

Spot Safety Project Evaluation

Project Log # 200702018

Spot Safety Project # 04-96-255

Spot Safety Project Evaluation of the Traffic Signal Upgrade and Additional Phasing at the Intersection of SR 1629 (Weldon Rd) and Virginia Avenue in Roanoke Rapids Halifax County

Documents Prepared By:

Safety Evaluation Group
Traffic Safety Systems Management Section
Traffic Engineering and Safety Systems Branch
North Carolina Department of Transportation

Principal Investigator

Jason B. Schronce

6-14-2007
Date

Traffic Safety Project Engineer

Spot Safety Project Evaluation Documentation

Subject Location

Evaluation of Spot Safety Project Number 04-96-255 – The Intersection of SR 1629 (Weldon Rd / Julian R. Allsbrook Hwy) and Virginia Avenue in Halifax County.

Project Information and Background from the Project File Folder

The spot safety project improvement countermeasure chosen for the subject location was the revision of the existing signal by updating it to current MUTCD Standards. These modifications include installing new signal heads, new eight-phase cabinet for future expansion, new controller, and revising the spans. The phasing was also altered to include protected-permitted left turns from SR 1629. Virginia Avenue is a two lane residential roadway with a 25 mph speed limit. SR 1629 (Weldon Rd / Julian R. Allsbrook Hwy) is a two-lane facility that widens at the intersection of Virginia Avenue to provide exclusive left turn lanes in both directions. SR 1629 has a posted speed limit of 35 mph with a 25 mph School Zone limit located through the intersection for the middle school positioned on Virginia Avenue.

The original statement of problem was that traffic has significantly increased at this intersection since the signal was initially installed in May of 1975. The outdated signal equipment is unable to keep up with the current traffic demands. Vehicles are known to collect on SR 1629 while waiting to access Virginia Avenue. The Roanoke Rapids Chaloner Middle School located on Virginia Avenue further contributes to the traffic dilemma.

The initial crash analysis was completed from February 1, 1995 to January 31, 1998 with seven (7) reported crashes resulting in five “C” injuries.

The final completion date for the improvement at the subject intersection was on August 1, 2002 with a total cost of \$40,000.00.

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 July 1, 2002 to September 31, 2002. The before period consisted of reported crashes from May 1, 1998 through June 30, 2002 (4 years and 2 months) and the after period consisted of reported crashes from October 1, 2002 through November 30, 2006 (4 years and 2 months). The ending date for this analysis was determined by the available crash data at the time of the analysis.

The treatment data consisted of all crashes within 150 feet of the subject intersection. *Please see attached location map and photos for further details.*

Since signal upgrades do not target one particular crash pattern, the intersection was analyzed on the basis of total crash reduction. Extra consideration was granted to Left Turn; Same Roadway crashes involving vehicles on SR 1629 due to the addition of the left turn protected-permitted phase on it's approaches in the after period. These crashes were reduced from 1 to 0 after the treatment was installed; which does not contribute significantly to the overall effectiveness.

<u>Treatment Information</u>			
	Before	After	Percent Reduction (-) Percent Increase (+)
Total crashes	10	9	- 10.00 %
Total Severity Index	5.44	11.07	103.50 %
Volume	6,000	6,900	15.00 %
<u>Injury Crash Summary</u>			
Fatal injury Crashes	0	0	N/A
Class A injury Crashes	0	1	100.0 %
Class B injury Crashes	1	1	0.00 %
Class C Injury Crashes	5	1	- 80.0 %
Total Injury Crashes	6	3	- 50.0 %

The naive before and after analysis at the treatment location resulted in a 10 percent decrease in Total Crashes, a 103.5 percent increase in the Total Severity Index, and a 15 percent increase in the intersection ADT. The before period ADT year was 2000 and the after period ADT year was 2004.

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 10 percent decrease in Total Crashes. The summary results above demonstrate that Total Crashes appear to have decreased at the treatment location from the before to the after period. We also observe a 50 percent reduction in total injury crashes.

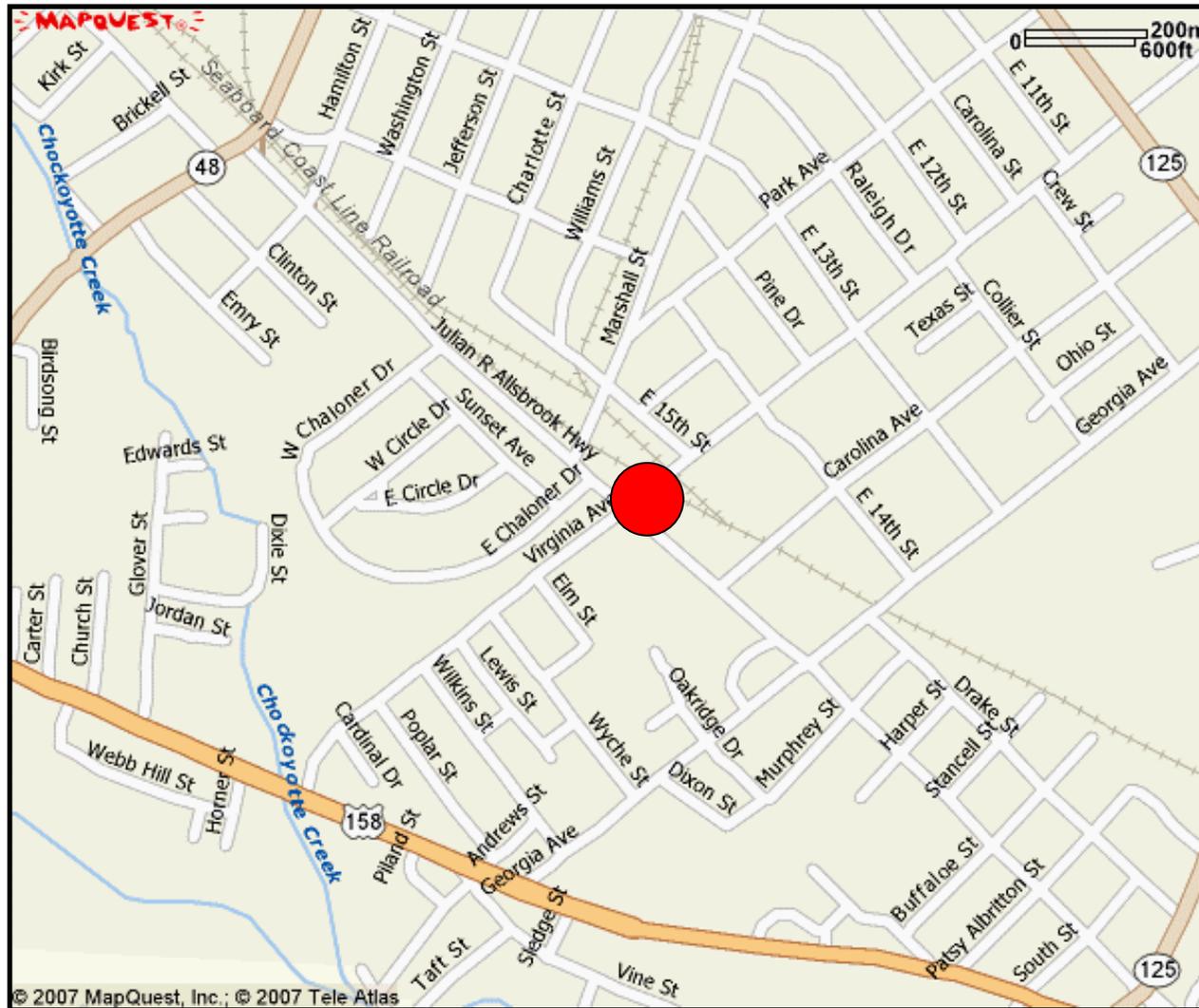
Referencing the *Collision Diagrams*, a large portion of crashes at the intersection in the before period (5 of 10) were angle collisions resulting from a vehicle running the red light. After the signal upgrades, this pattern was reduced to two (2) angle crashes. It can be concluded that the new signal heads provide greater visibility and response to the existing intersection control.

The calculated benefit to cost ratio for this project is (-16.56) considering total crashes. 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. The negative ratio is due to the increase in cost of the single "A" injury crash of the after period.

Please see the attached *Treatment Site Photos*. Photos are provided for all approaches to the treatment 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.

**Location Map
Halifax County
Evaluation of Spot Safety Project # 04-96-255**



**Treatment Location: SR 1629 (Julian R. Allsbrook Hwy / Weldon Rd) at Virginia Avenue
Site located within Roanoke Rapids City Limits**

TREATMENT SITE PHOTO TAKEN 5/30/2007



Traveling East on SR 1629 (Julian R. Allsbrook Hwy)



Traveling North on Virginia Avenue



Traveling South on Virginia Ave.



Traveling South on Virginia Avenue



Traveling West on SR 1629



New Signal Head and Left Turn Protected Phase

BENEFIT-COST ANALYSIS WORKSHEET

LOCATION: SR 1629 at Virginia
 COUNTY: Halifax
 FILE NO.: SS 04-96-255

BY: JBS
 DATE: 3/22/2007

DETAILED COST: TYPE IMPROVEMENT - **Shoulder Guardrail**

ITEMS	TOTAL	SERVICE	CRF	ANNUAL COST
Construction	\$40,000	10	0.149	\$5,961
	\$0	0	0.000	\$0
Right-of-Way	\$0	0	0.000	\$0
TOTALS	\$40,000	10	0.149	\$5,961

ESTIMATED INCREASE IN ANNUAL MAINT. COST = \$200
 ESTIMATED INCREASE IN ANNUAL UTILITY COST = \$150
 TOTAL ANNUAL COST= \$6,311
 TOTAL COST OF PROJECT= \$40,000

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	4.17	0	0.00	6	1.44	4	0.96	\$29,640
AFTER	4.17	1	0.24	2	0.48	6	1.44	\$134,149

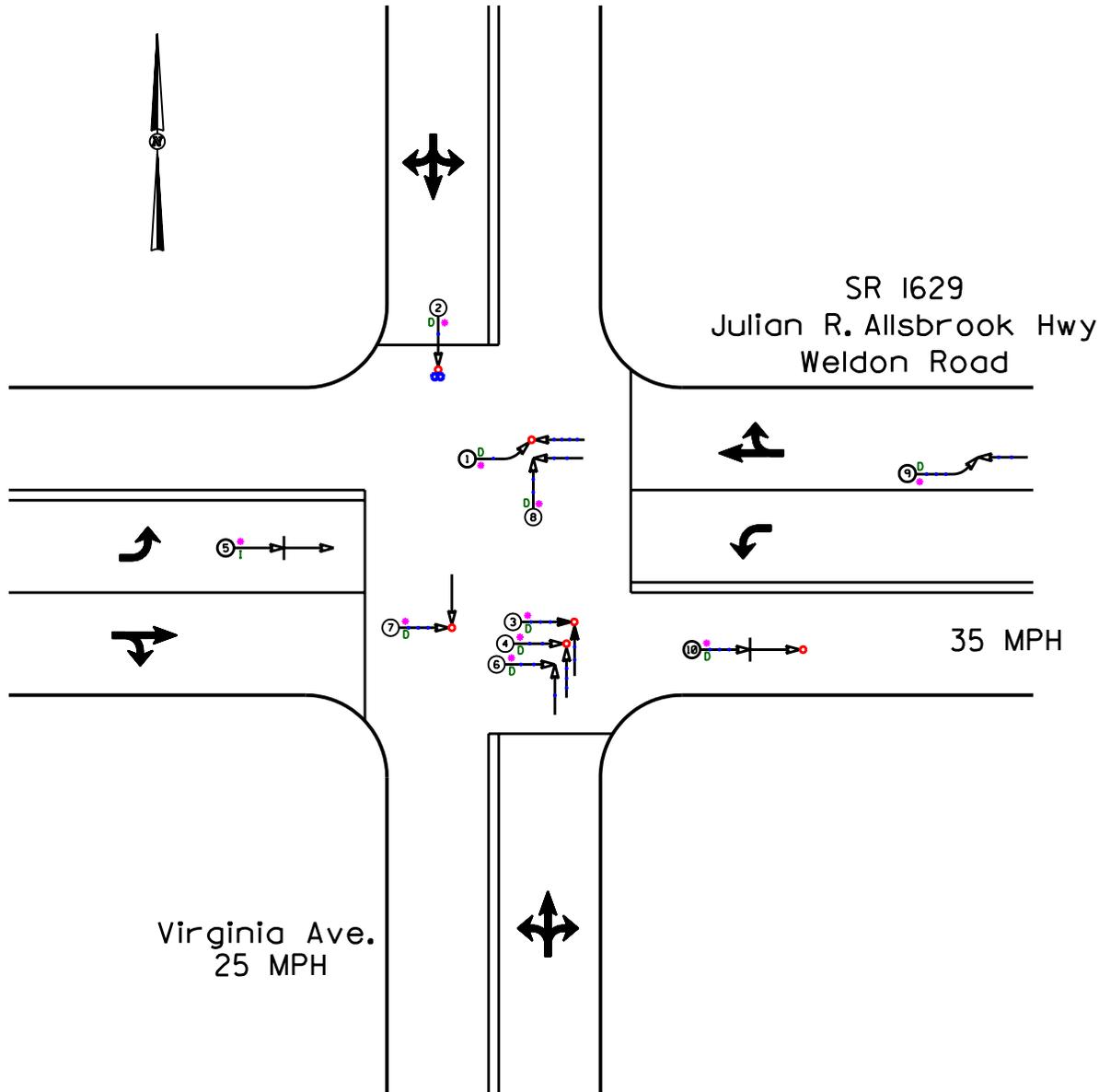
Annual Benefits from Crash Cost Savings (\$104,508)

NET AVG. ANNUAL BENEFITS = AVG. ANNUAL BENEFITS - TOTAL ANNUAL COST = (\$110,820)

BENEFIT-COST RATIO = AVG ANNUAL BENEFITS/TOTAL ANNUAL COST = -16.56

TOTAL COST OF PROJECT - \$40,000 COMPREHENSIVE B/C RATIO - -16.56

Virginia Ave.



LEGEND

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

SS# 04-96-255
 Halifax County
 Before Period
 5/1/98 - 6/30/02
 SR 1629 at Virginia Ave.

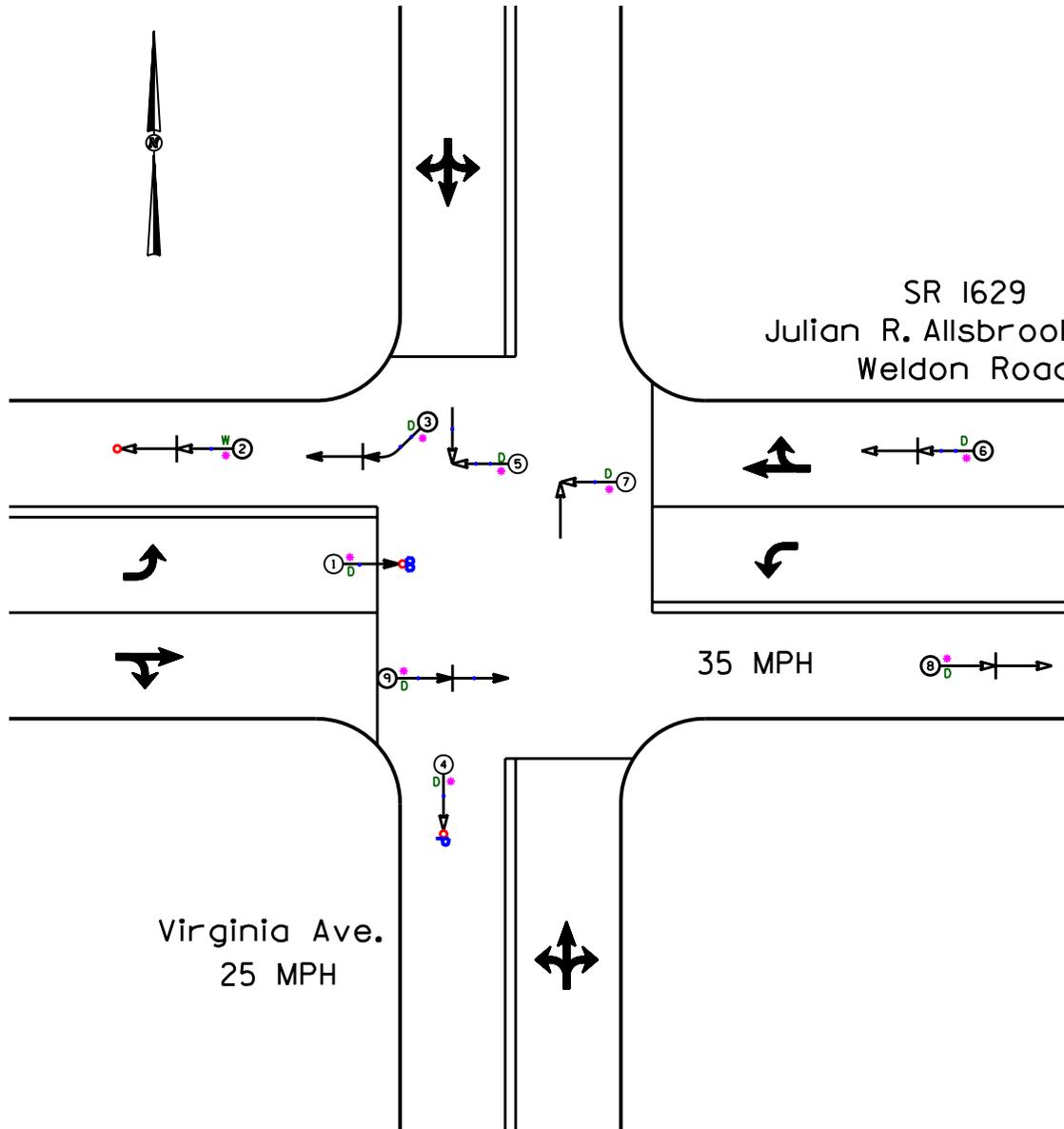


TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 4	AREA:
STUDY PERIOD: 5/1/1998 TO 6/30/2002	DISTANCE: 1-LINE + 150 FT	
ANALYSIS PREPARED BY: JBS	ANALYSIS CHECKED BY: BR	
DIAGRAM PREPARED BY: JBS	DIAGRAM REVIEWED BY: ST	
SCALE: NOT TO SCALE		
DATE: 3-22-2007		
LOG NUMBER: SS* 04-96-255		

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

Virginia Ave.

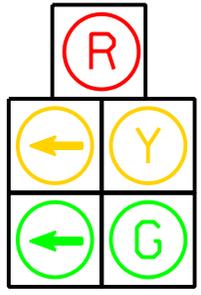


LEGEND

	MOVING VEHICLE		ANGLE		9 MPH OR LESS		P PEDESTRIAN
	PEDESTRIAN		TURNING		10 MPH TO 19		T TRAIN
	PAKED VEHICLE		BACKING		20 MPH TO 29		D DRIVER AT FAULT
	PAKED VEHICLE		SIDESWIPE		30 MPH TO 39		D DRY
	FIXED OBJECT		OUT OF CONTROL		40 MPH TO 49		W WET
	HEAD ON		REAR END		50 MPH TO 59		I TO AND UP
	REAR END		HIT		60 MPH TO 69		S SPEED UNKNOWN
	RAN OFF ROAD		FATALITY		0		O ONLY

SS# 04-96-255
 Halifax County
 After Period
 10/1/02 - 11/30/06
 SR 1629 at Virginia Ave.

Upgrade to current
 MUTCD Standards and
 protected-permissive lefts
 on SR 1629



TRAFFIC SAFETY SYSTEMS MANAGEMENT UNIT

	COLLISION DIAGRAM	
	DIVISION: 4	AREA:
STUDY PERIOD: 10/1/2002 TO 11/30/2006		
DISTANCE: 1+LINE + 150FT		
ANALYSIS PREPARED BY: JBS		
ANALYSIS CHECKED BY: BR		
DIAGRAM PREPARED BY: JBS		
DIAGRAM REVIEWED BY: ST		
SCALE: NOT TO SCALE		
DATE: 3-22-2007		
LOG NUMBER: SS* 04-96-255		

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