

Spot Safety Project Evaluation

Spot Safety Project # 12-05-205

**Spot Safety Project Evaluation of the Addition of a Westbound Protected/Permitted Left-Turn Phase
SR 1100 (Brawley School Rd.) at SR 1109 (Williamson Rd.)
Iredell County**

Documents Prepared By:
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for
Safety Evaluation Group
Traffic Safety Systems Management Section
Transportation Mobility and Safety Division
North Carolina Department of Transportation

Principal Investigator



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Transportation Designer

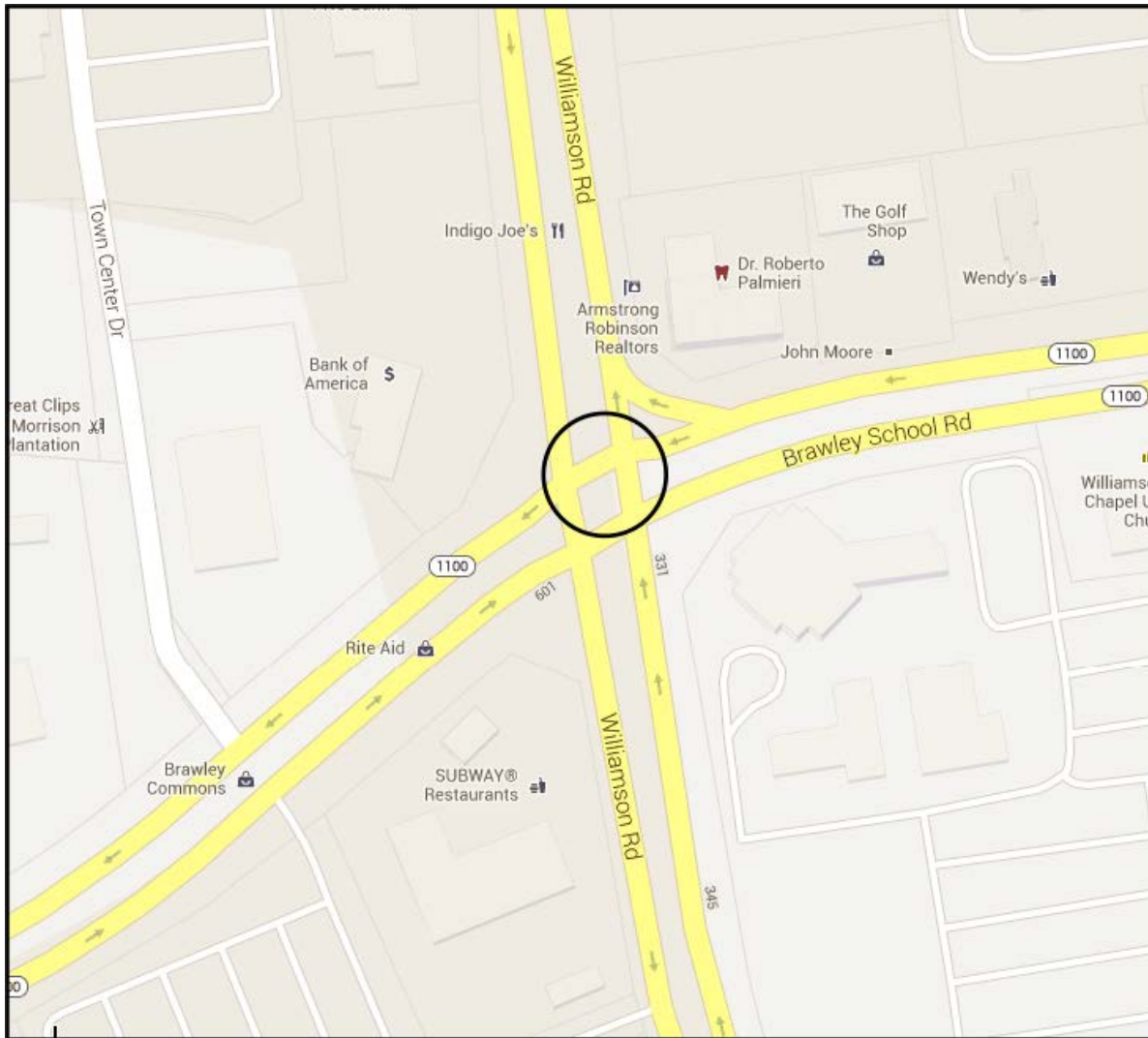
8-15-2013
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-05-205 located at the Intersection of SR 1100 (Brawley School Road) at SR 1109 (Williamson Road) in Iredell County.

The Sig ID is 12-1062 for this 8-Phase Fully Actuated Traffic Signal.





Aerial 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 addition of a protected/permitted left-turn phase for the westbound approach.

SR 1100 is a 2-lane road with a two-way left-turn lane west of the subject intersection. The road widens on both the eastbound and westbound approaches to include left-turn lanes at the intersection. SR 1109 is a two-lane road with a two-way left turn lane south of the subject intersection. The road widens to include exclusive left-turn lanes on both the northbound and southbound approaches. The speed limit on both SR 1100 and SR 1109 is 45-mph. The subject location was signal controlled with a 4-phase signal.

The original statement of problem was the presence of westbound left-turn, same roadway collisions. The initial crash analysis was completed from December 1, 1999 to November 30, 2004

with fifty-two (52) reported crashes. The final completion date for the improvement at the subject intersection was on August 25, 2008 with a total cost of \$23,000.00.

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 July through September 2008. In addition, crash reports showed that there was construction un-related to this spot safety improvement during the months of June through September 2011. Therefore, that period was also omitted from this analysis in order to prevent including crashes that were caused by the construction. As a result of this omission, the before and after periods are shorter than normal. The before period consisted of reported crashes from November 1, 2005 through June 30, 2008 (2 years, 8 months); and the after period consisted of reported crashes from October 1, 2008 through May 31, 2011 (2 years, 8 months).

The treatment data consisted of all crashes within 150 feet of the subject intersection for the SR 1100 and SR 1109 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 Westbound Left turn, same roadway crashes were the target crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	41	32	- 22.0 %
Total Severity Index	3.35	2.39	- 28.7 %
Target Crashes	9	1	- 88.9 %
Target Crash Severity Index	3.47	8.40	+ 142.1 %
Volume (2007, 2010)	43,000	40,300	- 6.3 %

<u>Injury Crash Summary</u>	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	1	2	+100.0 %
Class C Injury Crashes	12	4	- 66.7 %
Property Damage Only	28	26	- 7.1 %

The naive before and after analysis at the treatment location resulted in a 22 percent decrease in Total Crashes, an 88.9 percent decrease in Target Westbound Left-Turn Same Direction Crashes, and a 28.7 percent decrease in the Total Severity Index. The before period ADT year was 2007 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:

<u>Additional Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Left Turn, Same Roadway	12	4	- 66.7 %
Northbound Approach Rear End Crashes	6	5	- 16.7 %
Southbound Approach Rear End Crashes	2	5	+ 150.0 %
Eastbound Approach Rear End Crashes	11	6	- 45.5 %
Westbound Approach Rear End Crashes	4	4	0.0 %

Results and Discussion

Referencing the *Collision Diagrams*, the target crashes experienced an 88.9 percent decrease in westbound left-turn same roadway collisions. The target crash severity index saw an increase of 142.1 percent. However, there was only one target crash in the after period. Class B injury crashes increased by 100.0 percent, while Class C injury crashes decreased by 66.7 percent.

From the additional information chart above, the number of left turn, same roadway crashes decreased from twelve (12) to four (4).

On the southbound approach of the intersection, the rear end crashes increased from two (2) to five (5) throughout the evaluation period. On the northbound and eastbound approaches, however, there were decreases of 16.7 percent and 45.5 percent, respectively. The number of eastbound rear-end collisions that occurred in the channelized right-turn lane remained the same with five (5) crashes in both the before and after periods.

As noted earlier in this report, due to the construction that occurred at this intersection from approximately June through September of 2011, the crashes from that time period were omitted and the before and after study periods were adjusted. In addition to the before and after analysis presented above, a second “after” analysis was performed to identify any crash patterns that may have developed as a result of the widening of Brawley School Road and the addition of multiple turn lanes at the intersection. As shown on the “*After Period (2)*” *Collision Diagram*, the intersection has been widened to include, among other things, dual left-turn lanes on all four approaches and dual right-turn lanes on the southbound approach. The signal now operates with protected-only left-turn phases on all approaches. The second after period consisted of reported crashes from October 1, 2011 through June 30, 2013 (1 year, 9 months). The ending date for this analysis was determined by the date of available crash data at the time of analysis. For the second after period analysis, there was no target crash assumed since the original countermeasure had already been implemented. The results of the analysis are shown in the tables below:

<u>Treatment Information</u>	After (2)
Total Crashes	43
Total Severity Index	2.20
Volume (2012)	42,300

There were forty-three (43) total crashes during the second after period and the severity index was 2.20 for this time period.

To further analyze the intersection crash patterns, the following table shows different traffic movements and the number of crashes for each:

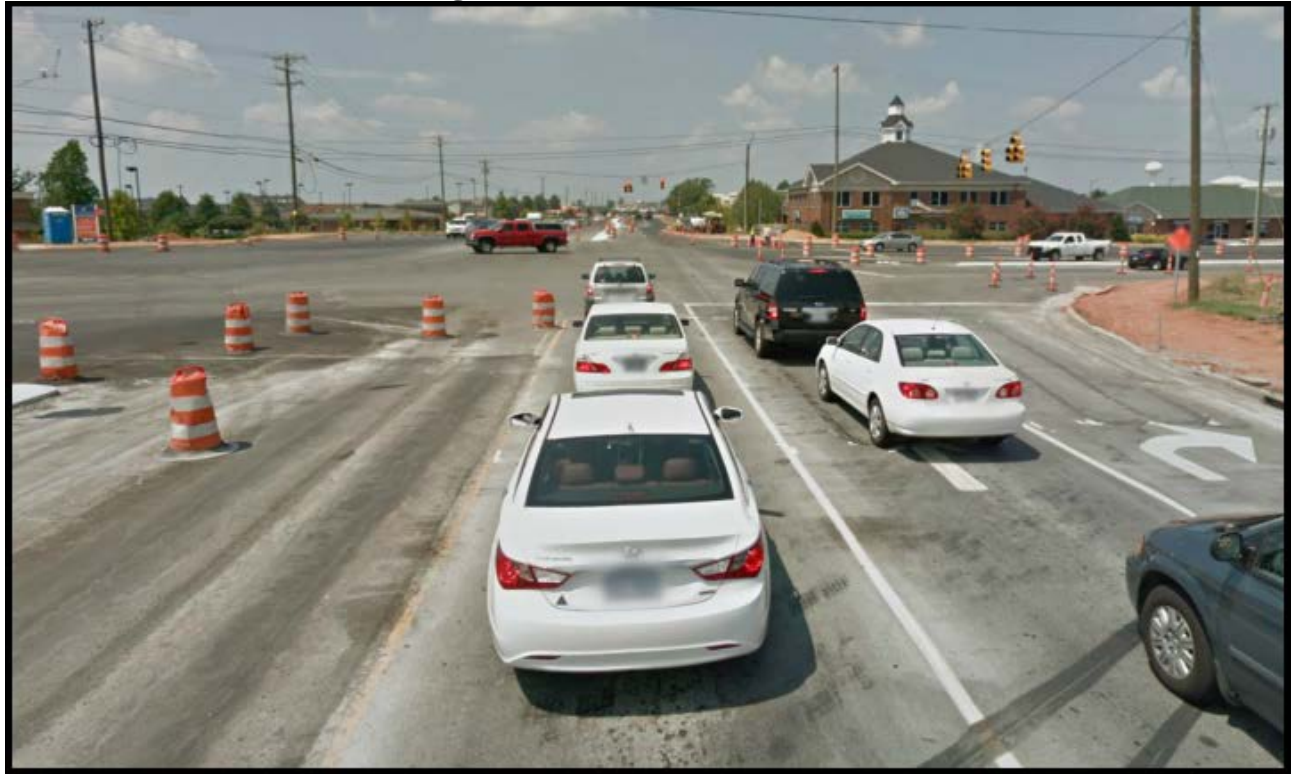
<u>Additional Information</u>	After (2)
U-turn Related Crashes	5
Sideswipe	5
Northbound Approach Rear End Crashes	8
Southbound Approach Rear End Crashes	3
Eastbound Approach Rear End Crashes	11
Westbound Approach Rear End Crashes	6

From the additional information shown above, there were five (5) sideswipe collisions during the second after period. Additionally, there were five (5) collisions that were related to u-turn movements. One (1) of those was also considered a sideswipe crash.

There were eight (8) rear-end collisions on the northbound approach and three (3) rear-end collisions on the southbound approach. Of the eight (8) rear-end crashes on the northbound approach, seven (7) of them occurred in the inside through lane. There were eleven (11) rear-end collisions on the eastbound approach, nine (9) of which occurred in the channelized right-turn lane. There were six (6) rear-end crashes on the westbound approach, five (5) of which occurred in the channelized right-turn lane.

Please see the attached *Treatment Site Photos*. Photos are provided from Google Street View for all three 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 (July 2011) – Looking North on SR 1109



Google Maps (September 2012) – Looking West on SR 1100



Google Maps (July 2011) – Looking South on SR 1109

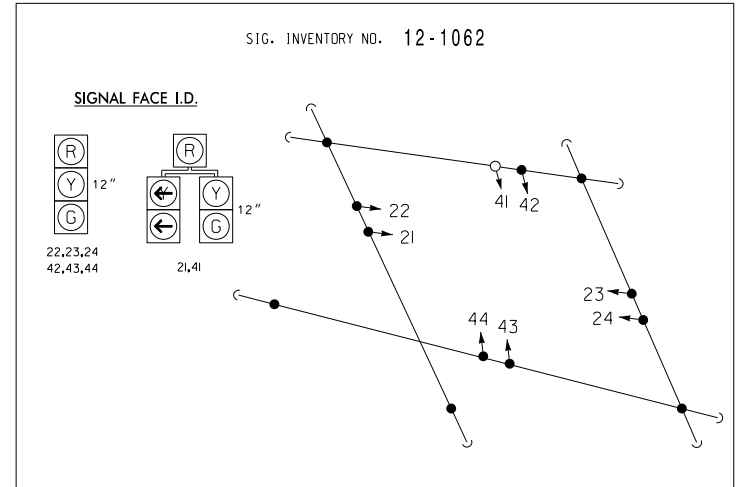
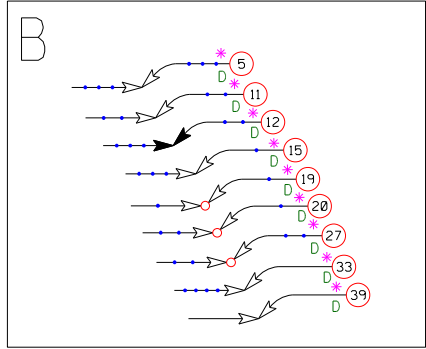
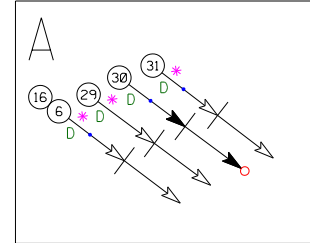
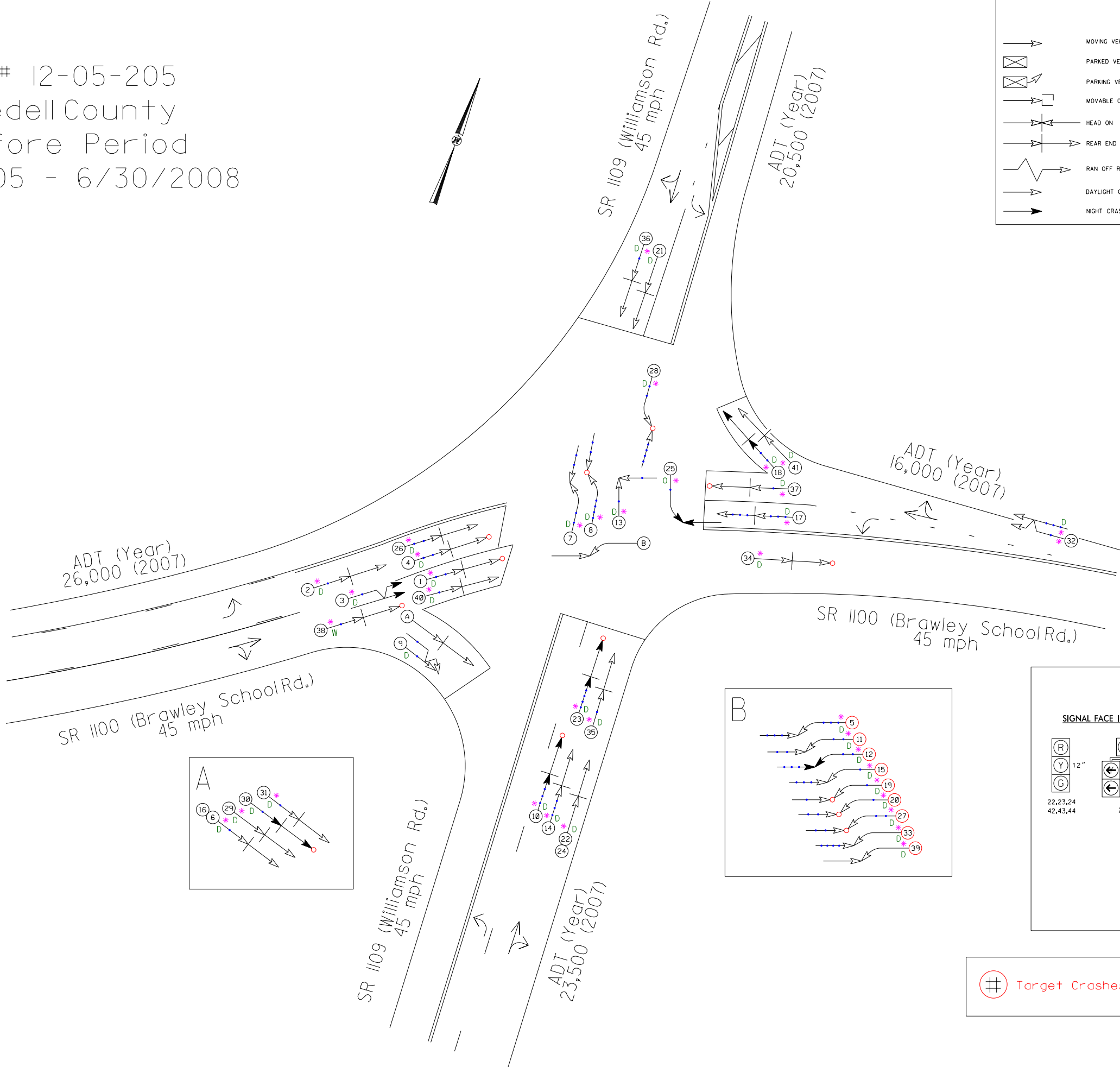


Google Maps (September 2012) – Looking East on SR 1100

SS# 12-05-205
 Iredell County
 Before Period
 11/1/2005 - 6/30/2008



LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		A ANIMAL
	PARKED VEHICLE		10 MPH TO 19		P PEDESTRIAN		B BICYCLE
	PARKING VEHICLE		20 MPH TO 29		T TRAIN		* DRIVER AT FAULT
	MOVABLE OBJECT		30 MPH TO 39		D DRY		W WET
	HEAD ON		40 MPH TO 49		I ICY OR SNOWY		O Other
	REAR END		50 MPH TO 59		INJURY		
	RAN OFF ROAD		60 MPH TO 69		FATALITY		
	DAYLIGHT CRASH		70 AND UP		SPEED UNKNOWN		
	NIGHT CRASH						



Target Crashes

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 TRANSPORTATION MOBILITY and
 SAFETY DIVISION

Date: 8/16/2013

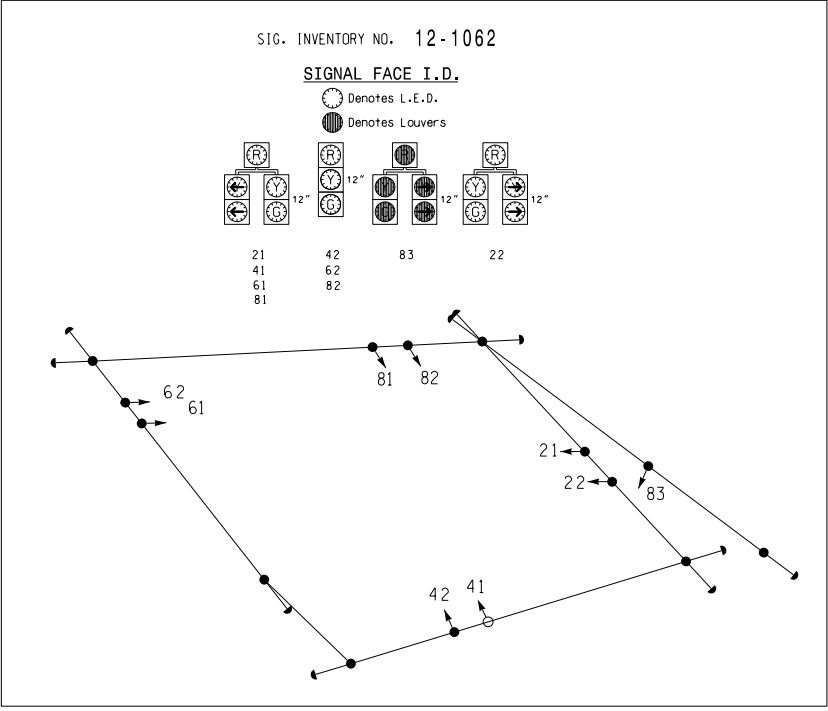
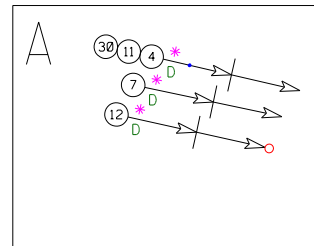
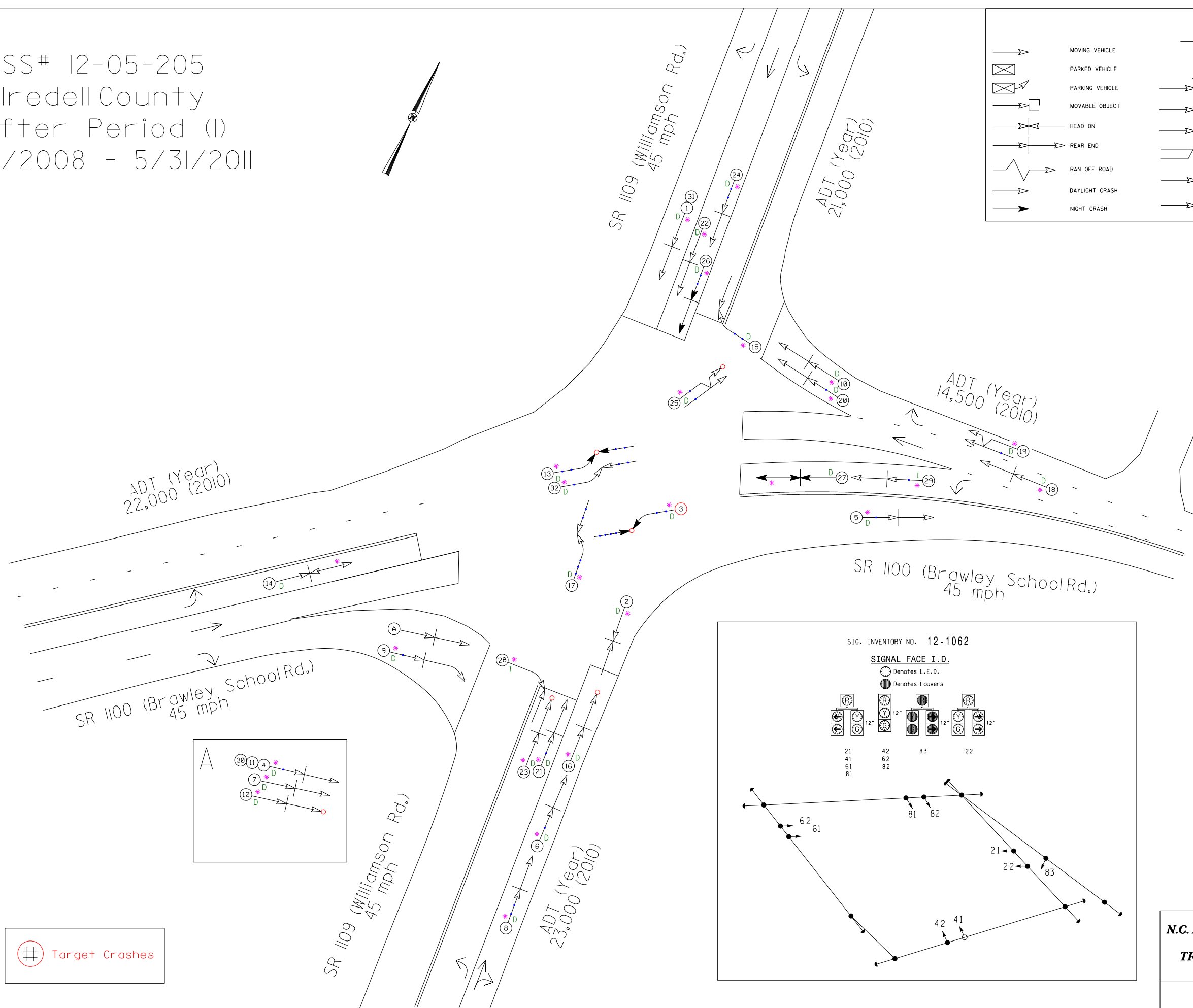
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SS# 12-05-205
 Iredell County
 After Period (I)
 10/1/2008 - 5/31/2011



LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		A ANIMAL
	PARKED VEHICLE		10 MPH TO 19		20 MPH TO 29		P PEDESTRIAN
	PARKING VEHICLE		30 MPH TO 39		40 MPH TO 49		B BICYCLE
	MOVABLE OBJECT		50 MPH TO 59		60 MPH TO 69		T TRAIN
	HEAD ON		70 AND UP		* DRIVER AT FAULT		D DRY
	REAR END		WET		I ICY OR SNOWY		O Other
	RAN OFF ROAD		INJURY		FATALITY		
	DAYLIGHT CRASH						
	NIGHT CRASH						
			SPEED UNKNOWN				



Target Crashes

PREPARED FOR
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DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and
SAFETY DIVISION

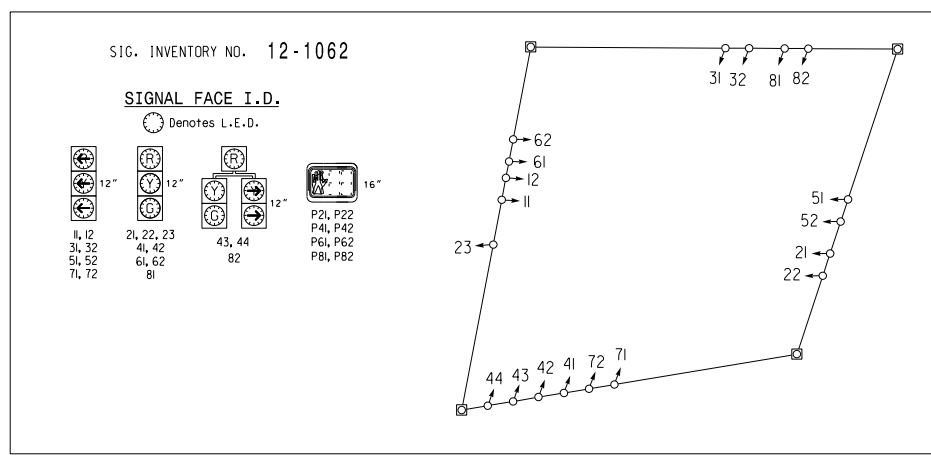
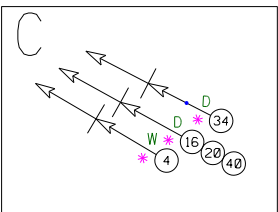
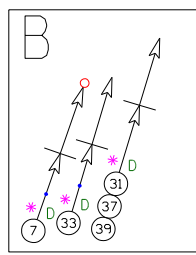
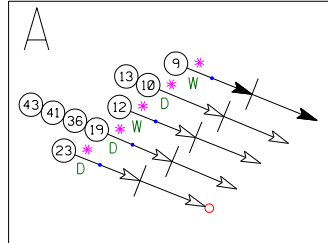
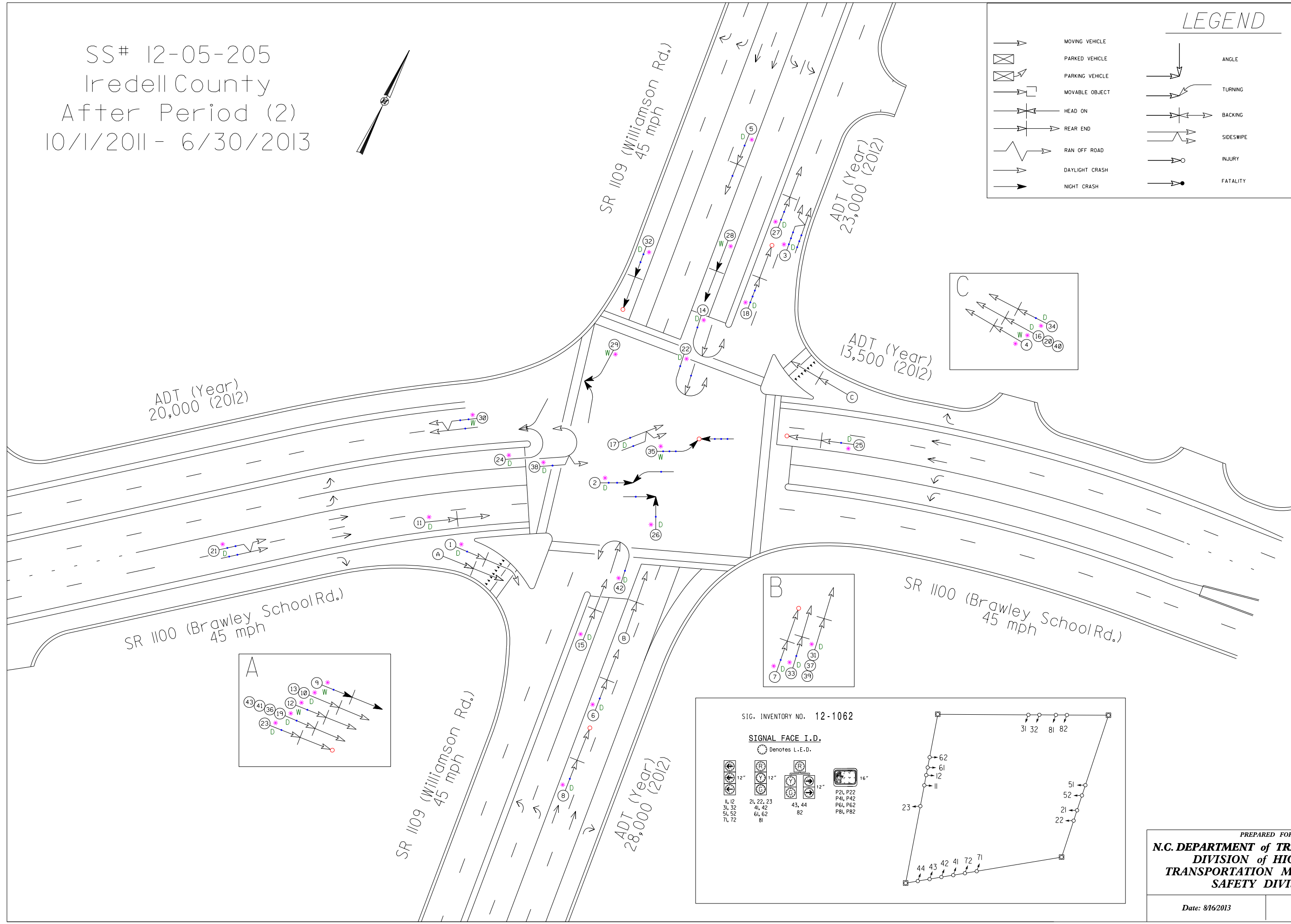
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SS# 12-05-205
 Iredell County
 After Period (2)
 10/1/2011 - 6/30/2013



LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		A ANIMAL
	PARKED VEHICLE		10 MPH TO 19		P PEDESTRIAN		B BICYCLE
	PARKING VEHICLE		20 MPH TO 29		T TRAIN		* DRIVER AT FAULT
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	NIGHT CRASH						



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