

Spot Safety Project Evaluation

Project Log # 200812039

Spot Safety Project # 12-02-215

**Spot Safety Project Evaluation of the Installation of an Actuated Flasher at the
Intersection of SR 1849 (Mt Pleasant Rd) and SR 1815 (Little Mountain Rd)
Catawba County**

Documents Prepared By:

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

Principal Investigator



Brad Robinson, PE

8/31/2009

Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-02-215 – The Intersection of SR 1849 (Mt Pleasant Rd) and SR 1815 (Little Mountain Rd) in Catawba County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of an actuated flasher which detects traffic on the mainline (SR 1849) and warns the side street traffic (SR 1815).

The subject location is a four-leg intersection which is controlled by stop signs on SR 1815 (Little Mountain Rd). SR 1815 had median islands with dual stop signs. All approaches to the intersection are single lane. The speed limits are 55 mph for SR 1849 (Mt Pleasant Rd) and 45 mph for SR 1815 (Little Mountain Rd).

The original statement of problem was that there is very limited sight distance for vehicles entering the intersection from SR 1815. On May 24, 2002 a crash involving a school bus occurred at the intersection which precipitated many complaints from private citizens and from the school system.

The initial crash analysis was completed from June 1, 1999 to May 31, 2002 with three reported crashes, one of which was considered correctable by the chosen countermeasure. The final completion date for the improvement at the subject intersection was on July 15, 2003 with a total cost of \$30,000.00.

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 was from June 1, 2003 to August 31, 2003. The before period consisted of reported crashes from March 1, 1998 through May 31, 2003 (5 years and 3 months); and the after period consisted of reported crashes from September 1, 2003 through November 30, 2008 (5 years and 3 months). The ending date for this analysis was determined by the available crash data at the time of analysis.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes involving a vehicle entering the intersection from SR 1815 (Little Mountain Rd) are the Target Crashes for the applied countermeasure. The target crashes are clearly identified in the before and after period collision diagrams.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	7	4	-42.9
Total Severity Index	3.11	6.55	110.6
Target Crashes	4	3	-25.0
Target Crash Severity Index	2.85	5.93	108.1
Volume	4,100	4,000	-2.4
<u>Crash Severity Summary</u>			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	1	1	0.0
Class C Crashes	1	2	100.0
PDO Crashes	5	1	-80.0

The naive before and after analysis at the treatment location resulted in a 43 percent decrease in Total Crashes, a 25 percent decrease in Target Crashes, and a 2 percent decrease in Average Daily Traffic (ADT). The before period ADT year was 2000 and the after period ADT year was 2006.

Results and Discussion

The naive before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 43 percent decrease in Total Crashes and a 25 percent decrease in Target Crashes. The Total Severity Index increased by 111 percent and the Target Crash Severity Index increased by 108 percent. The summary results above demonstrate that both Total Crashes and Target Crashes appear to have decreased at the treatment location from the before to the after period.

The calculated benefit to cost ratio for this project is -0.12 considering total crashes. The benefit to cost ratio considering only target crashes is -0.42. The benefits are calculated using the change in annual crash costs from the before to the after period. Operational and other benefits related to the project are not considered in this analysis. The costs of the project include the actual construction costs as well as the increase in annual maintenance and utility costs.

Target Crashes were reduced by 25 percent from the before to the after period, although that translates into only one less Target Crash in the after period. After looking at the crash reports, it appears that two of the four before period Target Crashes occurred as a result of a vehicle running the stop sign. In the after period there did not appear to be any crashes resulting from a vehicle running the stop sign.

Because of the current economic conditions, we were not able to get site photos of this intersection or the site distances. 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.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1849 and SR 1815
 COUNTY: Catawba
 FILE NO.: SS 12-02-215

BY: BDR
 DATE: 4/13/2009

DETAILED COST: TYPE IMPROVEMENT - Actuated Flasher

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$30,000	10	0.149	\$4,471
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$30,000	10	0.149	\$4,471

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$350
 TOTAL ANNUAL COST= \$5,221
 TOTAL COST OF PROJECT= \$30,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.25	0	0.00	2	0.38	5	0.95	\$11,619
AFTER	5.25	0	0.00	3	0.57	1	0.19	\$12,229

Annual Benefits from Crash Cost Savings (\$610)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$5,830)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.12

TOTAL COST OF PROJECT - \$30,000 COMPREHENSIVE B/C RATIO - -0.12

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1849 and SR 1815
 COUNTY: Catawba
 FILE NO.: SS 12-02-215 Target Crashes

BY: BDR
 DATE: 4/13/2009

DETAILED COST: TYPE IMPROVEMENT - Actuated Flasher

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$0	0	0.000	\$0
	\$30,000	10	0.149	\$4,471
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$30,000	10	0.149	\$4,471

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$350
 TOTAL ANNUAL COST= \$5,221
 TOTAL COST OF PROJECT= \$30,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

TIME PERIOD	YEARS	ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES				PDO		ANNUAL COSTS
		K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	CRASHES	CRASHES PER YR	
BEFORE	5.25	0	0.00	1	0.19	3	0.57	\$6,210
AFTER	5.25	0	0.00	2	0.38	1	0.19	\$8,419

Annual Benefits from Crash Cost Savings (\$2,210)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$7,430)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.42

TOTAL COST OF PROJECT - \$30,000 COMPREHENSIVE B/C RATIO - -0.42

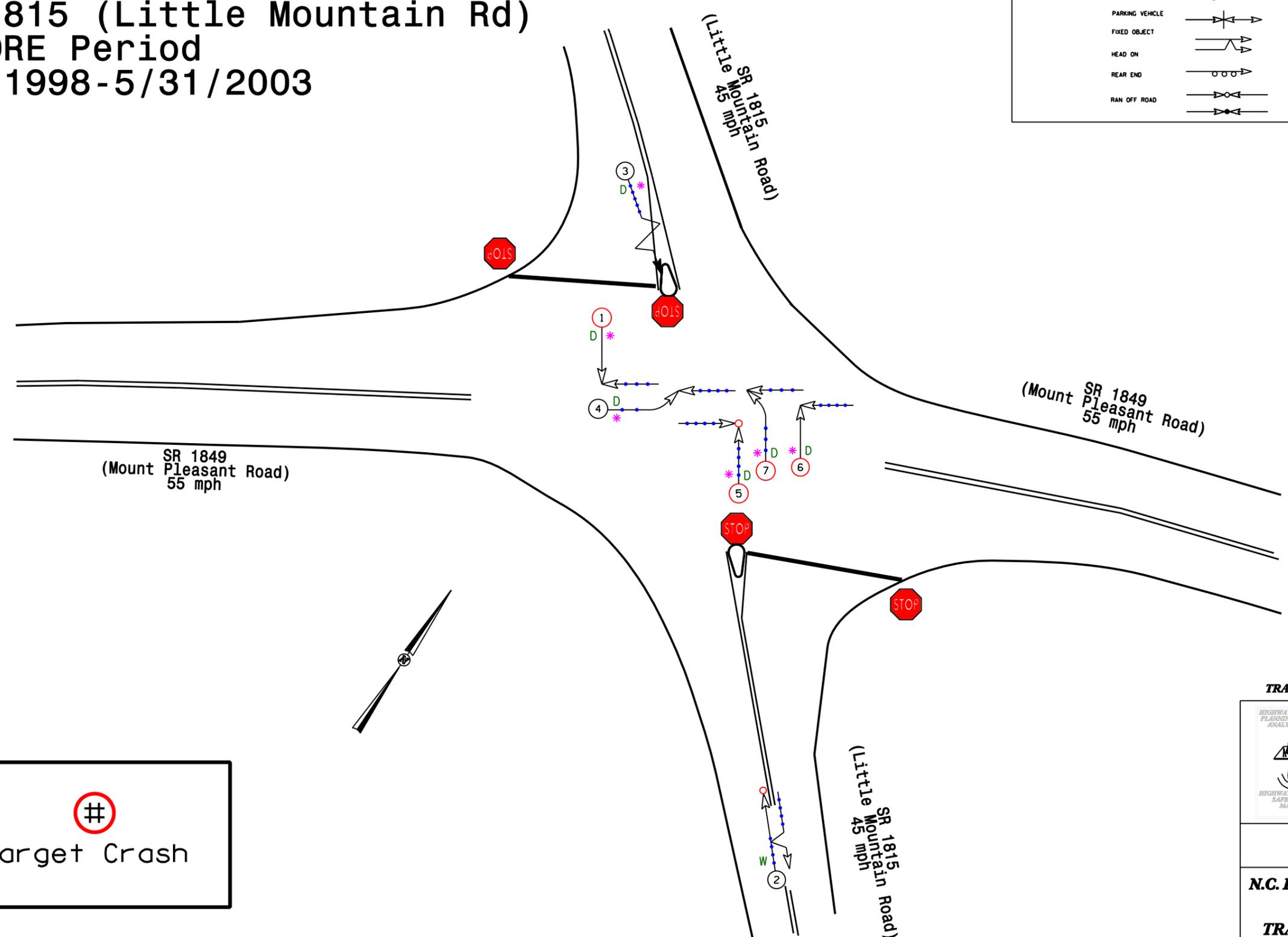
Aerial Photo from Googlemaps



Catawba County
 SR 1849 (Mt Pleasant Rd) at
 SR 1815 (Little Mountain Rd)
 BEFORE Period
 3/1/1998-5/31/2003

LEGEND

MOVING VEHICLE	ANGLE	9 MPH OR LESS	P PEDESTRIAN
PEDESTRIAN	TURNING	10 MPH TO 19	T TRAIN
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 OIL
RAN OFF ROAD		70 AND UP	
		SPEED UNKNOWN	



 Target Crash

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

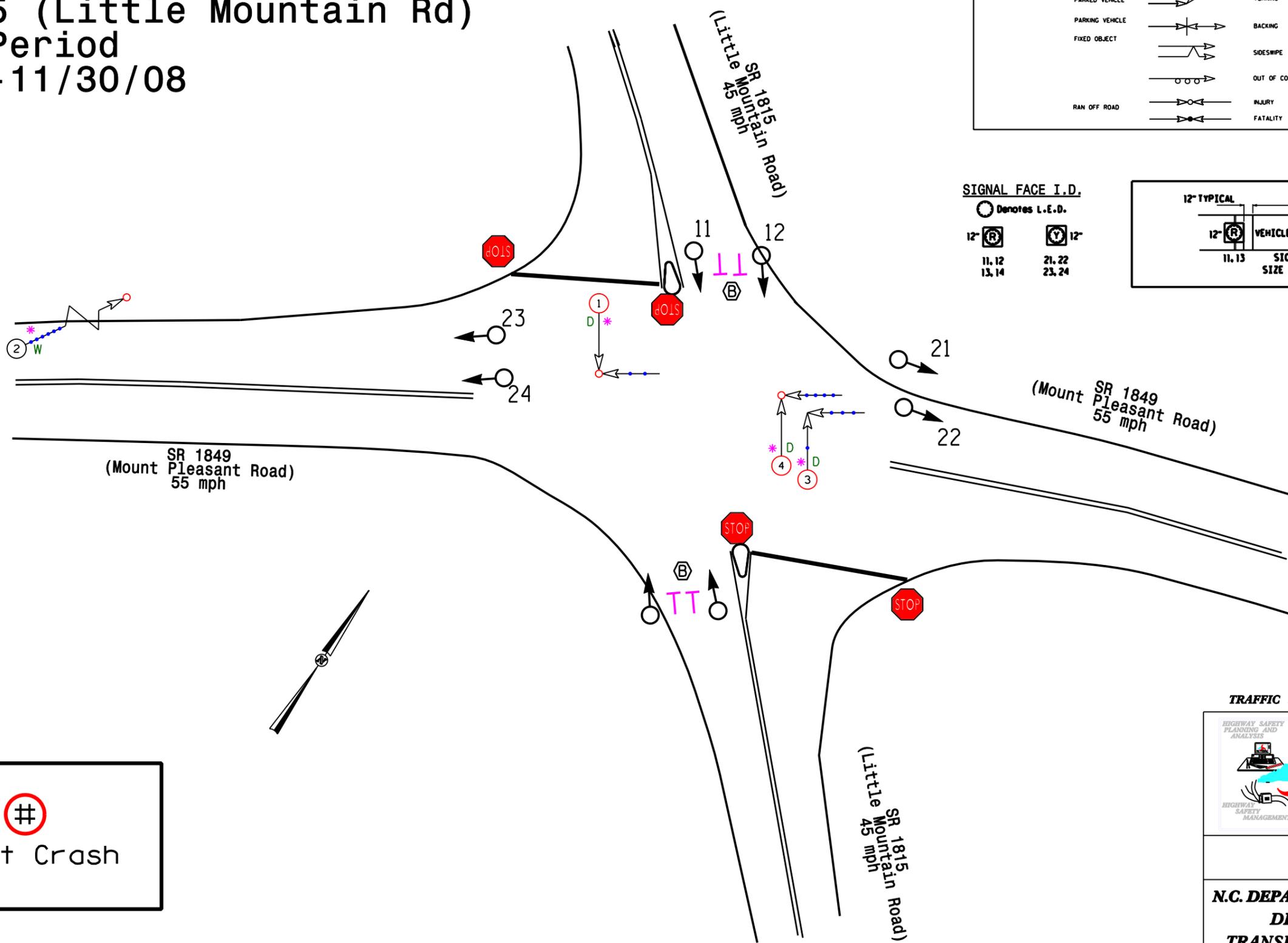
	COLLISION DIAGRAM	
	DIVISION: 12	AREA:
STUDY PERIOD: 3/1/98-5/31/03		
DISTANCE: Y-LINE = 150 FT		
ANALYSIS PREPARED BY: BDR		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: March 2009		
LOG NUMBER: 20082039		

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

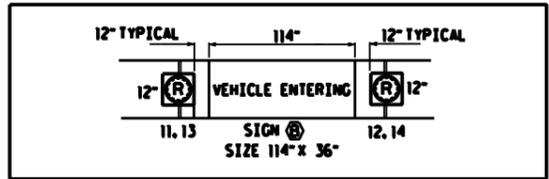
Catawba County
 SR 1849 (Mt Pleasant Rd) at
 SR 1815 (Little Mountain Rd)
 AFTER Period
 9/1/03-11/30/08

LEGEND

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



SIGNAL FACE I.D.
 ○ Denotes L.E.D.
 12" (R) 12" (Y)
 11, 12 21, 22
 13, 14 23, 24



Target Crash

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 12	AREA:
	STUDY PERIOD: 9/1/2003-9/30/2008	
	DISTANCE: Y-LINE = 150 FT	
ANALYSIS PREPARED BY: BDR		
ANALYSIS CHECKED BY:		
DIAGRAM PREPARED BY: BDR		
DIAGRAM REVIEWED BY:		
SCALE: NOT TO SCALE		
DATE: March 2009		
LOG NUMBER: 20082039		

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