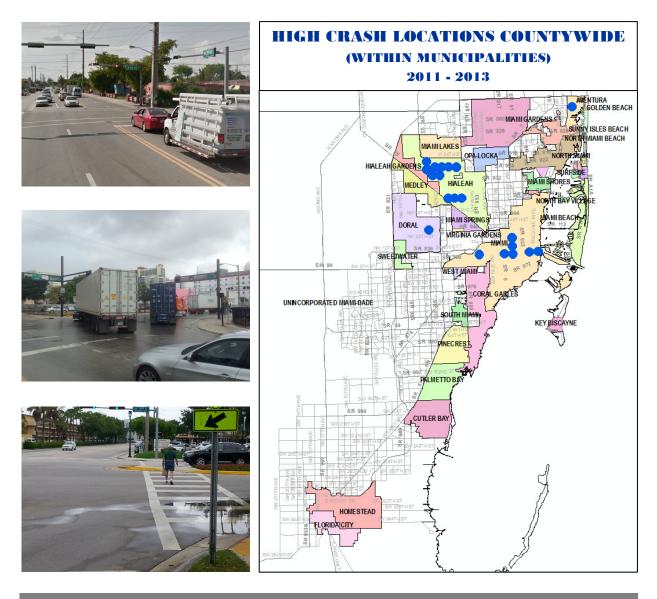


## Miami Dade County

## **Public Works and Waste Management Department**



## SAFETY STUDIES AT HIGH CRASH LOCATIONS COUNTYWIDE (WITHIN MUNICIPALITIES)

**Traffic Engineering Division** 

August 2014



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#### **EXECUTIVE SUMMARY**

The Miami Dade County Public Works and Waste Management Department (PWWM) Traffic Engineering Division (TED) undertook this traffic safety study based on a contract with the Metropolitan Planning Organization (MPO). The objective of this study is to identify traffic safety concerns and to recommend countermeasures to improve the operational safety of twenty (20) high-crash locations within municipalities countywide. The following tasks have been performed to achieve the objective:

- 1. Acquiring and Processing of Crash Data
- 2. Identifying High Crash Locations
- 3. Conducting Field Studies
- 4. Intersection Safety Assessment
- 5. Countermeasures and Potential Improvements
- 6. Preparation and Submission of Final Report

After conducting the safety analysis, the 20 locations as identified in the study are ranked in the following table:

Loc.	Address	COM.	RIF	Local	Crashes	Frequency	Safet	y Ratio	Crash Seve	erity(EPDO)	Composite Rank	FINAL
No.	Address	Dist.	Dist.	Jurisdiction	Value	Rank (R1)	Value	Rank (R2)	Value	Rank (R3)	(R1+R2+R3)	RANK
15	W 20 AVE / W 60 ST	12	9	Hialeah	93	2	1.717	3	1.645	3	8	1
18	W 24 AVE / W 60 ST	12	9	Hialeah	89	5	1.455	4	1.506	6	15	2
3	NW 17 AVE / NW SOUTH RIVER DR	5	2	Miami	92	3	1.858	1	1.293	13	17	3
1	NE 1 AVE / NE 6 ST	3	2	Miami	85	6	1.807	2	1.459	9	17	4
9	NW 87 AVE / NW 36 ST	12	1	Doral	100	1	1.371	5	1.120	20	26	5
2	NE 29 PL / AVENTURA BLVD	4	3	Aventura	52	18	1.229	8	2.077	1	27	6
12	W 12 AVE / W 68 ST	12,13	9	Hialeah	90	4	1.084	14	1.433	10	28	7
5	NW 17 AVE / NW 20 ST	3	2	Miami	82	8	1.247	7	1.293	14	29	8
6	NW 22 AVE / NW 7 ST	5	2	Miami	80	9	1.060	15	1.525	5	29	9
7	NW 3 AVE / NW 5 ST	3	2	Miami	54	17	1.145	11	2.000	2	30	10
20	W 28 AVE / W 76 ST	12	9	Hialeah	68	15	1.127	12	1.485	7	34	11
10	W 8 AVE / W 29 ST	13	9	Hialeah	60	16	1.055	16	1.600	4	36	12
11	W 12 AVE / W 29 ST	13	9	Hialeah	69	14	1.097	13	1.348	12	39	13
17	W 21 CT / W 68 ST	12	9	Hialeah	76	11	1.158	10	1.197	18	39	14
4	NW 17 AVE / NW 7 ST	5	2	Miami	75	12	0.867	20	1.480	8	40	15
8	NW 45 AVE / NW 7 ST	6	2	Miami	51	19	1.316	6	1.235	15	40	16
13	W 14 AVE / W 29 ST	13	9	Hialeah	40	20	1.180	9	1.375	11	40	17
19	W 28 AVE / W 68 ST	12	9	Hialeah/H. Gardens	85	7	1.054	17	1.212	16	40	18
14	W 16 AVE / W 68 ST	12	9	Hialeah	79	10	1.022	18	1.200	17	45	19
16	W 20 AVE / W 68 ST	12	9	Hialeah	74	13	0.868	19	1.162	19	51	20



Based on the safety concerns found during the development of this report, the field investigation, the collected traffic data and the traffic analysis performed, the following is a summary of the intersections safety/operational analysis and recommendations.

## Summary of the Intersections Safety/Operational Analysis and Recommendations

Rank	Location	Signal ID	Com. Dist.	RIF Dist.	Local Jurisdiction	Abnormal Crash Types	Probable Causes	Recommended Countermeasures
1	W 20 AVE and W 60 ST	5913	12	9	Hialeah	- Rear End - Angel - Righ Turn - Sidesw ipe	<ul> <li>Restricted sight distance</li> <li>Presence/Location of Drivew ays</li> <li>Inadequate roadw ay lighting</li> </ul>	Lengthen southbound left-turn lane to 220 ft.     Add pedestrian crossw alk on the east leg.     Install pedestrian signals and push buttons.     Provide street light on south leg.
2	W 24 AVE and W 60 ST	4908	12	9	Hialeah	- Rear End - Angle - Sidesw ipe - Pedestrian	Restricted sight distance     Presence/Location of Drivew ays     hadequate roadw ay lighting     Poor pavement markings	Provide painted island on southeast corner to better channelize exclusive right turn lane.     Pesoive drainage issue on North leg (w est side) by sodding swale and possibly delineating it with curb and gutter.     Pelocate bus stops along West 60th Street from the near side to the far side.     Povide lighting on north leg specifically the east side of W 24 Avenue.
3	NW 17 AVE and NW South River DR	5189	5	2	Miami	- Rear End - Sidesw ipe - Fixed Object	- Large turning volumes - Restricted sight distance - Poor visibility of signal - Presence/Location of Drivew ays	Provide a raised median for the intersection north leg.     Provide speed limit feedback signs for SB and NB traffic.     Improve signage at the intersection.     Provide street lights at the intersection and all approaches.     Pesurfacing the intersection and refurbishing of pavement markings.
4	NE 1 AVE and NW 6 ST	3336	3	2	Miami	- Angle - Sidesw ipe	<ul> <li>Large turning volumes</li> <li>Restricted sight distance</li> <li>Poor visibility of signal</li> <li>Presence/Location of Drivew ays</li> </ul>	Provide guideline for the w estbound double right-turn lanes.     Provide "No Right Turn On Red" sign for w estbound traffic.     Provide ADA ramps for south leg.     Resurfacing the intersection and refurbishing of pavement markings.
5	NW 87 AVE and NW 36 ST	4477	12	1	Doral	- Rear End - Sideswipe	- Large turning volumes - Presence/Location of Drivew ays - Inadequate channelization - Pedestrian activity	Close the median opening on the west leg to improve safety operation; and extend the left-turn bay length to about 300 feet. Provide a pained island between the exclusive right turn bay and the adjacent thru lane on the south leg to improve channelization. Install high visibility ladder crossw alks on all legs. Resurfacing the intersection and refurbishing of pavement markings. Extend WB left-turn bay length by reducing the median width.
6	NE 29 PL and Aventura BLVD	4299	4	3	Aventura	- Pedestrian - Bicycle - Fixed Object	- Large turning volumes - hadequate signage - hadequate signal timing - hadequate pavement markings	Add additional left-turn arrows and only messages pavement markings for the exclusive NBLT lane on the south leg. Also, install lane use signs. Push the exclusive right-turn bay inside next to the thru lane on the south leg NB direction. Pegrade sw ale at east end of curb and gutter. Provide a concrete island on the northeast corner to eliminate the diagonal long crossing.
7	W 12 AVE and W 68 ST	3332	12, 13	9	Hialeah	- Rear End - Left Turn - Right Turn - Sidesw ipe	- Large turning volumes - Excessive speed on approach - Presence/Location of Drivew ays - Inadequate signal timing	Update to countdown pedestrian signals for w est and south crossing.     Resurfacing the intersection and refurbishing of pavement markings.     Provide high visibility ladder crossw alks on all legs.     Install "right Turn Only" signs at the gas station drivew ays.     Update pushbuttons for east ramp.
8	NW 17 AVE and NW 20 ST	2402	3	2	Miami	- Rear End - Angle - Sidesw ipe	- Poor visibility of signal - Large turning volumes - Presence/Location of Drivew ays - Restricted sight distance	Relocate north leg crossw alk closer to the intersection aw ay from the gas station drivew ay, and update ADA ramps at northw est corner.     Update span w ire traffic signal to mast arm suspension signal.     Lengthen the eastbound left-turn lane to 200 ft.     Provide Turning Vehicles Yield to Pedestrians signs for all directions.     Resurfacing the intersection and refurbishing of pavement markings.
9	NW 22 AVE and NW 7 ST	2332	5	2	Miami	- Rear End - Left Turn - Fixed Object	Presence/Location of Drivew ays     Large turning volumes     Pestricted sight distance     Crossing pedestrians	Update span w ire traffic signal to mast arm suspension signal.     Lengthen SBLT lane to approximately 350 ft and NBLT lane to     approximately 150 ft.     hstall reflective back plates for all signals heads.     Provide Turning Vehicles Yield to Pedestrians signs for all direction.     Resurface the intersection and refurbish pavement markings.
10	NW 3 AVE and NW 5 ST	3425	3	2	Miami	- Angle - Sideswipe - Bicycle	- Large turning volumes - Crossing pedestrians - Restricted sight distance - Poor signal timing	Provide signal ahead w arning signs on both sides of NW 5 Street for eastbound traffic.     Provide "No Right Turn On Red" sign for northbound traffic.     Pesurfacing the intersection and refurbishing of pavement markings.     Update ADA ramps at all corners.
11	W 28 AVE and W 76 ST	4977	12	9	Hialeah	- Rear End - Left Turn - Right Turn - Sidesw ipe	Restricted sight distance     Poor visibility of signal     Large turning volumes     Inadequate road design     Poor pavement/markings conditions     Inadequate road lighting	Extend curbing to discourage parking along south side of east leg.     Provide painted channelization for the exclusive right turn bays on the east and w est legs.     Provide exclusive westbound right turn bay.     City of Hialeah has a project that will implement several improvements, most of which coincide with the proposed recommendations.
12	W 8 AVE and W 29 ST	3331	13	9	Hialeah	- Left Turn - Fixed Object	Large turning volumes     Presence/Location of Drivew ays     No left-turn phase     Restricted sight distance	Upgrade span w ire intersection to mast arm.     Install directional arrow markings for all approaches along West 29 St.     Relocate bus stops along West 29 Street from near to the far side of the intersection.     Resurfacing the intersection and refurbishing of pavement markings.



## Summary of the Intersections Safety/Operational Analysis and Recommendations

Rank	Location	Signal ID	Com. Dist.	RIF Dist.	Local Jurisdiction	Abnormal Crash Types	Probable Causes	Recommended Countermeasures
13	W 12 AVE and W 29 ST	3253	13	9	Hialeah	- Angle - Left Turn	- Large turning volumes - Restricted sight distance - No left-turn phase	Change the span wire to mast arm with illuminated street signs.     Upgrade push button on northeast corner.     Instal high visibility ladder crossw alks on all approaches.     Add "Right turn yield to pedestrian" sign on all approaches.     Mil and Resurface north and south legs.     Upgrade all pedestrian signal heads to countdow n.
14	W 21 Court and W 68 ST	4665	12	9	Hialeah	- Rear End - Left Turn - Sidesw ipe	- Large turning volumes - Presence/Location of Drivew ays - Inadequate channelization - Restricted sight distance - Inadequate pavement markings	Modify the pavement markings to restrict movements at the intersection of W 21 Court and W 67 Pace.     Restripe the south leg of the intersection to provide one LT lane, one thru lane and one RT lane for NB movement.     Provide sidew ak along the w est side of W 21 Court (north leg) by possibly reducing lane widths.     Imorove alignment of w est leg to soften curves & provide a bus bay.     Provide Pavement messages on w est and east legs of the intersection.
15	NW 17 AVE and NW 7 ST	2330	5	2	Miami	- Rear End - Sidesw ipe	- Large turning volumes - Inadequate signal timing - Crossing pedestrian	Lengthen the southbound left-turn lane to approximately 300 feet     Provide Turning Vehicles Yield to Pedestrians (R10-15) signs for all directions.     Provide push button to cross NW 17 Avenue.
16	NW 45 AVE and NW 7 ST	3999	6	2	Miami	- Rear End - Left Turn - Right Turn - Sideswipe	- Large turning volumes - Inadequate signal timing - Crossing pedestrians - Inadequate road design - Restricted sight distance	Update span w ire traffic signal to mast arm.     Provide crossw ak on south leg.     Provide countdow n pedestrian signal heads for all directions.     Provide ADA ramps for east-w est directions on north and south legs.     Provide solar pow ered speed limit feedback signs for east and w estbound traffic.
17	W 14 AVE and W 29 ST	5800	13	9	Hialeah	- Left Turn - Sidesw ipe	- Large turning volumes - Inadequate signal timing - Presence/Location of Drivew ays - No left turn phase	Pefurbish pavement markings including crossw alks at the south leg.     Add Yellow Pedestrian ramps for NW and NE corners.     Add pedestrian signal heads for all directions.     Upgrade the crossw alks to high visibility ladder crossw alks.     Add lane designation marking arrows for east/w est approaches.
18	W 28 AVE and W 68 ST	4979	12	9	Hialeah/ H. Gardens	- Rear End - Right Turn - Sidesw ipe - Fixed Object	- Large turning volumes - Presence/Location of Drivew ays - Excessive speed - Restricted sight distance	Lengthen the northbound left-turn lanes to 250 feet each.     Upgrade pedestrian pushbuttons and add detectable w arning devices.     Upgrade crossw alks to high visibility ladder type crossw alks.     Pesurfacing the intersection and refurbishing of pavement markings.     Add sidew alk connection to existing bus stop on the south leg of the intersection (w est side).
19	W 16 AVE and W 68 ST	3870	12	9	Hialeah	- Rear End - Angle - Right Turn - Sidesw ipe	- Large turning volumes - Excessive speed - Presence/Location of Drivew ays - Inadequate roadw ay design - Restricted sight distance	Install "Turning Vehicles Yield to Pedestrians" sign on all approaches.     Install pedestrian ramp on northeast corner for north crossing.     Install pedestrian signals and upgrade push buttons.     Straighten road alignment on the west side.     Add painted islands on northeast and southwest corners.
20	W 20 AVE and W 68 ST	6220	12	9	Hialeah	- Angle - Sideswipe - Fixed Object	<ul> <li>Poor visibility of signal</li> <li>Excessive speed</li> <li>Inadequate pavement markings</li> <li>Inadequate channelization</li> </ul>	Improve pavement markings on the NE corner to better delineate the WB traffic emerging from the SR 826 S. Off-Ramp. Lengthen merge lane on NW side to approximately 270 ft. Add Rt0-11 sign on the mast arm for EB traffic. Add tubular delineators on the right lane of the EB approach.



## **1. INTRODUCTION**

The Miami Dade County Public Works and Waste Management Department (PWWM) Traffic Engineering Division (TED) undertook this traffic safety study based on a contract with the Metropolitan Planning Organization (MPO). The objective of this study is to identify traffic safety concerns and to recommend countermeasures to improve the operational safety of twenty (20) high-crash locations within municipalities countywide. The top 20 crash locations countywide were identified for the study period from 2011 through 2013. A list of the 20 locations and their associated jurisdictions is presented in *Table 1*.

PWWM-TED has evaluated the crash data for the years 2011 through 2013; as such, a review of the police reports was performed, and collision diagrams were prepared. Furthermore, a comprehensive traffic safety analysis was performed for all locations in order to identify the abnormal crash patterns. In addition, field reviews were conducted within the project limits. In some cases, Synchro/Simtraffic simulation was performed. As such, traffic data was also collected at these intersections. Based on these criteria, findings, and conclusions recommendations are presented. The improvements have been developed and sketched to clearly identify the modifications required. Finally, these efforts have been documented and presented in a report format. *Figure 1* presents the study intersection locations.

This report follows the procedures outlined in the Manual on Uniform Traffic Studies (MUTS), the Highway Capacity Manual – 2000 Update (HCM2000), the Manual of Uniform Traffic Control Devices (MUTCD), and the National Highway Institute (NHI) Safety Analysis guidelines. The report evaluates the following for each intersection:

- Site Description
- Safety Conditions and Analysis
- Traffic Operation Conditions and Analysis
- Recommendations
- Conceptual plan

## 2. METHODOLOGY

In order to determine high crash locations it is necessary to look at crash data collected throughout the county. First, a list of locations of 15 or more crashes per year during the last three years (2011, 2012 and 2013) was obtained using two database systems: *FIRES* (Florida's Integrated Report Exchange System) and Florida *Signal Four Analytics*. This data needed to be filtered and arranged so we can identify the highest 20 crash locations.

Once the candidate locations were determined, review of the police reports was performed, and collision diagrams was prepared for the 20 locations. They were categorized by as many of the following features as possible: time of day, traffic control, alcohol involvement, weather conditions, etc. Additionally, 24-hour traffic volumes, turning movement volumes and signal timing data were collected for all locations. Also, field visits and evaluations were conducted for all locations.

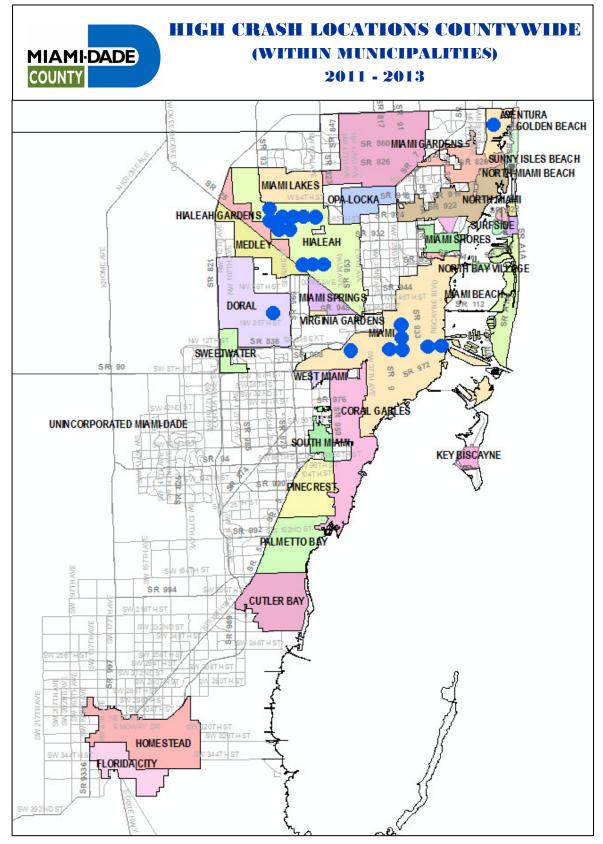


# Table 1 – Study Locations (In alphabetical order)

Loc. No.	Address	Signal ID	Local Jurisdiction	Road Jurisdiction	Comm. District	RIF District
1	AVENTURA BLVD / NE 29 PL	4299	Aventura	City	4	3
2	NE 1 AVE / NE 6 ST	3336	Miami	County	3	2
3	NW 17 AVE / NW 20 ST	2402	Miami	County	3	2
4	NW 17 AVE / NW 7 ST	2330	Miami	County	5	2
5	NW 17 AVE / NW SOUTH RIVER DR	5189	Miami	County	5	2
6	NW 22 AVE / NW 7 ST	2332	Miami	County	5	2
7	NW 3 AVE / NW 5 ST	3425	Miami	City	3	2
8	NW 45 AVE / NW 7 ST	3999	Miami	County	6	2
9	NW 87 AVE / NW 36 ST	4477	Doral	County	12	1
10	W 12 AVE / W 29 ST	3253	Hialeah	County	13	9
11	W 12 AVE / W 68 ST	3332	Hialeah	County	12/13	9
12	W 14 AVE / W 29 ST	5800	Hialeah	City	13	9
13	W 16 AVE / <b>W 68 ST</b>	3870	Hialeah	County	12/13	9
14	W 20 AVE / W 60 ST	5913	Hialeah City		12	9
15	W 20 AVE / W 68 ST	6220	Hialeah	City	12	9
16	W 21 CT / W 68 ST	4665	Hialeah	City	12	9
17	W 24 AVE / W 60 ST	4908	Hialeah	City	12	9
18	W 28 AVE / W 68 ST	4979	Hialeah / H. Gardens	City	12	9
19	W 28 AVE / W 76 ST	4977	Hialeah	City	12	9
20	W 8 AVE / W 29 ST	3331	Hialeah	City	13	9

\* County Maintained Roadway





## Figure 1: Study Locations Map



A three-phased ranking scheme is used as the basis to determine the high crash locations. Intersections are then ranked by the total number of crashes (Crash Frequency), crash rate (Safety Ratio), and crash severity index (Equivalent Property Damage Only – EPDO) methods. Finally, these intersections are ranked by a combination of these factors. The summary of the 20 high crash locations safety analysis is shown in *Table 2*.

## 2.1. Number of Crashes/Crash Frequency Method

In this method, we rank locations by the number (or frequency) of average annual relevant crashes for the three year study period. The location with the highest number of crashes ranks as number 1, the location with the next highest number of crashes ranks as number 2 and so on.

## 2.2. Crash Rate/Safety Ratio Method

The Crash Rate Method compares the number of crashes to the volume of traffic, with the later measured as the number of vehicles entering a spot in a given time period. The steps involved in this method are as follows.

1. Determine the location's actual crash rate. The actual spot crash rate is found as annual average number of crashes during the study period divided by the average daily traffic volume (AADT) during the study period in crashes per million vehicles.

Actual Crash Rate (RMEV) =	Number of Crashes	× <u>1,000,000</u>
netuai erasii Kate (KinL V) –	AADT	365

2. Find the critical crash rate for similar spot locations throughout the state

Critical Crash Rate = Avg.StateCrashRate +	0.5	Avg.StateCrashRate
Critical Crush Kale – Avg.SuleCrushKale +	TrafficBase $1.90$	TrafficBase

Where:

Traffic Base =	Years * AADT * 365
Traffic Dase -	1,000,000

3. Calculate the safety ratio by dividing the actual crash rate by the critical crash rate.

Safety Ratio =	Actual Crash Rate
	Critical Crash Rate

4. Rank locations by the safety ratio. The location with the highest safety ratio ranks as 1, the location with the next highest safety ratio ranks as 2 and so on.



Using the crash rate method in comparing the crash experience between different time periods or between locations provides a basis for more accurate and meaningful conclusions since it accounts for the numbers of vehicles "exposed" to the hazards of driving within a given time period. It also prevents the potentially misleading classification of a relatively safe highvolume location as "high-crash" simply because it has experienced a relatively large number of crashes. However, it tends to unfairly identify low-volume locations having relatively few crashes as high-crash locations.

## 2.3. Crash Severity Index/Equivalent Property Damage Only (EPDO) Method

Each site is ranked according to the financial loss from the crashes. This is determined by using values based on the injuries sustained in each crash type as found in the data provided. The crash severity index is calculated by the following formula based on the values obtained from FDOT:

 $Crash Severity Index = \frac{(12 \times FatalCrashCount) + (4 \times InjuryCrashCount) + (Pr opertyDamageOnlyCrashCount)}{(TotalCrashCount)}$ 

Then the location with the highest cost ranks as 1, the location with the next highest cost ranks as 2 and so on.

## 2.4. Composite Ranking

Each intersection was given a score based on its ranking of the crash frequency, safety ratio, and EPDO. For example, the intersection with the highest number of crashes was given a score of 1; the intersection with the next highest number of crashes was given a score of 2 and so on. The same scoring procedure was done with safety ratio and EPDO for each intersection. The sum of these individual scores represented the intersection's composite score. Accordingly, the highest rank (1) is given to the location with the lowest combined score and so on. In case of a tie, each location gets the same rank and the following ranking is skipped. *Table 3* provides complete details of the ranking methodology.



					Cra	Ishes I	<b>Crashes Frequency</b>	ncy					FL Avg.					Crash
Loc.		2011		2012		2013		T otal 3 Years	ars	Avera	Average Annual		Crash	Traffic	Actual	Critical	Safety	Severity
#	Address	Total		Total		Total		(2011 to 2013)	013)	(201	(2011 to 2013)		Rate-3	Base	Crash	Crash	Ratio	مع
		PDO Injury Fatal	PDO	Injury Fatal	tal PDO	Injury	Fatal	PDO Injury	Fatal	PDO I	Injury F	Fatal	year Avg. (*)		Kate (*)	Kate (*)		EPDO
•	NE 4 AVE / NE 6 ST	32		59		24		85			28		1 000			0,00		
-		25 7 0	25	4 0	) 22	2	0	72 13	0	24	4	0 1/233	700.1	0.230	GUC.4	2.493	1.807	FC4.1
2	NE 29 PL / AVENTURA BLVD	19		19		14		52			17	26376	0.595	9 627	1 800	1 465	1 229	2 077
ı		11 7 1	14	5 0	11	З	0	36 15	1	12	5	0 0	0.00	9.021	000.1	pot-	6771	
6	NW 17 AVE / NW SOUTH RIVER DR	27		29		36		92			31	33000	0 595	12 081	7 538	1 367	1 858	1 203
<b>&gt;</b>		23 4 0	27	2 0	33	3	0	83 9	0	28	3	0	0.00.0	100.71	000.2	100.1	000.1	067.1
٢	NIM 17 AVE / NIM 7 ST	35		20		20	-	75			25	00037	100	10.01	1 170	107	230.0	1 400
t		28 7 0	15	0 2	20	0	0	63 12	0	21	4	0	0.311	10.314	1.4/0	1.7 04	0.007	1.400
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0		25 4 0	26	3 0	) 23	-	0	74 8	0	25	3	38020	/6/.0	14.098	1.939	ccc.1	1.24/	1.293
u u	NIM 22 AVE / NIM 7 ST	30		29		21	╞	80	,		27	10500	0 767	10,000	1 670	1 404	1 000	1 606
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>		26 1 0	15	3 0	9	0	0	47 4	0	16	-	0 10224	101.0	700.0	000.7	1.342	010.1	CC7.1
6	NW 87 AVE / NW 36 ST	28		37		35		100			33	58501	0 575	01353	1 561	1 138	4 374	1 120
<b>,</b>		28 0 0	35	2 0	33	2	0	96 4	0	32	1	0	0.00	000.14	100.1	001.1	1.0.1	
9	W 8 AVF / W 29 ST	20		19		21		60			20	31606	0 757	11 536	1 73/	1 6/3	1 055	1 600
2		16 4 0	16	3 0	16	5	0	48 12	0	16	4	0	10.0	000.11	+0	0+0	000.1	000.1
ŧ	W 12 AVE / W 29 ST			24		24		69			23	36357	0 757	13 270	1 733	1 580	1 007	1 3/8
		17 4 0	33	2 0	22	2	0	61 8	0	20	3	0	10.10	017.01	001.1	000.1	100.1	0+0-1
12	W 12 AVE / W 68 ST	29		30		31		06			30	52867	0 757	19.296	1 555	1 435	1.084	1.433
		25 4 0	25	5 0	27	4	0	77 13	0	26	4	0	5.5	004-0-	0000-	001	5	201
13	W 14 AVE / W 29 ST			13		12		40			13	14907	0 757	5 441	2 450	2 076	1.180	1.375
		15 0 0	6	4 0	1	~	0	35 5	0	12	2	0	5		22	2		
14	W 16 AVE / W 68 ST	8	5	-	+	58 1	4		•		27	49537	0.757	18.081	1.490	1.458	1.022	1.200
		0 7 07	3	- 5	3	ი გ	>	0 2 2	>	₹,	<u> </u>	D				T		
15	W 20 AVE / W 60 ST	30 10 0	24	21 6 0 8	20	8 4	c	93 73 20	-	10	31 7	29517	0.757	10.774	2.877	1.675	1.717	1.645
		21			+	25		0000	>	5	25							
16	W 20 AVE / W 68 ST	20 1 0	27	+ 0	) 23	5	0	70 4	0	23	3 –	0 45472	0.911	16.597	1.486	1.712	0.868	1.162
17	W 21 CT / W 68 ST	29				21					25	50717	0 575	18 512	1369	1 182	1 158	1 197
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18	W 24 AVE / W 60 ST	25 21 4 0	28	31 3   0	25	» ∞	0	89 74 15	C	25	30	0 34987	0.757	12.770	2.323	1.597	1.455	1.506
\$				-	+	- 50		**			28							
5	W 28 AVE / W 68 S I	28 0 0	29	2 0	) 22	4	0	79 6	0	26	2	0 50874	0.757	18.569	1.526	1.448	1.054	1.212
20	W 28 AVE / W 76 ST	17		milian	-			68	-		23	34298	0 757	12 519	1811	1 606	1.127	1.485
i		13 4 0	24	4 0	20	e	0	57 11	0	19	4	0	0.0	210.71	-	000.1		000±
с *	* Crashes per Million Entering Vehicles	J Vehicles																

## Table 2 – Summary of Safety Analysis



Loc.	Address	COM.	RIF	Local	Crashes I	Frequency	Safet	y Ratio	Crash Seve	erity(EPDO)	Composite Rank	FINAL
No.	Address	Dist.	Dist.	Jurisdiction	Value	Rank (R1)	Value	Rank (R2)	Value	Rank (R3)	(R1+R2+R3)	RANK
15	W 20 AVE / W 60 ST	12	9	Hialeah	93	2	1.717	3	1.645	3	8	1
18	W 24 AVE / W 60 ST	12	9	Hialeah	89	5	1.455	4	1.506	6	15	2
3	NW 17 AVE / NW SOUTH RIVER DR	5	2	Miami	92	3	1.858	1	1.293	13	17	3
1	NE 1 AVE / NE 6 ST	3	2	Miami	85	6	1.807	2	1.459	9	17	4
9	NW 87 AVE / NW 36 ST	12	1	Doral	100	1	1.371	5	1.120	20	26	5
2	NE 29 PL / AVENTURA BLVD	4	3	Aventura	52	18	1.229	8	2.077	1	27	6
12	W 12 AVE / W 68 ST	12,13	9	Hialeah	90	4	1.084	14	1.433	10	28	7
5	NW 17 AVE / NW 20 ST	3	2	Miami	82	8	1.247	7	1.293	14	29	8
6	NW 22 AVE / NW 7 ST	5	2	Miami	80	9	1.060	15	1.525	5	29	9
7	NW 3 AVE / NW 5 ST	3	2	Miami	54	17	1.145	11	2.000	2	30	10
20	W 28 AVE / W 76 ST	12	9	Hialeah	68	15	1.127	12	1.485	7	34	11
10	W 8 AVE / W 29 ST	13	9	Hialeah	60	16	1.055	16	1.600	4	36	12
11	W 12 AVE / W 29 ST	13	9	Hialeah	69	14	1.097	13	1.348	12	39	13
17	W 21 CT / W 68 ST	12	9	Hialeah	76	11	1.158	10	1.197	18	39	14
4	NW 17 AVE / NW 7 ST	5	2	Miami	75	12	0.867	20	1.480	8	40	15
8	NW 45 AVE / NW 7 ST	6	2	Miami	51	19	1.316	6	1.235	15	40	16
13	W 14 AVE / W 29 ST	13	9	Hialeah	40	20	1.180	9	1.375	11	40	17
19	W 28 AVE / W 68 ST	12	9	Hialeah/H. Gardens	85	7	1.054	17	1.212	16	40	18
14	W 16 AVE / W 68 ST	12	9	Hialeah	79	10	1.022	18	1.200	17	45	19
16	W 20 AVE / W 68 ST	12	9	Hialeah	74	13	0.868	19	1.162	19	51	20

## Table 3 – Ranking of Locations

## 2.5. Possible Crash Causes and Probable Countermeasures

In this section, a description of possible cause(s) for each type of crash along with suggested countermeasure(s) is provided in *Table 4*.



Collision Type	Possible Causes	Probable Countermeasures
Rear End	<ul> <li>(1) Large number of turning vehicles</li> <li>(2) Slippery surface</li> <li>(3) Poor visibility of signal</li> <li>(4) Inadequate signal timing</li> </ul>	<ol> <li>Prohibit turns</li> <li>Improve turn storage capacity</li> <li>Reduce speed limits</li> <li>Install or improve signs</li> </ol>
	<ul> <li>(5) Lack of signal coordination</li> <li>(6) Inadequate roadway lighting</li> <li>(7) Crossing pedestrians</li> <li>(8) Presence/Location of driveways</li> </ul>	<ul><li>5. Improve pavement conditions</li><li>6. Improve signal timing/coordination</li><li>7. Improve pedestrian crossing</li><li>8. Improve driveway design/location</li></ul>
Angle	<ul> <li>(9) Restricted sight distance</li> <li>(10) Excessive speed on approach</li> <li>(11) Inadequate advanced warning</li> <li>(12) Large total intersection volume</li> <li>In addition to #(3), #(4), #(6) and #(8)</li> </ul>	<ul> <li>9. Improve sight distance</li> <li>10. Adjust amber phase</li> <li>11. Install all red clearance phase</li> <li>12. Improve roadway lighting</li> <li>In addition to #3, #4, #6 and #8</li> </ul>
Left Turn	<ul> <li>(13) Large volume of left-turns</li> <li>(14) Too short amber phase</li> <li>(15) Absence of left-turning phase</li> <li>In addition to #(4), #(6), #(8), #(9) and #(10)</li> </ul>	<ol> <li>Provide/lengthen/add modify turn lanes</li> <li>Provide protected phase if justified</li> <li>Provide turning guidelines for multiple turn lanes</li> <li>Reduce the offset between opposing left turn lanes</li> <li>Install or improve warning signs</li> <li>In addition to #6, #9, #11 and #12</li> </ol>
Sideswipe	<ul> <li>(16) Inadequate roadway design</li> <li>(17) Excessive vehicle Speed</li> <li>(18) Inadequate pavement markings</li> <li>(19) Inadequate channelization</li> <li>(20) Inadequate signing</li> <li>(21) Improper road maintenance</li> </ul>	<ul> <li>18. Provide wider lanes</li> <li>19. Improve pavement markings</li> <li>20. Improve alignment and grade</li> <li>21. Install/improve channelization</li> <li>22. Install direction/warning signs</li> <li>In addition to #3 and #4</li> </ul>
Pedestrian with Vehicle	In addition to #(8) (22) Inadequate protection for pedestrians (23) Inadequate Signals (24) Inadequate Phasing Signal In addition to #(6), #(9), #(17) and #(18)	<ul> <li>23. Provide/improve sidewalks</li> <li>24. Provide improve crosswalks</li> <li>25. Provide pedestrian signal</li> <li>26. Improve pedestrian phase</li> <li>27. Provide raised median as refuge</li> <li>In addition to #3, #4 and #11</li> </ul>
Fixed Object	<ul> <li>(25) Obstruction in/too close to roadway</li> <li>In addition to #(2), #(6), #(11), #(16), #(17), #(18), and #(20)</li> </ul>	28. Remove/relocate fixed object In addition to #3, #5, #12, #17, #18, #19 and #20

## Table 4 – General Crash Causes and Countermeasures



## 3. STUDY LOCATIONS

This section provides a crash analysis at each of the study intersections. Furthermore, this section includes field observation reports for each of the study intersections. The field observation reports are used to verify if field conditions such as signal operation, pavement markings, geometry of the intersection or any other existing condition supports the probable cause developed through the study.

## 3.1. W 20 Avenue and W 60 Street

## 3.1.1. Site Description

This intersection is a signalized four legged intersection located in the City of Hialeah in the area of Northwest Miami-Dade County. W 20 Avenue is a two lane undivided local roadway and W 60 Street is a four lane divided arterial that runs east-west.

## 3.1.2. Safety Conditions and Analysis

The intersection of W 20 Avenue and W 60 Street is ranked number 1 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 93 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 31. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 2*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2007

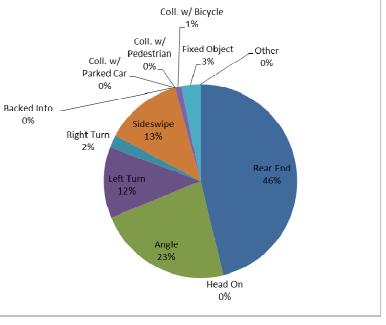


Figure 2 Predominant Crash Types W 20 AVE & W 60 ST

FDOT's "Expected Value Analysis." *Table 5* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.



TYPE OF CRASHCOLLISION TYPERear EndHead OnAngleLeft TurnRight TurnSideswipeBacked IntoColl. will parked CarColl. will bedestrianColl. will bedestrianColl. will an Off RoadOverlunedOtherTotal CrashesFatal crashesInjury crashesLIGHT CONDITIONSDay LightDuskDawnDarkUniknownSURFACE CONDITIONSDay LightDuskDawnDarkUniknownUnknownSURFACE CONDITIONSDryWetOthersMONTH OF A YEARJanuaryFebruaryMarchAprilMayJuneJulyAugustSeptemberOctoberNovemberDecemberDAY OF THE WEEKMondayTruesdayFridaySaturdayHOUR OF THE DAY0:0:0:0:0:0:00:0:0:0:0:0:0:00:0:0:0:0:0:0:0:00:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0:0:0:0:0:00:0:0:0:0:0:0:0		ER OF CR YEAR 2012 12 0 6 5 5 0 0 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	<b>2013</b> 12 0 5 1 1 4 0 0 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1	<b>3 YEAR</b> TOTAL CRASHES 43 0 21 11 11 2 12 0 0 0	% of Total 46% 0% 23% 12% 2%	MEAN Accidents per Year 14.33 0.00		ANNUAL CR 90th Percentile	95th	ABNORM Mean	ALLY HIGH 90th Percentil	95th
COLLISION TYPE Rear End Head On Angle Left Turn Right Turn Sideswipe Backed Into Coll. w/ Padestrian Coll. w/ Padestrian Dark Unknown SURFACE CONDITIONS Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dy Wet Others MONTH OF A YEAR Fatal crashes Fatal crashes Fatal crashes Fatal crash Superbare Colober November December Day OF THE WEEK Sunday Thursday Friday Friday Saturday HOUR OF THE DAY 00:00-06:00 06:00-09:00 11:00-11:00 11:00-13:00 13:00-15:00 15:00-18:00 18:00-24:00 Average Daily Traffic ADT (Vehicles per Da Florida Average Crash rate (Crashes per Million Er Critical Crash R	<b>2011</b> 19 0 10 5 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2012 12 0 6 5 0 3 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	12 0 5 1 4 0 0 0 1	CRASHES         43         0           21         11         2         12         12         0 <t< th=""><th>Total           46%           0%           23%           12%           2%</th><th><b>per Year</b> 14.33 0.00</th><th>MEAN</th><th>Percentile</th><th></th><th>Mean</th><th></th><th></th></t<>	Total           46%           0%           23%           12%           2%	<b>per Year</b> 14.33 0.00	MEAN	Percentile		Mean		
Head On         Angle         Left Turn         Right Turn         Sideswipe         Backed Into         Coll. wi Parked Car         Total Crashes         Flipting Carshes         Injury crashes         Light Conditions         Day Light         Dusk         Dawn         Dark         Unknown         Worthers         MONTH OF A YEAR         January         August         September         October         November         Davor FTHE WEEK         Monday         Turesday	19 0 10 5 1 5 0 0 0 0 0 0 0 0 0 0 0 0 0 0	12 0 6 5 0 3 0 0 0 0 0 1 1 0 0 0	12 0 5 1 4 0 0 0 1	43 0 21 11 2 12 0 0	46% 0% 23% 12% 2%	14.33 0.00	2.76					Percent
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Wet       Others         OTHOFAYEAR       January         February       March         April       March         April       May         June       July         July       August         September       October         November       December         December       November         Dursday       Tuesday         Monday       Tuesday         DUR OF THE DAY       0:00-06:00         06:00-03:00       13:00-13:00         13:00-13:00       13:00-13:00         13:00-12:00       18:00-24:00         werage Daily Traffic ADT (Vehicles per Daida Average Crash rate (Crashes per Million Era	35	23	24	82	88%	27.33	9.86	23.15       25.72         16.74       18.47       X         0.59       1.12       X         0.55       0.63       X         8.73       9.76       X         0.70       0.80       X         21.75       24.03       X         21.75       24.03       X         2.63       2.8       X         2.63       2.97       X         2.03       2.26       X       X         2.67       2.97       X       X         2.67       2.86       X       X         2.10       2.34       X       X         2.03       2.25       X       X         2.43       2.72       X       X         2.43       2.72       X       X         2.67       2.99       X       3.77         3.77       4.15       X       X         3.61       3.95       X	х			
Others       January         January       January         Hebruary       March         April       March         March       April         May       June         July       August         September       October         November       December         December       Monday         Tuesday       Wednesday         Friday       Saturday         DUR OF THE DAY       00:00-09:00         09:00-11:00       11:00-13:00         13:00-13:00       13:00-13:00         13:00-13:00       13:00-13:00         13:00-12:00       18:00-24:00	5	4	1	10	11%	3.33	1.59				x x x x x x x x x x x x x x x x x x x	
February         March         April         May         June         July         August         September         October         November         December         Ay OF THE WEEK         Sunday         Monday         Tuesday         Friday         Saturday         DUR OF THE DAY         00:00-06:00         00:00-09:00         00:00-09:00         00:00-09:00         00:00-01:00         11:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-13:00         13:00-18:00         18:00-24:00         verage Daily Traffic ADT (Vehicles per Dail         orida Average Crash rate (Crashes per Million Er         rific Base         ctual Crash Rate (Crashes per Million Er         igh Crash Location??         Actual Crash Rate $A \times 1,00$ V	0	0	1	1	1%	0.33	0.22	0.80	0.92	Х	x x x x x x x x x x x x x x x x x x x	
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April         May         June         July         August         September         October         November         December         December         August         Monday         Turesday         Wednesday         Thursday         Friday         Saturday         OUR OF THE DAY         00:00-06:00         03:00-11:00         11:00-13:00         13:00-15:00         15:00-24:00         Norolison         Werage Daily Traffic ADT (Vehicles per Dailog)         Verage Crash rate (Crashes per Million Er         Titical Crash Rate (Crashes per Million Er         Actual Crash Rate (Crashes per Million Er         Tigh Crash Location??         Actual Crash Rate $\frac{A \times 1,00}{V}$	4	3	0	7	8%	2.33	0.81					Х
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	2	0	2	4	4%	1.33	1.13					
June         July         July         August         September         October         November         December         Ay OF THE WEEK         Sunday         Monday         Tuesday         Wednesday         Wednesday         Friday         Saturday         OUR OF THE DAY         00:00-09:00         09:00-11:00         11:00-13:00         13:00-15:00         13:00-15:00         13:00-13:00         13:00-24:00    verage Daily Traffic ADT (Vehicles per Dailorida Average Crash rate (Crashes per Nationa) traffic Base ctual Crash Rate (Crashes per Million Entritical Crash Rate (Crashes per Million Entritical Crash Rate (Crashes per Million Entritical Crash Location?? Actual Crash Rate and Crash Rate = $\frac{A \times 1,00}{V}$	5	2	1	8	9%	2.67	1.07					
July         August         September         October         November         December         AY OF THE WEEK         Sunday         Tuesday         Wednesday         Thursday         Friday         Saturday         OUR OF THE DAY         06:00-09:00         00:00-06:00         00:00-06:00         00:00-06:00         00:00-08:00         01:00-06:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         00:00-08:00         11:00-13:00         11:00-13:00         11:00-13:00         11:00-13:00         18:00-24:00         Verage Daily Traffic ADT (Vehicles per Dailorida Average Crash rate (Crashes per Million Er         riftic Base         ctual Crash Rate (Crashes per Million Er         ritical Crash	4	4	2	10	11%	3.33	1.20					
August         September         October         November         December         AY OF THE WEEK         Sunday         Monday         Tuesday         Wednesday         Wednesday         Thursday         Friday         Saturday         OUR OF THE DAY         00:00-08:00         00:00-08:00         00:00-09:00         09:00-11:00         11:00-13:00         13:00-13:00         13:00-18:00         13:00-18:00         18:00-24:00    verage Daily Traffic ADT (Vehicles per Dailon Ermitical Crash Rate (Crashes per Million Ermitical Crash Location??          Actual Crash Rate       Ax 1,000         V       V	2	1	3	6	6%	2.00	1.03					~
September October           November           November           December           AY OF THE WEEK           Monday           Tuesday           Wednesday           Friday           Saturday           OUR OF THE DAY           00:00-06:00           06:00-09:00           09:00-11:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-13:00           13:00-14:00           Verage Daily Traffic ADT (Vehicles per Daily Traffic Base           ctual Crash Rate (Crashes per Million Erritical Crash Rate (Crashes per Million Erritical Crash Rate (Crashes per Million Erritical Crash Location??           Actual Crash Rate Crash Rate = $\frac{A \times 1,00}{V}$	5	3	1	9	10%	3.00 4.00	0.87					X
October November December           AY OF THE WEEK         Sunday Monday Tuesday Wednesday Thursday Friday Saturday           OUR OF THE DAY         00:00-06:00 06:00-09:00 06:00-09:00 06:00-09:00 06:00-09:00 09:00-11:00 11:00-13:00 11:	2	3	2	12 8	13% 9%	2.67	0.89					X
November December           AY OF THE WEEK         Sunday Monday Tuesday Wednesday Friday Saturday           DUR OF THE DAY         00:00-08:00 06:00-09:00 09:00-11:00 11:00-13:00 13:00-15:00 15:00-18:00 18:00-24:00           verage Daily Traffic ADT (Vehicles per Date 0rida Average Crash rate (Crashes per Million Er ritical Crash Rate (Crashes per Million Er ritical Crash Rate (Crashes per Million Er ritical Crash Location??           Actual Crash Rate $\frac{A \times 1,00}{V}$	2	2	3	7	9 % 8%	2.33	1.02				^	^
December           AY OF THE WEEK         Sunday           Monday         Tuesday           Wednesday         Thursday           Thursday         Friday           Saturday         Saturday           OUR OF THE DAY         00:00-06:00           00:00-06:00         00:00-01:00           00:00-06:00         00:00-01:00           00:00-06:00         00:00-01:00           00:00-06:00         00:00-01:00           00:00-06:00         00:00-01:00           00:00-06:00         00:00-06:00           00:00-06:00         00:00-06:00           00:00-06:00         00:00-06:00           00:00-06:00         00:00-06:00           00:00-06:00         00:00-06:00           00:00-06:00         00:00-06:00           00:00-06:00         00:00-06:00           11:00-13:00         11:00:13:00           13:00-18:00         15:00-18:00           18:00-24:00         18:00-24:00           verage Daily Traffic ADT (Vehicles per Daily Traffic Base         ctual Crash Rate (Crashes per Million Er           ritical Crash Rate (Crashes per Million Er         atety Ratio           iigh Crash Location??         Actual Crash Rate = $\frac{A \times 1,000}{V}$ <td>3</td> <td>1</td> <td>4</td> <td>8</td> <td>9%</td> <td>2.67</td> <td>0.92</td> <td></td> <td></td> <td></td> <td>x</td> <td></td>	3	1	4	8	9%	2.67	0.92				x	
AY OF THE WEEK Sunday Monday Tuesday Wednesday Thursday Friday Saturday OUR OF THE DAY OUR OF THE DAY	0	2	3	5	5%	1.67	1.02				~	
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$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	6	5	2	13	14%	4.33	1.51				х	Х
$\begin{tabular}{ c c c c c c c c c c c c c c c c c c c$	10	3	6	19	21%	6.33	1.73					Х
Friday         Saturday         IOUR OF THE DAY         00:00-06:00         00:00-06:00         00:00-01:00         01:00-01:00         11:00-13:00         13:00-15:00         15:00-18:00         18:00-24:00	9	6	5	20	22%	6.67	1.58	3.29	3.62	Х	Х	Х
Saturday         OUR OF THE DAY $0:00-06:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $0:00-09:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-13:00$ $1:00-24:00$ $1:00-24:00$ Nearge Daily Traffic ADT (Vehicles per Dailor Environment (Crash Rate (Crashes per Million Envirtical Crash Rate (Crashes per Million Envirtical Crash Location??         Actual Crash Rate Crash Rate = $\frac{A \times 1,000}{V}$	7	2	5	14	15%	4.67	2.01	4.75	5.28	Х		
IOUR OF THE DAY         00:00:06:00           06:00:09:00         06:00:09:00           09:00:11:00         11:00:13:00           13:00:15:00         13:00           13:00:15:00         13:00           13:00:15:00         13:00           13:00:16:00         13:00           13:00:17:00         13:00           13:00:18:00         13:00:18:00           18:00:24:00         18:00:24:00           Werage Daily Traffic ADT (Vehicles per Dail         18:00:24:00           Norial Crash Rate (Crashes per Million Er         16:01:01:01:01:01:01:01:01:01:01:01:01:01:	3	2	4	9	10%	3.00	1.61	4.11	4.58	Х		
$\frac{06300-09300}{09300-11300}$ $\frac{11300-13300}{13300-15300}$ $\frac{13300-15300}{15300-15300}$ $\frac{15300-24300}{15300-24300}$ werage Daily Traffic ADT ( <i>Vehicles per Da</i> lorida Average Crash rate ( <i>Crashes per M</i> <i>india</i> Average Crash rate ( <i>Crashes per M</i> <i>india</i> Average Crash Rate ( <i>Crashes per Million Er</i> <i>indica</i> Crash <i>Rate</i> ( <i>Crashes per Million Er</i> <i>X</i>	3	4	2	9	10%	3.00	1.44	3.92	4.39	Х		
$\frac{09:00-11:00}{11:00-13:00}$ $\frac{13:00-15:00}{13:00-15:00}$ $\frac{13:00-15:00}{15:00-18:00}$ $\frac{15:00-18:00}{18:00-24:00}$ Nevrage Daily Traffic ADT ( <i>Vehicles per Da</i> Reverage Daily Traffic ADT ( <i>Vehicles per Da</i> Reverage Crash rate ( <i>Crashes per Million Er</i> Critical Crash Rate ( <i>Crashes per Million Er</i> Critical Crash Rate ( <i>Crashes per Million Er</i> <b>Safety Ratio</b> <b>digh Crash Location??</b> Actual Crash Rate = $\frac{A \times 1,000}{V}$	2	1	3	6	6%	2.00	1.06	3.35	3.79	X		
$\frac{11:00-13:00}{13:00-15:00}$ $\frac{15:00-18:00}{15:00-18:00}$ $\frac{15:00-18:00}{18:00-24:00}$ werage Daily Traffic ADT (Vehicles per Dailorida Average Crash rate (Crashes per Million Ericola Crashes Per Million Ericola Crashes Per Million Ericola Crash Rate (Crashes Per Million Ericola Crashes Per Million Ericola Crashes Per Million Ericola Crashes Per Million Ericola Crash Rate (Crashes Per Million Ericola Crashes Per Million Er	3	1	2	6	6%	2.00	1.41	3.71	4.16		v	v
$\frac{13:00-15:00}{15:00-18:00}$ $\frac{13:00-16:00}{15:00-18:00}$ $\frac{15:00-18:00}{15:00-18:00}$ $\frac{10:00}{16:00-24:00}$	3	5	1	9 10	10% 11%	3.00 3.33	1.21 1.14	2.70 3.11	2.99			X
$\frac{15:00-18:00}{18:00-24:00}$ werage Daily Traffic ADT (Vehicles per Dailorida Average Crash rate (Crashes per Million Ericital Crash Location?? $Actual Crash Rate = \frac{A \times 1,000}{V}$	4	3	2	10	16%	5.00	1.14	3.11	3.49 3.55			x
18:00-24:00         verage Daily Traffic ADT (Vehicles per Da         lorida Average Crash rate (Crashes per M         raffic Base         ctual Crash Rate (Crashes per Million Er         iritical Crash Rate (Crashes per Million Er         iafety Ratio         ligh Crash Location??         Actual Crash Rate = $\frac{A \times 1,00}{V}$	11	6	8	25	27%	8.33	2.24	5.01	5.54			X
verage Daily Traffic ADT (Vehicles per Da lorida Average Crash rate (Crashes per N raffic Base ctual Crash Rate (Crashes per Million Er vitical Crash Rate (Crashes per Million Er light Crash Location?? Actual Crash Rate = $\frac{A \times 1,000}{V}$	12	7	3	22	24%	7.33	3.35	7.67	8.50	x	A	~
lorida Average Crash rate (Crashes per M raffic Base ctual Crash Rate (Crashes per Million Er ritical Crash Rate (Crashes per Million Er afety Ratio ligh Crash Location?? Actual Crash Rate = $\frac{A \times 1,00}{V}$			Ŭ	~~~	2470	7.00	0.00	1.01	0.00	~		
lorida Average Crash rate (Crashes per M raffic Base cutual Crash Rate (Crashes per Million Er critical Crash Rate (Crashes per Million Er critical Crash Rate (Crashes per Million Er afety Ratio ligh Crash Location?? Actual Crash Rate = $\frac{A \times 1,000}{V}$					YEAR		3-Year					
lorida Average Crash rate (Crashes per M raffic Base ctual Crash Rate (Crashes per Million Er ritical Crash Rate (Crashes per Million Er afety Ratio ligh Crash Location?? Actual Crash Rate = $\frac{A \times 1,00}{V}$				1	2	3	Average					
lorida Average Crash rate (Crashes per M raffic Base cutual Crash Rate (Crashes per Million Er critical Crash Rate (Crashes per Million Er critical Crash Rate (Crashes per Million Er afety Ratio ligh Crash Location?? Actual Crash Rate = $\frac{A \times 1,000}{V}$	av)			27,093	29,449	32,010	29,517	1				
raffic Base ctual Crash Rate (Crashes per Million Err ritical Crash Rate (Crashes per Million Err <b>afety Ratio</b> <b>ligh Crash Location??</b> Actual Crash Rate = $\frac{A \times 1,000}{V}$		ntori== 1/	hial`	-				4				
Actual Crash Rate (Crashes per Million Error Artical Crash Rate (Crashes per Million Error Artety Ratio High Crash Location?? Actual Crash Rate = $\frac{A \times 1,000}{V}$	viiiion Ei	nering Vel	iicies)	0.757	0.757	0.757	0.757	4				
ritical Crash Rate (Crashes per Million En <b>afety Ratio</b> <b>ligh Crash Location??</b> Actual Crash Rate = $\frac{A \times 1,000}{V}$				9.889	10.749	11.683	10.774	1				
ritical Crash Rate (Crashes per Million En <b>afety Ratio</b> <b>ligh Crash Location??</b> Actual Crash Rate = $\frac{A \times 1,000}{V}$	nterina \	(ehicles)		4.045	2.512	2.225	2.927	1				
afety Ratio ligh Crash Location?? Actual Crash Rate = $\frac{A \times 1,00}{V}$	-	,				-		4				
<b>ligh Crash Location??</b> Actual Crash Rate = $\frac{A \times 1,00}{V}$	ntering \	venicies)		1.718	1.677	1.637	1.677	4				
Actual Crash Rate = $\frac{A \times 1,00}{V}$				2.355	1.498	1.359	1.737					
				YES	YES	YES	YES					
								-				
	000 000		Where:									
	,000	-	A = Tota	al number of	crashes or	r number of a	crashes by t	ype occurring	in a 1 year pe	eriod.		
Cuisical Carach Parts - AVD + 0.5			V = Ave	rage Annual	Daily Traffi	ic X 365						
Critical Create Pate - AVP   0.5												
CriticalCrash Pate = AVP   0.5												
$C_{nitian} C_{nan} h D_{nta} = A V D + 0.3 + 7$	AU	D	Where:									
CFUICOR FOSTROLP = AVR ++1	TF.	Λ		Average Stat	ewide Cras	sh Rate for a	particular ty	pe of intersec	tion or roadwa	av segment		
TB	T \ TF	}		affic Base					r	, ,		-
				st Factor (z-	value)				Confidence I		Constant Z	
				96 (assume		idence l eval	for RI IRAJ	areas)	68.30		1.00	
$Traffic Base = \frac{Years \times ADT \times 36}{1,000,000}$	55			29 (assume					86.60		1.50	
1 1000 000 = -1000 000			= 3.	LJ (03501118	JJ.JJ /0 UL	ormuence Le		a.cas/	90.00 95.00		1.64 1.96	
1,000,000									95.50		2.00	
									98.80		2.50	
$Safety Ratio = \frac{Actual Crash}{Critical Crash}$	n	_							99.00	)	2.58	
Critical Crash	Rate								99.70 99.95		3.00 3.29	

## Table 5 – Crash Analysis – W 20 Avenue and W 60 Street

# Table 6 – Abnormal Crash Details & CountermeasuresW 20 Avenue and W 60 Street

Total Boy:         Total B		(4 Lane x 2 L	ane, Signalized, W	20 Aven ith Turn La				22) - URE	BAN Spot		
Term         Term <th< th=""><th></th><th></th><th></th><th>NUMBE</th><th></th><th>ASHES</th><th>3 YEAR</th><th>%</th><th>MEAN</th><th></th><th></th></th<>				NUMBE		ASHES	3 YEAR	%	MEAN		
Itea How and contract         Optimal Cont					YEAR		TOTAL	of	Accidents		Counter- measure(s
Highing Condition         DomeSbath         C <td></td> <td>Total Rear Er</td> <td>nd Crashes</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>14.33</td> <td></td> <td></td>		Total Rear Er	nd Crashes						14.33		
Bear End         Barbon         Barbo		Lighting Conditions								(8)	
Bear End         Hours of Day (100)		Eighting Conditions									
House of Day         House of Day<											
Picka ci Day Houra of Day <td></td> <td></td>											
Image: biology of the second	Rear End	Hours of Day	11:00 - 13:00					7%	1.00		
Image: biology of the sector of the							-				
Direction         Sum         1         2         1         4         9%         1333 100           Intervent         Note: For Assets         Note:			18:00 - 24:00	8	4	0		29%	4.00		
Direction         East         6         5         4         15         25%         50%           Mundle FL OF DI- Lighting Crasting         Number of Direction         Stream         5         4         10         25%         50%         50%         60%           Lighting Crasting         Total Angle Crasting         Total Angle Crasting         0											
Image: constraint of the		Direction									
Intelline in the second seco											
Image: Construct to the construct			Unknown	U	U	0	0	0%	0.00		
Total Angle Combine         201         2012         2013         CRASHES         Total Angle Combine         Company         Company </td <td></td> <td></td> <td></td> <td>NUMBE</td> <td></td> <td>ASHES</td> <td></td> <td></td> <td></td> <td></td> <td>Counter-</td>				NUMBE		ASHES					Counter-
Angle         Lighting Conditions         Day Light         6         6         3         15         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         6000         71%         <		Tatal Assals	Overhan							_	
Lighting Conditions         Deam         0		Total Angle									_
Angle         Bit of the bit of th		Lighting Conditions	Dawn	0	0	0	0	0%	0.00		
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Angle         Hours of Day         0030 - 11 300 1300 - 120 0         1         3         0         4         1956 - 1056 - 1030 0           Bit EB         2         0         0         2         0         0         1         130 - 1056 -											
Anglo         1300 1500         2         1         2         5         24%         167           1500 1500         2         0         0         0         105         105         105           N11 150         2         0		Hauna - ( Davi	09:00 - 11:00	1	3	0	4	19%	1.33		
Isoo 1800         1         2         0         3         14%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%         11%         10%         10%	Angle	Hours of Day									
Image: Non-24-00         2         0         0         2         10%         0.07%         0.07%           Direction         B3 + EB         1         0			15:00 - 18:00	1	2	0	3	14%	1.00		
Birection         NB + WB Et S         3 1         1 0         4 0         8 0         88% 50         257 503           MUMEER CF CRASHES Data Name         NUMEER CF CRASHES 2013         NYEAL 0         0 0         MEAN 00         Count Count 000           Total Left Turn Crashes         9 0         0 0			18:00 - 24:00					10%	0.67		
Direction         BB r EB Unknown         1 0         0 0         1 0											
Image: constraint of the second sec		Direction	SB + EB	1		0	1	5%			
Image: constraint of the second sec											
Total Left Turn         Total Left Turn         Cashes         Cashes <td></td> <td></td> <td>CHRIOWH</td> <td></td> <td></td> <td></td> <td></td> <td>078</td> <td></td> <td></td> <td></td>			CHRIOWH					078			
Total Left Turn         Total Left				NUMBE		ASHES				Possible	Counter-
Image: condition in the condition of the condition				2011		2013				Cause(s)	measure(s
Lighting Condition         Dawn         0	_	Total Left Tu		5	5	1	11	100%	3.67		-
Left Turn         Dark         0         1         0         1         9%         0.33           Hours of Day         0000-05:00         0		Lighting Conditions								(14)	
Left Turn         00:00:09:00         1         0         0         1         9%         0.33 0.0           Hours of Day         11:00:15:00         0         1         1         1         2         18%         0.67 0.00           13:00:15:00         2         0         0         1         1         2         18%         0.67 0.630           13:00:15:00         2         0         0         1         1         9%         0.33 0.67           13:00:15:00         2         0         0         1         0         5         45%         1.67           13:00:15:00         0		-99	Dark	0	1		1	9%			
Left Turn         Hours of Day         00:00:11:00         0 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>											
Left Turn         Hours of Day 15:00 1:3:00         10         1         1         2         18%         0.67           15:00 1:8:00         2         3         0         5         45%         1.67           18:00 -20         0         1         0         1         9%         0.637           18:00 -20         0         1         0         1         45%         1.09           18:00 -20         0         1         0         3         45%         1.09           18:00 -20         0<											
Total Pight Turn         Total Pight P	Left Turn	Hours of Day	11:00 - 13:00								
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Bit - SB         4         1         0         5         45%         1.67           B - EB         1         0         2         0         2         18%         0.67           B - BB         0         2         0         2         18%         0.67           B - BB         0         2         0         2         18%         0.67           Unknown         0 <th< td=""><td></td><td></td><td>18:00 - 24:00</td><td>0</td><td>1</td><td></td><td>1</td><td>9%</td><td>-</td><td></td><td></td></th<>			18:00 - 24:00	0	1		1	9%	-		
Birection         Birection         Birection         I         0         0         1         9%         0.33           Unknown         0											
Image: Normal base in the second se		Direction									
Right Turn         Total Right Turn Crashes         1         0         1         2         100%         0.6.7         0.0.6											
Total Right Turn Crashes         1         00         1         2011         2012         2013         CRASHES         Total         Per Year         Cause()         Cause()         measu()           Lighting Conditions         Dawn         0         0         1         1         50%         0.33         (9)         9           Lighting Conditions         Dawn         0			Unknown								
Right Turn         Total Right Turn Crashes         1         0         1         2         100%         0.67         0.67         0.9         0.9           Lighting Conditions         Day Light         0         0         1         1         50%         0.33         0.00         0				NUMBE			3 YEAR	%	MEAN		
Bight Turn         Day Light Lighting Conditions         Day Dawn Dark         0         0         1         1         50% 0         0.33 0.00           Hours of Day         Daven Dark         1         0         0         0         0         0.33           Hours of Day         00.00 06:00         0         0         0         0         0         0         0.33           Hours of Day         11:00 - 13:00         0						ASHES	τοται		Accidente		Counter-
Right Turn         Lighting Conditions         Dawn         0 <t< td=""><td></td><td></td><td></td><td>2011</td><td>YEAR</td><td></td><td></td><td>of</td><td></td><td></td><td>Counter- measure(s</td></t<>				2011	YEAR			of			Counter- measure(s
Bight Turn         Dark         1         0         0         1         50%         0.33           Hours of Day         00:0 - 06:00         0		Total Right Tu		1	YEAR 2012 0	2013 1	CRASHES 2	of Total 100%	per Year 0.67	Cause(s)	measure(s
Bight Turn         Hours of Day         0         0         0         0         0         0         0%         0.00           11:00 - 13:00         0         0         0         0         0         0%         0.00           13:00 - 15:00         0         0         0         0         0         0%         0.00           13:00 - 15:00         0         0         0         1         1         50%         0.33           15:00 - 18:00         0         0         0         0         0         0.06         0.06           15:00 - 18:00         0         0         0         0         0         0.07%         0.00           18:00 - 24:00         1         0         0         0         0         0         0.07%         0.00           0         0         0         0         0         0         0         0         0.07%         0.00           Bior 24:00         1         0         <			DayLight	1 0	YEAR 2012 0	2013 1 1	CRASHES 2 1	of <u>Total</u> 100% 50%	per Year 0.67 0.33	Cause(s)	measure(s
Night Turn         Hours of Day         09.00 - 11:00         0         0         0         0         0         0%         0.00           13:00 - 15:00         0         0         0         0         0         0%         0.00           13:00 - 15:00         0         0         0         0         0%         0.00           13:00 - 18:00         0         0         0         0         0%         0.00           18:00 - 24:00         1         0         1         1         50%         0.33           18:00 - 24:00         1         0         1         2         100%         0.67           Bistore zero         NB—EB         0         0         0         0         0%         0.00           WBNB         0         0         0         0         0         0         0%         0.00           Unknown         0         0         0         0         0         0         0         0         0           Unknown         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0<			Day Light Dawn Dark	1 0 0 1	YEAR 2012 0 0 0 0	<b>2013</b> <b>1</b> 0 0	CRASHES 2 1 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	of <u>Total</u> 100% 50% 0% 50%	per Year           0.67           0.33           0.00           0.33	Cause(s)	measure(s
Night Turn         Hours of Day Hours of Day 13:00 - 15:00         11:00 - 13:00 0         0         0         0         0         0%         0.00 0.33           15:00 - 18:00         0         0         0         0         0         0         0.00         0%         0.00           18:00 - 24:00         1         0         0         1         50%         0.33           Direction         BB-EB         1         0         0         0         0.00         0%         0.00           Direction         WB-NB         0         0         0         0         0         0%         0.00           SB-WB         0         <	-		Day Light Dawn Dark 00:00 - 06:00	1 0 0 1 0	YEAR 2012 0 0 0 0 0	<b>2013</b> 1 1 0 0 0 0	CRASHES 2 1 0 1 0	of <u>Total</u> 100% 50% 0% 50% 0%	<b>per Year</b> 0.67 0.33 0.00 0.33 0.00	Cause(s)	measure(s
Sideswipe (Overtake)         Total Sideswipe Crashes         5         3         4         12         100%         0.00           Bio0 - 15:00         0         0         0         0         0         0         0.33           18:00 - 24:00         1         0         0         1         50%         0.33           Direction         BB-EB         1         0         1         2100%         0.67           WB-NB         0         0         0         0         0         0         0.06           WB-NB         0         0         0         0         0         0         0           Unknown         0         0         0         0         0         0         0           VERA         2011         2012         2013         CRASHES         NetAn Per Vear         Accidents per Vear         Cause(s)         measu           10         0 <td>-</td> <td>Lighting Conditions</td> <td>Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00</td> <td>1 0 1 0 0</td> <td>YEAR 2012 0 0 0 0 0 0</td> <td><b>2013</b> 1 1 0 0 0 0 0</td> <td>CRASHES 2 1 0 1 0 0 0 0</td> <td>of Total 100% 50% 0% 50% 0%</td> <td>per Year           0.67           0.33           0.00           0.33           0.00           0.33           0.00</td> <td rowspan="2">Cause(s)</td> <td>measure(s</td>	-	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00	1 0 1 0 0	YEAR 2012 0 0 0 0 0 0	<b>2013</b> 1 1 0 0 0 0 0	CRASHES 2 1 0 1 0 0 0 0	of Total 100% 50% 0% 50% 0%	per Year           0.67           0.33           0.00           0.33           0.00           0.33           0.00	Cause(s)	measure(s
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Direction         WBNB         0         0         0         0         0         0%         0.00           BWB         0         0         0         0         0%         0.00         0%         0.00           Unknown         0         0         0         0         0%         0.00         0%         0.00           WIMB-WOWN         0         0         0         0%         0.00         0%         0.00           Unknown         0         0         0         0         0%         0.00         0%         0.00           Unknown         0         0         0         0         0         0%         MeAN of Cause(s)         Perspector         Count measure           Zoll1         2012         2013         4         12         100%         4.00         8           Lighting Conditions         DayLight         4         3         4         11         92%         3.67           DayLo         Dayn/Dusk         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0 <td>Right Turn</td> <td>Lighting Conditions</td> <td>Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00</td> <td>1 0 1 0 0 0 0 0 0 0 1</td> <td>YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>2013 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>CRASHES 2 1 0 0 0 0 0 0 1 0 1 1</td> <td>of Total 100% 50% 0% 0% 0% 0% 0% 50% 50%</td> <td>per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33</td> <td>Cause(s)</td> <td>measure(s</td>	Right Turn	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	1 0 1 0 0 0 0 0 0 0 1	YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0	2013 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES 2 1 0 0 0 0 0 0 1 0 1 1	of Total 100% 50% 0% 0% 0% 0% 0% 50% 50%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33	Cause(s)	measure(s
Sideswipe (Overtake)         Total Sideswipe Crashes         5         3         4         12         100%         0.00         0 <th< td=""><td>Right Turn</td><td>Lighting Conditions</td><td>Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB</td><td>1 0 0 0 0 0 0 0 0 0 1 1</td><td>YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>2013 1 0 0 0 0 0 0 1 0 1 1</td><td>CRASHES 2 1 0 0 0 0 0 1 1 2</td><td>of Total 100% 50% 0% 50% 0% 50% 0% 50% 100%</td><td>per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67</td><td>Cause(s)</td><td>measure(s</td></th<>	Right Turn	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB	1 0 0 0 0 0 0 0 0 0 1 1	YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0	2013 1 0 0 0 0 0 0 1 0 1 1	CRASHES 2 1 0 0 0 0 0 1 1 2	of Total 100% 50% 0% 50% 0% 50% 0% 50% 100%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67	Cause(s)	measure(s
NUMBER OF CRASHES         3 YEAR TOTAL CRASHES         MEAN Accidents per Year         Possible Cause(s)         Count measure           Total Sideswipe Crashes         5         3         4         12         100%         4.00         6.00         8           Lighting Conditions (Overtake)         Day Light Dark         4         3         4         11         92%         3.67         0.00         8         19           Bideswipe (Overtake)         Day Light Dark         1         0	Right Turn	Lighting Conditions	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           13:00 - 15:00           15:00 - 18:00           18:00 - 24:00           NB→EB           EB→SB           WB→NB	1 0 0 1 0 0 0 0 0 0 1 1 0 0 0	YEAR           2012           0	2013 1 1 0 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES 2 1 0 0 1 0 0 0 0 1 1 0 1 2 0 0 0 0 0 0	of Total 100% 50% 0% 0% 0% 0% 0% 50% 0% 50% 100% 0%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00	Cause(s)	measure(s
VEAR         Of Total of Accidents Counts of Cause(s)         Possible Counts of Cause(s)         reading to the count of the cause of the ca	Right Turn	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB	1 0 1 0 0 0 0 0 0 1 1 1 0 0 0 0	YEAR           2012           0	2013 1 1 0 0 0 0 0 1 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES           2           1           0	of Total 100% 50% 0% 0% 0% 0% 0% 50% 0% 50% 100% 0% 0% 0%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.00           0.00	Cause(s)	measure(s
Sideswipe (Overtake)         Hours of Day         Day 13:00 - 15:00         O         1         1         2013         CRASHES         Total         per Year         Cause(s)         measure measure           Sideswipe (Overtake)         Total Sideswipe Crashes         5         3         4         12         100%         4.00         (8)         8           Lighting Conditions         Day Light         4         3         4         11         92%         3.67         (8)         19           Dark         1         0         0         0         0         0%         0.00         0%         0.00         19         19         19         19         19         10         10         1         8%         0.33         119         119         119         10         1         8%         0.33         119         119         119         10         1         8%         0.33         119         119         119         119         110         110         110         110         110         110         110         110         110         110         110         110         110         110         110         110         110         110         1110         110	Right Turn	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB	1 0 0 1 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0	YEAR           2012           0	2013 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES 2 1 1 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0	of Total 100% 50% 0% 0% 0% 0% 0% 50% 0% 50% 100% 0% 0% 0%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00	Cause(s)	measure(s
Sideswipe (Overtake)         Day Light Lighting Conditions         Day Light Dawn/Dusk         4         3         4         11         92%         3.67         19           Sideswipe (Overtake)         Lighting Conditions         Dawn/Dusk         0         0         0         0         0%         0.00           Hours of Day         0:00 - 06:00         0         0         0         0         0%         0.00           11:00 - 11:00         0         1         0         1         8%         0.33           11:00 - 13:00         1         1         0         1         8%         0.33           15:00 - 18:00         3         0         1         4         33%         1.33           16:00 - 24:00         1         1         1         3         25%         1.00           Direction         South         0         0         1         4         33%         1.33           10         1         1         1         3         25%         1.00           18:00 - 24:00         1         1         1         3         4%         0.33           10         1         1         1         8%         0.33 <td< td=""><td>Right Turn</td><td>Lighting Conditions</td><td>Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB</td><td>1 0 0 1 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0</td><td>YEAR           2012           0<!--</td--><td>2013 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>CRASHES 2 1 1 0 0 0 0 0 0 1 1 2 0 0 0 0 0 0 0 0</td><td>of           Total           100%           50%           0%</td><td>per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00</td><td>Cause(s) (9) Possible</td><td>easure(s</td></td></td<>	Right Turn	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB	1 0 0 1 0 0 0 0 0 0 0 1 1 1 0 0 0 0 0 0	YEAR           2012           0 </td <td>2013 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>CRASHES 2 1 1 0 0 0 0 0 0 1 1 2 0 0 0 0 0 0 0 0</td> <td>of           Total           100%           50%           0%</td> <td>per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00</td> <td>Cause(s) (9) Possible</td> <td>easure(s</td>	2013 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES 2 1 1 0 0 0 0 0 0 1 1 2 0 0 0 0 0 0 0 0	of           Total           100%           50%           0%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00	Cause(s) (9) Possible	easure(s
Sideswipe (Overtake)         Lighting Conditions         Dawn/Dusk         0         0         0         0         0         0%         0.00           Bideswipe (Overtake)         Dark         1         0         0         1         8%         0.33           Hours of Day         00:00 - 06:00         0         0         0         0         0%         0.00           10:00 - 10:00         0         0         0         0         0%         0.00           11:00 - 10:00         0         1         0         0         0%         0.00           11:00 - 13:00         1         1         1         3         25%         1.00           15:00 - 18:00         3         0         1         4         33%         1.33           18:00 - 24:00         1         1         1         3         25%         1.00           Direction         East         1         0         1         4         33%         1.33	Right Turn	Lighting Conditions Hours of Day Direction	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 15:00           15:00 - 15:00           15:00 - 24:00           NBEB           EBSB           WBNB           SBWB           Unknown	1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2013 1 0 0 0 0 0 1 0 1 0 0 1 0 0 0 0 ASHES 2013	CRASHES 2 1 1 0 1 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0	of Total 100% 50% 0% 50% 0% 0% 0% 0% 50% 0% 50% 100% 0% 0% 0% 0% 0%	per Year           0.67           0.33           0.00           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.67           0.33           0.67           0.00	Cause(s) (9) Possible Cause(s)	Counter- measure(s
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Right Turn	Lighting Conditions Hours of Day Direction	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           13:00 - 15:00           15:00 - 24:00           NB→EB           EB→SB           WB→NB           SB→WB           Unknown	1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	2013 1 1 0 0 0 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES           2           1           0           0           0           0           1           0           1           0           1           0           1           2           0           0           0           0           0           0           0           0           0           0           0           0           0           0           12	of Total 100% 50% 0% 50% 0% 0% 50% 0% 50% 0% 50% 0% 0% 0% 0% 0% 0% 0% 0% 0%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Right Turn	Lighting Conditions Hours of Day Direction Total Sideswi	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           13:00 - 11:00           11:00 - 13:00           13:00 - 15:00           18:00 - 24:00           NB→EB           EB→SB           WB→NB           Junknown	1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           3           0	2013 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES 2 1 1 0 1 0 0 0 0 1 0 0 1 1 2 0 0 0 0 0	of           Total           100%           50%           0%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
Sideswipe (Overtake)         Hours of Day $09:00 - 11:00$ 0         1         0         1         8%         0.33           11:00 - 13:00         1         1         1         3         25%         1.00           13:00 - 15:00         0         0         1         1         3         25%         1.00           16:00 - 18:00         3         0         1         4         33%         1.33           18:00 - 24:00         1         1         1         3         25%         1.00           Direction         East         1         0         1         8%         0.33	Right Turn	Lighting Conditions Hours of Day Direction Total Sideswi	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           15:00 - 18:00           15:00 - 24:00           NB→EB           EB→SB           WB→NB           SB→WB           Unknown	1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           3           0           0	2013 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES           2           1           0           0           0           0           0           0           1           0           0           1           0           0           0           0           0           0           0           0           0           0           0           0           0           1           11           0           1	of           Total           100%           50%           0%           55%           0f           Total           100%           92%           0%           8%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           3.67           0.00           0.33	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
Sideswipe (Overtake)         Hours of Day         11:00-13:00         1         1         1         3         25%         1.00           13:00-15:00         0         0         1         1         8%         0.33           15:00-18:00         3         0         1         4         33%         1.33           18:00-24:00         1         1         1         3         25%         1.00           Direction         East         1         0         1         1         8%         0.33	Right Turn	Lighting Conditions Hours of Day Direction Total Sideswi	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           13:00 - 15:00           18:00 - 24:00           NB → EB           EB → SB           WB → NB           Unknown           Day Light           Day Light           Day Light           Day Light           Day Light           Day Light           Dawn/Dusk           Dark           00:00 - 06:00	1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           2012           3           0           0           0	2013 1 1 0 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES         2           1         0           0         0           0         0           0         0           0         0           1         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           12         11           0         1           0         0	of           Total           100%           50%           0%           50%           0%	Mer         Year           0.67         0.33           0.00         0.33           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.33         0.00           0.33         0.67           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.33         0.00	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		Lighting Conditions Hours of Day Direction Total Sideswi Lighting Conditions	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           13:00 - 15:00           15:00 - 18:00           18:00 - 24:00           NB-EB           EB-SB           WB-NB           SB-WB           Unknown           Day Light           Day/Dark           Day           Dark           Dark           00:00 - 06:00           06:00 - 09:00	1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           1	2013 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES         2           1         0           0         0           0         0           0         0           1         0           0         0           1         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         1           0         0           1         1	of Total 100% 50% 0% 50% 0% 0% 0% 50% 100% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	Met Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
18:00 - 24:00         1         1         1         3         25%         1.00           North         2         2         0         4         33%         1.33           South         0         0         1         1         8%         0.33           Direction         East         1         0         1         2         17%         0.67	Sideswipe	Lighting Conditions Hours of Day Direction Total Sideswi Lighting Conditions	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 15:00           13:00 - 15:00           15:00 - 18:00           15:00 - 24:00           NB→EB           EB→SB           WB→NB           SB→WB           Unknown           Dawn/Dusk           Dawn/Dusk           Dawn/Dusk           Dawn/Dusk           Davn/Dusk           Davn/Dusk <t< td=""><td>1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>YEAR           2012           0           1</td><td>2013 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0</td><td>CRASHES         2           1         0           0         0           0         0           0         1           0         0           1         0           0         1           2         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           11         1           0         0           0         1           3         3</td><td>of           Total           100%           50%           0%           50%           0%      0</td><td>per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           1.00</td><td>Cause(s) (9) Possible Cause(s)</td><td>Counter- measure(s 8</td></t<>	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           1	2013 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES         2           1         0           0         0           0         0           0         1           0         0           1         0           0         1           2         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           11         1           0         0           0         1           3         3	of           Total           100%           50%           0%           50%           0%      0	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           1.00	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
South         0         0         1         1         8%         0.33           Direction         East         1         0         1         2         17%         0.67	Sideswipe	Lighting Conditions Hours of Day Direction Total Sideswi Lighting Conditions	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 15:00           15:00 - 18:00           18:00 - 24:00           NB → EB           EB → SB           WB → NB           SB → WB           Unknown           Dark           Dary/Dusk           Dark           00:00 - 06:00           09:00 - 11:00           11:00 - 13:00	1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR 2012 0 0 0 0 0 0 0 0 0 0 0 0 0	2013 1 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES           2           1           0           1           0           0           1           0           0           1           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           11           0           1           1           0           1           3           1	of Total 100% 50% 0% 50% 0% 0% 0% 0% 0% 0% 0% 0% 0%	Mer         Year           0.67         0.33           0.00         0.33           0.00         0.00           0.33         0.00           0.00         0.00           0.33         0.00           0.33         0.00           0.33         0.67           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.00           0.00         0.33           0.00         0.33           0.00         0.33           0.00         0.33	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
Direction East 1 0 1 2 17% 0.67	Sideswipe	Lighting Conditions Hours of Day Direction Total Sideswi Lighting Conditions	Day Light           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           15:00 - 18:00           18:00 - 24:00           NB → EB           EB → SB           WB → NB           SB → WB           Unknown           Dark           00:00 - 06:00           06:00 - 09:00           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 15:00           13:00 - 15:00           13:00 - 15:00           15:00 - 18:00	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           1           1           1	2013 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES           2           1           0           11           0           11           0           1           1           3	of           Total           100%           50%           0%           55%           0%	Per Year           0.67           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           1.00	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
	Sideswipe	Lighting Conditions Hours of Day Direction Total Sideswi Lighting Conditions	Day Light           Dawn           Dawn           Oci00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           13:00 - 15:00           15:00 - 18:00           18:00 - 24:00           NB → EB           EB → SB           WB → NB           Dawn/Dusk           Day Light           Dawn/Dusk           Dark           00:00 - 06:00           09:00 - 11:00           11:00 - 13:00           13:00 - 18:00           15:00 - 18:00           18:00 - 24:00	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           0           1           0           1           2	2013 1 1 0 0 0 0 1 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES         2           1         0           0         0           0         0           0         0           1         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           11         0           0         1           3         1           4         3           4         4	of Total 100% 50% 0% 50% 0% 0% 50% 0% 50% 0% 50% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           3.67           0.00           0.33           0.00           0.33           0.00           0.33           1.00           0.33           1.33	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8
West         2         1         2         5         42%         1.67           Unknown         0         0         0         0         0%         0.00	Sideswipe	Lighting Conditions Hours of Day Direction Total Sideswi Lighting Conditions Hours of Day	Day Light           Dawn           Dawn           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 13:00           15:00 - 18:00           15:00 - 24:00           NB→EB           EB→SB           WB→NB           SB→WB           Unknown           Day Light           Dayn/Dusk           Dark           00:00 - 06:00           06:00 - 09:00           09:00 - 11:00           11:00 - 11:00           11:00 - 15:00           15:00 - 18:00           18:00 - 24:00           North           South	1           0           1           0           3           1           2           0	YEAR           2012           0           1           0           1           2           0	2013 1 1 0 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	CRASHES           2           1           0           1           0           1           0           1           0           1           1           3           4           1	of Total 100% 50% 0% 50% 0% 0% 0% 0% 50% 100% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 8% 8% 8% 8% 8% 8% 33% 33%	per Year           0.67           0.33           0.00           0.33           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.67           0.00           0.33           0.67           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           1.00           0.33           1.33           1.33	Cause(s) (9) Possible Cause(s)	Counter- measure(s 8

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 2.355, 1.498, and 1.359, respectively. The safety ratio for the three years averaged 1.737. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.

From this analysis it was determined that rear end, angle, right-turn, and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 6*.

## 3.1.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 20 Avenue & W 60 Street were performed on a typical weekday on May 20, 2014. A summary of the traffic data is presented in *Figure 3*, and the field review is presented in *Figure 4*.

This intersection has single left-turn bays for all approaches. The signal operation is protected/permissive for east/west approaches, and permissive for north/south left-turn traffic. Retro-reflective backplates are installed on the left-turn signals on the north and south mast arms. Queue was noticed for southbound left-turn vehicles.

A strip mall is present at this intersection with driveways located very close that generate potential conflicts with the other movements. Pavement markings at all four legs are faded. Lot of Impatient drivers and red light running was observed at the intersection.

## 3.1.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 20 Avenue & W 60 Street, the following is recommended:

- Refurbishing of pavement markings including crosswalks using thermoplastic painting at all four legs.
- Providing ADA approved pedestrian ramps at all corners.
- Provide high visibility ladder crosswalks.
- Add pedestrian crosswalk on the east leg.
- Install pedestrian signals and push buttons.
- Paint the nose of the concrete separator on the west leg yellow.
- Provide street light on the south leg.
- Lengthen the southbound left-turn lane to about 220 feet.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 5.

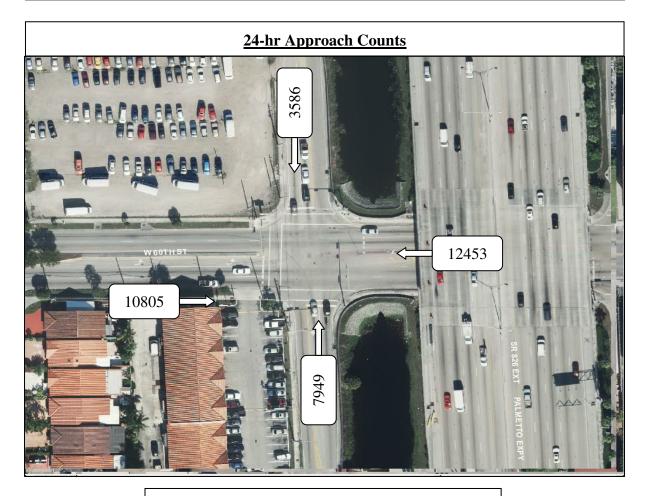


### 3.1.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$155,064. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





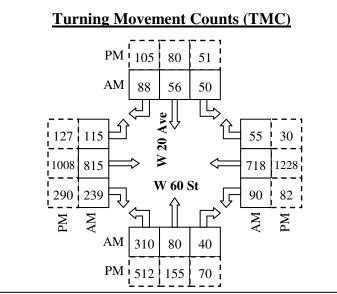


Figure 3: Traffic Data – W 20 Avenue and W 60 Street



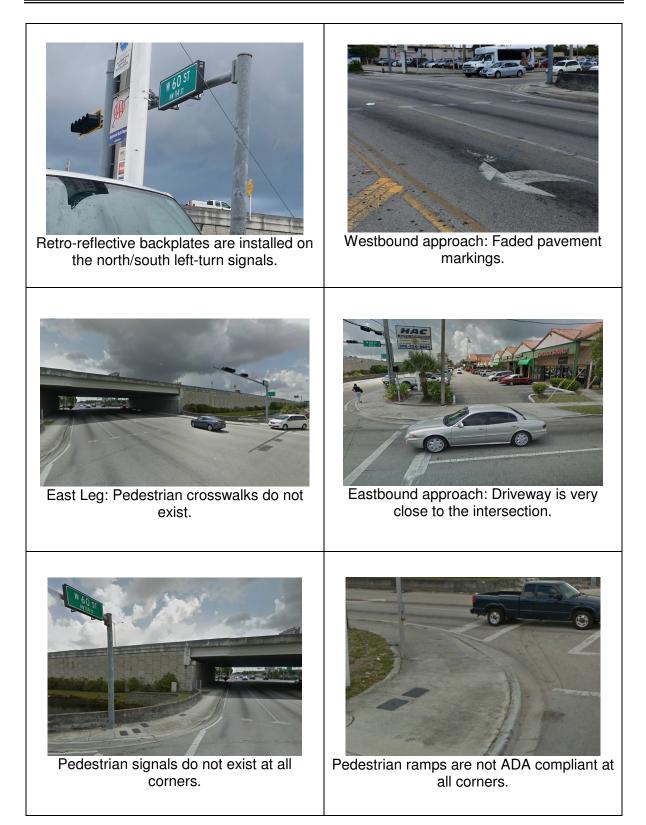


Figure 4: Field Review – W 20 Avenue and W 60 Street



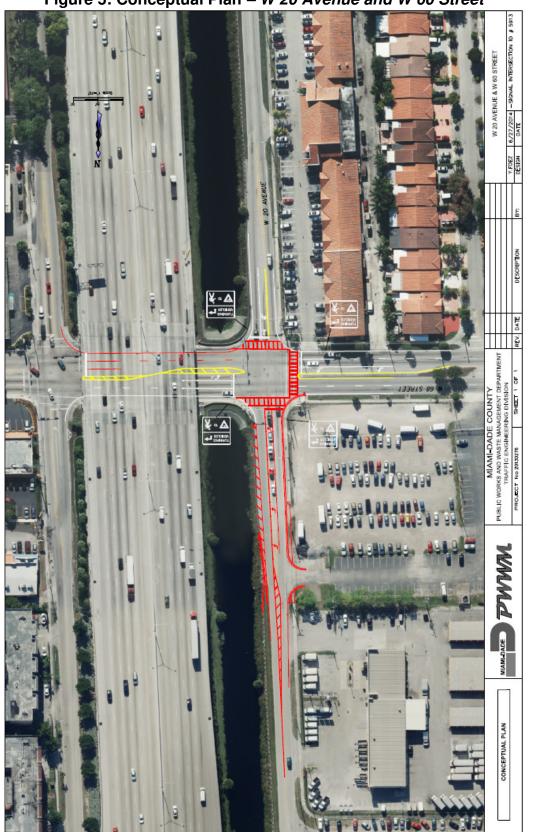


Figure 5: Conceptual Plan – W 20 Avenue and W 60 Street



## 3.2. W 24 Avenue and W 60 Street

#### 3.2.1. Site Description

This intersection is a signalized four legged intersection located within the City of Hialeah in the northwest area of Miami Dade County. West 24 Avenue is mostly a two lane urban local road that runs north-south from West 52 Street to West 84 Street. West 60 Street is an east-west road that varies in lane configuration but at the studied intersection exhibits four lanes with a raised center median.

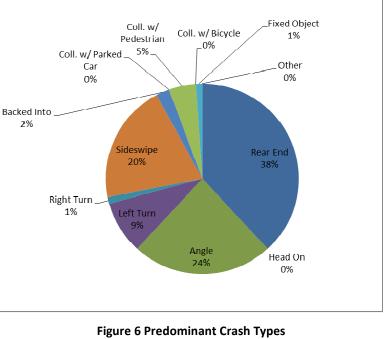
### 3.2.2. Safety Conditions and Analysis

The intersection of W 24 Avenue and W 60 Street is ranked number 2 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 89 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 30. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 6*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2007



W 24 AVE & W 60 ST

FDOT's "Expected Value Analysis." *Table 7* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.304, 1.522, and 1.525, respectively. The safety ratio for the three years averaged 1.451. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.

		(4   005	x 21 on-	Signali-			W 60 Stre		22) - URBAN	Spot			
		· ·									4010014		0040115
	TYPE OF CRASH		R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents	MEAN	ANNUAL CF	95th	Mean	90th	95th
COLLISION TYPE	Rear End	2011 6	2012 14	2013 14	CRASHES 34	Total 38%	11.33	2.76	Percentile 6.48	7.20	х	Percentil X	Percenti X
	Head On	0	0	0	0	0%	0.00	0.24	0.85	0.97			
	Angle	5	10	6	21	24%	7.00	2.36	6.25	6.99	X	X	X
	Left Turn Right Turn	5	0	3	8	9% 1%	2.67 0.33	1.53	4.51 0.44	5.08 0.51	X		
	Sideswipe	7	6	5	18	20%	6.00	1.01	2.67	2.99	X	x	x
	Backed Into	0	1	1	2	2%	0.67	0.13	0.53	0.61	Х	X	X
	Coll. w/ Parked Car Coll. w/ Pedestrian	0	0	0	0 4	0% 4%	0.00	0.03 0.20	0.25	0.30 0.76	x	x	x
	Coll. w/ Bicycle	0	0	0	0	0%	0.00	0.20	0.33	0.38	~	^	^
	Fixed Object	0	0	1	1	1%	0.33	0.40	1.22	1.37			
	Ran Off Road Overtuned	0	0	0	0	0%	0.00	0.02	0.16	0.19			
	Overtuned Other	0	0	0	0	0% 0%	0.00	0.04 2.78	0.23 7.62	0.27 8.55			
	Total Crashes	25	31	33	89	100%	29.67	11.67	25.59	28.26	Х	X	X
EVERITY	PDO crashes	21	28	25	74	83%	24.67	6.22	15.03	16.72	Х	X	Х
	Fatal crashes	0	0	0	0	0%	0.00	0.08	0.35	0.41			
IGHT CONDITIONS	Injury crashes Day Light	4	3 26	8 23	15 66	17% 74%	5.00 22.00	9.77 7.66	23.15 16.74	25.72 18.47	х	x	x
	Dusk	0	0	0	00	0%	0.00	0.32	0.99	1.12	^		<u> </u>
	Dawn	1	0	0	1	1%	0.33	0.15	0.55	0.63	Х		
	Dark	7	5	10	22	25%	7.33	3.39	8.73	9.76	Х		
JRFACE CONDITIONS	Unknown	0 24	0 28	0 26	0 78	0% 88%	0.00 26.00	0.14 9.86	0.70 21.75	0.80 24.03	x	- v	x
URFACE CONDITIONS	Wet	24	3	20	11	12%	3.67	1.59	3.55	3.93	X	X X X X X X X X X X X X X X X X X X	<u>^</u>
	Others	0	0	0	0	0%	0.00	0.22	0.80	0.92			
ONTH OF A YEAR	January	6	2	1	9	10%	3.00	0.82	2.23	2.49	Х	X X X X X X X X X X X X X X X X	X
	February	1	1	7	9	10%	3.00	0.81	2.03	2.26	X		X
	March April	2	6	4	12 5	13% 6%	4.00 1.67	1.13 1.07	2.67 2.70	2.97 3.01	X X		X
	May	4	2	2	8	9%	2.67	1.20	3.01	3.35	X		
	June	3	2	2	7	8%	2.33	1.03	2.57	2.86	Х		
	July	0	2	1	3	3%	1.00	0.87	2.10	2.34	X		
	August	1	3	2	6	7%	2.00 2.67	0.89	2.26	2.52	X X	~	x
4	September October	1	5	2	8	9% 7%	2.07	0.88	2.03 2.45	2.25 2.72	X	^	^
	November	2	2	5	9	10%	3.00	0.92	2.43	2.72	X	X	X
	December	1	3	3	7	8%	2.33	1.02	2.67	2.99	Х		
AY OF THE WEEK	Sunday	3	2	5	10	11%	3.33	1.78	3.77	4.15	X		
	Monday Tuesday	2	2	5 4	9 8	10% 9%	3.00 2.67	1.51 1.73	3.56 4.18	3.95 4.65	X		
	Wednesday	1	7	7	15	17%	5.00	1.58	3.29	3.62	x	x	x
	Thursday	1	8	3	12	13%	4.00	2.01	4.75	5.28	Х		
	Friday	10	4	5	19	21%	6.33	1.61	4.11	4.58	X		X
OUR OF THE DAY	Saturday	7	5	4	16	18% 7%	5.33 2.00	1.44	3.92	4.39 3.79	x	X	X
OUR OF THE DAT	00:00-06:00 06:00-09:00	5	2	1 4	6 11	13%	3.67	1.00	3.35 3.71	4.16	X		
	09:00-11:00	1	2	3	6	7%	2.00	1.21	2.70	2.99	X		
	11:00-13:00	2	8	4	14	16%	4.67	1.14	3.11	3.49	Х	X	X
	13:00-15:00	4	3	0	7	8%	2.33	1.26	3.18	3.55	X	v	
	15:00-18:00 18:00-24:00	5 5	9 4	14	28 16	32% 18%	9.33 5.33	2.24 3.35	5.01 7.67	5.54 8.50	X	X	X
	10.00-24.00	5	4	1			3.33		7.07	0.50	Λ	1	1
					1	YEAR 2	3	3-Year Average					
verage Daily Traffic A	DT (Vehicles per D	av)			32,114	34,906	37,942	34,987	-				
8,	· ·		toric - 17	hiel'					-				
lorida Average Crash	rale (Urashes per l	viillion En	tering Vel	iicies)	0.757	0.757	0.757	0.757	4				
affic Base					11.722	12.741	13.849	12.770					
ctual Crash Rate (Cr	ashes per Million Ei	ntering Ve	ehicles)		2.133	2.433	2.383	2.316	1				
ritical Crash Rate (C	rashes per Million E	nterina V	ehicles)		1.636	1.598	1.562	1.599	1				
afety Ratio	, · · · · · · · · · · · · · · · · · · ·	3.			1.304	1.522	1.525	1.451	-				
	00								-				
igh Crash Location	??				YES	YES	YES	YES					
Actual Crash	$Rate = \frac{A \times 1,00}{V}$	00,000		V = Ave	al number of rage Annual			rashes by t	ype occurring	in a 1 year p	eriod.		
CriticalCrashR	$Pate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$	$TF\sqrt{\frac{AV}{TB}}$	R	TB = Tra	Average Stat affic Base st Factor (z-		sh Rate for a	particular ty	pe of intersec	tion or roadwa		Constant Z	
Traffic Base =	$\frac{Years \times ADT \times 3}{1,000,000}$	65		= 1.	96 (assume 29 (assume	95% Confi				68.30 86.60 90.00 95.00 95.50	) ) )	1.00 1.50 1.64 1.96 2.00	]
Safety Ratio	$= \frac{Actual Crass}{Critical Crass}$	h Rate	_							93.30 98.80 99.00 99.70 99.95	) ) )	2.50 2.58 3.00	

## Table 7 – Crash Analysis – W 24 Avenue and W 60 Street



## Table 8 – Abnormal Crash Details & CountermeasuresW 24 Avenue and W 60 Street

		Wa	24 Aven	ue & W	60 Stre	et				
	(4 Lane x 2 L	ane, Signalized, W	ith Turn L	anes, 4 Le	eg Interse	ction - Table	22) - URE	BAN Spot		
				R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
	Total Rear Er	nd Crashes	2011 6	2012 14	2013 14	CRASHES 34	Total 100%	per Year 11.33	(2)	5
		Day Light	4	10	10	24	71%	8.00	(6)	7
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(8)	8
		Dark	2	4	4	10	29%	3.33		12
		00:00 - 06:00 06:00 - 09:00	0 2	0	0	0	0% 6%	0.00 0.67		19 21
		09:00 - 11:00	0	1	2	3	9%	1.00		24
Rear End	Hours of Day	11:00 - 13:00	1	4	1	6	18%	2.00		
		13:00 - 15:00	1	1	0	2	6%	0.67		
		15:00 - 18:00 18:00 - 24:00	1	4	7 4	12 9	35% 26%	4.00 3.00		
		North	0	2	6	8	24%	2.67		
		South	1	1	0	2	6%	0.67		
	Direction	East	4	5	4	13	38%	4.33		
		West	1	6	4	11	32%	3.67		
	1	Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	Dessible	Countor
				YEAR		TOTAL	of	Accidents		Counter- measure(s)
		Question	2011	2012	2013	CRASHES	Total	per Year		
	Total Angle	Crashes Day Light	5 2	10 8	6 2	21 12	100% 52%	7.00 4.00		10 11
	Lighting Conditions	Day Light Dawn	2	8	2	12	52% 4%	4.00 0.33		12
	3 . 3	Dark	2	2	6	10	43%	3.33	Cause(s) (6) (9) (9) (9) (9) (2) (9) (2) (2) (3) (3) (4) (5) (5) (6) (6) (6) (7) (6) (7) (7) (7) (7) (7) (7) (7) (7	14
		00:00 - 06:00	2	2	1	5	25%	1.67		
		06:00 - 09:00	2	0	0	2	10%	0.67		
	Hours of Day	09:00 - 11:00 11:00 - 13:00	0	1	1	2	10% 15%	0.67		
Angle	Hours of Day	13:00 - 15:00	1 0	2	0	2	10%	0.67		
		15:00 - 18:00	0	2	3	5	25%	1.67		
		18:00 - 24:00	0	0	1	1	5%	0.33		
		NB + EB	1	3	3	7	33%	2.33		
	Direction	NB + WB	2	3	2	7	33%	2.33		
	Direction	SB + EB SB + WB	1	3	1	5 2	24% 10%	1.67 0.67		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	ER OF CR YEAR	ASHES	3 YEAR TOTAL	%	MEAN	Possible	Counter-
1			2011	2012	2013	CRASHES	of Total	Accidents per Year	Cause(s)	measure(s)
	Total Sideswi	pe Crashes	7	6	5	18	100%	6.00	(8)	8
		Day Light	6	6	4	16	89%	5.33		19
	Lighting Conditions	Dawn								
			0	0	0	0	0%	0.00		10
		Dark 00:00 - 06:00	1	0	0 1	2	11%	0.00 0.67		
		Dark 00:00 - 06:00 06:00 - 09:00			0			0.00		
		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	1 0 1 0	0 0	0 1 0 1 0	2 0 4 0	11% 0% 22% 0%	0.00 0.67 0.00 1.33 0.00		
Sideswipe	Hours of Day	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	1 0 1 0 0	0 0 2 0 1	0 1 0 1 0 3	2 0 4 0 4	11% 0% 22% 0% 22%	0.00 0.67 0.00 1.33 0.00 1.33		
Side <i>s</i> wipe (Overtake)	Hours of Day	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00	1 0 1 0 0 2	0 0 2 0 1 0	0 1 0 1 0 3 0	2 0 4 0 4 2	11% 0% 22% 0% 22% 11%	0.00 0.67 0.00 1.33 0.00 1.33 0.67		
•	Hours of Day	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	1 0 1 0 0	0 0 2 0 1	0 1 0 1 0 3	2 0 4 0 4	11% 0% 22% 0% 22%	0.00 0.67 0.00 1.33 0.00 1.33		
•	Hours of Day	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	1 0 1 0 2 2 2 2 0	0 0 2 0 1 0 3	0 1 0 1 3 0 0	2 0 4 2 5 3 4	11% 0% 22% 0% 22% 11% 28% 17% 22%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33		
•		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South	1 0 1 2 2 2 0 3	0 0 2 0 1 0 3 0 3 1	0 1 0 3 0 0 1 1 2	2 0 4 2 5 3 4 6	11% 0% 22% 0% 22% 11% 28% 17% 22% 33%	$\begin{array}{c} 0.00\\ 0.67\\ 0.00\\ 1.33\\ 0.00\\ 1.33\\ 0.67\\ 1.67\\ 1.00\\ 1.33\\ 2.00\\ \end{array}$		
•	Hours of Day Direction	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 15:00 - 18:00 18:00 - 24:00 North South East	1 0 1 2 2 2 2 0 3 1	0 0 2 0 1 0 3 0 3 1 0	0 1 0 1 0 3 0 0 1 1 1 2 1	2 0 4 2 5 3 4 6 2	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67		
•		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South	1 0 1 2 2 2 0 3	0 0 2 0 1 0 3 0 3 1	0 1 0 3 0 0 1 1 2	2 0 4 2 5 3 4 6	11% 0% 22% 0% 22% 11% 28% 17% 22% 33%	$\begin{array}{c} 0.00\\ 0.67\\ 0.00\\ 1.33\\ 0.00\\ 1.33\\ 0.67\\ 1.67\\ 1.00\\ 1.33\\ 2.00\\ \end{array}$		
•		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East West	1 0 1 2 2 2 2 0 3 1 3 0	0 0 2 0 1 0 3 0 3 1 0 2 0	0 1 0 3 0 0 1 1 2 1 1 0	2 0 4 2 5 3 4 6 2 6 0	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33%	0.00 0.67 0.00 1.33 0.67 1.67 1.67 1.00 1.33 2.00 0.67 2.00		
•		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East West	1 0 1 2 2 2 2 0 3 1 3 0	0 0 2 0 1 0 3 3 0 3 1 0 2 0 0 8 OF CF	0 1 0 3 0 0 1 1 2 1 1 0	2 0 4 2 5 3 4 6 2 6 0 3 YEAR	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.00 MEAN	Possible	
•		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East West	1 0 0 2 2 2 2 0 3 1 3 0 <b>NUMBE</b>	0 0 2 0 1 0 3 0 3 1 0 2 0 8 CF CR YEAR	0 1 0 1 0 3 0 0 1 1 1 0 ASHES	2 0 4 2 5 3 4 6 6 0 3 YEAR TOTAL	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 33% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.00 MEAN Accidents	Possible Cause(s)	Counter- measure(s)
•	Direction	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 15:00 - 18:00 15:00 - 24:00 North East West Unknown	1 0 0 2 2 2 0 3 3 1 3 0 <b>NUMBE</b> 2011	0 0 1 0 3 0 2 0 8 7 7 7 7 7 7 7 7 7 7 7 7 7	0 1 0 1 0 3 0 0 1 1 1 0 ASHES 2013	2 0 4 2 5 3 4 6 6 0 3 YEAR TOTAL CRASHES	11% 0% 22% 22% 11% 28% 33% 11% 33% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.00	Cause(s)	Counter- mea sure(s)
•		00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown estrian Crashes	1 0 1 2 2 2 2 0 3 3 1 3 0 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0 8	0 0 2 0 1 0 3 0 2 0 <b>R OF CR</b> <b>YEAR</b> <b>2012</b> <b>0</b>	0 1 0 1 0 3 0 1 2 1 1 0 ASHES 2013 2	2 0 4 5 3 4 6 2 6 0 3 YEAR TOTAL CRASHES 4	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33% 0% 0% 0% 0% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.00 MEAN Accidents per Year 1.33	Cause(s) (6)	Counter- measure(s)
•	Direction Total Coll. w/ Ped	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 15:00 - 18:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown Easting Crashes Day Light	1 0 0 2 2 2 2 0 3 1 3 0 0 <b>NUMBE</b> 2011 2 2	0 0 2 0 1 3 0 3 1 0 2 0 0 8 R OF CR YEAR 2012 0 0	0 1 0 1 0 0 1 2 1 1 0 ASHES 2013 2	2 0 4 2 5 3 4 6 2 6 6 0 3 YEAR TOTAL CRASHES 4 4	11% 0% 22% 0% 22% 11% 28% 33% 0% 17% 22% 33% 0% 0% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.00 MEAN Accidents per Year 1.33 1.33	Cause(s)	Counter- mea sure(s)
•	Direction	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown estrian Crashes	1 0 1 2 2 2 2 0 3 3 1 3 0 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0 8 0 8	0 0 2 0 1 0 3 0 2 0 <b>R OF CR</b> <b>YEAR</b> <b>2012</b> <b>0</b>	0 1 0 1 0 3 0 1 2 1 1 0 ASHES 2013 2	2 0 4 5 3 4 6 2 6 0 3 YEAR TOTAL CRASHES 4	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33% 0% 0% 0% 0% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.00 MEAN Accidents per Year 1.33	Cause(s) (6)	Counter- measure(s)
•	Direction Total Coll. w/ Ped	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown East Day Light Dawn	1 0 0 2 2 2 0 3 1 3 3 0 <b>NUMBE</b> 2011 2 2 2 0 0	0 0 1 0 3 0 3 1 0 2 0 8 7 6 7 6 7 8 7 6 7 8 7 8 7 8 7 8 7 8 7	0 1 0 1 0 3 0 0 1 1 2 1 1 0 ASHES 2013 2 0	2 0 4 2 5 3 4 6 0 3 YEAR TOTAL CRASHES 4 0	11% 0% 22% 0% 22% 11% 28% 28% 17% 22% 33% 0% 11% 33% 0% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.00 <b>MEAN</b> Accidents per Year 1.33 1.33 0.00	Cause(s) (6)	Counter- measure(s)
•	Direction Total Coll. w/ Ped	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown Bay Light Dawn Dark 00:00 - 06:00 06:00 - 09:00	1 0 1 2 2 2 2 2 3 1 1 3 0 0 <b>NUMBE</b> 2011 2 2 1 1 2 0 0 0	0 0 2 0 1 0 3 1 0 2 0 0 <b>SR OF CR</b> <b>2012</b> <b>0</b> 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 1 0 1 0 0 1 1 2 1 1 0 ASHES 2013 2 0 0 0 0	2 0 4 2 5 3 4 6 2 6 0 3 YEAR TOTAL CRASHES 4 4 0 0	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33% 0% 0% 0% 0% 0% 0% 0% 25%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.00 MEAN Accidents per Year 1.33 1.33 0.00	Cause(s) (6)	Counter- measure(s)
(Overtake)	Direction Total Coll. w/ Ped Lighting Conditions	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown Bay Light Dawn Dark 00:00 - 06:00 09:00 - 11:00	1 0 0 2 2 2 2 0 3 1 1 3 0 0 <b>NUMBE</b> 2011 2 2011 2 0 0 0 0 0 0 0 0 0	0 0 2 0 3 3 0 2 0 2 0 5 7 6 7 6 7 6 7 6 7 6 7 7 8 7 7 7 7 7 7 7	0 1 0 1 0 1 0 1 2 1 1 0 ASHES 2013 2 0 0 0 0 1 0 1 1 1 0 1 1 1 0 1 1 1 0 0 0 0 1 1 1 0 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 4 2 5 3 4 6 0 <b>3 YEAR</b> TOTAL CRASHES 4 4 0 0 0 1 0	11% 0% 22% 0% 22% 28% 17% 28% 28% 33% 11% 33% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	0.00 0.67 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.00 <b>MEAN</b> Accidents per Year 1.33 1.33 0.00 0.00 0.00 0.00	Cause(s) (6)	Counter- measure(s)
(Overtake)	Direction Total Coll. w/ Ped	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 14:00 13:00 - 24:00 North South East West Unknown Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	1 0 2 2 2 3 1 1 3 0 <b>NUMBE</b> 2011 2011 2 0 0 0 0 0 0 0 0 0 0 0 0	0 0 2 0 1 0 3 0 2 0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 1 0 1 0 1 2 1 1 0 ASHES 2013 2 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 4 5 5 3 4 6 0 0 <b>3 YEAR</b> <b>TOTAL</b> <b>CRASHES</b> 4 4 0 0 0 0 0 0 0 0 0 0	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33% 0% 0% 0% 0%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.00 <b>MEAN</b> Accidents per Year 1.33 1.33 0.000 0.00	Cause(s) (6)	Counter- measure(s)
(Overtake)	Direction Total Coll. w/ Ped Lighting Conditions	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 15:00 - 18:00 18:00 - 24:00 North South East West Unknown Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00	1 0 1 2 2 2 2 0 3 3 1 1 3 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 0 2 0 1 0 3 0 2 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 1 0 1 2 1 1 0 <b>ASHES</b> <b>2013</b> <b>2</b> 0 0 1 0 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 4 2 5 3 4 6 2 6 0 3 YEAR TOTAL CRASHES 4 4 0 0 0 1 1 0 0 1	11% 0% 22% 0% 22% 11% 28% 17% 28% 17% 33% 11% 33% 0% 0% 0% 0% 0% 25%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.67 2.00 0.00 <b>MEAN</b> Accidents per Year 1.33 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.33 0.00 0.00 0.33	Cause(s) (6)	Counter- measure(s)
(Overtake)	Direction Total Coll. w/ Ped Lighting Conditions	00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 15:00 - 18:00 15:00 - 18:00 North South East West Unknown Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 15:00 - 18:00	1 0 0 2 2 2 0 3 1 3 0 <b>NUMBE</b> 2011 2 0 0 0 0 0 0 0 0 1 1 1	0 0 2 0 1 0 3 3 0 2 0 0 2 0 0 2 0 0 0 0 0 0 0 0 0	0 1 0 1 0 3 0 0 1 1 1 1 1 1 0 <b>ASHES</b> <b>2013</b> <b>2</b> 0 0 0 1 1 1 0 0 1 1 1 0 0 0 0 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	2 0 4 2 5 3 4 6 2 6 0 <b>3 YEAR</b> <b>TOTAL</b> <b>CRASHES</b> 4 4 0 0 0 1 1 0 0 1 2	11% 0% 22% 0% 22% 11% 28% 17% 22% 33% 11% 33% 0% 0% 0% 0% 0% 0% 0% 0% 25% 0% 0% 50%	0.00 0.67 0.00 1.33 0.00 1.33 0.67 1.67 1.00 1.33 2.00 0.67 2.00 0.67 2.00 0.00 <b>MEAN</b> Accidents per Year 1.33 0.000 0.00	Cause(s) (6)	Counter- measure(s
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From this analysis, it was determined that rear end, angle, collision with pedestrian, and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 8*.

## 3.2.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at West 24 Avenue and West 60 Street were performed on a typical weekday on May 15, 2014. A summary of the traffic data is presented in *Figure 7*, and the field review is presented in *Figure 8*.

This intersection has single left-turn bays on all approaches with a protected/permissive leftturn signal operation. There is not adequate lighting on the north leg of West 24 Avenue. Drainage issue exists on the north leg on the intersection (west side). Visibility of vehicle turning right from west leg of West 60 Street is restricted by condominium wall on northwest corner. North leg crosswalk is faded and all ramps are missing the detectable warning device.

Driveway on the East leg (south side) is too close to the intersection. Bus stop is located on the near side of the intersection along West 60 Street westbound. Teenagers were observed irresponsibly crossing the road without using pedestrian signals.

Extra pavement is hatch-marked on the north leg (east side of the intersection). This area is sometimes used as parking and it is wrongly demarcated because it's closing off an active entrance/exist to the condominium. Red light running was observed at the intersection as well as a failure of right turning vehicles from yielding the right-of-way.

#### 3.2.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of West 24 Avenue and West 60 Street, the following is recommended:

- Paint the existing concrete median noses yellow.
- Restripe all pedestrian crossings with high visibility ladder markings.
- Upgrade existing pedestrian signals to countdown.
- Provide detectable warning devices on all ramps.
- Provide painted island on southeast corner to better channelize exclusive right turn lane.
- Provide retro-flectorized backplates on all signal heads.
- Provide lighting on north leg specifically the east side of W 24 Avenue.
- Emphasize hatch-marked area on north leg east side by adding RPMs along the edge line and remove the marking at driveway to provide access to the condominium.



- Install "Right Turn Only" sign at the driveway on north leg east side.
- Coordinate with Miami-Dade Transit (MDT) to relocate bus stops along West 60<sup>th</sup> Street from the near to the far side of the intersection.
- Resolve drainage issue on North leg (west side) by sodding swale and possibly delineating it with curb and gutter. Clean drainage structure.
- Remove the closest McDonald driveway on East leg (south side)

A conceptual vision of the proposed roadway improvements is exhibited in Figure 9.

### 3.2.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$97,448. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





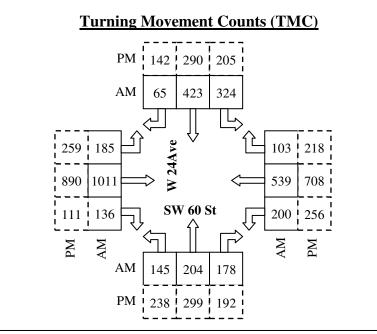
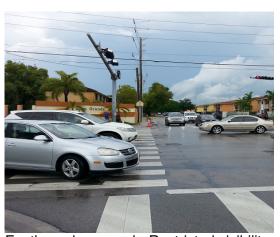


Figure 7: Traffic Data – W 24 Avenue and W 60 Street





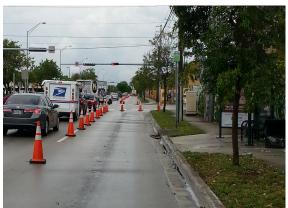
W 24 Ave Northbound: Drainage issue; sand is visible all the way up to the NW return of the intersection.



Eastbound approach: Restricted visibility.



W 24 Ave Northbound: Faded north crosswalk



Westbound approach: Bus stop on near side of construction.



north leg east side.



too close to intersection

Figure 8: Field Review – W 24 Avenue and W 60 Street





Figure 9: Conceptual Plan – W 24 Avenue and W 60 Street



## 3.3. NW 17 Avenue and NW South River Drive

## 3.3.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NW 17 Avenue is a four lane north-south urban arterial; divided by a raised median to the south of the studied intersection and undivided to the north. NW South River Drive is a two lane local street that runs east-west with the unique characteristic of having a junction with the eastbound Dolphin Expressway off-ramp approximately 580 feet to the east of the studied intersection. NW South River Drive is a two-way road to the west of NW 17 Avenue and one-way westbound only road to the east of NW 17 Avenue. S Miami River Bridge is located approximately 675 feet north of the intersection.

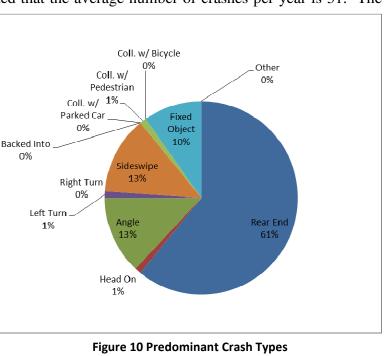
### 3.3.2. Safety Conditions and Analysis

The intersection of NW 17 Avenue and NW South River Drive is ranked number 3 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 92 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 31. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 10*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2007



NW 17 AVE & NW SOUTH RIVER DR

FDOT's "Expected Value Analysis." *Table 9* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.736, 1.759, and 2.059, respectively. The safety ratio for the three years averaged 1.852. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.

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$\begin{aligned} \hline \text{Decomber} & 3 & 1 & 4 & 8 & 9\% & 2.67 & 1.02 & 2.77 & 2.99 & x & x & x \\ \hline \text{Monday} & 3 & 4 & 9 & 16 & 17\% & 5.33 & 1.51 & 3.56 & 3.95 & x & x & x \\ \hline \text{Monday} & 3 & 4 & 9 & 16 & 17\% & 5.33 & 1.51 & 3.56 & 3.95 & x & x & x \\ \hline \text{Mudesday} & 8 & 4 & 6 & 11 & 12\% & 5.87 & 1.73 & 4.18 & 4.65 & x & x & x \\ \hline \text{Modresday} & 8 & 4 & 6 & 18 & 20\% & 6.00 & 2.01 & 4.75 & 5.28 & x & x & x & x \\ \hline \text{Fiday} & 6 & 8 & 4 & 18 & 20\% & 6.00 & 1.61 & 4.11 & 4.58 & x & x & x \\ \hline \text{Saturday} & 3 & 2 & 2 & 7 & 8\% & 2.33 & 1.44 & 3.52 & 4.39 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 2 & 1 & 2 & 5 & 5\% & 1.67 & 1.06 & 3.35 & 3.79 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 2 & 9 & 5 & 16 & 17\% & 5.67 & 1.21 & 2.70 & 2.99 & x & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 4 & 3 & 5 & 12 & 13\% & 4.00 & 1.26 & 3.18 & 3.55 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 4 & 3 & 5 & 12 & 13\% & 4.00 & 1.26 & 3.18 & 3.55 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 4 & 3 & 5 & 12 & 13\% & 4.00 & 1.26 & 5.18 & 5.50 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 4 & 3 & 5 & 12 & 13\% & 4.00 & 1.26 & 5.18 & 3.55 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.00006500 & 4 & 3 & 5 & 12 & 13\% & 0.022\% & 5.00 & 2.24 & 5.01 & 5.54 & x & x & x \\ \hline \text{MOUR OF THE DAY} & 0.0000 & 3 & 1 & 3 & 7 & 8\% & 2.33 & 3.35 & 7.67 & 8.50 & x & x & x \\ \hline \text{Morage Dally Traffic ADT (Vehicles per Day) & 30.381 & 33.022 & 35.894 & 33.099 \\ \hline \text{Nordak Average Crash rate (Crashes per Million Entering Vehicles) & 0.595 & 0.595 & 0.595 & 0.595 & 0.595 \\ \hline \text{Traific Base} & 11.009 & 12.053 & 1.3.101 & 12.081 \\ \text{Morage Dally Traffic ADT (Vehicles per Day) & 30.381 & 33.022 & 35.894 & 33.099 \\ \hline \text{Nordak Average Crash rate (Crashes per Million Entering Vehicles) & 1.402 & 1.367 & 1.334 & 1.368 \\ \hline \text{Actual Crash Rate (Crashes per Million Entering Vehicles) & 1.402 & 1.367 & 1.334 & 1.368 \\ \hline \text{Traffic Base} & 11.009 & 12.053 & 1.3.101 & 12.081 \\ Morage Dally Traffic ABase & TF & Totia number of crashes or number of crashes by type occurring in $				4									x x x x x x x x x x x x x x x x x x x		
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$CriticalCrashRate = AVR + \frac{0.5}{TB} + TF \sqrt{\frac{AVR}{TB}} \qquad \overline{AVR} = \text{Average Statewide Crash Rate for a particular type of intersection or roadway segment.}$ $TB = \text{Traffic Base} = \frac{Years \times ADT \times 365}{1,000,000} = 1.96 \text{ (assume 95\% Confidence Level for RURAL areas)} = 3.29 \text{ (assume 99.95\% Confidence Level for URBAN areas)} = 3.29 \text{ (assume 99.95\% Confidence Level for URBAN areas)} = 3.29 \text{ (assume 99.95\% Confidence Level for URBAN areas)}$		o -	[ . · ·	<u></u>	Where:										
$Traffic Base = \frac{Years \times ADT \times 365}{1,000,000} = \frac{Years \times ADT \times 365}{2.29 (assume 99.95\% Confidence Level for RURAL areas)} = 3.29 (assume 99.95\% Confidence Level for URBAN areas) = 3.29 (assume $	CriticalCrashk	$Rate = AVR + \frac{0.5}{-} \pm$	$TE \left  \frac{AV}{V} \right $	ĸ		Average Stat	ewide Cras	sh Rate for a	particular tv	pe of intersec	tion or roadwa	av seament			
$Traffic Base = \frac{Years \times ADT \times 365}{1,000,000} = \frac{Years \times ADT \times 365}{2.29 (assume 99.95\% Confidence Level for RURAL areas)} = 3.29 (assume 99.95\% Confidence Level for URBAN areas) = 3.29 (assume $	CriticalCrushin	TB	'' \ TE	}		0						, ,		-	
$Traffic Base = \frac{Years \times ADT \times 365}{1,000,000} = \frac{1.96}{assume 99.95\%} Confidence Level for RURAL areas) = 3.29 (assume 99.95\% Confidence Level for URBAN areas) = 3.29 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Confidence Level for URBAN areas) = 95.50 = 1.96 (assume 99.95\% Conf$							value)								
$Traffic Base = \frac{Years \times AD1 \times 365}{1,000,000} = 3.29 (assume 99.95\% Confidence Level for URBAN areas) = 3.29 (assume 99.95\% Confidence Level for URBAN areas) = 90.00 = 1.64 = 95.00 = 1.96 = 95.50 = 2.00 = 98.80 = 2.50 = 2.00 = 2.$		Vagen ADT	65				,	dence Level	for RURAL a	areas)					
95.50 2.00 98.80 2.50	Traffic Base =	$= \frac{1 e a r s \times A D I \times 3}{1 e a r s \times A D I \times 3}$	000								90.00	)	1.64		
98.80 2.50		1,000,000													
$Safety Ratio = \frac{Actual Crash Rate}{Critical Crash Rate}$ $99.00 2.58$ $99.70 3.00$ $99.95 3.20$															
Sujery Kuito – Critical Crash Rate 99.70 3.00 0005 3.20	Safato Dati-	_ Actual Crash	h Rate								99.00	)	2.58		
	MULEIV KALIO			_							99.70	)	3.00	1	

## Table 9 – Crash Analysis – NW 17 Avenue and NW South River Drive



From this analysis, it was determined that rear end, fixed object, and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 10*.

## Table 10 – Abnormal Crash Details & CountermeasuresNW 17 Avenue and NW South River Drive

		1444 17	Avenue	a IN VV 3	South F	liver Dr				
	(4 Lane x 2 L	ane, Signalized, V	/ith Turn La	anes, 4 Le	eg Interse	ection - Table	22) - URE	BAN Spot		
			NUMBE	ER OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	illeasure(s)
	Total Rear Er	nd Crashes	12	15	29	56	100%	18.67	(1)	2
		Day Light	10	15	28	53	95%	17.67	(3)	4
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(7)	7
		Dark	2	0	1	3	5%	1.00	(12)	
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	3	5	8	14%	2.67		
		09:00 - 11:00	2	3	6	11	20%	3.67		
Rear End	Hours of Day	11:00 - 13:00	0	8	7	15	27%	5.00		
near Ena		13:00 - 15:00	3	0	4	7	13%	2.33		
		15:00 - 18:00	5	1	5	11	20%	3.67		
		18:00 - 24:00	2	0	2	4	7%	1.33		
		North	1	7	16	24	43%	8.00		
		South	11	7	10	28	50%	9.33		
	Direction	East	0	1	1	2	4%	0.67		
		West	0	0	2	2	4%	0.67		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN		
			NOND	YEAR	ASHES	TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Fixed Ob	iont Crachos	4	2012	3				(0)	13
	TOLAI TIXEU OD	DayLight	1	2	3	<b>9</b> 4	100% 44%	3.00 1.33	(9)	17
	Lighting Conditions								(13)	17
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		
		Dark	3	0	2	5	56%	1.67		
		00:00 - 06:00	2	0	2	4	44%	1.33		
		06:00 - 09:00	0	1	0	1	11%	0.33		
		09:00 - 11:00	0	0	1	1	11%	0.33		
Fixed Object	Hours of Day	11:00 - 13:00	0	1	0	1	11%	0.33		
		13:00 - 15:00	1	0	0	1	11%	0.33		
		15:00 - 18:00	0	0	0	0	0%	0.00		
		18:00 - 24:00	1	0	0	1	11%	0.33		
		North	0	1	1	2	22%	0.67		
		South	4	1	2	7	78%	2.33		
	Direction	East	0	0	0	0	0%	0.00		
		West	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN		<u> </u>
			_	YEAR		TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Sideswi	ne Crashes	7	4	1	12	100%	4.00	(8)	9
										21
	10141 014001		7		1	12	100%	4.00	(9)	
		Day Light	7	4		12 0	100%	4.00	(9) (12)	
	Lighting Conditions	DayLight Dawn	7 0	4 0	0	0	0%	0.00	(9)	
		Day Light Dawn Dark	7 0 0	4 0 0	0	0	0% 0%	0.00 0.00		
		Day Light Dawn Dark 00:00 - 06:00	7 0 0 0	4 0 0 0	0 0 0	0 0 0	0% 0% 0%	0.00 0.00 0.00		
		DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00	7 0 0 0 1	4 0 0 0 2	0 0 0 0	0 0 0 3	0% 0% 0% 25%	0.00 0.00 0.00 1.00		
Sideswine	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	7 0 0 0 1 2	4 0 0 2 0	0 0 0 0 0 0	0 0 0 3 2	0% 0% 0% 25% 17%	0.00 0.00 0.00 1.00 0.67		
Sideswipe		Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	7 0 0 1 1 2 2	4 0 0 2 0 1	0 0 0 0 0	0 0 3 2 3	0% 0% 25% 17% 25%	0.00 0.00 1.00 0.67 1.00		
Sideswipe (Overtake)	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00	7 0 0 1 2 2 0	4 0 0 2 0 1 0	0 0 0 0 0 0 1	0 0 3 2 3 1	0% 0% 25% 17% 25% 8%	0.00 0.00 1.00 0.67 1.00 0.33		
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 11:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	7 0 0 1 2 2 0 2	4 0 0 2 0 1 0 0 0	0 0 0 0 0 0 0 1 0	0 0 3 2 3 1 2	0% 0% 25% 17% 25% 8% 17%	0.00 0.00 1.00 0.67 1.00 0.33 0.67		
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	7 0 0 1 2 2 0 2 0	4 0 0 2 0 1 0 0 1 0 1	0 0 0 0 0 0 1 0 0	0 0 3 2 3 1 2 1 2 1	0% 0% 25% 17% 25% 8% 17% 8%	0.00 0.00 1.00 0.67 1.00 0.33 0.67 0.33		
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North	7 0 0 1 2 2 0 2 0 3	4 0 0 2 0 1 0 0 1 1 1	0 0 0 0 0 0 1 0 0 0 0	0 0 3 2 3 1 2 1 2 1 4	0% 0% 25% 17% 25% 8% 17% 8% 33%	0.00 0.00 1.00 0.67 1.00 0.33 0.67 0.33 1.33		
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South	7 0 0 1 2 2 0 2 0 2 0 3 3 4	4 0 0 2 0 1 0 0 1 1 2	0 0 0 0 0 0 1 0 0 0 0 1	0 0 3 2 3 1 2 1 4 7	0% 0% 25% 17% 25% 8% 17% 8% 33% 58%	0.00 0.00 1.00 0.67 1.00 0.33 0.67 0.33 1.33 2.33		
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South East	7 0 0 1 2 2 0 2 0 2 0 3 3 4 0	4 0 0 2 0 1 0 0 1 1 1 2 1	0 0 0 0 0 0 1 0 0 0 1 0	0 0 3 2 3 1 2 1 4 7 7 1	0% 0% 25% 17% 25% 8% 17% 8% 33% 58% 8%	0.00 0.00 1.00 0.67 1.00 0.33 0.67 0.33 1.33 2.33 0.33		
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South	7 0 0 1 2 2 0 2 0 2 0 3 3 4	4 0 0 2 0 1 0 0 1 1 2	0 0 0 0 0 0 1 0 0 0 0 1	0 0 3 2 3 1 2 1 4 7	0% 0% 25% 17% 25% 8% 17% 8% 33% 58%	0.00 0.00 1.00 0.67 1.00 0.33 0.67 0.33 1.33 2.33		



## 3.3.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 17 Avenue and NW South River Drive were performed on a typical weekday on May 13, 2014. A summary of the traffic data is presented in *Figure 11*, and the field review is presented in *Figure 12*.

This intersection has left-turn lanes for north and westbound approaches only and the signal operation is protected-permissive for the northbound and permissive for westbound approach. Westbound right-turn movement was heavy mainly during the am period. This movement is controlled by a yield sign. Heavy vehicles were observed delayed and having difficulties trying to find adequate gaps to proceed north on NW 17 Avenue.

Right turn movement is prohibited for northbound traffic while left turn movement is prohibited for southbound. Eastbound traffic is limited to right or left turn only. Pedestrian crosswalks exist in east and west legs only. Pavement and marking conditions were fair at the intersection with the exception of the east leg.

This intersection handles large number of heavy vehicles and trucks for north and south traffic but mainly westbound right turns. Pedestrian activity was low during field inspection mainly along NW 17 Avenue. Speeding was observed for south and northbound. The north leg east side guard rail was damaged at the time of the field review. Deficient pavement conditions were observed.

### 3.3.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NW 17 Avenue and NW South River Drive, the following is recommended:

- Provide Signal Ahead warning sign for southbound traffic
- Installing reflective back plates for all signals heads
- Provide a raised median for the intersection north leg and install on it a No Left Turn sign for southbound traffic and thru arrow pavement marking for southbound outside lane
- Provide No Right Turn sign ground mounted for northbound traffic and thru arrow pavement marking for northbound inside lane
- Provide lane distribution sign and arrow (left and right) pavement marking arrow for eastbound traffic
- Provide street lights at the intersection and all approaches
- Provide solar powered speed limit feedback signs on NW 17 Avenue for south and northbound traffic.
- Resurfacing the intersection and refurbishing of pavement markings using thermoplastic painting.

A conceptual vision of the proposed roadway improvements is exhibited in *Figure 13*.



### 3.3.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$122,532. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





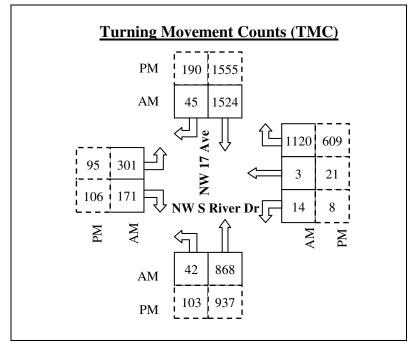


Figure 11: Traffic Data – NW 17 Avenue and NW South River Drive





Figure 12: Field Review – NW 17 Avenue and NW South River Drive



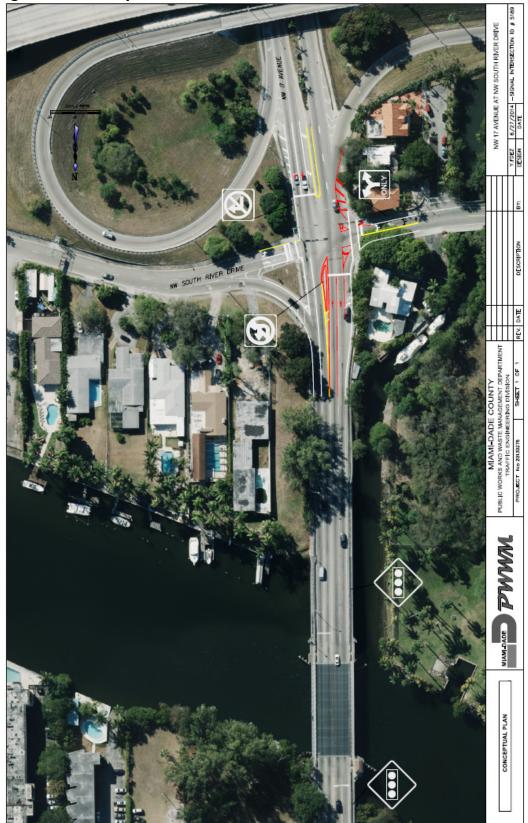


Figure 13: Conceptual Plan – NW 17 Avenue and NW South River Drive



# 3.4. NE 1 Avenue and NE 6 Street

# 3.4.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NE 1 Avenue is a one-way northbound three lane urban collector with that runs north-south, and NE 6 Street is a one-way westbound three lane urban collector that runs east-west.

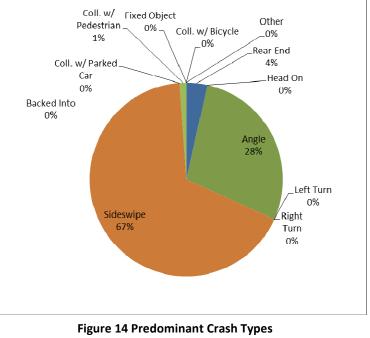
# 3.4.2. Safety Conditions and Analysis

The intersection of NE 1 Avenue and NE 6 Street is ranked number 4 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 85 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 28. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 14*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2007



NE 1 AVE & NE 6 ST

FDOT's "Expected Value Analysis." *Table 11* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 2.165, 1.852, and 1.446, respectively. The safety ratio for the three years averaged 1.821. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.

		(4 Lane	e x 4 Lane	e, Signaliz	zed, With Tu	m Lanes, 4	4 Leg Interse	ection -Table	28) - URBAN	Spot			
		NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN	EXPECTED	ANNUAL CF	ASH VALUE	ABNORM	ALLY HIGH	CRASHE
	TYPE OF CRASH	2011	YEAR 2012	2013	TOTAL	of Total	Accidents per Year		90th Percentile	95th Percentile	Mean	90th Percentil	95th
OLLISION TYPE	Rear End	2	0	1	3	4%	1.00	5.70	16.96	19.12		reroentar	i cidein
	Head On Angle	0	0	0	0 24	0% 28%	0.00 8.00	0.33 3.05	1.02 7.08	1.15	x	x	x
	Left Turn	8	9 0	7	0	0%	0.00	1.67	4.02	7.85	^	<u> </u>	<u> </u>
	Right Turn	0	0	0	0	0%	0.00	0.33	1.25	1.42			
	Sideswipe	22	20	15	57	67%	19.00	1.60	4.64	5.22	Х	X	X
	Backed Into Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.17 0.10	0.56	0.63 0.59			
	Coll. w/ Pedestrian	0	0	1	1	1%	0.33	0.28	1.04	1.19	x		
	Coll. w/ Bicycle	0	0	0	0	0%	0.00	0.09	0.33	0.38			
	Fixed Object	0	0	0	0	0%	0.00	0.03	0.21	0.24			
	Ran Off Road Overtuned	0	0	0	0	0% 0%	0.00	0.00 0.03	0.00	0.00 0.24			
	Other	0	0	0	0	0%	0.00	3.70	8.83	9.82			
	Total Crashes	32	29	24	85	100%	28.33	17.77	40.96	45.39	Х		
EVERITY	PDO crashes	25	25	22	72	85%	24.00	9.93	22.30	24.67	X	X	
	Fatal crashes Injury crashes	0	0 4	0	0	0% 15%	0.00 4.33	0.05	0.26 33.08	0.29 36.90			
GHT CONDITIONS	DayLight	23	22	17	62	73%	20.67	12.40	29.18	32.39	х		
	Dusk	1	1	0	2	2%	0.67	0.28	0.87	0.98	Х		
	Dawn	0	0	0	0	0%	0.00	0.17	0.56	0.63			
	Dark Unknown	8 0	6 0	7	21 0	25% 0%	7.00	4.56 0.35	10.53 1.05	11.68 1.18	X		
URFACE CONDITIONS		32	27	22	81	95%	27.00	15.30	34.45	38.12	х		
	Wet	0	2	2	4	5%	1.33	2.10	6.02	6.76			
	Others	0	0	0	0	0%	0.00	0.37	1.10	1.24			
IONTH OF A YEAR	January February	1	2	1	4 8	5% 9%	1.33 2.67	1.42 1.42	3.33 3.53	3.69 3.93	x		<u> </u>
	March	4	2	1	7	8%	2.33	1.67	4.12	4.59	x		<u> </u>
	April	2	5	1	8	9%	2.67	1.30	3.21	3.57	Х		
	May	5	2	2	9	11%	3.00	1.74	4.46	4.99	X		
	June July	4	5 2	1	10 6	12% 7%	3.33 2.00	1.38 1.35	3.49 3.22	3.90 3.58	X		
	August	2	0	2	4	5%	1.33	1.56	3.99	4.46	^		
	September	2	1	4	7	8%	2.33	1.46	3.73	4.16	Х		
	October	1	1	2	4	5%	1.33	1.47	3.59	4.00			
	November	4	4	1	9	11%	3.00	1.39	3.53	3.94	<u>x</u>		
AY OF THE WEEK	December Sunday	3	1	5 6	9 15	11% 18%	3.00 5.00	1.61 2.70	4.43 6.42	4.97 7.13	X		
	Monday	5	1	4	10	12%	3.33	2.49	6.18	6.88	X		
	Tuesday	3	3	1	7	8%	2.33	2.56	5.84	6.47			
	Wednesday	5	5	2	12	14%	4.00	2.88	7.20	8.03	X		
	Thursday Friday	5 6	6 5	2	13 19	15% 22%	4.33 6.33	3.07 2.61	7.50 6.40	8.35 7.13	X		
	Saturday	4	4	1	9	11%	3.00	1.46	3.47	3.85	X		
IOUR OF THE DAY	00:00-06:00	4	2	5	11	13%	3.67	1.70	3.39	3.71	Х	Х	
	06:00-09:00	1	0	3	4	5%	1.33	1.98	5.12	5.72	v		
	09:00-11:00 11:00-13:00	4	4	2	10 8	12% 9%	3.33 2.67	1.72 2.40	4.23 6.30	4.71 7.05	X		
	13:00-15:00	5	12	6	23	27%	7.67	1.95	5.32	5.96	X	x	x
	15:00-18:00	8	6	3	17	20%	5.67	3.58	7.81	8.62	Х		
	18:00-24:00	6	5	1	12	14%	4.00	4.42	10.63	11.82			
						YEAR		3-Year	1				
					1	2	3	Average					
verage Daily Traffic A	DT (Vehicles per D	Day)			15,817	17,193	18,688	17,233	1				
lorida Average Crash			terina Ve	hicles)	1.062	1.062	1.062	1.062	1				
	and the second period				5.773	6.275	6.821	6.290	4				
raffic Base									4				
Actual Crash Rate (Cr		-	,		5.543	4.621	3.518	4.561	4				
Critical Crash Rate (C	rashes per Million E	ntering V	(ehicles)		2.560	2.495	2.433	2.496					
Safety Ratio					2.165	1.852	1.446	1.821					
ligh Crash Location	??				YES	YES	YES	YES					
Actual Crash	$Rate = \frac{A \times 1,00}{V}$	00,000			al number of rage Annual			crashes by t	ype occurring	in a 1 year pe	eriod.		
	$Pate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$		$\frac{\overline{R}}{3}$	TB = Tra TF = Te	Average State affic Base st Factor (2-1 96 (assume s	value)				tion or roadwa	evel (%)	Constant Z	-
	$= \frac{Years \times ADT \times 3}{1,000,000}$ $= \frac{Actual Crass}{Critical Crass}$		_		29 (assume :				,	86.60 90.00 95.50 98.80 99.00		1.50 1.64 1.96 2.00 2.50 2.58 3.00	
Sujery huild	Critical Cras	sh Rate								99.70 99.95		3.00 3.29	

# Table 11 – Crash Analysis – NE 1 Avenue and NE 6 Street



From this analysis, it was determined that angle and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 12*.

Table 12 – Abnormal Crash Details & Countermeasures
NE 1 Avenue and NE 6 Street

		N	E 1 Aver	nue & N	E 6 Stree	et				
	(4 Lane x 4	Lane, Signalized, N	Nith Turn L	anes, 4 L	_eg Intersec	tion -Table	28) - URB	AN Spot		
			NUME	BER OF C YEAR	RASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible	Counter-
			2011	2012	2013	CRASHE	Total	per Year	Cause(s)	measure(s)
	Total Angle	e Crashes	8	9	7	24	100%	8.00	(1)	2
		Day Light	4	7	2	13	54%	4.33	(3)	7
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(7)	
		Dark	4	2	5	11	46%	3.67	(12)	
		00:00 - 06:00	3	1	4	8	33%	2.67		
		06:00 - 09:00	1	0	0	1	4%	0.33		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Angle	Hours of Day	11:00 - 13:00	0	0	1	1	4%	0.33		
Aligie		13:00 - 15:00	1	6	2	9	38%	3.00		
		15:00 - 18:00	0	2	0	2	8%	0.67		
		18:00 - 24:00	3	0	0	3	13%	1.00		
		NB + EB	2	0	0	2	8%	0.67		
		NB + WB	6	9	7	22	92%	7.33		
	Direction	SB + EB	0	0	0	0	0%	0.00		
		SB + WB	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		
			NUME	BER OF C	RASHES	3 YEAR	%	MEAN	Possible	Counter-
			YEAR			TOTAL	of	Accidents		
			2011	2012	2013	CRASHE	Total	per Year	Cause(s)	measure(s)
	Total Sideswi	pe Crashes	22	20	15	57	100%	19.00	(9)	9
		Day Light	18	15	13	46	81%	15.33	(13)	17
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		
		Dark	4	5	2	11	19%	3.67		
		00:00 - 06:00	1	1	1	3	5%	1.00		
		06:00 - 09:00	0	0	2	2	4%	0.67		
		09:00 - 11:00	4	4	2	10	18%	3.33		
Sideswipe	Hours of Day	11:00 - 13:00	4	0	3	7	12%	2.33		
(Overtake)		13:00 - 15:00	3	6	3	12	21%	4.00		
		15:00 - 18:00	7	4	3	14	25%	4.67		
		18:00 - 24:00	3	5	1	9	16%	3.00		
		North	21	20	15	56	98%	18.67		
		South	0	0	0	0	0%	0.00		
								1		1
	Direction	East	1	0	0	1	2%	0.33		
	Direction	East West	1	0	0	1 0	2% 0%	0.33		

# 3.4.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NE 1 Avenue and NE 6 Street were performed on a typical weekday on May 15, 2014. A summary of the traffic data is presented in *Figure 15*, and the field review is presented in *Figure 16*.

The westbound approach has one share right/thru lane and two thru lanes, while the northbound approach has one shared left/thru and two thru lanes. Obstructions to the sight distance exist at all corners; however, southeast corner is critical due to the unique characteristics of the intersection (one-way west and northbound). On-street parking exists at



the south leg on the west side of NE 1 Avenue and at west leg north side of NE 6 Street. A railroad crossing is located at approximately 150 feet north of the intersection.

Moderate pedestrian and bicycles activity takes place all day long. Crosswalks and push buttons are provided for all directions except on the north leg where pedestrian crossing is prohibited due to the high westbound right turn demand of heavy vehicles coming from the port of Miami going to the 836 Expressway and I-95 Interstate. ADA ramps are provided for all directions including the north leg where crossing is prohibited. However, no ADA ramps exist on the south leg.

The pavement is in substandard conditions and pavement markings are faded mainly caused by the high demand of heavy vehicles. Such demand is expected to decrease considerably once the tunnel connecting Watson Island with Dodge Island opens to the public. The opening of the tunnel is expected for the summer of this year.

#### 3.4.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NE 1 Avenue and NE 6 Street, the following is recommended:

- Provide ADA ramps for south leg.
- Remove ADA ramps to cross NE 1 Avenue at north leg.
- Installing reflective back plates for all signals heads.
- Retiming/optimizing of the existing signal while maintaining cycle length for both the AM and PM peak hours pursuing to extend clearance timing for both directions.
- Provide "No Right Turn On Red" sign for westbound traffic.
- Provide guideline for the westbound double right-turn lanes.
- Resurfacing the intersection and refurbishing of pavement markings using thermoplastic painting.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 17.

#### 3.4.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$39,337. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





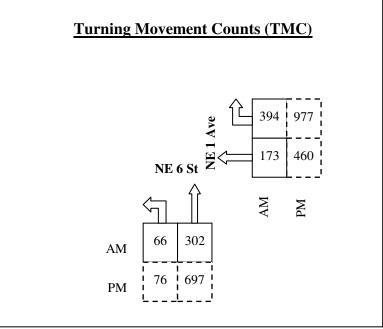


Figure 15: Traffic Data – NE 1 Avenue and NE 6 Street





Figure 16: Field Review – NE 1 Avenue and NE 6 Street



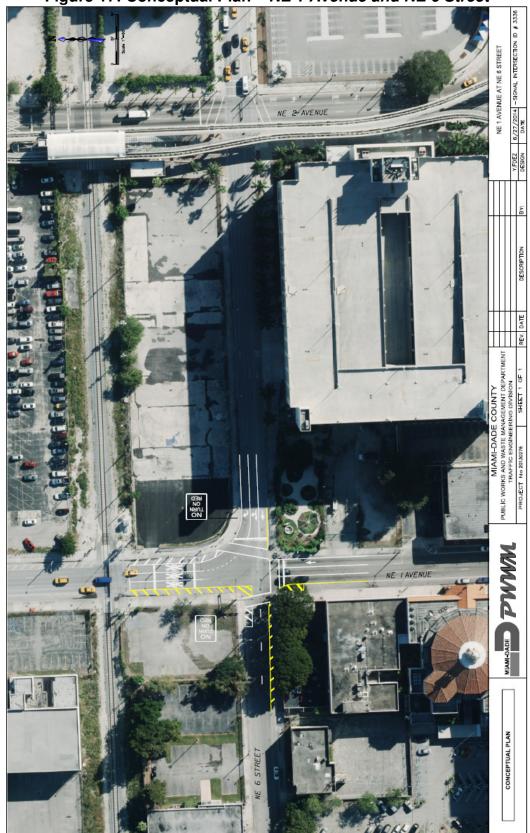


Figure 17: Conceptual Plan – NE 1 Avenue and NE 6 Street



### 3.5. NW 87 Avenue and NW 36 Street

#### 3.5.1. Site Description

This intersection is a signalized four legged intersection located within the City of Doral in the Northwest area of Miami Dade County. NW 87 Avenue is a six lane divided urban arterial that runs north-south. At the intersection with NW 36 Street, 87 avenue gains two additional lanes that serve as exclusive left turn lanes. NW 36 Street is a six lane divided urban arterial that runs east-west. At the intersection with NW 87 Avenue, 36 Street gains two additional lanes that serve as exclusive left turn lanes.

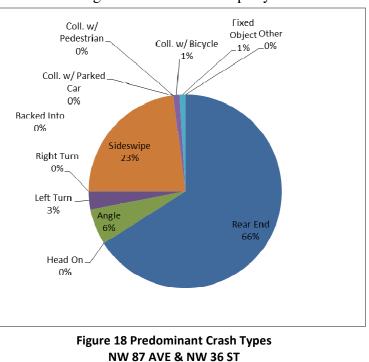
#### 3.5.2. Safety Conditions and Analysis

The intersection of NW 87 Avenue and NW 36 Street is ranked number 5 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period 100 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 33. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 18*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2007



FDOT's "Expected Value Analysis." *Table 13* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.227, 1.525, and 1.356, respectively. The safety ratio for the three years averaged 1.369. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.

		(61.000	x 6 Long		NW 87 A				36) - URBAN	Spot			
	TYPE OF CRASH	NUMBE	R OF CF YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	EXPECTED MEAN	ANNUAL CR 90th	ASH VALUE 95th	ABNORM/ Mean	ALLY HIGH 90th	CRASHE 95th
COLLISION TYPE	Rear End	2011 23	2012 24	2013 19	CRASHES 66	Total 66%	per Year 22.00	7.80	Percentile 17.12	Percentile 18.90	X	Percentil X	Percent X
OLLISIONTIFE	Head On	0	0	0	00	0%	0.00	0.31	0.91	1.03	^	<u> </u>	<u> </u>
	Angle	0	1	5	6	6%	2.00	4.11	8.06	8.82			
	Left Turn	0	1	2	3	3%	1.00	3.20	6.52	7.16			
	Right Turn	0	0	0	0	0%	0.00	0.87	1.88	2.07			
	Sideswipe	4	10	9	23	23%	7.67	2.98	6.83	7.57	Х	X	X
	Backed Into Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.44 0.09	1.26 0.41	1.42 0.48			
	Coll. w/ Pedestrian	0	0	0	0	0%	0.00	0.44	1.34	1.51			
	Coll. w/ Bicycle	0	1	0	1	1%	0.33	0.22	0.67	0.76	Х		
	Fixed Object	1	0	0	1	1%	0.33	0.62	1.52	1.69			
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Overtuned	0	0	0	0	0%	0.00	0.07	0.29	0.34			
	Other Total Crashes	0 28	0 37	0 35	100	0%	33.33	5.09 26.24	11.59 47.45	12.84 51.51	x		
EVERITY	PDO crashes	28	35	33	96	96%	32.00	14.33	26.64	28.99	x	x	x
	Fatal crashes	0	0	0	0	0%	0.00	0.20	0.85	0.97	~	<u> </u>	<u> </u>
	Injury crashes	0	2	2	4	4%	1.33	19.22	40.94	45.10			
GHT CONDITIONS	Day Light	20	32	28	80	80%	26.67	17.36	32.17	35.01	Х		
	Dusk	0	1	0	1	1%	0.33	0.64	1.46	1.62			
	Dawn	1	0	0	1	1%	0.33	0.18	0.59	0.66	X		┝───
	Dark Unknown	7	4	7	18 0	18% 0%	6.00 0.00	7.36 0.09	15.05 0.47	16.53 0.55			
URFACE CONDITIONS		25	32	31	88	88%	29.33	22.04	41.61	45.35	x		
	Wet	3	5	4	12	12%	4.00	3.22	6.25	6.83	x		<u> </u>
	Others	0	0	0	0	0%	0.00	0.36	0.96	1.07			
IONTH OF A YEAR	January	2	2	1	5	5%	1.67	2.49	4.66	5.08			
	February	1	3	0	4	4%	1.33	1.91	4.01	4.41			
	March	3	4	5	12	12%	4.00	2.33	5.43	6.02	X		
	April May	5	4	1	10 6	10%	3.33 2.00	1.89 2.16	4.46 4.04	4.95 4.40	X		
	June	2	1	5	8	8%	2.00	1.93	4.04	4.40	x		
	July	4	3	2	9	9%	3.00	2.38	5.17	5.70	- x		
	August	3	3	4	10	10%	3.33	2.51	4.97	5.44	X		
	September	1	5	4	10	10%	3.33	1.60	3.13	3.42	X	X	
	October	2	3	5	10	10%	3.33	2.13	4.00	4.35	Х		
	November	1	1	4	6	6%	2.00	1.98	4.35	4.81	X		
	December	4	5	1	10	10%	3.33	2.31	4.78	5.26	Х		
AY OF THE WEEK	Sunday Monday	5	8	3	5 17	5% 17%	1.67 5.67	3.60 3.42	7.06 6.95	7.73 7.63	x		
	Tuesday	3	6	8	17	17%	5.67	3.42	6.93	7.54	- Â		
	Wednesday	7	3	5	15	15%	5.00	4.02	7.66	8.35	X		
	Thursday	4	8	3	15	15%	5.00	4.36	8.22	8.97	Х		
	Friday	7	9	8	24	24%	8.00	4.16	8.40	9.21	Х		
	Saturday	1	2	4	7	7%	2.33	2.36	5.17	5.71			
IOUR OF THE DAY	00:00-06:00	1	1	2	4	4%	1.33	2.20	4.63	5.10	v		
	06:00-09:00 09:00-11:00	4	4	6 1	14 8	14% 8%	4.67 2.67	3.64 2.04	7.22 4.45	7.91 4.91	X		
	11:00-13:00	3	7	2	12	12%	4.00	2.56	5.59	6.17	x		
	13:00-15:00	4	3	8	15	15%	5.00	3.38	6.82	7.48	X		
	15:00-18:00	3	10	7	20	20%	6.67	5.09	9.37	10.19	Х		
	18:00-24:00	11	7	9	27	27%	9.00	6.71	13.41	14.69	Х		
						YEAR		3-Year	1				
					1	2	3	Average					
Verage Daily Troffic A	DT /Vehicles por 5	)av)			53,697	-	-	-	1				
verage Daily Traffic A		• •				58,366	63,441	58,501	4				
lorida Average Crash	rate (Crashes per	Million En	tering Ve	hicles)	0.575	0.575	0.575	0.575					
raffic Base					19.599	21.304	23.156	21.353					
ctual Crash Rate (Cr	ashes ner Million F	nterina V	ehicles)		1.429	1.737	1.511	1.559	1				
		-	,						-				
Critical Crash Rate (C	rashes per Million E	ntering V	enicles)		1.164	1.139	1.115	1.139	1				
afety Ratio					1.227	1.525	1.356	1.369					
ligh Crash Location	??				YES	YES	YES	YES					
									-				
Astual Const	$Rate = \frac{A \times 1,00}{V}$	000, 00		Where: A - Tota	al number of	crashee or	number of c	rashee by t		in a 1 year pe	eriod		
Actual Crush I	$Rate = \frac{V}{V}$	,			rage Annual			addied by t	ype occurring	in a rycarp.	chou.		
	,			. = / 110	lugo / linidu.	Daily Hail							
	0.5		_	Where:									
CriticalCrashRa	$te = AVR + \frac{0.5}{2} + \frac{0.5}{2}$	$TF   \frac{AVI}{V}$	<u> </u>		Average Stat	ewide Cras	sh Rate for a	particular tv	oe of intersec	tion or roadwa	av seament.		
CriticaiCrushita	$ate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$	''			affic Base	omao orac		particular (j			ay ooginona		_
	10	, 10			st Factor (z-	value)				Confidence I	evel (%)	Constant Z	1
							dence l evel	for RURAL a	reas)	68.30		1.00	1
	VALUE ADTV2	65						vel for URBA	,	86.60		1.50 1.64	
	rears × ADT × 5									90.00	,	1.04	1
	1,000.000			- 0.	20 (00000					95.00	)		
Traffic Base = ·	1,000,000			- 0	20 (00000					95.00 95.50	)	1.96 2.00	
Traffic Base = -				- 0	20 (00001110					95.50 98.80	)	1.96 2.00 2.50	
Traffic Base = -	$\frac{Tears \times ADT \times S}{1,000,000}$ $= \frac{Actual Crash}{Critical Crash}$		_	- 0	20 (0000///0					95.50	) )	1.96 2.00	

# Table 13 – Crash Analysis – NW 87 Avenue and NW 36 Street



From this analysis, it was determined that rear end and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 14*.

Table 14 – Abnormal Crash Details & Countermeasures
NW 87 Avenue and NW 36 Street

		NW	87 Aven	ue & N	W 36 St	treet				
	(6 Lane x 6 L	ane, Signalized, W	ith Turn La	anes, 4 L	eg Interse	ection - Table	36) - URI	BAN Spot		
			_	R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
	Total Rear Er	ad Crachoc	2011 23	2012 24	2013 19	CRASHES 66	Total 100%	per Year 22.00	(1)	5
		Day Light	16	24	19	52	79%	17.33	(7)	8
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(8)	10
	Lighting conditions	Dark	7	3	4	14	21%	4.67	(21)	11
		00:00 - 06:00	1	1	0	2	3%	0.67	(= · )	19
		06:00 - 09:00	3	2	3	8	12%	2.67		21
		09:00 - 11:00	1	4	1	6	9%	2.00		
	Hours of Day	11:00 - 13:00	3	2	0	5	8%	1.67		
Rear End		13:00 - 15:00	4	3	5	12	18%	4.00		
		15:00 - 18:00	1	8	4	13	20%	4.33		
		18:00 - 24:00	10	4	6	20	30%	6.67		
		North	4	5	7	16	24%	5.33		
		South	1	1	2	4	6%	1.33		
	Direction	East	10	10	7	27	41%	9.00		
		West	8	8	3	19	29%	6.33		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	Accidents	Cause(s)	measure(s)
			2011	2012	2013	CRASHES	Total	per Year		.,
	Total Sideswi		4	10	9	23	100%	7.67	(8)	8
		Day Light	3	10	8	21	91%	7.00	(19)	21
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		
		Dark	1	0	1	2	9%	0.67		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	1	2	2	5	22%	1.67		
Sideswipe	Linux of Day	09:00 - 11:00	1	0	0	1	4%	0.33		
	Hours of Day	11:00 - 13:00	0	4	2	6	26%	2.00		
(Overtake)		13:00 - 15:00	0	0	2	2 4	9% 17%	0.67		
		15:00 - 18:00	1	2	1	4	17% 22%	1.33 1.67		
		18:00 - 24:00 North	1	4		5	30%	2.33		
			0	4	1	3	30% 13%	2.33		
		South	-			-	22%	1.00		
	Direction									
	Direction	East	1	2	2	5		-		
	Direction	East West Unknown	1 1 0	2	2 5 0	5 8 0	35% 0%	2.67		

# 3.5.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 87 Avenue at NW 36 Street were performed on a typical weekday on June 3, 2014. A summary of the traffic data is presented in *Figure 19*, and the field review is presented in *Figure 20*.

This intersection has double left-turn bays for all approaches. The signal operation is protected for all approaches left-turn traffic. The intersection is mast arm with standard overhead illuminated street signs. Red light cameras are present on east, west and south legs.



Large trucks use the intersection, and there is a "No Trucks" sign facing westbound traffic on NW 36<sup>th</sup> Street. There is a "No Stopping or Standing" Sign signs on the southwest corner facing eastbound traffic.

The volume of eastbound traffic observed on the afternoon peak created a long queue that accumulated up to the east leg of the intersection. As a result vehicles on the south leg northbound right-turn lane planning to head eastbound changed lanes to the adjacent thru lane I order to continue northbound and avoid the backup. Some driveways in the vicinity of the intersection are allowed to perform left turn movements.

The intersection has pavement markings for all crosswalks but pedestrian signals do not exist. Several pedestrians were observed using the crossings at the time of the field survey. The ramps at the northeast, northwest and southeast corners do not have detectable warning devices.

#### 3.5.4. Recommendation

Based on the safety analysis, field observations and traffic operations for the intersection of NW 87 Avenue and NW 36 Street, the following are recommended:

- Paint median noses yellow.
- Mill and resurface and/or reconstruct pavement at intersection along with new signing and pavement markings.
- Install high visibility ladder crosswalks on all legs.
- Modify timing to provide enough time for pedestrian crossing.
- Add back plates to all signal heads.
- Provide a painted island between the exclusive right turn bay and the adjacent thru lane on the south leg to improve channelization.
- Relocate or rotate "No trucks" sign at the "American Welding Society" driveway so it's not visible to westbound vehicles traveling on NW 36 Street.
- Remove "No Stopping or Standing" sign on the southwest corner facing eastbound traffic.
- Consider posting the "Do not block intersection" sign on the mast arm.
- Reconstruct ramps to add detectable warning devices.
- Close the median opening on the west leg to improve safety operation; and extend the left-turn bay length to about 300 feet.
- Extend the westbound left-turn bay length by reducing the median width.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 21.

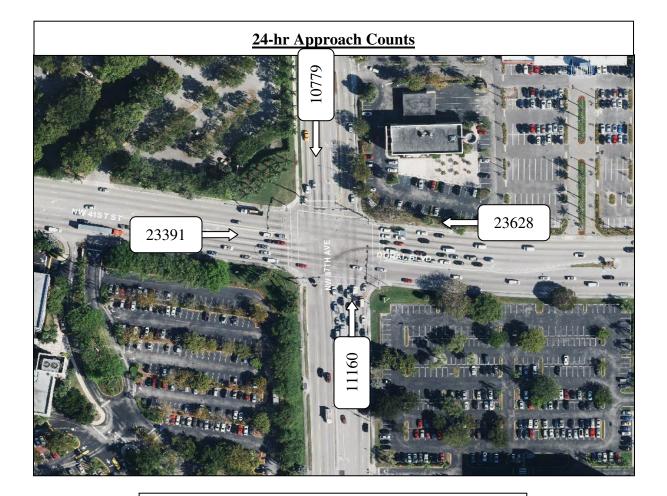


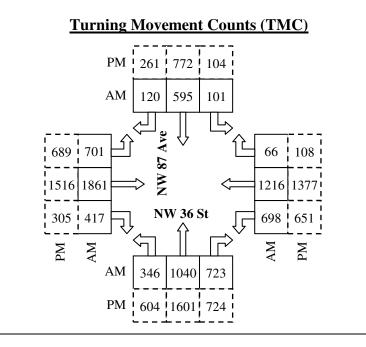
#### 3.5.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$301,530. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.









# Figure 19: Traffic Data – NW 87 Avenue and NW 36 Street



NW 87 Ave Southbound: Deteriorated pavement.



NW 36 St Westbound: "No truck" sign facing westbound vehicles.



NW 36 St Westbound: No pedestrian signals.



NW 36 St Eastbound: "No stopping or Standing" sign.



Figure 20: Field Review – NW 87 Avenue and NW 36 Street



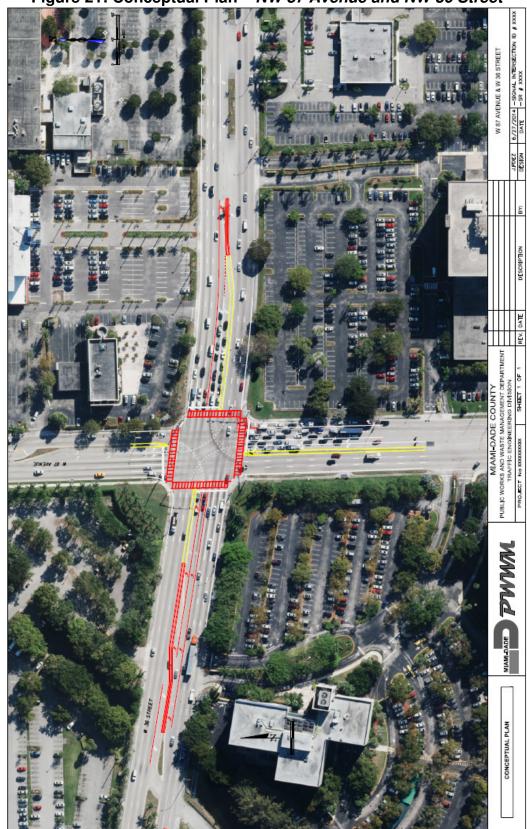


Figure 21: Conceptual Plan – NW 87 Avenue and NW 36 Street



# 3.6. NE 29 Place and Aventura Boulevard

# 3.6.1. Site Description

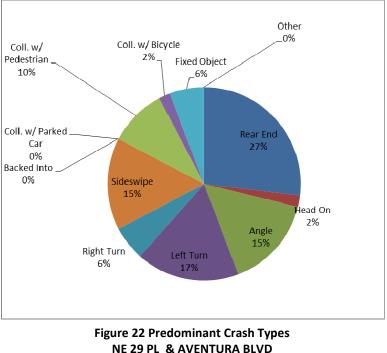
This intersection is a signalized four-legged intersection located within the City of Aventura in the northeast quadrant of Miami Dade County. Aventura Boulevard is a four lane urban collector divided by a raised median that runs east-west. In the area that includes the studied intersection Aventura Boulevard is contained between Biscayne Blvd and West Country Club Drive. NE 29 Place is a four lane divided local road that runs north-south from Abigail Road to NE 203 Street.

# 3.6.2. Safety Conditions and Analysis

The intersection of NE 29 Place and Aventura Boulevard is ranked number 6 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 52 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 17. The crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 22*.

Calculated intersection mean crash per year were compared to the average Miami-Dade for Crash Rate County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010 FDOT's Value "Expected Analysis." *Table 15* illustrates the expected accident volume



analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.428, 1.349, and 0.939, respectively. The safety ratio for the three years averaged 1.239. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		(4 Lano	x 4 Lano	Signalia			ventura B		28) - URBAN	Spot			
		(4 Lane	X 4 Lane	, Signaliz		n Lanes, 4	+ Ley Interse	ction - Table	20) - UNDAIN	Spot			
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents		ANNUAL CF	ASH VALUE		ALLY HIGH 90th	CRASHES 95th
		2011	2012	2013	CRASHES	Total	per Year		Percentile		Mean	Percentil	Percenti
OLLISION TYPE	Rear End Head On	3	6 0	5	14	27%	4.67 0.33	5.70 0.33	16.96	19.12 1.15	x		
	Angle	2	3	3	8	15%	2.67	3.05	7.08	7.85	~		
	Left Turn	3	4	2	9	17%	3.00	1.67	4.02	4.47	Х		
	Right Turn	1	1	1	3	6%	1.00	0.33	1.25	1.42	Х		
	Sideswipe	3	3	2	8	15%	2.67	1.60	4.64	5.22	Х		
	Backed Into Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.17	0.56	0.63			
	Coll. w/ Pedestrian	3	1	1	5	10%	1.67	0.28	1.04	1.19	х	X	х
	Coll. w/ Bicycle	1	0	0	1	2%	0.33	0.09	0.33	0.38	Х	X	
	Fixed Object	2	1	0	3	6%	1.00	0.03	0.21	0.24	Х	X	Х
	Ran Off Road Overtuned	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Other	0	0	0	0	0%	0.00	3.70	8.83	9.82			
	Total Crashes	19	19	14	52	100%	17.33	17.77	40.96	45.39			
EVERITY	PDO crashes	11	14	11	36	69%	12.00	9.93	22.30	24.67	Х		
	Fatal crashes	1	0	0	1	2%	0.33	0.05	0.26	0.29	Х	X	х
IGHT CONDITIONS	Injury crashes Day Light	7	5 11	3	15 33	29% 63%	5.00 11.00	13.14 12.40	33.08 29.18	36.90 32.39			
	Dusk	2	0	0	2	4%	0.67	0.28	0.87	0.98	х	1	
	Dawn	0	1	0	1	2%	0.33	0.17	0.56	0.63	Х	1	
	Dark	6	7	3	16	31%	5.33	4.56	10.53	11.68	Х		
	Unknown	0	0	0	0	0%	0.00	0.35	1.05	1.18			
URFACE CONDITIONS	Dry Wet	19 0	13 1	5	37 3	71% 6%	12.33	15.30 2.10	34.45 6.02	38.12 6.76			
	Others	0	5	7	12	23%	4.00	0.37	1.10	1.24	х	x	x
IONTH OF A YEAR	January	6	0	1	7	13%	2.33	1.42	3.33	3.69	x	1	- ^
	February	1	1	1	3	6%	1.00	1.42	3.53	3.93			
	March	1	2	0	3	6%	1.00	1.67	4.12	4.59			
	April May	1	0	0	1	2% 4%	0.33	1.30 1.74	3.21 4.46	3.57 4.99			
	June	1	0	1	2	4%	0.67	1.38	3.49	3.90			
	July	0	2	0	2	4%	0.67	1.35	3.22	3.58			
	August	1	3	1	5	10%	1.67	1.56	3.99	4.46	Х		
	September	0	1	3	4	8%	1.33	1.46	3.73	4.16	v		
	October November	2	2	4	8	15% 13%	2.67 2.33	1.47 1.39	3.59 3.53	4.00 3.94	X		
	December	2	4	2	8	15%	2.67	1.61	4.43	4.97	X		
AY OF THE WEEK	Sunday	2	2	1	5	10%	1.67	2.70	6.42	7.13			
	Monday	2	1	3	6	12%	2.00	2.49	6.18	6.88			
	Tuesday Wednesday	4	3	7	14 6	27% 12%	4.67	2.56 2.88	5.84 7.20	6.47 8.03	Х		
	Thursday	3	2	1	10	12%	3.33	3.07	7.20	8.35	х		
	Friday	1	3	0	4	8%	1.33	2.61	6.40	7.13	~		
	Saturday	4	2	1	7	13%	2.33	1.46	3.47	3.85	Х		
IOUR OF THE DAY	00:00-06:00	5	2	3	10	19%	3.33	1.70	3.39	3.71	Х		
	06:00-09:00 09:00-11:00	0	1	3	2	4%	0.67	1.98 1.72	5.12 4.23	5.72 4.71	х		
	11:00-13:00	4	1	2	7	13%	2.00	2.40	6.30	7.05	^		
	13:00-15:00	3	1	1	5	10%	1.67	1.95	5.32	5.96			
	15:00-18:00	4	6	4	14	27%	4.67	3.58	7.81	8.62	Х		
	18:00-24:00	2	6	0	8	15%	2.67	4.42	10.63	11.82			
									-				
						YEAR	-	3-Year					
					1	2	3	Average	_				
verage Daily Traffic A	DT (Vehicles per D	Day)			24,210	26,315	28,604	26,376					
lorida Average Crash	rate (Crashes per	Million En	tering Vel	hicles)	0.595	0.595	0.595	0.595	7				
raffic Base			<u> </u>	,	8.837	9.605	10.440	9.627	1				
	achoo no- Miller	ntoric - 1/	abials = )						-				
ctual Crash Rate (Cr		-	,		2.150	1.978	1.341	1.823	4				
Critical Crash Rate (C	rashes per Million E	Intering V	ehicles)		1.505	1.466	1.428	1.466					
Safety Ratio					1.428	1.349	0.939	1.239	1				
ligh Crash Location	??				YES	YES	NO	YES	1				
	$Rate = \frac{A \times 1,00}{V}$	_	R	V = Ave	rage Annual	Daily Traff	ic X 365			in a 1 year p			
	$Rate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$		2	TB = Tra TF = Te	affic Base st Factor (z-	value)	sh Rate for a idence Level			Confidence I	.evel (%)	Constant Z	
	$= \frac{Years \times ADT \times 3}{1,000,000}$						onfidence Level		,	86.60 90.00 95.00 95.50 98.80	) ) )	1.50 1.64 1.96 2.00 2.50	
Safety Ratio	$= \frac{Actual Cras}{Critical Cras}$	h Rate sh Rate	-							99.00 99.70 99.95	)	2.58 3.00 3.29	

# Table 15 – Crash Analysis – NE 29 Place and Aventura Boulevard



From this analysis, it was determined that collisions with pedestrian and fixed object collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Also, Collision with bicycle exceeded the 90th percentile. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 16*.

		NE	29 Place	ο & Δνο	ntura B	llvd				
	(4 Lane x 4 L	ane, Signalized, W					28) - URE	BAN Spot		
			NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	Accidents	Cause(s)	measure(s)
			2011	2012	2013	CRASHES	Total	per Year		. ,
	Total Coll. w/ Ped		3	1	1	5	100%	1.67	(1)	4
		Day Light	2	0	1	3	60%	1.00	(4)	24
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(24)	
		Dark	1	1	0	2	40%	0.67		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	0	0	0	0%	0.00		
0	Hours of Day	09:00 - 11:00	0	0	0	0	0% 20%	0.00		
Coll. w/	Hours of Day	11:00 - 13:00	1		0	1		0.33		
Pedestrian		13:00 - 15:00 15:00 - 18:00	1	0	0	1	20% 20%	0.33		
		18:00 - 24:00	1	1	1	2	40%	0.33		
		North	0	0	0	0	40%	0.07		
		South	0	0	0	0	0%	0.00		
	Direction	East	2	1	1	4	0% 80%	1.33		
	Direction	West	2	0	0	4	20%	0.33		
		Unknown	0	0	0	0	20%	0.33		
		UTIKITUWIT	U	U	U	0	0%	0.00		l
			NUMBE	R OF CR	ACHEC	3 YEAR	%	MEAN		
			NOWIDE	YEAR	ASHES	TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Coll. w/ Ped	estrian Crashes	2	1	0	3	100%	1.00	(11)	17
		Day Light	2	1	0	3	100%	1.00	(18)	19
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(20)	
-		Dark	0	0	0	0	0%	0.00		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	0	0	0	0%	0.00		
	Hours of Day	09:00 - 11:00 11:00 - 13:00	1	0	0	1	33% 0%	0.33		
Fixed Object	riours of Day	13:00 - 15:00	1	0	0	1	33%	0.33		
		15:00 - 18:00	0	1	0	1	33%	0.33		
		18:00 - 24:00	0	0	0	0	0%	0.00		
		North	0	0	0	0	0%	0.00		
		South	1	1	0	2	67%	0.67		
	Direction	East	1	0	0	1	33%	0.33		
		West	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		
					401150					1
			NUMBE	ER OF CR YEAR	ASHES	3 YEAR TOTAL	%	MEAN	Possible	Counter-
			2011	2012	2013	CRASHES	of Total	Accidents per Year	Cause(s)	measure(s)
	Total Left Tu	m Crachos		4	2013		100%		(13)	9
		DayLight	3	4	2	<b>9</b> 6	67%	3.00 2.00	(13)	9 16
	Lighting Conditions	DayLight	0	0	0	0	0%	0.00	(10)	10
		Dark	0	3	0	3	33%	1.00		
		00:00 - 06:00	0	1	0	1	11%	0.33		
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	0	0	0	0	0%	0.00		
	Hours of Day	11:00 - 13:00	1	0	1	2	22%	0.67		
Left Turn	,	13:00 - 15:00	1	0	1	2	22%	0.67		
		15:00 - 18:00	1	1	0	2	22%	0.67		
		18:00 - 24:00	0	2	0	2	22%	0.67		
			0	0	0	0	0%	0.00		
		$NB \rightarrow WB$				0				
		$WB \rightarrow SB$	2	1	0	3	33%	1.00		
	Direction									
	Direction	$WB \rightarrow SB$	2	1	0	3	33%	1.00		
	Direction	$\begin{array}{c} WB \to SB \\ SB \to EB \end{array}$	2 0	1 1	0 2	3 3	33% 33%	1.00 1.00		

# Table 16 – Abnormal Crash Details & CountermeasuresNE 29 Place and Aventura Boulevard



#### 3.6.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at Aventura Blvd and NE 29 Place were performed on a typical weekday on June 3, 2014. A summary of the traffic data is presented in *Figure 23*, and the field review is presented in *Figure 24*.

This intersection has single left-turn bays for all approaches. The signal operation is protected/permissive for all approaches left-turn traffic. The intersection is mast arm with standard overhead illuminated street signs. Tree canopy obstructs view of signal heads on the north leg.

Right-turn movements and left-turn movements do not always yield the way to pedestrians, this is most critical for pedestrian crossing on the east leg where the southbound left-turn vehicles are turning at a less than 90 degree angle. These roads do not cross at a perpendicular angle. Due this configuration, the most complex movement at this intersection is the southbound left-turn that has to turn on a tight angle and travels more than two lanes of traffic. During the field review, an elderly pedestrian reiterated the situation of left-turn movements and pedestrians on the east crosswalk.

There are pedestrian countdowns, high visibility ladder crosswalk as well as W11-2 with W16-7 signs on all crossing. Elderly pedestrians were observed using the intersection during the survey. A Publix supermarket is located on the southeast corner and a Walgreens on the northeast corner. The road exhibits ponding on the southeast corner that takes up most of the pedestrian ramp. Construction fence at the southwest corner development obstructs visibility of pedestrian walking northbound on the west sidewalk.

The left-turn bay on the south leg of the intersection gets confused with a thru and left lane. Cars were observed confusing the lane by a thru and having to change to the next adjacent thru lane before crossing Aventura Blvd.

#### 3.6.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of Aventura Blvd and NE 29 Place, the following is recommended:

- Add additional left turn arrows and only messages pavement markings for the exclusive northbound left-turn lane on the south leg. Also, install lane use signs.
- Push the exclusive right-turn bay inside next to the thru lane on the south leg northbound direction. By doing this, the crossing distance for NE 29 Place will be shorten, the vehicles approaching the intersection from the south will have a better visibility considering the curvy alignment and the left-turn vehicles on the north leg will have a shorter distance to drive and better visibility of the pedestrian crossing on the east leg which will be relocated as a result of this modification.



- Re-grade swale at east end of curb and gutter to alleviate water standing on southeast corner. If elevations create low point on the ramp, reconstruction of corner will be needed.
- Trim tree on south leg median to improve visibility of signals
- Install R10-15 signs to alert turning vehicles of the crossing pedestrians on all directions.
- Possibility increase the pedestrian crossing time.
- Provide a concrete island on the northeast corner to eliminate the diagonal long crossing and provide two perpendicular shorter crossing for pedestrians.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 25.

#### 3.6.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$74,455. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





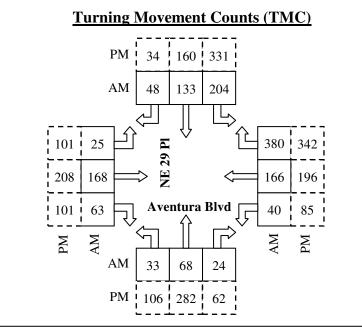


Figure 23: Traffic Data – NE 29 Place and Aventura Boulevard





Water ponding on SE corner in front of ramp.



NE 29 PI south leg (northbound direction) Left turn lane confused with thru lane.



NE 29 PI south leg Longer crossing distance due to separation between right turn and thru lane.



NE 29 PI north leg Roads do not intersect at a 90° angle.

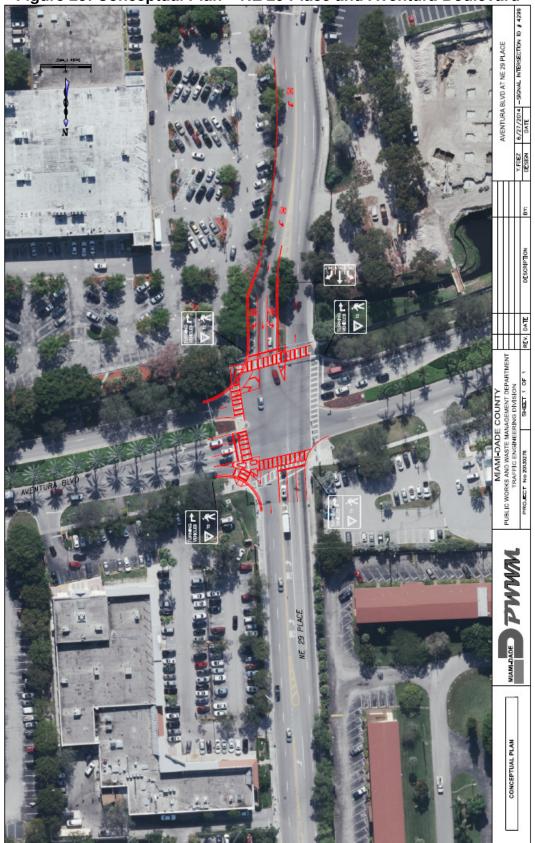


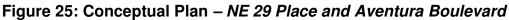


About 300' of intersection south leg (looking northbound): Inside lane feels like a thru lane.

# Figure 24: Field Review – NE 29 Place and Aventura Boulevard









# 3.7. W 12 Avenue and W 68 Street

# 3.7.1. Site Description

This intersection is a signalized four legged intersection located in the City of Hialeah in the area of Northwest Miami Dade County. W 12 Avenue is a four lane undivided urban arterial, and W 68 Street is a four lane undivided urban collector that runs east-west.

# 3.7.2. Safety Conditions and Analysis

The intersection of W 12 Avenue and W 68 Street is ranked number 7 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 90 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 30. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 26*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010 FDOT's "Expected Value

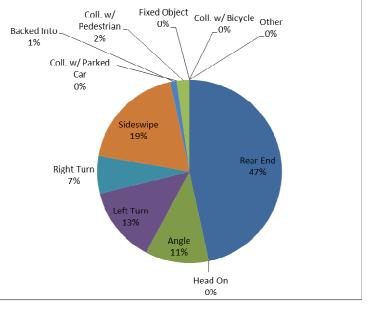


Figure 26 Predominant Crash Types W 12 AVE & W 68 ST

Analysis." *Table 17* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.117, 1.086, and 1.053, respectively. The safety ratio for the three years averaged 1.085. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.

From this analysis, it was determined that rear-end, left-turn, right-turn and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 18*.



COLLISION TYPE Rear End Head On Angle Left Turn Sideswipe Backed Into Coll. w/ Part Coll. w/ Part Total Crashe Total Crashe Injury crashe Injury crashe Injury crashe Dawn Dawn Dawn Dawn Dawn SURFACE CONDITIONS Dry Wet Others Month OF A YEAR April	NUMB           2011           11           0           4           7           3           4           0           d Car           ostrian           0	ER OF CF YEAR 2012 15 0 2 2 6 6 1 1 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0		<b>3 YEAR</b> TOTAL CRASHES 42 0 10 12 6 17 1 1 0 0 0 0 0 0 0 0	%           of           Total           47%           0%           11%           13%           7%           19%           1%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%	MEAN           Accidents           per Year           14.00           0.00           3.33           4.00           2.00           5.67           0.33           0.00           0.67           0.00		29) - URBAN 90th Percentile 8.08 1.15 6.53 3.22 1.07 4.91 0.47 0.57 1.35		ABNORM Mean X X X X X X X X X X X	ALLY HIGH 90th Percentil X X X X X	95th
COLLISION TYPE Rear End Head On Angle Left Turn Right Turn Sideswipe Backed Into Coll. w/ Park Goll. w/ Park Goll. w/ Park Goll. w/ Ped Goll. w/ Bed Coll. w/ Bed	ZO11           0           4           7           3           4           0           4           0           4           0           4           0      0	YEAR           15           0           3           2           6           1           0	2013 16 0 3 3 1 7 0 0 1 0 0 0 0 0 31	TOTAL           CRASHES           42           0           10           12           6           17           1           0           2           0           0           0           0           0           0           0           0           0           0           0           0	of Total 47% 0% 11% 13% 7% 19% 19% 1% 0% 0% 0%	Accidents per Year 14.00 0.00 3.33 4.00 2.00 5.67 0.33 0.00 0.67 0.00	MEAN 3.43 0.51 3.11 1.44 0.34 1.51 0.11 0.11 0.47	90th Percentile 8.08 1.15 6.53 3.22 1.07 4.91 0.47 0.57 1.35	95th Percentile 8.97 1.28 7.19 3.56 1.21 5.56 0.54 0.66	Mean X X X X X X X X	90th Percentil X X X X	95th Percenti X X X
COLLISION TYPE Rear End Head On Angle Left Tum Right Tum Sideswipe Backed Into Coll. w/ Park Goll. w/ Park Goll. w/ Park Goll. w/ Ped Coll. w/ Bidy Fixed Object Ran Off Roa Overtuned Other Total Crash Injury crashe Fatal crashe Injury crashe Eatal crashe Injury crashe Dawn Dark Unknown Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR Heat Dany Content Dave Dave Dave Dave Dave Dave Dave Dave	2011           11           0           4           7           3           4           0           d Car           o           strian           0	<b>2012</b> 15 0 3 2 2 2 6 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 5 5	16 0 3 1 7 0 0 0 1 0 0 0 0 0 0 31	CRASHES           42           0           10           12           6           17           1           0           2           0           0           0           0           0           0           0	Total           47%           0%           11%           13%           7%           19%           1%           0%           2%           0%           0%	per Year 14.00 0.00 3.33 4.00 2.00 5.67 0.33 0.00 0.67 0.00	3.43 0.51 3.11 1.44 0.34 1.51 0.11 0.11 0.47	Percentile 8.08 1.15 6.53 3.22 1.07 4.91 0.47 0.57 1.35	Percentile 8.97 1.28 7.19 3.56 1.21 5.56 0.54 0.66	X X X X X X X	Percentil X X X X	Percenti X X X
Head On Angle Left Turn Right Turn Sideswipe Backed Into Coll. w/ Part Coll. w/ Part Disk Dawn Dark Unknown Dark Unknown Dark Unknown Dark Unknown Cothers Month OF A YEAR March	11           0           4           7           3           4           0           dCar           0           strian           0	15 0 3 2 2 2 6 1 1 0 1 0 0 0 0 0 0 0 0 30 25 0 0 5	16 0 3 1 7 0 0 0 1 0 0 0 0 0 0 31	42 0 10 12 6 17 1 0 2 0 0 0 0 0 0	47% 0% 11% 13% 7% 19% 1% 0% 2% 0%	0.00 3.33 4.00 2.00 5.67 0.33 0.00 0.67 0.00	0.51 3.11 1.44 0.34 1.51 0.11 0.11 0.47	8.08 1.15 6.53 3.22 1.07 4.91 0.47 0.57 1.35	8.97 1.28 7.19 3.56 1.21 5.56 0.54 0.66	X X X X X X	X X X	X X X
Angle Left Turn Right Turn Sideswipe Backed Into Coll. w/ Ped Goll. w/ Ped Goll. w/ Bed Goll. w/ Bidy Fixed Object Ran Off Roa Other Total Crash Injury crashe Fatal crashe Injury crashe LIGHT CONDITIONS Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others Others Others Others Others Others Others Others Others Others Others Others Others Others Others Others Others Others Day Light	4           7           3           4           0           d Car           0           bitrian           0	3 2 2 6 1 1 0 0 0 0 0 0 0 0 0 0 0 0 5	3 3 1 7 0 0 1 0 0 0 0 0 0 31	10 12 6 17 1 0 2 0 0 0 0 0	11% 13% 7% 19% 1% 0% 2% 0% 0%	3.33 4.00 2.00 5.67 0.33 0.00 0.67 0.00	3.11 1.44 0.34 1.51 0.11 0.11 0.47	6.53 3.22 1.07 4.91 0.47 0.57 1.35	7.19 3.56 1.21 5.56 0.54 0.66	X X X X	х	Х
Left Turn Right Turn Sideswipe Backed Into Coll. w/ Park Coll. w/ Park Coll. w/ Park Coll. w/ Bicy Fixed Object Ran Off Roa Overtuned Other Total Crashe Fatal crashe Injury crashe Injury crashe Injury crashe Injury crashe Day Light Dusk Dawn Dark Dawn Dark Unknown Dark Unknown SURFACE CONDITIONS Dry Wet Others Month OF A YEAR January February March	7         3           4         0           0 d Car         0           bitrian         0           e         0           0         0           0         0           0         0           0         0           0         0           0         0           6         0           0         0           0         0           4         20           0         0           0         0           0         0           0         0           0         0	2 2 6 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 1 7 0 1 0 0 0 0 0 0 0 31	12 6 17 1 0 2 0 0 0 0 0 0	13% 7% 19% 0% 2% 0% 0%	4.00 2.00 5.67 0.33 0.00 0.67 0.00	1.44 0.34 1.51 0.11 0.11 0.47	3.22 1.07 4.91 0.47 0.57 1.35	3.56 1.21 5.56 0.54 0.66	X X X X	х	Х
Sideswipe Backed Into Coll. w/ Park Coll. w/ Ped Coll. w/ Bicy Fixed Object Ran Off Roa Overtuned Other Total Crashe Fatal crashe Injury crashe Injury crashe Injury crashe Injury crashe Injury crashe Injury crashe Injury crashe Injury crashe Do crashe Fatal crashe Do crashe Fatal crashe Unknown Dark Unknown Dark Unknown Dark Unknown Others Others Month OF A YEAR January February March	4           0           d Car           0	6 1 0 1 0 0 0 0 0 0 0 0 0 30 25 0 5	0 1 0 0 0 0 0 31	17 1 0 2 0 0 0 0 0	19% 1% 0% 2% 0% 0%	2.00 5.67 0.33 0.00 0.67 0.00	1.51 0.11 0.11 0.47	4.91 0.47 0.57 1.35	5.56 0.54 0.66	X X		
Backed Into Coll. w/ Park Coll. w/ Park Coll. w/ Bicy Fixed Object Ran Off Roa Overtuned Other Total Crashe Fatal crashe Injury crashe Injury crashe Injury crashe Dawn Dark Dawn Dark Dusk Dawn Dark Unknown BurkACE CONDITIONS UNFACE CONDITIONS SURFACE CONDITIONS Others MONTH OF A YEAR Harch	0         0           strian         0           e         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0           0         0	1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0 1 0 0 0 0 0 31	1 0 2 0 0 0 0 0	1% 0% 2% 0% 0%	0.33 0.00 0.67 0.00	0.11 0.11 0.47	0.47 0.57 1.35	0.54 0.66	Х	X	X
Coll. w/ Park Coll. w/ Ped Coll. w/ Bicy Fixed Object Ran Off Roa Overtuned Other Total Crashs Fatal crashs Injury crashs LIGHT CONDITIONS Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR March	d Car 0 strian 0 e 0 0 0 0 0 0 0 0 0 0 25 0 4 20 0 9 0	0 1 0 0 0 0 0 0 0 0 0 25 0 5	0 1 0 0 0 0 0 31	0 2 0 0 0 0	0% 2% 0% 0%	0.00 0.67 0.00	0.11 0.47	0.57 1.35	0.66			
Coll. w/ Ped Coll. w/ Boy Fixed Object Ran Off Roa Overtuned Other Total Crashe Fatal crashe Injury	strian         0           e         0           0         0           0         0           0         0           0         0           29         25           0         0           i         4           20         0           0         0           0         0           0         0           0         0	0 0 0 0 30 25 0 5	0 0 0 31	0 0 0 0	0% 0%	0.00				v		
Fixed Object Ran Off Roa Overtuned Other Total Crash Fatal crashe Injury crashe LIGHT CONDITIONS Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR March	0 0 0 29 25 0 3 4 20 0 0 9 0 0	0 0 0 30 25 0 5	0 0 0 31	0 0 0	0%		0.12					
Ran Off Roa Overtuned Other Total Crashe Fatal crashe Injury crashe Inju	0 0 29 25 0 4 4 20 0 0 9 0	0 0 30 25 0 5	0 0 0 31	0				0.49	0.56			
Overtuned Other Total Crash Fatal crashe Injury crashe LIGHT CONDITIONS Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR March	0 0 29 25 0 4 20 0 0 9 0	0 30 25 0 5	0 31	0	4 U%	0.00	0.04	0.23	0.27			
Total Crash SEVERITY PDC crashe Fatal crashe Injury crashe Injury crashe Injury crashe Injury crashe Injury crashe Injury crashe Day Light Dusk Dawn Dark Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others Month OF A YEAR January February March	s 29 25 0 4 20 0 0 9 0	30 25 0 5	31		0%	0.00	0.01	0.10	0.13			
SEVERITY PDO crashe Fatal crashe Injury crashe LIGHT CONDITIONS Day Light Dawn Dark Unknown SURFACE CONDITIONS Ty Wet Others MONTH OF A YEAR March	25 0 4 20 0 0 9 0	25 0 5		0	0%	0.00	5.26	12.78	14.22	v		
Fatal crashe Injury crashe Day Light Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR January February March	0 4 20 0 0 9 0	0 5		90 77	100% 86%	30.00 25.67	17.31 8.79	37.75 24.57	41.66 27.59	<u>x</u>	x	-
LIGHT CONDITIONS Day Light Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR March	20 0 0 9 0		0	0	0%	0.00	2.49	15.45	17.93	~	~	
Dusk Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others Others January February March	0 0 9 0		4	13	14%	4.33	10.55	20.71	22.66			
Dawn Dark Unknown SURFACE CONDITIONS Dry Wet Others Others January February March	0 9 0	1	24	67 2	74% 2%	22.33 0.67	9.69 0.53	23.99 1.61	26.72 1.81	X		
Dark Unknown SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR February March	9 0	0	2	2	2%	0.67	0.39	1.43	1.63	x		
SURFACE CONDITIONS Dry Wet Others MONTH OF A YEAR January February March		6	4	19	21%	6.33	4.30	9.57	10.57	Х		
Wet Others January February March		0 29	0 24	0 80	0% 89%	0.00 26.67	0.61	2.23 30.50	2.54 33.90	x		
Others MONTH OF A YEAR January February March	27 2	1	7	10	11%	3.33	1.91	4.43	4.92	- Â		
February March	0	0	0	0	0%	0.00	0.68	2.09	2.36			
March	3	1	2	6	7%	2.00	1.24	2.67	2.94	<u>X</u>		
	2	2	4	8	9% 8%	2.67 2.33	1.67	4.01 4.07	4.46 4.53	<u>x</u>		-
	4	1	3	8	9%	2.67	1.50	3.60	4.01	X		
May	3	6	0	9	10%	3.00	1.51	3.24	3.57	Х		
June July	1	1	2	4	4% 8%	1.33 2.33	1.62	3.97 3.82	4.42 4.24	x		
August	2	1	3	6	7%	2.00	1.73	4.09	4.54	x		
September	1	5	2	8	9%	2.67	1.63	4.31	4.83	Х		
October November	3	4	4	11 8	12% 9%	3.67 2.67	1.46	3.92	4.39 4.46	X		
December	4	4	3	8	9%	2.67	1.40 1.41	3.97 4.02	4.40	x		
DAY OF THE WEEK Sunday	1	1	2	4	4%	1.33	2.67	7.18	8.04			
Monday	6	6	4	16	18%	5.33	2.47	5.66	6.27	X		
Tuesday Wednesday	2	6	4	12 14	13% 16%	4.00 4.67	2.47 2.33	5.61 5.55	6.21 6.16	X		
Thursday	5	3	6	14	16%	4.67	2.44	5.25	5.79	X		
Friday	6	5	10	21	23%	7.00	2.46	5.51	6.10	X	X	Х
Saturday HOUR OF THE DAY 00:00-06:00	4	2	3	9	10% 3%	3.00 1.00	2.52	6.23 4.23	6.94 4.73	X		
06:00-09:00	2	3	5	10	11%	3.33	1.36	3.39	3.78	х		
09:00-11:00	3	1	5	9	10%	3.00	1.28	3.25	3.62	Х		
11:00-13:00 13:00-15:00	2	2	2	6 12	7% 13%	2.00 4.00	1.70	4.20 5.42	4.68 6.09	X X		
15:00-18:00	5	3	4	25	28%	8.33	1.88	7.98	8.94	- x	x	
18:00-24:00	10	8	7	25	28%	8.33	3.79	9.27	10.32	X		
								-				
					YEAR		3-Year					
				1	2	3	Average					
Average Daily Traffic ADT (Vehicle	per Day)			48,525	52,744	57,331	52,867					
Florida Average Crash rate (Crash	s per Million E	ntering Ve	hicles)	0.757	0.757	0.757	0.757					
Traffic Base				17.712	19.252	20.926	19.296	1				
	lion Enterina \	(ehicles)						1				
	-							1				
	inon Entening	<i>• GIIIGIES)</i>						-				
•								-				
High Crash Location??				YES	YES	YES	YES					
Florida Average Crash rate (Crash Traffic Base Actual Crash Rate (Crashes per M Critical Crash Rate (Crashes per M Safety Ratio High Crash Location?? Actual Crash Rate = A	lion Entering N	/ehicles) Vehicles)	Where:		19.252 1.558 1.435 <b>1.086</b> <b>YES</b>	20.926 1.481 1.407 <b>1.053</b> <b>YES</b>	19.296 1.559 1.436 <b>1.085</b> <i>YES</i>		in a 1 year a	ried		

# Table 17 – Crash Analysis – W 12 Avenue and W 68 Street



# Table 18 – Abnormal Crash Details & Countermeasures W 12 Avenue and W 68 Street

Izhr         Ollat         Ollat <tho< th=""><th></th><th></th><th></th><th>12 Aven</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></tho<>				12 Aven								
TOTAL <br< th=""><th></th><th>(4 Lane x 4 L</th><th>ane, Signalized, W</th><th>ith Turn L</th><th>anes, 4 Lo</th><th>eg Interse</th><th>ection - Table</th><th>29) - URE</th><th>BAN Spot</th><th></th><th></th></br<>		(4 Lane x 4 L	ane, Signalized, W	ith Turn L	anes, 4 Lo	eg Interse	ection - Table	29) - URE	BAN Spot			
International control of the second control					YEAR		TOTAL	of	Accidents		Counter- measure(s	
North         S <ths< th="">         S         S         S</ths<>		Total Door Er	nd Crashos									
Lighing Condition Date         Date         O         O         I         I         I         P         O         O         I         I         P         O         O         O         I         I         P         O         O         O         I         I         P         O         O         I         I         P         O         O         I         I         I         P         O         O         I         I         I         P         O         O         I <td></td> <td>Total Rear Er</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5 8</td>		Total Rear Er	1								5 8	
Number         C         Date         2         1         3         6         1 + 4/4         200           0030         0050         0         0         1         1         2%         0.037 <t< td=""><td></td><td>Lighting Conditions</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>(10)</td><td>0</td></t<>		Lighting Conditions								(10)	0	
Rear End         0000-06:00 0630 <sup>-06:00</sup> 0         0         1 <th< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>												
Rear End         B600.0000000000000000000000000000000000	-											
Rear End         Hours of Day 1300 - 15:00         0         0         4         4         10%         133 7%         130 7%         130 7%           1500 - 15:00         2         1         2         6         144         33%         44           1500 - 15:00         2         6         4         4         33%         467           North         2         4         4         33%         467           South         5         3         2         10         24%         333           North         2         2         2         4         83%         467           North         2         2         2         4         8         10%         287           North         2         2         2         10         8         138         287           North         2         1         10         200         10												
North         1300         1500         1600 <t< td=""><td></td><td></td><td></td><td>0</td><td>0</td><td>4</td><td>4</td><td>10%</td><td>1.33</td><td></td><td></td></t<>				0	0	4	4	10%	1.33			
Image: state in the s	Den ser En d	Hours of Day	11:00 - 13:00	2	1	0	3	7%	1.00			
Image: book of the section o	Rear End		13:00 - 15:00	3	1	2	6	14%	2.00			
Nom         2         4         4         10         24%         3.33           Direction         South         5         3         2         10         24%         3.33           Undection         2         2         4         8         19%         2.83         10         2.44         8         19%         2.85         10         2.44         8         19%         2.85         10         2.44         8         19%         2.85         10			15:00 - 18:00	2	8	4	14	33%	4.67			
Bunction         South         5         3         2         10         24%         33           Unik cover         2         2         4         8         19%         267           West         2         2         4         8         19%         267           Unik cover         0         0         0         0         0         0         0%         0.00           Unik cover         Number of the state         7         2         3         CRASHES         701AL         0         0         Could of the state         0         Could of the state         0 <td></td> <td></td> <td>18:00 - 24:00</td> <td>4</td> <td>3</td> <td>3</td> <td></td> <td></td> <td>3.33</td> <td></td> <td></td>			18:00 - 24:00	4	3	3			3.33			
Direction         East 12         2         6         6         14         33%         467           West Unknown         2         4         6         19         0         <												
West         2         2         4         8         19%         2.67           Introvin         0												
Inknown         0 </td <td></td> <td>Direction</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Direction										
NUMBER OF CRASHES YEAR         3 YEAR TOTAL CRASHES         3 YEAR TOTAL CRASHES         3 YEAR TOTAL CRASHES         0 of the per Year Couse(6) mea           Day Lighting Conditions         Day Lighting Day Lighting Conditions         Day Lighting Day Lighting Conditions         Total Left Turn Crashes         7         2         3         12         100%         4.00         (i)           Lighting Conditions         Day Lighting 0600-0600         1         0         1         1         65:0         0.00         0												
VEAR         Total Leit Turn Crashes         Total Crashes         S YEAR         Total Crashes         Total Crashes         S YEAR         Total Crashes <th colsp<="" td=""><td></td><td></td><td>Unknown</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0%</td><td>0.00</td><td></td><td></td></th>	<td></td> <td></td> <td>Unknown</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0%</td> <td>0.00</td> <td></td> <td></td>			Unknown	0	0	0	0	0%	0.00		
Total Left Turn Crashes         T         2012         2013         2014<				NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN	Possible	Counter-	
Total Left Tum Crashes         2011         2012         2013         CHASHES         100%         4.00%         (1)           Lighting Conditions         Day/Light         4         0         1         5         42%         1.87         (1)         (1)         1         8%         0.33         (2)         1         6         50%         2.00         (1)         0         0         1         1         8%         0.33         (1)         0         0         1         1         8%         0.33         (1)         0 <td< th=""><th></th><th></th><th></th><th>L</th><th></th><th></th><th></th><th></th><th></th><th></th><th>measure(s</th></td<>				L							measure(s	
Lighting Condition         Day Light Day         4         0         1         5         42%         1.87         (1)           Dak         3         2         1         6         50%         2.00         0         0         0         1         1         9%         0.03         0         0         1         0         1         0         1         0         1         0		<b>T</b>	0									
Lighting Conditions         Dawn         0         0         1         1         8%         0.33           Dark         3         2         1         6         50%         2.03           Doro         0.000         0.000         0         0         1         8%         0.33           Doro         0.000         0		Total Left Tu									3	
Left Turn         Dark         3         2         1         6         50%         2.00           Hours of Day         0000-06:00         1         0         1         2         17%         0.67           1300-15:00         2         0         <		lighting Orac III								(10)	8	
Left Turn         0000-06:00         1         0         0         1         2         17%         0.67           1000-1900         1         0 <t< td=""><td></td><td>Lighting Conditions</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>		Lighting Conditions										
Left Turn         B6:00-09:00         1         0         1         2         17%         0.67           1300-15:00         2         0         0         0         0         0%         0.00           1300-15:00         2         0         0         2         17%         0.67           13:00-15:00         1         0         1         1         9%         0.33           13:00-24:00         2         2         1         5         42%         1.67           NB-WB         0         0         1         1         9%         0.33         3           WB-SB         2         0												
Left Turn         Hours of Day         000-11:00 1300-15:00         0												
Left Turn         Hours of Day         11:00 - 13:00         <												
Left Turn         13:00 - 15:00         2         0         0         2         17%         0.67           15:00 - 18:00         1         0         1         2         17%         0.67           15:00 - 18:00         2         2         1         5         42%         1.67           0         0         1         1         9%         0.33         0.67           0         0         0         1         1         49%         0.67           0         0         0         0         0         0         0         0           0         0         0         0         0         0         0         0         0         0         0           0		Hours of Day										
Is00 1800         1         0         1         2         17%         0.67           I8:00 24:00         2         2         1         5         42%         1.67           INE - WB         0         0         1         1         9%         0.33           Direction         SB - EB         2         0         0         2         18%         0.67           BD rection         SB - EB         2         1         1         4         36%         1.33           Unknown         0	Left Turn	Hours of Day										
IfB00 : 24:00         2         2         1         5         42%         1.67           NB - VB         0         0         1         1         0         4         36%         1.33           Direction         EB - VB         2         0         0         2         18%         0.67           EB - NB         2         1         1         4         36%         1.33           Unknown         0<												
NB         NB         0         0         1         1         9%         0.33           Direction         SB												
WB - SB         3         1         0         4         36%         1.33           BB - HB         2         0         0         2         18%         0.67           BB - MB         2         1         1         4         36%         1.33           Unknown         0												
Birction         B - EB         2         0         0         2         18%         0.67           EB - NB         2         1         1         4         36%         1.33           Unknown         0												
EBNB         2         1         1         4         36%         1.33           Unknown         0         0         0         0         0         0         0%         0.00           WMBER OF CRASHES         3 YEAR TOTAL         % of CRASHES         MEAN Accidents per Year         Possible Cause(s)         Co mea           Image: Conditions         Day Light         2         2         1         6         100%         2.00         (1)           Lighting Conditions         Dawn         0		Direction										
Unknown         0 </td <td></td> <td>Direction</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		Direction										
VEAR         TOTAL         of CRASHES         Accidents Total Per Year         Possible Cause (s)         Cossible mean           Image: Solution of the second												
VEAR         TOTAL         of Total         Accidents per Vear         Possible transmit         Course (s) mean           Total Rear End Crashes         3         2         1         6         100%         2.00         (1)           Lighting Conditions         Day Light         2         2         0         4         67%         1.33         (1)         <												
Image: constraint of the second sec				NUMBE		ASHES				Possible	Counter-	
Fight Turn         Total Rear End Crashes         3         2         1         6         100%         2.00         (1)           Lighting Conditions         Dawn         0         0         0         0         0         0.00         0%         0.00           Dark         1         0         1         2         33%         0.67         0.00         0%         0.00           Dark         1         0         1         2         33%         0.67         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         11300         15.00         0<				2011		2012	-			Cause(s)	measure(s	
Right Turn         Day Light Dawn         2         2         0         4         67%         1.33 0.00         (12)           Hours of Day         Dark         1         0         0         0         0         0%         0.00           90:00 - 06:00         0         0         0         0         0%         0.00         0%         0.00           90:00 - 10:00         0         0         0         0         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0%         0.00         0         0%         0.00         0         0%         0.00         0         0%         0.00         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0         0		Total Bear Fr	nd Crashes		-					(1)	4	
Right Turn         Lighting Conditions         Dawn         0 <t< td=""><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>5</td></t<>	-										5	
Bight Turn         Dark         1         0         1         2         33%         0.67           Hours of Day         0:00 - 06:00         0	1	Lighting Conditions			0	0	0			. ,	6	
Bight Turn         06:00 - 09:00         0			Dark	1	0	1	2	33%	0.67			
Number         Number         O <th< td=""><td></td><td></td><td>00:00 - 06:00</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0%</td><td>0.00</td><td></td><td></td></th<>			00:00 - 06:00	0	0	0	0	0%	0.00			
Newson of Day         11:00 - 13:00         0         1         0         1         17%         0.33           13:00 - 15:00         0         0         0         0         0         0%         0.00           15:00 - 18:00         1         1         0         2         33%         0.67           18:00 - 24:00         2         0         1         3         50%         1.00           Direction         NB-EB         0         0         0         0%         0.00           BB-WB         1         1         0         2         33%         0.67           BB-WB         1         1         1         3         50%         1.00           Unknown         0         0         0         0         0         0         0           Unknown         0 <t< td=""><td></td><td></td><td>06:00 - 09:00</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0%</td><td>0.00</td><td></td><td></td></t<>			06:00 - 09:00	0	0	0	0	0%	0.00			
Night Turn         13:00 - 15:00         0				0	0	0	0	0%	0.00			
NB         1         0	Right Turn	Hours of Day	11:00 - 13:00	0	1	0	1	17%	0.33			
	night rum		13:00 - 15:00	0	0	0	0	0%	0.00			
NBEB         0         0         0         0         0%         0.00           Direction         EBSB         1         1         0         2         33%         0.67           WBNB         1         0         0         1         17%         0.33           SBWB         1         1         1         3         50%         1.00           Unknown         0         0         0         0         0         0         0         0         0           NUMBER OF CRASHES YEAR         3 YEAR TOTAL         %         MEAN Accidents per Year         Possible Cause(s)         Co mea           Image: Conditions         Day Light         3         4         7         17         100%         5.67         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (4)         (8)         (4)         (8)         (4)         (8)         (4)         (5)         (4)         (5)         (4)         (5)         (4)         (5)         (4)         (5)         (6)												
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$												
Direction         WBNB         1         0         0         1         17%         0.33           SBWB         1         1         1         1         3         50%         1.00           Unknown         0												
SB-WB         1         1         1         3         50%         1.00           Unknown         0												
Unknown         0 </td <td></td> <td>Direction</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td> </td>		Direction										
Total Left Turn Crashes         4         6         7         17         100%         5.67         (4)           Lighting Conditions         Day Light         3         4         7         14         82%         4.67         (8)           Sideswipe (Overtake)         Hours of Day         Day         1         1         1         3         18%         1.00         1         1         1         1         1         1         1         1         1<												
YEAR         TOTAL         of RASHES         Accident per Year         Possible Cause(s)         Co mea           Total Left Turn Crashes         4         6         7         17         100%         5.67         (4)           Lighting Conditions         Day Light         3         4         7         14         82%         4.67         (8)           Davn         0         0         0         0         0         0%         0.00         (8)         (9)         (9)         0.00         0%         0.00         (8)         (9)         (9)         (9)         (9)         (9)         (9)         (1)         1         1         3         18%         1.00         (8)         (9)         (9)         (9)         (1)         (1)         1			Unknown	0	0	0	0	0%	0.00			
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		Direction				3						
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#### 3.7.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 12 Avenue & W 68 Street were performed on a typical weekday on May 20, 2014. A summary of the traffic data is presented in *Figure 27*, and the field review is presented in *Figure 28*.

This intersection has single left-turn bays for all approaches. The signal operation is protected/permissive for all approaches left-turn traffic. Red light running was observed at the intersection.

The gas station, Walgreens and a strip mall present many consecutive driveways that generate potential conflicts with the other movements.

Pavement conditions are deteriorated, and pavement markings and pedestrian crosswalks at all four legs are faded.

#### 3.7.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 12 Avenue & W 68 Street, the following is recommended:

- Refurbishing of pavement markings including crosswalks using thermoplastic painting at all 4 legs.
- Provide high visibility ladder crosswalks on all legs.
- Mill and resurface intersection and reconstruct areas in need.
- Add painted island on northeast corner (see sketch).
- Update pedestrian signals to countdowns for the west and south crossing.
- Install retro-reflective backplates on signals.
- Install "right Turn Only" signs at the gas station driveways.
- Update pushbuttons for east ramp.

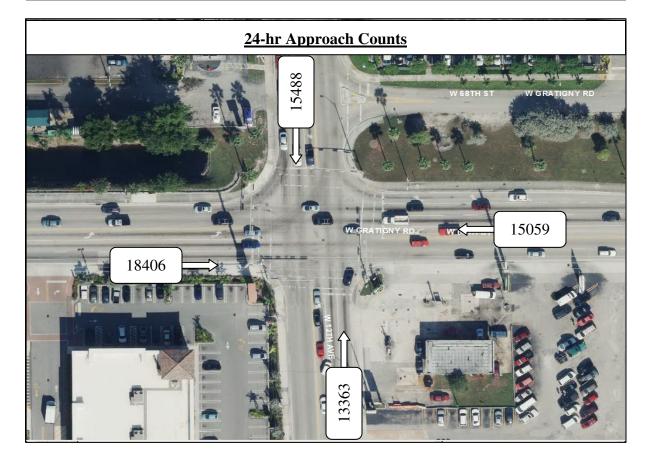
A conceptual vision of the proposed roadway improvements is exhibited in Figure 29.

# 3.7.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$85,795. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





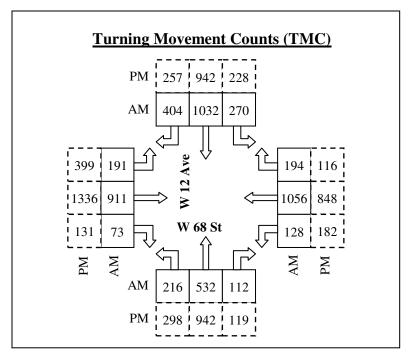


Figure 27: Traffic Data – W 12 Avenue and W 68 Street





Figure 28: Field Review – W 12 Avenue and W 68 Street



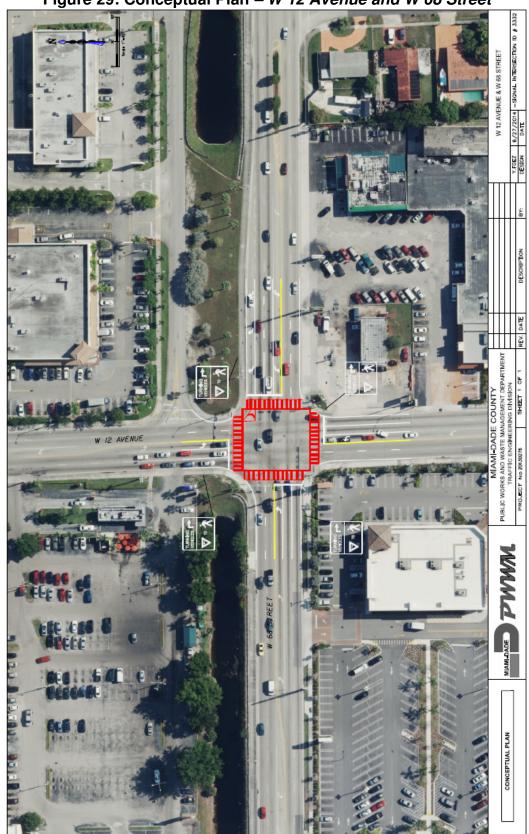


Figure 29: Conceptual Plan – W 12 Avenue and W 68 Street



# 3.8. NW 17 Avenue and NW 20 Street

# 3.8.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NW 17 Avenue is a two lane urban minor arterial with a two-way left-turn center lane that runs north-south, and NW 20 Street is a four lane urban minor arterial with a two-way left-turn center lane that runs east-west.

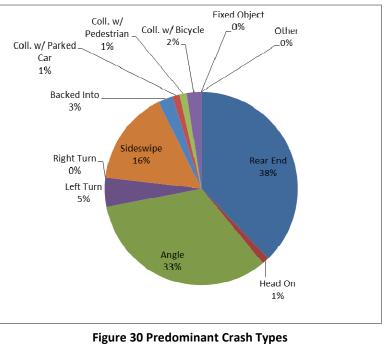
### 3.8.2. Safety Conditions and Analysis

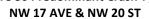
The intersection of NW 17 Avenue and NW 20 Street is ranked number 8 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 82 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 27. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 30*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010





FDOT's "Expected Value Analysis." *Table 19* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.408, 1.325, and 1.032, respectively. The safety ratio for the three years averaged 1.255. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



	Provide         Provide <t< th=""><th></th><th>3 YEAR TOTAL CRASHES 31 1 27 4 0 13 2 1 1 1</th><th>% of Total 38% 1% 33% 5% 0% 16% 2% 1%</th><th>MEAN           Accidents           per Year           10.33           0.33           9.00           1.33           0.00           4.33           0.67           0.33</th><th></th><th>23) - URBAN ANNUAL CR 90th Percentile 4.09 0.58 3.01 1.29 0.39 1.40 2.40</th><th>ASH VALUE 95th Percentile 4.56 0.66 3.33 1.44 0.45 1.56</th><th>ABNORMA Mean X X X X X X</th><th>ALLY HIGH 90th Percentil X X X X</th><th>95th</th></t<>		3 YEAR TOTAL CRASHES 31 1 27 4 0 13 2 1 1 1	% of Total 38% 1% 33% 5% 0% 16% 2% 1%	MEAN           Accidents           per Year           10.33           0.33           9.00           1.33           0.00           4.33           0.67           0.33		23) - URBAN ANNUAL CR 90th Percentile 4.09 0.58 3.01 1.29 0.39 1.40 2.40	ASH VALUE 95th Percentile 4.56 0.66 3.33 1.44 0.45 1.56	ABNORMA Mean X X X X X X	ALLY HIGH 90th Percentil X X X X	95th
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0.87         1.92           0         0         0         0         0%         0.00         0.14         0.57           3         4         2         9         11%         3.00         0.48         1.33           4         2         2         8         10%         2.67         0.59         1.40           3         2         1         6         7%         2.00         0.71         1.76           4         3         4         11         13%         3.67         0.58         1.47           0         2         1         3         4%         1.00         0.52         1.32           3         2         1         6         7%         2.00         0.53         1.28           1         2         1         4         5         0.67         0.61         1.50           3         3<!--</td--><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td>7         7         7         21         26%         7.00         2.00         4.57         5.66         X         X           24         29         22         75         91%         25.00         0.63         13.06         1.43.7         X         X           0         0         0         0%         0.00         0.14         0.57         0.65         X         X           1         0         0         0         0%         0.00         0.14         0.57         0.65         X         X           3         4         2         9         11%         3.00         0.48         1.33         1.49         X         X           3         2         1         6         7%         2.00         0.71         1.76         1.96         X         X           0         1         1         2.27%         0.67         0.61         1.50         1.67         X         X           1         2         2.5         6%         1.67         0.69         1.68         1.87         X         X           3         2         10         12%         3.33         0.53         1.48</td></td></td></td<></td></td<>	7       7       7         0       0       0         24       29       22         0       0       0         3       4       2         3       2       1         4       2       2         3       2       1         4       3       2         1       2       2         4       3       4         0       1       1         0       2       1         1       2       2         4       3       0         3       4       4         3       2       5         1       2       1         3       4       4         3       2       5         1       2       1         3       1       3         5       3       2         4       6       0         2       5       5         5       5       6         3       4       2         3       4       2         5       3       3	7       7       7       21         0       0       0       0         24       29       22       75         5       0       2       7         0       0       0       0         3       4       2       9         4       2       2       8         3       2       1       6         4       3       4       11         0       1       1       2         0       2       1       3         3       2       1       6         4       3       4       11         0       2       5       10         1       2       2       5         4       3       0       7         3       4       4       11         3       2       5       10         1       2       1       4         3       1       3       7         5       3       2       10         4       6       10       1         2       5       7       14	7         7         7         21         26%           0         0         0         0         0%         0%           24         29         22         75         91%         5           5         0         2         7         9%         0         0         0%           3         4         2         9         11%         4         2         2         8         10%           3         4         2         9         11%         4         2         2         8         10%           4         3         4         11         13%         0         1         2         2%           0         2         1         3         4%         3         1         3%           3         2         1         6         7%         1         1         2         1         4%           3         2         1 <td< td=""><td>7         7         7         21         26%         7.00           0         0         0         0         0%         0.00           24         29         22         75         91%         25.00           5         0         2         7         9%         233           0         0         0         0%         0.00           3         4         2         9         11%         3.00           4         2         2         8         10%         2.67           3         2         1         6         7%         2.00           4         3         4         11         13%         3.67           0         2         1         3         4%         1.00           3         2         1         6         7%         2.00           1         2         2         5         6%         1.67           4         3         0         7         9%         2.33           3         1         2         1         4         5%         1.33           3         1         2         1         12%         &lt;</td><td>7         7         7         21         26%         7.00         2.00           0         0         0         0         0%         0.00         0.12           24         29         22         75         91%         25.00         0.63           5         0         2         7         9%         2.33         0.87           0         0         0         0%         0.00         0.14           3         4         2         9         11%         3.00         0.48           4         2         2         8         10%         2.67         0.59           3         2         1         6         7%         2.00         0.53           0         1         1         2         2%         0.67         0.61           0         2         1         3         4%         1.00         0.52           3         2         1         6         7%         2.00         0.53           1         2         2         5         6%         1.67         0.69           4         3         0         7         9%         2.33         0.73<!--</td--><td>7         7         7         21         26%         7.00         2.00         4.57           0         0         0         0         0%         0.00         0.12         0.46           24         29         22         75         91%         2.33         0.87         1.92           0         0         0         0         0%         0.00         0.14         0.57           3         4         2         9         11%         3.00         0.48         1.33           4         2         2         8         10%         2.67         0.59         1.40           3         2         1         6         7%         2.00         0.71         1.76           4         3         4         11         13%         3.67         0.58         1.47           0         2         1         3         4%         1.00         0.52         1.32           3         2         1         6         7%         2.00         0.53         1.28           1         2         1         4         5         0.67         0.61         1.50           3         3<!--</td--><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td>7         7         7         21         26%         7.00         2.00         4.57         5.66         X         X           24         29         22         75         91%         25.00         0.63         13.06         1.43.7         X         X           0         0         0         0%         0.00         0.14         0.57         0.65         X         X           1         0         0         0         0%         0.00         0.14         0.57         0.65         X         X           3         4         2         9         11%         3.00         0.48         1.33         1.49         X         X           3         2         1         6         7%         2.00         0.71         1.76         1.96         X         X           0         1         1         2.27%         0.67         0.61         1.50         1.67         X         X           1         2         2.5         6%         1.67         0.69         1.68         1.87         X         X           3         2         10         12%         3.33         0.53         1.48</td></td></td></td<>	7         7         7         21         26%         7.00           0         0         0         0         0%         0.00           24         29         22         75         91%         25.00           5         0         2         7         9%         233           0         0         0         0%         0.00           3         4         2         9         11%         3.00           4         2         2         8         10%         2.67           3         2         1         6         7%         2.00           4         3         4         11         13%         3.67           0         2         1         3         4%         1.00           3         2         1         6         7%         2.00           1         2         2         5         6%         1.67           4         3         0         7         9%         2.33           3         1         2         1         4         5%         1.33           3         1         2         1         12%         <	7         7         7         21         26%         7.00         2.00           0         0         0         0         0%         0.00         0.12           24         29         22         75         91%         25.00         0.63           5         0         2         7         9%         2.33         0.87           0         0         0         0%         0.00         0.14           3         4         2         9         11%         3.00         0.48           4         2         2         8         10%         2.67         0.59           3         2         1         6         7%         2.00         0.53           0         1         1         2         2%         0.67         0.61           0         2         1         3         4%         1.00         0.52           3         2         1         6         7%         2.00         0.53           1         2         2         5         6%         1.67         0.69           4         3         0         7         9%         2.33         0.73 </td <td>7         7         7         21         26%         7.00         2.00         4.57           0         0         0         0         0%         0.00         0.12         0.46           24         29         22         75         91%         2.33         0.87         1.92           0         0         0         0         0%         0.00         0.14         0.57           3         4         2         9         11%         3.00         0.48         1.33           4         2         2         8         10%         2.67         0.59         1.40           3         2         1         6         7%         2.00         0.71         1.76           4         3         4         11         13%         3.67         0.58         1.47           0         2         1         3         4%         1.00         0.52         1.32           3         2         1         6         7%         2.00         0.53         1.28           1         2         1         4         5         0.67         0.61         1.50           3         3<!--</td--><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td>7         7         7         21         26%         7.00         2.00         4.57         5.66         X         X           24         29         22         75         91%         25.00         0.63         13.06         1.43.7         X         X           0         0         0         0%         0.00         0.14         0.57         0.65         X         X           1         0         0         0         0%         0.00         0.14         0.57         0.65         X         X           3         4         2         9         11%         3.00         0.48         1.33         1.49         X         X           3         2         1         6         7%         2.00         0.71         1.76         1.96         X         X           0         1         1         2.27%         0.67         0.61         1.50         1.67         X         X           1         2         2.5         6%         1.67         0.69         1.68         1.87         X         X           3         2         10         12%         3.33         0.53         1.48</td></td>	7         7         7         21         26%         7.00         2.00         4.57           0         0         0         0         0%         0.00         0.12         0.46           24         29         22         75         91%         2.33         0.87         1.92           0         0         0         0         0%         0.00         0.14         0.57           3         4         2         9         11%         3.00         0.48         1.33           4         2         2         8         10%         2.67         0.59         1.40           3         2         1         6         7%         2.00         0.71         1.76           4         3         4         11         13%         3.67         0.58         1.47           0         2         1         3         4%         1.00         0.52         1.32           3         2         1         6         7%         2.00         0.53         1.28           1         2         1         4         5         0.67         0.61         1.50           3         3 </td <td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td> <td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td> <td>7         7         7         21         26%         7.00         2.00         4.57         5.66         X         X           24         29         22         75         91%         25.00         0.63         13.06         1.43.7         X         X           0         0         0         0%         0.00         0.14         0.57         0.65         X         X           1         0         0         0         0%         0.00         0.14         0.57         0.65         X         X           3         4         2         9         11%         3.00         0.48         1.33         1.49         X         X           3         2         1         6         7%         2.00         0.71         1.76         1.96         X         X           0         1         1         2.27%         0.67         0.61         1.50         1.67         X         X           1         2         2.5         6%         1.67         0.69         1.68         1.87         X         X           3         2         10         12%         3.33         0.53         1.48</td>	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	7         7         7         21         26%         7.00         2.00         4.57         5.66         X         X           24         29         22         75         91%         25.00         0.63         13.06         1.43.7         X         X           0         0         0         0%         0.00         0.14         0.57         0.65         X         X           1         0         0         0         0%         0.00         0.14         0.57         0.65         X         X           3         4         2         9         11%         3.00         0.48         1.33         1.49         X         X           3         2         1         6         7%         2.00         0.71         1.76         1.96         X         X           0         1         1         2.27%         0.67         0.61         1.50         1.67         X         X           1         2         2.5         6%         1.67         0.69         1.68         1.87         X         X           3         2         10         12%         3.33         0.53         1.48

# Table 19 – Crash Analysis – NW 17 Avenue and NW 20 Street



From this analysis, it was determined that rear end, angle, sideswipe, Backing and Bicycle collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 20*.

Table 20 – Abnormal Crash Details & Countermeasures
NW 17 Avenue and NW 20 Street

	(4)		17 Aven				- 00) UD	DAN OF 1		
	Vith Turn Lanes, 4 Leg Interser			3 YEAR	%	MEAN	Possible	Counter-		
			YEAR		TOTAL	of	Accidents	Cause(s)	measure(s)	
	Tatal Dave F		2011	2012	2013	CRASHE	Total	per Year	. ,	•
Rear End	Total Rear Er		8	11	12	31	100%	10.33	(1)	2
	Lighting Conditions	Day Light	5	8	8	21	68%	7.00	(3)	4
		Dawn	0	0	0	0	0%	0.00	(7)	7
		Dark	3	3	4	10	32%	3.33	(12)	
	Hours of Day	00:00 - 06:00	2	0	2	4	13%	1.33		
		06:00 - 09:00	0	1	3	4	13%	1.33		
		09:00 - 11:00	1	1	1	3	10%	1.00		
		11:00 - 13:00	1	2	1	4	13%	1.33		
		13:00 - 15:00	0	2	2	4	13%	1.33		
		15:00 - 18:00	1	3	2	6	20%	2.00		
	L	18:00 - 24:00	3	2	0	5	17%	1.67		
	Direction	North	1	4	4	9	29%	3.00		
		South	4	1	3	8	26%	2.67		
		East	1	3	1	5	16%	1.67		
	I	West	2	3	4	9	29%	3.00		
		Unknown	0	0	0	0	0%	0.00		
			NUMB	NUMBER OF CRASHES		3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	Accidents	Cause(s)	measure(s
		<u> </u>	2011	2012	2013	CRASHE	Total	per Year	( )	•
Angle	Total Left Tu		14	9	4	27	100%	9.00	(9)	9
	Lighting Conditions	Day Light	11	5	2	18	67%	6.00	(13)	13
		Dawn	0	0	0	0	0%	0.00		17
	L	Dark	3	4	2	9	33%	3.00		
	Hours of Day	00:00 - 06:00	1	2	1	4	15%	1.33		
		06:00 - 09:00	3	2	2	7	26%	2.33		
		09:00 - 11:00	0	1	0	1 2	4% 7%	0.33		
		11:00 - 13:00	1		0	4		0.67		
		13:00 - 15:00	4	0	0	4 5	15%	1.33		
		15:00 - 18:00 18:00 - 24:00	2	2	0	5 4	19% 15%	1.67 1.33		
	Direction	NB + EB	2	2	0	4	15%	1.33		
		NB + WB	4	3	2	4 9	33%	3.00		
		SB + EB	5	1	0	6	22%	2.00		
			-			-				
		SB + WB	3	3	2	8	30%	2.67		
		Unknown	U	U	U	0	0%	0.00		
			NUMB			3 YEAR	0/	MEAN		
				NUMBER OF CRASHES YEAR			%	Accidents	Possible	Counter-
			2011	2012	2013	TOTAL CRASHE	of Total	per Year	Cause(s)	measure(s
	Total Right Tu	Irn Crashes	5	4	4		100%	4.33	(8)	9
	Lighting Conditions	Day Light	4	4	4	13	92%	4.33		9 21
		DayLight	0	4	4	0	92%	0.00	(9) (12)	21
	Lighting Conditions	Dark	1	0	0	1	8%	0.00	(14)	
	Hours of Day	00:00 - 06:00	0	0	0	0	8% 0%	0.33		
		00:00 - 06:00	0	0	0 1	2	15%	0.00		
Sideswipe (Overtake)		06:00 - 09:00	0	3	0	2	23%	1.00		
		11:00 - 13:00	0	0	1	3	23%	0.33		
		13:00 - 15:00	1	0	1	2	8% 15%	0.33		
		15:00 - 18:00	2	0	1	2	23%	1.00		
		18:00 - 24:00	2	0	0	2	23%	0.67		
		North	2	2	1	2 4	31%	1.33		
	Direction	South	1	1	0	4	15%	0.67		
		East	1	0	1	2	15%	0.67		
		West Unknown	2	1	2	5 0	38% 0%	1.67 0.00		



#### 3.8.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 17 Avenue and NW 20 Street were performed on a typical weekday on May 13, 2014. A summary of the traffic data is presented in *Figure 31*, and the field review is presented in *Figure 32*.

The intersection is controlled by a signal suspended in span wires. This intersection has leftturn lanes for all approaches and the signal operation is protected-permissive for all of them. North and southbound traffic is balanced throughout the entire day while the eastbound is heavier than westbound during the am period and vice versa during the pm period. Considerable weaving and careless driving was observed during field observations.

High pedestrian activity at the intersection and its approaches was observed as well as bikers at all directions. Conflicts exist with turning vehicles and pedestrians. Conflicts were also observed between cars exiting businesses driveways with thru traffic and pedestrians. Crosswalks are provided for all directions. Pedestrian countdown signals are also provided for all direction; however, the countdown signal at southwest corner is not in alignment for westbound crossing. Push buttons exist to cross NW 20 Street.

Pavement was observed in substantial conditions. Pavement markings were faded and skid marks were visible. There is high demand of heavy vehicles on all directions.

#### 3.8.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NW 17 Avenue and NW 20 Street, the following is recommended:

- Update span wire traffic signal to mast arm suspension signal.
- Relocate north leg crosswalk closer to the intersection away from the gas station driveway, and update ADA ramps at northwest corner.
- Provide Turning Vehicles Yield to Pedestrians (R10-15) signs for all directions.
- Installing reflective back plates for all signals heads.
- Provide lane distribution signs (left, thru and right) for north and southbound traffic.
- Resurfacing the intersection and refurbishing of pavement markings using thermoplastic painting.
- Retiming/optimizing of the existing signal while maintaining cycle length for both the AM and PM peak hours pursuing to extend clearance timing for east-west directions.
- Lengthen the eastbound left-turn lane to 200'.
- Consider canceling the signal nighttime flashing mode and have the signal in standard operations 24-hrs.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 33.



#### 3.8.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$611,117. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





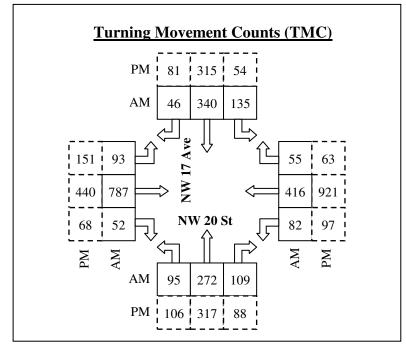


Figure 31: Traffic Data – NW 17 Avenue and NW 20 Street





Figure 32: Field Review – NW 17 Avenue and NW 20 Street









## 3.9. NW 22 Avenue and NW 7 Street

## 3.8.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NW 22 Avenue is a four lane urban minor arterial with painted median that runs north-south, and NW 7 Street is a four lane undivided urban principal arterial that runs east-west.

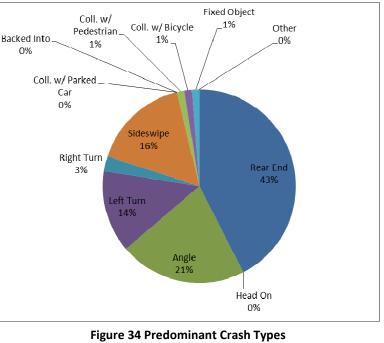
## 3.9.2. Safety Conditions and Analysis

The intersection of NW 22 Avenue and NW 7 Street is ranked number 9 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 80 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 27. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 34*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010



NW 22 AVE & NW 7 ST

FDOT's "Expected Value Analysis." *Table 21* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.271, 1.155, and 0.786, respectively. The safety ratio for the three years averaged 1.071. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



							NW 7 Str						
		(4 Lane	x 4 Lane	, Signaliz	ed, With Tur	m Lanes, 4	Leg Interse	ction - Table	29) - URBAN	Spot			
		NUMBE		ASHES	3 YEAR	%	MEAN	EXPECTED	ANNUAL CF		ABNORM		-
	TYPE OF CRASH	2011	YEAR 2012	2013	TOTAL CRASHES	of Total	Accidents per Year	MEAN	90th Percentile	95th Percentile	Mean	90th Percentil	95th Percenti
OLLISION TYPE	Rear End	14	10	10	34	43%	11.33	3.43	8.08	8.97	Х	Х	Х
	Head On Angle	0	0	0	0 17	0% 21%	0.00 5.67	0.51 3.11	1.15 6.53	1.28 7.19	x		
	Left Turn	3	4	4	17	14%	3.67	1.44	3.22	3.56	X	x	х
	Right Turn	0	2	0	2	3%	0.67	0.34	1.07	1.21	X	~	~
	Sideswipe	2	6	5	13	16%	4.33	1.51	4.91	5.56	X		
	Backed Into	0	0	0	0	0%	0.00	0.11	0.47	0.54			
	Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.11	0.57	0.66			
	Coll. w/ Pedestrian	1	0	0	1	1%	0.33	0.47	1.35	1.52	v		
	Coll. w/ Bicycle Fixed Object	0	0	0	1	1% 1%	0.33	0.12	0.49	0.56	X	x	х
	Ran Off Road	0	0	0	0	0%	0.00	0.04	0.00	0.27	~	<u> </u>	^
	Overtuned	0	0	0	0	0%	0.00	0.01	0.10	0.13			
	Other	0	0	0	0	0%	0.00	5.26	12.78	14.22			
	Total Crashes	30	29	21	80	100%	26.67	17.31	37.75	41.66	Х		
EVERITY	PDO crashes	22	25	19	66	83%	22.00	8.79	24.57	27.59	Х	<u> </u>	
	Fatal crashes	0	0	0	0	0% 18%	0.00 4.67	2.49 10.55	15.45 20.71	17.93 22.66			
IGHT CONDITIONS	Injury crashes Day Light	8 19	4 20	2 14	53	66%	4.67	9.69	20.71	22.66	х		
	Dusk	0	2	0	2	3%	0.67	0.53	1.61	1.81	x		
	Dawn	0	0	1	1	1%	0.33	0.39	1.43	1.63			
	Dark	10	7	5	22	28%	7.33	4.30	9.57	10.57	Х		
	Unknown	1	0	1	2	3%	0.67	0.61	2.23	2.54	X		
SURFACE CONDITIONS		22	24	19	65	81%	21.67	12.76	30.50	33.90	X	<u> </u>	
	Wet	7	5	1	13	16%	4.33	1.91	4.43	4.92 2.36	X		
NONTH OF A YEAR	Others January	1	0	1	2	3% 6%	0.67	0.68	2.09	2.36	х		
	February	2	0	3	5	6%	1.67	1.67	4.01	4.46	^		
	March	4	3	1	8	10%	2.67	1.64	4.07	4.53	Х		
	April	1	3	1	5	6%	1.67	1.50	3.60	4.01	Х		
	May	0	2	1	3	4%	1.00	1.51	3.24	3.57			
	June	4	3	0	7	9%	2.33	1.62	3.97	4.42	X		
	July	3	3	2	8 10	10% 13%	2.67 3.33	1.67 1.73	3.82 4.09	4.24 4.54	X		
	August September	4	3	2	8	10%	2.67	1.63	4.09	4.54	X		
	October	1	3	1	5	6%	1.67	1.46	3.92	4.39	x		
	November	2	2	5	9	11%	3.00	1.40	3.97	4.46	Х		
	December	3	1	3	7	9%	2.33	1.41	4.02	4.52	Х		
DAY OF THE WEEK	Sunday	9	4	1	14	18%	4.67	2.67	7.18	8.04	X		
	Monday	5	4	2	11	14%	3.67	2.47	5.66	6.27	X		
	Tuesday	4	4	1	9 10	11%	3.00	2.47	5.61	6.21	X		
	Wednesday Thursday	1 8	5	4	10	13% 18%	3.33 4.67	2.33 2.44	5.55 5.25	6.16 5.79	X		
	Friday	2	5	3	10	13%	3.33	2.46	5.51	6.10	X		
	Saturday	1	6	5	12	15%	4.00	2.52	6.23	6.94	X		
HOUR OF THE DAY	00:00-06:00	4	3	3	10	13%	3.33	1.61	4.23	4.73	Х		
	06:00-09:00	5	2	4	11	14%	3.67	1.36	3.39	3.78	X	X	
	09:00-11:00	4	3	3	10	13%	3.33	1.28	3.25	3.62	X	X	
	11:00-13:00 13:00-15:00	2	6	4	12 6	15% 8%	4.00 2.00	1.70 1.88	4.20	4.68 6.09	X	L	
	15:00-18:00	5	6	5	16	20%	5.33	2.99	7.98	8.94	X		
	18:00-24:00	8	6	1	15	19%	5.00	3.79	9.27	10.32	x		
						YEAR		3-Year					
					1	2	3	Average					
Viorago Daily Troff - A	DT (Vobiolog per D				-	-	-	46,522	-				
Average Daily Traffic A		• ·			42,701	46,414	50,450		-				
Iorida Average Crash	rate (Crashes per I	Million En	tering Ve	hicles)	0.757	0.757	0.757	0.757					
Fraffic Base					15.586	16.941	18.414	16.980					
Actual Crash Rate (Cr	ashes per Million F	nterina Va	ehicles)		1.925	1.712	1.140	1.592					
		-	,						-				
Critical Crash Rate (C	rashes per Million E	ntering V	ehicles)		1.514	1.482	1.451	1.482	4				
Safety Ratio					1.271	1.155	0.786	1.071					
High Crash Location	??				YES	YES	NO	YES					
	$Rate = \frac{A \times 1,00}{V}$		-		al number of rage Annual			crashes by t	■ type occurring	in a 1 year p	eriod.		
CriticalCrashR	$Pate = AVR + \frac{0.5}{TB} + 0$	$TF\sqrt{\frac{AVI}{TB}}$	R	AVR = 7 TB = Tra TF = Te	affic Base st Factor (z-	value)			pe of intersec	tion or roadwa	Level (%)	Constant Z	
Traffic Base =	$\frac{Years \times ADT \times 3}{1,000,000}$	865			96 (assume 29 (assume					86.60 90.00 95.00 95.50	) ) )	1.50 1.64 1.96 2.00	
Safety Ratio	$= \frac{Actual Crass}{Critical Crass}$	h Rate sh Rate	_							98.80 99.00 99.70 99.95	)	2.50 2.58 3.00 3.29	

# Table 21 – Crash Analysis – NW 22 Avenue and NW 7 Street



# Table 22 – Abnormal Crash Details & Countermeasures NW 22 Avenue and NW 7 Street

			22 Aven	ue & N	W 7 Str	eet				
	(4 Lane x 4 La	ane, Signalized, Wi	th Turn La	nes, 4 Le	g Interse	ction - Table	e 29) - UR	BAN Spot		
l			NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible	Counter-
			2011	2012	2013	CRASHE	Total	per Year	Cause(s)	measure(s)
	Total Rear Er		14	10	10	34	100%	11.33	(1)	5
		Day Light	8	7	9	24	71%	8.00	(8)	8
	Lighting Conditions	Dawn	0	1	0	1 9	3% 26%	0.33 3.00	(9)	13
		Dark 00:00 - 06:00	6 2	2	1	3	20% 9%	1.00		
		06:00 - 09:00	1	1	2	4	12%	1.33		
		09:00 - 11:00	1	1	2	4	12%	1.33		
Rear End	Hours of Day	11:00 - 13:00	0	1	2	3	9%	1.00		
near End		13:00 - 15:00	2	2	1	5	15%	1.67		
		15:00 - 18:00	3 5	2	2	7	21% 24%	2.33 2.67		
		18:00 - 24:00 North	- 5 - 4	2 6	7	0 17	24% 50%	5.67		
		South	2	0	2	4	12%	1.33		
	Direction	East	7	3	1	11	32%	3.67		
		West	1	1	0	2	6%	0.67		
		Unknown	0	0	0	0	0%	0.00		
					401150					
			NUMBE	R OF CR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible	Counter-
			2011	2012	2013	CRASHE	Total	per Year	Cause(s)	measure(s)
	Total Rear Er	nd Crashes	9	4	4	17	100%	5.67	(1)	2
		Day Light	5	3	2	10	59%	3.33	(3)	4
	Lighting Conditions	Dawn	0	0	1	1	6%	0.33	(7)	7
		Dark 00:00 - 06:00	4	1	1	6 5	35% 31%	2.00 1.67	(12)	
		06:00 - 09:00	4	0	2	6	38%	2.00		
		09:00 - 11:00	2	0	0	2	13%	0.67		
Angle	Hours of Day	11:00 - 13:00	0	1	0	1	6%	0.33		
3		13:00 - 15:00 15:00 - 18:00	0	1	0	1	6% 6%	0.33		
		18:00 - 24:00	0	0	0	0	0%	0.00		
		NB + EB	4	2	2	8	47%	2.67		
		NB + WB	3	1	0	4	24%	1.33		
	Direction	SB + EB	2	1	2	5	29%	1.67		
		SB + WB Unknown	0	0	0	0	0% 0%	0.00		
		Ginalowi	v	v	v	v	070	0.00		
			NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR	0010	TOTAL	of	Accidents	Cause(s)	measure(s)
	Total Rear Er	nd Crashes	2011 3	2012 6	2013	CRASHE	Total	per Year		
		Day Light			2	11 1		3.67	(1)	2
	Lighting Conditions		3	4	2 0	11 7	100% 64%	3.67 2.33	(1) (3)	2 4
		Dawn	0	4 0	0	7 0	64% 0%	2.33 0.00	(3) (7)	
		Dark	0 0	4 0 2	0 0 2	7 0 4	64% 0% 36%	2.33 0.00 1.33	(3)	4
		Dark 00:00 - 06:00	0 0 0	4 0 2 1	0 0 2 2	7 0 4 3	64% 0% 36% 27%	2.33 0.00 1.33 1.00	(3) (7)	4
		Dark	0 0	4 0 2	0 0 2	7 0 4	64% 0% 36%	2.33 0.00 1.33	(3) (7)	4
l eft Turn	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	0 0 0 0 0 1	4 0 2 1 1 0 3	0 0 2 2 0 0 0	7 0 4 3 1 0 4	64% 0% 36% 27% 9% 0% 36%	2.33 0.00 1.33 1.00 0.33 0.00 1.33	(3) (7)	4
Left Turn		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00	0 0 0 0 1 0	4 0 2 1 1 0 3 0	0 0 2 2 0 0 0 0 0	7 0 4 3 1 0 4 0	64% 0% 36% 27% 9% 0% 36% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00	(3) (7)	4
Left Turn		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	0 0 0 0 1 0 1	4 0 2 1 0 3 0 0	0 0 2 2 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1	64% 0% 36% 27% 9% 0% 36% 0% 9%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33	(3) (7)	4
Left Turn		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	0 0 0 0 1 0	4 0 2 1 0 3 0 0 1	0 0 2 2 0 0 0 0 0	7 0 4 3 1 0 4 0	64% 0% 36% 27% 9% 0% 36% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67	(3) (7)	4
Left Turn	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	0 0 0 1 0 1 1 1	4 0 2 1 0 3 0 0	0 2 2 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2	64% 0% 36% 27% 9% 0% 36% 0% 9% 18%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33	(3) (7)	4
Left Turn		$\begin{array}{c} \text{Dark} \\ 00:00 & 06:00 \\ 06:00 & 09:00 \\ 09:00 & 11:00 \\ 11:00 & 13:00 \\ 13:00 & 15:00 \\ 15:00 & 15:00 \\ 18:00 & 24:00 \\ \text{NB} \rightarrow \text{WB} \\ \text{SB} \rightarrow \text{SB} \\ \text{SB} \rightarrow \text{EB} \end{array}$	0 0 0 1 1 0 1 1 0 0 2	4 0 2 1 1 0 3 0 0 1 0 1 1 1	0 0 2 0 0 0 0 0 0 0 1 1 0	7 0 4 3 1 0 4 0 1 2 1 2 3	64% 0% 36% 27% 9% 0% 36% 0% 9% 18% 9% 18% 27%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67 0.33 0.67 1.00	(3) (7)	4
Left Turn	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 15:00 - 18:00 NB → WB WB → SB VB → SB EB → NB	0 0 0 1 0 1 1 0 0 2 1	4 0 2 1 1 0 3 0 0 0 1 0 1 1 4	0 0 2 0 0 0 0 0 0 0 0 0 1 1 1 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5	64%           0%           36%           27%           9%           0%           36%           0%           36%           0%           38%           0%           38%           9%           18%           27%           45%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67 0.33 0.67 1.00 1.67	(3) (7)	4
Left Turn	Hours of Day	$\begin{array}{c} \text{Dark} \\ 00:00 & 06:00 \\ 06:00 & 09:00 \\ 09:00 & 11:00 \\ 11:00 & 13:00 \\ 13:00 & 15:00 \\ 15:00 & 15:00 \\ 18:00 & 24:00 \\ \text{NB} \rightarrow \text{WB} \\ \text{SB} \rightarrow \text{SB} \\ \text{SB} \rightarrow \text{EB} \end{array}$	0 0 0 1 1 0 1 1 0 0 2	4 0 2 1 1 0 3 0 0 1 0 1 1 1	0 0 2 0 0 0 0 0 0 0 1 1 0	7 0 4 3 1 0 4 0 1 2 1 2 3	64% 0% 36% 27% 9% 0% 36% 0% 9% 18% 9% 18% 27%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67 0.33 0.67 1.00	(3) (7)	4
Left Turn	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 15:00 - 18:00 NB → WB WB → SB VB → SB EB → NB	0 0 0 1 1 0 1 1 0 2 1 0 0	4 0 2 1 0 3 0 0 0 1 0 1 1 4 0	0 0 2 2 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5	64%           0%           36%           27%           9%           0%           38%           0%           18%           9%           18%           9%           0%           0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67 0.33 0.67 1.00 1.67	(3) (7) (12)	4 7
Left Turn	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 15:00 - 18:00 NB → WB WB → SB VB → SB EB → NB	0 0 0 1 1 0 0 0 2 1 0 0 0 0 2 1 0	4 0 2 1 1 0 0 0 1 1 1 4 0 8 R OF CR YEAR	0 0 2 0 0 0 0 0 0 1 1 0 0 0 0 ASHES	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 0 3 YEAR TOTAL	64% 0% 27% 9% 0% 36% 0% 9% 18% 9% 18% 27% 45% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents	(3) (7) (12) Possible	Counter-
Left Turn	Hours of Day		0 0 0 1 1 0 1 1 1 0 0 2 1 0 0 <b>NUMBE</b> 2011	4 0 2 1 1 0 0 0 1 1 4 0 8 7 6 7 6 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7 7 8 7	0 2 2 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	64% 0% 36% 27% 9% 9% 36% 0% 9% 18% 27% 45% 0% 0% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year	(3) (7) (12) Possible Cause(s)	Counter- measure(s)
Left Turn	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB → WB WB → SB SB → EB EB → NB Unknown d Crashes	0 0 0 1 1 0 0 2 1 1 0 0 2 1 0 0 2 2 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 0 0	4 0 1 1 0 0 1 0 1 1 4 0 0 8 R OF CR YEAR 2012 6	0 2 2 0 0 0 0 0 0 1 1 0 0 ASHES 2013 5	7 0 4 3 1 0 4 0 4 0 1 2 1 2 3 5 0 3 YEAR TOTAL CRASHE 13	64% 0% 36% 27% 9% 0% 36% 0% 9% 18% 27% 45% 0% 0% 0% 0% 0% 0% 10%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 0.33 0.67 1.00 1.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33	(3) (7) (12) Possible Cause(s) (1)	Counter- measure(s)
Left Turn	Hours of Day		0 0 0 1 1 0 1 1 1 0 0 2 1 0 0 <b>NUMBE</b> 2011	4 0 2 1 1 0 0 0 1 0 1 1 4 0 8 7 6 7 6 7 8 7 7 8 7 8 7 7 8 7 7 8 7 7 8 7	0 2 2 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8 7 8	64% 0% 36% 27% 9% 9% 36% 0% 9% 18% 27% 45% 0% 0% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.00 0.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year	(3) (7) (12) Possible Cause(s)	Counter- measure(s)
Left Turn	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 NB → WB WB → SB SB → EB EB → NB SB → EB EB → NB Unknown d Crashes DayLight Dawn Dark Dark	0 0 0 1 1 0 0 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 2 2 2 1 1 2 2 0 0 0	4 0 2 1 1 0 0 0 1 1 0 1 1 4 0 2 6 4 0 2 1 1 1 1 1 1 1 1 1 1 1 1 1	0 0 2 0 0 0 0 0 0 1 1 0 0 0 ASHES 2013 5 4 0 1 1	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 3 YEAR TOTAL CRASHE 13 10 0 3 3	64% 0% 36% 27% 9% 9% 36% 0% 9% 18% 27% 45% 0% 0% 0% 0% 0% 0% 27% 0% 0% 23%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.03 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00	(3) (7) (12) Possible Cause(s) (1) (3)	Counter- measure(s)
Left Turn	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB → WB WB → SB EB → NB EB → NB Unknown d Crashes Day Light Dawn Dark 00:00 - 06:00	0 0 0 1 1 0 1 1 0 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 2 2 1 1 0 0 0 1 1 1 0 0 0 1 1 1 0 0 0 1 1 0 0 0 0 1 1 0 1 0 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 1 0 0 0 1 0 0 0 1 0 0 0 0 1 0 0 0 0 0 1 0	4 0 2 1 0 3 0 0 1 0 1 4 0 2 2012 6 4 0 2 0	0 0 2 2 0 0 0 0 0 0 1 1 0 0 0 0 0 <b>ASHES</b> <b>2013</b> <b>5</b> 4 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 1 2 3 5 0 8 <b>3 YEAR</b> TOTAL CRASHE 10 0 0 3 3 0	64% 0% 36% 27% 9% 0% 36% 0% 36% 0% 9% 18% 9% 18% 9% 18% 9% 45% 0% 0% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 0.33 0.67 1.00 1.67 0.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 0.00	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Left Turn	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB → WB WB → SB EB → NB EB → NB Unknown d Crashes Day Light Dark 00:00 - 09:00 06:00 - 09:00	0 0 0 0 1 1 0 0 2 1 0 0 0 0 0 0 0 0 0 0	4 0 2 1 1 0 0 0 1 0 0 1 1 4 0 0 <b>ER OF CR</b> <b>YEAR</b> 2012 6 4 0 0 2 0 0	0 0 2 2 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 5 0 0 3 YEAR TOTAL CRASHE 13 10 0 3 3 0 0 0 0 0	64% 0% 36% 27% 9% 9% 36% 0% 36% 0% 9% 18% 9% 18% 9% 18% 27% 0% 45% 0% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 1.00 0.00 0.00	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 15:00 18:00 - 24:00 NB → WB WB → SB SB → EB EB → NB Unknown Dark 00:00 - 06:00 06:00 - 09:00 06:00 - 01:00	0 0 0 1 1 0 0 2 1 1 0 0 2 0 1 0 0 0 0 0	4 0 2 1 1 0 0 0 1 0 0 1 1 0 0 1 1 0 0 1 2 0 0 0 1	0 0 2 2 0 0 0 0 0 1 1 0 0 0 <b>XASHES</b> <b>2013</b> <b>5</b> 4 0 1 0 1 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 1 2 1 1 2 3 5 5 0 3 YEAR TOTAL CRASHE 13 10 0 3 3 0 2	64% 0% 36% 27% 9% 9% 36% 0% 9% 18% 27% 9% 18% 27% 0% 0% 0% 0% 0% 77% 0% 23% 0% 0% 0% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 1.00 0.00 0.00 0.00	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Left Turn Sideswipe (Overtake)	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB → WB WB → SB EB → NB EB → NB Unknown d Crashes Day Light Dark 00:00 - 09:00 06:00 - 09:00	0 0 0 0 1 1 0 0 2 1 0 0 0 0 0 0 0 0 0 0	4 0 2 1 1 0 0 0 1 0 0 1 1 4 0 0 <b>ER OF CR</b> <b>YEAR</b> 2012 6 4 0 0 2 0 0	0 0 2 2 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 5 0 0 3 YEAR TOTAL CRASHE 13 10 0 3 3 0 0 0 0 0	64% 0% 36% 27% 9% 9% 36% 0% 36% 0% 9% 18% 9% 18% 9% 18% 27% 0% 45% 0% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 1.00 0.00 0.00	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Sideswipe	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 15:00 NB → WB WB → SB SB → EB EB → NB Unknown Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 13:00 - 13:00 13:00 - 15:00	0 0 0 1 1 0 2 1 1 0 0 2 2 1 1 0 0 0 0 0	4 0 2 1 1 0 0 0 1 0 0 1 1 4 0 0 <b>ER OF CR</b> <b>YEAR</b> 2012 6 4 0 2 2 0 0 1 1 1 0 2	0 0 2 2 0 0 0 0 0 1 1 1 0 0 0 0 <b>ASHES</b> <b>2013</b> <b>5</b> 4 0 1 1 0 0 1 2 2	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 0 <b>3 YEAR</b> <b>TOTAL</b> <b>CRASHE</b> <b>13</b> 10 0 3 3 0 0 2 3 3 0 0 5 5	64% 0% 36% 27% 9% 9% 36% 0% 9% 18% 27% 9% 18% 27% 0% 45% 0% 45% 0% 0% 77% 0% 23% 0% 15% 23% 0%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 1.00 0.00 0.00 0.00 0	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Sideswipe	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 NB → WB WB → SB SB → EB EB → NB Unknown DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 15:00 13:00 - 15:00 18:00 - 24:00	0 0 0 1 1 0 0 2 1 1 0 0 2 2 1 1 0 0 2 0 1 2 0 0 0 0	4 0 2 1 1 0 3 0 0 1 0 1 1 0 1 4 0 5 6 4 0 2 2 0 0 1 1 0 2 2 2	0 0 2 2 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 3 YEAR TOTAL CRASHE 13 0 0 3 3 0 0 2 3 3 0 5 3 3 0 5 3 3	64% 0% 36% 27% 9% 0% 36% 0% 36% 9% 18% 9% 18% 9% 45% 0% 0% 0% 0% 0% 0% 27% 45% 0% 0% 0% 23% 0% 23% 23%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 0.00 0.00 0.00 0.00 0	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Sideswipe	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 15:00 13:00 - 18:00 18:00 - 24:00 NB → WB WB → SB EB → NB EB → NB Unknown d Crashes Day Light Dark 00:00 - 06:00 06:00 - 09:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 15:00 - 12:00 North	0 0 0 1 1 0 0 2 1 0 0 0 0 0 0 0 0 0 0 0	4 0 2 1 1 0 3 0 0 1 1 4 0 7 2012 6 4 0 0 1 1 0 2 2 2 2	0 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 3 4 5 0 3 7 EAR TOTAL CRASHE 13 10 0 3 0 0 2 3 0 0 5 5 3 4	64% 0% 36% 27% 9% 0% 36% 0% 36% 0% 27% 45% 0% 45% 0% 45% 0% 0% 0% 77% 0% 23% 0% 23% 0% 38% 23% 0% 31%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 0.00 0.00 0.00 0.00 0	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Sideswipe	Hours of Day Direction	Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 NB → WB WB → SB SB → EB EB → NB Unknown DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 15:00 13:00 - 15:00 18:00 - 24:00	0 0 0 1 1 0 0 2 1 1 0 0 2 2 1 1 0 0 2 0 1 2 0 0 0 0	4 0 2 1 1 0 3 0 0 1 0 1 1 0 1 4 0 5 6 4 0 2 2 0 0 1 1 0 2 2 2	0 0 2 2 0 0 0 0 0 0 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0	7 0 4 3 1 0 4 0 1 2 1 2 3 5 0 3 YEAR TOTAL CRASHE 13 0 0 3 3 0 0 2 3 3 0 5 3 3 0 5 3 3	64% 0% 36% 27% 9% 0% 36% 0% 36% 9% 18% 9% 18% 9% 45% 0% 0% 0% 0% 0% 77% 0% 0% 23% 0% 23% 0% 38% 23%	2.33 0.00 1.33 1.00 0.33 0.00 1.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 0.00 0.00 0.00 0.00 0	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)
Sideswipe	Hours of Day Direction Total Rear Er Lighting Conditions Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 13:00 - 15:00 18:00 - 24:00 NB → WB WB → SB SB → EB EB → NB Unknown Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 15:00 - 18:00 18:00 - 24:00 North South	0 0 0 0 1 1 0 0 2 2 1 1 0 0 0 0 0 0 0 0	4 0 2 1 1 0 0 0 1 0 1 4 0 0 <b>XEAR</b> <b>2012</b> 6 4 4 0 2 2 0 0 1 1 1 0 0 2 2 2 1	0 0 2 2 0 0 0 0 0 0 1 1 1 0 0 0 0 <b>ASHES</b> <b>2013</b> <b>5</b> 4 0 0 1 1 2 0 0 1 2 2 0 2 2 1	7 0 4 3 1 0 4 0 1 2 1 2 3 5 5 0 0 3 <b>YEAR</b> TOTAL CRASHE 13 10 0 3 3 0 0 2 3 3 0 0 5 5 3 4 3 3	64% 0% 36% 27% 9% 9% 0% 36% 0% 18% 9% 18% 27% 0% 27% 0% 45% 0% 0% <b>77%</b> 0% <b>70%</b> 77% 0% 23% 0% 15% 23% 23% 23%	2.33 0.00 1.33 0.00 0.33 0.00 0.33 0.67 0.33 0.67 1.00 1.67 0.00 <b>MEAN</b> Accidents per Year 4.33 3.33 0.00 1.00 1.00 0.00 0.00 0.00 0	(3) (7) (12) Possible Cause(s) (1) (3) (7)	Counter- measure(s)



From this analysis, it was determined that rear end, left-turn and fixed object collisions exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Also, angle, right-turn, sideswipe and bicycle collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 22*.

# 3.9.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 22 Avenue and NW 7 Street were performed on a typical weekday on May 13, 2014. A summary of the traffic data is presented in *Figure 35*, and the field review is presented in *Figure 36*.

The intersection is controlled by a signal suspended in span wires. This intersection has leftturn lanes for all approaches and the signal operation is protected-permissive for all of them. Obstructions to the sight distance are present at the southeast, southwest and northwest corners. Long queues were observed for southbound left-turn during am peak period with vehicles were spilling back and blocking the through lane. Same situation occurs for northbound left-turn during the pm peak period.

Immediately south of the intersection there is a school speed zone for Citrus Grove Elementary School. A mid-block pedestrian signal exists 350 feet west of the intersection. Moderate pedestrian activity was observed at all directions and the activity increases during school arrival and dismissal times. Crosswalks are provided for all directions. Also pedestrian head counts are provided for all direction, and push buttons exist to cross NW 7 Street. Conflicts exist with turning vehicles and pedestrians. Pavement was observed in substandard conditions. Pavement markings were faded.

#### 3.9.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NW 22 Avenue and NW 7 Street, the following is recommended:

- Update span wire traffic signal to mast arm suspension signal
- Lengthen the southbound left-turn lane to approximately 350 feet and the northbound left-turn lane to approximately 150 feet
- Update ADA ramps at northeast corner
- Install reflective back plates for all signals heads
- Provide Turning Vehicles Yield to Pedestrians (R10-15) signs for all direction
- Resurface the intersection and refurbish pavement markings using thermoplastic painting.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 37.



## 3.9.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$425,814. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





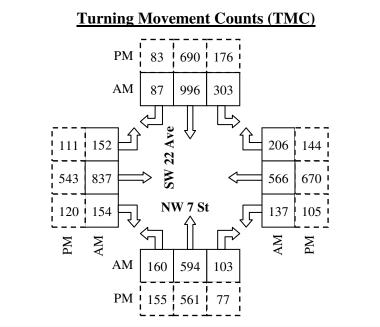


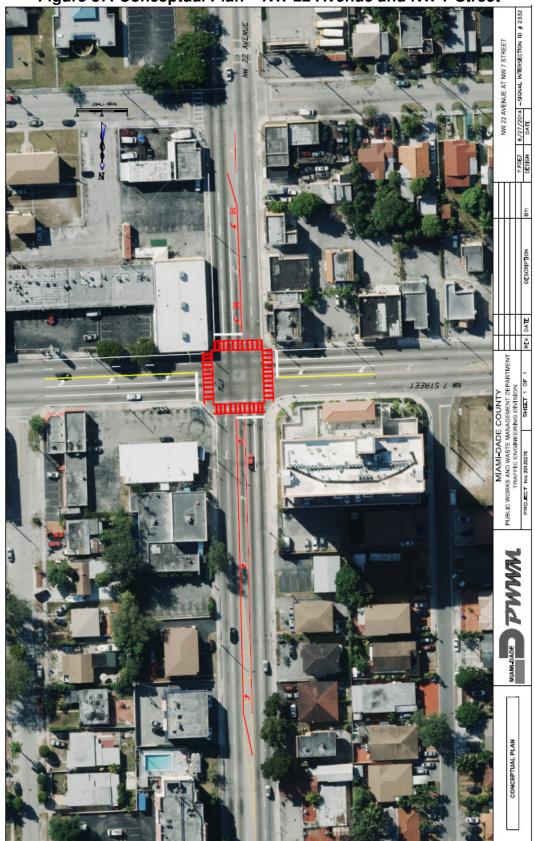
Figure 35: Traffic Data – NW 22 Avenue and NW 7 Street





Figure 36: Field Review – NW 22 Avenue and NW 7 Street









## 3.10. NW 3 Avenue and NW 5 Street

## 3.10.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NW 3 Avenue is a one-way northbound three lane urban collector with that runs north-south, and NW 5 Street is a one-way eastbound three lane urban collector that runs east-west.

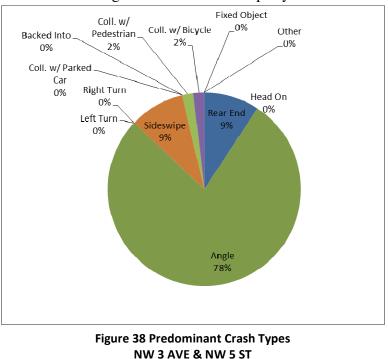
## 3.10.2. Safety Conditions and Analysis

The intersection of NW 3 Avenue and NW 5 Street is ranked number 10 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 54 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 18. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 38*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010



FDOT's "Expected Value Analysis." *Table 23* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 0.743, 1.847, and 0.841, respectively. The safety ratio for the three years averaged 1.144. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



							NW 5 Stre						
		(4 Lane	x 2 Lane	, Signaliz	ed, With Tu	m Lanes, 4	4 Leg Interse	ction -Table	23) - URBAN	Spot			
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents		O ANNUAL CF	ASH VALUE	ABNORM	ALLY HIGH 90th	CRASHES 95th
		2011	2012	2013	CRASHES	Total	per Year	MEAN	Percentile	Percentile	Mean	Percentil	
COLLISION TYPE	Rear End Head On	1	3	1	5 0	9% 0%	1.67 0.00	1.62 0.16	4.09 0.58	4.56 0.66	Х		
	Angle	8	25	9	42	78%	14.00	1.37	3.01	3.33	х	x	x
	Left Turn	0	0	0	0	0%	0.00	0.49	1.29	1.44			
	Right Turn Sideswipe	0	0	0	0	0% 9%	0.00	0.10	0.39	0.45	x	x	x
	Backed Into	0	0	0	0	0%	0.00	0.07	0.40	0.46	^	^	^
	Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.08	0.50	0.58			
	Coll. w/ Pedestrian Coll. w/ Bicycle	0	0	1	1	2% 2%	0.33	0.16	0.56	0.63	X	x	x
	Fixed Object	0	0	0	0	0%	0.00	0.00	0.55	0.62	^	^	^
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Overtuned Other	0	0	0	0	0% 0%	0.00	0.01 2.44	0.11 6.28	0.13 7.02			
	Total Crashes	11	29	14	54	100%	18.00	7.27	15.00	16.48	х	x	x
SEVERITY	PDO crashes	6	21	9	36	67%	12.00	3.99	9.34	10.36	X	X	X
	Fatal crashes	0	0	0	0	0%	0.00	0.00	0.00	0.00	v		
IGHT CONDITIONS	Injury crashes Day Light	5 9	8 20	5 10	18 39	33% 72%	6.00 13.00	5.10 4.76	11.25 9.80	12.43 10.76	X	x	x
	Dusk	0	0	2	2	4%	0.67	0.24	0.65	0.73	Х	X	
	Dawn	0	1	0	1	2%	0.33	0.14	0.49	0.55	X		
	Dark Unknown	2	7	2	11	20% 2%	3.67 0.33	2.00 0.12	4.57 0.46	5.06 0.52	X		
SURFACE CONDITIONS		10	28	13	51	94%	17.00	0.63	13.06	14.37	x	x	x
	Wet	1	0	1	2	4%	0.67	0.87	1.92	2.12			
MONTH OF A YEAR	Others January	0	1	0	1 5	2% 9%	0.33	0.14	0.57	0.65	X	x	x
NONTH OF A TEAN	February	1	1	1	3	6%	1.00	0.48	1.33	1.49	x	^	^
	March	0	2	1	3	6%	1.00	0.71	1.76	1.96	Х		
	April May	0	3	1	4	7% 13%	1.33 2.33	0.58	1.47	1.65 1.67	X	v	~
	June	0	5 4	2	5	9%	2.33	0.61	1.30	1.67	X	X	X
	July	3	1	0	4	7%	1.33	0.53	1.28	1.42	X	X	
	August	0	1	0	1	2%	0.33	0.69	1.68	1.87			
	September October	1	3	1	5 9	9% 17%	1.67 3.00	0.73	1.96	2.19 2.14	X	x	x
	November	2	2	2	6	11%	2.00	0.53	1.49	1.68	X	X	X
1	December	0	2	0	2	4%	0.67	0.54	1.33	1.48	X		
DAY OF THE WEEK	Sunday Monday	2	3	2	7 8	13% 15%	2.33 2.67	0.96	1.99 2.90	2.19 3.23	X	X	X
	Tuesday	1	4	1	6	11%	2.00	1.11	2.43	2.68	X		
	Wednesday	2	5	4	11	20%	3.67	1.10	2.49	2.76	Х	X	X
	Thursday Friday	0	3	0	3 7	6% 13%	1.00 2.33	1.09 0.92	2.49 2.25	2.76 2.50	x	x	
	Saturday	2	2	3	12	22%	4.00	0.92	2.23	2.66	x	x	x
HOUR OF THE DAY	00:00-06:00	1	3	1	5	9%	1.67	0.71	2.04	2.29	Х		
	06:00-09:00	2	1	1	4	8%	1.33	0.78	2.23	2.50	X	v	v
	09:00-11:00 11:00-13:00	3	6 5	2	11 10	21% 19%	3.67 3.33	0.63	1.67 1.60	1.86 1.77	X	X	X X
	13:00-15:00	1	3	1	5	9%	1.67	0.79	1.96	2.18	X	~	~
	15:00-18:00	1	6	2	9	17%	3.00	1.53	3.50	3.88	X		
	18:00-24:00	1	5	3	9	17%	3.00	2.13	4.38	4.81	Х		
						YEAR		3-Year	1				
					1	2	3	Average					
Average Daily Traffic A	NDT /Vehicles per D	avi			15,874	17,255	18,755	17,295					
, ,	· ·	.,	toring 1/	hieles)					-				
Florida Average Crash	rate (Grasnes per l	viillion En	tering ve	IICIES)	1.062	1.062	1.062	1.062	4				
Traffic Base					5.794	6.298	6.846	6.313	-				
Actual Crash Rate (Cr					1.898	4.605	2.045	2.849					
Critical Crash Rate <i>(C</i>	rashes per Million E	ntering V	ehicles)		2.557	2.492	2.431	2.493					
Safety Ratio					0.743	1.847	0.841	1.144	1				
High Crash Location	??				NO	YES	NO	YES					
CriticalCrashK	$Rate = \frac{A \times 1,00}{V}$ $Rate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$	$TF\sqrt{\frac{AV}{TB}}$		V = Ave Where: AVR = A TB = Transition TF = Te	rage Annual	Daily Traffi ewide Cras value)	ic X365 sh Rate for a	particular ty	type occurring rpe of intersec	tion or roadwa	ay segment Level (%)	Constant Z	_
	$= \frac{Years \times ADT \times 3}{1,000,000}$ $= Actual Crass$				29 (assume :					86.60 90.00 95.00 95.50 98.80 99.00	) ) )	1.50 1.64 1.96 2.00 2.50 2.58	
σητιγ καιο	$= \frac{Actual Crass}{Critical Crass}$	sh Rate								99.70 99.95		3.00 3.29	

# Table 23 – Crash Analysis – NW 3 Avenue and NW 5 Street



From this analysis, it was determined that angle, sideswipe and bicycle collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 24*.

	(4)		V 3 Aven							
	(4 Lane x 2 L	ane, Signalized, V	vith Turn La	anes, 4 Le	eg interse	ction - lable	9 23) - UR	BAN Spot		
			_	R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s
	<b>T</b>		2011	2012	2013	CRASHE	Total	per Year	.,	
	Total Rear Er		8	25	9	42	100%	14.00	(1)	2
	Linking Conditions	Day Light	6	18	5	29	69%	9.67	(3)	4
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(7)	7
		Dark	2	7	4	13	31%	4.33	(12)	
		00:00 - 06:00	1	3	1	5	12%	1.67		
		06:00 - 09:00	1	1	0	2	5%	0.67		
		09:00 - 11:00	1	6	1	8	20%	2.67		
Angle	Hours of Day	11:00 - 13:00	2	5	3	10	24%	3.33		
7		13:00 - 15:00	1	2	0	3	7%	1.00		
		15:00 - 18:00	1	5	1	7	17%	2.33		
		18:00 - 24:00	1	3	2	6	15%	2.00		
		NB + EB	8	24	8	40	95%	13.33		
		NB + WB	0	1	1	2	5%	0.67		
	Direction	SB + EB	0	0	0	0	0%	0.00		
		SB + WB	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		
								MEAN		
			NUMBE	ROFCR	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	Accidents	Cause(s)	measure(s
	<b>T 1 1 0 T</b>	0	2011	2012	2013	CRASHE	Total	per Year	. ,	
	Total Left Tu		2	1	2	5	100%	1.67	(9)	9
		Day Light	2	0	2	4	80%	1.33	(13)	13
	Lighting Conditions	Dawn		0			0%	0.00		17
			0	-	0	0				
		Dark	0	1	0	1	20%	0.33		
		Dark 00:00 - 06:00	0	1 0	0	1 0	20% 0%	0.33		
		Dark 00:00 - 06:00 06:00 - 09:00	0	1	0	1	20%	0.33		
		Dark 00:00 - 06:00	0	1 0	0	1 0	20% 0%	0.33		
Sideswipe	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00	0 0 0	1 0 0	0 0 1	1 0 1	20% 0% 20%	0.33 0.00 0.33		
Sideswipe (Overtake)		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	0 0 0 2	1 0 0 0	0 0 1 0	1 0 1 2	20% 0% 20% 40%	0.33 0.00 0.33 0.67		
		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	0 0 0 2 0	1 0 0 0	0 0 1 0 0	1 0 1 2 0	20% 0% 20% 40% 0%	0.33 0.00 0.33 0.67 0.00		
		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00	0 0 0 2 0 0 0	1 0 0 0 0 0	0 0 1 0 0 0	1 0 1 2 0 0	20% 0% 20% 40% 0%	0.33 0.00 0.33 0.67 0.00 0.00		
		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	0 0 2 0 0 0 0	1 0 0 0 0 0 0	0 0 1 0 0 0 1	1 0 1 2 0 0 1	20% 0% 20% 40% 0% 0% 20%	0.33 0.00 0.33 0.67 0.00 0.00 0.33		
		Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	0 0 2 0 0 0 0 0 0	1 0 0 0 0 0 0 1	0 0 1 0 0 0 1 0	1 0 1 2 0 0 1 1 1	20% 0% 20% 40% 0% 0% 20% 20%	0.33 0.00 0.33 0.67 0.00 0.00 0.33 0.33		
		Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North	0 0 2 0 0 0 0 0 0 0 0	1 0 0 0 0 0 0 1 0	0 0 1 0 0 0 1 0 0	1 0 1 2 0 0 1 1 1 0	20% 0% 20% 40% 0% 20% 20% 20%	0.33 0.00 0.33 0.67 0.00 0.00 0.33 0.33 0.00		
	Hours of Day	Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South	0 0 2 0 0 0 0 0 0 0 1	1 0 0 0 0 0 1 0 0	0 0 1 0 0 0 1 0 0 0 0	1 0 1 2 0 0 1 1 1 0 1	20% 0% 20% 40% 0% 20% 20% 20% 20%	0.33 0.00 0.33 0.67 0.00 0.33 0.33 0.33 0.00 0.33		

# Table 24 – Abnormal Crash Details & CountermeasuresNW 3 Avenue and NW 5 Street

# 3.10.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 3 Avenue and NW 5 Street were performed on a typical weekday on May 15, 2014. A summary of the traffic data is presented in *Figure 39*, and the field review is presented in *Figure 40*.

The eastbound approach has one left turn lane and three thru lanes while the northbound approach has one shared right and thru lane and two thru lanes. Eastbound traffic has auxiliary pedestal signals at both sides of NW 5 Street and also mounted on the signal mast

arm posts. However the signal visibility is still poor since the bridge darkens the approach significantly. Obstruction to the sight distance exists at the southwest corner affecting both east and north approach due to the unique characteristics of these two one-way roads. On-street parking exists on the east leg at the north side of NW 5 Street.

Public parking lots exist on the north and south-west corners while many governmental and public offices exist to the east of the intersection. Downtown Miami Charter School and Law Enforcement Officer Memorial High School are located south of the study intersection. Pedestrian activity is moderate during the entire day and increases during student arrival and dismissal times.

The pavement is in substandard conditions and mast arm post cover plates were either damaged or missing. Updated ADA pedestrian ramps exist only on the intersection north leg for the east-west crossing direction. Crosswalks and pedestrian head counts are provided for all directions.

# 3.10.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NW 3 Avenue and NW 5 Street, the following is recommended:

- Update ADA ramps at all corners
- Installing reflective back plates for all signals heads
- Provide signal ahead warning signs on both sides of NW 5 Street for eastbound traffic
- Retiming/optimizing of the existing signal while maintaining cycle length for both the AM and PM peak hours pursuing to extend clearance timing for east direction.
- Provide mast arm post cover plates
- Provide "No Right Turn On Red" sign for northbound traffic
- Resurfacing the intersection and refurbishing of pavement markings using thermoplastic painting.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 41.

# 3.10.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$54,925. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





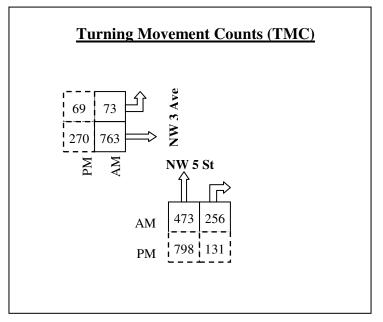


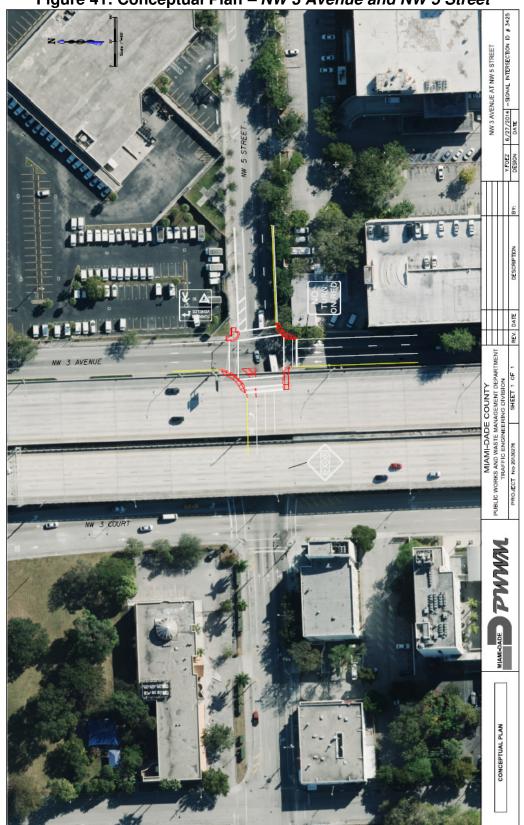
Figure 39: Traffic Data – NW 3 Avenue and NW 5 Street





Figure 40: Field Review – NW 3 Avenue and NW 5 Street









# 3.11. W 28 Avenue and W 76 Street

## 3.11.1. Site Description

This intersection is a signalized four legged intersection located within the City of Hialeah in the northwest area of Miami Dade County. West 28 Avenue is a four lane urban arterial divided by a median mostly paved that runs north-south, and West 76 Street is a two lane local road that runs east-west.

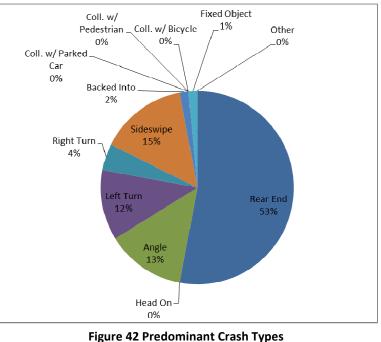
## 3.11.2. Safety Conditions and Analysis

The intersection of W 28 Avenue and W 76 Street is ranked number 11 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 68 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 23. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 42*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate County for corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010



W 28 AVE & W 76 ST

FDOT's "Expected Value Analysis." *Table 25* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 0.899, 1.395, and 1.079, respectively. The safety ratio for the three years averaged 1.124. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		(4 ] ===	× 01	Ciara-l'			W 76 Stre			Cost			
		(4 Lane	x 2 Lane	, Signaliz	ed, With Tur	m Lanes, 4	Leg Interse	ction - Table	23) - URBAN	Spot			
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents		ANNUAL CF	ASH VALUE 95th		ALLY HIGH 90th	CRASHES 95th
		2011	2012	2013	CRASHES	Total	per Year	MEAN	Percentile	Percentile	Mean	Percentil	Percentil
COLLISION TYPE	Rear End Head On	8	16 0	12 0	36 0	53% 0%	12.00 0.00	1.62 0.16	4.09 0.58	4.56 0.66	Х	X	X
	Angle	5	3	1	9	13%	3.00	1.37	3.01	3.33	х		
	Left Turn	3	2	3	8	12%	2.67	0.49	1.29	1.44	Х	x	х
	Right Turn	0	2	1	3	4%	1.00	0.10	0.39	0.45	X	X	X
	Sideswipe Backed Into	0	4	6	10	15%	3.33 0.33	0.56	1.40 0.40	1.56	X	X	X
	Coll. w/ Parked Car	0	0	0	0	1%	0.33	0.07	0.40	0.46 0.58	~		
	Coll. w/ Pedestrian	0	0	0	Ő	0%	0.00	0.16	0.56	0.63			
	Coll. w/ Bicycle	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Fixed Object	0	1	0	1	1%	0.33	0.22	0.55	0.62	Х		
	Ran Off Road Overtuned	0	0	0	0	0% 0%	0.00	0.00	0.00	0.00 0.13			
	Other	0	0	0	0	0%	0.00	2.44	6.28	7.02			
	Total Crashes	17	28	23	68	100%	22.67	7.27	15.00	16.48	х	x	х
SEVERITY	PDO crashes	13	24	20	57	84%	19.00	3.99	9.34	10.36	Х	X	Х
	Fatal crashes	0	0	0	0	0%	0.00	0.00	0.00	0.00			
IGHT CONDITIONS	Injury crashes Day Light	4	4 21	3 17	11 54	16% 79%	3.67 18.00	5.10 4.76	11.25 9.80	12.43 10.76	x	x	x
	DayLight Dusk	0	21	1	3	4%	1.00	0.24	0.65	0.73	X	x	x
	Dawn	1	0	0	1	1%	0.33	0.14	0.49	0.55	Х		
	Dark	0	4	5	9	13%	3.00	2.00	4.57	5.06	X		
	Unknown	0	1	0	1	1%	0.33	0.12	0.46	0.52	X		v
SURFACE CONDITIONS	Dry Wet	14 3	20 7	21 2	55 12	81% 18%	18.33 4.00	0.63	13.06 1.92	14.37 2.12	X	X X	X X
	Others	0	1	0	12	1%	0.33	0.87	0.57	0.65	x	L ^	Â
MONTH OF A YEAR	January	0	1	3	4	6%	1.33	0.48	1.33	1.49	Х	х	
	February	2	2	1	5	7%	1.67	0.59	1.40	1.56	Х	X	X
	March	2	4	3	9	13%	3.00	0.71	1.76	1.96	X	x	Х
	April May	1	1	2	4 8	6% 12%	1.33 2.67	0.58	1.47	1.65 1.67	X	x	x
	June	4	4	3	11	16%	3.67	0.52	1.32	1.47	x	x	x
<u>-</u>	July	2	1	0	3	4%	1.00	0.53	1.28	1.42	Х		
	August	1	4	2	7	10%	2.33	0.69	1.68	1.87	Х	Х	Х
	September	0	1	1	2	3%	0.67	0.73	1.96	2.19	x	x	
	October November	2	3	2	6 6	9% 9%	2.00 2.00	0.74	1.92 1.49	2.14 1.68	X	x	х
	December	0	2	1	3	4%	1.00	0.54	1.33	1.48	X	<u> </u>	^
DAY OF THE WEEK	Sunday	2	3	3	8	12%	2.67	0.93	2.38	2.66	Х	Х	Х
	Monday	6	2	1	9	13%	3.00	0.96	1.99	2.19	Х	Х	Х
	Tuesday	1	4	6	11 7	16%	3.67	1.16	2.90 2.43	3.23 2.68	X	X	X
	Wednesday Thursday	2	2 4	5	13	10% 19%	2.33 4.33	1.11 1.10	2.43	2.00	X	x	х
	Friday	2	6	4	12	18%	4.00	1.09	2.49	2.76	X	X	x
	Saturday	0	7	1	8	12%	2.67	0.92	2.25	2.50	Х	Х	Х
HOUR OF THE DAY	00:00-06:00	0	2	3	5	7%	1.67	0.71	2.04	2.29	X		
	06:00-09:00 09:00-11:00	2	2 0	3	7	10% 4%	2.33 1.00	0.78	2.23	2.50 1.86	X	X	
	11:00-13:00	0	5	0	5	7%	1.67	0.69	1.60	1.77	X	x	
	13:00-15:00	2	5	2	9	13%	3.00	0.79	1.96	2.18	X	X	х
	15:00-18:00	8	7	8	23	34%	7.67	1.53	3.50	3.88	Х	X	Х
	18:00-24:00	2	6	7	15	22%	5.00	2.13	4.38	4.81	Х	X	X
						YEAR		2 Voor	1				
					L			3-Year					
					1	2	3	Average	_				
Average Daily Traffic A	DT (Vehicles per D	lay)			31,482	34,219	37,195	34,298					
Iorida Average Crash	rate (Crashes per l	Million En	tering Ve	hicles)	0.757	0.757	0.757	0.757					
Traffic Base					11.491	12.490	13.576	12.519	1				
Actual Crash Rate (Cr	ashes per Million E	ntering V	ahicles)		1.479	2.242	1.694	1.805	-				
		-							-				
Critical Crash Rate (C	rashes per Million E	ntering V	ehicles)		1.645	1.607	1.571	1.608	1				
Safety Ratio					0.899	1.395	1.079	1.124					
High Crash Location	??				NO	YES	YES	YES					
	$Rate = \frac{A \times 1,00}{V}$ $ute = AVR + \frac{0.5}{TB} + \frac{1}{2}$			V = Ave <u>Where:</u> AVR = D TB = Training the second	rage Annual Average State affic Base	Daily Traffi ewide Cras	c X 365			in a 1 year pe tion or roadwa	ay segment	Constant Z	٦
	<u>Years × ADT × 30</u> 1,000,000			= 1.	st Factor (z- 96 (assume 29 (assume	95% Confi				68.30 86.60 90.00 95.00 95.50	) ) )	1.00 1.50 1.64 1.96 2.00	
Safety Ratio =	$= \frac{Actual Crash}{Critical Crash}$	n Rate h Rate	-							98.80 99.00 99.70 99.55	)	2.50 2.58 3.00 3.29	

# Table 25 – Crash Analysis – W 28 Avenue and W 76 Street



# Table 26 – Abnormal Crash Details & CountermeasuresW 28 Avenue and W 76 Street

	(4 Lane x 2 L	ane, Signalized, Wi	ith Turn L	anes, 4 L	g Interse		e 23) - URE	BAN Spot		
				R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(
	Total Rear E	nd Crashes	2011 8	2012 16	2013 12	CRASHES 36	Total 100%	per Year 12.00	(6)	10
		DayLight	8	12	9	29	81%	9.67	(11)	11
	Lighting Conditions	Dawn Dark	0	0 4	0	0 7	0% 19%	0.00 2.33	(18) (19)	12 13
		00:00 - 06:00	0	1	1	2	6%	0.67	(13)	19
		06:00 - 09:00	1	0	2	3	9%	1.00	. ,	21
	Lieure of Deur	09:00 - 11:00	2	0	0	2	6%	0.67		
Rear End	Hours of Day	11:00 - 13:00 13:00 - 15:00	0	3	0	3 7	9% 20%	1.00 2.33		
		15:00 - 18:00	4	4	4	12	34%	4.00		
		18:00 - 24:00	0	3	3	6	17%	2.00		
		North South	1	4	2	7 8	17% 20%	2.33 2.67		
	Direction	East	2	6	5	13	32%	4.33		
		West	2	3	8	13	32%	4.33		
		Unknown		0 R OF CF		0 3 YEAR	0%	0.00		
			2011	YEAR 2012	2013	TOTAL	% of Total	Accidents per Year	Possible Cause(s)	Counter- measure(
	Total Rear E		5	3	1	9	100%	3.00	(6)	8
	Linking Oracity	DayLight	4	2	0	6	67%	2.00	(8)	9
	Lighting Conditions	Dawn Dark	1	0	0	1 2	11% 22%	0.33	(9)	10 11
	<u> </u>	00:00 - 06:00	0	1	1	2	22%	0.67		12
		06:00 - 09:00	1	0	0	1	11%	0.33		
	Herme of Device	09:00 - 11:00 11:00 - 13:00	1	0	0	1	11%	0.33		
Angle	Hours of Day	11:00 - 13:00	0	0	0	0	0% 0%	0.00		
		15:00 - 18:00	3	2	0	5	56%	1.67		
		18:00 - 24:00	0	0	0	0	0%	0.00		
	I	NB + EB	3	0	0	3	33%	1.00		
	Direction	NB + WB SB + EB	0	2	0	2	22% 33%	0.67		
		SB + WB	0	0	1	1	11%	0.33		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN		
				YEAR		TOTAL	of	Accidents	Possible Cause(s)	Counter measure(
	T. 10 F	10.1	2011	2012	2013	CRASHES	Total	per Year		
	Total Rear E		3	2	3	<b>8</b> 5	100% 63%	2.67 1.67	(6) (8)	8
	Lighting Conditions	Day Light Dawn	0	0	0	0	03 %	0.00	(14)	11
		Dark	0	1	2	3	38%	1.00	(16)	12
		00:00 - 06:00	0	0	0	0	0%	0.00		13
		06:00 - 09:00 09:00 - 11:00	0	0	0	0	0%	0.00		
Left Turn	Hours of Day	11:00 - 13:00	0	0	0	0	0%	0.00		
Leit Tuffi		13:00 - 15:00	1	0	0	1	13%	0.33		
		15:00 - 18:00 18:00 - 24:00	0	1	1 2	2 5	25% 63%	0.67		
		NB → WB	0	0	3	3	38%	1.00		
		WB→SB <b>€</b>	1	0	0	1	13%	0.33		
	Direction	$SB \rightarrow EB$ $EB \rightarrow NB$	0	1	0	1	13% 38%	0.33		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN	Possible	Counter
			2011	YEAR 2012	2013	TOTAL	of Total	Accidents per Year	Cause(s)	measure(
	Total Right Tu	um Crashes	0	2012	1	3	100%	1.00	(1)	5
		Day Light	0	2	0	2	67%	0.67	(9)	9
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(19)	13
	L	Dark 00:00 - 06:00	0	0	1	1	33% 0%	0.33	(21)	
	I	06:00 - 09:00	0	0	0	0	0%	0.00		
	L	09:00 - 11:00	0	0	0	0	0%	0.00		
Right Turn	Hours of Day	11:00 - 13:00	0	1	0	1	33% 33%	0.33		
		13:00 - 15:00 15:00 - 18:00	0	0	0	0	0%	0.33		
		18:00 - 24:00	0	0	1	1	33%	0.33		
		NB→EB	0	2	0	2	67%	0.67		
	Direction	EB→SB WB→NB	0	0	1	1	33% 0%	0.33		
	5500011	SB→WB	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		
					ASHES	3 YEAR	%	MEAN	Possible	Counter
			NUMBE	R OF CR	AOHEO					measure
	·		2011	YEAR 2012	2013	TOTAL CRASHES	of Total	Accidents per Year	Cause(s)	
	Total Sideswi		2011 0	YEAR 2012 4	2013 6	TOTAL CRASHES 10	Total 100%	per Year 3.33	(18)	19
		Day Light	2011 0 0	YEAR 2012 4 2	2013 6 5	TOTAL CRASHES 10 7	Total 100% 70%	per Year 3.33 2.33		
	Total Sideswi		2011 0 0	YEAR 2012 4	2013 6	TOTAL CRASHES 10	Total 100%	per Year 3.33	(18)	19
		Day Light Dawn Dark 00:00 - 06:00	2011 0 0 0 0	YEAR 2012 4 2 0 2 0	2013 6 5 0 1 1	TOTAL           CRASHES           10           7           0           3           1	Total           100%           70%           0%           30%           10%	per Year           3.33           2.33           0.00           1.00           0.33	(18)	19
		Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00	2011 0 0 0 0 0 0 0	YEAR 2012 4 0 2 0 2 0 2 0 2	2013 6 5 0 1 1 1	TOTAL CRASHES 10 7 0 3 1 3	Total 100% 70% 0% 30% 10% 30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00	(18)	19
Sideswine	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	2011 0 0 0 0 0 0 0 0 0	YEAR 2012 4 2 0 2 0 2 0 2 0 2 0	2013 6 5 0 1 1 1 1 0	TOTAL           CRASHES           10           7           0           3           1           3           0	Total 100% 70% 0% 30% 10% 30% 0%	per Year           3.33           2.33           0.00           1.00           0.33           1.00           0.00	(18)	19
Sideswipe (Overtake)		Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00	2011 0 0 0 0 0 0 0	YEAR 2012 4 0 2 0 2 0 2 0 2	2013 6 5 0 1 1 1	TOTAL CRASHES 10 7 0 3 1 3	Total 100% 70% 0% 30% 10% 30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00	(18)	19
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	2011 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR 2012 4 2 0 2 0 2 0 0 2 0 0 0 0 0 0 0	2013 6 5 0 1 1 1 0 0	TOTAL CRASHES 10 7 0 3 1 3 0 0 0 0 0 0 3	Total           100%           70%           0%           30%           0%           0%           0%           0%           0%           0%           30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00           0.00           0.00           0.00           1.00           0.00           1.00           0.00           1.00           0.00           1.00	(18)	19
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	2011 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR 2012 4 2 0 2 0 2 2 0 0 2 0 0 0 0 0 0 0 2	2013 6 5 0 1 1 1 0 0 0 0 3 1	TOTAL CRASHES 10 7 0 3 3 1 3 0 0 0 0 0 3 3 3	Total           100%           70%           0%           30%           0%           0%           0%           0%           0%           0%           30%           30%           30%           30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00           0.00           0.00           0.00           1.00           0.00           0.00           0.00           1.00           1.00           1.00	(18)	19
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North	2011 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           4           2           0           2           0           2           0           2           0           2           0           2           0           0           0           0           1	2013 6 5 0 1 1 1 0 0 0 3 3 1 2	TOTAL CRASHES 10 7 0 3 3 1 3 0 0 0 0 0 0 3 3 3 3	Total           100%           70%           0%           30%           0%           30%           0%           30%           30%           30%           30%           30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00           0.00           0.00           1.00           0.00           1.00           1.00           1.00           1.00           1.00           1.00           1.00	(18)	19
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 North South	2011 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           4           2           0           2           0           2           0           2           0           2           1           0	2013 6 5 0 1 1 1 0 0 0 3 3 1 2 2 1	TOTAL           CRASHES           10           7           0           3           0           0           3           0           3           3           3           3           3           3           3           1	Total           100%           70%           0%           30%           0%           30%           0%           30%           30%           30%           10%           30%           30%           30%           30%           30%           30%           30%           30%           30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00           0.00           0.00           0.00           1.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           1.00           1.00           0.33	(18)	19
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North	2011 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	YEAR           2012           4           2           0           2           0           2           0           2           0           2           0           2           0           0           0           0           1	2013 6 5 0 1 1 1 0 0 0 3 3 1 2	TOTAL CRASHES 10 7 0 3 3 1 3 0 0 0 0 0 0 3 3 3 3	Total           100%           70%           0%           30%           0%           30%           0%           30%           30%           30%           30%           30%	per Year           3.33           2.33           0.00           1.00           0.33           1.00           0.00           0.00           1.00           0.00           1.00           1.00           1.00           1.00           1.00           1.00           1.00	(18)	19



From this analysis, it was determined that rear end, left-turn, right-turn and sideswipe collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level. Also, Angle, backing and bicycle collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 26*.

# 3.11.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at West 28<sup>th</sup> Avenue and West 76<sup>th</sup> Street were performed on a typical weekday on May 15, 2014. A summary of the traffic data is presented in *Figure 43*, and the field review is presented in *Figure 44*.

This intersection has single left-turn bays for all approaches. The signal operation is protected/permissive for all approaches left-turn traffic.

The intersection has no pedestrian signal, detectable warnings devices are not present on existing ramps, and no connections are provided to existing sidewalks. Pedestrians including a visually challenged individual were observed during the field visit walking in the area and using the transit stops.

The pavement exhibits wear and deterioration and pavement markings are faded.

All returns present a small radius, large vehicles encroach into the second (inner lane) in order to make the turns at the SE corner where only one lane exists eastbound. Vehicles encroach into the left turn lane in order to proceed at the NW corner. The stop bar for the left turn bay on the west leg has been pushed back to avoid conflicts with turning vehicles.

Illegal parking takes place on the south side of the east leg which possibly creates conflicts with thru movement as well as right turn vehicles.

Visibility is impacted by landscaping installed on the east swale on the south leg of the intersection.

Cars currently use the west leg right turn only bay as a thru lane to continue thru the intersection. This lane used to be thru and right before the lane designation was changed by the City of Hialeah Reconstruction Project.

Westbound thru lane is not aligned because of temporary marking by City of Hialeah MOT.

Light poles along West 76 Street on the east side of West 28 Avenue are covered by trees.

Red light running was observed at the intersection as well as a failure of right turning vehicles from making a complete stop before proceeding to turn.



## 3.11.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of West 28 Avenue and West 76 Street, the following is recommended:

- Provide ADA complaint ramps.
- Provide ADA complaint pedestrian signals.
- Provide sidewalk continuity and connection especially to existing bus stops.
- Relocate existing bus stop to far side of the intersection
- Remove landscaping on the east side of the south leg.
- Extend the return curbing to discourage parking along the south side of the east leg.
- Trim tree canopies to allow passage of light.
- Provide at a minimum painted channelization for the exclusive right turn bays on the east and west legs.
- Provide exclusive westbound right turn bay.
- Install "Right Lane Must Turn Right" Signs on the approach to the exclusive right turn bays on the east and west leg.
- Resurface the intersection.
- Refurbish pavement markings using thermoplastic painting.
- City of Hialeah currently has a project that will implement several improvements, most of which coincide with the recommendations proposed herein. Once this project is fully constructed, it's recommended to perform a field review of the site and compare and analyze new markings, lane designations and new conditions.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 45.

# 3.11.5. Cost Estimate

No cost estimate was developed for this project since improvements are included in the City of Hialeah project.





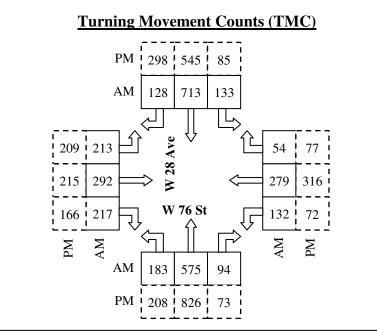


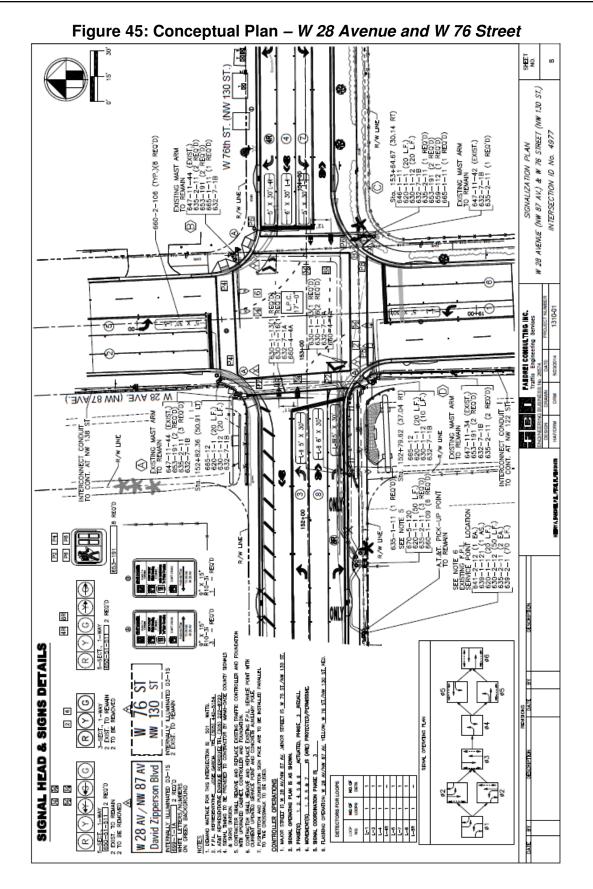
Figure 43: Traffic Data – W 28 Avenue and W 76 Street





Figure 44: Field Review – W 28 Avenue and W 76 Street







# 3.12. W 8 Avenue and W 29 Street

## 3.12.1. Site Description

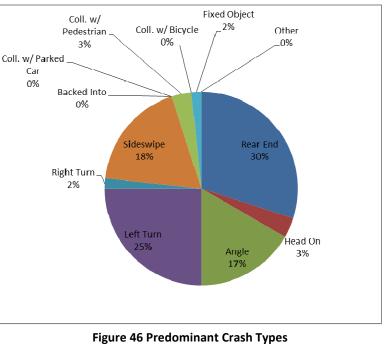
This intersection is a signalized four legged intersection located within the City of Hialeah in the northwest area of Miami Dade County. West 8 Avenue is a four lane urban collector divided by a median mostly paved that runs north-south, and West 29 Street is a four lane urban undivided collector that runs east-west.

## 3.12.2. Safety Conditions and Analysis

The intersection of W 8 Avenue and W 29 Street is ranked number 12 in our high crash locations list. A review of the hard copy police reports for the year 2011 through 2013 was performed. During the three-year analysis period, 60 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 20. The crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 46*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010 "Expected FDOT's Value Analysis." *Table 27* illustrates the expected accident volume





analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.122, 1.004, and 1.045, respectively. The safety ratio for the three years averaged 1.057. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



							N 29 Stree						
		(4 Lane	x 4 Lane	, Signaliz	ed, With Tur	m Lanes, 4	Leg Interse	ction - Table	29) - URBAN	Spot			
		NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	EXPECTED	ANNUAL CF	ASH VALUE	ABNORM	ALLY HIGH	CRASHES
	TYPE OF CRASH	2011	YEAR 2012	2013	TOTAL CRASHES	of Total	Accidents per Year	MEAN	90th Percentile	95th Percentile	Mean	90th Percentil	95th Percenti
COLLISION TYPE	Rear End	9	6	3	18	30%	6.00	3.43	8.08	8.97	Х		
	Head On Angle	0	1	1	2 10	3% 17%	0.67 3.33	0.51 3.11	1.15 6.53	1.28 7.19	X X		
	Left Turn	6	4	5	15	25%	5.00	1.44	3.22	3.56	<u>x</u>	x	х
	Right Turn	0	0	1	1	2%	0.33	0.34	1.07	1.21			
	Sideswipe	2	6	3	11	18%	3.67	1.51	4.91	5.56	Х		
	Backed Into Coll. w/ Parked Car	0	0	0	0	0% 0%	0.00	0.11	0.47 0.57	0.54 0.66			
	Coll. w/ Pedestrian	1	0	1	2	3%	0.67	0.11	1.35	1.52	х		
	Coll. w/ Bicycle	0	0	0	0	0%	0.00	0.12	0.49	0.56			
	Fixed Object	0	0	1	1	2%	0.33	0.04	0.23	0.27	Х	X	Х
	Ran Off Road Overtuned	0	0	0	0	0%	0.00	0.00	0.00	0.00 0.13			
	Other	0	0	0	0	0%	0.00	5.26	12.78	14.22			
	Total Crashes	20	19	21	60	100%	20.00	17.31	37.75	41.66	Х		
EVERITY	PDO crashes	16	16	16	48	80%	16.00	8.79	24.57	27.59	Х		
	Fatal crashes Injury crashes	0	0	0	0	0% 20%	0.00 4.00	2.49 10.55	15.45 20.71	17.93 22.66			
IGHT CONDITIONS	Day Light	4	14	5 16	41	68%	4.00	9.69	23.99	22.00	х		
	Dusk	1	0	0	1	2%	0.33	0.53	1.61	1.81			
	Dawn	0	1	0	1	2%	0.33	0.39	1.43	1.63			
	Dark Unknown	8 0	4	5 0	17 0	28% 0%	5.67	4.30 0.61	9.57	10.57 2.54	Х		
URFACE CONDITIONS		18	16	16	50	83%	0.00 16.67	12.76	2.23 30.50	2.54 33.90	х		
	Wet	2	3	5	10	17%	3.33	1.91	4.43	4.92	x	1	
	Others	0	0	0	0	0%	0.00	0.68	2.09	2.36			
IONTH OF A YEAR	January	1	2	0	3	5%	1.00	1.24	2.67	2.94			
	February March	2	0	0	1 4	2% 7%	0.33	1.67 1.64	4.01	4.46 4.53			
	April	4	4	1	9	15%	3.00	1.50	3.60	4.01	х		
	May	1	5	3	9	15%	3.00	1.51	3.24	3.57	Х		
	June	1	2	2	5	8%	1.67	1.62	3.97	4.42	Х		
	July	1	1	3	5	8% 5%	1.67 1.00	1.67 1.73	3.82 4.09	4.24 4.54			
	August September	1	0	0	1	2%	0.33	1.63	4.05	4.83			
	October	3	1	3	7	12%	2.33	1.46	3.92	4.39	Х		
	November	2	1	4	7	12%	2.33	1.40	3.97	4.46	Х		
	December	1	3	2	6	10%	2.00	1.41	4.02	4.52	Х		
DAY OF THE WEEK	Sunday Monday	3	1	3	7	12% 5%	2.33 1.00	2.67 2.47	7.18	8.04 6.27			
	Tuesday	3	3	2	8	13%	2.67	2.47	5.61	6.21	х		
	Wednesday	2	4	6	12	20%	4.00	2.33	5.55	6.16	Х		
	Thursday	2	3	3	8	13%	2.67	2.44	5.25	5.79	X		
	Friday Saturday	4	3 5	2	9 13	15% 22%	3.00 4.33	2.46 2.52	5.51 6.23	6.10 6.94	<u>x</u> x		
OUR OF THE DAY	00:00-06:00	3	0	2	5	8%	1.67	1.61	4.23	4.73	X		
	06:00-09:00	0	3	1	4	7%	1.33	1.36	3.39	3.78			
	09:00-11:00	1	2	2	5	8%	1.67	1.28	3.25	3.62	X		
	11:00-13:00 13:00-15:00	3	3	1	7	12% 5%	2.33 1.00	1.70 1.88	4.20 5.42	4.68 6.09	Х		
	15:00-18:00	1	6	9	16	27%	5.33	2.99	7.98	8.94	х		
	18:00-24:00	10	5	5	20	33%	6.67	3.79	9.27	10.32	X		
					L	YEAR	0	3-Year					
					1	2	3	Average					
Average Daily Traffic A	DT (Vehicles per D	lay)			29,010	31,533	34,275	31,606					
lorida Average Crash	rate (Crashes per I	Million En	tering Vel	hicles)	0.757	0.757	0.757	0.757					
raffic Base					10.589	11.509	12.510	11.536	1				
Actual Crash Rate (Cr	ashes per Million F	nterina V	ehicles)		1.889	1.651	1.679	1.739	-				
Critical Crash Rate (C		-	,						-				
1	asties per Million E	mening V	enicies)		1.684	1.644	1.606	1.645	-				
Safety Ratio					1.122	1.004	1.045	1.057					
ligh Crash Location	??				YES	YES	YES	YES					
	$Rate = \frac{A \times 1,00}{V}$		_		al number of rage Annual			rashes by t	type occurring	in a 1 year pe	eriod.		
CriticalCrashRa	$ate = AVR + \frac{0.5}{TB} + T$	$TF\sqrt{\frac{AVI}{TB}}$	2	AVR = A TB = Tra	Average State affic Base st Factor (z-1		h Rate for a	particular ty	pe of intersec	Confidence I	evel (%)	Constant Z	]
Traffic Base =	$\frac{Years \times ADT \times 36}{1,000,000}$	<u>65</u>			96 (assume 29 (assume					68.30 86.60 90.00 95.00 95.50		1.00 1.50 1.64 1.96 2.00	
Safety Ratio	$= \frac{Actual Crash}{Critical Crash}$	n Rate h Rate	-							93.30 98.80 99.00 99.70 99.95		2.50 2.58 3.00 3.29	

# Table 27 – Crash Analysis – W 8 Avenue and W 29 Street



From this analysis, it was determined that left-turn and fixed object collisions exceeded the 95th percentile and 90th percentile confidence level threshold limits. Also, rear end, angle, sideswipe and pedestrian collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 28*.

		w	8 Aven	ue & W	29 Stre	et				
	(4 Lane x 4 L	ane, Signalized, W	ith Turn L	anes, 4 Le	eg Interse	ection - Table	29) - URI	BAN Spot		
			NUMBE		ASHES	3 YEAR	%	MEAN	Possible	Counter-
			0011	YEAR	0010	TOTAL	of	Accidents	Cause(s)	measure(s
	Tatal Dear Fr	d Creahaa	2011	2012	2013	CRASHES	Total	per Year	(1)	
	Total Rear Er		2	2	6	10	100%	3.33	(1)	8
	Lighting Conditions	Day Light			5	6	60%	2.00	(8)	11
	Lighting Conditions	Dawn Dark	0	0	0	0 4	0% 40%	0.00	(15)	
		00:00 - 06:00		0	0	4	10%	0.33		
		06:00 - 09:00	1	0	0	0	0%	0.00		
		09:00 - 11:00	0	1	0	1	10%	0.33		
	Hours of Day	11:00 - 13:00	0	0	1	1	10%	0.33		
Angle	riours of Day	13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	0	0	4	4	40%	1.33		
		18:00 - 24:00	1	1	1	3	30%	1.00		
		NB + EB	1	1	1	3	30%	1.00		
		NB + WB	0	0	2	2	20%	0.67		
	Direction	SB + EB	1	1	1	3	30%	1.00		
	Birooton	SB + WB	0	0	2	2	20%	0.67		
		Unknown	0	0	0	0	0%	0.00		
		Cinatomi	v	v	v	Ů	070	0.00		
			NUMB	R OF CR	VCHEC	3 YEAR	%	MEAN		
			NOWBE	YEAR	ASTIES	TOTAL	% Of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES			Cause(s)	measure(s
	Total Left Tur	n Crashes	6	4	5	15	Total 100%	per Year 5.00	(8)	9
		DayLight	4	2	4	10	67%	3.33	(9)	11
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(15)	12
	Lighting Conditions	Dark	2	2	1	5	33%	1.67	(13)	13
		00:00 - 06:00	0	0	0	0	0%	0.00		14
		06:00 - 09:00	0	1	1	2	13%	0.67		14
		09:00 - 11:00	1	0	1	2	13%	0.67		
	Hours of Day	11:00 - 13:00	1	0	0	1	7%	0.33		
Left Turn	liouio or Duj	13:00 - 15:00	1	0	1	2	13%	0.67		
		15:00 - 18:00	0	1	2	3	20%	1.00		
		18:00 - 24:00	3	2	0	5	33%	1.67		
		$NB \rightarrow WB$	2	1	0	3	20%	1.00		
		$WB \rightarrow SB$	2	2	2	6	40%	2.00		
	Direction	$SB \rightarrow EB$	0	0	0	0	0%	0.00		
		$EB \rightarrow NB$	1	1	3	5	33%	1.67		
		Unknown	1	0	0	1	7%	0.33		
		Onicioni		v	v	. · .	170	0.00		
			NUMBE	R OF CR	ACHES	3 YEAR	%	MEAN		
			nombi	YEAR	AUTIEU	TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s
	Total Left Tur	n Crashes	2	6	3	11	100%	3.67	(8)	13
		DayLight	0	5	3	8	73%	2.67	(15)	
	Lighting Conditions	Dawn	0	1	0	1	9%	0.33	()	
	3 9 9 00000	Dark	2	0	0	2	18%	0.67		
		00:00 - 06:00	1	0	0	1	9%	0.33		
		06:00 - 09:00	0	0	0	0	18%	0.67		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Sideswipe	Hours of Day	11:00 - 13:00	0	1	0	1	9%	0.33		
(Overtake)		13:00 - 15:00	0	0	0	0	0%	0.00		
(oronano)		15:00 - 18:00	0	2	1	3	27%	1.00		
		18:00 - 24:00	1	1	2	4	36%	1.33		
		North	0	1	0	4	<u> </u>	0.33		
		South	0	0	1	1	9% 9%	0.33		
	Direction	East	1	2	1	4	36%	1.33		
	Direction			3	1	4 5	45%			
		West Unknown	1 0	0	0	0	45%	1.67 0.00		

# Table 28 – Abnormal Crash Details & CountermeasuresW 8 Avenue and W 29 Street



## 3.12.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at West 8 Avenue and West 29 Street were performed on a typical weekday on May 14, 2014. A summary of the traffic data is presented in *Figure 47*, and the field review is presented in *Figure 48*.

This intersection has single left-turn bays for the north and south legs where the signal operation is protected/permissive. The signal operation is permissive for the east and west leg left-turn traffic. The intersection is span wire with standard overhead street signs. The pavement exhibits deterioration on the north and south legs. Vehicles travel at higher speeds thru both corridors.

High volume of left turns was observed along West 29 Street mainly for the northbound movement to West 8 Avenue. These vehicles do not have an exclusive left turn bay nor exclusive left turn signal therefore red-light running and turning conflicts were observed for this movement.

Red light running was observed at the intersection as well as a failure of right turning vehicles from completely stopping before proceeding to turn. Many conflicts were also observed with vehicles coming in and out of existing driveways close to the intersection.

A high volume of vehicles exit the Walgreens located on the southeast corner of the intersection thru the driveway fronting West 8 Avenue and change lanes twice in a distance of about 70'. This recurrent maneuver creates conflicts with the thru movement of traffic heading north along West 8 Avenue.

There is a Bus Stop on near side of the east and west leg on West 29 Street. Lighting along West 8 Avenue does not seem adequate for a five-lane road.

#### 3.12.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of West 8 Avenue and West 29 Street, the following is recommended:

- Upgrade span wire intersection to mast arm.
- Provide illuminated overhead street signs
- Install directional arrow markings for the all approaches along West 29 Street.
- Relocate bus stops along West 29 Street from near to the far side of the intersection.
- Resurface the intersection.
- Provide "right turn only" signs to the Marathon gas station driveways on the NW corner of the intersection.
- Close entrance to Walgreens on the SE corner along West 8<sup>th</sup> Avenue.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 49.

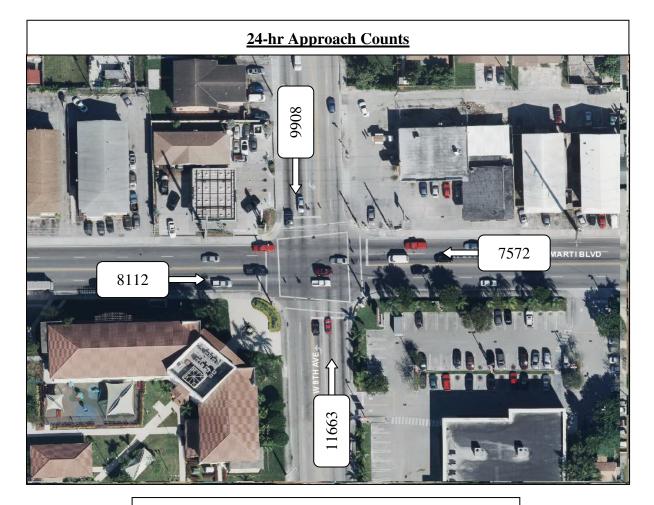


## 3.12.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$311,518. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





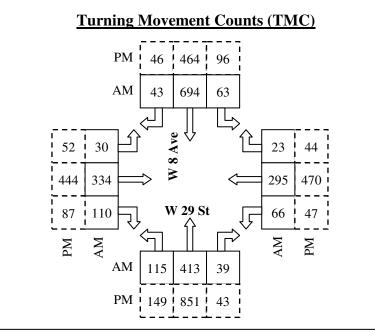


Figure 47: Traffic Data – W 8 Avenue and W 29 Street





Figure 48: Field Review – W 8 Avenue and W 29 Street





## 3.13. W 12 Avenue and W 29 Street

## 3.13.1. Site Description

This intersection is a signalized four legged intersection located in the City of Hialeah in the area of Northwest Miami Dade County. W 12 Avenue is a four lane urban arterial divided by a median mostly paved that runs North- South, and W 29 Street is a four lane undivided urban collector that runs east-west.

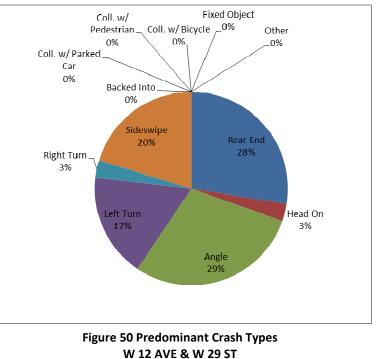
## 3.13.2. Safety Conditions and Analysis

The intersection of W 12 Avenue and W 29 Street is ranked number 13 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 69 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 23. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 50*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010



FDOT's "Expected Value Analysis." *Table 29* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.065, 1.146, and 1.079, respectively. The safety ratio for the three years averaged 1.097. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		14.2		0:		/enue &			00) UDDAT	Orest			
		(4 Lane	x 4 Lane	, Signaliz	ed, With Tu	rn Lanes, 4	4 Leg Interse	ction -Table	29) - URBAN	Spot			
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	EXPECTED	O ANNUAL CR	ASH VALUE 95th	ABNORM	ALLY HIGH 90th	CRASHES 95th
		2011	2012	2013	CRASHES	Total	per Year	MEAN	Percentile	Percentile	Mean	Percentil	
COLLISION TYPE	Rear End	4	10	5	19	28%	6.33	3.43	8.08	8.97	X		
	Head On	1	0	1	2 20	3% 29%	0.67 6.67	0.51	1.15	1.28	X	x	
	Angle Left Turn	5	6 3	4	12	17%	4.00	3.11 1.44	6.53 3.22	7.19 3.56	x	X	x
	Right Turn	0	1	1	2	3%	0.67	0.34	1.07	1.21	x	<u>^</u>	~
	Sideswipe	4	4	6	14	20%	4.67	1.51	4.91	5.56	Х		
	Backed Into	0	0	0	0	0%	0.00	0.11	0.47	0.54			
	Coll. w/ Parked Car Coll. w/ Pedestrian	0	0	0	0	0%	0.00	0.11	0.57	0.66			
	Coll. w/ Pedesthan	0	0	0	0	0%	0.00	0.47	1.35 0.49	1.52 0.56			
	Fixed Object	0	0	0	0 0	0%	0.00	0.04	0.23	0.27			
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Overtuned	0	0	0	0	0%	0.00	0.01	0.10	0.13			
	Other	0	0	0	0 69	0%	0.00 23.00	5.26	12.78	14.22	x		
EVERITY	Total Crashes PDO crashes	21 17	24 22	24 22	69	88%	20.33	17.31 8.79	37.75 24.57	41.66 27.59	x		
	Fatal crashes	0	0	0	0	0%	0.00	2.49	15.45	17.93	~		
	Injury crashes	4	2	2	8	12%	2.67	10.55	20.71	22.66			
IGHT CONDITIONS	Day Light	16	17	18	51	74%	17.00	9.69	23.99	26.72	Х		
	Dusk	0	1	0	1	1%	0.33	0.53	1.61	1.81			
	Dawn Dark	0	0	0	0 16	0% 23%	0.00	0.39 4.30	1.43 9.57	1.63 10.57	x		
	Unknown	0	1	0	1	1%	0.33	0.61	2.23	2.54	~		
SURFACE CONDITIONS	Dry	20	23	22	65	94%	21.67	12.76	30.50	33.90	Х		
	Wet	1	0	2	3	4%	1.00	1.91	4.43	4.92			
MONTH OF A YEAR	Others January	0	4	0	1 7	1% 10%	0.33 2.33	0.68	2.09 2.67	2.36 2.94	x		
IGHTIOLA IEAN	February	3	4	4	8	10%	2.33	1.24	4.01	4.46	- x		
	March	4	2	0	6	9%	2.00	1.64	4.07	4.53	х		
	April	2	3	0	5	7%	1.67	1.50	3.60	4.01	Х		
	May	3	3	3	9	13%	3.00	1.51	3.24	3.57	Х		
	June July	0	2	2	4 7	6% 10%	1.33 2.33	1.62 1.67	3.97 3.82	4.42 4.24	х		
	August	2	1	5	8	12%	2.67	1.73	4.09	4.54	x		
	September	2	2	0	4	6%	1.33	1.63	4.31	4.83			
	October	0	2	2	4	6%	1.33	1.46	3.92	4.39			
	November	1	1	2	4	6%	1.33	1.40	3.97	4.46			
DAY OF THE WEEK	December Sunday	1	0	2	3	4% 9%	1.00 2.00	1.41 2.67	4.02 7.18	4.52 8.04			
DAT OF THE WEEK	Monday	5	4	4	13	19%	4.33	2.07	5.66	6.27	x		
	Tuesday	1	4	5	10	14%	3.33	2.47	5.61	6.21	Х		
	Wednesday	5	3	2	10	14%	3.33	2.33	5.55	6.16	Х		
	Thursday	6	3	3	12	17%	4.00	2.44	5.25	5.79	Х		
	Friday Saturday	1	1	4	6 12	9% 17%	2.00 4.00	2.46 2.52	5.51 6.23	6.10 6.94	x		
HOUR OF THE DAY	00:00-06:00	1	3	1	5	7%	1.67	1.61	4.23	4.73	- x		
	06:00-09:00	2	0	1	3	4%	1.00	1.36	3.39	3.78			
	09:00-11:00	1	4	3	8	12%	2.67	1.28	3.25	3.62	Х		
	11:00-13:00	2	0	3	5	7%	1.67	1.70	4.20	4.68			
	13:00-15:00 15:00-18:00	3	3	5	11 14	16% 20%	3.67 4.67	1.88 2.99	5.42 7.98	6.09 8.94	X		
	18:00-24:00	9	6	8	23	33%	7.67	3.79	9.27	10.32	- x		
									_	=		•	
						YEAR		3-Year					
					1	2	3	Average					
Average Daily Traffic A	DT (Vehicles per D	av)			33,371	36,273	39,428	36,357					
Florida Average Crash		• ·	terina Va	hicles	0.757	0.757	0.757	0.757	-				
	and fordories per i								-				
Traffic Base					12.181	13.240	14.391	13.270	_				
Actual Crash Rate (Cr	ashes per Million E	ntering Ve	ehicles)		1.724	1.813	1.668	1.735					
Critical Crash Rate (C	rashes per Million E	ntering V	ehicles)		1.618	1.581	1.546	1.582					
Safety Ratio		-			1.065	1.146	1.079	1.097	1				
High Crash Location	22				YES	YES	YES	YES	-				
ingit Grasit Location	••				123	123	123	123					
	$Rate = \frac{A \times 1,00}{V}$		-		al number of rage Annual			rashes by t	type occurring	in a 1 year pe	eriod.		
CriticalCrashRo	$ate = AVR + \frac{0.5}{TB} + 7$	$TF\sqrt{\frac{AVI}{TB}}$	<u> </u>	AVR = A TB = Tra	Average Stat affic Base st Factor (z-		h Rate for a	particular ty	pe of intersec	Confidence I	evel (%)	Constant Z	
Traffic Base =	Years × ADT × 30 1,000,000	<u>55</u>		= 1.	96 (assume 29 (assume	95% Confi			,	68.30 86.60 90.00 95.00		1.00 1.50 1.64 1.96	
6 6 . D. I	$= \frac{Actual Crash}{Critical Crash}$							95.50 98.80 99.00 99.70		2.00 2.50 2.58			

# Table 29 – Crash Analysis – W 12 Avenue and W 29 Street



From this analysis, it was determined that left-turn collisions exceeded the threshold limits for the 95th percentile and 90th percentile confidence level. Also, rear end, angle and sideswipe exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 30*.

# Table 30 – Abnormal Crash Details & CountermeasuresW 12 Avenue and W 29 Street

					29 Stre					
	(4 Lane x 4 I	ane, Signalized, W.		anes, 4 L		ection -Table	29) - URE	AN Spot		
			2011	YEAR 2012	2013	TOTAL	of Total	Accidents per Year	Possible Cause(s)	Counter- measure(s)
	Total Rear E	nd Crashes	7	6	7	20	100%	6.67	(8)	8
		Day Light	4	3	4	11	55%	3.67	(9)	9
	Lighting Conditions		4	0	0	0	0%	0.00	(9)	10
	Lighting Conditions	Dawn								L.
	L	Dark	3	3	3	9	45%	3.00		11
		00:00 - 06:00	1	1	0	2	10%	0.67		
		06:00 - 09:00	1	0	0	1	5%	0.33		
		09:00 - 11:00	0	1	1	2	10%	0.67		
Angle	Hours of Day	11:00 - 13:00	1	0	0	1	5%	0.33		
3		13:00 - 15:00	0	1	3	4	20%	1.33		
		15:00 - 18:00	1	1	0	2	10%	0.67		
		18:00 - 24:00	3	2	3	8	40%	2.67		
		NB + EB	0	1	3	4	20%	1.33		
		NB + WB	1	1	2	4	20%	1.33		
	Direction	SB + EB	0	2	0	2	10%	0.67		
		SB + WB	6	2	2	10	50%	3.33		
		Unknown	0	0	0	0	0%	0.00		
						, ,	• / •			
				R OF CR		3 YEAR	%	MEAN		
			NOWIDE	YEAR	ASTILS	TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013		-		Cause(s)	measure(s
	Total Rear E	d Craabaa			4	CRASHES	Total	per Year	(0)	9
			5	3		12	100%	4.00	(8)	L
	Linking Orgeliting	Day Light	4	2	2	8	67%	2.67	(9) (15)	11
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		13
		Dark	1	1	2	4	33%	1.33		14
		00:00 - 06:00	0	1	1	2	17%	0.67		16
		06:00 - 09:00	1	0	0	1	8%	0.33		
	Hours of Day	09:00 - 11:00	0	0	0	0	0%	0.00		
Left Turn		11:00 - 13:00	0	0	0	0	0%	0.00		
Lent runn		13:00 - 15:00	1	0	1	2	17%	0.67		
		15:00 - 18:00	0	2	1	3	25%	1.00		
		18:00 - 24:00	3	0	1	4	33%	1.33		
		$NB \rightarrow WB$	1	0	0	1	8%	0.33		
		$WB \rightarrow SB$	2	0	0	2	17%	0.67		
	Direction	SB → EB	0	1	1	2	17%	0.67		
	2	$EB \rightarrow NB$	2	2	3	7	58%	2.33		
			0	2	0	0				
		Unknown	U	U	U	U	0%	0.00		
				D OF 65	101150		<i>.</i>	MEAN		
				R OF CR	ASHES	3 YEAR	%	MEAN	Possible	Counter-
			NOME							
				YEAR	0010	TOTAL	of	Accidents	Cause(s)	measure(s
			2011	YEAR 2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s
	Total Rear E		2011 4	YEAR 2012 4	6	CRASHES 14	Total 100%	per Year 4.67	Cause(s) (1)	13
		nd Crashes Day Light	2011	YEAR 2012	6 6	CRASHES 14 13	Total 100% 93%	per Year	.,	
	Total Rear En		2011 4	YEAR 2012 4	6	CRASHES 14	Total 100%	per Year 4.67	(1)	13
		Day Light	2011 4 4	YEAR 2012 4 3	6 6	CRASHES 14 13	Total 100% 93%	<b>per Year</b> <b>4.67</b> 4.33	(1)	13
		Day Light Dawn	2011 4 4 0	YEAR 2012 4 3 0	6 6 0	CRASHES 14 13 0	Total           100%           93%           0%	per Year           4.67           4.33           0.00	(1)	13
		Day Light Dawn Dark 00:00 - 06:00	2011 4 4 0 0	YEAR 2012 4 3 0 1 1	6 6 0 0	CRASHES 14 13 0 1 1 1 1	Total           100%           93%           0%           7%           7%	per Year           4.67           4.33           0.00           0.33           0.33	(1)	13
		Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00	2011 4 4 0 0 0	YEAR 2012 4 3 0 1	6 6 0 0	CRASHES 14 13 0 1	Total           100%           93%           0%           7%           0%	per Year           4.67           4.33           0.00           0.33           0.33           0.00	(1)	13
Sideswipe	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	2011 4 4 0 0 0 0 0 0	YEAR 2012 4 3 0 1 1 0 0 0	6 6 0 0 0 0 1	CRASHES 14 13 0 1 1 0 1 0 1	Total           100%           93%           0%           7%           0%           7%           0%           7%           0%	per Year           4.67           4.33           0.00           0.33           0.033           0.00           0.33           0.00           0.33	(1)	13
Sideswipe (Overtake)		Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	2011 4 4 0 0 0 0 0 0 1	YEAR 2012 4 3 0 1 1 0 0 0 0 0	6 0 0 0 0 1 2	CRASHES 14 13 0 1 1 0 1 3	Total           100%           93%           0%           7%           0%           7%           0%           7%           21%	per Year           4.67           4.33           0.00           0.33           0.033           0.00           0.33           1.00	(1)	13
Side <i>s</i> wipe (Overtake)	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00	2011 4 0 0 0 0 0 1 1	YEAR           2012           4           3           0           1           0           0           1           0           1           1           1           1           1           1           1           1           1           1	6 0 0 0 1 2 0	CRASHES 14 13 0 1 1 0 1 1 3 2	Total           100%           93%           0%           7%           0%           7%           0%           1100%           1100%           1100%           1100%           110%           110%	per Year           4.67           4.33           0.00           0.33           0.033           0.33           1.00           0.67	(1)	13
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	2011 4 0 0 0 0 0 1 1 1 1	YEAR           2012           4           3           0           1           0           0           1           2	6 6 0 0 0 1 2 0 2	CRASHES 14 13 0 1 1 0 1 3 2 5	Total           100%           93%           0%           7%           0%           7%           10%           14%           36%	per Year           4.67           4.33           0.00           0.33           0.33           0.00           0.33           0.03           1.00           0.67	(1)	13
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	2011 4 0 0 0 0 0 1 1 1 1 1	YEAR           2012           4           3           0           1           0           0           1           0           0           1           0           0           0           0           0           0           0           0           0           0	6 6 0 0 1 2 0 2 1	CRASHES 14 13 0 1 1 1 0 1 3 2 5 2	Total           100%           93%           0%           7%           0%           7%           14%           36%           14%	per Year           4.67           4.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           1.00           0.67           1.67	(1)	13
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North	2011 4 4 0 0 0 0 0 1 1 1 1 1 3	YEAR           2012           4           3           0           1           0           0           1           0           0           1           2           0           1	6 0 0 1 2 0 2 1 0	CRASHES 14 13 0 1 1 0 1 1 3 2 5 5 2 2 4	Total           100%           93%           0%           7%           0%           7%           14%           36%           14%           29%	per Year           4.67           4.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           1.00           0.67           1.67           0.67           1.33	(1)	13
	Lighting Conditions Hours of Day	Day Light Dawn Dark 00:00 - 06:00 09:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00	2011 4 4 0 0 0 0 0 1 1 1 1 3 0	YEAR           2012           4           3           0           1           0           0           1           0           0           1           0           0           0           0           0           0           0           0           0           0	6 0 0 0 1 2 0 2 1 0 0 0	CRASHES 14 13 0 1 1 0 1 0 1 3 2 5 2 4 0	Total           100%           93%           0%           7%           0%           7%           14%           36%           14%           29%           0%	per Year           4.67           4.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           1.00           0.67           1.67	(1)	13
	Lighting Conditions	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North	2011 4 4 0 0 0 0 0 1 1 1 1 1 3	YEAR           2012           4           3           0           1           0           0           1           0           0           1           2           0           1	6 0 0 1 2 0 2 1 0	CRASHES 14 13 0 1 1 0 1 1 3 2 5 5 2 2 4	Total           100%           93%           0%           7%           0%           7%           14%           36%           14%           29%	per Year           4.67           4.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           1.00           0.67           1.67           0.67           1.33	(1)	13
	Lighting Conditions Hours of Day	Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 North South	2011 4 4 0 0 0 0 0 1 1 1 1 3 0	YEAR           2012           4           3           0           1           0           0           1           2           0           1           2           0           1           0	6 0 0 0 1 2 0 2 1 0 0 0	CRASHES 14 13 0 1 1 0 1 0 1 3 2 5 2 4 0	Total           100%           93%           0%           7%           0%           7%           14%           36%           14%           29%           0%	per Year           4.67           4.33           0.00           0.33           0.00           0.33           1.00           0.67           1.67           0.67           1.33           0.00	(1)	13



#### 3.13.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 12 Avenue & W 29 Street were performed on a typical weekday on May 21, 2014. A summary of the traffic data is presented in *Figure 51*, and the field review is presented in *Figure 52*.

This intersection has single left-turn bays for the north and south legs where the signal operation is protected/permissive. The signal operation is permissive for the east and west leg left-turn traffic. The intersection is span wire with standard overhead street signs. Vehicles travel at high speeds thru both corridors.

Two strip malls and a CVS are present at this intersection with many driveways that generate potential conflicts with the other movements.

Pavement Markings and Pedestrian crosswalks at all four legs are faded.

Red light running was observed at the intersection as well as failure of right turning vehicles from making a complete stop before proceeding to turn. Many conflicts were also observed with vehicles coming in and out of existing driveways close to the intersection.

#### 3.13.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 12 Avenue & W 29 Street, the following is recommended:

- Refurbish pavement markings including crosswalks using thermoplastic painting.
- Add "Right turn yield to pedestrian" sign on all approaches.
- Change the span wire intersection to mast arm with illuminated street signs.
- Upgrade push button on northeast corner.
- Install high visibility ladder crosswalks on all approaches.
- Install retroreflective backplates to all signals on the intersection.
- Close the driveway closest to the intersection that leads to the shopping center on the northwest corner.
- Close the driveway closest to the intersection that leads to the shopping center on the northeast corner.
- Mill and Resurface north and south legs.
- Install "Right turn only" signs on all driveways on all four corners of the intersection.
- Only one pedestrian signal is countdown, upgrade all others to countdown.
- Install directional arrow markings for the all approaches along West 29 Street.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 53.



#### 3.13.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$285,590. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.

**Traffic Engineering Division** 





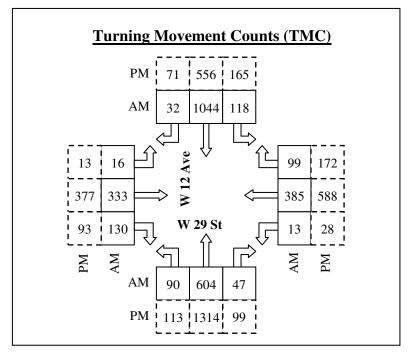


Figure 51: Traffic Data – W 12 Avenue and W 29 Street



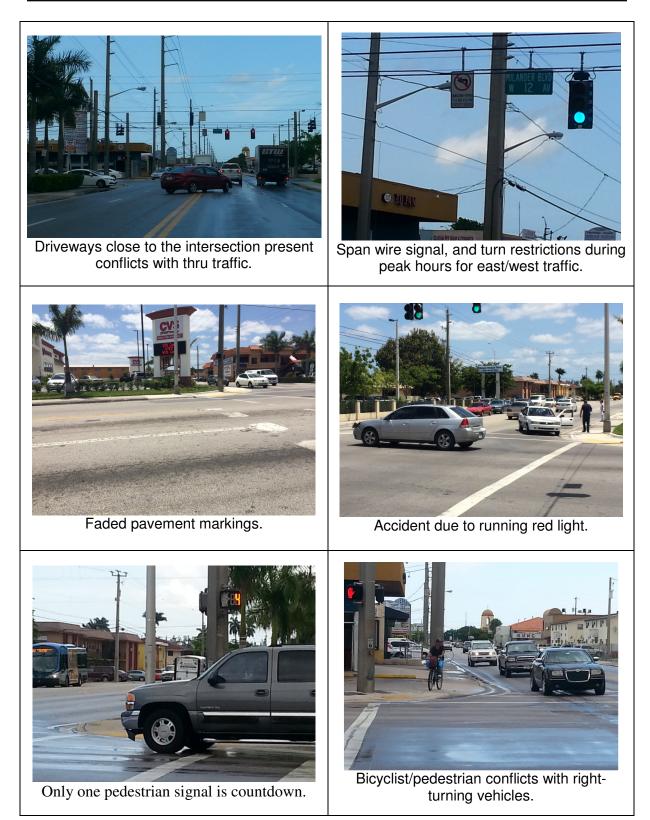
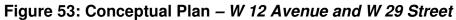


Figure 52: Field Review – W 12 Avenue and W 29 Street









# 3.14. W 21 Court and W 68 Street

## 3.14.1. Site Description

This intersection is a signalized four legged intersection located within the City of Hialeah in the northwest area of Miami Dade County. W 21 Court is a two lane local road with a center scramble lane that runs north-south from W 60 Street to W 68 Street where it acts as a main entrance to the Palmetto Hospital. West 68<sup>th</sup> Street is a four-lane collector that runs east-west and exhibits a paved center lane that allows for left turns or for the location of a raised median. As West 68 street approaches W 21 Court it gains additional lanes to accommodate the 826 entrance and exit ramp traffic and the complex traffic circulation of the area.

# 3.14.2. Safety Conditions and Analysis

The intersection of W 21 Court and W 68 Street is ranked number 14 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 76 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 25. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 54*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2007 FDOT's "Expected Value

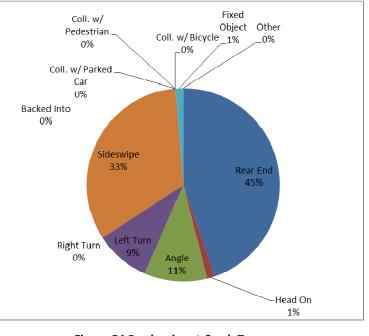


Figure 54 Predominant Crash Types W 21 CT & W 68 ST

Analysis." *Table 31* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.411, 1.190, and 0.904, respectively. The safety ratio for the three years averaged 1.169. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		(4   000	x 21 and	Signalia			V 68 Stree		23) - URBAN	Spot			
							-						
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents		O ANNUAL CF 90th	ASH VALUE 95th		ALLY HIGH 90th	CRASHES 95th
		2011	2012	2013	CRASHES	Total	per Year	MEAN	Percentile	Percentile	Mean	Percentil	
COLLISION TYPE	Rear End	11	14	9	34	45% 1%	11.33 0.33	1.62	4.09 0.58	4.56	X X	X	X
	Head On Angle	0	0	1	1 8	1%	2.67	0.16 1.37	3.01	0.66 3.33	X		
	Left Turn	3	2	2	7	9%	2.33	0.49	1.29	1.44	X	X	х
	Right Turn	0	0	0	0	0%	0.00	0.10	0.39	0.45			
	Sideswipe	10	8	7	25	33%	8.33	0.56	1.40	1.56	X	X	X
	Backed Into Coll. w/ Parked Car	0	0	0	0	0% 0%	0.00	0.07	0.40	0.46 0.58			
	Coll. w/ Pedestrian	0	0	0	0	0%	0.00	0.00	0.56	0.63			
	Coll. w/ Bicycle	0	Ő	0	Ő	0%	0.00	0.00	0.00	0.00			
	Fixed Object	1	0	0	1	1%	0.33	0.22	0.55	0.62	Х		
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Overtuned	0	0	0	0	0% 0%	0.00	0.01	0.11	0.13			
	Other Total Crashes	29	26	21	76	100%	25.33	2.44 7.27	6.28 15.00	7.02	х	× ×	x
SEVERITY	PDO crashes	27	24	20	70	93%	23.67	3.99	9.34	10.36	X	X	x
	Fatal crashes	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Injury crashes	2	2	1	5	7%	1.67	5.10	11.25	12.43			
LIGHT CONDITIONS	Day Light	19	24	18	61	80%	20.33	4.76	9.80	10.76	X	X	X
	Dusk	1	0	2	3	4% 0%	1.00	0.24	0.65	0.73 0.55	Х	X	X
	Dawn Dark	9	0	0	0 12	16%	4.00	2.00	4.57	0.55	х		
	Unknown	0	0	0	0	0%	0.00	0.12	0.46	0.52	^		
SURFACE CONDITIONS		24	22	18	64	84%	21.33	0.63	13.06	14.37	Х	X	х
	Wet	5	4	3	12	16%	4.00	0.87	1.92	2.12	Х	Х	Х
	Others	0	0	0	0	0%	0.00	0.14	0.57	0.65			
MONTH OF A YEAR	January February	2	3	2	7 4	9% 5%	2.33 1.33	0.48	1.33	1.49 1.56	X	<u>×</u>	x
	March	1	3	1	5	7%	1.67	0.39	1.40	1.96	x		
	April	3	1	1	5	7%	1.67	0.58	1.47	1.65	x	x	х
	May	4	3	1	8	11%	2.67	0.61	1.50	1.67	Х	X	х
	June	2	0	3	5	7%	1.67	0.52	1.32	1.47	Х	Х	Х
	July	6	1	1	8	11%	2.67	0.53	1.28	1.42	X		X
	August	2	3	2	7	9%	2.33	0.69	1.68	1.87	X		X
	September October	1	4	1	6 8	8% 11%	2.00 2.67	0.73	1.96 1.92	2.19 2.14	X X		х
	November	1	4	2	7	9%	2.33	0.53	1.49	1.68	X		x
	December	1	3	2	6	8%	2.00	0.54	1.33	1.48	X	X	X
DAY OF THE WEEK	Sunday	0	1	0	1	1%	0.33	0.93	2.38	2.66			
	Monday	9	4	2	15	20%	5.00	0.96	1.99	2.19	X	Х	Х
	Tuesday	6	6	6	18	24%	6.00	1.16	2.90	3.23	X		X
	Wednesday Thursday	4	5 3	1	10 12	13% 16%	3.33 4.00	1.11	2.43 2.49	2.68 2.76	X		X
	Friday	5	4	4	13	17%	4.33	1.09	2.49	2.76	X	X X X X X X X X X X X X X X X X X X X	x
	Saturday	1	3	3	7	9%	2.33	0.92	2.25	2.50	X		~
HOUR OF THE DAY	00:00-06:00	1	1	0	2	3%	0.67	0.71	2.04	2.29			
	06:00-09:00	1	4	3	8	11%	2.67	0.78	2.23	2.50	X		X
	09:00-11:00	2	4	3	9	12%	3.00	0.63	1.67	1.86	X		X
	11:00-13:00 13:00-15:00	3 6	2	6	11	14% 14%	3.67 3.67	0.69	1.60	1.77 2.18	X		X
	15:00-18:00	5	9	5	19	25%	6.33	1.53	3.50	3.88	x		x
	18:00-24:00	11	2	3	16	21%	5.33	2.13	4.38	4.81	X		X
									_				
						YEAR		3-Year					
					1	2	3	Average					
Average Daily Traffic A	DT (Vehicles per D	lay)			45,605	49,571	53,882	49,686					
Florida Average Crash	· ·	27	terina Vo	hicles)	0.575	0.575	0.575	0.575	1				
•	all joidanes per l	.amon LII	Sing Ve						-				
Traffic Base					16.646	18.093	19.667	18.135	4				
Actual Crash Rate (Cr	ashes per Million E	ntering Ve	ehicles)		1.742	1.437	1.068	1.416					
Critical Crash Rate (C	rashes per Million E	ntering V	ehicles)		1.217	1.189	1.163	1.190					
Safety Ratio		0	,		1.432	1.208	0.918	1.186	1				
	22	_	_	_					-				
High Crash Location	11				YES	YES	NO	YES					
Actual Crash	$Rate = \frac{A \times 1,00}{V}$	00,000			al number of rage Annual			rashes by t	type occurring	in a 1 year p	eriod.		
	$ate = AVR + \frac{0.5}{TB} + \frac{1}{2}$		2	TB = Tra TF = Te	affic Base st Factor (z-	value)			vpe of intersec	tion or roadwa	Level (%)	Constant Z	_
Traffic Base =	Years × ADT × 30 1,000,000	65					dence Level onfidence Le			86.60 90.00 95.00 95.50	) ) )	1.50 1.64 1.96 2.00	
Safety Ratio :	$= \frac{Actual Crash}{Critical Crash}$	n Rate h Rate	-							98.80 99.00 99.70 99.95	)	2.50 2.58 3.00 3.29	

# Table 31 – Crash Analysis – W 21 Court and W 68 Street



From this analysis, it was determined that rear end, left-turn and sideswipe collisions presented abnormal crash patterns that exceed the 95th percentile and 90th percentile confidence level threshold limits. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 32*.

Table 32 – Abnormal Crash Details & Countermeasures
W 21 Court and W 68 Street

			Color Theory 1		68 Stre		00) 1/0/			
	(4 Lane x 2 L	ane, Signalized, W		ER OF CF YEAR	0	3 YEAR TOTAL	23) - URE % of	MEAN Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s) (1) (8) (12) (16) Possible Cause(s) (9) (13) (16) (16)	measure(s
	Total Rear E	nd Crashes	11	14	9	34	100%	11.33	(1)	2
		Day Light	6	14	8	26	76%	8.67		4
	Lighting Conditions	Dawn	0	0	0	20	0%	0.00		13
	Lighting Conditions	Dark	5	2	1	8	24%	2.67	. ,	15
	<u> </u>	00:00 - 06:00	1	0	0	1	3%	0.33	(10)	
		06:00 - 09:00	1	2	1	4	12%	1.33		
		09:00 - 11:00	0	0	1	4	3%	0.33		
	Hours of Day	11:00 - 13:00	1	0	2	3	3% 9%	1.00		
Rear End	Hours of Day	13:00 - 15:00	1	3	1	5	9% 15%	1.67		
		15:00 - 18:00	2	7	2	11	32%	3.67		
		18:00 - 24:00	2 5	2	2	9	32% 26%	3.67		
						-				
		North	4	3	2	9	26%	3.00		
	Discotion	South	0	2	0	2	6%	0.67		
	Direction	East	5	7	4	16	47%	5.33		
		West	2	2	3	7	21%	2.33		
		Unknown	0	0	0	0	0%	0.00		
			NUMBER OF CRASHES YEAR				- 1	MEAN		
					3 YEAR	%		Possible	Counter	
			2011	2012	2013	TOTAL	of	Accidents	Cause(s)	measure(
	Total Left Tu	rn Crachae	3	2012	2013	CRASHES	Total	per Year	(0)	9
		Day Light	3	1	2	7 6	<b>100%</b> 86%	2.33 2.00		11
	Lighting Conditions	DayLight	0	0	0	0	0%	0.00		14
	Lighting Conditions	Dark	0	1	0	1	14%	0.33	(10)	16
		00:00 - 06:00	0	1	0	1	14%	0.33		10
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	0	0	0	0	0%	0.00		
	Hours of Day	11:00 - 13:00	0	1	1	2	29%	0.67		
Left Turn		13:00 - 15:00	2	0	0	2	29%	0.67		
		15:00 - 18:00	0	0	1	1	14%	0.33		
		18:00 - 24:00	1	0	0	1	14%	0.33		
		$NB \rightarrow WB$	0	0	0	0	0%	0.00		
		$WB \rightarrow SB$	1	2	0	3	43%	1.00		
	Direction	$SB \rightarrow EB$	1	0	1	2	29%	0.67		
		$EB \rightarrow NB$	1	0	1	2	29%	0.67		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	ER OF CF	ASHES	3 YEAR	%	MEAN	Possible	Counter
				YEAR		TOTAL	of	Accidents		measure(
			2011	2012	2013	CRASHES	Total	per Year		
	Total Sideswi	1	10	8	7	25	100%	8.33		19
	Linking C. Itt	Day Light	8	8	7	23	92%	7.67		20
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		21
	L	Dark	2	0	0	2	8%	0.67	(19)	22
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	2	2	4	16%	1.33		
Sideswipe	Hours of Day	09:00 - 11:00	2	3	1	6 4	24%	2.00		
	Hours of Day	11:00 - 13:00	1	1	2	4	16% 12%	1.33 1.00		
(Overtake)		13:00 - 15:00		1		-	12% 20%			
		15:00 - 18:00 18:00 - 24:00	2	1	2	5	20%	1.67 1.00		
		10.00 - 24.00		0 1		3	8%	0.67		
		North								
		North	0		1					
	Direction	South	1	0	0	1	4%	0.33		
	Direction	South East	1 5	0 6	0 5	1 16	4% 64%	0.33 5.33		
	Direction	South	1	0	0	1	4%	0.33		



#### 3.14.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 21 Court and W 68 Street were performed on a typical weekday on May 13, 2014. A summary of the traffic data is presented in *Figure 55*, and the field review is presented in *Figure 56*.

This intersection has single left-turn bays for the north, east and west legs with protected/permissive phases. The south leg provides one shared lane for left and thru movements with a permissive phase. Left and right turning volumes on this leg were high during the field review.

The intersection is located about 800 feet from the SR 826 exit ramp. Very often the exclusive left turn lane on the east leg of the intersection has a long queue that takes up the whole length of the left turn bay and vehicles exiting SR 826 and wanting to make a left turn at W 21 Court do not have enough space to transition from the north side of the road to the left turn bay on the south. This movement, along with the existence of a very short merge lane west of W 20 Avenue, creates conflicts with the thru westbound movement along W 68 Street as well as the operation of the intersection.

The operation at the intersection of W 21 Court and W 68 Street seem to be highly affected by the operation of the intersection of W 67 Place at W 21 Court. These two intersections are very close to each other; and the space between the two does not provide sufficient storage for the volume of traffic wanting to access W 68 Street. As a result, the intersection at W 67 Place gets blocked and the southbound left-turn movement from the east leg on W 68 Street cannot proceed.

The eastbound approach of the intersection at W 21 Court and W 68 Street presents a curvy alignment with a little bit of a vertical grade which could create confusion for the inexperienced, less skilled, or out of area driver. Also, several driveways are located at the beginning of the curve adding more conflicts points to the eastbound thru movement on W 68 Street. The eastbound driver is presented with decision points and weaving locations to access SR 826 south and north directions as well as a high volume of right turning movements from W 21 Court that do not always yields the right of way to thru movement.

A number of pedestrians were observed crossing the intersection from the Palmetto Hospital to the south side along the west crossing. Existing pedestrian signal timing is short for the wide crossing.

There is an existing tree on the southeast corner that restricts visibility of turning vehicles and pedestrian using the crosswalk on the south leg. Red light running was observed at the intersection as well as a failure of right turning vehicles from making a complete stop before proceeding to turn.



#### 3.14.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 21 Court and W 68 Street, the following is recommended:

- Install RPM's on all lane lines to better delineate the location and direction of lanes.
- Provide retroflectorized backplates for all signal heads.
- Provide High visibility ladder crosswalks for all crossings.
- Provide Pavement messages on west and east legs of the intersection (eastbound direction) to better direct users to expressway north and south ramps and W68 Street eastbound.
- Relocate or remove tree on the southeast corner of the intersection.
- Modify the pavement markings to restrict movements at the intersection of W 21 Court and W 67 Place (see sketch).
- Restripe the south leg of the intersection to provide one exclusive left-turn lane, one thru lane and one exclusive right turn lane for the northbound movement.
- Provide sidewalk along the west side of W 21 Court (north leg) by possibly reducing lane widths.
- Improve alignment of W 68 Street to soften curves and provide a bus bay.

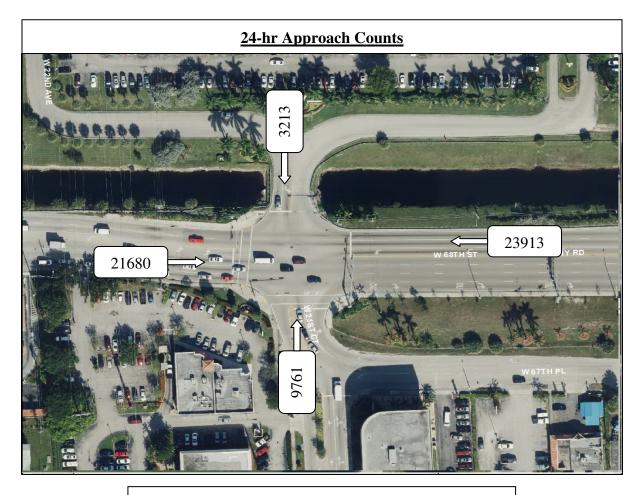
A conceptual vision of the proposed roadway improvements is exhibited in Figure 57.

## 3.14.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$368,269. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





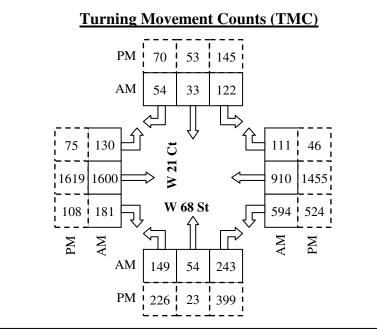


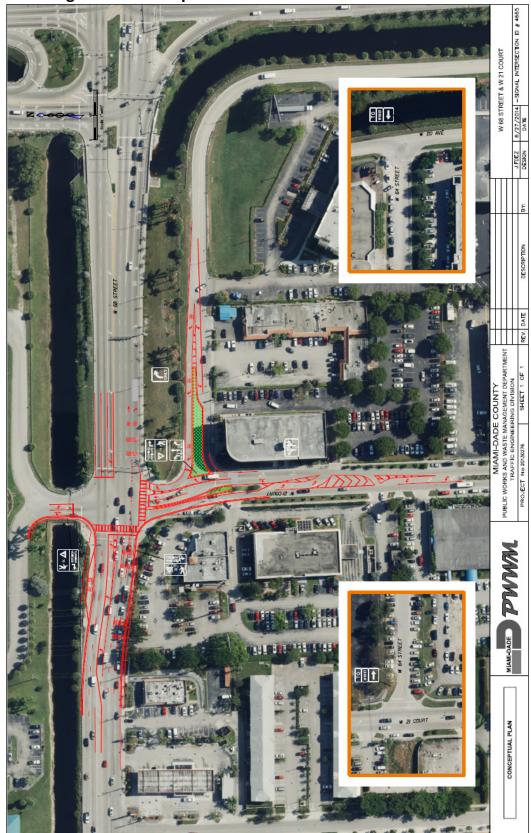
Figure 55: Traffic Data – W 21 Court and W 68 Street

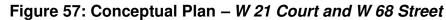




Figure 56: Field Review – W 21 Court and W 68 Street









# 3.15. NW 17 Avenue and NW 7 Street

# 3.15.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NW 17 Avenue is a six lane urban minor arterial divided by a raised median that runs north-south, and NW 7 Street is a four lane minor arterial divided by painted median that runs east-west. This intersection was directly affected by the construction of the Marlins Ballpark, project that broke ground in July 2009 and was completed in March 2012.

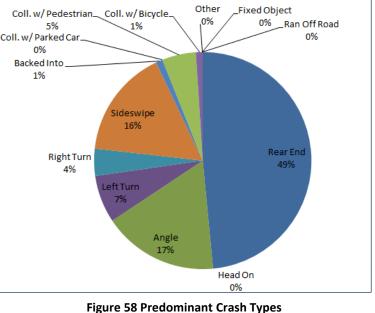
# 3.15.2. Safety Conditions and Analysis

The intersection of NW 17 Avenue and NW 7 Street is ranked number 15 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 75 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 25. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 58*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric This characteristics. study is





based on the 2010 FDOT's "Expected Value Analysis." *Table 33* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.296, 0.695, and 0.652, respectively. The safety ratio for the three years averaged 0.881. Also, results of confidence level indicated that this intersection has been a high crash location during 2011 with a confidence level higher than 99.95%.



R         %           L         of           IES         Total           09%         07%           17%         7%           16%         0%           15%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           100%         84%           0%         3%           16%         63%           4%         15%           3%         3%           5%         5%           4%         11%           11%         11%           11%         5%	4 Leg Interse MEAN Accidents per Year 12:00 0.00 4.33 1.67 1.00 4.00 0.33 0.33 0.00 0.00 0.00 0.00 0.00 0.00 0.00 25:00 21:00 25:00 21:00 0.33 7.33 7.33 0.67 2.00 2.33 1.00 2.67 2.57 2	EXPECTED	2 35) - URBAN 2 ANNUAL CC 90th Percentile 17.26 1.64 9.19 6.13 1.36 4.92 0.84 0.57 1.80 0.49 2.01 0.11 0.11 0.11 0.11 0.11 0.128 21.05 54.94 36.95 0.56 0.56 0.56 0.56 0.56 0.56 0.56 0.56 1.43 1.80 1.85 1.80 1.80 1.80 1.80 1.80 1.85 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.85 1.80 1.85 1.83 1.88 1.89 1.8	ASH VALUE	ABNORM Mean X X X X X X X X	90th	CRASHE 95th Percent
LL of Total 49% 0% 17% 4% 17% 4% 5% 5% 5% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0% 0%	Accidents per Year 12:00 0.00 4.33 1.67 1.00 4.00 1.33 0.33 0.00 0.00 0.00 0.00 0.00 0	MEAN           8.68           0.60           5.40           3.00           0.46           2.58           0.12           0.74           0.73           0.011           0.04           8.67           0.12           0.73           0.14           0.79           0.01           0.04           8.67           0.14           0.77           19.89           0.61           0.38           10.22           0.41           2.57           2.37           3.09	90th Percentile 17.26 1.64 9.19 6.13 1.36 4.92 0.84 0.57 1.80 0.49 2.01 0.49 2.01 0.49 2.01 0.49 2.01 0.49 2.01 0.28 0.56 38.34 38.34 38.34 35.12 1.43 1.03 1.894 1.15 4.57 1.88 1.894 1.15	95th Percentile 18.90 1.84 9.92 6.73 1.53 5.37 0.94 0.65 2.00 0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	Mean X X X X X X X X X	90th	95th
Total           49%           0%           17%           4%           16%           0%           1%           0%           1%           0%           1%           0%           5%           0%           0%           0%           0%           0%           0%           0%           10%           0%           10%           0%           10%           3%           83%           15%           4%           11%           11%           11%           11%           11%           11%           11%	per Year           12.00           0.00           4.33           1.67           1.00           4.03           0.33           0.00           0.33           0.00           1.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           25.00           21.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.33           0.67           0.67           0.67           2.067           1.00           2.33           1.00           2.67	MEAN           8.68           0.60           5.40           3.00           4.2.58           0.12           0.74           0.79           0.01           0.04           8.67           31.51           19.21           0.38           0.22           0.41           2.57           2.57           2.57           2.57	Percentile 17.26 1.64 9.19 6.13 1.36 4.92 0.84 0.57 1.80 0.49 2.01 0.11 0.28 2.1.05 54.94 36.95 0.56 38.34 35.12 1.43 1.03 1.894 1.15 45.71 8.78 1.88 5.04 5.04	Percentile 18.90 1.84 9.92 6.73 1.53 5.37 0.94 0.66 2.00 0.65 2.04 0.13 0.65 2.24 0.13 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x x x x x x x x x		
0%           17%           7%           4%           16%           5%           1%           0%           0%           0%           0%           0%           0%           0%           0%           0%           100%           84%           1%           0%           16%           63%           3%           83%           5%           4%           15%           4%           15%           4%           11%           11%           11%           11%           11%           11%           11%           11%	$\begin{array}{c} 0.00\\ 4.33\\ 1.67\\ 1.00\\ 4.00\\ 4.00\\ 0.33\\ 0.00\\ 1.33\\ 0.33\\ 0.00\\$	0.60 5.40 3.00 0.46 2.58 0.12 0.74 0.14 0.79 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.61 0.38 10.22 0.41 26.41 26.41 26.57 2.57 2.37 3.09	$\begin{array}{c} 1.64\\ 9.19\\ 6.13\\ 1.36\\ 0.84\\ 0.57\\ 1.80\\ 0.49\\ 2.01\\ 0.71\\ 0.28\\ 2.01\\ 0.71\\ 0.28\\ 36.95\\ 36.95\\ 38.34\\ 35.12\\ 1.05\\ 54.94\\ 36.95\\ 38.34\\ 35.12\\ 1.43\\ 1.03\\ 1.894\\ 1.15\\ 45.71\\ 8.78\\ 1.88\\ 5.04\\ 4.59\\ \end{array}$	1.84 9.92 6.73 1.53 5.37 0.94 0.65 2.00 0.55 2.24 0.33 23.42 0.33 23.42 0.63 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x x x x x x		
$\begin{array}{c} 17\%\\ 7\%\\ 7\%\\ 4\%\\ 16\%\\ 0\%\\ 10\%\\ 0\%\\ 5\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 10\%\\ 0\%\\ 10\%\\ 84\%\\ 0\%\\ 10\%\\ 84\%\\ 10\%\\ 4\%\\ 3\%\\ 83\%\\ 15\%\\ 3\%\\ 83\%\\ 15\%\\ 5\%\\ 4\%\\ 4\%\\ 9\%\\ 4\%\\ 11\%\\ 11\%\\ 11\%\\ 11\%\\ 11\%\\ 13\%\\ 5\%\\ 13\%\\ 13\%\\ 13\%\\ 13\%\\ 13\%\\ 13\%\\ 13\%\\ 13$	$\begin{array}{c} 4.33\\ 1.67\\ 1.00\\ 4.00\\ 0.33\\ 0.00\\ 1.33\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 15.67\\ 1.00\\ 15.67\\ 1.00\\ 0.33\\ 7.33\\ 0.67\\ 0.67\\ 2.067\\ 3.67\\ 0.67\\ 2.00\\ 1.33\\ 1.00\\ 2.33\\ 1.00\\ 2.67\\ \end{array}$	5.40 3.00 0.46 2.58 0.28 0.12 0.74 0.79 0.01 19.21 0.04 8.67 31.51 19.21 0.38 10.22 0.41 26.41 26.41 2.57 2.57 2.57 2.309	9.19 6.13 1.36 4.92 0.84 0.57 1.80 0.49 2.01 0.11 0.28 21.05 54.94 36.95 0.56 0.56 0.56 38.34 35.12 1.43 1.03 1.894 1.15 45.71 8.78 1.88 5.04 4.59	9.92 6.73 1.53 5.37 0.94 0.66 2.00 0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x x x x		
7%           4%           16%           1%           0%           5%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           16%           3%           8%           5%           4%           11%           11%           11%           11%           11%           11%           11%	1.67           1.00           4.00           0.33           0.00           1.33           0.00           0.00           0.00           0.00           0.00           0.00           0.00           0.00           25.00           21.00           0.00           4.00           15.67           15.67           1.00           0.33           7.33           7.33           0.67           20.67           3.67           2.33           1.00           2.33           1.00           2.67	3.00 0.46 2.58 0.28 0.74 0.74 0.74 0.74 0.74 0.74 0.74 0.74	6.13           1.36           4.92           0.84           0.57           1.80           0.49           2.01           0.11           0.28           21.05           54.94           36.95           0.56           38.34           35.12           1.43           1.15           45.71           8.78           1.88           5.04           4.59	6.73 1.53 5.37 0.94 0.65 2.00 0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x x x x		
4%           16%           19%           0%           5%           1%           0%           0%           0%           0%           0%           0%           0%           0%           100%           84%           16%           63%           4%           11%           29%           5%           4%           15%           3%           8%           5%           4%           11%           11%           11%           11%           11%           11%           11%           11%           11%           11%	$\begin{array}{c} 1.00\\ 4.00\\ 0.33\\ 0.00\\ 1.33\\ 0.33\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 0.00\\ 25.00\\ 21.00\\ 0.00\\ 15.67\\ 1.00\\ 15.67\\ 1.00\\ 0.33\\ 7.33\\ 0.67\\ 20.67\\ 3.67\\ 2.00\\ 1.33\\ 1.00\\ 2.33\\ 1.00\\ 2.67\end{array}$	0.46 2.58 0.12 0.74 0.14 0.79 0.01 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 20.77 19.89 0.61 20.77 19.89 0.61 20.77 19.89 0.64 1.22 0.38 10.22 0.41 2.57 2.57 2.57 2.379	$\begin{array}{c} 1.36\\ 4.92\\ 0.84\\ 0.57\\ 1.80\\ 2.01\\ 0.11\\ 0.28\\ 21.05\\ 54.94\\ 36.95\\ 0.56\\ 38.34\\ 35.12\\ 1.43\\ 1.03\\ 18.94\\ 1.15\\ 45.71\\ 8.78\\ 1.88\\ 5.04\\ 4.59\\ \end{array}$	1.53 5.37 0.94 0.65 2.00 0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x x x x		
$\begin{array}{c} 1\% \\ 0\% \\ 5\% \\ 0\% \\ 0\% \\ 0\% \\ 0\% \\ 0\% \\ 0$	0.33 0.00 1.33 0.33 0.00 0.00 0.00 25.00 21.00 0.00 4.00 15.67 1.00 0.33 7.33 0.67 20.67 2.00 1.33 1.00 2.33 1.00 2.57	0.28 0.12 0.74 0.74 0.71 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.61 0.38 10.22 0.41 26.41 26.41 26.57 2.57 2.37	0.84 0.57 1.80 0.49 2.01 0.11 0.28 21.05 54.94 36.95 38.34 35.12 1.43 1.03 18.94 1.15 45.71 8.78 1.88 5.04	0.94 0.65 2.00 0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x x		
0%           5%           1%           0%           0%           0%           0%           100%           84%           0%           63%           4%           1%           29%           3%           83%           5%           4%           11%           11%           11%           11%           11%           11%           5%           4%           11%           11%           11%           11%           11%           11%           11%           11%	0.00           1.33           0.33           0.00           0.00           0.00           0.00           0.00           25.00           21.00           0.00           15.67           1.00           0.33           7.33           0.67           20.67           3.67           2.00           1.33           1.00           2.33           1.00           2.67	0.12 0.74 0.74 0.79 0.01 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 2.277 19.89 0.61 2.641 2.641 2.57 2.57 2.37 3.09	0.57 1.80 0.49 2.01 0.11 0.28 21.05 54.94 36.95 0.56 38.34 35.12 1.43 1.03 1.894 1.15 45.71 8.78 1.88 5.04 4.59	0.65 2.00 0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	x x x		
$\begin{array}{c} 5\%\\ 1\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 0\%\\ 100\%\\ 84\%\\ 63\%\\ 16\%\\ 63\%\\ 4\%\\ 63\%\\ 4\%\\ 15\%\\ 29\%\\ 3\%\\ 83\%\\ 83\%\\ 15\%\\ 15\%\\ 15\%\\ 11\%\\ 11\%\\ 11\%\\ 11\%\\ 11$	1.33           0.33           0.00           0.00           0.00           25.00           21.00           21.00           15.67           1.00           0.33           7.33           0.67           20.67           3.67           0.67           2.00           1.33           1.00           2.33           1.00           2.67	0.74 0.14 0.79 0.01 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 26.41 26.41 26.57 2.37 3.09	1.80           0.49           2.01           0.11           0.28           21.05           54.94           36.95           0.56           38.34           1.03           1.15           45.71           8.78           1.88           5.04           4.59	2.00 0.55 2.24 0.13 23.42 59.43 40.35 0.63 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X X X		
1%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           0%           3%           3%           3%           5%           4%           11%           11%           11%           11%           13%	0.33 0.00 0.00 0.00 25.00 21.00 0.00 15.67 1.00 0.33 7.33 0.67 20.67 3.67 2.00 1.33 1.00 2.33 1.00 2.33 1.00	0.14 0.79 0.01 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 26.41 26.41 2.57 2.37 3.09	0.49 2.01 0.11 0.28 21.05 54.94 36.95 38.34 35.12 1.43 1.03 18.94 1.15 45.71 8.78 1.88 5.04 4.59	0.55 2.24 0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X X X		
$\begin{array}{c} 0\% \\ 0\% \\ 0\% \\ 0\% \\ 0\% \\ 100\% \\ 100\% \\ 84\% \\ 0\% \\ 16\% \\ 84\% \\ 0\% \\ 4\% \\ 19\% \\ 29\% \\ 3\% \\ 83\% \\ 15\% \\ 3\% \\ 83\% \\ 15\% \\ 5\% \\ 15\% \\ 4\% \\ 15\% \\ 15\% \\ 15\% \\ 15\% \\ 11\% \\ 11\% \\ 11\% \\ 11\% \\ 11\% \\ 13\% \\ 13\% \end{array}$	0.00 0.00 0.00 25.00 21.00 0.00 15.67 1.00 0.33 7.33 0.67 20.67 2.067 1.33 1.00 2.33 1.00 2.33 1.00 2.57	0.79 0.01 0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	0.11 0.28 21.05 54.94 36.95 0.56 38.34 1.43 1.03 1.03 1.8.94 1.15 45.71 8.78 1.88 5.04 4.59	0.13 0.33 23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X		
0%           0%           100%           84%           0%           16%           63%           4%           1%           29%           83%           3%           83%           5%           4%           11%           9%           4%           11%           11%           11%           11%           5%           13%	0.00 0.00 25.00 21.00 0.00 4.00 15.67 1.00 0.33 7.33 0.67 20.67 3.67 2.00 1.33 1.00 2.33 1.00 2.33 1.00	0.04 8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	0.28 21.05 54.94 36.95 0.56 38.34 35.12 1.43 1.03 18.94 1.15 4.571 8.78 1.88 5.04 4.59	0.33 23.42 59.43 40.35 0.63 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X		
0%           100%           84%           0%           16%           63%           4%           29%           3%           83%           5%           4%           11%           11%           11%           11%           11%           5%           13%	0.00 25.00 21.00 0.00 4.00 15.67 1.00 0.33 7.33 0.67 20.67 2.067 2.067 1.33 1.00 2.33 1.00 2.33 1.00	8.67 31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	21.05 54.94 36.95 0.56 38.34 35.12 1.43 1.03 18.94 1.15 45.71 8.78 1.88 1.88 5.04 4.59	23.42 59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X		
100%           84%           0%           16%           63%           4%           1%           29%           3%           83%           5%           4%           11%           11%           11%           11%           11%           13%	25.00 21.00 0.00 15.67 1.00 0.33 7.33 0.67 20.67 2.00 1.33 1.00 2.33 1.00 2.67	31.51 19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	54.94 36.95 0.56 38.34 35.12 1.43 1.03 18.94 1.15 4.5,71 8.78 1.88 5.04 4.59	59.43 40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X		
84%           0%           16%           63%           4%           1%           29%           3%           83%           5%           4%           11%           9%           4%           11%           11%           11%           11%           11%           11%           13%	21.00 0.00 4.00 15.67 1.00 0.33 7.33 0.67 20.67 2.00 1.33 1.00 2.33 1.00 2.67	19.21 0.16 20.77 19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	36.95 0.56 38.34 35.12 1.43 1.03 18.94 1.15 45.71 8.78 1.88 7.04 4.59	40.35 0.63 41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52	X		
16%           63%           4%           1%           29%           3%           83%           15%           3%           5%           4%           11%           11%           11%           13%	4.00 15.67 1.00 0.33 7.33 0.67 20.67 2.00 1.33 1.00 2.33 1.00 2.67	20.77 19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	38.34 35.12 1.43 1.03 18.94 1.15 45.71 8.78 1.88 5.04 4.59	41.71 38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52			
63%           4%           1%           29%           3%           83%           15%           3%           8%           5%           4%           9%           4%           11%           11%           11%           11%           11%           13%	15.67 1.00 0.33 7.33 0.67 20.67 3.67 0.67 2.00 1.33 1.00 2.33 1.00 2.67	19.89 0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	35.12 1.43 1.03 18.94 1.15 45.71 8.78 1.88 5.04 4.59	38.03 1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52			
4% 1% 29% 3% 83% 15% 3% 8% 4% 9% 4% 11% 11% 11% 11% 11% 5% 13%	1.00 0.33 7.33 0.67 20.67 3.67 2.00 1.33 1.00 2.33 1.00 2.67	0.61 0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	1.43 1.03 18.94 1.15 45.71 8.78 1.88 5.04 4.59	1.58 1.16 20.61 1.30 49.41 9.62 2.11 5.52			
1%           29%           3%           83%           15%           3%           8%           5%           11%           11%           11%           11%           13%	0.33 7.33 0.67 20.67 3.67 2.00 1.33 1.00 2.33 1.00 2.67	0.38 10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	1.03           18.94           1.15           45.71           8.78           1.88           5.04           4.59	1.16 20.61 1.30 49.41 9.62 2.11 5.52			
29% 3% 83% 15% 3% 4% 4% 11% 11% 11% 11% 5% 13%	7.33 0.67 20.67 3.67 2.00 1.33 1.00 2.33 1.00 2.67	10.22 0.41 26.41 4.41 0.69 2.57 2.37 3.09	18.94 1.15 45.71 8.78 1.88 5.04 4.59	20.61 1.30 49.41 9.62 2.11 5.52	X		
3%           83%           15%           3%           8%           5%           4%           9%           4%           11%           11%           11%           11%           13%	0.67 20.67 3.67 2.00 1.33 1.00 2.33 1.00 2.67	0.41 26.41 4.41 0.69 2.57 2.37 3.09	1.15 45.71 8.78 1.88 5.04 4.59	1.30 49.41 9.62 2.11 5.52	X		
15%           3%           8%           5%           4%           9%           11%           11%           11%           11%           13%	3.67 0.67 2.00 1.33 1.00 2.33 1.00 2.67	4.41 0.69 2.57 2.37 3.09	8.78 1.88 5.04 4.59	9.62 2.11 5.52			
3% 8% 5% 4% 9% 4% 11% 11% 11% 11% 5% 13%	0.67 2.00 1.33 1.00 2.33 1.00 2.67	0.69 2.57 2.37 3.09	1.88 5.04 4.59	2.11 5.52			
8% 5% 9% 4% 11% 11% 11% 11% 5% 13%	2.00 1.33 1.00 2.33 1.00 2.67	2.57 2.37 3.09	5.04 4.59	5.52			
5% 4% 9% 11% 11% 11% 11% 11% 5% 13%	1.33 1.00 2.33 1.00 2.67	2.37 3.09	4.59				
4% 9% 4% 11% 11% 11% 11% 5% 13%	1.00 2.33 1.00 2.67	3.09					
4% 11% 11% 11% 11% 5% 13%	1.00 2.67	2.57		6.46			
11% 11% 11% 11% 5% 13%	2.67		5.30	5.82			
11% 11% 11% 5% 13%		2.51	4.81	5.25			
11% 11% 5% 13%		2.81 2.60	5.74 4.96	6.30 5.42	x		
11% 5% 13%	2.67	3.00	5.66	6.17	^		
13%	2.67	2.48	4.92	5.39	Х		
	1.33	2.89	5.40	5.88			
	3.33	2.41	4.85	5.32	Х		
8%	2.00	2.22	4.55	5.00			
13%	3.33 3.33	4.00 4.62	6.58 9.23	7.08			
13%	3.33	4.46	7.81	8.46			
12%	3.00	4.56	8.62	9.40			
12%	3.00	5.04	9.04	9.80			
11% 25%	2.67 6.33	4.86 3.98	9.39 8.10	10.26 8.89	x		
					^		
13%	3.33	3.44	6.94	7.61			
7%	1.67	2.58	5.30	5.82			
					Х		
23%		8.60	15.51				
YEAR		3-Year					
2	3	Average					
3 46,232	50,252	46,339					
	0.911	0.911	-				
			-				
			-				
4 1.185	1.090	1.510					
0 1.705	1.671	1.706					
6 0.695	0.652	0.881					
_	_						
		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,					
	7%           17%           11%           19%           23%           YEAR           2           33           46,232           1           0.911           25           16.875           14           1.185           0           1.705           6           0.695           NO	13%         3.33           7%         1.67           17%         4.33           11%         2.67           19%         4.67           23%         5.67           YEAR         2           2         3           346,232         50,252           1         0.911         0.911           25         16.875         18.342           44         1.185         1.090           0.         1.705         1.671           6         0.695         0.652           5         NO         NO	13%         3.33         3.44           7%         1.67         2.58           17%         4.33         3.12           11%         2.67         3.57           19%         4.67         6.38           23%         5.67         8.60           YEAR           2         3         Average           33         46,232         50,252         46,339           1         0.911         0.911         0.911           25         16.875         18.342         16.914           44         1.185         1.090         1.510           0         1.705         1.671         1.706           6         0.695         0.652         0.881           5         NO         NO         NO	13%         3.33         3.44         6.94           7%         1.67         2.58         5.30           17%         4.33         3.12         5.78           11%         2.67         3.57         6.32           19%         4.67         6.38         11.52           23%         5.67         8.60         15.51           YEAR         3-Year         Average           33         46,232         50,252         46,339           1         0.911         0.911         0.911           25         16.875         18.342         16.914           44         1.185         1.090         1.510           0         1.705         1.671         1.706           6         0.695         0.652         0.881           5         NO         NO         NO	13%         3.33         3.44         6.94         7.61           7%         1.67         2.58         5.30         5.82           17%         4.33         3.12         5.78         6.29           11%         2.67         3.57         6.32         6.85           19%         4.67         6.38         11.52         12.50           23%         5.67         8.60         15.51         16.83           YEAR         3-Year         Average           33         46,232         50,252         46,339           1         0.911         0.911         0.911           25         16.875         18.342         16.914           4         1.185         1.090         1.510           0         1.705         1.671         1.706           6         0.695         0.652         0.881           5         NO         NO         NO	13%     3.33     3.44     6.94     7.61       7%     1.67     2.58     5.30     5.82       17%     4.33     3.12     5.78     6.29     X       11%     2.67     3.57     6.32     6.85       19%     4.67     6.38     11.52     12.50       23%     5.67     8.60     15.51     16.83       YEAR     3-Year       2     3     Average       33     46,232     50,252     46,339       1     0.911     0.911     0.911       25     16.875     18.342     16.914       4     1.185     1.090     1.510       0     1.705     1.671     1.706       6     0.695     0.652     0.881	13%     3.33     3.44     6.94     7.61       7%     1.67     2.58     5.30     5.82       17%     4.33     3.12     5.78     6.29     X       11%     2.67     3.57     6.32     6.85       19%     4.67     6.38     11.52     12.50       23%     5.67     8.60     15.51     16.83       YEAR     3-Year       2     3     Average       33     46,232     50,252     46,339       1     0.911     0.911     0.911       25     16.875     18.342     16.914       44     1.185     1.090     1.510       0     1.705     1.671     1.706       6     0.695     0.652     0.881       5     NO     NO

# Table 33 – Crash Analysis – NW 17 Avenue and NW 7 Street



From this analysis, it was determined that rear end, right-turn, sideswipe, pedestrian and bicycle collisions presented abnormal crash patterns that exceed the threshold limits for the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 34*.

Table 34 – Abnormal Crash Details & Countermeasures
NW 17 Avenue and NW 7 Street

		NW	17 Avei	nue & N	IW 7 St	reet				
	(6 Lane x 4 L	ane, Signalized, W	Vith Turn L	anes, 4 L	eg Interse	ection - Table	35) - URE	BAN Spot		
			NUMBE	R OF CF YEAR 2012	ASHES	3 YEAR TOTAL	% Of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
	Total Rear Er	nd Crashes	17	2012	12	CRASHES 36	Total 100%	per Year 12.00	(1)	2
	Total fical El	Day Light	12	5	6	23	66%	7.67	(3)	4
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(7)	
	3 - 3	Dark	5	1	6	12	34%	4.00	(12)	
		00:00 - 06:00	1	0	0	1	3%	0.33	( )	
		06:00 - 09:00	1	0	2	3	8%	1.00		
		09:00 - 11:00	1	0	0	1	3%	0.33		
	Hours of Day	11:00 - 13:00	4	0	2	6	17%	2.00		
Rear End		13:00 - 15:00	0	3	3	6	17%	2.00		
		15:00 - 18:00	7	2	0	9	25%	3.00		
		18:00 - 24:00	3	2	5	10	28%	3.33		
		NB→EB	4	0	6	10	28%	3.33		
		EB→SB	6	5	2	13	36%	4.33		
	Direction	WB→NB	6	2	4	12	33%	4.00		
		SB→WB	1	0	0	1	3%	0.33		
		Unknown	0	0	0	0	0%	0.00		
			-							
			NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	of Accidents		
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Sideswi	pe Crashes	5	3	4	12	100%	4.00	(1)	2
		Day Light	5	3	3	11	92%	3.67	(3)	4
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(7)	
		Dark	0	0	1	1	8%	0.33	(12)	
		00:00 - 06:00	0	0	1	1	8%	0.33		
		06:00 - 09:00	2	0	1	3	25%	1.00		
		09:00 - 11:00	2	0	0	2	17%	0.67		
Sideswipe	Hours of Day	11:00 - 13:00	0	2	1	3	25%	1.00		
(Overtake)		13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	0	0	0	0	0%	0.00		
		18:00 - 24:00	1	1	1	3	25%	1.00		
		North	2	1	2	5	42%	1.67		
		South	0	2	0	2	17%	0.67		
	Direction	East	2	0	2	4	33%	1.33		
		West	1	0	0	1	8%	0.33		
	1	Unknown	0	0	0	0	0%	0.00		

## 3.15.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 17 Avenue and NW 7 Street were performed on a typical weekday on May 13, 2014. A summary of the traffic data is presented in *Figure 59*, and the field review is presented in *Figure 60*.

This intersection has left-turn lanes with protected-permissive signal operation for all approaches. Pedestrian crosswalks exist on all legs and are equipped with head counts and push buttons to cross NW 7 Street. Pavement and marking conditions were fair since the intersection was improved by the Marlin Ballpark project.



Traffic was observed to be heavy but balanced in all approaches with the exception of the westbound in the am peak. Southbound left turn vehicles spilled back obstructing thru traffic during pm peak. Pedestrian activity was moderate during field inspection. Also vehicles were observed careless turning while pedestrian were crossing at crosswalks. Speeding was observed for northbound.

# 3.15.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NW 17 Avenue and NW 7 Street, the following is recommended:

- Lengthen the southbound left-turn lane to approximately 300 feet
- Retime/optimize of the existing signal while maintaining cycle length for both the AM and PM peak hours.
- Install reflective back plates for all signals heads
- Provide Turning Vehicles Yield to Pedestrians (R10-15) signs for all directions
- Provide push button to cross NW 17 Avenue

A conceptual vision of the proposed roadway improvements is exhibited in Figure 61.

## 3.15.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$30,911. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





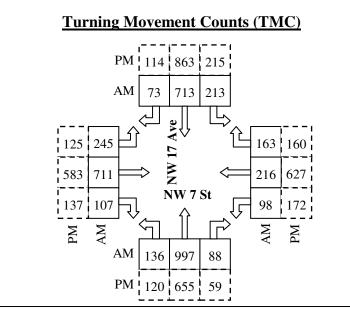


Figure 59: Traffic Data – NW 17 Avenue and NW 7 Street





Figure 60: Field Review – NW 17 Avenue and NW 7 Street



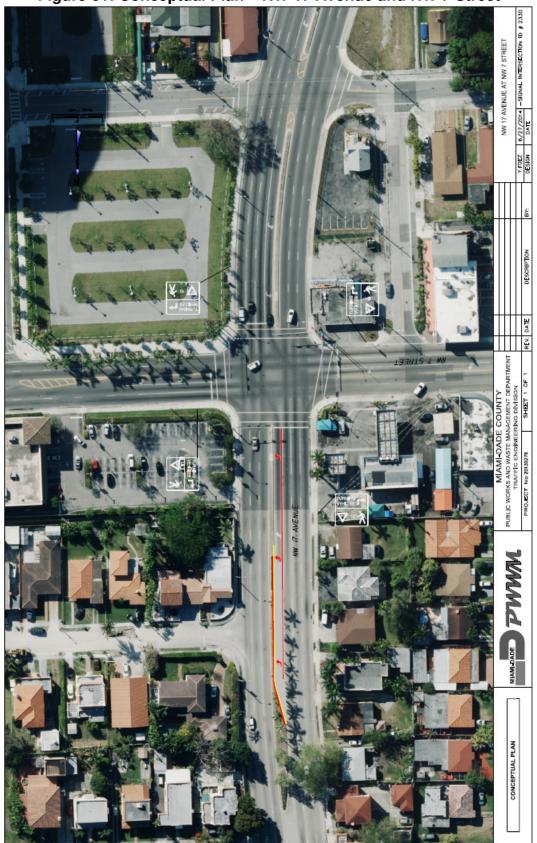


Figure 61: Conceptual Plan – NW 17 Avenue and NW 7 Street



## 3.16. NW 45 Avenue and NW 7 Street

#### 3.16.1. Site Description

This intersection is a signalized four legged intersection located in the City of Miami. NW 45 Avenue is a two lane local road that runs north-south and offsets when intersecting with NW 7 Street which is a four lane urban minor arterial with a two-way left-turn center lane that runs eastwest.

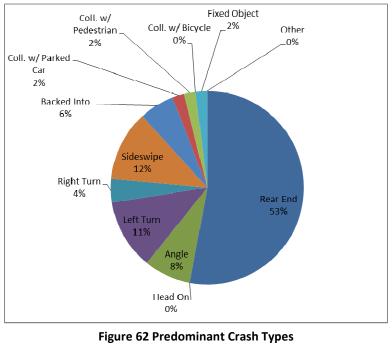
#### 3.16.2. Safety Conditions and Analysis

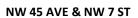
The intersection of NW 45 Avenue and NW 7 Street is ranked number 16 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 51 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 17. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 62*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010





FDOT's "Expected Value Analysis." *Table 35* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 2.214, 1.396, and 0.440, respectively. The safety ratio for the three years averaged 1.350. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		(4 Lane	X Z Lane	, Signalia	ed. With Lui	m Lanes 4		Ction - Lanie	23) - URBAN	Spot			
							-						
	TYPE OF CRASH	NUMBE	R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents		90th	ASH VALUE 95th	ABNORM Mean	ALLY HIGH 90th	CRASHES 95th
COLLISION TYPE	Rear End	2011 16	2012 8	2013 3	CRASHES 27	Total 53%	per Year 9.00	1.62	Percentile 4.09	Percentile 4.56	X	Percentil X	Percenti X
JULLISION I IPE	Head On	0	8	0	0	0%	0.00	0.16	0.58	4.56 0.66	^	<u> </u>	<u> </u>
	Angle	2	0	2	4	8%	1.33	1.37	3.01	3.33			
	Left Turn Right Turn	1	4	1	6 2	12% 4%	2.00 0.67	0.49	1.29 0.39	1.44 0.45	X	X	X X
	Sideswipe	2	4	0	6	12%	2.00	0.56	1.40	1.56	x	x x	x
	Backed Into	3	0	0	3	6%	1.00	0.07	0.40	0.46	Х	X	Х
	Coll. w/ Parked Car Coll. w/ Pedestrian	1	0	0	1	2% 2%	0.33	0.08	0.50	0.58	x		
	Coll. w/ Bicycle	0	0	0	0	2%	0.33	0.16	0.00	0.63	~		
	Fixed Object	1	0	0	1	2%	0.33	0.22	0.55	0.62	Х		
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Overtuned Other	0	0	0	0	0% 0%	0.00	0.01 2.44	0.11 6.28	0.13 7.02			
	Total Crashes	27	18	6	51	100%	17.00	7.27	15.00	16.48	х	x	x
SEVERITY	PDO crashes	26	15	6	47	92%	15.67	3.99	9.34	10.36	X	X	X
	Fatal crashes	0	0	0	0	0%	0.00	0.00	0.00	0.00			
LIGHT CONDITIONS	Injury crashes Day Light	1 19	3 15	0	4 40	8% 78%	1.33 13.33	5.10 4.76	11.25 9.80	12.43 10.76	х	x	x
	Dusk	2	1	0	3	6%	1.00	0.24	0.65	0.73	Х	X	x
	Dawn	1	0	0	1	2%	0.33	0.14	0.49	0.55	X		
	Dark Unknown	4	2	0	6	12% 2%	2.00 0.33	2.00 0.12	4.57 0.46	5.06 0.52	X X		<b> </b>
SURFACE CONDITIONS		23	17	6	46	90%	15.33	0.63	13.06	14.37	Х	x	x
	Wet	2	1	0	3	6%	1.00	0.87	1.92	2.12	X		
MONTH OF A YEAR	Others January	2	0	0	2 5	4% 10%	0.67	0.14	0.57	0.65	X	X	X X
MONTHOFATEAN	February	3	2	0	5	10%	1.67	0.48	1.40	1.45	X	x x	x
	March	2	1	2	5	10%	1.67	0.71	1.76	1.96	Х		
	April	2	2	0	4 8	8%	1.33 2.67	0.58 0.61	1.47 1.50	1.65	X	x	x
	May June	4	3	0	3	16% 6%	2.67	0.61	1.30	1.67 1.47	X	<u>^</u>	^
	July	6	0	0	6	12%	2.00	0.53	1.28	1.42	X	X	х
	August	1	2	0	3	6%	1.00	0.69	1.68	1.87	X		
	September October	2	2	1	5	10% 6%	1.67 1.00	0.73	1.96 1.92	2.19 2.14	X X		-
	November 2 0 0 2 4% 0.67 0.53 1.49 1.68 X		<u> </u>										
	December	2	0	0	2	4%	0.67	0.54	1.33	1.48	Х		
DAY OF THE WEEK	Sunday Monday	2	1	2	5	10%	1.67 1.00	0.96 1.16	1.99 2.90	2.19 3.23	Х		<u> </u>
	Monday Tuesday	1 6	2	0	3	6% 14%	2.33	1.16	2.90	3.23 2.68	х		ł
	Wednesday	4	3	1	8	16%	2.67	1.10	2.49	2.76	X	X	
	Thursday	5	7	1	13	25%	4.33	1.09	2.49	2.76	X	X	X
	Friday Saturday	2	2	2	6 9	12% 18%	2.00 3.00	0.92	2.25 2.38	2.50 2.66	X	x	x
HOUR OF THE DAY	00:00-06:00	2	2	0	4	8%	1.33	0.71	2.04	2.29	X	<u>^</u>	~
	06:00-09:00	5	4	0	9	18%	3.00	0.78	2.23	2.50	Х	Х	Х
	09:00-11:00 11:00-13:00	1	0	2	3	6% 12%	1.00 2.00	0.63	1.67 1.60	1.86 1.77	X X	x	x
	13:00-15:00	4	3	0	7	14%	2.33	0.09	1.96	2.18	X	x	x
	15:00-18:00	8	4	2	14	28%	4.67	1.53	3.50	3.88	Х	X	Х
	18:00-24:00	3	3	1	7	14%	2.33	2.13	4.38	4.81	Х		
						YEAR		3-Year	1				
					1	2	3	Average					
Average Daily Traffic A	DT (Vehicles per D	av)			16,727	18,182	19,763	18,224	-				
Florida Average Crash		••	tering Vo	hicles	0.757	0.757	0.757	0.757	-				
~	inate (Urasiles per l	v#IIIOII EN	enng ve	10105)					-				
Traffic Base					6.105	6.636	7.213	6.652	4				
Actual Crash Rate (C		-	,		4.422	2.712	0.832	2.656	4				
Critical Crash Rate (C	rashes per Million E	ntering V	ehicles)		1.997	1.944	1.892	1.944					
Safety Ratio					2.214	1.396	0.440	1.350	1				
High Crash Location	??				YES	YES	NO	YES	1				
Actual Crash	$Rate = \frac{A \times 1,00}{V}$ $Rate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$		R	V = Ave $\frac{Where:}{AVR} = A$	al number of rage Annual	crashes o Daily Traff	r number of c ic X 365	rashes by t		in a 1 year po			
Traffic Base =	$=\frac{Years \times ADT \times 3}{1,000,000}$	865		TF = Te = 1.		95% Confi	idence Level onfidence Le			Confidence I 68.30 86.60 90.00 95.00 95.50 95.50 98.80	) ) )	Constant Z 1.00 1.50 1.64 1.96 2.00 2.50	
Safety Ratio	$= \frac{Actual Crass}{Critical Crass}$	h Rate	_							99.00 99.70 99.95	)	2.58 3.00 3.29	

# Table 35 – Crash Analysis – NW 45 Avenue and NW 7 Street



## Table 36 – Abnormal Crash Details & Countermeasures NW 45 Avenue and NW 7 Street

	(4 Long x 2 L	NW 4 ane, Signalized, Wi	15 Aven				22) I IDI	PAN Spot		
	(4 Larie X 2 La	arie, Signalizeu, wi		R OF CR		3 YEAR	% 23) - UHI	MEAN		
			2011	YEAR 2012	2013	TOTAL	of Total	Accidents per Year	Possible Cause(s)	Counter- measure(s)
	Total Rear Er	nd Crashes	16	8	3	27	100%	9.00	(1)	2
		Day Light	13	6	3	22	81%	7.33	(3)	4
	Lighting Conditions	Dawn	1	0	0	1	4%	0.33	(7)	7
		Dark	2	2	0	4	15%	1.33	(12)	
		00:00 - 06:00 06:00 - 09:00	0 4	1	0	1	4% 27%	0.33 2.33		
		09:00 - 11:00	1	0	0	, 1	4%	0.33		
Rear End	Hours of Day	11:00 - 13:00	1	1	0	2	8%	0.67		
Rear End		13:00 - 15:00	2	0	0	2	8%	0.67		
		15:00 - 18:00	5	2	1	8	31%	2.67		
		18:00 - 24:00	2	2	1	5	19%	1.67		
		North South	1	0	0	1	4% 7%	0.33 0.67		
	Direction	East	1	2	1	4	15%	1.33		
		West	13	5	2	20	74%	6.67		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	ROFCR	ASHES	3 YEAR	%	MEAN	Possible	Counter-
			0011	YEAR	2012	TOTAL	of Total	Accidents	Cause(s)	measure(s)
	Total Left Tur	n Crachec	2011	2012	2013	CRASHE	Total	per Year		3
	TOLAI LEIL TUI	Day Light	1	4	1	<b>6</b> 5	100% 83%	2.00 1.67	(8) (10)	3
	Lighting Conditions	Day Light Dawn	0	3 0	0	5	83% 0%	0.00	(10)	°
	_igning conditions	Dawn Dark	0	1	0	1	17%	0.00	(10)	
		00:00 - 06:00	0	1	0	1	17%	0.33		
		06:00 - 09:00	1	0	0	1	17%	0.33		
		09:00 - 11:00	0	0	1	1	17%	0.33		
Left Turn	Hours of Day	11:00 - 13:00	0	0	0	0	0%	0.00		
Lent rum		13:00 - 15:00	0	2	0	2	33%	0.67		
		15:00 - 18:00	0	1	0	1	17%	0.33		
		18:00 - 24:00	0	0	0	0	0%	0.00		
		$NB \rightarrow WB$	0	1	0	1	17%	0.33		
	Discution	WB→SB	0	1	0	1	17%	0.33		
	Direction		0	0	0	0	0%	0.00		
	EB→NB → 1 2 1 4 67% 1.33 Unknown 0 0 0 0 0 0% 0.00									
		Unknown	0	0	0	0	0%	0.00		
		Unknown	0 NUMBE		0 ASHES	0 3 YEAB	0%	0.00		
		Unknown		0 ER OF CR YEAR 2012		0 3 YEAR TOTAL CRASHE	0% % of Total	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
	Total Rear Er		NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN		
	Total Rear Er		NUMBE	R OF CR YEAR 2012	ASHES 2013	3 YEAR TOTAL CRASHE	% of Total	MEAN Accidents per Year	Cause(s)	measure(s)
	Total Rear Er	d Crashes Day Light Dawn	NUMBE 2011 1 1 0	R OF CR YEAR 2012 1 1 0	ASHES 2013 0 0	3 YEAR TOTAL CRASHE 2 0	% of Total 100% 67% 0%	MEAN Accidents per Year 0.67 0.00	Cause(s) (9)	measure(s) 4
		d Crashes Day Light Dawn Dark	NUMBE 2011 1 0 0	R OF CR YEAR 2012 1 1 0 0	ASHES 2013 0 0 1	3 YEAR TOTAL CRASHE 2 2 0 1	% of Total 100% 67% 0% 33%	MEAN Accidents per Year 0.67 0.67 0.00 0.33	Cause(s) (9)	measure(s) 4
		d Crashes Day Light Dawn Dark 00:00 - 06:00	<b>NUMBE</b> 2011 1 0 0 0	R OF CR YEAR 2012 1 1 0 0	ASHES 2013 0 0 1 0	<b>3 YEAR</b> TOTAL CRASHE 2 0 1 0	% of Total 100% 67% 0% 33% 0%	MEAN Accidents per Year 0.67 0.00 0.33 0.00	Cause(s) (9)	measure(s) 4
		id Crashes Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00	NUMBE 2011 1 0 0 0 0	<b>PROFCR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0</b>	ASHES 2013 0 0 0 1 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0	% of Total 100% 67% 0% 33% 0% 0%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.00	Cause(s) (9)	measure(s) 4
	Lighting Conditions	Id Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	NUMBE           2011           1           0           0           0           0           0           0	<b>PROFCR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0</b>	ASHES 2013 0 0 0 1 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0	%           of           Total           100%           67%           0%           33%           0%           0%           0%           0%	MEAN           Accidents           per Year           0.67           0.67           0.00           0.33           0.00           0.00           0.00	Cause(s) (9)	measure(s) 4
Right Turn		d Crashes Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	NUMBE           2011           1           0           0           0           0           1	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0	ASHES 2013 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 1 0 0 0 0 1	%           of           Total           100%           67%           0%           33%           0%           0%           0%           33%	MEAN           Accidents           per Year           0.67           0.67           0.00           0.33           0.00           0.00           0.00           0.33	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	Id Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00	NUMBE           2011           1           0           0           0           0           0           0	<b>PROFCR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0</b>	ASHES 2013 0 0 0 1 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 0	%           of           Total           100%           67%           0%           33%           0%           0%           0%           0%	MEAN           Accidents           per Year           0.67           0.67           0.00           0.33           0.00           0.00           0.00	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 11:00 13:00 - 15:00	2011           1           0           0           0           0           1           0           0           0           0           0           0           0           0           0           0           0           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 0 0 0 1 0	% of Total 100% 67% 0% 33% 0% 0% 0% 33% 0%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.00           0.33           0.00           0.33           0.00           0.33	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00	NUMBE           2011           1           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0           0	R OF CR YEAR 2012 1 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 1 0 0 1 0 1	% of Total 100% 67% 0% 33% 0% 0% 33% 0% 33%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB	NUMBE           2011           1           0	<b>R OF CR</b> <b>YEAR</b> <b>2012</b> <b>1</b> 1 0 0 0 0 0 0 0 1 0 1 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0	3 YEAR TOTAL CRASHE 2 2 0 1 0 0 0 1 1 0 1 1 1 0	%         of           Total         100%           67%         0%           0%         33%           0%         0%           33%         0%           33%         33%           33%         33%           0%         33%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.33           0.33	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 2 0 0 0 0 0 0 0 1 1 1 1 1 0 0 0 0	%         of           Total         100%           67%         0%           0%         0%           0%         0%           0%         33%           33%         33%           33%         0%           0%         0%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.00           0.33	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes Day Light Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB	NUMBE           2011           1           0	<b>R OF CR</b> <b>YEAR</b> <b>2012</b> <b>1</b> 1 0 0 0 0 0 0 0 1 0 1 0 1 0 1 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0	3 YEAR TOTAL CRASHE 2 2 0 1 0 0 0 1 1 0 1 1 1 0	%         of           Total         100%           67%         0%           0%         33%           0%         0%           33%         0%           33%         33%           33%         33%           0%         33%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.33           0.33	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 2 0 0 0 0 0 0 0 1 1 1 1 1 0 0 0 0	%         of           Total         100%           67%         0%           0%         0%           0%         0%           0%         33%           33%         33%           33%         0%           0%         0%	MEAN           Accidents           per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.00           0.33	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 2 0 0 0 0 0 0 0 1 1 1 1 1 0 0 0 0	%         of           0fal         100%           67%         0%           0%         0%           0%         0%           0%         33%           33%         33%           33%         0%           0%         0%	MEAN Accidents per Year           0.67           0.633           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.00           0.00           0.00	Cause(s) (9)	measure(s) 4
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0	3 YEAR TOTAL CRASHE 2 2 0 0 0 0 0 0 0 1 1 1 1 1 0 0 0 0	%         of           0fal         100%           67%         0%           0%         0%           0%         0%           0%         33%           33%         33%           33%         0%           0%         0%	MEAN Accidents per Year           0.67           0.633           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.00           0.00           0.00	(9) (16)	measure(s) 4 6
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 1 1 0 0 1 1 1 1 1 0 0 0 2 0	%           of           Total           100%           67%           0%           33%           0%           33%           0%           33%           0%           33%           0%           67%           0%           67%           0%           67%           0%           67%           0%           67%           0%	MEAN Accidents per Year           0.67           0.633           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.00           0.00           0.67           0.00	Cause(s) (9) (16) Possible	Measure(s) 4 6 2
Right Turn	Lighting Conditions Hours of Day Direction	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 13:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0	3 YEAR TOTAL CRASHE 2 2 0 1 0 0 1 0 0 1 1 1 1 1 0 0 2 0 0 3 YEAR	%         of           Total         100%           67%         0%           33%         0%           0%         33%           0%         33%           0%         33%           0%         67%           0%         67%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           0%         0%           %         %	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.00           0.67           0.00           0.67           0.00	(9) (16)	measure(s) 4 6
Right Turn	Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown	NUMBE           2011           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 1 0 0 0 1 0 0 0 ASHES 2013 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 1 1 1 1 1 1 1 0 0 2 0 3 YEAR TOTAL CRASHE 6	% of Total 100% 67% 0% 33% 0% 33% 0% 33% 0% 33% 0% 67% 0% 67% 0% 67% 0%	MEAN Accidents per Year           0.67           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00	(9) (16) Possible Cause(s) (4)	Counter- measure(s)
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Right Turn	Lighting Conditions Hours of Day Direction	d Crashes DayLight Dawn Dark 00:00 - 06:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 16:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown n Crashes DayLight Dawn	NUMBE           2011           1           0           2011           2           1           0	R OF CR YEAR 2012 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 1 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 1 1 0 0 1 1 1 1 1 1 0 0 2 0 0 1 1 1 1	%           of           Total           100%           67%           0%           33%           0%           33%           0%           33%           0%	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.00           0.433           0.00           0.33           0.00           0.67           0.00           Accidents           per Year           2.00           3.67           0.00	(9) (16) Possible Cause(s) (4)	Counter- measure(s)
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Right Turn	Lighting Conditions Hours of Day Direction	d Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown n Crashes DayLight Dawn Dark 00:00 - 06:00	NUMBE           2011           1           0           1           0           1           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 2 0 1 0 0 0 1 1 0 0 1 1 1 1 0 0 2 0 0 3 YEAR TOTAL CRASHE 6 11 0 0 2 0	%         of           Total         100%           67%         0%           33%         0%           0%         33%           0%         33%           33%         0%           67%         0%           0%         33%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         0%           0%         0f           100%         85%           0%         0%           15%         0%	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.67           0.00           3.67           0.00           0.67           0.00	(9) (16) Possible Cause(s) (4)	Counter- measure(s)
Right Turn	Lighting Conditions Hours of Day Direction	d Crashes DayLight Dawn Dark 00:00 - 06:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 15:00 - 15:00 18:00 - 24:00 NB→EB EB→SB WBNB SB→WB Unknown NB-NB SB→WB DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00	NUMBE           2011           1           0           1           0           1           0           1           0           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 1 1 0 0 0 1 1 1 1 1 0 0 2 0 0 0 2 0 0 0 2 0 0 0 2 0 0 1 1 0 0 0 1 1 0 0 0 0	%           of           Total           100%           67%           0%           33%           0%           33%           0%           33%           0%           0%           33%           33%           0%           0%           0%           0%           0%           0%           0%           0%           0%           of           Total           100%           85%           0%           15%           0%           15%           0%           15%           0%	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.00           0.67           0.00           0.67           0.00           0.67           0.00           3.67           0.00           0.67           0.00	(9) (16) Possible Cause(s) (4)	Counter- measure(s)
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Sideswipe	Lighting Conditions Hours of Day Direction Total Left Tur Lighting Conditions	d Crashes DayLight Dawn Dark 00:00 - 06:00 09:00 - 11:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown NB→RB SB→WB Unknown Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 11:00 - 13:00	NUMBE           2011           1           0           1           0           0           0           0           0           1           0           0           1           0           0           1	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 1 1 0 0 1 1 1 1 1 1 0 0 2 0 0 2 0 0 2 0 0 2 0 0 2 0 0 1 1 0 0 0 1 1 1 1	%           of           Total           100%           67%           0%           33%           0%           33%           0%           33%           0%           0%           33%           0%           0%           0%           0%           0%           0%           0%           0%           of           Total           100%           85%           0%           15%           0%           23%           0%           23%           23%	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.33           0.33           0.300           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00           1.00           1.00           1.00	(9) (16) Possible Cause(s) (4)	Counter- measure(s)
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Sideswipe	Lighting Conditions Hours of Day Direction Total Left Tur Lighting Conditions	d Crashes DayLight Dark 00:00 - 06:00 06:00 - 09:00 11:00 - 13:00 13:00 - 15:00 15:00 - 18:00 15:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown n Crashes DayLight Dawn Dark 00:00 - 06:00 06:00 - 09:00 09:00 - 11:00 13:00 - 15:00 15:00 - 18:00 15:00 - 18:00 15:00 - 18:00 15:00 - 18:00 15:00 - 18:00 North	NUMBE           2011           1           0           1           0           0           1           0           0           1           0           0           0           0           0           0           0           0           0           0           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ASHES 2013 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 0 1 1 0 0 1 1 1 1 1 0 0 2 0 0 3 YEAR TOTAL CRASHE 6 111 0 0 2 0 0 3 3 3 3 3 1 2	%         of           Total         100%           67%         0%           33%         0%           0%         33%           0%         33%           0%         33%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         67%           0%         0%           2%         0%           15%         23%           23%         23%           23%         23%           23%         23%           23%         15%	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.33           0.33           0.33           0.33           0.33           0.367           0.00           3.67           0.00           1.00           1.00           1.00           0.33	(9) (16) Possible Cause(s) (4)	Counter- measure(s)
Sideswipe	Lighting Conditions Hours of Day Direction Total Left Tur Lighting Conditions Hours of Day	d Crashes DayLight Dawn Dark 00:00 - 06:00 09:00 - 11:00 11:00 - 13:00 13:00 - 13:00 13:00 - 15:00 16:00 - 18:00 18:00 - 24:00 NB→EB EB→SB WB→NB SB→WB Unknown Dark 00:00 - 06:00 09:00 - 11:00 11:00 - 13:00 15:00 - 18:00 18:00 - 24:00 North South	NUMBE           2011           1           0           1           0           0           0           1           0           0           0           0           0           0           0           0           0           0           0           0           0	R OF CR YEAR 2012 1 1 0 0 0 0 0 0 0 0 0 0 0 1 0 0 0 0	ASHES 2013 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	3 YEAR TOTAL CRASHE 2 0 1 0 0 1 1 0 0 1 1 1 1 1 1 1 1 1 0 0 0 2 0 0 3 3 YEAR TOTAL CRASHE 6 11 1 0 0 0 2 0 0 1 1 0 0 0 1 1 0 0 0 0	% of Total 100% 67% 0% 33% 0% 0% 33% 33% 33% 33% 33% 33% 0% 0% 67% 0% 67% 0% 67% 0% 67% 0% 5% 15%	MEAN Accidents per Year           0.67           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.00           0.33           0.33           0.33           0.33           0.33           0.33           0.33           0.300           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.67           0.00           0.33           0.367           0.00           1.00           1.00           0.67           0.67	(9) (16) Possible Cause(s) (4)	Counter- measure(s)



From this analysis, it was determined that rear end, left-turn, right-turn, sideswipe and backing collisions presented abnormal crash patterns that exceed the 95th percentile and 90th percentile confidence level threshold limits. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 36*.

### 3.16.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at NW 45 Avenue and NW 7 Street were performed on a typical weekday on May 15, 2014. A summary of the traffic data is presented in *Figure 63*, and the field review is presented in *Figure 64*.

The intersection is controlled by a signal suspended in span wires. This intersection has leftturn lanes for all approaches except for southbound. The signal operation is protectedpermissive for eastbound left turn and permissive only for westbound left turns; north and southbound approaches are operating on split phases. Obstructions to the sight distance are present at all corners due to buildings and fences.

Pavement and markings are in fair conditions. Skid marks were visible on markings for east and west directions. Speeding was observed for east and west traffic.

High pedestrian activity was observed on all directions. Crosswalks are provided in all legs except for the south leg. Push buttons are provided to cross NW 7 Street at east and west legs. ADA ramps exist on NW 7 Street to cross north-south direction on both legs east and west.

#### 3.16.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of NW 45 Avenue and NW 7 Street, the following is recommended:

- Update span wire traffic signal to mast arm.
- Provide crosswalk on south leg.
- Provide countdown pedestrian signal heads for all directions.
- Provide ADA ramps for east-west directions on north and south legs.
- Install reflective back plates for all signals heads.
- Provide solar powered speed limit feedback signs on NW 7 Street for east and westbound traffic.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 65.



#### 3.16.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$433,989. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





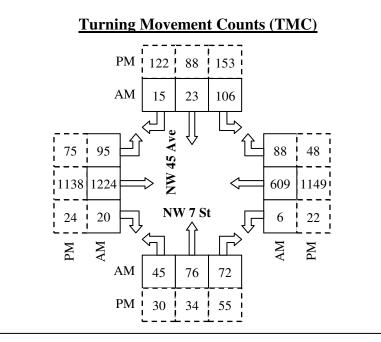


Figure 63: Traffic Data – NW 45 Avenue and NW 7 Street



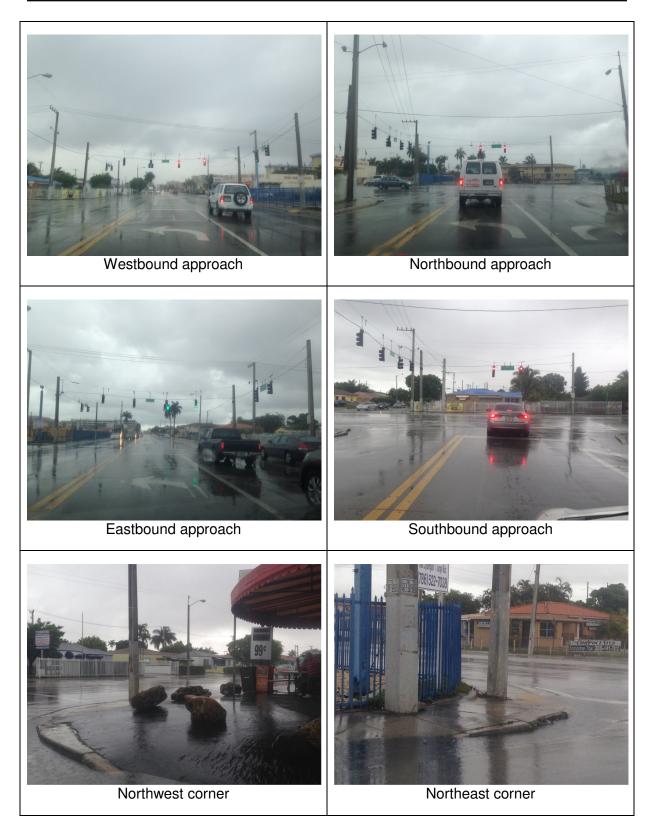


Figure 64: Field Review – NW 45 Avenue and NW 7 Street









### 3.17. W 14 Avenue and W 29 Street

#### 3.17.1. Site Description

This intersection is a signalized four legged intersection located in the City of Hialeah in the area of Northwest Miami Dade County. W 14 Avenue is a two lane undivided local road that runs North- South, and W 29 Street is a four lane undivided collector that runs east-west.

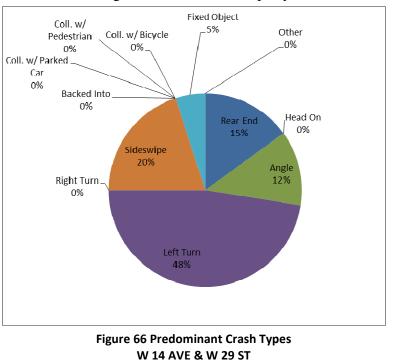
#### 3.17.2. Safety Conditions and Analysis

The intersection of W 14 Avenue and W 29 Street is ranked number 17 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 40 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 13. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 66*.

Calculated intersection mean crash per year were compared to the average Miami-Dade for Crash Rate County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010



FDOT's "Expected Value Analysis." *Table 37* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.405, 1.153, and 1.007, respectively. The safety ratio for the three years averaged 1.188. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		(4.1.4.1.1.	0.1	Diama di			W 29 Stre			NI Oraci			
		(4 Lane x	2 Lane, S	Signalize	d, Without T	urn Lanes,	4 Leg Inters	ection - Tab	le 23) - URBA	N Spot			
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	EXPECTED	O ANNUAL CR	ASH VALUE 95th	ABNORM	ALLY HIGH 90th	CRASHES 95th
	THEOFCHASH	2011	2012	2013	CRASHES	Total	per Year	MEAN	Percentile	Percentile	Mean		Percenti
COLLISION TYPE	Rear End	5	1	0	6	15%	2.00	1.62	4.09	4.56	Х		
	Head On Angle	0	0	0	0 5	0%	0.00	0.16	0.58	0.66 3.33	x		
	Left Turn	5	9	5	19	48%	6.33	0.49	1.29	1.44	X	х	Х
	Right Turn	0	0	0	0	0%	0.00	0.10	0.39	0.45	v	v	
	Sideswipe Backed Into	2	2	4	8 0	20% 0%	2.67 0.00	0.56	1.40 0.40	1.56 0.46	X	X	X
	Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.07	0.50	0.58			
	Coll. w/ Pedestrian	0	0	0	0	0%	0.00	0.16	0.56	0.63			
	Coll. w/ Bicycle Fixed Object	0	0	0	0	0% 5%	0.00	0.00	0.00	0.00	x	x	x
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.02	~	<u> </u>	<u>^</u>
	Overtuned	0	0	0	0	0%	0.00	0.01	0.11	0.13			
	Other	0	0	0	0	0%	0.00	2.44	6.28	7.02	v		
SEVERITY	Total Crashes PDO crashes	15 15	13 9	12 11	40 35	100% 88%	13.33 11.67	7.27	15.00 9.34	16.48 10.36	X	x	x
	Fatal crashes	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Injury crashes	0	4	1	5	13%	1.67	5.10	11.25	12.43			
IGHT CONDITIONS	DayLight Dusk	8	11	9	28 3	70% 8%	9.33 1.00	4.76 0.24	9.80 0.65	10.76 0.73	X	x	x
	Dawn	1	0	0	1	3%	0.33	0.24	0.65	0.75	x	Ê	Ê
	Dark	4	1	3	8	20%	2.67	2.00	4.57	5.06	Х		
SURFACE CONDITIONS	Unknown Dry	0 11	0	0 11	0 31	0% 78%	0.00	0.12 0.63	0.46	0.52 14.37	x		
	Wet	4	9 4	1	9	23%	3.00	0.83	1.92	2.12	x	x	x
	Others	0	0	0	0	0%	0.00	0.14	0.57	0.65			
IONTH OF A YEAR	January	0	1	1	2	5% 5%	0.67	0.48	1.33	1.49	X		
	February March	2	0	2	2 5	5% 13%	0.67	0.59	1.40	1.56 1.96	X		
	April	2	1	0	3	8%	1.00	0.58	1.47	1.65	Х		
	May	1	1	0	2	5%	0.67	0.61	1.50	1.67	X	×	
	June July	1	1 2	2	4 3	10% 8%	1.33	0.52	1.32	1.47 1.42	X	X	
	August	3	2	1	6	15%	2.00	0.69	1.68	1.87	X	x	X
	September	0	1	0	1	3%	0.33	0.73	1.96	2.19			
	October November	2	1	1	4 5	10% 13%	1.33 1.67	0.74 0.53	1.92	2.14 1.68	X	x	
	December	1	0	2	3	8%	1.00	0.53	1.33	1.48	x	<u> </u>	
DAY OF THE WEEK	Sunday	1	1	1	3	8%	1.00	0.96	1.99	2.19	Х		
	Monday Tuesday	3	2	2	7 8	18% 20%	2.33 2.67	1.16	2.90 2.43	3.23 2.68	X	x	
	Wednesday	4	2	2	5	13%	1.67	1.11	2.43	2.00	x	<u> </u>	
	Thursday	2	3	1	6	15%	2.00	1.09	2.49	2.76	Х		
	Friday	2	1	1	4	10%	1.33	0.92	2.25	2.50	X		
HOUR OF THE DAY	Saturday 00:00-06:00	0	3	3	7	18% 2%	2.33 0.33	0.93	2.38 2.04	2.66 2.29	^		
	06:00-09:00	2	0	9	11	22%	3.67	0.78	2.23	2.50	Х	X	Х
	09:00-11:00	0	0	0	0	0%	0.00	0.63	1.67	1.86			
	11:00-13:00 13:00-15:00	0	1	3	4	8% 12%	1.33	0.69	1.60	1.77 2.18	X	x	
	15:00-18:00	5	5	4	14	29%	4.67	1.53	3.50	3.88	X	x	x
	18:00-24:00	7	4	2	13	27%	4.33	2.13	4.38	4.81	Х		
						YEAR		3-Year	1				
					1	YEAR 2	3	3-Year Average					
Norado Daily Troff-	NDT (Vabialaa ac- C							•	-				
Average Daily Traffic		•			13,683	14,873	16,166	14,907	-				
Florida Average Crash	n rate (Crashes per l	viillion En	tering Vel	nicles)	0.757	0.757	0.757	0.757	_				
Fraffic Base					4.994	5.429	5.901	5.441					
Actual Crash Rate <i>(C</i>	rashes per Million E	ntering Ve	ehicles)		3.003	2.395	2.034	2.477					
Critical Crash Rate (C	Crashes per Million E	ntering V	ehicles)		2.138	2.078	2.020	2.079					
Safety Ratio					1.405	1.153	1.007	1.188					
High Crash Location	1??				YES	YES	YES	YES					
3													
	$Rate = \frac{A \times 1,00}{V}$		R		al number of rage Annual			erashes by t	type occurring	in a 1 year pe	eriod.		
CriticalCrashl	$Rate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$	$TF\sqrt{\frac{AV}{TB}}$	2	TB = Tra	Average State affic Base st Factor (z-1		sh Rate for a	particular ty	pe of intersec	Confidence I	.evel (%)	Constant Z	
	Vears X ADT V2	865		= 1.:	96 (assume	95% Confi				68.30 86.60		1.00 1.50	
Traffic Base =	$=\frac{Years \times ADT \times 3}{1,000,000}$			= 3.	29 (assume	99.95% Co	onfidence Le	vel for URB/	AN areas)	90.00	)	1.64	
	1,000,000									95.00 95.50		1.96 2.00	
	Actual C-	h Dete								98.80	)	2.50	
Cafety Datio	$= \frac{Actual Crass}{Critical Crass}$	n Kate	_							99.00		2.58	1
<i>Sujery</i> κατιο										99.70	)	3.00	

# Table 37 – Crash Analysis – W 14 Avenue and W 29 Street



From this analysis, it was determined that left turn, sideswipe and fixed object collisions presented abnormal crash pattern that exceeds the threshold limits for the 95th percentile and 90th percentile confidence level. Also, rear end and angle collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 38*.

			4 Aven							
	(4 Lane x 2 Lar	e, Signalized, With	out Turn I	anes, 4 L	eg Inters	ection - Tat	ole 23) - U	RBAN Spot		
			NUMB	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible	Counter-
			2011	2012	2013	CRASHE	Total	per Year	Cause(s)	measure(s
	Total Left Tu	n Crashes	5	9	5	19	100%	6.33	(1)	6
		Day Light	2	8	4	14	74%	4.67	(4)	13
	Lighting Conditions	Dawn	1	0	0	1	5%	0.33	(15)	14
		Dark	2	1	1	4	21%	1.33		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	1	0	0	1	5%	0.33		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Left Turn	Hours of Day	11:00 - 13:00	0	1	1	2	11%	0.67		
Leit Turn		13:00 - 15:00	1	1	0	2	11%	0.67		
		15:00 - 18:00	1	5	3	9	47%	3.00		
		18:00 - 24:00	2	2	1	5	26%	1.67		
	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$NB \rightarrow WB$	0	0	0	0	0%	0.00		
		$WB \rightarrow SB$	0	3	4	7	37%	2.33		
		$EB \rightarrow NB$	3	6	1	10	53%	3.33		
		Unknown	0	0	0	0	0%	0.00		
			NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	Accidents	Cause(s)	measure(s
			2011	2012	2013	CRASHE	Total	per Year	. ,	
	Total Left Tu		2	2	4	8	100%	2.67	(8)	8
		Day Light	1	2	3	6	75%	2.00	(17)	22
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		
		Dark	1	0	1	2	25%	0.67		
		00:00 - 06:00	0	0	1	1	13%	0.33		
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Sideswipe	Hours of Day	11:00 - 13:00	0	0	1	1	13%	0.33		
(Overtake)		13:00 - 15:00	0	1	1	2	25%	0.67		
		15:00 - 18:00	0	0	1	1	13%	0.33		
		18:00 - 24:00	2	1	0	3	38%	1.00		
		North	0	0	0	0	0%	0.00		
		South	1	0	0	1	13%	0.33		
		oouur								1
	Direction	East	1	1	4	6	75%	2.00		
	Direction		1 0	1	4	6 1	75% 13%	2.00 0.33		

# Table 38 – Abnormal Crash Details & CountermeasuresW 14 Avenue and W 29 Street

# 3.17.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 14 Avenue & W 29 Street were performed on a typical weekday on May 21, 2014. A summary of the traffic data is presented in *Figure 67*, and the field review is presented in *Figure 68*.

This is a signalized intersection with permissive left-turn movements, and no left-turn lanes for all directions. The east/west left-turn vehicles find difficulties turning due to the heavy opposing east/west thru traffic.



At the northwest corner trees, shrubberies and an FPL concrete pole are blocking the view of oncoming traffic. Cars were observed parked at the SW corner blocking the view as well.

#### 3.17.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 14 Avenue & W 29 Street, the following is recommended:

- Refurbish pavement markings including crosswalks using thermoplastic painting at the south leg.
- Add Yellow Pedestrian ramps for northwest and northeast corners.
- Add pedestrian signal heads for all directions.
- Upgrade the crosswalks to high visibility ladder crosswalks.
- Add lane designation pavement marking arrows for east/west approaches.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 69.

#### 3.17.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$22,420. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





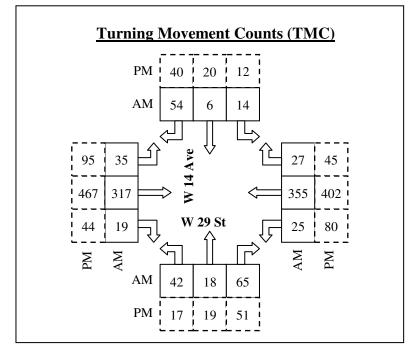


Figure 67: Traffic Data – W 14 Avenue and W 29 Street





Northwest corner: trees, shrubberies and FPL pole block the view of oncoming traffic



East/west directions: heavy traffic and no left-turn lanes.



Southwest corner: angle parked cars block the view of oncoming traffic.



Southeast corner: angle parking damages the edge of pavement.



No pedestrian signal heads.



Figure 68: Field Review – W 14 Avenue and W 29 Street





Figure 69: Conceptual Plan – W 14 Avenue and W 29 Street



## 3.18. W 28 Avenue and W 68 Street

## 3.18.1. Site Description

This intersection is a signalized four-legged intersection located at the city limit between the City of Hialeah and the City of Hialeah Gardens in the northwest area of Miami Dade County. W 28 Avenue is a four lane urban arterial divided by a median mostly paved that runs north-south, and W 68 Street is a four lane collector divided by a median mostly paved that runs east-west.

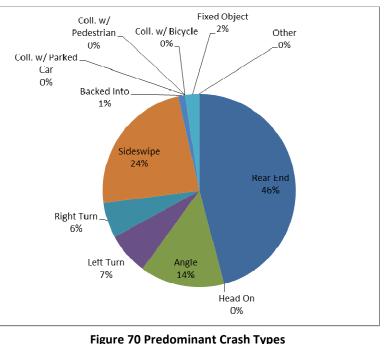
## 3.18.2. Safety Conditions and Analysis

The intersection of W 28 Avenue and W 68 Street is ranked number 18 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 85 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 28. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 70*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010



W 28 AVE & W 68 ST

FDOT's "Expected Value Analysis." *Table 39* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.110, 1.155, and 0.909, respectively. The safety ratio for the three years averaged 1.058. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



							W 68 Stre						
		(4 Lane	x 4 Lane	, Signaliz	ed, With Tu	m Lanes, 4	Leg Intersed	tion - Table	29) - URBAN	Spot			
		NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	EXPECTED	ANNUAL CR		ABNORM		
	TYPE OF CRASH	2011	YEAR 2012	2013	TOTAL CRASHES	of Total	Accidents per Year	MEAN	90th Percentile	95th Percentile	Mean	90th Percentil	95th Percentil
COLLISION TYPE	Rear End	9	19	11	39	46%	13.00	3.43	8.08	8.97	Х	X	X
	Head On Angle	0	0	0	0	0% 14%	0.00 4.00	0.51 3.11	1.15 6.53	1.28 7.19	x	-	
	Left Turn	1	1	4	6	7%	2.00	1.44	3.22	3.56	<u>x</u>		
	Right Turn	4	0	1	5	6%	1.67	0.34	1.07	1.21	X	x	x
	Sideswipe	8	7	5	20	24%	6.67	1.51	4.91	5.56	Х	X	x
	Backed Into	0	1	0	1	1%	0.33	0.11	0.47	0.54	Х		
	Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.11	0.57	0.66			
	Coll. w/ Pedestrian	0	0	0	0	0%	0.00	0.47	1.35 0.49	1.52			
	Coll. w/ Bicycle Fixed Object	0	0	1	2	2%	0.00	0.12	0.49	0.56 0.27	х	x	x
	Ran Off Road	0	0	0	0	0%	0.00	0.04	0.20	0.00	~	<u> </u>	<u> </u>
	Overtuned	0	0	0	0	0%	0.00	0.01	0.10	0.13			
	Other	0	0	0	0	0%	0.00	5.26	12.78	14.22			
	Total Crashes	28	31	26	85	100%	28.33	17.31	37.75	41.66	Х		
SEVERITY	PDO crashes	28	29	22	79	93%	26.33	8.79	24.57	27.59	Х	X	
	Fatal crashes Injury crashes	0	0	0	0	0% 7%	0.00 2.00	2.49	15.45 20.71	17.93 22.66			
LIGHT CONDITIONS	DayLight	23	27	4 19	69	81%	23.00	9.69	23.99	22.00	х		
	Dusk	0	1	0	1	1%	0.33	0.53	1.61	1.81	~	<u> </u>	<u> </u>
	Dawn	0	0	0	0	0%	0.00	0.39	1.43	1.63			
	Dark	5	2	7	14	16%	4.67	4.30	9.57	10.57	Х		
	Unknown	0	1	0	1	1%	0.33	0.61	2.23	2.54			
SURFACE CONDITIONS		24	22	19	65	76%	21.67	12.76	30.50	33.90	X		
	Wet Others	4	8	7	19	22% 1%	6.33 0.33	1.91 0.68	4.43	4.92	Х	X	X
MONTH OF A YEAR	January	2	3	2	1 7	8%	2.33	1.24	2.09 2.67	2.36 2.94	х		
MONTHOFATEAN	February	4	0	2	6	7%	2.33	1.67	4.01	4.46	- x	1	
	March	1	1	4	6	7%	2.00	1.64	4.07	4.53	x		
	April	2	3	4	9	11%	3.00	1.50	3.60	4.01	Х		
	May	3	9	2	14	16%	4.67	1.51	3.24	3.57	Х	x	X
	June	1	2	3	6	7%	2.00	1.62	3.97	4.42	Х		
	July	6	5	1	12	14%	4.00	1.67	3.82	4.24	X	X	
	August	4	1	2	7	8%	2.33	1.73	4.09	4.54	<u>X</u>		
	September	2	3	3	8 5	9% 6%	2.67 1.67	1.63 1.46	4.31 3.92	4.83 4.39	X X	L	
	October November	1	3	1	2	2%	0.67	1.40	3.92	4.39			
	December	1	0	2	3	4%	1.00	1.40	4.02	4.40			
DAY OF THE WEEK	Sunday	2	2	2	6	7%	2.00	2.67	7.18	8.04			
	Monday	6	4	4	14	16%	4.67	2.47	5.66	6.27	Х		
	Tuesday	5	4	3	12	14%	4.00	2.47	5.61	6.21	Х		
	Wednesday	5	2	5	12	14%	4.00	2.33	5.55	6.16	Х		
	Thursday	2	7	2	11	13%	3.67	2.44	5.25	5.79	X		
	Friday	6	6	8	20	24%	6.67	2.46	5.51	6.10	X	X	X
HOUR OF THE DAY	Saturday 00:00-06:00	2	6 0	2	10 0	12%	3.33 0.00	2.52	6.23 4.23	6.94 4.73	Х		
HOUR OF THE DAT	06:00-09:00	1	0	2	3	4%	1.00	1.36	3.39	3.78			
	09:00-11:00	1	2	1	4	5%	1.33	1.28	3.25	3.62	Х		
	11:00-13:00	5	4	4	13	15%	4.33	1.70	4.20	4.68	X	x	
	13:00-15:00	5	5	3	13	15%	4.33	1.88	5.42	6.09	Х		
	15:00-18:00	11	10	8	29	34%	9.67	2.99	7.98	8.94	Х	X	X
	18:00-24:00	5	10	8	23	27%	7.67	3.79	9.27	10.32	Х		
						YEAR		3-Year	1				
					1	2	3	Average					
Augrage Deile Treff 1	ADT (Vabi-I								-				
Average Daily Traffic A		••			46,696	50,756	55,170	50,874	4				
Florida Average Crash	n rate <i>(Crashes per l</i>	Million En	tering Vel	hicles)	0.757	0.757	0.757	0.757					
Traffic Base					17.044	18.526	20.137	18.569	1				
	rachec por Million -	ntoring V	abicloc)		-				-				
Actual Crash Rate (C					1.643	1.673	1.291	1.536	4				
Critical Crash Rate (C	rashes per Million E	ntering V	ehicles)		1.480	1.449	1.420	1.449					
Safety Ratio					1.110	1.155	0.909	1.058					
High Crash Location	1??				YES	YES	NO	YES					
	$Rate = \frac{A \times 1,00}{V}$ $ate = AVR + \frac{0.5}{TB} + 2$		2	V = Ave $\frac{Where:}{AVR} = A$	rage Annual Average Stat	Daily Traffi	c X 365		ype occurring			L.	
		•		<i>TF</i> = Te = 1.		95% Confi	dence Level			Confidence I 68.30 86.60	)	Constant Z 1.00 1.50	-
Traffic Base =				= 0	29 (assume	99.95% UL	onnaence Lei	el for URBA	(N areas)		)	1.64	
Traffic Base =	1,000,000	_		= 3.	29 (assume	99.95% 60	onnaence Lei	el tor URBA	in areas)	90.00 95.00	)	1.64 1.96	
Traffic Base =	1,000,000			= 0	29 (assume	99.95% 60	oniidence Lei	ei tor URBA	in areas)	95.00 95.50	)	1.96 2.00	
				= 3.	29 (assume	99.95% 00	onnaence Let	ei tor URBA	in areas)	95.00 95.50 98.80	) )	1.96 2.00 2.50	
	$= \frac{Actual Crash}{Critical Crash}$		-	= 0	29 (assume	99.93% 00	onnaence Let	ei tor UKBA	in areas)	95.00 95.50	) ) )	1.96 2.00	

# Table 39 – Crash Analysis – W 28 Avenue and W 68 Street



From this analysis, it was determined that rear end, right-turn, sideswipe and fixed object collisions presented abnormal crash patterns that exceed the 95th percentile and 90th percentile confidence level threshold limits. Also, angle and left-turn collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 40*.

		107	28 Aven	110 & W	68 Str	oot				
	(4 Lane x 4 L	ane, Signalized, W					e 29) - URE	BAN Spot		
	(	,,,								
			NUMBE	ER OF CF	ASHES	3 YEAR	%	MEAN	Possible	Counter-
				YEAR		TOTAL	of	Accidents		
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Rear Er	nd Crashes	9	19	11	39	100%	13.00	(1)	2
		Day Light	7	17	9	33	85%	11.00	(8)	5
	Lighting Conditions	Dawn	0	1	0	1	3%	0.33	(10)	8
		Dark	2	1	2	5	13%	1.67	. ,	
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	1	0	0	1	3%	0.33		
		09:00 - 11:00	1	1	1	3	8%	1.00		
	Hours of Day	11:00 - 13:00	1	2	2	5	13%	1.67		
Rear End		13:00 - 15:00	2	5	2	9	23%	3.00		
		15:00 - 18:00	2	7	4	13	33%	4.33		
		18:00 - 24:00	2	4	2	8	21%	2.67		
		North	7	7	4	18	46%	6.00		
		South	2	4	2	8	21%	2.67		
	Direction	East	0	1	4	5	13%	1.67		
		West	0	7	1	8	21%	2.67		
		Unknown	0	0	0	0	0%	0.00		
		onaionn	, ,	, v	, v	0	0,0	0.00		
			NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN		<b>.</b> .
			-	YEAR		TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Rear Er	nd Crashes	4	0	1	5	100%	1.67	(8)	9
		Day Light	2	0	1	3	60%	1.00	(9)	10
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(10)	
		Dark	2	0	0	2	40%	0.67	(17)	
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	0	1	1	20%	0.33		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Right Turn	Hours of Day	11:00 - 13:00	0	0	0	0	0%	0.00		
<b>J</b> • •		13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	2	0	0	2	40%	0.67		
		18:00 - 24:00	2	0	0	2	40% 10%	0.67		
		NB→EB EB→SB	1	0	1	1	10%	0.33		
	Direction	B→SB WB→NB	8	0	0	8	80%	2.67		
	Direction	SB→WB	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		
		onatown	v	v	v	Ű	070	0.00		
			NUMBE	R OF CF	ASHES	3 YEAR	%	MEAN	D	0
				YEAR		TOTAL	of	Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Left Tu	rn Crashes	8	7	5	20	100%	6.67	(8)	8
		Day Light	7	7	3	17	85%	5.67	. /	19
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		
		Dark	1	0	2	3	15%	1.00		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	0	1	0	1	5%	0.33		
Sideswipe	Hours of Day	11:00 - 13:00	2	1	2	5	25%	1.67		
(Overtake)		13:00 - 15:00	2	0	1	3	15%	1.00		
(Overlake)			3	2	1	6	30%	2.00		
(Overlake)	15	15:00 - 18:00								
(overlake)		18:00 - 24:00	1	3	1	5	25%	1.67		
(overlake)	<u> </u>	18:00 - 24:00 North	1 2	3 1	2	5	25%	1.67		
(overlake)		18:00 - 24:00 North South	1 2 2	3 1 2	2 0	5 4	25% 20%	1.67 1.33		
(overlake)	Direction	18:00 - 24:00 North South East	1 2 2 0	3 1 2 1	2 0 1	5 4 2	25% 20% 10%	1.67 1.33 0.67		
(overland)	Direction	18:00 - 24:00 North South	1 2 2	3 1 2	2 0	5 4	25% 20%	1.67 1.33		

# Table 40 – Abnormal Crash Details & CountermeasuresW 28 Avenue and W 68 Street



## 3.18.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 28 Avenue and W 68 Street were performed on a typical weekday on May 13, 2014. A summary of the traffic data is presented in *Figure 71*, and the field review is presented in *Figure 72*.

This intersection has double left-turn bays for the north/south approaches with protected phases. The east/west left turn movements operate on single left-turn bays with protected/permissive phases.

Pavement markings are faded. Vehicles travel at high speeds thru both corridors. Left-turn movements during the permissive phase on W 68 Street go up to the middle of the road waiting for a gap which many times occurs after the light has turned red.

Red light running was observed at the intersection as well as a failure of right turning vehicles from making a complete stop before proceeding to turn. Many driveways are present on the east side of the south leg along W 28 Avenue with one in particular at the return of the southeast corner.

Tire marks were observed over the southeast sidewalk return, evidence of crashes were present on the south leg southbound lanes as well as the northeast corner. Pedestrian push buttons need to be upgraded and ramps are missing detectable warning devices. Sidewalk connection to bus stop on the south leg of the intersection (west side) is missing.

### 3.18.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of West 28 Avenue and West 68 Street, the following is recommended:

- Provide retroflectorized back plates for all signal heads.
- Mill and resurface intersection; possible reconstruction due to rutting on south leg.
- Restripe intersection with thermoplastic markings and install additional RPMs to emphasize location and direction of lanes.
- Upgrade pedestrian pushbuttons and add detectable warning devices to all existing ramps.
- Install "Right Turn Only" sign at driveways on the intersection.
- Upgrade crosswalks to high visibility ladder type crosswalks.
- Add sidewalk connection to existing bus stop on the south leg of the intersection (west side)
- Lengthen the northbound left-turn lanes to 250 feet each.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 73.



## 3.18.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$116,522. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





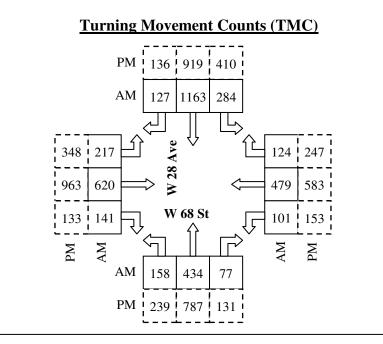


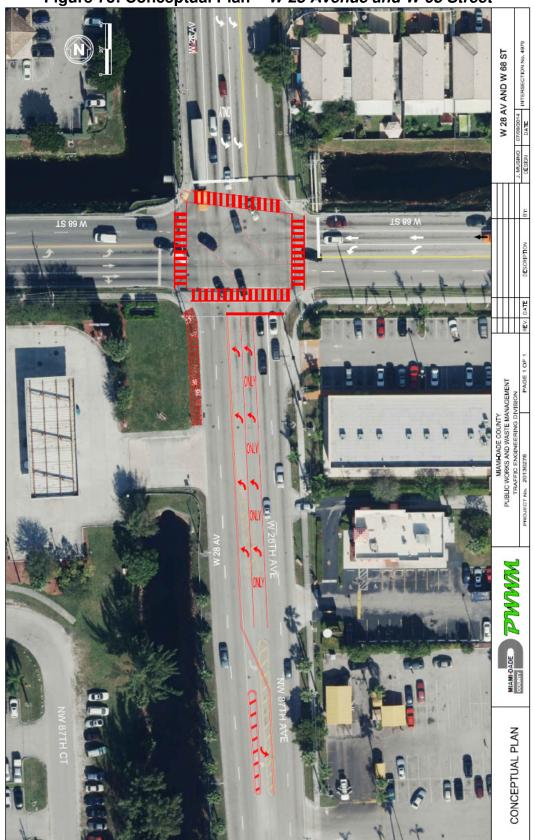
Figure 71: Traffic Data – W 28 Avenue and W 68 Street

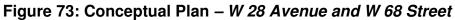




Figure 72: Field Review – W 28 Avenue and W 68 Street









## 3.19. W 16 Avenue and W 68 Street

## 3.19.1. Site Description

This intersection is a signalized four legged intersection located in the City of Hialeah in the area of Northwest Miami Dade County. W 16 Avenue is a four lane undivided urban collector that runs north-south, and W 68 Street is an east-west four lane urban arterial divided on the west leg and undivided on the east leg.

## 3.19.2. Safety Conditions and Analysis

The intersection of W 16 Avenue and W 68 Street is ranked number 19 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 79 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 26. The

crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 74*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate County for corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010

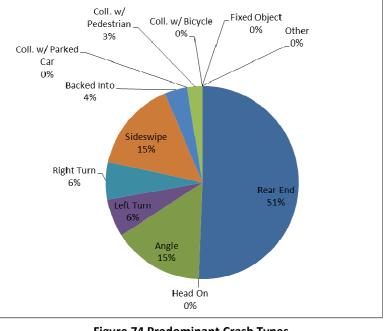


Figure 74 Predominant Crash Types W 16 AVE & W 68 ST

FDOT's "Expected Value Analysis." *Table 41* illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 1.213, 0.874, and 0.928, respectively. The safety ratio for the three years averaged 1.005. Also, results of confidence level indicated that this intersection has been a high crash location during the three years with a confidence level higher than 99.95%.



		(4   ano	x 4 Japo	Signalia			W 68 Stre		28) - URBAN	Spot			
		(4 Lane	x 4 Lane	, Signaliz	eu, with fui	n Lanes, 4	+ Ley Interset	Stion - Table	20) - UNDAIN	Spor			
	TYPE OF CRASH	NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents		ANNUAL CR	ASH VALUE 95th		ALLY HIGH 90th	CRASHES 95th
		2011	2012	2013	CRASHES	Total	per Year	MEAN	Percentile	Percentile	Mean	Percentil	
OLLISION TYPE	Rear End Head On	17 0	10 0	13 0	40 0	51% 0%	13.33 0.00	5.70 0.33	16.96 1.02	19.12 1.15	X		
	Angle	5	3	4	12	15%	4.00	3.05	7.08	7.85	x		
	Left Turn	1	1	3	5	6%	1.67	1.67	4.02	4.47			
	Right Turn	0	5	0	5	6%	1.67	0.33	1.25	1.42	X	X	Х
	Sideswipe Backed Into	6 1	4	2	12 3	15% 4%	4.00	1.60 0.17	4.64 0.56	5.22 0.63	X	x	x
	Coll. w/ Parked Car	0	0	0	0	0%	0.00	0.10	0.50	0.59	^	^	^
	Coll. w/ Pedestrian	0	0	2	2	3%	0.67	0.28	1.04	1.19	Х		
	Coll. w/ Bicycle	0	0	0	0	0%	0.00	0.09	0.33	0.38			
	Fixed Object Ran Off Road	0	0	0	0	0% 0%	0.00	0.03	0.21	0.24			
	Overtuned	0	0	0	0	0%	0.00	0.03	0.00	0.24			
	Other	0	0	0	0	0%	0.00	3.70	8.83	9.82			
	Total Crashes	30	23	26	79	100%	26.33	17.77	40.96	45.39	X		
EVERITY	PDO crashes Fatal crashes	28 0	22 0	23	73 0	92% 0%	24.33 0.00	9.93 0.05	22.30 0.26	24.67 0.29	X	X	
	Injury crashes	2	1	0	6	8%	2.00	13.14	33.08	36.90		<u> </u>	
IGHT CONDITIONS	Day Light	20	11	21	52	66%	17.33	12.40	29.18	32.39	Х		
	Dusk	2	1	0	3	4%	1.00	0.28	0.87	0.98	Х	X	х
	Dawn Dark	0	0	0	0 24	0% 30%	0.00 8.00	0.17 4.56	0.56	0.63	x		
	Unknown	0	0	0	24	0%	0.00	4.56	1.05	1.18	^		
URFACE CONDITIONS	Dry	27	19	22	68	86%	22.67	15.30	34.45	38.12	Х		
	Wet	3	4	4	11	14%	3.67	2.10	6.02	6.76	Х		
ONTH OF A YEAR	Others January	0	0	0	0 2	0% 3%	0.00	0.37 1.42	1.10 3.33	1.24 3.69			
ONTH OF A TEAR	January February	1	2	1	2 4	3% 5%	1.33	1.42	3.33	3.69		<u> </u>	
	March	2	1	2	5	6%	1.67	1.67	4.12	4.59		t i	
	April	4	1	3	8	10%	2.67	1.30	3.21	3.57	Х		
	May	2	3	2	7	9%	2.33 3.33	1.74	4.46	4.99	X		
	June July	4 5	0	6	10 8	13% 10%	2.67	1.38 1.35	3.49 3.22	3.90 3.58	X		
	August	1	6	3	10	13%	3.33	1.56	3.99	4.46	X		
	September	2	4	1	7	9%	2.33	1.46	3.73	4.16	Х		
	October	3	0	0	3	4%	1.00	1.47	3.59	4.00			
	November December	1	1	2	4	5% 14%	1.33 3.67	1.39 1.61	3.53 4.43	3.94 4.97	x		
AY OF THE WEEK	Sunday	1	2	1	4	5%	1.33	2.70	6.42	7.13	Α		
-	Monday	5	3	2	10	13%	3.33	2.49	6.18	6.88	Х		
	Tuesday	5	4	3	12	15%	4.00	2.56	5.84	6.47	Х		
	Wednesday Thursday	4	0	0	4 21	5% 27%	1.33 7.00	2.88 3.07	7.20 7.50	8.03 8.35	x		
	Friday	3	5	5	13	16%	4.33	2.61	6.40	7.13	- Â		
	Saturday	6	5	4	15	19%	5.00	1.46	3.47	3.85	Х	Х	Х
IOUR OF THE DAY	00:00-06:00	1	0	0	1	1%	0.33	1.70	3.39	3.71			
	06:00-09:00 09:00-11:00	0	3	2	5 5	6% 6%	1.67 1.67	1.98 1.72	5.12 4.23	5.72 4.71			
	11:00-13:00	4	5	1	10	13%	3.33	2.40	6.30	7.05	x		
	13:00-15:00	0	1	7	8	10%	2.67	1.95	5.32	5.96	Х		
	15:00-18:00	7	1	8	16	21%	5.33	3.58	7.81	8.62	Х		
	18:00-24:00	17	10	6	33	42%	11.00	4.42	10.63	11.82	X	X	
						YEAR		3-Year	1				
					1	2	3	Average					
verage Daily Traffic A	DT (Vehicles per D	lav)			45,468	49,422	53,720	49,537	-				
, ,		•	torice	hial`					-				
lorida Average Crash	rate (Urasnes per l	viiiion En	tering Vel	iicies)	0.757	0.757	0.757	0.757	-				
raffic Base					16.596	18.039	19.608	18.081					
Actual Crash Rate (Cr	ashes per Million E	ntering V	ehicles)		1.808	1.275	1.326	1.470	1				
Critical Crash Rate (C	rashes per Million E	Intering V	(ehicles)		1.490	1.459	1.429	1.459	1				
Safety Ratio		-			1.213	0.874	0.928	1.005	1				
High Crash Location	22				YES	NO	NO	YES	1				
ligh Clash Location					123	NO	NO	123					
Actual Crash	$Rate = \frac{A \times 1,00}{V}$	00,000		V = Ave	al number of rage Annual			rashes by t	ype occurring	in a 1 year po	əriod.		
	$Rate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$		$\frac{R}{R}$	TB = Tra TF = Te	affic Base st Factor (z-	value)				tion or roadwa	evel (%)	Constant Z	]
	$=\frac{Years \times ADT \times 3}{1,000,000}$						idence Level onfidence Le			86.60 90.00 95.00 95.50 98.80		1.50 1.50 1.64 1.96 2.00 2.50	
Safety Ratio	$= \frac{Actual Crass}{Critical Crass}$	h Rate sh Rate	_							98.80 99.00 99.70 99.95		2.50 2.58 3.00 3.29	

# Table 41 – Crash Analysis – W 16 Avenue and W 68 Street



# Table 42 – Abnormal Crash Details & CountermeasuresW 16 Avenue and W 68 Street

		w	16 Aven	ue & W	68 Stre	et				
	(4 Lane x 4 La	ane, Signalized, V	Vith Turn La	nes, 4 Le	g Interse	ction - Table	ə 28) - UR	BAN Spot		
			_	R OF CR YEAR		3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
	Tatal David		2011	2012	2013	CRASHE	Total	per Year	(2)	
	Total Rear E		17	10	13	40	100%	13.33	(8)	4
		Day Light	11	6	13	30	75%	10.00	(10)	8
	Lighting Conditions	Dawn/Dusk	0	0	0	0	0%	0.00	(16)	13
		Dark	6	4	0	10	25%	3.33		19
		00:00 - 06:00	1	0	0	1	3%	0.33		
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	1	1	2	4	10%	1.33		
Deex Fed	Hours of Day	11:00 - 13:00	1	1	0	2	5%	0.67		
Rear End		13:00 - 15:00	0	1	5	6	15%	2.00		
		15:00 - 18:00	4	0	4	8	20%	2.67		
		18:00 - 24:00	10	7	2	19	48%	6.33		
		North	8	2	3	13	33%	4.33		
		South	1	0	0	1	3%	0.33		
	Direction	East	3	6	7	16	40%	5.33		
		West	4	2	3	9	23%	3.00		
		Unknown	1	0	0	1	3%	0.33		

			NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible	Counter- measure(s)
			2011	2012	2013	CRASHE	Total	per Year	Cause(s)	measure(s)
	Total Rear Er	nd Crashes	5	3	4	12	100%	4.00	(1)	2
		Day Light	3	1	4	8	67%	2.67	(3)	4
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00	(7)	7
		Dark	2	2	0	4	33%	1.33	(12)	
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	1	2	3	25%	1.00		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Angle	Hours of Day	11:00 - 13:00	2	0	0	2	17%	0.67		
Angle		13:00 - 15:00	0	0	1	1	8%	0.33		
		15:00 - 18:00	0	1	1	2	17%	0.67		
		18:00 - 24:00	3	1	0	4	33%	1.33		
		NB + EB	0	2	1	3	25%	1.00		
		NB + WB	3	0	2	5	42%	1.67		
	Direction	SB + EB	1	1	1	3	25%	1.00		
		SB + WB	1	0	0	1	8%	0.33		
		Unknown	0	0	0	0	0%	0.00		

			NUMBE	R OF CR YEAR 2012	2013	3 YEAR TOTAL CRASHE	% of Total	MEAN Accidents per Year	Possible Cause(s)	Counter- measure(s)
	Total Left Tu	rn Crashes	6	4	2	12	100%	4.00	(9)	9
		Day Light	6	2	2	10	83%	3.33	(13)	13
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		17
		Dark	0	2	0	2	17%	0.67		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	0	1	0	1	8%	0.33		
Sideswipe	Hours of Day	11:00 - 13:00	1	1	1	3	25%	1.00		
(Overtake)		13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	3	0	1	4	33%	1.33		
		18:00 - 24:00	2	2	0	4	33%	1.33		
		North	3	1	1	5	42%	1.67		
		South	0	1	1	2	17%	0.67		
	Direction	East	3	2	0	5	42%	1.67		
		West	0	0	0	0	0%	0.00		
		Unknown	0	0	0	0	0%	0.00		

			NUMBE	R OF CR YEAR 2012	ASHES	3 YEAR TOTAL CRASHE	% of Total	MEAN Accidents per Year	Possible Cause(s)	Counter- measure(s)
	Total Right Tu	urn Crashes	0	5	0	5	100%	1.67	(1)	8
	J	Day Light	0	4	0	4	80%	1.33	(8)	13
	Lighting Conditions	Dawn	0	0	0	0	0%	0.00		19
		Dark	0	1	0	1	20%	0.33		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	2	0	2	40%	0.67		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Right Turn	Hours of Day	11:00 - 13:00	0	2	0	2	40%	0.67		
Right Full		13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	0	0	0	0	0%	0.00		
		18:00 - 24:00	0	1	0	1	20%	0.33		
		NB→EB	0	3	0	3	60%	1.00		
		EB→SB	0	0	0	0	0%	0.00		
	Direction	WB→NB	0	0	0	0	0%	0.00		
		SB→WB	0	2	0	2	40%	0.67		
		Unknown	0	0	0	0	0%	0.00		



From this analysis, it was determined that right turn and backing presented abnormal crash patterns that exceed the 95th percentile and 90th percentile confidence level threshold limits. Also, rear end, angle, sideswipe and pedestrian collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 42*.

## 3.19.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 16 Avenue & W 68 Street were performed on a typical weekday on May 20, 2014. A summary of the traffic data is presented in *Figure 75*, and the field review is presented in *Figure 76*.

This intersection has single left-turn bays for all approaches. The signal operation is protected/permissive for all approaches left-turn traffic. Left turn five-section head on east mast arm is missing the hood in one of the lenses.

Two gas stations and a strip mall are present at this intersection with many consecutive driveways that generate potential conflicts with other movements. Lot of Impatient drivers and red light running was observed at the intersection.

Pavement Markings and Pedestrian crosswalks at all four legs are faded. No pedestrian signal heads are installed at any of the corners.

## 3.19.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 16 Avenue and W 68 Street, the following is recommended:

- Refurbish pavement markings including high visibility ladder crosswalks using thermoplastic painting at all four legs.
- Install "Turning Vehicles Yield to Pedestrians" sign on all approaches.
- Install pedestrian ramp on northeast corner for north crossing (existing ramp is aligned for east crossing but a bit far for the north crossing).
- Install pedestrian signals and upgrade push buttons.
- Bus Stop on east leg is too close to the intersection and on driveway, needs to be relocated farther east.
- Install retroreflective backplates on signals.
- Straighten road alignment on the west side (see sketch).
- Add painted islands on northeast and southwest corners (see sketch).
- Add "Right Turn Only" sign to all driveways close to the intersection.

A conceptual vision of the proposed roadway improvements is exhibited in Figure 77.



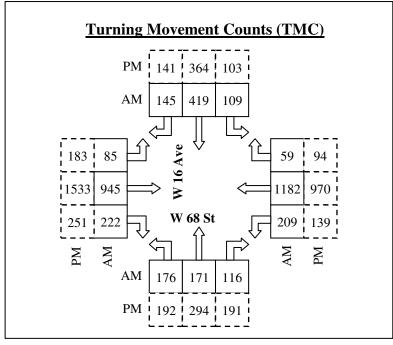
## 3.19.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$161,005. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.







## Figure 75: Traffic Data – W 16 Avenue and W 68 Street





Southeast corner: Bus stop is too close to the intersection and gas station driveway.



Southeast corner: gas station driveways are too close to the intersection.



Faded pavement markings.



Turning vehicles conflict with crossing pedestrians.



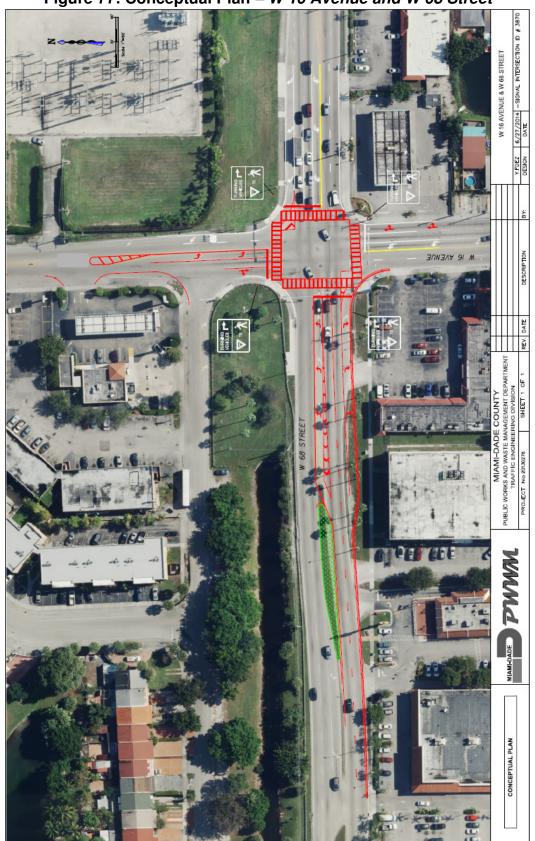
Pedestrian features need to be upgraded.

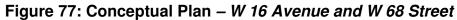


No pedestrian signal heads at all corners.

Figure 76: Field Review – W 16 Avenue and W 68 Street









## 3.20. W 20 Avenue and W 68 Street

## 3.20.1. Site Description

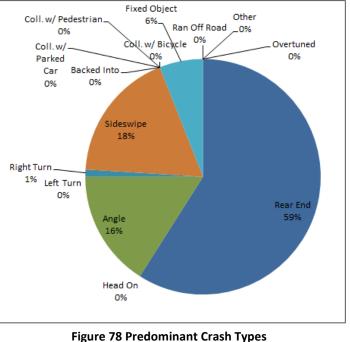
This intersection is a signalized four legged intersection located in City of Hialeah in the area of Northwest Miami Dade County. W 20 Avenue is two lane roadway that runs north-south with its north leg connected to the southbound exit ramp of Palmetto Expressway and South leg ending at the ramp to Palmetto Expressway. W 68 Street is a four lane urban collector divided by a raised median at this location that runs east-west.

## 3.20.2. Safety Conditions and Analysis

The intersection of W 20 Avenue and W 68 Street is ranked number 20 in our high crash locations list. A review of the hard copy police reports for the years 2011 through 2013 was performed. During the three-year analysis period, 74 relevant crashes occurred at the intersection. The analysis indicated that the average number of crashes per year is 25. The crash summaries, crash statistics and collision diagrams for the intersection are documented in *Appendix A*.

Based on the analysis of crash records for this intersection, the predominant types of crashes are shown in *Figure 78*.

Calculated intersection mean crash per year were compared to the average Miami-Dade Crash Rate for County corridors to assess the safety conditions at the study intersection in relation to other roadways with similar traffic and geometric characteristics. This study is based on the 2010 FDOT's "Expected Value Analysis." Table 43 illustrates the expected accident volume analysis of this intersection as well as the safety ratios and the confidence levels during the analysis period.



W 20 AVE & W 68 ST

Based on a regression growth of 8% from the 2014 entering volume, the calculated safety ratios for the years 2011, 2012, and 2013 were 0.788, 0.987, and 0.827, respectively. The safety ratio for the three years averaged 0.868.



		(61.0)	no v 4 L o	no Siano			W 68 Stre		4) - URBAN S	pot			
		(6 Lai	ne x 4 Lai	ne, Signa	uizea, with i	ium Lanes	, 1-intersecti	on - Table 34	4) - URBAN S	pol			
		NUMBE	R OF CR	ASHES	3 YEAR	%	MEAN	EXPECTED		ASH VALUE	ABNORM		
	TYPE OF CRASH	2011	YEAR 2012	2013	TOTAL CRASHES	of Total	Accidents per Year	MEAN	90th Percentile	95th Percentile	Mean	90th Percentil	95th Percenti
COLLISION TYPE	Rear End	11	16	17	44	59%	14.67	4.84	15.32	17.32	Х	reicentii	reicenu
	Head On	0	0	0	0	0%	0.00	0.18	0.53	0.59			
	Angle Left Turn	6 0	3	3	12 0	16% 0%	4.00 0.00	1.67 1.20	5.18 3.45	5.85 3.88	Х		
	Right Turn	0	1	0	1	1%	0.00	0.56	1.81	2.05			
	Sideswipe	3	6	4	13	18%	4.33	1.56	3.91	4.36	Х	х	
	Backed Into	0	0	0	0	0%	0.00	0.16	0.66	0.75			
	Coll. w/ Parked Car Coll. w/ Pedestrian	0	0	0	0	0% 0%	0.00	0.02	0.16 0.48	0.19 0.55			
	Coll. w/ Bicycle	0	0	0	0	0%	0.00	0.02	0.40	0.19			
	Fixed Object	1	2	1	4	5%	1.33	0.04	0.24	0.27	Х	Х	Х
	Ran Off Road	0	0	0	0	0%	0.00	0.00	0.00	0.00			
	Overtuned Other	0	0	0	0	0%	0.00	0.00 2.31	0.00 6.52	0.00 7.32			
	Total Crashes	21	28	25	74	100%	24.67	13.62	37.27	41.80	X		
SEVERITY	PDO crashes	20	27	23	70	95%	23.33	8.98	27.74	31.33	X		
	Fatal crashes	0	0	0	0	0%	0.00	0.04	0.33	0.38			
	Injury crashes	1	1	2	4	5%	1.33	7.20	15.92	17.59	v		
LIGHT CONDITIONS	Day Light Dusk	15	16 2	17 0	48 3	65% 4%	16.00 1.00	10.04 0.18	29.07 0.59	32.71 0.66	X	x	x
	Dawn	1	1	1	3	4%	1.00	0.18	0.72	0.83	x	x	x
	Dark	3	8	7	18	24%	6.00	3.09	7.48	8.32	Х		
	Unknown	1	1	0	2	3%	0.67	0.13	0.41	0.46	X	Х	X
SURFACE CONDITIONS	Dry Wet	17 3	25 2	24	66 6	89% 8%	22.00 2.00	10.82	30.00 7.02	33.67 7.89	X		<u> </u>
	Others	1	1	0	2	3%	0.67	0.31	0.75	0.83	х		
MONTH OF A YEAR	January	0	3	1	4	5%	1.33	1.13	2.84	3.17	Х		
	February	0	1	3	4	5%	1.33	1.11	3.56	4.03	X		
	March April	1	2	2	5	7% 7%	1.67 1.67	1.07	3.38 3.60	3.82 4.05	X X		
	May	4	2	0	6	8%	2.00	1.02	2.92	3.28	X		
	June	3	2	3	8	11%	2.67	1.11	2.75	3.07	X		
	July	4	3	0	7	9%	2.33	0.91	2.60	2.93	Х		
	August	3	4	0	7	9%	2.33	1.27	3.63	4.08	X		
	September October	0	2	4	6 5	8% 7%	2.00 1.67	1.27	3.38 3.69	3.79 4.18	X		
	November	2	5	2	9	12%	3.00	1.13	3.87	4.40	X		
	December	1	2	5	8	11%	2.67	1.24	3.68	4.15	Х		
DAY OF THE WEEK	Sunday	2	5	4	11	15%	3.67	2.27	6.77	7.63	X		
	Monday	3	2	2	7	9% 9%	2.33 2.33	2.02	6.05 5.43	6.83 6.07	X		
	Tuesday Wednesday	1	3	3	7	9% 18%	4.33	1.98	6.00	6.77	<u>x</u>		
	Thursday	2	5	1	8	11%	2.67	2.35	6.51	7.30	X		
	Friday	8	7	3	18	24%	6.00	1.71	4.69	5.26	Х	X	X
HOUR OF THE DAY	Saturday	2	2	6	10 11	14% 15%	3.33 3.67	1.18 0.78	2.98 1.93	3.33	<u>x</u> x	X X	X
OUR OF THE DAT	00:00-06:00 06:00-09:00	3	5 2	2	10	15%	3.87	1.35	3.25	2.15 3.61	X	x	<u> </u>
	09:00-11:00	2	3	0	5	7%	1.67	1.47	3.94	4.42	X	~	
	11:00-13:00	1	4	3	8	11%	2.67	1.56	4.61	5.20	Х		
	13:00-15:00	5	2	6	13	18%	4.33	1.98	6.88	7.81	X		
	15:00-18:00 18:00-24:00	3	5	3	13 14	18% 19%	4.33 4.67	3.24 3.24	10.19 7.93	11.52 8.82	X		
	10.00-24.00	5	5	U	14	1376	4.07	0.24	7.55	0.02	^		
						YEAR		3-Year	1				
					1	2	3	Average					
Average Daily Traffic A	DT (Vehicles per D	)av)			41,738	45,367	49,312	45,472					
8,	1	.,				1.1.1			4				
Iorida Average Crash	rate (Crashes per l	Willion En	tering Vel	nicles)	0.911	0.911	0.911	0.911					
raffic Base					15.234	16.559	17.999	16.597					
Actual Crash Rate (Cr	rashes per Million E	ntering V	ehicles)		1.378	1.691	1.389	1.486	1				
Critical Crash Rate (C	rashes per Million F	Interina V	ehicles)		1.748	1.713	1.679	1.713	1				
Safety Ratio	<i>p</i>	3.	/		0.788	0.987	0.827	0.868	-				
									-				
High Crash Location	11				NO	NO	NO	NO					
	$Rate = \frac{A \times 1,00}{V}$		_	V = Ave	al number of rage Annual			rashes by t	ype occurring	in a 1 year pe	eriod.		
CriticalCrashH	$Rate = AVR + \frac{0.5}{TB} + \frac{0.5}{TB}$	$TF\sqrt{\frac{AV}{TB}}$	R	TB = Tra	Average Stat affic Base st Factor (z-		h Rate for a	particular ty	pe of intersec	tion or roadwa	evel (%)	Constant Z	
Traffic Base =	$=\frac{Years \times ADT \times 3}{1,000,000}$	365		= 1.	96 (assume 29 (assume	95% Confi				68.30 86.60 90.00 95.00 95.50		1.00 1.50 1.64 1.96 2.00	
Safety Ratio	$= \frac{Actual Crass}{Critical Crass}$	h Rate sh Rate	_							98.80 99.00 99.70 99.95		2.50 2.58 3.00 3.29	

# Table 43 – Crash Analysis – W 20 Avenue and W 68 Street



# Table 44 – Abnormal Crash Details & CountermeasuresW 20 Avenue and W 68 Street

		W	20 Aven	ue & W	68 Stre	et				
	(6 Lane x 4	Lane, Signalized,	With Turn	Lanes, T	-Intersect	ion - Table 3	4) - URBA	N Spot		
			NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible	Counter-
			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	measure(s)
	Total Rear E	nd Crashes	6	3	3	12	100%	4.00	(3)	10
		Day Light	2	2	2	6	55%	2.00		11
	Lighting Conditions	Dawn/Dusk	0	0	0	0	0%	0.00		
		Dark	3	1	1	5	45%	1.67		
		00:00 - 06:00	1	0	0	1	8%	0.33		
		06:00 - 09:00	0	0	0	0	0%	0.00		
		09:00 - 11:00	1	0	0	1	8%	0.33		
Angle	Hours of Day	11:00 - 13:00	0	1	1	2	17%	0.67		
Angle		13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	2	1	0	3	25%	1.00		
		18:00 - 24:00	2	1	2	5	42%	1.67		
		NB + EB	0	0	0	0	0%	0.00		
		NB + WB	0	0	0	0	0%	0.00		
	Direction	SB + EB	1	0	1	2	18%	0.67		
		SB + WB	4	3	2	9	82%	3.00		
		Unknown	0	0	0	0	0%	0.00		

			_	R OF CF YEAR		3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
			2011	2012	2013	CRASHES	Total	per Year		
	Total Rear Er		3	6	4	13	100%	4.33	(18)	19
		Day Light	3	5	3	11	85%	3.67	(19)	21
	Lighting Conditions	Dawn/Dusk	0	0	0	0	0%	0.00		
		Dark	0	1	1	2	15%	0.67		
		00:00 - 06:00	0	0	0	0	0%	0.00		
		06:00 - 09:00	0	0	1	1	8%	0.33		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Sideswipe	Hours of Day	11:00 - 13:00	0	1	0	1	8%	0.33		
(Overtake)		13:00 - 15:00	2	2	2	6	46%	2.00		
		15:00 - 18:00	0	2	0	2	15%	0.67		
		18:00 - 24:00	1	1	1	3	23%	1.00		
		North	0	0	0	0	0%	0.00		
		South	0	1	0	1	8%	0.33		
	Direction	East	0	4	4	8	62%	2.67		
		West	3	1	0	4	31%	1.33		
	1	Unknown	0	0	0	0	0%	0.00		

			NUMBE	R OF CR YEAR	ASHES	3 YEAR TOTAL	% of	MEAN Accidents	Possible Cause(s)	Counter- measure(s)
_			2011	2012	2013	CRASHES	Total	per Year	Cause(s)	illeasure(s)
	Total Rear E	nd Crashes	1	2	1	4	100%	1.33	(17)	5
		Day Light	1	0	0	1	25%	0.33		17
	Lighting Conditions	Dawn/Dusk	0	0	0	0	0%	0.00		
		Dark	0	2	1	3	75%	1.00		
		00:00 - 06:00	0	2	0	2	50%	0.67		
		06:00 - 09:00	0	0	1	1	25%	0.33		
		09:00 - 11:00	0	0	0	0	0%	0.00		
Fixed Object	Hours of Day	11:00 - 13:00	1	0	0	1	25%	0.33		
Fixed Object		13:00 - 15:00	0	0	0	0	0%	0.00		
		15:00 - 18:00	0	0	0	0	0%	0.00		
		18:00 - 24:00	0	0	0	0	0%	0.00		
		North	0	0	0	0	0%	0.00		
		South	0	0	0	0	0%	0.00		
	Direction	East	0	2	0	2	50%	0.67		
		West	1	0	1	2	50%	0.67		
		Unknown	0	0	0	0	0%	0.00		

From this analysis, it was determined that fixed object collisions presented abnormal crash patterns that exceed the threshold limits for the 95th percentile and 90th percentile confidence level; and sideswipe type exceeded the 90th percentile level. Also, the rear end and angle collisions exceeded the mean. Those results indicate that these types of collisions were abnormally high during the period of 2011 through 2013. A detailed review of the abnormal crashes as well as probable countermeasures is presented in *Table 44*.



## 3.20.3. Traffic Operation Conditions and Analysis

In order to identify the traffic operation characteristics and safety relevant conflicts, field observations at W 20 Avenue and W 68 Street were performed on a typical weekday on May 25, 2014. A summary of the traffic data is presented in *Figure 79*, and the field review is presented in *Figure 80*.

The signal operation is synched with the Palmetto Expressway ramp signal.

Pavement markings and pedestrian crosswalk at all four legs are in good conditions.

Lot of impatient drivers and red light running was observed at the intersection.

The westbound merge storage length is extremely short, a crash was observed while performing review.

The "stop here on red" sign for eastbound traffic on the southwest corner of the intersection is not noticed by some drivers.

### 3.20.4. Recommendations

Based on the safety analysis, field observations and traffic operations for the intersection of W 20 Avenue & W 68 Street, the following is recommended:

- Improve pavement markings on the northeast corner to better delineate the westbound traffic emerging from the SR 826 S. Off-Ramp.
- Increase length of merge lane on northwest side of intersection to approximately 270 feet.
- Add R10-11 sign on the mast arm for eastbound traffic.
- Add tubular delineators on the right lane of the eastbound approach of the intersection.
- Paint the top of the noses of the concrete separators on the east side of the intersection (eastbound direction).

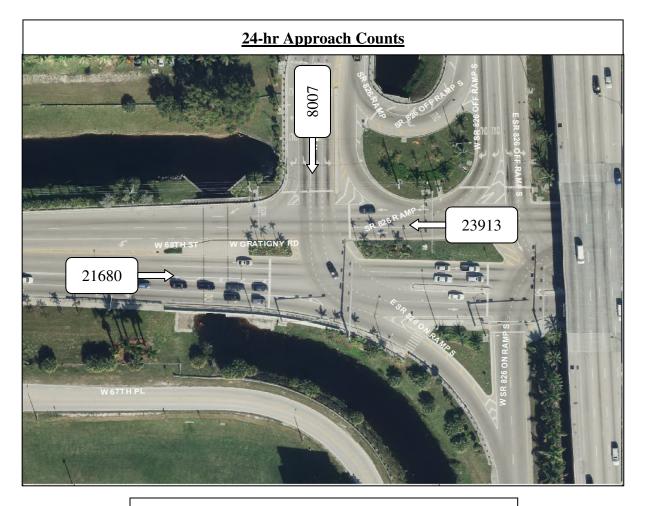
A conceptual vision of the proposed roadway improvements is exhibited in Figure 81.

### 3.20.5. Cost Estimate

Based on the recommended improvements and the Conceptual Plan, the estimated cost for this project is approximately \$116,816. The details of the preliminary project costs are presented in *Appendix D*.

Construction costs were obtained from items cost on the latest pay item Average Unit Cost Report for the Area 13 (Miami-Dade County), and the Miami-Dade Traffic Signal Division price list.





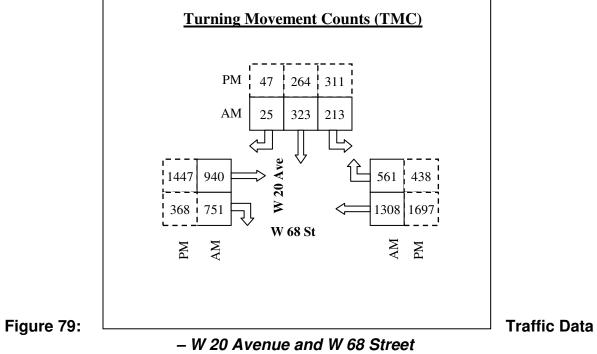






Figure 80: Field Review – W 20 Avenue and W 68 Street



