

Board of Supervisors

Meg Bohmke, Chairman Gary F. Snellings, Vice Chairman Jack R. Cavalier Thomas C. Coen L. Mark Dudenhefer Wendy E. Maurer Cindy C. Shelton

Thomas C. Foley County Administrator

Infrastructure Committee Meeting AGENDA

March 6, 2018 – 2:00 pm Conference Room A/B/C, Second Floor

Committee Members: Chairman Mark Dudenhefer, Meg Bohmke and Jack Cavalier

	Agenda Item							
	Transportation:							
	a. Proposed Smartscale Projects							
1.	b. Stafford Comprehensive Road Evaluation							
	c. FY2019 Secondary Six-Year Plan							
	d. Brooke Road Bids							
	e. Funding for Site Acquisition for Garrisonville Road Signal							
2.	Discuss Options for Tiered Utilities Rates							
3.	Proposed Fueling Stations on County Property							
	Next IC meeting is scheduled for April 3, 2018							

InfraAgenda/03.06.2018



2018 Smart Scale Application Updates

- Staff provided Committee members with some potential Smart Scale projects deemed eligible for District Grant funding during the 3rd round of Scale project applications.
- These projects either had been Board priorities on previous Smart Scale applications, in the Capital Improvement Program, and/or staff felt could be presented in such a way as to score well in the Smart Scale process
- Selected projects during this round of Smart Scale will be eligible for funding in FY2024 and 2025. Exact funding amounts have not been established by the state, but are estimated at \$25 to \$30 million total for the Fredericksburg District.
- Staff believes that projects which have support from previously completed studies, and/or a local government funding source, will score highest in the Smart Scale process.
- Staff is suggesting the following projects be considered as local **District Grant** projects for the 3rd round of Smart Scale. Localities are allowed to submit up to four projects.
 - <u>Route 1/Enon Road</u> Staff recommends this as the first priority for district Smart Scale funding and includes improvements to the intersection of Route 1 and Enon Road, and extending along Enon Road. Our previous Smart Scale application for this improvement extended to the I-95 Bridge, and was estimated at \$10.1 million, but the project was not chosen for funding. The Board could chose to resubmit the same project this year in the amount of \$10.4 million (adjusted for inflation due to the later starting date), but with additional state and local funding applied. The additional funding, when combined with the fact that several local projects were funded ahead of our project during the last cycle and no longer competing, should improve the chance for a successful application. The funding could be as shown below:

Fuels Tax -	\$50,000
<u>CMAQ/RSTP</u> -	\$ 3,500,000
Impact Fees-	\$ 1,500,000
Smart Scale -	<u>\$ 5,350,000</u>
Total	\$10,400,000

Staff believes that our effort last year was scored lower due to the high cost relative to the local contribution of approximately \$400,000 previously expended for survey and preliminary engineering. Furthermore, staff believes that reviewers failed to adequately take into account the results of the study completed in 2012 which logged 9,000 vpd using this 2-lane road, and identified the intersection performing at a LOS F during the morning peak, and which would worsen significantly by 2020.

The Board could also consider scaling back the project from the initial plan, but retaining the most important features, including the turn lane improvements on Route 1 and the added third lane to the school entrance. The total cost for the scaled back project is estimated at \$7,966.000, and funded as follows:

Fuels Tax -	\$50,000
CMAQ/RSTP -	\$3,500,000
Impact Fees-	\$1,500,000
<u>Smart Scale</u> -	\$2,916,000
Total	\$7,966,000

Although there is no assurance of being awarded any funding, staff feels that the larger scope improvement should score well given the proven need for the project as demonstrated by a traffic study, and the heavy investment of local and regional funding applied to the project.

2. <u>Winding Creek Road Widening</u> – the Board may wish to consider improvements to Winding Creek Road between Courthouse Road and Walpole Street with this round of Smart Scale funding. A substantial portion of this road is being improved with the Courthouse Road widening, and another very difficult section is proffered for completion with a recent rezoning. The remaining section is approximately 0.95 mile long and is estimated to cost \$6,672,660. Additional funding could be provided using developer proffered cash contributions, along with impact fees and revenue sharing, if we can identify qualifying proffers.

Developer Contribution -	\$2,216,090 (Road Improvements)
Developer Contribution -	\$ 150,000 (Right of Way)
Smart Scale -	<u>\$4,306,570</u>
Total	\$6,672,660

3. <u>Eskimo Hill Road Improvements</u> – The 1.8 mile segment of Eskimo Hill Road between Big Springs Lane and Potomac Run Road is constructed as a narrow, winding rural road without shoulders or adequate clear zone. In addition, there has been a significant increase in large trash truck traffic to the Regional Landfill.

This has created traffic volumes in excess of the capacity of this road, and placed small private vehicles in close proximity to much larger commercial vehicles. Local funding for these improvements could be provided from a contribution from the R-Board that recognizes the impact of additional landfill traffic on the safety of this road. These local funds could be matched with revenue sharing to reduce the Smart Scale request and enhance competitiveness. The funding plan could be as shown below:

<u>R-Board</u> -	\$1,000,000
Revenue Sharing	- \$1,000,000
Smart Scale -	\$5,920,000
Total	\$7,920,000

4. <u>Stefaniga and Mountain View Road Intersection</u> – this project has been studied by VDOT, and is therefore supported by an engineering study. VDOT recommended construction of a roundabout at this location to improve safety and traffic flow. The estimated cost for these improvements is \$4,400,000 in 2024. Local contribution options are limited to proffers or other local revenue, as neither Mountain View Road nor Stefaniga Road are not presently included in our impact fee ordinance.

<u>Smart Scale</u> - \$4,400,000

• Other projects the Board may wish to consider include:

<u>Decatur Road</u> – this project was submitted during the last round but scored near the bottom of all projects. Without a significant investment in local funds, it is unlikely the scoring will improve significantly. The project includes approximately 2.6 miles of 2-lane reconstruction between the emergency exit for Aquia Harbour and Widewater Road. The project will include widening travel lanes, adding shoulders and striping, and straightening out horizontal and vertical curves, making the road much safer for motorists. It is proposed to apply the 3R (resurfacing, restoration, and rehabilitation) road standard for these improvements, similar to the Brooke Road improvements, to reduce cost. This involves using 11' lanes and 2' shoulders. The project is estimated to cost \$15,500,000, with the entire amount funded by Smart Scale.

<u>Courthouse Road (Ramoth Church Road to Shelton Shop Road)</u> - widening of the remaining 1.5 mile length of Courthouse Road was in a previous Capital Improvement Program before being removed due to lack of funds. The most recent daily traffic count of 10,000 vpd supports construction of two additional lanes, and the completed project would provide a much needed east-west high volume travel route from I-95.

The cost estimate for this project is \$28.8 million, without a significant source of local funding.

<u>Courthouse Road (Ramoth Church Road to Walpole Street)</u> – this project would widen Courthouse Road along the .55 mile segment adjacent to the project currently under construction, and ending at Walpole Street. Walpole Street is a logical terminus if the widening project is to be completed in stages. The cost estimate for this section of a phased approach to improving Courthouse Road is \$12.7 million, entirely from Smart Scale funding.

Garrisonville Road Widening (Eustace Road to Shelton Shop Road) -

Widening of Garrisonville Road from Eustace Road to Shelton Shop was included in a previous Capital Improvement Program, before being removed due to lack of funding. This project was estimated to cost \$28.4 million if started in 2019, and approximately \$33 million with a 2024 project start date.

While the Garrisonville Road Service District offers an opportunity for local funding for the Garrisonville Road widening, the tax rate would have to be increased significantly to add the debt service for another large project.

FAMPO and GWRC Projects

Both these agencies submitted projects during the last round that weren't funded. Since those results were posted, localities in the planning district have been engaged in regional discussions about improving the results for the current round of Smart Scale. Staff has been made aware of certain projects in Stafford County that could be included on an application submitted by a regional agency for Smart Scale funding. These include:

Mine Road Commuter Lot Expansion

The Mine Road Commuter Lot Expansion was submitted by GWRC in the last round of Smart Scale, but failed to secure funding. At that time it was combined with improved access to I-95 via a slotted left turn from the Route 610 Bridge. The HOT Lanes extension south of Exit 143 resulted in uncertainty as to the need for the I-95 access and the project failed to secure funding from the statewide application review.

Staff believes the commuter lot expansion by itself may score higher due to the preference for park and ride facilities under the Smart Scale process. The project includes an expansion of 400 spaces at a cost of \$14,000,000 million for a commuter

lot that is presently operating above its capacity. The project is shown conceptually on the attached graphic.

Leeland Road VRE Lot Expansion

The VRE lot at Leeland Road is operating at full capacity, and expansion is needed to accommodate additional VRE passengers, and would be particularly important if the temporary gravel lot were to be developed. The VRE expansion shown on the attached graphic would occur on adjacent property owned by the County, and would add 225 spaces for an estimated cost of \$5,000,000.

The projects endorsed by the Board will be analyzed in greater detail prior to submission for Smart Scale consideration, and the details and estimated cost may be revised from that presented.

The completed applications are due by August 1, 2018, and VDOT has requested receipt of local district grant candidate projects by June 1st if localities wish technical support from VDOT staff.

Traffic Engineering Analysis

Enon Road (Route 753) (from U.S. Route 1 to I-95 Bridge)

Stafford County, Virginia

October 2012

Prepared for:

Stafford County Department of Public Works

Prepared by:



Project #: 9377-01-001

Traffic Engineering Analysis

Enon Road (Route 753) (from U.S. Route 1 to I-95 Bridge)

Stafford County, Virginia

October 2012

Prepared for:

Stafford County Department of Public Works 1300 Courthouse Road P.O. Box 339 Stafford, VA 22555

Prepared by:



Bowman Consulting Group, Ltd. 3951 Westerre Parkway, Suite 150 Richmond, Virginia 23233 Phone: 804.616.3240 Fax: 804.270.2008

Project Manager: John D. Riley, PE Analyst: Stephen O. Schmidt, PE

Project #: 9377-01-001

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- B Stafford County High School Attendance Zones (2012-2013)
- C Traffic Counts
- D Existing (2012) Peak Hour Analysis Worksheets
- E Crash Data
- F Concept Plan for Stafford High School Reconstruction
- G Generalized Development Plan for Chichester Park
- H 2020 Forecasted Peak Hour Analysis Worksheets
- H2 2035 Forecasted Peak Hour Analysis Worksheets
- I Turn Lane Warrant Analysis Worksheets



1. INTRODUCTION

1.1. Purpose and Study Objectives

This report summarizes the findings of a traffic engineering analysis that was performed by Bowman Consulting Group, Ltd. (BCG) for the eastern portion of Enon Road (Route 753) in Stafford County, Virginia (see Figure 1). Enon Road is a key east-west collector roadway in central Stafford County which has experienced increased traffic over the past years, a trend which is expected to continue in the coming decade and beyond. BCG prepared this analysis at the direction of Stafford County's Department of Public Works (DPW) under an existing on-call contract for roadways and linear projects. This analysis addresses existing 2012 and projected future (2020 and 2035) traffic conditions and identifies recommended capacity and operational improvements to Enon Road and the U.S. Route 1/Enon Road intersection to accommodate anticipated growth in traffic. The recommendations and conclusions contained herein include preliminary cost estimates and a conceptual design schematic illustrating the recommended improvements. These items are intended for the County's use in identifying funding requirements and prioritization for possible future roadway improvements along Enon Road.





2. BACKGROUND INFORMATION

While grounded in rural traditions, Stafford County is rapidly becoming an urban community and currently ranks as one of the fastest growing counties in the State The County's transportation priorities over the past decade have and nation. included safety improvements along many of its rural roads along with capacity improvements to its arterial and collector network. In 2006, a new interchange was constructed just north of Enon Road on I-95 (Exit 136) to handle the County's increased demand for interstate access. The combination of growth and new interstate access has changed travel patterns in this portion of the County and created increased traffic demands for Enon Road. Currently, the County is investing a combined total of \$70 million for two projects located along eastern Enon Road: the reconstruction of Stafford High School (±\$64 million) and the construction of the new 37-acre Chichester Park (±\$6 million), just south of the high school. Each of these projects will access Enon Road via Stafford Indians Lane and will add incremental increases to traffic along Enon Road. Both projects are anticipated for completion in 2015.

From a regional perspective, Enon Road is part of a key network of roadways in central Stafford County that provides east-west connectivity between the County's two north-south principal arterials: U.S. Route 17 and U.S. Route 1. Enon Road is also one of only four (4) non-interchange roadway crossings of I-95 in the County and will provide long-term regional relief for east-west traffic through the County's nearest interchanges: Centreport Parkway (Ex. 136) to the north and U.S. Route 17 (Ex. 133) to the south. Enon Road currently carries approximately 9,000 vehicles per day (VPD) in the vicinity of U.S. Route 1; however, its traffic is anticipated to increase to approximately 15,400 VPD by 2020, an increase of over 70%.

2.1. Traffic Analysis Procedure

The study intersections were analyzed using the 2000 Highway Capacity Manual (HCM) methodologies using the computer software package Synchro 7 with



SimTraffic. The analysis uses capacity, Level of Service, control delay, and queuing as the criteria for the performance of the intersections.

Capacity, as defined by the HCM, is a measure of the maximum number of vehicles in an hour that can travel through an intersection or section of roadway under typical conditions. Level of Service (LOS) is a marker of the driving conditions and perception of drivers while traveling during the given time period. LOS ranges from LOS "A" which represents free flow conditions, to LOS "F" which represents breakdown conditions. Table 1 shows the LOS for intersections as defined by the HCM.

Unsignal	ized Intersections	Signalized Intersections						
Level of Service	Average Control Delay (sec/veh)	Level of Service	Average Control Delay (sec/veh)					
А	≤10	А	≤10					
В	>10-15	В	>10-20					
С	>15-25	С	>20-35					
D	>25-35	D	>35-55					
Е	>35-50	E	>55-80					
F	≥50	F	≥80					

Table 1 – HCM Level of Service Criteria

Typically, LOS "A" through "D" is considered acceptable, while LOS "E" and "F" are considered failing or unacceptable.

Control delay is a measure of the total amount of delay experienced by an individual vehicle and includes delay related to deceleration, queue delay, stopped delay, and acceleration. Table 1 shows the amount of control delay (in seconds per vehicle) that corresponds to the LOS for signalized and unsignalized intersections.



The reported queues, or linear distance of delayed vehicles, in this study are 95th percentile queues. They are reported to ensure that the storage lengths of lanes at intersections are of adequate length and that queued vehicles will not interfere with free flow vehicles or adjacent intersections.

2.2. Traffic Analysis Software Inputs

Signal timing data for the existing signalized intersection was obtained from VDOT and is included in Appendix A. All signal timings and offsets were optimized under future conditions. All other software defaults remain unchanged.

2.3. Horizon Year Scenario

A primary horizon year of 2020 was selected for this study, and No-Build and Build alternatives were evaluated herein. This horizon year was chosen to coincide with traffic projections contained in Stafford County's 2020 Travel Demand Model and to provide a conservative estimate of traffic during the years which follow opening of Reconstructed Stafford High School and Chichester Park. For information purposes, this report also contains a discussion of projected 2035 traffic conditions, which would be roughly 20 years beyond the earliest likely construction of any Enon Road improvement resulting from this engineering analysis.

3. EXISTING CONDITIONS (2012)

3.1. Existing Roadway Network

The discussion which follows describes existing conditions along Enon Road, Stafford Indians Lane and U.S. Route 1, along with each facility's respective roles in local and regional traffic. Existing laneage and traffic control for the study area network is shown on Figure 2.





Enon Road (Route 753) is identified as a two lane undivided rural major collector roadway on VDOT's 2005 Functional Classification Map for the County, and it has an east/west alignment and a posted speed limit of 40 miles per hour through the study area (between the Interstate 95 overpass and U.S. 1). The segment of Enon Road evaluated in this analysis (from I-95 to U.S. Route 1) lies just outside of Stafford County's Central West Traffic Impact Fee Area, while the segment west of I-95 lies entirely within the Central West Traffic Impact Fee Area.

Enon Road connects Jefferson Davis Highway (U.S. Route 1/Principal Arterial) to the east with Truslow Road (Urban Collector) to the west. On its Anticipated Transportation Needs Map, the transportation element of the Stafford County Comprehensive Plan (2010-2030) identifies the entire Enon Road corridor (from U.S. Route 1 to Truslow Road) for a 2-Lane Upgrade. The Comprehensive Plan's supporting traffic information identifies Enon Road as a 2-lane facility with a planned 60' R/W from U.S. Route 1 to Hulls Chapel Road and a 4-lane facility with a planned 110' R/W from Hulls Chapel Road to Truslow Road.

Truslow Road connects Enon Road to other east-west roadways (Plantation Drive, Berea Church Road, and Poplar Road) that provide regional connectivity between U.S Route 1 and Warrenton Road (U.S. Route 17/Principal Arterial), further to the west. Enon Road crosses U.S. Route 1 and becomes Cranes Corner Road, which is a two-lane local roadway. Cranes Corner Road provides access to a number of single-family residences before terminating (dead end) slightly over 1 mile east of U.S. Route 1.

Between U.S. Route 1 and its bridge over I-95, Enon Road has intersections with the following stop-controlled side streets:

- Porter Lane (Route 640, ±1,100 feet west of U.S. Route 1)
- Brasse Court (±1,275 feet west of U.S. Route 1)
- Stafford Indians Lane (Route 9399, ±1,800 feet west of U.S. Route 1)



 Beauregard Drive (Route 747, ±3,100 feet west of U.S. Route 1 & ±200 feet east of the beginning of the Enon Road bridge over I-95).

Stafford Indians Lane extends south from Enon Road and provides access to Stafford High School, which is currently programmed for reconstruction. Stafford High School is the dominant traffic generator on the Enon Road corridor, and its 2012-13 attendance zone (see Appendix B) dictates that the majority of student/bus traffic will access the school via the U.S. Route 1/Enon Road intersection. Porter Lane, Brasse Court, and Beauregard Drive provide access to a small number of residential dwelling units and do not have connectivity to other public streets. Porter Lane also serves the Stafford High School stadium and driver's education lot. Approximately 20 residential dwelling units have direct driveway access to the ±2,000' section of Enon Road between Beauregard Drive and Porter Lane, with a roughly equal number on the north and south sides of Enon Road. To the west of I-95, the density of residential driveways with direct access to Enon Road drops significantly.

Between U.S. Route 1 and its bridge over I-95, Enon Road has School Zone signage (25 MPH school zone speed limit w/flashing beacons) signs located ±300' in advance of its eastbound and westbound approaches to Stafford Indians Lane. Enon Road is also posted with a School Bus Stop Ahead warning sign in the westbound direction (just west of U.S. Route 1) and a School Pedestrian Crossing warning sign in the eastbound direction, prior to Stafford Indians Lane.

According to the most recent published VDOT data (2010), Enon Road carries approximately 4,800 vehicles per day along the project corridor. BCG conducted a 24-hour mechanical tube count in late May 2012 that indicated Enon Road currently is carrying approximately 9,000 vehicles per day just west of its intersection with Jefferson Davis Highway. Based on an analysis of factored peak hour traffic counts and the directional split of school traffic at Stafford Indians Lane,



the estimated traffic count along Enon Road to the west of Stafford Indians Lane is approximately 7,500 VPD.

Enon Road/Stafford Indians Lane Intersection is unsignalized with stop-control on the northbound Stafford Indians Lane approach. A residential driveway on the north side of Enon Road aligns with Stafford Indians Lane. On weekday mornings from approximately 7:00AM – 7:35AM when public schools are in session, a volunteer for the high school is stationed at this intersection to direct traffic and to insure inbound school trips from U.S. Route 1 have sufficient gaps to turn across opposing (eastbound) Enon Road traffic. During all other hours of the day – including the afternoon school peak, when students and buses release – the intersection operates under "normal" stop-control without anyone directing traffic.

<u>Stafford Indians Lane (Route 9399)</u> is a two lane undivided local street that serves as the primary entrance to Stafford High School and provides access to approximately eight (8) single-family residential dwelling units. Stafford Indians Lane has a north/south alignment and two outbound lanes (dedicated left-turn and right-turn lanes) at its intersection with Enon Road. It has two inbound lanes, with the inside lane terminating as a "drop lane" approximately 375' south of Enon Road at an existing Stafford High School student parking lot. South of the school parking lot entrance, Stafford Indians Lane transitions to a 2-lane cross-section and continues for another ±500' through the residential area before terminating as a dead end. According to the most recent published VDOT data (2010), Stafford Indians Lane carries approximately 2,500 VPD.

<u>U.S. Route 1 (Jefferson Davis Highway)</u> is a four-lane undivided (south of Enon Road) and six-lane divided (north of Enon Road) principal arterial roadway (per VDOT's 2005 Functional Class Map). In the vicinity of the study area, U.S. Route 1 has a north-south alignment and a posted speed limit varying between 45-55 MPH. U.S. Route 1 has a signalized intersection with Enon Road/Cranes Corner Road on the eastern limits of the study area for this project. U.S. Route 1 provides regional



access to the City of Fredericksburg (to the south), and to North Stafford County, Marine Corps Base Quantico (MCBQ), and Prince William County (to the north). Additionally, access to the Interstate 95 corridor is provided via the U.S. Route 1/Centreport Parkway signalized intersection to the north of the Enon Road Corridor.

South of Enon Road, U.S. Route 1 has centerline rumble strips and a rolling vertical curvature. VDOT recently erected an overhead mast arm with "Watch For Stopped Vehicles Ahead 7-8 AM" warning signs on the northbound U.S. Route 1 approach to its signalized intersection with Enon Road/Cranes Corner Road. The mast arm and warning signs are located approximately 1,200' in advance of the intersection. North of Enon Road, U.S. Route 1 has a typical section that was completely reconstructed as part of the recent I-95/Centreport Parkway interchange project. U.S. Route 1 has a signalized intersection at Centreport Parkway, which is located approximately 1,100' north of its signalized intersection with Enon Road/Cranes Corner Road.

According to the most recent VDOT data (2010), Jefferson Davis Highway (U.S. Route 1) carries approximately 20,000 vehicles per day south of the Enon Road intersection. BCG conducted a 24-hour mechanical tube count in late May 2012 that indicated Jefferson Davis Highway carries approximately 23,200 vehicles per day just south of its intersection with Enon Road.

U.S. Route 1/Enon Road/Cranes Corner Road Intersection is signalized with video detection and overhead intersection lighting. The traffic signal operates with a cycle length of 155 (AM) and 120 (PM) seconds, split phasing on the Enon Road and Cranes Corner Road approaches, and protected left-turn phases for the northbound and southbound left-turn movements on U.S. Route 1. Prior to the intersection, the northbound approach on U.S. Route 1 widens to three (3) through lanes. The southbound approach has three (3) lanes which reduce to two (2) on the south side of Enon Road, as the third through lane drops as a dedicated right-



turn lane onto westbound Enon Road. The drop lane is signed Right Turn Must Turn Right, and also has advance signing for Stafford High School. The southbound U.S. Route 1 right-turn movement onto Enon Road is signed at the intersection for No Turn on Red 7-8 AM Mon-Fri. U.S. Route 1 has a raised 16'wide median immediately north and south of Enon Road.

3.2. Bicycle, Pedestrian and Transit Facilities

Currently there are no bicycle or pedestrian facilities within the study area segments of Enon Road and U.S. Route 1. The transportation element of the Stafford County Comprehensive Plan (2010-2030) states the following: "*All new, reconstructed, or expanded roadways should include bicycle and pedestrian routes.* ... *Development for bicycles and pedestrians should comply with VDOT standards.*" The Stafford County Bicycle/Facilities Plan (adopted 1996) is an element of the Comprehensive Plan and recommends the incorporation of bicycle lanes into planned improvements along the U.S. Route 1 corridor in Stafford County in order to provide a primary north-south, inter-jurisdictional bicycle route.

Route D5 of the Fredericksburg Regional Transit Authority (FRED) passes through the U.S. Route 1 segment of the study area and has an existing northbound stop along approximately 1,200' south of the U.S. Route 1 / Enon Road / Cranes Corner Road intersection.

3.3. Existing Traffic Counts

Existing peak hour turning movement traffic counts were conducted by BCG (while public schools were in session) at the following intersections in the study area:

- 1. U.S. Route 1 / Enon Road / Cranes Corner Road
- 2. Enon Road / Porter Lane
- 3. Enon Road / Stafford Indians Lane

The counts were conducted in May 2012 during a typical weekday from 7:00-9:00 AM and 2:00-6:00 PM to capture the AM peak hour, the school PM peak hour, and



the commuter PM peak hour, respectively. (Note: The AM peak hour count at the U.S. Route 1/Enon Road/Cranes Corner Road was conducted in November, 2011).

The raw traffic data is included in Appendix C and is summarized on Figure 3. The counts were balanced as necessary and Figure 3 shows the AM, school PM, and Commuter PM peak hour counts. The counts show that the AM peak hour generally occurs between 7:00 to 8:00 AM, the school PM peak hour from 2:00 to 3:00 PM, and the commuter PM peak hour from 5:00 to 6:00 PM.

BCG also conducted mechanical 24-hour tube counts at the following locations in May 2012:

- 1. U.S. Route 1 south of the intersection with Enon Road/Porter Lane
- 2. Enon Road between U.S. Route 1 and Porter Lane

The raw traffic data is included in Appendix C and summarized on Figure 3. The counts indicate that U.S. Route 1 currently carries 23,200 VPD south of Enon Road while Enon Road carries approximately 9,000 VPD between U.S. Route 1 and Porter Lane. It is also noted that the directional peak hour volumes at the Enon Road / Stafford Indians Lane intersection indicate that approximately 85% of trips to and from Stafford High School are from the east, by way of the U.S. Route 1 / Enon Road intersection.





3.4. Existing Traffic Observations

BCG observed traffic operations within the study area, with a particular emphasis on AM peak hour operations during the 7:00 – 7:30 AM period, when Stafford High School traffic is heaviest. During the AM peak period noted above, the following field observations were recorded:

- Traffic control at the Enon Road/Stafford Indians Lane intersection was by a volunteer, with the majority of the inbound school demand coming from U.S. Route 1
- Enon Road queuing for the westbound left onto Stafford Indians Lane was very heavy
- Northbound left-turn demand on U.S. Route 1 was extremely heavy, with up to 35 left-turn vehicles being served per cycle
- The U.S. Route 1 northbound left-turn queues extended far beyond the existing 500' left-turn lane; backs of queue were observed extending nearly 2,000' back along northbound U.S. Route 1
- During several cycles, northbound left-turns and southbound right-turns could not advance on green due to westbound Enon queues extending all the way to U.S. Route 1

During the mid-afternoon school peak and PM commuter peak, no significant traffic issues were observed, although volumes were heavier at times during the PM commuter peak.

3.5. Analysis of Existing Peak Hour Traffic Conditions

The analysis of existing Peak Hour Traffic Conditions was based on the analysis procedures described above, the existing lane use, traffic control, and volumes shown on Figure 3. At the Enon Road / Stafford Indians Lane intersection, BCG prepared a situation-specific model to evaluate the AM Peak Hour operations when traffic was directed by a volunteer. The model was calibrated so that the



intersection operates as a 3-phase traffic signal to mimic the volunteer's efforts to allow the three (3) approaches to operate one at a time.

The calculation worksheets are included in Appendix D and the results of the analysis are summarized in Table 2.

3.6. Crash Data

As part of this traffic study, BCG reviewed the most recent five (5) years of available crash data (2005 to 2010) in the vicinity of the Enon Road study area. The crash data was provided by the Virginia Department of Transportation (VDOT), and a total of 88 crash records (73 on U.S. Route 1 and 15 on Enon Road) were returned for review by BCG. BCG screened the crash data to eliminate crashes that were not within the operational constraints of the Enon Road and U.S. Route 1 study area. The screening process resulted in a final set of 40 crashes, which are included in Appendix E and summarized below in Table 3 and Table 4.

Table 3 summarizes those crashes which were reported in the study area along Enon Road that were outside of the influence of the U.S. Route 1/Enon Road intersection. Table 4 summarizes those crashes which were reported in the study area and were deemed to be influenced by the U.S. Route 1/Enon Road intersection. The summary provides a grouping by year and classifies each year's crashes by type and severity. Additional analysis of the crash data indicates the following:

- Over 90% of all the crashes analyzed in the screened data set were related to the U.S. Route 1 / Enon Road / Cranes Corner Road intersection (note: only 3 crash reports were provided for Enon Road as crash data for that section of the study area prior to 2010 was not available from VDOT).
- Approximately 28% of the reported crashes involved injuries
- 62% of all crashes at the intersection of U.S. 1 and Enon Road occur south of the intersection.



Table 2 – Analy	vsis Summar	v of Peak Hou	r Conditions
	y 515 Ourinnui	y of 1 curt 110u	

	Existing, 2012 AM Pork Hour School PM Pork Hour						ak Hour	Total Future, 2020 AM Peak Hour School PM Peak Hour Commuter PM Peak Hour						Total Future, 2035																
Intersection	Control	Lane	Available	Lane	Lane	<u>our</u>	Lane	Lane	<u>nour</u>	Lane	Lane	ak Hour	Lane	Lane	<u>.</u>	Lane	Lane	<u>IIIour</u>	Lane	Lane	<u>ik Hour</u>	Lane	Lane	<u></u>	Lane	Lane	<u>iour</u>	Lane	Lane	akiloui
		Group	Storage ⁽¹⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾	LOS	Delay	Queue ⁽²⁾
			(ft)		(sec/ven)	(ft)		(sec/ven)	(ft)		(sec/ven)	(ft)		(sec/ven)	(ft)		(sec/ven)	(ft)		(sec/veh)	(ft)		(sec/veh)	(ft)		(sec/veh)	(ft)		(sec/ven)	(ft)
																N	O IMPROVEME	INTS	1						NC	IMPROVEME	NTS			
1. Enon Road (E-W)/	Stop	NBL	250	F	99.5	296	c	15.7	60 04	C	16.4	32	F	112.3	383	C	23.4	80 107	E	41.6	43	-	-	-	-	-	-	-	-	-
Stafford Indians Lane (N-S)	Elagger ⁽³⁾	FRTR	~	F	92.2 278.1	2 223		21.7	-		9.5	-	F	339.7	2 035		21.1	107	Б	10.6	43	-	-			-	-	-		-
	Flagger ⁽³⁾	WBLT	~	F	186.8	757	А	2.5	40	A	1.6	43	F	293.0	750	А	2.2	75	А	2.7	105	-	-	-	-	-	-	-	-	-
- with addition of EB right turn lane, set through-left lane) and continuous SB	cond WB lane	(for use as a	а																											
extending to proposed roundabout.	Stop	NBL	250	-	-	-	_	-	-	-		-	F	86.4	132	С	21.8	73	E	38.8	41	F	90.8	250	D	31.0	74	F	103.9	53
	Stop	NBR	~	-	-	-	-	-	-	-	-	-	F	83.7	245	С	23.0	113	в	10.4	46	F	87.4	493	E	38.6	124	В	14.0	60
	Flagger ⁽³⁾	EBT	~	-	-	-	-	-	-	-	-	-	F	80.2	2,327	-	-	-	-	-	-	F	99.5	2,200	-	-	-	-	-	-
	Flagger ⁽³⁾	EBR	200	-	-	-	-	-	-	-	-	-	D	48.4	265	-	-	-	-	-	-	D	46.5	273	-	-	-	-	-	-
	Flagger ⁽³⁾	WBLT	~	-	-	-	-	-	-	-	-	-	D	50.5	672	A	7.7	14	A	8.2	42	E	69.7	688	A	8	42	A	9.3	54
																N	O IMPROVEME	INTS							NC	IMPROVEME	NTS			
3. U.S. Route 1 (N-S)/		NBL	500	F	108.3	2,462	E	77.3	202	E	68.4	269	F	142.9	3,004	F	89.3	202	F	262.8	619	-	-	-	-	-	-	-	-	-
Enon Road (E-W)/		NBTR	~	В	19.7	2,377	В	15.4	161	В	12.0	104	С	21.3	3,023	В	18.0	248	В	16.6	472	-	-	-	-	-	-	-	-	-
Cranes Corner Road (E-W)		SBL	225	F	87.4	10 217	F	95.5	10	E	67.3	0	F	87.4	0	F	140.7	10	E	66.7 226.0	25	-	-	-	-	-	-	-	-	-
	Signal	SBR	~	E	78.8 59.9	140	c	24.6	80	C	22.7	282	E	58.9	180	C	42.0	107	D	33.2	749		-	-	-	-	-	-	-	-
		EBLT	~	F	333.8	933	E	70.0	186	E	66.4	157	F	705.0	935	E	76.7	455	E	82.4	282	-	-	-	-	-	-	-	-	-
		EBR	200	E	64.3	350	E	60.1	213	D	45.1	132	F	84.1	377	E	61.9	331	D	39.8	134	-	-	-	-	-	-	-	-	-
		WBLTR	~	<u>F</u>	<u>149.0</u>	<u>586</u>	E	76.9	<u>32</u>	Ē	<u>65.0</u>	<u>37</u>	<u>F</u>	208.6	<u>274</u>	<u>E</u>	95.6	<u>63</u>	Ē	<u>63.5</u>	27	=	Ξ	Ξ	=	Ξ	Ξ	Ξ	Ξ	Ξ
		Overall Inte	ersection	F	100.5		D	39.9		D	40.4		F	182.6	-	D	45.9	-	F	148.7	-		-	-	- I	-	-	-	-	-
- with addition of second NB left turn la	ane, 2nd WB																													
to dedicated left-turn lane, realignment	gri-ien t	NBI	500							_			F	69.3	634	F	64.6	105	F	120.2	185					INPROVED	-			-
of EB right-turn to be EB	•	NBTR	~	-	-	-	-	-	-	-	-	-	C	32.5	555	В	16.2	229	В	12.0	158		-	-	-	-	-	-	-	-
through-left, and construction of		SBL	225	-	-	-	-	-	-	-	-	-	F	87.4	0	F	140.7	12	F	82.0	33	-	-	-	-	-	-	-	-	-
newEB right-turn lane.	Signal	SBT	~	-	-	-	-	-	-	-	-	-	E	64.8	295	D	35.3	424	E	65.8	620	-	-	-	-	-	-	-	-	-
	Ŭ	SBR	~	-	-	-	-	-	-	-	-	-	D	52.0	130	С	27.4	222	В	10.3	327	-	-	-	-	-	-	-	-	-
		EBLI	~ 200	-	-	-	-	-	-	-	-	-		77.4 47.6	565 368	F	57.9 76.7	188 258		68.1 43.0	215	-	-	-	-	-	-	-	-	-
		WBLTR	~	-	-	-	-	-	-	-	-	-	E	<u>104.3</u>	<u>218</u>	E	<u>80.9</u>	<u>64</u>	E	<u>75.7</u>	28		-	-	-	-	-	-	-	-
		Overall Inte	ersection	-	-	-	-	-	-	-	-	-	D	54.9		D	41.1		D	52.7		-	-		-	-		-	-	
- with opening of 3rd dedicated SB																														
through lane and newSB dedicated															1	MPROVED	W/FULL 6-LAN	E US ROUTE	1						IMPROVED W	V/FULL 6-LAN	E US ROUTE 1			
right-turn lane (all other laneage		NBL	500	-	-	-	-	-	-	-	-	-	E	65.4	537	E	63.3	103	E	56.9	205	E	55.4	439	E	63.8	110	F	90.4	230
same as above scenario)		NBTR	~	-	-	-	-	-	-	-	-	-	С	33.8	522	В	14.6	133	В	11.4	180	С	32.3	720	В	16.2	219	В	13.7	243
		SBL	~	-	-	-			-	-		-	F	87.4 60.0	204	F C	95.5 27.7	12	F C	82.0 34 1	32 436		40.9	22	F C	32.7	406	F	82.0 66.8	37 588
	Signal	SBR	200	-	-	-	-	-	-	-	-	-	D	54.0	122	c	25.0	183	c	26.2	185	D	37.2	95	c	27.8	164	c	27.1	481
		EBLT	~	-	-	-	-	-	-	-	-	-	E	72.5	474	E	65.0	175	E	74.3	195	E	79.5	730	E	60.8	198	E	71.0	208
		EBR	200	-	-	-	-	-	-	-	-	-	E	69.8	354	E	64.3	196	D	54.0	144	D	43.5	329	E	70.2	168	D	54.0	174
		WBLTR	~	=	=	=	=	=	=	=	-	=	D	<u>46.7</u>	<u>215</u>	Ē	<u>76.8</u>	<u>64</u>	Ē	75.7	27	E	<u>96.4</u>	<u>167</u>	Ē	77.7	<u>37</u>	<u>E</u>	<u>75.7</u>	<u>34</u>
		Overall Inte	ersection		-	-	-	-	_	-	-	_	D	53.1		D	36.6		D	35.2		D	45.4		D	37.7		D	53.1	
Notes:																														

(1) ~ Indicates a continuous lane.
 (2) Queues are 95th percentile queues as reported by SimTraffic.
 (3) Volunteer flagger controls intersection only in AM peak hour. At all other times, Enon Road operates free-flow and Stafford Indians Lane operates with stop-control.

- 74% of all crashes at the intersection of U.S. 1 and Enon Road are rear end type crashes.
- Of the total number of rear end crashes (28) at the intersection of U.S. 1 and Enon Road, 24 of them (62%) occurred south of the intersection.
- Crashes were spread relatively evenly across AM, Noon, PM and off-peak periods, with no easily-discernible trends for any particular peak (or offpeak) condition.

Based on field observations and analysis of the crash data, northbound U.S. Route 1 left-turn queues that exceed the existing storage capacity for the left-turn movement create unsafe traffic conditions for northbound traffic movements in the AM peak hour. Northbound left turn queue spillback into the innermost U.S. Route 1 northbound through movement lane creates conflict between vehicles moving at differing speeds (NB Left turn movement speeds of 0mph to 10mph – NB through movement speeds of 45mph to 60mph). The speed differential of these movements occurring in the same lane of travel introduces conflict along the northbound section of U.S. Route 1, whose rolling topography tends to limit sight distance.

			Sev	erity		<u>Type</u>							
Year	# of Crashes	Killed	Injured	Property	Non- Reportable	Angle	Rear End	Side Swipe	Etc				
2005	None reported												
2006	None reported												
2007	None reported												
2008	None reported												
2009	None reported												
2010	3		1	2		1	1		1				
Total	3	0	1	2	0	1	1	0	1				
	Percentage	0.0%	33.0%	67.0%	0.0%	33.0%	33.0%	0.0%	33.0%				

Table 3 – Enon Road Crash Data Summary (U.S. Route 1 to I-95)

			Sev	erity		Туре							
Year	# of Crashes	Killed	Injured	Property	Non- Reportable	Angle	Rear End	Side Swipe	Etc				
2005	8		2	6			7	1					
2006	3		2	1			3						
2007	0												
2008	10			10			6		4				
2009	4		2	2		1	2	1					
2010	12		4	8			10		2				
Total	37	0	10	27	0	1	28	2	6				
	Percentage	0.0%	27.0%	73.0%	0.0%	3.0%	76.0%	5.0%	16.0%				

Table 4 – U.S. Route 1 / Enon Road Intersection Crash Data Summary

4. APPROVED/UNBUILT DEVELOPMENTS

At the time of this analysis, two County projects (Stafford High School (Reconstruction) and Chichester Park) in the study area were in the preliminary approval phase and were programmed for construction by 2015. These projects will have an influence on traffic operations in the study area. A description of these projects and their anticipated trip generation potential is provided below.

4.1. Stafford High School (Reconstruction)

Stafford County Public Schools has submitted a Conditional Use Permit (CUP, #1200032) to allow for the reconstruction of the existing Stafford County High School, which is located along the south side of Enon Road off of Stafford Indians Lane (see Figure 1). A concept plan of the proposed school is included in Appendix F. The new school would be built on the current 115.5 acre school site to completely replace the existing school, and it would be constructed in the parking lot adjacent to the existing school. Stafford High School's 2012-13 attendance zone covers southeastern Stafford County as shown in Appendix B. With reconstruction, the capacity would increase from 1,800 students to 2,000 students. The school's current enrollment is over-capacity at 1,933 students.

Access to the reconstructed Stafford High School is proposed from Enon Road via the existing Stafford Indians Lane. As part of the school reconstruction, a fivelegged roundabout is proposed at the entrance to the school on Stafford Indians Lane. The various legs of the roundabout will provide access to the residential dwelling units southwest of the school, the proposed Chichester Park (discussed below), and the various parking and drop-off destinations for buses, staff, students, and visitors on the new school campus. The trips that would be generated by the proposed school reconstruction were estimated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition, and are shown in Table 5.

As shown in Table 5, it is estimated that the school reconstruction would generate 28 new AM peak hour trips, 19 new school PM peak hour trips, 9 new commuter PM peak hour trips, and 115 new daily trips. On a typical school day, the AM and School PM peak traffic volumes are closely tied to Stafford High School's regular bell schedule, which has classes beginning at 7:40 AM and ending at 2:15 PM.

4.2. Chichester Park

Stafford County Parks, Recreation, and Community Facilities has submitted a CUP (#1200060) to allow for the construction of the proposed Chichester Park which will consist of a variety of recreation fields on approximately 7.8 acres of undeveloped land southwest of Stafford High School (see Figure 1). The Generalized Development Plan (GDP) for the park shows 5 ball fields along with ancillary park facilities. A copy of the Chichester Park GDP is included in Appendix G. Access to the proposed Chichester Park would be provided from an extension of an existing access road which ties into Stafford Indians Lane. The park would be responsible for extending the access road into the park.

The trips that would be generated by the proposed park were estimated using the Institute of Transportation Engineers (ITE) Trip Generation Manual, 8th Edition, and are shown in Table 5. As shown in Table 5, it is estimated that the park would generate 8 new AM peak hour trips, 12 new school PM peak hour trips, 109 new

commuter PM peak hour trips, and 357 new daily trips. The trips that would be generated during the school PM peak hour were estimated by BCG based on the daily trip generation as ITE does not have data for parks during that time frame.

For purposes of this analysis, the reconstruction of Stafford High School and the construction of Chichester Park were assumed to be complete by 2015.

			Weekday									
		Land Use	A	M Peak	Hour	Schoo	I PM Pea	ik Hour	Commu	Daily		
Land Use	Size Units	Code	In	Out	Total	In	Out	Total	In	Out	Total	<u>Trips</u>
Proposed Chichester Park Sports (Baseball) Complex ^(1,2)	5 Fields	488	4	4	8	8	4	12	75	34	109	357
Stafford High School Reconstruction/Exp												
High School	67 Students	530	19	9	28	6	13	19	4	5	9	115
Total New Trips			23	13	36	14	17	31	79	39	118	472

Table 5 – Background Site Trip Generation Analysis

Notes: (1) Trips obtained from the Chichester Park - Traffic Impact Statement prepared by Timmons Group (Attachment 2 of the July 11, 2012 Stafford County staff report).

(2) Park trips during School PM peak hour are BCG estimate as ITE has no data for sports complex trip generation during the school PM peak hour of generator.

(3) Trips obtained from the Stafford High School Rebuild Staff Report dated July 11, 2012.

5. FUTURE TRAFFIC CONDITIONS (2020 and 2035)

In order to analyze future traffic conditions for the 2020 and 2035 scenarios, traffic forecasts were developed based on the following:

- Existing traffic patterns and counts
- Volumes from Stafford County's 2020 Travel Demand Model
- Regional traffic growth
- Anticipated background trips from approved/unbuilt developments
- Engineering judgment

5.1. Traffic Forecasting Approach

The development of 2020 total future traffic forecasts was initiated by utilizing projected 2020 travel demand model volumes provided by Stafford County for Enon Road and U.S. Route 1. A summary of these link volumes is provided below in Table 6, and they are presented alongside existing and historic VDOT link volumes for reference.

Table 6 indicates variable growth along the Enon Road and U.S. Route 1 corridors, with the trend from 2000 to 2005 being upward. From 2005 to 2010, growth trends are difficult to interpret on both routes due to significant regional changes in traffic while the I-95/Centreport Parkway interchange was under construction. For this reason, historic growth trends for volumes reported by VDOT were not utilized in this analysis. The 2012 BCG counts indicate a recent and significant spike up in traffic along both Enon Road and U.S. Route 1 in the study area. These volumes are indicative of a trend for localized and regional growth that is expected to continue for the coming years in southern Stafford County.

Table 6 – Link Volume Summary

													County TDM ⁽⁴⁾	FAMPO TDM ⁽⁶⁾	BCG ⁽⁵⁾	County TDM ⁽⁴⁾	Annual Growth Rate		FAMF	Annual Growth Rate		
Facility	Segment	2000	2001 ⁽¹⁾	2002 ⁽¹⁾	2003 ⁽¹⁾	2004 ⁽¹⁾	2005 ⁽¹⁾	2006	2007	2008	2009	2010	2010	2010	2012	2020	2012 to 2020	2020	2030	2035 (Interp.)	2040 ⁽⁷⁾	2012 to 2040
Enon Road (Route 753)	E of I-95	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	9,200	7,200	9,000	15,400	6.94%	9,100	11,100	12,200	13,200	1.38%
Enon Road (Route 753)	W of I-95	n/a	3,400	3,800	5,800	6,400	7,300	n/a	4,400	4,500	4,800	4,800	8,000	6,600	7,700 (2)	13,100	6.87%	8,200	9,900	11,000	12,000	1.60%
U.S. Route 1	N of Enon	15,000	15,000	15,000	17,000	17,000	17,000	14,000 ⁽³⁾	14,000 ⁽³⁾	14,000 ⁽³⁾	13,000 ⁽³⁾	13,000 ⁽³⁾	25,400	45,200	24,900 (2)	39,200	5.84%	63,400	86,500	99,300	112,000	5.52%
U.S. Route 1	S of Enon	13,000	13,000	13,000	14,000	14,000	14,000	12,000	12,000	12,000	19,000	20,000	20,500	39,200	23,200	30,900	3.65%	55,600	76,600	88,600	100,500	5.38%

(1) Volumes reported from 2001-2005 w ere for Mountain View Road (Rte. 627), which was re-named as Enon Road upon construction of the I-95/Centerport Pkwy interchange.

(2) Factored from peak hour volumes.

(a) Link volume reported by VDOT extends from Enon Road to Ramoth Church Road/American Legion Road; it is assumed that volume was taken north of US Rte 1/Centerport Parkway intersection.

(4) Stafford County Travel Demand Model.

⁽⁵⁾ Counts by Bow man Consulting Group, Ltd.

(6) FAMPO Travel Demand Model 3.0

(7) FAMPO Travel Demand Model 3.0 - 2040 SE Data on 2010 Network

The volumes and link growth rates shown in 2012 and 2020 above were utilized as the basis for developing the projected 2020 peak hour traffic volumes, as discussed further in the sections below.

For reference, Table 6 also shows the Fredericksburg Area Metropolitan Planning Organization (FAMPO) Travel Demand Model 3.0 volumes for the selected roadway links. It is noted that the 2010 FAMPO volumes along U.S. Route 1 are significantly higher (almost double) than the 2010 County TDM volumes and the 2012 counts conducted by BCG. The discrepancy between the FAMPO and County models continues in the 2020 volumes with the FAMPO numbers indicating 25,000 more daily trips on U.S. Route 1 (as compared to the County volumes). For purposes of this analysis, the FAMPO numbers were considered impractical and were not utilized for any of the analyses contained herein.

5.2. Stafford County 2020 Travel Demand Model

Stafford County's travel demand model was used during the 2010-2030 Comprehensive Plan update as the basis for identifying future roadway improvements in the Transportation Plan and Transportation Implementation Element. The travel demand model examines existing and future land use, the existing road network and capacity as well as new planned roadways. The purpose of the model is to evaluate future year conditions and allow for the testing of various roadway improvement alternatives in order to achieve an overall operating Level of Service (LOS) equal to C. The County's travel demand model uses an iterative process to project growth on the transportation system over time based on the County's adopted Land Use Plan. With the exception of most of the County's residential streets, all roadways in the County are included in the model for greater flexibility and accuracy.

The following assumptions were utilized in the County travel demand model for 2020 evaluations of Enon Road and U.S. Route 1 in the project study area:

• Enon Road = 2-lane facility

• U.S. Route 1 = 6-lane facility north of Enon Road and 4-lane facility south

Because of variability in actual development patterns vs. those projected by the travel demand model, the County's Transportation Plan recommends that detailed studies (similar to this analysis) be prepared to determine more refined design features of the Plan's improvements.

5.3. 2020 Future Traffic Forecasts

The following steps describe the methodology to develop and finalize the 2020 weekday AM, school PM, and commuter PM peak hour forecasted volumes used for analysis herein:

- 1. Existing peak hour volumes along Enon Road and U.S. Route 1 were reduced to remove Stafford Senior High School trips, which are not included in background traffic growth.
- The adjusted existing peak hour volumes (without Stafford High School trips) were grown for eight (8) years (with compounding, based on growth rates calculated in Table 6) to develop preliminary 2020 peak hour volumes. It is noted that trips to/from Cranes Corner Road were not grown given that additional development is not anticipated on that roadway.
- Existing Stafford Senior High School trips were added to the preliminary 2020 peak hour volumes.
- Anticipated new trips from the reconstruction of Stafford Senior High School and the proposed Chichester Park were added to the volumes developed in Step 3.
- Final volumes were rounded to the nearest 20 for through movements along Enon Road and U.S. Route 1 as well as for turning movements between Enon Road and U.S. Route 1.

The forecasted 2020 Total Future weekday AM, school PM, and commuter PM peak hour turning movements and link AADTs (from the County TDM) are shown on Figure 4.


5.4. 2035 Future Traffic Forecasts

The following steps describe the methodology to develop and finalize the 2035 weekday AM, school PM, and commuter PM peak hour forecasted volumes used for analysis herein:

- Total Future 2020 peak hour and ADT volumes along Enon Road and U.S. Route 1 were reduced to remove Stafford Senior High School trips and Chichester Park trips, which are not included in background traffic growth.
- 2. The adjusted Total Future 2020 peak hour and ADT volumes (without Stafford High School and Chichester Park trips) were grown for fifteen (15) years (with compounding) at 2% per year along U.S. Route 1 and 1% per year along Enon Road. It is noted that trips to/from Cranes Corner Road were not grown given that additional development is not anticipated on that roadway.
- 3. Stafford Senior High School and Chichester Park trips were added to the preliminary 2035 peak hour volumes.
- Final volumes were rounded to the nearest 20 for through movements along Enon Road and U.S. Route 1 as well as for turning movements between Enon Road and U.S. Route 1.

The forecasted 2035 Total Future weekday AM, school PM, and commuter PM peak hour turning movements and link AADTs (from the County TDM) are shown on Figure 4A.



5.5. Analysis of 2020 Future Peak Hour Traffic Conditions

The analysis of 2020 Future Peak Hour Traffic Conditions was conducted using existing laneage and traffic control as a "No Improvements" baseline scenario as well as the various alternatives of laneage and traffic control (discussed below) and the final recommended improvements. The analysis for the "No Improvements" baseline scenario was based on the analysis procedures described above, the existing lane use and traffic control shown on Figure 2, and the Total Future Traffic Forecasts (2020) shown on Figure 4.

The analyses of the laneage/traffic control alternatives and the final recommended laneage and traffic control were conducted in the same manner, but with the alternate lane use and traffic control (discussed below in Alternatives Evaluation) and the recommended lane use and traffic control shown on Figure 5. The development of the recommended laneage and traffic control is discussed further in the **Recommended Improvements** section below.

The calculation worksheets for all projected future peak hour traffic conditions for the Recommended Improvements scenario are included in Appendix H, and the results of the analysis are summarized in Table 2.

It is noted that a supplemental 2020 Total Future traffic analysis was conducted assuming the widening of U.S. Route 1 to a 6-lane divided section south of Enon Road. This analysis assumes that the existing SB right-turn lane along U.S. Route 1 at Enon Road is converted to a dedicated SB through lane (to eventually be merged into the 4-lane undivided section of U.S. Route 1 further south) and a new dedicated southbound right-turn lane is constructed. The results of this supplemental analysis are included in Table 2, for reference.



5.6. Analysis of 2035 Future Peak Hour Traffic Conditions

The analysis of 2035 Future Peak Hour Traffic Conditions was conducted using the Recommended Future Lane Use and Traffic Control (2020) shown on Figure 5, a widened section of U.S. Route 1 to a 6-lane facility as discussed above, and the Total Future Traffic Forecasts (2035) shown on Figure 4A. All traffic signal splits were optimized for 2035 conditions.

The calculation worksheets for all projected future peak hour traffic conditions for are included in Appendix H2, and the results of the analysis are summarized in Table 2.

As shown on Table 2, under 2035 traffic conditions, both the Enon Road intersections with Stafford Indians lane and U.S. Route 1 would continue to operate at comparable levels of service to 2020 traffic conditions. As expected, delay and queues increase incrementally.

The Recommended Future Lane Use and Traffic Control (2035) is shown on Figure 5A.



5.7. Alternatives Evaluation

Several capacity and operational alternatives were assessed and reviewed with County staff prior to finalizing the recommended improvements for this study. The alternatives that were evaluated are listed below, along with the reasons [*in brackets*] that they were not included in the final Recommended Improvements. It is noted that a "Do Nothing" alternative was considered for the entire study area; however, after a brief review it was easily dismissed given the extent of unacceptable existing issues in the study area that will only continue to worsen without improvements.

<u>U.S. Route 1</u>

 Construct new access to Stafford High School approximately 1,100' south of Enon Road utilizing existing gated entrance to east of school's athletic stadium [proposed school's campus not designed for access from U.S. Route 1, and on-site upgrades would be extremely costly. This access point would require special signing/markings and create multiple potential internal conflict points with Driver's Education classes, users of the athletics stadium and other sporting fields, and on-campus pedestrian traffic].

U.S. Route 1 / Enon Road / Cranes Corner Intersection

- 1. Change NB left-turn phase to protected-permissive operation to allow leftturns on green ball [*did not provide sufficient capacity to improve queuing / level of service for that movement, especially in projected 2020 scenario*].
- 2. Extend NB left-turn lane to contain queuing [projected traffic volumes were too high be served by single left-turn lane].

Enon Road and Stafford Indians Lane Intersection

- 1. Construct 3-way stop control [insufficient capacity to handle AM peak hour school traffic effectively].
- 2. Construct traffic signal with no turn lane improvements [*insufficient capacity to handle AM peak hour school traffic effectively*].

- 3. Construct single-lane roundabout [*insufficient capacity to handle AM peak hour school traffic effectively*].
- 4. Construct dual-lane roundabout [inbound AM school traffic from the east (coming from U.S. Route 1) would have continuous right-of-way over eastbound through traffic on Enon Road, causing undesirable queuing and delays for the eastbound approach].
- Add eastbound right-turn lane and continuous (2nd) receiving lane along SB Stafford Indians Lane to the proposed Stafford High School roundabout [does not alleviate enough of conflict for WB left-turn movements and results in negligible capacity improvement].
- 6. Construct a dedicated WB left-turn lane only [this improvement is warranted by existing traffic counts and forms a portion of the overall Recommended Improvements discussed below; however, by itself it does not relieve the queuing issues for the WB approach to Stafford Indians Lane during the AM school peak].

Operations and Districting of Stafford High School

- 1. Adjust school zone boundary to achieve more balanced distribution of student drivers to the east and west [not feasible].
- 2. Stagger class start times for upper-classmen to spread out the inbound AM school peak [*not feasible*].
- 3. Start classes prior to 7AM to minimize conflict with local/regional commuter peak [*not feasible*].
- 4. Provide alternate point of access [see discussion above re: U.S. Route 1 access; not feasible]

5.8. Turn Lane Warrant Analysis

BCG conducted a right-turn lane warrant analysis for the eastbound Enon Road turning movement onto southbound Stafford Indians Lane. The analysis was completed using the traffic volumes for existing and forecasted weekday AM and PM peak hour volumes and the Turn Lane Criteria from Appendix F of the VDOT Road Design Manual. The results of the analyses are included in Appendix I and summarized in Table 6.

	Intersection	Approach	<u>Existing</u> Turn Lane Warranted?	<u>, 2012</u> Storage Length	<u>Total Futu</u> Turn Lane Warranted?	<u>ıre 2020</u> Storage Length
1.	Enon Road/ Stafford Indians Lane	Eastbound Right	Yes	200'	Yes	200'

Table 7 – Turn Lane Warrants Summary

As shown in Table 7, an eastbound right-turn lane is warranted at the Enon Road and Stafford Indians Lane intersection under existing and projected Total Future 2020 conditions. The AM peak hour is the dominant scenario triggering the warrant under both analysis years.

A westbound left-turn lane along Enon Road at the Stafford Indians Lane intersection is warranted by observation based on the heavy congestion occurring due to this movement and the need for manual traffic control during the AM peak hour when inbound traffic to Stafford High School is highest.

6. **RECOMMENDED IMPROVEMENTS**

The recommended improvements outlined below have been developed with a goal of providing adequate capacity, improved levels of service, and improved safety along Enon Road and at the U.S. Route 1 / Enon Road / Cranes Corner intersection while also providing improved access to Stafford Senior High School, proposed Chichester Park, and existing residences along Enon Road. These improvements are consistent with the improvement shown schematically (see Figure 5) and are illustrated graphically on Figure 6 at the end of this section. Based on the analysis, the following improvements are recommended to accommodate projected 2020 traffic conditions at the U.S. Route 1 / Enon Road / Cranes Corner intersection and along Enon Road (between U.S. Route 1 and its bridge over I-95):

U.S. Route 1 / Enon Road / Cranes Corner Intersection

- Construct additional 500' northbound left-turn lane (can be accommodated within existing raised median). Provide 400' combined taper length for the new dual left-turn configuration.
- 2. Modify eastbound Enon Road approach as follows:
 - a. Convert existing shared through/left-turn to dedicated left-turn lane with 500' storage
 - b. Restripe existing right-turn lane to accommodate through/left-turn movements and extend 300'.
 - c. Construct new dedicated right-turn lane with minimum 200' storage.
- 3. Reconstruct existing traffic signal as required to accommodate the above improvements.

Enon Road (from U.S. Route 1 to bridge over I-95)

 Construct additional westbound lane along Enon Road to receive dual leftturn movements from northbound U.S. Route 1. Lane shall begin at U.S. Route 1 and continue west approximately 1,800' through the Enon Road intersection with Stafford Indians Lane. Resulting configuration should provide for a dedicated left-turn lane and a dedicated through lane at the westbound approach to Stafford Indians Lane. The striping of the inside lane should be coordinated with VDOT to provide adequate room to receive and merge the dual northbound left-turn movements from U.S. Route 1.

- The westbound Enon Road approach to Stafford Indians Lane should have a combination of signing/striping that communicates the following traffic pattern to drivers:
 - a. During the AM school peak (typically between 7:00 7:30 AM), traffic will be directed at this intersection by a volunteer traffic flagger in a manner consistent with the existing operation; however, the flagger will allow westbound left-turns simultaneously from <u>both</u> the dedicated left-turn lane and the through lane.
 - b. During all other periods of the day, westbound left-turn movements from Enon Road onto Stafford Indians Lane will occur only from the inner lane.
- Subject to VDOT approval, fold-up type signage may be considered along westbound Enon Road to provide advanced notice of temporary turning operations at Stafford Indians Lane during the AM school peak. Display of signage may be controlled by volunteer flagger.
- 4. Stafford County Department of Public Works must coordinate the dual westbound left-turn operation from Enon Road onto Stafford Indians Lane with Stafford County Schools to ensure that the existing dual entry lanes on Stafford Indians Lane are extended through the proposed internal roundabout shown on the Stafford High School concept plan (see Appendix F). The dual lanes should continue either to the first of the three roundabout spurs which will serve Stafford High School. For clarity, this is the spur after the spur providing access to Chichester Park.
- Construct eastbound right-turn lane (200' storage x 200' taper) on Enon Road at Stafford Indians Lane.
- The three lane section should continue as far west as possible to maximize the ability to provide access to the 10+ residences west of Stafford Indians Lane. Transition the 3-lane Enon Road section back to the existing 2-lane alignment prior to the Enon Road bridge over I-95.

Discussion of 2035 Conditions

The long-term functionality of the eastern segment of Enon Road must be evaluated in conjunction with the functionality of U.S. Route 1, which is one of only three (3) principal arterials in Stafford County. U.S. Route 1 is planned as an ultimate 6-lane divided facility in Stafford County; however, the segment immediately south of Enon Road is currently a 5-lane divided cross-section (3 northbound and 2 southbound through lanes) that transitions to a 4-lane undivided cross-section approximately 1,200' south of Enon Road. The widening of U.S. Route 1 to a 6-lane divided cross-section south of Enon Road (including carrying a 3rd southbound through lane through the intersection) would provide significant long-term capacity and operational improvements to the U.S. Route 1 / Enon Road / Cranes Corner Road intersection, which in turn would improve mobility along Enon Road.

The evaluation of the U.S. Route 1 / Enon Road / Cranes Corner Road intersection with a 6-lane section along U.S. Route 1 was conducted in this study (see Table 2) for reference to demonstrate the level of service and queuing improvements if the widening were to be in place under projected 2020 and 2035 traffic conditions.



7. PLANNING LEVEL COST ESTIMATE

Table 8 presents a summary of planning level costs for the recommended improvements outlined above *for projected 2020 conditions only*. The summary includes a breakdown of engineering, construction, and right-of-way/utilities costs. The unit prices shown in Table 8 are based on recent construction experience in Stafford County and VDOT planning estimates for roadway projects. The costs were prepared without the benefit of a detailed survey, and ranges and contingencies were applied to provide low and high ranges of reasonably expected costs. All costs are in 2012 dollars.

To accommodate traffic for the ultimate projected horizon year of 2035, U.S. Route 1 will need to be modified to provide a third dedicated southbound through lane at its intersection with Enon Road, and a new dedicated southbound right-turn lane will be required for the southbound left-turn movements from U.S. Route 1 onto westbound Enon Road. The third southbound through lane will need to be carried up to ½ mile south of Enon Road prior to merging back to two lanes. The costs for the added improvements along U.S. Route 1 are not included in Table 8, but could reasonably be anticipated to increase the total project cost by 30% - 40%.

		Α		В	С	D	E	F	G	Н	I	J	К	
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				(construc	tion only)	8	%	Construc	tion Cost	50%	65%	Construc	tion Cost	
				Low	High	Low	High	Low	High	Low	High	Low	High	
						8% x (F+H)	8%x (G+l)	(A x B)	(A x C)	50% x F	65% x G	D+F+H	E+G+I	
1	Modify Traffic Signal at U.S. Route 1 / Enon Rd / Cranes Corner Rd.	1	Each	\$100,000	\$150,000	\$12,000	\$20,000	\$100,000	\$150,000	\$50,000	\$98,000	\$162,000	\$268,000	To accommodate turn lane improvements on US Rte 1 & Enon Rd
2	Add 2nd NB left-turn lane on U.S. Route 1 to serve Enon Road	0.170	Lane-Mile ⁽¹⁾	\$1,000,000	\$1,500,000	\$20,000	\$34,000	\$170,000	\$256,000	\$85,000	\$166,000	\$275,000	\$456,000	500' storage with taper, to combine w/existing NB left-turn lane $^{(2)}$
3	Upgrade EB Enon Rd. approach to U.S. Route 1 - Extend existing right-turn lane 300', convert to through/left-turn ⁽²⁾	0.057	Lane-Mile ⁽¹⁾	\$1,000,000	\$1,500,000 \$1,500,000	\$7,000 \$7,000	\$11,000 \$11,000	\$57,000 \$57,000	\$85,000 \$85,000	\$29,000 \$29,000	\$55,000 \$55,000	\$93,000 \$93,000	\$151,000 \$151,000	Provides additional queuing and double left-turn capacity to NB Rte 1
	- Construct new right-turn lane (200° S x 200° 1)	0.057	Lane-Mile	\$1,000,000	φ1,500,000	\$7,000	ΦΤΙ,000	φ57,000	φοο,000	¢∠9,000	ູ ຈວວ,000	\$93,000	ΦΙΟΙ,000	Allows for high-turns of red and/or hight-turn overlap phasing
4	Add 2nd WB lane on Enon Rd (U.S. Route 1 to I-95 Bridge)	0.625	Lane-Mile ⁽¹⁾	\$1,000,000	\$1,500,000	\$75,000	\$124,000	\$625,000	\$938,000	\$313,000	\$610,000	\$1,013,000	\$1,672,000	To accommodate double northbound lefts
5	Add EB right-turn lane on Enon Road at Stafford Indians Lane	0.057	Lane-Mile ⁽¹⁾	\$1,000,000	\$1,500,000	\$7,000	\$11,000	\$57,000	\$85,000	\$29,000	\$55,000	\$93,000	\$151,000	200' storage with 200' taper ⁽²⁾
6	Extend 2nd SB Stafford Indians Lane to/through Prop. Roundabout (by others)													Assumed to be constructed with Stafford High School Rebuild
7	Subtotal 1 (Sum of Lines 1-6)					\$128,000	\$211,000	\$1,066,000	\$1,599,000	\$535,000	\$1,039,000	\$1,729,000	\$2,849,000	
8	Contingency	10%				\$13,000	\$21,000	\$107,000	\$160,000	\$54,000	\$104,000	\$173,000	\$285,000	
	Total Planning Level Cost of Imp	orovements				\$141,000	\$232,000	\$1,173,000	\$1,759,000	\$589,000	\$1,143,000	\$1,902,000	\$3,134,000	

⁽¹⁾ All turn lane improvement costs based on an assumed \$1M / lane-mi construction cost and are not intended for use in developing bond estimates. All costs rounded to nearest \$1,000.

⁽²⁾ Proposed turn lane storage lengths based on SimTraffic queuing analyses for 2020 Total Future forecasted traffic conditions.

⁽³⁾ Right-of-way and Utilities %'s based on VDOT 2009 Planning Level Cost Estimates for suburban low-density residential areas in Fredericksburg District.

8. CONCLUSIONS

The Enon Road (Route 753) corridor is a key east-west roadway in southern Stafford County that connects the U.S. Route 1 and U.S. Route 17 corridors, both of which are principal arterials. The eastern segment of Enon Road (between I-95 and U.S. Route 1) carries ±9,000 VPD and is nearing its capacity as a standard 2-lane roadway. By 2020, traffic along this roadway segment is projected to grow by 70% to over 15,000 VPD. In addition to carrying significant through traffic volumes, the eastern segment of Enon Road is responsible for providing access to Stafford High School (proposed for reconstruction) and Chichester Park (proposed). Stafford County is investing over \$70 million dollars to complete these two projects by the end of 2015. Enon Road also serves numerous residences directly and by way of side street connections.

Existing levels of service (LOS) along Enon Road and at its intersection with U.S. Route 1 are failing during the weekday AM peak hour under the demands of local and regional commuter traffic combined with the inbound peak for Stafford High School. Excessive queuing on eastbound Enon Road and northbound U.S. Route 1 are a regular occurrence in the mornings. Numerous crashes have been reported at this intersection both during the AM peak hour and other periods of the day. These conditions pose a significant hazard to motorists and will only continue to worsen in the future without capacity and operational improvements. By 2020, AM peak hour delays will nearly double and weekday PM peak hour conditions will worsen by over a factor of 3X, dropping well below LOS F. In the PM peak hour, the heavier movement of southbound afternoon commuters will experience significant delays.

The improvements discussed herein along Enon Road and at the U.S. Route 1 / Enon Road / Cranes Corner Road intersection will result in 50% reductions in 2020 AM peak hour delays (compared to existing conditions) and will generally maintain existing LOS (overall D) during the afternoon and PM commuter peaks; however, it is noted that the PM commuter peak is approaching the capacity of the U.S. Route 1 / Enon Road / Cranes Corner Road intersection under the 2020 PM commuter

peak conditions (V/C over 0.95). In addition, the improvements will significantly reduce AM congestion and queuing along Enon Road at Stafford Indians Lane when inbound school traffic is most intense. Preliminary planning estimates indicate that these improvements could be constructed at a rough cost of \$2-3 million (2012 dollars) to address the improvements to meet projected 2020 conditions.

With continued growth in this region of the County, traffic is anticipated to exceed the capacity of the U.S. Route 1 / Enon Road / Cranes Corner Road intersection shortly beyond the 2020 horizon. This condition will begin to cause excessive delays and queuing for the southbound U.S. Route 1 approach, which will eventually result in deterioration for the other key movements (eastbound Enon Road and northbound U.S. Route 1 approaches). The recommended solution to this longer-term congestion is to identify a way to widen U.S. Route 1 to a 6-lane divided facility south of Enon Road to provide for three (3) dedicated southbound through lanes at this intersection. This improvement was modeled and analyzed under total future 2035 traffic conditions and was found to provide significant delay reductions and extra capacity for the afternoon and PM peak hours while maintaining AM LOS. In addition, this improvement would mirror the recent widening of U.S. Route 1 north of Enon Road and also be consistent with the County's long-term vision for this facility. It is estimated that these additional improvements could reasonably be anticipated to increase the total project cost by 30% - 40%.

October 2012

APPENDIX A

EXISTING SIGNAL TIMINGS

Bowman

Job # 9377-01-001

Programmed EPAC Data

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Access Data

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No A Sec Prog Chan Control Ph.1 V0 Ph.4 V0 Ph.4 OI Ph.4 OI Ph.5 Pc	Alternate quences grammed nel Assigni i Channel eh 1 eh 4 eh 7 ed 10 LP 13 LP 16 ed 19	ment Hardw 1 - Ph. 4 - Ph. 7 - Ph. 12 - Ph. 17 - Ph. 20 - Ph. 13 - Ph.	v are Pi I RYG 4 RYG 7 RYG 4 DPW I RYC 4 RYC 5 DPW	n Set 1 4 7 12 17 13 20 7 13		Control Ph.2 Vel Ph.5 Vel Ph.8 Vel Ph.6 Pec Ph.2 OL Ph.1 Pec Ph.7 Pec	Channel 1 2 1 5 1 8 1 11 P 14 1 17 1 20	Har 2 - P 5 - P 8 - P 14 - P 18 - F 9 - P 15 - P	dware Pi h.2 RYG h.5 RYG h.6 DPW h.2 RYC h.1 DPW h.7 DPW	in Set 2 5 8 14 6 18 7 9 V 15		Contr Ph.3 V Ph.6 V Ph.2 P Ph.8 P Ph.3 O Ph.3 P	ol (⁷ eh ⁷ ed ⁹ ed ⁹ ed ⁹ ed ⁹ ed	Channe 3 6 9 12 15 18	: H 3 - 6 - 10 - 16 - 19 - 11 -	ardwar Ph.3 R Ph.6 R - Ph.2 D - Ph.8 D - Ph.3 R - Ph.3 D	e Pin Set YG 3 YG 6 PW 1 PW 1 PW 1 PW 1
No 4 Sec Prog Control Ph.1 VG Ph.4 VG Ph.4 VG Ph.4 PG Ph.1 OI Ph.4 OI Ph.5 Pc	Alternate quences grammed nel Assigni i Channel eh 1 eh 4 eh 7 ed 10 LP 13 LP 16 ed 19 nation Data	ment Hardw 1 - Ph. 4 - Ph. 7 - Ph. 12 - Ph. 17 - Ph. 20 - Ph. 13 - Ph.	/are Pi I RYG 4 RYG 7 RYG 4 DPW I RYC 4 RYC 5 DPW	a Set 1 4 7 12 17 12 17 12 17 12 17 12 17 12 17 12 17 12 17 12 17 12 17 12 17 12 17 12 17 17 17 17 17 17 17 17 17 17		Control Ph.2 Vei Ph.5 Vei Ph.6 Peo Ph.6 Peo Ph.2 OL Ph.1 Peo Ph.7 Peo	Channel 1 2 1 5 1 8 1 11 P 14 1 17 1 20	Har 2 - P 5 - P 8 - P 14 - P 18 - F 9 - P1 15 - P	dware Pi h.2 RYG h.5 RYG h.8 RYG h.6 DPW h.2 RYC h.1 DPW h.7 DPW	in Set 2 5 8 14 6 18 7 9 15		Contr Ph.3 V Ph.6 V Ph.2 P Ph.8 P Ph.3 O Ph.3 P	ol Veh Veh Ped Ped DLP Ped	Channe 3 6 9 12 15 18 Dial /	H 3 - 6 - 10 - 16 - 19 - 11 - Split	ardward Ph.3 R Ph.6 R - Ph.2 D - Ph.8 D - Ph.3 R - Ph.3 D - Ph.3 D	e Pin Set YG 3 YG 6 PW 1 PW 1 YG 1 PW 1 PW 1
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Maximun Mode: 2=Max 2 Max Dwell Time: 0 Manual Offset: 1 Correction Mode: 0=Dwell Yield Period: 0 Split Times and Phase Mode Dial / Split Ph. Splits Ph. Mode Ph. Splits Ph. Mode Ph. Splits Ph. Mode Ph. Splits Ph. Mode Traffic Plan Data Offset Time: Alt. Sequence: Mode: Rg 2 Lag Time: Rg 3 Lag Time: Rg 4 Lag Time: Plan: // Local TBC Data Equate Days Source Start of Daylight Saving Cycle Zero Reference Hours: 0 Month: 3 Week: 2 Min: 1 Day 2 3 4 5 6 ĩ 7 End of Daylight Saving 7 0 0 0 0 0 Month: 11 Week: 1 1 0 2 3 4 5 6 0 0 0

Page 2 of 6

Traffic	: Data				
Event	Dav	Time	D/S/0	flach	PHASE FUNCTION
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2	2	0:1	0/0/4		
3	2	6:45	0/0/0		
4	2	6:50	0/0/0		
5	2	7:30	0/0/0		
6	2	8:0	0/0/4		
7	2	14:15	0/0/0		
8	2	15:0	0/0/4		
9	51	14:0	0/0/0		
10	51	22:0	0/0/4		
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Special	Function 7	1			
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Phase Function														·		
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Phase 5 Max2					X											
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Phase 7 Max2							X	\square						\square	\square	\square
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Phase 2 Phase Omit					\square			\square		X					\square	\square
Phase 3 Phase Omit				\square			\square	\square		\square	X	\square		Π	\square	
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Phase 5 Phase Omit	\square							\square		\square		\square	X	\square		
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4 N0	0	0	0	0	0	0		o · 8	4.0 4.0	2.0	10	8 /	+.U 1 0	2.0	10	8 8	4.0	2.0
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Exit	Exit		Exit	Exit	Exit	Exit		Exit	E	xit		Exit	I	Exit		Exit	Exit	
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Page 5 of 6

reempt 6		
Vehical Phases	Pedestrian Phases	Overlaps
1. Track Dwell Cycle	Ph. Track Dwell Cycle	Ovlp. Track Dwell Cycle
efault Data	Default Data	Default Data
System/Detectors Data		
Local Critical Alarms	Bevert to	Backup 15 Ist Phone: 5405827504
ocal Free: No Cycle Failure: No Co	ord Failure: No Conflict Flash: Yes R	temote Flash: Yes 2nd Phone:
ocal Fash: Yes Cycle Fault: No Co	ord Fault: No Premption: No V	Voltage Monitor:
pecial Status 1: No Special Status 2: N	0 Special Status 3: No Special Status 4	(es 4: No Special Status 5: No Special Status 6: No
Traffic Responsive System Detector Average Detector Channel Veh/Hr Time(mir	e Occupancy Min Queue is) Correction/10 Volume % Detecto	1 System Weight Queue 2 System Weight ors Detectors Factor Detectors Detectors Factor
Default Data	Default	Data Default Data
ample Interval:	Queue: 1 Input Selection: 0=Average	Queue:
	Detector Failed Level : 0	Level Enter Leave Dial / Split / Offset
	Queue: 2 Input Selection: 0=Average	/ /
	Detector Failed Level : 0	Default Data
Vehical Detector	Vehical Detector	Special Detector
Diagnostic Value 0	Diagnostic Value 1	Diagnostic Value 0
MaxNoErraticDetectorPresenceActivityCount	Max No Er Detector Presence Activity C	rratic Max No Erratic rratic Detector Presence Activity Count ount
Default Data - Diag 0 Values	Default Data - No Diag 1 Val	ues Default Data - No Diag 0 Values
Pedestrian Detector	Pedestrian Detector	Special Detector
Diagnostic Value 0	Diagnostic Value 1	Diagnostic Value 1
MaxNoErraticDetectorPresenceActivityCount	Max No Er Detector Presence Activity C	rratic Max No Erratic Count Detector Presence Activity Count
Default Data - No Diag 0 Values	Default Data - No Diag 1 Val	ues Default Data - No Diag 1 Values
Speed Trap Data Speed Trap:	Dial/Split/	Speed Trap Speed Trap Offset Low Treshold High Treshold
Measurement: Detector 1 Detector_2 Distance :	Default	Data

Default Data

¢

Volume Detector Data

Report Interval Volume Controller Detector Detector Number Channel

Default Data

October 2012

APPENDIX B

STAFFORD COUNTY HIGH SCHOOL ATTENDANCE ZONES (2012-2013)

Bowman

Job # 9377-01-001



Demographic Planning 2/23/12

APPENDIX C

TRAFFIC COUNTS

Bowman

Job # 9377-01-001

BOWMAN CONSULTING 3951 Westere Parkway Suite 150 Richmond, Virginia 23233 File Nam

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Stafford Indians Lane AM Site Code : 00000000 Start Date : 5/30/2012 Page No : 1

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							ш	ion Road				Stafford	i Indian:	s Lane		and a second	Ū	on Roac			
		Ļ	om No	цh			Ŀ	om East				ч	om Sout	ų			Fr	om West	<u>س</u>		
Start Time	Right	Thru	Left	Heavy Vetscles	App. Total	Right	Thru	Left Heavy	Vetroles A	pp. Total	Right	Thru	Left	eavy Vetucles	App. Total	Right	Thru	Left	avy Vetscles	App. Total	Int. Total
07:15 AM	0	0	0	0	0	0	15	313	0	328	105	0	13	20	138	71	84	0	0	155	621
07:30 AM	0	0	0	0	0	0	6	519	0	528	127	0	12	0	139	53	55	0	0	108	775
07:45 AM	0	0	0	0	0	0	41	75	0	116	89	Ļ	9	ഹ	101	18	92	0	2	112	329
Total	0	0	0	0	0	0	65	907	0	972	321	-	31	25	378	142	231	0	7	375	1725
08:00 AM	0	0	0	0	0	0	42	13	0	55	6	0	4	0	13	-	56	0	2	59	127
08:15 AM	0	0	0	0	0	0	34	10	0	44	9	0	0	0	9	2	70	0	0	72	122
08:30 AM	0	0	0	0	0	0	21	8	0	29	8	0	0	0	8	ę	60	0	0	63	100
08:45 AM	0	0	0	0	0	0	47	11	0	58	7	0	0	0	7	2	51	0	-	54	119
Total	0	0	0	0	0	0	144	42	0	186	30	0	4	0	34	80	237	0	3	248	468
00:00 AM	0	0	0	0	0	0	52	14	0	66	10	0	ო	0	13	4	47	0	0	51	130
Grand Total	0	0	0	0	0	0	261	963	0	1224	361	-	38	25	425	154	515	0	с Р	674	2323
Apprch %	0	0	0	0		0	21.3	78.7	0	~*****	84.9	0.2	8.9	5.9		22.8	76.4	0	0.7		
Total %	0	0	0	0	0	0	11.2	41.5	0	52.7	15.5	0	1.6	1.1	18.3	6.6	22.2	0	0.2	29	
Unshifted	0	0	0	0	0	0	261	963	0	1224	361	~	38	25	425	154	515	0	2	674	2323
% Unshifted	0	0	0	0	0	0	100	100	0	100	100	100	100	100	100	100	100	0	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	С	0	C	C	c

Road and Stafford Indians Lane 0000 2012			
File Name:Enon Site Code :00000 Start Date :5/30/2 Page No :2		Out In Total 876 0 2100 0 1224 2100 876 1224 2100 1224 2100 0 0 261 963 0 0 261 963 0 0 261 963 0 0 261 963 0 0 261 963 0 Vehicles Vehicles Vehicles	
Richmond, Virginia 23233	Out In Total Cut In Total Cut In Total Right Thru Left Heavy Right Thru Left Heavy	North 5/30/2012 07:15 AM 5/30/2012 09:00 AM Unshifted Bank 1	Image: Figure 117 Heavy Left Thru Right Vehicles 38 1 361 25 38 1 361 25 38 1 361 25 38 1 361 25 117 425 1542 011 425 1542 011 425 1542 011 1 10 0 1 16 11 Total 1542 0 1 1542 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1 0 1 1
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Project: Enon Road Operational Counter: David Deal Weather:			

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 AM

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233 File Nam

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Stafford Indians Lane AM Site Code : 00000000 Start Date : 5/30/2012 Page No : 3

		Ľ	om Nort	q			ப் ப	on Roat om East				Stafford	d Indians om South	s Lane h			шů	non Roa	ъ ÷		
Start Time	Right	Thru	Left	leavy Vehicles A	App. Total	Right	Thru	Left 🐭	w/ vehicles AF	pp. Total	Right	Thru	Left 👾	avy Vetucles	vpp. Total	Right	Thru	Left	eavy Vehicles A	pp. Total	nt. Total
eak Hour Analys	sis From 0	7:15 AM 1	to 09:00 /	AM - Pea	ik 1 of 1																
ak Hour for Ent	tire Interse	sction Bec	tins at 07	7:15 AM																	
07:15 AM	0	.0	0	0	0	0	15	313	0	328	105	0	13	20	138	71	84	0	0	155	621
07:30 AM	0	0	0	0	0	0	6	519	0	528	127	0	12	0	139	53	55	0	0	108	775
07:45 AM	0	0	0	0	0	0	41	75	0	116	89	*	9	ŝ	101	18	92	0	2	112	329
08:00 AM	0	0	0	0	0	0	42	13	0	55	6	0	4	0	13	۲	56	0	2	59	127
Total Volume	0	0	0	0	0	0	107	920	0	1027	330	~	35	25	391	143	287	0	4	434	1852
% App. Total	0	0	0	0		0	10,4	89.6	0		84.4	0.3	6	6.4		32.9	66.1	0	0.9		
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BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233 File N

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Stafford Indians Lane Site Code : 00000000 Start Date : 5/30/2012 Page No : 1

						No. of the second distance of the second dist	F.1	Grou	ips Printa	ed- Unshi	ifted - Bar	nk I Stafford	Indiane 1	one			-3	bood and		And and a state of the state of	
		FI	om North				F	rom East				Fre	om South				FI	om West			
Start Time	Right	Thru	Left heavy	Vetacles Apt	o. Total	Right	Thru	Left	v Vehicles A	pp. Total	Right	Thru	Left 🔤	wy Vehickes 🛛 🗚	pp. Total	Right	Thru	Left _w	eary V checkes	App. Total	Int. Total
02:00 PM	0	0	0	0	0	0	43	26	0	69	17	0	4	0	21	8	36	0	0	44	134
02:15 PM	0	0	0	0	0	0	39	20	0	59	371	0	30	0	401	18	18	0	0	36	496
02.30 PM	0	0	0	0	0	0	54	24	0	78	400	0	36	0	436	ŝ	39	0	0	4	556
02:45 PM	0	0	0	0	0	0	63	18	0	81	43	0	12	ŝ	58	9	42	0	0	48	187
Total	0	0	0	0	0	0	199	88	0	287	831	0	82	3	916	35	135	0	0	170	1373
03:00 PM	0	0	0	0	0	0	52	18	0	70	51	0	11	0	62	9	45	0	0	51	183
03:15 PM	0	0	0	0	0	0	78	18		76	36	0	10	0	46	4	50			56	661
03:30 PM	0	0	0	0	0	0	78	26	0	104	59	0	7	0	99	5	46	0	0	51	221
03-45 PM	0	0	0	0	0	0	88	15	0	103	32	0	10	-	43	4	36	0	0	40	186
Total	0	0	0	0	0	0	296	<i>LL</i>		374	178	0	38	-	217	19	177	1	-	198	789
04:00 PM	0	0	0	0	0	0	89	20	0	601	20	0	12	0	32	7	23	0	0	25	166
04:15 PM	0	0	0	0	0	0	81	=	0	92	47	0	ŝ	0	52	2	48	0	0	50	194
04:30 PM	0	0	0	0	0	0	107	19	0	126	32	0	ę	0	35	-	72	0	0	73	234
04:45 PM	0	0	0	0	0	0	103	18	0	121	17		4	0	22	2	56	0	0	58	201
Total	0	0	0	0	0	0	380	68	0	448	116	L	24	0	141	7	199	0	0	206	795
05:00 PM	0	0	0	0	0	0	134	16	0	150	15	0	m	0	18	7	60	0	0	62	230
05:15 PM	0	0	0	0	0	0	16	15	0	106	20	0	4	0	24	m	62	0	0	65	195
05:30 PM	0	0	0	0	0	0	94	20	0	114	22	0	4	0	26	0	71	0	0	11	211
05:45 PM	0	0	0	0	0	0	84	17	0	101	10	0	÷	0	13	7	58	0	0	60	174
Total	0	0	0	0	0	0	403	68	0	471	67	0	14	0	81	7	251	0	0	258	810
Grand Total	0	0	0	0	0	0	1278	301	-	1580	1192	-	158	4	1355	68	762	1	1	832	3767
Apprch %	0	0	0	0		0	80.9	19.1	0.1		88	0.1	11.7	0.3		8.2	91.6	0.1	0.1		
Total %	0	0	0	0	0	0	33.9	8	0	41.9	31.6	0	4.2	0.1	36	1.8	20.2	0	0	22.1	
Unshifted	0	0	0	0	0	0	1278	301		1580	1192	-	158	4	1355	68	762	-	-	832	3767
% Unshifted	0	0	0	0	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	Enon Road and Stafford Indians Lane 00000000 5/30/2012 2		Enon Road	
CTING	File Name:File Name:FSite Code:Code:Code:Code:Code:Code:Code:Code:		Out In Total 1954 1580 0 1954 1580 3534 0 1954 1580 3534 0 1580 1580 0 0 1580 1580 0 0 1580 1 1580 0 0 0 0 0 0 0 0 0 0 0 0 0 0	
1AN CONSUI 3951 Westerre Parkway	Suite 150 Richmond, Virginia 23233	Out In Total 2 0 0 2 2 0 0 2 2 0 0 2 2 0 0 2 Right Thru Left Heary Kight Thru Left Heary	North 5/30/2012 02:00 PM 5/30/2012 05:45 PM Unshifted Bank 1	Heavy Heavy Left Thu Left Thu 158 1 158 1 158 1 158 1 158 1 158 1 192 4 369 1355 1355 1724 0 0 0 1
BOWN	udy		Enon Road Cut find From Road Cut find From Road Cut find Cut find From Road Cut find From Road Cut find Cut find C	
	Project: Enon Road Operational Sti Counter: David Deal Weather:			

BOWMAN CONSULTING

3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Stafford Indians Lane Site Code : 00000000 Start Date : 5/30/2012 Page No : 3

							EI	10n Road				Stafford	Indians	Lane			E	non Road	l	WWWWWWWWWWWWWWWWWWWWWWWWWWWWW	
		H	rom Nor	-th			Ē	rom East				Fr(om South	_			ł	rom Wes	t		
Start Time	Right	Thru	Left	Heavy Vehicles	App. Total	Right	Thru	Left n	we Vehicles A	Vpp Total	Right	Thru	Left H	anv Veholes	App Total	Right	Thru	Left ,	Heavy Volucles	App. Total	Int. Total
Peak Hour Analysis	From 02	00 PM to	05:45 PN	A - Peak 1	of l														· · · · · · · · · · · · · · · · · · ·		
Peak Hour for Entir	e Intersect	ion Begin	us at 02:1:	5 PM																	
02:15 PM	0	0	0	0	0	0	39	20	0	59	371	0	30	0	401	18	18	0	0	36	496
02:30 PM	0	0	0	0	0	0	54	24	0	78	400	0	36	0	436	ŝ	39	0	0	42	556
02:45 PM	0	0	0	0	0	0	63	18	0	81	43	0	12	3	58	9	42	0	0	48	187
03:00 PM	0	0	0	0	0	0	52	18	0	70	51	0	Π	0	62	9	5	0	0	51	183
Total Volume	0	0	0	0	0	0	208	80	0	288	865	0	89	Э	957	33	144	0	0	177	1422
% App. Total	0	0	0	0		0	72.2	27.8	0		90.4	0	9.3	0.3		18.6	81.4	0	0		
PHF	000	000	000	000	000	.000	.825	.833	-000	.889	.541	000	.618	250	549	.458	800	000	000	868	639

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Porter Lane AM Site Code : 00000000 Start Date : 5/31/2012 Page No : 1

								Groups	Printed-	Unshift	ted - Ban	k I									
							En	on Road				Por	ter Lane	-			En	on Road			
		Fr	om North				Fr	om East				Fro	m South				Fr	om West			
Start Time	Right	Thru	Left 🖦	avy Vehicles	App. Total	Right	Thru	Left Heavy Volue	In App. 7	Total	Right	Thru	Left he	ar) Vetueles 🗛	App. Total	Right	Thru	Left "	eary Vehicles	App. Total	Int. Total
07:00 AM	0	0	0	0	0	0	240	0	0	240	2	0	0	0	C1	1	141	0	0	142	384
07:15 AM	0	С	0	0	0	0	317	-	. 0	318	0	0	0	0	0		162	0	0	163	481
07:30 AM	0	0	0	0	0	0	231	m	. 0	234	2 000	0		0	7	0	224	0	0	224	460
07:45 AM	0	0	0	c	0	0	64	2	0	66		0	-	0	2	0	82	0	0	82	150
Total	0	0	0	0	0	0	852	9	0	858	4	0	7	0	6	C 1	609	0	0	611	1475
08:00 AM	0	0	0	0	0	0	50	-	0	51	0	0	0	0	0	ŝ	56	0	C	59	110
08:15 AM	0	0	0	0	0	0	39	1	0	40	0	0		0			78	0	0	62	120
08:30 AM	0	0	0	0	0	0	36	0	0	36	S.	0	0	0	5	1	67	0	0	68	601
08:45 AM	0	0	0	0	0	0	57	1	0	58	-	0	0	0	H	0	99	0		67	126
Total	0	0	0	0	0	0	182	3	0	185	9	0		0	7	5	267	0	-	273	465
Grand Total	0	0	0	0	0	0	1034	6	0 1(043	10	0	ę	0	13	٢	876	0		884	1940
Apprch %	0	0	0	0		0	1.66	0.9	0		76.9	0	23.1	0		0.8	1.66	0	0.1		
Total %	0	0	0	0	0	0	53.3	0.5	0 5	53.8	0.5	0	0.2	0	0.7	0.4	45.2	С	0.1	45.6	
Unshifted	0	0	0	0	0	0	1034	6	0 1(043	10	0	3	0	13	٢	876	0	-	884	1940
% Unshifted	0	0	0	0	0	0	100	100	0	100	100	0	100	0	100	100	100	0	100	100	100
Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bank 1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	: Enon Road and Porter Lane AM : 00000000 : 5/31/2012 : 2			
LING	File Name Site Code Start Date Page No		Enon Road Out In Total 886 1043 1929 0 1043 0 1929 0 1043 9 0 0 1034 9 0 0 1034 9 0 Right Thru Left Heavy Vehicles	
IAN CONSUL 3951 Westerre Parkway Suite 150	Kichmond, Virginia 23233	Out In Total 0 0 0 0 0 0 0 0 Right Thru Left Heavy Kight Thru Left Heavy	North 5/31/2012 07:00 AM 5/31/2012 08:45 AM Unshifted Bank 1	Image: Constraint of the service
BOWN	tudy		Eron Road 1037 1	
	Project: Enon Road Operational S Counter: David Deal Weather:			

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Porter Lane AM Site Code : 00000000 Start Date : 5/31/2012 Page No : 3

							En	ton Road				Pot	rter Lane	-			En	ion Road			
		Fr	om Nor	th			F	⁻ om East				Fr(om South				Fr	om West			
Start Time	Right	Thru	Left	Rewy Velacies	App. Total	Right	Thru	Left new	Vehicles Ap	p. Total	Right	Thru	Left ne	avy Vehicles A	pp. Total	Right	Thru	Left Her	wy Vehicles 🛛 A	pp. Total	Int. Total
Peak Hour Analysis	: From 07.0	00 AM to	08:45 AN	M - Peak 1	of l																
Peak Hour for Entir-	e Intersecti	ion Begin:	s at 07:00) AM																	
07.00 AM	0	0	0	0	0	0	240	0	0	240	1	0	0	0	1	-	141	0	0	142	384
07:15 AM	0	0	0	0	0	0	317		0	318	0	0	0	0	0		162	0	0	163	481
07.30 AM	0	0	0	0	0	0	231	ę	0	234		0	1	0	7	0	224	0	0	224	460
07:45 AM	0	0	0	0	0	0	64	7	0	99		0	-	0	7	0	82	0	0	82	150
Total Volume	0	0	0	0	0	0	852	9	0	858	4	0	ы	0	9	7	609	0	0	611	1475
% App. Total	0	0	0	0		0	99.3	0.7	0		66.7	0	33.3	0		0.3	69.7	0	0		
PHF	000	000.	000	000	000	000	.672	500	000	-675	500	000	500	000	.750	.500	.680	.000	000	.682	767
BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

> Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Porter Lane PM Site Code : 00000000 Start Date : 5/31/2012 Page No : 1

Turner North	Guom Month					E	on Road	ps France	d- Unsni	lied - Bai	nk i Por	ter Lane	-			Er	non Road			
r Thru I Aff	From North			Ann Total	Diaht	Then	-om East	~~		Diaht	Frc Thm.	m South		1-1-1-1	Dicke		rom West		-	
		Iteary Vehicles			U	01	1	Volutes 0	LDU L UG	NIGIN 1	nur	TCH II	ury Vehicles	4pp. 101a1	NIBIR 0	11111		Iracy Vehicles	App. Lotal	101. 1 Otal
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0 0 0 0	0 0	0		0	0	101	7	0	103	0	0	-	0	1	1	117	0	0	118	222
0 0 0 0	0 0	0		0	0	114	3	0	117		0	-	0	2	0	116	0	0	116	235
0 0 0 0	0 0	0		0	4	111	-	0	116	5	0	2	0	7	7	101	0	0	103	226
0 0 0 0	0 0	0		0	0	203	4	0	207	6	0	-	0	10	1	122	0	0	123	340
0 0 0 0	0 0	0		0	4	529	10	0	543	15	0	'n	0	20	4	456	0	0	460	1023
0 0 0 0	0 0	0		0	0	114	-	0	115	1	0	0	0		1	71	0	0	72	188
0 0 0	0 0	0		0	0	145	7	0	147	7	0	-	0	ŝ		74	0	0	75	225
0 0 0 0	0 0	0		0	0	118	7	0	120	2	0	-	0	ŝ		16	0	0	92	215
0 0 0 0	$0 \qquad 0$	0		0	0	153	г	0	154		0	-	0	7	0	16	0		92	248
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0 0 0 0	0 0	0		0	0	161	1	0	192	0	0	0	0	0	0	132	0	-	133	325
0 0 0 0	0 0	0		0	0	118	0	0	118		0		0	C1		85	0	0	86	206
0 0 0 0	0 0	0		0	0	179	0	0	179	0	0	0	0	0	0	65	0	0	65	244
0 0 0 0	0 0	0	ļ	0	0	186	1	0	187	0	0	0	0	0		64	0	0	65	252
0 0 0 0	0 0	0		0	0	674	2	0	676	-	0	-	0	7	2	346	0		349	1027
0 0 0 0	0 0	0		0	4	2133	25	0	2162	25	0	11	0	36	14	1748	0	ŝ	1765	3963
0 0 0 0	0 0	0			0.2	98.7	1.2	0		69.4	0	30.6	0		0.8	66	0	0.2		
0 0 0 0	0 0	0	and the second s	0	0.1	53.8	0.6	0	54.6	0.6	0	0.3	0	0.9	0.4	44.1	0	0.1	44.5	
0 0 0 0	0 0	0		0	4	2133	25	0	2162	25	0	11	0	36	14	1748	0	÷	1765	3963
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0 0 0 0	0 0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 0 0 0	0	0		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

BOWMAN CONSULTING Stetere Parkway 3951 Westerre Parkway 3951 Westerre Parkway 3951 Westerre Parkway Suite 150 File Name Enon Road and Porter Lane PM r: David Deal Site Code 00000000 r: David Deal Start Date 5/31/2012 r: Page No :2	Enon Road 1773 2162 3935 0 0 0 0 1773 2162 3935 4 2133 25 0 0 0 0 0 0 4 2133 25 0 4 2133 25 0 4 2133 25 0 4 2133 25 0 Right Thru Left Heavy 4 2133 25 0 7 12132 25 0 8 12132 25 0 9 12132 25 0 9 12132 25 0 9 12132 125 12 9 12142 12 12 9 12142 14 14 12152 12142 10 10 12152 14 16 16 12152 14 16 16 12152 14 16<	$\begin{array}{c} \begin{array}{c} \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} \\ \end{array} \\ \end{array} \\ \begin{array}{c} \end{array} \\ \end{array} $
Project: Enor Counter: Dav Weather:		

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

Project: Enon Road Operational Study Counter: David Deal Weather:

File Name : Enon Road and Porter Lane PM Site Code : 00000000 Start Date : 5/31/2012 Page No : 3

		and an analysiski Wite as A formula sound maked	and a second	INVESTIGATION OF A MARKANER MARKANER			Eı	10n Road				Po	rter Lane				En	on Road	in a final star of a many start of a start of the		
		F	rom Nort	q			Ľ.	rom East				Fr	om South				Fr	om West			
Start Time	Right	Thru	Left	Reavy Volacles 7	App Total	Right	Thru	Left has	o Vehicles A	pp. Total	Right	Thru	Left ne	wy Vetacles Ap	p. Total	Right	Thru	Left _{Rew}	s Vehiclas App	Total I	nt. Total
Peak Hour Analysis	s From 02:	00 PM to	05:45 PM	- Peak 1 o	f 1								And a state grant of the state	WITH A VERY WITH WAR AND A VERY WA							promotion of the second se
Peak Hour for Entit	re Intersect	ion Begin	is at 02:15	PM																	
02: 15 PM	0	0	0	0	0	0	78	-	0	79	7	0	7	0	4	r.	240	0	0	243	326
02:30 PM	0	0	0	0	0	0	136	ŝ	0	139	0	0	0	0	0	~	202	0	-	205	344
02:45 PM	0	0	0	0	0	0	105	7	0	107	0	0	0	0	0	0	132	0	0	132	239
03:00 PM	0	0	0	0	0	0	101	7	0	103	0	0	-	0	_	-	117	0	0	118	222
Total Volume	0	0	0	0	0	0	420	8	0	428	2	0	3	0	5	9	169	0	1	698	1131
% App. Total	0	0	0	0		0	98.1	6.1	0		40	0	60	0		0.9	66	0	0.1		
HHF	000	000	000	000	000	000	772	.667	000	.770	.250	000	.375	000	.313	500	.720	000	.250	718	822



a na manana m

					V	ehicle	Volum	es					
Locatio	n: US Ro	oute 1 &	Mounta	in View	Road/Cr	ranes Co	rner Roa	ad	County	/Area: S	tafford-	Cranes (Corner
Date Su	irveyed	: Wedne	sday-No	vember	2, 2011		•		Weath	er: Cool/	Sunny/[Dry	
		US Route	1	L	JS Route	1	Crane	es Corner	Road	Moun	tain Viev	v Road	
	F	rom Nor	th	F	rom Sou	th		From Eas	t	F	rom We	st	
End Time	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Int. Total
6:45	0	53	10	33	260	0	1	1	0	60	1	6	425
7:00	0	74	28	110	296	0	2	1	2	70	0	23	606
7:15	0	45	46	209	276	6	0	3	4	74	0	49	712
7:30	0	73	47	197	237	8	1	15	3	62	2	94	739
7:45	1	97	42	58	280	2	0	2	2	92	0	63	639
8:00	0	96	38	35	288	2	2	0	5	66	0	34	566
8:15	0	64	28	31	262	0	4	0	2	54	0	15	460
8:30	0	75	26	21	209	0	2	0	0	47	0	25	405
Total	1	524	255	661	1848	18	11	21	18	465	2	303	4127
% Appr Total	0.001	0.672	0.486	0.262	0.731	0.007	0.220	0.420	0.360	0.604	0.003	0.394	
Trucks	0	22	8	1	24	0	0	0	0	9	0	0	64
%Trucks	0	0.042	0.0314		0.013	0	0	0	0	0.0194	0	0	0.0155
Buses	0	5	7	37	13	0	2	2	0	23	2	40	131
%Buses		0.0095	0.0275	0.056	0.007	0	0.1818	0.0952	0	0.0495	1	0.132	0.0317

Pedestrian Volumes

Location: US Route 1	& Mountain	View Road/Cranes Corner Road	

County/Area: Stafford-Cranes Corner

Date Sur	veyed: Wednesday-Nov	vember 2, 2011	Weathe	er: Cool/Sunny/Dry	
	US Route 1 Across North Leg	US Route 1 Across South Leg	Cranes Corner Road Across East Leg	Cranes Corner Road Across West Leg	-
End Time	Pedestrians	Pedestrians	Pedestrians	Pedestrians	Int. Total
6:45	0	0	0	0	0
7:00	0	0	0	0	0
7:15	0	0	0	0	0
7:30	0	0	0	0	0
7:45	0	0	0	0	0
8:00	0	0	0	0	0
8:15	0	0	0	0	0
8:30	0	0	0	0	0
Total	0	0	0	0	0

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

> Project: Enon Road Operational Study Counter: Ed Tatum Weather:

File Name : Route 1 and Enon Road PM Site Code : 00000001 Start Date : 5/30/2012 Page No : 1

والمتعادية والمحافظ والمحافظ والمستعد ومحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ والمحافظ								0 2 0	Jups Prin	Ited- Uns	hifted -	Bank 1									
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02:15 PM	41	154	~	11	207	-	2	-	0	4	~	92	35	;-	139	132	-	42	31	206	556
02:30 PM	59	178	0	15	252	-	0	-	-	n	0	118	14	2	134	151	0	45	4	200	589
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Project: Enon Road Operational S Counter: Ed Tatum Weather:			

BOWMAN CONSULTING 3951 Westerre Parkway

BOWMAN CONSULTING 3951 Westerre Parkway Suite 150 Richmond, Virginia 23233

Project: Enon Road Operational Study Counter: Ed Tatum Weather:

File Name : Route 1 and Enon Road PM Site Code : 00000001 Start Date : 5/30/2012 Page No : 3

			Route 1				Cranes	Corner	Road				Route 1				ш	Jon Road	T		
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o1 vvesterre Parkway, Suite 150 Richmond, Virginia 23233 *804.816.3240*

Enon Road Operational Study ADT Counts Enon Road (West of Route 1)

Stafford County, Virginia

Combined	Total	39	14	16	20	85	209	620	966	487	406	382	493	1079	584	626	546	578	632	381	284	218	158	06	82	8995	
	Eastbound	<u>۲</u>	9	10	11	72	151	278	442	287	242	206	220	740	274	288	236	262	308	173	140	88	62	42	32	4584	51.0%
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25-May-12	Fni,																										
Start	Time	12:00 AM	01:00	02:00	03:00	04:00	05:00	00:90	02:00	08:00	00:60	10:00	11:00	12:00 PM	01:00	02:00	03:00	04:00	02:00	00:90	02:00	08:00	00:00	10:00	11:00	Total	Percent

Bowman Consulting Group 3951 Westerre Parkway, Suite 150 Richmond, Virginia 23233

Enon Road Operational Study ADT Counts Enon Road (West of Route 1)

Stafford County, Virginia

Total	43	15	12	18	11	34	86	130	193	270	264	352	317	317	266	214	198	225	169	147	120	129	80	52	3662	
Eastbound	15	റ	9	9	11	22	64	74	100	132	130	166	147	131	118	84	96	107	79	76	68	51	40	24	1756	48.0%
Westbound	28	9	9	12	0	12	22	56	93	138	134	186	170	186	148	130	102	118	06	71	52	78	40	28	1906	52.0%
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Time	12:00 AM	01:00	02:00	03:00	04:00	05:00	00:00	02:00	08:00	00:60	10:00	11:00	12:00 PM	01:00	02:00	03:00	04:00	02:00	00:90	02:00	08:00	00:60	10:00	11:00	Total	Percent
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Enon Road (West of Route 1)				4. 816. 2240	Stafford C	County, Virgin
Ctort						
Time	ZI-VIAY-1Z		1	Combined		
12-00 AM	ouri		casuounu 21			anny opening sold that is a substantial substantial solution is a substantial solution.
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04:00		~ (00	13		
00:00		Q	23	59		
00:00		28	28	56		
00:20		32	48	80		
08:00		62	106	168		
00:60		140	108	248		
10:00		123	149	272		
11:00		112	142	254		
12:00 PM		122	160	282		
01:00		133	124	257		
02:00		108	116	224		
03:00		98	102	200		
04:00		94	87	181		
05:00		91	103	194		
00:90		78	68	146		
01:00		92	68	160		
08:00		88	62	150		
00:00		57	54	111		
10:00		49	50	66		
11:00		31	29	60		
Total		1602	1672	3274		
Percent		48.9%	51.1%			

ADT Counts Enon Road (West of Route 1)			Richmor	id, Virginia 23233 ೩.ಕಿಕಿಕಿ.3240	Staff	ford County, Virginia
Start Time	28-May-12 Mon	Meethornad	Eacthound	Combined		
12:00 AM	IDA	westbound 21	14	1 Utal 35		
01:00		12	4	16	пления	
02:00		7	ω	15		
03:00		ω	4	12		
04:00		7	12	19		
02:00		ω	30	38		
00:00		16	28	44		
02:00		16	41	57		
08:00		52	61	113		
00:60		124	150	274		
10:00		76	75	151		
11:00		115	117	232		
12:00 PM		112	138	250		
01:00		104	118	222		
02:00		83	94	177		
03:00		112	93	205		
04:00		96	103	199		
02:00		104	88	192		
00:90		87	114	201		
02:00		118	06	208		
08:00		86	06	176		
00:60		60	64	124		
10:00		24	30	54		
11:00		24	16	40		
Total		1472	1582	3054		A CONTRACT OF
Doroont		700 200	51 8%			

Bowman Consulting Group 3951 Westerre Parkway, Suite 150 Richmond, Virginia 23233

Enon Road Operational Study ADT Counts Enon Road (West of Route 1)

Stafford County, Virginia

Combined	Total	17	20	6	25	66	262	649	1173	535	451	367	347	375	462	998	661	756	681	444	288	232	102	61	51	9065	
ne ne vez a menez en el con	Eastbound	4	0	ო	20	85	202	335	600	301	265	189	171	178	230	646	313	303	252	196	127	102	48	30	24	4633	51.1%
and de an	Westbound	13	11	9	5	14	60	314	573	234	186	178	176	197	232	352	348	453	429	248	161	130	54	31	27	4432	48.9%
29-May-12	Tue																										
Start	Time	12:00 AM	01:00	02:00	03:00	04:00	02:00	00:90	02:00	08:00	00:60	10:00	11:00	12:00 PM	01:00	02:00	03:00	04:00	02:00	00:90	00:20	08:00	00:60	10:00	11:00	Total	Percent

on Road best of Route 1)			Richmon	d, Virginia 23233 3.876.3240		Stafford County, Virginia
Start	30-May-12			Combined		
Time	Wed	Westbound	Eastbound	Total		
12:00 AM		10	თ	19		
01:00		9	10	16		
02:00		5	с	8		
03:00		n	14	17		
04:00		15	93	108		
05:00		81	206	287		
00:00		332	314	646		
02:00		598	538	1136		
08:00		204	294	498		
00:60		173	196	369		
10:00		149	212	361		
11:00		150	168	318		
12:00 PM		166	159	325		
01:00		222	184	406		
02:00		322	636	958		
03:00		410	332	742		
04:00		483	344	827		
05:00		426	309	735		
00:90		268	170	438		
00:70		127	118	245		
08:00		135	117	252		
00:60		103	63	166		
10:00		50	43	93		
11:00		24	29	53		
Total		4462	4561	9023		
Percent		49.5%	50.5%			
Grand Tota		182	85 1878	88		
Percentage	C)	49.3	3% 50.7	%		
ΤΩΥ		ΤC	0.170	4	DT 0 170	

Enon Road Operational : ADT Count	Study		Bowman C 3951 Westeri Richmon	onsulting Group re Parkway, Suite 150 Id, Virginia 23233	Page 1
U.S. Route 1 (South of Enon Road)	,			4.876.9240	Stafford County, Virginia
Start Time	25-May-12 Fri	Southbound	Northbound	Combined Total	
12:00 AM		88	06	178	
01:00		36	70	106	
02:00		40	94	134	
03:00		20	132	152	
04:00		58	229	287	
05:00		106	470	576	
00:00		252	814	1066	
02:00		556	1268	1824	
08:00		529	809	1338	
00:60		541	598	1139	
10:00		603	474	1077	
11:00		812	566	1378	
12:00 PM		1502	618	2120	
01:00		1338	618	1956	
02:00		1353	634	1987	
03:00		1282	534	1816	
04:00		1354	550	1904	
05:00		1318	542	1860	
00:90		1015	460	1475	
02:00		538	360	898	
08:00		380	296	676	
00:60		348	226	574	
10:00		256	188	444	
11:00		198	115	313	
Total		14523	10755	25278	
Percent		57.5%	42.5%		

o i vvesterre Parkway, Suite 150 Richmond, Virginia 23233 804.816.8240

Enon Road Operational Study ADT Count U.S. Route 1 (South of Enon Road)

Stafford County, Virginia

Combined	Total	170	108	72	20	89	155	288	468	1102	1534	1672	1693	1676	1622	1228	992	957	867	804	631	574	541	399	277	17989	
	Northbound	20	44	32	32	60	116	174	267	644	744	656	534	504	496	481	442	474	437	382	316	290	300	179	131	7805	43.4%
	Southbound	100	64	40	38	29	39	114	201	458	200	1016	1159	1172	1126	747	550	483	430	422	315	284	241	220	146	10184	56.6%
26-Mav-12	Sať																										
Start	Time	12:00 AM	01:00	02:00	03:00	04:00	02:00	00:90	00:20	08:00	00:60	10:00	11:00	12:00 PM	01:00	02:00	03:00	04:00	02:00	00:90	02:00	08:00	00:60	10:00	11:00	Total	Percent

Richmond, Virginia 23233 804.676.3240

Enon Road Operational Study ADT Count U.S. Route 1 (South of Enon Road)

Stafford County, Virginia

Combined	Total	180	106	78	56	61	106	223	354	513	600	732	802	955	892	988	924	887	766	724	648	524	510	376	245	12250	
	Northbound	67	47	39	32	37	78	140	226	333	330	412	387	439	428	450	428	409	388	379	322	255	244	194	113	6177	50.4%
	Southbound	113	59	39	24	24	28	83	128	180	270	320	415	516	464	538	496	478	378	345	326	269	266	182	132	6073	49.6%
27-May-12	Sun																										
Start	Time	12:00 AM	01:00	02:00	03:00	04:00	05:00	00:00	00:20	08:00	00:60	10:00	11:00	12:00 PM	01:00	02:00	03:00	04:00	02:00	00:90	02:00	08:00	00:60	10:00	11:00	Total	Percent

Bowman Consulting Group 3951 Westerre Parkway, Suite 150 Richmond, Virginia 23233

Enon Road Operational Study ADT Count U.S. Route 1 (South of Enon Road)

Stafford County, Virginia

 Combined	Total	141	104	64	75	65	130	195	286	402	694	672	798	892	1016	1154	1205	1336	1323	1263	1122	946	548	247	199	14877	
	Northbound	61	46	34	40	45	100	101	156	238	368	336	368	444	596	746	815	970	977	930	290	666	332	115	89	9363	62.9%
	Southbound	80	58	30	35	20	30	94	130	164	326	336	430	448	420	408	390	366	346	333	332	280	216	132	110	5514	37.1%
28-May-12	Non																										
Start	Time	12:00 AM	01:00	02:00	03:00	04:00	05:00	00:00	00:20	08:00	00:60	10:00	11:00	12:00 PM	01:00	02:00	03:00	04:00	05:00	00:00	00:20	08:00	00:60	10:00	11:00	Total	Percent

ADT Count U.S. Route 1 (South of Enon Road)	tudy		Richmo	nd, Virginia 23233 ೩. ಕೇಹಿ. ೫೭೩೧	Stafford County, Virgini
Start Time	29-May-12 Tue	Southbound	Northhound	Combined Total	
12:00 AM	2	54	37	91	
01:00		24	30	54	
02:00		24	27	51	1 -
03:00		18	54	72	
04:00		44	308	352	
05:00		126	650	776	
00:00		222	985	1207	
02:00		612	1606	2218	
08:00		486	994	1480	
00:60		488	595	1083	
10:00		460	561	1021	
11:00		504	440	944	
12:00 PM		530	536	1066	
01:00		570	520	1090	
02:00		1103	572	1675	
03:00		1158	594	1752	
04:00		1374	584	1958	
05:00		1294	690	1984	
00:90		984	449	1433	
02:00		551	378	929	
08:00		435	308	743	
00:60		258	188	446	
10:00		177	95	272	
11:00		105	47	152	
Total		11601	11248	22849	
Percent		50.8%	49.2%		

Start 30-W		Richmon	d, Virginia 23233 4.816.3240	Stafford County, Virgin
Time	lay-12 Southhound	Northbound	Combined Total	
12:00 AM	48	30	78	
01:00	37	23	09 09	
02:00	18	26	44	1
03:00	22	63	85	
04:00	45	310	355	
05:00	115	686	801	
00:00	248	1068	1316	
02:00	562	1506	2068	
08:00	462	952	1414	
00:00	492	684	1176	
10:00	474	508	982	
11:00	486	505	991	
12:00 PM	533	556	1089	
01:00	558	590	1148	
02:00	1084	563	1647	
03:00	1200	624	1824	
04:00	1422	622	2044	
05:00	1402	712	2114	
00:90	945	532	1477	
02:00	610	338	948	
08:00	475	327	802	
00:00	348	224	572	
10:00	226	134	360	
11:00	128	96	224	
Total	11940	11679	23619	
Percent	50.6%	49.4%		
Grand Total	598	35 5702	27	
Percentage	51.2	2% 48.8	%	
ADT	ADT	19,477	A	ADT 19.477

APPENDIX D

EXISTING (2012) PEAK HOUR ANALYSIS WORKSHEETS

Bowman

Job # 9377-01-001

HCM Signalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 8/14/2012

		\mathbf{i}	1		1	/	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	1.			ភា	ሻ	7	
Volume (vph)	248	104	671	83	35	279	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0			3.0	3.0	3.0	
Lane Util. Factor	1.00			1.00	1.00	1.00	
Frt	0.95			1.00	1.00	0.85	
Fit Protected	1.00			0.96	0.95	1.00	
Satd. Flow (prot)	1763			1781	1770	1583	
Flt Permitted	1.00			0.96	0.95	1.00	
Satd. Flow (perm)	1763			1781	1770	1583	
Peak-hour factor, PHF	0.78	0.50	0.44	0.64	0.67	0.65	
Adj. Flow (vph)	318	208	1525	130	52	429	
RTOR Reduction (vph)	12	0	0	0	0	407	
Lane Group Flow (vph)	514	0	0	1655	52	22	
Turn Type			Split			Perm	
Protected Phases	4		. 8	8	2		
Permitted Phases						2	
Actuated Green, G (s)	41.0			138.0	10.3	10.3	
Effective Green, g (s)	41.0			138.0	10.3	10.3	
Actuated g/C Ratio	0.21			0.70	0.05	0.05	
Clearance Time (s)	3.0			3.0	3.0	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	3.0	
Lane Grp Cap (vph)	365			1239	92	82	
v/s Ratio Prot	c0.29			c0.93	c0.03		
v/s Ratio Perm						0.01	
v/c Ratio	1.41			1.34	0.57	0.27	
Uniform Delay, d1	78.6			30.2	91.8	90.4	
Progression Factor	1.00			1.00	1.00	1.00	
Incremental Delay, d2	199.5			156.7	7.7	1.8	
Delay (s)	278.1			186.8	99.5	92.2	
Level of Service	F			F	F	F	
Approach Delay (s)	278.1			186.8	93.0		
Approach LOS	F			F	F		
Intersection Summary							
HCM Average Control Delay	1		187.9	H	CM Level	of Service	F
HCM Volume to Capacity ra	tio		1.31				
Actuated Cycle Length (s)			198.3	S	um of lost	time (s)	9.0
Intersection Capacity Utilizat	tion		74.3%	IC	CU Level o	of Service	D
Analysis Period (min)			15				
c Critical Lane Group							

HCM Signalized Intersection Capacity Analysis 3: Enon Road & U.S. Route 1

Enon Road Operational Study 8/14/2012

	٨		\mathbf{i}	1	4	×.	1	1	1	1	Ļ	1
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		र्स	۲		4		ኻ	<u>ቀ</u> ቀሴ		ሻ	* *	*
Volume (vph)	298	2	229	3	21	11	574	1089	16	1	289	163
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.95	1.00
Frt Albert Contractor		1.00	0.85		0.95		1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1726	1429		1667		1719	5056		1770	3539	1568
Flt Permitted		0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1726	1429		1667		1719	5056		1770	3539	1568
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	481	8	290	8	60	44	832	1184	48	4	391	187
RTOR Reduction (vph)	0	0	124	0	15	0	0	3	0	0	0	162
Lane Group Flow (vph)	0	489	166	0	97	0	832	1229	0	4	391	25
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split	÷ .	Perm	Split		·	Prot	N	ta da la composición de la composición	Prot		Perm
Protected Phases	4	4		.3	3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)		28.0	28.0		9.4		68.0	87.9		1.2	21.1	21.1
Effective Green, g (s)		28.0	28.0		9,4		68.0	87.9		1.2	21.1	21.1
Actuated g/C Ratio		0.18	0.18		0.06		0.44	0.57		0.01	0.14	0.14
Clearance Time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		312	258		101		754	2867		14	482	213
v/s Ratio Prot		c0.28			c0.06		c0.48	0.24		0.00	c0.11	
v/s Ratio Perm			0.12									0.02
v/c Ratio		1.57	0.64		0.96		1.10	0.43		0.29	0.81	0.12
Uniform Delay, d1		63.5	58.9		72.6		43.5	19.2		76.5	65.0	58.8
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		270.3	5.4		76.4		64.8	0.5		10.9	13.8	1.1
Delay (s)		333.8	64.3		149.0		108.3	19.7		87.4	78.8	59.9
Level of Service		F	E		F		F	В		F	E	E
Approach Delay (s)		233.5			149.0			55.4			72.8	
Approach LOS		F			F			Е			E	
Intersection Summary												
HCM Average Control Delay			100.5	НС	CM Level	of Service	e		F			
HCM Volume to Capacity ratio			1.15				-		•			
Actuated Cycle Length (s)			155.0	Su	im of lost	time (s)			28.5			
Intersection Capacity Utilization			83.0%	IC	U Level d	of Service			E			
Analysis Period (min)			15						_			
c Critical Lane Group												

Existing AM Peak Hour Bowman Consulting (Job #9377-01-001)

Synchro 7 - Report Page 2

Queuing and Blocking Report Existing AM Peak Hour

8/14/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	EB	WB	NB	NB										
Directions Served	TR	LT	L	R				 	 		 			
Maximum Queue (ft)	2029	626	274	788										
Average Queue (ft)	1963	555	132	422										
95th Queue (ft)	2223	757	296	808										
Link Distance (ft)	2014	612		1076										
Upstream Blk Time (%)	73	16												
Queuing Penalty (veh)	0	178												
Storage Bay Dist (ft)			250											
Storage Blk Time (%)			0	49										
Queuing Penalty (veh)			0	26										

Intersection: 2: Enon Road & Porter Lane

Movement	EB	WB	NB								
Directions Served	TR	LT	LR			 	 	 	 	 	
Maximum Queue (ft)	629	780	74								
Average Queue (ft)	613	367	29								
95th Queue (ft)	634	819	65								
Link Distance (ft)	612	922	905								
Upstream Blk Time (%)	38										
Queuing Penalty (veh)	283										
Storage Bay Dist (ft)											
Storage Blk Time (%)											
Queuing Penalty (veh)											

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LT	R	LTR	L	Т	Т	TR	L	Т	Т	R	
Maximum Queue (ft)	935	300	588	2348	2340	2038	1778	21	321	335	156	
Average Queue (ft)	926	149	292	1879	1785	1491	1131	2	181	194	63	
95th Queue (ft)	933	350	586	2462	2377	2160	2009	10	297	317	140	
Link Distance (ft)	922		1006	4359	4359	4359	4359		992	992	992	
Upstream Blk Time (%)	66											
Queuing Penalty (veh)	511											
Storage Bay Dist (ft)		200						225				
Storage Blk Time (%)	73								6			
Queuing Penalty (veh)	213								0			

HCM Unsignalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 8/14/2012

		\mathbf{i}	Ý	4	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	ĥ			÷1	ሻ	۲	
Volume (veh/h)	71	33	80	208	89	425	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph)	44	72	96	251	144	787	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None			None			
Median storage veh)							
Upstream signal (ft)							
pX, platoon unblocked							
vC, conflicting volume			116		524	80	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol					- 1.1		
vCu, unblocked vol			116		524	80	
tC, single (s)			4.1		6.4	6.2	
tC, 2 stage (s)					<u> </u>		
t⊢ (s)			2.2		3.5	3.3	
pu queue free %			93		70	20	
civi capacity (ven/n)			1473		480	980	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2			
Volume Total	116	347	144	787			
Volume Left	0	96	144	0			
Volume Right	72	0	0	787			
cSH	1700	1473	480	980			
Volume to Capacity	0.07	0.07	0.30	0.80			
Queue Length 95th (ft)	0	5	31	223			
Control Delay (s)	0.0	2.5	15.7	21.7			
Lane LOS		A	С	С			
Approach Delay (s)	0.0	2.5	20.8				
Approach LOS			С				
Intersection Summary							
Average Delay			14.5				· · · · · · · · · · · · · · · · · · ·
Intersection Capacity Utilization	ו		36.9%	IC	CU Level	of Service	e A
Analysis Period (min)			15				

Existing School PM Peak Hour Bowman Consulting (Job #9377-01-001)

Synchro 7 - Report Page 1

HCM Signalized Intersection Capacity Analysis 3: Enon Road & U.S. Route 1

Enon Road Operational Study 8/14/2012

	۶		\mathbf{i}	*		Ł	1	1	M	1	Ť	-
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		र्स	7		4.		ሻ	<u> </u>		ሻ	* *	7
Volume (vph)	152	1	339	5	4	4	108	463	4	2	618	193
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.95	1.00
Frt ANA Production and		1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1725	1429		1607		1719	5068		1770	3539	1568
Flt Permitted		0.95	1.00		0.98		0.95	1.00		0.95	1.00	1 00
Satd. Flow (perm)		1725	1429		1607		1719	5068		1770	3539	1568
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adi, Flow (vph)	245	4	429	13	11	16	157	503	12	0.20	835	222
RTOR Reduction (vph)	0	0	275	0	15	0	0	1	0	Ő	000	105
Lane Group Flow (vph)	0	249	154	Õ	25	0 0	157	514	0	8	835	100
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	.4	4		' 3	3		1	6		5	2	
Permitted Phases			4							e se P		2
Actuated Green, G (s)		29.2	29.2		6.0		19.4	89.8		1.5	71.9	71.9
Effective Green, g (s)		29.2	29.2		6.0		19.4	89.8		1.5	71.9	71.9
Actuated g/C Ratio		0.19	0.19		0.04		0.13	0.58		0.01	0.46	0.46
Clearance Time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	:	325	269		62		215	2936	1	17	1642	727
v/s Ratio Prot		c0.14	200		c0.02		c0 09	0.10		0.00	c0 24	121
v/s Ratio Perm			0.11		00.01		00.00	0.10		0.00	00.21	0.07
v/c Ratio		0.77	0.57		0 40		0.73	0 17		0 47	0.51	0.01
Uniform Delay, d1		597	57.2		72 7		65.3	15.3		76.4	29.2	24.1
Progression Factor		1.00	1.00		1.00		1.00	1 00		1 00	1 00	1 00
Incremental Delay, d2		10.3	2.9		4.1		12.0	0.1		19.2	11	0.5
Delay (s)		70.0	60.1		76.9		77.3	15.4		95.5	30.3	24.6
Level of Service		E	E		E		F	B		- 00.0 F	0.00 C	2.F2 C
Approach Delay (s)		63.8			76.9		-	29.9		•	29.6	Ũ
Approach LOS		E			E			C			C	
Intersection Summary												
HCM Average Control Delay			39.9	ŀ	ICM Leve	l of Servic	e		D			
HCM Volume to Capacity ratio			0.60	•			-					
Actuated Cycle Length (s)			155.0	,c	Sum of los	t time (s)			28.5			
Intersection Capacity Utilizatio	n		60.2%	10	CU Level	of Service	9		R			
Analysis Period (min)			15			2. 25. 100						
c Critical Lane Group												

Queuing and Blocking Report Existing School PM Peak Hour

8/14/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	В
Directions Served	LT	L	R	२
Maximum Queue (ft)	53	65	104	4 - Constanting a factor space space where the product of the second statements of the second statements of the
Average Queue (ft)	12	32	65	5
95th Queue (ft)	40	60	94	4 - Charles Alexandra Alexandra Alexandra Alexandra
Link Distance (ft)	612		1076	6
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement	WB	NB											
Directions Served	LT	LR			 	 		 -2101010	 	 		 	
Maximum Queue (ft)	74	31											
Average Queue (ft)	11	4											
95th Queue (ft)	48	21											
Link Distance (ft)	922	905											
Upstream Blk Time (%)													
Queuing Penalty (veh)													
Storage Bay Dist (ft)													
Storage Blk Time (%)													
Queuing Penalty (veh)													

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LT	R	LTR	L	Т	T	TR	L	Т	Т	R	
Maximum Queue (ft)	175	290	30	222	63	124	171	20	187	184	98	
Average Queue (ft)	108	112	10	113	16	31	65	1	124	128	30	
95th Queue (ft)	186	213	32	202	49	94	161	10	183	187	80	
Link Distance (ft)	922		1006		533	533	533		992	992	992	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)		200		400				225				
Storage Blk Time (%)		2										
Queuing Penalty (veh)		3										

Enon Road Operational Study 8/14/2012

		\mathbf{i}	×	4	1	M	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	1 +				ሻ	*	
Volume (veh/h)	215	7	68	403	14	58	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph)	134	15	82	486	23	107	na kija okon panja dote bijo a note tektor.
Pedestrians							
Lane Width (ft)	a ta shekara			1.1.1.1.1.1.1			
Walking Speed (ft/s)							
Percent Blockage			en de trave	1			
Right turn flare (veh)							
Median type	None			None	-		
Median storage veh)				*******			
Upstream signal (ft)	· · ·			······································	•		
pX, platoon unblocked							
vC, conflicting volume	· · · ·		150		791	142	
vC1, stage 1 conf vol						1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 - 1999 -	
vC2, stage 2 conf vol			1				
vCu, unblocked vol			150		791	142	
tC, single (s)	· · · ·		4.1	1	6.4	6.2	
tC, 2 stage (s)							
tF (s)	tere en el contra		2.2		3.5	3.3	
p0 queue free %			94		93	88	
cM capacity (veh/h)	5 - 1 - 4		1432		338	906	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2			
Volume Total	150	567	23	107			
Volume Left	0	82	23	0			
Volume Right	15	0	0	107			
cSH	1700	1432	338	906	ana 1		
Volume to Capacity	0.09	0.06	0.07	0.12			
Queue Length 95th (ft)	0	5	5	10			
Control Delay (s)	0.0	1.6	16.4	9.5			
Lane LOS		А	С	A			
Approach Delay (s)	0.0	1.6	10.7			·. · ·	
Approach LOS			В				
Intersection Summary							
Average Delay			2.7				
Intersection Capacity Utilization	n		41.6%	IC	U Level o	of Service	Α
Analysis Period (min)			15	· •			· ·

HCM Signalized Intersection Capacity Analysis 3: Enon Road & U.S. Route 1

Enon Road Operational Study 8/14/2012

	۶	>	\mathbf{i}	1	-	×.	1	Ť	1	1	Ļ	~
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		ર્શ	۴		\$		ሻ	<u> </u>		ሻ	^	*
Volume (vph)	157	4	111	4	0	2	184	597	4	5	1391	302
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.95	1.00
Frt Baller in Pro-		1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
FIt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1729	1429		1540		1719	5071		1770	3539	1568
FIt Permitted		0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1729	1429		1540		1719	5071		1770	3539	1568
Peak-hour factor, PHF	0.84	0.50	0.82	0.50	0.35	0.50	0.75	0.94	0.33	0.31	0.94	0.96
Adj. Flow (vph)	187	8	135	8	0	4	245	635	12	16	1480	315
RTOR Reduction (vph)	0	0	116	0	4	0	0	1	0	0	0	124
Lane Group Flow (vph)	0	195	19	0	8	0	245	646	0	16	1480	191
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split		Perm	Split	1		Prot		Teng de	Prot		Perm
Protected Phases	.4	4		3	3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)		16.9	16.9		2.0		20.2	70.2		2.4	52.4	52.4
Effective Green, g (s)		16.9	16.9		2.0		20.2	70.2		2.4	52.4	52.4
Actuated g/C Ratio		0.14	0.14		0.02		0.17	0.59		0.02	0.44	0.44
Clearance Time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		244	201		26		289	2967		35	1545	685
v/s Ratio Prot		c0.11			c0.01		c0.14	0.13		0.01	c0.42	
v/s Ratio Perm			0.01									0.12
v/c Ratio		0.80	0.09		0.31		0.85	0.22		0.46	0.96	0.28
Uniform Delay, d1		49.9	44.9		58.3		48.4	11.8		58.2	32.7	21.7
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		16.5	0.2		6.7		20.0	0.2		9.2	14.9	1.0
Delay (s)		66.4	45.1		65.0		68.4	12.0		67.3	47.6	22.7
Level of Service		E	D		Е		Е	B		Е	D	С
Approach Delay (s)		57.7			65.0			27.5			43.4	
Approach LOS		E			Е			с. С			D	
Intersection Summary												
HCM Average Control Delay			40.4	Н	ICM Leve	l of Servio	ce		D	· · · ·		
HCM Volume to Capacity rati	0		0.89						_			
Actuated Cycle Length (s)			120.0	S	um of los	st time (s)			28.5			
Intersection Capacity Utilization	on		78.6%	IC	CU Level	of Service	e		D			
Analysis Period (min)			15									
c Critical Lane Group												

Queuing and Blocking Report Existing Commuter PM Peak Hour

8/14/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	EB	WB	NB	NB	
Directions Served	TR	LT	L	R	
Maximum Queue (ft)	22	54	24	53	
Average Queue (ft)	1	11	13	28	
95th Queue (ft)	11	43	32	44	
Link Distance (ft)	2014	612		1076	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 2: Enon Road & Porter Lane

Movement	NB													
Directions Served	LR			 	 	 	 	 		 				
Maximum Queue (ft)	30													
Average Queue (ft)	2													
95th Queue (ft)	14													
Link Distance (ft)	905													
Upstream Blk Time (%)														
Queuing Penalty (veh)														
Storage Bay Dist (ft)														
Storage Blk Time (%)														
Queuing Penalty (veh)														

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	
Directions Served	LT	R	LR	L	Т	Т	TR	Т	Т	R	
Maximum Queue (ft)	173	155	53	286	46	66	151	506	540	511	
Average Queue (ft)	94	63	9	158	17	24	37	348	387	79	
95th Queue (ft)	157	132	37	269	43	54	104	499	536	282	
Link Distance (ft)	921		1006	533	533	533	533	992	992	992	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)		200									
Storage Blk Time (%)								18			
Queuing Penalty (veh)								1			

SimTraffic Report Page 1

October 2012

APPENDIX E CRASH DATA

Bowman

Job # 9377-01-001

Document Number	Physical Jurisdiction	Crash Date	Crash Time Day Of Wee	k Route Or Street Name	Crash Severity	Pedestrian Fatality Count	Non Pedestrian Fatality Count	Pedestrian Injury Cnt	Non Pedestrian Injury Count	Work Zone Related	Collision Type	Weather Condition Type	Líght Condition
50332144	Stafford County	1/18/2005	7:05 Tue		1 property damage crash	a	c	0	0	2. Na	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
50471312	Stafford County	1/26/2005	17:40 Wed		1 property damage crash	G	0	0	0	1. Yes	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	3. Dusk
51100538	Stafford County	4/5/2005	9:20 Tue		1 property damage crash	o	o	0	c	2. No	2. Angle	1. No Adverse Condition (Clear/Cloudy)	2. Davlight
51172362	Stafford County	4/14/2005	14:30 Thu		1 property damage crash	0	a	0	0	1. Yes	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Dayight
51451285	Stafford County	5/17/2005	15:52 Tue		I property damage crash	0	8	0	0	1. Yes.	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
51461865	Stafford County	5/16/2005	7/20 Mon		I injury crash	0	0	0	1	1. Yes	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Dayight
52011612	Stafford County	2/6/2005	11:47 Wed		1 property damage crash	Ø	0	a	0	1. Yes	2. Angle	1. No Adverse Candition (Clear/Cloudy)	2. Davlight
52291917	Stafford County	6/18/2005	16:00 Sat		1 property damage crash	0	0	٥		Z. No	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Cloudy)	2. Davight
52642536	Stafford County	500Z/ET/6	7:35 Fue		1 Injury crash	ú	c	0		1. Yes	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
18601722	Stafford County	9/7/2005	16:00 Wed		1 property damage crash	0	0	0	o	2. Na	1. Avar End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
53181234	Stafford County	10/26/2005	8:55 Wed		I property damage crash	0	0	0	0	1. Yes	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
53181790	Stafford County	10/25/2005	7:20 Tue		I property damage crash	0	0	0	0	2. Na	1. Reat End	5. Rain	1. Dawn
53630727	Stafford County	11/21/2005	7:30 Man		1 property damage crash	0	a	6	0	2. No	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
98131386	Stafford County	1/9/2006	17:46 Man		1 mjury crash	0	0	0		1. Yes	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	5. Darkness - Road Not Lighted
60531570	Stafford County	2/1/2006	13:15 Wed	R	1 injury crash	0	0	c	1	2. No	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daykiştıt
6500029	Stafford County	6/19/2006	14:30 Mon	-	l injury crash	a	0	0	1	2. No	4. Sideswipe - Same Direction	1. No Adverse Condition {Clear/Cloudy}	2. Daylight
62000495	Stafford County	6/25/2006	19:15 San	r	1 property damage crash	a	a	0	0	2. ND	4. Sideswipe - Same Direction	1. No Adverse Condition (Clear/Eloudy)	2. Daylight
62560749	Stafford County	9/2/2006	12:06 Sat	^	a property damage crash	0	a	0	0	2. No	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight
501101£9	Stafferd County	10/3/2006	7:35 Tue		l property damage crash	0	0	0	0	2. Na	1. Rear End	1. Na Adverse Condition (Cleat/Cloudy)	2. Davlight
63120709	Stafford County	9/28/2006	16:59 Thu	-	I property damage crash	8	C	0	0	2. No	1. Rear Erd	1. No Adverse Condition (Clear/Cloudy)	2. Davlight
63332976	Stafford County	10/27/2006	7:10 611		I property damage crash	0	0	0	0	2. No	1. Rear End	1. No Adverse Condition (Clear/Cloudy)	2. Daylight

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4. Darkness - Road Lighted	2. Daylight	2. Daylight	2. Daylight	2. Daviight	2. Daylight	2. Daylight	5. Darkness - Road Not Lighted	2. Daylight	5. Darkness - Road Not Lighted	5. Darkness - Road Not Lighted	3. Dusk	2. Daylight	2. Daylight	2. Daylight	2. Daykght	2. Daylight	2. Daylight	2. Daylight	2. Daylight	2. Daytight	2. Daylight
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1. Rear End	3. Rear End	1. Roar End	1. Rear End	4. Sideswipe - Same Direction	1. Rear End	1. Rear End	4. Sideswipe - Same Direction	1. Rear End	5. Sideswipe - Opposite Direction	1. Rear End	4. Sideswipe - Same Direction	2. Angle	1. Rear End	Z. Angle	10. Deer	1. Rear End	10. Deer	1. Rear End	10. Dett	1. Rear End	1. Rear End
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20:20 Wed	16:10 Fri	12:47 Thu	14:25 Thu	7:22 Tue	7:20 Wed	7:40 Fti	17:07 [hu	7:34 Thu	22:00 Sun	23:40 Fri	21:20 Wed	10:19 Sat	13:40 Fhu	10:20 Mon	14:42 Tue	9:27 Tue	10:30 Wed	2:30 Thu	7:12 Tue	7:10 Tue	7:10 Fri
11/22/2006	1/5/2007	3/8/2007	3/8/2007	7/17/2007	10/24/2007	2/1/2008	1/10/2008	1/31/2008	5/11/2008	4/11/2008	4/9/2008	5/24/2008	8/7/2008	5/26/2008	6/24/2008	6/10/2008	8/6/2008	9/4/2008	9/30/2008	8002/0E/6	10/3/2008
1446 Stafford County	7712 Stafford County	063 Stafford County	688 Stafford County	1932 Stafford County	1653 Stafford County	480 Stafford County	A111 Stafford County	016 Stafford County	013 Stafford County	195 Stafford County	212 Stafford County	113 Stafford County	352 Stafford County	294 Stafford County	077 Stafford County	055 Stafford County	613 Stafford County	019 Stafford County	680 Stafford County	440 Stafford County	'891 Stafford County
63520	70310	10801	71201	12050	73181	80575	80635	80865	82395	82675	82815	83155	57158	56658	60125	90215	50835	91125	91250	91260	91260

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Weather Condition Type	1. Ma Advance Conditions (Classific	1. No Atherse Condition (Clear/County)	1. No Adverse Condition (Clear/Cloudy)	1. No Atherse Condition (Clear/Cloudy)	1. No Adverse Candition (Clear/Cloudy)	1. No Adverse Condition (Clear/Cloudy)	5. Rain	1. No Adverse Condition (Clear/Cloudy)	1. No Adverse Condition (Clear/Cloudy)	1. No Adverse Condition (Clear/Cloudy)	1. No Adverse Condition (Clear/Glaudy)	1. No Adverse Condition (Clear/Cloudy)	1. No Adverse Condition (Clear/Cloudy)	1. Na Adverse Condition (Clear/Claudy)	
Collision Type	0 Fixed Dhiart . Off Board	2. Angle	10. Deer	1. Rear End	9. Fixed Object - Off Road	1. Rear End	1. Rear End	2. Angle	J. Rear End	L.Rear End	1. Rear End	3. Head On	2. Angle	L. Rear End	O Fixed Object Of Band
Work Zone Related	2 No	2. No	2. No	2. No	2. No	2. No	2. No	2. No	2. Na	2. Na	2. Mo	2. Na	2. No	2. No	No.
Non Pedestrian Injury Count	c		0	0	0	0	0	Q	Q	1	0	-	Pre	0	C
Pedestrian Injury Cnt	0	0	0	0	C	0	0	0	0	0	0	0	0	a	C
Non Pedestrian Fatality Count	0	D	0	0	0	0	0	0	o	0	0		o	0	U U
Pedestrian Fatality Count	0	0	0	a	0	0	0	0	0	0	0	0	0	0	0
Crash Severity	property damage crash	injury crash	property damage crash	property damage crash	property damage crash	property damage crash	property damage crash	property damage crash	property damage crash	injury crash	property damage crash	fatal crash	injury crash	property damage crash	property damage crash
Route Or Street Name	753	753	753	753	753	753	753	enon rd	ROUTE 757 (ENDN ROAD)	ENON RD	ENON ROAD	ENON RD RT 253	R† 753 ENDN ROAD	ENOW ROAD, RT. 753	ENON ROAD, RT. 753
Day Of Week	fri	Thu	Thu	Thu	Wed	Wed	Thu	Wed	Mon	Wed	Tue	Sat	i	Sat	Mon
Crash Time	7:43	15:45	10:20	18:33	18:05	14:15	14:30	16:00	14:35	14:36	7:30	8:06	7:45	11:25 5	14:25
Crash Date	1/18/2008	3/20/2008	2/28/2008	10/16/2008	10/22/2008	11/19/2008	11/13/2008	2/4/2009	6007/6/2	2/4/2009	8/17/2009	7/18/2009	4/30/2010	6/19/2010	9/27/2010
Physical Jurisdiction	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County	Stafford County
Document Number	80635106	81065358	81095286	91330375	91350322	91530563	91550101	92030251	62050157	92050314	92300669	92870030	101540274	101795025	102715053
October 2012

APPENDIX F CONCEPT PLAN FOR STAFFORD HIGH SCHOOL RECONSTRUCTION

Bowman

APPENDIX G GENERALIZED DEVELOPMENT PLAN FOR CHICHESTER PARK

Bowman

October 2012

APPENDIX H 2020 FORECASTED PEAK HOUR ANALYSIS WORKSHEETS

Bowman

HCM Signalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/2/2012

		\mathbf{i}	∢	←	•	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	د î			4	ኻ	ŕ	
Volume (vph)	420	108	690	140	38	289	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0			3.0	3.0	3.0	
Lane Util. Factor	1.00			1.00	1.00	1.00	
Frt	0.96			1.00	1.00	0.85	
Flt Protected	1.00		an da	0.96	0.95	1.00	
Satd. Flow (prot)	1791		Que de la composición	1784	1770	1583	
Flt Permitted	1.00	~~~~**********************************		0.96	0.95	1.00	
Satd. Flow (perm)	1791			1784	1770	1583	
Peak-hour factor, PHF	0.78	0.50	0.44	0.64	0.67	0.65	
Adj. Flow (vph)	538	216	1568	219	57	445	
RTOR Reduction (vph)	7	0	0	0	0	424	
Lane Group Flow (vph)	747	0	0	1787	57	21	
Turn Type			Split			Perm	
Protected Phases	4		8	8	2		
Permitted Phases						2	
Actuated Green, G (s)	53.0			128.0	9.6	9.6	
Effective Green, g (s)	53.0			128.0	9.6	9.6	
Actuated g/C Ratio	0.27		la de la com	0.64	0.05	0.05	
Clearance Time (s)	3.0			3.0	3.0	3.0	
Vehicle Extension (s)	3.0			3.0	3.0	3.0	
Lane Grp Cap (vph)	476			1144	85	76	
v/s Ratio Prot	c0.42	e la tra el presente de la compañía		c1.00	c0.03		
v/s Ratio Perm		·····				0.01	
v/c Ratio	1.57		na a ya	1.56	0.67	0.28	
Uniform Delay, d1	73.3		······	35.8	93.4	91.7	
Progression Factor	1.00			1.00	1.00	1.00	
Incremental Delay, d2	265.9			257.2	18.8	2.0	······································
Delay (s)	339.2	No en de	un na h	293.0	112.3	93.7	
Level of Service	F			F	F	F	
Approach Delay (s)	339.2	- standa		293.0	95.8		
Approach LOS	F			F	F		
Intersection Summary							
HCM Average Control Delay			271.9	Н	ICM Leve	l of Service	e F
HCM Volume to Capacity ratio			1.52				
Actuated Cycle Length (s)			199.6	S	um of los	t time (s)	9.0
Intersection Capacity Utilization	1		87.6%		CU Level	of Service	n di sa sana ku ku ku je 🗄 n jene a kaje tu bi jene sa t
Analysis Period (min)			15				
c Critical Lane Group		- 1		e Alfrida	i trafficial.		

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		र्स	٢		¢,		ሻ	<u> </u>		ሻ	* *	*
Volume (vph)	460	2	240	3	21	11	620	1460	16	1000	380	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.95	1.00
Frt State Base of a state		1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1725	1429		1667		1719	5063		1770	3539	1568
FIt Permitted		0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1725	1429		1667		1719	5063		1770	3539	1568
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adi. Flow (vph)	742	8	304	8	60	44	899	1587	48	4	514	207
RTOR Reduction (vph)	0	0	84	0	15	0	0	2	0	0	0	177
Lane Group Flow (vph)	0	750	220	0	97	0	899	1633	0	4	514	30
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	1 0111
Permitted Phases			4									2
Actuated Green, G (s)		28.0	28.0		8.0		68.0	89.3		12	22.5	22.5
Effective Green, g (s)		28.0	28.0		8.0		68.0	89.3		12	22.5	22.5
Actuated g/C Ratio		0.18	0.18		0.05		0.44	0.58		0.01	0.15	0.15
Clearance Time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		312	258		86		754	2917		14	514	228
v/s Ratio Prot		c0.43			c0.06		c0.52	0.32		0.00	c0 15	
v/s Ratio Perm			0.15								00.10	0.02
v/c Ratio		2.40	0.85		1.13		1.19	0.56		0.29	1.00	0.13
Uniform Delay, d1		63.5	61.5		73.5		43.5	20.6		76.5	66.2	57.7
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		641.5	22.7		135.1		99.4	0.8		10.9	39.7	1.2
Delay (s)		705.0	84.1		208.6		142.9	21.3		87.4	105.9	58.9
Level of Service		F	F		F		F	С		F	F	E
Approach Delay (s)		525.9			208.6			64.5			92.4	
Approach LOS		F			F			e de E			F	
Intersection Summary												
HCM Average Control Delay			182.6	1. C.	ICM Leve	el of Servic	e		F			
HCM Volume to Capacity ratio			1.42									
Actuated Cycle Length (s)			155.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization			95.0%	10	CU Level	of Service	•		F			
Analysis Period (min)			15									
c Critical Lane Group												

Queuing and Blocking Report TF AM Peak Hour 2020 (No Improvements)

10/2/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	EB	WB	NB	NB	
Directions Served	TR	LT	L	R	
Maximum Queue (ft)	2029	619	275	1092	
Average Queue (ft)	2022	556	194	1052	
95th Queue (ft)	2035	750	383	1161	
Link Distance (ft)	2014	612		1076	
Upstream Blk Time (%)	91	22		49	
Queuing Penalty (veh)	0	273		0	
Storage Bay Dist (ft)			250		
Storage Blk Time (%)				86	
Queuing Penalty (veh)				49	

Intersection: 2: Enon Road & Porter Lane

Movement	EB	WB	NB	
Directions Served	TR	LT	LR	
Maximum Queue (ft)	627	937	200	
Average Queue (ft)	617	466	156	
95th Queue (ft)	625	1012	204	
Link Distance (ft)	612	922	905	
Upstream Blk Time (%)	51	0		
Queuing Penalty (veh)	499	5		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	
Directions Served	LT	R	LTR	L	Т	Т	TR	Т	Т	R	
Maximum Queue (ft)	938	300	334	3122	3206	3224	3203	375	389	209	
Average Queue (ft)	926	151	131	2281	2231	2058	1877	300	305	97	
95th Queue (ft)	935	377	274	3004	3023	2909	2799	380	383	180	
Link Distance (ft)	922		1006	4359	4359	4359	4359	992	992	992	
Upstream Blk Time (%)	67										
Queuing Penalty (veh)	716										
Storage Bay Dist (ft)		200									
Storage Blk Time (%)	75							29			
Queuing Penalty (veh)	228							1			

Enon Road Operational Study 10/2/2012

		\mathbf{i}	1	4	1	1	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	Ĵ .			র্ম	ኻ	ሻ	
Volume (veh/h)	120	37	90	360	93	438	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph)	75	80	108	434	150	811	
Pedestrians							
Lane Width (ft)	144.NN						
Walking Speed (ft/s)							
Percent Blockage				1424934	2021 (N		
Right turn flare (veh)							
Median type	None		ente da la	None	n de la com	banah)	
Median storage veh)							
Upstream signal (ft)					a an taon		
pX, platoon unblocked							
vC, conflicting volume		Ale de loc	155		766	115	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			155		766	115	
tC, single (s)			4.1	1993 B. 1993	6.4	6.2	
tC, 2 stage (s)							
tF (s)		영영관관	2.2		3.5	3.3	
p0 queue free %			92		56	13	
cM capacity (veh/h)			1425		343	937	
Direction, Lane #	EB 1	WB 1	NB 1	NB 2			
Volume Total	155	542	150	811			
Volume Left	0	108	150	0			
Volume Right	80	0	0	811			
cSH	1700	1425	343	937	an and a second and the based for		
Volume to Capacity	0.09	0.08	0.44	0.87	1.1.1.1	he broker	References de la paísé de terrencia de la compañía de
Queue Length 95th (ft)	0	6	54	281			
Control Delay (s)	0.0	2.2	23.4	27.7	4 - E - M		
Lane LOS		А	С	D			
Approach Delay (s)	0.0	2.2	27.0	15.12 D V			
Approach LOS			D				
Intersection Summary							
Average Delay			16.4				
Intersection Capacity Utilization	n in Die		42.4%		CU Level	of Servic	${f e}$, which is a set of ${f A}$, the tensor of the state of th
Analysis Period (min)			15				
		line e e e			101 - 101 - 101 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101 - 101		

TF School PM Peak Hour 2020 (No Improvements) Bowman Consulting (Job #9377-01-001)

Synchro 7 - Report Page 1

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		र्स	7		\$		٢	<u> </u>		ሻ	条 条	*م
Volume (vph)	200	1	360	5	4	4	140	620	4	2	820	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.95	1.00
Frt		1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1676	1495		1474		1687	4835		1719	3438	1538
Flt Permitted		0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1676	1495		1474		1687	4835		1719	3438	1538
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	323	4	456	13	11	16	203	674	12	8	1108	391
RTOR Reduction (vph)	0	0	219	0	16	0	0	1	0	0	0	161
Lane Group Flow (vph)	0	327	237	0	24	0	203	685	0	8	1108	230
Heavy Vehicles (%)	8%	8%	8%	20%	20%	20%	7%	7%	7%	5%	5%	5%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)		34.8	34.8		4.3		21.9	86.2		1.2	65.5	65.5
Effective Green, g (s)		34.8	34.8		4.3		21.9	86.2		1.2	65.5	65.5
Actuated q/C Ratio		0.22	0.22		0.03		0.14	0.56		0.01	0.42	0.42
Clearance Time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		376	336		41		238	2689		13	1453	650
v/s Ratio Prot		c0.20			c0.02		c0.12	0.14		0.00	c0.32	
v/s Ratio Perm			0.16									0.15
v/c Ratio		0.87	0.70		0.60		0.85	0.25		0.62	0.76	0.35
Uniform Delay, d1		57.9	55.4		74.5		65.0	17.8		76.7	38.1	30.4
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		18.8	6.6		21.1		24.4	0.2		64.0	3.8	1.5
Delay (s)		76.7	61.9		95.6		89.3	18.0		140.7	42.0	31.9
Level of Service		Е	E		F		F	В		F	D	С
Approach Delay (s)		68.1			95.6			34.3			39.9	-
Approach LOS		Ε			F,			С			D	
Intersection Summary												
HCM Average Control Delay			45.9		ICM Leve	l of Service	ce		D			
HCM Volume to Capacity ratio			0.80									
Actuated Cycle Length (s)			155.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization	า		67.0%	þ	CU Level	of Service	Э		С			
Analysis Period (min)			15									
c Critical Lane Group												

TF School PM Peak Hour 2020 (No Improvements) Bowman Consulting (Job #9377-01-001) Synchro 7 - Report Page 3

Queuing and Blocking Report TF School PM Peak Hour 2020 (No Improvements)

10/2/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	
Directions Served	LT	L	R	
Maximum Queue (ft)	78	89	103	
Average Queue (ft)	31	42	73	
95th Queue (ft)	75	80	107	
Link Distance (ft)	612		1076	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement	WB	NB							
Directions Served	LT	LR							
Maximum Queue (ft)	70	31							
Average Queue (ft)	17	6							
95th Queue (ft)	55	25							
Link Distance (ft)	922	905							
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LT	R	LTR	L	Т	Т	TR	L	Т	Т	R	
Maximum Queue (ft)	623	300	66	224	87	127	297	21	384	378	119	
Average Queue (ft)	227	173	24	118	33	70	119	1	209	222	53	
95th Queue (ft)	455	331	63	202	82	128	248	10	344	376	107	
Link Distance (ft)	922		1006		533	533	533		992	992	992	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)		200		400				225				
Storage Blk Time (%)	14	3							5			
Queuing Penalty (veh)	50	6							0			

HCM Unsignalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/2/2012

MovementEBTEBTLane ConfigurationsImage: Additional systemVolume (veh/h)360Sign ControlFreeGrade0%Peak Hour Factor0.80Hourly flow rate (vph)225PedestriansLane Width (ft)Walking Speed (ft/s)Percent BlockageRight turn flare (veh)Median typeNoneMedian storage veh)Lastream signal (ft)	BR WBL 37 117 46 0.83 80 141	WBT	NBL 29 Stop 0% 0.62 47	NBR 7 82 0.54 152	
Lane Configurations ♪ Volume (veh/h) 360 Sign Control Free Grade 0% Peak Hour Factor 0.80 0.4 Hourly flow rate (vph) 225 8 Pedestrians	37 117 46 0.83 80 141	€ 680 Free 0% 0.83 819	* 29 Stop 0% 0.62 47	0.54 152	
Volume (veh/h) 360 360 Sign Control Free Grade 0% Peak Hour Factor 0.80 0.4 Hourly flow rate (vph) 225 8 Pedestrians Lane Width (ft) 9 Walking Speed (ft/s) 9 9 Percent Blockage 8 10 Right turn flare (veh) Median type None Median storage veh) 10 10 Unstream signal (ft) 10 10	37 117 46 0.83 80 141	680 Free 0% 0.83 819	29 Stop 0% 0.62 47	82 0.54 152	
Sign Control Free Grade 0% Peak Hour Factor 0.80 0.4 Hourly flow rate (vph) 225 8 Pedestrians 225 8 Lane Width (ft) Walking Speed (ft/s) 9 Percent Blockage 8 9 Right turn flare (veh) Median type None Median storage veh) 10 10	46 0.83 80 141	Free 0% 0.83 819	Stop 0% 0.62 47	0.54 152	
Grade 0% Peak Hour Factor 0.80 0.4 Hourly flow rate (vph) 225 8 Pedestrians 225 8 Lane Width (ft) Walking Speed (ft/s) 9 Percent Blockage 8 8 Right turn flare (veh) Median type None Median storage veh) 10 10	46 0.83 80 141	0% 0.83 819	0% 0.62 47	0.54 152	
Peak Hour Factor 0.80 0.4 Hourly flow rate (vph) 225 8 Pedestrians 225 8 Lane Width (ft) Walking Speed (ft/s) 9 Percent Blockage Right turn flare (veh) 0.4 Median type None 0.4 Median storage veh) 10 0.4	46 0.83 80 141	0.83 819	0.62 47	0.54 152	
Hourly flow rate (vph) 225 8 Pedestrians	80 141	819	47	152	
Pedestrians Lane Width (ft) Walking Speed (ft/s) Percent Blockage Right turn flare (veh) Median type None Median storage veh)		None			
Lane Width (ft) Walking Speed (ft/s) Percent Blockage Right turn flare (veh) Median type None Median storage veh)		None			
Walking Speed (ft/s) Percent Blockage Right turn flare (veh) Median type None Median storage veh) Unstream signal (ft)		None			
Percent Blockage Right turn flare (veh) Median type None Median storage veh)		None			
Right turn flare (veh) Median type None Median storage veh)		None			
Median type None Median storage veh)		None			
Median storage veh)	Na ugʻruru kari	NOLIC			
Instream signal (ft)	New protocol de la				
opsircam signar (it)	the second states				
pX, platoon unblocked					
vC, conflicting volume	305		1366	265	
vC1, stage 1 conf vol					
vC2, stage 2 conf vol					
vCu, unblocked vol	305		1366	265	
tC, single (s)	4.1	Na Sabay	6.4	6.2	
tC, 2 stage (s)					
tF.(s)	2.2		3.5	3.3	
p0 queue free %	89		68	80	
cM capacity (veh/h)	1255		144	773	
Direction, Lane # EB 1 WB	31 NB 1	NB 2			
Volume Total 305 96	60 47	152			
Volume Left 0 14	41 47	0			
Volume Right 80	0 0	152			
cSH 1700 125	55 144	773			
Volume to Capacity 0.18 0.1	11 0.32	0.20	the parks		
Queue Length 95th (ft) 0	9 33	18			
Control Delay (s) 0.0 2	2.7 41.6	10.8	이 소설 문제		
Lane LOS	A E	В			
Approach Delay (s) 0.0 2	2.7 18.0				
Approach LOS	С				
Intersection Summary					
Average Delay	4.2				
Intersection Capacity Utilization	A		CU Level	of Servic	e la construction de la construc
Analysis Period (min)	67.3%				

TF Commuter PM Peak Hour 2020 (No Improvements) Bowman Consulting (Job #9377-01-001) Synchro 7 - Report Page 1

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		र्स	7		4		ኻ	<u> </u>		ኻ	*	7
Volume (vph)	280	4	160	4	.0	2	300	780	4	5	1860	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor		1.00	1.00		1.00		1.00	0.91		1.00	0.95	1.00
Frt		1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1776	1583		1722		1770	5074		1787	3574	1599
Flt Permitted		0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)		1776	1583		1722		1770	5074		1787	3574	1599
Peak-hour factor, PHF	0.84	0.50	0.82	0.50	0.35	0.50	0.75	0.94	0.33	0.31	0.94	0.96
Adj. Flow (vph)	333	8	195	8	0	4	400	830	12	16	1979	542
RTOR Reduction (vph)	0	0	144	0	4	0	0	1	0	0	0	182
Lane Group Flow (vph)	0	341	51	0	8	0	400	841	0	16	1979	360
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Split		Perm	Split		BART	Prot		e e e e	Prot		Perm
Protected Phases	4	4		.3	3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)		24.2	24.2		2.0		19.0	62.9		2.4	46.3	46.3
Effective Green, g (s)		24.2	24.2		2.0		19.0	62.9		2.4	46.3	46.3
Actuated g/C Ratio		0.20	0.20		0.02		0.16	0.52		0.02	0.39	0.39
Clearance Time (s)		7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)		3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)		358	319		29		280	2660		36	1379	617
v/s Ratio Prot		c0.19			c0.00		c0.23	0.17		0.01	c0.55	
v/s Ratio Perm			0.03									0.23
v/c Ratio		0.95	0.16		0.28		1.43	0.32		0.44	1.44	0.58
Uniform Delay, d1		47.3	39.5		58.3		50.5	16.3		58.1	36.9	29.2
Progression Factor		1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		35.1	0.2		5.2		212.3	0.3		8.5	200.0	4.0
Delay (s)		82.4	39.8		63.5		262.8	16.6		66.7	236.9	33.2
Level of Service		F	D		E		F	В		Ε	F	С
Approach Delay (s)		66.9			63.5			95.9			192.3	
Approach LOS		E			E			F			F	
Intersection Summary												
HCM Average Control Delay			148.7	- The second	ICM Leve	el of Servi	ce		F			
HCM Volume to Capacity ratio			1.28									
Actuated Cycle Length (s)			120.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization	ו		107.3%	10	CU Level	of Service	Э		G			
Analysis Period (min)			15									
c Critical Lane Group												

TF Commuter PM Peak Hour 2020 (No Improvements) Bowman Consulting (Job #9377-01-001)

Synchro 7 - Report Page 4

Queuing and Blocking Report <u>TF Commuter PM Peak Hour 2020 (No Improvements)</u>

10/2/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	
Directions Served	LT	L	R	
Maximum Queue (ft)	118	46	50	
Average Queue (ft)	42	19	28	
95th Queue (ft)	105	43	43	
Link Distance (ft)	612		1076	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement	WB								
Directions Served	LT								
Maximum Queue (ft)	29								
Average Queue (ft)	2								
95th Queue (ft)	14								
Link Distance (ft)	921								
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)									
Storage Blk Time (%)									
Queuing Penalty (veh)									

Queuing and Blocking Report TF Commuter PM Peak Hour 2020 (No Improvements)

10/2/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	WB	NB	NB	NB	NB	B4	B4	SB	SB	SB
Directions Served	LT	R	LR	L	Т	Т	TR	Т	Т	L	Т	Т
Maximum Queue (ft)	284	145	29	604	578	108	186	41	55	40	599	629
Average Queue (ft)	202	82	8	521	143	61	89	3	4	5	556	576
95th Queue (ft)	282	134	27	619	472	106	154	20	26	25	599	618
Link Distance (ft)	921		1006	533	533	533	533	3771	3771		992	992
Upstream Blk Time (%)				10	0							
Queuing Penalty (veh)				0	0							
Storage Bay Dist (ft)		200								225		
Storage Blk Time (%)	13										52	
Queuing Penalty (veh)	21										3	

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB							
Directions Served	R							
Maximum Queue (ft)	561							
Average Queue (ft)	420							
95th Queue (ft)	749							
Link Distance (ft)	992							
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	682	160	176	227	175	96	111	140	53	
Average Queue (ft)	451	114	110	117	101	50	38	64	22	
95th Queue (ft)	682	165	170	191	176	89	95	128	55	
Link Distance (ft)	667	992	992	992			1764	1764	1764	
Upstream Blk Time (%)	2									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%) Queuing Penalty (veh)				1 9	1 2					

Network Summary

Network wide Queuing Penalty: 34

Enon Road Operational Study Bowman Consulting (Job #9377-01-001) SimTraffic Report Page 2

HCM Signalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 8/15/2012

		7	1		1	M	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	ŕ	7	ሻ	स्	ሻ	1	
Volume (vph)	420	108	690	140	38	289	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.85	
Flt Protected	1.00	1.00	0.95	0.96	0.95	1.00	
Satd. Flow (prot)	1863	1583	1681	1705	1770	1583	
Flt Permitted	1.00	1.00	0.95	0.96	0.95	1.00	
Satd. Flow (perm)	1863	1583	1681	1705	1770	1583	
Peak-hour factor, PHF	0.78	0.50	0.44	0.64	0.67	0.65	
Adj. Flow (vph)	538	216	1568	219	57	445	
RTOR Reduction (vph)	0	64	0	0	0	415	
Lane Group Flow (vph)	538	152	894	893	57	30	
Turn Type		Perm	Split			Perm	
Protected Phases	4		8	8	2		
Permitted Phases		4				2	
Actuated Green, G (s)	58.3	58.3	105.5	105.5	12.3	12.3	
Effective Green, g (s)	58.3	58.3	105.5	105.5	12.3	12.3	
Actuated g/C Ratio	0.31	0.31	0.57	0.57	0.07	0.07	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	587	499	958	972	118	105	
v/s Ratio Prot	c0.29		c0.53	0.52	c0.03		
v/s Ratio Perm		0.10				0.02	
v/c Ratio	0.92	0.31	0.93	0.92	0.48	0.28	
Uniform Delay, d1	61.1	48.1	36.6	35.9	83.3	82.2	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	19.1	0.3	15.4	13.2	3.1	1.5	
Delay (s)	80.2	48.4	52.0	49.1	86.4	83.7	
Level of Service	F	D	D	D	F	F	
Approach Delay (s)	71.1			50.5	84.0		
Approach LOS	E			D	F		
Intersection Summary							
HCM Average Control Del	ay		61.1	Н	CM Level	of Service	e E
HCM Volume to Capacity	ratio		0.90				
Actuated Cycle Length (s)			185.1	S	um of lost	t time (s)	9.0
Intersection Capacity Utiliz	ation		58.2%	IC	CU Level o	of Service	В
Analysis Period (min)			15				
c Critical Lane Group							

Enon Road Operational Study 8/15/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	ęţ.	7		4		ሻሻ	<u> </u>		ሻ	* *	7
Volume (vph)	460	2	240	3	21	11	620	1460	16	1	380	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.95	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1640	1429		1667		3335	5063		1770	3539	1568
Flt Permitted	0.95	0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1640	1429		1667		3335	5063		1770	3539	1568
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	742	8	304	8	60	44	899	1587	48	4	514	207
RTOR Reduction (vph)	0	0	174	0	15	0	0	2	0	0	0	166
Lane Group Flow (vph)	378	372	130	0	97	0	899	1633	0	4	514	41
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split	1.1.1	Perm	Split	1919		Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)	39.9	39.9	39.9		11.1		44.7	74.3		1.2	30.8	30.8
Effective Green, g (s)	39.9	39.9	39.9		11.1		44.7	74.3		1.2	30.8	30.8
Actuated g/C Ratio	0.26	0.26	0.26		0.07		0.29	0.48		0.01	0.20	0.20
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	420	422	368		119		962	2427		14	703	312
v/s Ratio Prot	c0.23	0.23			c0.06		c0.27	0.32		0.00	c0.15	
v/s Ratio Perm			0.09									0.03
v/c Ratio	0.90	0.88	0.35		0.82		0.93	0.67		0.29	0.73	0.13
Uniform Delay, d1	55.6	55.3	47.0		70.9		53.7	31.0		76.5	58.2	51.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	21.8	18.9	0.6		33.3		15.5	1.5		10.9	6.6	0.9
Delay (s)	77.4	74.2	47.6		104.3		69.3	32.5		87.4	64.8	52.0
Level of Service	E	E	D		F		E	C		F	Е	D
Approach Delay (s)		67.7			104.3			45.6			61.3	
Approach LOS		E			F			D			Е	
Intersection Summary												
HCM Average Control Delay	y		54.9	Н	CM Leve	l of Servic	е		D			
HCM Volume to Capacity ra	atio		0.86									
Actuated Cycle Length (s)			155.0	S	um of los	t time (s)			28.5			
Intersection Capacity Utiliza	ition		70.9%	IC	CU Level	of Service			С			
Analysis Period (min)			15									
c Critical Lane Group												

Queuing and Blocking Report TF AM Peak Hour 2020

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Intersection: 1: Enon Road & Stafford Indians Lane

Movement	EB	EB	WB	WB	NB	NB	
Directions Served	Т	R	L	LT	L	R	
Maximum Queue (ft)	2022	225	618	618	137	230	
Average Queue (ft)	1763	134	487	500	80	156	
95th Queue (ft)	2327	265	665	672	132	245	
Link Distance (ft)	2007		606	606		1071	
Upstream Blk Time (%)	27		6	8			
Queuing Penalty (veh)	0		37	48			
Storage Bay Dist (ft)		200			250		
Storage Blk Time (%)	65	3				0	
Queuing Penalty (veh)	141	14				0	

Intersection: 2: Enon Road & Porter Lane

Movement	WB	WB	NB									
Directions Served	LT	Т	LR						*********		 	
Maximum Queue (ft)	295	330	31									
Average Queue (ft)	148	149	14									
95th Queue (ft)	318	345	37									
Link Distance (ft)	907	907	891									
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)												
Storage Blk Time (%)												
Queuing Penalty (veh)												

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	L	L	Т	T	TR	Т	Т	R
Maximum Queue (ft)	520	657	300	205	550	699	730	643	649	265	304	145
Average Queue (ft)	290	350	175	122	436	461	242	330	391	209	234	68
95th Queue (ft)	437	565	368	218	568	634	486	554	555	266	295	130
Link Distance (ft)		907		999			4353	4353	4353	985	985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400						
Storage Blk Time (%)	1	30			12	16				7		
Queuing Penalty (veh)	5	201			65	85				0		

HCM Unsignalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/2/2012

		\mathbf{k}	4	-	4	M	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	†	7	ሻ	†	ሻ	ሻ	
Volume (veh/h)	120	37	90	360	93	438	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph) Pedestrians	75	80	108	434	150	811	
Lane Width (ft)							
Walking Speed (ff/s)							
Percent blockage							
Median type	Mono			Nono			
Median storage veh)	NOLE			NULLE			
Unstream signal (ft)							
pX. platoon unblocked							
vC, conflicting volume			155		726	75	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			155		726	75	
tC, single (s)			4.1		6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			92		59	18	
cM capacity (veh/h)			1425		362	986	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	
Volume Total	75	80	108	434	150	811	
Volume Left	0	0	108	0	150	0	
Volume Right	0	80	0	0	0	811	
cSH	1700	1700	1425	1700	362	986	
Volume to Capacity	0.04	0.05	0.08	0.26	0.41	0.82	
Queue Length 95th (ft)	0	0	6	0	49	241	
Lontrol Delay (s)	0.0	0.0	1.1	0.0	21.8	23.0	
Lalle LUS Approach Dolou (a)	0.0		A			U .	
Approach LOS	0.0		1.0		22.8 C		
Intersection Summary							
Average Delay			13.7				
Intersection Capacity Utilization Analysis Period (min)	on ^s ,		37.1% 15	e în 1510	CU Level	of Servic	e a sylver for tha (A i sector) share the solution

TF School PM Peak Hour 2020 Bowman Consulting (Job #9377-01-001)

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ኻ	र्स	۴		ф.		ኻኻ	<u> </u>		ሻ	^	*
Volume (vph)	200	1	360	5	4	4	140	620	4	2	820	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.95	1.00
Frt Barrie Laboration	1.00	1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1588	1594	1495		1474		3273	4835		1719	3438	1538
Flt Permitted	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1588	1594	1495		1474		3273	4835		1719	3438	1538
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	323	4	456	13	11	16	203	674	12	8	1108	391
RTOR Reduction (vph)	0	0	217	0	15	0	0	1	0	0	0	157
Lane Group Flow (vph)	165	162	239	0	25	0	203	685	0	8	1108	234
Heavy Vehicles (%)	8%	8%	8%	20%	20%	20%	7%	7%	7%	5%	5%	5%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4							433		2
Actuated Green, G (s)	30.2	30.2	30.2		5.3		19.0	89.8		1.2	72.0	72.0
Effective Green, g (s)	30.2	30.2	30.2		5.3		19.0	89.8		1.2	72.0	72.0
Actuated g/C Ratio	0.19	0.19	0.19		0.03		0.12	0.58		0.01	0.46	0.46
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	309	311	291		50		401	2801		13	1597	714
v/s Ratio Prot	0.10	0.10			c0.02		c0.06	0.14		0.00	c0.32	
v/s Ratio Perm			c0.16									0.15
v/c Ratio	0.53	0.52	0.82		0.49		0.51	0.24		0.62	0.69	0.33
Uniform Delay, d1	56.1	55.9	59.8		73.5		63.6	16.0		76.7	32.8	26.2
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	1.8	1.6	16.9		7.4		1.0	0.2		64.0	2.5	1.2
Delay (s)	57.9	57.5	76.7		80.9		64.6	16.2		140.7	35.3	27.4
Level of Service	E	Ε	E		F		E	В		F	D	С
Approach Delay (s)		68.8			80.9			27.2			33.8	
Approach LOS		E			F			С			С	
Intersection Summary												
HCM Average Control Delay		N SARAR	41.1		ICM Leve	el of Servio	ce		D			
HCM Volume to Capacity ratio			0.69									
Actuated Cycle Length (s)			155.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization	n		67.0%	10	CU Level	of Service	e		С			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	
Directions Served	L	L	R	·
Maximum Queue (ft)	29	72	121	
Average Queue (ft)	2	48	76	
95th Queue (ft)	14	73	113	
Link Distance (ft)	606		1071	
Upstream Blk Time (%) 1919-1919			
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement	WB	NB	
Directions Served	LT	LR	
Maximum Queue (ft)	31	31	
Average Queue (ft)	9	6	
95th Queue (ft)	30	24	
Link Distance (ft)	907	891	
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

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Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	L	L	Т	Т	TR	L	Т	T
Maximum Queue (ft)	181	233	265	66	70	117	93	166	256	25	432	416
Average Queue (ft)	86	120	165	24	41	61	26	49	104	2	285	315
95th Queue (ft)	171	188	258	64	80	105	67	125	229	12	406	424
Link Distance (ft)		907		999			527	527	527		985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		2	6								18	
Queuing Penalty (veh)		9	13								0	

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB					
Directions Served	R					
Maximum Queue (ft)	213					
Average Queue (ft)	130					
95th Queue (ft)	222					
Link Distance (ft)	985					
Upstream Blk Time (%)	n se stabil					
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	545	162	184	263	175	53	79	108	72	
Average Queue (ft)	325	95	107	129	130	24	28	45	33	
95th Queue (ft)	517	161	174	226	199	56	73	90	76	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				1	2					
Queuing Penalty (veh)				7	4					

Network Summary

Network wide Queuing Penalty: 33

HCM Unsignalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/2/2012

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Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	۸	*	ሻ	*	ኻ	7	
Volume (veh/h)	360	37	117	680	29	82	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph)	225	80	141	819	47	152	
Pedestrians							
Lane Width (ft)				e de la fact	NA SA	NANA SA	
Walking Speed (ft/s)							
Percent Blockage	6.996					page de	
Right turn flare (veh)							
Median type	None	4.1.4.4.4		None			
Median storage veh)							
Upstream signal (ft)	bioge.	1114		963393		n de la co	
pX, platoon unblocked							
vC, conflicting volume	AND N		305		1326	225	
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol			305		1326	225	
tC, single (s)	9,1,1,1,1,		4.1		6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	Na kaj populaj de la popular de la completa de la completa de
p0 queue free %			89		69	81	
cM capacity (veh/h)			1255		152	814	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	
Volume Total	225	80	141	819	47	152	
Volume Left	0	0	141	0	47	0	
Volume Right	0	80	0	0	0	152	
SH	1700	1700	1255	1700	152	814	
Volume to Capacity	0.13	0.05	0.11	0.48	0.31	0.19	
Queue Length 95th (ft)	0	0	9	0	30	17	
Control Delay (s)	0.0	0.0	8.2	0.0	38.8	10.4	
_ane LOS			A.		E	 B	
Approach Delay (s)	0.0		1.2		17.1		Ado és natur é este a planar pela endire de la companya de la companya de la companya de la companya de la comp
Approach LOS		, 			C		
Intersection Summary							
Average Delay			3.1				
ntoroaction Operative Little-tion			15 8%	10		ofConvice	A
Intersection Capacity Unitration			- + J. D /0	· · · · · · · · · · · · · · · · · · ·	JULEVED	DI OBINICE	\mathbf{A} , and \mathbf{A} , and the second se

Enon Road Operational Study 10/2/2012

	.*		\rightarrow	¥		Ł	1	Ť	M	1	Ļ	-
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ኻ	र्स	۴		¢,		ሻሻ	<u> </u>		ኻ	**	*م
Volume (vph)	280	4	160	4	0	2	300	780	4	5	1860	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.0
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.95	1.00
Frt Berger and Berger	1.00	1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1689	1583		1722		3433	5074		1787	3574	1599
Flt Permitted	0.95	0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1689	1583		1722		3433	5074		1787	3574	1599
Peak-hour factor, PHF	0.84	0.50	0.82	0.50	0.35	0.50	0.75	0.94	0.33	0.31	0.94	0.96
Adj. Flow (vph)	333	8	195	8	0	4	400	830	12	16	1979	542
RTOR Reduction (vph)	0	0	43	0	4	0	0	1	0	0	0	144
Lane Group Flow (vph)	170	171	152	0	8	0	400	841	0	16	1979	398
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Split	11.60.00	pm+ov	tilaZ			Prot			Prot		pm+ov
Protected Phases	4	4	1	3	3		1	6		5	2	4
Permitted Phases			4									2
Actuated Green, G (s)	19.6	19.6	35.2		2.0		15.6	87.5		2.4	74.3	93.9
Effective Green, g (s)	19.6	19.6	35.2		2.0		15.6	87.5		2.4	74.3	93.9
Actuated g/C Ratio	0.14	0.14	0.25		0.01		0.11	0.62		0.02	0.53	0.67
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	235	236	477		25		383	3171		31	1897	1072
v/s Ratio Prot	0.10	c0.10	0.04		c0.00		c0.12	0.17		0.01	c0 55	0.05
v/s Ratio Perm			0.06								00.00	0.00
v/c Ratio	0.72	0.72	0.32		0.32		1.04	0.27		0.52	1 04	0.37
Uniform Delay, d1	57.6	57.6	42.6		68.3		62.2	11.8		68.2	32.8	10.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1 00
Incremental Delay, d2	10.5	10.5	0.4		7.4		58.0	0.2		13.7	33.0	0.2
Delay (s)	68.1	68.1	43.0		75.7		120.2	12.0		82.0	65.8	10.3
Level of Service	E	E	D		Е		F	В		F	E	В
Approach Delay (s)		59.0			75.7			46.9			54.1	-
Approach LOS		E			Ε			D			D	
Intersection Summary												
HCM Average Control Delay			52.7	H	ICM Leve	l of Servic	ce		D			
HCM Volume to Capacity ratio			0.97									
Actuated Cycle Length (s)			140.0	S	Sum of los	t time (s)			28.5			
Intersection Capacity Utilization			88.5%	10	CU Level	of Service	Э		E			
Analysis Period (min)			15									

c Critical Lane Group

Queuing and Blocking Report TF Commuter PM Peak Hour 2020

10/2/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	
Directions Served	L	L	R	
Maximum Queue (ft)	31	30	53	
Average Queue (ft)	16	20	30	
95th Queue (ft)	42	41	46	
Link Distance (ft)	606		1071	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement				
Directions Served				<u>, and a second se</u>
Maximum Queue (ft)				
Average Queue (ft)				
95th Queue (ft)				
Link Distance (II)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report TF Commuter PM Peak Hour 2020

10/2/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LR	L	L	Т	Т	TR	L	Т	T
Maximum Queue (ft)	153	222	222	30	178	194	65	87	196	46	590	601
Average Queue (ft)	76	136	119	8	132	135	33	54	81	10	495	509
95th Queue (ft)	133	215	211	28	185	180	72	100	158	33	607	620
Link Distance (ft)		907		999			527	527	527		985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		1	1								30	
Queuing Penalty (veh)		3	2								2	

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB							
Directions Served	R							
Maximum Queue (ft)	576							
Average Queue (ft)	118							
95th Queue (ft)	327							
Link Distance (ft)	985							
Upstream Blk Time (%)								
Queuing Penalty (veh)		×						
Storage Bay Dist (ft)								
Storage Blk Time (%)								
Queuing Penalty (veh)								

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	 LR	Т	Т	Т	R	L	Т	Т	T	
Maximum Queue (ft)	681	224	224	242	175	96	109	116	53	
Average Queue (ft)	447	122	134	133	112	53	35	56	27	
95th Queue (ft)	678	199	204	217	174	98	90	115	65	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)	2									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				6	0					
Queuing Penalty (veh)				36	1					

Network Summary

Network wide Queuing Penalty: 43

Enon Road Operational Study Bowman Consulting (Job #9377-01-001)

SimTraffic Report Page 2

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	4	7		ф.		ኻኻ	<u>ቀ</u> ቀኁ		ሻ	***	7
Volume (vph)	460	2	240	3	21	11	620	1460	16	ાસ્ટર્ગ	380	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.91	1.00
Frt State Line of State	1.00	1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1640	1429		1667		3335	5063		1770	5085	1568
Flt Permitted	0.95	0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1640	1429		1667		3335	5063		1770	5085	1568
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	742	8	304	8	60	44	899	1587	48	4	514	207
RTOR Reduction (vph)	0	0	176	0	15	0	0	2	0	0	0	169
Lane Group Flow (vph)	378	372	128	0	97	0	899	1633	0	4	514	38
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	r onn
Permitted Phases			4									2
Actuated Green, G (s)	40.9	40.9	40.9		11.6		45.7	72.8		1.2	28.3	28.3
Effective Green, g (s)	40.9	40.9	40.9		11.6		45.7	72.8		1.2	28.3	28.3
Actuated g/C Ratio	0.26	0.26	0.26		0.07		0.29	0.47		0.01	0.18	0.18
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	431	433	377		125		983	2378		14	928	286
v/s Ratio Prot	c0.23	0.23			c0.06		c0.27	c0.32		0.00	0.10	200
v/s Ratio Perm			0.09									0.02
v/c Ratio	0.88	0.86	0.34		0.78		0.91	0.69		0.29	0.55	0.13
Uniform Delay, d1	54.6	54.3	46.1		70.4		52.8	32.2		76.5	57.6	53.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	17.8	15.5	0.5		25.6		12.6	1.6		10.9	2.4	1.0
Delay (s)	72.5	69.8	46.7		96.0		65.4	33.8		87.4	60.0	54.0
Level of Service	E	E	D		F		E	С		F	Е	D
Approach Delay (s)		64.1			96.0			45.0			58.4	
Approach LOS		E			F			D			Έ	
Intersection Summary												
HCM Average Control Delay			53.1	H	ICM Leve	l of Servic	ce		D			
HCM Volume to Capacity ratio)		0.80									
Actuated Cycle Length (s)			155.0	S	um of los	t time (s)			21.0			
Intersection Capacity Utilizatio	n		70.9%	IC	CU Level	of Service	9		C			
Analysis Period (min)			15									
c Critical Lane Group												

Queuing and Blocking Report TF AM Peak Hour 2020 - 6 Lane US 1

10/2/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	L	L	Т	Т	TR	Т	Т	Т
Maximum Queue (ft)	477	483	300	205	549	594	305	462	519	198	211	196
Average Queue (ft)	291	330	157	118	412	421	194	297	366	119	142	159
95th Queue (ft)	426	474	354	215	537	538	321	483	522	169	194	204
Link Distance (ft)		895		999			4352	4352	4352	985	985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400						
Storage Blk Time (%)		29			11	12						
Queuing Penalty (veh)		196			59	63						

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB						
Directions Served	R						
Maximum Queue (ft)	143						
Average Queue (ft)	66						
95th Queue (ft)	122						
Link Distance (ft)	985						
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	T	
Maximum Queue (ft)	681	304	456	487	175	113	51	72	99	
Average Queue (ft)	681	144	164	189	144	48	14	32	58	
95th Queue (ft)	685	247	312	364	204	91	42	56	93	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)	36									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				4	7					
Queuing Penalty (veh)				31	20					

Network Summary

Network wide Queuing Penalty: 617

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	र्स	۲		4		ኻኻ	<u> </u>		ሻ	***	<u>**</u>
Volume (vph)	200	1	360	5	4	4	140	620	4	2	820	340
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1588	1594	1495		1474		3273	4835		1719	4940	1538
Flt Permitted	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1588	1594	1495		1474		3273	4835		1719	4940	1538
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	323	4	456	13	11	16	203	674	12	8	1108	391
RTOR Reduction (vph)	0	0	306	0	15	0	0	1	0	0	0	194
Lane Group Flow (vph)	165	162	150	0	25	0	203	685	0	8	1108	197
Heavy Vehicles (%)	8%	8%	8%	20%	20%	20%	7%	7%	7%	5%	5%	5%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4			3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)	25.6	25.6	25.6		6.4		20.2	93.0		1.5	74.3	74.3
Effective Green, g (s)	25.6	25.6	25.6		6.4		20.2	93.0		1.5	74.3	74.3
Actuated g/C Ratio	0.17	0.17	0.17		0.04		0.13	0.60		0.01	0.48	0.48
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	262	263	247		61		427	2901		17	2368	737
v/s Ratio Prot	c0.10	0.10			c0.02		c0.06	0.14		0.00	c0.22	
v/s Ratio Perm			0.10									0.13
v/c Ratio	0.63	0.62	0.61		0.40		0.48	0.24		0.47	0.47	0.27
Uniform Delay, d1	60.3	60.1	60.1		72.4		62.5	14.4		76.4	27.1	24.1
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	4.7	4.2	4.2		4.3		0.8	0.2		19.2	0.7	0.9
Delay (s)	65.0	64.4	64.3		76.8		63.3	14.6		95.5	27.7	25.0
Level of Service	E	Е	E		Ε		E	В		F	С	С
Approach Delay (s)		64.4			76.8			25.8			27.4	
Approach LOS		E			E			С			С	
Intersection Summary												
HCM Average Control Delay			36.6	He star	ICM Leve	l of Servic	ce		D			
HCM Volume to Capacity ratio			0.50									
Actuated Cycle Length (s)			155.0	S	Sum of los	t time (s)			28.5			
Intersection Capacity Utilization	۱		60.2%	10	CU Level	of Service	Э		В			
Analysis Period (min)			15									

c Critical Lane Group

TF School PM Peak Hour 2020 - 6 Lane US 1 Bowman Consulting (Job #9377-01-001)

Synchro 7 - Report Page 2

Queuing and Blocking Report TF School PM Peak Hour 2020 - 6 Lane US 1

10/2/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	L	L	Т	Т	TR	L	T	T
Maximum Queue (ft)	172	212	196	66	91	116	114	134	147	25	174	195
Average Queue (ft)	83	125	120	24	51	63	24	39	68	- 2	119	145
95th Queue (ft)	162	175	196	64	87	103	79	98	133	12	169	198
Link Distance (ft)		895		999			527	527	527		985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		1	0									
Queuing Penalty (veh)		7	1									

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB	SB					
Directions Served	Т	R				 	<u>pitettin minin</u>
Maximum Queue (ft)	221	256					
Average Queue (ft)	151	89					
95th Queue (ft)	197	183					
Link Distance (ft)	985	985					
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	545	204	215	251	175	53	73	67	161	
Average Queue (ft)	323	98	111	124	114	24	19	27	61	
95th Queue (ft)	514	164	191	213	179	56	55	63	128	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				1	1					
Queuing Penalty (veh)				4	3					

Network Summary

Network wide Queuing Penalty: 15

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	र्स	۴		ф.		ኻኻ	<u> </u>		ሻ	***	۴
Volume (vph)	280	4	160	4	0	2	300	780	4	5	1860	520
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1689	1583		1722		3433	5074		1787	5136	1599
Flt Permitted	0.95	0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1689	1583		1722		3433	5074		1787	5136	1599
Peak-hour factor, PHF	0.84	0.50	0.82	0.50	0.35	0.50	0.75	0.94	0.33	0.31	0.94	0.96
Adj. Flow (vph)	333	8	195	8	0	4	400	830	12	16	1979	542
RTOR Reduction (vph)	0	0	170	0	4	0	0	1	0	0	0	202
Lane Group Flow (vph)	170	171	25	0	8	0	400	841	0	16	1979	340
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4									2
Actuated Green, G (s)	18.3	18.3	18.3		2.0		24.4	88.8		2.4	66.8	66.8
Effective Green, g (s)	18.3	18.3	18.3		2.0		24.4	88.8		2.4	66.8	66.8
Actuated g/C Ratio	0.13	0.13	0.13		0.01		0.17	0.63		0.02	0.48	0.48
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	220	221	207		25		598	3218		31	2451	763
v/s Ratio Prot	0.10	c0.10			c0.00		c0.12	0.17		0.01	c0.39	
v/s Ratio Perm			0.02									0.21
v/c Ratio	0.77	0.77	0.12		0.32		0.67	0.26		0.52	0.81	0.45
Uniform Delay, d1	58.8	58.8	53.8		68.3		54.0	11.2		68.2	31.1	24.3
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	15.4	15.4	0.3		7.4		2.8	0.2		13.7	3.0	1.9
Delay (s)	74.3	74.3	54.0		75.7		56.9	11.4		82.0	34.1	26.2
Level of Service	Ε	E	D		Ε		Е	В		F	С	С
Approach Delay (s)		66.9			75.7			26.1			32.7	
Approach LOS		::::::::::::::::::::::::::::::::::::::			E			С			С	
Intersection Summary												
HCM Average Control Delay		in di	35.2	ŀ	ICM Leve	el of Servic	е		D			
HCM Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			140.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization			73.1%	10	CU Level	of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

Queuing and Blocking Report TF Commuter PM Peak Hour 2020 - 6 Lane US 1

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LR	L	L	Т	Т	TR	L	Т	T
Maximum Queue (ft)	153	221	172	30	221	237	88	138	174	45	406	446
Average Queue (ft)	88	138	88	7	123	135	43	62	89	10	283	306
95th Queue (ft)	143	195	144	27	197	205	82	130	180	32	430	436
Link Distance (ft)		895		999			527	527	527		985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		2									16	
Queuing Penalty (veh)		5									1	

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB	SB					
Directions Served	Т	R					
Maximum Queue (ft)	430	229					
Average Queue (ft)	313	103					
95th Queue (ft)	435	185					
Link Distance (ft)	985	985					
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	681	228	224	379	175	96	88	74	116	
Average Queue (ft)	383	116	127	133	118	50	22	31	64	
95th Queue (ft)	584	205	204	274	183	89	67	67	118	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)	1									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				5	0					
Queuing Penalty (veh)				31	1					

Network Summary

Network wide Queuing Penalty: 38

Enon Road Operational Study Bowman Consulting (Job #9377-01-001)

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10/2/2012

October 2012

APPENDIX H2 2035 FORECASTED PEAK HOUR ANALYSIS WORKSHEETS

Bowman

HCM Signalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/2/2012

		\mathbf{i}	*	- 4	1	M	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	*	۴	ሻ	र्स	ሻ	7	
Volume (vph)	500	108	690	160	38	289	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Util. Factor	1.00	1.00	0.95	0.95	1.00	1.00	
Frt	1.00	0.85	1.00	1.00	1.00	0.85	
Flt Protected	1.00	1.00	0.95	0.97	0.95	1.00	
Satd. Flow (prot)	1863	1583	1681	1708	1770	1583	
Flt Permitted	1.00	1.00	0.95	0.97	0.95	1.00	
Satd. Flow (perm)	1863	1583	1681	1708	1770	1583	
Peak-hour factor, PHF	0.78	0.50	0.44	0.64	0.67	0.65	
Adj. Flow (vph)	641	216	1568	250	57	445	
RTOR Reduction (vph)	0	53	0	0	0	417	
Lane Group Flow (vph)	641	163	909	909	57	28	
Turn Type		Perm	Split			Perm	
Protected Phases	4		8	8	2		
Permitted Phases		4				2	
Actuated Green, G (s)	66.0	66.0	105.1	105.1	12.2	12.2	
Effective Green, g (s)	66.0	66.0	105.1	105.1	12.2	12.2	
Actuated g/C Ratio	0.34	0.34	0.55	0.55	0.06	0.06	
Clearance Time (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	639	543	919	933	112	100	
v/s Ratio Prot	c0.34		c0.54	0.53	c0.03		
v/s Ratio Perm		0.10				0.02	
v/c Ratio	1.00	0.30	0.99	0.97	0.51	0.28	
Uniform Delay, d1	63.2	46.2	43.0	42.3	87.2	85.9	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	36.4	0.3	26.7	23.2	3.6	1.6	
Delay (s)	99.5	46.5	69.7	65.5	90.8	87.4	
Level of Service	F	D	Е	Е	F	F	
Approach Delay (s)	86.2			67.6	87.8		Historia de Lore de la companya de la company
Approach LOS	F			E	F		
Intersection Summary							
HCM Average Control Delay			75.8	Н	ICM Leve	l of Service	E
HCM Volume to Capacity rat	io		0.96			ini a stat	
Actuated Cycle Length (s)			192.3	S	um of los	t time (s)	9.0
Intersection Capacity Utilizat	ion		63.0%		CU Level	of Service	${}_{\mathrm{B}}$, and ${}_{\mathrm{B}}$, and ${}_{\mathrm{B}}$, where ${}_{\mathrm{B}}$, ${}_{\mathrm{B}$, ${}_{\mathrm{B}}$, ${}_{\mathrm{B}}$, ${}_{\mathrm{B}}$, ${}_{\mathrm{B}}$, ${}_{\mathrm{B}}$, ${}_{\mathrm{B}}$, ${$
Analysis Period (min)			15				
c Critical Lane Group		in the test					

	٨		\mathbf{i}	¥	4	×.	*	1	M	1	Ļ	-
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ኻ	र्स	ሻ		\$		ኻኻ	<u> </u>		ሻ	***	7
Volume (vph)	540	2	260	3	21	11	640	1960	16	1	520	180
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
FIt Protected	0.95	0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1633	1638	1429		1667		3335	5068		1770	5085	1568
Flt Permitted	0.95	0.95	1.00		1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1633	1638	1429		1667		3335	5068		1770	5085	1568
Peak-hour factor, PHF	0.90	0.90	0.90	0.38	0.35	0.25	0.90	0.92	0.33	0.25	0.90	0.90
Adi. Flow (vph)	600	2	289	8	60	44	711	2130	48	4	578	200
RTOR Reduction (vph)	0	0	231	0	18	0	0	1	0	0	0	148
Lane Group Flow (vph)	300	302	58	0	94	Ō	711	2177	Ő	4	578	52
Heavy Vehicles (%)	5%	2%	13%	20%	10%	2%	5%	2%	2%	2%	2%	3%
Turn Type	Split	vi alter	Perm	Split			Prot			Prot		Perm
Protected Phases	4	4	onn	3	3		1	ß		5	2	a a oùn
Permitted Phases		e e se	4	, in the second s			a da se			Ŭ	_)
Actuated Green, G (s)	26.2	26.2	26.2		89		32.3	65.2		12	34.1	3/1 1
Effective Green, g (s)	26.2	26.2	26.2		89		32.3	65.2		1.2	34.1	34.1
Actuated g/C Ratio	0.20	0.20	0.20		0.07		0.25	0.50		0.01	0.26	0.26
Clearance Time (s)	7.0	7.0	7.0		7 0		7.0	7.5		7.0	75	75
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grn Can (vnh)	329	330	288		114		829	25/2		16	133/	111
v/s Ratio Prot	0.18	c0 18	200		c0.06		c0 21	c0 43		0.00	0.11	2 2 4 1 1
v/s Ratio Perm	0.10	00.10	0.04		00.00		00.21	00.40		0.00	0.11	0.03
v/c Ratio	0.91	0.92	0.20		0.83		0.86	0.86		0.25	0.43	0.00
Uniform Delay d1	50.8	50.8	43.2		59.8		46.7	28.3		64.0	30.40	36.6
Progression Factor	1 00	1 00	1.00		1 00		1 00	1 00		1 00	1.00	1 00
Incremental Delay d2	28.3	28.7	0.3		36.6		87	1.00		8.1	1.00	1.00
Delay (s)	79.1	79.5	43.5		96.4		55.4	32.3		72.0	40.9	37.2
Level of Service	F	F	10.0		F		F	02.0 C		, 2.0 F	-0.5 D	07.2 D
Approach Delay (s)		67 7	2		96.4		· · ·	38.0		t i g t h an	40.1	
Approach LOS		E			F			D			-0.1 D	
Intersection Summary												
HCM Average Control Delay			45.4	H	CM Leve	l of Servic	е		D			
HCM Volume to Capacity rati	0		0.91									
Actuated Cycle Length (s)			130.0	S	um of los	t time (s)			28.5			
Intersection Capacity Utilizati	on		82.8%	IC	U Level	of Service			Е			
Analysis Period (min)			15									
c Critical Lane Group												

TF AM Peak Hour 2035 Bowman Consulting (Job #9377-01-001)

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Queuing and Blocking Report TF AM Peak Hour 2035

10/2/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	EB	EB	WB	WB	NB	NB	
Directions Served	Т	R	L	LT	L	R	
Maximum Queue (ft)	2022	225	621	637	274	510	
Average Queue (ft)	1985	135	564	570	103	282	
95th Queue (ft)	2200	273	682	688	250	493	
Link Distance (ft)	2007		606	606		1071	
Upstream Blk Time (%)	51		9	13			
Queuing Penalty (veh)	0		60	83			
Storage Bay Dist (ft)		200			250		
Storage Blk Time (%)	60	0				14	
Queuing Penalty (veh)	129	0				8	

Intersection: 2: Enon Road & Porter Lane

Movement	EB	WB	WB	NB	
Directions Served	TR	LT	Т	LR	
Maximum Queue (ft)	73	204	263	51	
Average Queue (ft)	9	94	105	11	
95th Queue (ft)	48	205	247	39	
Link Distance (ft)	606	895	895	891	
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)					
Storage Blk Time (%)					
Queuing Penalty (veh)					

Queuing and Blocking Report TF AM Peak Hour 2035

10/2/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	Ĺ	L	Т	Т	TR	L	T	T
Maximum Queue (ft)	524	895	300	180	533	494	577	719	720	26	174	222
Average Queue (ft)	268	351	156	108	280	298	367	462	504	6	115	125
95th Queue (ft)	469	730	329	167	421	439	580	699	720	22	167	186
Link Distance (ft)		895		999			4352	4352	4352		985	985
Upstream Blk Time (%)		0										
Queuing Penalty (veh)		5										
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		32	0		0	1	4					
Queuing Penalty (veh)		189	0		1	6	27					

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB	SB								
Directions Served	Т	R						 	 	
Maximum Queue (ft)	236	127								
Average Queue (ft)	142	57								
95th Queue (ft)	205	95								
Link Distance (ft)	985	985								
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)										
Storage Blk Time (%)										
Queuing Penalty (veh)										

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	700	239	282	428	175	74	53	54	119	
Average Queue (ft)	684	138	154	188	154	41	28	39	70	
95th Queue (ft)	695	212	226	357	210	69	51	65	110	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)	55									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				4	9					
Queuing Penalty (veh)				26	23					

Network Summary

Network wide Queuing Penalty: 557

HCM Unsignalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/2/2012

		\mathbf{F}	¥		1	M	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	۴	7	ሻ	ŕ	ሻ	ሻ	
Volume (veh/h)	140	37	90	420	93	438	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph)	175	80	108	506	150	811	
Pedestrians							
Lane Width (ft) Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type	None		10221	None		na para ara	
Median storage veh)							
Upstream signal (ft)						ananan (
pX, platoon unblocked							
vC, conflicting volume			255	And And	898	175	
vC1, stage 1 conf vol						s an bol a sama dan bir sa ang ang ang ang ang ang ang ang ang an	
vC2, stage 2 conf vol						660.000	
vCu, unblocked vol			255	de (de um 5 de autoritante de la président de la construction de la constru	898	175	
tC, single (s)			4.1	<u>Repres</u>	6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			92		47	7	
cM capacity (veh/h)			1310		284	868	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	
Volume Total	175	80	108	506	150	811	
Volume Left	0	0	108	0	150	0	
Volume Right	0	80	0	0	0	811	
cSH	1700	1700	1310	1700	284	868	
Volume to Capacity	0.10	0.05	0.08	0.30	0.53	0.93	
Queue Length 95th (ft)	0	0	7	0	72	356	
Control Delay (s)	0.0	0.0	8.0	0.0	31.0	38.6	
Lane LOS			Α		D	Е	
Approach Delay (s)	0.0		1.4		37.4		
Approach LOS					E		
Intersection Summary							
Average Delay			20.1				
Intersection Capacity Utiliz	ation		41.2%		CU Level	of Servic	e data a bara ta ante A contrata da ante a contrata da a
Analysis Period (min)			15				
			en e e e e e e	A States		4 N. B. B. B.	
HCM Signalized Intersection Capacity Analysis 3: Enon Road & U.S. Route 1

Enon Road Operational Study 10/2/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	र्भ	*		ф.		ኻኻ	<u> </u>		ሻ	***	۴
Volume (vph)	200	1	360	5	4	4	140	780	4	2	1100	380
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.91	1.00
Frt	1.00	1.00	0.85		0.95		1.00	1.00		1.00	1.00	0.85
Flt Protected	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1588	1594	1495		1474		3273	4838		1719	4940	1538
Flt Permitted	0.95	0.95	1.00		0.98		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1588	1594	1495		1474		3273	4838		1719	4940	1538
Peak-hour factor, PHF	0.62	0.25	0.79	0.38	0.35	0.25	0.69	0.92	0.33	0.25	0.74	0.87
Adj. Flow (vph)	323	4	456	13	11	16	203	848	12	8	1486	437
RTOR Reduction (vph)	0	Ö	256	0	15	0	0	1	0	0	0	175
Lane Group Flow (vph)	165	162	200	0	25	0	203	859	0	8	1486	262
Heavy Vehicles (%)	8%	8%	8%	20%	20%	20%	7%	7%	7%	5%	5%	5%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	, on the
Permitted Phases			4							a se T	0.005	2
Actuated Green, G (s)	28.0	28.0	28.0		6.1		19.8	91.2		1.2	72.6	72.6
Effective Green, g (s)	28.0	28.0	28.0		6.1		19.8	91.2		1.2	72.6	72.6
Actuated g/C Ratio	0.18	0.18	0.18		0.04		0.13	0.59		0.01	0.47	0.47
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	287	288	270		58		418	2847		13	2314	720
v/s Ratio Prot	0.10	0.10			c0.02		c0.06	0.18		0.00	c0.30	1 = 0
v/s Ratio Perm			c0.13									0.17
v/c Ratio	0.57	0.56	0.74		0.42		0.49	0.30		0.62	0.64	0.36
Uniform Delay, d1	58.1	57.9	60.0		72.7		62.9	16.0		76.7	31.3	26.4
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1 00
Incremental Delay, d2	2.8	2.5	10.1		4.9		0.9	0.3		64.0	1.4	1.4
Delay (s)	60.8	60.4	70.2		77.7		63.8	16.2		140.7	32.7	27.8
Level of Service	Е	E	E		E		Е	В		F	С	C
Approach Delay (s)		66.2			77.7			25.3			32.0	· ·
Approach LOS		E			E			C			С	
Intersection Summary												
HCM Average Control Delay			37.7	ŀ	ICM Leve	el of Servio	ce		D			
HCM Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			155.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization			65.6%	ļ	CU Level	of Service	Э		C			
Analysis Period (min)			15									
c Critical Lane Group												

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	
Directions Served	L	L	R	
Maximum Queue (ft)	50	93	142	
Average Queue (ft)	14	43	81	
95th Queue (ft)	42	74	124	
Link Distance (ft)	606		1071	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement	WB	WB	NB	
Directions Served	LT	Т	LR	
Maximum Queue (ft)	72	76	28	
Average Queue (ft)	9	5	4	
95th Queue (ft)	42	36	19	
Link Distance (ft)	895	895	891	
Upstream Blk Time (%)) is hereit			
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report TF School PM Peak Hour 2035

10/2/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LTR	L	L	Т	Т	TR	L	Т	Т
Maximum Queue (ft)	155	232	197	52	114	110	135	266	271	25	339	436
Average Queue (ft)	70	122	100	10	71	71	56	79	112	5	195	224
95th Queue (ft)	147	198	168	37	106	110	130	188	219	19	321	385
Link Distance (ft)		895		999			527	527	527		985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		1	0								5	
Queuing Penalty (veh)		5	1								0	

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB	SB				
Directions Served	Т	R				
Maximum Queue (ft)	441	155				
Average Queue (ft)	246	90				
95th Queue (ft)	406	164				
Link Distance (ft)	985	985				
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)						
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	669	202	240	323	175	75	52	76	99	
Average Queue (ft)	420	120	133	177	123	38	28	38	66	
95th Queue (ft)	661	188	218	307	200	83	48	77	98	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)	0									
Queuing Penalty (veh)	0									
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				5	2					
Queuing Penalty (veh)				33	5					

Network Summary

Network wide Queuing Penalty: 44

HCM Unsignalized Intersection Capacity Analysis 1: Enon Road & Stafford Indians Lane

Enon Road Operational Study 10/3/2012

		\mathbf{i}	1	-	1	M	
Movement	EBT	EBR	WBL	WBT	NBL	NBR	
Lane Configurations	1	*	٣	个	ሻ	*ז	
Volume (veh/h)	420	37	117	800	29	82	
Sign Control	Free			Free	Stop		
Grade	0%			0%	0%		
Peak Hour Factor	0.80	0.46	0.83	0.83	0.62	0.54	
Hourly flow rate (vph) Pedestrians	525	80	141	964	47	152	
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (ven)	Nana			Mana			
Median storage yeb	None			None			
Unetream signal (ff)							
nX nlatoon unblocked							
vC conflicting volume			605		1771	525	
vC1_stage 1 conf vol			000		1. 1 . 1 . 1	020	
vC2, stage 2 conf vol							
vCu, unblocked vol			605		1771	525	
tC, sinale (s)			4.1		6.4	6.2	
tC, 2 stage (s)							
tF (s)			2.2		3.5	3.3	
p0 queue free %			86		40	73	
cM capacity (veh/h)			973		78	552	
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	
Volume Total	525	80	141	964	47	152	
Volume Left	0	0	141	0	47	0	
Volume Right	0	80	0	0	0	152	
cSH	1700	1700	973	1700	78	552	
Volume to Capacity	0.31	0.05	0.14	0.57	0.60	0.27	
Queue Length 95th (ft)	0	0	13	0	67	28	
Control Delay (s)	0.0	0.0	9.3	0.0	103.9	14.0	
Lane LOS			A			В	
Approach LOS	0.0		1.2		35.2 E		
Intersection Summary							
Average Delay			4.3				
Intersection Capacity Utilization	ation		52.1%		CU Level	of Servic	${f e}$, the formula of the formula of ${f A}$, the formula of the formula o
Analysis Period (min)			15				

HCM Signalized Intersection Capacity Analysis 3: Enon Road & U.S. Route 1

Enon Road Operational Study 10/3/2012

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	ሻ	र्स	ሻ		4		ኻኻ	<u> </u>		ሻ	***	7
Volume (vph)	320	4	180	4	0	2	340	1060	4	5	2500	600
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Lane Util. Factor	0.95	0.95	1.00		1.00		0.97	0.91		1.00	0.91	1.00
Frt State State State	1.00	1.00	0.85		0.96		1.00	1.00		1.00	1.00	0.85
FIt Protected	0.95	0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1681	1689	1583		1722		3433	5077		1787	5136	1599
Flt Permitted	0.95	0.95	1.00		0.97		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1681	1689	1583		1722		3433	5077		1787	5136	1599
Peak-hour factor, PHF	0.84	0.50	0.82	0.50	0.35	0.50	0.75	0.94	0.33	0.31	0.94	0.96
Adj. Flow (vph)	381	8	220	8	0	4	453	1128	12	16	2660	625
RTOR Reduction (vph)	0	0	145	0	4	0	0	1	0	0	0	193
Lane Group Flow (vph)	194	195	75	0	8	0	453	1139	0	16	2660	432
Heavy Vehicles (%)	2%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	1%
Turn Type	Split		Perm	Split			Prot			Prot		Perm
Protected Phases	4	4		3	3		1	6		5	2	
Permitted Phases			4							a de la		2
Actuated Green, G (s)	20.9	20.9	20.9		2.0		19.3	86.2		2.4	69.3	69.3
Effective Green, g (s)	20.9	20.9	20.9		2.0		19.3	86.2		2.4	69.3	69.3
Actuated g/C Ratio	0.15	0.15	0.15		0.01		0.14	0.62		0.02	0.50	0.50
Clearance Time (s)	7.0	7.0	7.0		7.0		7.0	7.5		7.0	7.5	7.5
Vehicle Extension (s)	3.0	3.0	3.0		3.0		3.0	3.0		3.0	3.0	3.0
Lane Grp Cap (vph)	251	252	236		25		473	3126		31	2542	792
v/s Ratio Prot	0.12	c0.12			c0.00		c0.13	0.22		0.01	c0.52	
v/s Ratio Perm			0.05									0.27
v/c Ratio	0.77	0.77	0.32		0.32		0.96	0.36		0.52	1.05	0.55
Uniform Delay, d1	57.3	57.3	53.2		68.3		59.9	13.3		68.2	35.4	24.5
Progression Factor	1.00	1.00	1.00		1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	13.7	13.7	0.8		7.4		30.5	0.3		13.7	31.5	2.7
Delay (s)	71.0	71.0	54.0		75.7		90.4	13.7		82.0	66.8	27.1
Level of Service	E	Е	D		Ë		F	В		F	E	С
Approach Delay (s)		64.9			75.7			35.5			59.4	
Approach LOS		E			E			D			E	
Intersection Summary												
HCM Average Control Delay			53.1	F	ICM Leve	of Service	ce		D			
HCM Volume to Capacity ratio	C		0.97									
Actuated Cycle Length (s)			140.0	S	Sum of los	st time (s)			28.5			
Intersection Capacity Utilization	on		88.1%	10	CU Level	of Service	e		E			
Analysis Period (min)			15									

С Critical Lane Group

TF Commuter PM Peak Hour 2035 Bowman Consulting (Job #9377-01-001) Synchro 7 - Report Page 3

Queuing and Blocking Report TF Commuter PM Peak Hour 2035

10/3/2012

Intersection: 1: Enon Road & Stafford Indians Lane

Movement	WB	NB	NB	
Directions Served	L	L	R	
Maximum Queue (ft)	55	50	78	
Average Queue (ft)	28	25	31	
95th Queue (ft)	54	53	60	
Link Distance (ft)	606		1071	
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250		
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 2: Enon Road & Porter Lane

Movement	WB	NB)	
Directions Served	LT	LR	R	
Maximum Queue (ft)	118	30) 정보 전문 가는 물 문 문 문 것을 다 같은 물 문 문 문 감 같 수 있는 것	
Average Queue (ft)	8	2		
95th Queue (ft)	57	14		
Link Distance (ft)	895	891		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Queuing and Blocking Report TF Commuter PM Peak Hour 2035

10/3/2012

Intersection: 3: Enon Road & U.S. Route 1

Movement	EB	EB	EB	WB	NB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	LT	R	LR	L	L	Т	Т	TR	L	Т	Т
Maximum Queue (ft)	159	206	220	30	221	224	119	169	300	47	525	508
Average Queue (ft)	89	153	97	13	154	164	65	101	160	9	455	460
95th Queue (ft)	140	208	174	34	211	230	120	160	243	37	588	577
Link Distance (ft)		895		999			527	527	527		985	985
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500		200		400	400				225		
Storage Blk Time (%)		3	2								29	
Queuing Penalty (veh)		9	5								(1) (1	

Intersection: 3: Enon Road & U.S. Route 1

Movement	SB	SB					
Directions Served	Т	R					
Maximum Queue (ft)	553	538					
Average Queue (ft)	467	201					
95th Queue (ft)	577	481					
Link Distance (ft)	985	985					
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 5: Centreport Pkwy & U.S. Route 1

Movement	WB	NB	NB	NB	NB	SB	SB	SB	SB	
Directions Served	LR	Т	Т	Т	R	L	Т	Т	Т	
Maximum Queue (ft)	472	162	233	282	175	94	51	53	97	
Average Queue (ft)	356	117	132	171	156	37	17	29	58	
95th Queue (ft)	509	171	214	283	211	71	48	62	84	
Link Distance (ft)	666	985	985	985			1764	1764	1764	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)					150	350				
Storage Blk Time (%)				4	7					
Queuing Penalty (veh)				23	17					

Network Summary

Network wide Queuing Penalty: 54

APPENDIX I

TURN LANE WARRANT ANALYSIS WORKSHEETS

Bowman

Job # 9377-01-001



Intersection:Enon Road/Stafford Indians LaneApproach:Eastbound RightSceanrio:Existing (2012)Speed Limit:40 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	352	222
Right Turns	104	7
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A



Intersection:Enon Road/Stafford Indians LaneApproach:Eastbound RightSceanrio:Total Future (2020)Speed Limit:40 mph

	AM Peak Hour	PM Peak Hour
Approaching Volume	528	397
Right Turns	108	37
Right Turn Adjustment:	No	No
Adjusted Right Turns:	N/A	N/A

POTENTIAL SMART SCALE PROJECT MINE ROAD PARK & RIDE EXPANSION

2017E884 MME 20



FOOTPRINT OF PROPOSED PARKING LOT ON STAFFORD COUNTY TAX MAP

SALISBURY DR

200'

SCALE

CONCEPTUAL

EXISTING MINE ROAD PARK & RIDE

Improvements: Brooke & Leeland – Leeland Station Parking Expansion

7 Spaces is near

.ot = 150 Spaces is 25% full, and is dopment

R [] [

1 use 3 acres owned provide about 225 s for about \$5 Million



Stafford Comprehensive Road Study

- Board members have expressed an interest in performing a comprehensive evaluation of our roads in the County for the purpose of assessing current performance and to develop a data driven priority for the allocation of scarce transportation funding
- The most recent example of a similar study was the Youth Driver Task Force, which formed the basis for the projects recommended for funding in the 2008 Transportation Bond Referendum
- Many of the projects identified in that study were subsequently funded and completed, and two others (Brooke Road and Poplar Road south of Mountain View Road) are scheduled to be under construction this year
- Since that study, transportation projects have been identified by the use of traffic studies with a more narrow focus. Examples include the 2nd Route 1 turn lane onto Garrisonville Road, the Courthouse Area improvements and the Enon Road project
- Although a comprehensive analysis of the many roads in the County is a significant undertaking, much of the information necessary for this study is currently available, including:
 - o 2016 traffic count data for over 2,200 locations
 - o Level of service data for over 1,100 roads/road segments
 - Crash statistics throughout the County from both VDOT and the Stafford Sheriff's Office
 - o Information from a similar study completed by Spotsylvania County
- Successful completion of an effort on this scale will require establishment of a study group which could consist of Board members, County staff, representatives from the Sheriff's Office, VDOT, public schools staff, and possibly outside consultants. Among other tasks, this group would establish the study scope and goals, evaluation criteria, data requirements, and scoring matrix.
- Although no funding is included in the existing or proposed budget for this study, it could be completed largely (or entirely) with County staff and resources, along with volunteer efforts, and therefore require little or no additional funding
- If the Board desires to conduct a comprehensive study of County roads, it may wish to formally commission the effort, thereby providing the mandate to solicit interagency assistance

FY2019 Secondary Six Year Plan

- Each year, the Board adopts a Secondary Six Year Plan (SSYP) funding strategy following a joint public hearing with District VDOT staff
- County staff has met with our local VDOT representatives to prepare a draft funding plan for consideration. There are several areas of the SSYP still in development; however, staff believes that input from Board members would be very helpful at this stage
- Funding is provided by the distribution of Telefees (charges to communication companies for the use of VDOT right of way for location of communication cables), along with state funding for paving unpaved state roads. Expected funding is provided below

Telefees	\$427,036
Unpaved Road Funds	<u>\$ 41,018</u>
TOTAL	\$468,054

In addition, \$349,458 would be transferred from a completed project in Stafford County

- For the next fiscal year, FY2019, staff is proposing to continue funding for a project currently underway, and to begin addressing secondary road safety issues, as noted below:
 - o Provide \$435,160 for the Courthouse Road Widening Project
 - Provide \$109,200 to pave the end of Quarry Road, an unpaved state maintained road
 - Provide \$150,000 for drainage improvements on Telegraph Road, although these funds are placed in one of the general SSYP categories
 - o \$42,738 is applied to fund shoulder wedge improvements where needed
 - Provide \$39,396 for traffic calming and cut through measures in qualifying neighborhoods
 - The unpaved road funding in the amount of \$41,018 would be applied towards the next unpaved state road on the priority list, Brent Point Road
- Other recommendations for future SSYP funding are as follows:
 - Begin funding safety improvements to rural secondary roads with high traffic volumes and high crash rate
 - Remove funding for the private portion of Raven Road. Two property owners have expressed opposition to having this private road made public, increasing the likelihood that condemnation actions would be required. Condemnations aren't eligible for SSYP funding
 - Maintain funding for repaying of the state maintained section of Raven Road to provide improved access to Crow's Nest
 - o Continue funding for qualifying neighborhood traffic safety initiatives
- The draft FY2019 SSYP is attached showing suggested funding through FY2024
- Following committee input, staff will request Board authorization at the March 20 meeting for a joint public hearing with VDOT staff, with the public hearing tentatively scheduled for April 17

			Second	ary Six Y	ear Plan	Summar	ry							
Projects	Estimated Cost	Previous Funding	Additional Funding Needed	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	Balance to Complete	Total Project Funding	Scope of Work		
Poplar Road														
From: 0.08 Miles North West of Intersection of Route 616 & Route 627	2,021,621	2,021,621	-	-		-	-	-		-	2,021,621	Safety Improvement		
To: 0.27 Miles South of Intersection of Route 616 & Route 627														
Courthouse Road												Beconstruction with		
From: 0.10 Miles West of Route 628	35,966,920	35,209,947	756,973	435,160	321,813	-	-	-		-	35,966,920	Added Capacity		
To: 0.22 Miles West of Route 732														
Quarry Road														
From: 0.75 Miles South of Intersection with Route 658	109,200	-	109,200	109,200	-	-	-	-		-	109,200	Resurfacing Unpaved State Road		
To: Dead End														
Juggins Road												Reconstruction and		
From: End of State Maintenance	2,253,905	2,253,905	-	-	-	-	-	-		-	2,253,905	Paving Unpaved State		
To: 0.28 Miles North of Route 659 Doc Stone Road												Road		
Raven Road - Phase 2 (0.311 miles)														
From: 0.31 Miles South of Brooke Road	110,000	110,000	-	-	-	-		-		-	110,000	Resurfacing		
To: Brooke Road (north intersection)														
Brent Point Road (1.78 miles)														
From: Intersection of 635 Decatur Rd	373,800	-	373,800	41,018	42,112	55,351	32,766	42,439	42,439	117,675	256,125	Resurfacing Unpaved State Road		
To: Intersection of 633 Arkendale Rd														
Maintenance Paving (Subdivisions)	TBD	308,472	TBD	42,738	-	183,536	379,300	429,132	429,132	TBD	1,772,310	TBD Misc. Paving		
Resurfacing existing subdivision roads												Locadona		
Countywide Traffic Services	TBD	115,866	-	39,396	66,789	50,000	22,036	50,000	50,000	-		Neighborhood Sefety		
Services include neighborhood traffic calming and cut through measures, speed & traffic studies, & signage improvements											394,087	Iniiatives		
Countywide Rural	TBD	-		-	-	-	-	-	-	TBD	-	Safety Enhancement		
Reconstruction without added capacity												Without Added Capacity		
Countywide Right-of-Way	TBD	705	TBD	150,000	-	-	-	-		TBD	150,705	Right-of-Way Acquisition		
Use when impractical to open a project: Attorney Fees & Acquisition Cost														
Countywide Engineering & Survey	TBD	48,629	TBD	-	-	-	-	-		TBD	48 620	Proliminant Engineering		
Minor Survey & Preliminary Engineering for Budget Items & Incidental Type Work											40,029	Lienunsia Endineeuud		
Total	\$ 44,201,572	\$ 40,069,145	4,132,427	\$ 817,512	\$ 430,714	\$ 288,887	\$ 434,102	\$ 521,571	\$ 521,571	\$ 949,675	\$ 45,531,869			

Funding Sources	FY2019	FY2020	FY2021	FY2022	FY2023	FY2024	Later Years Funding	Total Project Cost
CTB Formula/HB 1887 DGP- Unpaved State Roads	41,018	42,112	-	-	-			150,765
TeleFee	427,036	427,036	427,036	427,036	479,132	479,132		3,093,444
District Grant - Unpaved	-	-	55,351	32,766	42,439	42,439		172,995
Prior Year Savings	349,458							
Total Funding Sources Identified	\$ 817,512	\$ 469,148	\$ 482,387	\$ 459,802	\$ 521,571	\$ 521,571	\$-	\$ 3,244,209

Brooke Road Project Update

- The Brooke Road Safety Improvement Project was one of the road improvements recommended by the Youth Driver Task Force. The project was initiated in 2012.
- The project was first advertised in March 2017 with bids received in July 2017. The lowest bid received was approximately \$6 million dollars which was \$1.5 million above the Engineer's Estimate and exceeded available project funding.
- After speaking with the contractors who provided bids, the County was informed that the restrictions on allowable lane closure hours and the timing of the advertisement were the main reasons bids were so high.
- County staff worked with VDOT to increase the allowable lane closure hours, increasing the time the contractor was allowed to work in the road from 6 hours per day (9AM 3:30 PM) to 10 hours per day (9AM 7PM).
- The extension of allowable lane closure hours was also coordinated with Stafford Schools.
- The Brooke Road Improvement Project was re-advertised in December 2017 and bids were received on February 22, 2018.
- The Board also approved a request for an additional \$900,000 in FY2019 Revenue Sharing Funds, matched with \$900,000 in local funds, for \$1.8 million in total additional funding.
- Three bids were received ranging from \$5,185,333 to \$5,599,997, with the apparent low bid submitted by Branch Civil.
- Construction Engineering & Inspection (CEI) services are also required, and a proposal in the amount of \$737,346 has been received for these services. A table showing project expenses and funding is provided below.

Expenses		Funding	
Engineering & Design	\$1,108,272	Fuels Tax	\$ 114,485
Right of Way Acquisition	\$966,970	Revenue Sharing	\$ 4,507,363
Construction Engineering & Inspection	\$787,346	Proffers	\$ 279,300
Construction	\$5,185,333	General Fund	\$ 2,850,000
Contingency	\$970,805	Impact Fees	\$ 1,267,578
TOTAL	\$9,018,726	TOTAL	\$ 9,018,726

- Although the contingency amount of nearly \$1 million is well in excess of that normally budgeted, staff recommends leaving this funding on the project until completion next year. The Board can take action then to request any remaining balance of revenue sharing funds be applied to another project, if needed, along with the matching County funding.
- County staff recommends proceeding with awarding the construction contract to Branch Civil and the CEI contract to AMT, and is prepared to bring the matter to the Board at their March 20th meeting.

Garrisonville Road Traffic Signal

- The Board rezoned a 45 acre parcel belonging to on Garrisonville Road to PTND in 2015 to allow for a mixed use development
- The site plan for this development included a signalized intersection at the main entrance to the development directly across Garrisonville Road from Travis Lane
- There was substantial coordination between the County, our contractor for the Garrisonville Road Widening Project (Branch Civil), and the Pence Group regarding the timing and responsibility for these improvements
- Branch completed major improvements at the entrance of this proposed development, while the traffic signal remained the responsibility of Pence
- The intersection is structurally complete, although there are cones blocking left turns from Travis Lane east onto Garrisonville Road. Staff does not feel this is a safe condition, and completion of the signalization is highly desirable
- Pence has determined that a small area on the northwest corner of the new intersection belonging to the Jaffe Group will require an easement to allow the signal installation
- There have been repeated attempts to acquire the easement amicably, with the most recent Pence offer of \$34,000, and the Jaffe Group counteroffer of \$48,000.
- Pence has indicated they are unwilling to increase their offer, and inquired about the County's willingness to use condemnation authority to acquire the easement
- The County has agreed to the use of condemnation authority where it was deemed to be in the public interest, staff has found this to be an expensive process which can continue for years
- Staff recommends the Board recognize the safety and economic benefits of a quick resolution to this matter, and consider funding the \$14,000 separating the two parties; thereby allowing for a faster, amicable settlement
- With the concurrence of the Board, staff will identify an appropriate account for this effort and work to facilitate a settlement between the Pence Group and the Jaffe Group for the required signal easement

Tiered Rates

- Board approved Ordinance O05-09 established the tiered rate system beginning January 1, 2006.
- Tiered Rates were set up to encourage conservation of water and avoid unnecessary capacity improvements at the treatment facilities
 - Peak Day Flows are used to determine necessary plant capacity
 - Summertime produces peak water flows due to lawn watering, car washes, pool fills, etc.
- Tiered Rates were effective to reduce Peak Day demands by roughly 3MGD, allowing Utility Funds to be focused towards needed Capital, Operational and Economic Development projects
- The Lake Mooney Water Treatment Facility, which was brought on line in 2014, has expanded our treatment capacity; however, a significant increase in peak day demand may cause the health department to require expansion of the facilities 5-10 years earlier than currently projected on the CIP and Master Plan.
- Utilities customers have raised concerns over the tiered rates particularly from new homeowners who are seeking to establish lawns (i.e. sod)
- The Board asked that the Utilities Commission to consider the tiered rates and make recommendations
- On February 13, 2018, staff presented to the Utilities Commission (UC) a comparative rate analysis of the surrounding Counties (Attached). The analysis shows that Stafford rates are very competitive however some of our customers have shared concerns that they are receiving high bills when they must use large amounts of water due to the requirement to have sod.
- County Code requires sod to be placed on all new residential lots less than 30,000 SF in size. Often builders will place the sod just before obtaining the occupancy permit/closing without properly establishing the sod with water. New sod can take 2 weeks to "knit" and up to 6 weeks to establish deep roots, making the first month critical to proper establishment
- 2017 Statistical Data was provided to the UC for their consideration:
 - On average 96% of all accounts fell between Tier 1 to Tier 4
 - Historically higher water consumption is observed between May and October, with the highest consumption in July. Less than 2% of accounts reached tier 6 last July.
- The UC discussed the Tiered Rates and recommended that the Utilities Department allow a onetime adjustment to customer accounts with high water consumption due to the establishment of new sod.
- The UC felt that by only charging the standard "non-conservation" rate for one month for all customers that could show they had applied sod, it would solve the issue for customers that must use high amounts of water.
- The program would create a "break" for the new homeowner while still encouraging conservation
- Although the UC recommended a one month adjustment to Tier level 4, the Board could also consider allowing adjustments to Tier 3 and/or allowing for a consecutive 2 month adjustment
- With either proposal, Staff would anticipate a minor impact to Revenue and little to no impact on overall, water demand (i.e. conservation)

Sod Credit

If you have recently installed at least one (1) new pallet of sod, you may qualify for a sod credit adjustment on your bill. In order to qualify, you must meet the following requirements:

- Have not had a sod credit issued in the last five (5) years
- Be able to demonstrate that you have had at least one full pallet of sod installed
- A copy of the receipt for the sod purchase or installation must be presented to the technician at the time of the Water Conservation Assessment.

Customers may be eligible for one bill adjustment, during which time the consumption will be discounted for any water usage falling in tier **5** or tier **6**. The water in tier **5** and tier **6** will be discounted to the tier **4** rate. (Board may choose to drop the rate to Tier 3).

All requests must be made no later than thirty (30) days after completion of sod installation. Requests will not be reviewed for consideration if all of the outlined items above are not included. Upon completion of the properly executed request, Stafford County Utilities shall issue an appropriate credit to the customer's account.

The examples below show how a credit could work using the tier 4 rates, or the tier 3 rates.

		Original Bil		A	djustment to Tier	4		
	Gallons of					Gallons of		
	Water Billed	Water Rate	Current	Sewer		Water Billed	Adjusted	
Tiers	Per Tier	per tier	Water Charge	Rate	Sewer*	Per Tier	Water Charge	Sewer*
Administrative Fees			\$10.69		\$13.39		\$10.69	\$13.39
1 0-2,000	2,000	\$2.52	\$5.04	_		2,000	\$5.04	
2 2001-4,000	2,000	\$3.51	\$7.02			2,000	\$7.02	
3 4,001-8,000	4,000	\$4.81	\$19.24	\$5.98	\$41.86	4,000	\$19.24	\$41.86
4 8,001-12,000	4,000	\$9.66	\$38.64			37,000	\$357.42	
5 12,001-25.000	13,000	\$12.25	\$159.25				\$0.00	
6 25,001 and over	20,000	\$17.03	\$340.60					
	45,000		\$569.79		\$55.25	45,000	\$388.72	\$55.25
1								
Total Original Bill	\$ 625.04							
Total Adjusted Bill	\$ 443.97							
Total Adjustments	\$ (181.07)							
* Note: Summer Sew	er bills are cappe	d <u>at the 6 mon</u>	th winter averag	e plus 20%	. New accounts	without an avera	age are capped at	7k gallons.
		Original Bil	1			A	djustment to Tier	3
	Gallons of					Gallons of		
	Water Billed	Water Rate	Current	Sewer		Water Billed	Adjusted	
Tiers	Per Tier	per tier	Water Charge	Rate	Sewer*	Per Tier	Water Charge	Sewer*
Administrative Fees			\$10.69		\$13.39		\$10.69	\$13.39
1 0-2,000	2,000	\$2.52	\$5.04			2,000	\$5.04	
2 2001-4,000	2,000	\$3.51	\$7.02			2,000	\$7.02	
3 4.001-8.000	4.000	\$4.81	\$19.24	\$5.98	\$41.86	41,000	\$197.21	\$41.86

4 8,001-12,000	4,000	\$9.66	\$38.64			\$0.00		
5 12,001-25.000	13,000	\$12.25	\$159.25			\$0.00		
6 25,001 and over	20,000	\$17.03	\$340.60					
	45,000		\$580.48	\$55.25	45,000	\$219.96	\$55.25	
Total Original Bill	635.73							
Total Adjusted Bill	\$ 275.21							
Total Adjustments	(360.52)							
* Note: Summer Sewer bills are capped at the 6 month winter average plus 20%. New accounts without an average are capped at 7k gallons.								

Infrastructure Committee:

New County Joint Fueling Station on Coal Landing Rd. 3/06/2018

- Fleet Services has been working on a location for a fuel station to replace the fueling site which was removed with the VDOT 630 Intersection Improvements
- Fleet Services Fuel sites are used by County, Sheriff, Fire and Rescue and School vehicles
- County and Schools Staff believe the best location is on County owned land on Coal Landing Road. The piece in question is a part of the Joint Aquia Wastewater and Utilities Field Operation Complex at 71 Coal Landing Road. There are currently no plans to use the area in question:



- The Site is convenient to Route 1 and other County Sites
- Schools have worked with Timmons Group to put together a potential layout (attached)
- Since the site is owned by the County, the Board would need to approve a Shared Use Agreement
- The Planning Commission has been requested to conduct a Comprehensive Plan Compliance Review for the site
- Staff recommends approval of a Shared-Use Agreement. If the Board is amenable, the agreement can be brought before the Board at the March 20'th meeting.



COUNTY OF STAFFORD - June 30, 2017



YOUR VISION ACHIEVED THROUGH OURS.