

# Spot Safety Project Evaluation

## Project Information

Order ID: 41000030185

Project ID: 10-09-203

Location: (1) NC 49 at SR 1157/SR 1139 (Old Charlotte Rd) – All Approaches  
(2) NC 49 at SR 1156 (Central Heights Dr)/Glenwood Dr – NC 49 Approaches;  
(3) NC 49 at Queens Dr SW/Central Cabarrus High School – All Approaches;  
(4) NC 49 at SR 1155 (Zion Church Rd) – All Approaches;

County: Cabarrus

City: Concord

Division: 10

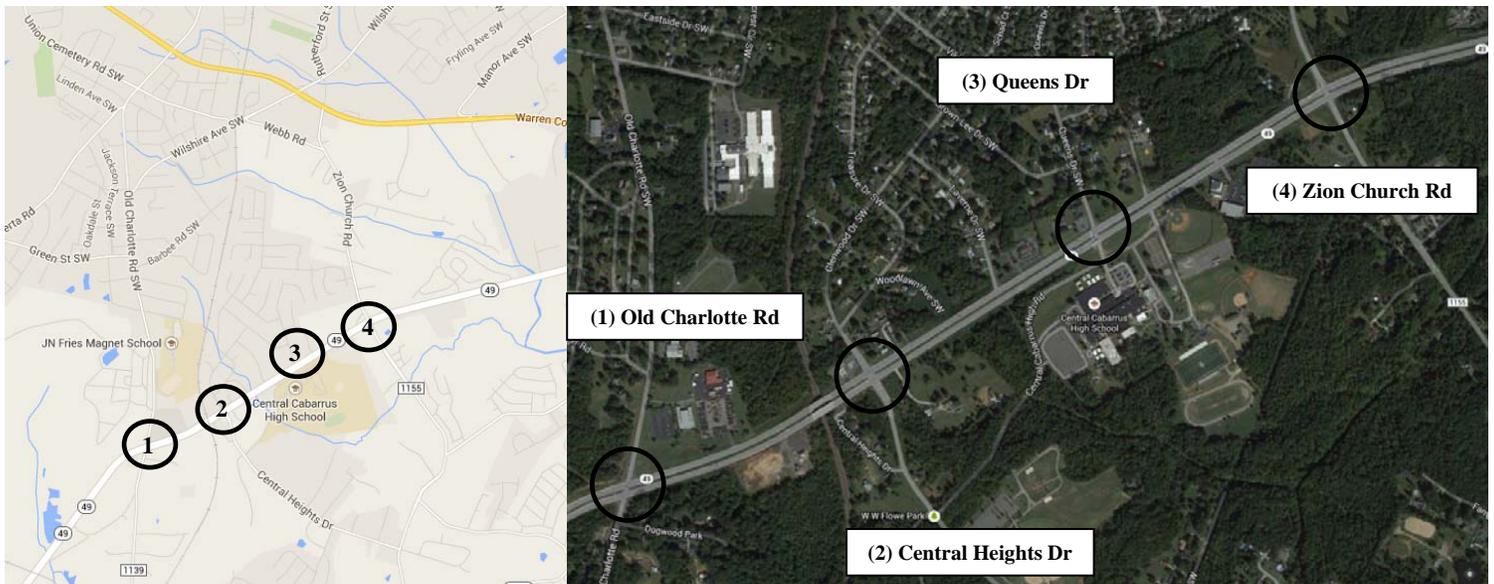
Signal ID: (1) 10-0389; (2) 10-0892; (3) 10-1767; (4) 10-1423

Countermeasure: Replace the 5-section protected/permissive left turn signal heads with 4-section Flashing Yellow Arrow (FYA) heads on the approaches listed above; and upgrade existing cabinet/controllers to 2070's.

Project Completion: August 18, 2010

Project Cost: \$73,000

## Map and Aerial (from Google Maps – Coordinates: 35.364407,-80.58418)



## Naive Before and After Analysis

Before Period: August 1, 2006 through June 30, 2010 (3 years, 11 months)

Const. Period: July 1, 2010 through September 30, 2010

After Period: October 1, 2010 through August 31, 2014 (3 years, 11 months)

Analysis Criteria: Treatment data consists of all crashes within 150 feet of the subject intersections.

Target Crashes: Left Turn Same Roadway (LTSR) Crashes are the target crashes for the applied countermeasure. Target crashes are only on the approaches where the FYA was installed in the after period.

### *Intersection 1: Old Charlotte Rd*

<b><u>Treatment Information</u></b> <b><u>Intersection 1</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Total Crashes	39	50	+ 28.2 %
Total Crash Severity Index	9.87	5.96	- 39.6 %
Target Crashes	16	10	- 37.5 %
Target Crash Severity Index	8.51	18.38	+ 116.0 %
Volume (2008, 2012)	28,600	28,700	+ 0.3 %

<b><u>Injury Crash Summary</u></b> <b><u>Intersection 1</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Fatal injury Crashes	1	0	- 100.0 %
Class A injury Crashes	2	2	0.0 %
Class B injury Crashes	5	2	- 60.0 %
Class C Injury Crashes	11	11	0.0 %
Property Damage Only	20	35	+ 75.0 %

### *Intersection 2: Central Heights Dr*

<b><u>Treatment Information</u></b> <b><u>Intersection 2</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Total Crashes	11	16	+ 45.5 %
Total Crash Severity Index	5.71	2.39	- 58.1 %
Target Crashes	3	2	- 33.3 %
Target Crash Severity Index	8.40	4.70	- 44.0 %
Volume (2008, 2012)	21,200	21,100	- 0.5 %

<b><u>Injury Crash Summary</u></b> <b><u>Intersection 2</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	2	1	- 50.0 %
Class C Injury Crashes	5	2	- 60.0 %
Property Damage Only	4	13	+ 225.0 %

*Intersection 3: Queens Dr*

<b><u>Treatment Information</u></b> <b><u>Intersection 3</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Total Crashes	5	10	+ 100.0 %
Total Crash Severity Index	3.96	4.70	+ 18.7 %
Target Crashes	0	2	N/A
Target Crash Severity Index	N/A	4.70	N/A
Volume (2008, 2012)	19,800	19,800	0.0 %

<b><u>Injury Crash Summary</u></b> <b><u>Intersection 3</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	0	1	N/A
Class C Injury Crashes	2	4	+ 100.0 %
Property Damage Only	3	5	+ 66.7 %

*Intersection 4: Zion Church Rd*

<b><u>Treatment Information</u></b> <b><u>Intersection 4</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Total Crashes	16	26	+ 62.5 %
Total Crash Severity Index	4.70	4.42	- 6.0 %
Target Crashes	3	4	+ 33.3 %
Target Crash Severity Index	8.40	4.70	- 44.0 %
Volume (2008, 2012)	21,600	21,400	- 0.9 %

<b><u>Injury Crash Summary</u></b> <b><u>Intersection 4</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	0	N/A
Class B injury Crashes	3	2	- 33.3 %
Class C Injury Crashes	5	10	+ 100.0 %
Property Damage Only	8	14	+ 75.0 %

*All Intersections Combined*

<b><u>All Intersections Combined</u></b>	<b>Before</b>	<b>After</b>	<b>Percent Reduction (-)</b> <b>Percent Increase (+)</b>
Total Crashes	71	102	+ 43.7 %
Target Crashes	22	18	- 18.2 %

## Overall Summary Results

### *Intersection 1: Old Charlotte Rd*

Total Crashes:	+ 28 %	(increase)
Total Crash Severity:	- 40 %	(reduction)
Target Crashes:	- 38 %	(reduction)
Target Crash Severity:	+ 116 %	(increase)
Volume:	0 %	

### *Intersection 2: Central Heights Dr*

Total Crashes:	+ 46 %	(increase)
Total Crash Severity:	- 58 %	(reduction)
Target Crashes:	- 33 %	(reduction)
Target Crash Severity:	- 44 %	(reduction)
Volume:	- 1 %	(reduction)

### *Intersection 3: Queens Dr*

Total Crashes:	+ 100 %	(increase)
Total Crash Severity:	+ 19 %	(increase)
Target Crashes:	N/A	
Target Crash Severity:	N/A	
Volume:	0 %	

### *Intersection 4: Zion Church Rd*

Total Crashes:	+ 63 %	(increase)
Total Crash Severity:	- 6 %	(reduction)
Target Crashes:	+ 33 %	(increase)
Target Crash Severity:	- 44 %	(reduction)
Volume:	- 1 %	(reduction)

### *All Intersections Combined*

Total Crashes:	+ 44 %	(increase)
Target Crashes:	- 18 %	(reduction)

## **Items for Discussion/Concerns**

All four study intersections experienced an increase in total crashes. Overall, there was a 44% increase in total crashes from 71 crashes in the before period to 102 crashes in the after period. The increase in total crashes is largely attributed to the increase in rear end crashes at all intersections. There was an overall 163% increase in rear end crashes from 24 crashes in the before period to 63 crashes in the after period.

The change in target crashes varied between the intersections, with an overall net decrease of 18%, from 22 target crashes in the before period to 18 target crashes in the after period. In the after period, each intersection averaged approximately 1 target crash/year.

## **Data Prepared For**

The Traffic Safety Unit *of the*  
Transportation Mobility and Safety Division *of the*  
Division of Highways *of the*  
North Carolina Department of Transportation

## **Data Prepared By**

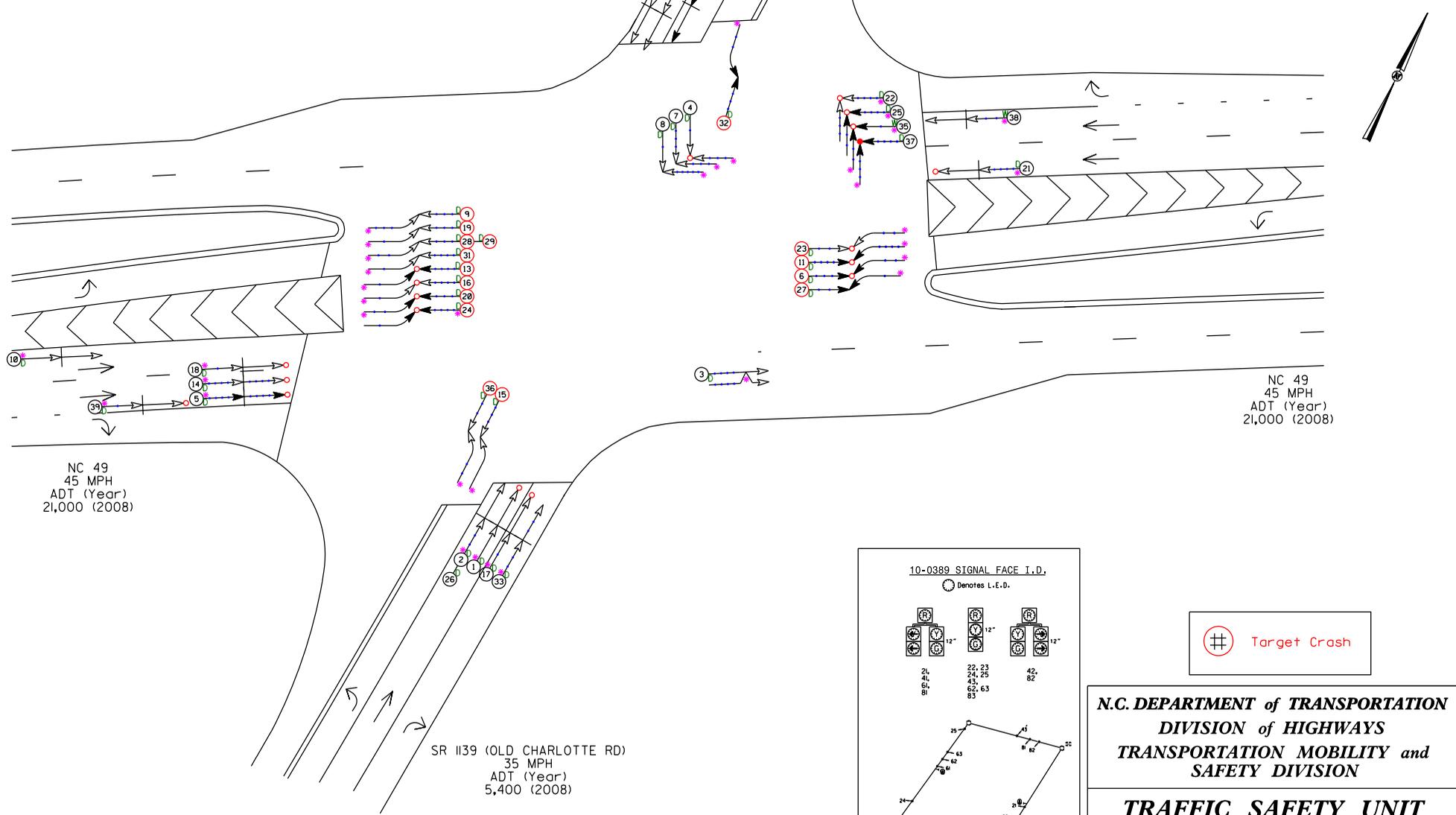
Principal Investigator: Carrie L. Simpson, PE  
Work Group/Consultant: NCDOT - Safety Evaluation Group  
Date: January 6, 2015

SS #10-09-203  
 Order # 41000030185  
 Cabarrus County  
 Before Period  
 8/1/2006 - 06/30/2010

SR 1157 (OLD CHARLOTTE RD)  
 35 MPH  
 ADT (Year)  
 9,700 (2008)

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

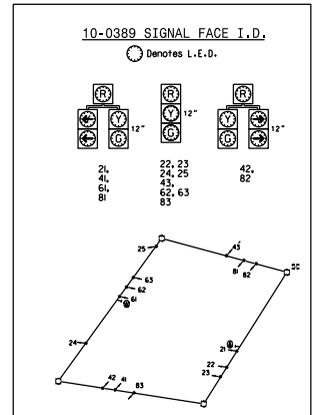
(I) NC 49 at SR 1157 (OLD CHARLOTTE RD)



NC 49  
 45 MPH  
 ADT (Year)  
 21,000 (2008)

NC 49  
 45 MPH  
 ADT (Year)  
 21,000 (2008)

SR 1139 (OLD CHARLOTTE RD)  
 35 MPH  
 ADT (Year)  
 5,400 (2008)



Target Crash

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

**TRAFFIC SAFETY UNIT**

Date: 09-15-2014

Prepared By: Troy S Finn

SS #10-09-203  
 Order # 41000030185  
 Cabarrus County  
 After Period  
 10/1/2010 - 08/31/2014

SR 1157 (OLD CHARLOTTE RD)  
 35 MPH  
 ADT (Year)  
 10,000 (2012)

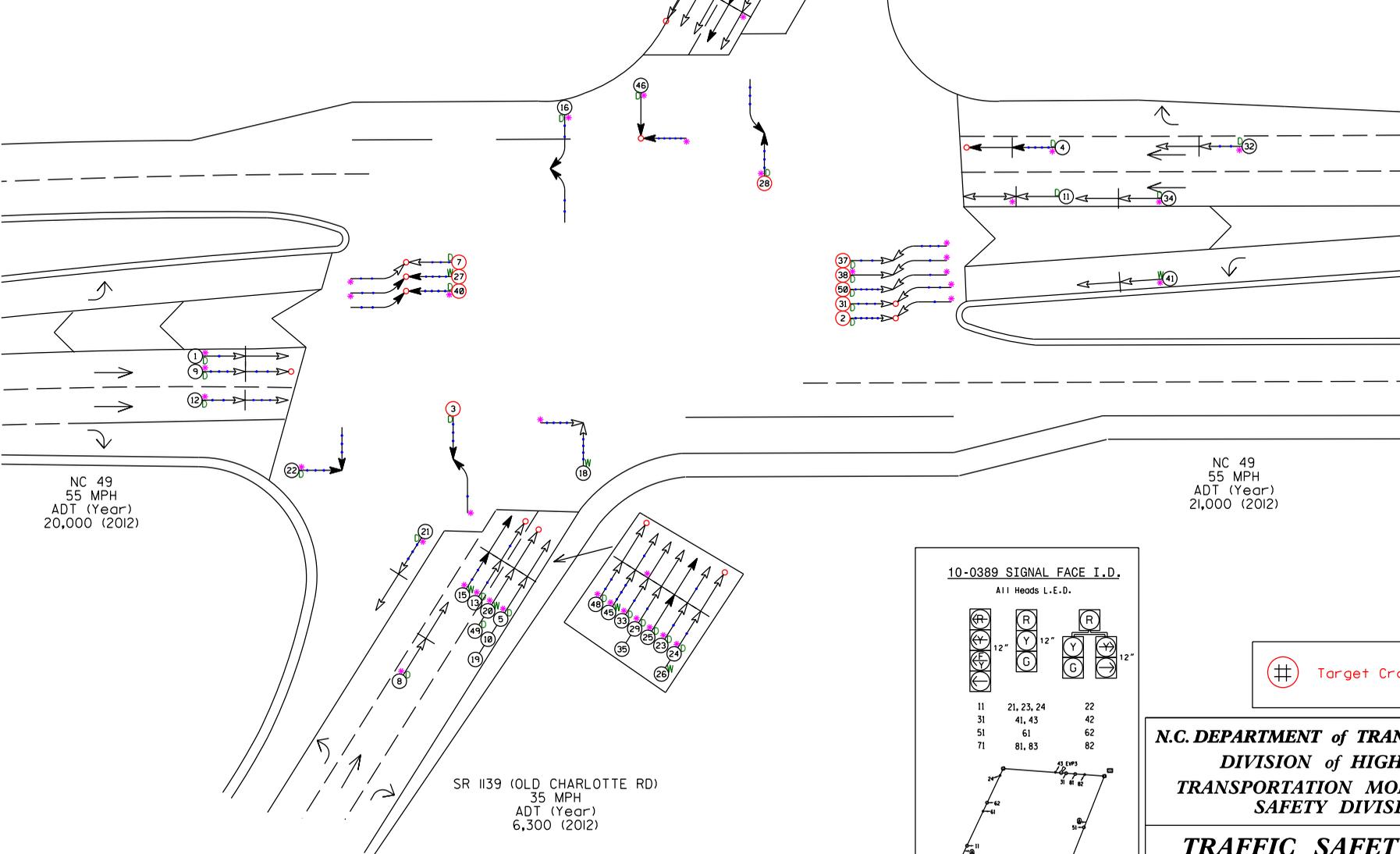
NC 49  
 55 MPH  
 ADT (Year)  
 20,000 (2012)

SR 1139 (OLD CHARLOTTE RD)  
 35 MPH  
 ADT (Year)  
 6,300 (2012)

LEGEND

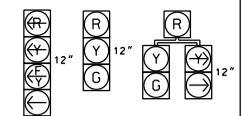
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		P PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		A ANIMAL
	PARKED VEHICLE		BACKING		20 MPH TO 29		* DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		INJURY		50 MPH TO 59		I ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		O ONLY
	RAN OFF ROAD				70 AND UP		

(I) NC 49 at SR 1157 (OLD CHARLOTTE RD)

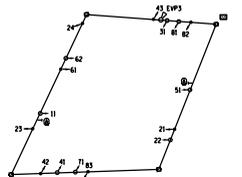


NC 49  
 55 MPH  
 ADT (Year)  
 21,000 (2012)

10-0389 SIGNAL FACE I.D.  
 All Heads L.E.D.



11	21, 23, 24	22
31	41, 43	42
51	61	62
71	81, 83	82



Target Crash

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

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Date: 09-15-2014

Prepared By: Troy S Finn

SS #10-09-203  
 Order # 41000030185  
 CABARRUS County  
 Before Period  
 08/01/2006 - 06/30/2010

GLENWOOD DR  
 45 MPH  
 ADT (Year)  
 EST 1,000 (2008)

Citgo

LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		ANIMAL
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		70 AND UP
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		OILY

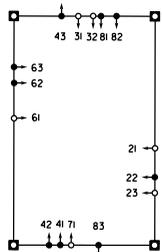
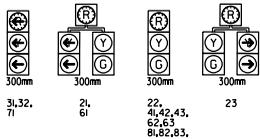
(2) NC 49 at SR 1156 (CENTRAL HEIGHTS DR)/GLENWOOD DR

NC 49  
 45 MPH  
 ADT (Year)  
 21,000 (2008)

NC 49  
 45 MPH  
 ADT (Year)  
 17,000 (2008)

10-0892 SIGNAL FACE I.D.

Denotes L.E.D.



SR 1156 (CENTRAL HEIGHTS DR)  
 45 MPH  
 ADT (Year)  
 3,700 (2008)

Target Crash

**N.C. DEPARTMENT of TRANSPORTATION**  
**DIVISION of HIGHWAYS**  
**TRANSPORTATION MOBILITY and**  
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Date: 09-15-2014

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SS #10-09-203  
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 CABARRUS County  
 AFTER Period  
 10/01/2010 - 08/31/2014

Citgo

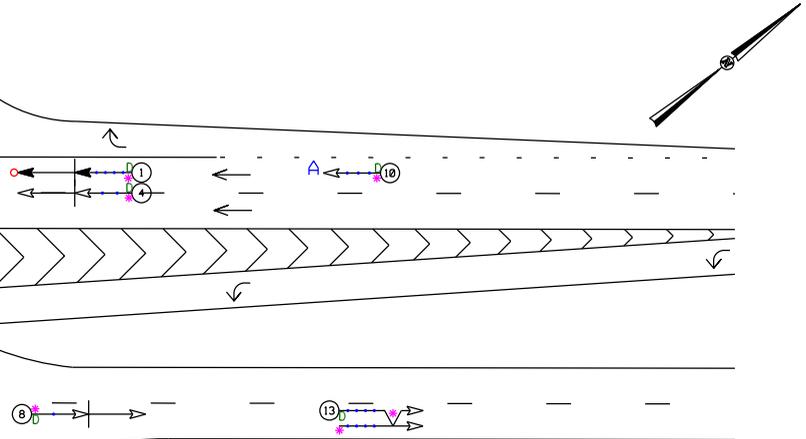
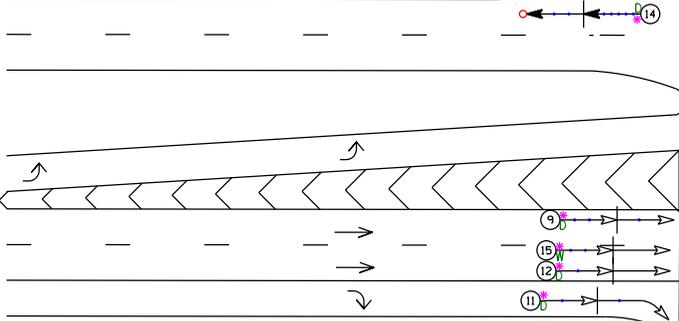
GLENWOOD DR  
 45 MPH  
 ADT (Year)  
 EST 1,000 (2012)

LEGEND

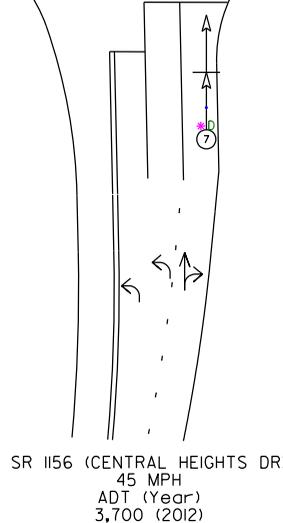
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		ANIMAL
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		OILY

(2) NC 49 at SR 1156 (CENTRAL HEIGHTS DR)/GLENWOOD DR

NC 49  
 55 MPH  
 ADT (Year)  
 21,000 (2012)

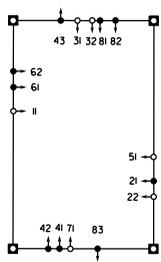
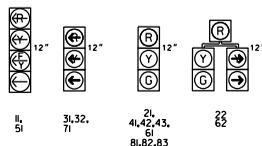


NC 49  
 55 MPH  
 ADT (Year)  
 17,000 (2012)



SR 1156 (CENTRAL HEIGHTS DR)  
 45 MPH  
 ADT (Year)  
 3,700 (2012)

10-0892 SIGNAL FACE I.D.  
 All Heads L.E.D.



Target Crash

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

TRAFFIC SAFETY UNIT

Date: 09-15-2014

Prepared By: Troy S Finn

SS #10-09-203  
 Order # 41000030185  
 CABARRUS County  
 Before Period  
 8/1/2006 - 06/30/2010

QUEENS DR  
 45 MPH  
 ADT (Year)  
 EST 1,000 (2008)

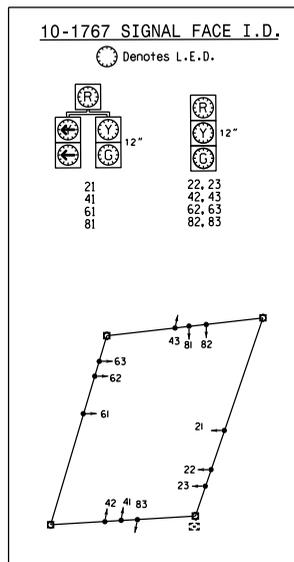
NC 49  
 55 MPH  
 ADT (Year)  
 21,000 (2008)

NC 49  
 55 MPH  
 ADT (Year)  
 17,000 (2008)

CENTRAL CABARRUS HIGH SCH  
 35 MPH  
 ADT (Year)  
 EST 1,000 (2008)

(3) NC 49 at QUEENS DR/CENTRAL CABARRUS HIGH

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



**N.C. DEPARTMENT of TRANSPORTATION**  
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SS #10-09-203  
 Order # 41000030185  
 CABARRUS County  
 AFTER Period  
 10/1/2010 - 08/31/2014

QUEENS DR  
 45 MPH  
 ADT (Year)  
 EST 1,000 (2012)

NC 49  
 45 MPH  
 ADT (Year)  
 21,000 (2012)

NC 49  
 45 MPH  
 ADT (Year)  
 17,000 (2012)

CENTRAL CABARRUS HIGH SCH  
 35 MPH  
 ADT (Year)  
 EST 1,000 (2012)

LEGEND

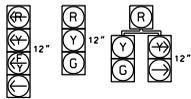
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	PEDESTRIAN		TURNING		10 MPH TO 19		ANIMAL
	PARKED VEHICLE		BACKING		20 MPH TO 29		* DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		INJURY		50 MPH TO 59		70 AND UP
	REAR END		FATALITY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD				70 AND UP		I ICY OR SNOWY
					SPEED UNKNOWN		O OILY

(3) NC 49 at QUEENS DR/CENTRAL CABARRUS HIGH

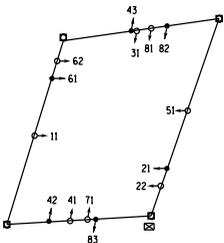


10-1767 SIGNAL FACE I.D.

All Heads L.E.D.



11	21	22
31	41, 42, 43	62
51	61	
71	81, 82, 83	



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SS #10-09-203  
 Order # 41000030185  
 CABARRUS County  
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 8/1/2006 - 6/30/2010

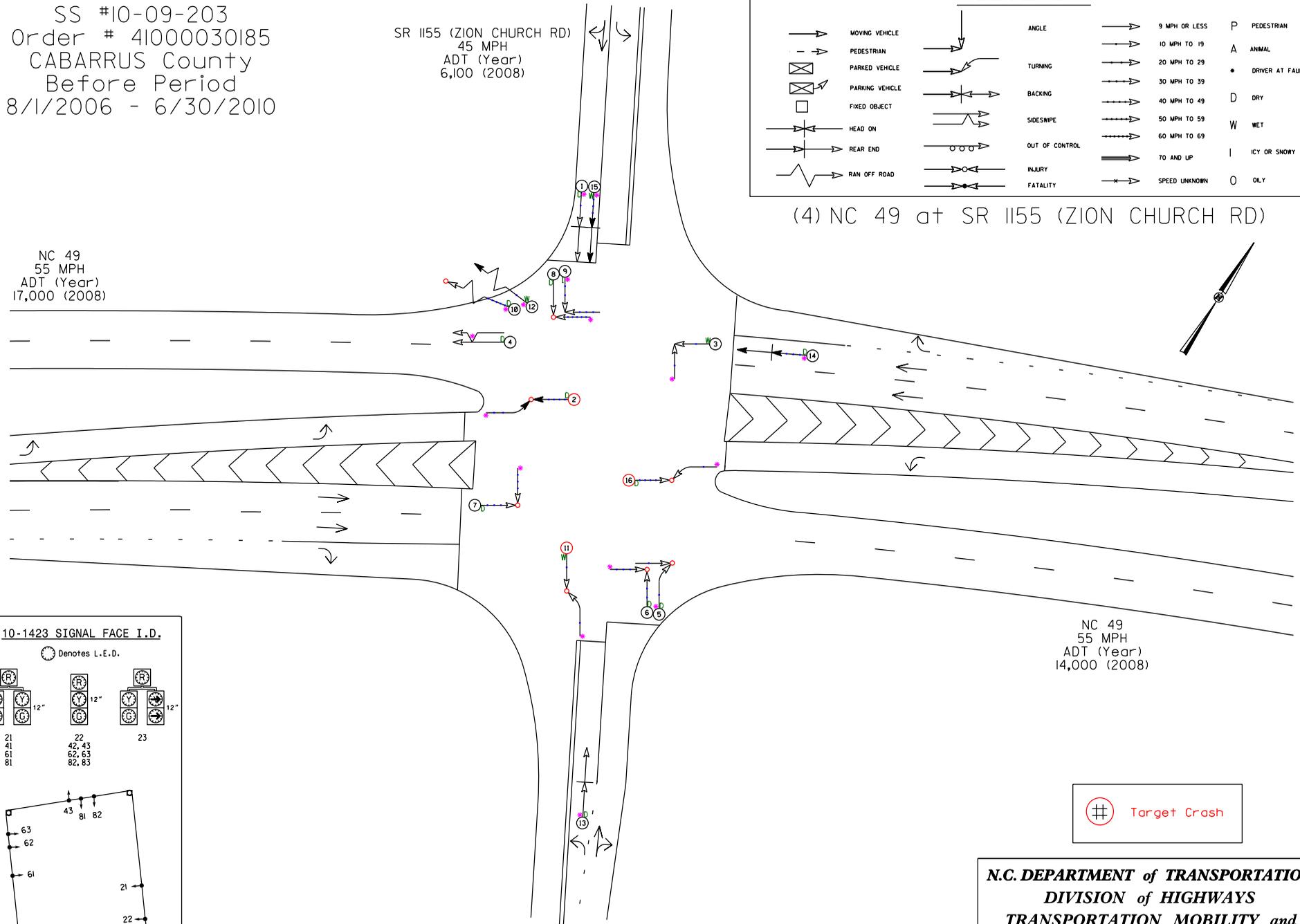
SR 1155 (ZION CHURCH RD)  
 45 MPH  
 ADT (Year)  
 6,100 (2008)

NC 49  
 55 MPH  
 ADT (Year)  
 17,000 (2008)

LEGEND

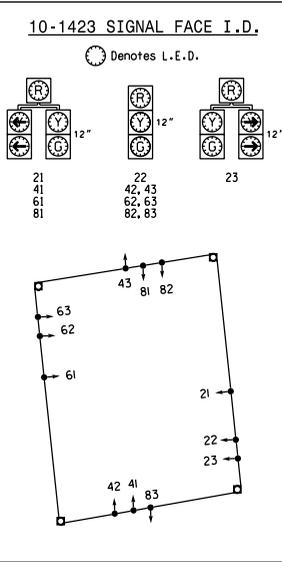
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		ANIMAL
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		OILY
	RAN OFF ROAD		SPEED UNKNOWN		70 AND UP		

(4) NC 49 at SR 1155 (ZION CHURCH RD)



SR 1155 (ZION CHURCH RD)  
 45 MPH  
 ADT (Year)  
 6,100 (2008)

NC 49  
 55 MPH  
 ADT (Year)  
 14,000 (2008)



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

**TRAFFIC SAFETY UNIT**

Date: 09-15-2014

Prepared By: Troy S Fimm

SS #10-09-203  
 Order # 41000030185  
 CABARRUS County  
 AFTER Period  
 10/1/2010 - 08/31/2014

SR 1155 (ZION CHURCH RD)  
 45 MPH  
 ADT (Year)  
 5,400 (2012)

NC 49  
 55 MPH  
 ADT (Year)  
 17,000 (2012)

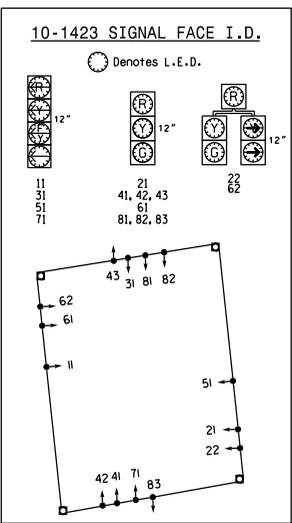
NC 49  
 55 MPH  
 ADT (Year)  
 15,000 (2012)

SR 1155 (ZION CHURCH RD)  
 45 MPH  
 ADT (Year)  
 5,400 (2012)

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		ANIMAL
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY		60 MPH TO 69		OILY
	RAN OFF ROAD				70 AND UP		
					SPEED UNKNOWN		

(4) NC 49 at SR 1155 (ZION CHURCH RD)



**N.C. DEPARTMENT of TRANSPORTATION**  
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