HMDL.ORG 5-30-2014

Comparative Performance of Traffic Control Options For the Hunter Mill/ Dulles Toll Road Intersections

This report compares the performance of traffic signals and roundabouts at three high-volume intersections along Hunter Mill Road in the vicinity of the Dulles Toll Road. The roundabout performance data in this report updates the study undertaken by VDOT in 2001 using the latest developments and best practices in roundabout engineering.

The Fairfax County Department of Transportation (FCDOT) June 14, 2013 publication, *The Dulles Corridor Study Transportation Study – Final Report*, was the source for all the traffic counts used in this comparative performance report. The same report evaluated the traffic signal performance for the existing 2013 conditions and two different development scenarios in the year 2030. The second of the two development scenarios, '2030 Scenario G', represents a substantial increase in level of planning density and traffic generation in Reston and is the scenario the Fairfax County Board of Supervisors ultimately adopted in amending the Comprehensive Plan in February, 2014. To stay in step with the Fairfax County Comprehensive plan, the 2013 Existing Conditions and 2030 Scenario G are used for intersection performance comparative evaluation in this report.

The roundabout designs and roundabout performance data were sourced from the engineering report of Alternative Street Design, Inc., a recognized engineering consultancy that specializes in roundabout design. The study was commissioned by HMDL and jointly funded by neighboring homeowner associations and residents. The HMDL-commissioned report used the FCDOT report's traffic numbers to develop roundabout designs and evaluate roundabout performance for the same high volume intersections.

The comparative performance of traffic signals and roundabouts depicted in this report's constituent tables show that even the optimized traffic signals are no match for roundabouts at these three locations now, or in 2030. In fact, while the signals struggle in 2030, the roundabouts will still be performing impressively. Notably, the throughput has increased and the roundabout footprint has shrunk from the 2001 VDOT design, reducing ROW needs. This is possible due to the imminent design guideline updates announced in April at the TRB-sponsored International Conference on Roundabouts. These updates rely on the increasing body of metrics taken at U.S. implementations.

Nationwide, roundabouts continue to perform very well and are being implemented at an increasing rate year over year due to their critical safety, maintenance, and performance benefits. This trend has driven a VDOT roundabout policy which states *"VDOT recognizes that roundabouts are frequently able to address safety and operational objectives better than other types of intersections. Therefore, it is VDOT policy that roundabouts be considered when a project includes reconstructing or constructing new intersections(s), signalized or un-signalized."*

The results shown in this comparative performance report validate the Hunter Mill Corridor communities' preference for the use of roundabouts for traffic control throughout its length.

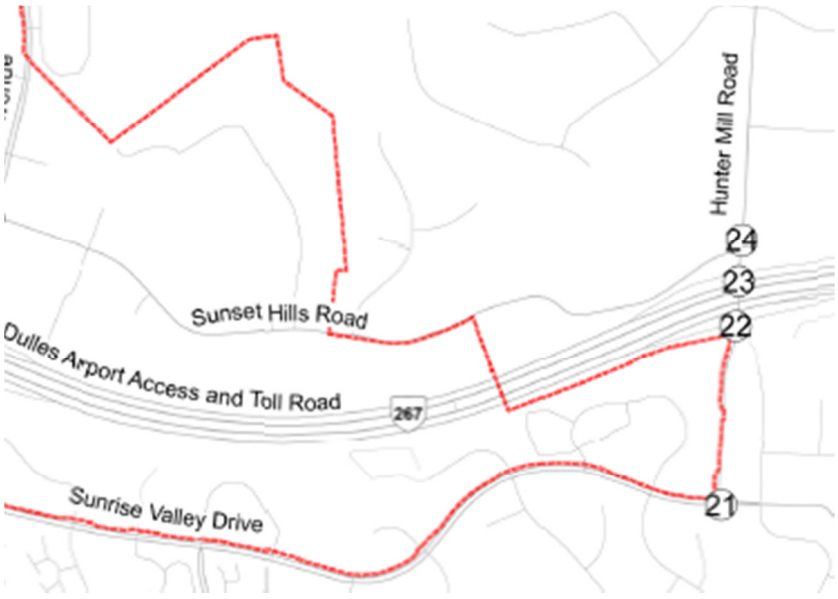
Level of Service Defined

Table 3.1 - Level of Service (LOS) Criteria for Signalized Intersections

LOS	Delay per Vehicle (sec)	Expected Conditions at Intersection
A	≤10	Negligible delay
B	> 10 and ≤ 20	Short delays
C	> 20 and ≤ 35	Number of vehicles stopping is significant
D	> 35 and ≤ 55	Influence of congestion becomes more noticeable
E	> 55 and ≤ 80	Significant delays causing long queues
F	> 80	Oversaturated; Vehicles wait through multiple signal cycles

Source: *Highway Capacity Manual 2010*, Transportation Research Board

Intersections Studied



#23 and 24 see table 2 below

#22 see table 1 below

#21 see table 3 below

Signal vs/ Roundabout Comparison Tables

Table 1 - Dulles Toll Road Eastbound Ramps/Hunter Mill Road (South Side of Toll Road)

Intersection Control - **Signal** (with Mitigation measures)	Peak Period	Level-of-Service	Average Delay (sec/veh)	95th Percentile Queue (ft)	Volume/ Capacity ratio
2013 Existing traffic volumes (before optimization)	AM	B	13.9	m678	0.86
	PM	B	13.7	#651	0.70
2030 Scenario G (optimized) Traffic Volumes	AM	C	21.4	285	1.37*
	PM	B	18.4	388	1.54*
Intersection Control - Roundabout	**Peak Period**	**Level-of-Service**	**Average Delay (sec/veh)**	**95th Percentile Queue (ft)**	**Volume/ Capacity ratio**
2013 Existing traffic volumes	AM	B	11.5	270	0.753
	PM	A	5.5	64	0.399
2030 Scenario G** Traffic Volumes	AM	A	6.5	100	0.538
	PM	A	5.7	65	0.459

* A Volume/Capacity ratio over 1.0 means the intersection is operating at a volume suggesting saturation has been reached.

** Network Results shown rather than as individual intersection results (differences are negligible). Network summary sheets are including in Appendix A.

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Table 2 - Summary of WB Ramps/Hunter Mill Road/Sunset Hills Road –One roundabout to replace two stop lights

Intersection Control - **Signal** (with Mitigation measures)	Peak Period	Level-of-Service	Average Delay (sec/veh)	95th Percentile Queue (ft)	Volume/ Capacity ratio
2013 Existing traffic volumes-**West Bound Ramps** (before optimization)	AM	D	42.9	#475	1.06*
	PM	D	41.2	394	1.0*
2013 Existing traffic volumes –**Sunset Hills RD** (before optimization)	AM	D	52.8	#679	1.0*
	PM	D	36.4	#520	1.06*
2030 Scenario G (optimized) Traffic Volumes – **West Bound Ramps**	AM	F	102.1	#584	1.32*
	PM	F	140.8	#886	1.54*
2030 Scenario G (optimized) Traffic Volumes – **Sunset Hills Rd**	AM	D	70.1	#611	1.32*
	PM	D	54.4	#523	1.52*
Intersection Control - **Roundabout**	Peak Period	Level-of-Service	Average Delay (sec/veh)	95th Percentile Queue (ft)	Volume/ Capacity ratio
2013 Existing traffic volumes	AM	A	8.1	81	0.377
	PM	B	10.2	102	0.424
2030 Scenario G** Traffic Volumes	AM	B	10.7	193	0.641
	PM	B	12.6	228	0.694

* A Volume/Capacity ratio over 1.0 means the intersection is operating at a volume suggesting saturation has been reached.

** Network Results shown rather than as individual intersection results (differences are negligible). Network summary sheets are including in Appendix A.

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Table 3 – Sunrise Valley Drive at Hunter Mill Road

Intersection Control - **Signal** (with Mitigation measures)	Peak Period	Level-of-Service	Average Delay (sec/veh)	95th Percentile Queue (ft)	Volume/ Capacity ratio
2013 Existing traffic volumes (before optimization)	AM	C	32	#441	0.92
	PM	C	29.1	#791	0.97
2030 Scenario G (optimized) Traffic Volumes	AM	F	94.2	#718	1.86*
	PM	E	65.3	#902	2.1*
Intersection Control - Roundabout	**Peak Period**	**Level-of-Service**	**Average Delay (sec/veh)**	**95th Percentile Queue (ft)**	**Volume/ Capacity ratio**
2013 Existing traffic volumes	AM	A	8.0	116	0.516
	PM	A	8.7	98	0.537
2030 Scenario G** Traffic Volumes Four-Way Intersection	AM	B	11.0	199	0.792
	PM	B	11.9	305	0.888
2030 Scenario G Traffic Volumes Tee Intersection	AM	A	9.0	163	0.735
	PM	A	9.4	170	0.758

* A Volume/Capacity ratio over 1.0 means the intersection is operating at a volume suggesting saturation has been reached.

** Network Results shown rather than as individual intersection results (differences are negligible). Network summary sheets are including in Appendix A.

95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.