Spot Safety Project Evaluation

Order # 41000005402

Spot Safety Project # 05-02-200

Spot Safety Project Evaluation of the Construction of Directional Crossovers on SR 2911 (New Bern Avenue-Formerly US 64) at the Intersections of Lord Ashley and Lord Berkley Wake County

Documents Prepared By:

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

Principal Investigator

Brad Robinson

Brad Robinson, PE

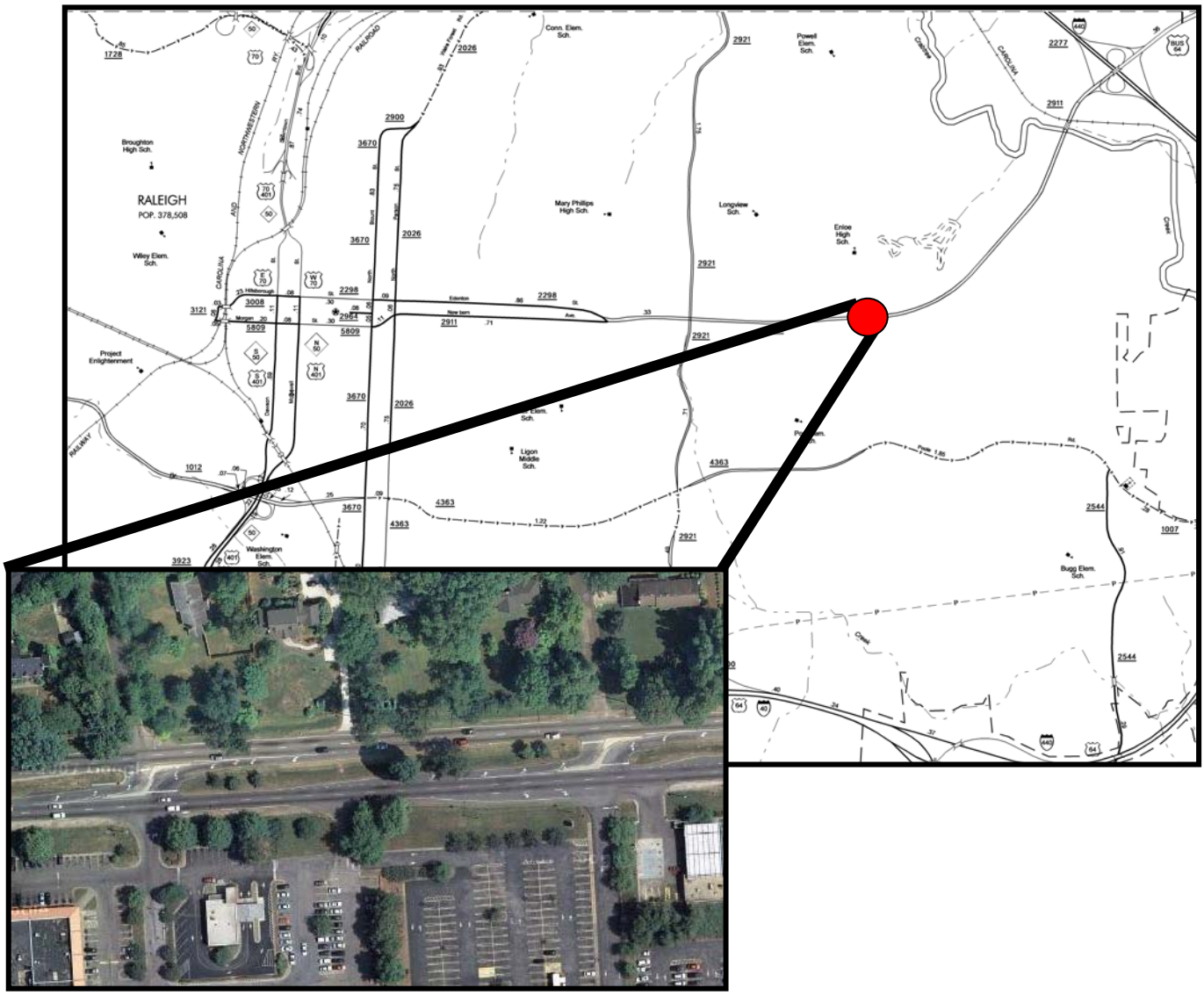
4/06/2010
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 05-02-200 – SR 2911 (New Bern Ave-Formerly US 64) at Lord Ashley Rd and Lord Berkley Rd in Wake 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 directional crossovers on SR 2911 (US 64) at both of the subject intersections.

Both intersections were full access crossovers with stop conditions on Lord Ashley Rd and Lord Berkley Rd. SR 2911 (New Bern Ave) has three-lane approaches with a left turn, thru, and a thru-

right lane. Lord Ashley Rd and Lord Berkley Rd have single lane approaches. The speed limits are 45 mph on SR 2911 and 35 mph on the side roads.

The original statement of problem was that the intersections were experiencing Frontal Impact Crashes involving vehicles exiting the side streets (Lord Ashley and Lord Berkley).

The initial crash analysis was conducted from December 1, 1998 to November 30, 2001. The intersection with Lord Ashley experienced a total of 15 crashes, seven of which were considered correctable by the chosen countermeasure. The intersection with Lord Berkley experienced a total of 16 crashes, nine of which were considered correctable. The final completion date for the improvements at the subject location was on June 15, 2004 with a total cost of $68,000.00.

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 was from May 1, 2004 to July 31, 2004. The before period consisted of reported crashes from November 1, 1998 through April 30, 2004 (5 years and 6 months) and the after period consisted of reported crashes from August 1, 2004 through January 31, 2010 (5 years and 6 months). The ending date for this analysis was limited by the available crash data at the time the analysis was conducted.

The treatment data consisted of all reported crashes within 150 feet of the subject intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note that Frontal Impact Crashes resulting from vehicles entering the intersection from the side roads are the Target Crashes for the applied countermeasures. These crash types are considered as follows: Left Turn, same roadway; Left Turn, different roadway; Right Turn, same roadway; Right Turn, different roadway; Head On and Angle. The target crashes are clearly identified in the before and after period collision diagrams.

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Treatment Information Lord Ashley Rd			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	34	9	-73.5
Total Severity Index	4.26	4.29	0.7
Target Crashes	14	0	-100.0
Target Crash	4.7	0	-100.0
Volume	21,000	21,000	0.0
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	1	0	-100.0
Class C Crashes	6	0	-100.0
PDO Crashes	7	0	-100.0

The naive before and after analysis for SR 2911 at Lord Ashley resulted in a 74 percent decrease in Total Crashes and a 100 percent decrease in Target Crashes. The before period ADT year was 2001 and the after period ADT year was 2007.

Treatment Information Lord Berkley Rd			
	Before	**After**	**Percent Reduction (-) Percent Increase (+)**
Total Crashes	30	4	-86.7
Total Severity Index	3.71	2.85	-23.2
Target Crashes	17	0	-100.0
Target Crash	3.61	0	-100.0
Volume	21,000	21,000	0.0
Target Crash Severity Summary			
Fatal Crashes	0	0	N/A
Class A Crashes	0	0	N/A
Class B Crashes	2	0	-100.0
Class C Crashes	4	0	-100.0
PDO Crashes	11	0	-100.0

The naive before and after analysis for SR 2911 at Lord Berkley resulted in an 87 percent decrease in Total Crashes and a 100 percent decrease in Target Crashes. The before period ADT year was 2001 and the after period ADT year was 2007.

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 74 percent decrease in Total Crashes at Lord Ashley and an 87 percent decrease in Total Crashes at Lord Berkley. Target Crashes at both intersections were reduced to zero in the after period. The summary results above demonstrate that both Total Crashes and Target crashes have been significantly reduced from the before to the after periods.

The calculated benefit to cost ratio for this project is 9.61 considering total crashes. The benefit to cost ratio considering only target crashes is 5.90. 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.

It is apparent that the crossover installations were very effective in reducing Target Crashes at the subject intersections. The crossovers eliminated all existing target crash patterns from the before period. Left Turn-Same Roadway Crashes (which were not Target Crashes) on SR 2911 at Lord Ashley Dr were reduced 88 percent (from 8 to 1).

In order to check for crash migration at the other intersections, a quick analysis of the full movement intersections on both sides of the crossover locations was conducted. To the west is King Charles Rd. This intersection experienced a 25 percent increase in crashes from the before to the after period (from 25 to 31). To the east is Clarendon Crescent Rd/Farris Ct. This intersection experienced a 19 percent decrease in crashes from the before to the after period (from 27 to 22). When looking at these two intersections together, they experienced an increase of one crash from the before to the after period so it is unlikely that any significant crash migration is occurring as a result of the crossovers. There also does not appear to be any crashes related to U-Turn movements at either of these intersections in the after period.

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 roadway.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: New Bern Ave at Lord Ashley and Lord Ber | BY: BDR
COUNTY: Wake | DATE: 3/31/2010
FILE NO.: SS 05-02-200

DETAILED COST: TYPE IMPROVEMENT - Directional Crossovers

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	$0	0	0.000	$0
	$68,000	10	0.149	$10,134
Right-of-Way	$0	0	0.000	$0
TOTALS	$68,000	10	0.149	$10,134

ESTIMATED INCREASE IN ANNUAL MAINT. COST = $200
ESTIMATED INCREASE IN ANNUAL UTILITY COST = $0

TOTAL ANNUAL COST= $10,334
TOTAL COST OF PROJECT= $68,000

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	5.50	0	0.00	26	4.73	38	6.91	$123,564
AFTER	5.50	0	0.00	5	0.91	8	1.45	$24,291

Annual Benefits from Crash Cost Savings $99,273

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $88,939

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 9.61

TOTAL COST OF PROJECT - $68,000 COMPREHENSIVE B/C RATIO - 9.61

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: New Bern Ave at Lord Ashley and Lord Ber | BY: BDR
COUNTY: Wake | DATE: 3/31/2010
FILE NO.: SS 05-02-200 Target Crashes Only

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TOTAL COST OF PROJECT= $68,000

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	5.50	0	0.00	13	2.36	18	3.27	$61,018
AFTER	5.50	0	0.00	0	0.00	0	0.00	$0

Annual Benefits from Crash Cost Savings $61,018

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = $50,684

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 5.90

TOTAL COST OF PROJECT - $68,000 COMPREHENSIVE B/C RATIO - 5.90

Treatment Site Photos from Google Street-View

Looking east on US 64 at Lord Ashley

Looking west on US 64 at Lord Ashley

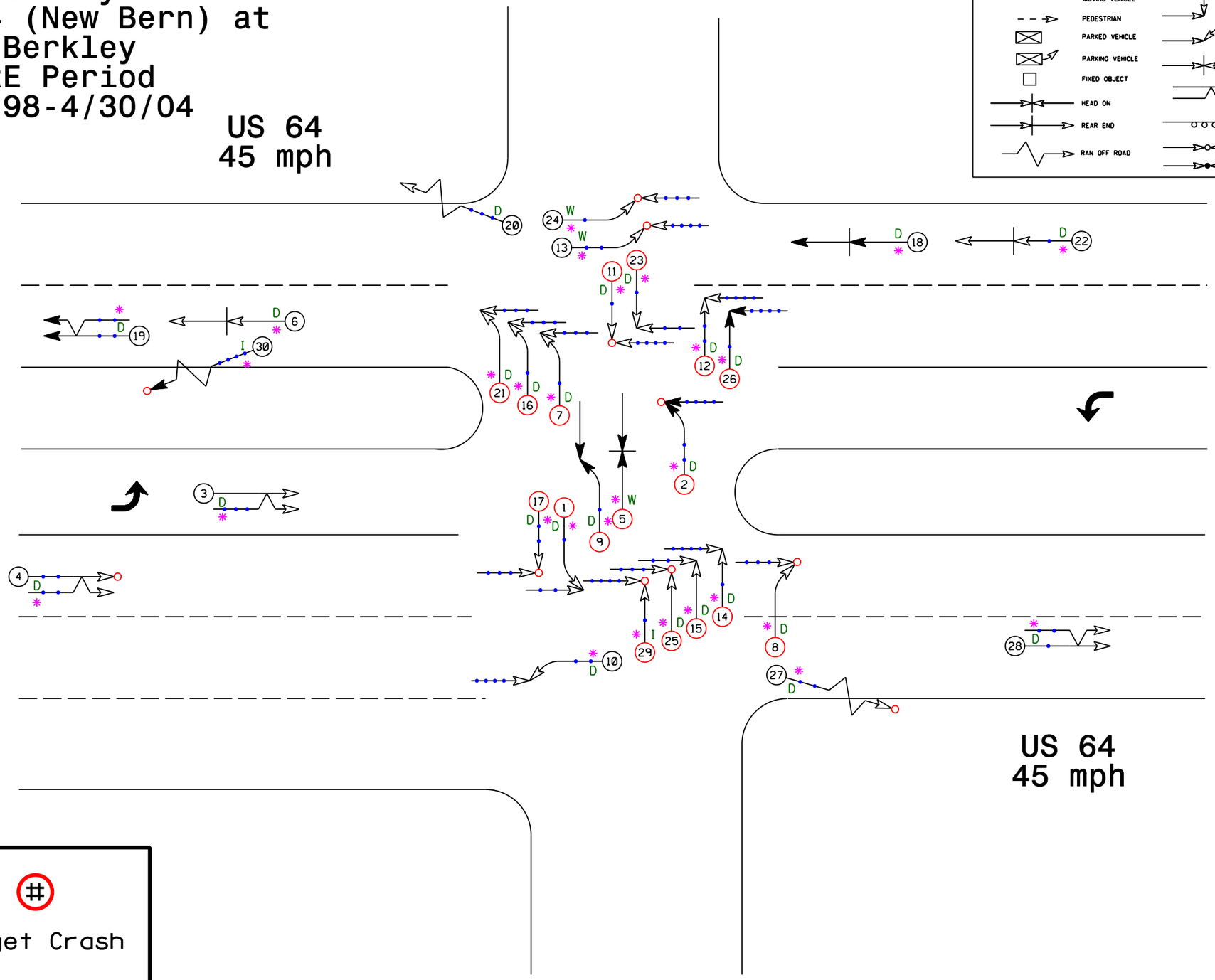
Looking east on US 64 at Lord Berkley

Looking west on US 64 at Lord Berkley

Wake County
US 64 (New Bern) at Lord Berkley
BEFORE Period
11/1/98-4/30/04

Lord Berkley Rd

US 64
45 mph



US 64
45 mph

Lord Berkley Rd

LEGEND

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

Target Crash

TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

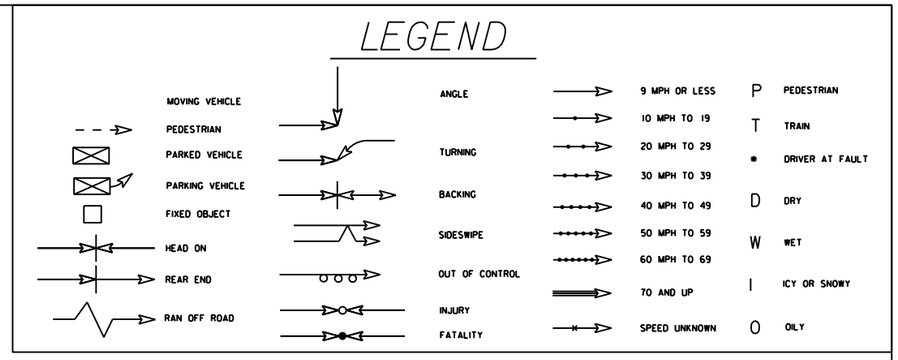
COLLISION DIAGRAM	
DIVISION: 5	AREA:
STUDY PERIOD: 11/1/98-4/30/04	
DISTANCE: Y-LINE = 150FT	
ANALYSIS PREPARED BY: BDR	
ANALYSIS CHECKED BY:	
DIAGRAM PREPARED BY: BDR	
DIAGRAM REVIEWED BY:	
SCALE: NOT TO SCALE	
DATE: March 2010	
LOG NUMBER: 41000005402	

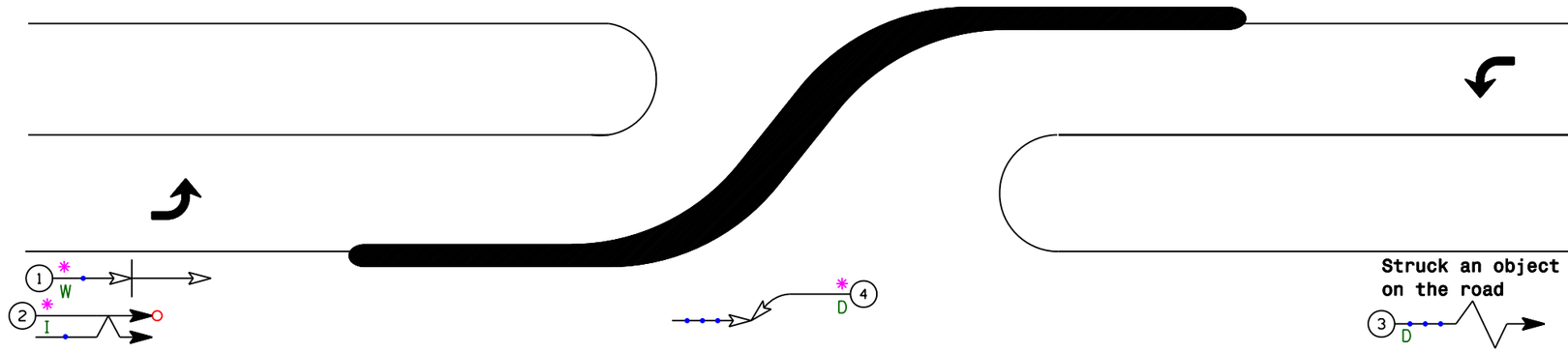
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY AND SAFETY DIVISION

Wake County
US 64 (New Bern) at
Lord Berkley Rd
AFTER Period
8/1/04-1/31/10

Lord Berkley Rd

US 64
45 mph





Target Crash

Lord Berkley Rd

US 64
45 mph

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Wake County
US 64 (New Bern) at Lord Ashley Rd
BEFORE Period
11/1/98-4/30/04

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
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60 MPH TO 69
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SPEED UNKNOWN

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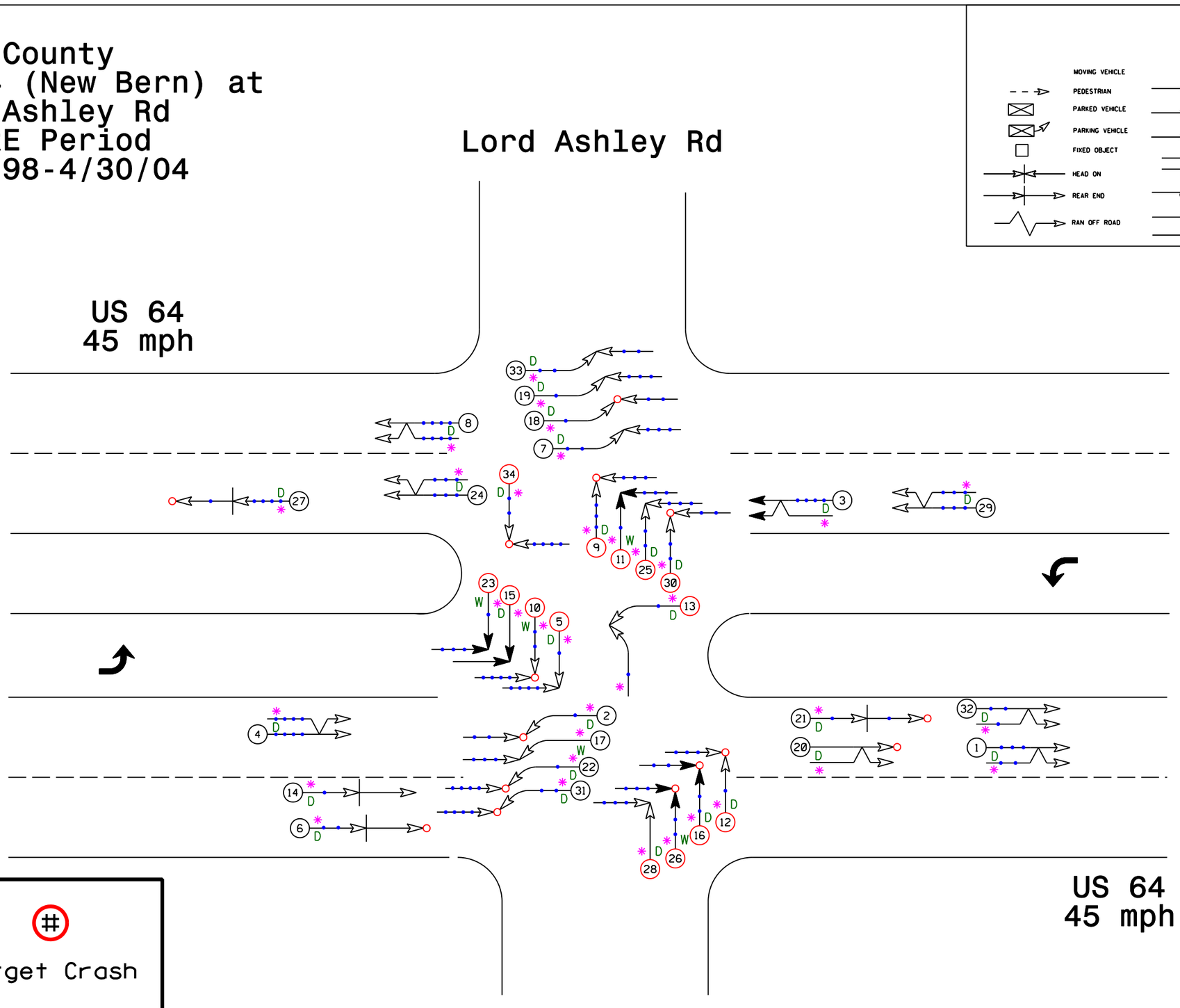

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Wake County
US 64 (New Bern) at Lord Ashley Rd
AFTER Period
8/1/04-1/31/10

Lord Ashley Rd

US 64
45 mph

LEGEND

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

ANGLE
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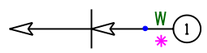

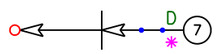

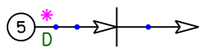

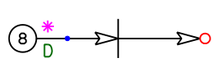

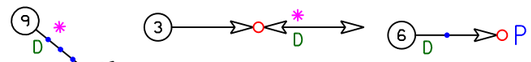

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Lord Ashley Rd

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