

Spot Safety Project Evaluation

Order # 41000004921
Project LOG # 200811118

Spot Safety Project # 06-00-210

**Spot Safety Project Evaluation of the Center Turn Lane Installation
NC 211 (Roberts Ave) around Kings Cross Road, MP 11.31 – 11.61
Robeson County, City of Lumberton**

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

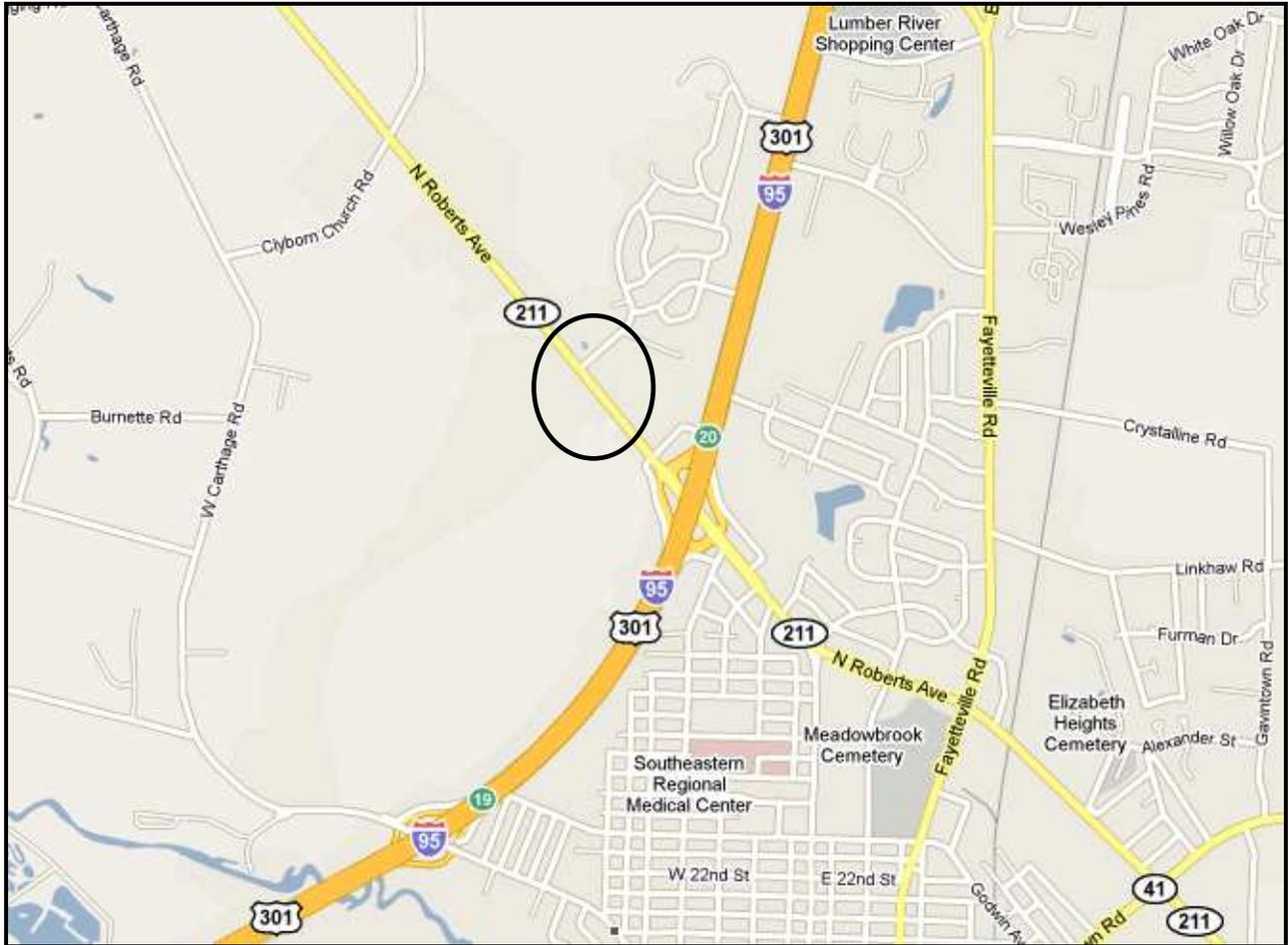
3-5-2010
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-00-210; a 0.3 mile segment located along NC 211 (Roberts Avenue) west of I-95 between Mileposts 11.31 and 11.61 in Robeson County, City of Lumberton. The intersection of NC 211 and Kings Cross Road is located in this strip.





Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the roadway widening to create a 0.3 mile two-way center turn lane. NC 211 (Roberts Ave) is a two-lane roadway to the west of this segment and widens for turn lanes approaching Interstate 95 (Exit 20) to the east. The posted speed limit is 35 mph along this segment. This 0.3 mile strip services a gas station, a local restaurant, and Kings Cross Road (a residential community).

The original statement of problem was the developing pattern of rear-end and left turn collisions resulting from a lack of storage for left turning vehicles and queuing along this roadway. The intended purpose of this countermeasure was to alleviate congestion, delay, and reduce the pattern of collisions at this location.

The initial crash analysis was completed from December 1, 1996 to November 30, 1999 with fifteen (15) reported crashes, seven (7) of which were deemed correctable. The final completion date for the improvement at the subject intersection was on February 4, 2003 with a total cost of \$125,000.

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 January through February 2003. The before period consisted of reported crashes from March 1, 1996 through December 31, 2003 (6 years and 10 months); and the after period consisted of reported crashes from March 1, 2003 through December 31, 2009 (6 years and 10 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 along this 0.3 mile roadway segment with a zero foot y-line. *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 Center Turn Lane related crashes were the target crashes for the applied countermeasure. The crash types considered are as follows: Left turn, same roadway; Rear-End, Slow or Stop; Rear-End, Turn (Left).

<u>Treatment Information</u>	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	40	24	- 40.0 %
Total Severity Index	5.26	2.23	- 57.6 %
Target Crashes	30	7	- 76.7 %
Target Crash Severity Index	6.18	5.23	- 15.4 %
Volume	11,000	13,000	18.2 %

<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	1	100.0 %
Class C Injury Crashes	23	3	- 87.5 %
Total Injury Crashes	23	4	- 82.6 %

The naive before and after analysis at the treatment location resulted in a 40 percent decrease in Total Crashes, a 77 percent decrease in Target Crashes, and a 58 percent decrease in the Total Severity Index. The before period ADT year was 1999 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 40 percent decrease in Total Crashes and a 77 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 showed a severe pattern of twenty (20) rear-end collisions approaching the Kings Cross Rd intersection traveling westbound. With the widening and installation of the center turn lane, this segment experienced significant safety improvements. Rear-end collisions reduced from twenty-eight (28) to five (5) through the analysis and left turn-same road collisions remained consistent at two (2) crashes in both time periods.

The calculated benefit to cost ratio for this project is **2.44 considering total crashes**. The benefit to cost ratio **considering only target crashes is 2.43**. 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 different points along this segment. 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 PHOTOS



Traveling West / Northwest on NC 211 (Roberts Ave)
Around MP 11.31



Traveling West / Northwest on NC 211 (Roberts Ave)
Around MP 11.41 – Beside the Shell Station



Traveling West / Northwest on NC 211 (Roberts Ave)
Around MP 11.51 – Kings Cross Rd Intersection



Traveling West / Northwest on NC 211 (Roberts Ave)
Around MP 11.61 – the return to two-lane roadway

BENEFIT-COST ANALYSIS WORKSHEET - Total Crashes

LOCATION: NC 211 at Kings Cross Rd		BY: JBS						
COUNTY: Robeson		DATE: 3/5/2010						
FILE NO.: SS 06-00-210		NOTES: Total Crashes						
DETAILED COST:	TYPE IMPROVEMENT - Center Turn Lane - 0.3 mile long							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$125,000	10	0.149	\$18,629			
	Right-of-Way	\$0	0	0.000	\$0			
		\$0	0	0.000	\$0			
	TOTALS	\$125,000	10	0.149	\$18,629			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$1,200			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$19,829			
	TOTAL COST OF PROJECT=				\$125,000			
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	6.84	0	0.00	23	3.36	17	2.49	\$70,219
AFTER	6.84	0	0.00	4	0.58	20	2.92	\$21,930
						Annual Benefits from Crash Cost Savings		\$48,289
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$28,461		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	2.44		
TOTAL COST OF PROJECT		-	\$125,000	COMPREHENSIVE B/C RATIO		-	2.44	

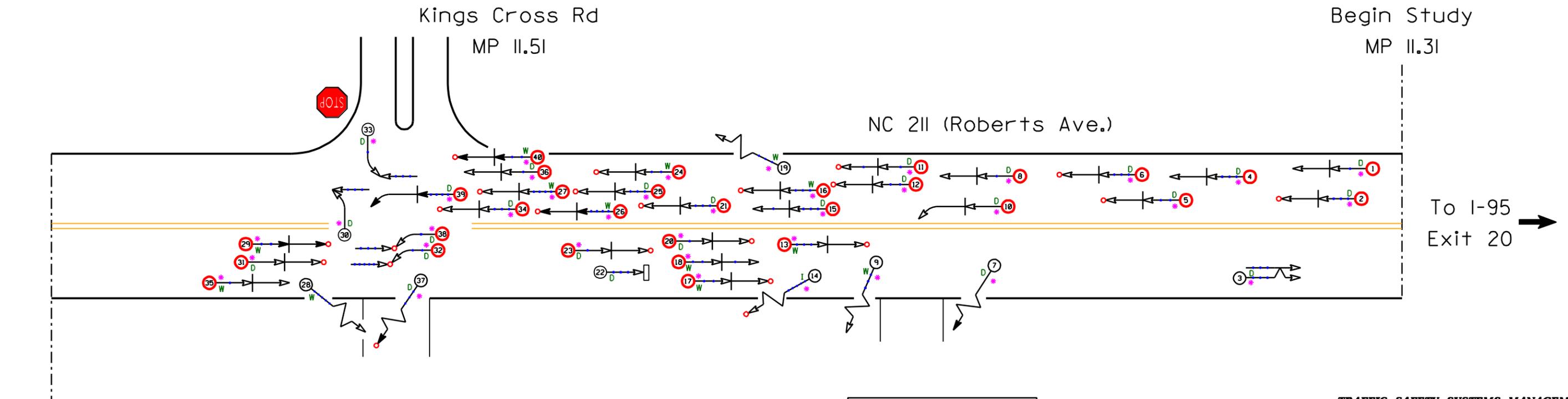
BENEFIT-COST ANALYSIS WORKSHEET - Target Crashes

LOCATION: NC 211 at Kings Cross Road		BY: JBS						
COUNTY: Robeson		DATE: 3/5/2010						
FILE NO.: SS 06-00-210		NOTES: Target Crashes						
DETAILED COST:	TYPE IMPROVEMENT - Center Turn Lane - 0.3 mile long							
	ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST			
	Construction	\$125,000	10	0.149	\$18,629			
	Right-of-Way	\$0	0	0.000	\$0			
		\$0	0	0.000	\$0			
	TOTALS	\$125,000	10	0.149	\$18,629			
	ESTIMATED INCREASE IN ANNUAL MAINT. COST =				\$1,200			
	ESTIMATED INCREASE IN ANNUAL UTILITY COST =				\$0			
	TOTAL ANNUAL COST=				\$19,829			
	TOTAL COST OF PROJECT=				\$125,000			
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	6.84	0	0.00	21	3.07	9	1.32	\$60,395
AFTER	6.84	0	0.00	4	0.58	3	0.44	\$12,237
						Annual Benefits from Crash Cost Savings		\$48,158
NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST					=	\$28,329		
BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST					=	2.43		
TOTAL COST OF PROJECT		-	\$125,000	COMPREHENSIVE B/C RATIO		-	2.43	

SS# 06-00-210
 Robeson County
 City of Lumberton
 BEFORE Period
 3/1/96 - 12/31/02



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



End Study
 MP 11.61

Fuller's BBQ
 MP 11.51

Gas Station
 MP 11.41

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

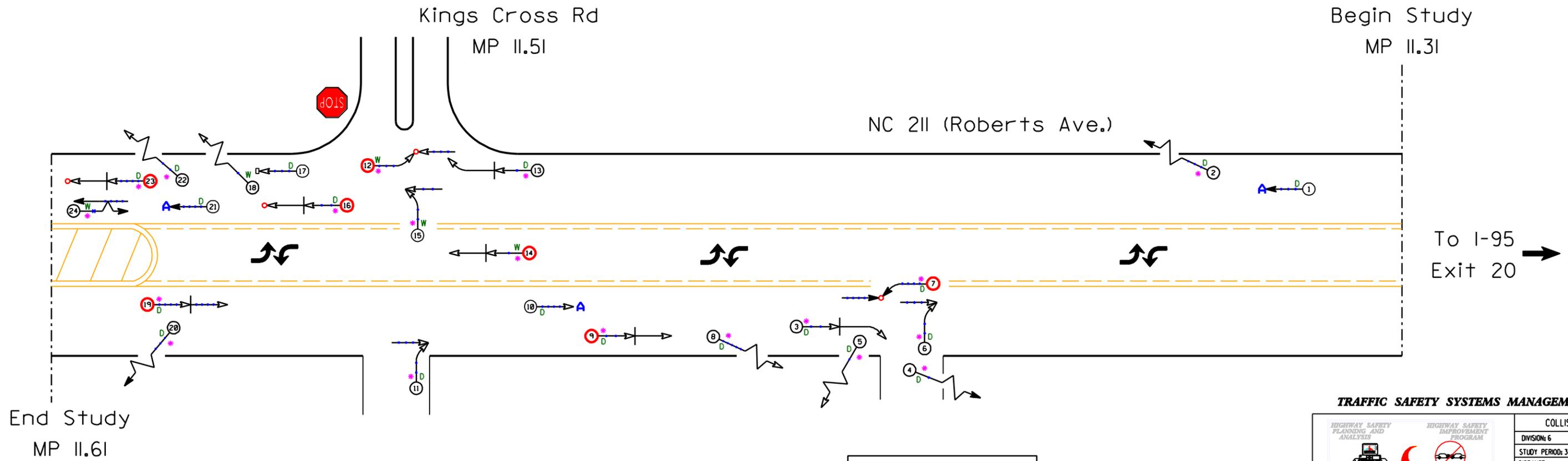
COLLISION DIAGRAM	
DIVISION: 6	AREA:
STUDY PERIOD: 3/1/1996 - 12/31/2002	
DISTANCE: Y-LINE : OFT	
ANALYSIS PREPARED BY: JBS	
ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	
DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE	
DATE: 3-5-2010	
LOG NUMBER: SS* 06-00-210 BEFORE	

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

SS# 06-00-210
 Robeson County
 City of Lumberton
 AFTER Period
 3/1/03 - 12/31/09



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



Fuller's BBQ
 MP 11.51

Gas Station
 MP 11.41

Target Crashes

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 6	AREA:
	STUDY PERIOD: 3/1/2003 - 12/31/2009	
	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: 3-5-2010		
LOG NUMBER: SS# 06-00-210 AFTER		

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