Spot Safety Project Evaluation

Spot Safety Project # 05-97-211

Spot Safety Project Evaluation for Installation of Traffic Signal with Protected-Permitted Left-Turn Phase for Southbound SR 1005 (Six Forks Road)

SR 1005 (Six Forks Road) at Wind Chime Court/Chesterbrook Road
Wake County

Documents Prepared By:

AECOM Technical Services of North Carolina, Inc.

For:

Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator

Heath Gore, PE

Heath, Gore, PE
AECOM

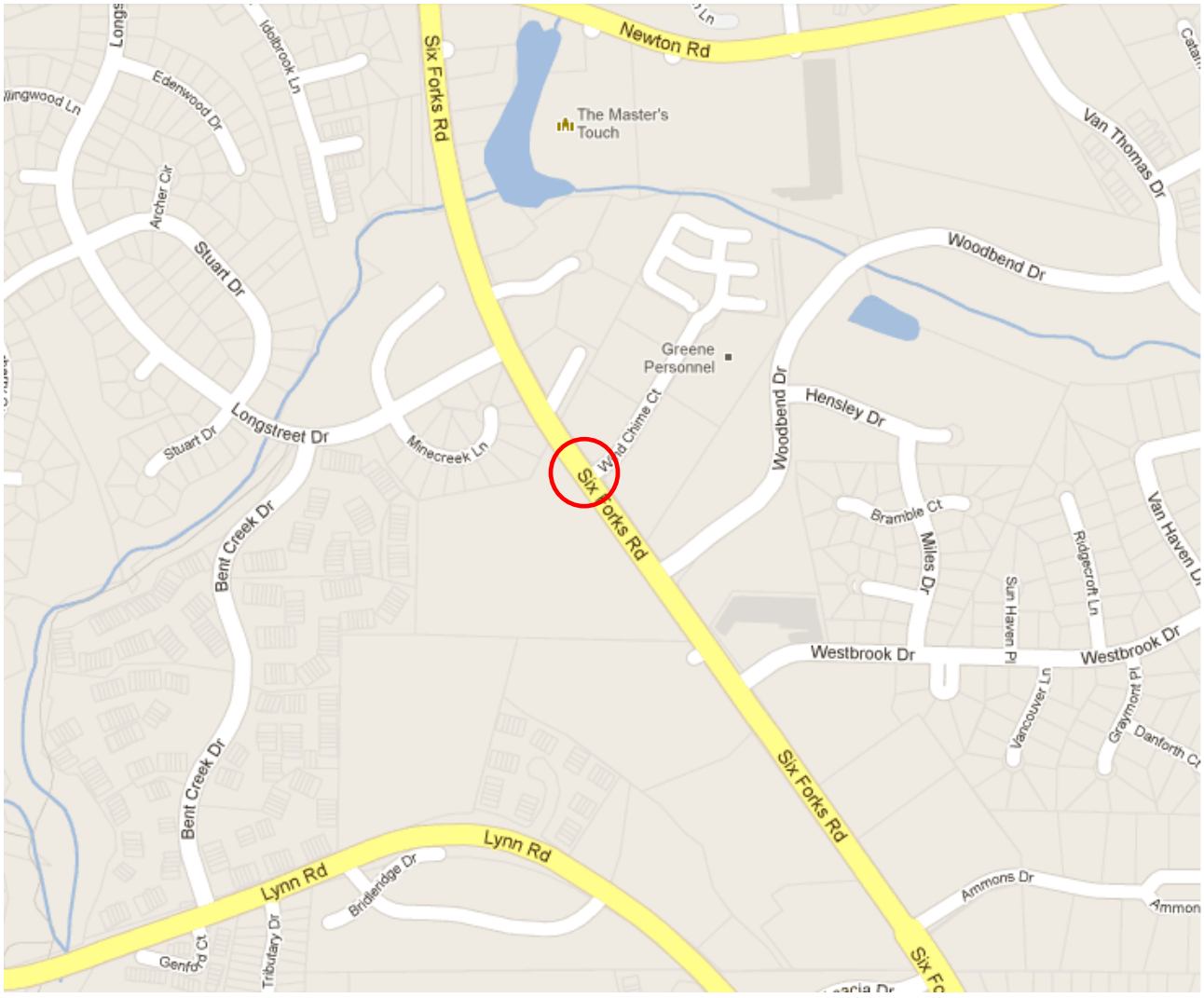
3-18-2013
Date

Spot Safety Project Evaluation Documentation

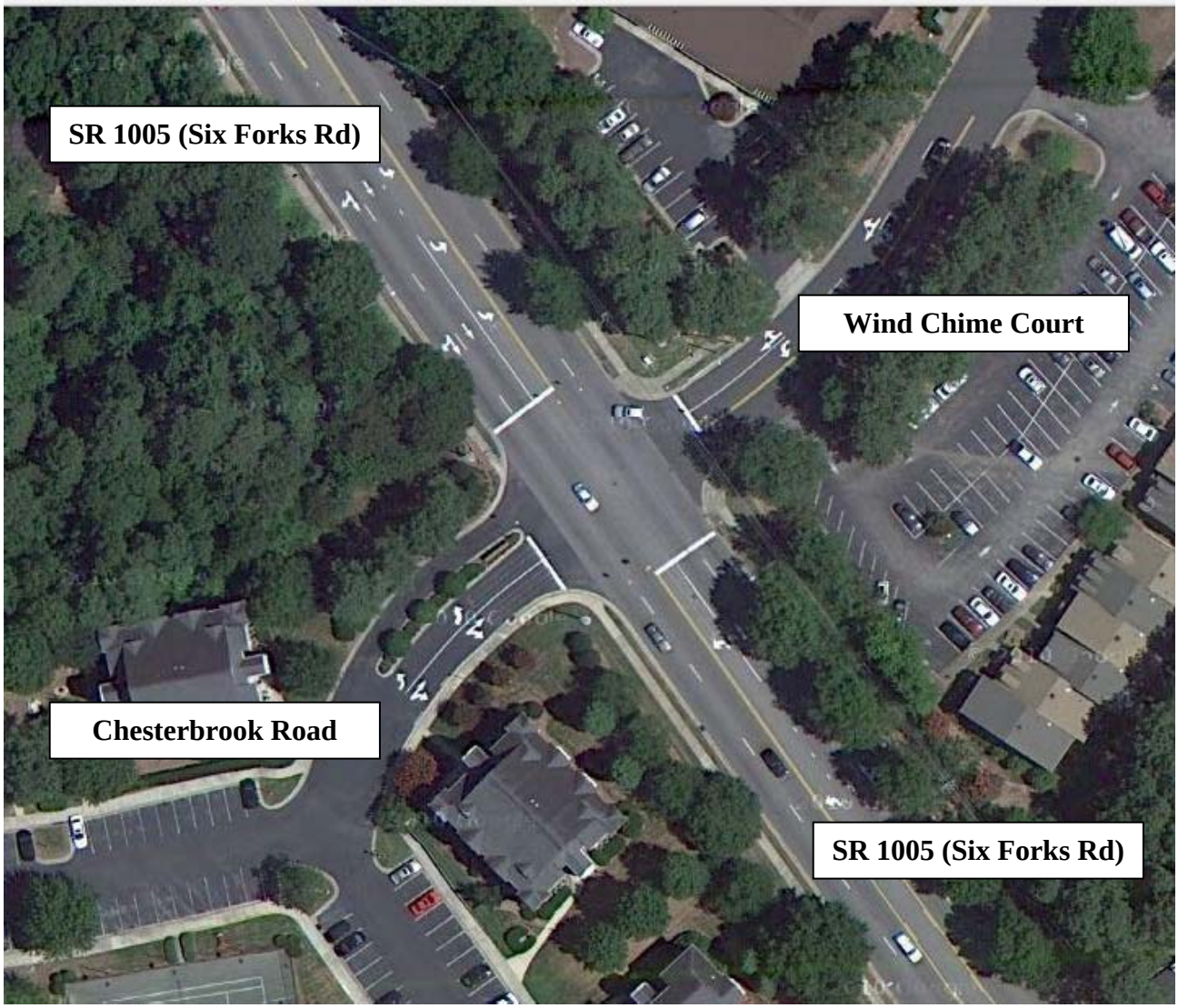
Subject Location

Evaluation of Spot Safety Project Number 05-97-211 located at the Intersection of SR 1005 (Six Forks Road) at Wind Chime Court/Chesterbrook Road in the City of Raleigh, Wake County.

The Sig ID is 05-2277 for this 3-Phase Actuated Traffic Signal.



Location Map Provided from Google Maps



Aerial Map Provided from Google Maps

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a traffic signal with protected-permitted left-turn phasing for the southbound approach of SR 1005 (Six Forks Road).

SR 1005 (Six Forks Road) is a four-lane undivided facility with a two-way left-turn lane on both approaches and a speed limit of 45 mph. Wind Chime Court is a small development driveway with a speed limit of 25 mph. Chesterbrook Road is an apartment complex driveway with a speed limit of 25 mph.

The original statement of problem was due to the high traffic volumes on SR 1005 (Six Forks Road), vehicles on Wind Chime Court and Chesterbrook Road cannot cross or enter safely. Also, the westbound left-turns from Wind Chime Court are often delayed. The initial crash analysis was completed from October 1, 1999 to September 30, 2004 with ten (10) total reported crashes, of which there were 2 angle and 2 left-turn different roadway crashes. The final completion date for the improvement at the subject intersection was on April 3, 2008 with a total cost of $105,550.00.

Naive Before and After Analysis

After reviewing the spot safety project file folder along with all the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period were the months of February through April 2008. The before period consisted of reported crashes from May 1, 2003 through January 31, 2008 (4 years 9 months); and the after period consisted of reported crashes from May 1, 2008 through January 31, 2013 (4 years 9 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection for the SR 1005 (Six Forks Road) and Wind Chime Court/Chesterbrook Road approaches. *Please see attached location map and aerial map for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes were the target crashes for the applied countermeasure. The Frontal Impact Crash Types considered are as follows: Left-turn, same roadway; left-turn, different roadways; Right-turn, same roadway; Right-turn, different roadways; Head-on; and Angle.

Treatment Information	**Before**	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	12	18	+ 50.0 %
Total Severity Index	4.08	3.06	- 25.0 %
Target Crashes	5	5	0.0 %
Target Crash Severity Index	3.96	2.48	- 37.4 %
Volume (2005, 2010)	37,000	35,000	- 5.4 %

Injury Crash Summary	**Before**	**After**	**Percent Reduction (-) Percent Increase (+)**
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	2	2	0.0 %
Class C Injury Crashes	3	3	0.0 %
Property Damage Only	7	13	+ 85.7 %

The naive before and after analysis at the treatment location resulted in a 50 percent increase in Total Crashes, a 0 percent reduction in Target Frontal Impact Crashes, and a 25 percent reduction in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2010.

To further analyze the intersection crash patterns, the following chart shows different traffic movements and the change in crash totals through the study:

Additional Information	**Before**	**After**	**Percent Reduction (-) Percent Increase (+)**
EB Frontal Impact Crashes (Target)	0	1	+ 100.0 %
WB Frontal Impact Crashes (Target)	5	2	- 60.0 %
NB Frontal Impact Crashes (Target)	0	1	+ 100.0 %
SB Frontal Impact Crashes (Target)	0	1	+ 100.0 %
Rear End Slow or Stop – NB Approach	2	5	+ 150.0 %
Rear End Slow or Stop – SB Approach	3	5	+ 66.7 %

Results and Discussion

Referencing the *Collision Diagrams*, the overall target crashes (Frontal Impact) remained the same from the before period to the after period; however, the crashes from the individual approaches varied.

From the additional information chart above, the eastbound, northbound, and southbound target crashes increased from zero (0) to one (1) crash. The westbound target crashes from Wind Chime Court decreased from five (5) to two (2) crashes. While the westbound target crashes decreased during the after period, the total target crashes remained the same. The installation of the traffic signal benefits the westbound approach; however, it increases the target crashes on all of the other approaches.

The overall after period experienced an increase in rear end crashes from five (5) to ten (10). The northbound approach experienced a 150 percent increase of rear end crashes and the southbound approach experienced a 67 percent increase of rear end crashes. The installation of the traffic signal has increased the number of rear-end crashes at this intersection.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all four approaches to the treatment intersection. As the Safety Evaluation Group completes additional spot safety reviews for this type of countermeasure, we will be able to provide objective and definite information regarding actual crash reduction factors for this type of intersection.

Treatment Site Photos from Google Street View

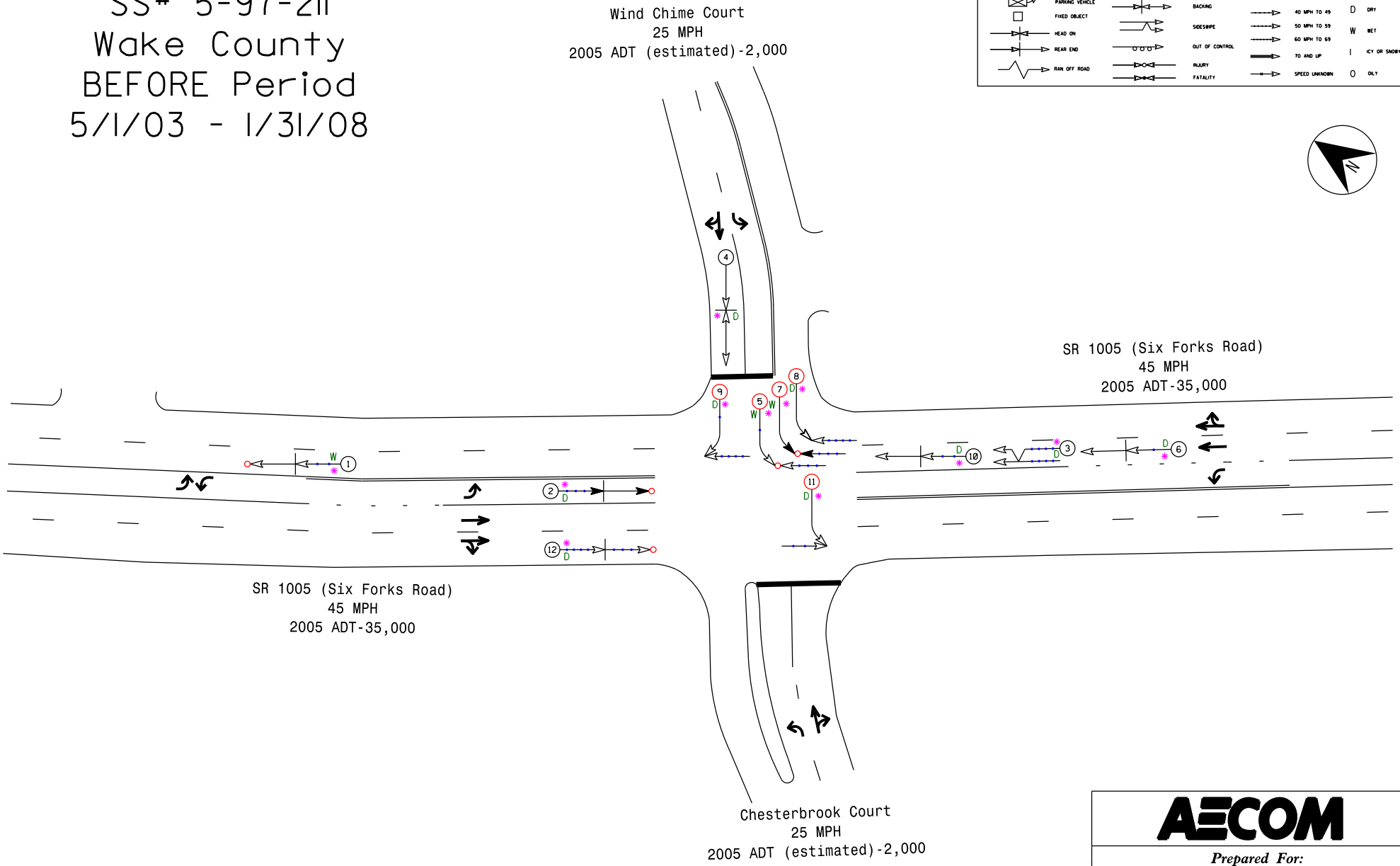
Google Maps (Image Date: 10/11) – Looking North on SR 1005 Approach

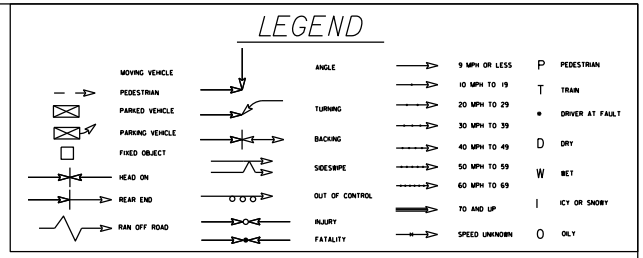
Google Maps (Image Date: 10/11) – Looking South on SR 1005 Approach

Google Maps (Image Date: 10/11) – Looking West on Wind Chime Court Approach

Google Maps (Image Date: 10/11) – Looking East on Chesterbrook Road Approach

SS# 5-97-211
Wake County
BEFORE Period
5/1/03 - 1/31/08





Frontal Impact Crashes

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Prepared For:
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 3-18-2013

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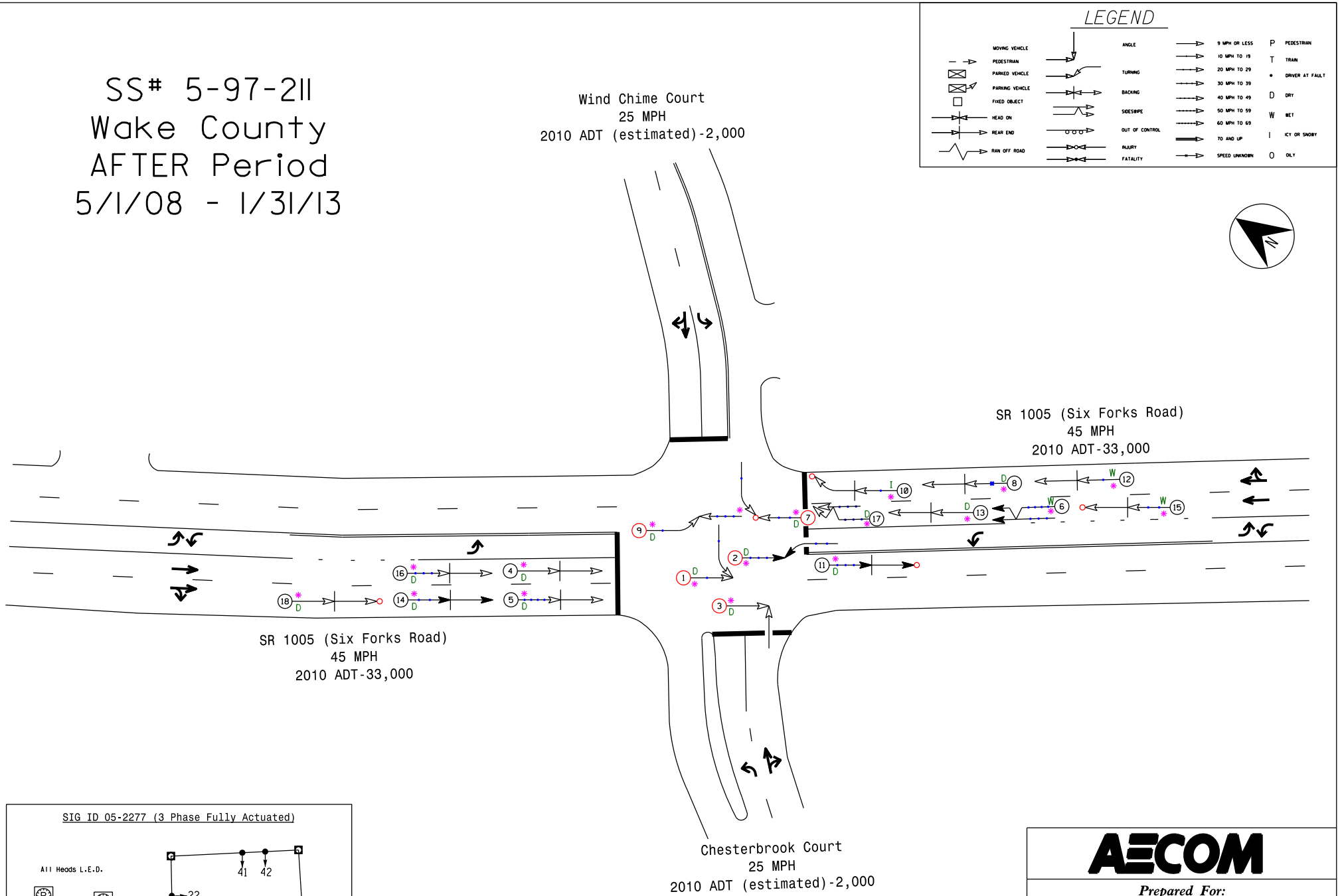
SS# 5-97-211
Wake County
AFTER Period
5/1/08 - 1/31/13



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