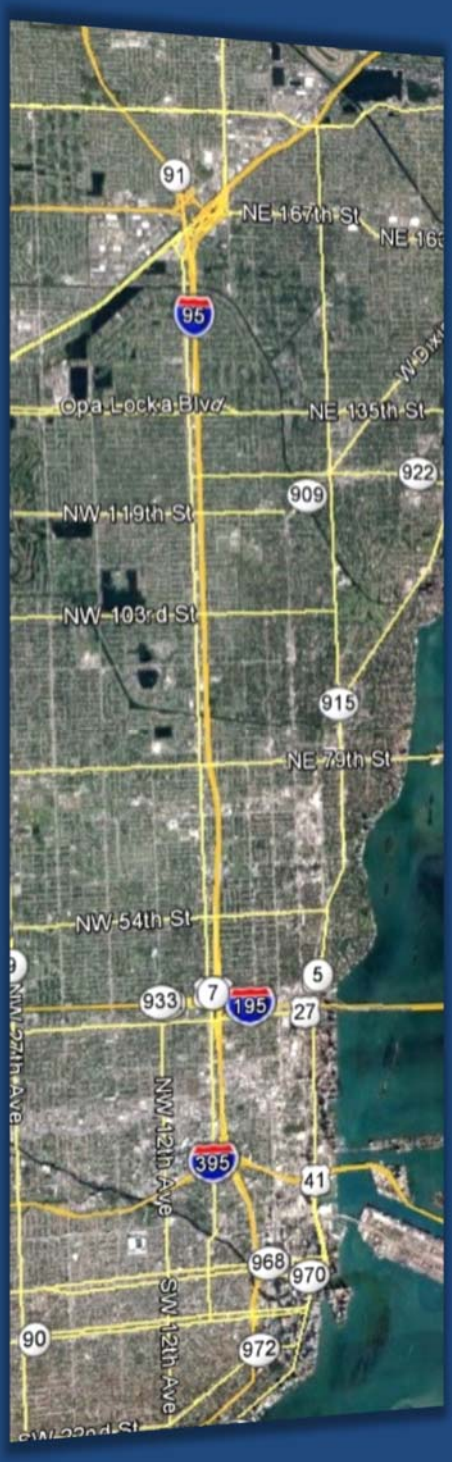

I-95 HISTORICAL CRASH DATA EVALUATION REPORT

SR 9A/I-95 FROM SOUTH OF SR 112/I-195 TO SOUTH OF GOLDEN GLADES INTERCHANGE

SECTION 87270000, MP 4.230 TO MP 12.190

SECTION 87270901, MP 0.000 TO MP 8.000

SECTION 87270902, MP 4.975 TO MP 12.975

YEAR 2012 TO YEAR 2015

FM No. 250084-3-32-01

Contract No. C9L60

Task Work Order No. 14

February 2017

Prepared for: Florida Department of Transportation, District 6

Prepared by: CTS Engineering, Inc.

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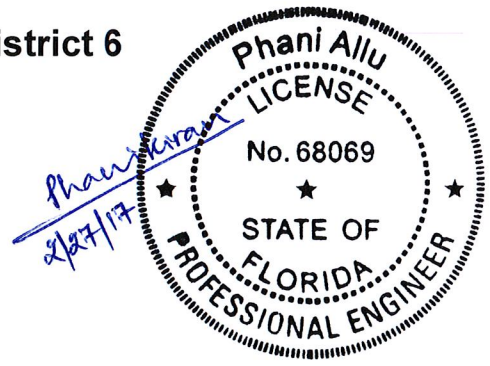
Florida Department of Transportation, District 6
Project Manager: Alexandra Lopez, P.E.



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EXECUTIVE SUMMARY

This I-95 Historical Crash Data Evaluation Report has updated the crash analysis for the segment of I-95 from south of SR 112/I-195 to south of Golden Glades interchange with crash data through 2015. This segment of I-95 comprises the express lanes built under the 95 Express Phase 1 project. The update includes crash data from 2005 through 2015.

Comparing the crashes for the three years (2005-2007) before express lanes to the six years (2010-2015) after express lanes, the following is a summary of observations:

- Fatal crashes dropped from 6.3 per year to 5.3 per year.
- Injury crashes dropped from 662 per year to 651 per year, basically the same.
- Crash rate increased from 1.81 to 2.23. The trend in the crash rate, similar to statewide trends, may be associated with distracted driving.
- The results are inconclusive in demonstrating either an increase or a decrease in safety. It is encouraging, however that the number of fatal and injury crashes have not increased while traffic has increased 15% since 2005.
- The results also suggest that the express lanes do not make the I-95 facility less safe. Express lane crash rate is 15% lower than the rate in the general purpose lanes. Of the 2,460 crashes in 2015; 1,975 were for the general purpose lanes (78%) and 545 (22%) were for the express lanes.

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Study Purpose and Background

The purpose of this report is to supplement the previously conducted "I-95 Historical Crash Data Evaluation Report, November 2013" for the segment of I-95 facility comprising express lanes (that were implemented as the Phase 1 of 95 Express) from south of SR 112/ I-195 to south of Golden Glades interchange with new crash data. The previous study included crash data for years 2005 through 2011. The current study reviewed the crash data for years 2012 through 2015. The study limits along I-95 replicate the limits used in the previous study, which considered the northern portion of the operational express lanes as egress and ingress points until completion of Phase 2 construction (FM 422796-2). Phase 2 was completed in 2016.

I-95, a north-south limited access facility, is designated as part of the Strategic Intermodal System (SIS) and is functionally classified as an urban principal arterial-interstate. SR 9A/I-95 is identified as section 87270000 on the State Highway System. The express lanes sections along I-95 are identified by section 87270901 for the northbound portion and section 87270902 for the southbound portion. The southern study limit is just south of the beginning of the express lanes, south of SR 112/I-195 (near the cross street NW 29 Street, approximate milepost [MP] 4.230) and the northern study limit is south of the Golden Glades Interchange (near the cross street NW 157 Street, approximate MP 12.190).

For a majority of the study segment, the typical section consists of four 11-foot general purpose lanes and two 11-foot express lanes in each direction. The northbound and southbound lanes are separated by a raised concrete barrier. The general purpose lanes and express lanes in the same direction are separated by express lane markers (plastic delineators). The posted speed limit along I-95 varies between 55 mph and 60 mph within the study segment per FDOT Roadway Characteristics Inventory (RCI).

The crash data for applicable section numbers (sections 87270000, 87270901, and 87270902) were obtained from the FDOT's Crash Analysis Reporting System (CARS) for the study segment for the referenced four-year period from 2012 through 2015. It should be noted that the crash data for the year 2015 has not yet been certified as complete by FDOT as of the date when this data was obtained.

The crash data evaluation methodology for this study was consistent with the one from the previous 2013 FDOT study. The mainline crashes and ramp influence crashes were separated using the section number attribute of the crash data. For the purpose of this study, the crash data was manually reviewed (by reviewing the crash reports) by Florida International University (FIU) to primarily confirm whether the crash was attributable to "express lanes" or "general purpose lanes." In addition, the review by FIU confirmed travel direction, crash type, and whether the crash occurred on I-95.

In addition, crash data for the 13-mile segment of I-95 from south of SR 112 to Miami-Dade/Broward County Line was also reviewed and summarized for background information. The statewide (Florida) and countywide (Miami-Dade County) crash statistics available from the Florida Department of Highway Safety and Motor Vehicles (DHSMV's) Annual Traffic Crash Facts reports were reviewed and summarized for the study period to understand regional and statewide crash trends.

Summary of Crash Statistics

The following tables summarize various crash statistics to understand historical crash trends along the I-95 study segment.

Table E1 – I-95 Study Segment (SR 112 to GGI) Crash Frequency

	2013 FDOT Study Years							Current Study Period			
	Before 95 Express			Construction		After 95 Express Phase 1					
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Both Directions											
Crashes	1,337	1,256	1,184	1,244	1,065	1,507	1,438	1,444	1,696	1,895	2,460
Fatal Crashes	9	7	3	5	3	4	7	2	9	3	7
Injury Crashes	751	637	598	606	492	711	637	554	609	578	819
Fatal+Injury	57%	52%	51%	49%	46%	47%	44%	39%	36%	31%	34%
Volume	247,436	234,468	234,133	211,931	226,166	248,630	260,881	249,102	274,076	283,915	283,692
Crash Rate	1.86	1.84	1.74	2.02	1.62	2.09	1.90	1.99	2.13	2.30	2.99
Northbound											
Crashes	730	625	598	706	580	796	776	773	884	972	1,411
Fatal Crashes	4	2	2	1	0	1	5	1	6	1	6
Injury Crashes	412	325	304	344	264	373	351	303	338	314	481
Fatal+Injury	57%	52%	51%	49%	46%	47%	46%	39%	39%	32%	35%
Volume	121,667	117,397	116,967	106,684	111,634	125,022	128,987	126,117	136,726	142,814	143,085
Crash Rate	2.07	1.83	1.76	2.28	1.79	2.19	2.07	2.11	2.23	2.34	3.39
Southbound											
Crashes	607	631	586	538	485	711	662	671	812	923	1,049
Fatal Crashes	5	5	1	4	3	3	2	1	3	2	1
Injury Crashes	339	312	294	262	228	338	286	251	271	264	338
Fatal+Injury	57%	50%	50%	50%	48%	48%	43%	38%	34%	29%	32%
Volume	126,040	117,106	117,358	105,241	114,989	123,662	132,110	122,985	137,350	141,101	140,607
Crash Rate	1.66	1.85	1.72	1.76	1.45	1.98	1.72	1.88	2.04	2.25	2.57

Table E2 – I-95 Study Segment (SR 112 to GGI) Crash Statistics (Express Lane/General Purpose)

	2013			2014			2015		
	EL	GP	EL %	EL	GP	EL %	EL	GP	EL %
	EL + GP			EL + GP			EL + GP		
Bidirectional	**Total Crashes**								
	320	1,376	19%	356	1,539	19%	545	1,915	22%
	1,696			1,895			2,460		
	Daily Volume (length-weighted average)								
	61,500	212,576	22%	63,000	220,915	22%	67,500	216,192	24%
	274,076			283,915			283,692		
	Actual Crash Rate (Crashes per million vehicle-miles)								
	1.79	2.14		1.95	2.45		2.78	3.05	
	2.13			2.29			2.99		
Northbound	**Northbound Crashes**								
	191	693	22%	214	758	22%	342	1,069	24%
	Daily Volume (length-weighted average)								
	30,000	106,726	22%	31,000	111,814	22%	33,000	110,085	23%
	Actual Crash Rate (Crashes per million vehicle-miles)								
	2.19	2.24		2.38	2.33		3.57	3.34	
Southbound	**Southbound Crashes**								
	129	683	16%	142	781	15%	203	846	19%
	Daily Volume (length-weighted average)								
	31,500	105,850	23%	32,000	109,101	23%	34,500	106,107	25%
	Actual Crash Rate (Crashes per million vehicle-miles)								
	1.41	2.22		1.53	2.46		2.03	2.74	

- There were 3,315 rear end crashes, 1,839 sideswipe crashes, 697 fixed object crashes, and 186 other crashes during a three-year period (2013-2015). The same statistics for the 2005-2007 period, were 2,285 rear end crashes, 826 sideswipe crashes, 441 fixed object crashes, and 225 other crashes.
- Approximately 18% (1,104 crashes) of the crashes occurred under wet pavement conditions during a three-year period (2013-2015) which is higher than the district-wide average of 15 percent. The same statistic for the 2005-2007 period was 16% (602 crashes). Some of the wet pavement crashes could be attributed to the new construction activity within the study segment described later.

- Approximately 34% (2,062 crashes) of the crashes occurred during night/dusk/dawn conditions during a three-year period (2013-2015), which is higher than the district-wide average of 30 percent. The same statistic for the 2005-2007 period was also 34% (1,268 crashes). The attached charts 1 and 2 show the time of day distribution of crashes for northbound and southbound directions, respectively.
- Time of day charts show higher crash frequency in the nighttime hours from 10:00 PM to 5:00 AM in the year 2015 for northbound direction. This time period typically coincides with permitted construction activity on I-95. In the southbound direction, this pattern begins with 2014 and continues into 2015. There were FDOT construction projects within the study limits in 2014 and 2015 as described later.
- The study segment has an increasing crash frequency over the past five years. **Table E3** shows that Miami-Dade County and the State of Florida also experienced increased number of crashes. Furthermore, the randomness of the annual fluctuations is also apparent in the five-year historic trends illustrated in Table E3.

Table E3 – Year over Year Fluctuation in Crashes

Year	I-95 Study Segment (south of SR 112 to south of Golden Glades	Year over year % change	Miami-Dade Countywide (Source: DHSMV Annual Crash Facts reports)	Year over year % change	Statewide (Source: DHSMV Annual Crash Facts reports)	Year over year % change
2011	1,438		42,171		228,000	
2012	1,444	0%	50,818	21%	281,340	23%
2013	1,696	17%	52,981	4%	316,943	13%
2014	1,895	12%	60,165	14%	344,170	9%
2015	2,460	30%	63,451	5%	374,342	9%

Note: DHSMV – Florida Department of Highway Safety and Motor Vehicles

- A statistical test was performed to compare the crash frequency (total and injury/fatal) for 2013-2015 and 2005-2007 three-year before and after express lane implementation.
    - There is no statistically significant difference in the number of injury and fatal crashes despite a significant increase in overall crash frequency.
    - It should be noted that the before-after comparison is not a typical application because the “after” period does not immediately follow the completion of the project. Hence, there is a larger influence of non-project variables like change in roadway conditions (e.g., age of pavement), travel patterns, new construction projects, motorist characteristics (e.g., age, driver behavior, mobile device ownership).

Timeline of Key Events during 2013-2015 potentially affecting crash patterns

Construction Activity

- September 2013 to February 2015 – SR 9A/I-95 (SB) from south of bridge over SR 922 to north of bridge over Biscayne River Canal (Section 87270000, MP 10.163 to MP 12.091) - rigid pavement rehabilitation project (FM 427515-1).
- October 2014 to December 2015 – Multiple ramps within the section of SR 9A/I-95 (SB) from Biscayne River Canal to NW 125 Street - pavement rehabilitation project (FM 427515-2).
- October 2014 to December 2015 – SR 9A/I-95 from NW 79 Street to NW 103 Street (Section 87270000, MP 7.294 to MP 8.823) - rigid pavement rehabilitation project (FM 429300-1).
- May 2015 to February 2016 – SR 9A/I-95 (SB) from NW 103 Street to north of NW 119 Street (Section 87270000, MP 8.823 to MP 10.163) - resurfacing project (FM 430790-1).
- May 2015 to February 2016 – SR 9A/I-95 (NB) from NW 103 Street to Biscayne River Canal (Section 87270000, MP 8.823 to MP 12.091) - resurfacing project (FM 430790-2).
- Additionally, 95 Express Phase 2 construction to the north of the study segment and PortMiami Tunnel construction were also ongoing during the study period.

New standard operating guidelines for express lane closure

- Initial rollout was April 2015 applicable to northbound afternoon peak period.

Probable Causes for the Observed 2013-2015 Crash Patterns

- Construction activity – the time of day distribution and nighttime crash pattern could be attributed to the construction activity. Construction activity on I-95 is typically limited to nighttime periods between 10 PM to 5 AM. Furthermore, even the crash data attributed 8% (185 crashes) of the 2015 crashes directly to work zone activity.
- Distracted driving has been designated as an Emphasis Area by the Florida Strategic Highway Safety Plan (SHSP) and is a probable cause applicable to I-95 crashes. According to the 2016 SHSP, “fatalities involving distracted driving increased 17 percent while serious injuries increased 36 percent” between 2011 and 2015.
- Aggressive driving (e.g., road rage, following too closely/tailgating, speeding, improper lane changing, lane diving, improper passing reacting to a distracted motorist). During periods of heavy congestion on I-95, there is potential driver frustration that can manifest into aggressive driving. A recent District 6 public message cites that 50% of all traffic crashes in the US are due to aggressive driving.
- Increased frequency of express lane closures during afternoon peak periods in the northbound direction.

Ongoing and Planned Countermeasures

- Periodic and targeted education campaigns by the Department
    - "Put It Down" targeting distracted driving and typically repeated annually
    - "Put It Down/Drive Sober" targeting distracted driving and impaired/aggressive driving
    - Messaging "DON'T DRIVE OVER PLASTIC POLES MINIMUM FINE $179" to inform motorists of the regulation and fine.
    - "Drive Safe" targeting aggressive driving
- Installation of new express lane markers at a spacing of 5 feet instead of the previous 10 feet to further minimize lane diving in/out of express lanes coupled with the "DON'T DRIVE OVER PLASTIC POLES MINIMUM FINE $179" message.
- Upgrade of all express lane dynamic message signs (DMS) to color DMS allowing regulatory messaging of lane closures.
- Refined the express lane closure standard operating guidelines which has resulted in improved express lane operations.

Summary

There has been an increase in the overall crash frequency and crash rate during the 2013-2015 study period compared to 2005-2007 period which could be attributed to a considerable (15%) increase in traffic volumes and significant construction activity, specifically, during 2014 and 2015. However, the historical crash data also demonstrates that the express lanes do not have an adverse effect on the I-95 facility. In fact, on average for the 2013-2015 period, the express lanes experienced a 15% lower crash rate than the general purpose lanes, thus contributing to a lower overall crash rate for the I-95 facility.

The Department should update these statistics as additional years of crash data become available. However, it is anticipated that the I-95 study segment may continue to experience higher crash frequencies due to significant upcoming construction activity in the next 5 to 10 years with the programmed FDOT projects such as the pavement rehabilitation project from NW 29 Street to NW 79 Street, I-395/I-95/SR 836 reconstruction, and Golden Glades Interchange construction projects.

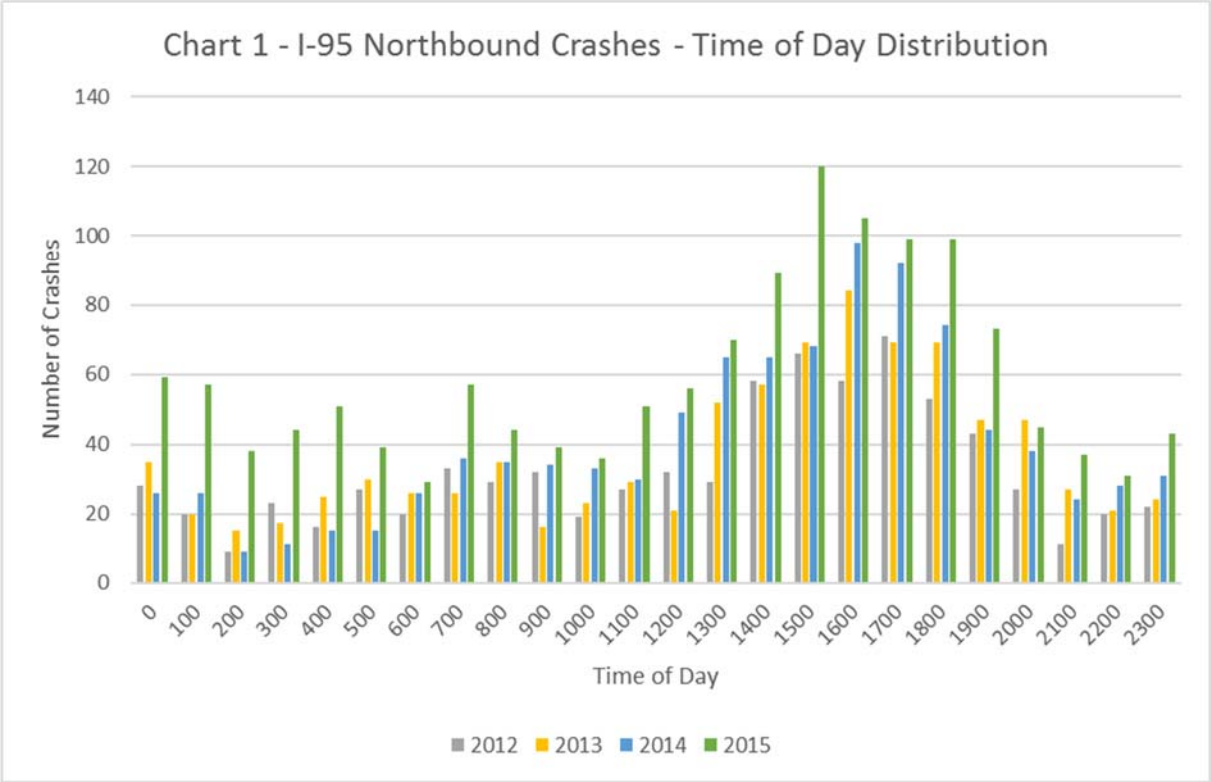

Chart 1 – Time of Day Distribution (I-95 NB Crashes)

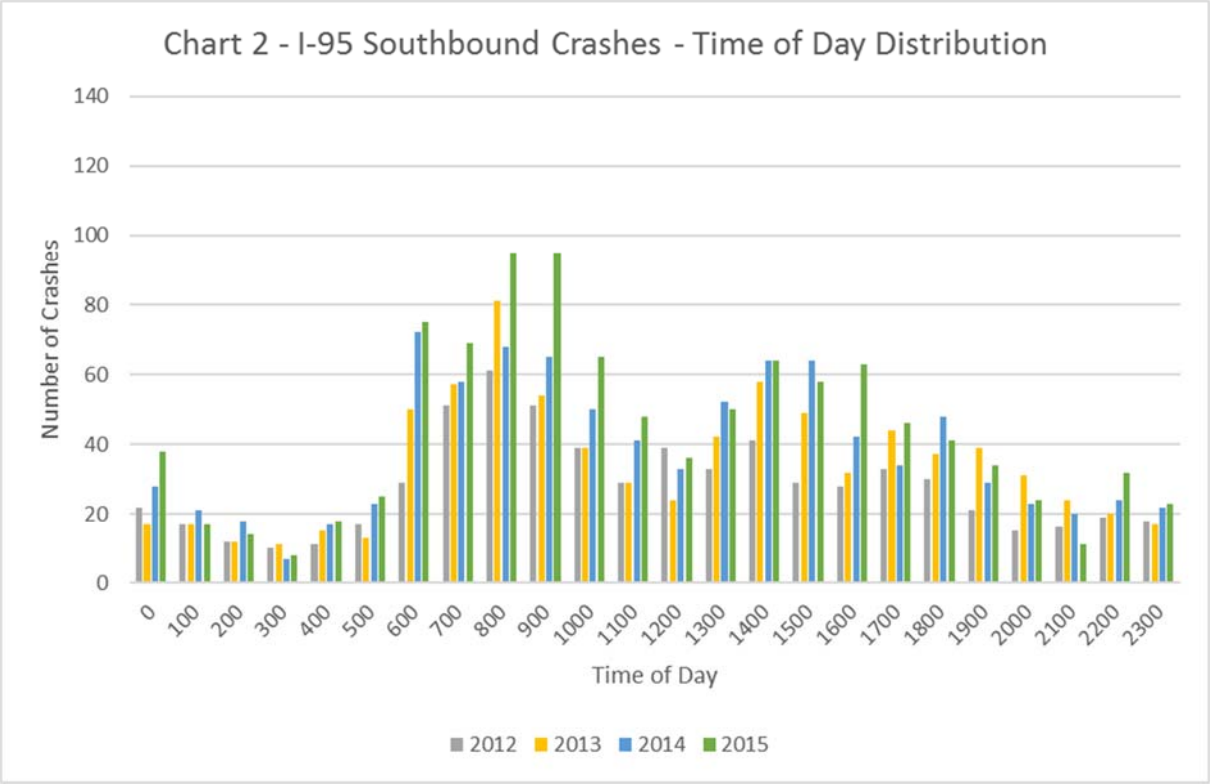

Chart 2 – Time of Day Distribution (I-95 SB Crashes)