



Kimley-Horn  
and Associates, Inc.

*EXECUTIVE SUMMARY*

US 1 CORRIDOR MODIFICATION  
EVALUATION

DELRAY BEACH, FLORIDA



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Kimley-Horn and Associates, Inc. was retained to evaluate potential changes to the lane configuration (a reduction from three travel lanes to two travel lanes) along southbound (5<sup>th</sup> Avenue) and northbound (6<sup>th</sup> Avenue) segments of US 1 between NE/SE 4th Street and NE/SE 4th Street. Prior to the temporary corridor modification, 5<sup>th</sup> Avenue operated with three through lanes southbound and 6<sup>th</sup> Avenue operated with three through lanes northbound. The corridor has been temporarily modified to include two lanes in each direction, introduce parking on both sides of the street, and modify turn lanes at the intersections along the corridor.

Speed, volume, and crash data were collected in the peak season prior to implementation of the corridor modification, and in the peak season after implementation of the lane reduction.

### ***LINK EVALUATION***

In order to compare the level of service before and after the corridor modification, traffic volumes were observed throughout the corridor in April 2007 and in February 2009, which can be considered peak season. Daily and peak hour traffic count information was obtained at mid-block locations in the corridor between NE 3<sup>rd</sup> Street and SE 2<sup>nd</sup> Street.

The overall traffic volumes were slightly lower in 2009 when compared to 2007. However, the overall time-of-day patterns did not significantly change as a result of the lane reduction. The lane reduction therefore did not significantly alter the traffic volumes or time-of-day patterns.

Per FDOT's Generalized Peak Hour Directional Service Volumes table, the LOS 'D' volume for 5<sup>th</sup> Avenue and 6<sup>th</sup> Avenue as two-lane, one-way facilities is 1,810 vehicles per hour. The maximum peak hour volume at all of the locations is less than the LOS 'D' volume; and therefore, the corridor is generally operating at an acceptable level of service.



### ***INTERSECTION VOLUMES***

In addition to roadway traffic volumes, intersection turning movement counts were conducted at signalized intersections along 5<sup>th</sup> Avenue and 6<sup>th</sup> Avenue in the study area during the AM and PM peak periods in 2007 and 2009.

The total intersection volumes were summed to determine the overall peak hour for all intersections in the study area. In 2007, the peak hours through the corridor were determined to be 8:00 AM – 9:00 AM, and 4:45 PM – 5:45 PM. In 2009, the peak hours through the corridor were determined to be 8:00 AM – 9:00 AM, and 4:30 PM – 5:30 PM.

### ***INTERSECTION EVALUATION***

The peak hour volumes at the study area intersections were analyzed using SYNCHRO software to determine the intersection level of service during the AM and PM peak hour. Levels of service were analyzed for two scenarios – the overall level of service for each intersection, and the level of service for the US 1 approaches only. The level of service and delay (in seconds) are reported for the 2007 volumes as well as the 2009 volumes.

When comparing the overall intersection level of service delay, the most significant change was an increase in delay of 5.3 seconds in the PM peak hour at the intersection of SE 1<sup>st</sup> Street and SE 6<sup>th</sup> Avenue. Some intersections saw a decrease in delay in the 2009 scenario, likely due to reduced actual traffic volumes at the intersections.

When comparing the US1 approaches only, the most significant increase in delay was 5.7 seconds at the intersection of Atlantic Avenue and SE 6<sup>th</sup> Avenue. Some approaches saw a decrease in delay in the 2009 scenario due to the decrease in volumes. The signal timings were not modified between 2007 and 2009; therefore, the changes in delay are most likely attributable to decreases in volumes, despite the corridor modifications.



### ***SPEED DATA***

The three-lane cross sections for 5<sup>th</sup> Avenue and 6<sup>th</sup> Avenue were believed to be conducive to high speeds. Speeding problems had been identified as a key factor in support of a corridor modification that would encourage slower speeds and improve the roadway for pedestrian and bicycle usage. The current posted speed limit for the area is 35 miles per hour. To determine if the effects of the corridor modification on the speeds through the corridor, speed data were collected in 2007 and in 2009 by placing pneumatic tube speed counters along the corridor. The occurrence of traffic traveling at lower speeds is greater in the 2009 scenarios at every location as shown below:

NE 5<sup>th</sup> Avenue south of NE 3<sup>rd</sup> Street - The 85<sup>th</sup> percentile speed range decreased from 42-44 mph to 36-38 mph with the lane reduction

SE 5<sup>th</sup> Avenue south of Atlantic Avenue - The 85<sup>th</sup> percentile speed range decreased from 36-38 mph to 30-32 mph with the lane reduction.

SE 5<sup>th</sup> Avenue south of SE 2<sup>nd</sup> Street - The 85<sup>th</sup> percentile speed range decreased from 42-44 mph to 36-38 mph with the lane reduction.

NE 6<sup>th</sup> Avenue south of NE 3<sup>rd</sup> Street - The 85<sup>th</sup> percentile speed range decreased from 42-44 mph to 36-38 mph with the lane reduction.

SE 6<sup>th</sup> Avenue south of Atlantic Avenue - The 85<sup>th</sup> percentile speed range decreased from 36-38 mph to 30-32 mph with the lane reduction.

SE 6<sup>th</sup> Avenue south of SE 2<sup>nd</sup> Street - The 85<sup>th</sup> percentile speed range decreased from 42-44 mph to 36-38 mph with the lane reduction.

Based on the speed data obtained, the 85<sup>th</sup> percentile is generally around the posted speed limit of 35 mph. Prior to the corridor modification, the observed operating speeds were 5 to 10 mph over the posted speed limit. Therefore, the corridor modification is resulting in lower operating speeds throughout the corridor.



### **CRASH DATA**

In order to evaluate the impact the corridor modification had on accidents within the US 1 (SR 5) corridor, KHA compared crash data for same three years as in the “US 1 Corridor Study and Conceptual Design” report with additional accident data provided by the City of Delray Beach after the temporary corridor modification was implemented. Crash data were collected between NE 4<sup>th</sup> Street and SE 4th Street along US 1.

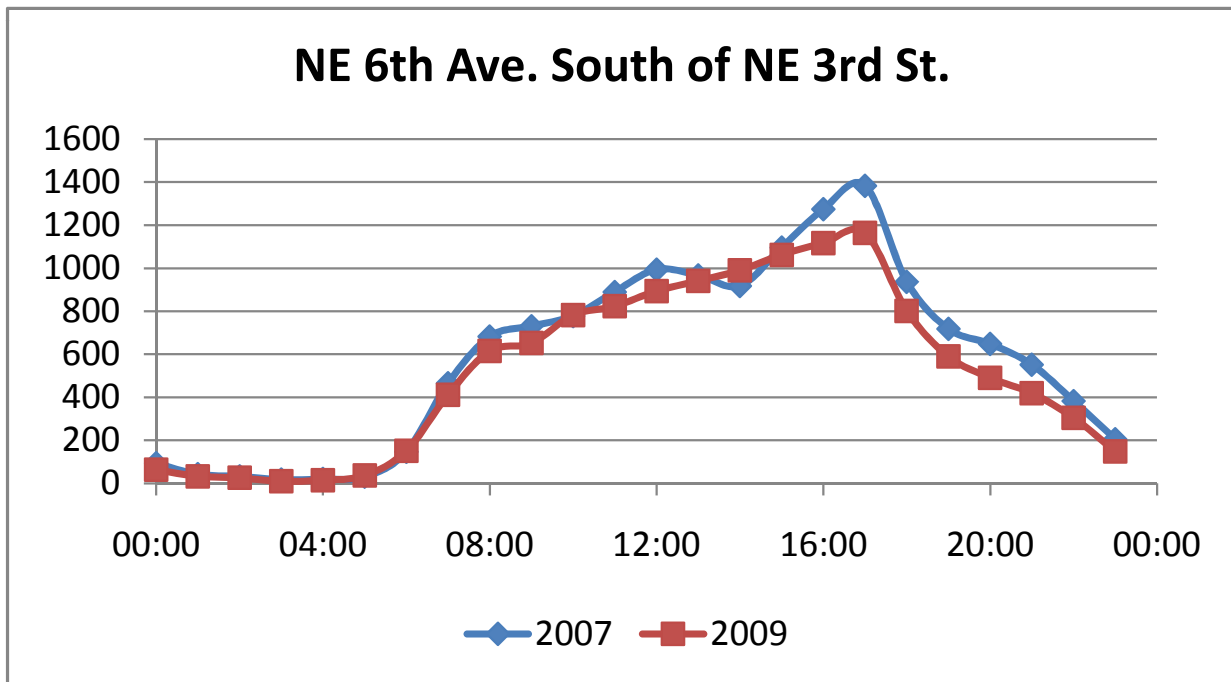
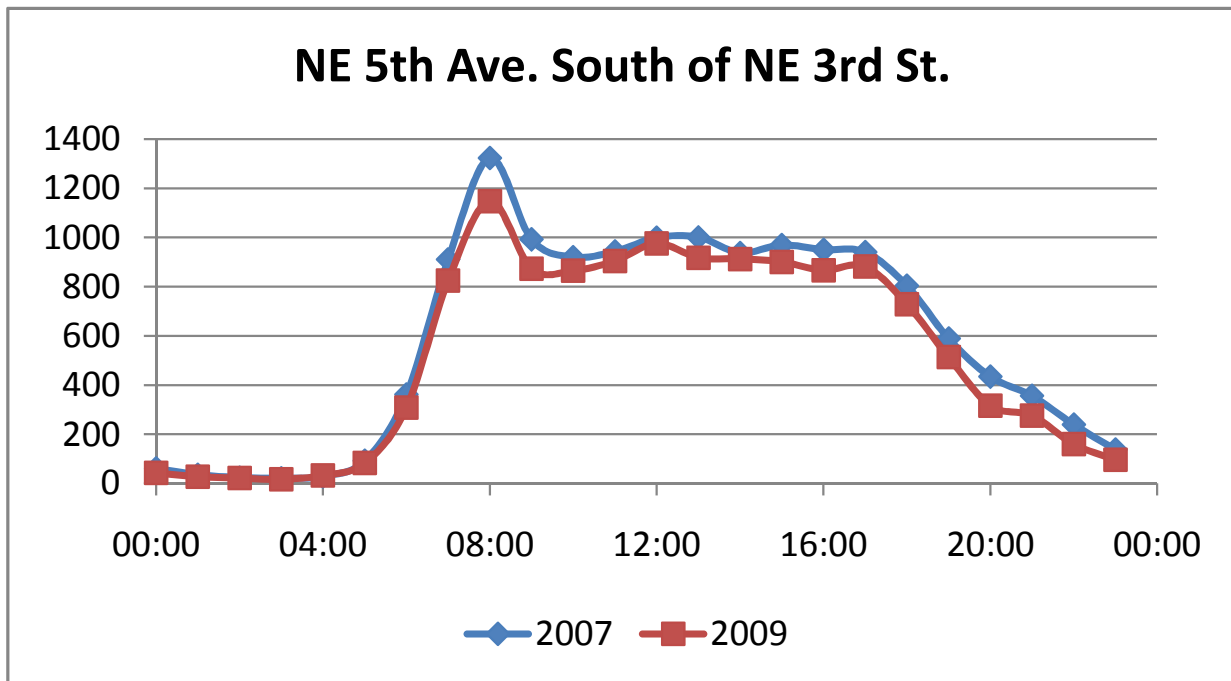
The following observations are made regarding the temporary corridor modification and its impact on crash history throughout the US 1 corridor:

- The crash history during the prior three year period had included a significant number of rear-end collisions at intersections throughout the area, attributable to the higher speeds along US 1 as well as to inattentive drivers. The reduction in speed has had a positive influence on the reduction of not only rear end accidents, but the total number of accidents as well.
- The US 1 intersections with Atlantic Avenue (East 5<sup>th</sup> Avenue and East 6<sup>th</sup> Avenue) previously experienced the highest number of accidents in the corridor which is expected based on the magnitude of traffic volumes on each approach. The reduction in speed along this segment of US 1 has resulted in a dramatic 75% reduction in the number of accidents.
- As with the prior three year analysis of traffic accident data, no fatalities were reported in the accident history for the period during the temporary corridor modification.

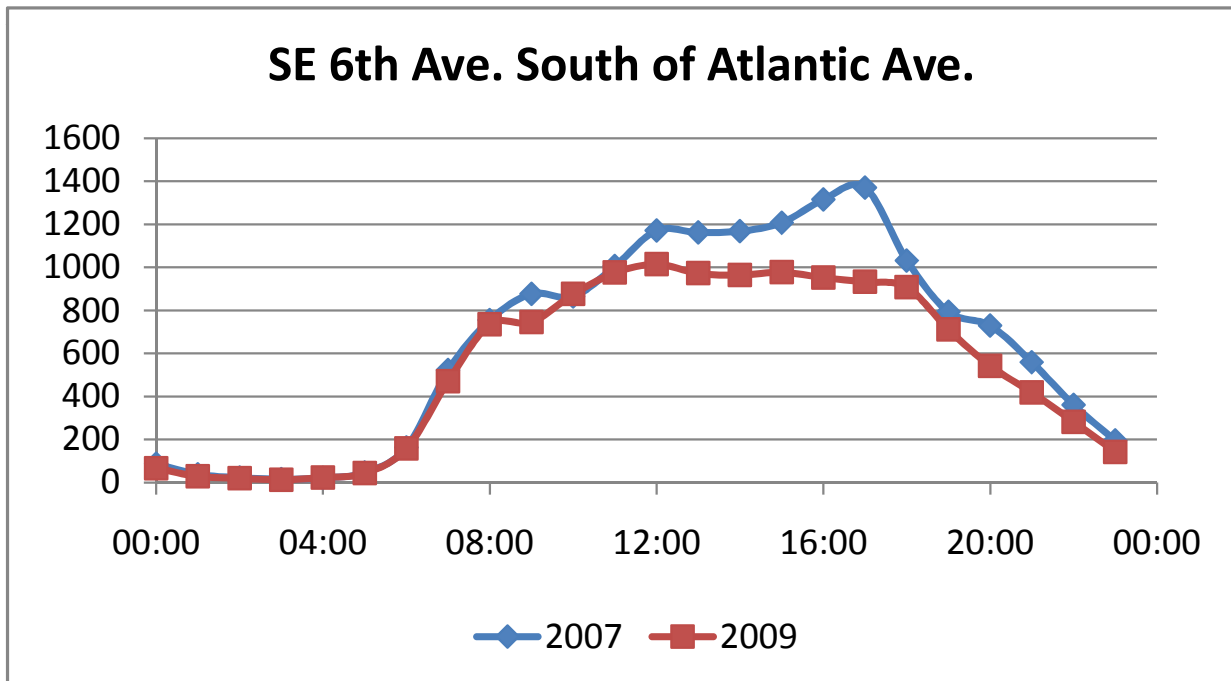
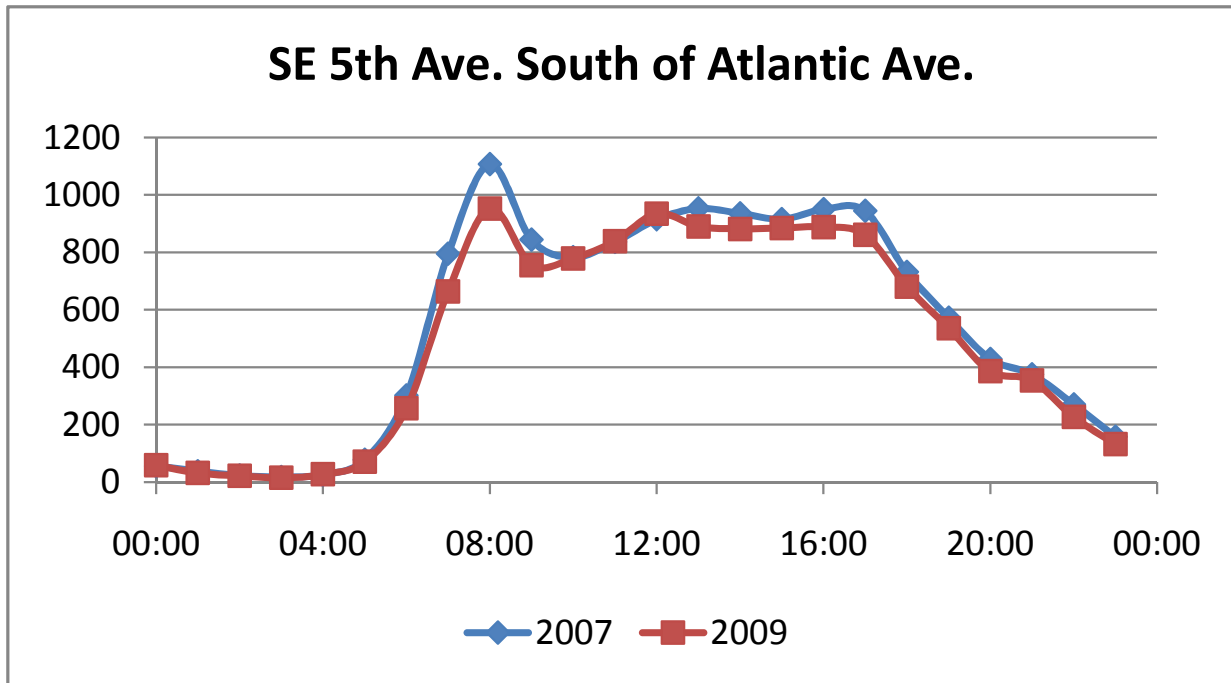
### **CONCLUSION**

The corridor modification for the US 1 one way pair within the City of Delray Beach, including the reduction from three travel lanes to two travel lanes, has resulted in slower speeds, fewer accidents and the same level of service within the US 1 corridor.

# Comparison of Hourly Volumes

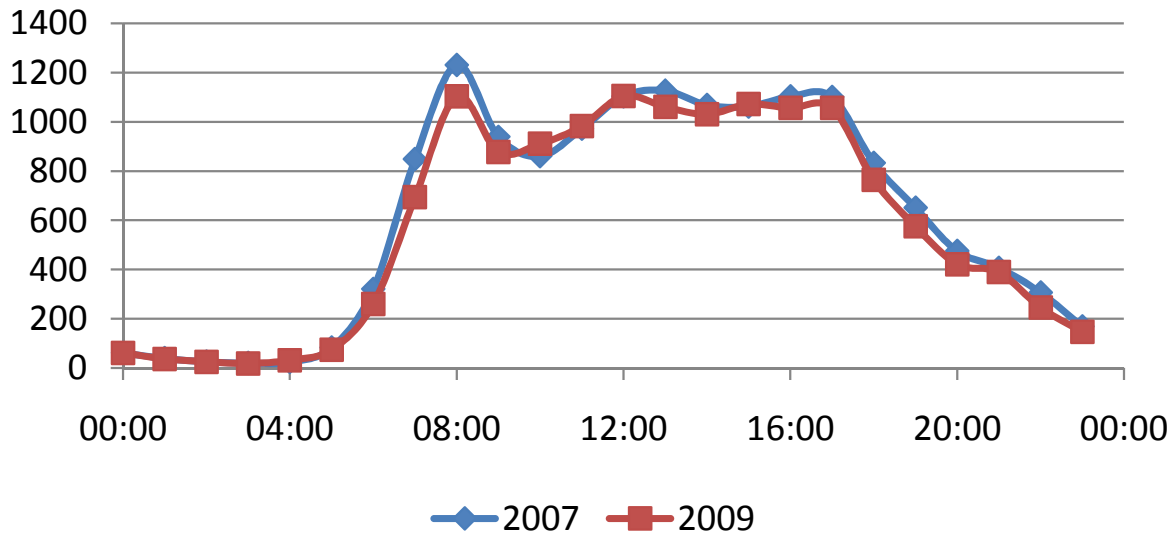


# Comparison of Hourly Volumes

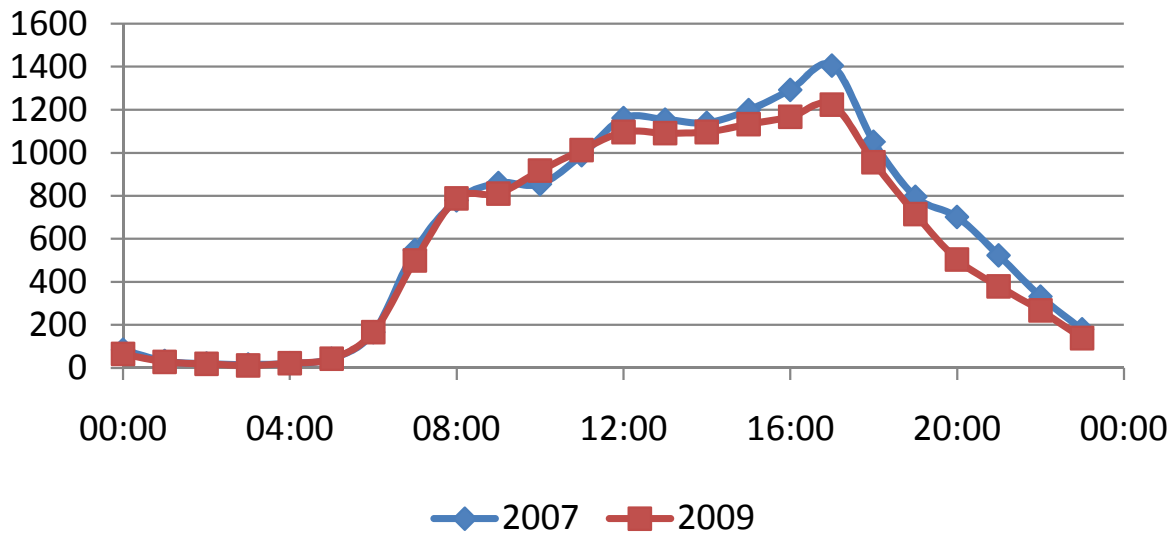


# Comparison of Hourly Volumes

## SE 5th Ave. South of SE 2nd Ave.



## SE 6th Ave. South of SE 2nd Ave.



### Level of Service Comparison

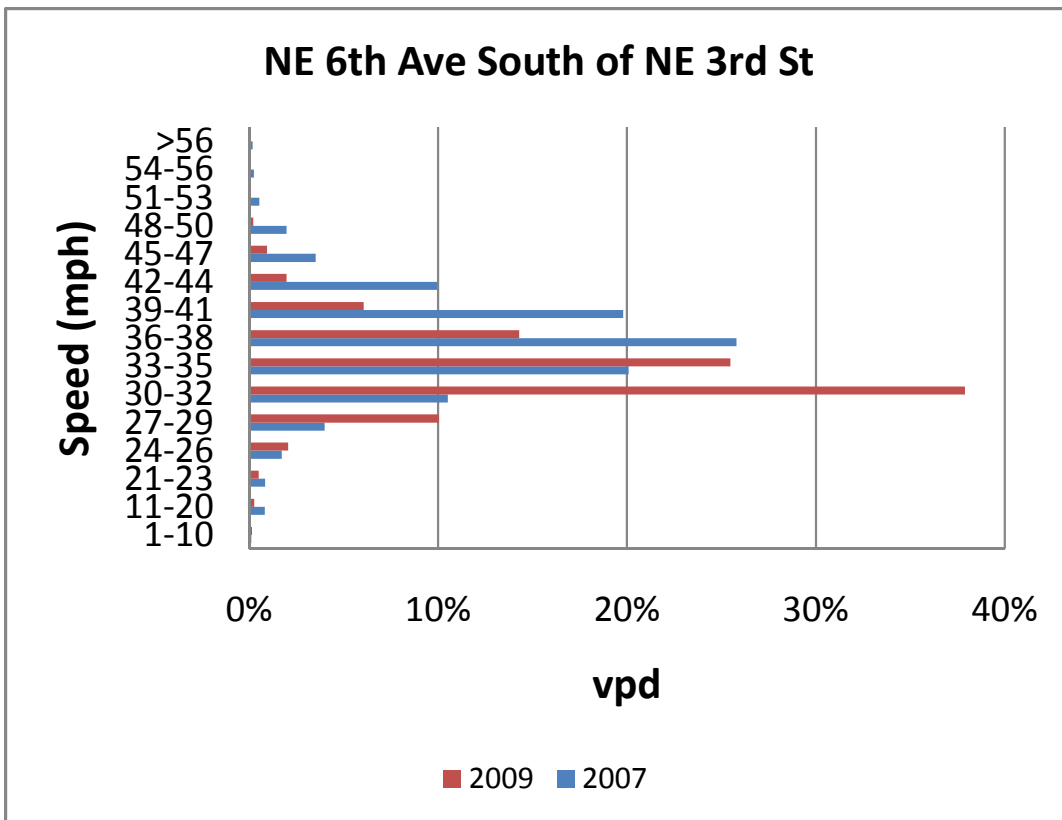
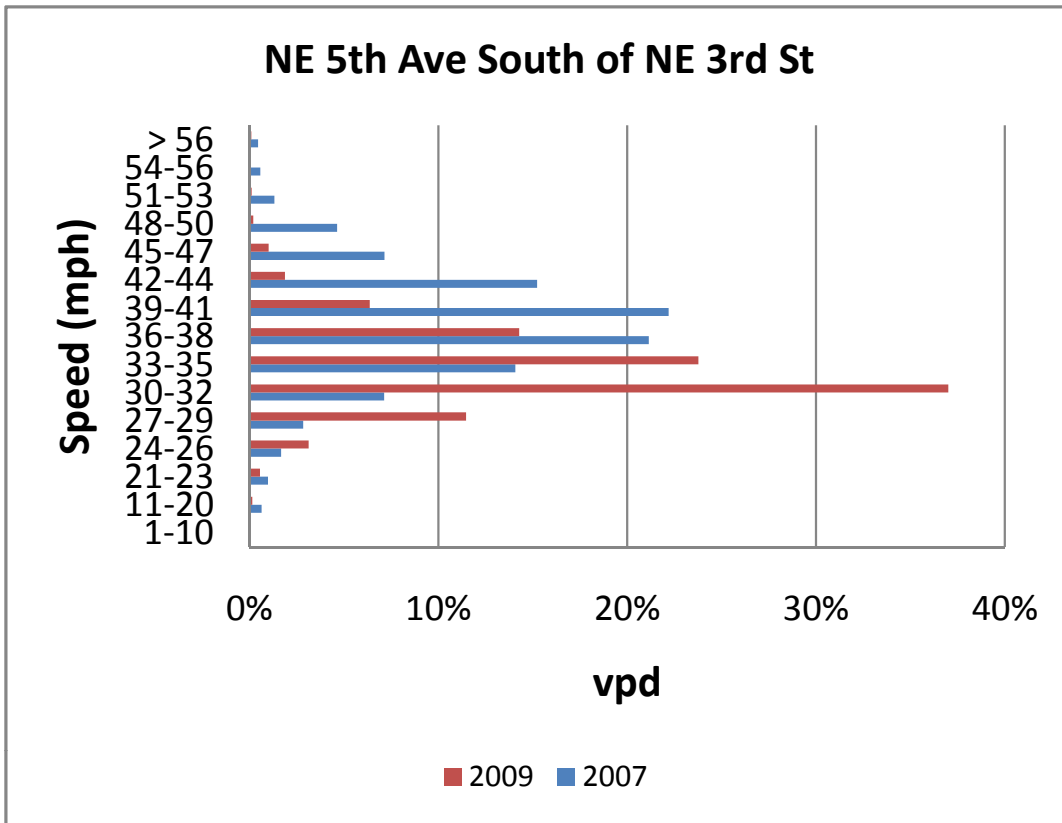
(Intersection Delay in Seconds / Level of Service)

Intersection	2007		2009		Change	
	AM	PM	AM	PM	AM	PM
NE 5th Avenue & NE 4th Street	14.2 / B	18.3 / B	15.7 / B	20.0 / B	1.5	1.7
NE 2nd Street	7.3 / A	10.6 / B	9.0 / A	10.6 / B	1.7	0.0
NE 1st Street	4.1 / A	5.4 / A	4.5 / A	5.8 / A	0.4	0.4
Atlantic Avenue	17.7 / B	15.7 / B	19.4 / B	17.7 / B	1.7	2.0
SE 1st Street	7.0 / A	8.7 / A	6.3 / A	9.2 / A	-0.7	0.5
SE 2nd Street	10.1 / B	16.3 / B	10.1 / B	15.9 / B	0.0	-0.4
NE 6th Avenue & NE 4th Street	11.5 / B	13.2 / B	13.5 / B	17.2 / B	2.0	4.0
NE 2nd Street	12.6 / B	12.2 / B	11.6 / B	11.1 / B	-1.0	-1.1
Atlantic Avenue	28.8 / C	21.0 / C	25.1 / C	23.5 / C	-3.7	2.5
SE 1st Street	9.0 / A	8.2 / A	9.9 / A	13.5 / B	0.9	5.3
SE 2nd Street	9.0 / A	8.2 / A	8.9 / A	10.0 / A	-0.1	1.8

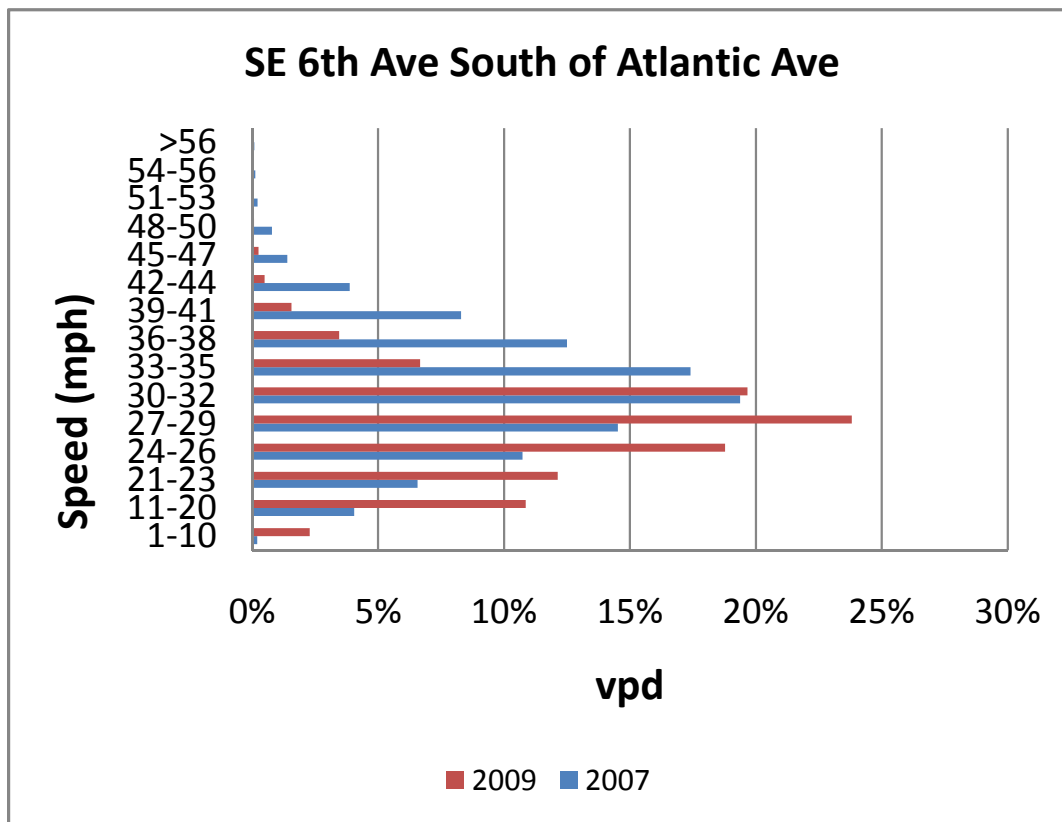
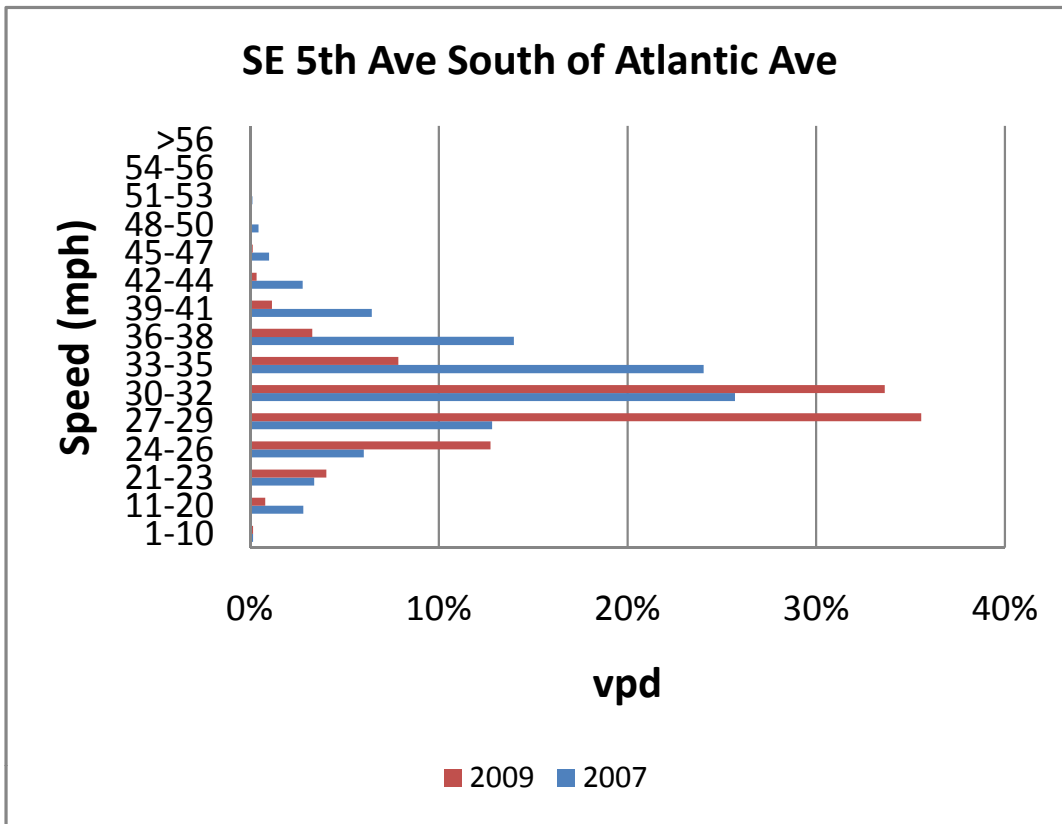
(US 1 Through Movement Delay in Seconds / Level of Service)

Intersection	2007		2009		Change	
	AM	PM	AM	PM	AM	PM
NE 5th Avenue & NE 4th Street	3.8 / A	3.9 / A	4.6 / A	5.1 / A	0.8	1.2
NE 2nd Street	1.1 / A	2.2 / A	1.6 / A	2.0 / A	0.5	-0.2
NE 1st Street	0.9 / A	1.0 / A	1.5 / A	1.0 / A	0.6	0.0
Atlantic Avenue	12.0 / B	9.9 / A	14.0 / B	11.6 / B	2.0	1.7
SE 1st Street	1.4 / A	2.0 / A	1.2 / A	1.3 / A	-0.2	-0.7
SE 2nd Street	4.3 / A	6.2 / A	3.7 / A	8.9 / A	-0.6	2.7
NE 6th Avenue & NE 4th Street	2.1 / A	9.5 / A	3.9 / A	11.0 / B	1.8	1.5
NE 2nd Street	4.4 / A	6.9 / A	3.6 / A	5.4 / A	-0.8	-1.5
Atlantic Avenue	16.4 / B	12.4 / B	9.0 / A	18.1 / B	-7.4	5.7
SE 1st Street	2.9 / A	2.8 / A	2.6 / A	2.1 / A	-0.3	-0.7
SE 2nd Street	1.9 / A	3.4 / A	2.0 / A	4.1 / A	0.1	0.7

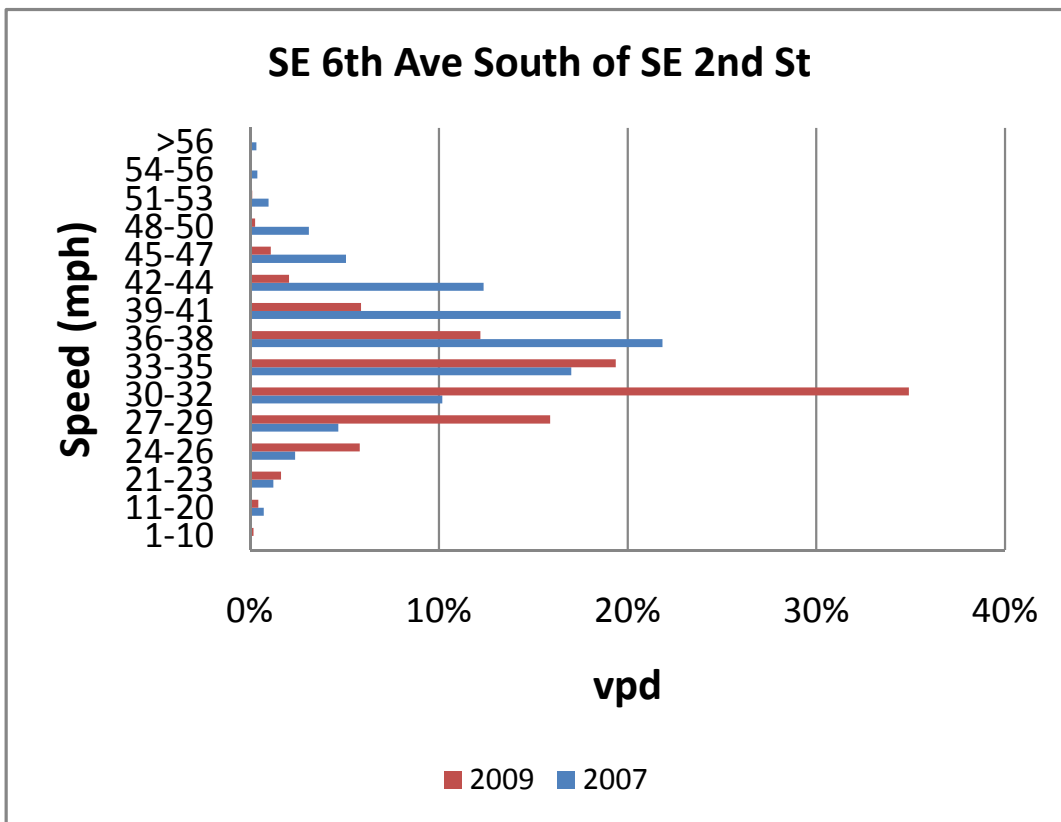
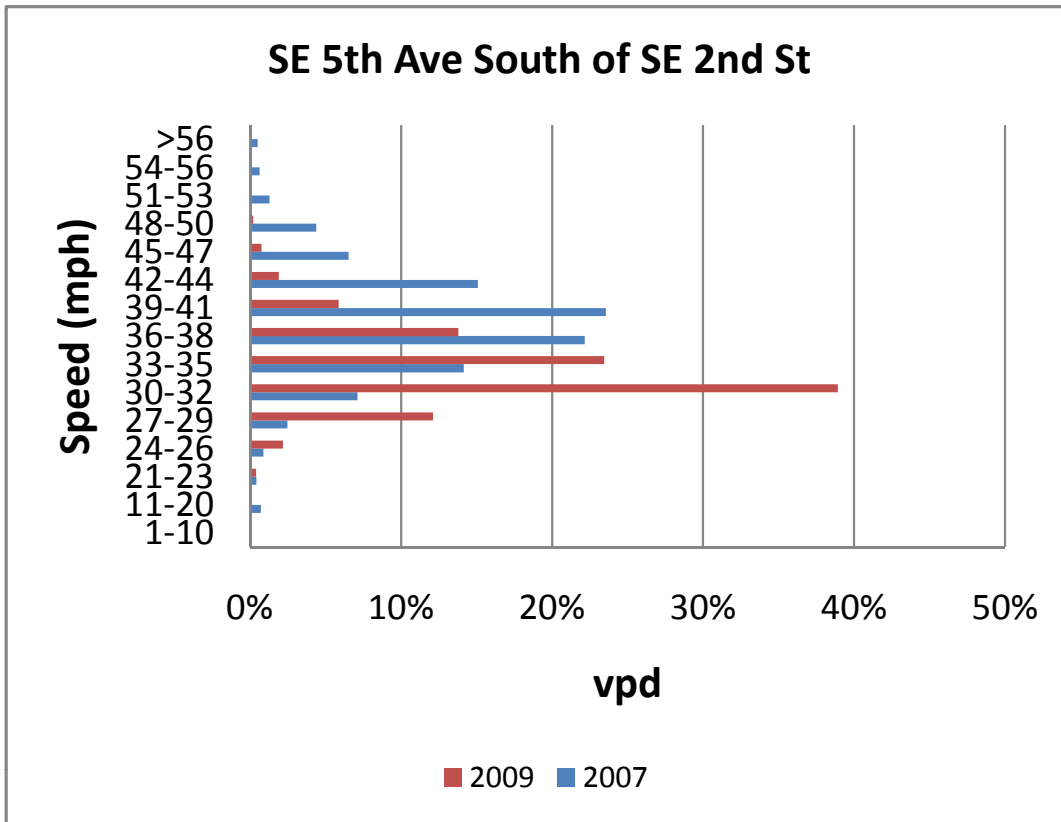
## Comparison of Speeds



# Comparison of Speeds



# Comparison of Speeds



<b>CRASH DATA SUMMARY</b>				
<b>INTERSECTION</b>		<b>No. Of Crashes</b>		
<b>N-S STREET</b>	<b>E-W STREET</b>	<b>Prior Average (Years 2001- 2003)</b>	<b>Temp Plan (April 2008- March 2009)</b>	<b>Difference</b>
NE 5 <sup>TH</sup> Avenue	NE 4 <sup>th</sup> Street	10	12	2
NE 6 <sup>th</sup> Avenue	NE 4 <sup>th</sup> Street	9	3	-6
NE 5 <sup>th</sup> Avenue	NE 3 <sup>rd</sup> Street	3	2	1
NE 6 <sup>TH</sup> Avenue	NE 3 <sup>rd</sup> Street	3	3	0
NE 5 <sup>th</sup> Avenue	NE 2 <sup>nd</sup> Street	7	7	0
NE 6 <sup>th</sup> Avenue	NE 2 <sup>nd</sup> Street	4	0	-4
NE 5 <sup>th</sup> Avenue	NE 1 <sup>st</sup> Street	3	1	-2
NE 6 <sup>th</sup> Avenue	NE 1 <sup>st</sup> Street	2	2	0
East 5 <sup>th</sup> Avenue	Atlantic Avenue	14	8	-6
East 6 <sup>th</sup> Avenue	Atlantic Avenue	21	1	-20
SE 5 <sup>th</sup> Avenue	SE 1 <sup>st</sup> Street	4	1	-3
SE 6 <sup>th</sup> Avenue	SE 1 <sup>st</sup> Street	7	4	-3
SE 5 <sup>th</sup> Avenue	SE 2 <sup>nd</sup> Street	5	4	-1
SE 6 <sup>th</sup> Avenue	SE 2 <sup>nd</sup> Street	8	0	-8
SE 5 <sup>th</sup> Avenue	SE 3 <sup>rd</sup> Street	1	2	1
SE 6 <sup>th</sup> Avenue	SE 3 <sup>rd</sup> Street	1	0	-1
SE 5 <sup>th</sup> Avenue	SE 4 <sup>th</sup> Street	5	3	-2
SE 6 <sup>th</sup> Avenue	SE 4 <sup>th</sup> Street	6	3	-3
	Annual Totals	107	56	-51