

Safety Assessment

for

Intersection of
Route 29 (Seminole Trail) and
Ashwood Blvd (Route 1670).

Albemarle County



Prepared by:

**VIRGINIA DEPARTMENT OF TRANSPORTATION
Northwestern Regional Operations - Traffic Engineering**

July 2008

OBJECTIVE OF STUDY

In response to a recent fatal crash that occurred at the intersection of Rte 29 (Seminole Trail) and Ashwood Blvd (Rte 1670), the Virginia Department of Transportation conducted an Intersection Safety Assessment which is outlined in this report.

The study at this signalized intersection included an inventory of existing conditions in respect to signing, markings, signal and related appurtenances, an examination of the operation of the intersection under prevailing conditions and identification of any enhancements to the operation and safety of the intersection.

The safety study is structured to include the following key aspects:

- (1) Inventory of existing conditions,
- (2) Traffic counts, including daily traffic, AM and PM peak hours,
- (3) Sight distances available at the intersection,
- (4) Speed limit review,
- (5) Crash data reduction,
- (6) Recommendations
- (7) Implementation Plan
- (8) APPENDICIES

Map of Area (North is up)

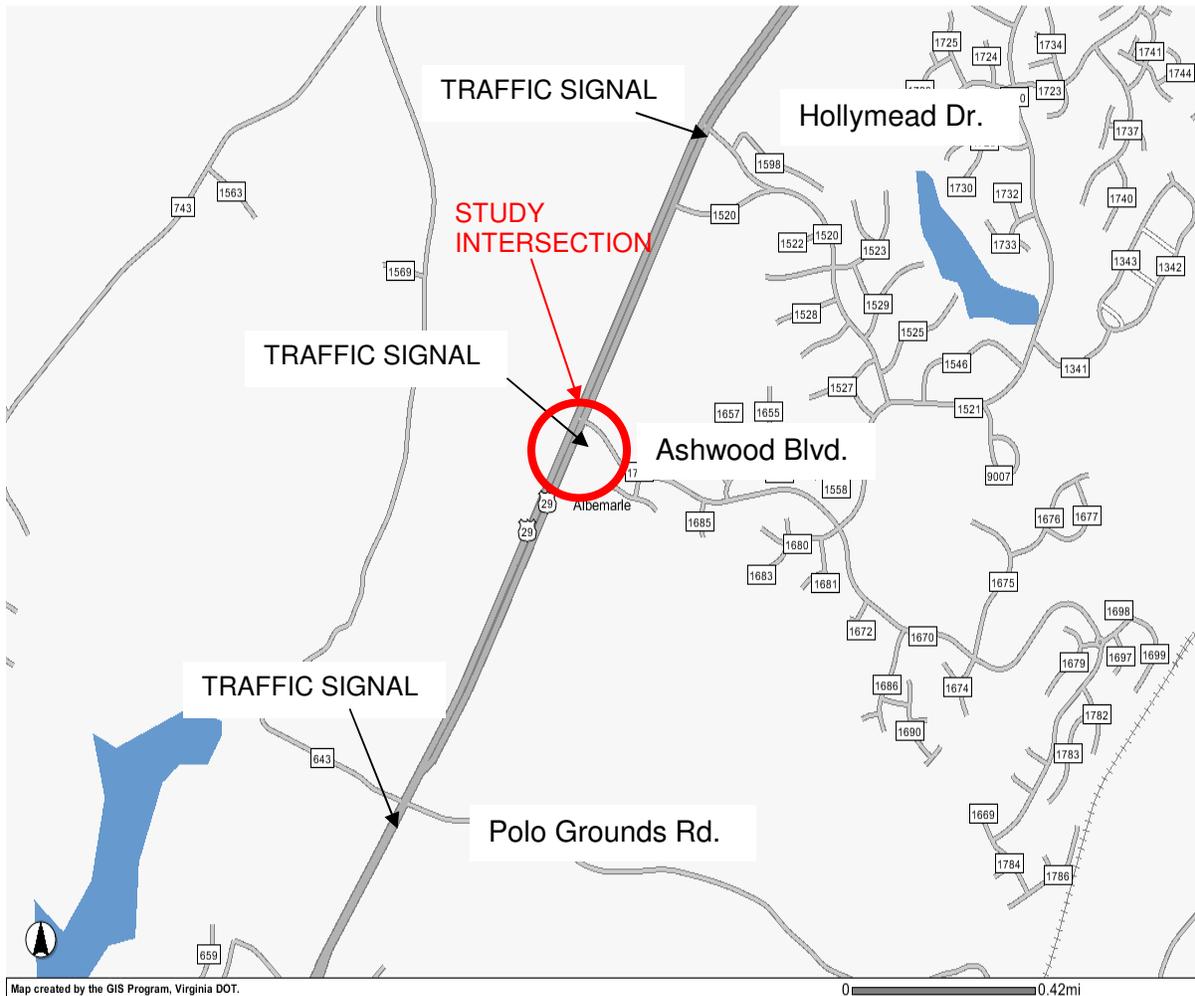


Figure 1 - Study Area

Aerial view of the US Route 29/Ashwood Blvd Intersection



Figure 2 - Aerial View



Figure 3 - US Route 29 Northbound approach



Figure 4 - US Route 29 Southbound approach

Existing Conditions:

US Route 29 is a four-lane (4) divided highway which extends in a general north-south direction, with the study intersection located within the limits of Albemarle County, Virginia, as shown in Figures 1 through 4.

Traffic Volume

US Route 29 has an estimated AADT (Average Annual Daily Traffic) of 51,000 vehicles for this section of road, according to 2006 VDOT published data and the percentage of trucks is 4 percent. An AM/PM peak hour count was conducted at the intersection including truck traffic and is shown in Appendix A. The AM peak hour is from 7:45 AM to 8:45 AM and the PM peak hour is 5:00 PM to 6:00 PM. The following is a summary of the peak hour turning movement counts:

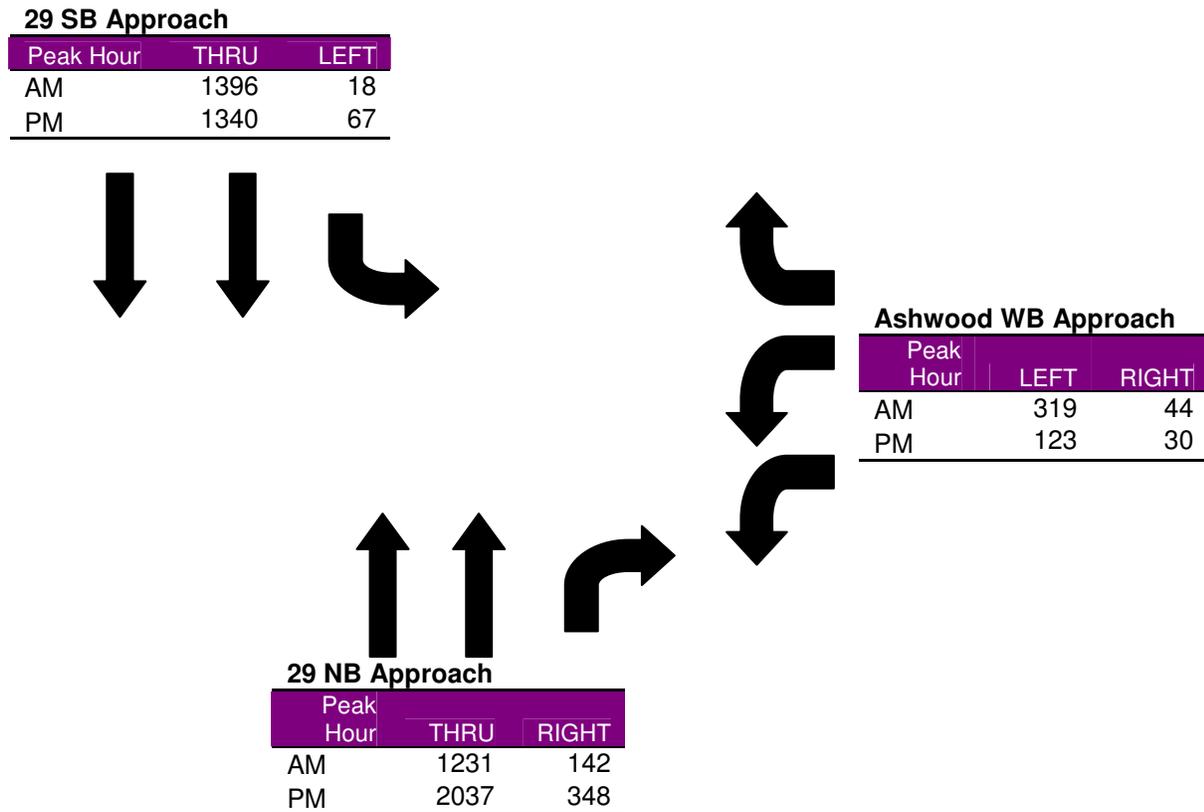


Figure 5 - Peak Hour traffic volume

Signal Head Visibility

The diagram on the next page (Figure 6) illustrates the various sight distances that were measured during field investigation. Field measurements indicate the approach sight distance along US 29 in the northbound direction to the signal heads to be approximately 1100 ft. Similar measurements in the southbound direction of US 29 noted this distance to be approximately 1000 ft to the signal heads. The Manual on Uniform Traffic Control Devices (MUTCD) recommends a minimum sight distance to the traffic signal heads to be 625 ft for an 85th percentile speed limit of 55 mph, (Reference MUTCD PP4D-12,4D-13). The signal head visibility meets the minimum required.

Stopping Sight Distance

Stopping sight distance is the sum of the brake reaction distance and actual braking distance. This is the total distance that is available to a vehicle traveling at or near the design speed to stop before reaching a stationary object in its path. Field measurements conducted at this intersection (See Figure 6) noted the stopping sight distance in the northbound direction to be approximately 1160 ft and in the southbound direction to be approximately 475 ft. The stopping sight distance along Ashwood Blvd was measured to be approximately 480 ft. The American Association of State Highway and Transportation Officials (AASHTO) recommends a stopping sight distance for an approaching vehicle to see another vehicle to be 495 ft for a design speed of 55 mph (US Route 29) and 250 ft for a design speed of 35 mph (Ashwood Blvd) (Reference AASHTO Green Book, PP 112). The stopping sight distance meets the minimum required in the northbound direction, but is less than the required sight distance on Route 29 southbound.

Operational Analysis/Stopping Sight Distance to Back of Queue

The following is a summary of the operational performance of the intersection. Level of Service is a qualitative measure of the traffic flow based on the delay (seconds) experienced per vehicle.

Peak Period	US 29 SB Approach	US 29 NB Approach	Ashwood Blvd WB Approach	Overall
AM	B	B	D	B
PM	A	F	D	E

Table 1 - Operational Analysis, Level of Service (LOS)

Operational analyses indicate the 90th percentile queue in the northbound direction on US 29 during the PM Peak hour to be approximately 1125 ft. from the stop bar at the intersection (see Appendix C). The resulting stopping sight distance to the back of the queue is approximately 1190 ft. In the southbound direction on US 29, the 90th percentile queue is approximately 600 ft and the stopping sight distance to the back of this queue is approximately 770 ft.

Typical northbound queuing in the PM peak hour reaches the traffic signal at Polo Grounds Road.

Signal Coordination

A coordinated traffic signal system exists on Route 29 from Charlottesville North City Line (NCL) to Polo Grounds Roads.

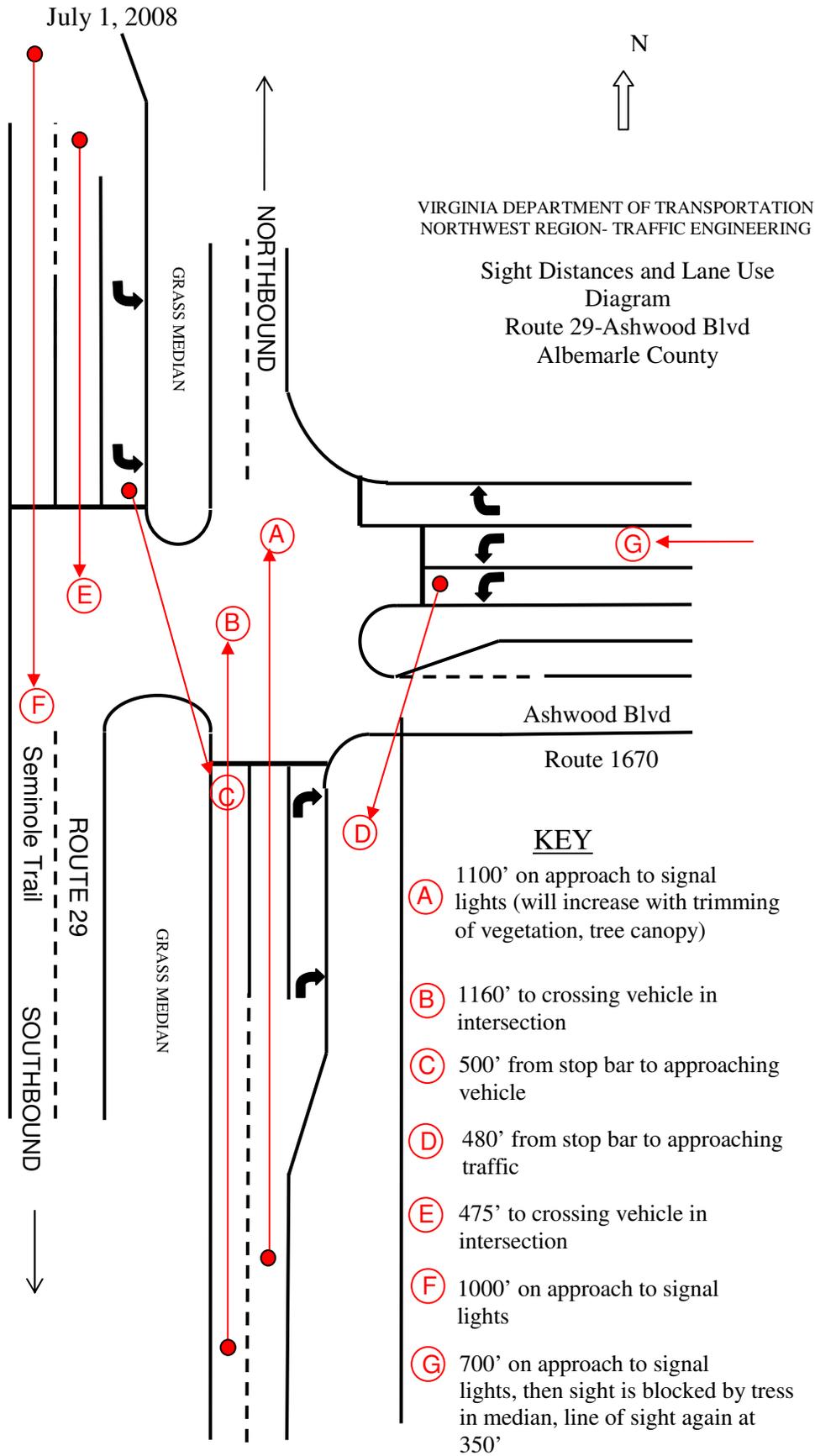


Figure 6

Speed Limit

The speed limit on this section of US 29 is 55 mph; it is posted statutory from 1000 ft north of Polo Grounds Road to the Albemarle County line. The area south is posted 45 mph from NCL Charlottesville to 1000 ft north of Polo Grounds Road. The 45 mph speed limit was moved north to its current location from the Rivanna River Bridge (just south of Polo Grounds) in 2002.

As a part of this investigation VDOT conducted a separate speed study on US 29 from Polo Grounds Road to Airport/Profit Road. A copy of this speed study is included under Appendix B.

Existing warning signs and devices on the approaches of Route 29 at Ashwood Blvd

- Dual indicated diagrammatic “Signal Ahead” signs are located with a “Watch for Stopped Vehicles” plaque below at about 1025 ft from the intersection on northbound approach of US 29 and 650 ft from the intersection on southbound approach of US 29.
- Dual indicated “Watch for Stopped Vehicles” signs with full time “Flashing Yellow Beacons” and advisory speed plates of 35 mph are located approximately 1500 ft from the intersection along US 29 in the northbound direction and about 1150 ft from the intersection along US 29 in the southbound direction.
- In both directions of US 29 in the median, prior to all of the above noted signs there are “Ashwood Blvd – Next Signal” advance guide signs with the appropriate right or left arrow (The northbound sign is located approximately 1800 ft from the intersection and the southbound sign is located approximately 2000 ft from the intersection).
- On Ashwood Blvd. there is a private sign “Forest Lakes- South Entrance” located in the median just behind the stop bar on Ashwood Blvd., which limits sight distance for vehicles in the left turn lanes, particularly in the turn lane closest to the median. Sight distance from the stop bar is 480 ft.



Figure 7 – View from Ashwood Blvd.

- In the northbound direction along US 29 there is a “School Bus Stop Ahead” sign with a 1700 ft distance plate located between the “Watch for Stopped Vehicles” sign and the “Signal Ahead” sign.

Crash Data- below is a 5 year crash summary for the intersection:

5 YEAR CRASH SUMMARY- Route 29 and Ashwood Blvd. 01/01/2003 to 12/31/2007											
	Total Crashes	RE	Angles	F/O	F/O-I	Deer	SS(sd)	Misc.	# Injury Crashes	Injuries	Fatals
2003	21	14	3	3	0	1	0	0	5	7	0
2004	12	10	2	0	0	0	0	0	3	6	0
2005	20	12	4	0	1	1	1	1	12	20	0
2006	30	21	3	1	1	2	2	0	6	7	0
2007	19	12	1	2	0	0	4	0	6	7	0
Total	102	69	13	6	2	4	7	1	32	47	0*

*Data above reflects to end of year only (current available update) and does not include the fatality on 5/9/08.

This intersection ranked as the 3rd highest intersection in Albemarle County for number of fatal and injury crashes from 2004 to 2006. This intersection is located on the Culpeper District Critical Crash rate intersection list in 2007.

KEY TO ABBREVIATIONS ABOVE

- RE = Rear end collisions
- F/O = Run off road - hit fixed object
- F/O-I = Hit object in road
- SS(sd) = Sideswipe type collision – same direction

The crash data indicates that a predominant number of accidents (67%) are attributed to rear end collisions, with angle collisions (approx. 13%) being the second highest. Injury-related crashes resulted in a total of 47 injuries.

Recommendations:

Summarized below are recommended solutions to enhance operations and safety at the US 29/Ashwood Blvd intersection. The recommendations were developed as a result of a review of the existing physical conditions, crash history, traffic counts and field review of the site.

1. Install “SIGNAL AHEAD” on pavement both directions on US 29 with accompanying rumble strips, two lines before and after each message. The optimum location will be field determined.

This action will draw added attention to the existing signalized intersection which is located along the hilly terrain of US 29.

2. Install a Controller Actuated Beacon (CAB) with flasher in both directions on US 29, activated when signal is going to turn red. This device has a diagrammatic signal ahead sign with a message to alert motorists, see Figure 8 below. This will replace the existing ‘Flashing Yellow Beacons’.

This action will serve as an additional warning to drivers of stopped vehicles due to a red signal, in the northbound and southbound direction of US 29.



Figure 8 – Controller Actuated Beacon (CAB)

3. Review Speed Limit – The speed limit from north of Polo Grounds Road to Airport/ Proffit Road area has been completed and is included in Appendix B. Based upon roadway geometrics, roadside development and crash history along the study corridor we are recommending that the speed limit be reduced to 45 mph. This action would be contingent upon pending review and approval by the VDOT Central Office.

If approved this new speed limit will provide a consistent speed limit to drivers over this section of US 29 with the section south, which is currently posted with 45 mph. Enforcement of this speed limit will be coordinated with Albemarle County and affiliated sheriff/police. Widened shoulders or pullouts should be installed along this section of Route 29 to permit law enforcement a safe area to patrol and safely pull drivers over.

4. Consideration should be given to relocating the “Forest Lakes- South Entrance” sign to enhance visibility exiting Ashwood Blvd. along the south leg of the intersection.

This action will enhance the existing sight distance to drivers exiting Ashwood Blvd. and turning left or right on to US 29.

In addition, the STOP bar location on the westbound approach of Ashwood Blvd should be relocated to bring it closer to the intersection.

This action will enhance the visibility to westbound drivers exiting the intersection.

5. Trim vegetation in the area on both approaches of US 29 including the median to enhance visibility of signs and the sight distance for southbound left turn traffic.

This action will enhance the sight distance to southbound to westbound drivers and also further increase signal head visibility to northbound and southbound traffic on US 29.

6. Install a “Signal Ahead” sign on Ashwood Blvd in advance of the intersection.

This action provides advance warning of a signal along the westbound approach of Ashwood Blvd.

7. The yellow and all red clearance for this intersection has been checked, and the summary chart with recommended adjustments is below.

This action further enhances operations and safety at the intersection.

	EXIST. YELLOW	EXIST.ALL RED	Calculated Yellow	Calculated All Red	Proposed Yellow	Proposed All Red	COMMENTS
US 29 NB	5 secs	2 secs	3 secs	1.6 secs	5.5 secs*	2 secs	decel=10ft/sec/sec
US 29 SB	5 secs	2 secs	5.5 secs	1.45 secs	5.5 secs	2 secs	SB Yellow governs NB, decel=10ft/sec/sec accel =15 ft/sec/sec accel =10 ft/sec/sec
US 29 SBLT	4 secs	2.4 secs	4 secs	1.6 secs	4 secs	2.5 secs	
ASHWOOD	4 secs	2.6 secs	4 secs	3 secs	4 secs	3 secs	

*Although NB Yellow needed is 3 seconds, a value of 5.5 seconds is recommended due to the fact that the Southbound Yellow governs if the phasing is to be concurrent green.

Figure 9 - Yellow and All Red calculations

- Coordinate traffic signals along US Route 29 from Polo Grounds Road to Airport/Proffit Road.

This action will improve traffic flow, reduce the number of stops, and potentially reduce the number of rear-end crashes.

Estimated Implementation Schedule of Recommendations:

An implementation schedule has been developed and estimated completion times developed. This schedule will be updated periodically.

Improvement	Responsible Party	Estimated completion time
1. Install "SIGNAL AHEAD" markings and rumble strips on pavement	VDOT NWRO Traffic Engineering design/Asset Maintenance install	Summer 2008
2. Install Controller Actuated Beacon (CAB)	VDOT NWRO	Winter 2008
3a. Speed Limit Reduction	VDOT NWRO Traffic Engineering seeks approval, Asset Maintenance installs	Late Summer 2008
3b. Safety Pullouts	VDOT Charlottesville Residency	Fall 2008
4a. Relocate Forest Lakes sign	Forest Lakes Owners Assoc.	To be determined
4b. Relocated STOP bar	VDOT NWRO Asset Maintenance	Summer 2008
5. Trim Vegetation	VDOT Charlottesville Residency	Brush removal – Summer 2008 Tree canopy removal - Spring 2009
6. Install "SIGNAL AHEAD" sign	VDOT NWRO Traffic Engineering design/Asset Maintenance install	Summer 2008
7. Adjust yellow and red intervals	VDOT NWRO Signal Maintenance	July 2008
8. Signal Coordination	VDOT NWRO Traffic Operations	Fall 2008

APPENDIX A
Peak Hour Traffic Counts

Route 29 and Ashwood Blvd.

AM/PM Peak Period traffic counts (All traffic) – (7 AM - 9 AM) and (4 PM- 6 PM):

(*Peak Hour in **BOLD** in chart below)

Start Time	Southbound			Westbound (Ashwood)			Northbound			Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	0	428	1	8	0	33	4	206	0	680
07:15 AM	0	475	3	9	0	43	5	215	0	750
07:30 AM	0	511	2	9	0	74	19	215	0	830
*07:45 AM	0	532	4	13	0	92	24	292	0	957
08:00 AM	0	396	2	13	0	66	41	319	0	837
08:15 AM	0	506	2	10	0	74	50	326	0	968
08:30 AM	0	494	10	8	0	87	27	294	0	920
08:45 AM	0	426	3	7	0	74	18	296	0	824
Total AM	0	3768	27	77	0	543	188	2163	0	6766

04:00 PM	0	393	14	11	0	38	37	451	0	944
04:15 PM	0	267	11	8	0	24	50	430	0	790
04:30 PM	0	421	15	6	0	27	31	350	1	851
04:45 PM	0	342	10	7	0	28	54	376	0	817
*05:00 PM	0	356	25	10	0	22	101	568	1	1083
05:15 PM	0	364	17	10	0	33	83	489	0	996
05:30 PM	0	282	14	5	0	38	77	441	0	857
05:45 PM	0	338	11	5	0	30	87	539	0	1010
Total PM	0	2763	117	62	0	240	520	3644	2	7348

Route 29 and Ashwood Blvd.

AM/PM Peak Period (Truck traffic only) – (7 AM - 9 AM) and (4 PM- 6 PM):

(*Peak Hour in **BOLD** in chart below)

Start Time	Southbound			Westbound (Ashwood)			Northbound			Total
	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	
07:00 AM	0	13	0	0	0	0	0	7	0	20
07:15 AM	0	13	0	0	0	0	0	19	0	32
07:30 AM	0	13	0	0	0	0	0	21	0	34
07:45 AM	0	10	0	0	0	0	0	14	0	24
*08:00 AM	0	17	0	0	0	0	0	13	0	30
08:15 AM	0	13	0	0	0	0	0	12	0	25
08:30 AM	0	15	0	0	0	0	0	24	0	39
08:45 AM	0	18	0	0	0	0	1	22	0	41
Total AM	0	112	0	0	0	0	1	132	0	245

*04:00 PM	0	14	0	0	0	2	0	16	0	32
04:15 PM	0	13	0	0	0	0	0	14	0	27
04:30 PM	0	10	0	0	0	0	0	12	0	22
04:45 PM	0	4	0	0	0	0	0	14	0	18
05:00 PM	0	6	0	0	0	0	0	6	0	12
05:15 PM	0	6	0	0	0	0	0	9	0	15
05:30 PM	0	7	0	0	0	0	0	9	0	16
05:45 PM	0	8	0	0	0	0	0	5	0	13
Total PM	0	68	0	0	0	2	0	85	0	155

APPENDIX B

**US Route 29 from Polo Grounds Road to Airport/Profit Road
Speed Study, June 2008**

**Northwestern Region Operations Traffic Engineering
VDOT Speed Study –6/30/2008**

This Speed Study conducted under the direction of _____

Vijay N. Kulkarni, PE, PTOE
Licensed Engineer

Study Area:

Location: US Route 29, Seminole Trail
County: Albemarle
From: 1000 ft North of Polo Grounds
To: 0.22 Miles North of Route 649 Proffit/Airport Road
Length: Field Measured 2.50 Miles
Functional Class: Urban Principal Arterial
Speed Zone(s) in Study Area: Posted Statutory 55 mph
Speed Zone(s) adjoining Study Area: Posted 45 mph by resolution of 1/29/2002 from 1000 ft north of Polo Grounds Road to Charlottesville City Limits; posted 55 mph statutory to Greene County Line.

Origin and Nature of Request:

We received a request from residents of Albemarle County for a reduced speed limit on Route 29 and requested a speed study be conducted to determine if a speed limit reduction is warranted. The citizens' concern is speeding traffic.

Study Results and Recommendations:

Due to the roadway geometrics, roadside development and friction, crash history in the corridor, which is well above the state and district averages, we are recommending that the existing 55 mph statutory posted speed limit be reduced to 45 mph.

Study Details:

A. Speed Data:

Radar speed samples were taken at 6 locations in the study area (3 northbound and 3 southbound). The results are below:

Route 29 Northbound

Date of Speed Sample:	6/9/08
Location:	0.1 Mi. N. of Rte. 1670
85th Percentile Speed:	53-mph
50th Percentile Speed:	49-mph
Pace Speed Range:	45 through 54

Date of Speed Sample: 6/12/08
Location: 0.2 Mi. S. of Rte. 1721
85th Percentile Speed: 55-mph
50th Percentile Speed: 49-mph
Pace Speed Range: 45 through 54

Date of Speed Sample: 6/12/08
Location: 0.01 Mi. N. of Rte. 1722
85th Percentile Speed: 50-mph
50th Percentile Speed: 45-mph
Pace Speed Range: 40 through 49

Route 29 Southbound

Date of Speed Samples: 6/9/08
Location: 0.1 Mi. N. of Rte. 1670
85th Percentile Speed: 58-mph
50th Percentile Speed: 53-mph
Pace Speed Range: 50 through 59

Date of Speed Samples: 6/12/08
Location: 0.02 Mi. S. of Towncenter Dr.
85th Percentile Speed: 51-mph
50th Percentile Speed: 48-mph
Pace Speed Range: 43 through 52

Date of Speed Samples: 6/12/08
Location: 0.1 Mi. N. of Rte. 1722
85th Percentile Speed: 42-mph
50th Percentile Speed: 38-mph
Pace Speed Range: 33 through 42

B. Road Characteristics:

US Route 29 is a four-lane to six-lane divided highway in the study area with an alignment that has moderate to significant vertical curves in the south section of the study area from north of Polo Grounds Road/ Rio Mills Road to Hollymead Drive and is generally flat in the north section of the study area from Towncenter Drive to Airport/Proffit Road. The area between Towncenter Drive and Hollymead Drive serves as a transition zone from the 4-lane section to the 6-lane section. Northbound a left lane is added and southbound the lane is dropped. The pavement is 25 ft – 36 ft wide, in addition to left and right turn lanes, and in good condition. Pavement markings are in good condition and consist of center skips, lane lines, stop bars, turn arrows and edgelines. There are also raised pavement markers in the south section of the study area only.

The south section of the study from north of Polo Grounds Road/ Rio Mills Road to Hollymead Drive is a rural 4 lane section with a 50 ft median with edge of pavement, variable 2 to 8 ft shoulders and raised pavement markers. Sight distances in this section is generally adequate but is limited in some areas by the rolling terrain and vertical curves. The north section of the study area from Towncenter Drive to Airport/Proffit Road is an urban 6 lane section with a 38 ft

median, primarily curb and gutter with 0 to 4 ft shoulders. Sight distances in this section of the study area are generally good. Signs in the study area are in good condition and include "SIGNAL AHEAD" signs, "WATCH FOR STOPPED VEHICLES" with flasher, speed limit signs, guide signs, other regulatory signs such as one ways, keep rights and stop signs on the state controlled side streets without a traffic signal.

The AADT on US 29 are noted as follows:

US 29 (from Rio Rd to Hollymeade Dr) 51,000 vehicles

US 29 (from Hollymeade Dr to Airport Rd) 39,000 vehicles

C. Roadside Development and Environment:

There are 5 signalized intersections on Route 29 within the study area; they are Airport/Proffit Road, Timberwood Blvd., Towncenter Drive, Hollymead Drive and Ashwood Blvd. The signalized intersections primarily serve the residential and commercial development in study area. There are 2 crossovers, 3 state road unsignalized intersections, 8 private entrances and 8 commercial entrances within the study area. The potential for conflicts is considered moderate. Access density is considered is low.

D. Parking Practices and Pedestrian Activity:

During the study no parking activity was observed and very little pedestrian activity was observed, although there are potential pedestrian generators in the north section of the study area. However, no intersections within the study area have pedestrian crosswalks and pedestrian equipment.

E. Reported Crash Experience for 3-Year Period:

Crash records and rates obtained through "HTRIS" are for the period

From: January 1, 2005

To: December 31, 2007

Length of period: 3 - Years

Note: Crashes where no injuries were sustained and property damage was below \$1,000 may not be recorded in HTRIS. Also, due to the time required to process and code crash data, HTRIS typically does not include occurrences in the last several months.

According to our records, the total number of reported **crashes** for this section of highway, from 1000 ft north of Polo Grounds to Airport/Proffit Road is: 364

And, the total number of reported **injuries** for this section of highway is: 170

And, the total number of reported **fatalities** for this section of highway is: 0

The **crash** rate for this section of highway is: 319 per 100 million VMT.

The **injury** rate for this section of highway is: 149 per 100 million VMT.

The **fatality** rate for this section of highway is: 0 per 100 million VMT.

For all primary roads statewide per the latest published crash data:

The 2005 district average **crash** rate is: 245 per 100 million VMT.

The 2005 district average **injury** rate is: 118 per 100 million VMT.

The 2005 district average **fatality** rate is: 219 per 100 million VMT.

For all primary roads in the State for 4-lane divided non access facilities per the latest published crash data

The State average **crash** rate is 110 per 100 million VMT

The State average **injury** rate is 61 per 100 million VMT

The State average **fatality** rate is 0.91 per 100 million VMT

F. Enforcement Consensus:

This recommended change in speed limit has been discussed with First Sgt. Lisa Roakes of the Virginia State Police and Sgt. Pete Mainzer of the Albemarle County Police Office. The Local enforcement officer concurs with/ opposes the recommendation.

The State Police Officer:

Concurs

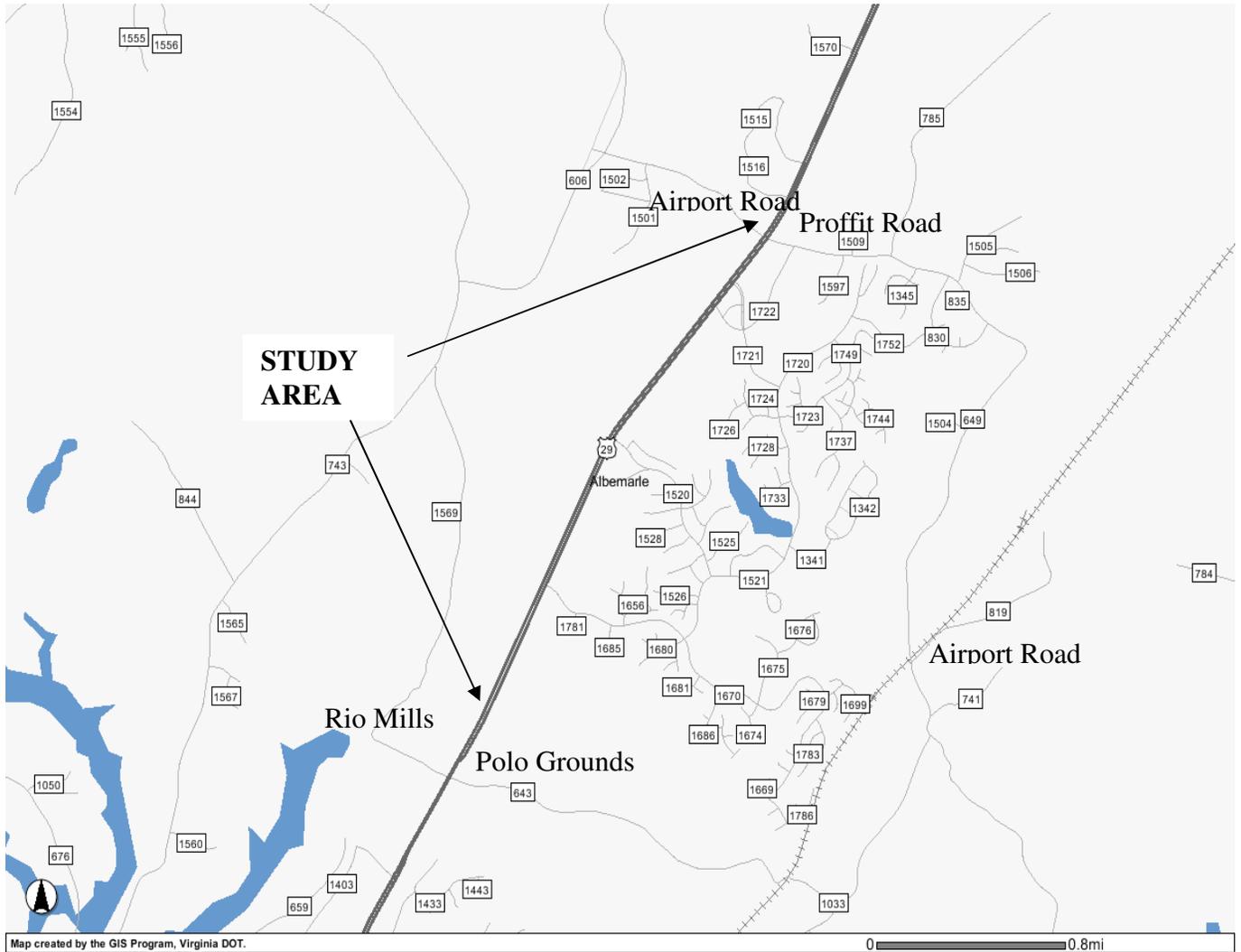
Opposes

If any officer opposes, please explain:

G. Additional comments: provide any additional details not included in the previous that pertain to the speed study

Study Area Map:

Note: North is up the page



APPENDIX C
Operational Analysis