Spot Safety Project Evaluation

Order # 41000008827

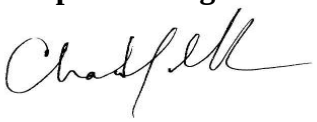
Spot Safety Project # 06-03-208

Spot Safety Project Evaluation of the Lengthening of the Eastbound Left Turn Lane on NC 24 At the Intersection of NC 24 and SR 1006 (Clinton Road / Maxwell Road) East of Fayetteville, In Cumberland County

Documents Prepared By:

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

Principal Investigator



Chad J. Neilson

Traffic Safety Project Engineer

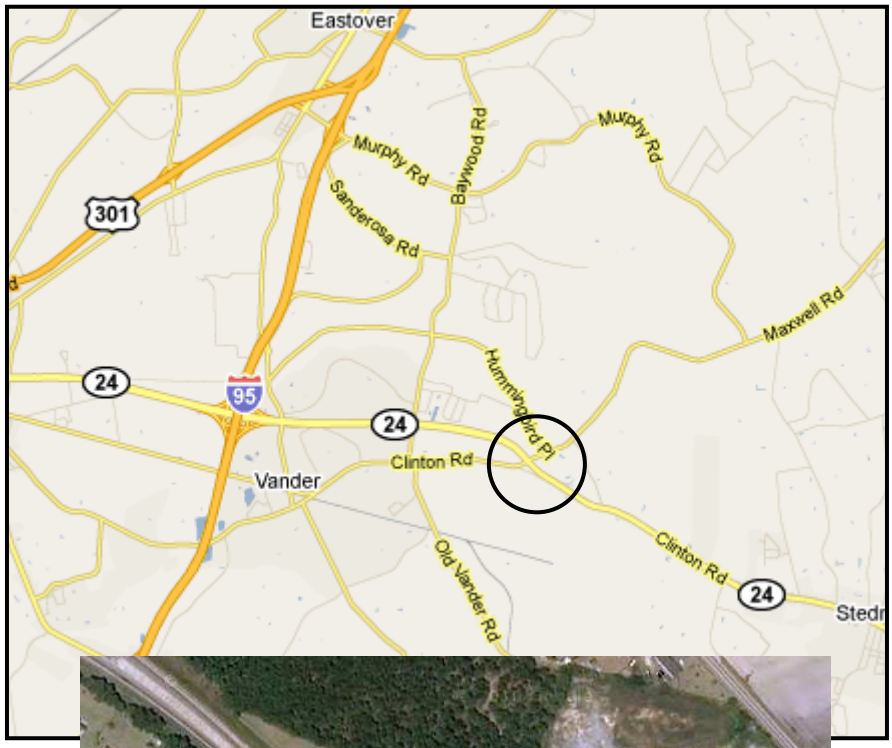
10/06/2010
Date

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-03-208 located at the intersection of NC 24 and SR 1006 (Maxwell Road / Clinton Road) east of Fayetteville, Cumberland County.

The signal ID for the exiting signal is 06-0154.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the extension of the eastbound left turn lane on NC 24 at the subject location. NC 24 is a four-lane, median divided facility at the subject intersection with speed limit of 55 mph for both approaches. SR 1006 (Maxwell Road / Clinton Road) is a two-lane facility with a speed limit of 55 mph for both approaches. The subject location is a signalized four-leg intersection

The original statement of problem was inadequate storage and taper length to accommodate the number of eastbound left turning vehicles. The queue extends into the eastbound through lanes as well as on the concrete island.

The initial crash analysis was completed from January 1, 2000 to December 31, 2002 with twenty-five (25) reported crashes, of which three (3) were deemed correctable. The final completion date for the improvement at the subject intersection was on September 16, 2005 with a total cost of $61,000.00.

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 August and September 2005. The before period consisted of reported crashes from September 1, 2000 through July 31, 2005 (4 years and 11 months); and the after period consisted of reported crashes from October 1, 2005 through August 31, 2010 (4 years and 11 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 as well as eastbound rear-end crashes within 150 feet of the end of the eastbound left-turn lane. *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 eastbound rear-end crashes that occurred at the end of the eastbound left-turn lane were the target crashes for the applied countermeasure.

Treatment Information	**Before**	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	43	34	- 20.93 %
Total Crash Severity Index	4.44	3.18	- 28.38 %
Target Crashes	1	0	- 100.0 %
Target Crash Severity Index	8.4	0.00	- 100.0 %
Volume (2003, 2008)	20,200	19,100	- 5.45 %

Injury Crash Summary	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	2	4	100.00 %
Class C Injury Crashes	18	6	- 66.67 %
Total Injury Crashes	20	10	- 50.00%

The naive before and after analysis at the treatment location resulted in a twenty (20) percent decrease in Total Crashes, one-hundred (100) percent elimination of Target Crashes, and a twenty-eight (28) percent decrease in the Total Severity Index. The before period ADT year was 2003 and the after period ADT year was 2008.

Results and Discussion

Referencing the *Collision Diagrams*, the before period presented one (1) target crash. There was an eastbound rear-end crash pattern in the through lane at the intersection that accounted for eight (8) crashes. There was a westbound rear-end crash pattern that accounted for eight (8) crashes. After the extension of the eastbound left-turn lane, there were zero (0) target crashes. The eastbound rear-end crash pattern increased in the after period to ten (10) crashes. The westbound rear-end crash pattern accounted for seven (7) crashes in the after period.

The calculated benefit to cost ratio for this project is **6.4 considering total crashes**. The benefit to cost ratio **considering only target crashes is 0.65**. 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.

Photos were provided for this location by Google Street View for all four approaches of this 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 NC 24 (at end of extended left-turn lane)

Looking West on NC 24 (at end of extended left-turn lane)

Looking East on NC 24

Looking North on SR 1006

Looking West on NC 24

Looking South on SR 1006

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: NC 24 at SR 1006 (Maxwell Rd / Clinton Rd) BY: C Neilson
COUNTY: Cumberland DATE: 10/1/2010
FILE NO.: SS 06-03-208

DETAILED COST: TYPE IMPROVEMENT - Extension of Left-turn lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$61,000	20	0.102	$6,213
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$61,000	20	0.102	$6,213

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $0
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $6,213
TOTAL COST OF PROJECT= $61,000

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	4.92	0	0.00	20	4.07	23	4.67	$101,402
AFTER	4.92	0	0.00	10	2.03	24	4.88	$61,626

Annual Benefits from Crash Cost Savings $39,776

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $33,563

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 6.40

TOTAL COST OF PROJECT - $61,000 COMPREHENSIVE B/C RATIO - 6.40

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: NC 24 at SR 1006 (Maxwell Rd / Clinton Rd) BY: C Neilson
COUNTY: Cumberland DATE: 10/1/2010
FILE NO.: SS 06-03-208

DETAILED COST: TYPE IMPROVEMENT - Extension of Left-turn lane

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
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ESTIMATED INCREASE IN ANNUAL MAINT. COST = $0
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $6,213
TOTAL COST OF PROJECT= $61,000

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	4.92	0	0.00	1	0.20		0.00	$4,065
AFTER	4.92	0	0.00	0	0.00	0	0.00	$0

Annual Benefits from Crash Cost Savings $4,065

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = ($2,148)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.65

TOTAL COST OF PROJECT - $61,000 COMPREHENSIVE B/C RATIO - 0.65

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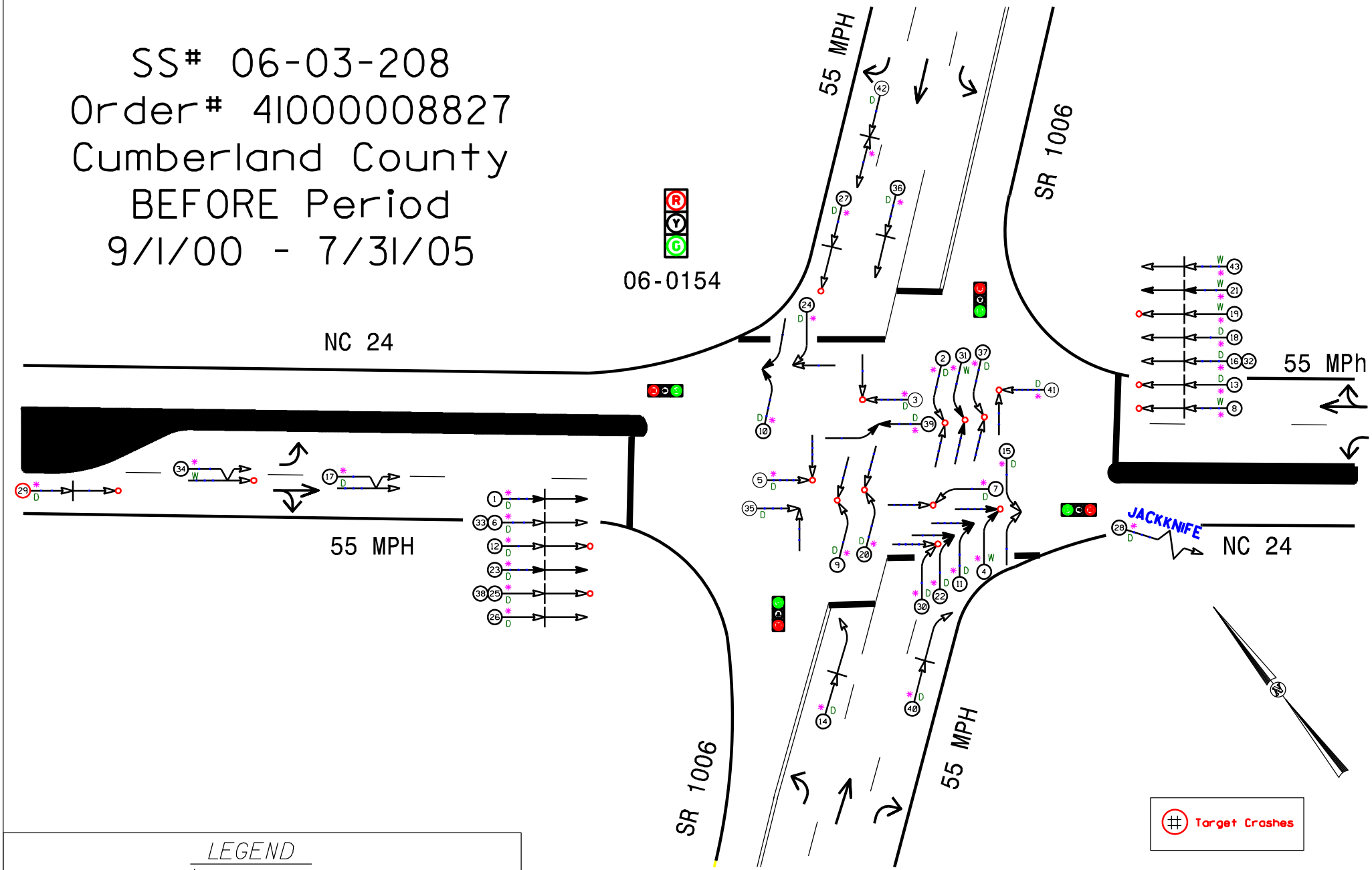
Cumberland County
BEFORE Period
9/1/00 - 7/31/05



LEGEND

MOVING VEHICLE
PEDESTRIAN
PARKED VEHICLE
PARKING VEHICLE
FIXED OBJECT
HEAD ON
REAR END
RAN OFF ROAD

ANGLE
TURNING
BACKING
SIDESWIPE
OUT OF CONTROL
INJURY
FATALITY

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

P PEDESTRIAN
T TRAIN
* DRIVER AT FAULT
D DRY
W WET
I ICY OR SNOWY
O OILY

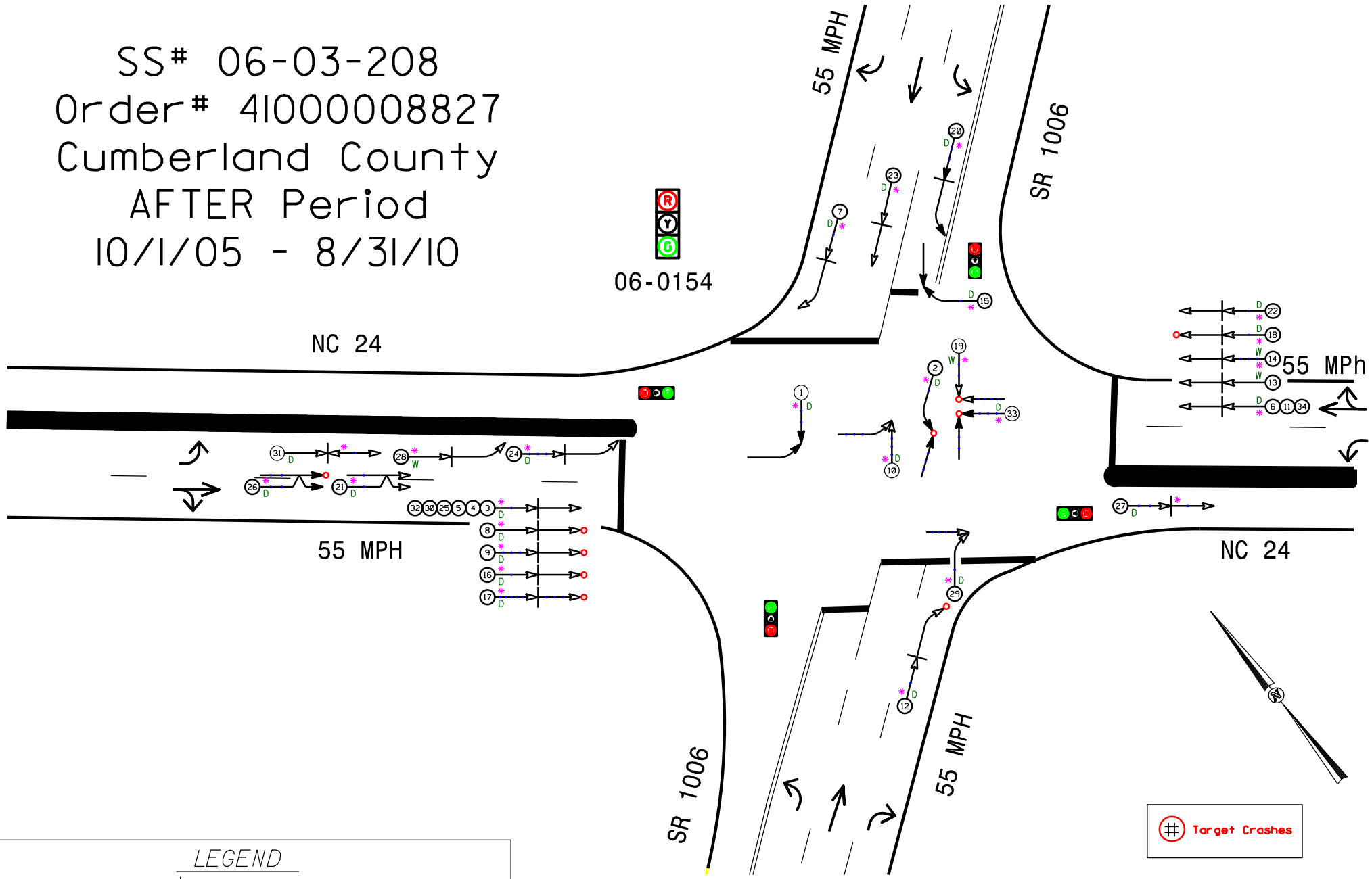
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 10-01-2010

Prepared By: C Neilson

SS# 06-03-208
Order# 41000008827
Cumberland County
AFTER Period
10/1/05 - 8/31/10



LEGEND

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N.C. DEPARTMENT of TRANSPORTATION
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TRAFFIC SAFETY UNIT

Date: 10-01-2010

Prepared By: C Neilson