

Spot Safety Project Evaluation

Spot Safety Project # 05-06-213

**Spot Safety Project Evaluation for Installation of Traffic Signal at ACC Boulevard
and Installation of Leftover at Skyland Ridge Parkway**

**SR 3100 (Brier Creek Parkway) at Skyland Ridge Parkway and
SR 3100 (Brier Creek Parkway) at ACC Boulevard**

Wake County

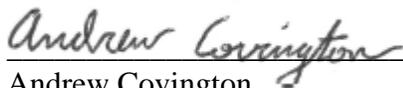
Documents Prepared By:

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



Andrew Covington
AECOM

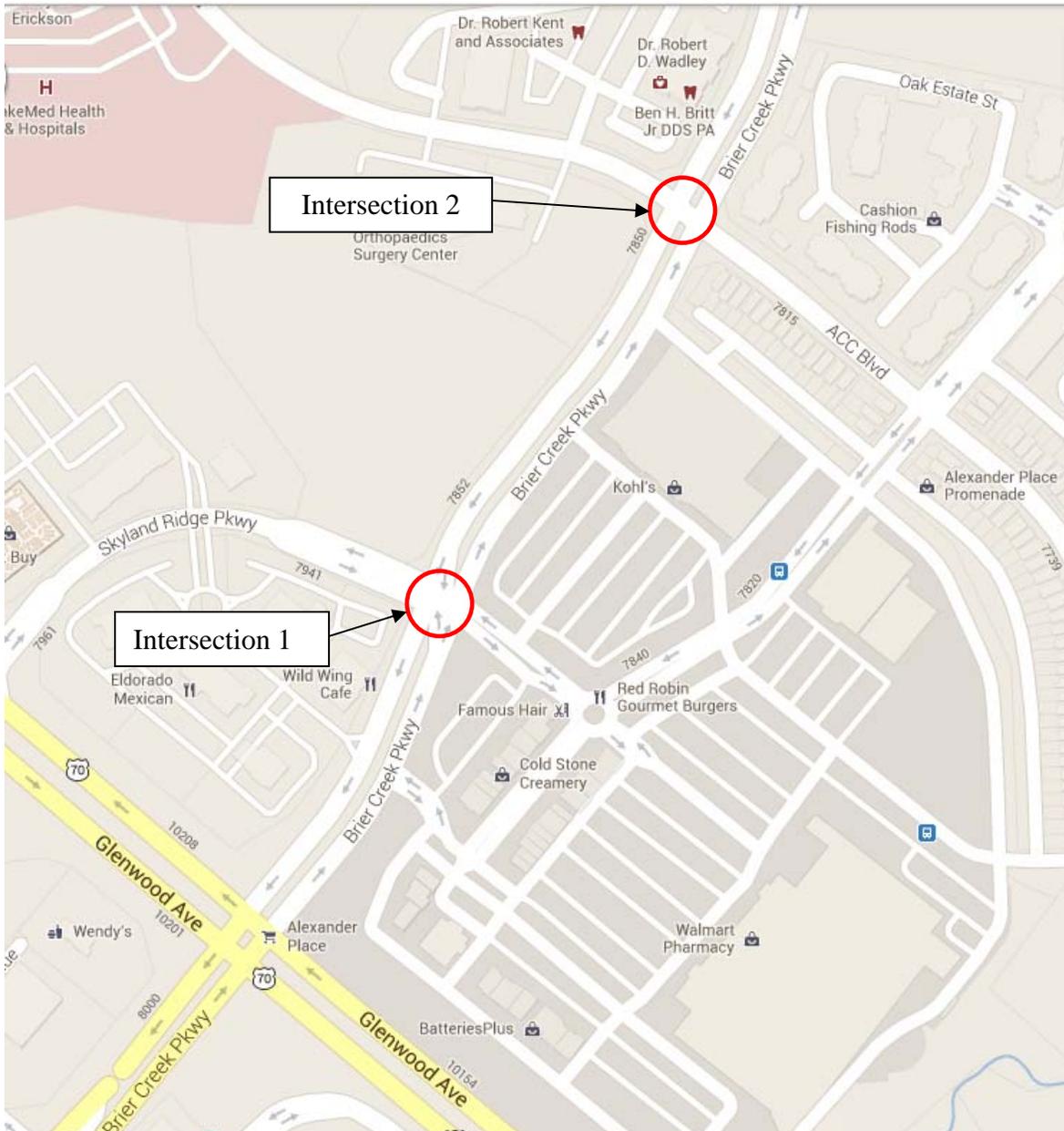
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Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-06-213 located at the intersections of SR 3100 (Brier Creek Parkway) at Skyland Ridge Parkway and SR 3109 (Brier Creek Parkway) at ACC Boulevard in Raleigh in Wake County.

The Sig ID at the intersection of SR 3109 (Brier Creek Parkway) and ACC Boulevard is 05-2284 for this 4-Phase Fully 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 countermeasures chosen for the subject location were installation of a traffic signal at SR 3100 (ACC Boulevard) and the installation of a leftover at Skyland Ridge Parkway.

SR 3100 (Brier Creek Parkway) is a multi-lane facility with a speed limit of 45 mph. SR 3100 (ACC Boulevard) is a multi-lane facility with a speed limit of 35 mph. Skyland Ridge Parkway is a two-lane facility with a speed limit of 35 mph.

The original statement of problem was that vehicles on Skyland Ridge Parkway could not safely cross or enter the intersection due to insufficient gaps in traffic. The initial crash analysis was completed from May 22, 2004 to May 21, 2006 with thirty-six (36) angle/left-turn different roadway crashes. The final completion date for the improvements at the subject intersections was on March 25, 2008 with a total cost of \$160,000.00.

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 February through April 2008. The before period for Intersection 1 (Brier Creek Parkway at Skyland Ridge Parkway) consisted of reported crashes from March 1, 2005 through January 31, 2008 (2 years 11 months); and the after period consisted of reported crashes from May 1, 2008 through May 31, 2013 (5 years 1 month). The before period for Intersection 2 (Brier Creek Parkway at ACC Boulevard) consisted of reported crashes from December 1, 2006 through January 31, 2008 (1 year 2 months); and the after period consisted of reported crashes from May 1, 2008 through May 31, 2013 (5 years 1 month). The begin dates for these analyses were determined by the first crash report showing the intersection as 4 legs. The ending date for these analyses was determined by the date of available crash data at the time of analysis.

The treatment data at Intersection 1 consisted of all crashes within 150 feet of the subject intersection for the SR 3100 (Brier Creek Parkway) and Skyland Ridge Parkway intersection, and the treatment data at Intersection 2 consisted of all crashes within 150 feet of the subject intersection for the SR 3100 (Brier Creek Parkway) and ACC Boulevard intersection.

Please see attached location map and aerial map for further details.

The following data tables depict the naive before and after analysis for the treatment locations. Please note that the target crashes at Intersection 1 were Angle and Left-turn, different roadways. Also note that Frontal Impact Crashes were the target crashes for the applied countermeasure at Intersection 2. 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.

Intersection 1 Treatment Information	Before (2 years 11 months)	After (5 years 1 month)	Percent Reduction (-) Percent Increase (+)
Total Crashes	82	25	N/A
Crashes Per Year	28.11	4.92	- 81.8 %
Total Severity Index	2.53	2.78	+9.9 %
Target Crashes	64	0	N/A
Target Crashes Per Year	21.9	0.00	- 100.0 %
Target Crash Severity Index	2.85	0.00	-100.0 %
Volume (2006, 2010)	21,000	25,000	+19.0 %

Intersection 1 Injury Crash Summary	Before (total)	Before (per year)	After (total)	After (per year)	Percent Reduction (-) Percent Increase (+) (per year)
Fatal injury Crashes	0	0.00	0	0.00	N/A
Class A injury Crashes	0	0.00	0	0.00	N/A
Class B injury Crashes	4	1.37	1	0.20	- 85.4 %
Class C Injury Crashes	13	4.46	5	0.98	- 78.0 %
Property Damage Only	65	12.79	19	3.93	- 70.8 %

The naive before and after analysis at Intersection 1 (Brier Creek Parkway and Skyland Ridge Parkway) resulted in a 82 percent reduction in Total Crashes per Year, a 100 percent removal of Target Crashes per Year and a 10 percent increase in the Total Severity Index. The before period ADT year was 2006 and the after period ADT year was 2010.

Intersection 2 Treatment Information	Before (1 years 2 months)	After (5 years 1 month)	Percent Reduction (-) Percent Increase (+)
Total Crashes	12	13	N/A
Crashes Per Year	10.29	2.56	- 75.1 %
Total Severity Index	1.62	2.71	+ 67.3 %
Target Crashes	4	1	N/A
Target Crashes Per Year	3.43	0.20	- 94.2 %
Target Crash Severity Index	1.00	8.4	+740.0 %
Volume (2007, 2010)	9,500	12,000	+26.3 %

Intersection 2 Injury Crash Summary	Before (total)	Before (per year)	After (total)	After (per year)	Percent Reduction (-) Percent Increase (+) (per year)
Fatal injury Crashes	0	0.00	0	0.00	N/A
Class A injury Crashes	0	0.00	0	0.00	N/A
Class B injury Crashes	0	0.00	0	0.00	N/A
Class C Injury Crashes	1	0.86	3	0.59	- 31.4 %
Property Damage Only	11	9.43	10	1.97	- 79.1 %

The naive before and after analysis at Intersection 2 (Brier Creek Parkway and ACC Boulevard) resulted in a 75 percent reduction in Total Crashes per Year, a 94 percent reduction of Target Crashes per Year and a 740 percent increase 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:

Intersection 1 Additional Information	Before (total)	Before (per year)	After (total)	After (per year)	Percent Reduction (-) Percent Increase(+) (per year)
Rear End Related Crash	10	3.43	9	1.77	- 48.4%

Intersection 2 Additional Information	Before (total)	Before (per year)	After (total)	After (per year)	Percent Reduction (-) Percent Increase(+) (per year)
Rear End, Slow or Stop	4	3.43	2	0.39	- 88.6%
Sideswipe	2	1.71	4	0.79	- 53.8%

Results and Discussion

Referencing the *Collision Diagrams*, target crashes (Angle/Left-turn, different roadway) at Intersection 1 experienced a reduction from 21.9 crashes per year in the before period to 0 crashes per year in the after period. After the leftover installation all target crashes were eliminated by the removal of the through movement from the WB and EB approaches.

At intersection 1 rear end crashes decreased from 3.43 crashes per year in the before period to 1.77 crashes per year in the after period.

Referencing the *Collision Diagrams*, target crashes (Frontal Impact Crashes) at Intersection 2 experienced a reduction from 10.29 crashes per year in the before period to 2.56 crashes per year in the after period. The installation of the signal was beneficial in reducing the number of target crashes.

At intersection 2 rear end crashes decreased from 3.43 crashes per year in the before period to 0.39 crashes per year in the after period. Sideswipe crashes decreased from 1.71 crashes per year in the before period to 0.79 crashes per year in the after period.

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

Intersection 1



Google Maps (Image Date: 8/11) - Looking North on SR 3100 (Brier Creek Parkway) Approach



Google Maps (Image Date: 8/11) - Looking South on SR 3100 (Brier Creek Parkway) Approach



Google Maps (Image Date: 5/09) – Looking East from Skyland Ridge Parkway Approach



Google Maps (Image Date: 8/11) – Looking West from Walmart Entrance Approach

Intersection 2



Google Maps (Image Date: 8/11) - Looking North on SR 3100 (Brier Creek Parkway) Approach



Google Maps (Image Date: 7/12) - Looking South on Brier Creek Parkway Approach



Google Maps (Image Date: 7/12) - Looking East on ACC Boulevard Approach



Google Maps (Image Date: 8/11) - Looking East on SR 3100 (ACC Boulevard) Approach

SS# 05-06-213
 Wake County
 BEFORE Period
 Intersection I
 3/1/05 - 1/31/08

Note: The before and after time periods are not equal

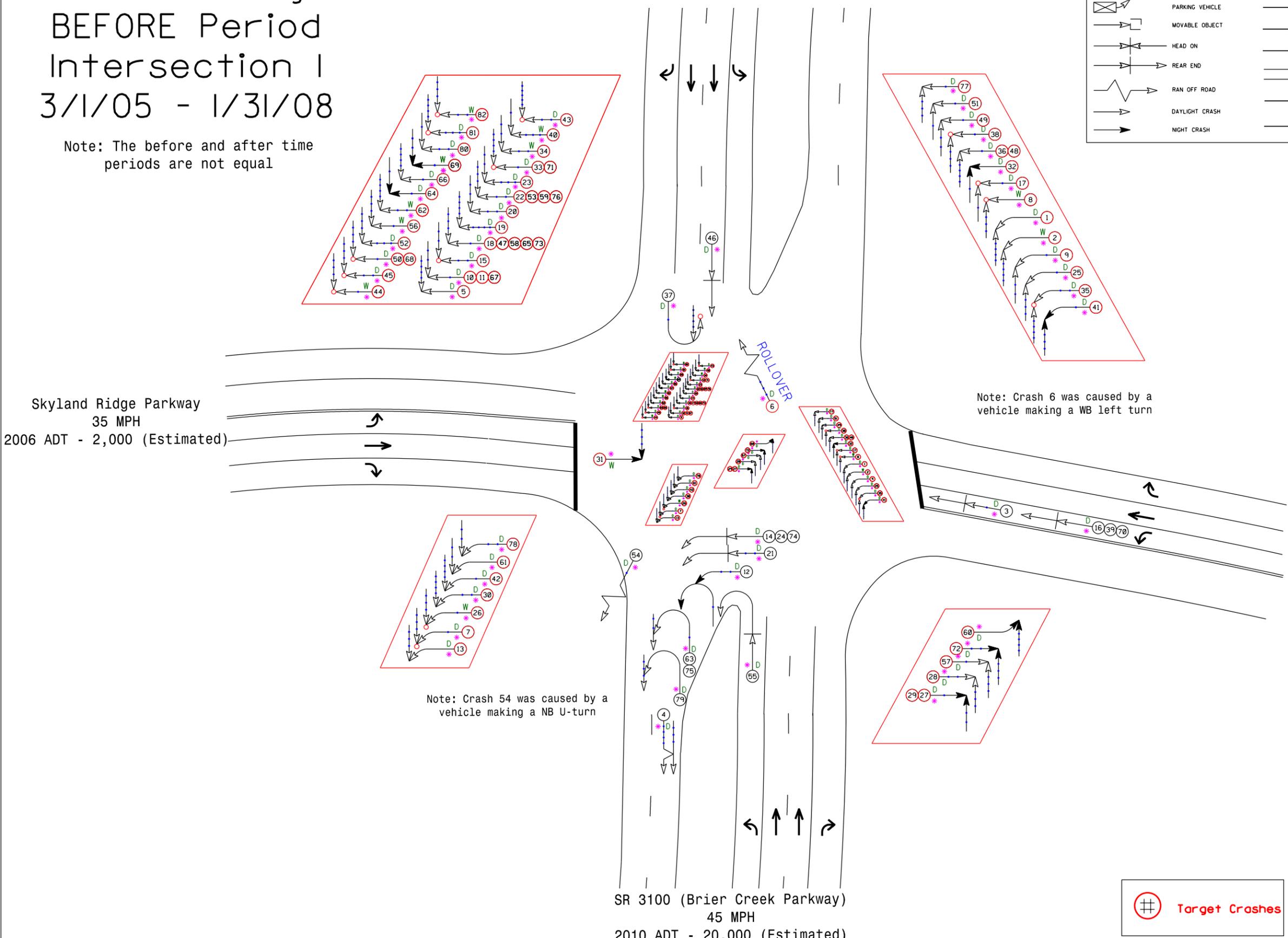
Brier Creek Parkway
 45 MPH
 2010 ADT - 8,000 (Estimated)

MOVING VEHICLE		ANGLE		9 MPH OR LESS		A ANIMAL	
	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 INJURY		O Other
	REAR END		50 MPH TO 59		60 MPH TO 69		70 AND UP
	RAN OFF ROAD		60 MPH TO 69		70 AND UP		SPEED UNKNOWN
	DAYLIGHT CRASH		70 AND UP				
	NIGHT CRASH						



Skyland Ridge Parkway
 35 MPH
 2006 ADT - 2,000 (Estimated)

Walmart Entrance
 No Posted Speed Limit
 2006 ADT - 12,000 (Estimated)



Note: Crash 6 was caused by a vehicle making a WB left turn

Note: Crash 54 was caused by a vehicle making a NB U-turn

SR 3100 (Brier Creek Parkway)
 45 MPH
 2010 ADT - 20,000 (Estimated)

Target Crashes

N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 7-31-13 Prepared By: Andrew Covington

SS# 05-06-213
 Wake County
 AFTER Period
 Intersection I
 5/1/08 - 5/31/13

Note: The before and after time periods are not equal

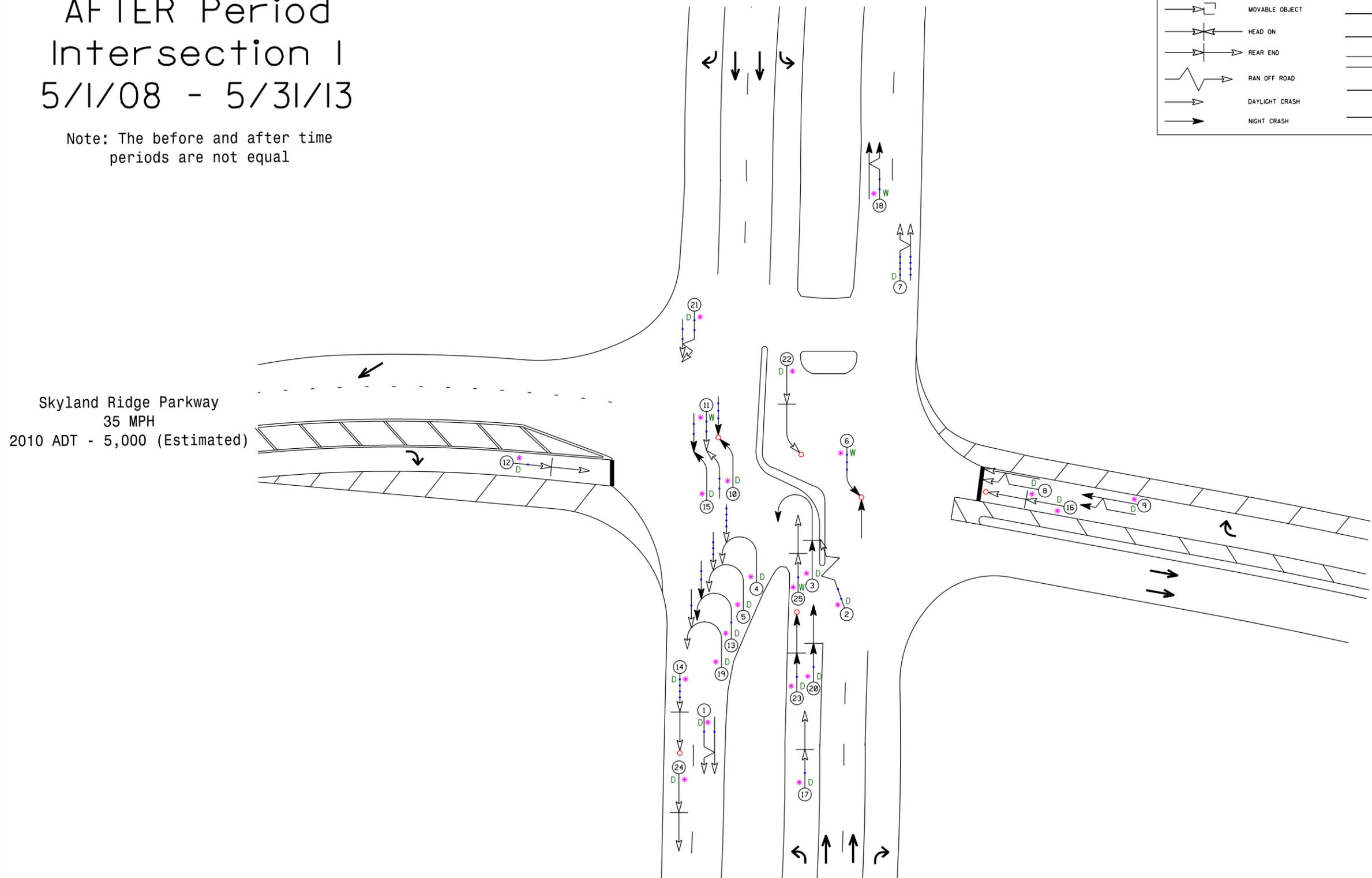
Brier Creek Parkway
 45 MPH
 2010 ADT - 13,000 (Estimated)

Skyland Ridge Parkway
 35 MPH
 2010 ADT - 5,000 (Estimated)

Walmart Entrance
 No Posted Speed Limit
 2006 ADT - 12,000 (Estimated)

SR 3100 (Brier Creek Parkway)
 45 MPH
 2010 ADT - 20,000 (Estimated)

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



Target Crashes

N.C. DEPARTMENT of TRANSPORTATION
 DIVISION of HIGHWAYS
 TRANSPORTATION MOBILITY and
 SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 7-31-13 Prepared By: Andrew Covington

SS# 05-06-213
 Wake County
 BEFORE Period
 Intersection 2
 12/1/06 - 1/31/08

Note: The before and after time periods are not equal

Brier Creek Parkway
 45 MPH
 2007 ADT - 1,000 (Estimated)

	MOVING VEHICLE
	PARKED VEHICLE
	PARKING VEHICLE
	MOVABLE OBJECT
	HEAD ON
	REAR END
	RAN OFF ROAD
	DAYLIGHT CRASH
	NIGHT CRASH

LEGEND

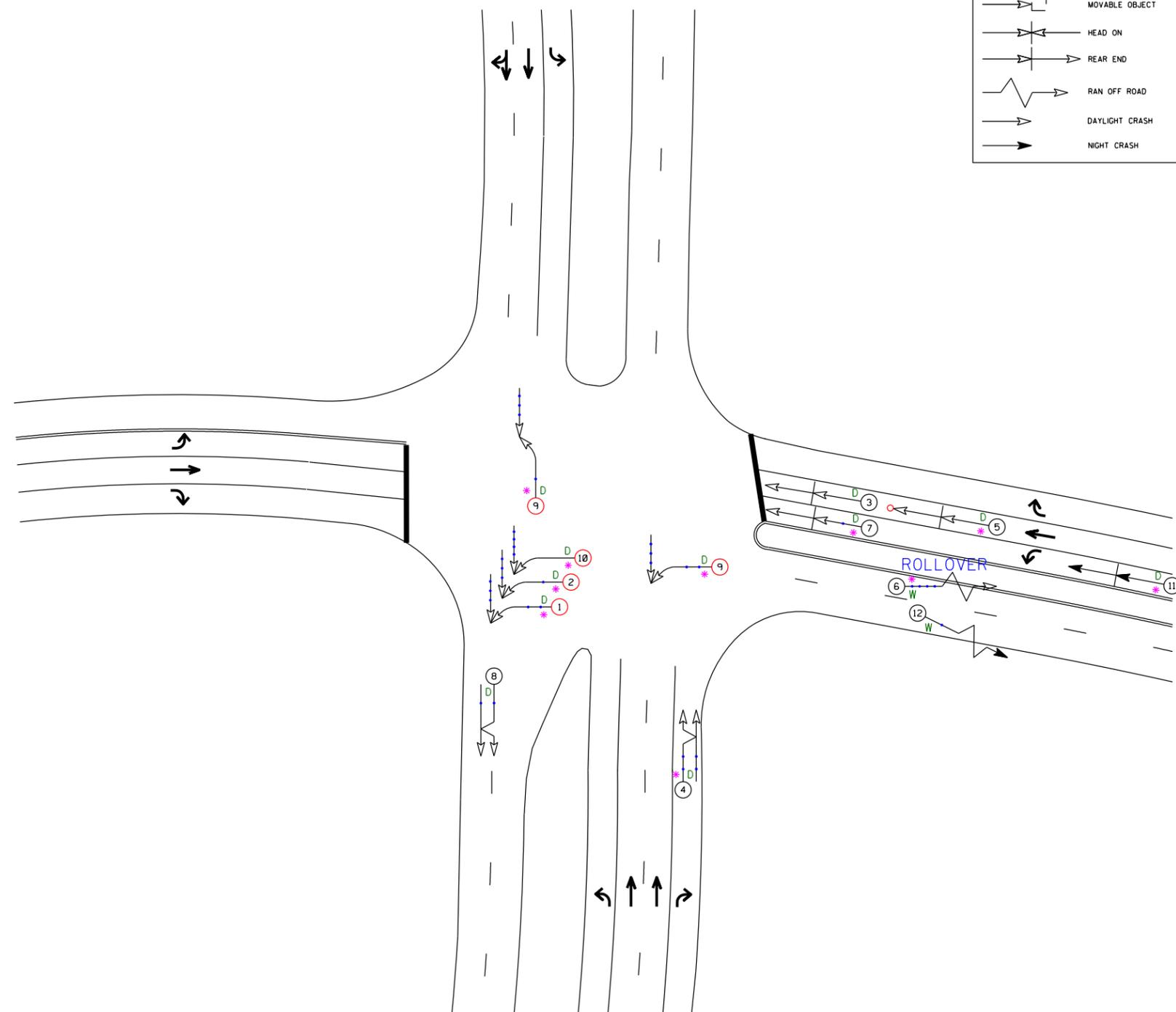
	ANGLE		9 MPH OR LESS	A	ANIMAL
	TURNING		10 MPH TO 19	P	PEDESTRIAN
	BACKING		20 MPH TO 29	B	BICYCLE
	SIDESWIPE		30 MPH TO 39	T	TRAIN
	INJURY		40 MPH TO 49	*	DRIVER AT FAULT
	FATALITY		50 MPH TO 59	D	DRY
			60 MPH TO 69	W	WET
			70 AND UP	I	ICY OR SNOWY
			SPEED UNKNOWN	O	Other



ACC Boulevard
 35 MPH
 2007 ADT - 1,000 (Estimated)

SR 3100 (ACC Boulevard)
 35 MPH
 2007 ADT - 6,000 (Estimated)

SR 3100 (Brier Creek Parkway)
 45 MPH
 2007 ADT - 8,000 (Estimated)



Frontal Impact Crashes

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 TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 7-31-13 Prepared By: Andrew Covington

SS# 05-06-213
 Wake County
 AFTER Period
 Intersection 2
 5/1/08 - 5/31/13

Note: The before and after time periods are not equal

Brier Creek Parkway
 45 MPH
 2010 ADT - 1,000 (Estimated)

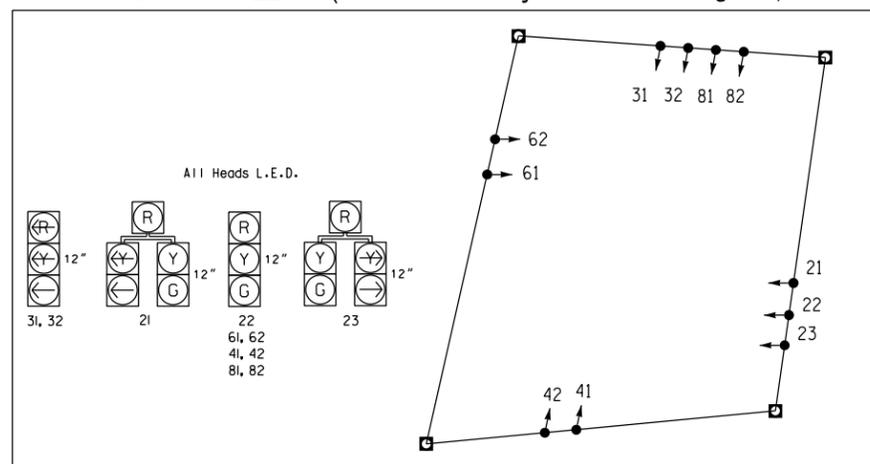
LEGEND			
	MOVING VEHICLE		ANGLE
	PARKED VEHICLE		TURNING
	PARKING VEHICLE		BACKING
	MOVABLE OBJECT		SIDESWIPE
	HEAD ON		INJURY
	REAR END		FATALITY
	RAN OFF ROAD		9 MPH OR LESS
	DAYLIGHT CRASH		10 MPH TO 19
	NIGHT CRASH		20 MPH TO 29
			30 MPH TO 39
			40 MPH TO 49
			50 MPH TO 59
			60 MPH TO 69
		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



ACC Boulevard
 35 MPH
 2010 ADT - 2,000 (Estimated)

SR 3100 (ACC Boulevard)
 35 MPH
 2010 ADT - 8,000 (Estimated)

SIG ID 05-2284 (4-Phase Fully Actuated Signal)



SR 3100 (Brier Creek Parkway)
 45 MPH
 2010 ADT - 13,000 (Estimated)

Frontal Impact Crashes

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 TRANSPORTATION MOBILITY and
 SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 7-31-13 Prepared By: Andrew Covington