

Spot Safety Project Evaluation

Order # 41000011886

Spot Safety Project # 02-04-204

Spot Safety Project Evaluation of the Left Turn Lane Installation NC 55 at Moss Hill Elementary School Lenoir 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

6-22-2011

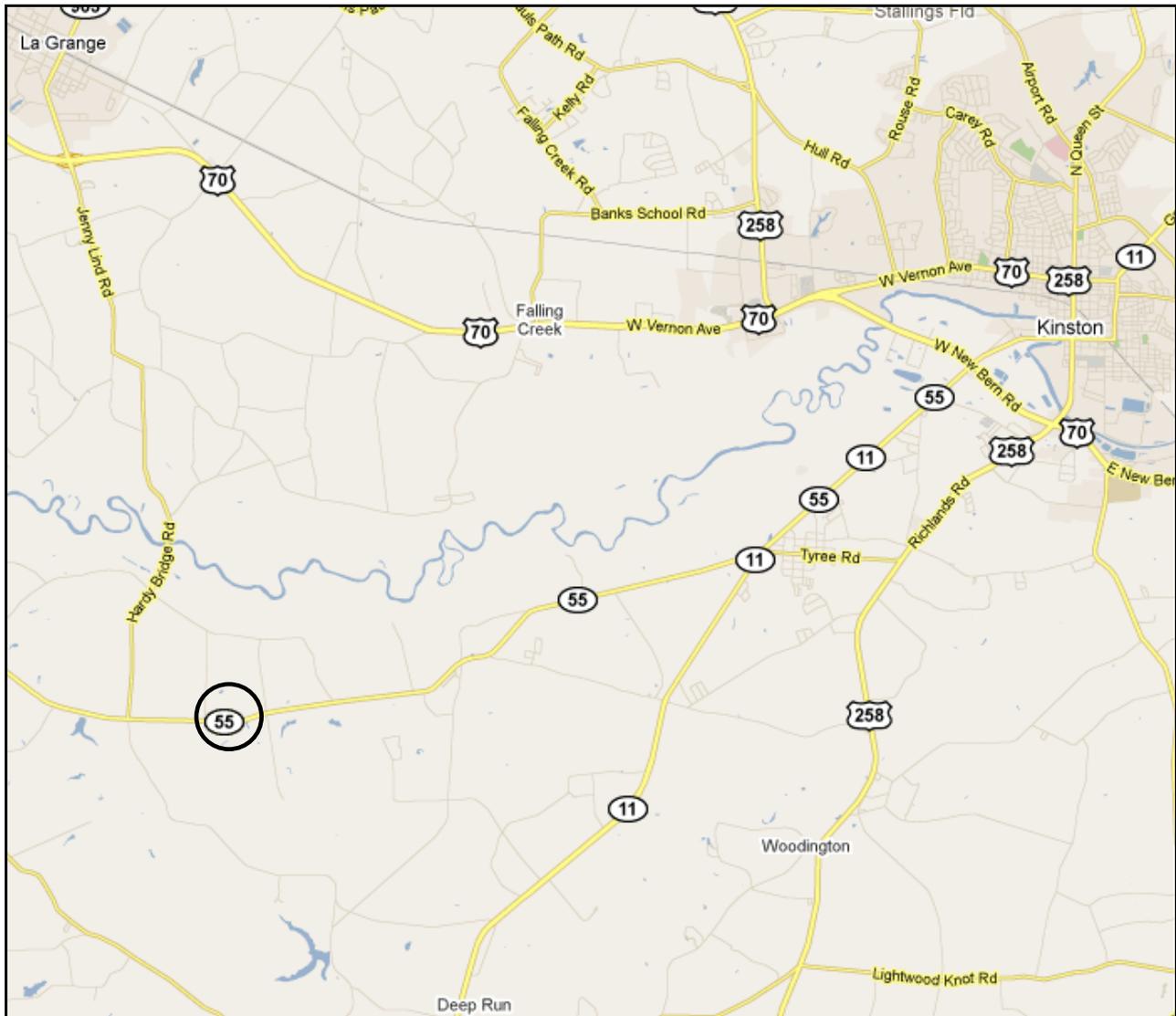
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 02-04-204 located at the entrance of Moss Hill Elementary School located on NC 55 between SR 1153 (Elmore Davis Road) and SR 1305 (John Davis Road) in Lenoir County, southwest of the City of Kinston.





Aerial Photograph obtained through Google Maps
Moss Hill Elementary School

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the installation of a NC 55 eastbound left turn lane accessing the school bus lot and child drop-off driveways. NC 55 is a two-lane facility at the school with a roadway speed limit of 55-mph and a 45-mph school time speed limit. NC 55 also contained a right turn lane into the main school driveway during the before period. The school operates on a traditional student schedule.

The original statement of problem was the concern for collisions due to vehicles on NC 55 being stopped in the eastbound travel through lane while the heavy right turn movements flow onto the school property. The desire was to remove the stationary vehicles from the roadway to prevent future crashes and reduce area congestion.

The initial crash analysis was completed from October 1, 2000 to September 30, 2003 with zero (0) reported crashes, but one (1) correctable rear-end in February 2004. The final completion date for the improvement at the subject intersection was on September 26, 2007 with a total cost of \$155,000.

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 August through September 2007. The before period consisted of reported crashes from March 1, 2004 through July 31, 2007 (3 years and 5 months); and the after period consisted of reported crashes from October 1, 2007 through February 28, 2011 (3 years and 5 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 the study roadway segment and a 150' y-line. The school zone limits are from Milepost 20.194 (1075 feet west of SR 1153) to Milepost 20.560 (900 feet east of SR 1305). *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 Mainline NC 55 Rear-End Crashes and Left Turn Crashes while accessing the school were the target crashes for the applied countermeasure.

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total Crashes	2	1	- 50.0 %
Total Severity Index	1.00	8.40	100+ %
Target Crashes	0	0	N/A
Target Crash Severity Index	0.00	0.00	N/A
Volume (2005, 2009)	3,000	2,900	- 3.3 %

<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	0	0	N/A
Class C Injury Crashes	0	1	100.0 %
Total Injury Crashes	0	1	100.0 %

The naive before and after analysis at the treatment location resulted in a 50 percent decrease in Total Crashes but a 100 percent increase in the Total Severity Index. The before period ADT year was 2005 and the after period ADT year was 2009.

Results and Discussion

Referencing the *Collision Diagrams*, this location experienced a very low crash history. The before period showed two crashes; a u-turn crash in-front of the school and a ran-off roadway crash where

the driver left the vehicle at the scene. After the left turn lane installation, the lack of crashes along this segment continued with just one NC 55 westbound rear-end which occurred during a temporary roadway work-zone. It can be concluded that this improvement benefited roadway congestion and mobility more than any existing safety concerns.

The calculated benefit to cost ratio for this project is **(-0.14) considering total crashes**. 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 our unit's field visit on June 15th, 2011 for both approaches to the treatment location. 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 countermeasure.

Treatment Site Photographs



Travelling Eastbound Entering School Zone



Travelling Eastbound through School Zone



Travelling Eastbound through School Zone



Travelling Westbound entering School Zone – School on Right



Front View of School Entrance

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: NC 55 @ Moss Hill Elem
 COUNTY: Lenoir
 FILE NO.: SS 02-04-204

BY: JBS
 DATE: 6/22/2011

DETAILED COST: TYPE IMPROVEMENT - Left Turn Lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$155,000	10	0.149	\$23,100
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$155,000	10	0.149	\$23,100

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$400
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$23,500
 TOTAL COST OF PROJECT= \$155,000

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	3.42	0	0.00	0	0.00	2	0.58	\$2,515
AFTER	3.42	0	0.00	1	0.29	0	0.00	\$5,848

Annual Benefits from Crash Cost Savings (\$3,333)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$26,833)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -0.14

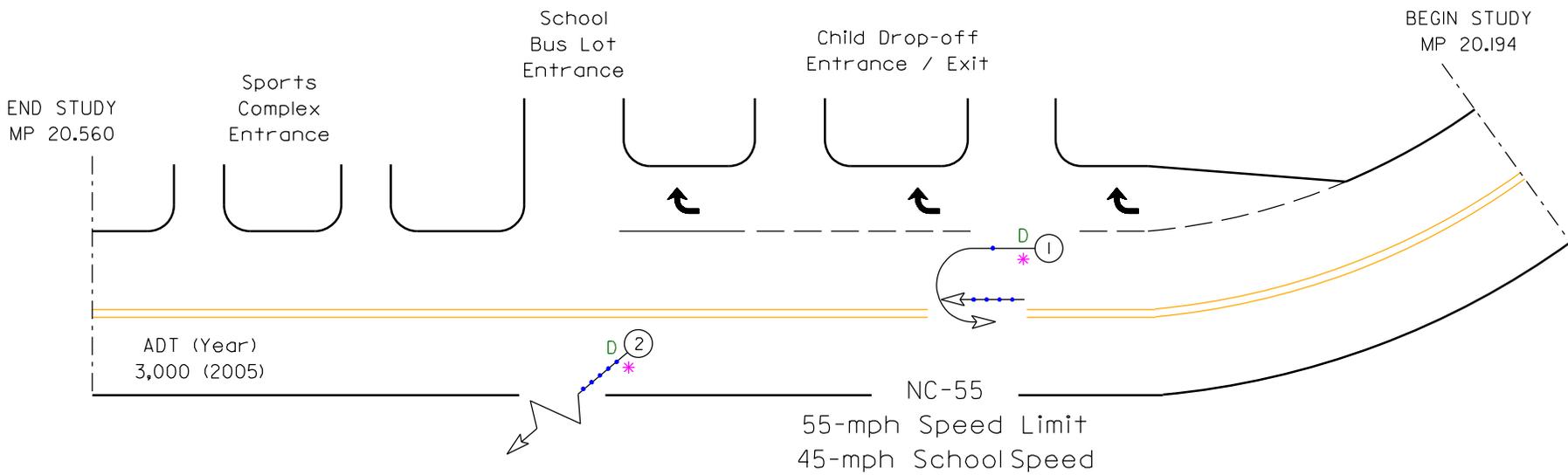
TOTAL COST OF PROJECT - \$155,000 COMPREHENSIVE B/C RATIO - -0.14

SS# 02-04-204
 Order# 41000011886
 Lenoir County
 BEFORE Period
 3/1/04 - 7/31/07

LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
	PAKED VEHICLE		SIDESWIPE		30 MPH TO 39		DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		WET
	HEAD ON		REAR END		50 MPH TO 59		ICY OR SNOWY
	REAR END		RAN OFF ROAD		60 MPH TO 69		TO AND UP
	RAN OFF ROAD		REAR END		70 MPH TO 79		SPEED UNKNOWN
	REAR END		REAR END		80 MPH TO 89		OTHER
	REAR END		REAR END		90 MPH TO 99		OTHER
	REAR END		REAR END		100 MPH TO 109		OTHER
	REAR END		REAR END		110 MPH TO 119		OTHER
	REAR END		REAR END		120 MPH TO 129		OTHER
	REAR END		REAR END		130 MPH TO 139		OTHER
	REAR END		REAR END		140 MPH TO 149		OTHER
	REAR END		REAR END		150 MPH TO 159		OTHER
	REAR END		REAR END		160 MPH TO 169		OTHER
	REAR END		REAR END		170 MPH TO 179		OTHER
	REAR END		REAR END		180 MPH TO 189		OTHER
	REAR END		REAR END		190 MPH TO 199		OTHER
	REAR END		REAR END		200 MPH TO 209		OTHER
	REAR END		REAR END		210 MPH TO 219		OTHER
	REAR END		REAR END		220 MPH TO 229		OTHER
	REAR END		REAR END		230 MPH TO 239		OTHER
	REAR END		REAR END		240 MPH TO 249		OTHER
	REAR END		REAR END		250 MPH TO 259		OTHER
	REAR END		REAR END		260 MPH TO 269		OTHER
	REAR END		REAR END		270 MPH TO 279		OTHER
	REAR END		REAR END		280 MPH TO 289		OTHER
	REAR END		REAR END		290 MPH TO 299		OTHER
	REAR END		REAR END		300 MPH TO 309		OTHER
	REAR END		REAR END		310 MPH TO 319		OTHER
	REAR END		REAR END		320 MPH TO 329		OTHER
	REAR END		REAR END		330 MPH TO 339		OTHER
	REAR END		REAR END		340 MPH TO 349		OTHER
	REAR END		REAR END		350 MPH TO 359		OTHER
	REAR END		REAR END		360 MPH TO 369		OTHER
	REAR END		REAR END		370 MPH TO 379		OTHER
	REAR END		REAR END		380 MPH TO 389		OTHER
	REAR END		REAR END		390 MPH TO 399		OTHER
	REAR END		REAR END		400 MPH TO 409		OTHER
	REAR END		REAR END		410 MPH TO 419		OTHER
	REAR END		REAR END		420 MPH TO 429		OTHER
	REAR END		REAR END		430 MPH TO 439		OTHER
	REAR END		REAR END		440 MPH TO 449		OTHER
	REAR END		REAR END		450 MPH TO 459		OTHER
	REAR END		REAR END		460 MPH TO 469		OTHER
	REAR END		REAR END		470 MPH TO 479		OTHER
	REAR END		REAR END		480 MPH TO 489		OTHER
	REAR END		REAR END		490 MPH TO 499		OTHER
	REAR END		REAR END		500 MPH TO 509		OTHER
	REAR END		REAR END		510 MPH TO 519		OTHER
	REAR END		REAR END		520 MPH TO 529		OTHER
	REAR END		REAR END		530 MPH TO 539		OTHER
	REAR END		REAR END		540 MPH TO 549		OTHER
	REAR END		REAR END		550 MPH TO 559		OTHER
	REAR END		REAR END		560 MPH TO 569		OTHER
	REAR END		REAR END		570 MPH TO 579		OTHER
	REAR END		REAR END		580 MPH TO 589		OTHER
	REAR END		REAR END		590 MPH TO 599		OTHER
	REAR END		REAR END		600 MPH TO 609		OTHER
	REAR END		REAR END		610 MPH TO 619		OTHER
	REAR END		REAR END		620 MPH TO 629		OTHER
	REAR END		REAR END		630 MPH TO 639		OTHER
	REAR END		REAR END		640 MPH TO 649		OTHER
	REAR END		REAR END		650 MPH TO 659		OTHER
	REAR END		REAR END		660 MPH TO 669		OTHER
	REAR END		REAR END		670 MPH TO 679		OTHER
	REAR END		REAR END		680 MPH TO 689		OTHER
	REAR END		REAR END		690 MPH TO 699		OTHER
	REAR END		REAR END		700 MPH TO 709		OTHER
	REAR END		REAR END		710 MPH TO 719		OTHER
	REAR END		REAR END		720 MPH TO 729		OTHER
	REAR END		REAR END		730 MPH TO 739		OTHER
	REAR END		REAR END		740 MPH TO 749		OTHER
	REAR END		REAR END		750 MPH TO 759		OTHER
	REAR END		REAR END		760 MPH TO 769		OTHER
	REAR END		REAR END		770 MPH TO 779		OTHER
	REAR END		REAR END		780 MPH TO 789		OTHER
	REAR END		REAR END		790 MPH TO 799		OTHER
	REAR END		REAR END		800 MPH TO 809		OTHER
	REAR END		REAR END		810 MPH TO 819		OTHER
	REAR END		REAR END		820 MPH TO 829		OTHER
	REAR END		REAR END		830 MPH TO 839		OTHER
	REAR END		REAR END		840 MPH TO 849		OTHER
	REAR END		REAR END		850 MPH TO 859		OTHER
	REAR END		REAR END		860 MPH TO 869		OTHER
	REAR END		REAR END		870 MPH TO 879		OTHER
	REAR END		REAR END		880 MPH TO 889		OTHER
	REAR END		REAR END		890 MPH TO 899		OTHER
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	REAR END		REAR END		930 MPH TO 939		OTHER
	REAR END		REAR END		940 MPH TO 949		OTHER
	REAR END		REAR END		950 MPH TO 959		OTHER
	REAR END		REAR END		960 MPH TO 969		OTHER
	REAR END		REAR END		970 MPH TO 979		OTHER
	REAR END		REAR END		980 MPH TO 989		OTHER
	REAR END		REAR END		990 MPH TO 999		OTHER
	REAR END		REAR END		1000 MPH TO 1009		OTHER



MOSS HILL ELEMENTARY SCHOOL



EB Rear-End Target Crashes

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

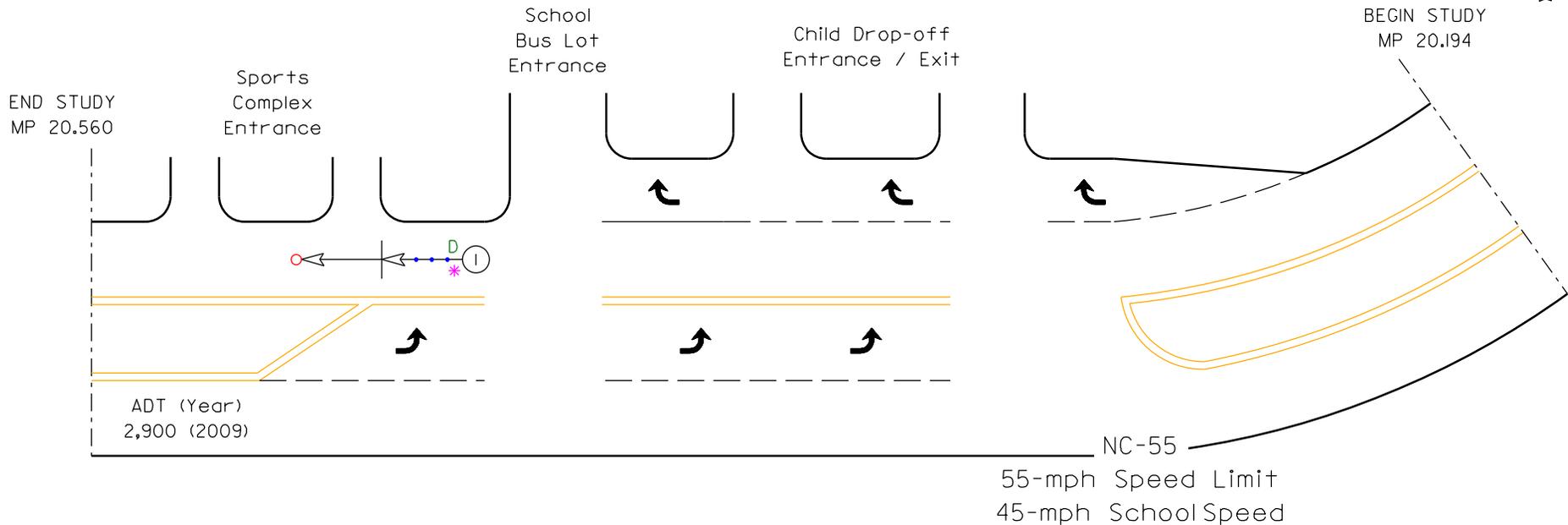
TRAFFIC SAFETY UNIT

Date: 6-22-2011 Prepared By: J. Schronce

SS# 02-04-204
 Order# 41000011886
 Lenoir County
 AFTER Period
 10/1/07 - 2/28/11

LEGEND							
	MOVING VEHICLE		ANGLE		9 MPH OR LESS		PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		DRIVER AT FAULT
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	REAR END		REAR END		TO AND UP		ONLY
	REAR END		REAR END		SPEED UNKNOWN		ONLY
	REAR END		REAR END		SPEED UNKNOWN		ONLY

MOSS HILL ELEMENTARY SCHOOL



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

TRAFFIC SAFETY UNIT

Date: 6-22-2011 Prepared By: J. Schronce

EB Rear-End Target Crashes