

Spot Safety Project Evaluation

Order # 41000006854

Spot Safety Project # 02-02-265

Spot Safety Project Evaluation of the Extension of the Eastbound Left Turn Lane on US 70 at its Intersection with Slocum Gate Rd Craven 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, PE

7/15/2010

Date

Traffic Safety Project Engineer

The original statement of problem was that left turning traffic from US 70 eastbound into Slocum Gate was queuing up beyond the left turn lane during peak hours, impeding through traffic on US 70.

The initial crash analysis was conducted from September 1, 1999 to August 31, 2002 with a total of four reported crashes, one of which was considered correctable by the chosen countermeasure. The final completion date for the improvements at the subject intersection was on March 31, 2005 with a total cost of \$82,500.00.

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 February 1, 2005 to April 30, 2005. The before period consisted of reported crashes from February 1, 2000 through January 31, 2005 (5 years) and the after period consisted of reported crashes from May 1, 2005 through April 30, 2010 (5 years). 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 with the exception of the eastbound leg of US 70, which consisted of all crashes within 2,000 feet of the intersection. The following data table depicts the Naive Before and After Analysis for the treatment location. Please note both Rear-End Crashes occurring in the left-hand through lane on the eastbound approach of US 70 were the Target Crashes for the applied countermeasure.

| <u>Treatment Information</u> | | | |
|--------------------------------------|---------------|--------------|---|
| | Before | After | Percent Reduction (-) Percent Increase (+) |
| Total Crashes | 44 | 67 | 52.3 |
| Total Severity Index | 3.19 | 4.78 | 49.8 |
| | | | |
| Target Crashes | 10 | 12 | 20.0 |
| Target Crash Severity Index | 4.7 | 1.62 | -65.5 |
| | | | |
| Volume | 24,000 | 24,000 | 0.0 |
| | | | |
| <u>Crash Severity Summary</u> | | | |
| Fatal Crashes | 0 | 0 | N/A |
| Class A Crashes | 0 | 0 | N/A |
| Class B Crashes | 0 | 0 | N/A |
| Class C Crashes | 5 | 1 | -80.0 |
| PDO Crashes | 5 | 11 | 120.0 |

The naive before and after analysis at the treatment location resulted in a 52 percent increase in Total Crashes, a 20 percent increase in Target Crashes, and no change in Average Daily Traffic (ADT). The before period ADT year was 2002 and the after period ADT year was 2007.

Results and Discussion

Rear-End Target Crashes experienced an increase of two crashes from the before to the after period. According to the crash reports, traffic still appears to queue up on the eastbound approach during certain times of day. One crash diagram showed stopped vehicles filling up the left turn lane and spilling into the through lane. This crash occurred at 6:47 AM. Five of the twelve after period Target Crashes occurred between 6:30 AM and 7:30 AM. Three of the remaining seven crashes occurred between 4:00 PM and 5:00 PM.

The calculated benefit to cost ratio for this project is -14.60 considering total crashes. The benefit to cost ratio considering only target crashes is 0.88. 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.

There was an existing pattern of Left Turn-Same Roadway Crashes involving eastbound US 70 vehicles turning left in the before period that appears to have increased in the after period. There were nine crashes of this type in the before period and 15 in the after period.

Please see the attached *Treatment Site Photos*. Photos were obtained from Google Street-view. 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.

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 70 at Slocum Gate Rd
 COUNTY: Craven
 FILE NO.: SS 02-02-265

BY: bdr
 DATE: 7/8/2010

DETAILED COST: TYPE IMPROVEMENT - Extension of Left Turn Lane

| ITEMS | TOTAL | SERVICE | CRF | ANNUAL COST |
|---------------|-----------------|-----------|--------------|-----------------|
| Construction | \$0 | 0 | 0.000 | \$0 |
| Right-of-Way | \$82,500 | 10 | 0.149 | \$12,295 |
| | \$0 | 0 | 0.000 | \$0 |
| TOTALS | \$82,500 | 10 | 0.149 | \$12,295 |

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$12,295
 TOTAL COST OF PROJECT= \$82,500

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

| TIME PERIOD | YEARS | ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES | | | | | | ANNUAL COSTS |
|-------------|-------|---|----------------------|---------------|----------------------|-------------|--------------------|--------------|
| | | K & A CRASHES | K & A CRASHES PER YR | B & C CRASHES | B & C CRASHES PER YR | PDO CRASHES | PDO CRASHES PER YR | |
| BEFORE | 5.00 | 0 | 0.00 | 13 | 2.60 | 31 | 6.20 | \$78,660 |
| AFTER | 5.00 | 1 | 0.20 | 24 | 4.80 | 42 | 8.40 | \$258,120 |

Annual Benefits from Crash Cost Savings (\$179,460)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$191,755)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -14.60

TOTAL COST OF PROJECT - \$82,500 COMPREHENSIVE B/C RATIO - -14.60

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: US 70 at Slocum Gate Rd
 COUNTY: Craven
 FILE NO.: SS 02-02-265 Target Crashes Only

BY: bdr
 DATE: 7/8/2010

DETAILED COST: TYPE IMPROVEMENT - Extension of Left Turn Lane

| ITEMS | TOTAL | SERVICE | CRF | ANNUAL COST |
|---------------|-----------------|-----------|--------------|-----------------|
| Construction | \$0 | 0 | 0.000 | \$0 |
| | \$82,500 | 10 | 0.149 | \$12,295 |
| Right-of-Way | \$0 | 0 | 0.000 | \$0 |
| TOTALS | \$82,500 | 10 | 0.149 | \$12,295 |

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$0
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$0
 TOTAL ANNUAL COST= \$12,295
 TOTAL COST OF PROJECT= \$82,500

COMPREHENSIVE COST REDUCTION:

ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES

| TIME PERIOD | YEARS | ESTIMATED NUMBER OF ANNUAL ACCIDENT DECREASES | | | | PDO | | ANNUAL COSTS |
|-------------|-------|---|----------------------|---------------|----------------------|---------|----------------|--------------|
| | | K & A CRASHES | K & A CRASHES PER YR | B & C CRASHES | B & C CRASHES PER YR | CRASHES | CRASHES PER YR | |
| BEFORE | 5.00 | 0 | 0.00 | 5 | 1.00 | 5 | 1.00 | \$24,300 |
| AFTER | 5.00 | 0 | 0.00 | 1 | 0.20 | 11 | 2.20 | \$13,460 |

Annual Benefits from Crash Cost Savings \$10,840

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$1,455)
 BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = 0.88

TOTAL COST OF PROJECT - \$82,500 COMPREHENSIVE B/C RATIO - 0.88

Treatment Site Photos from Google Street-View



Looking east on US 70



Looking east on US 70



Looking west on US 70

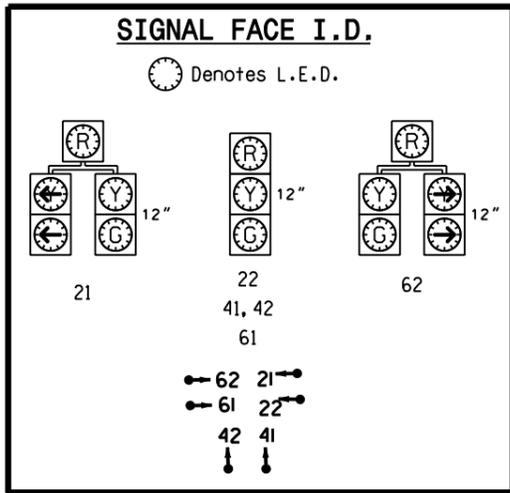


Looking toward Slocum Gate Rd from intersection

Craven County
 US 70 at Slocum Gate Rd
 BEFORE Period
 2/1/2000-1/31/2005

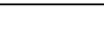

 Target Crash

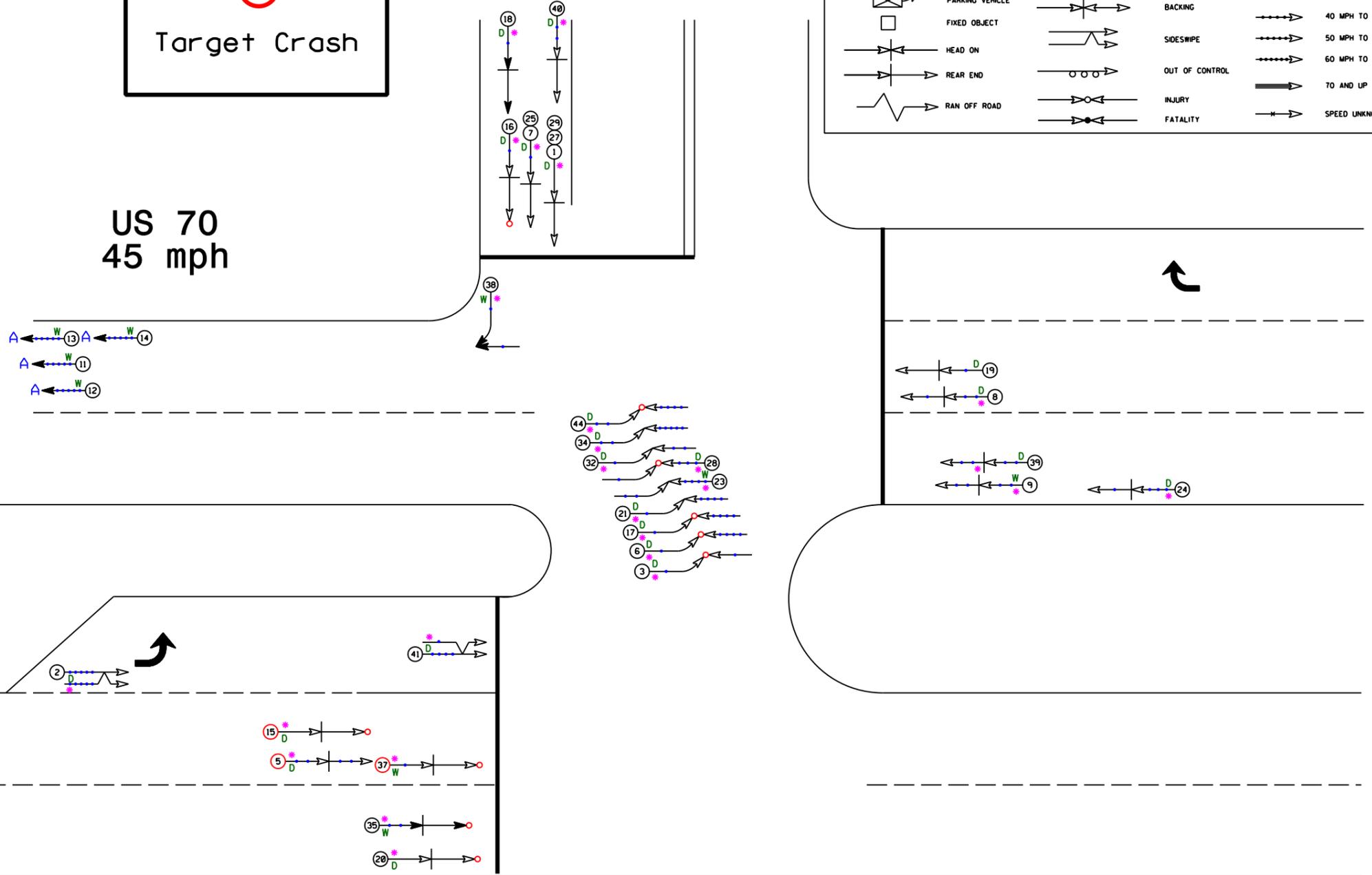
Slocum Gate



US 70
 45 mph

LEGEND

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



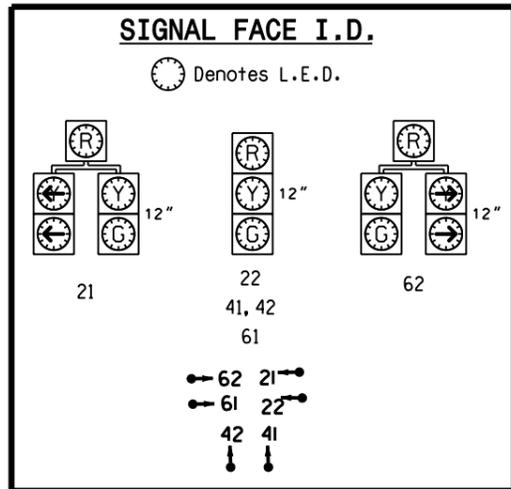
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRANSPORTATION MOBILITY and
SAFETY DIVISION
TRAFFIC SAFETY UNIT
 Date: June 2010 Prepared By: BDR

Craven County
 US 70 at Slocum Gate Rd
 AFTER Period
 5/1/2005-4/30/2010


 Target Crash

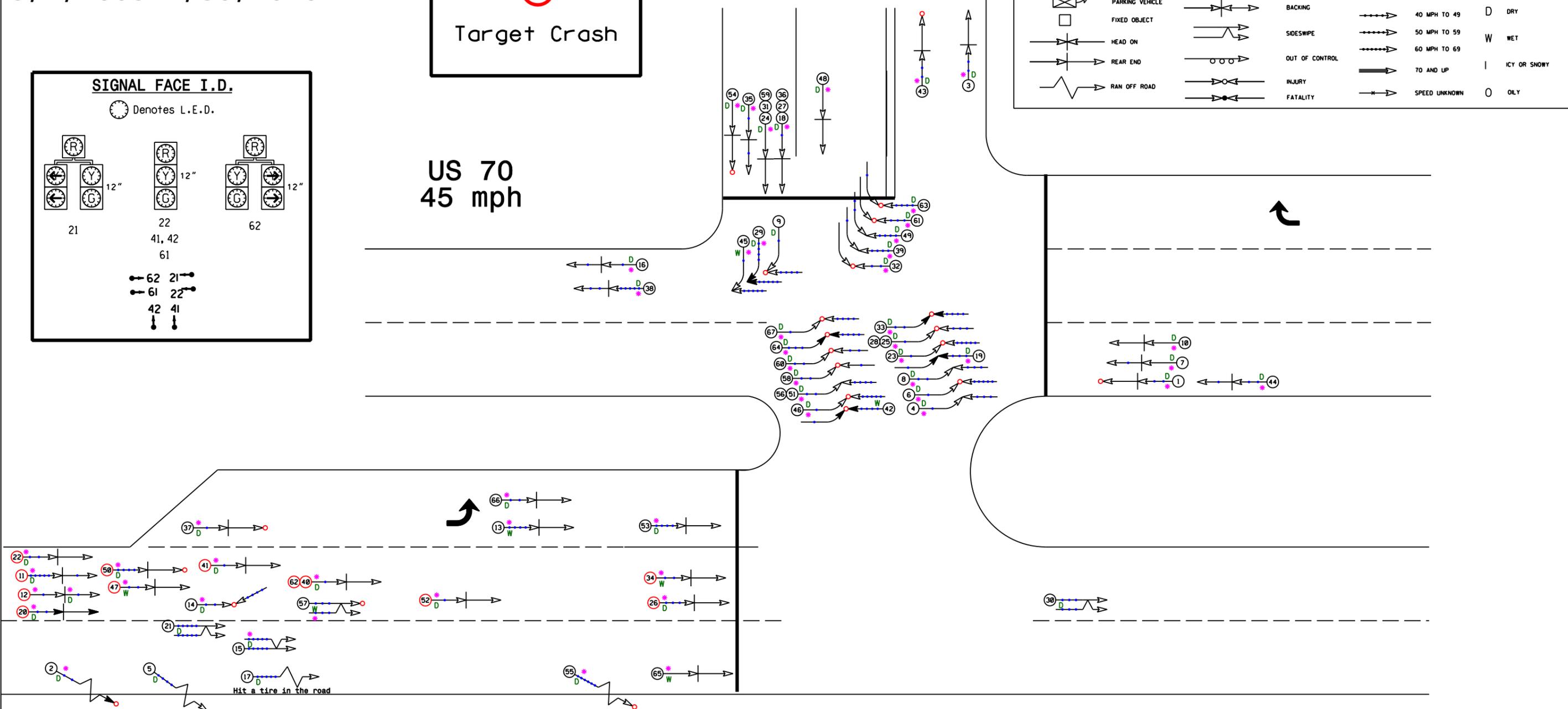
Slocum Gate

US 70
45 mph



LEGEND

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



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

TRAFFIC SAFETY UNIT

Date: June 2010

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