway Type	Pedestrian Crashes (2008 – 2013)	Fatal Pedestrian Crashes
1.	SW 27 Avenue at SW 6/7/8 Street	State	18	3
2.	NE 6 Avenue at NE 149 Street/NE 150 Street	State	17	
3.	NW 22 Avenue at NW 36 Street	State	11	
4.	NW 62 Street from NW 13 Court to NW 12 Avenue	Local	11	
5.	Kendall Drive at SW 157 Avenue	State	9	
6.	SW 137 Avenue at SW 152 Street	Local	9	
7.	SW 137 Avenue at SW 268 Street/Moody Drive	Local	8	2
8.	W 24 Avenue at W 60 Street (Hialeah)	Local	8	
9.	W 12 Avenue at W 37 Street (Hialeah)	Local	7	
10.	W 16 Avenue at W 44 Place (Hialeah)	Local	6	1

Table 18: High Bicycle Crash Locations

	Segment	Roadway Type	Bicycle Crashes (2008 – 2013)	Fatal Bicycle Crashes
11.	Crandon Blvd between Harbor Drive and Seaview Drive	Local	46	0
12.	SR A1A/Collins Avenue between Bayview Drive and 174 Street	State	19	0
13.	W 29 Street between Palm Avenue and W 16 Avenue/Milam Diary Road	Local	17	0
14.	SR 976/SW 40 Street/Bird Road at SR 973/SW 87 Avenue	State	7	0
15.	SR 973/SW 112 Avenue between Old Cutler Road and US 1	State	11	0
16.	SW 312 Street/Campbell Drive between SW 177 Avenue and NE 1 Road*	Local	12	0

* SW 312 Street/Campbell Drive was evaluated for pedestrian and bicycle crashes. There were 18 pedestrian crashes.

Field Review of High Pedestrian Crash Locations

Location 1: SW 27 Avenue at SW 6/7/8 Street

Given the proximity, all these three signalized intersections along SW 27 Avenue were evaluated.

Crash Data Summary

There were 18 pedestrian crashes between 2008 and 2013 within study limits. As shown in Table 19, eight crashes involved turning vehicles at signalized intersections. In addition, six crashes occurred when pedestrians were crossing outside of designated crosswalks. The majority of crashes occurred during daylight conditions.

Table 19. Location 1 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	2
At signalized intersection – turning vehicle	8
At driveway	1
At mid-block/outside of the crosswalk	6
Other	1

Table 20. Location 1 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	3	3	
2009	5	3	2
2010	2	1	1
2011	2	1	1
2012	4	4	
2013	2	2	
Total	18	14	4

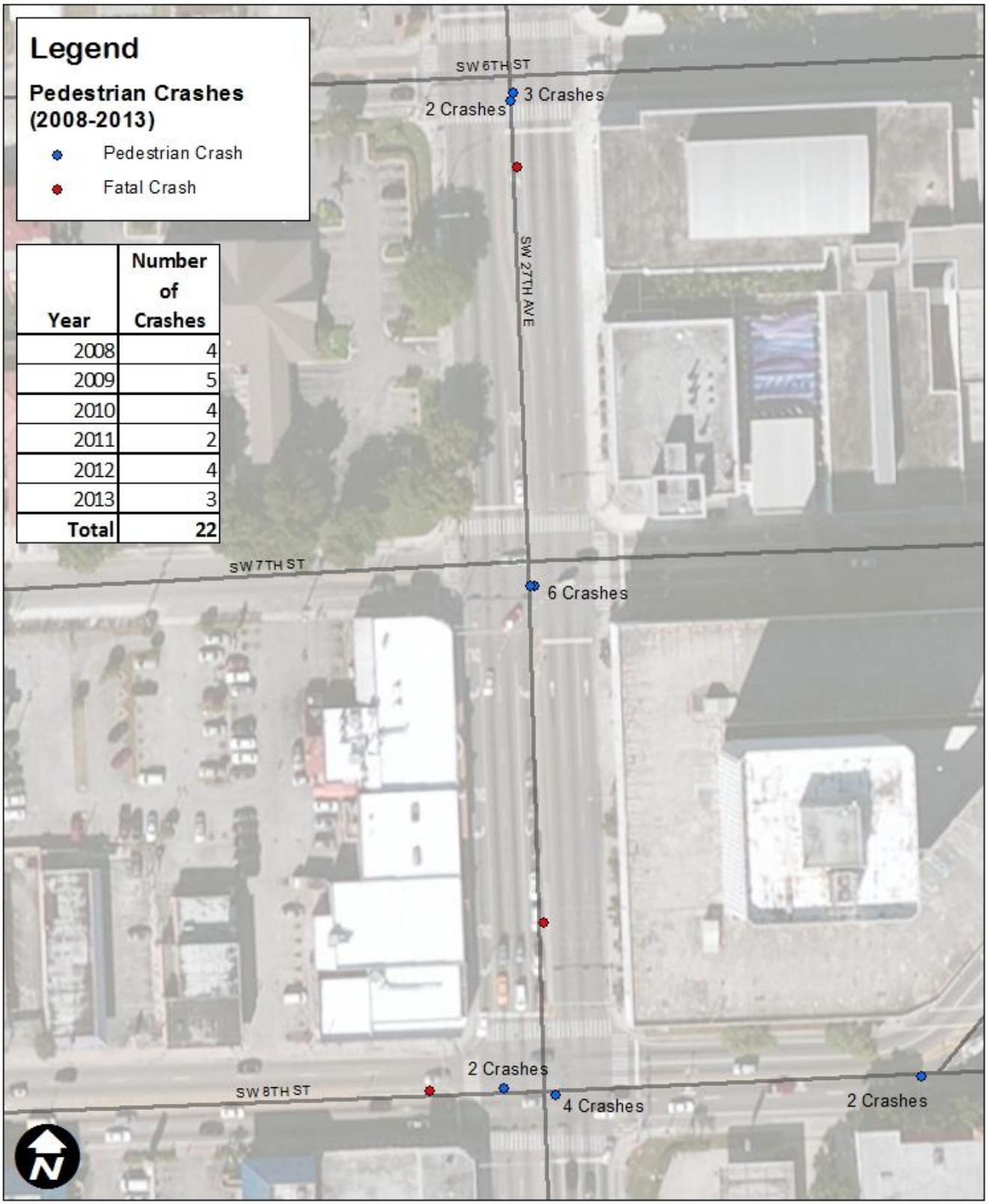
Field Review

A summary of field observations is provided below.

SW 27 Avenue at SW 6 Street

SW 27 Avenue at SW 6 Street is a four-legged signalized intersection with mast arm signal assembly. High emphasis crosswalks exist on all four legs of the intersection. Pedestrian ramps are furnished with the detectable warning surfaces, except at the northwest corner. Pedestrian signal heads (not countdown type) with push buttons and signage exist at all corners of the intersection. Sidewalks exist on both sides of the SW 27 Avenue and on SW 6 Street in the vicinity of the intersection. The pavement surface and markings in the vicinity of the intersection are in good condition. Bus stops are provided on the northeast and southwest quadrants of the intersection. The adjacent land uses include Miami Dade College (MDC) at southeast and northeast corners, a bank at the southwest corner, and residential homes at the northwest corner.

Figure 17: SW 27 Avenue at SW 6/7/8 Street



Year	Number of Crashes
2008	4
2009	5
2010	4
2011	2
2012	4
2013	3
Total	**22**

The following were observations at the intersection:

- Pedestrians were observed crossing outside of the crosswalks on the south and north legs of the intersection.
- Missing yellow detectable warning surface at the northwest quadrant.
- Southbound approach pavement has a large ridge of cement, which encroaches into the crosswalk.
- The WALK indication is very dim on the northeast quadrant.
- Cracked and uneven sidewalk at the southwest quadrant.
- As shown in Photograph 2, vehicles possibly driving over the median (along SW 27 Avenue) on the south side of the intersection have caused damage to the median.
- Faded crosswalk pavement markings.

Photograph 1: Worn out pavement markings

Photograph 2: Traffic separator damaged by traffic

Photograph 3: Large ridge of cement along the SB lanes and leading into the crosswalk

Recommendations

- Upgrade the pedestrian signal heads to countdown type and pedestrian signal actuation signage to meet current MUTCD standards at all corners of the intersection.
- Remove cement ridge on pavement on the southbound approach, which can be a tripping hazard.
- Install a detectable warning surface at northwest corner.
- Repair the WALK indication, which is dim on the northeast quadrant of the intersection.
- Restripe crosswalks and pavement marking at the intersection.
- Install "USE CROSSWALK" (R9-3b) signs near bus stops within the study location.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (R10-15) signs on all approaches to the intersection.

SW 27 Avenue at SW 7 Street

SW 27 Avenue at SW 7 Street is a four-legged signalized intersection with mast arm signal assembly. SW 7 Street is one-way westbound east of SW 27 Avenue. High emphasis crosswalks are provided, except on the south side of the intersection where a crosswalk does not exist. Pedestrian ramps at all corners of the intersection are furnished with the detectable warning surfaces, except at the southwest corner. Pedestrian signal heads (not countdown type) with push buttons and signage exist, except at the southwest and northwest corners where pedestrian signage is missing. Sidewalks exist on both sides of SW 27 Avenue and SW 7 Street in the vicinity of the intersection. There is a bus stop on the northeast corner. The adjacent land uses include Miami-Dade College (MDC) at the northeast corner, a parking garage at southeast corner, a CVS Pharmacy at southwest corner and a bank at northwest corner.

- Pedestrians were observed crossing outside of crosswalks on the south and north legs of the intersection.
- Missing signage for pedestrian crossing on the southwest and northwest corner.
- The "NO PEDESTRIAN CROSSING, USE CROSSWALK" sign on the southwest corner-facing northbound is faded.
- Damages indicate vehicles driving over the traffic separator along SW 27 Avenue on the north side of the intersection.
- The "DO NOT ENTER" sign is faded facing the eastbound direction.
- The "NO STOPPING OR STANDING, TOW-AWAY" sign in the westbound direction is installed upside down.

Photograph 4: Missing pedestrian crossing signage at the southwest corner

Photograph 5: Faded No Pedestrian Crossing sign on the southwest corner

Recommendations

- Upgrade the pedestrian signal heads to countdown type and related pedestrian signal actuation signage to comply with current MUTCD standards at all corners of the intersection.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (modified R10-15) signs for all approaches except on the northbound approach.
- Replace the faded "DO NOT ENTER" (R5-1) sign.
- Reinstall the "NO STOPPING OR STANDING, TOW-AWAY" sign at the westbound direction into upright position.
- Replace the faded "NO PEDESTRIAN CROSSING, USE CROSSWALK" sign on the southwest corner-facing northbound direction.

SW 27 Avenue at SW 8 Street

SW 27 Avenue at SW 8 Street is a four-legged signalized intersection with mast arm signal assembly. High emphasis crosswalks exist on all four legs of the intersection. Pedestrian ramps are furnished with detectable warning mats, except the northwest corner. Pedestrian signal heads (not countdown type) with push buttons and signage exist at all corners of the intersection. Sidewalks exist on both sides of the SW 27 Avenue at SW 8 Street in the vicinity of the intersection. Eastbound and westbound left turns are prohibited. The adjacent land uses are primarily commercial with a pharmacy on the northwest corner, the Inter American Plaza on the northeast corner, a private school (Lincoln-Marti) on the southwest corner, and a bank on the southeast corner.

- Pedestrian actuation signs are vandalized and faded at the southwest and northeast corners.
- Missing the detectable warning surface at the northwest corner.
- There are two bus stops on the west side of the intersection, one serves eastbound buses and the other serves westbound buses.
- Pavement on the southeast corner is rutted.
- A damaged sign base at the southeast corner presents a tripping hazard.
- Knocked down roadway name sign at the northeast corner.
- Some pedestrians were observed crossing mid-block in the vicinity of the study intersection.

Photograph 6: Pedestrians crossing north of SW 8 Street mid-block

Photograph 7: Damaged sign post at the southeast corner

Recommendations

- Upgrade the pedestrian signal heads to countdown type and related pedestrian signal actuation signage to comply with current MUTCD standards at all corners of the intersection.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (modified R10-15) signs.
- Remove the damaged sign base on the southeast corner, which presents a tripping hazard.
- Reinstall the broken roadway name sign located at the northeast corner.
- Install "USE CROSSWALK" (R9-3b) signs near bus stops within the study location.

Location 2: NE 6 Avenue between NE 149 Street and NE 150 Street

The study corridor is located within unincorporated Miami-Dade County. NE 6 Avenue is a five-lane undivided road (including a two-way left-turn lane) with a posted speed limit of 40 mph. The adjacent land uses include commercial/retail (including a Walgreens), gas stations, and apartments.

Crash Data Summary

There were 17 pedestrian crashes between 2008 and 2013 within study limits. Four crashes occurred in the vicinity of the unsignalized intersection at NE 150 Street. In addition, five crashes occurred at mid-block locations and another five crashes at driveway connections. The majority of crashes occurred during daylight conditions.

Table 21. Location 2 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	2
At signalized intersection – turning vehicle	1
At unsignalized intersection	4
At driveway	5
At mid-block/outside of the crosswalk	5

Table 22. Location 2 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	4	3	1
2009	4	3	1
2010	3	2	1
2011	2	2	
2012	2	2	
2013	2	2	
Total	17	14	3

NE 6 Avenue at NE 149 Street

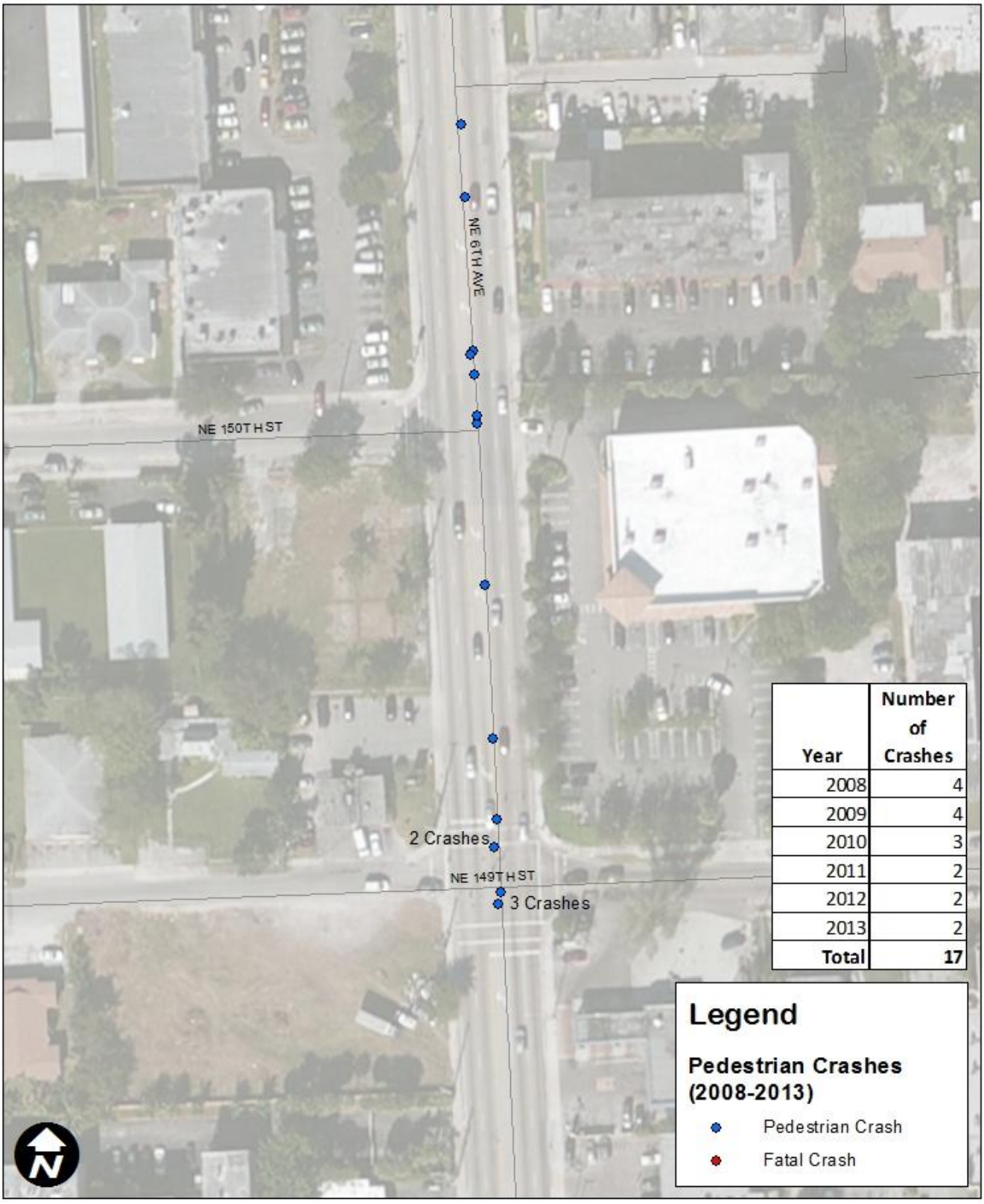
NE 6 Avenue at NE 149 Street is a four-legged signalized intersection with span wire signal assembly. High emphasis crosswalks exist on all four legs of the intersection. Pedestrian ramps are furnished with the detectable warning surfaces. Countdown type pedestrian signals exist at all corners of the intersection with push buttons and related pedestrian signage except for southwest corner where the pedestrian sign panel is missing. Sidewalks exist on both sides of NE 6 Avenue. A school zone exists further south of the intersection.

- The pedestrian clearance interval to cross at the intersection appears to be insufficient.
- There is no signage indicating the sidewalk discontinuity on the south side of east leg of NE 149 Street.
- There are no sidewalks on the west leg.
- Missing push button actuation sign at the southwest corner.
- Pedestrians signal pole at southwest corner has been damaged.
- Damaged gutter on the east side of north leg.
- Poor shoulders and water ponding (southwest quadrant) on the west leg.
- Pedestrians were observed crossing on the mid-block north of NE 149 Street.

NE 6 Avenue at NE 150 Street

- NE 150 Street intersects with NE 6 Avenue forming an unsignalized T-intersection with stop control for the eastbound approach.
- High emphasis crosswalk exists on the west leg. Pedestrian ramps at both ends of the crosswalk are furnished with detectable warning surfaces.
- Damaged sidewalk at several locations on the north side of west leg.
- Pavement surface is not flushed with shoulder on both sides of west leg.
- Pedestrians were observed crossing NE 6 Avenue at NE 150 Street where no crossing facilities are provided.

Figure 18: NE 6 Avenue between NE 149 Street and NE 150 Street



Photograph 8: Sidewalk discontinuity on the south side of east leg

Photograph 9: Pedestrian crossing at mid-block just north of NE 150 Street

Recommendations

- Request FDOT to evaluate the feasibility of reconfiguring typical section of NE 6 Avenue (add a raised median and potential road diet) to improve pedestrian safety.
- Evaluate the feasibility of installing a crosswalk on NE 6 Avenue in the vicinity of NE 150 Street.
- Conduct an educational campaign targeting pedestrians crossing near NE 150 Street to encourage use of crosswalks. As previously noted, several pedestrian crashes occurred near NE 150 Street.

NE 6 Avenue at NE 149 Street

- Install "SIDEWALK CLOSED, USE OTHER SIDE" (R9-10) sign at southeast corner on south side of east leg.
- Request Miami-Dade County to review and adjust pedestrian clearance times on all legs of the intersection.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (modified R10-15) signs for all approaches at the intersection.
- Align the pedestrian signal head on the southwest corner facing north.
- Repair the damaged sidewalk on the north side of east leg.
- Evaluate drainage deficiencies and implement appropriate improvements along with maintenance of drainage inlets, gutter and shoulder area in the vicinity of the study location.

NE 6 Avenue at NE 150 Street

- Install "Pedestrian Crossing" (W11-2) sign and "LOOK" (R15-8) plaque on the eastbound approach of NE 150 Street.
- Repair the damaged sidewalk on the north side of west leg.
- Repair the shoulder on the north side of west leg to be flush with roadway pavement.

Location 3: NW 22 Avenue at NW 36 Street

Crash Data Summary

Eleven pedestrian crashes occurred between 2008 and 2013 within study limits. As shown in Table 23, there were no discernable crash patterns. The majority of crashes occurred during daylight conditions.

Table 23. Location 3 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	3
At signalized intersection – turning vehicle	3
At mid-block/outside of the crosswalk	2
Other	3

Table 24. Location 3 - Lighting Condition

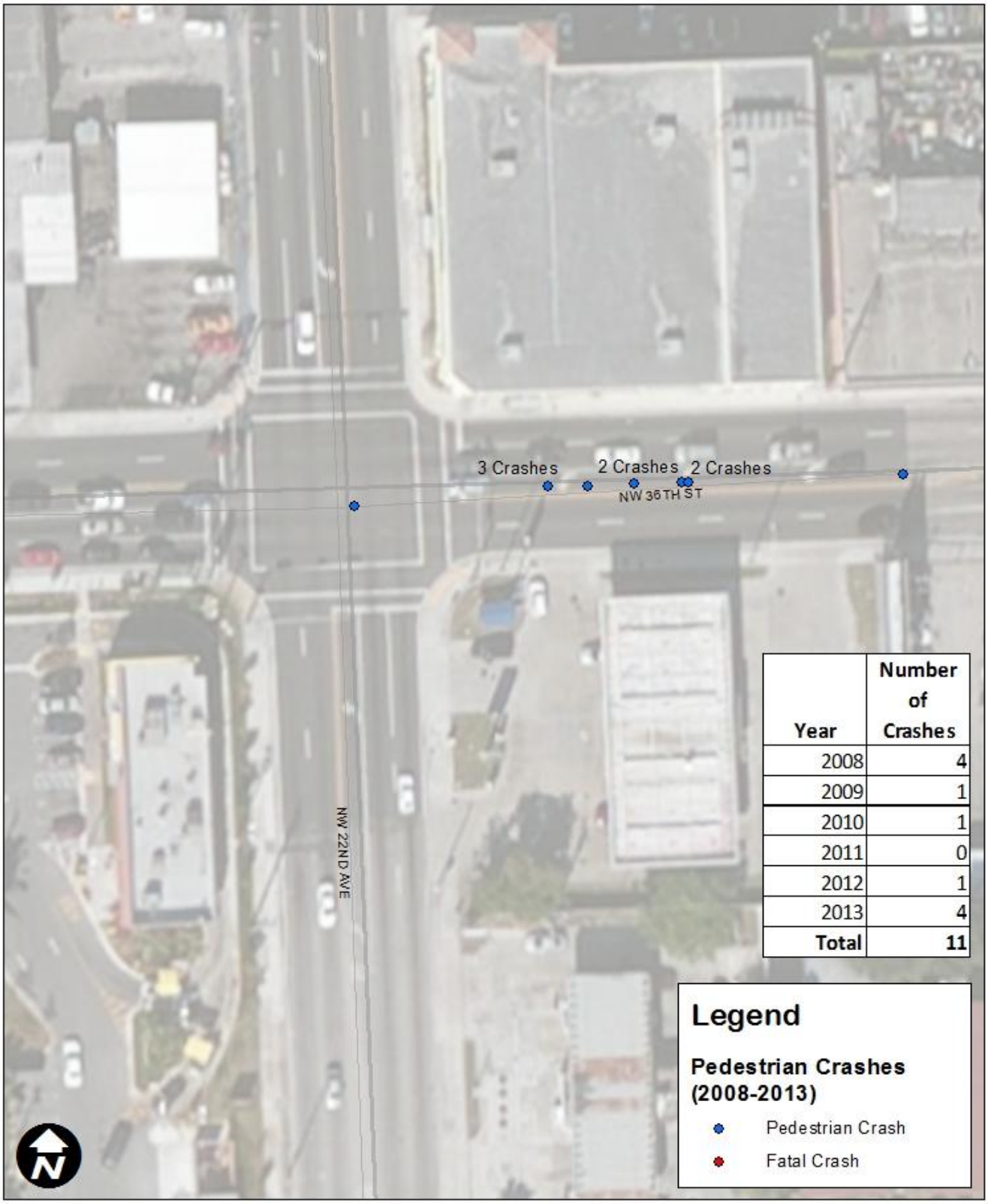
Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	4	2	2
2009	1	1	
2010	1		1
2011			
2012	1	1	
2013	4	3	1
Total	11	7	4

Field Review

NW 22 Avenue at NW 36 Street is a four-legged signalized intersection with mast arm signal assembly. Standard crosswalks exist on all four legs of the intersection. Pedestrian ramps at all corners of the intersection are furnished with the detectable warning surfaces. Pedestrian signal heads (not count type) with push buttons and signage exist at all corners of the intersection, except for southeast corner where a push button is missing. Sidewalks with curb and gutter exist on both sides of NW 22 Avenue and NW 36 Street in the vicinity of the intersection. There are bus stops at the northeast and southwest corners with benches and shelters and a bus stop at the northwest corner with a bench. The adjacent land uses include Presidente Supermarket at the northeast corner, a gas station at the southeast corner, a McDonalds restaurant at the southwest corner, and USA Auto Shop at the northwest corner. Most of the pedestrian movement observed at this location can be attributed to the bus stops. Additional observations include:

- Faded pavement markings in the vicinity of the intersection.
- Broken pedestrian push button at the southeast corner.
- The WALK indication is dim on the northwest quadrant.
- Eastbound pavement has a large ridge of cement which can be a potential tripping hazard for pedestrians accessing the bus stop.
- I-95 guide sign is missing on the northbound approach.

Figure 19: NW 22 Avenue at NW 36 Street



Year	Number of Crashes
2008	4
2009	1
2010	1
2011	0
2012	1
2013	4
Total	**11**

Photograph 10: Missing pedestrian push button on the southeast corner

Photograph 11: Uneven pavement on eastbound outside lane

Photograph 12: Worn pavement markings and dim pedestrian walk indication

Recommendations

- Upgrade pedestrian signal heads to countdown type and related pedestrian signage.
- Repair pedestrian signal push button at the southwest corner.
- Restripe crosswalk markings and upgrade to ladder type on all legs of the intersection.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (modified R10-15) signs for all approaches at the intersection.
- Repair uneven pavement on the eastbound approach.
- Replace pedestrian signal WALK indication on the northwest quadrant of the intersection.
- Install missing, I-95 guide sign at the southeast corner.

Location 4: NW 62 Street from NW 13 Court to NW 12 Avenue

The study segment is located within the City of Miami. NW 62 Street is a four-lane road with a posted speed limit of 30 mph. A landscaped median is provided intermittently. The adjacent land uses include residential and commercial/retail. The study segment includes a signalized intersection at NW 12 Avenue and a mid-block pedestrian signal near NW 13 Court.

Crash Data Summary

There were 11 pedestrian crashes between 2008 and 2013 within study limits. As shown in Table 25, five pedestrian crashes occurred outside of designated crossings. Five out of 11 crashes occurred during dark conditions. As shown in Figure 20, four crashes occurred near NW 13 Avenue, which is east of the existing mid-block crosswalk.

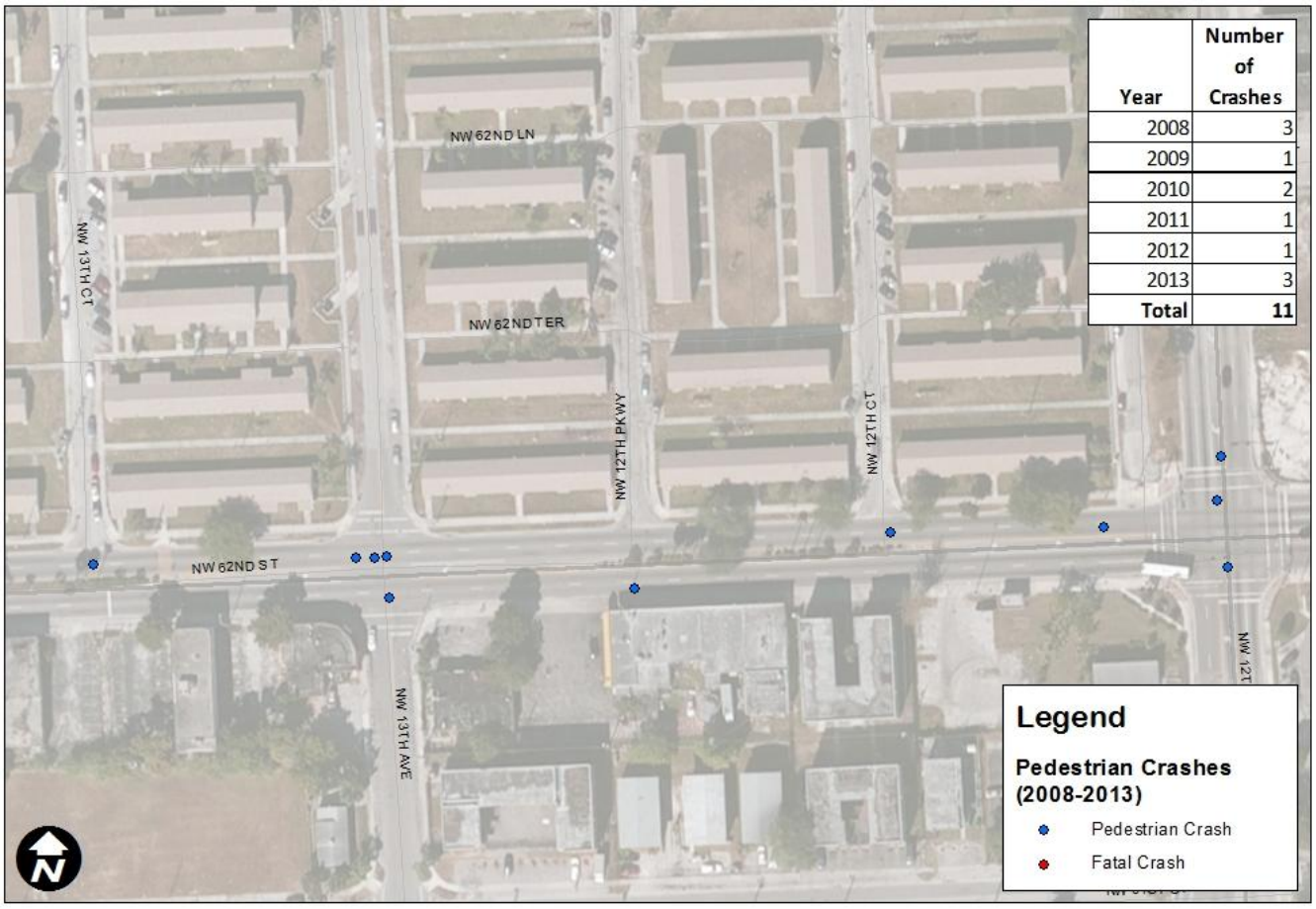
Table 25. Location 4 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	4
At signalized intersection – turning vehicle	1
At unsignalized intersection	1
At mid-block/outside of the crosswalk	5

Table 26. Location 4 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	3	1	2
2009	1	1	
2010	2	1	1
2011	1		1
2012	1		1
2013	3	3	
Total	11	6	5

Figure 20: NW 62 Street from NW 13 Court to NW 12 Avenue



NW 62 Street at NW 12 Avenue

NW 62 Street and NW 12 Avenue is a four-legged signalized intersection. Countdown pedestrian signals are provided. The pavement markings in the vicinity of the intersection are in poor condition, including crosswalk markings on all legs.

- The pedestrian buttons and related signage are relatively old and do not meet current MUTCD standards.
- The pedestrian clearance times appear to be insufficient on all four legs.
- Water ponding at the northeast quadrant along the gutter.
- Damaged fence at the northeast corner.

NW 62 Street between NW 12 Avenue and NW 13 Court

- Street lighting provided on both sides of NW 62 Street in a staggered arrangement.
- Broken sidewalk on the north side west of NW 12 Court.
- The pedestrian ramp at the northeast corner of the intersection at NW 12 Parkway appears to be too steep and sidewalk is damaged.
- The crosswalk marking on the south leg at NW 13 Avenue is faded.
- The crosswalk markings on the north and south legs of NW 13 Avenue are faded.
- A pedestrian activated signal exists east of NW 13 Court. The push button and signage are old, and the pedestrian signal actuation information sign is missing on the north side.
- A utility cover on the south side sidewalk west of NW 12 Court is bent, presenting a potential tripping hazard for pedestrians and bicyclists.
- Pedestrians were observed crossings mid-block or at unsignalized intesections within the study location.

Photograph 14: Water ponding at northeast corner of NW 12 Avenue intersection

Photograph 13: Pedestrian crossing NW 62 Street at NW 12 Parkway.

Photograph 15: Missing pedestrian signage at pedestrian signal east of NW 13 Court

Recommendations

NW 62 Street at NW 12 Avenue

- Request Miami-Dade County to review existing pedestrian clearance times and make adjustments, if needed.
- Upgrade push buttons and pedestrian signage at all corners of the intersection per current MUTCD standards.
- Refurbish pavement markings in the vicinity of the intersection.
- Clear sand/debris in the gutter area on the west side of south leg.
- Implement appropriate improvements to prevent standing water at the northeast corner.

NW 62 Street from NW 13 Court to NW 12 Avenue

- Request the City of Miami to review overall crash data to determine if there is a high incidence of nighttime crashes; if so, conduct a lighting assessment.
- Determine if the existing mid-block crossing should be relocated closer to NW 13 Avenue (there were four pedestrian crashes at NW 13 Avenue).
- Consider implementing an educational campaign to encourage pedestrians to use the crosswalks. Target populations are transit users and local residents.
- Install "USE CROSSWALK" (R9-3b) signs at all bus stop locations within the study limits.
- Repair the damaged sidewalk on the north side of NW 62 Street west of NW 12 Court.

- Reconstruct the sidewalk and pedestrian ramp at the northeast corner of NW 12 Parkway to be compliant with ADA requirements.
- Refurbish crosswalk markings on NW 12 Parkway, NW 12 Court, NW 13 Avenue and NW 13 Court.
- Upgrade the push buttons and pedestrian signage at the mid-block pedestrian crossing per current MUTCD standards.
- Remove sand/debris deposited within the pedestrian ramp on the north side of NW 62 Street at signalized crossing.
- Replace the bent utility cover within the sidewalk on the south side, west of NW 12 Court.

Location 5: Kendall Drive at SW 157 Avenue

Crash Data Summary

There were nine pedestrian crashes between 2008 and 2013 within study limits. As shown in Table 27, five pedestrian crashes involved turning vehicles and three crashes occurred outside of designated crossings. Four out of nine crashes occurred during dark conditions.

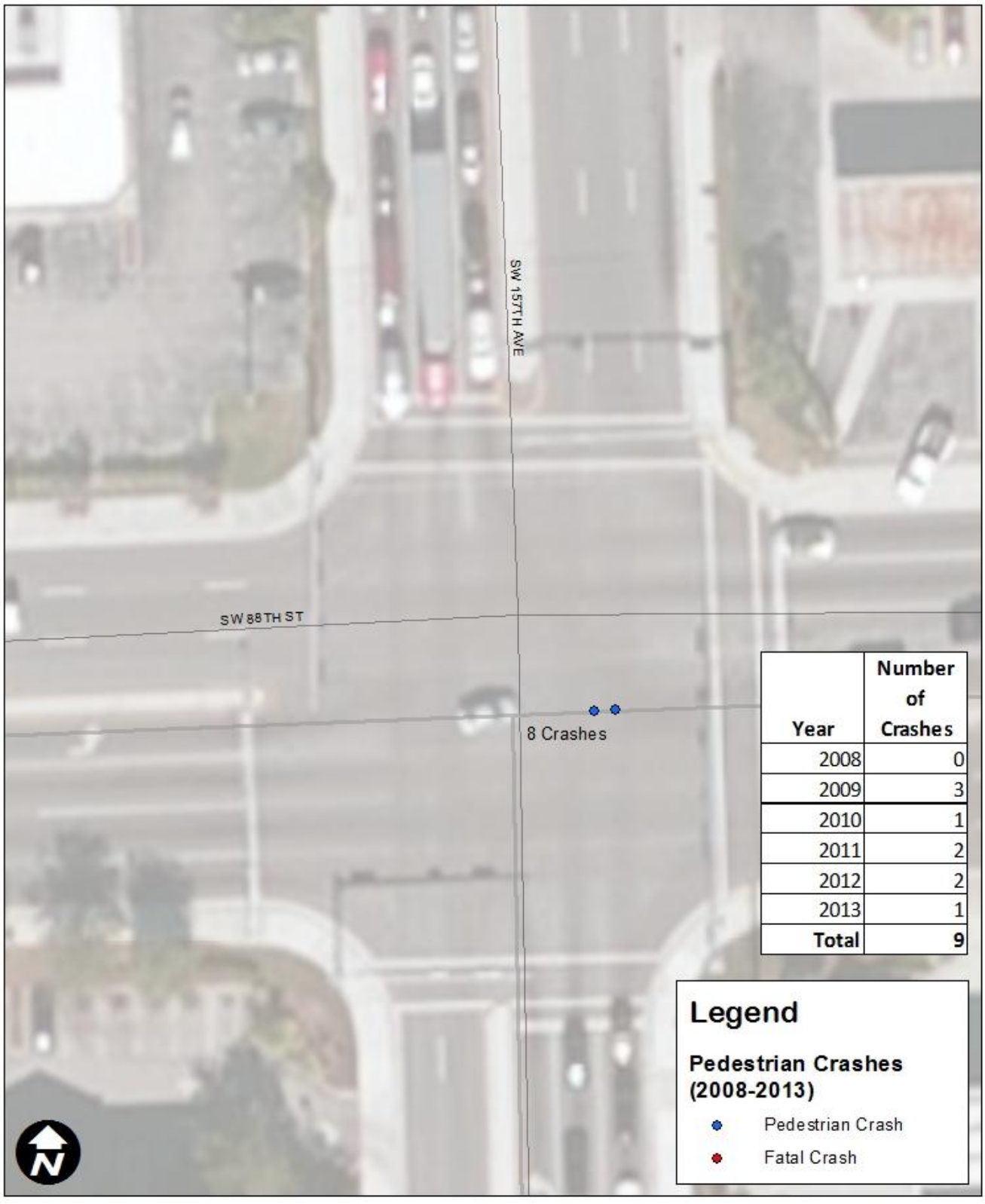
Table 27. Location 5 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	1
At signalized intersection – turning vehicle	5
At mid-block/outside of the crosswalk	3

Table 28. Location 5 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008			
2009	3	2	1
2010	1	1	
2011	2		2
2012	2	2	
2013	1		1
Total	9	5	4

Figure 21: Kendall Drive at SW 157 Avenue



Field Reviews

Kendall Drive/SW 88 Street at SW 157 Avenue is a four-legged signalized intersection with mast arm signal assembly. Standard crosswalks exist on north, east and south legs of the intersection, and a crosswalk is not provided on the west leg. Pedestrian ramps at all corners of the intersection are furnished with the detectable warning surfaces. Countdown type pedestrian signal heads are provided. Sidewalks exist on both sides of Kendall Drive and SW 157 Avenue in the vicinity of the intersection. The adjacent land uses are primarily commercial, including a McDonalds and a Payless Shoe Center at the northwest corner, gas stations at the northeast and southeast corners, and a CVS Pharmacy and a Home Depot at the southwest corner.

- The pedestrian clearance times of 20 seconds to cross east leg and 15 seconds to cross north and south legs appear to be insufficient.
- Damaged detectable warning surfaces on pedestrian ramps at the northeast, southeast and southwest corners.
- Pedestrian crossing signs are not provided per current MUTCD standards.
- Street lighting is provided on the south side of Kendall Drive, no street lighting exists along SW 157 Avenue.

Photograph 16: Damaged pedestrian detectable warning mat at southeast corner

Photograph 17: Damaged pedestrian detectable warning mat at southwest corner

Recommendations

- Request FDOT to review overall crash data to determine if there is a high incidence of nighttime crashes; if so, conduct a lighting assessment.
- Request FDOT to evaluate the feasibility of installing a signalized crossing on the west leg of the intersection.
- Given the number of pedestrian crashes at the intersection, upgrade crosswalk markings to ladder type.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (modified R10-15) signs for all approaches at the intersection.
- Install/upgrade pedestrian crossing signs consistent with current MUTCD standards.
- Replace the detectable warning surfaces at the northeast, southeast and southwest corners.
- Install "NO PEDESTRIAN CROSSING" (R9-3) and "USE CROSSWALK" (R9-3b) signs in the vicinity bus stop locations.

Location 6: SW 137 Avenue at SW 152 Street

Crash Data Summary

There were nine pedestrian crashes between 2008 and 2013 within study limits. As shown in Table 29, six pedestrian crashes occurred at driveways or outside of crosswalks within study limits. Four out of nine crashes occurred during dark conditions.

Table 29. Location 6 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	1
At signalized intersection – turning vehicle	1
At driveway	4
At mid-block/outside of the crosswalk	2
Other	1

Table 30. Location 6 - Lighting Condition

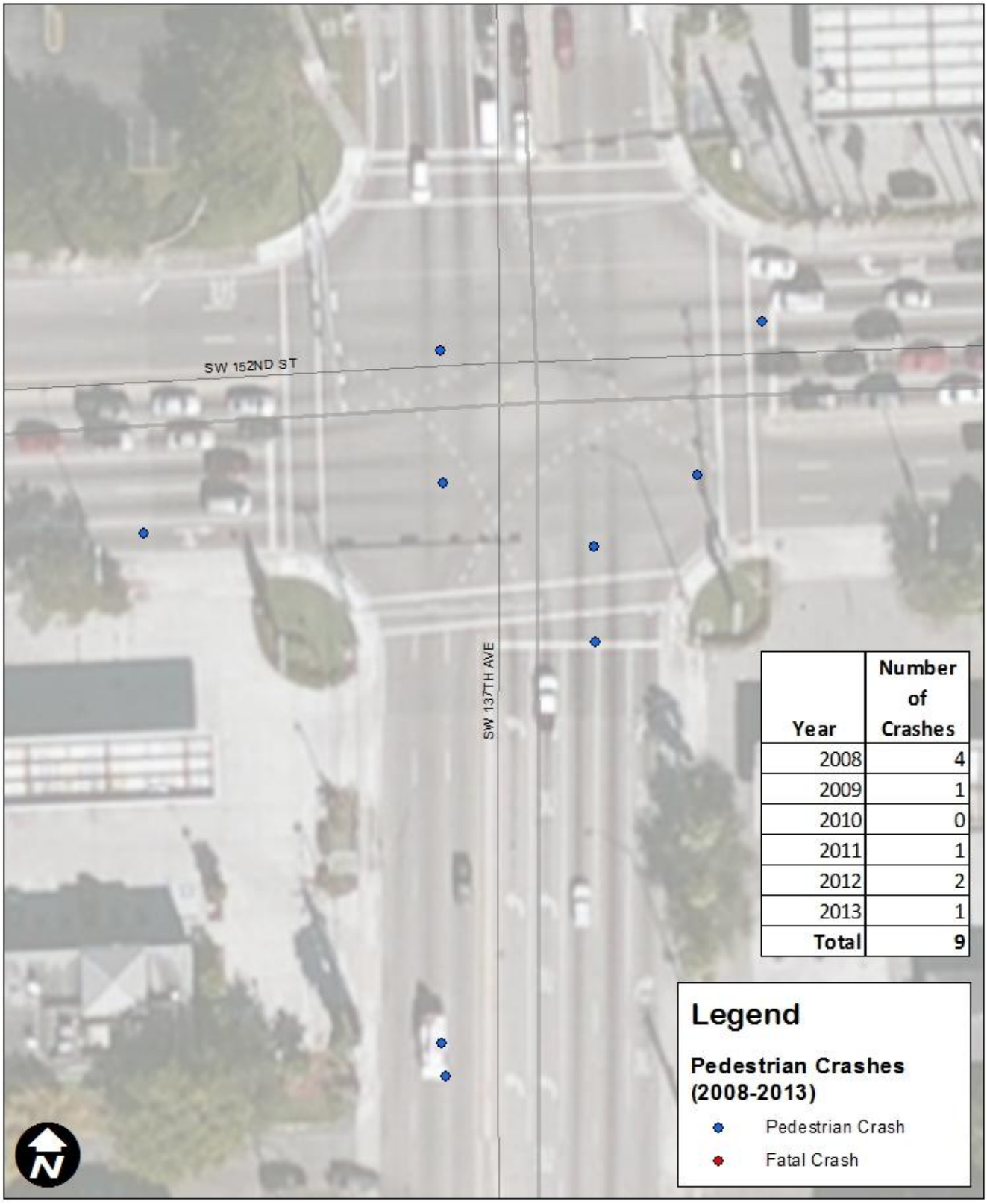
Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	4	1	3
2009	1	1	
2010	0		
2011	1	1	
2012	2	2	
2013	1		1
Total	9	5	4

Field Reviews

SW 152 Street at SW 137 Avenue is a four-legged signalized intersection with mast arm signal assembly. Standard crosswalks exist on all legs of the intersection with pedestrian ramps and detectable warning surfaces. Countdown type pedestrian signal heads are provided at all corners of the intersection with push buttons and related pedestrian signage. Sidewalks exist on both sides of SW 152 Street at SW 137 Avenue. During the time of the field visit, road work was occurring on the north, east and west legs of the intersection. The adjacent land uses include gas stations at the northeast, southeast and southwest corners, and a Publix and banks at the northwest corner. Fast-food restaurants are also located in the vicinity.

- The pedestrian clearance intervals do not appear to be sufficient.
- Street lighting is provided on the south side of SW 152 Street and on the east side of SW 137 Avenue.
- Pedestrian push buttons and related signage are faded at all corners of the intersection.
- Bus stops are located away from the intersection.
- While the gas station at the northeast corner has one driveway connection per street, the gas stations on the southeast and southwest corners have two driveway connections per street.
- Cracked sidewalks were noted on the west side of north leg and on the north side of west leg.
- The “RIGHT LANE MUST TURN RIGHT” sign for northbound approach is tilted. The subject sign appears to be located too close to the travel lanes.

Figure 22: SW 137 Avenue at SW 152 Street



Photograph 18: Pedestrian push buttons and signage

Photograph 19: Tilted sign for the northbound approach (too close to travel lanes)

Recommendations

- Request FDOT to review overall crash data to determine if there is a high incidence of nighttime crashes; if so, conduct a lighting assessment.
- Request Miami-Dade County to review existing pedestrian clearance times and make adjustments, if needed.
- Install "NO PEDESTRIAN CROSSING" (R9-3) and "USE CROSSWALK" (R9-3b) signs in the vicinity bus stop.
- Evaluate the feasibility of installing sign assembly of "LOOK" (R15-8) and pedestrian crossing (W11-2) signs at driveways within study limits.
- Upgrade pedestrian push buttons and related signage to comply with current MUTCD standards.
- Relocate the tilted "RIGHT LANE MUST TURN RIGHT" sign facing northbound traffic outside of clear zone.

Location 7: SW 137 Avenue at SW 268 Street/Moody Drive

Crash Data Summary

There were eight pedestrian crashes between 2008 and 2013 within study limits. Two crashes resulted in fatalities. As shown in Table 31, six pedestrian crashes occurred at driveways or outside of the crosswalks within study limits. Six out of eight crashes occurred during dark conditions.

Table 31. Location 7 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – turning vehicle	2
At driveway	1
At mid-block/outside of the crosswalk	5

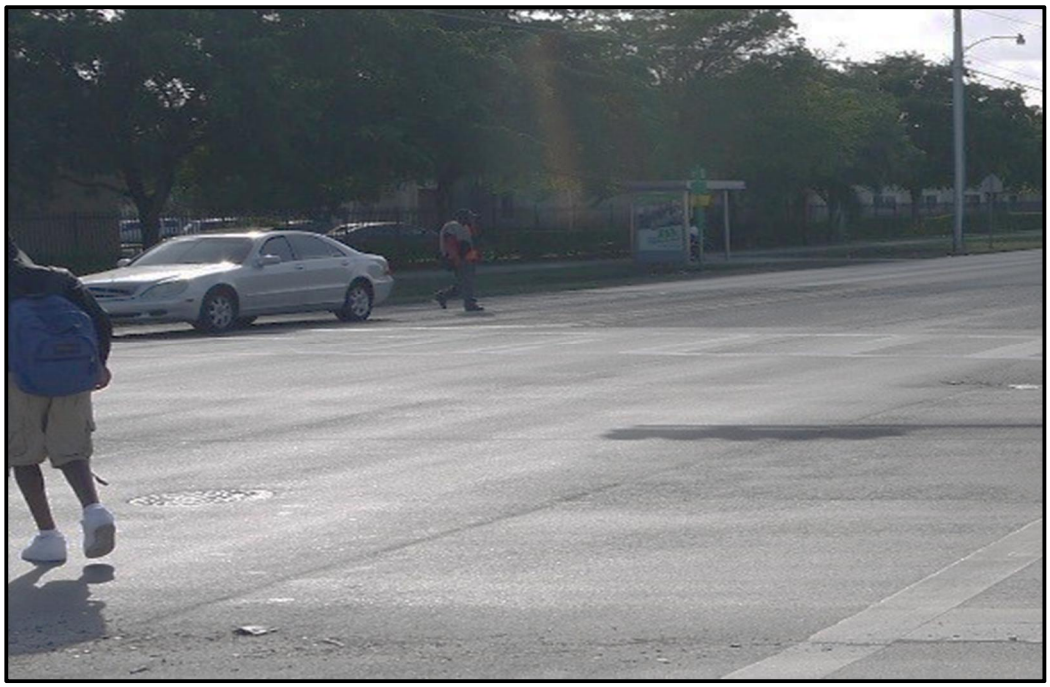
Table 32. Location 7 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	0		
2009	2	1	1
2010	2		2
2011	2	1	1
2012	1		1
2013	1		1
Total	8	2	6

Field Reviews

SW 137 Avenue at SW 268 Street is a four-legged signalized intersection with mast arm signal assembly. Both SW 137 Avenue and SW 268 Street are undivided streets. High emphasis crosswalks exist on all legs of the intersection with pedestrian ramps and detectable warning surfaces. Countdown type pedestrian signal heads exist at all corners with push buttons and related pedestrian signage. An exclusive pedestrian phase is provided. The adjacent land uses are a mix of commercial and residential including a gas station at northwest corner, vacant/residential on the northeast corner, gas station/food store on the southeast corner, and residential on the southwest corner.

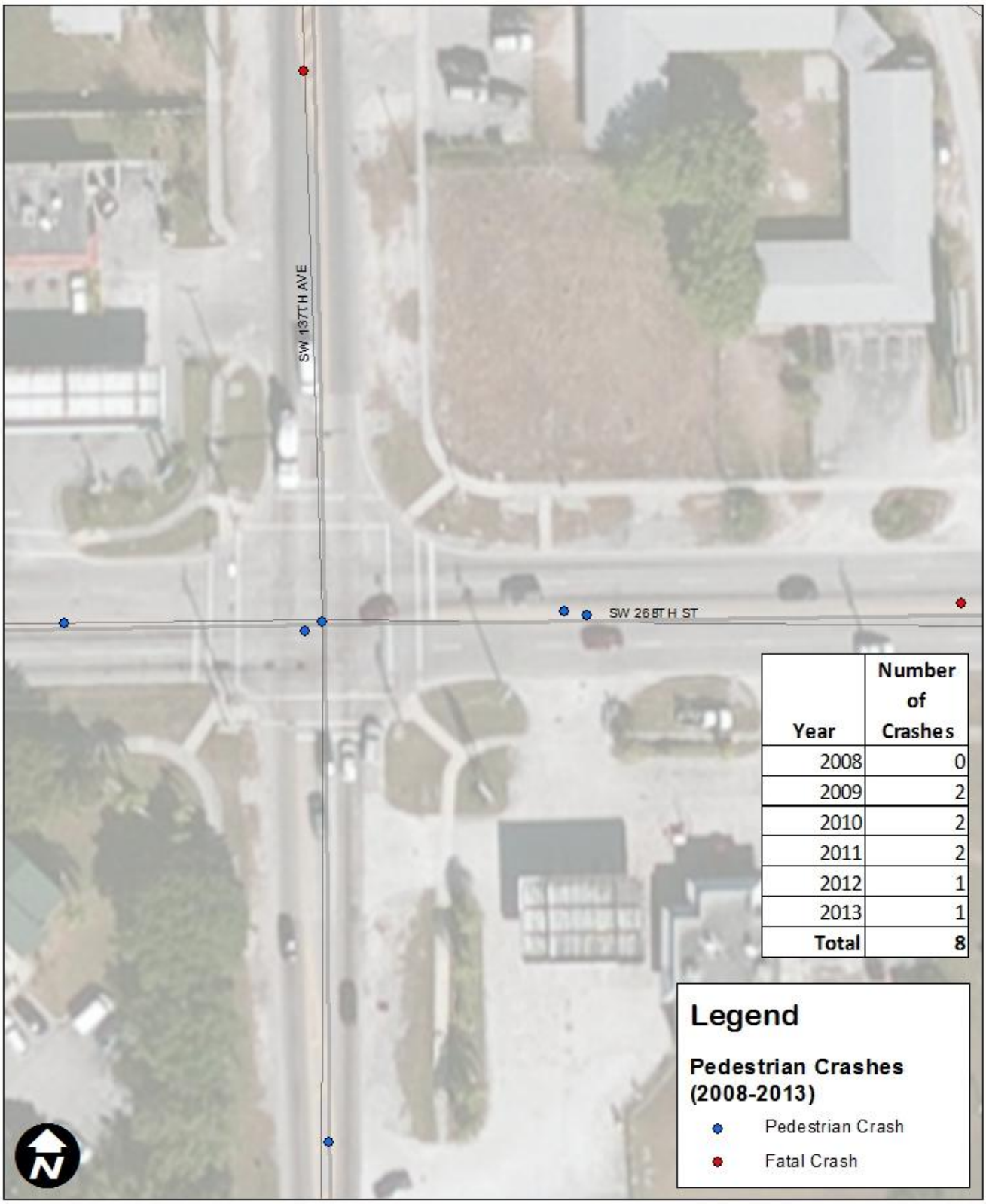
- Pedestrian activity was observed to be high with pedestrians walking along sidewalks and crossing on all legs of the intersection at the time of field visit. Few pedestrians were seen crossings outside of the crosswalks.
- Street lighting is not provided at the intersection.
- Pedestrian clearance time of 14 seconds appears to be insufficient.
- The pedestrian signal head at the southwest corner facing north is partially blocked by a utility pole.
- A portion of detectable warning surface at the southeast corner is missing.
- School crossing sign on the south side of west leg is faded.
- Sidewalks on the east and west sides of south leg are cracked or damaged at several locations.
- Sidewalk on the east side of north leg is damaged and uneven at several locations.
- Drainage inlet on the east side of south leg is blocked by debris.
- Water ponding was observed on the west side of north leg, both sides of the south leg, and north side of the east leg.
- In general, roadway surface and pavement markings are in poor condition.



Photograph 20: Pedestrians crossing at the intersection

Photograph 21: Deficient pedestrian facilities

Figure 23: SW 137 Avenue at SW 268 Street/Moody Drive



Recommendations

- Request Miami-Dade County to evaluate intersection lighting and implement enhancements. Six out of eight pedestrian crashes occurred during dark conditions.
- Request Miami-Dade County to review existing pedestrian clearance times and make adjustments, if needed.
- Conduct an educational campaign to encourage pedestrians to use the crosswalks. Six pedestrian crashes involved pedestrians crossing outside of designated crossings.
- Relocate the existing pedestrian signal head at the southwest corner facing north onto a dedicated pole to improve its visibility.
- Refurbish crosswalk markings on all legs in the vicinity of the intersection.
- Install/upgrade pedestrian crossing signs per current MUTCD standards.
- Upgrade pedestrian signal actuation information panels per current MUTCD standards.
- Replace detectable warning surface at the southeast corner.
- Evaluate drainage deficiencies and implement appropriate improvements.
- Repair the broken sidewalk on both sides of south leg.

Location 8: W 24 Avenue at W 60 Street

Crash Data Summary

There were eight pedestrian crashes between 2008 and 2013 within study limits. As shown in Table 33, four pedestrian crashes occurred outside of the crosswalks within study limits.

Table 33. Location 8 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	2
At signalized intersection – turning vehicle	2
At mid-block/outside of the crosswalk	4

Table 34. Location 8 - Lighting Condition

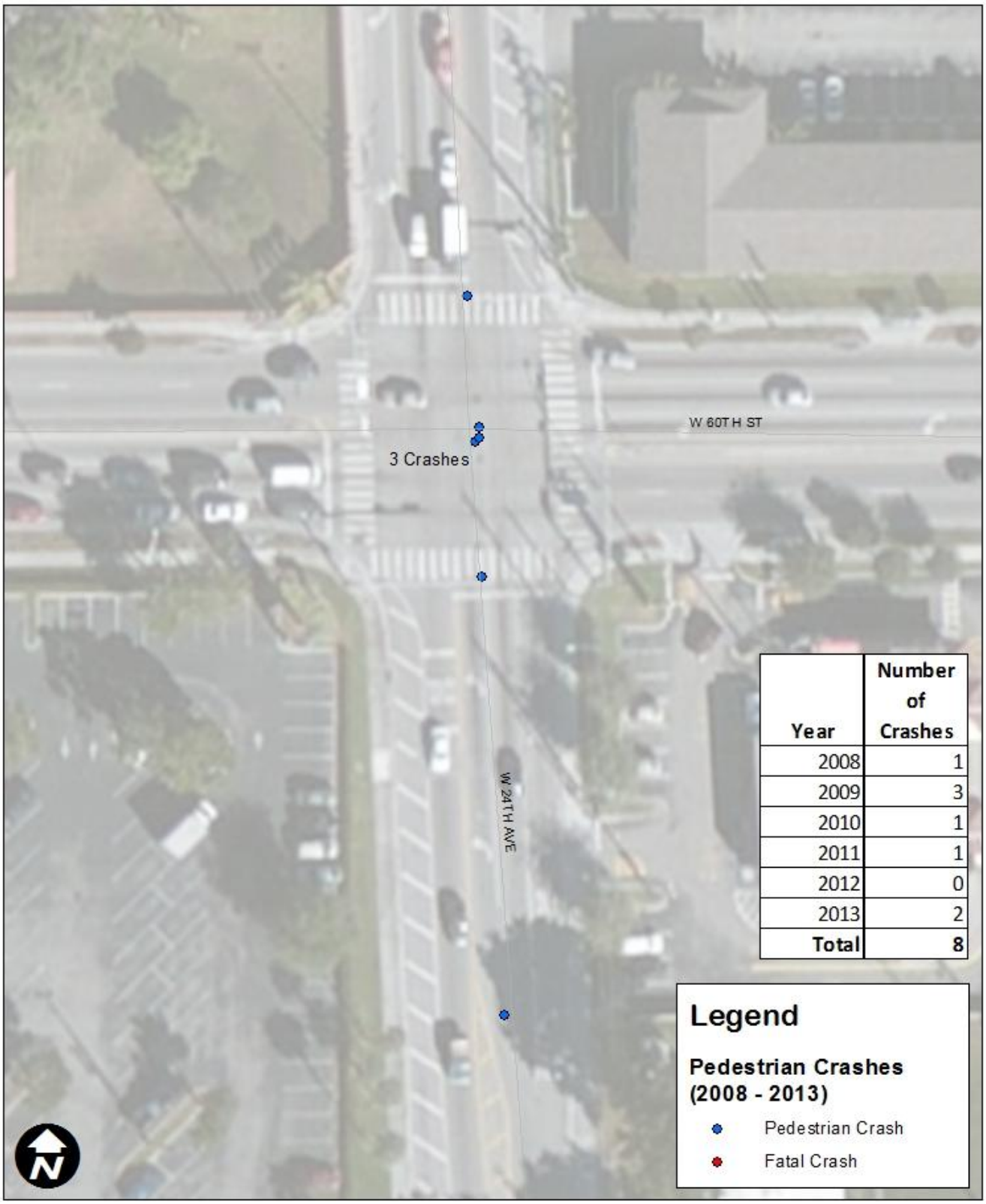
Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	1	1	
2009	3		3
2010	1	1	
2011	1	1	
2012			
2013	2	2	
Total	8	5	3

Field Reviews

W 24 Avenue at W 60 Street is a four-legged signalized intersection with mast arm signal assembly in Hialeah. W 60 Street is a divided road, whereas W 24 Avenue is an undivided road. High emphasis crosswalks exist on all four legs of the intersection with pedestrian ramps and detectable warning surfaces. Pedestrian signal heads (not count type) with push buttons and signage exist at all corners of the intersection except for the southwest corner where a push button is missing. Sidewalks with curb and gutter exist on both side of the W 24 Avenue and W 60 Street in the vicinity of the intersection. Eastbound and westbound U-turns are prohibited by signage on mast arms. The pavement surface and markings in the vicinity of the intersection are in fair condition. Sharrow markings exist on the southbound approach. A school speed zone exists on the south leg of the intersection. The adjacent land use in the northwest and northeast corners is residential. A shopping plaza (Publix, Pollo Tropical, etc.) is located at the southwest corner, and a fast food restaurant and strip commercial/retail uses are located at the southeast corner. Two schools are located further south from the study intersection.

- Missing pedestrian push button actuation sign at southwest corner. Push button on the northwest corner is damaged.
- Existing detectable warning surfaces on pedestrian ramps do not meet current ADA guidelines.
- School crossing signs at (1) southwest corner facing the eastbound motorists, (2) southeast corner facing the northbound traffic and (3) northwest corner facing the southbound motorists do not comply with current MUTCD standards.
- The school speed limit sign on the west side of south leg is fixed upside down.
- School sign on the south side of west leg near to the shopping plaza driveway is tilted. The sign does not comply with current MUTCD standards.
- Uneven sidewalk on the south side of west leg. Damaged sidewalk on the north side of east leg (near a utility pole).
- Bus stop sign on the east side of south leg is knocked down and is placed inside the school fence. Bus stop sign on the north side of west leg is tilted backwards.
- Roadside sign pole at the northeast corner facing westbound traffic is missing a sign.

Figure 24: W 24 Avenue at W 60 Street



Photograph 22: Existing detectable warning surfaces

Photograph 23: Upside down school speed limit sign on the west side of south leg

Photograph 24: Pedestrian activity in the vicinity of the study location

Recommendations

- Install "NO PEDESTRIAN CROSSING" (R9-3) and "USE CROSSWALK" (R9-3b) signs in the median of W 60 Street within intersection limits where residents and transit users were seen crossing outside of the crosswalks.
- Upgrade pedestrian signal heads to countdown type and related push buttons and signage.
- Replace school crossing signs in the vicinity of the intersection to be compliant with current MUTCD standards.
- Install detectable warning surfaces on pedestrian ramps at all corners of the intersection.
- Reinstall the upside down school speed limit ahead sign on the west side of south leg.
- Install the missing sign at the northeast corner facing westbound motorists.
- Install bus stop sign on the east side of south leg and on the north side of west leg.
- Reconstruct damaged sidewalk on the south side of west leg and on the north side of east leg.
- Consider conducting an educational campaign to encourage pedestrians to use crosswalks (target population groups are residents and transit users).

Location 9: W 12 Avenue at W 37 Street

Crash Data Summary

There were seven pedestrian crashes between 2008 and 2013 within study limits. As shown in Table 35, four pedestrian crashes involved turning vehicles and three pedestrian crashes occurred outside of the crosswalks within study limits. The majority of crashes occurred during daylight conditions.

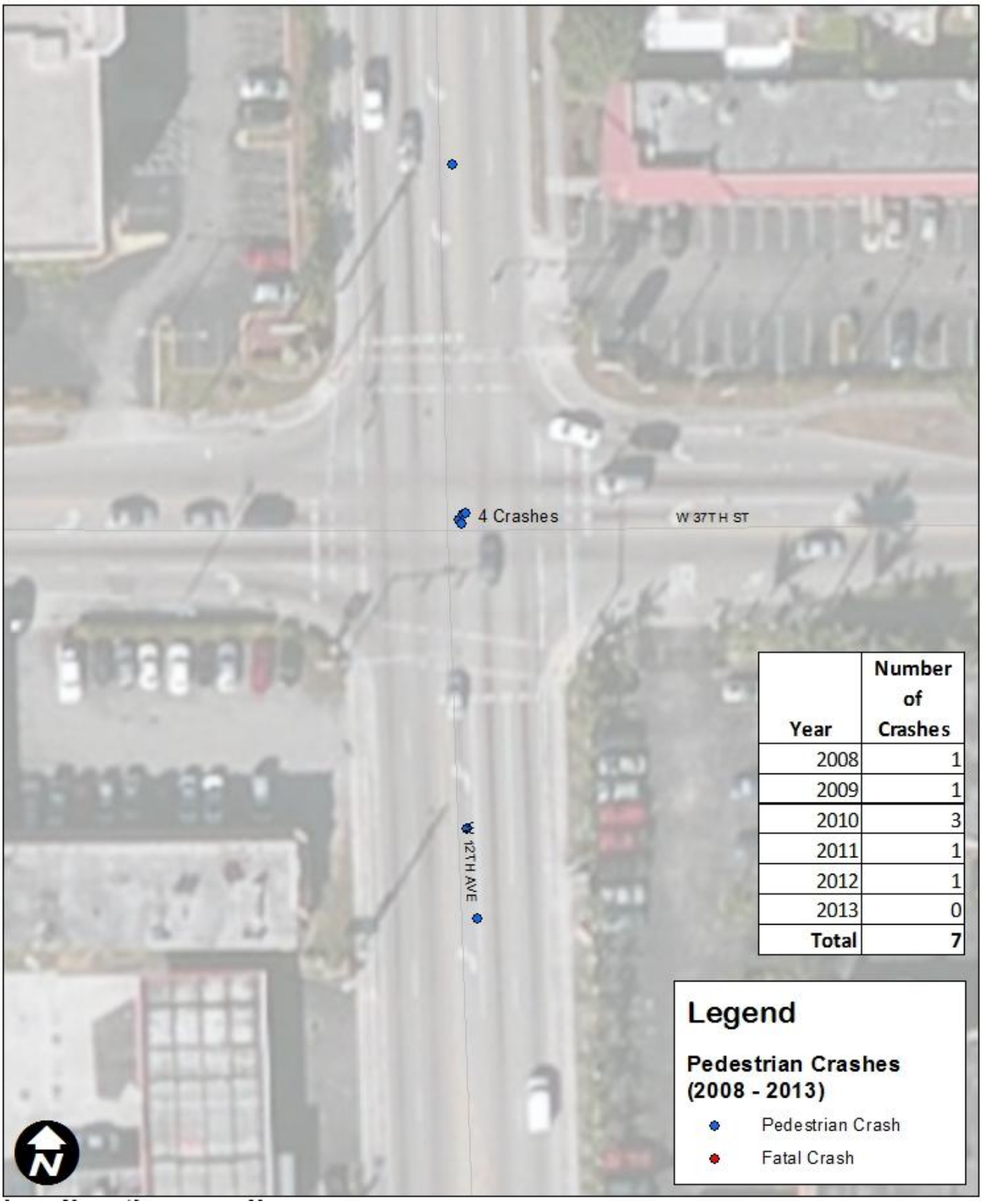
Table 35. Location 9 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – turning vehicle	4
At mid-block/outside of the crosswalk	3

Table 36. Location 9 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	1	1	
2009	1	1	
2010	3	2	1
2011	2	1	1
2012	0		
2013	0		
Total	7	5	2

Figure 25: W 12 Avenue at W 37 Street



Field Reviews

W 12 Avenue at W 37 Street is a four-legged signalized intersection with mast arm signal assembly in Hialeah. W 12 Avenue is a two-lane undivided road and W 37 Street is a four-lane undivided road. Regular crosswalks exist on all four legs of the intersection. Pedestrian signal heads do not exist at any corner of the intersection. However, push buttons and signage exist at all corners of the intersection. Sidewalks with curb and gutter exist on both sides of W 12 Avenue and W 37 Street. The adjacent land uses include a bank at the northwest corner, shopping plaza at the northeast corner, apartment buildings at the southeast corner, and a cafeteria/gas station at the southwest corner of the intersection.

- Pavement markings in the vicinity of the intersection are faded.
- The pedestrian ramp at the northwest corner is not aligned with the crosswalk on the west leg.
- Detectable warning surfaces on the northeast and southwest corners do not meet current ADA guidelines.
- Sidewalks on the northeast and southwest corners are cracked.
- Driveway connections at the southeast, southwest and northwest corners are located very close to the intersection.

Photograph 25: Push buttons and signage exist without pedestrian signal heads

Photograph 26: Faded crosswalk markings

Recommendations

- Install countdown pedestrian signal heads at all corners of the intersection and upgrade push buttons and associated pedestrian signage.
- Install pedestrian detectable warning surfaces on pedestrian ramps at the northeast and southwest corners of the intersection.
- Reconstruct pedestrian ramp at the northwest corner to align with crosswalks.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS" (modified R10-15) signs for all approaches to the intersection.
- Refurbish crosswalk pavement markings and upgrade to ladder type.
- Repair sidewalk surface to be flush with the drainage inlet at the northwest corner.
- Coordinate with Miami-Dade Transit to examine the feasibility of relocating the bus stop on westbound approach closer to the intersection similar to the existing bus stop on the eastbound approach.
- Coordinate with the City of Hialeah to request property owners of northeast, northwest and southwest corners to install STOP signs on the exit driveways.

Location 10: W 16 Avenue at W 44 Place

Crash Data Summary

There were five pedestrian crashes between 2008 and 2013 within study limits. One crash resulted in a fatality. As shown in Table 37, three pedestrian crashes involved turning vehicles.

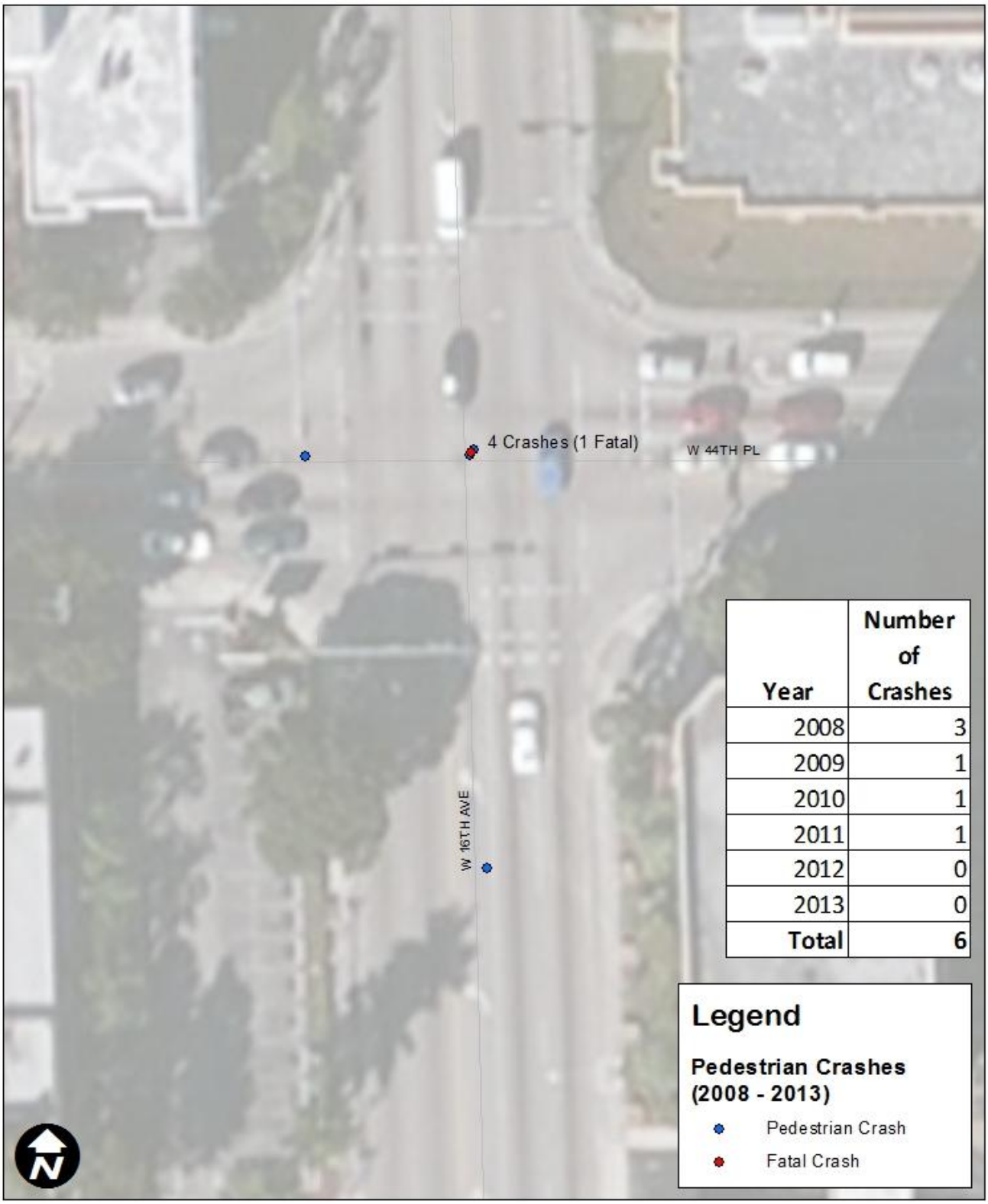
Table 37. Location 10 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – turning vehicle	3
At driveway	1
At mid-block/outside of the crosswalk	1

Table 38. Location 10 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	2	1	1
2009	1	1	
2010	1		1
2011	1	1	
2012	0		
2013	0		
Total	5	3	2

Figure 26: W 16 Avenue at W 44 Place



Field Reviews

W 44 Place at W 16 Avenue is a four-legged signalized intersection with mast arm signal assembly in Hialeah. Both W 44 Place and W 16 Avenue are undivided roads. Regular crosswalks exist on all four legs of the intersection. Pedestrian signal heads with push buttons and signage exist at all corners of the intersection. Sidewalks with curb and gutter exist on both sides of W 44 Place and W 16 Avenue. The pavement surface and markings in the vicinity of the intersection are in fair condition. The adjacent land uses include residential buildings at the northwest and northeast corners, Care Vantage Office building at the southeast corner, and a bank at the southeast corner.

- The pedestrian signal heads at the southwest corner facing east and at the northwest corner facing south are not functioning.
- The pedestrian push buttons and related signage at all corners of the intersection are faded. The pedestrian signal actuation sign panel and push button at the southwest corner are damaged.
- The crosswalks on east and south legs are not aligned with the pedestrian ramps at the southeast corner. The pedestrian ramp at the southeast corner on south leg is behind the stop bar for northbound motorists and the pedestrian ramp at the southeast corner on east leg is located east of the crosswalk.
- The pedestrian ramp at the northwest corner is not aligned with the crosswalks on the north and west legs.
- Detectable warning surfaces on pedestrian ramps do not meet current ADA guidelines. The pedestrian ramp at the northwest corner appeared small and non-ADA compliant.
- The pedestrian ramps at the northeast and northwest corners are non-ADA compliant due to excessive slopes.
- Water ponding is evident within pedestrian ramps at the southeast, northeast and northwest quadrants of the intersection (field observations and Google images).
- Broken sidewalk on the west side of north leg at driveway is closed.

Photograph 27: Pedestrian ramp at northwest corner not ADA compliant

Photograph 28: Damaged push button and sing panel at southwest corner

Recommendations

- Install detectable warning surfaces on pedestrian ramps at all corners of the intersection.
- Reconstruct pedestrian ramp at the northwest corner to be ADA compliant. Align the pedestrian ramp with crosswalks on the north and west legs.
- Reconstruct pedestrian ramps at the southeast corner to align with crosswalks on the east and south legs.
- Reconstruct pedestrian ramp at the northeast corner to comply with ADA requirements.
- Upgrade pedestrian pushbuttons and related signage at all corners of the intersection. Repair non-functional pedestrian signal heads at the northeast and southeast corners.
- Evaluate drainage deficiencies and implement appropriate improvements to prevent standing water within pedestrian ramps.
- Reconstruct the broken sidewalk on the west side of north leg.

Summary of Recommendations - High Pedestrian Crash Locations

Table 39 summarizes key recommendations made for each study location.

Table 39. High Pedestrian Crash Locations - Summary of Recommendations

Location	Pedestrian signal feature upgrades	Pedestrian signal timing	Street lighting	Mid-block crosswalks	Complete street concepts	ADA facility upgrades	Signs and markings	Bus stop relocation	Drainage improvements	Education/awareness
SW 27 Avenue at SW 6/7/8 Street	x					x	x			
NE 6 Avenue at NE 149 Street/NE 150 Street				x	x		x		x	x
NW 22 Avenue at NW 36 Street	x						x			
NW 62 Street from NW 13 Court to NW 12 Avenue	x	x	x			x	x		x	x
Kendall Drive at SW 157 Avenue			x			x	x			
SW 137 Avenue at SW 152 Street	x	x	x				x			
SW 137 Avenue at SW 268 Street/Moody Drive	x	x	x			x	x			x
W 24 Avenue at W 60 Street (Hialeah)						x	x			x
W 12 Avenue at W 37 Street (Hialeah)	x					x	x	x		
W 16 Avenue at W 44 Place (Hialeah)	x					x			x	

Field Review of High Bicycle Crash Locations

Based on the crash data analysis, the following high-bicycle crash segments were identified for further evaluation.

Location 11: Crandon Boulevard between Harbor Drive and Seaview Drive

The study segment is located within the municipality of Key Biscayne. Crandon Boulevard is a four-lane divided road with a speed limit of 30 mph. Designated bike lanes are provided on both sides of Crandon Boulevard. Adjacent land uses include "parks," "institutions," "commercial and shopping," "office," and "residential." Street lighting is present on both sides of Crandon Boulevard for the entirety of the study segment. Miami-Dade Transit bus route 102 operates along Crandon Boulevard.

Crash Data Summary

There were 46 bicycle crashes between 2008 and 2013 within the study segment. As shown in Table 40, 29 crashes involved vehicles turning right. In addition, six crashes involved vehicles exiting driveways. Two crashes were associated with on-street parking. Approximately one-third of the crashes involved cyclists aged between 41 and 50 years. As shown in Table 42, over 90 percent of the crashes occurred during daytime.

Table 40. Location 11 - Bicycle Crashes by Type

Crash Type	Count
Motorist right turn onto driveway	15
Motorist right turn at signalized intersection	8
Motorist right turn at unsignalized intersection	6
Motorist exiting driveway	6
Motorist turning left	2
Parked vehicle next to bike lane - dooring	2
Other/Unknown	7

Figure 27: Crandon Boulevard between Harbor Drive and Seaview Drive

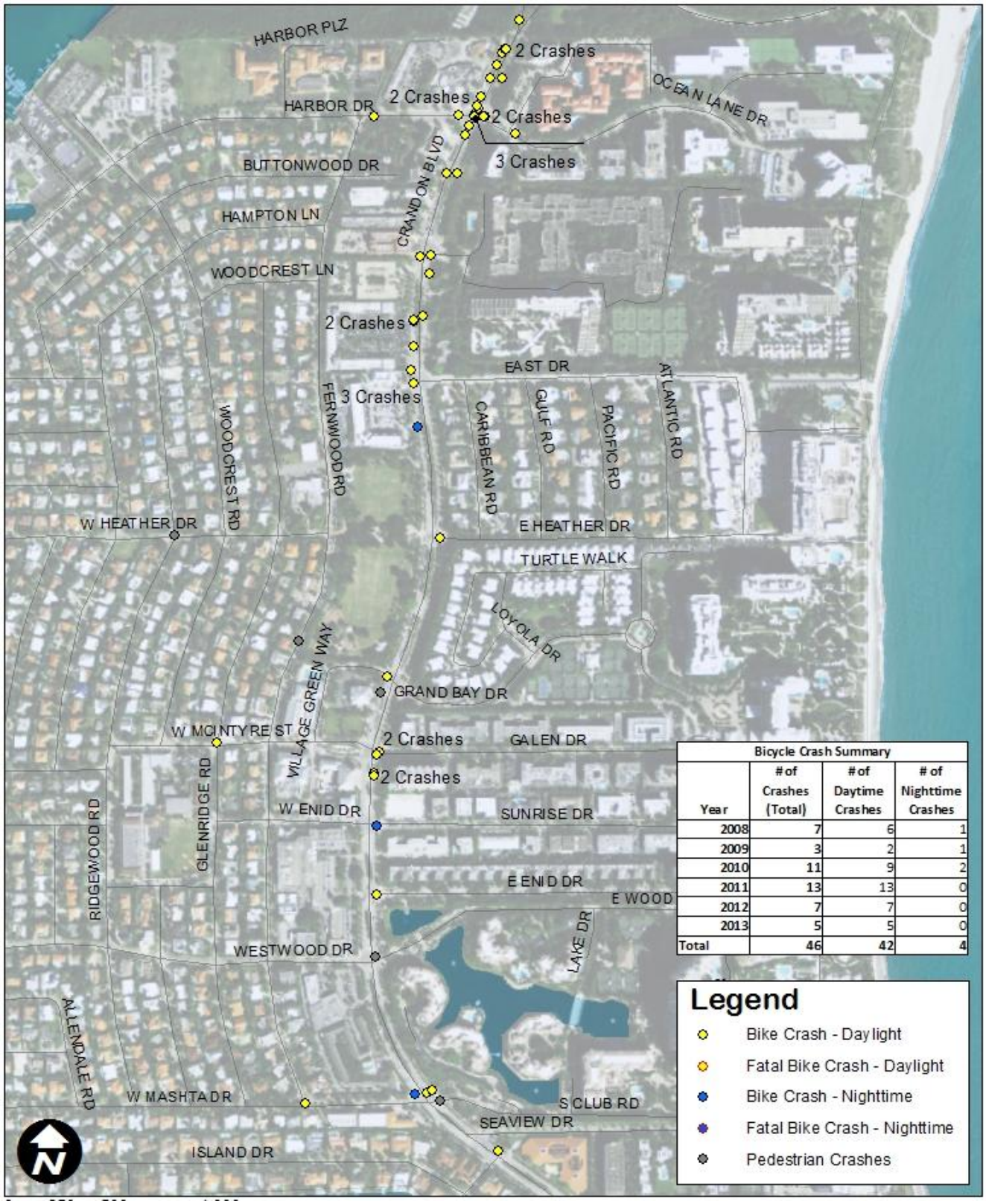


Table 41. Location 11 - Age of Cyclists

Age	Number of Crashes	Percentage
no data	5	11%
10 or less	2	4%
11 to 20	2	4%
21 to 30	3	6%
31 to 40	5	11%
41 to 50	16	34%
51 to 60	8	17%
61 to 70	6	13%

Table 42. Location 11 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	7	6	1
2009	3	2	1
2010	11	9	2
2011	13	13	0
2012	7	7	0
2013	5	5	0
Total	46	42	4

Field Review

A field review was conducted on Wednesday, February 10, 2016. A summary of field observations is provided below.

- Standard bike lanes are present within city limits. Outside of city limits, bike lanes with green colored pavement have been provided (see Photograph 30).
- At Heather Drive, Rectangular Rapid Flashing Beacons (RRFB) have been installed for the two crossings across Crandon Boulevard. However, as shown in Photograph 31, the supplementary arrow plaques on pedestrian crossing signs are pointing in the wrong direction (on the west side of Crandon Boulevard).
- On-street parking is provided on the west side of Crandon Boulevard in the vicinity of Village Green Park.
- Landscaping along Crandon Boulevard at intersections appear to reduce the approaching motorists' visibility of parallel crossings (see Photograph 32).
- Many children were observed on foot, bicycles, and skateboards crossing Crandon Boulevard from east to west at intersection of Harbor Drive in the afternoon following the school dismissal. Saint Agnes Academy is located further west by the intersection of Harbor Drive at Fernwood Road. Unmarked golf carts were also observed, transporting children across the intersection (see Photograph 33).

Photograph 29: Bicyclist on Crandon Boulevard

Photograph 30: Green bike lane ends at city limits

Photograph 31: RRFB at Heather Drive

Photograph 32: Poor visibility of crosswalk for right-turning vehicles at Key Colony (looking north)

Photograph 33: Students crossing Crandon Boulevard at Key Colony

Recommendations

- Add green pavement to existing bike lanes along Crandon Boulevard at intersections and areas of conflict to increase the emphasis of bike lanes.
- Install signs along Crandon Boulevard to remind that the State law requires motorists to maintain a minimum three-foot clearance when passing a bicyclist.
- Install Bicycle/Pedestrian warning signs (W11-2) with "Ahead" or "LOOK" plaque on (unsignalized) streets connecting to Crandon Boulevard to warn motorists to expect bicyclists.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS/BICYCLISTS" (modified R10-15) signs facing right turning vehicles on Crandon Boulevard at signalized intersections. Where feasible, install the subject signs on signal mast arms.
- Coordinate with the City of Key Biscayne and Miami-Dade County to install school crossing signs and high emphasis crosswalk markings at Key Colony and Harbor Drive intersections.
- Trim landscaping to maintain adequate sight distance for right turning vehicles at intersections within the corridor.

Location 12: SR A1A/Collins Avenue between Bayview Drive and 174 Street

The study corridor is located within the municipality of Sunny Isles Beach. SR A1A/Collins Avenue is a six-lane divided road with a posted speed limit of 35 mph. There are no designated bicycle lanes or paved shoulders along SR A1A/Collins Avenue. Adjacent land uses are primarily "commercial" west of SR A1A/Collins Avenue, and "high-density multi-family" and "hotel" east of SR A1A/Collins Avenue. Street lighting is present on both sides of SR A1A/Collins Avenue. Miami-Dade Transit bus routes operate along SR A1A/Collins Avenue, 174 Street, and NE 163 Street.

Crash Data Summary

There were 19 bicycle crashes within this segment between 2008 and 2013. Sixteen of these crashes occurred during daytime. Most of the crashes involved bicyclists riding on sidewalks or crosswalks along SR A1A/Collins Avenue, and motorists turning from minor streets or out of driveways. Crashes occurred at the intersections of Bayview Drive, Kings Point Drive, Atlantic Isle, 16828 Collins Avenue, NE 170 Street, 172 Street, and 174 Street.

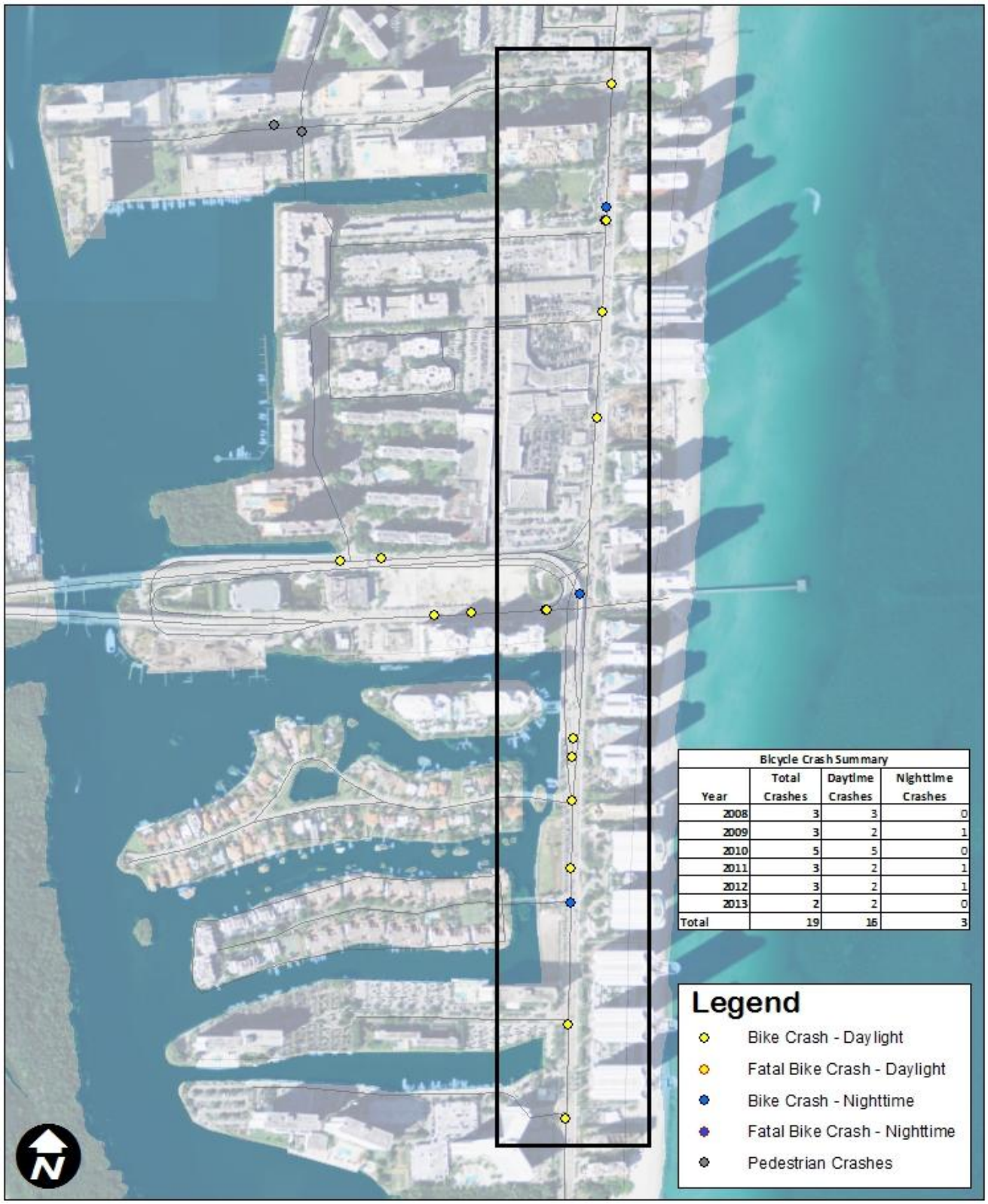
Table 43. Location 12 - Bicycle Crashes by Type

Crash Type	Count
Motorist exiting driveway	6
Motorist right turn at signalized intersection	4
Bicyclist riding on road	4
Motorist right turn at unsignalized intersection	2
Motorist turning left	2
Other/Unknown	1

Table 44. Location 12 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	3	3	0
2009	3	2	1
2010	5	5	0
2011	3	2	1
2012	3	2	1
2013	2	2	0
Total	19	16	3

Figure 28: SR A1A/Collins Avenue between Bayview Drive and 174 Street



Field Review

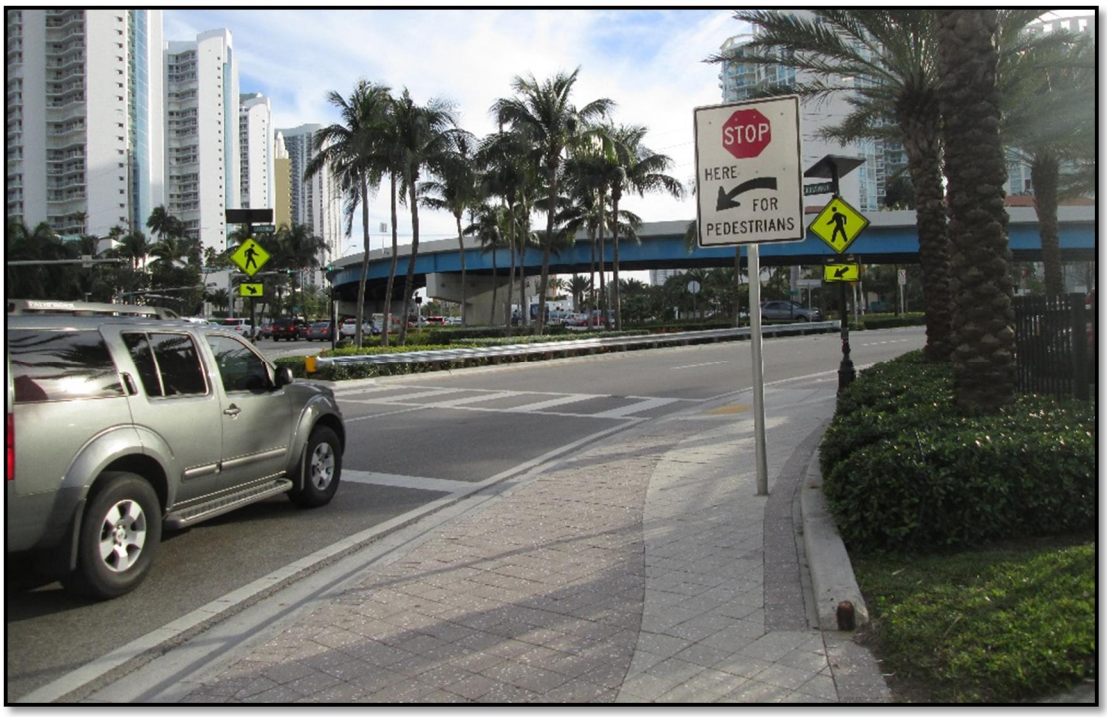
The field review for this location was conducted on Wednesday, February 10, 2016. A summary of field observations is provided below.

- A landscaped and fenced median is provided along much of the SR A1A/Collins Avenue study segment to prevent pedestrians crossing midblock (see Photograph 34).
- In absence of bicycle facilities along SR A1A/Collins Avenue, many bicyclists were observed riding on sidewalks (see Photographs 35 and 36).
- An RRFB crosswalk is provided across the right-turn lane from southbound SR A1A/Collins Avenue to SR 826/NE 163rd Street (see Photograph 37).
- At SR A1A/Collins Avenue and NE 170 Street, crosswalks are present on the south side only.
- At SR A1A/Collins Avenue and 172 Street, crosswalks are present on the north side only.
- Sight-distance is limited for the eastbound approach at the intersection of SR A1A/Collins Avenue and Atlantic Isle due to structures and a roadside utility pole (see Photograph 39).
- Detectable-warning surface is not provided at ramps on the west side of intersection of SR A1A/Collins Avenue and Oceania Island driveway.

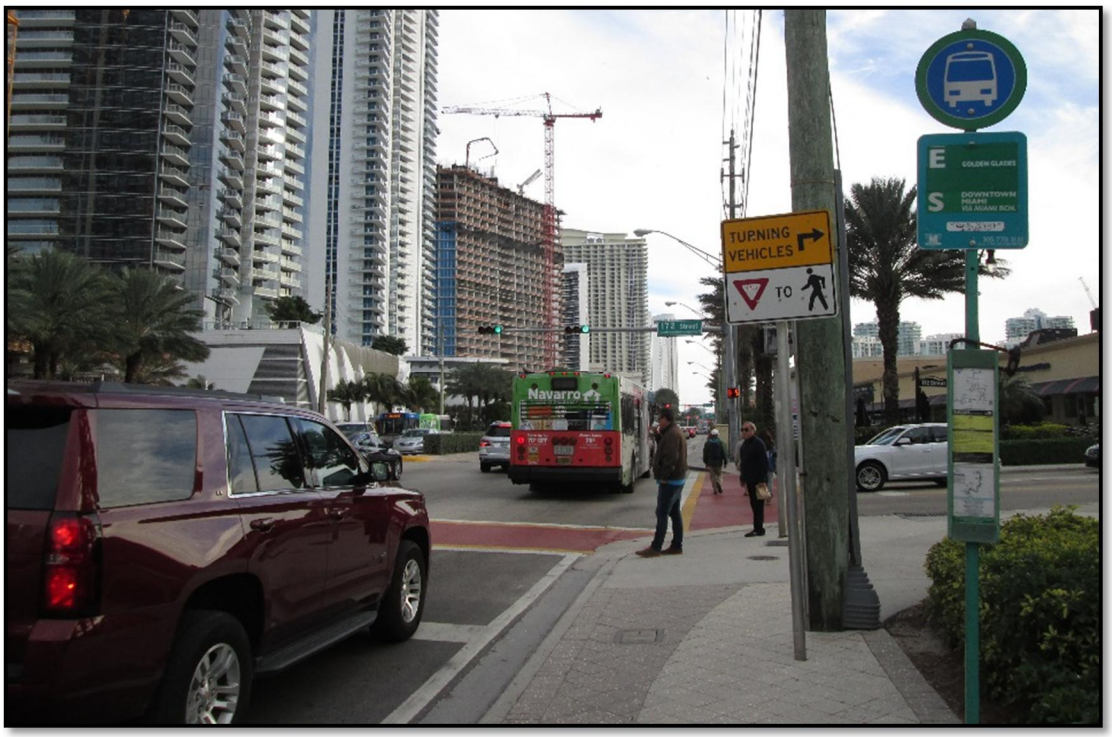
Photograph 34: Median fence to prevent pedestrians form crossing at mid-block

Photograph 35: Bicyclists and pedestrians on sidewalk

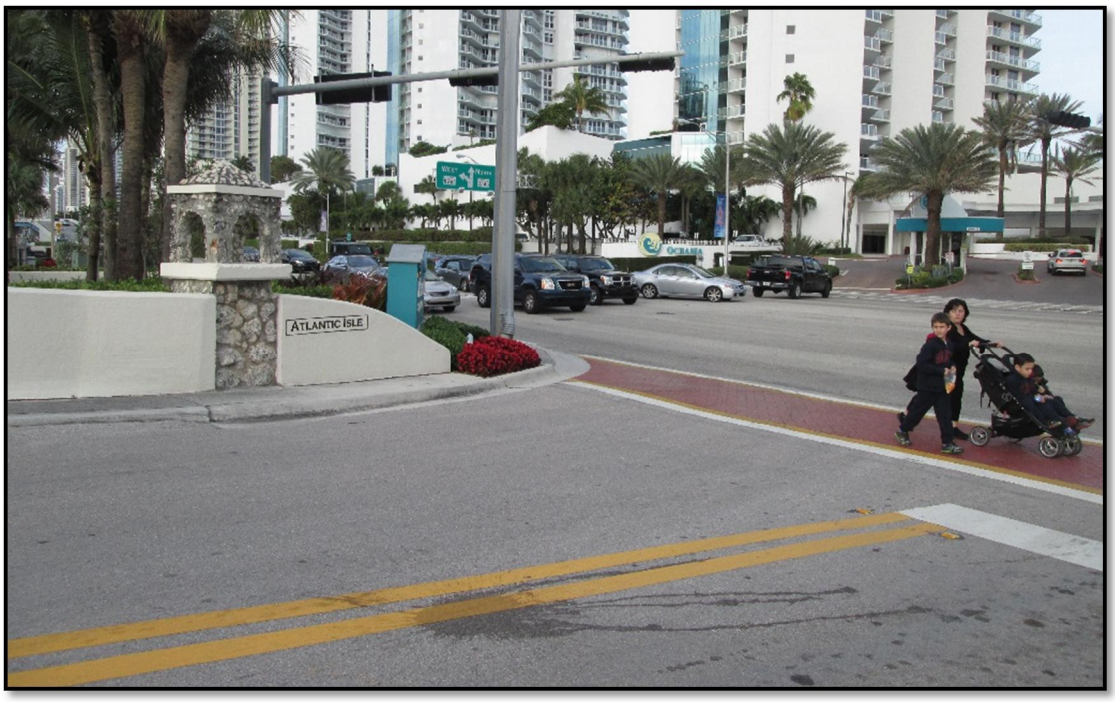
Photograph 36: Bicycle sharing sidewalk with pedestrians at 172 Street



Photograph 37: Signage and RRFB at interchange of NE 163 Street and Collins Avenue



Photograph 38: Yield to pedestrians sign facing right-turning vehicles at 172 Street



Photograph 39: Limited sight distance at Atlantic Isle and Collins Avenue

Recommendations

- Request the FDOT conduct an assessment and determine the feasibility of installing:
  - Bicycles May Use Full Lane (R4-11) signs along SR A1A/Ocean Drive.
  - "TURNING VEHICLES STOP FOR PEDESTRIANS/BICYCLISTS" (modified R10-15) signs facing right turning vehicles at signalized intersections to warn motorists to anticipate bicyclists and pedestrians.
- Install "Bicycle/Pedestrian" warning signs with "ahead" or "LOOK" plaque on minor streets and driveways to warn motorists to expect bicyclists when approaching SR A1A/Ocean Drive.
- Coordinate with the City of Sunny Isles Beach to examine the feasibility of installing a "convex mirror" at driveways with limited sight distance to improve motorists' visibility of approaching pedestrians and bicyclists.
- Install detectable warning surfaces at ramps on west side of intersection of SR A1A/Collins Avenue and Oceania Island driveway

Location 13: W 29 Street between Palm Avenue and W 16 Avenue/Milam Dairy Road

The study location is within the municipality of Hialeah. W 29 Street is an undivided four-lane road with a speed limit of 30 mph within study limits. There are no designated bicycle lanes or paved shoulders. The adjacent land uses are primarily "residential," "commercial," "institutional," and "industrial." Street lighting is present on the north side of W 29 Street. Miami-Dade Transit bus routes operate along W 29 Street.

Crash Data Summary

There were 17 bicycle crashes between 2008 and 2013. A review of police reports indicated that the majority of crashes occurred at intersections, which included six crashes associated with turning vehicles. Three crashes occurred when bicyclists crossing the street mid-block. Ten crashes occurred during daytime and seven occurred during nighttime. Therefore, approximately 41 percent of the bicycle crashes occurred during nighttime.

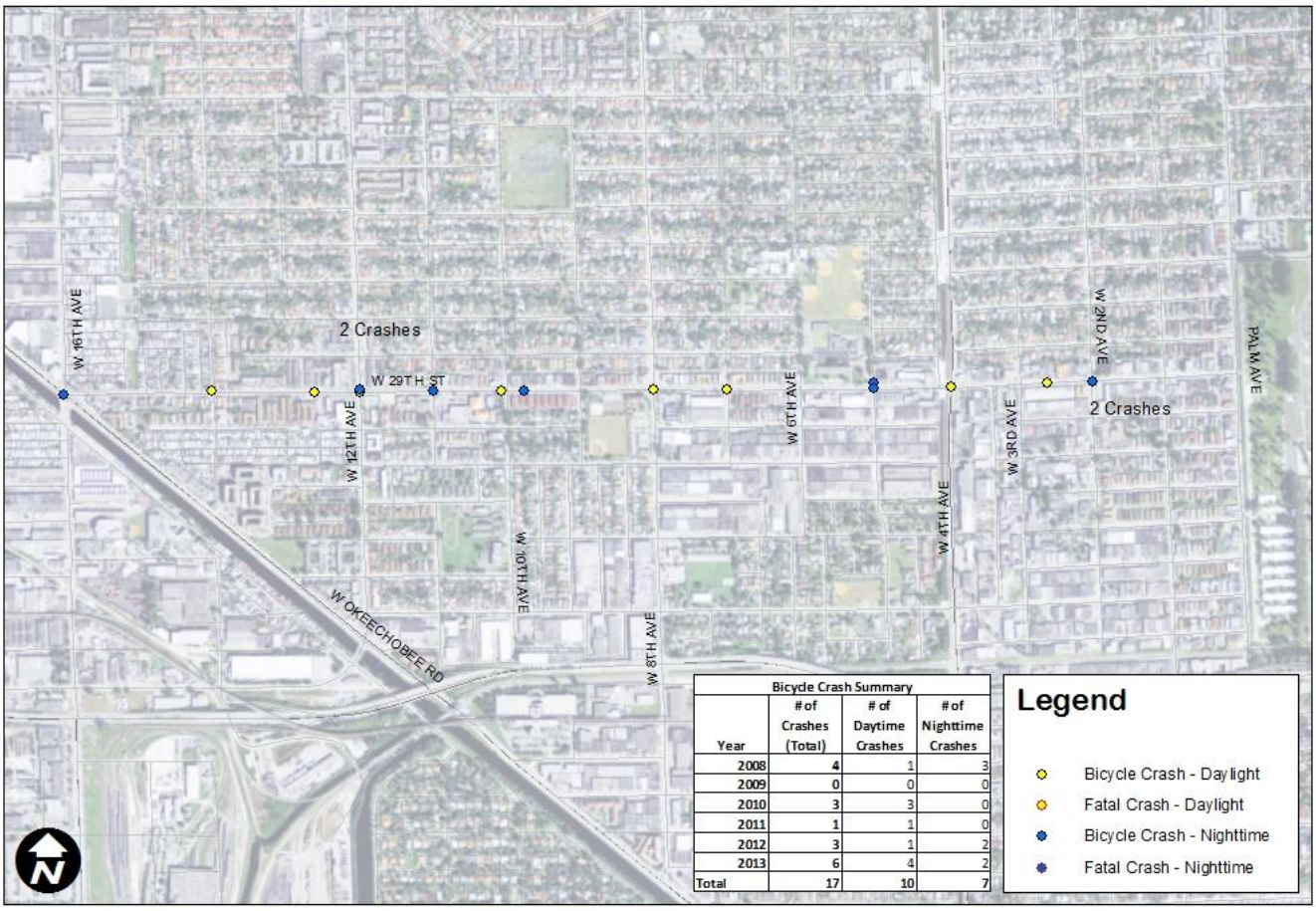
Table 45. Location 13 - Bicycle Crashes by Type

Crash Type	Count
Motorist right turn at signalized intersection	4
Bike mid-block crossing	3
Motorist exiting driveway/parking lot	2
Motorist turning left	2
Motorist (traveling through) failed to yield at intersection	2
Bicyclist failed to yield at intersection	1
Motorist right turn at unsignalized intersection	1
Other/Unknown	2

Table 46. Location 13 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	4	1	3
2009	0	0	0
2010	3	3	0
2011	1	1	0
2012	3	1	2
2013	6	4	2
Total	17	10	7

Figure 29: W 29 Street between Palm Avenue and W 16 Avenue/Milam Dairy Road



Field Review

The field review for this location was conducted on Tuesday, February 2, 2016. A summary of field observations is provided below.

- Overall corridor
  - W 29th Street is a four-lane, undivided corridor with no bike lanes or paved shoulders.
  - The posted speed limit is 30 mph
  - Traffic signals are provided approximately at 0.25-mile spacing (except between W 4 Avenue and W 6 Avenue where the signal spacing is 0.125 miles).
  - The parking layout for several roadside commercial and residential properties within study limits is designed for straight-in and back out maneuvers. This layout can result in conflicts between vehicles and sidewalk users when vehicles back out from parking spaces onto W 29 Street. Further, parked vehicles (delivery trucks and loading/unloading) were seen blocking the sidewalk (see Photograph 42).
  - Street lighting is provided on the north side of W 29 Street
- Intersection of W 2 Avenue at W 29 Street
  - While push buttons are provided, there is no designated crossing across W 29 Street. There are no pedestrian signal heads or crosswalks present at the north-to-south crossing
  - ADA-compliant ramps with detectible-warning surface are needed.
  - Pavement markings are worn.
  - Backplates are not provided for signal heads.
- Intersection of W 4 Avenue at W 29 Street
  - Road surface has recently been resurfaced.
  - Intersection is current with ADA standards.
  - Traffic lights are new and have backplates with retroreflective tape.
- Intersection of W 8 Avenue at W 29 Street
  - Pedestrian signal actuation sign panels are outdated.
  - Heavy pedestrian activity near El Presidente Super Market was observed
- Intersection of W 10 Avenue at W 29 Street
  - Pedestrian signal actuation sign panels are outdated; no countdowns.

Photograph 40: View of W 29 Street corridor

Photograph 41: Bicyclist using sidewalk

Photograph 42: Parked vehicles blocking the sidewalk along W 29 Street

Photograph 43: Pedestrian crossing mid-block at W 3 Court and W 29 Street

Photograph 44: Pedestrian crossing mid-block near W 10 Avenue and W 29 Street

Recommendations

- Given the lack of bicycle facilities, undivided roadway, and the potential for conflicts between sidewalk users and parking maneuvers, evaluate the feasibility of a road diet project that would reduce the number of through lanes, add a median, bike lanes, and reduce conflicts between parking and sidewalk users. Further analysis is needed to determine lane configuration alternatives and limits for road diet.
- Coordinate with the City of Hialeah for enforcement of parking violations.
- Install signs along W 29 Street to remind drivers that the State law requires maintaining a minimum three-foot clearance when passing a bicyclist.
- Upgrade crosswalk markings.
- Upgrade pedestrian signal amenities at signalized intersections.
- "TURNING VEHICLES STOP FOR PEDESTRIANS/BICYCLISTS" (modified R10-15) signs facing right turning vehicles at signalized intersections to warn motorists to anticipate bicyclists and pedestrians.

Location 14: SR 976/SW 40 Street/Bird Road at SR 973/SW 87 Avenue

The study location is within unincorporated Miami-Dade County. SR 976/Bird Road/SW 40 Street and SR 973/SW 87 Avenue are six-lane divided State highways. The speed limit is 40 mph on all approaches to the intersection. There are no designated bicycle lanes or paved shoulders at any leg of this intersection. Adjacent land uses are primarily "retail/commercial" and "office." Street lighting is present on the east side of SR 973/SW 87 Avenue. Street lighting is present on both sides of Bird Road/SW 40 Street. Miami-Dade Transit bus routes operate along both corridors; there are three near-side and one far-side bus stops within approximately 150 feet of the intersection.

Crash Data Summary

There were seven bicycle crashes between 2008 and 2013 at this location. All crashes occurred during daytime. Five of the bicycle crashes occurred at driveway connections, involving the bicyclists riding on sidewalk.

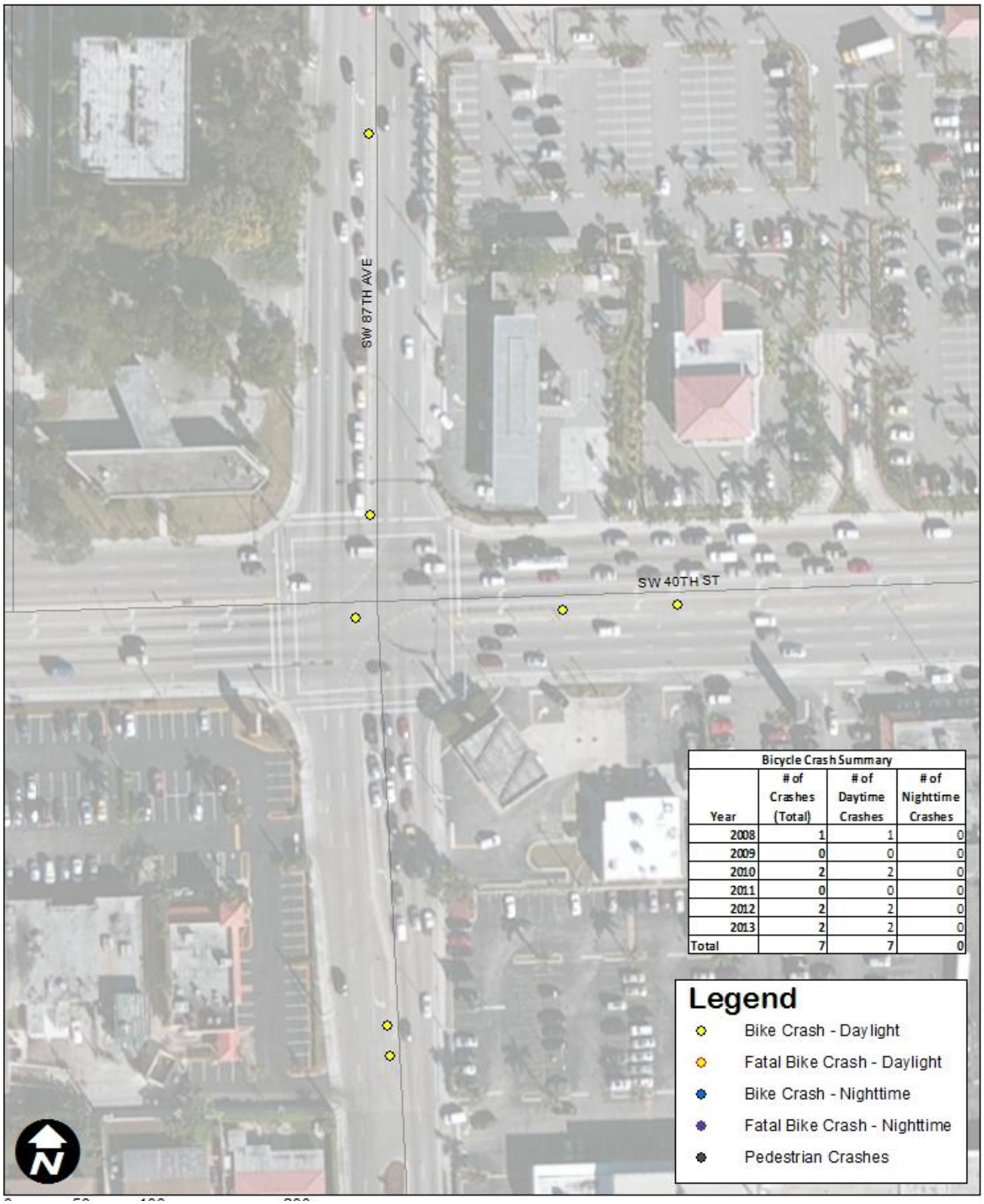
Table 47. Location 14 - Bicycle Crashes by Type

Crash Type	Count
Motorist exiting driveway/parking lot	5
Bicyclist entering from a driveway	1
Bike crossing mid-block	1

Table 48. Location 14 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	1	1	0
2009	0	0	0
2010	2	2	0
2011	0	0	0
2012	2	2	0
2013	2	2	0
Total	7	7	0

Figure 30: SR 976/SW 40 Street/Bird Road at SR 973/SW 87 Avenue



Field Review

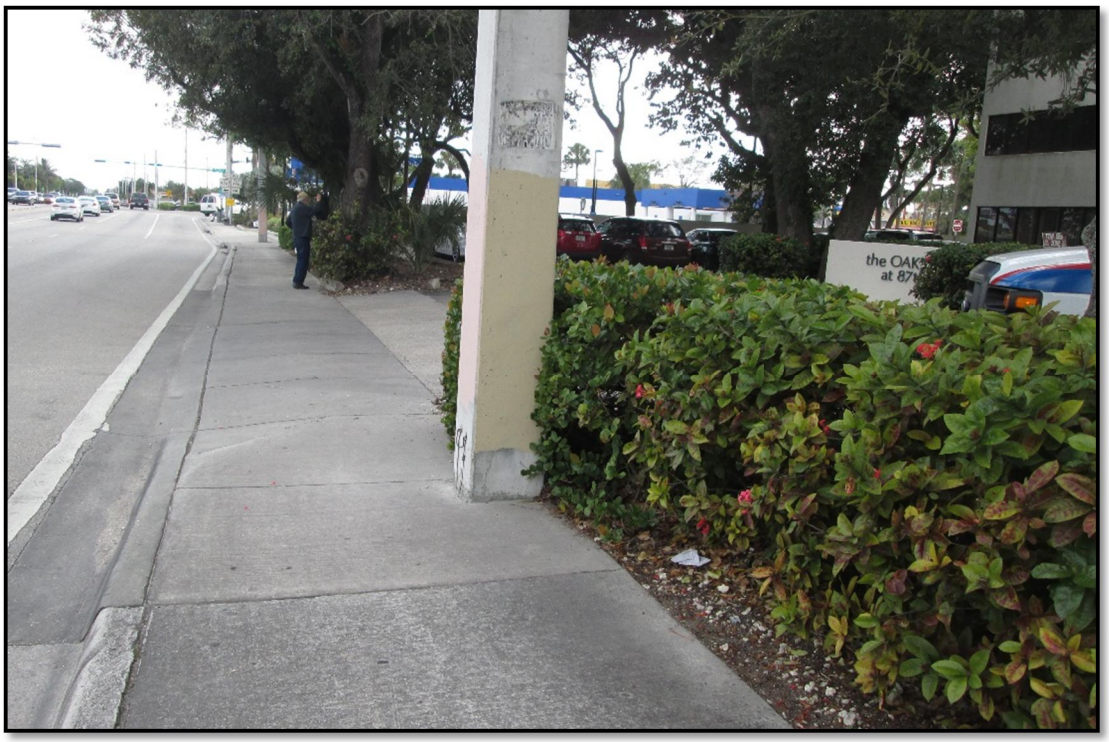
The field review for this location was conducted on Tuesday, February 2, 2016. A summary of field observations is provided below.

- Due to the absence of bike lane/shoulder, bicyclists were observed traveling along sidewalks.
- The sight distance for motorists exiting the driveways is limited at the following locations:
  - Overgrown landscaping at Pollo Tropical north driveway (see Photograph 45).
  - Privacy wall at the Pollo Tropical south driveway (see Photograph 46)
  - Overgrown landscaping at driveway exiting 3850 SW 87 Avenue (see Photograph 48).
- Bus stops are located approximately 50-150 feet away from intersection crosswalks. Transit users and pedestrians were observed crossing the streets outside of the designated crossings.
- Sidewalk width is limited at locations where bus benches and amenities are provided.
- Sidewalks have pedestrian ramps and detectable warning surfaces.
- Traffic signal pedestrian actuation sign panels do not meet the current MUTCD standards.

Photograph 45: Landscaping on the west side of SW 87th Avenue/south leg (looking south)

Photograph 46: Privacy wall on the west side of SW 87th Avenue/south leg (looking south)

Photograph 47: View of the sidewalk on the west side of SW 87th Avenue/south leg (looking north)



Photograph 48: Landscaping on the west side of SW 87th Avenue/north leg (looking south)

Photograph 49: Pedestrians crossing mid-block on the east leg (SW 40th Street)

Photograph 50: Absence of pedestrian signal actuation signs

Recommendations

- Trim overgrown landscaping at driveways to provide adequate visibility of pedestrians and bicyclists for motorists exiting the driveways.
- Coordinate with Pollo Tropical through Miami-Dade County to examine the feasibility of installing a "convex mirror" at the south driveway to improve motorists' visibility of approaching pedestrians and bicyclists.
- Install "Bicycles May Use Full Lane" (R4-11) signs on SW 40 Street and SW 87 Avenue.
- Install "No Pedestrian Crossing" (R9-3), and "Use Crosswalk" (R9-3bP) plaques along the medians in the vicinity of bus stops.
- Install traffic signal pedestrian actuation signs on all four corners of intersection per current MUTCD guidelines.
- Request Miami-Dade County to assess the adequacy of pedestrian signal clearance times.

Location 15: SR 989/SW 112 Avenue between Old Cutler Road and US 1

The study segment is located within unincorporated Miami-Dade County. SR 989/SW 112 Avenue is a four-lane divided highway with a speed limit of 35 mph. There are no designated bicycle lanes or paved shoulders along the segment. Adjacent land uses include "residential" between Old Cutler Road and SW 216 Street; "institutional," "parks," "utilities," "commercial" and "office" between SW 216 Street and US 1. Miami-Dade Transit bus routes operate along this segment.

Crash Data Summary

There were 11 bicycle crashes between 2008 and 2013. Seven crashes occurred at intersections and three crashes occurred at mid-block locations. Seven crashes occurred during daytime and four crashes occurred during nighttime.

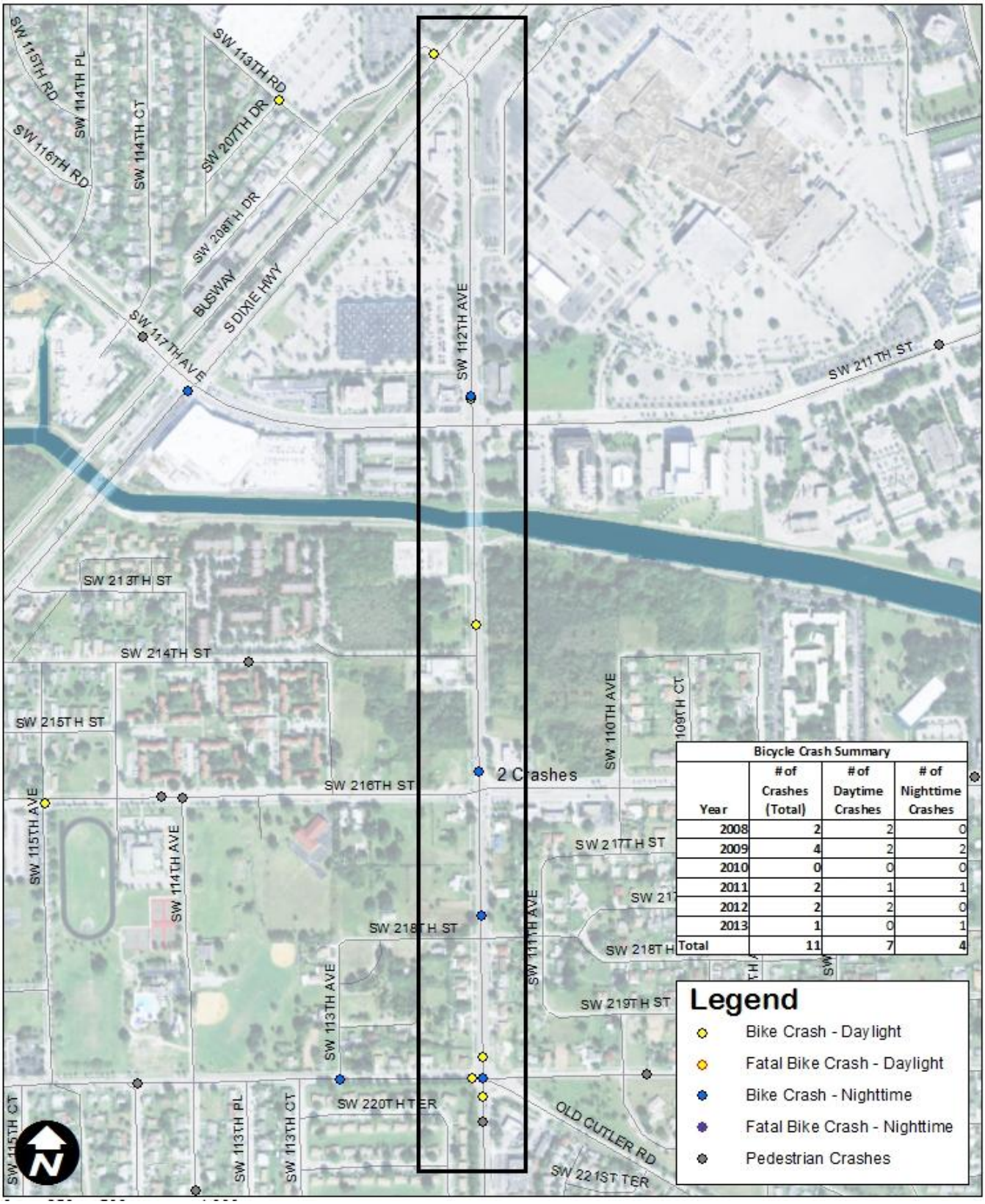
Table 49. Location 15 - Bicycle Crashes by Type

Crash Type	Count
Bike did not yield right of way at intersection	3
Bike crossing mid-block	3
Motorist did not yield right of way at intersection	2
Motorist right turn	2
Other/Unknown	1

Table 50. Location 15 - Lighting Condition

Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	2	2	0
2009	4	2	2
2010	0	0	0
2011	2	1	1
2012	2	2	0
2013	1	0	1
Total	11	7	4

Figure 31: SR 989/SW 112 Avenue between Old Cutler Road and US 1



Bicycle Crash Summary			
Year	# of Crashes (Total)	# of Daytime Crashes	# of Nighttime Crashes
2008	2	2	0
2009	4	2	2
2010	0	0	0
2011	2	1	1
2012	2	2	0
2013	1	0	1
Total	11	7	4

Legend

- Bike Crash - Daylight
- Fatal Bike Crash - Daylight
- Bike Crash - Nighttime
- Fatal Bike Crash - Nighttime
- Pedestrian Crashes

Field Review

The field review for this location was conducted on Tuesday, February 2, 2016. A summary of field observations is provided below.

- Southland Mall is located on the southeast corner of SR 989/SW 112 Avenue and US 1.
- The Black Creek Trail runs parallel to Black Creek Canal (C-1) and crosses SR 989/SW 112 Avenue
- A crossing with RRFB is present at the Black Creek Trail crossing.
- While bike lanes or paved shoulders were not observed, continuous sidewalks that are setback from SR 898/SW 112 Avenue are provided.
- Several transit riders were observed at bus stops north of the Black Creek Canal.
- Pedestrian signs were observed throughout the corridor, indicating recent installation of signs due to pedestrian presence.
- Street lighting is present on the west side north of SW 216 Street, and on the east side south of SW 216 Street.
- While the posted speed limit is 35 mph, roadway typical section and sparse roadside development south of SW 211 Street is conducive for speeding.

Photograph 51: Advance trail crossing signs on SW 112 Avenue

Photograph 52: RRFB at Black Creek Trail crossing

Photograph 53: Transit users waiting

Recommendations

- Evaluate the feasibility of installing bike lanes along SW 112 Avenue.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS/BICYCLISTS" (modified R10-15) signs facing right turning vehicles at signalized intersections to warn motorists to anticipate bicyclists and pedestrians.

Location 16: NE 8 Street/Campbell Drive between SW 177 Avenue and NE 1 Road

The study segment is located within the City of Homestead. NE 8 Street/Campbell Drive is a divided four-lane roadway with a speed limit is 30 mph. Adjacent land uses are primarily "commercial," "office," and "institutional." Street lighting is present along the median of NE 8 Street/Campbell Drive. Miami-Dade Transit bus routes operate along NE 8 Street/Campbell Drive. This segment is reviewed both for pedestrian and bicycle crashes.

Crash Data Summary

There were 12 bicycle crashes and 18 pedestrian crashes between 2008 and 2013. Nine of the bicycle crashes and eight of the pedestrian crashes occurred at an intersection. Eight pedestrian crashes occurred while crossing at mid-block locations. Twenty crashes occurred during daytime and 10 crashes occurred during nighttime. Locations with a concentration of crashes include SR 997/Krome Avenue, NE 2 Avenue, Old Dixie Highway/Busway, and N Flagler Avenue.

Table 51. Location 16 - Bicycle Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	5
Motorist right turn at signalized intersection	1
Motorist turning left	1
Bike mid-block crossing	1
Motorist right turn at unsignalized intersection	1
At unsignalized intersection – through vehicle	1
Other/Unknown	2

Figure 32: NE 8 Street/Campbell Drive between SW 177 Avenue and NE 1 Road – Bicycle Crashes

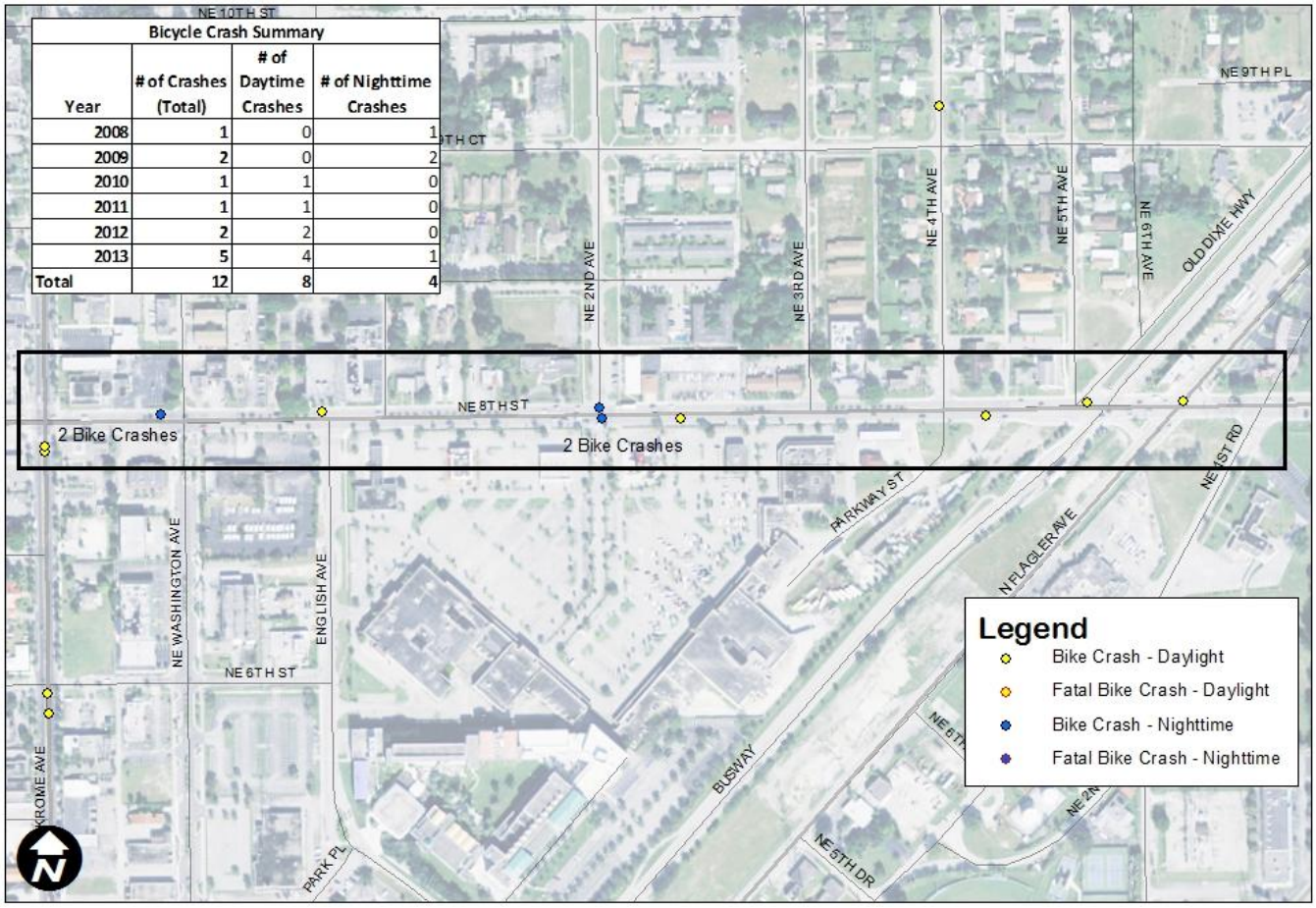


Figure 33: NE 8 Street/Campbell Drive between SW 177 Avenue and NE 1 Road – Pedestrian Crashes

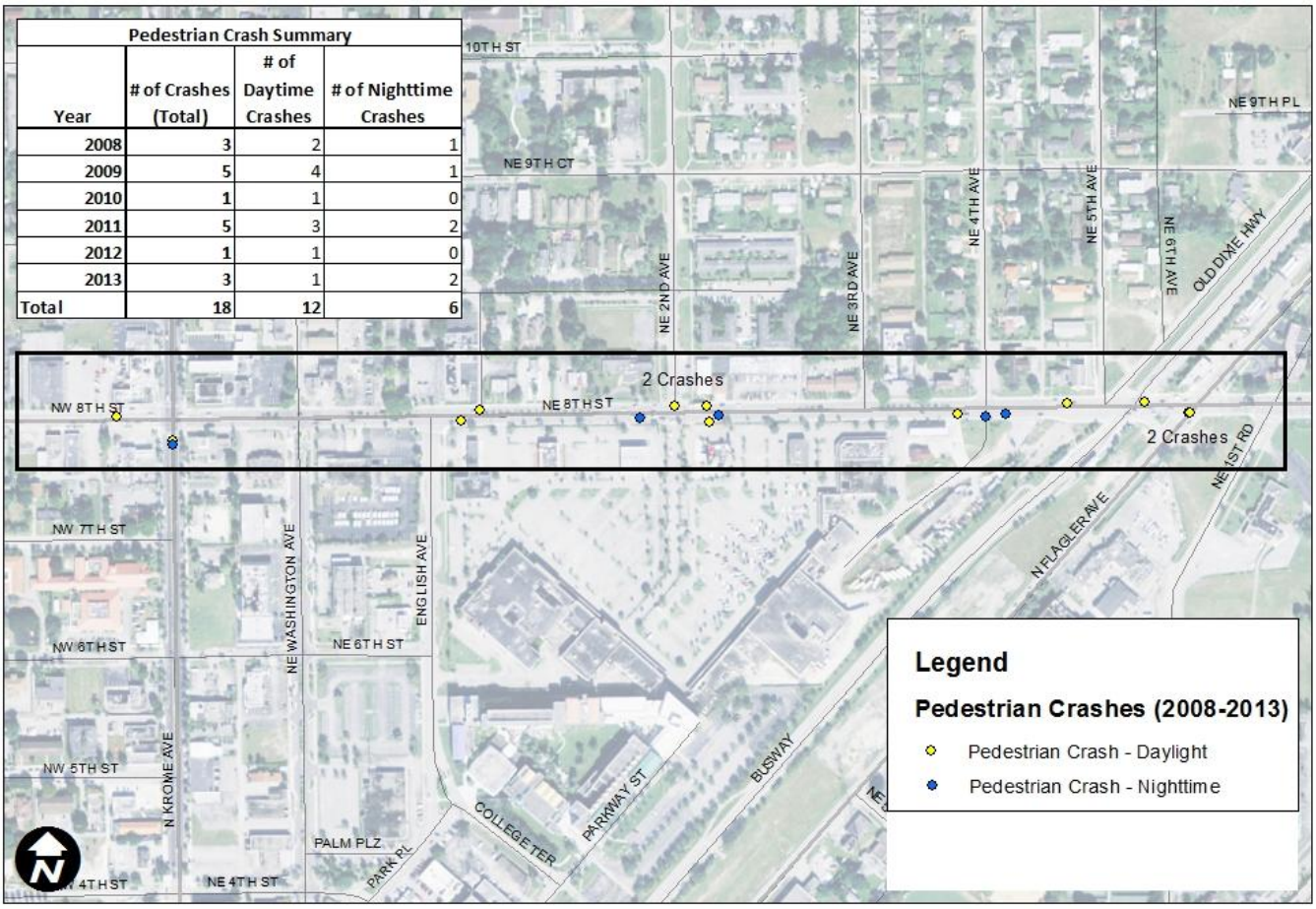


Table 52. Location 16 - Pedestrian Crashes by Type

Crash Type	Count
At signalized intersection – through vehicle	2
At signalized intersection – turning vehicle	4
At unsignalized intersection	2
At driveway	2
At mid-block	8

Table 53. Location 16 - Lighting Condition

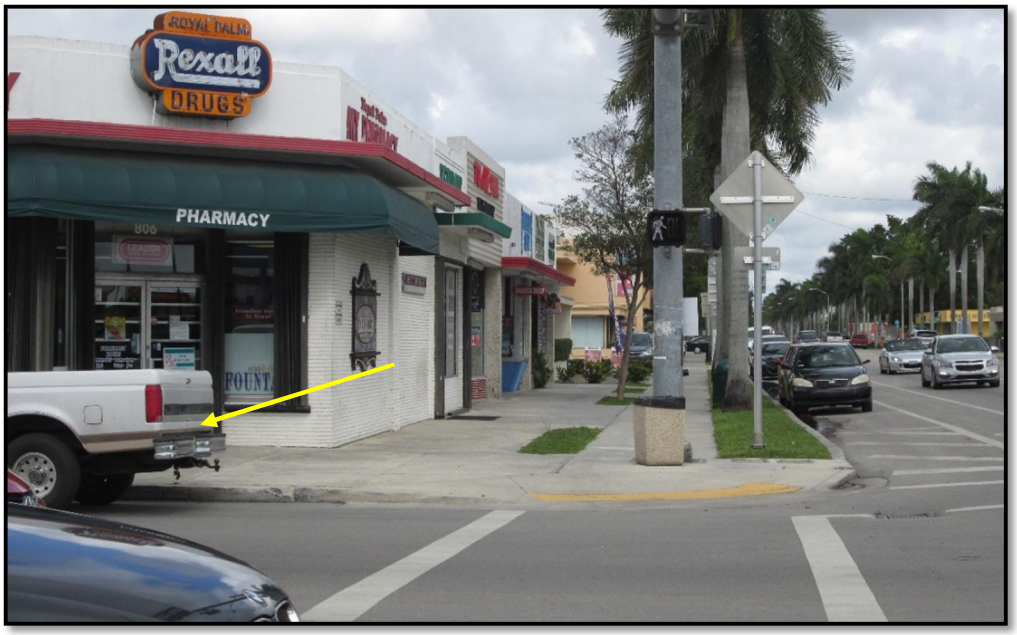
Year	Total Crashes	Daytime Crashes	Nighttime Crashes
2008	4	2	2
2009	7	4	3
2010	2	2	
2011	6	4	2
2012	3	3	
2013	8	5	3
Total	30	20	10

Field Review

A field review was conducted on Tuesday, February 2, 2016. A summary of observations is provided below.

- Overall corridor
  - There are no designated bicycle lanes or paved shoulders along NE 8 Street/Campbell Drive.
  - A landscaped median is provided along NE 8 Street/Campbell Drive.
  - Street lighting is provided within the landscaped median. Additional lighting is provided on north and south sides of the corridor utilizing dedicated poles and on utility poles, but the pole spacing is inconsistent.
  - Pedestrians were observed crossing mid-block, often utilizing the gaps created on the landscaped median. In general, landscaping in the median is overgrown.
- NE 8 Street/Campbell Drive at SR 997/Krome Avenue
  - Vehicles were seen parked too close to the intersection on NE 8 Street/Campbell Drive at the northwest corner.
  - On-street parking is provided along SR 997/Krome Avenue.
  - Bike lanes are present on the north leg of SR 997/Krome Avenue within the intersection's influence area.

  - Bike lanes are present on the southbound direction only on the south leg of SR 997/Krome Avenue.
  - Standard crosswalk markings and countdown signal heads are present.
- NE 8 Street/Campbell Drive at NE 2 Avenue
  - Frequent pedestrian movement was observed, including many occurrences of jaywalking and crossing outside of crosswalk. The majority of mid-block crossing was observed to the east of NE 2 Avenue (see Photograph 56). Three mid-block pedestrian crashes occurred to the east of NE 2 Avenue and one crash to the west of NE 2 Avenue.
  - No crosswalk is provided on the east leg of intersection (see Photograph 57). One pedestrian crash occurred on the east leg of the intersection.
  - Both eastbound and westbound bus stops are provided on the west leg of the intersection, hence providing access to the existing crosswalk.
  - Homestead Plaza is located on the south side of NE 8 Street/Campbell Drive, which has Winn Dixie and several other retail stores.
  - Detectable warning surfaces are not provided at pedestrian ramps.
  - Two mast-arm mounted street lights are provided on the northeast and southeast corners.
- NE 8 Street/Campbell Drive at N Flagler Avenue
  - Observed many student pedestrians walking from busway to Mavericks High campus. Students crossed south of existing crossing on Flagler Avenue (south leg) at NE 8 Street/Campbell Drive (see Photograph 58). There were two pedestrian crashes at this location, including one crash in the general vicinity where the students were crossing N Flagler Avenue.
- NE 8 Street/Campbell Drive at NE 1 Road
  - Pedestrian signal heads are not provided for the marked crosswalks (see Photograph 59).



Photograph 54: Parked vehicle on northwest corner at Krome Avenue

Photograph 55: Broken sidewalk near Washington Avenue

Photograph 56: Pedestrians crossing mid-block east of NE 2 Avenue

Photograph 57: No crosswalk on east leg of NE 2 Avenue at Campbell Drive

Photograph 58: Students crossing N Flagler Avenue

Photograph 59: No pedestrian signal displays for crossing at NE 1 Road

Recommendations

- Install Shared Lane Markings (Sharrows) along Campbell Drive.
- Trim overgrown median landscaping along NE 8 Street/Campbell Drive.
- Install "No Pedestrian Crossing" (R9-3) signs with "Use Crosswalk" plaques in the landscaped medians along NE 8 Street/Campbell Drive.
- Install pavement marking and signs on the north side of northwest corner of NE 8 Street/Campbell Drive and SR 997/Krome Avenue to delineate on-street parking.
- Evaluate the need for enhancing existing street lighting within the NE 8 Street/Campbell Drive corridor.
- Evaluate the feasibility of providing a crosswalk on the east leg of NE 8 Street/Campbell Drive at NE 2 Avenue.
- Consider implementing a pedestrian safety awareness program to reduce mid-block crossing in the vicinity of NE 2 Avenue.
- Install detectable warning surfaces at the intersection of NE 8 Street/Campbell Drive at NE 2 Avenue.
- Replace the damaged sidewalk on the north side of NE 8 Street/Campbell Drive near Washington Avenue.
- Install "TURNING VEHICLES STOP FOR PEDESTRIANS/BICYCLISTS" (modified R10-15) signs facing eastbound right turn slip ramp of NE 8 Street/Campbell Drive at N Flagler Avenue.
- Evaluate potential countermeasures to improve safety of Mavericks High students who cross N Flagler Avenue south of NE 8 Street/Campbell Drive, including:
    - A pedestrian safety awareness program to encourage the use of existing crosswalk
    - Evaluate the feasibility of installing a crosswalk across N Flagler Avenue south of NE 8 Street/Campbell Drive with RRFB.
- Install pedestrian signal heads at NE 8 Street/Campbell Drive and NE 1 Road.

Summary of Recommendations - High Bicycle Crash Locations

Table 54 summarizes key recommendations made for each study location.

Table 54. High Bicycle Crash Locations – Summary of Recommendations

Location	Green bike lanes in conflict areas	Road diet/complete street concepts	Bicycles share the road signs	Bike/pedestrian warning signs on driveways	New bike lanes	State law - 3-foot clearance sign	Other signs	Street lighting	Education/Enforcement	Landscape maintenance
Crandon Blvd between Harbor Drive and Seaview Drive	x			x		x	x			
SR A1A/Collins Avenue between Bayview Drive and 174 Street			x	x			x			
W 29 Street between Palm Avenue and W 16 Avenue/Milam Diary Road		x			x	x	x		x	
SR 976/SW 40 Street/Bird Road at SR 973/SW 87 Avenue			x							x
SW 112 Avenue between Old Cutler Road and US 1					x		x			
SW 312 Street/Campbell Drive between SW 177 Avenue and NE 1 Road*			x				x	x	x	x

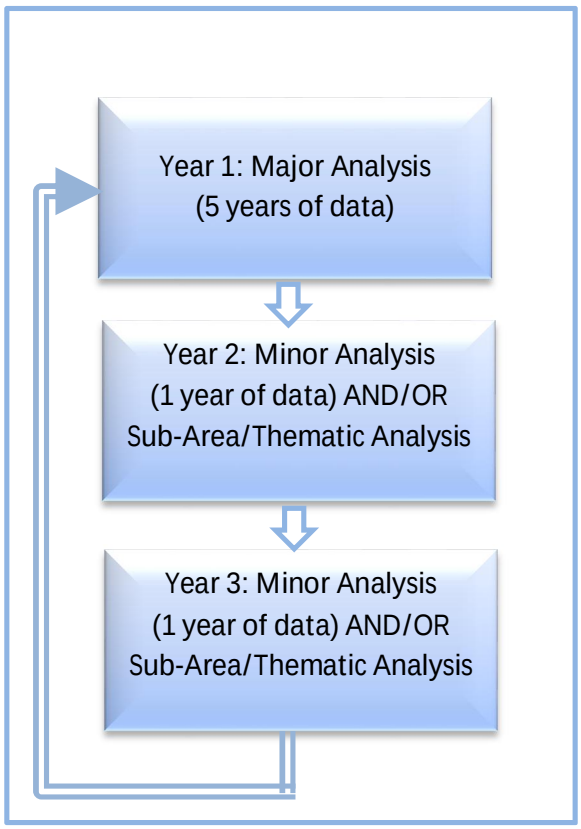
* Evaluated for bicycle and pedestrian safety improvement needs

PROCESS DEVELOPMENT

The MPO wishes to continue the evaluation of pedestrian and bicycle crash data and identify countermeasures on an annual basis. The following process, which includes a framework for crash data analysis, monitoring, guidance, and stakeholder involvement was developed.

Crash Data Analysis Process

The Miami-Dade MPO is expected to take the lead role in conducting countywide pedestrian and bicycle crash data analysis. The required crash data should be obtained from the FDOT's Unified Base Map Repository, which provides detailed information of crashes occurring on both state and non-state public roadways. The analysis included in this report considered six years of crash data up to 2013.



Typically, pedestrian and bicycle safety studies consider five years of crash data. Therefore, if the MPO conducts countywide crash data analysis annually, every subsequent year would consider four years of previously analyzed data and one year of new data. For example, the next update is likely to include only one year of new data (2014) and four years of previously analyzed data (2010-2013). As such, it's suggested to perform a full analysis of five years of data every three years. This method ensures each major update would utilize three years of crash data that was not utilized for the last major update. During interim years, minor updates may be performed using the latest one year of countywide crash data. Any significant crash patterns identified during minor updates may need to be validated by reviewing the crash data from prior years. Alternatively, interim year analysis could focus on a geographic sub-area or on a specific safety issue of interest (thematic analysis). An example of a sub-area analysis is to evaluate five years of pedestrian crash data within the City of Miami. An example of a thematic analysis is to evaluate pedestrian crashes at mid-block locations to identify high crash segments.

Monitoring

The MPO should continue to obtain crash data and summary reports from FDOT and DHSMV and share this information with safety partners to monitor the trends in bicycle and pedestrian safety. Crash data can also be used to evaluate the effectiveness of individual countermeasures.

Guidance and Coordination

The successful implementation of pedestrian and bicycle safety improvement strategies often require broad cooperation among the Florida Department of Transportation (FDOT), Miami-Dade County, local agencies, law enforcement, school district, elected officials, community leaders, citizens and organizations, academic institutions, media, and business community. Therefore, the MPO should consider working with FDOT to create a Community Traffic Safety Team (CTST) devoted to pedestrian and bicycle safety. The CTST process brings together planning, engineering, law enforcement and educational agencies to identify problems and develop multi-disciplinary solutions. A Pedestrian-Bicycle CTST could meet 2-3 times per year to review crash data, share knowledge, and coordinate efforts. A Pedestrian-Bicycle CTST would be the coordinating body for future non-motorized safety planning studies.

SUMMARY

The Miami-Dade MPO's Countermeasures for Pedestrian and Bicycle High Crash Locations Study is another step of its continued effort to improve pedestrian and bicycle safety. The specific objectives of this study include the identification of locations with a high incidence of pedestrian and bicycle crashes, development of engineering and non-engineering countermeasures, and recommendation a process for continuous review of crash data, stakeholder coordination, and development of strategies to improve safety of pedestrians and bicyclists.

The countywide pedestrian and bicycle crash data for the six-year period between 2008 and 2013 was evaluated to identify crash patterns and high crash locations. Pedestrians and cyclists accounted for over 35 percent of fatal crashes in the county. During recent years, the trends of crashes involving pedestrians and bicyclists are rising. Between 2008 and 2013 there were 7,028 pedestrian crashes, including 388 fatal crashes; and 3,854 bicycle crashes, including 47 fatal crashes. Overall, one in 18 pedestrian crashes and one in 82 bicycle crashes resulted in a fatality. Vehicular speed (represented by posted speed limit), dark conditions, and road user impairment were notable causal factors for fatal pedestrian and bicycle crashes. Elderly pedestrians were found to be a particularly vulnerable group with the likelihood of a fatality being two times greater than the overall pedestrian population. Mid-block pedestrian and bicycle crashes were found to result in a higher proportion of fatal crashes than intersection crashes. While there were approximately equal numbers of pedestrian crashes on state and non-state roads, two thirds of fatal pedestrian crashes occurred on state roads. However, 55 percent of bicycle crashes and 66 percent of fatal bicycle crashes were reported on non-state roads. Therefore, the need for addressing pedestrian and bicycle safety issues on both state and non-state roadways is evident from the data analysis.

The need for engineering and educational strategies as well as increased coordination among stakeholder agencies was identified to achieve sustainable safety improvements. Enhanced street lighting in high pedestrian activity locations, mid-block crossings with appropriate control measures, countdown signals and enhanced signage at intersections, median refuge islands, green colored bike lanes in conflict areas, and maintenance of landscaping at driveways are few recommended engineering solutions. Educational campaigns to increase motorist, pedestrian and cyclist awareness of safe behaviors related to crossing the street, speeding, yielding at crosswalks, safe passing of cyclists, and using caution after dark. Coordination with transit agencies to use advertising space for traffic safety messages and in-vehicle alerts to remind alighting passengers to use crosswalks, as well as safety educational efforts targeting elderly pedestrians through the "Golden Passport" program should be considered. Furthermore, current safety awareness programs such as "Safe Steps" and WalkSafe/BikeSafe should be further expanded.

A total of 16 high crash locations were selected for field reviews, which included 10 high pedestrian crash locations, five high bicycle crash locations, and one high pedestrian/high bicycle crash location. The preliminary safety improvement strategies identified include lighting enhancements, roadway reconfiguration (e.g., road diet) to incorporate pedestrian and bicycle features, mid-block crosswalks, green colored bike lanes within intersection conflict areas, relocation of bus stops, countdown pedestrian signals, reevaluation of pedestrian clearance intervals, and new/enhanced signs and markings. The opportunities for implementing education

campaigns to reduce the instances of pedestrians crossing outside of designated crossings were noted. Additionally, GIS methodologies were used to identify signalized intersections with a high incidence of pedestrian and bicycle crashes involving turning vehicles. These locations are candidates for countermeasures such as enhanced signage, leading pedestrian interval, and flashing yellow arrow.

Recommendations were developed for implementing an on-going process for the evaluation of countywide pedestrian and bicycle crashes. This process calls for analysis of pedestrian and bicycle crash data on an annual basis, which includes a major analysis of countywide five-year crash data on year one, followed by minor analysis of one-year countywide crash data (and sub-area or thematic analysis, if desired) during the next two years, and then repeat the process. Finally, a recommendation was made to establish a Pedestrian and Bicycle Community Traffic Safety Team with the purpose of providing guidance for non-motorized safety planning studies, enhancing stakeholder coordination, and sharing knowledge and resources.