

Spot Safety Project Evaluation

Order # 41000001549

Spot Safety Project # 12-02-213

**Spot Safety Project Evaluation of the
Traffic Signal and Left Turn Lane Installation
SR 1100 (Brawley School Rd) at SR 1116 / SR 2906
Iredell County**

Documents Prepared By:

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

Principal Investigator



Jason B. Schronce

9-29-2009

Date

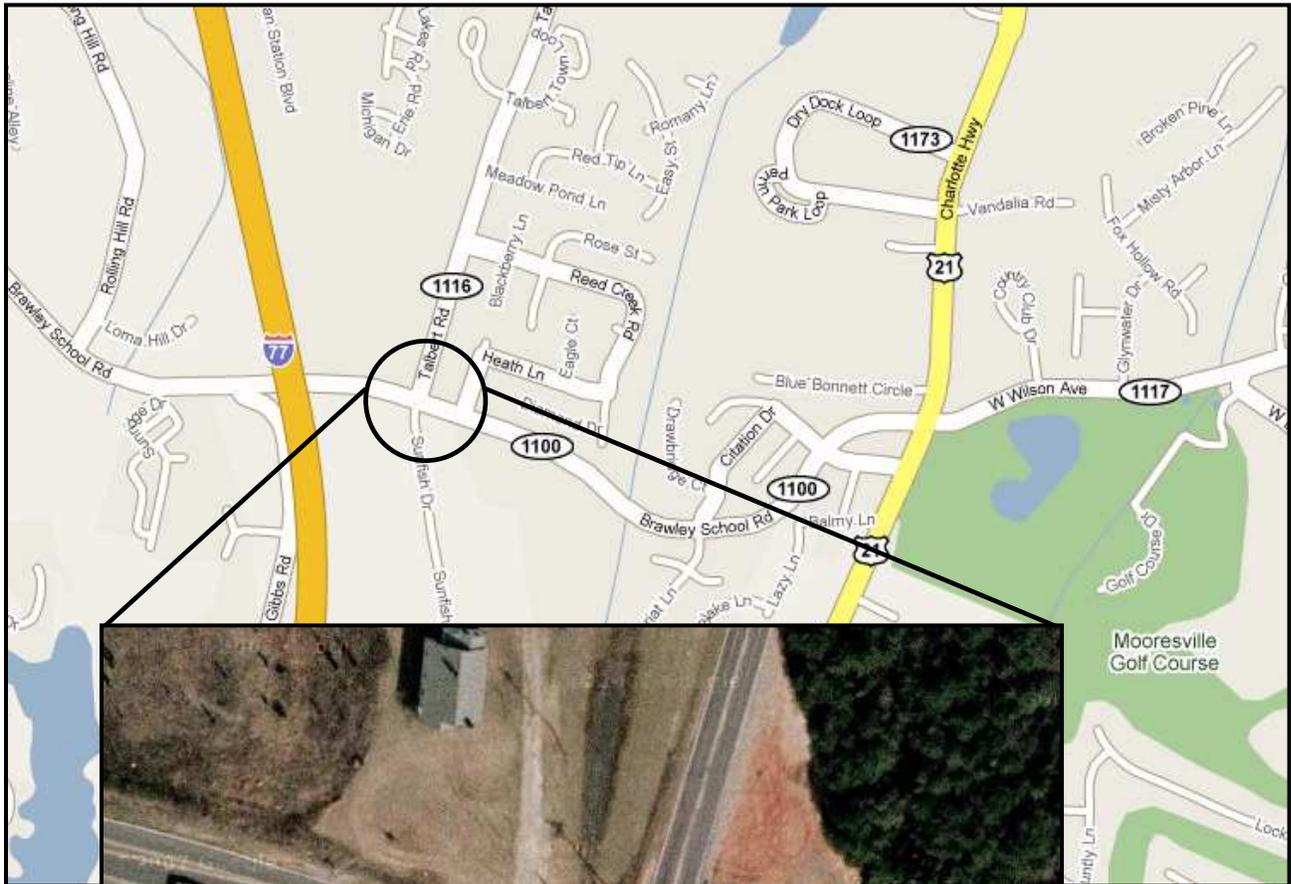
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 12-02-213 located at the Intersection of SR 1100 (Brawley School Road) and SR 1116 (Talbert Road) / SR 2906 (Sunfish Drive) in Iredell County, near the City of Mooresville.

The Sig ID is 12-1689 for this newly installed traffic signal.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasures chosen for the subject location were the installation of a SR 1100 (Brawley School Road) eastbound left turn lane and an intersection three-phase traffic signal. SR 1100, SR 1116, and SR 2906 are all two-lane facilities at the subject intersection with speed limits of 45 mph. Sunfish Drive is a small dead-end residential street serving a cove of Lake Norman. The subject location is a four-leg intersection, which was controlled by a stop condition on SR 1116 (Talbert Road) / SR 2906 (Sunfish Drive) in the before period.

The original statement of problem was the increased time delay for motorists on SR 1116 (Talbert Road). SR 1100 (Brawley School Road) has become a popular thoroughfare for residential development near Mooresville. The intended purpose was to reduce delay on SR 1116 and improve the overall intersection safety.

The initial crash analysis was completed from December 1, 1998 to November 30, 2001 with seven (7) reported crashes, three (4) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on January 22, 2004 with a total cost of \$90,000.

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 December 2003 through January 2004. The before period consisted of reported crashes from June 1, 1998 through November 30, 2003 (5 years and 6 months); and the after period consisted of reported crashes from February 1, 2003 through July 31, 2009 (5 years and 6 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. *Please see attached location map, aerial map, and photos 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 signal installation. 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.

Also, Eastbound SR 1100 Rear-end Collisions were the selected target crashes for the left turn lane installation. These crash types only involved vehicles that were explicitly turning left onto SR 1116 (Talbert Road).

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	19	25	31.6 %
Total Severity Index	9.27	3.66	- 60.5 %
Volume	12,400	19,900	60.4 %

<u>Target Crash Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Frontal Impact Target Crashes	12	6	- 50.0 %
Frontal Target Crash Severity Index	12.25	4.70	- 61.6 %
EB SR 1100 Rear-end Target Crashes	2	1	- 50.0 %
Rear-end Target Crash Severity Index	4.70	1.00	- 78.7 %

<u>Injury Crash Summary</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	1	0	- 100.0 %
Class B injury Crashes	4	1	- 75.0 %
Class C Injury Crashes	7	8	14.3 %
Total Injury Crashes	12	9	- 25.0 %

The naive before and after analysis at the treatment location resulted in a 32 percent increase in Total Crashes, but a 50 percent decrease in Target Crashes, and a 60.5 percent decrease in the Total Severity Index. The before period ADT year was 2001 and the after period ADT year was 2006.

Results and Discussion

From the *Collision Diagrams*, the before period frontal impact crash pattern consisted of twelve (12) collisions; of which five (5) were high speed angle crashes resulting from a vehicle running the stop sign. With the signal installation, frontal impact crashes at the intersection reduced by 50 percent to six (6) collisions. Only two (2) vehicles in the after period ran the red indication signal.

Once again referencing the *Collision Diagrams*, the before period eastbound SR 1100 rear-end crash pattern at the intersection consisted of two (2) collisions while vehicles were waiting to make the left turn onto SR 1116. After the left turn lane installation, this small pattern was reduced to one (1) collision that occurred in the turn lane. However, the intersection has experienced an overall crash count increase through the analysis. Total rear-end collisions approaching the intersection and signal have increased from five (5) in the before period to thirteen (13) in the after period.

The calculated benefit to cost ratio for this project is **5.38 considering total crashes**. The benefit to cost ratio **considering only target crashes is 6.58**. 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.

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



Looking East on SR 1100 (Brawley School Rd) approaching Intersection



Looking West on SR 1100 (Brawley School Rd) approaching Intersection



Looking North onto SR 1116 (Talbert Road) from intersection



Looking South onto SR 2906 (Sunfish Drive) from intersection

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: SR 1100 at SR 1116		BY: JBS						
COUNTY: Iredell		DATE: 9/23/2009						
FILE NO.: SS 12-02-213		NOTES: Total Crashes						
DETAILED COST: TYPE IMPROVEMENT - EB SR 1100 Left Turn Lane and Signal								
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$90,000	10	0.149	\$13,413				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$90,000	10	0.149	\$13,413				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,600				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
TOTAL ANNUAL COST=				\$16,913				
TOTAL COST OF PROJECT=				\$90,000				
COMPREHENSIVE COST REDUCTION:								
ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES								
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.50	1	0.18	11	2.00	7	1.27	\$131,873
AFTER	5.50	0	0.00	9	1.64	16	2.91	\$40,800
Annual Benefits from Crash Cost Savings								\$91,073
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$74,160		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	5.38		
TOTAL COST OF PROJECT		-	\$90,000	COMPREHENSIVE B/C RATIO		-	5.38	

BENEFIT-COST ANALYSIS WORKSHEET - Combined Targets

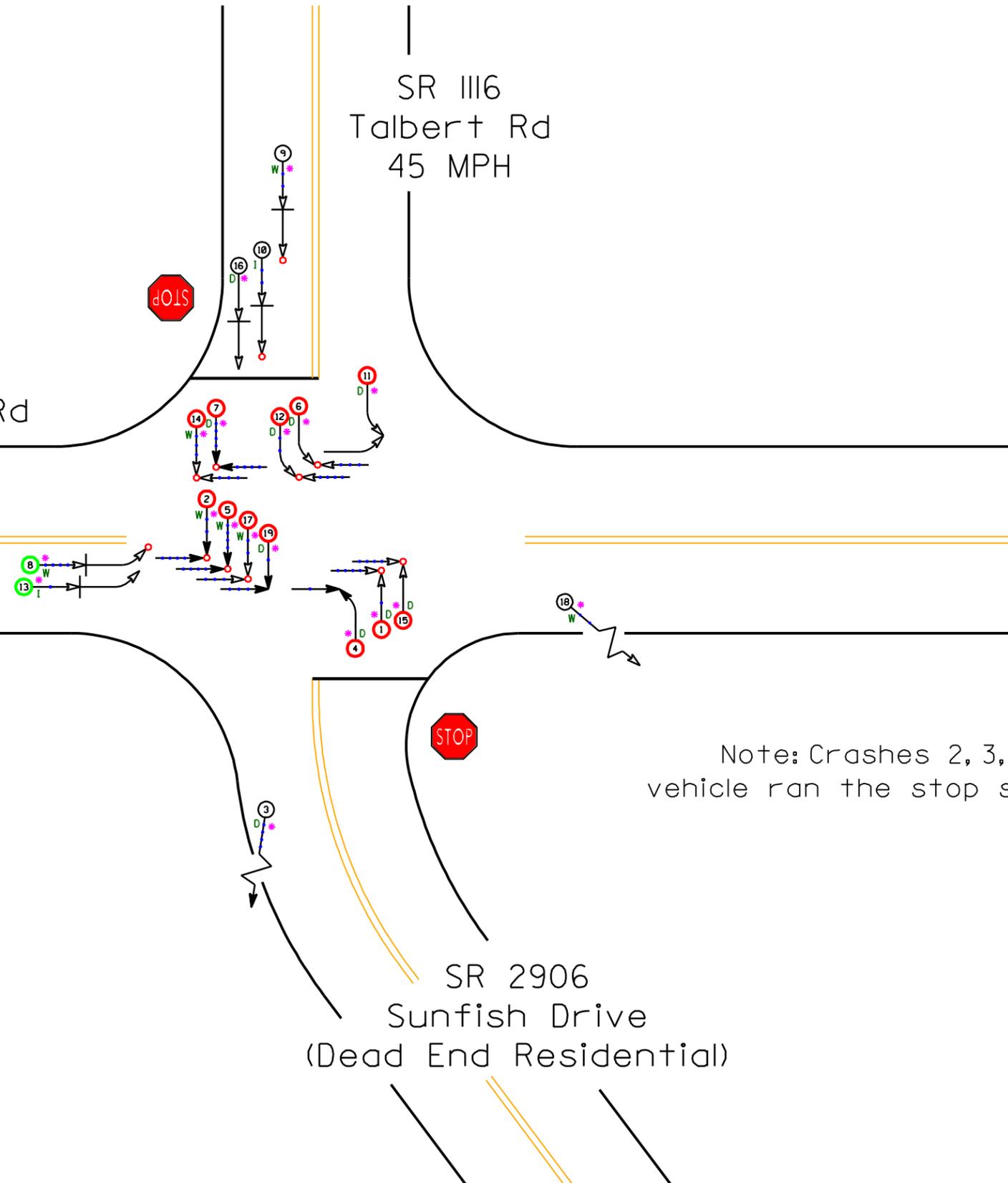
LOCATION: SR 1100 at SR 1116		BY: JBS						
COUNTY: Iredell		DATE: 9/23/2009						
FILE NO.: SS 12-02-213		NOTES: Target Crashes - Frontal & EB Rear-End						
DETAILED COST: TYPE IMPROVEMENT - EB SR 1100 Left Turn Lane and Signal								
ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
Construction	\$90,000	10	0.149	\$13,413				
Right-of-Way	\$0	0	0.000	\$0				
TOTALS	\$90,000	10	0.149	\$13,413				
ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,600				
ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
TOTAL ANNUAL COST=				\$16,913				
TOTAL COST OF PROJECT=				\$90,000				
COMPREHENSIVE COST REDUCTION:								
ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES								
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	5.50	1	0.18	9	1.64	4	0.73	\$123,200
AFTER	5.50	0	0.00	3	0.55	3	0.55	\$11,945
Annual Benefits from Crash Cost Savings								\$111,255
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$94,342		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	6.58		
TOTAL COST OF PROJECT		-	\$90,000	COMPREHENSIVE B/C RATIO		-	6.58	



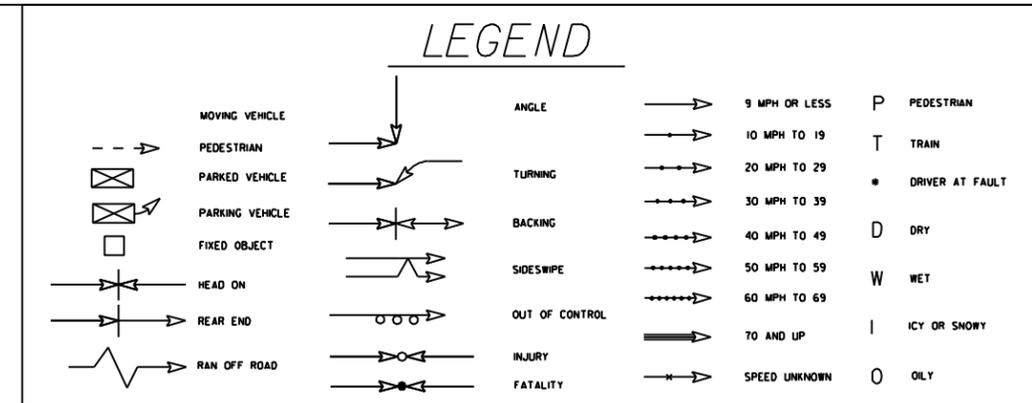
SR 1116
Talbert Rd
45 MPH

SR 1100
Brawley School Rd
45 MPH

SR 2906
Sunfish Drive
(Dead End Residential)



Note: Crashes 2, 3, 5, 7, 14, & 17
vehicle ran the stop sign from SR 1116



SS# 12-02-213
Iredell County
City of Mooresville
BEFORE Period
6/1/98 - 11/30/03



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

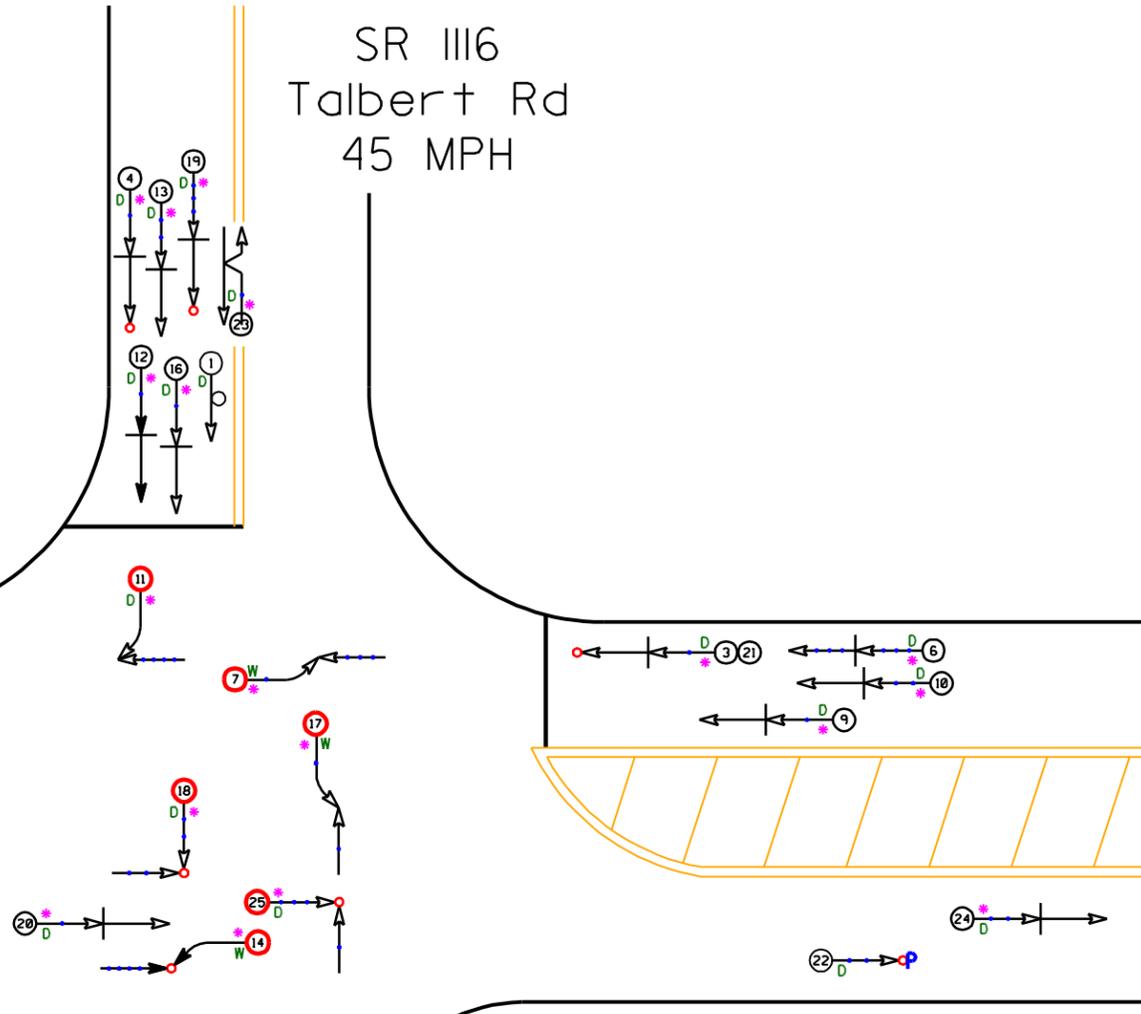
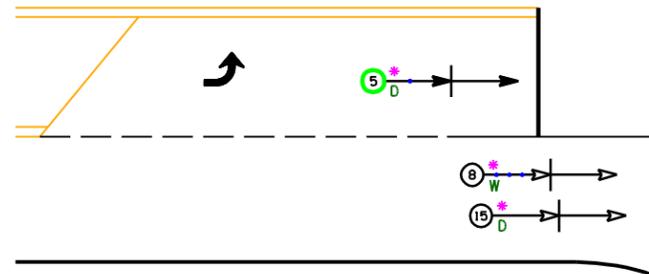
	COLLISION DIAGRAM	
	DIVISION: 12	AREA:
	STUDY PERIOD: 6/1/1998 - 11/30/2003	
	DISTANCE: Y-LINE : 150FT	
	ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 9-23-2009		
ORDER NUMBER: 400000549		

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

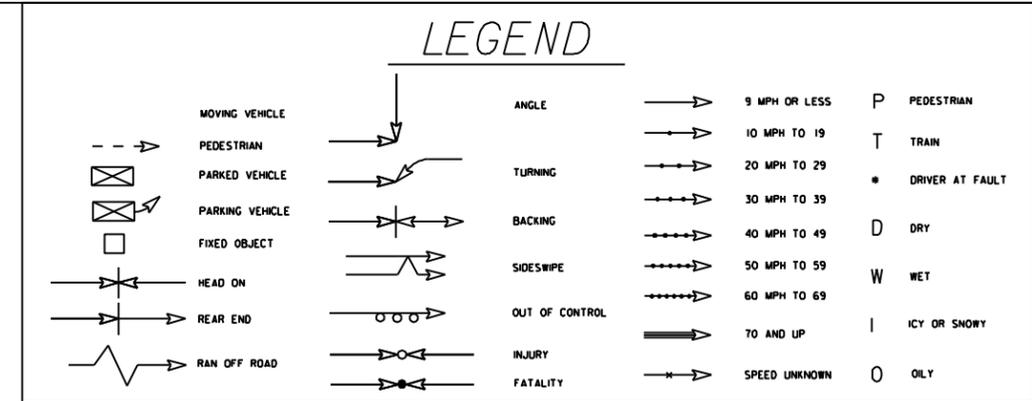


SR 1116
Talbert Rd
45 MPH

SR 1100
Brawley School Rd
45 MPH



SR 2906
Sunfish Drive
(Dead End Residential)



SS# 12-02-213
Iredell County
City of Mooresville
AFTER Period
2/1/04 - 7/31/09

New Signalized
 Intersection
 Sig ID 12-1689

SR 1100 Rear-End
Target Crashes

Frontal Impact
Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 12	AREA:
STUDY PERIOD: 2/1/2004 - 7/31/2009		
DISTANCE: Y-LINE = 150 FT		
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: N/A		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 9-23-2009		
ORDER NUMBER: 400000549		

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