

Spot Safety Project Evaluation

Project Log # 200712043

Spot Safety Project # 11-01-205

**Spot Safety Project Evaluation of the School Zone Flasher Installation
Located at Flat Rock Elementary School on NC 103 (E. Pine Street)
Surry 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

11-24-2008

Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 11-01-205 located on NC 103 (E. Pine Street) at Flat Rock Elementary School between SR 1742 (McBride Rd / Quaker Rd) and SR 1749 (Detherage Rd) in Surry 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 posted school zone flashers on both approaches of NC 103 at Flat Rock Elementary School. NC 103 (E. Pine Street) is a two lane roadway with moderate vertical curvature and a 35 mph standard speed limit. The posted school zone speed limit is 25 mph during the times of 7:00 to 8:00 am and from 2:00 to 3:00 pm. The school zone is also located directly next to the intersection of NC 103 and SR 1742 (McBride Rd / Quaker Rd) which is surrounded by multiple convenience stores and private driveways.

The original statement of problem was the potential for collisions involving school related traffic as other motorists are not slowing down to the posted school zone speed limit. The overall goal was to increase awareness to the posted school zone speed limit.

The initial crash analysis was completed from August 1, 1997 to August 1, 2000 with two (2) reported crashes, both of which were deemed correctable. The final completion date for the improvement at the subject intersection was on January 25, 2002 with a total cost of \$6,000.00.

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 January and February 2002. The before period consisted of reported crashes from July 1, 1995 through December 31, 2001 (6 years and 6 months); and the after period consisted of reported crashes from March 1, 2002 through August 31, 2008 (6 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 on a strip segment of NC 103 from MP 2.092 (150' west of SR 1742) to MP 2.4716 (150' west of SR 1749) with a 0 foot y-line. *Please see attached location map and photos for further details.*

The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that School Zone (Flat Rock Elementary School) Related Crashes were the target crashes for the applied countermeasure. The School Zone Crash types considered are as follows: Left turn, same roadway; Left turn, different roadways; Right turn, same roadway; Right turn, different roadways; Rear End, slow or stop; and Rear End, turn.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	32	25	- 21.9 %
Total Severity Index	5.16	7.29	41.3 %
Target Crashes – School Zone	4	1	- 75.0 %
Target Crash Severity Index	6.55	1.00	- 84.7 %
Volume	6,000	6,500	8.3 %
<u>Injury Crash Summary</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	1	100.0 %
Class B injury Crashes	7	2	- 71.4 %
Class C Injury Crashes	11	9	- 18.2 %
Total Injury Crashes	18	12	- 33.3 %

The naive before and after analysis at the treatment location resulted in a 22 percent decrease in Total Crashes, a 75 percent decrease in Target Crashes, and a 41 percent increase in the Total Severity Index. The before period ADT year was 1998 and the after period ADT year was 2005.

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 22 percent decrease in Total Crashes and a 75 percent decrease in Target Crashes. 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.

School related crashes did drop from four (4) in the before period to the one (1) in the after period. All four collisions in the before period were rear end crashes from vehicles traveling eastbound on NC 103. This small pattern was eliminated in the after period.

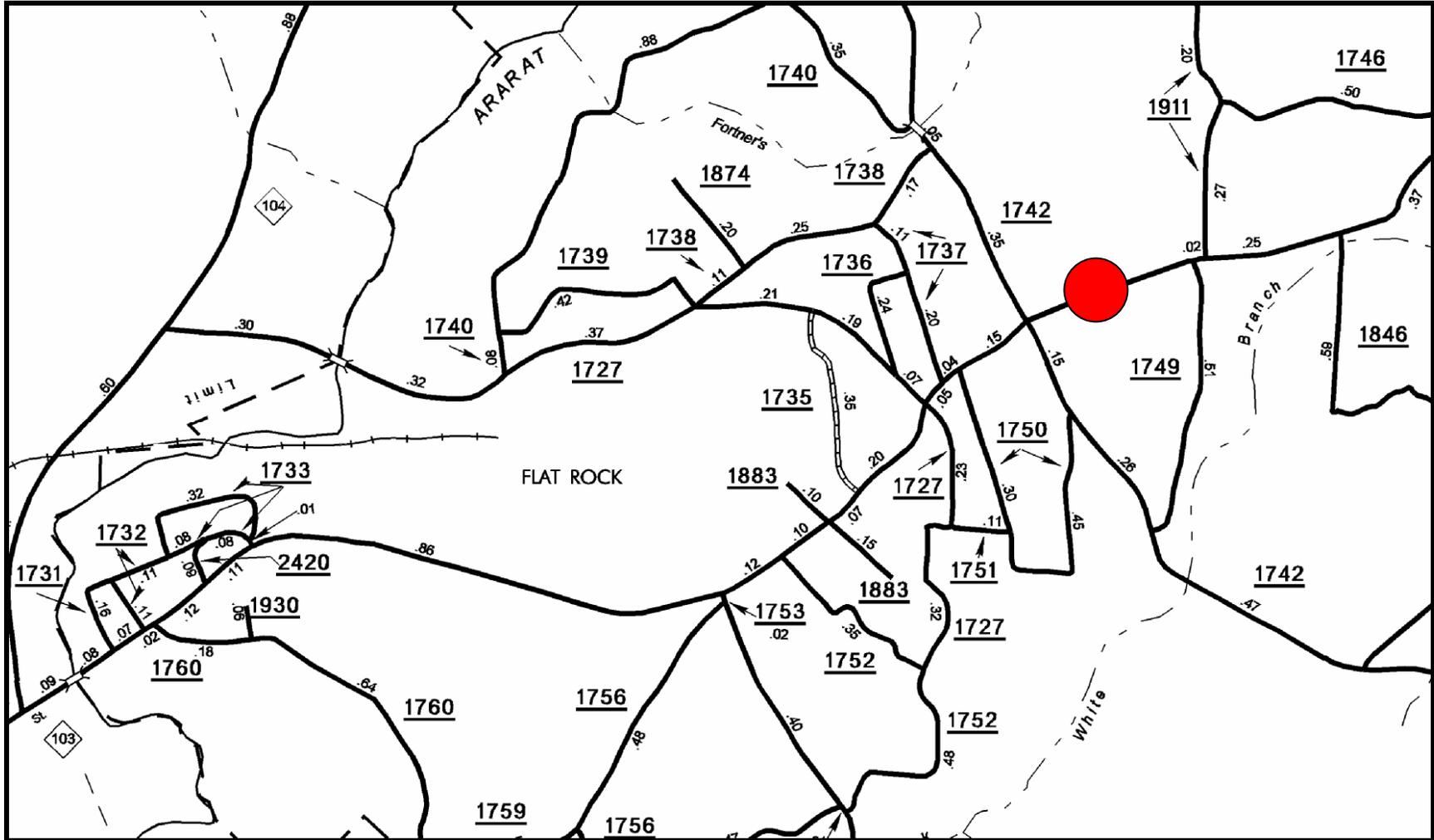
Referencing the *Collision Diagrams*, the majority of the crashes along this strip occurred at the intersection of SR 1742. The intersection is controlled by stop signs on both side street approaches with a standard overhead flasher. The before to the after analysis concluded that frontal impact crashes increased from fifteen (15) to seventeen (17) and angle collisions increased from six (6) to eight (8). The angle collisions appear to be occurring from vehicles who unsuccessfully attempt to cross NC 103 after they have already obeyed the side street stop control.

The calculated benefit to cost ratio for this project is **(-21.95) considering total crashes**. The benefit to cost ratio **considering only target crashes is 3.20**. 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. The elevated

negative ratio overall was highly influenced by one A-class injury resulting from a reckless driver crashing by running off the roadway.

Please see the attached *Treatment Site Photos*. Photos are provided for all 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.

Location Map
Surry County, Town of Flat Rock
Evaluation of Spot Safety Project # 11-01-205



Treatment Location: NC 103 (E. Pine Street) at Flat Rock Elementary School, near SR 1742

TREATMENT SITE PHOTOS TAKEN 3/17/2008



Traveling East on NC 103 (E. Pine Street)
New School Zone Flasher



Traveling East on NC 103



Traveling East on NC 103 through school zone



Traveling East on NC 103 through school zone



NC 103 Westbound School Zone Flasher



Traveling West on NC 103



Traveling West on NC 103



Traveling West on NC 103

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: NC 103 at Flat Rock Elem
 COUNTY: Surry
 FILE NO.: SS 11-01-205

BY: JBS
 DATE: 11/20/2008
 NOTES: Total Strip Crashes

DETAILED COST: TYPE IMPROVEMENT - School Zone Flashers

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$6,000	10	0.149	\$894
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$6,000	10	0.149	\$894

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$1,000
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$700
 TOTAL ANNUAL COST= \$2,594
 TOTAL COST OF PROJECT= \$6,000

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	6.50	0	0.00	18	2.77	14	2.15	\$58,246
AFTER	6.50	1	0.15	11	1.69	13	2.00	\$115,185

Annual Benefits from Crash Cost Savings (\$56,938)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$59,533)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -21.95

TOTAL COST OF PROJECT - \$6,000 COMPREHENSIVE B/C RATIO - -21.95

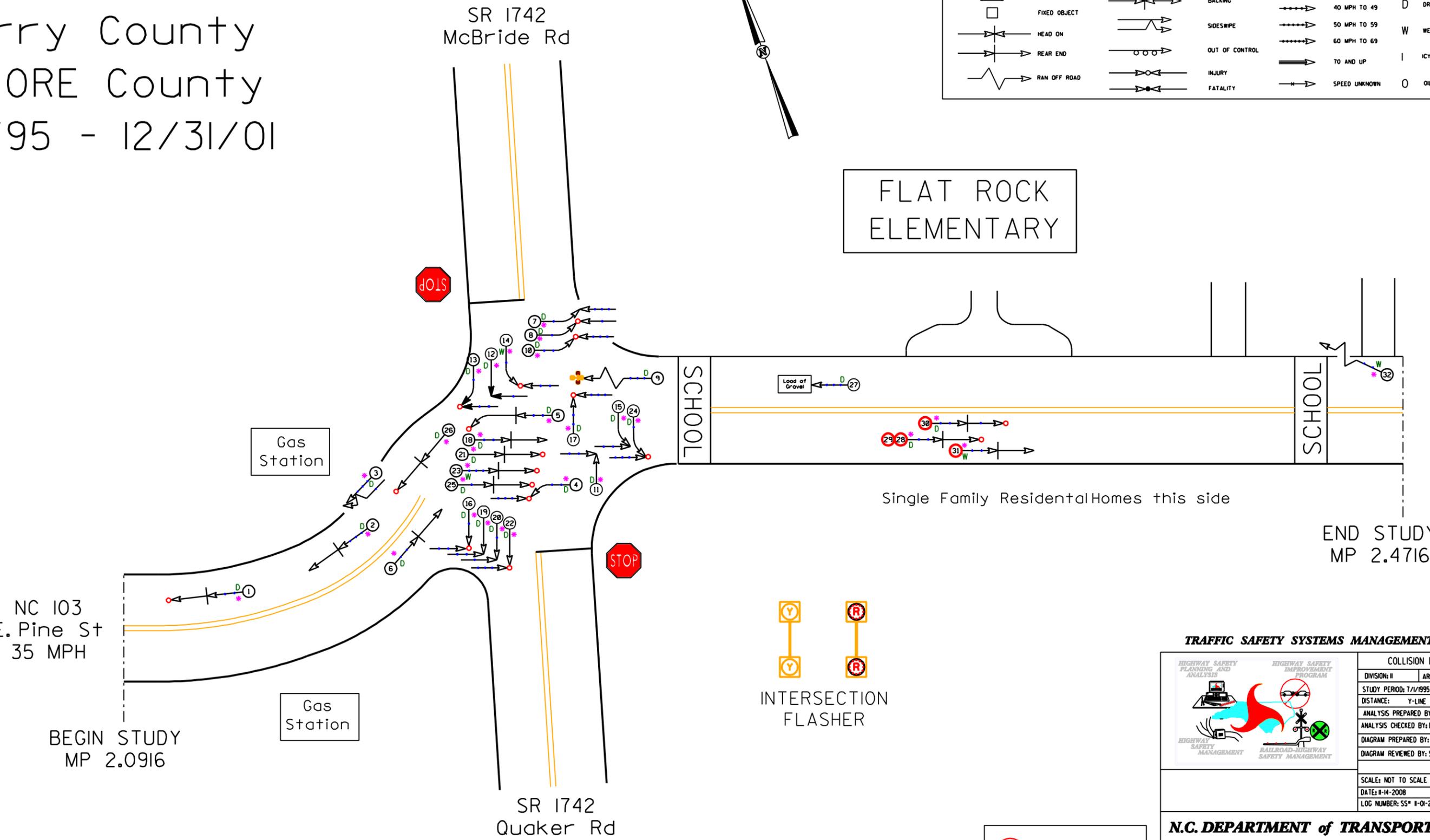
SS# 11-01-205
 Surry County
 BEFORE County
 7/1/95 - 12/31/01

LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	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



FLAT ROCK
 ELEMENTARY



INTERSECTION
 FLASHER

Target Crashes

END STUDY
 MP 2.4716

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

COLLISION DIAGRAM	
DIVISION: II	AREA:
STUDY PERIOD: 7/1/1995 - 12/31/2001	
DISTANCE: Y-LINE : OF T	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 11-14-2008	
LOG NUMBER: SS* 11-01-205 BEFORE	

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

SS# 11-01-205
 Surry County
 AFTER County
 3/1/02 - 8/31/08

LEGEND

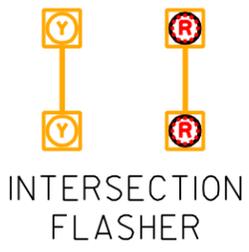
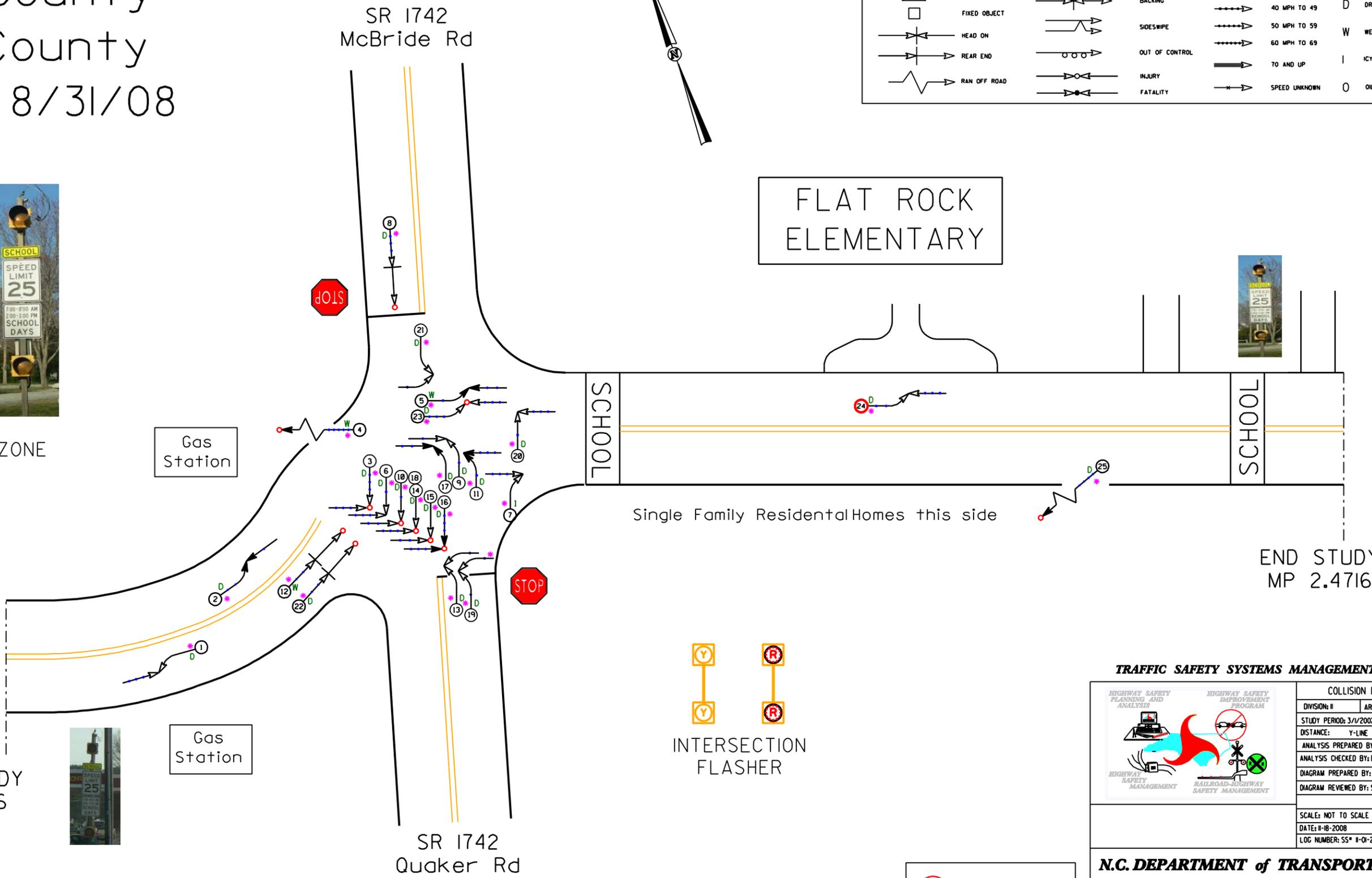
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PARKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PARKING VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		INJURY		50 MPH TO 59		ICY OR SNOWY
	REAR END		FATALITY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



NEW SCHOOL ZONE FLASHERS



BEGIN STUDY MP 2.0916



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

		COLLISION DIAGRAM	
STUDY PERIOD: 3/1/2002 - 8/31/08		DIVISION: II	AREA:
DISTANCE: Y-LINE : OFT		ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR		DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST		SCALE: NOT TO SCALE	
DATE: 11-18-2008		LOG NUMBER: SS* 11-01-205 AFTER	

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