

Spot Safety Project Evaluation

Project Log # 200906133

Spot Safety Project # 04-02-201

**Spot Safety Project Evaluation of the Traffic Signal Installation
SR 1927 (E. Anderson Street) at SR 2332 (Webb Street)
City of Selma, Johnston 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

8-17-2009

Date

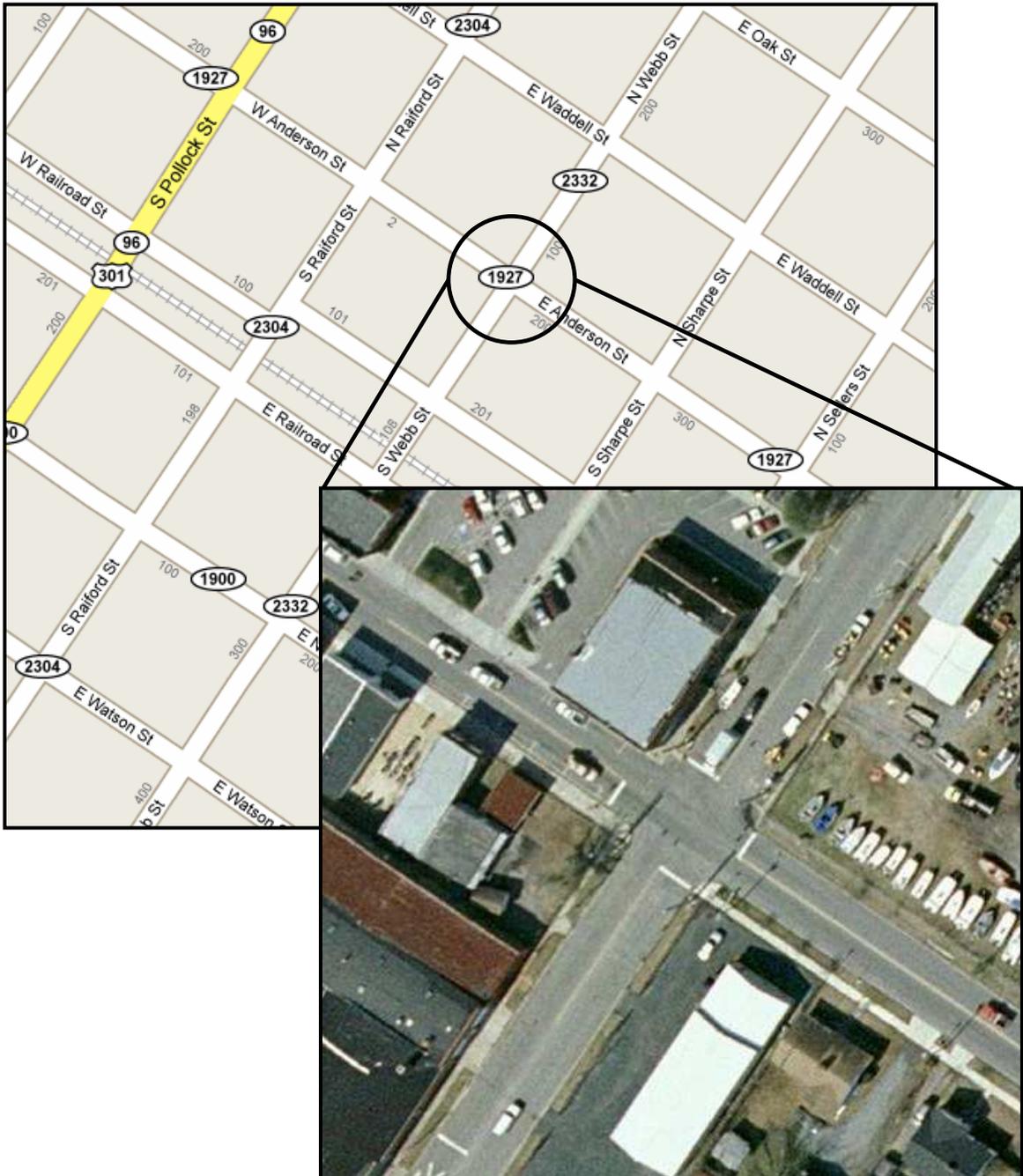
Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-02-201 located at the Intersection of SR 1927 (E. Anderson Street) and SR 2332 (Webb Street) in Johnston County, within the City of Selma.

The Sig ID is 04-1283 for this newly installed traffic signal.



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 intersection 2-phase traffic signal. SR 1927 (Anderson Street) and SR 2332 (Webb Street) are both two-lane, two-way facilities with city speed limits of 35 mph on all approaches. The intersection is part of the City of Selma grid system and on-street parking is allowed north and west of the intersection. The subject location is a four-leg intersection, which was controlled by stop signs on SR 2332 (Webb Street).

The original statement of problem was the existing pattern of frontal impact collisions occurring at this intersection. The intended purpose of the new traffic signal was to reduce the number of angle type collisions.

The initial crash analysis was completed from August 31, 1999 to August 31, 2001 with fourteen (14) reported crashes, thirteen (13) of which were deemed correctable angle collisions. The final completion date for the improvement at the subject intersection was on July 11, 2003 with a total cost of \$60,000.

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 June through July 2003. The before period consisted of reported crashes from September 1, 1997 through May 31, 2003 (5 years and 9 months); and the after period consisted of reported crashes from August 1, 2003 through April 30, 2009 (5 years and 9 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 countermeasure. 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.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	14	5	- 64.3 %
Total Severity Index	4.70	1.00	- 78.7 %
Target Crashes	12	2	- 83.3 %
Target Crash Severity Index	4.70	1.00	- 78.7 %
Volume	5,500	5,200	- 5.5 %

<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	0	- 100.0 %
Class C Injury Crashes	6	0	- 100.0 %
Total Injury Crashes	7	0	- 100.0 %

The naive before and after analysis at the treatment location resulted in a 64 percent decrease in Total Crashes, an 83 percent decrease in Target Crashes, and a 79 percent decrease in the Total Severity Index. 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 64 percent decrease in Total Crashes and an 83 percent decrease in Target Crashes. The summary results above demonstrate that both Total and Target Crashes appear to have decreased at the treatment location from the before to the after period.

Referencing the *Collision Diagrams*, the before period was experiencing a reoccurring pattern of angle collisions. These crashes were mixed between motorists running the stop sign on Webb Street and others choosing insufficient gaps when attempting to cross Anderson Street after stopping at the stop sign. After the signal installation, the angle crash pattern was eliminated. Permissive left turn collisions increased from one (1) in the before period to two (2) in the after period. The signal was successful in reducing both the frequency and severity of crashes at this intersection.

The calculated benefit to cost ratio for this project is **1.97 considering total crashes**. The benefit to cost ratio **considering only target crashes is 1.82**. 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 by Google Streetview 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 North on SR 2332 (Webb Street)



Looking South on Webb Street – notice sight distance issues are building



Looking West on SR 1927 (E. Anderson Street)



Looking East on Anderson Street

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: Anderson at Webb		BY: JBS							
COUNTY: Johnston		DATE: 8/13/2009							
FILE NO.: SS 04-02-201		NOTES: Total Crashes							
DETAILED COST:	TYPE IMPROVEMENT -	New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$60,000	10	0.149	\$8,942				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$60,000	10	0.149	\$8,942				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
	TOTAL ANNUAL COST=				\$11,842				
	TOTAL COST OF PROJECT=				\$60,000				
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	5.75	0	0.00	7	1.22	7	1.22	\$26,661	
AFTER	5.75	0	0.00	0	0.00	5	0.87	\$3,391	
						Annual Benefits from Crash Cost Savings		\$23,270	
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$11,428			
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	1.97			
	TOTAL COST OF PROJECT	-	\$60,000	COMPREHENSIVE B/C RATIO	-			1.97	

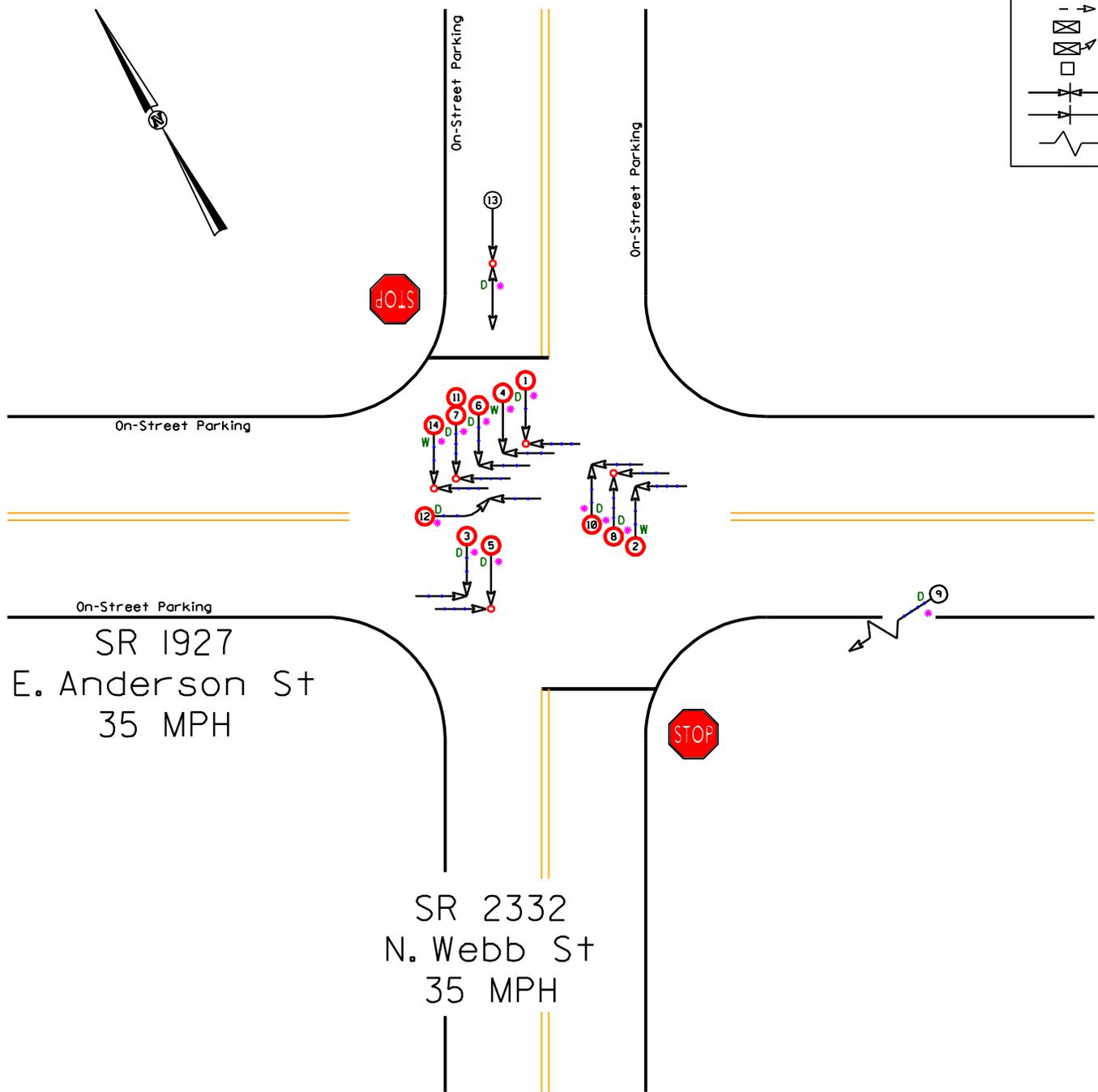
BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: Anderson at Webb		BY: JBS							
COUNTY: Johnston		DATE: 8/13/2009							
FILE NO.: SS 04-02-201		NOTES: Target Crashes - Frontal Impact							
DETAILED COST:	TYPE IMPROVEMENT -	New Traffic Signal							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST				
	Construction	\$60,000	10	0.149	\$8,942				
	Right-of-Way	\$0	0	0.000	\$0				
	TOTALS	\$60,000	10	0.149	\$8,942				
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$2,000				
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$900				
	TOTAL ANNUAL COST=				\$11,842				
	TOTAL COST OF PROJECT=				\$60,000				
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	5.75	0	0.00	6	1.04	6	1.04	\$22,852	
AFTER	5.75	0	0.00	0	0.00	2	0.35	\$1,357	
						Annual Benefits from Crash Cost Savings		\$21,496	
	NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST				=	\$9,654			
	BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST				=	1.82			
	TOTAL COST OF PROJECT	-	\$60,000	COMPREHENSIVE B/C RATIO	-			1.82	

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED 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		TO AND LP		50 MPH TO 59		ICY OR SNOW
	REAR END		HURRY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		70 AND LP		ONLY

SS# 04-02-201
 Johnston County
 City of Selma
 BEFORE Period
 9/1/97 - 5/31/03



Frontal Impact Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 4	AREA:
	STUDY PERIOD: 9/1/97 - 5/31/2003	
	DISTANCE: Y-LINE + 150 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: BR	
	DIAGRAM PREPARED BY: JBS	
	DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE		
DATE: 8/12/2009		
LOG NUMBER: SS* 04-02-201 BEFORE		

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

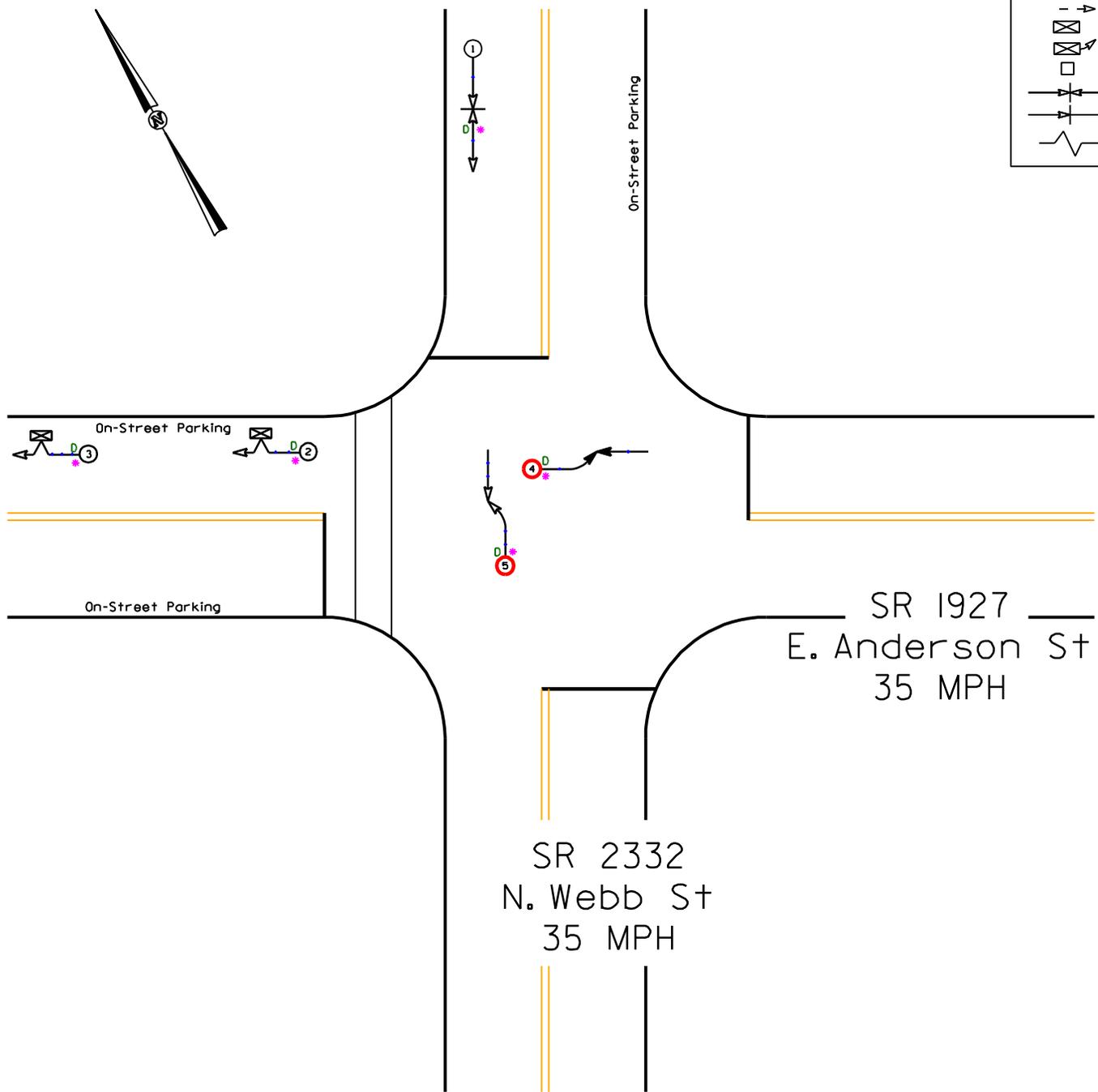
LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAM
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		D RY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W ET
	HEAD ON		TO AND UP		50 MPH TO 59		I CY OR SNOW
	REAR END		HURRY		60 MPH TO 69		SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		70 AND UP		O NLY

SS# 04-02-201
 Johnston County
 City of Selma
 AFTER Period
 8/1/03 - 4/30/09



New Signalized
 Intersection
 Sig ID 04-1283



SR 1927
 E. Anderson St
 35 MPH

SR 2332
 N. Webb St
 35 MPH

Frontal Impact
 Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 4	AREA:
	STUDY PERIOD: 8/1/2003 - 4/30/2009	
	DISTANCE: Y-LINE + 150 FT	
	ANALYSIS PREPARED BY: JBS	
	ANALYSIS CHECKED BY: BR	
	DIAGRAM PREPARED BY: JBS	
	DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE		
DATE: 8/2/2009		
LOG NUMBER: SS* 04-02-201 AFTER		

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