

Spot Safety Project Evaluation

Project Log # 200606162

Spot Safety Project # 03-01-213

**Spot Safety Project Evaluation of the Offset Left Turn Lane Installation
At the Intersection of US 421 (Carolina Beach Rd) and SR 1524 (Golden Rd) /
Masonboro Commons Shopping Center, New Hanover County**

Documents Prepared By:

Safety Evaluation Group
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Principal Investigator

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Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

The Intersection of US 421 (Carolina Beach Rd) and SR 1524 (Golden Rd) / Masonboro Commons Shopping Center, New Hanover County

Project Information

The project improvement countermeasure chosen for the subject location was to positively offset the median left turn lanes on US 421. US 421 is a four-lane divided facility with auxiliary left and right turn lanes in each direction at the treatment intersection. US 421 is a major arterial in this area, providing access between the southern New Hanover County beaches and Wilmington. The intersection is controlled by stop signs on Golden Rd and the entrance to Masonboro Commons. The speed limits are 55 mph on US 421 and 45 mph on Golden Rd within the vicinity of the intersection.

The initial crash analysis for this location was completed from November 1, 1997 through December 31, 2000 with a total of 25 reported crashes. According to the initial crash analysis, there were 12 Left Turn-Same Roadway crashes deemed correctable by the project, resulting in 6 class-B and 15 class-C injuries. A fatality occurred at the treatment intersection (in February 2001) after the initial study period, but was not considered correctable by the treatment.

According to the Project Justification Sheet, a pattern of Left Turn-Same Roadway crashes emerged due to the limited sight distance provided for US 421 motorists attempting left turns while left turning motorists were queued in the opposing left turn lane. The improvement was intended to mitigate the pattern of Left Turn type accidents. The project was completed on February 4, 2003 at an estimated cost of \$95,000.

Naïve Before and After Analysis

After reviewing all of the crashes at the subject location, the crash data omitted from this analysis to consider for an adequate construction period was from December 1, 2002 through March 31, 2003. The before period consisted of reported crashes from November 1, 1999 through November 30, 2002 (3 Years, 1 Month) and the after period consisted of reported crashes from April 1, 2003 through April 30, 2006 (3 Years, 1 Month). The ending date for this analysis was determined by the available crash data at the time the crash analysis was completed.

The treatment data consisted of all crashes within 150 feet of the subject intersection. Please see attached *Location Map* for further detail. The following tables depict the Naïve Before and After Analysis for the Total Crashes and Target Crashes at the treatment location. Please note that the Target Crashes for the applied countermeasure were Left Turn-Same Roadway (LTSR) Crashes on US 421.

| <u>Total Treatment Information</u> | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|------------------------------------|---------------|--------------|--|
| Total Crashes | 26 | 20 | - 23.1% |
| Total Severity Index | 11.95 | 3.96 | - 66.9% |
| Target Crashes | 15 | 0 | - 100.0% |
| Target Severity Index | 11.97 | 0 | - 100.0% |
| Volume | 27,400 | 33,100 | 20.8% |

| <u>Target Crash Information</u> | Before | After | Percent Reduction (-)/ Percent Increase (+) |
|---------------------------------|---------------|--------------|--|
| Fatal Injury Crashes | 0 | 0 | N/A |
| Non-Fatal Injury Crashes | 13 | 0 | - 100.0% |
| Total Injury Crashes | 13 | 0 | - 100.0% |
| Night Crashes | 2 | 0 | - 100.0% |
| Wet Crashes | 0 | 0 | N/A |

The naïve before and after analysis at the treatment location resulted in a 23 percent decrease in Total Crashes and a 100 percent decrease in Target Crashes. Further investigation shows there was a 67 percent decrease in the Total Severity Index and a 100 percent decrease in the Target Severity Index. The before period ADT year was 2001 and the after period ADT year was 2004.

Results and Discussion

The naïve before and after analysis involving the comparison of treatment actual before data versus treatment actual after data resulted in a 23 percent decrease in Total Crashes and a 100 percent decrease in Target Crashes. The summary results above demonstrate that the Treatment Location appears to have had a decrease in the number of Total and Target Crashes from the before to the after period using naïve methodologies.

The treatment location also experienced a considerable decrease in crash severity. The Severity Index for Total Crashes and Target Crashes at the treatment intersection decreased by 67 percent and 100 percent, respectively. In the before period, Target Crashes resulted in one Class-A injury crash, six Class-B injury crashes, six class-C injury crashes, and two PDO crashes. In the after period, there were no Target Crashes.

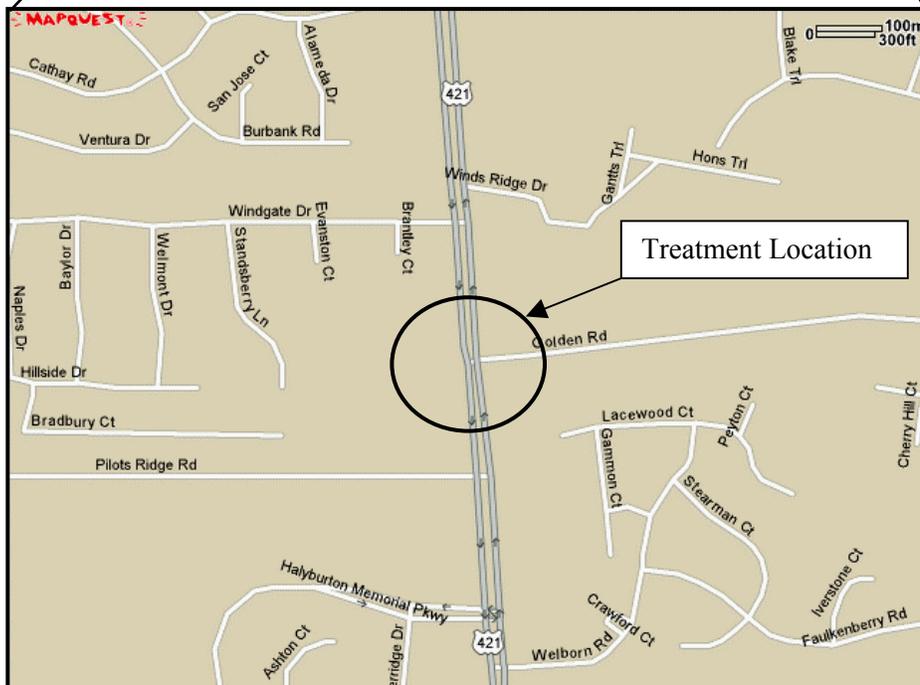
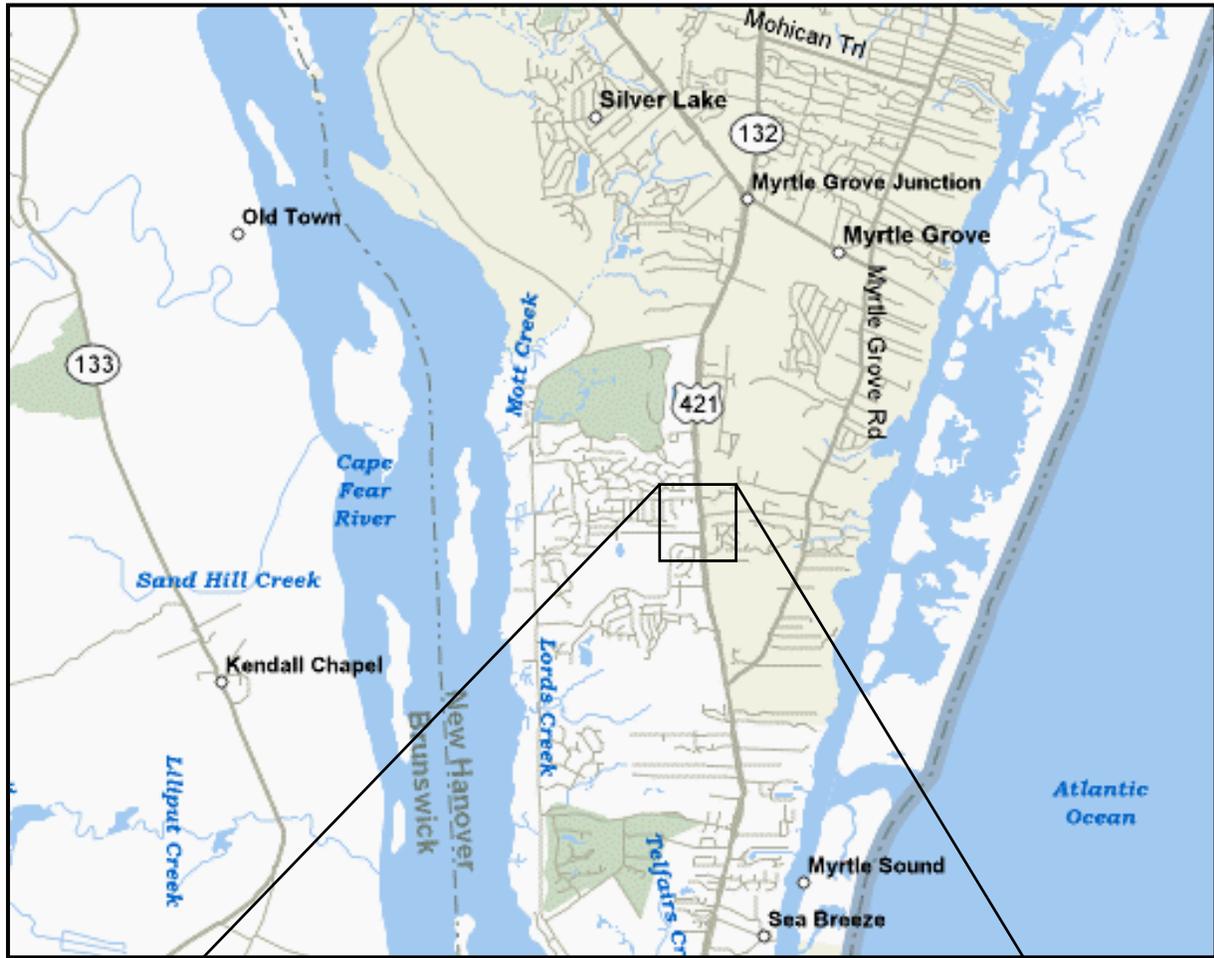
Signals are currently located close to the treatment intersection in both directions on US 421. The intersection of US 421 at Cathay Rd is located approximately 1/3 mile north of the treatment intersection and has been signalized throughout the entire before and after periods. The intersection of US 421 at Halyburton Memorial Pkwy is located approximately 1/4 mile south of the treatment intersection and has been signalized since 2001. These traffic signals have the potential to stop US 421 vehicles and create gaps for the traffic at the treatment intersection. Specifically, because the signal at the intersection of Halyburton Memorial Pkwy was installed during the study period, it may have affected the Treatment Crashes between northbound vehicles and southbound left-turning vehicles.

Please see the attached Treatment Site Photos. The photos were taken from each leg of the treatment location. Also included are photos looking northbound from the old left turn alignment and looking northbound from the new offset left turn alignment. As you can see from the photos, offsetting the left-turn lanes has created much clearer sight lines and eliminated the sight restrictions created when left turning motorists were queued in the opposing left turn lane.

Also notice (as shown in a photo) that during the field investigation vehicles from the side streets were pulling into the median on US 421 and waiting to finish their turning movement. While these vehicles were queued in the median the sight lines for any left turn movements from the mainline were blocked.

As the Safety Evaluation Group completes additional reviews for this type of countermeasure, we will be able to provide more objective and definite information regarding actual crash reduction factors.

Location Map



Treatment Location Photos (Taken on June 26, 2006)



Both photos taken at the treatment intersection while looking south on US 421.

Treatment Location Photos (Taken on June 26, 2006)



Both photos taken at the treatment intersection while looking north on US 421.

In the bottom photo, notice the vehicle that pulled into the median from Golden Rd and blocked the vehicles attempting to turn left from southbound US 421.

Treatment Location Photos (Taken on June 26, 2006)



Looking north from the OLD Left Turn Lane on US 421.



Looking north from the NEW Left Turn Lane on US 421.

Treatment Location Photos (Taken on June 26, 2006)



Photo taken while looking east from the entrance to Masonboro Commons Shopping Center.



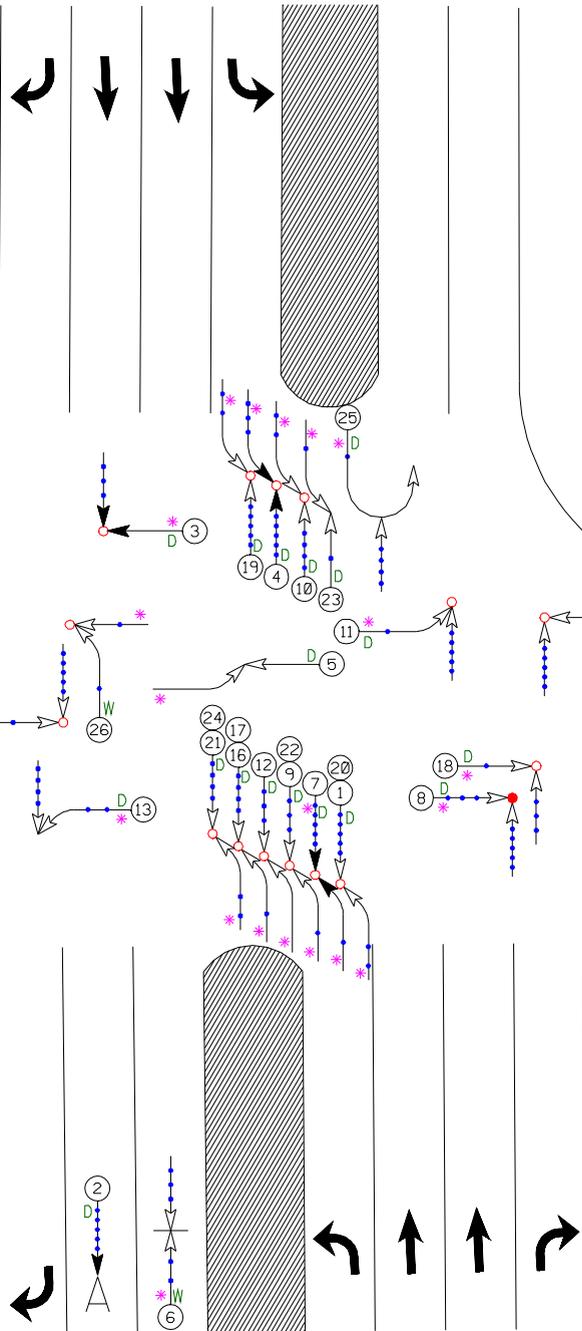
Photo taken while looking west on SR 1524 (Golden Road).

US 421
55 mph

Masonboro Commons
Shopping Center



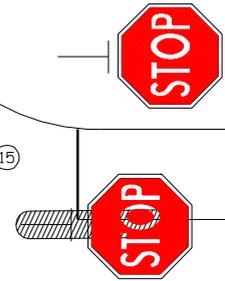
US 421



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 |
| | DEER | | OUT OF CONTROL | | 40 MPH TO 49 | | WET |
| | FIXED OBJECT | | INJURY | | 50 MPH TO 59 | | ICY OR SNOWY |
| | HEAD ON | | FATALITY | | 60 MPH TO 69 | | ONLY |
| | REAR END | | | | 70 AND UP | | |
| | RAN OFF ROAD | | | | SPEED UNKNOWN | | |

Treatment Site - Total Crashes
Before Period
11/1/1999 - 11/30/2002
(3 years, 1 month)



SR 1524 (Golden Rd)
45 mph



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



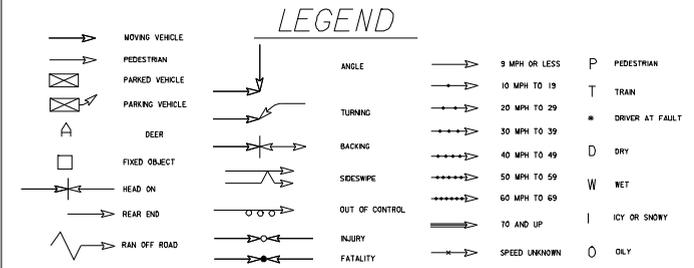
| | |
|--------------------------------------|-------|
| COLLISION DIAGRAM | |
| DIVISION: | AREA: |
| STUDY PERIOD: 11/1/1999 - 11/30/2002 | |
| DISTANCE: Y-LINE = 150 ft | |
| ANALYSIS PREPARED BY: CLS | |
| ANALYSIS CHECKED BY: | |
| DIAGRAM PREPARED BY: CLS | |
| DIAGRAM REVIEWED BY: | |
| SCALE: NOT TO SCALE | |
| DATE: 6/22/2006 | |
| LOG NUMBER: | |

US 421 at SR 1524
Before Period

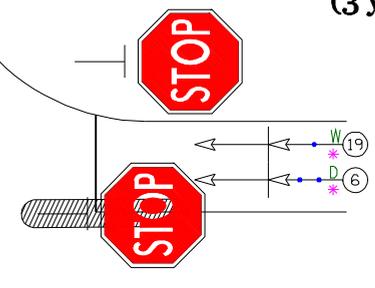
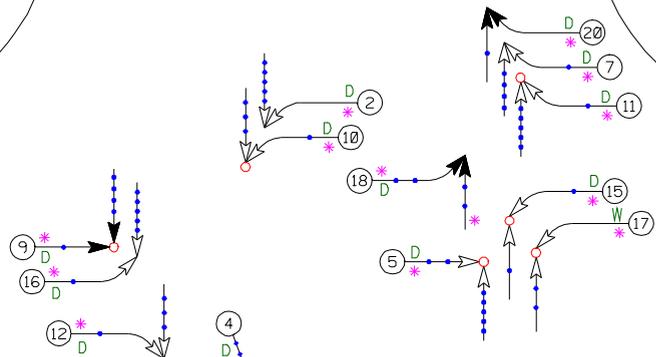
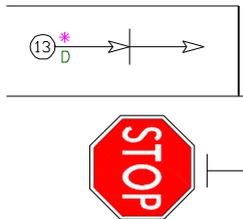
N.C. DEPARTMENT of TRANSPORTATION
DIVISION of HIGHWAYS
TRAFFIC ENGINEERING AND SAFETY SYSTEMS BRANCH

US 421
55 mph

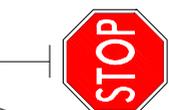
Masonboro Commons
Shopping Center



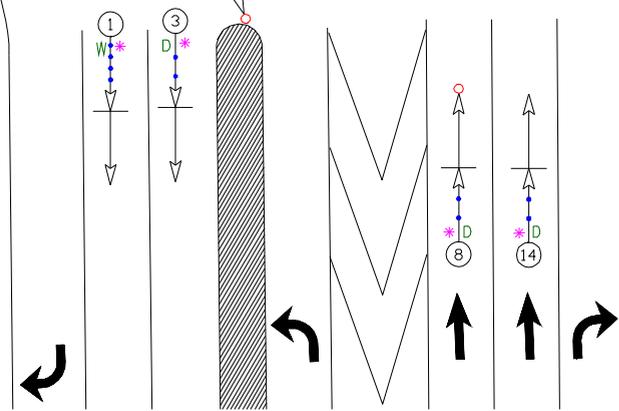
Treatment Site - Total Crashes
After Period
4/1/2003 - 4/30/2006
(3 years, 1 month)



SR 1524 (Golden Rd)
45 mph



US 421



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT



| | |
|------------------------------------|-------|
| COLLISION DIAGRAM | |
| DIVISION: | AREA: |
| STUDY PERIOD: 4/1/2003 - 4/30/2006 | |
| DISTANCE: Y-LINE = 150 ft | |
| ANALYSIS PREPARED BY: CLS | |
| ANALYSIS CHECKED BY: | |
| DIAGRAM PREPARED BY: CLS | |
| DIAGRAM REVIEWED BY: | |
| SCALE: NOT TO SCALE | |
| DATE: 6/22/2006 | |
| LOG NUMBER: | |

US 421 at SR 1524
After Period

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DIVISION of HIGHWAYS
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SYSTEMS BRANCH