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EXCEPTIONAL SOLUTIONS
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Westward Drive Arterial Qualitative Assessment Report

Westward drive

Prepared for:



JANUARY 2011



PROFESSIONAL ENGINEER CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Calvin, Giordano & Associates, a corporation authorized to operate as an engineering business, EB 00006500, by the State of Florida Department of Professional Regulation, Board of Professional Engineers, and that I have prepared or approved the evaluation, findings, opinions, conclusions, or technical advice hereby for:

PROJECT: Westward Drive Arterial Qualitative Assessment Report

LOCATION: City of Miami Springs, Florida

CLIENT: City of Miami Springs, Florida

I acknowledge that the procedures and references used to develop the results contained in these computations are standard to the professional practice of transportation engineering as applied through professional judgment and experience.

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EXECUTIVE SUMMARY

Calvin Giordano & Associates, Incorporated (CGA) at the request of the City of Miami Springs was commissioned to conduct an Arterial Qualitative Assessment analysis in the business district of Westward Drive between the Curtiss Parkway Circle and the Miami-Dade Public Library, which is located at Flamingo Circle. This Qualitative Assessment report documents the findings of field review, crash data review, traffic data collection, access management review and level of service analysis.

Based on field observations during the AM and PM peak period, vehicular traffic appears to traverse the corridor without any sources of significant delay. Progression of traffic in the eastbound and westbound direction along the corridor was found to be good between the closely spaced intersections. Although Westward Drive is not a state roadway and does not have a designated access classification, the Westward Drive corridor most closely resembles an FDOT Access Class 7 roadway. This is the least restrictive of the Department's access management classifications, allowing minimum driveway connections spaced at 125 feet, directional median openings at 330 feet, full median openings at 660 feet, and signal spacing at 1,320 feet. Signal spacing complies with current access standards; however all of the full median openings located at each side street are spaced well below 660 feet. In addition, although not measured driveway connections appear to be spaced closer than 125 feet in many locations.

Occasionally slight delays were observed for east/west left-turn movements at the un-signalized intersections, due to opposing traffic. At times, vehicles maneuvering in/out of on-street parking cause slight delays along the corridor. It appeared that most vehicles were within a few miles per hour of the posted speed limit of 25 miles per hour, although spot speed data was not collected.

Side street delays and queuing were also found to be minimal for the most part. However, vehicles approaching Westward Drive from side streets between Cross Street and Morningside Drive attempting to complete left-turns and thru movements were forced were frequently observed to pull beyond the stop bar and into the crosswalk to gain a better view of opposing traffic, due to sight distance obstructions with on-street parked vehicles along Westward Drive. Consideration should be given to modifying intersection geometry or restricting these movements to “Right-Turn Only”. Removal of on-street parking does not appear to be a feasible consideration in these locations.

The United States Postal Service (USPS) “Drop Box” located in front of the Miami Springs Branch Public Library on the northeast corner of the Westward Drive/Flamingo Circle intersection located on a substandard driveway parallel to Westward Drive created conflicts with traffic traveling westbound on Westward Drive. In addition, although there was little to no pedestrian activity observed towards the western portion of the study area, pedestrians are forced to cross over the canal located between Esplanade Drive and Flamingo Circle without a pedestrian crosswalk.

From a crash history standpoint of the study arterial, a total of 64 crashes were documented within the referenced three-year period for the study limits. The numbers of crashes by year are: 2007 (26 crashes), 2008 (17 crashes) and 2009 (21 crashes), with 27 crashes (42% of the 64 total crashes) documented as angle crashes. The Park Drive (16 crashes – 25%), Cross Street 12 crashes – 19%) and Curtis Parkway Circle (14 crashes – 22%) segment yielded the highest percentage of crashes for the combined 3-year referenced period. However, consistent with conflicts observed during the field review which occurred due to the substandard configuration of the USPS driveway to the “Drop Box”, Flamingo Circle (14 crashes – 22%) also yielded a high percentage of crashes (11 angle crashes (79%) out of the 14 total crashes). Lastly, there were thirteen “Hit Parked Car” crashes along the study corridor. Each of the “Hit Parked Car” crashes occurred between the area just west of Morningside Drive and Curtis Parkway

Circle. These crashes occurred at the locations where most of the business activity appeared highest.

Classifying the crashes based on severity, it was found that there were 2 (3%) injury-type, 62 (97%) property damage only and no fatal crashes. Among contributing causes documented in the crash data, careless driving (8 crashes - 13%), failure to yield the right-of-way (27 crashes - 42%), improper lane change (8 crashes - 13%), improper backing (7 crashes - 11%) and disregard traffic signal (1 crashes - 1%) were among the highest.

The level of service analysis performed along the corridor shows that all of the roadway segments and intersections within the study area currently operate at acceptable levels of service during a typical weekday AM and PM peak period. In fact, the roadway geometry could be reduced from a 4-lane divided roadway to a 2-lane divided roadway and still be at an acceptable level of service.

A review of the parking inventory of all available on-street parking and off-street lot parking within one (1) block of Westward Drive within the study area was performed during typical weekday peak periods. This review revealed that there are approximately 567 spaces available along the Westward Drive corridor within the study limits. However, only 260 spaces (46% of the total 567 spaces) are available for general public use. The remaining 307 spaces (54% of the total 567 spaces) are designated private parking for commercial, residential and municipal uses. During the typical weekday peak hour observations, the parking supply appeared to exceed the demand.

Of the 260 spaces available for public use, 68 spaces (26% of the 260 public spaces) are available in public parking lots and 192 spaces (74% of the 260 public spaces) are available in public on-street parking.

Several recommendations are suggested to address concerns found along the Westward Drive corridor within the study area, as follows:

- A. Perform a comprehensive arterial analysis study to perform the following task, as follows:
- i. Reconfigure the substandard driveway parallel to Westward Drive at the Flamingo Circle intersection for the United States Postal Service (USPS) “Drop Box” located in front of the Miami Springs Branch Public Library.
 - ii. Redesign the bridge over the canal located between Esplanade Drive and Flamingo Circle to accommodate a pedestrian crosswalk in the east/west direction.
 - iii. Perform individual intersection safety analysis at each of the side street locations to address sight distance obstructions and make safety recommendations. This task would include a historical crash analysis with collision diagrams.
 - iv. Redesign the landscaped center island pedestrian pathways to create connectivity to the designated crosswalks at the intersections.
 - v. Prepare an access management plan to address full median openings located at each side streets. These median openings are currently spaced well below minimum FDOT access management standard guidelines of 660 feet for Access Class 7.
 - vi. Perform a parking accumulation study during weekdays and weekends to address parking concerns.
 - vii. Prepare a 2-lane divided typical cross-section to incorporate a more pedestrian friendly environment along Westward Drive. This typical section is not intended to decrease on-street parking, but may include bulb-outs at intersections to shorten pedestrian crossing distances, improved intersection sight distance at side streets, bike lanes and wider sidewalks.

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1.0 INTRODUCTION

Calvin Giordano & Associates, Incorporated (CGA) at the request of the City of Miami Springs was commissioned to conduct an Arterial Qualitative Assessment analysis in the business district of Westward Drive between the Curtiss Parkway Circle and the Miami-Dade Public Library, which is located at Flamingo Circle. The study corridor is a two-way east/west roadway. CGA has prepared this Qualitative Assessment report to document the findings of field review, crash data review, traffic data collection, access management review and level of service analysis. **Figure 1-1** depicts the general limits of the project study limits.

2.0 EXISTING CONDITIONS

The study limits are on Westward Drive between the Curtiss Parkway Circle and Flamingo Circle. Traffic operational and roadway elements which may impact the operations and safety within the study limits have been recorded within this Qualitative Assessment.

2.1 General Description

Westward Drive between the Curtiss Parkway Circle and Flamingo Circle, functions as a two-way, four-lane divided roadway which runs in the east/west direction within the study limits. Westward Drive forms a T-intersection at the Curtis Parkway Circle intersection, where the Curtis Parkway Circle is one-way in the southbound direction.

Although not measured, travel lanes on Westward Drive appear to be approximately 10 feet wide along the corridor. There is on-street parallel parking on the north and south sides of Westward Drive through a majority of the study corridor. Although not measured, the parking lanes appear to be approximately 8 to 9 feet wide.

The Westward Drive corridor is lined commercial land uses with residences, both single-family units and multi-family complexes on the surrounding streets. Many private commercial parking lots supplement the previously mentioned on-street parking supply.

Westward Drive between Curtis Parkway Circle and Flamingo Circle

N.T.S.



2.2 Traffic Control

The posted speed limit along Westward Drive is 25 miles per hour throughout the project study limits. There is one (1) signalized intersection within the study limits at the Westward Drive and Park Street intersection. Based on information obtained from Miami-Dade County Traffic Signals and Signs Division, this signal operates in semi-actuated mode. This signal at Park Street is a mast arm type signal, with horizontal-mounted signal heads. No backplates were found on any of the signal heads. Pedestrian signals and push buttons were found on each corner of the signalized intersection to cross Westward Drive.

Stop-controlled intersections exist within this segment at the Curtis Parkway Circle, Cross Street, Morningside Drive, Esplanade Drive and Flamingo Circle. For all of these side streets locations, side street approaches north/south direction are stop-controlled.

2.3 Pavement Condition

From field review, the pavement condition along Westward Drive can be qualitatively described as ranging from good to fair in most locations within the study limits. There were no notable signs of asphalt cracking, spalling or potholes present along Westward Drive within the study limits.

Pavement conditions on most of the side streets can be qualitatively described as ranging from fair to poor. Some side street approaches showed signs of asphalt cracking and/or spalling.

2.4 Signage and Pavement Markings

Signage along the Westward Drive corridor in the study area was generally found to be in functional condition.

In general, pavement markings are functional through the corridor, although in some locations they are faded. Crosswalks exist on all legs at the Cross Street and Park Street, however only east/west crosswalks along Westward Drive at Morningside Drive,

Esplanade Drive and Flamingo Circle. Pavement markings on some of the side streets appear to be faded and worn, particularly.

2.5 Sidewalk

There is sidewalk along both sides of Westward Drive, with the exception of the canal crossing between Esplanade Drive and Flamingo Circle. Pedestrian curb ramps are present at all crosswalk locations for the signalized and un-signalized intersections. In a few locations, benches, utility poles and newspaper stands are present within the sidewalk, which reduce the effective width of the sidewalk in those areas. Although measurements to check compliance with the Americans with Disability Act (ADA) standards were not performed as part of this study, the pedestrian ramps appear to be functional. Sidewalk condition is generally in fair to good condition.

In addition, brick paved pedestrian pathways with pedestrian enhancement features exists in the center median between Morningside Drive and Esplanade Drive, Morningside Drive and Park Street, Park Street and Cross Street, and Cross Street and the Circle. These pathways are shielded by shrubs and wooden fencing, however these pedestrian pathways lack connectivity to designated crosswalks at the intersections, encourage uncontrolled mid-block crossing and pose safety concerns.

2.6 Other Roadway Features

Street lighting exists on both sides of Westward Drive along the entire corridor. Poles are generally located in a staggered configuration. Various types of light poles and fixtures are found along the corridor. Roadside signs are located within the sidewalk on both sides of the street.

2.7 Access Management Conditions

Although Westward Drive is not a state roadway and does not have a designated access classification, the Westward Drive corridor most closely resembles an FDOT Access Class 7 roadway. This is the least restrictive of the Department's access management classifications,

allowing minimum driveway connections spaced at 125 feet, directional median openings at 330 feet, full median openings at 660 feet, and signal spacing at 1,320 feet.

Signal spacing complies with current access standards; however all of the full median openings located at each side street are spaced well below 660 feet. In addition, although not measured driveway connections appear to be spaced closer than 125 feet in many locations.

2.8 Traffic Count Data

Twenty-four (24) hour machine approach counts were collected at two (2) locations during typical weekday traffic conditions, as listed:

- Westward Drive between Curtiss Parkway Circle and Cross Street
- Westward Drive between Esplanade Drive and Morningside Drive

Four (4) hour manual turning movement counts were also collected on a typical weekday during the AM (7AM – 9AM) and PM (4PM – 6PM) peak periods. Turning movement counts were collected on all the approaches each intersection within the study corridor, as listed:

- Westward Drive at Curtis Parkway Circle
- Westward Drive at Cross Street
- Westward Drive at Park Street
- Westward Drive at Morningside Drive
- Westward Drive at Esplanade Drive
- Westward Drive at Flamingo Circle

Summaries of the balanced, seasonally adjusted approach counts and turning movement counts with the application of peak season conversion factor (pscf) of 1.07 are shown in **Figures 3-1 and 3-2**, respectively. The seasonal factor was taken from data published by Florida Department of Transportation (FDOT) for Miami-Dade North.

3.0 *LEVEL OF SERVICE ANALYSIS*

Analysis of existing traffic conditions was performed for typical weekday AM and PM peak hour conditions on the roadway (arterial and highway) segments within the study area. The Florida Department of Transportation (FDOT) Generalized Level of Service (LOS) Tables were used to identify the vehicular capacity on the roadway segments. Intersection levels of service were determined for a typical weekday peak hour conditions using Synchro (version 7.0) based on the procedures of the 2000 Highway Capacity Manual. The levels of service thresholds used for the analysis are based on the “Generalized Level of Service” tables for Urbanized Areas within the FDOT Level of Service Handbook for the LOS threshold “D”.

Level of Service (LOS) is a quality measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, and comfort and convenience.

Six (6) LOS are defined for each type of facility that have analysis procedures available. Letters designate each level, from A to F, with LOS A representing the best operating conditions and LOS F the worst. Each level of service represents a range of operating conditions and the driver’s perception of those conditions. Safety is not included in the measures that establish service levels.

3.1 **Roadway Segment Level of Service**

The adjusted typical weekday peak hour turning movement counts were used to estimate the typical weekday peak hour link volumes within the study area. Raw traffic data was balanced and adjusted using peak seasonal conversion factors and axle factors. Both factors were obtained from the most recent FDOT Traffic Information DVD. The resulting link and intersection data are summarized on **Figures 3-1 and 3-2**.

The link maximum service volumes used in this study are derived from the 2009 FDOT Level of Service Handbook. **Table 3-1** includes facility type, number of travel lanes, existing

typical weekday peak hour volumes, peak hour maximum service volumes, the adopted level of service standard and peak hour level of service.

The analysis shows that all of the roadway segments within the study area currently operate at acceptable levels of service during a typical weekday AM and PM peak period.

3.2 Intersection Level of Service

The collected AM and PM peak period turning movement counts were converted to average turning movement volumes by applying a peak season conversion factor (PSCF) of 1.07. The peak season conversion factors were obtained from the most recent FDOT Traffic Information DVD. These volumes are also summarized on **Figures 3-1 and 3-2**.

The analysis shows that all intersections within the study area currently operate at acceptable levels of service. The existing intersection levels of service analysis worksheets are summarized on **Figures 3-1 and 3-2** and included in **Appendix D**.

Figure 3-1 – Existing Typical Weekday AM Peak Hour Vehicle Trip Summary

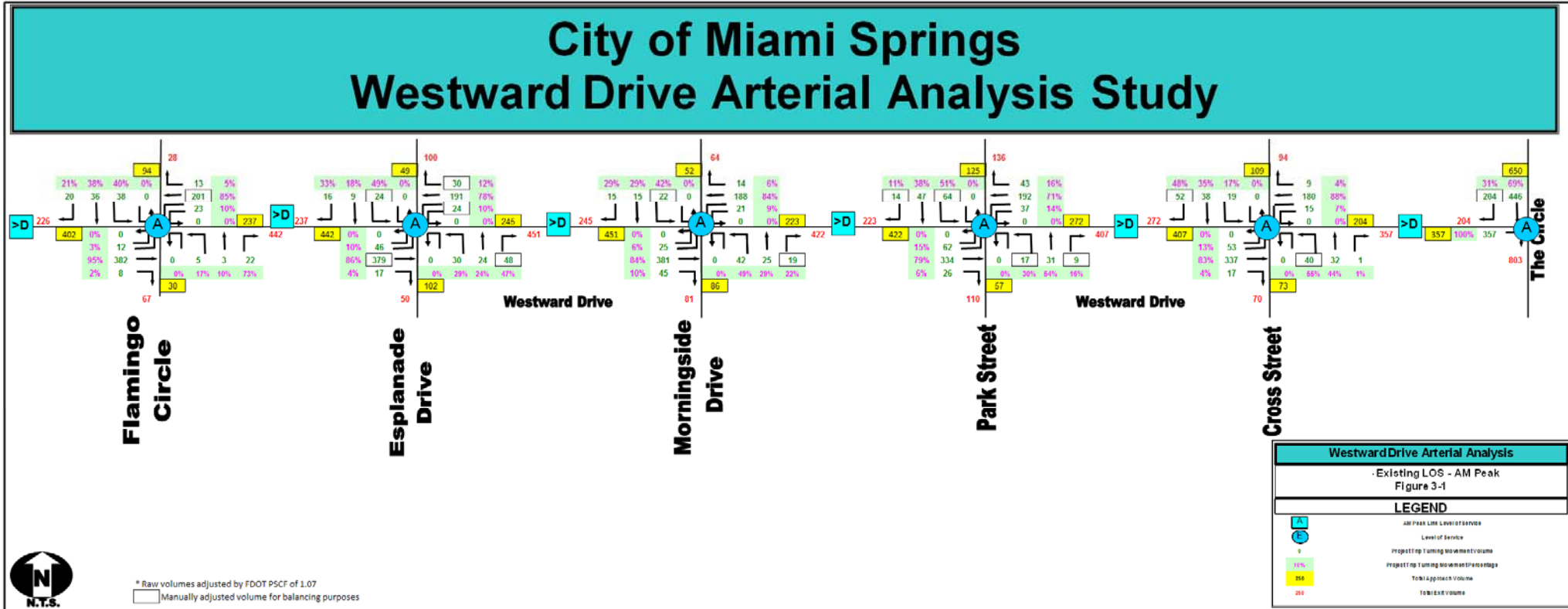


Figure 3-2 – Existing Typical Weekday PM Peak Hour Vehicle Trip Summary

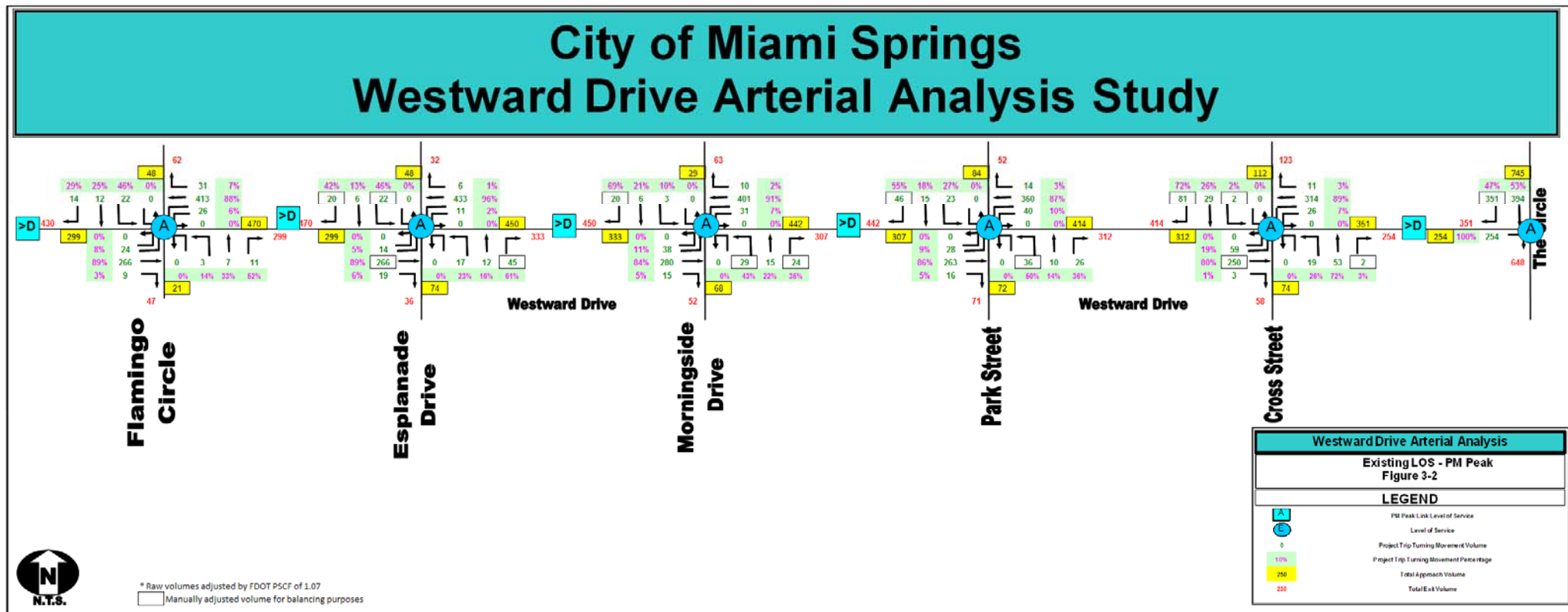


Table 3-1 – Existing Conditions Segment Analysis – Typical Weekday AM/PM Peak

Peak Hour Volume Level Of Service Analysis						
LOCATION	Roadway Type*	Existing AM Peak Hour (PH) Volume	Existing PM Peak Hour (PH) Volume	PH LOS "D" Capacity*	Existing AM Peak Hour LOS	Existing PM Peak Hour LOS
Westward Drive - W. of Flamingo Circle	4LD	628	729	3,204	D or better	D or better
Westward Drive - from Flamingo Circle to Esplanade Drive	4LD	679	769	3,204	D or better	D or better
Westward Drive - from Esplanade Drive to Morningside Drive	4LD	696	783	3,204	D or better	D or better
Westward Drive - from Morningside Drive to Park Street	4LD	645	749	3,204	D or better	D or better
Westward Drive - from Park Street to Cross Street	4LD	679	726	3,204	D or better	D or better
Westward Drive - from Cross Street to The Circle	4LD	561	605	3,204	D or better	D or better

* - Determined Roadway Capacity from FDOT 2009 Generalized LOS Tables

4.0 *FIELD REVIEW*

The following section documents observations made regarding traffic operations and safety within the study limits during field visits conducted by a qualified traffic engineer during the AM (7 AM to 9 AM) and PM (4 PM to 6 PM) peak periods on a typical weekday. Photographs pertinent to field conditions and traffic operations are included in **Appendix A**.

4.1 **General Observations (AM and PM Peak Periods)**

Progression of traffic in the eastbound and westbound direction along the corridor was found to be good. Occasional slight delays were observed for east/west left-turn movements at the un-signalized intersections, due to opposing traffic. At times, vehicles maneuvering in/out of on-street parking cause slight delays along the corridor. Frequently vehicles approach Westward Drive from side streets between Cross Street and Morningside Drive attempting to complete left-turns and thru movements were forced to pull beyond the stop bar and into the crosswalk, due to sight distance obstructions with on-street parked vehicles along Westward Drive.

There is one (1) metro bus route within the study limits along Westward Drive with multiple stop locations. During both the AM and PM peak periods, delays were occasionally observed at the bus stops. There was moderate pedestrian activity observed crossing Westward Drive outside of the designated crosswalks near the bus stops locations.

The Curtis Parkway Circle (Un-signalized)

This intersection forms a T-intersection at the easternmost point of the project study limits. The Curtis Parkway Circle is one-way in the southbound direction with three (3) lanes at the intersection. Very few pedestrians were observed crossing this intersection.

At times, eastbound right turns conflict with southbound thru vehicles due to the intersection geometry and the closely spaced driveway to Curtis Parkway on the Curtis Parkway Circle, south of the Westward Drive intersection.

Eastbound queues of approximately 3 to 4 vehicles per lane were occasionally observed to build up during both the AM and PM peak periods.

Cross Street (Un-signalized)

Cross Street is a 2-lane stop-controlled undivided roadway on both the north and south legs of the intersection. On street parking exist on the east side of the roadway on the north leg and on the west side of the roadway on the south leg. There was light pedestrian activity observed at this intersection.

At times, 1 or 2 vehicles were observed queued on the north and south legs of the intersection, however at most times very little traffic was observed during the AM and PM peak periods.

Park Street (Signalized)

Park Street is 2-lane undivided roadway on both the north and south legs of the intersection. On street parking exist on both sides of the roadway on both the north and south legs of the intersection. The City of Miami Springs City Hall/Police Department exists on the northwest corner of the intersection. Miami Springs Elementary School exists approximately two (2) blocks north of the intersection.

There was light traffic on the northbound and southbound approaches with minimal (1 to 2 vehicles) queue observed during most of the day, with the exception of school dismissal time (approximately 3 PM) where northbound queues on the north leg of the intersection entering the school nearly extended back 400 feet to the Westward Drive at Park Street intersection. Traffic in the eastbound and westbound directions was moderate, with average queues observed of 3 to vehicles per lane with very few left turn movements. No cycle failures were observed during the AM or PM peak periods.

Morningside Drive (Un-signalized)

Morningside Drive is a 2-lane stop-controlled undivided roadway on both the north and south legs of the intersection. On street parking exist on both sides of the roadway on both the north and south legs of the intersection. The First Presbyterian Church exists on the northwest corner of the intersection. There was light pedestrian activity observed at this intersection.

During the PM peak hours, many vehicles were observed at the church to pick up preschool children. These vehicles were not present more than a few minutes each and did not create any delays along Westward Drive. At times, 1 or 2 vehicles were observed queued on the north and south legs of the intersection, however at most times very little traffic was observed during the AM and PM peak periods.

Esplanade Drive (Un-signalized)

Esplanade Drive is a 2-lane stop-controlled undivided roadway on both the north and south legs of the intersection. Esplanade Drive runs parallel to a canal which exists on the west side of the roadway. There is no on street parking on the north or south leg of the intersection. However, illegal parking was observed in the grass swale on the east side of the roadway on both the north and south legs of the intersection. The Miami Springs Baptist Church exists on the southeast corner of the intersection. There was little to no pedestrian activity observed at this intersection, but that which was observed in the east/west direction was forced to cross without a pedestrian crosswalk over the canal, west of this intersection.

At times, 1 or 2 vehicles were observed queued on the north and south legs of the intersection, however at most times very little traffic was observed during the AM and PM peak periods.

Flamingo Circle (Un-signalized)

Flamingo Circle is a 2-lane stop-controlled undivided roadway on both the north and south legs of the intersection. Flamingo Circle runs parallel to a canal which exists on the east side of the roadway. On street parking exists on the east side of the roadway on the north leg of the intersection. The Miami Springs Branch Public Library exists on the northeast corner of the intersection. In addition, there is a United States Postal Service (USPS) "Drop Box" located on a driveway located off the library driveway, but parallel to Westward Drive. Conflicts with traffic traveling westbound on Westward Drive were frequently observed at this USPS driveway, due to the substandard configuration. There was little to no pedestrian activity observed at this intersection, but that which was observed in the east/west direction was forced to cross without a pedestrian crosswalk over the canal, east of this intersection.

At times, 1 or 2 vehicles were observed queued on the north and south legs of the intersection, however at most times very little traffic was observed during the AM and PM peak periods.

5.0 CRASH REVIEW

This report reviews and summarizes crash data provided by the Department for the three-year period from January 2007 to December 2009. Crash summary tables for the study intersection are included in **Appendix B**. A review of crash data summaries provided insight into the historical crash patterns for the subject study corridor.

A total of 64 crashes were documented within the referenced three-year period for the study limits. The numbers of crashes by year are: 2007 (26 crashes), 2008 (17 crashes) and 2009 (21 crashes).

Among the 64 crashes, the crash types were:

- 27 angle crashes (42%)
- 13 crashes with parked vehicles (20%)

- 7 sideswipe crashes (11%)
- 6 fixed object crashes (9%)
- 5 backed into crashes (8%)
- 2 left turn crashes (3%)
- 2 right turn crashes (3%)
- 1 pedestrian crashes (1%)
- 1 bicycle crashes (1%)

Also, among the 64 documented crashes, there were:

- 13 night time crashes (20%)
- 5 wet pavement crashes (8%)

Classifying the crashes based on severity, it was found that there were 2 (3%) injury-type, 62 (97%) property damage only and no fatal crashes. Among contributing causes documented in the crash data, careless driving (8 crashes - 13%), failure to yield the right-of-way (27 crashes - 42%), improper lane change (8 crashes - 13%), improper backing (7 crashes - 11%) and disregard traffic signal (1 crashes - 1%) were among the highest. Table 5-1, shown below provides a 3-year crash summary by hour, day of week and month.

Table 5-1 – Crash Summary Table by Hour, Day of Week, and Month
Combined 3-Year Period (2007, 2008 and 2009)

Hour of Day		
00:00-06:00	1	1.6%
06:00-09:00	8	12.5%
09:00-11:00	7	10.9%
11:00-13:00	6	9.4%
13:00-15:00	12	18.8%
15:00-18:00	19	29.7%
18:00-24:00	11	17.2%
Total No.	64	100.0%

Day of Week		
Sunday	4	6.3%
Monday	14	21.9%
Tuesday	10	15.6%
Wednesday	7	10.9%
Thursday	11	17.2%
Friday	9	14.1%
Saturday	9	14.1%
Total No.	64	100.0%

Month of Year		
January	4	6.3%
February	11	17.2%
March	6	9.4%
April	4	6.3%
May	7	10.9%
June	8	12.5%
July	5	7.8%
August	2	3.1%
September	4	6.3%
October	4	6.3%
November	3	4.7%
December	6	9.4%
Total No.	64	100.0%

The values shown within Table 5-2 were used to compute the confidence level for the study segment for the years of 2007, 2008 and 2009. The average statewide crash rate for the years of 2005 through 2009 was used in computing the confidence level for each year. The statewide average crash rate between the years of 2005 and 2009 for an urban 4-lane divided raised roadway was used in computing the confidence level for this study segment.

Table 5-2 – Segment Confidence Level Summary Table

Year	Number of Crashes	AADT *	Actual Crash Rate ACR (per million vehicles)	Statewide Average Crash Rate A (crashes per million vehicles)	M	K	Confidence Level C
2007	26	7006	21.204	2.499	1.226	13.387	99.99%
2008	17	7076	13.727	2.499	1.238	8.187	99.99%
2009	21	7450	16.789	2.499	1.251	10.393	99.99%

Actual Crash Rate = No. of crashes in a year / [(No. of vehicles (AADT) * 365 * length in miles) / 1,000,000]

AADT – Average Annual Daily Traffic

K – Level of statistical significance = $[(ACR - A + (1/2M)) / (A/M)^{0.5}]$

M – Average vehicle exposure for one year at location (mvm) = $[(AADT * 365 * length in miles) / 1,000,000]$

C - Confidence Level = Percent probability that the crash rate is abnormally high for the location under study, using the statewide average as a basis.

* Used 2005-2009 Average Crash Rate provided by FDOT - URBAN 4-5LN 2WY DIVD RASD

** Calculated using a 1% growth rate per year

The intersections yield the highest percentage of crashes for the combined 3-year referenced period:

- Park Drive (16 crashes – 25%)
- Flamingo Circle (14 crashes – 22%)
- Curtis Parkway Circle (14 crashes – 22%)
- Cross Street (12 crashes – 19%)

Table 5-3 provides the combined 3-year crash summary by each intersection along the study segment. 42 crashes (66% of the total crashes) were attributed to the segment between Curtis Parkway Circle and Park Street.

Table 5-3 – Crash Type and Total Crashes by Intersection

Westward Drive at	Type of Crash														Total Crashes
	Rear End	Angle	Left Turn	Side Swipe	Ped	Fixed Obj.	Bike	Backed	Parked	Rt. Turn	Others	Fatality	Night	Wet	
Albatross Street	0	2	0	1	0	0	0	1	0	0	0	0	0	0	4
Flamingo Circle	0	11	1	1	0	1	0	0	0	0	0	0	3	2	14
Esplanade Drive	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Morningside Drive	0	1	0	0	0	0	0	0	2	0	0	0	2	0	3
Park Street	0	1	1	1	1	5	0	1	6	0	0	0	4	1	16
Cross Street	0	5	0	1	0	0	0	3	3	0	0	0	3	2	12
Curtis Parkway Circle	0	6	0	3	0	0	1	0	2	2	0	0	1	0	14
Total	0	27	2	7	1	6	1	5	13	2	0	0	13	5	64

There were thirteen “Hit Parked Car” crashes along the study corridor. Each of the “Hit Parked Car” crashes occurred between the area just west of Morningside Drive and Curtis Parkway Circle. These crashes occurred at the locations where most of the business activity appeared highest.

There were also twenty-seven “Angle” crashes along the study corridor. Eleven of the twenty-seven “Angle” crashes occurred near Flamingo Circle. These crashes are consistent with conflicts observed during the field review which occurred due to the substandard configuration of the USPS driveway to the “Drop Box”.

6.0 PARKING REVIEW

The following section documents a review of the parking inventory count of all available on-street parking and off-street lot parking within one (1) block of Westward Drive within the study area.

6.1 On-Street Parking

Along Westward Drive on-street parking exists on both the north and south side of the roadway between the Curtis Parkway Circle and Esplanade Drive. There is also on-street parking located along each of the side streets with the exception of Esplanade Drive, as described:

- Cross Street: On street parking exist on the east side of the roadway on the north leg and on the west side of the roadway on the south leg.
- Park Street: On street parking exist on both sides of the roadway on both the north and south legs of the intersection.
- Morningside Drive: On street parking exist on both sides of the roadway on both the north and south legs of the intersection.

- Esplanade Drive: There is no on street parking on the north or south leg of the intersection.
- Flamingo Circle: On street parking exists on the east side of the roadway on the north leg of the intersection.

6.2 Public Parking Lots

There are three public parking lots located along Westward Drive within the study area. These public parking lots are located in the following locations:

- North of Westward Drive, between Cross Street and Park Street
- South of Westward Drive, between Cross Street and Park Street
- South of Westward Drive, between Park Street and Morningside Drive

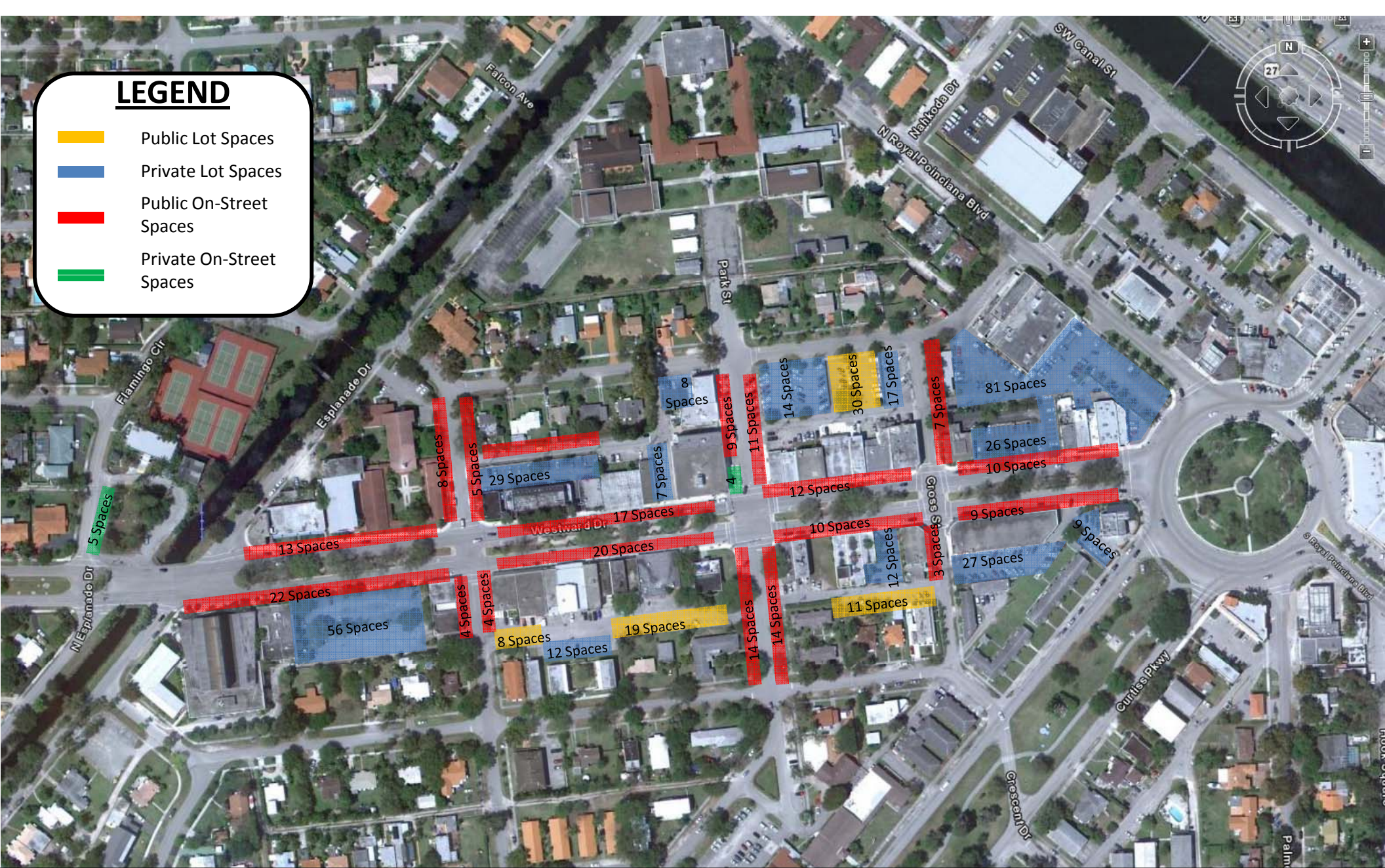
6.3 Private Parking Lots

There are many private parking lots located along Westward Drive within the study area. In general, these parking spaces service private businesses along the corridor and are signed private with “Tow-Away” warnings. Therefore, these spaces are not considered available for public use and will not be considered in the overall inventory count. In addition, illegally parked vehicles in non-designated spaces will not be considered in the overall inventory count.

A summary of all available on-street parking and off-street lot parking within one (1) block of Westward Drive is shown on **Figure 6-1**.

As shown, there are approximately 567 spaces available along the Westward Drive corridor within the study limits. However, only 260 spaces (46% of the total 567 spaces) are available for general public use. The remaining 307 spaces (54% of the total 567 spaces) are designated private parking for commercial, residential and municipal uses.

Of the 260 spaces available for public use, 68 spaces (26% of the 260 public spaces) are available in public parking lots and 192 spaces (74% of the 260 public spaces) are available in public on-street parking.



* Note: On-Street parking spaces are approximate, based on 20 feet per car length.

City of Miami Springs Arterial Qualitative Assessment
 Parking Inventory

Figure
 6-1

7.0 *PRELIMINARY RECOMMENDATIONS*

From findings of field review, crash data review, traffic data collection, access management review and level of service analysis, the following main highlights have been found.

Based on field observations during the AM and PM peak period, vehicular traffic appears to traverse the corridor without any sources of significant delay. Progression of traffic in the eastbound and westbound direction along the corridor was found to be good between the closely spaced intersections. Although Westward Drive is not a state roadway and does not have a designated access classification, the Westward Drive corridor most closely resembles an FDOT Access Class 7 roadway. This is the least restrictive of the Department's access management classifications, allowing minimum driveway connections spaced at 125 feet, directional median openings at 330 feet, full median openings at 660 feet, and signal spacing at 1,320 feet. Signal spacing complies with current access standards; however all of the full median openings located at each side street are spaced well below 660 feet. In addition, although not measured driveway connections appear to be spaced closer than 125 feet in many locations.

Occasionally slight delays were observed for east/west left-turn movements at the unsignalized intersections, due to opposing traffic. At times, vehicles maneuvering in/out of on-street parking cause slight delays along the corridor. It appeared that most vehicles were within a few miles per hour of the posted speed limit of 25 miles per hour, although spot speed data was not collected.

Side street delays and queuing were also found to be minimal for the most part. However, vehicles approaching Westward Drive from side streets between Cross Street and Morningside Drive attempting to complete left-turns and thru movements were forced were frequently observed to pull beyond the stop bar and into the crosswalk to gain a better view of opposing traffic, due to sight distance obstructions with on-street parked vehicles along Westward Drive. Consideration should be given to modifying intersection geometry or restricting these movements to "Right-Turn Only". Removal of on-street parking does not appear to be a feasible consideration in these locations.

The United States Postal Service (USPS) “Drop Box” located in front of the Miami Springs Branch Public Library on the northeast corner of the Westward Drive/Flamingo Circle intersection located on a substandard driveway parallel to Westward Drive created conflicts with traffic traveling westbound on Westward Drive. In addition, although there was little to no pedestrian activity observed towards the western portion of the study area, pedestrians are forced to cross over the canal located between Esplanade Drive and Flamingo Circle without a pedestrian crosswalk.

From a crash history standpoint of the study arterial, a total of 64 crashes were documented within the referenced three-year period for the study limits. The numbers of crashes by year are: 2007 (26 crashes), 2008 (17 crashes) and 2009 (21 crashes), with 27 crashes (42% of the 64 total crashes) documented as angle crashes. The Park Drive (16 crashes – 25%), Cross Street 12 crashes – 19%) and Curtis Parkway Circle (14 crashes – 22%) segment yielded the highest percentage of crashes for the combined 3-year referenced period. However, consistent with conflicts observed during the field review which occurred due to the substandard configuration of the USPS driveway to the “Drop Box”, Flamingo Circle (14 crashes – 22%) also yielded a high percentage of crashes (11 angle crashes (79%) out of the 14 total crashes). Lastly, there were thirteen “Hit Parked Car” crashes along the study corridor. Each of the “Hit Parked Car” crashes occurred between the area just west of Morningside Drive and Curtis Parkway Circle. These crashes occurred at the locations where most of the business activity appeared highest.

Classifying the crashes based on severity, it was found that there were 2 (3%) injury-type, 62 (97%) property damage only and no fatal crashes. Among contributing causes documented in the crash data, careless driving (8 crashes - 13%), failure to yield the right-of-way (27 crashes - 42%), improper lane change (8 crashes – 13%), improper backing (7 crashes – 11%) and disregard traffic signal (1 crashes – 1%) were among the highest.

The level of service analysis performed along the corridor shows that all of the roadway segments and intersections within the study area currently operate at acceptable levels of service during a typical weekday AM and PM peak period. In fact, the roadway geometry could be reduced from a 4-lane divided roadway to a 2-lane divided roadway and still be at an acceptable level of service.

A review of the parking inventory of all available on-street parking and off-street lot parking within one (1) block of Westward Drive within the study area was performed during typical weekday peak periods. This review revealed that there are approximately 567 spaces available along the Westward Drive corridor within the study limits. However, only 260 spaces (46% of the total 567 spaces) are available for general public use. The remaining 307 spaces (54% of the total 567 spaces) are designated private parking for commercial, residential and municipal uses. During the typical weekday peak hour observations, the parking supply appeared to exceed the demand.

Of the 260 spaces available for public use, 68 spaces (26% of the 260 public spaces) are available in public parking lots and 192 spaces (74% of the 260 public spaces) are available in public on-street parking.

Several recommendations are suggested to address concerns found along the Westward Drive corridor within the study area, as follows:

- A. Perform a comprehensive arterial analysis study to perform the following task, as follows:
 - i. Reconfigure the substandard driveway parallel to Westward Drive at the Flamingo Circle intersection for the United States Postal Service (USPS) "Drop Box" located in front of the Miami Springs Branch Public Library.
 - ii. Redesign the bridge over the canal located between Esplanade Drive and Flamingo Circle to accommodate a pedestrian crosswalk in the east/west direction.
 - iii. Perform individual intersection safety analysis at each of the side street locations to address sight distance obstructions and make safety recommendations. This task would include a historical crash analysis with collision diagrams.
 - iv. Redesign the landscaped center island pedestrian pathways to create connectivity to the designated crosswalks at the intersections.
 - v. Prepare an access management plan to address full median openings located at each side streets. These median openings are currently spaced well below minimum FDOT access management standard guidelines of 660 feet for Access Class 7.
 - vi. Perform a parking accumulation study during weekdays and weekends to address parking concerns.

- vii. Prepare a 2-lane divided typical cross-section to incorporate a more pedestrian friendly environment along Westward Drive. This typical section is not intended to decrease on-street parking, but may include bulb-outs at intersections to shorten pedestrian crossing distances, improved intersection sight distance at side streets, bike lanes and wider sidewalks.



Appendix A: Project Photographs



PHOTO 1



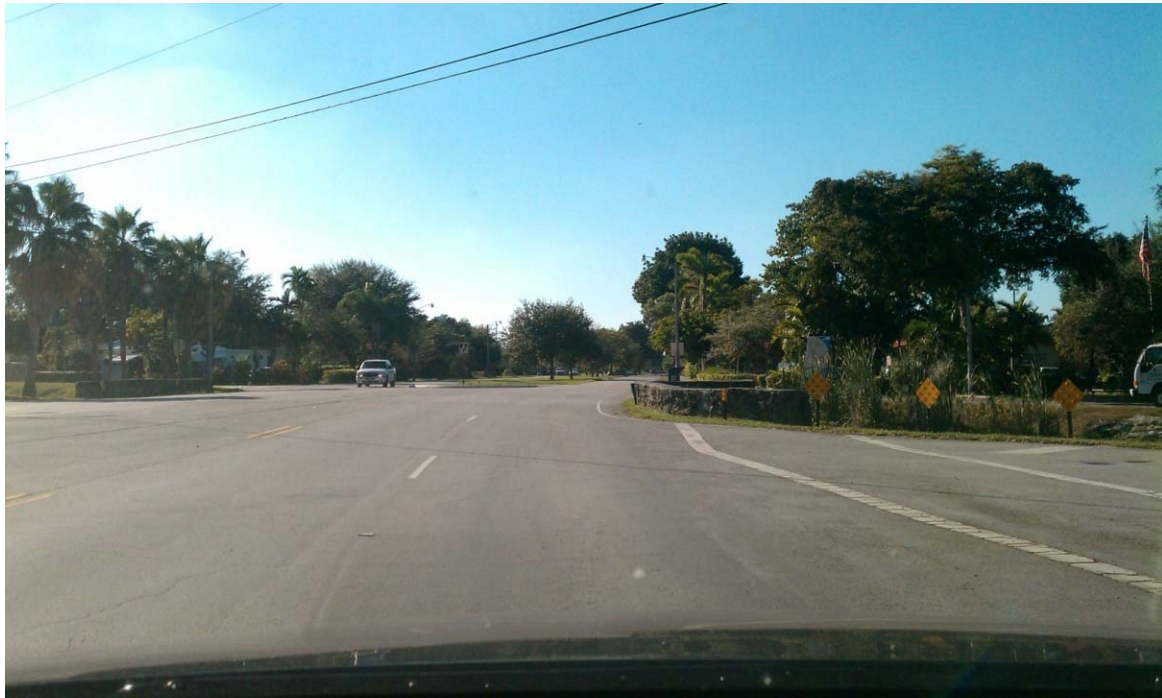
Northbound at Cross Street – Notice that vehicles obstruct view of opposing traffic.

PHOTO 2



Westbound on Westward Drive at Park Street – Notice vehicle parked blocking crosswalk.

PHOTO 3



Westbound on Westward Drive at Esplanade Drive – Crosswalk lacks connectivity to sidewalk across the canal on north side of roadway.

PHOTO 4



Eastbound on Westward Drive at Flamingo Circle – Crosswalk lacks connectivity to sidewalk across the canal on south side of roadway.

PHOTO 5



Eastbound on Westward Drive, just east of Park Street – Notice the pedestrian pathway in the center median that lacks connectivity to crosswalks at the intersection.

PHOTO 6



Eastbound on Westward Drive, just west of Curtis Parkway Circle.

PHOTO 7



Northbound on Park Street at Westward Drive – Notice queue nearly extends to Westward Drive at school dismissal.

PHOTO 8



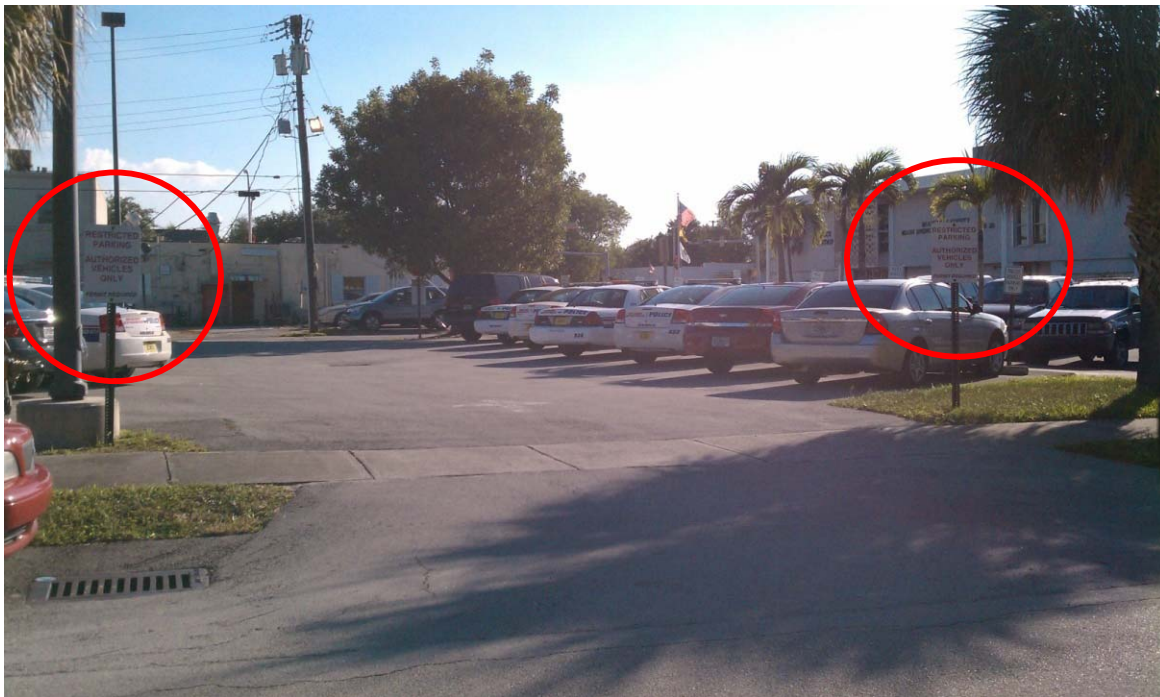
Northbound on Esplanade Drive at Westward Drive – Notice eastbound bicycle forced to enter roadway to cross canal.

PHOTO 9



View of Public Parking lot on the north side of Westward Drive, between Park Street and Cross Street

PHOTO 10



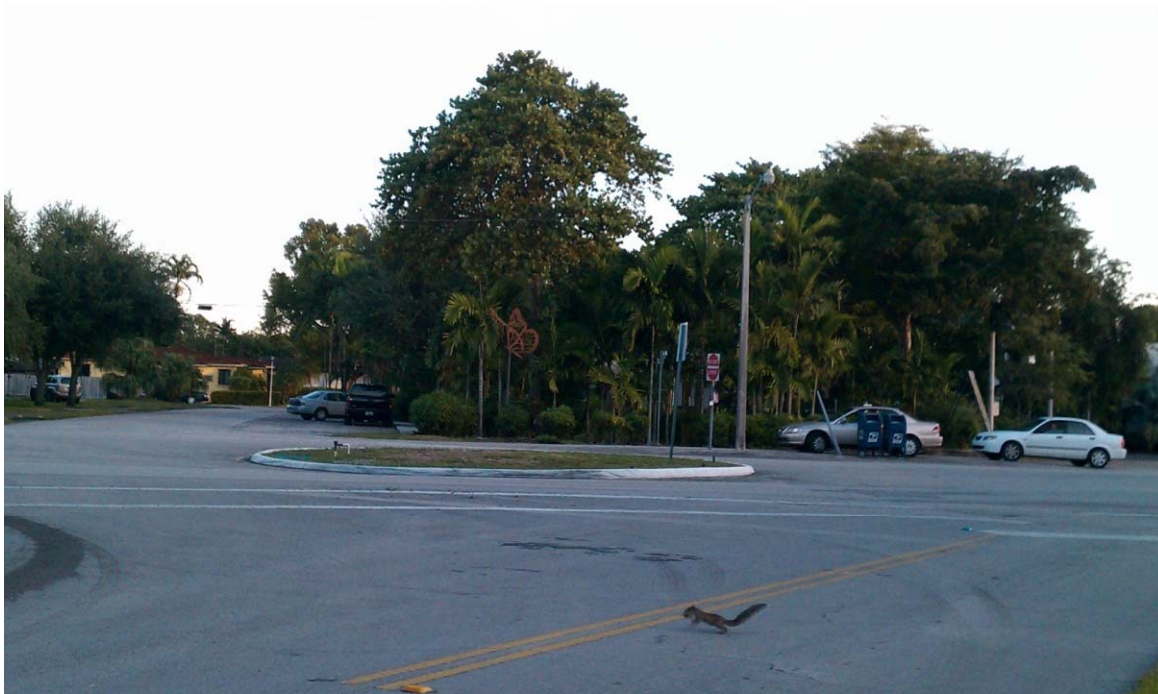
View of Public Parking lot on the north side of Westward Drive, between Park Street and Cross Street – Notice parking restrictions.

PHOTO 11



Westbound on Westward Drive, just east of Flamingo Circle – Notice substandard driveway that services USPS Drop Box.

PHOTO 12



Northbound on Flamingo Circle at Westward Drive – Notice vehicles queued at substandard driveway that services USPS Drop Box.



Appendix B: Crash Summaries



Appendix B

FLORIDA DEPARTMENT OF TRANSPORTATION ACCIDENT SUMMARY

SECTION: <u>0</u>					STATE ROUTE: <u>N/A</u>						
INTERSECTING ROUTE: <u>Westward Drive from Curtis Parkway Circle to Flami</u>					M.P. <u>0</u>		TO <u>0.46</u>		ENGINEER: <u>CGA</u>		
STUDY PERIOD: FROM <u>1/ 2007</u>					TO <u>12/ 2007</u>		COUNTY: <u>Miami-Dade</u>				

No.	MILEPOST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	P. D. ONLY	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE 1 / 2
1	0.090	1/18/2007	Thu	0800	Sideswipe	0	0	1	Day	Dry	Improper Lane Change / NID
2	0.000	1/29/2007	Mon	0900	Backed into	0	0	1	Day	Dry	Improper Backing / NID
3	0.330	2/2/2007	Fri	1700	Hit parked car	0	0	1	Night	Dry	Failed to Maintain Equipment / NID
4	0.460	2/8/2007	Thu	1500	Angle	0	0	1	Day	Dry	FTY R/W / NID
5	0.220	2/20/2007	Tue	2100	Hit parked car	0	0	1	Night	Dry	Driver Distraction / NID
6	0.090	2/21/2007	Wed	0800	Angle	0	0	1	Day	Dry	NID / FTY R/W
7	0.090	2/24/2007	Sat	2000	Angle	0	0	1	Night	Dry	FTY R/W / NID
8	0.090	3/3/2007	Sat	1300	Angle	0	0	1	Day	Dry	FTY R/W / NID
9	0.460	3/29/2007	Thu	1500	Angle	0	0	1	Day	Dry	FTY R/W / NID
10	0.460	3/29/2007	Thu	1700	Angle	0	0	1	Day	Dry	All Others / N/A
11	0.090	4/13/2007	Fri	0800	Angle	0	0	1	Day	Dry	FTY R/W / NID
12	0.090	4/28/2007	Sat	1300	Angle	0	0	1	Day	Dry	FTY R/W / NID
13	0.390	5/4/2007	Fri	1700	Angle	0	0	1	Day	Dry	NID / FTY R/W
14	0.460	5/21/2007	Mon	1000	Sideswipe	0	0	1	Day	Dry	Improper Lane Change / NID
15	0.000	5/24/2007	Thu	1500	Sideswipe	0	0	1	Day	Dry	Improper Lane Change / NID
16	0.390	6/2/2007	Sat	1000	Angle	0	0	1	Day	Wet	FTY R/W / NID
17	0.460	6/5/2007	Tue	1600	Angle	0	0	1	Day	Dry	FTY R/W / NID
18	0.220	8/18/2007	Sat	1300	Angle	0	0	1	Day	Dry	FTY R/W / NID
19	0.320	9/1/2007	Sat	1400	FO above road	0	0	1	Day	Dry	Improper Backing / NA
20	0.450	9/29/2007	Sat	1000	Hit parked car	0	0	1	Day	Dry	All Others / NID
21	0.460	10/11/2007	Thu	0900	Sideswipe	0	0	1	Day	Dry	Improper Lane Change / NID
22	0.230	10/22/2007	Mon	1900	Hit parked car	0	0	1	Night	Dry	Careless Driving / NID
23	0.310	11/16/2007	Fri	1600	Hit parked car	0	0	1	Day	Dry	Careless Driving / NID
24	0.390	12/13/2007	Thu	1400	Angle	0	0	1	Day	Dry	FTY R/W / NID
25	0.320	12/17/2007	Mon	1400	Hit parked car	0	0	1	Day	Dry	Improper Turn / NID
26	0.460	12/19/2007	Wed	1600	Angle	0	0	1	Day	Dry	FTY R/W / NID
											/
TOTAL NO.	FATAL	INJURY	P.D. ONLY	ANGLE	LEFT TURN	RIGHT TURN	REAR END	SIDE SWIPE	PED/BIKE	Legend NID - No Improper Driving FTY R/W - Failed to Yield Right-of-Way ADT - Average Daily Traffic P.D. - Property Damage Traf - Traffic NA - Not Applicable Unk - Unknown	
26	0	0	26	14	0	0	0	4	0		
	0.00%	0.00%	100.00%	53.85%	0.00%	0.00%	0.00%	15.38%	0.00%		
ONE VEHICLE	DAY	NIGHT	WET/ SLIPPERY	DRY	Improper Backing	DISREGARD TRAFFIC SIGNAL	FTY R/W	Improper Lane Change	CARELESS DRIVING		
1	22	4	1	25	2	0	13	4	2		
3.85%	84.62%	15.38%	3.85%	96.15%	7.69%	0.00%	50.00%	15.38%	7.69%		

TOTAL VEH ENTERING / ADT :	7,303	CRASH RATE:	21.204 Per Million Veh. Miles	CONFIDENCE LEVEL: 99.99%
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Hour of Day		
00:00-06:00	0	0.0%
06:00-09:00	3	11.5%
09:00-11:00	5	19.2%
11:00-13:00	0	0.0%
13:00-15:00	6	23.1%
15:00-18:00	9	34.6%
18:00-24:00	3	11.5%
Total No.	26	100.0%

Day of Week		
Sunday	0	0.0%
Monday	4	15.4%
Tuesday	2	7.7%
Wednesday	2	7.7%
Thursday	7	26.9%
Friday	4	15.4%
Saturday	7	26.9%
Total No.	26	100.0%

Month of Year		
January	2	7.7%
February	5	19.2%
March	3	11.5%
April	2	7.7%
May	3	11.5%
June	2	7.7%
July	0	0.0%
August	1	3.9%
September	2	7.7%
October	2	7.7%
November	1	3.9%
December	3	11.5%
Total No.	26	100.0%

**FLORIDA DEPARTMENT OF TRANSPORTATION
ACCIDENT SUMMARY**

SECTION: <u>0</u>						STATE ROUTE: <u>N/A</u>					
INTERSECTING ROUTE: <u>Westward Drive from Curtis Parkway Circle to Flami</u>						M.P. <u>0</u>		TO <u>0.46</u>		ENGINEER: <u>CGA</u>	
STUDY PERIOD: FROM <u>1/ 2008</u>						TO <u>12/ 2008</u>		COUNTY: <u>Miami-Dade</u>			
No.	MILEPOST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	P. D. ONLY	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE 1 / 2
1	0.320	2/15/2008	Fri	2000	Other FO	0	0	1	Night	Dry	All Others / NA
2	0.390	2/19/2008	Tue	1800	Hit parked car	0	0	1	Night	Dry	NID / FTY R/W
3	0.390	3/25/2008	Tue	1000	Hit parked car	0	0	1	Night	Dry	NID / FTY R/W
4	0.090	4/18/2008	Fri	0800	Angle	0	0	1	Day	Dry	FTY R/W / NID
5	0.460	5/14/2008	Wed	0700	Bike in lane	0	1	0	Day	Dry	FTY R/W / NID
6	0.320	5/15/2008	Thu	1100	Angle	0	0	1	Day	Dry	FTY R/W / NID
7	0.000	5/28/2008	Wed	1500	Angle	0	0	1	Day	Dry	FTY R/W / NID
8	0.320	6/2/2008	Mon	1500	Pedestrian	0	0	1	Day	Wet	FTY R/W / NID
9	0.320	6/16/2008	Mon	0700	Hit parked car	0	0	1	Day	Dry	Improper Backing / NID
10	0.460	7/8/2008	Tue	1300	Hit parked car	0	0	1	Day	Dry	FTY R/W / NID
11	0.090	7/15/2008	Tue	1200	FO above road	0	0	1	Day	Wet	Careless Driving / NA
12	0.460	7/16/2008	Wed	1000	Right Turn	0	0	1	Day	Dry	Improper Turn / NID
13	0.320	8/5/2008	Tue	2000	Other FO	0	0	1	Night	Dry	NID / NA
14	0.320	9/16/2008	Tue	1300	Sideswipe	0	0	1	Day	Dry	Careless Driving / NID
15	0.320	10/21/2008	Tue	0800	Hit parked car	0	0	1	Day	Dry	Careless Driving / NID
16	0.090	11/9/2008	Sun	2000	Angle	0	0	1	Night	Dry	Careless Driving / NID
17	0.320	12/4/2008	Thu	1100	Backed into	0	0	1	Day	Dry	All Others / NA
/											
TOTAL NO.		FATAL	INJURY	P.D. ONLY	ANGLE	LEFT TURN	RIGHT TURN	REAR END	SIDE SWIPE	PED/BIKE	Legend NID - No Improper Driving FTY R/W - Failed to Yield Right-of-Way ADT - Average Daily Traffic P.D. - Property Damage Traf - Traffic NA - Not Applicable Unk - Unknown
17		0	1	16	4	0	1	0	1	2	
		0.00%	5.88%	94.12%	23.53%	0.00%	5.88%	0.00%	5.88%	11.76%	
ONE VEHICLE		DAY	NIGHT	WET/SLIPPERY	DRY	Improper Backing	DISREGARD TRAFFIC SIGNAL	FTY R/W	Improper Lane Change	CARELESS DRIVING	
4		12	5	2	15	1	0	8	0	4	
23.53%		70.59%	29.41%	11.76%	88.24%	5.88%	0.00%	47.06%	0.00%	23.53%	
TOTAL VEH ENTERING / ADT : 7,376						CRASH RATE: 13.727 Per Million Veh. Miles			CONFIDENCE LEVEL: 99.99%		

Hour of Day		
00:00-06:00	0	0.0%
06:00-09:00	4	23.5%
09:00-11:00	2	11.8%
11:00-13:00	3	17.7%
13:00-15:00	2	11.8%
15:00-18:00	2	11.8%
18:00-24:00	4	23.5%
Total No.	17	100.0%

Day of Week		
Sunday	1	5.9%
Monday	2	11.8%
Tuesday	7	41.2%
Wednesday	3	17.7%
Thursday	2	11.8%
Friday	2	11.8%
Saturday	0	0.0%
Total No.	17	100.0%

Month of Year		
January	0	0.0%
February	2	11.8%
March	1	5.9%
April	1	5.9%
May	3	17.7%
June	2	11.8%
July	3	17.7%
August	1	5.9%
September	1	5.9%
October	1	5.9%
November	1	5.9%
December	1	5.9%
Total No.	17	100.0%

**FLORIDA DEPARTMENT OF TRANSPORTATION
ACCIDENT SUMMARY**

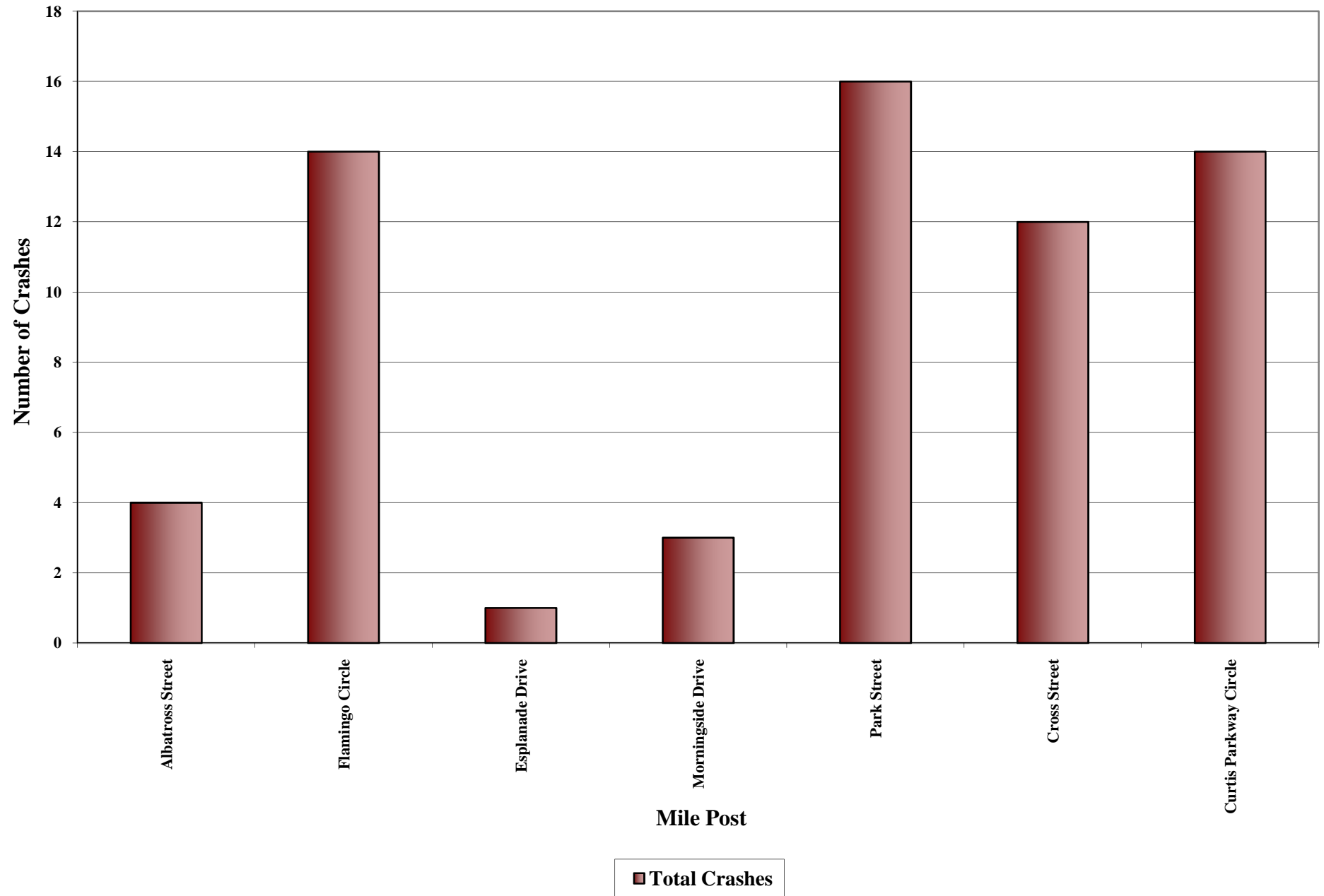
SECTION: <u>0</u> STATE ROUTE: <u>N/A</u>											
INTERSECTING ROUTE: <u>Westward Drive from Curtis Parkway Circle to Flami</u> M.P. <u>0</u> TO <u>0.46</u> ENGINEER: <u>CGA</u>											
STUDY PERIOD: FROM <u>1/ 2009</u> TO <u>12/ 2009</u> COUNTY: <u>Miami-Dade</u>											
No.	MILEPOST	DATE	DAY	TIME	CRASH TYPE	FATAL	INJURY	P. D. ONLY	DAY / NIGHT	WET / DRY	CONTRIBUTING CAUSE 1 / 2
1	0.390	1/5/2009	Mon	1200	Backed into	0	0	1	Day	Dry	Improper Backing / NID
2	0.390	1/5/2009	Mon	1800	Angle	0	0	1	Night	Dry	FTY R/W / NID
3	0.090	2/16/2009	Mon	1300	Angle	0	0	1	Day	Dry	FTY R/W / NID
4	0.460	2/16/2009	Mon	1300	Right Turn	0	0	1	Day	Dry	Improper Lane Change / NID
5	0.090	2/24/2009	Tue	1700	Angle	0	0	1	Night	Dry	All Others / N/A
6	0.130	2/27/2009	Fri	1300	Angle	0	0	1	Day	Dry	FTY R/W / NID
7	0.090	3/7/2009	Sat	1700	Angle	0	0	1	Day	Dry	FTY R/W / NID
8	0.090	3/16/2009	Mon	0700	Left Turn	0	0	1	Day	Dry	FTY R/W / NID
9	0.320	4/12/2009	Sun	0200	Hit parked car	0	0	1	Night	Dry	Improper Backing / NID
10	0.390	5/29/2009	Fri	1500	Sideswipe	0	0	1	Day	Wet	Improper Lane Change / NID
11	0.460	6/14/2009	Sun	2200	Sideswipe	0	0	1	Night	Dry	Improper Lane Change / NID
12	0.390	6/20/2009	Sat	1600	Backed into	0	0	1	Day	Dry	NID / Improper Backing
13	0.390	6/22/2009	Mon	1400	Backed into	0	0	1	Day	Dry	Improper Backing / NID
14	0.390	6/25/2009	Thu	1600	Hit parked car	0	0	1	Day	Dry	All Others / NID
15	0.300	7/2/2009	Thu	2000	FO above road	0	0	1	Day	Dry	Careless Driving / NA
16	0.000	7/8/2009	Wed	1800	Angle	0	0	1	Day	Dry	FTY R/W / NID
17	0.090	9/4/2009	Fri	1500	Angle	0	0	1	Day	Wet	Disregarded Stop Sign / NID
18	0.320	10/19/2009	Mon	1100	Left Turn	0	0	1	Day	Dry	Disregard Traf Signal / NID
19	0.300	11/2/2009	Mon	1600	FO above road	0	0	1	Day	Dry	Careless Driving / NA
20	0.390	12/2/2009	Wed	1600	Angle	0	1	0	Day	Dry	Disregarded Stop Sign / NID
21	0.460	12/27/2009	Sun	1200	Angle	0	0	1	Day	Dry	Improper Lane Change / NID
											/
											/
TOTAL NO.	FATAL	INJURY	P.D. ONLY	ANGLE	LEFT TURN	RIGHT TURN	REAR END	SIDE SWIPE	PED/BIKE	Legend	
21	0	1	20	9	2	1	0	2	0	NID - No Improper Driving FTY R/W - Failed to Yield Right-of-Way ADT - Average Daily Traffic P.D. - Property Damage Traf - Traffic NA - Not Applicable Unk - Unknown	
	0.00%	4.76%	95.24%	42.86%	9.52%	4.76%	0.00%	9.52%	0.00%		
ONE VEHICLE	DAY	NIGHT	WET/SLIPPERY	DRY	Improper Backing	DISREGARD TRAFFIC SIGNAL	FTY R/W	Improper Lane Change	CARELESS DRIVING		
2	17	4	2	19	4	1	6	4	2		
	9.52%	80.95%	19.05%	9.52%	90.48%	19.05%	4.76%	28.57%	19.05%	9.52%	
TOTAL VEH ENTERING / ADT : 7,450 CRASH RATE: 16.789 Per Million Veh. Miles CONFIDENCE LEVEL: 99.99%											

Hour of Day		
00:00-06:00	1	4.8%
06:00-09:00	1	4.8%
09:00-11:00	0	0.0%
11:00-13:00	3	14.3%
13:00-15:00	4	19.1%
15:00-18:00	8	38.1%
18:00-24:00	4	19.1%
Total No.	21	100.0%

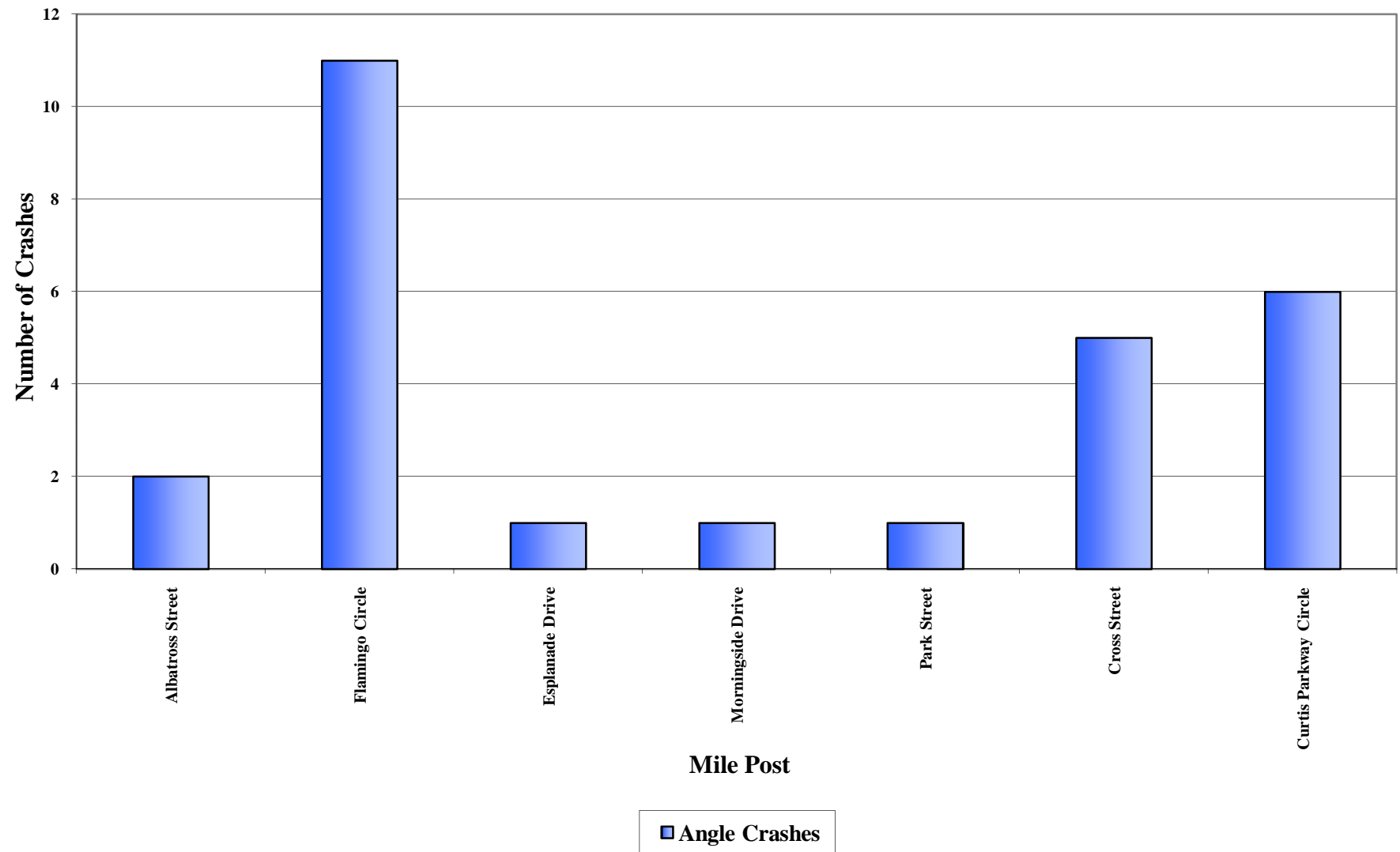
Day of Week		
Sunday	3	14.3%
Monday	8	38.1%
Tuesday	1	4.8%
Wednesday	2	9.5%
Thursday	2	9.5%
Friday	3	14.3%
Saturday	2	9.5%
Total No.	21	100.0%

Month of Year		
January	2	9.5%
February	4	19.1%
March	2	9.5%
April	1	4.8%
May	1	4.8%
June	4	19.1%
July	2	9.5%
August	0	0.0%
September	1	4.8%
October	1	4.8%
November	1	4.8%
December	2	9.5%
Total No.	21	100.0%

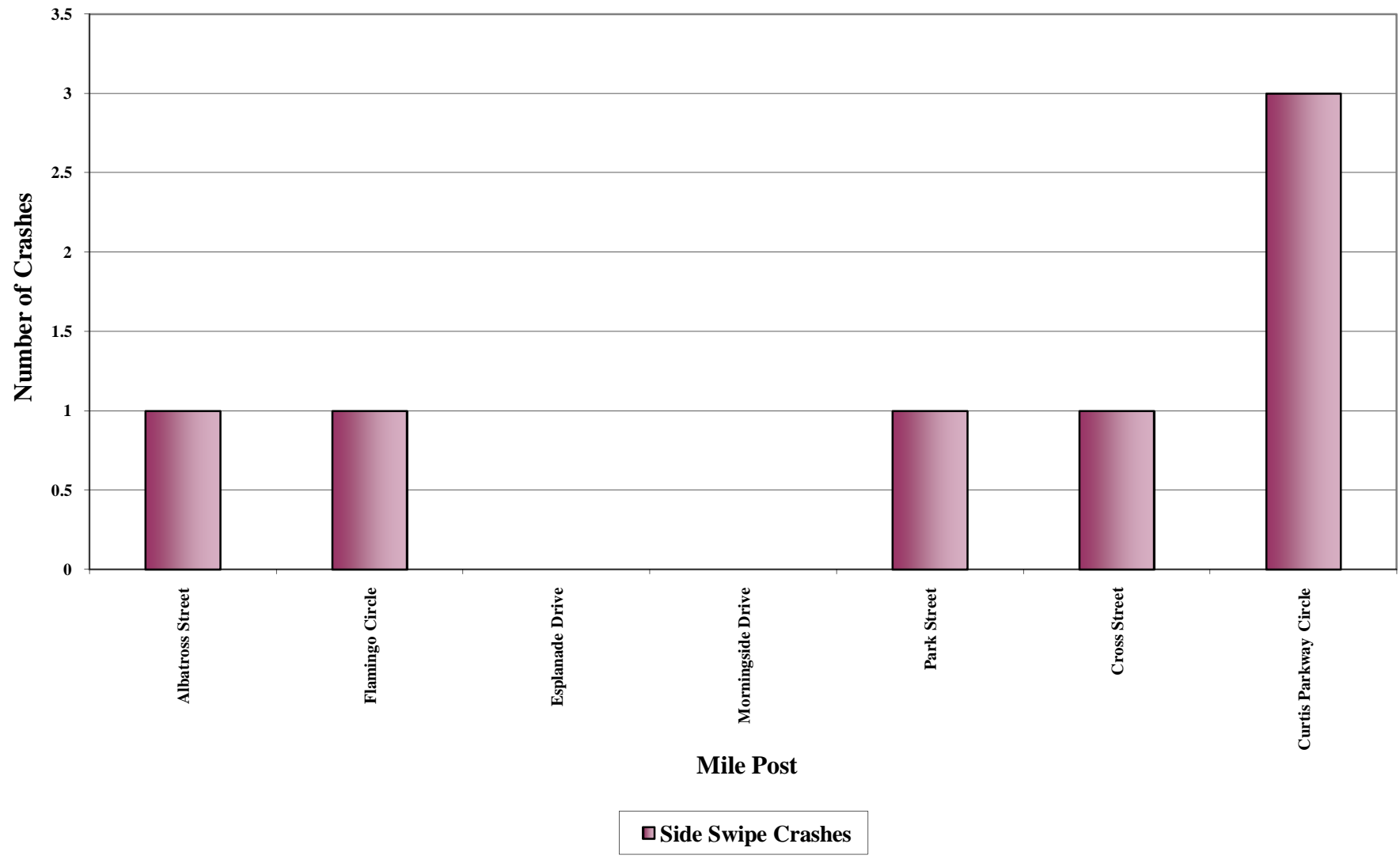
Total Crashes



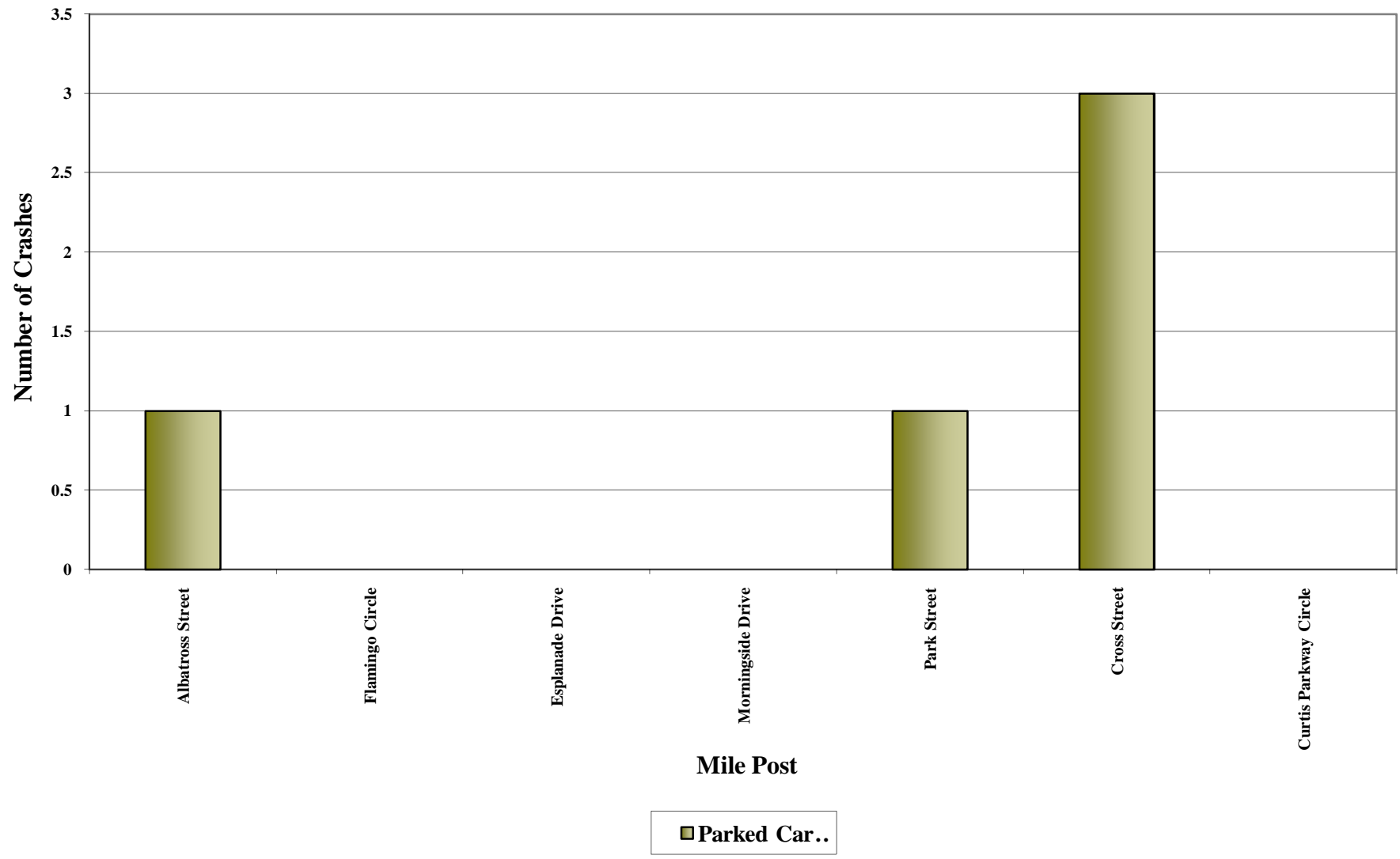
Angle Crashes



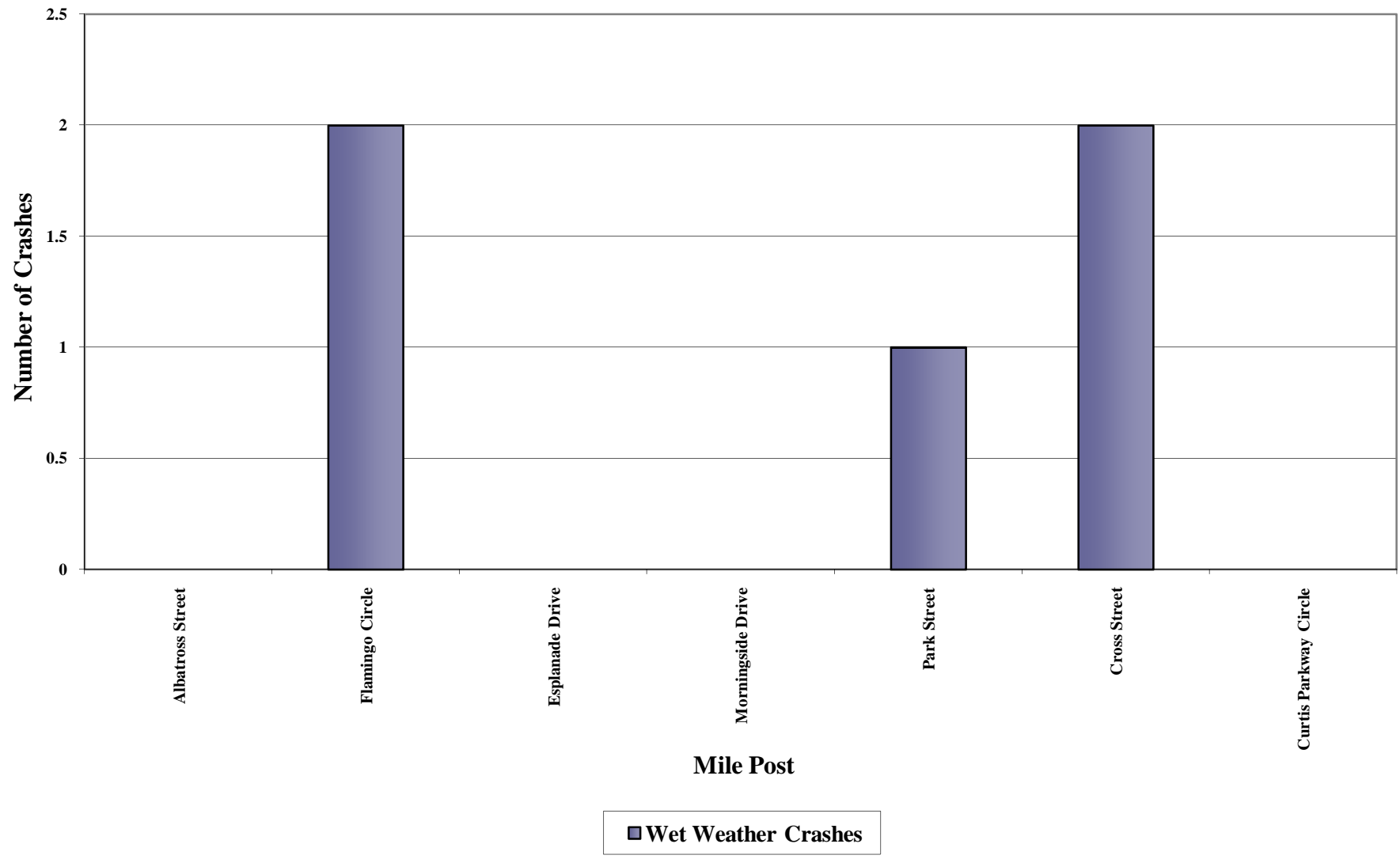
Side Swipe Crashes



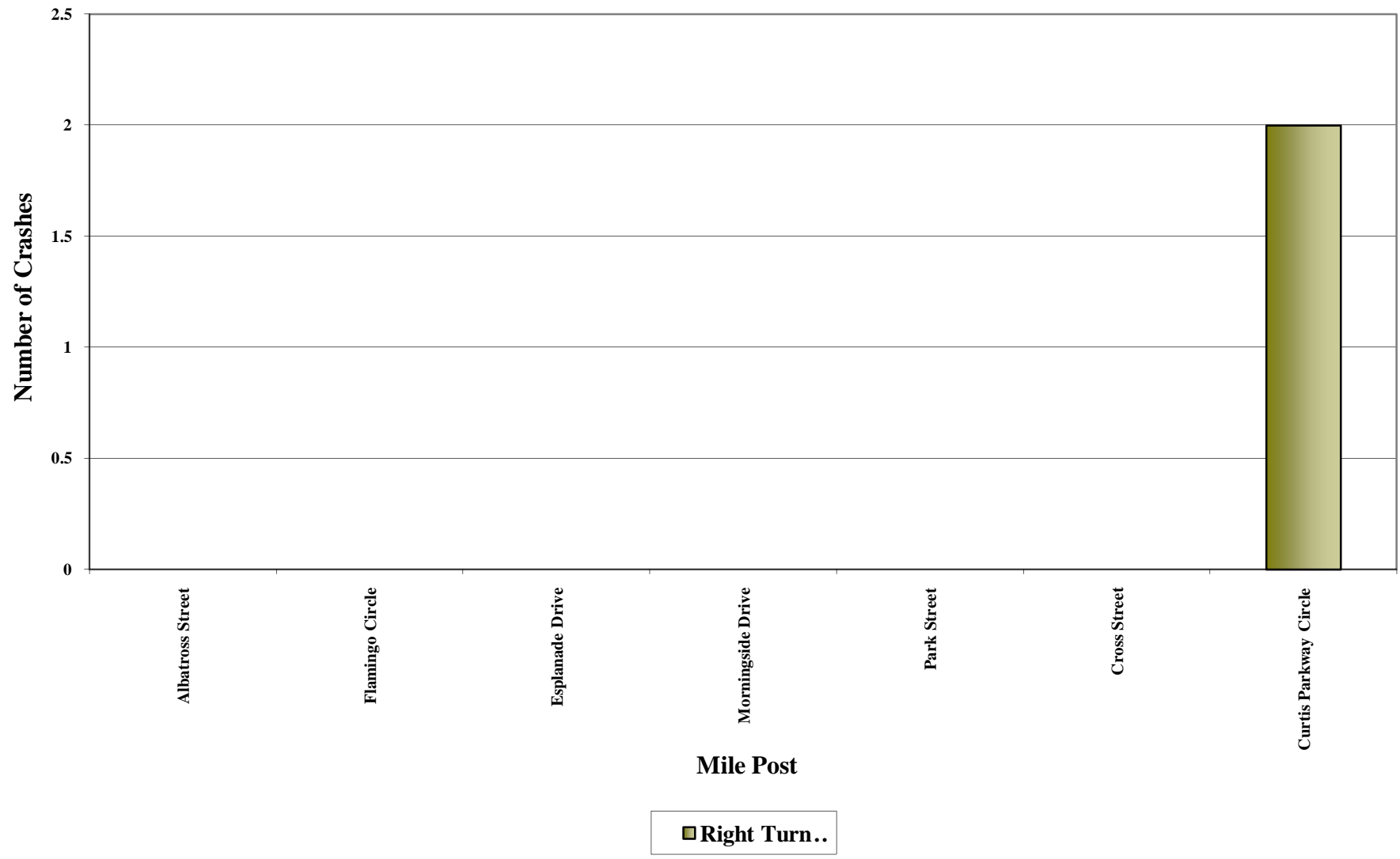
Hit Packed Car Crashes



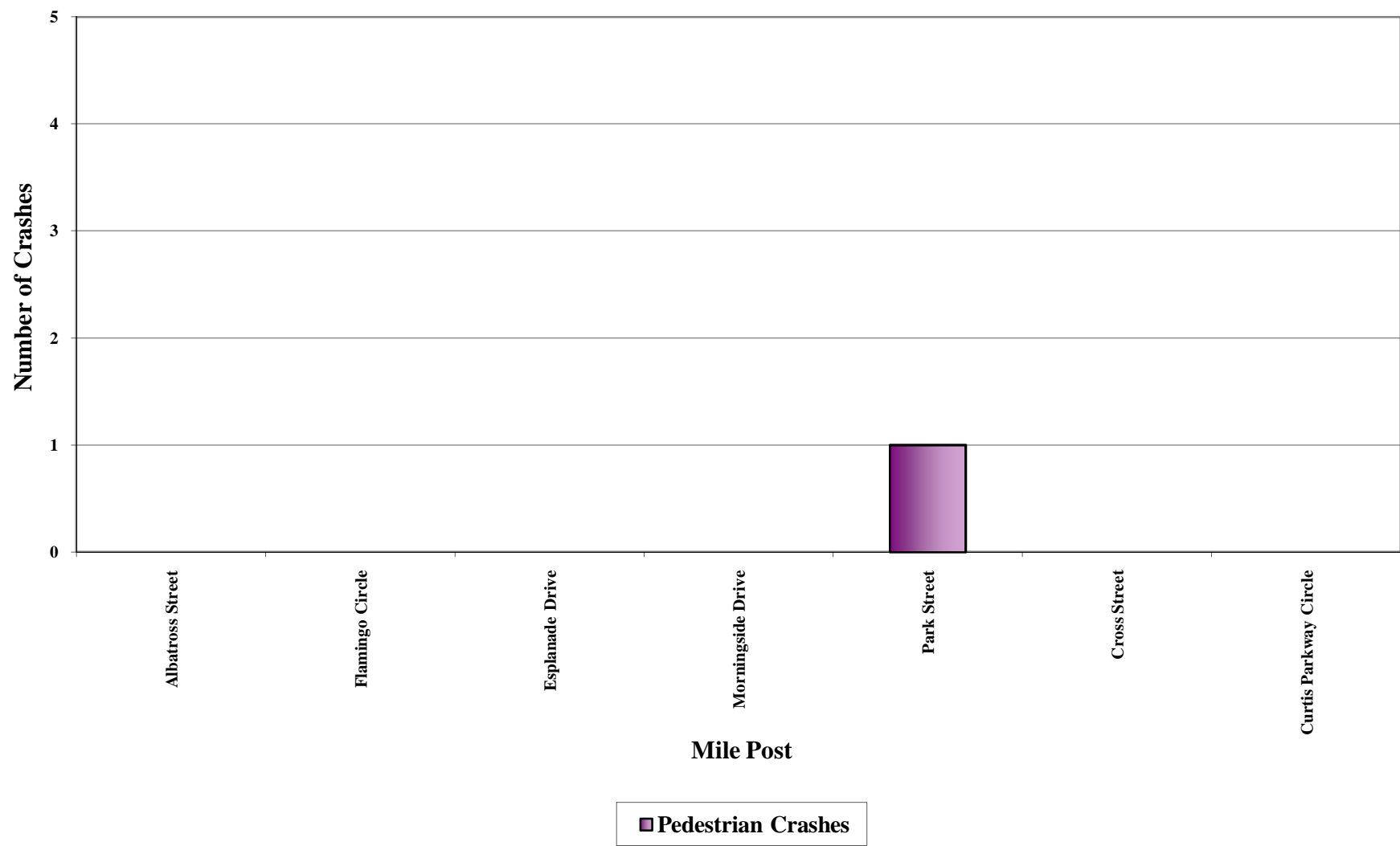
Wet Weather Crashes



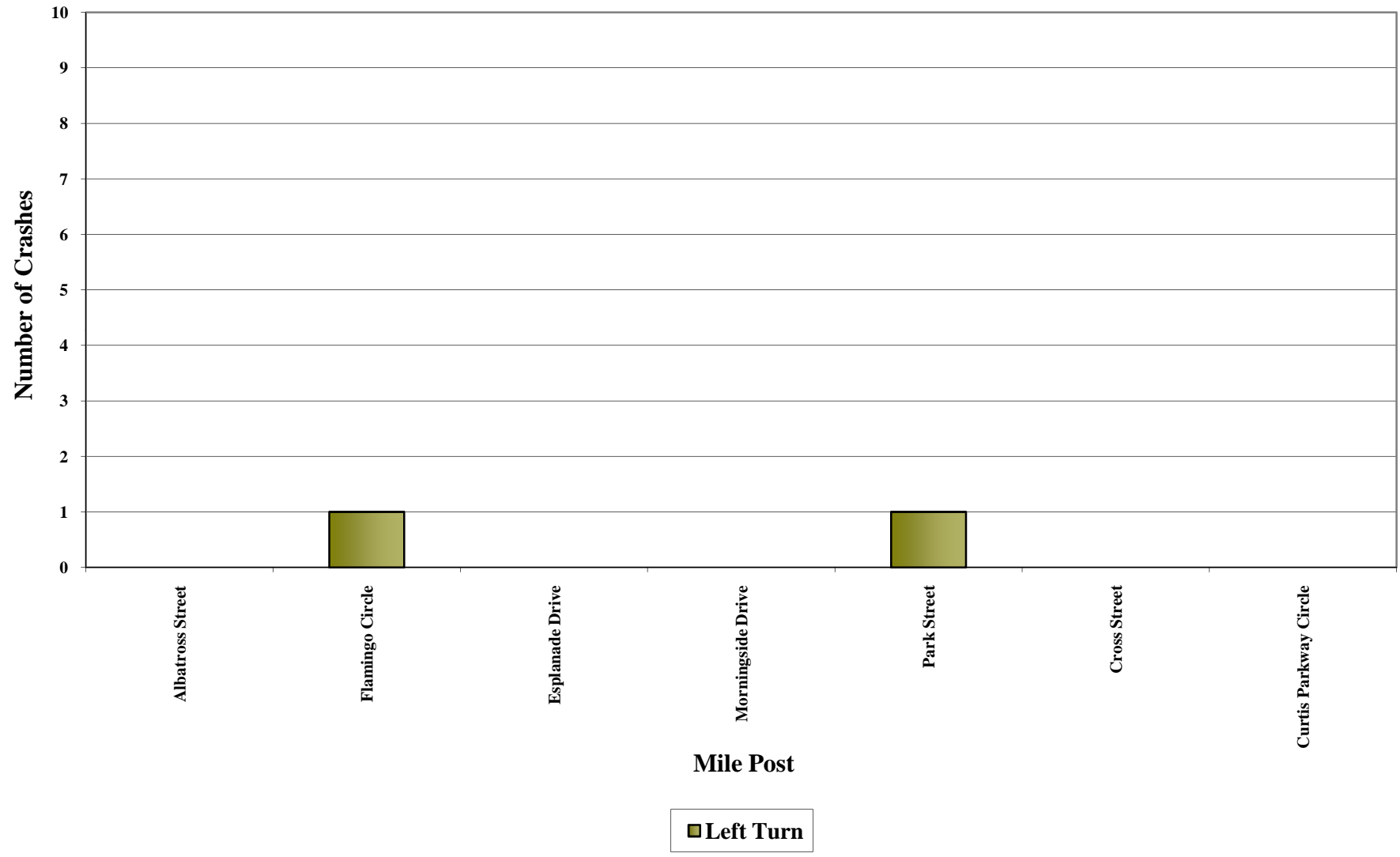
Right Turn Crashes



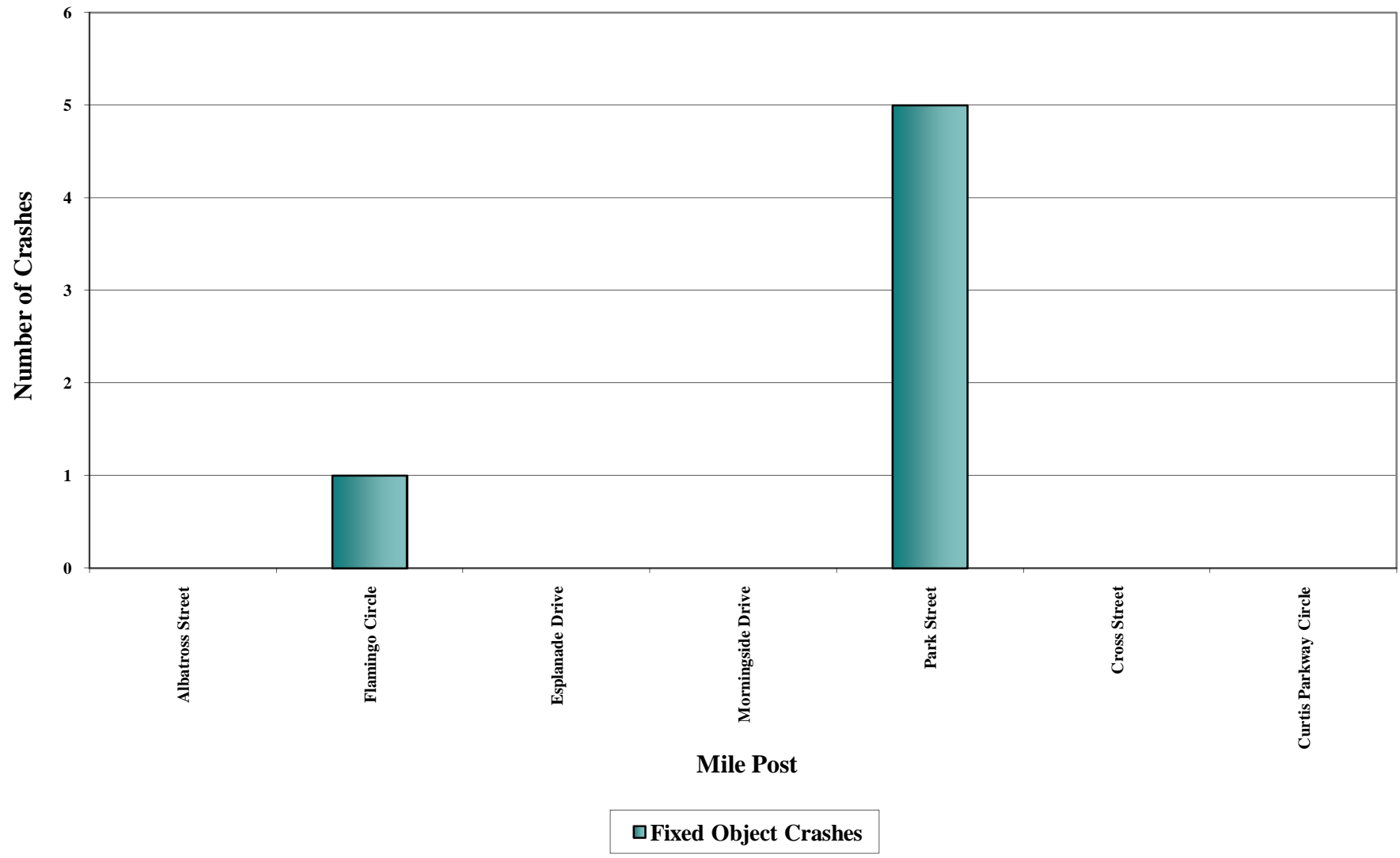
Pedestrian Crashes



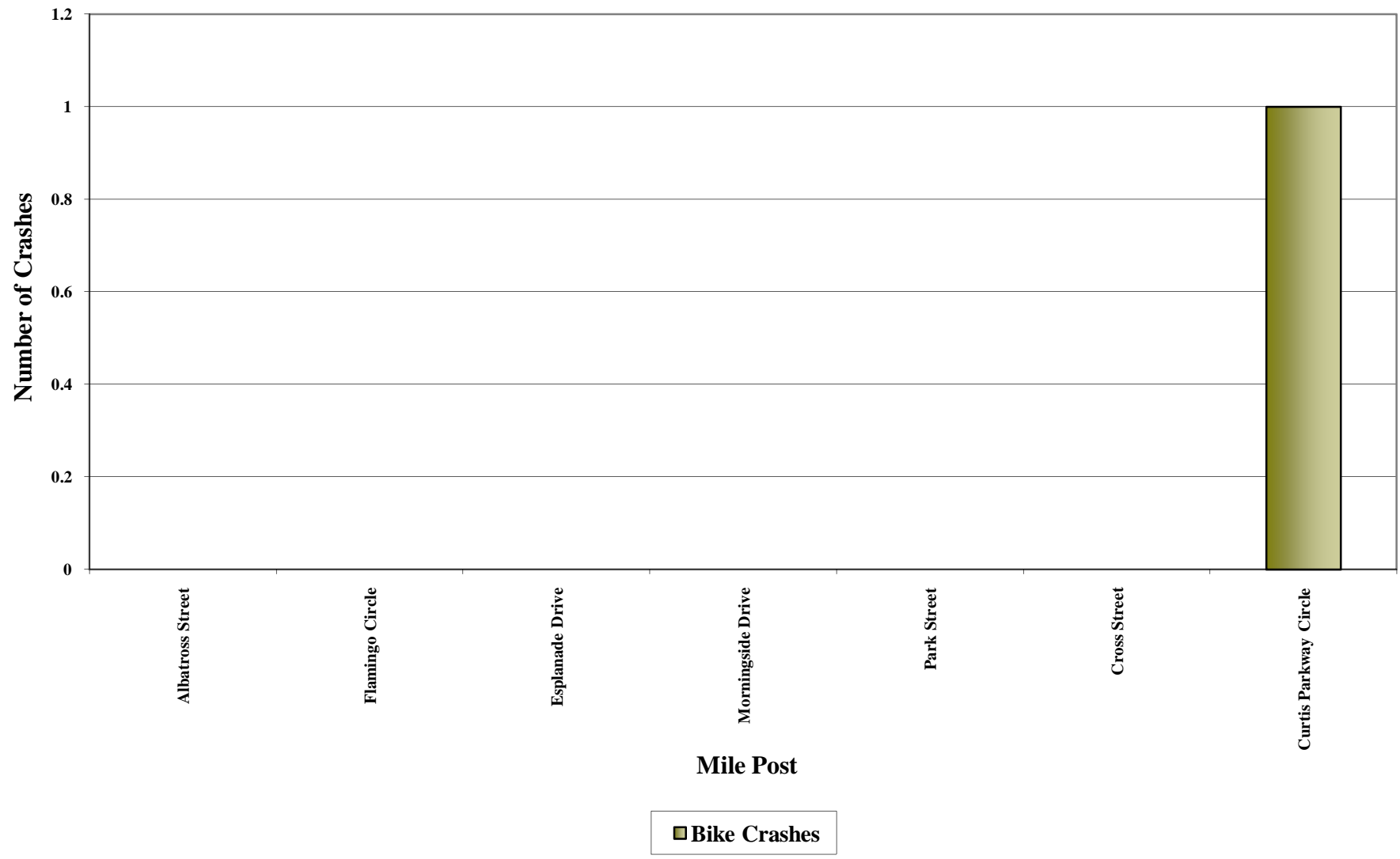
Left Turn



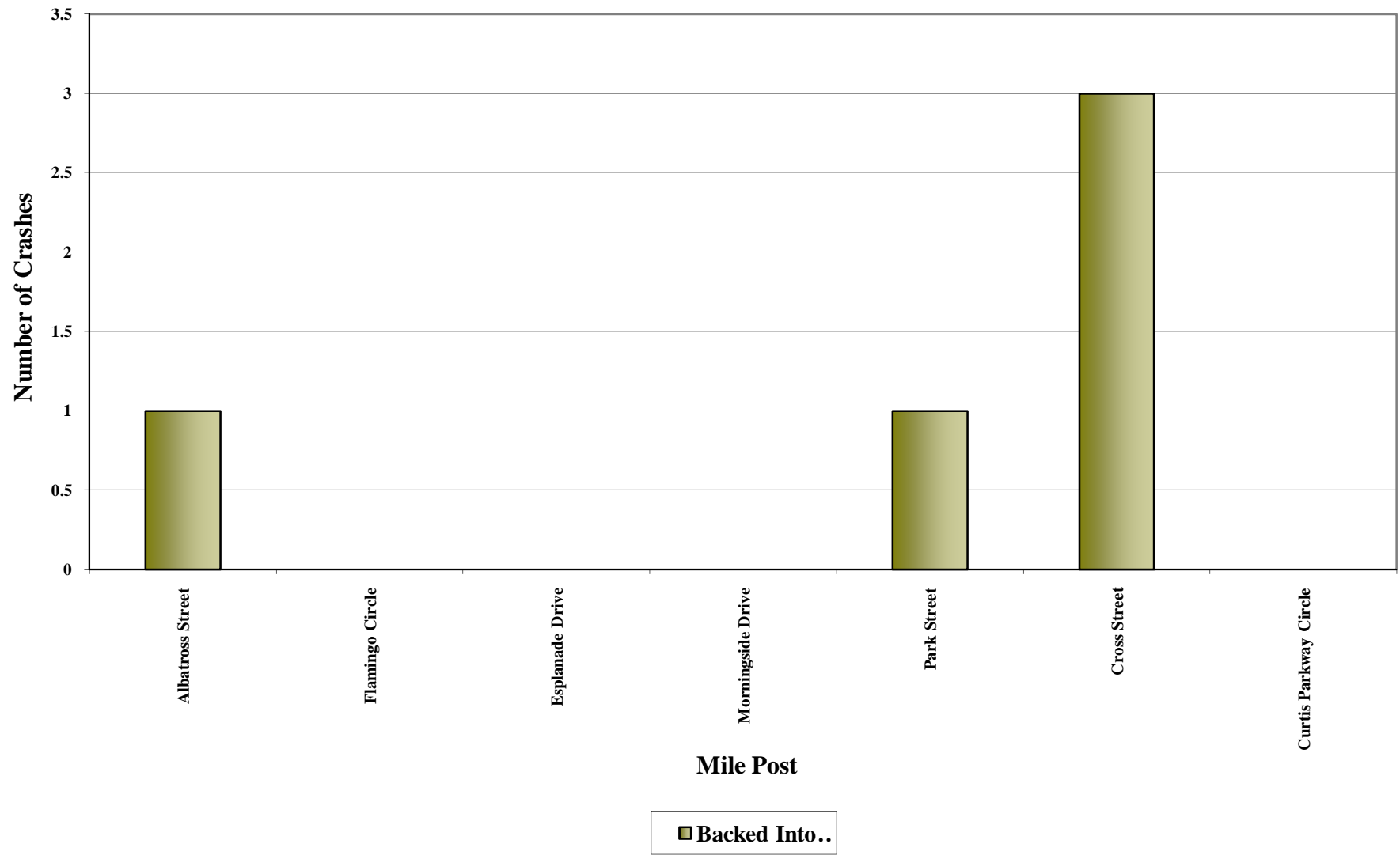
Fixed Object Crashes



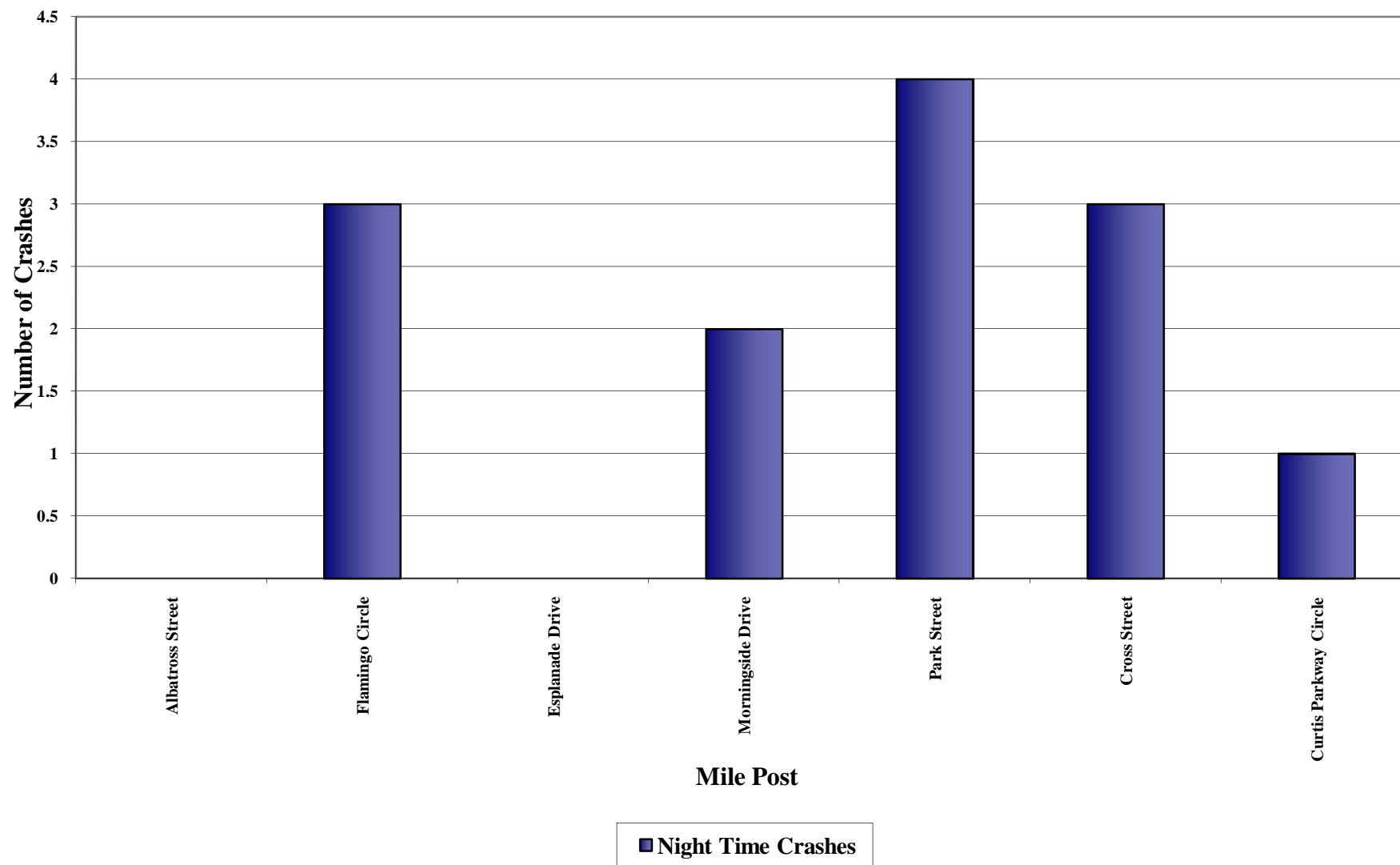
Bike Crashes



Backed Into Crashes



Night Time Crashes





Appendix C: Signal Timing Plans





TOD Schedule Report for 3863: Park St&Westward D

Active Phase Bank: Phase Bank 1

Phase	Walk	Don't Walk	Min Initial	Veh Ext	Max Limit	Max 2	Yellow	Red
Phase Bank								
	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3	1 2 3		
1	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0	0
2 WBT	0 - 7 - 0	0 - 15 - 0	16 - 7 - 0	1 - 1 - 0	35 - 35 - 0	35 - 0 - 0	4	1
3	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0	0
4 NBT	0 - 7 - 0	0 - 21 - 0	7 - 7 - 0	2.5 - 2.5 - 0	20 - 20 - 0	20 - 0 - 0	4	1
5	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0	0
6 EBT	0 - 7 - 0	0 - 15 - 0	16 - 7 - 0	1 - 1 - 0	35 - 35 - 0	35 - 0 - 0	4	1
7	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0 - 0 - 0	0	0
8 SBT	0 - 7 - 0	0 - 21 - 0	7 - 7 - 0	2.5 - 2.5 - 0	20 - 20 - 0	20 - 0 - 0	4	1

Last In Service Date: unknown

Permitted Phases

12345678

Default -234-6-8
External Permit 0 -----
External Permit 1 -----
External Permit 2 -----

Current	Plan	Cycle	1	2	3	4	5	6	7	8	Ring Offset	Offset
TOD Schedule			WBT		NBT		EBT		SBT			

Local TOD Schedule

Time	Plan	DOW
0000	Flash	Su M T W Th F S
0600	Free	Su M T W Th F S
0700	Free	M T W Th F
0930	Free	M T W Th F
1330	Free	M T W Th F
1600	Free	M T W Th F
2200	Flash	Su M T W Th F S

Current Time of Day Function

Time	Function	Settings *	Day of Week
0000	TOD OUTPUTS	-7-----1	Su M T W Th F S
0700	TOD OUTPUTS	-----	M T W Th F
0900	TOD OUTPUTS	-7-----1	M T W Th F
1330	TOD OUTPUTS	-----	M T W Th F
1600	TOD OUTPUTS	-7-----1	M T W Th F

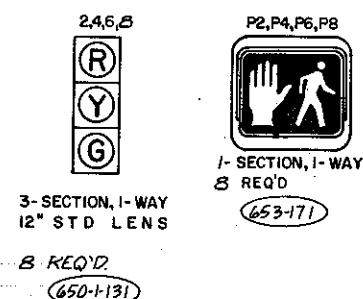
Local Time of Day Function

Time	Function	Settings *	Day of Week
0000	TOD OUTPUTS	-7-----1	Su M T W Th F S
0700	TOD OUTPUTS	-----	M T W Th F
0900	TOD OUTPUTS	-7-----1	M T W Th F
1330	TOD OUTPUTS	-----	M T W Th F
1600	TOD OUTPUTS	-7-----1	M T W Th F

* Settings

Blank - FREE - Phase Bank 1, Max 1
Blank - Plan - Phase Bank 1, Max 2
1 - Phase Bank 2, Max 1
2 - Phase Bank 2, Max 2
3 - Phase Bank 3, Max 1
4 - Phase Bank 3, Max 2
5 - EXTERNAL PERMIT 1
6 - EXTERNAL PERMIT 2
7 - X-PED OMIT
8 - TBA

DETAIL OF SIGNAL HEADS

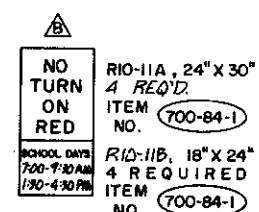


SIGNALS 2 & 6 WITH BACK PLATES
4 REQUIRED
ITEM NUMBER 659-101

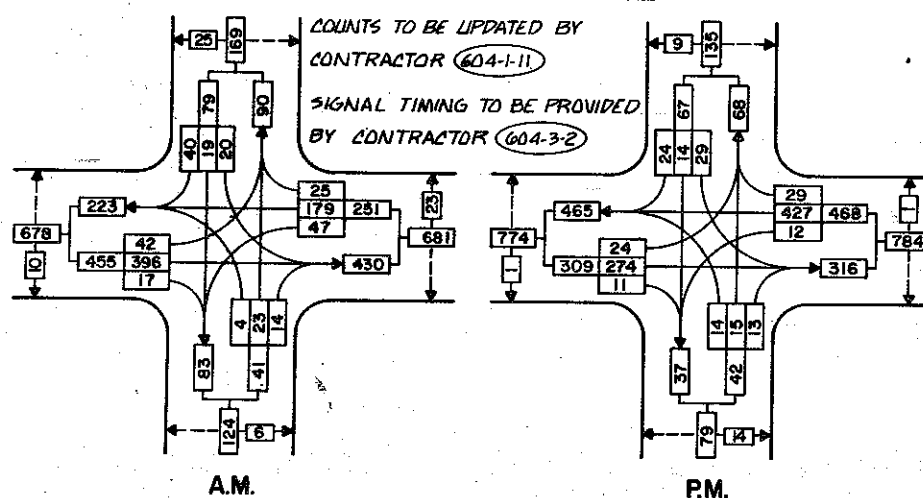
SIGN INVENTORY

LEG	ENTER	EXIT
NORTH	R10-11A POLICE VEHICLES ONLY (2) R10-4A ✱	R7-108 R10-11A ✱ AUX. PNL ✱
SOUTH	R10-11A R10-4A ✱	R10-11A ✱ AUX. PNL ✱
EAST	R10-11A D4-1 R3-4 R7-108 R10-4A ✱	R3-4 R10-11A ✱ AUX. PNL ✱
WEST	R10-11A R3-4 R10-4A ✱	R3-4 R7-108 R10-11A ✱ AUX. PNL ✱

* PROPOSED SIGN

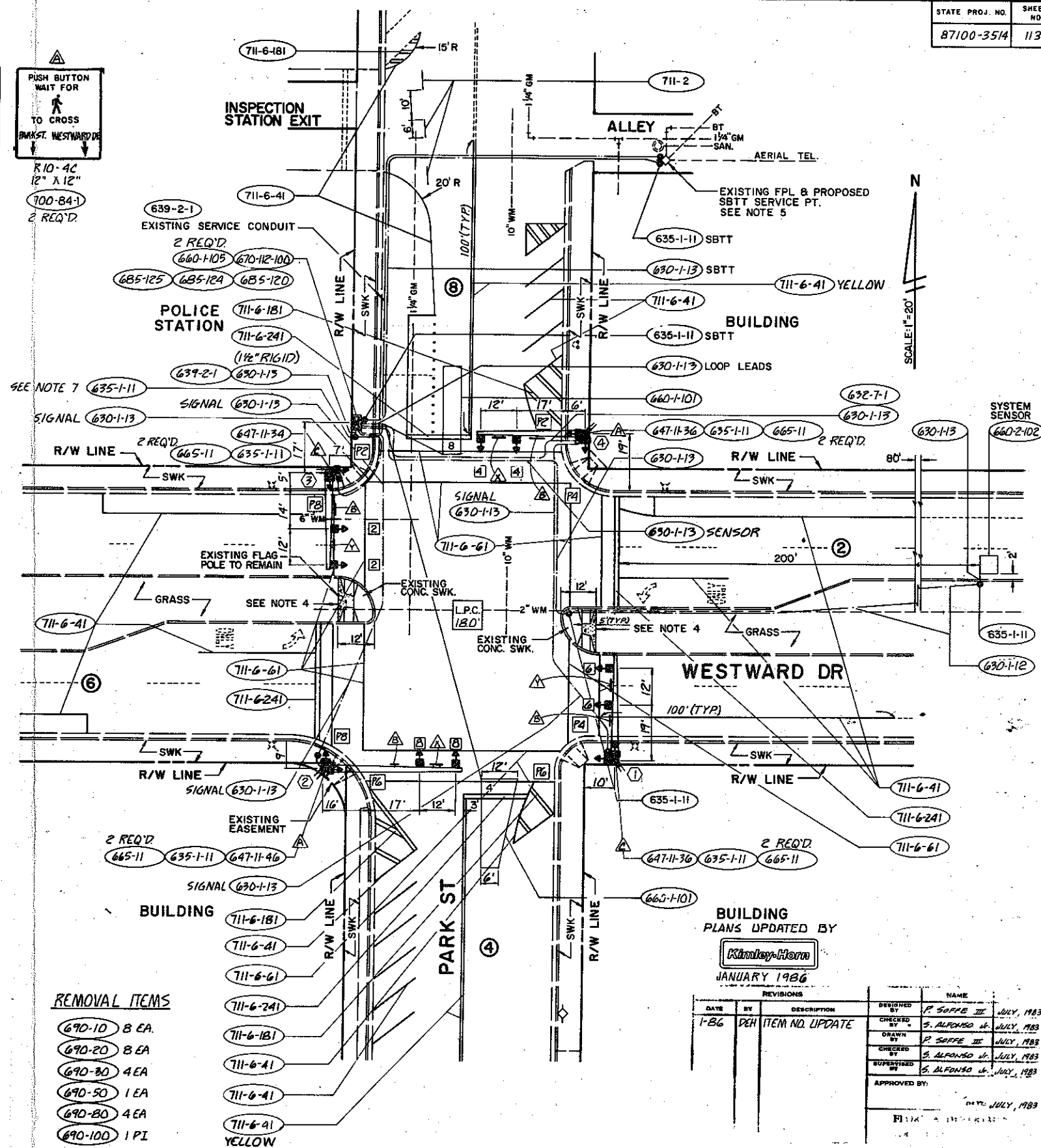
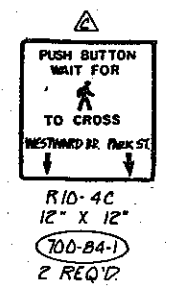
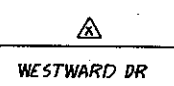


1979 PEAK HOUR VOLUMES



- NOTES:**

1. DEMAND WATTAGE FOR THIS INTERSECTION IS 1425 WATTS.
2. ALL PAVEMENT MARKINGS ARE WHITE UNLESS OTHERWISE NOTED.
3. CONTRACTOR TO FURNISH AND INSTALL 150 LF OF GROUNDING ELECTRODE. BID ITEM NO. 620-1-1
4. CONST. 20 SY OF 4" THICK CONC. SWK. WITH 4 CURB CUT RAMPS (APPROX. 10 SY) PER D.O.T. INDEX NO. 304 ITEM NO. 522-1 110-4
5. REPLACE EXISTING SERVICE WIRE WITH NEW SERVICE WIRE 639-2-1
6. ALL CONDUIT SHALL BE 2" PVC UNLESS OTHERWISE INDICATED.
7. PICK UP EXISTING FPL SERVICE CONDUIT AND FIRE PRE-EMPTION CONDUIT AT EXISTING CONTROLLER LOCATION.
8. LOOP ASSEMBLY 660-2-101 SHALL BE 6' X 30' UNLESS OTHERWISE INDICATED.



REMOVAL ITEMS

- 690-10 8 EA.
690-20 8 EA
690-30 4 EA
690-50 1 EA
690-80 4 EA
690-100 1 PI

BUILDING
PLANS UPDATED BY
Kimley-Horn
JANUARY 1986

REVISONS			NAME
DATE	BY	DESCRIPTION	
1-86	PEH	ITEM NO. UPDATE	
		CHECKED BY	P. SORRE III JULY, 1983
		DRAWN BY	S. ALFONSO Jr. JULY 1983
		CHECKED BY	P. SORRE III JULY, 1983
		SUPERVISED BY	S. ALFONSO Jr. JULY, 1983
APPROVED BY:			
			DATE JULY, 1983

PARK ST & WESTWARD DR
INTERSECTION IDENTIFICATION NO. 33863
CATEGORY II
Sec# 6.1



Appendix D: Existing Level of Service Worksheets



HCM Unsignalized Intersection Capacity Analysis

2: Westward Drive & Circle

Westward Drive Arterial Analysis

Existing AM Peak





















Movement	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations		RT	RT	RT		
Volume (veh/h)	0	357	446	204	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	388	485	222	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	485	242			707	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	485	242			707	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	49			100	
cM capacity (veh/h)	511	758			888	
Direction, Lane #	EB 1	EB 2	SB 1	SB 2	SB 3	
Volume Total	194	194	242	242	222	
Volume Left	0	0	0	0	0	
Volume Right	194	194	0	0	222	
cSH	758	758	1700	1700	1700	
Volume to Capacity	0.26	0.26	0.14	0.14	0.13	
Queue Length 95th (ft)	25	25	0	0	0	
Control Delay (s)	11.4	11.4	0.0	0.0	0.0	
Lane LOS	B	B				
Approach Delay (s)	11.4		0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			4.0			
Intersection Capacity Utilization			16.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

Westward Drive Arterial Analysis

3: Westward Drive & Park Street

Existing AM Peak



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	62	334	26	37	192	43	17	31	9	64	47	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.97			0.98			0.99	
Flt Protected	0.95	1.00		0.95	1.00			0.99			0.97	
Satd. Flow (prot)	1770	3501		1770	3442			1796			1789	
Flt Permitted	0.59	1.00		0.52	1.00			0.92			0.84	
Satd. Flow (perm)	1105	3501		970	3442			1668			1543	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	67	363	28	40	209	47	18	34	10	70	51	15
RTOR Reduction (vph)	0	17	0	0	34	0	0	6	0	0	6	0
Lane Group Flow (vph)	67	374	0	40	222	0	0	56	0	0	130	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.3	9.3		9.3	9.3			15.1			15.1	
Effective Green, g (s)	9.3	9.3		9.3	9.3			15.1			15.1	
Actuated g/C Ratio	0.27	0.27		0.27	0.27			0.44			0.44	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	299	946		262	931			732			677	
v/s Ratio Prot	c0.11			0.06								
v/s Ratio Perm	0.06			0.04				0.03			c0.08	
v/c Ratio	0.22	0.40		0.15	0.24			0.08			0.19	
Uniform Delay, d1	9.7	10.3		9.6	9.8			5.6			5.9	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.4	0.3		0.3	0.1			0.2			0.6	
Delay (s)	10.1	10.5		9.8	9.9			5.8			6.5	
Level of Service	B	B		A	A			A			A	
Approach Delay (s)	10.5			9.9				5.8			6.5	
Approach LOS	B			A				A			A	
Intersection Summary												
HCM Average Control Delay			9.4	HCM Level of Service			A					
HCM Volume to Capacity ratio			0.27									
Actuated Cycle Length (s)			34.4	Sum of lost time (s)			10.0					
Intersection Capacity Utilization			37.6%	ICU Level of Service			A					
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Westward Drive & Cross Street

Westward Drive Arterial Analysis

Existing AM Peak



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	53	337	17	15	180	9	40	32	1	19	38	52
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	58	366	18	16	196	10	43	35	1	21	41	57
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		346										
pX, platoon unblocked												
vC, conflicting volume	205			385			698	729	192	550	733	103
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	205			385			698	729	192	550	733	103
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			99			84	89	100	94	87	94
cM capacity (veh/h)	1363			1170			266	329	817	368	327	932
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	58	244	141	16	130	75	79	118				
Volume Left	58	0	0	16	0	0	43	21				
Volume Right	0	0	18	0	0	10	1	57				
cSH	1363	1700	1700	1170	1700	1700	293	487				
Volume to Capacity	0.04	0.14	0.08	0.01	0.08	0.04	0.27	0.24				
Queue Length 95th (ft)	3	0	0	1	0	0	27	24				
Control Delay (s)	7.8	0.0	0.0	8.1	0.0	0.0	21.8	14.7				
Lane LOS	A			A			C	B				
Approach Delay (s)	1.0			0.6			21.8	14.7				
Approach LOS							C	B				
Intersection Summary												
Average Delay			4.7									
Intersection Capacity Utilization			33.1%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

9: Westward Drive & Morningside Drive

Westward Drive Arterial Analysis

Existing AM Peak

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	25	381	45	21	188	14	42	25	19	22	15	15
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	27	414	49	23	204	15	46	27	21	24	16	16
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					542							
pX, platoon unblocked												
vC, conflicting volume	220			463			665	758	232	553	775	110
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	220			463			665	758	232	553	775	110
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			98			86	92	97	93	95	98
cM capacity (veh/h)	1347			1095			316	321	771	367	314	923
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	27	276	187	23	136	83	93	57				
Volume Left	27	0	0	23	0	0	46	24				
Volume Right	0	0	49	0	0	15	21	16				
cSH	1347	1700	1700	1095	1700	1700	365	419				
Volume to Capacity	0.02	0.16	0.11	0.02	0.08	0.05	0.26	0.13				
Queue Length 95th (ft)	2	0	0	2	0	0	25	12				
Control Delay (s)	7.7	0.0	0.0	8.4	0.0	0.0	18.2	14.9				
Lane LOS	A			A			C	B				
Approach Delay (s)	0.4			0.8			18.2	14.9				
Approach LOS							C	B				
Intersection Summary												
Average Delay			3.3									
Intersection Capacity Utilization			31.8%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

14: Westward Drive & Flamingo Circle

Westward Drive Arterial Analysis

Existing AM Peak

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	SBR2	NEL2	NEL	NER
Lane Configurations												
Volume (veh/h)	12	382	8	23	201	13	38	36	20	5	3	22
Sign Control		Free			Free		Stop				Stop	
Grade		0%			0%		0%				0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	13	415	9	25	218	14	41	39	22	5	3	24
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					1236							
pX, platoon unblocked												
vC, conflicting volume	233			424			535	726	116	646	728	212
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	233			424			535	726	116	646	728	212
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			98			90	88	98	98	99	97
cM capacity (veh/h)	1332			1132			403	339	914	310	337	793
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	NE 1						
Volume Total	221	216	134	123	102	33						
Volume Left	13	0	25	0	41	5						
Volume Right	0	9	0	14	22	24						
cSH	1332	1700	1132	1700	422	569						
Volume to Capacity	0.01	0.13	0.02	0.07	0.24	0.06						
Queue Length 95th (ft)	1	0	2	0	23	5						
Control Delay (s)	0.5	0.0	1.7	0.0	16.2	11.7						
Lane LOS	A		A		C	B						
Approach Delay (s)	0.3		0.9		16.2	11.7						
Approach LOS					C	B						
Intersection Summary												
Average Delay			2.9									
Intersection Capacity Utilization			40.0%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

20: Westward Drive & Esplanade Drive

Westward Drive Arterial Analysis

Existing AM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	46	379	17	24	191	30	30	24	48	24	9	16
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	50	412	18	26	208	33	33	26	52	26	10	17
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage veh												
Upstream signal (ft)					1020							
pX, platoon unblocked												
vC, conflicting volume	240			430			699	814	215	647	807	120
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	240			430			699	814	215	647	807	120
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			98			89	91	93	91	97	98
cM capacity (veh/h)	1324			1125			298	292	790	296	295	909
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1	SW 1						
Volume Total	256	224	130	136	111	53						
Volume Left	50	0	26	0	33	26						
Volume Right	0	18	0	33	52	17						
cSH	1324	1700	1125	1700	419	379						
Volume to Capacity	0.04	0.13	0.02	0.08	0.26	0.14						
Queue Length 95th (ft)	3	0	2	0	26	12						
Control Delay (s)	1.8	0.0	1.8	0.0	16.7	16.0						
Lane LOS	A		A		C	C						
Approach Delay (s)	1.0		0.9		16.7	16.0						
Approach LOS					C	C						
Intersection Summary												
Average Delay			3.7									
Intersection Capacity Utilization			35.7%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Westward Drive & Circle

Westward Drive Arterial Analysis

Existing PM Peak





















Movement	EBL	EBR	SBL	SBR	NWL	NWR
Lane Configurations		RT	RT	RT		
Volume (veh/h)	0	254	394	351	0	0
Sign Control	Stop		Free		Free	
Grade	0%		0%		0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	276	428	382	0	0
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type			None		None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	428	214			810	
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	428	214			810	
tC, single (s)	6.8	6.9			4.1	
tC, 2 stage (s)						
tF (s)	3.5	3.3			2.2	
p0 queue free %	100	65			100	
cM capacity (veh/h)	555	791			812	
Direction, Lane #	EB 1	EB 2	SB 1	SB 2	SB 3	
Volume Total	138	138	214	214	382	
Volume Left	0	0	0	0	0	
Volume Right	138	138	0	0	382	
cSH	791	791	1700	1700	1700	
Volume to Capacity	0.17	0.17	0.13	0.13	0.22	
Queue Length 95th (ft)	16	16	0	0	0	
Control Delay (s)	10.5	10.5	0.0	0.0	0.0	
Lane LOS	B	B				
Approach Delay (s)	10.5		0.0			
Approach LOS	B					
Intersection Summary						
Average Delay			2.7			
Intersection Capacity Utilization			25.1%		ICU Level of Service	A
Analysis Period (min)			15			

HCM Signalized Intersection Capacity Analysis

Westward Drive Arterial Analysis

3: Westward Drive & Park Street

Existing PM Peak



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	28	263	16	40	360	14	36	10	26	23	15	46
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Lane Util. Factor	1.00	0.95		1.00	0.95			1.00			1.00	
Frt	1.00	0.99		1.00	0.99			0.95			0.93	
Flt Protected	0.95	1.00		0.95	1.00			0.98			0.99	
Satd. Flow (prot)	1770	3509		1770	3520			1729			1701	
Flt Permitted	0.51	1.00		0.57	1.00			0.86			0.92	
Satd. Flow (perm)	956	3509		1056	3520			1517			1595	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	286	17	43	391	15	39	11	28	25	16	50
RTOR Reduction (vph)	0	12	0	0	8	0	0	16	0	0	28	0
Lane Group Flow (vph)	30	291	0	43	398	0	0	62	0	0	63	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases	4			8			2			6		
Permitted Phases	4			8			2			6		
Actuated Green, G (s)	9.5	9.5		9.5	9.5			15.1			15.1	
Effective Green, g (s)	9.5	9.5		9.5	9.5			15.1			15.1	
Actuated g/C Ratio	0.27	0.27		0.27	0.27			0.44			0.44	
Clearance Time (s)	5.0	5.0		5.0	5.0			5.0			5.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0			3.0			3.0	
Lane Grp Cap (vph)	262	963		290	966			662			696	
v/s Ratio Prot	0.08			c0.11								
v/s Ratio Perm	0.03			0.04				c0.04			0.04	
v/c Ratio	0.11	0.30		0.15	0.41			0.09			0.09	
Uniform Delay, d1	9.4	9.9		9.5	10.3			5.7			5.7	
Progression Factor	1.00	1.00		1.00	1.00			1.00			1.00	
Incremental Delay, d2	0.2	0.2		0.2	0.3			0.3			0.3	
Delay (s)	9.6	10.1		9.7	10.6			6.0			6.0	
Level of Service	A	B		A	B			A			A	
Approach Delay (s)	10.1			10.5				6.0			6.0	
Approach LOS	B			B				A			A	
Intersection Summary												
HCM Average Control Delay			9.5	HCM Level of Service			A					
HCM Volume to Capacity ratio			0.22									
Actuated Cycle Length (s)			34.6	Sum of lost time (s)			10.0					
Intersection Capacity Utilization			33.5%	ICU Level of Service			A					
Analysis Period (min)			15									
c Critical Lane Group												

HCM Unsignalized Intersection Capacity Analysis

6: Westward Drive & Cross Street

Westward Drive Arterial Analysis

Existing PM Peak



















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	59	250	3	26	314	11	19	53	2	2	29	81
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	64	272	3	28	341	12	21	58	2	2	32	88
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		346										
pX, platoon unblocked												
vC, conflicting volume	353			275			733	811	138	699	807	177
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	353			275			733	811	138	699	807	177
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			98			91	80	100	99	89	89
cM capacity (veh/h)	1202			1285			239	289	886	261	290	836
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	64	181	94	28	228	126	80	122				
Volume Left	64	0	0	28	0	0	21	2				
Volume Right	0	0	3	0	0	12	2	88				
cSH	1202	1700	1700	1285	1700	1700	279	548				
Volume to Capacity	0.05	0.11	0.06	0.02	0.13	0.07	0.29	0.22				
Queue Length 95th (ft)	4	0	0	2	0	0	29	21				
Control Delay (s)	8.2	0.0	0.0	7.9	0.0	0.0	23.1	13.4				
Lane LOS	A			A			C	B				
Approach Delay (s)	1.5			0.6			23.1	13.4				
Approach LOS							C	B				
Intersection Summary												
Average Delay			4.6									
Intersection Capacity Utilization			33.0%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

9: Westward Drive & Morningside Drive

Westward Drive Arterial Analysis

Existing PM Peak

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	38	280	15	31	401	10	29	15	24	3	6	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	41	304	16	34	436	11	32	16	26	3	7	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					542							
pX, platoon unblocked												
vC, conflicting volume	447			321			705	909	160	778	912	223
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	447			321			705	909	160	778	912	223
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			97			89	94	97	99	97	97
cM capacity (veh/h)	1110			1236			293	256	856	252	255	780
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	SB 1				
Volume Total	41	203	118	34	291	156	74	32				
Volume Left	41	0	0	34	0	0	32	3				
Volume Right	0	0	16	0	0	11	26	22				
cSH	1110	1700	1700	1236	1700	1700	366	475				
Volume to Capacity	0.04	0.12	0.07	0.03	0.17	0.09	0.20	0.07				
Queue Length 95th (ft)	3	0	0	2	0	0	19	5				
Control Delay (s)	8.4	0.0	0.0	8.0	0.0	0.0	17.3	13.1				
Lane LOS	A			A			C	B				
Approach Delay (s)	1.0			0.6			17.3	13.1				
Approach LOS							C	B				
Intersection Summary												
Average Delay			2.4									
Intersection Capacity Utilization			35.3%			ICU Level of Service		A				
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

14: Westward Drive & Flamingo Circle

Westward Drive Arterial Analysis

Existing PM Peak

















												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	SBL	SBR	SBR2	NEL2	NEL	NER
Lane Configurations												
Volume (veh/h)	24	266	9	26	413	31	22	12	14	3	7	11
Sign Control		Free			Free		Stop				Stop	
Grade		0%			0%		0%				0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	26	289	10	28	449	34	24	13	15	3	8	12
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					1236							
pX, platoon unblocked												
vC, conflicting volume	483			299			735	873	241	649	885	149
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	483			299			735	873	241	649	885	149
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			98			92	95	98	99	97	99
cM capacity (veh/h)	1076			1259			286	274	760	323	269	870
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	SB 1	NE 1						
Volume Total	171	154	253	258	52	23						
Volume Left	26	0	28	0	24	3						
Volume Right	0	10	0	34	15	12						
cSH	1076	1700	1259	1700	345	438						
Volume to Capacity	0.02	0.09	0.02	0.15	0.15	0.05						
Queue Length 95th (ft)	2	0	2	0	13	4						
Control Delay (s)	1.5	0.0	1.1	0.0	17.3	13.7						
Lane LOS	A		A		C	B						
Approach Delay (s)	0.8		0.5		17.3	13.7						
Approach LOS					C	B						
Intersection Summary												
Average Delay			1.9									
Intersection Capacity Utilization			41.5%		ICU Level of Service		A					
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

20: Westward Drive & Esplanade Drive

Westward Drive Arterial Analysis

Existing PM Peak

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NEL	NET	NER	SWL	SWT	SWR
Lane Configurations												
Volume (veh/h)	14	266	19	11	433	6	17	12	45	22	6	20
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	15	289	21	12	471	7	18	13	49	24	7	22
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)					1020							
pX, platoon unblocked												
vC, conflicting volume	477			310			614	831	155	728	838	239
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	477			310			614	831	155	728	838	239
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			99			95	96	94	91	98	97
cM capacity (veh/h)	1081			1248			353	297	863	279	294	763
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NE 1	SW 1						
Volume Total	160	165	247	242	80	52						
Volume Left	15	0	12	0	18	24						
Volume Right	0	21	0	7	49	22						
cSH	1081	1700	1248	1700	526	382						
Volume to Capacity	0.01	0.10	0.01	0.14	0.15	0.14						
Queue Length 95th (ft)	1	0	1	0	13	12						
Control Delay (s)	0.9	0.0	0.5	0.0	13.1	15.9						
Lane LOS	A		A		B	C						
Approach Delay (s)	0.4		0.2		13.1	15.9						
Approach LOS					B	C						
Intersection Summary												
Average Delay			2.3									
Intersection Capacity Utilization			31.9%		ICU Level of Service				A			
Analysis Period (min)			15									