Spot Safety Project Evaluation

Order # 41000008511

Spot Safety Project # 06-02-206

Spot Safety Project Evaluation of the Realignment of the Intersection of NC 55 (North Raleigh Street) at SR 1594 (North Broad Street) City of Angier, In Harnett County

Documents Prepared By:

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

Principal Investigator

_____ 9-22-2010

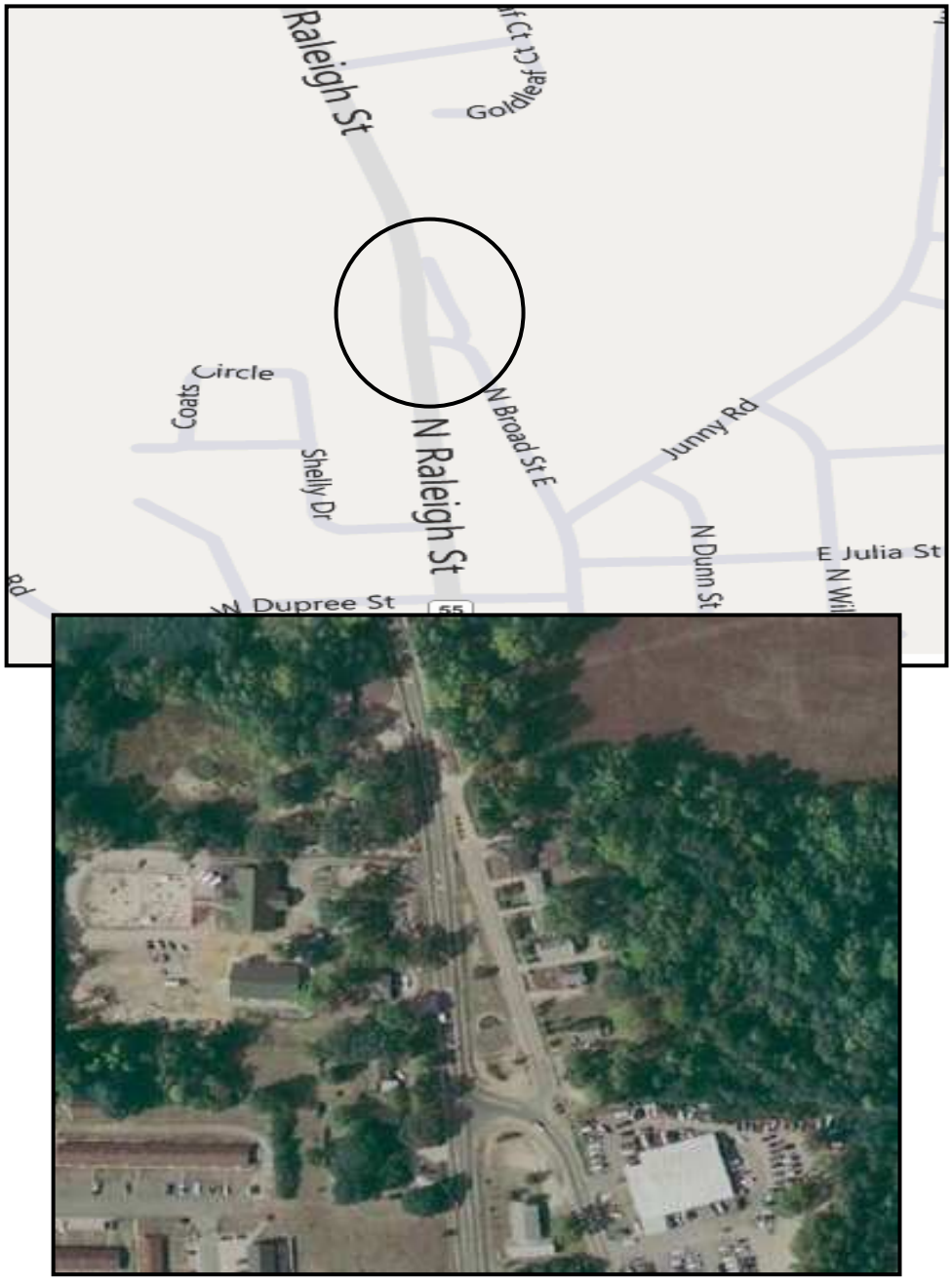
Chad J. Neilson Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 06-02-206 located at the Intersection of NC 55 (North Raleigh Street) and SR 1594 (North Broad Street) in the city of Angier, in Harnett County.



Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the realignment of the intersection of NC 55 (North Raleigh Street) at SR 1594 (North Broad Street). NC 55 (North Raleigh Street) is a two-lane facility with a speed limit of 45 mph. SR 1594 (North Broad Street) is a two-lane facility and has a speed limit of 35 mph.

The original statement of problem was the concern for rear-end type crashes for motorist along NC 55 (North Raleigh Street). The intended purpose of the newly realigned intersection and the addition of a center two-way-left-turn-lane along NC 55 (North Raleigh Street) is to decrease the number of rear-end crashes at the study intersection.

The initial crash analysis was completed from January 1, 1999 to January 1, 2002 with thirteen (13) reported crashes, eleven (11) of which were rear-end type crashes. The final completion date for the improvement at the subject intersection was on September 30, 2005 with a total cost of $50,000.00.

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 2005 through September 2005. The before period consisted of reported crashes from March 1, 2000 through December 31, 2004 (4 years and 10 months); and the after period consisted of reported crashes from October 1, 2005 through July 31, 2010 (4 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 within 150 feet of the subject intersections. *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 Rear-End Crashes were the target crashes for the applied countermeasure. The Rear-End crash types considered are as follows: rear-end, slow or stop and rear-end, turn.

Treatment Information	**Before**	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	30	10	- 66.67 %
Total Crash Severity Index	2.23	3.22	44.39 %
Target Crashes	25	3	- 88.00 %
Target Crash Severity Index	1.89	3.47	83.60 %
Volume (2002,2007)	16,000	17,000	6.25 %

Injury Crash Summary	Before	After	Percent Reduction (-) Percent Increase (+)
Fatal Injury Crashes	0	0	0.00 %
Class A Injury Crashes	0	0	0.00 %
Class B Injury Crashes	1	1	0.00 %
Class C Injury Crashes	4	2	- 50.00 %
Total Injury Crashes	5	3	- 40.00 %

The naive before and after analysis at the treatment location resulted in a sixty – six (66) percent decrease in Total Crashes, an eighty – eight (88) percent decrease in Target Crashes, and a forty-four (44) percent increase in the Total Severity Index. The before period ADT year was 2002 and the after period ADT year was 2007.

Results and Discussion

Referencing the *Collision Diagrams*, the before period had a southbound rear-end crash pattern at the study intersection, which accounted for thirteen (13) target crashes. Also, in the before is a westbound rear-end crash pattern that accounted for twelve (12) target crashes. After the realignment of SR 1594 (North Broad Street), the southbound rear-end crash pattern was reduced to two (2) target crashes and the westbound rear-end crash pattern was completely eliminated.

The calculated benefit to cost ratio for this project is **4.77 considering total crashes**. The benefit to cost ratio **considering only target crashes is 5.12**. 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 approaches at the study 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 South on NC 55 (North Raleigh Street)
Old Alignment

Looking North on NC 55 (North Raleigh Street)
Old Alignment

Looking South on NC 55 (North Raleigh Street)
New Alignment

Looking North on NC 55 (North Raleigh Street)
New Alignment

Looking West on SR 1594 (North Broad Street)
New Alignment

BENEFIT-COST ANALYSIS WORKSHEET - TOTAL

LOCATION: NC 55 (N. Raleigh St) at SR 1594 (N. Broad St) BY: C Neilson
COUNTY: Harnett DATE: 9/21/2010
FILE NO.: SS 06-02-206

DETAILED COST: TYPE IMPROVEMENT - Roadway Realignment

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$50,000	20	0.102	$5,093
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$50,000	20	0.102	$5,093

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

TOTAL ANNUAL COST= $5,093
TOTAL COST OF PROJECT= $50,000

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	4.83	0	0.00	5	1.04	25	5.18	$42,961
AFTER	4.83	0	0.00	3	0.62	7	1.45	$18,654

Annual Benefits from Crash Cost Savings $24,306

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $19,214

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 4.77

TOTAL COST OF PROJECT - $50,000 COMPREHENSIVE B/C RATIO - 4.77

BENEFIT-COST ANALYSIS WORKSHEET - TARGET

LOCATION: NC 55 (N. Raleigh St) at SR 1594 (N. Broad St) BY: C Neilson
COUNTY: Harnett DATE: 9/21/2010
FILE NO.: SS 06-02-206

DETAILED COST: TYPE IMPROVEMENT - Roadway Realignment

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$50,000	20	0.102	$5,093
	$0	0	0.000	$0
Right-of-Way	$0	0	0.000	$0
TOTALS	$50,000	20	0.102	$5,093

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

TOTAL ANNUAL COST= $5,093
TOTAL COST OF PROJECT= $50,000

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

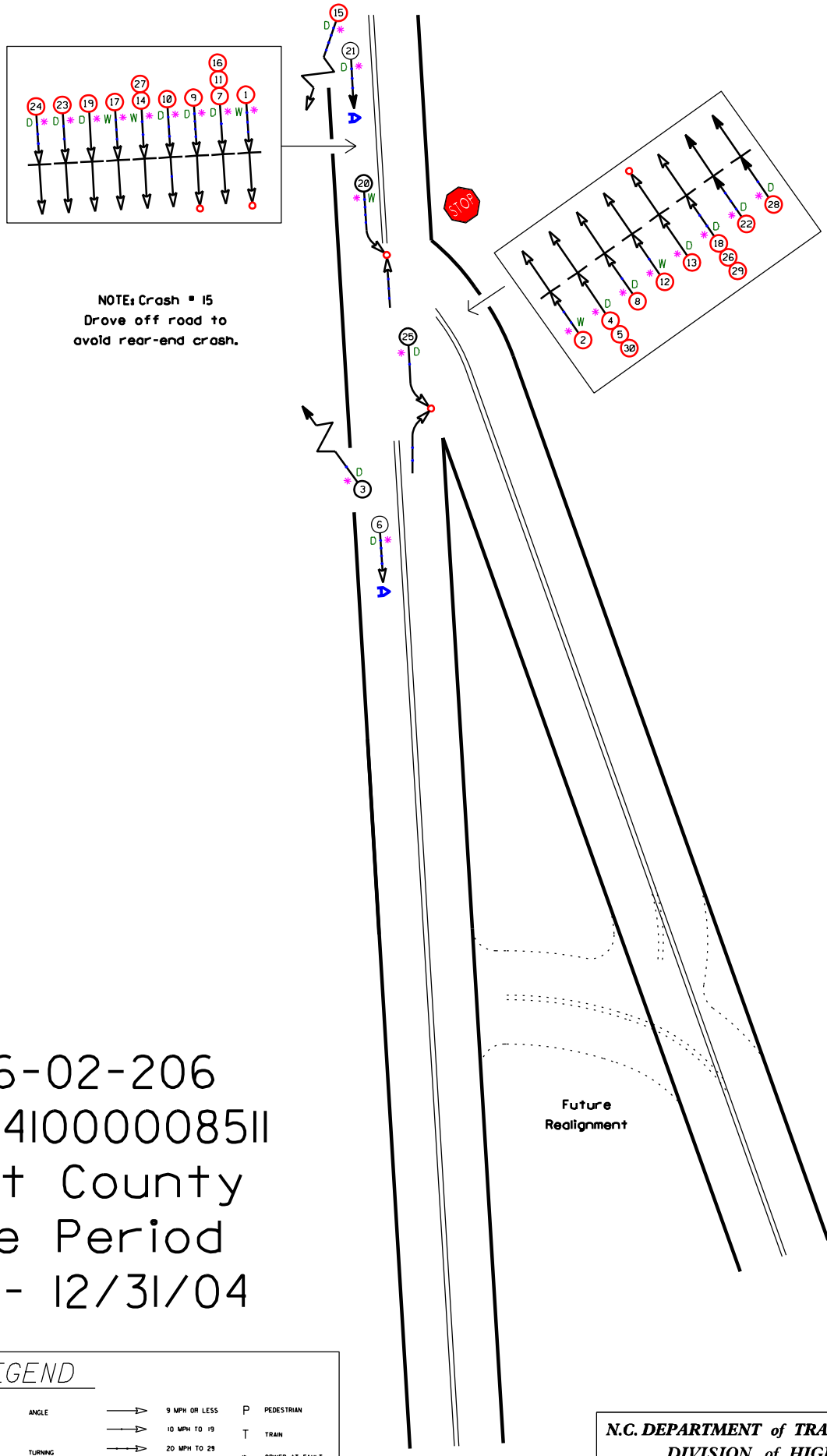
TIME PERIOD	YEARS	K & A CRASHES	K & A CRASHES PER YR	B & C CRASHES	B & C CRASHES PER YR	PDO CRASHES	PDO CRASHES PER YR	ANNUAL COSTS
BEFORE	4.83	0	0.00	3	0.62	22	4.55	$32,008
AFTER	4.83	0	0.00	1	0.21	2	0.41	$5,921

Annual Benefits from Crash Cost Savings $26,087

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $20,994

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 5.12

TOTAL COST OF PROJECT - $50,000 COMPREHENSIVE B/C RATIO - 5.12



SS# 06-02-206
Order# 4100000851l
Harnett County
Before Period
3/1/00 - 12/31/04

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

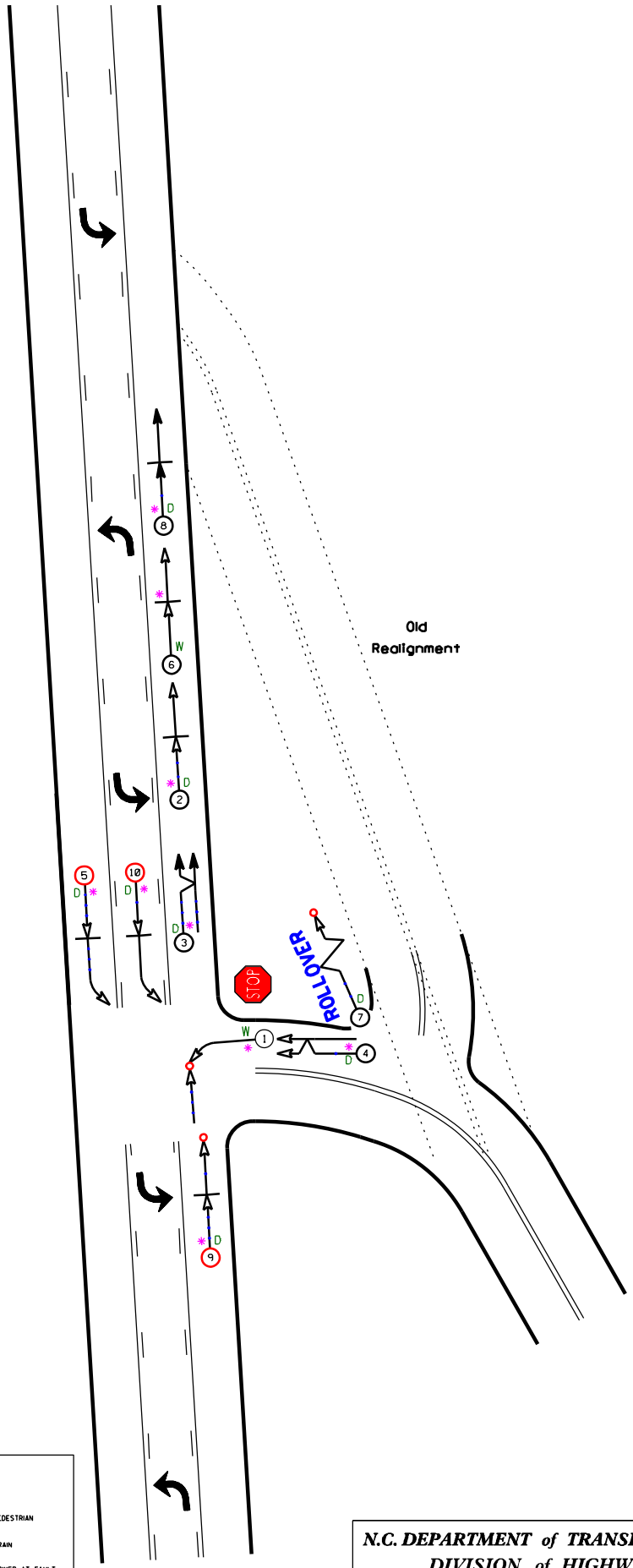
(#) Rear-End Target Crashes

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

TRAFFIC SAFETY UNIT

Date: 9-22-2010

Prepared By: C Neilson



SS# 06-02-206
Order# 4100000851l
Harnett County
After Period
10/1/05 - 7/31/10

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
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70 AND UP
SPEED UNKNOWN

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

Rear-End
Target Crashes

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TRANSPORTATION MOBILITY and SAFETY DIVISION

TRAFFIC SAFETY UNIT

Date: 9-22-2010

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