

Boar's Head Tennis and Birdwood Golf Improvements Site Traffic Evaluation Charlottesville, VA

December 18, 2017



Executive Summary

The University of Virginia Foundation (UVAF) is planning the expansion of athletic facilities and improvements to connectivity within the Boar's Head property in Charlottesville, Virginia. UVAF plans to reconfigure the existing tennis courts into a tennis complex that will net eight additional courts. UVAF also plans to create a six-hole par-3 golf course adjacent the existing course. To better serve all athletic activities on the Boar's Head Inn site and the Birdwood Golf Course site, UVAF also plans to open the Berwick Road extension to Golf Course Drive – or, "Connector Road" – on a permanent basis.

The modified land use generates 472 new daily trips, or 236 vehicles, to the Boar's Head and Birdwood properties (19 trips in the AM peak and 41 trips in the PM peak). VHB utilized existing traffic patterns to distribute the new daily trips externally (81% of traffic to/from the east [Charlottesville] and 19% to/from the west [Ivy/Crozet]) and hourly across the day. For two worst-case scenarios, VHB evaluated the traffic impact of just the modified land use (i.e., no Connector Road). The site access intersections of Ednam Drive and Golf Course Drive maintain the same Level of Service, and the increase in delay is experienced solely by the low-volume, minor street approaches.

Time of Day	AM Peak	Activity Peak	PM Peak
% Growth (Trips/Hour)	10.3% (< 40)	12.7% (< 60)	9.5% (< 45)

VHB appraised the impact of the Connector Road by developing three rerouting / access control scenarios. VHB reassigned vehicles within the site based on travel time, distance, general direction of travel along the US 250 corridor, and intersection control. For each of these three rerouting scenarios, VHB calculated the number of rerouted vehicles and computed new turning movement counts at Ednam Drive, Farmington Drive, and Golf Course Drive.

VHB modeled traffic rerouting on the Connector Road for the three separate scenarios with the Connector Road opened on a permanent basis, to assess the impact of the rerouting expected once the inter-parcel connectivity is provided. The capacity analysis (table on next page) demonstrates that the existing infrastructure can accommodate the shift in traffic patterns provided by the Connector Road for any of the intersection control scenarios. Intersection delay, LOS, and queueing analysis reveals that the Connector Road improves the overall operations of the intersections by distributing traffic between the two intersections until an equilibrium is reached. In all scenarios, the intersection(s) under signal control all operate at LOS B, an improvement over the existing LOS C condition at Ednam Drive without the Connector Road. While the provision of signal-control at Golf Course Drive would alleviate the delay for the southbound movement at Colridge Drive; the installation of a signal at this time is unnecessary for an impact to fewer than ten vehicles during the peak hour.

VHB assessed signal warrants at the two access intersections. Volume warrants 1B, 2, and 3B are met at either Ednam Drive or Golf Course Drive when the Connector Road is open, but with the Connector Road in place and traffic distributed across the two intersections based on driver behavior factors, there is insufficient volume to warrant concurrent signal control at both intersections. Because the distribution of traffic is so heavily in favor of Charlottesville (81%), drivers would favor the signal at Golf Course Drive over the signal at Ednam Drive, such that the signal at Ednam would no longer meet warrants.

VHB also performed a corridor analysis to determine the impact to US 250 corridor of the Connector Road redistribution of traffic. Signal timings from Broomley Road through the US 29 interchange were preliminarily optimized and coordinated. Analysis reveals that the

existing intersection control of signal-control at Ednam Drive and stop-control at Golf Course Drive best facilitates the additional trips and reassignment due to the Connector Road.

In conclusion, the increased trips generated by the modified tennis and golf land use have negligible impact on the transportation system and introduction of the Connector Road on a permanent basis has minimal impact on the transportation system. Those impacts are accommodated by the existing infrastructure and intersection control. Consideration may be given to relocating signal control to

Golf Course Drive; and, there are advantages of doing so such as improving access for the White Gables neighborhood and servicing the dominant flow direction (i.e., to/from Charlottesville) slightly better. But both scenarios more than adequately accommodate the anticipated traffic impacts created by the improvements in the Special Use Permit; and, those impacts do not necessitate the relocation of signal control, nor do those impacts necessitate any other road improvement project.

Intersection and Approach	2017 Existing Conditions		Build 2A (Signal at Ednam, Stop at Golf Course)		Build 2B (Stop at Ednam, Signal at Golf Course)		Build 2C (Signal at Ednam, Signal at Golf Course)	
	AM	PM	AM	PM	AM	PM	AM	PM
US 250 / Ednam Drive	C (22.5 sec/veh)	B (15.6 sec/veh)	C (24.7 sec/veh)	B (13.2 sec/veh)	A (1.0 sec/veh)	A (1.2 sec/veh)	B (13.6 sec/veh)	B (11.3 sec/veh)
Eastbound	C-33.5	C-24.3	D-40.1	B-18.3	A-0	A-0	B-19.9	B-15
Westbound	A-9.8	B-10.1	A-6.9	A-9.3	A-4.5	A-0.3	A-4.4	A-7.8
Northbound	B-15.2	B-12	B-12.7	B-14	C-23	E-42.1	C-21.3	B-18.3
Southbound	---	---	---	---	---	---	---	---
US 250 / Golf Course Drive	A (1.1 sec/veh)	A (1.2 sec/veh)	A (2.2 sec/veh)	A (2.0 sec/veh)	C (22.9 sec/veh)	B (19.7 sec/veh)	C (23.0 sec/veh)	B (19.6 sec/veh)
Eastbound	A-0	A-0	A-0	A-0	D-35.1	C-29	D-36.4	C-29.5
Westbound	A-0.2	A-0.3	A-0.9	A-1.1	B-11.6	B-13.3	B-10.4	B-12.9
Northbound	F-50.9	F-59.5	C-23.4	C-22.9	B-10.6	B-14.1	A-8.8	B-13.2
Southbound	F-139.1	F-76.6	F-228.9	F-130.7	C-31.9	A-0.2	C-31.9	A-0.2

Legend: X - # - Level of Service - Seconds of Delay

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1

Introduction

The University of Virginia Foundation (UVAF) is planning the expansion of athletic facilities and improvements to connectivity within the Boar's Head property in Charlottesville, Virginia. UVAF plans to reconfigure the existing tennis courts into a tennis complex that will net eight additional courts. UVAF also plans to create a six-hole par-3 golf course adjacent the existing course. To better serve all athletic activities on the Boar's Head Inn site and the Birdwood Golf Course site, UVAF also plans to open the Berwick Road extension to Golf Course Drive – or, “Connector Road” – on a permanent basis. Figure 1 shows a map of the two properties (including the new tennis complex and Connector Road), a regional context map, and a detail plan of the connector road.

Vehicular access to the existing and proposed expanded facilities is provided via two existing, UVAF-maintained roads at two existing intersections with VDOT-maintained US 250 (US 250):

- Ednam Drive (western access) – existing signal-controlled T-intersection currently providing vehicular access to all BHI facilities, including tennis, but no access to Birdwood Golf Course.
- Golf Course Drive (eastern access) – existing stop-controlled driveway with non-controlled US 250 currently providing access only to Birdwood Golf Course.

Opening of the Connector Road permanently is intended to provide inter-parcel connectivity between the sites. Traffic patterns accessing the properties and internal to the site are anticipated to change as a result. The extent of that rerouting is contingent on several factors, including access control at the two external site access intersections

on US 250, among other factors that will be discussed in this Traffic Impact Study (TIA). The impact on the two site access intersections is of utmost importance, considering VDOT's recent designation of this segment of US 250 as an Arterial Preservation Corridor, which will mean increased scrutiny from VDOT at the state level on any proposed intersection control measures, especially new traffic signals.

UVAF retained the services of VHB to analyze the traffic impacts of the improvements proposed by the SUP to identify any off-site measures, if necessary, to mitigate the impacts of the additional/rerouted trips. UVAF and VHB met with Albemarle County and/or VDOT staff on numerous occasions between the summer and fall of 2017, including a pre-scoping meeting with VDOT Culpeper Traffic Engineering and Culpeper Planning on October 23, at Albemarle County offices, to discuss the requisite elements of the traffic impact analysis, and a preliminary-findings meeting with Albemarle County Planning and Transportation on November 30, to review the trip generation and initial impact results.

This TIA documents the trip generation from the two expanded athletic uses, trip distribution, traffic assignment including the traffic rerouting afforded by the Connector Road, and impacts to site access at the two intersections with US 250. VHB evaluated the impact of multiple traffic rerouting scenarios to account for flexibility in future parking and intersection control measures. The new trip generation covers the 8-court tennis and short course 6-hole golf facility expansions.



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Existing (2017) Conditions

Evaluation of the traffic impacts associated with the proposed SUP requires a thorough understanding of the transportation network in the project study area. Existing conditions observed in the study area include roadway geometrics, traffic control devices, and peak hour traffic volumes. This chapter summarizes the existing conditions observed within the study area.

Study Area

The study area for the assessment of project related impacts was determined based on discussions with the University Foundation, Albemarle County, and VDOT Culpeper District Traffic Engineering and Planning divisions. The following intersections were included in the study area and were analyzed for existing and future conditions, as applicable:

- US 250 and Ednam Drive (signalized)
- US 250 and Farmington Drive (signalized)
- US 250 and Golf Course Drive (unsignalized)

The existing land use includes the Boar's Head Inn, the Boar's Head Sports Club, the UVA Foundation and Professional Center, the golf course, and the Ednam Forest and Ednam Village residential neighborhoods. Except for the golf course, all land uses currently access US 250 via Ednam Drive.

The Foundation and Professional Center are located to the northwest of Boar's Head Inn adjacent to US 250. All Boar's Head Inn facilities and Sports Club are situated along Berwick Road. The Ednam Village neighborhood consists of a single street of duplexes situated on Ednam Village Drive, which intersects Berwick Road near the Sports

Club on the east side of the Boar's Head property. Ednam Forest is a community of single family houses on larger plots that is situated southwest of the Boar's Head Inn and the Sports Club. Access to the Ednam Forest neighborhood is provided primarily by Ednam Drive, with Wellington Drive providing an alternative link between the neighborhood and the Boar's Head Inn and Sports Club facilities on the east side of the property.

Existing Roadway Conditions

This section describes the existing roadways within the study area. Average Annual Daily Traffic (AADT) data for the surrounding network of roadway were obtained from the Virginia Department of Transportation (VDOT). The most recent AADT counts from the VDOT are for 2016.

US 250

US 250 is a three-lane undivided arterial with a posted speed limit of 35 miles per hour (mph) east of Farmington Drive through the Golf Course Drive intersection and 45 mph west of Farmington Drive through the Ednam Drive intersection. The 2016 AADT on US 250 was 13,000 vehicles per day (vpd) between Route 637 (Woods Road) to the west of the study segment and the US 29 Bypass east of the study segment.

US 250 at Ednam Drive

This signalized intersection currently provides access to the Boar's Head Inn, the Boar's Head Sports Club, and the residential neighborhoods adjacent the property. US 250 has one through lane in each direction with a 250-foot dedicated eastbound right turn bay and a 175-foot dedicated westbound left turn bay. Ednam Drive has dedicated left and right turn lanes onto US 250.

US 250 at Farmington Drive

This signalized intersection lies within the study corridor but does not provide access to the study properties. US 250 has three lanes in each direction (dedicated left, through, and right lanes), while Farmington Drive has a single shared lane on each approach.

US 250 at Golf Course / Colridge Drive

This unsignalized intersection currently provides access to the Birdwood Property / Golf Course to the south of US 250 and to the White Gables residential neighborhood to the north. US 250 has one through lane in each direction with a two-way left turn lane and dedicated right turn bays (200-foot eastbound and 225-foot westbound). Golf Course / Colridge Drive has a single shared approach lane on both approaches.

Ednam Drive

Ednam Drive is a 25-mph two-lane, privately-maintained road that provides access to Boar's Head Inn, the Boar's Head Sports Club, and the residential neighborhoods behind the property.

Golf Course Drive

Golf Course Drive is a 25-mph two-lane, privately-maintained road that provides access to the Birdwood Property / Golf Course.

Existing Turning Movement Counts

VHB collected 14-hour turning movement counts (6 AM – 8 PM) at the US 250 intersections with Ednam Drive and Golf Course Drive on May 18, 2017, as part of previous work for UVAF. VHB also collected 4-hour peak turning movement counts (7 – 9 AM, 5 – 7 PM) at the nearby signalized intersection at Farmington Drive as part of VDOT's 2017 US 250 STARS Corridor study. The summarized peak

AM and peak PM hour turn movement counts are shown in Figure 2.

Existing Pedestrian and Bicycle Environment

There are no pedestrian or bicycle facilities along this segment of US 250. Pedestrian and bicycle activity along the corridor is almost non-existent. Similarly, there is limited pedestrian activity on either Ednam Drive or Golf Course Drive near US 250. Pedestrian activity is present predominantly along Berwick Road. A marked crossing is provided across Ednam Drive at Berwick Road. A pedestrian connection between the Golf Course and the Boar's Head properties currently exists near the Sports Club, although the path includes stairs to surmount the grade difference between the Golf Course and Sports Club parking areas.

Existing Area Transit Service

Charlottesville Area Transit (CAT) and University Transit Service (UTS) service area stops east of the US 29 Bypass interchange. Boar's Head and the Golf Course are not serviced by transit.

Safety

VHB analyzed the existing roadway safety conditions at the access locations into Boar's Head and Birdwood properties. Between 2011-2015, there were 3 property damage only (PDO) and 1 injury rear-end crashes at the US 250 / Ednam Drive intersection. At the US 250 / Golf Course Drive intersection, there was 1 rear-end PDO, 1 deer PDO crash, and 1 injury fixed-object crash. The relatively infrequent and low severity crash history indicates that there are no conditions requiring safety mitigation.



Figure 2 Peak Hour Turning Movement Counts

3 Future Conditions

Future Conditions

The build out year for the proposed tennis and golf improvements is within the next two years. Opening the Connector Road is anticipated even sooner. Because the improvements are near-term and there is no background growth on the corridor (discussed in subsequent report section), there is no specific future build year designated for assessing impacts. The following sections describe the process and results of the future conditions analysis.

Background Growth

Figure 3 – excerpted from VDOT’s 2017 draft US 250 STARS Study report – shows the historical annual average daily traffic (AADT) along US 250 near the Boar’s Head and Birdwood Golf Course properties.

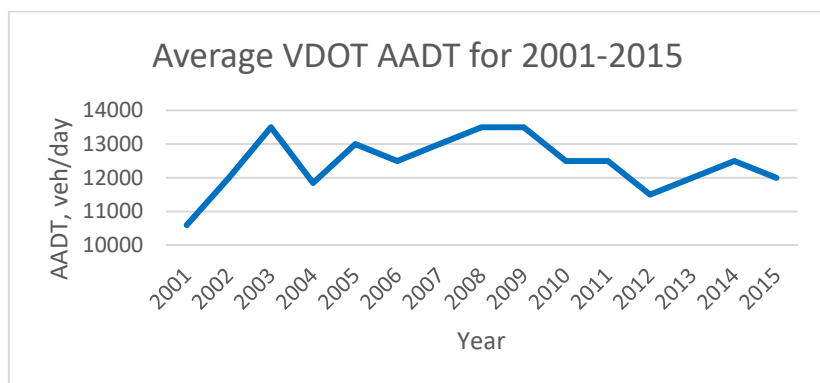


Figure 3 Historical Traffic Trends on US 250
Source: VDOT’s US 250 STARS Draft Report

The report used a 0% annual growth rate for traffic west of the US 250 / Canterbury Road intersection, and a 1% annual growth rate for traffic at the intersection and to the east, which was confirmed by VDOT for that study. Also through discussion with VDOT and UVAF, there is not anticipated development in the vicinity expected to suggest a change in the recent trend. VHB reconfirmed the 0% growth rate for this TIA during meetings with VDOT Culpeper District Planning.

Trip Generation

VHB calculated trip generation for the upgraded existing land uses on the Boar’s Head and Birdwood properties using the Institute of Transportation Engineers’ Trip Generation Manual, 9th Edition (the 10th Edition had not yet been released at the start of this process). VHB retrieved from the Manual a daily trip rate for the two land uses based on the independent variables of number of golf holes and number of tennis courts. Trips were distributed throughout the day using the existing trip distribution derived from historical golf and tennis activity at the Sports Club and Birdwood Golf Course.

The permanent opening of the Connector Road will complete an internal road connection between Ednam Drive and Golf Course Drive parallel to US 250, providing a vehicular link for Boar’s Head patrons of the Inn and Sports Center, as well as residents of Ednam Village, with the golf course and expanded tennis facilities on the Birdwood property.

VHB assumed an internal capture rate of 10% for both expanded facilities. This means that 10% of the trips generated by the tennis and golf are local trips originating at the Inn or the adjacent residential neighborhoods. These local trips may currently utilize US 250; but in the future scenario, these patrons are assumed to take advantage of the Connector Road or improved pedestrian/cart

connectivity adjacent the Connector Road. This is a conservative factor based on historical golf course records suggesting that a higher percentage of patrons using the golf course may be Inn guests who may be accessing the golf course.

Table 1 Boar's Head New Land Use Trip Generation

Use	ITE Code	Size	Units	Daily Trip Ends	AM Peak Hour *			PM Peak Hour *		
					Enter	Exit	Total	Enter	Exit	Total
Golf	430	6	Holes	214	10	3	13	12	11	23
Tennis	491	8	Courts	310	12	12	24	9	8	17
Total Trips				524	14	7	22	15	37	21
Golf Capture (10%)				52	1	0	1	0	1	1
Tennis Capture (10%)				31	1	0	1	1	2	1
Golf Net New Trips				193	8	3	9	3	12	11
Tennis Net New Trips				279	5	4	11	11	22	8
Total Net New Trips				472	13	6	20	14	33	19

* Peak hour volumes based on daily distribution derived from historical facility data.

The new 6-hole Par 3 short golf course will generate 96 vehicles on a typical day, which will be distributed across 24 hours. The peak activity for the golf occurs outside the peak traffic period for US 250. The new golf trips are shown in Table 2 as percent increase of total traffic from all properties accessing US 250 at Ednam Drive and Golf Course Drive.

Table 2 Added Golf Trips

Time of Day	AM Peak	Activity Peak	PM Peak
% Growth (Trips/Hour)	3.6% (< 15)	5.1% (< 25)	5.5% (< 25)

The additional tennis courts will generate 139 vehicles on a typical day, which will be distributed across 24 hours. The peak activity for the tennis courts also occurs outside the peak traffic period for US

250. The new tennis trips are shown in Table 3 as percent increase of total traffic from all properties accessing US 250 at Ednam Drive and Golf Course Drive.

Table 3 Added Tennis Trips

Time of Day	AM Peak	Activity Peak	PM Peak
% Growth (Trips/Hour)	6.7% (< 25)	7.6% (< 35)	4.0% (< 20)

Total traffic growth from the additional golf holes and tennis courts is shown as percent increase of total traffic from properties accessing US 250 at Ednam Drive and Golf Course Drive in Table 4.

Table 4 Total Added Golf and Tennis Trips

Time of Day	AM Peak	Activity Peak	PM Peak
% Growth (Trips/Hour)	10.3% (< 40)	12.7% (< 60)	9.5% (< 45)

Trip Distribution

In pre-scoping documentation, VHB proposed an external distribution of 81% to/from the east (Charlottesville), and 19% to/from the west (Ivy/Crozet). VHB developed this distribution split from existing traffic patterns derived from the traffic volume counts, assuming the expanded land use would conform to existing traffic patterns. VHB further utilized existing traffic patterns within the Boar's Head property to develop hourly distributions for the new traffic volume. Hourly distributions of the new volume were used to conduct the signal warrant analyses at the US 250 intersections with Ednam Drive and Golf Course Drive.

Assignment of trips on the network according to the three scenarios studied. Assignment is described in subsequent chapters.

4 Traffic Operations

This section presents the results of the intersection capacity analysis. Analysis was performed under the following scenarios:

- Existing (2017) Conditions
- Build 1: Land Use Improvement Only
- Build 2a: Land Use Improvements + Connector Road; Existing Intersection Control
- Build 2b: Land Use Improvements + Connector Road; Signal Control at Golf Course Drive, Stop Control at Ednam Drive
- Build 2c: Land Use Improvements + Connector Road; Signal Control at Ednam Drive and Golf Course Drive

The Existing (2017) scenario includes AM and PM peak hour analysis based on turning movement count data collected in May 2017. As discussed in the Trip Generation section of this report, there is no background growth and the improvements are anticipated in the next couple of years; so, there is no future analysis year specified and no No-Build scenario included in the analysis. The four Build scenarios include existing traffic with the addition of the projected site trips generated by the proposed improvements and/or the reassignment of trips on the study network based on the permanent use of the Connector Road.

The four scenarios were studied to isolate the impact of the improvements (Build 1 scenario) from the impact of the permanent use of the Connector Road (all Build 2 scenarios). The Build 2 scenario was studied in three different sub-scenarios to show the impact on the study network based on the various intersection control strategies that may be considered at the two US 250 intersections. Although other intersection strategies may be considered beyond the three analyzed under the three Build 2

scenarios, the purpose of this study was intended to show how the intersections would perform with or without signal control at the two access points to the two properties after the permanent inter-parcel link is opened.

The scenario in which signal control is removed from Ednam Drive and added to Golf Course Drive was analyzed at the request of VDOT, per the pre-scoping meeting.

Level of Service Criteria

Peak hour level of service (LOS) measures the adequacy of the intersection geometrics and traffic controls of an intersection or approach for the given turning volumes. Levels of service range from A through F, based on the average control delay experienced by vehicles traveling through the intersection during the peak hour. Control delay represents the portion of total delay attributed to traffic control devices (e.g., signals or stop signs). Table provides a general description of various levels of service categories and delay ranges.

The level of service designation is reported differently for signalized and unsignalized intersections. For signalized intersections, the analysis considers the operation of all traffic entering the intersection and the LOS designation is for the overall condition at the intersection. For unsignalized intersections, the analysis assumes that through traffic on the mainline is not affected by traffic on the side streets. Thus, the LOS designations reported for unsignalized intersections are for the worst operating, stop-controlled approach and not for the overall intersection.

Intersection levels of service analyses were performed for the typical weekday AM and PM peak hours using *Synchro Professional Version 9*, in accordance with VDOT's *Traffic Operations and Safety Analysis*

Manual, Version 1.0. Signal timings were optimized within *Synchro* for all scenarios. *Synchro* output data is included in the Appendix.

Table 5 Level of Service Description for Intersections

Level of Service	Description	Signalized Intersection	Unsignalized Intersection
A	Little or no delay	<= 10 sec.	<= 10 sec.
B	Short traffic delay	10-20 sec.	10-15 sec.
C	Average traffic delay	20-35 sec.	15-25 sec.
D	Long traffic delay	35-55 sec.	25-35 sec.
E	Very long traffic delay	55-80 sec.	35-50 sec.
F	Unacceptable delay	> 80 sec.	> 50 sec.

Existing (2017) Conditions

Signalized intersection capacity analysis was performed in the study area for the following intersections within the study area:

- US 250 and Ednam Drive (signalized)
- US 250 and Golf Course Drive (unsignalized)

Table 6 shows the intersection delay for both peak periods and corresponding level of service (LOS) for both US 250 intersection providing access to the Boar's Head and Birdwood properties. The northbound delay for each intersection is also reported to show the current condition of the approaches that will be most impacted by the proposed land use and roadway network improvements.

Table 6 Existing Conditions Intersection Operating Metrics

Scenario	US 250 / Golf Course Drive (Existing Stop Control)			US 250 / Ednam Drive (Existing Signal-Control)		
	Intersection Delay [s/veh]	LOS	NB Delay [s/veh]	Intersection Delay [s/veh]	LOS	NB Delay [s/veh]
Existing Conditions	1.1 [1.2]	A [A]	51 [59]	22.2 [15.1]	C [B]	39 [27]

The Golf Course intersection currently operates at LOS A in both peak periods with almost no intersection delay because the US 250 mainline is free-flowing; only the two side street approaches with much smaller volumes by comparison incur delay due to the stop bar. The intersection at Ednam Drive experiences LOS C and LOS B conditions during the AM and PM periods, respectively. At the signal control, the delay is more equitable across all approaches, although the US 250 mainline is favored to promote progression of the higher volume through traffic. Both intersections perform more than adequately during the two peak hours of operation. Additional performance metrics (i.e., approach delay, movement delay, queues) are provided in subsequent sections of this report.

Build 1: Land Use Improvements Only

For Scenario 1, VHB evaluated the impact of adding the trips generated by the tennis and golf course improvements without any roadway improvements (e.g., Connector Road or modified intersection control) to isolate the impacts of the modified land use. This evaluation assumed no connection between Berwick Road and Golf Course Drive (i.e., Connector Road) and existing stop-control at Golf Course Drive / US 250 and existing signal-control at Ednam Drive / US 250. Table 7 reports the overall intersection delay, intersection LOS, and northbound movement delay for the two intersections compared to the existing conditions (previously reported in Table 6). Results are reported for two assignment conditions depending on where parking will be located for the expanded tennis facility. For both assignment conditions, all Golf Club traffic is assigned to Golf Course Drive. Because the final determination of tennis parking has not yet been determined, VHB assumed two worst-case scenarios – one in which all tennis trips utilize Golf Course Drive and one in which all tennis trips utilize Ednam Drive. The most likely condition in the future would be less than 100% to either intersection.

Table 7 Traffic Impact of Modified Land Use Only

Scenario	US 250 / Golf Course / Colridge (Existing Two-Way Stop Control)				US 250 / Ednam (Existing Signal-Control)		
	Int. Delay [s/veh]	LOS	NB Delay [s/veh]	SB Delay [s/veh]	Int. Delay [s/veh]	LOS	NB Delay [s/veh]
Existing Conditions	1.1 [1.2]	A [A]	51 [59]	139 [77]	22.2 [15.1]	C [B]	39 [27]
Future Conditions (100% Tennis on Ednam Dr.)	1.2 [1.6]	A [A]	48 [65]	155 [83]	23.3 [15.6]	C [B]	39 [27]
Future Conditions (100% Tennis on Golf Course Dr.)	1.7 [2.1]	A [A]	62 [83]	174 [88]	22.2 [15.1]	C [B]	39 [27]

There is no impact to US 250 mainline traffic flow with the modified land use. The northbound Golf Course approach experiences an incremental increase in delay with the addition of the new golf trips and moderate increase (~ 24 seconds/vehicle) if the 100% of the new tennis trips were to utilize the Golf Course Drive intersection as well. Even with this increase in delay, the 95th% queue length on Golf Course Drive is only two vehicles.

Delay on the southbound Colridge Drive approach would be impacted in both scenarios (~35 seconds/vehicle in the AM peak hour; however, there are fewer than 10 afflicted vehicles in the AM peak hour and fewer than 5 afflicted vehicles in the PM peak hour. There is no impact to intersection delay for the northbound delay at Ednam Drive because the generated tennis volume is not significant enough to have an impact even if 100% of tennis trips were to utilize Ednam Drive.

This impact is also based on no inter-parcel connection. As demonstrated in the next sections of this report, the Connector Road

improves the overall operation of the intersections by distributing traffic between the two US 250 access points.

Build 2: Land Use Improvements and Connector Road

The Connector Road will reduce traffic volume on US 250 by connecting the golf course facilities to the Boar's Head Inn and residential neighborhoods. Golf patrons from the Inn and neighborhoods must currently exit onto US 250 to drive to/from the golf clubhouse. As documented in the pre-scoping form, VHB assumed a 10% internal capture of the existing golf course volume, and thus removed this volume quantity from existing turning movement counts (TMCs) at Ednam Drive and Golf Course Drive since these drivers will no longer utilize US 250. The connector road will also improve emergency access to the entire Boar's Head property and residential neighborhoods by providing a second access point to US 250.

The following sections describe the reassignment of vehicles, both existing traffic and added trips, throughout the internal roadway network and redistribution to the two US 250 access points. Signal timings were optimized within *Synchro* for all scenarios.

Internal Trip Distribution and Reassignment

The permanent opening of the Connector Road will reroute a percentage of existing traffic on Ednam Drive and Golf Course Drive. Rerouting assumptions provide the framework for evaluating Ednam Drive and Golf Course Drive delay/LOS assuming the Connector Road is opened on a permanent basis. Rerouting assumptions depend on travel time, distance, general direction of travel along the US 250 corridor, and intersection control.

VHB confirmed with VDOT and the County that rerouting distributions will be contingent on intersection control (i.e., a percentage of traffic will favor the signal-controlled intersection.

Using this supposition as a foundation, VHB developed three rerouting scenarios:

- Build 2A: Assumes signal control at Ednam Drive and two-way stop-control at Golf Course Drive
- Build 2B: Assumes two-way stop-control at Ednam Drive and signal control at Golf Course Drive
- Build 2C: Assumes signal control at both Ednam Drive and Golf Course Drive

For UVAF's 2017 Boar's Head Parking and Traffic Circulation Study, VHB synthesized historical data from the various facilities on site. This included usage data for the Inn, restaurants, conference pavilion, spa, sports club, and golf. VHB used this data to determine the share each of these facilities represented in the parking and traffic throughout the course of a typical day. VHB also used ITE Trip Generation information corresponding to the residential land use for the two adjacent neighborhoods to normalize the data to adjust for the share that is represented by the Ednam Forest and Ednam Village neighborhoods. Holding constant the distribution of trips along US 250 according to the existing turn movement counts at the two intersections, VHB reassigned trips between the two intersections based on the permanent opening of the Connector Road and the rerouting behavioral decision-making metrics referenced previously.

Figure 4 shows land use location within the property and as an illustrative example of the three rerouting scenarios, documents the internal reassignment by aggregated land use. Table 8 lists the internal distribution percentages for all three scenarios at Golf

Course Drive; the remaining distribution is assumed at Ednam Drive.

Table 8 Internal Reassignment

Land Use	Build 2A: Signal at Ednam; Stop at Golf Course		Build 2B: Stop at Ednam; Signal at Golf Course		Build 2C: Signal at Ednam; Signal at Golf Course	
	At Golf Course for C-ville	At Golf Course for Ivy/Crozet	At Golf Course for C-ville	At Golf Course for Ivy/Crozet	At Golf Course for C-ville	At Golf Course for Ivy/Crozet
BHI (Boar's Head Inn)	40%	0%	90%	10%	80%	0%
Spa	40%	0%	90%	10%	80%	0%
Restaurant	40%	0%	90%	10%	80%	0%
Sports Club	50%	10%	100%	80%	100%	60%
UVA Foundation	0%	0%	30%	0%	10%	0%
Professional Center	0%	0%	30%	0%	10%	0%
Ednam Forest 1	10%	0%	60%	10%	50%	0%
Ednam Forest 2	50%	10%	100%	70%	100%	0%
(Ednam Village	70%	10%	100%	80%	100%	30%
Conference & Events	40%	0%	90%	10%	80%	0%
Golf Course	100%	20%	100%	90%	100%	80%

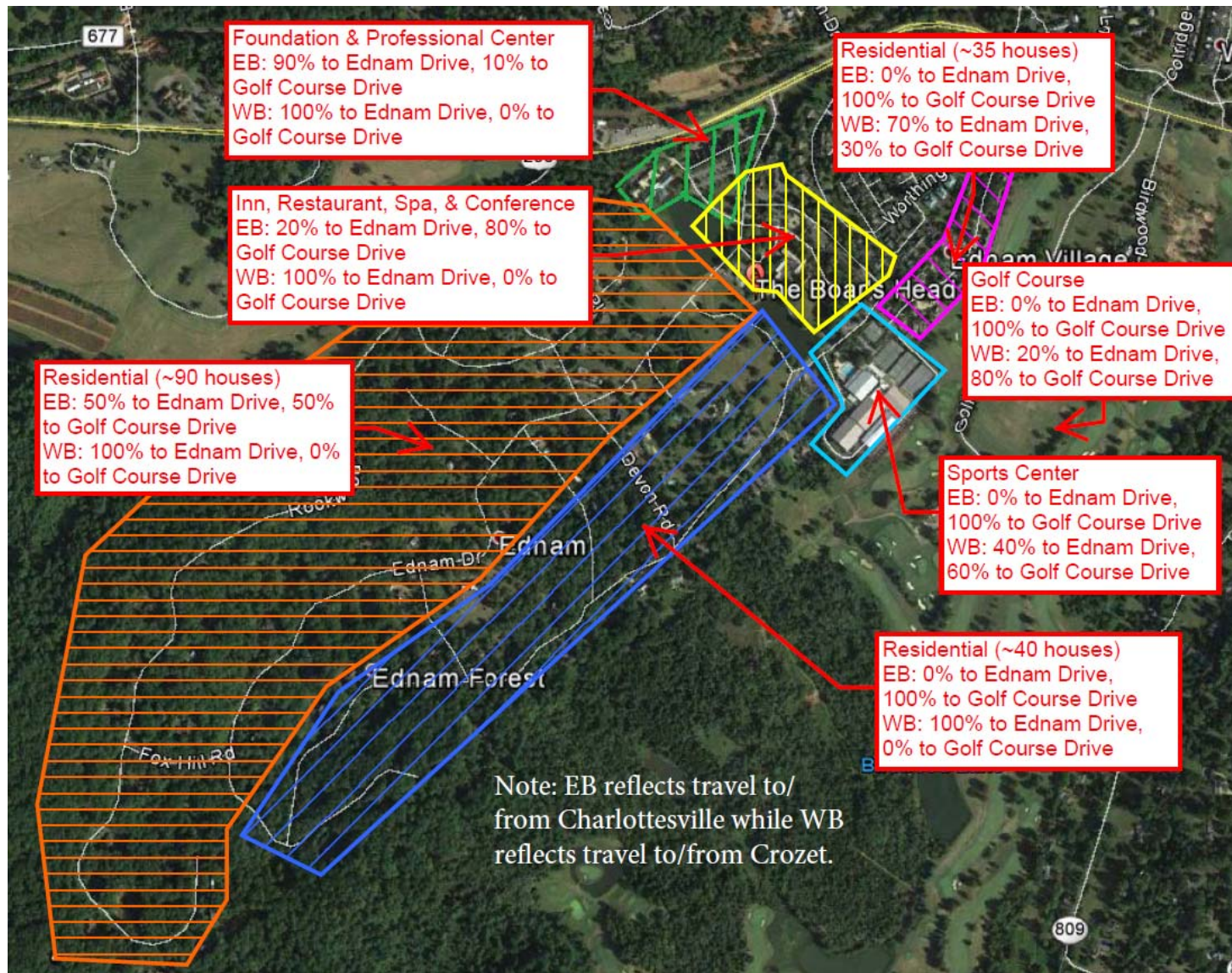


Figure 4 Internal Distribution for Build 2C

In previous work for UVAF, VHB developed the percentage of Ednam Drive volume associated with each specific land use. VHB computed the internal rerouting volumes by applying the Table 8 distribution rates to the existing land use volumes. For example, in Build 2A, 40% of the existing Boar's Head Inn traffic coming to/from Charlottesville reroutes to Golf Course Drive, while the remaining 60% continues to utilize Ednam Drive; 0% of Boar's Head Inn traffic coming to/from Ivy/Crozet reroutes to Golf Course Drive, while 100% remains on Ednam Drive. VHB also applied the distribution rates to the new trips generated by the expanded tennis and golf facilities. The final output of this trip distribution analysis is new 15-minute turning movement counts along US 250 at Ednam Drive, Farmington Drive, and Golf Course Drive. Table 9 reports the average 15-minute volume changes by turning movement for each of the Build scenarios. VHB used the new volumes in the capacity analysis, signal warrant analysis, and signal coordination consideration.

Table 9 Average 15-Minute Volume Change (Existing to New)

	Scenario	NBL	NBR	WBL	WBT	EBT	EBR
Golf Course Drive	Build 2A	-1	11	13	-10	-8	-1
	Build 2B	2	25	29	-26	-22	3
	Build 2C	1	23	26	-23	-20	1
Ednam Drive	Build 2A	1	-9	-11	-1	-1	2
	Build 2B	-2	-23	-27	3	3	-2
	Build 2C	-1	-21	-24	2	2	-1
Farmington Drive	Build 2A	-	-	-	-4	-3	-
	Build 2B	-	-	-	-9	-5	-
	Build 2C	-	-	-	-8	-5	-

Intersection Capacity Analysis for Three Build 2 Scenarios

Table 10 reports the results of the intersection analysis for three intersection control scenarios for Build 2, to show the impacts on the two US 250 intersections based on reassignment due to the presence of the Connector Road. Table 10 shows the overall intersection delay, intersection LOS (Level of Service), and delay and LOS by movement. For this analysis, VHB optimized signal timings in Synchro for individual intersections in isolation.

The variations in overall intersection delay between the three scenarios are due primarily to intersection control. The through movements on US 250 do not experience any delay at two-way stop-controlled intersections; however, these heavy movements incur delay under signal control conditions. The minor road approaches, particularly southbound Colridge Drive (at US 250 / Golf Course Drive), are served best by Build 2B and Build 2C control conditions, in which a signal is provided at the Golf Course Drive intersection. The minor road approaches, particularly southbound Colridge Drive (at US 250 / Golf Course Drive), are served best by Build 2B and Build 2C control conditions, in which a signal is provided at the Golf Course Drive intersection; however, the impact of 2A on the Colridge Drive approach is restricted to fewer than ten vehicles in either peak hour. Table 11 reports the results of the queueing analysis for each movement at Ednam Drive and Golf Course Drive under the three-intersection control / reassignment scenarios.

The queueing analysis indicates that queue lengths in Build 2A are either shorter or equitable to queue lengths under existing conditions. It is not appropriate to compare the queue lengths between scenarios in which control changed; however, a qualitative assessment can be made regarding Build 2B and Build 2C. Relocating signal control presently at Ednam Drive (Existing Conditions and Build 2A) to Golf Course Drive (Build 2B) relocates the longer queues

from Ednam Drive to Golf Course Drive, in the same way that the delay shifts with the transfer of signal control from one intersection to the other. The queueing and delay conditions are a by-product of signal control, which explains why delays and queues increase under Build 2C.

Intersection delay, LOS, and queueing analysis reveals that the Connector Road improves the overall operations of the intersections by distributing traffic between the two intersections until an equilibrium is reached. In all scenarios, the intersection(s) under signal control all operate at LOS B, an improvement over the LOS C condition without the Connector Road.

Both intersections are expected to operate well within acceptable conditions and can easily accommodate the day-to-day traffic growth from the expanded tennis and golf facilities. Traffic at the two intersections will reach an equilibrium commensurate with the

control. Under any of the Build scenarios, the study intersections operate with acceptable intersection performance metrics (i.e., intersections operate at LOS C or better in all scenarios). Impacts to individual approaches/movements vary between scenarios; however, the impacts are either within acceptable thresholds and/or are limited to extremely low volumes (i.e., fewer than ten vehicles in a peak hour)."

The Connector Road more evenly distributes traffic across the two access points with US 250, increases inter-parcel connectivity, relocates vehicle trips from US 250 internal to the properties, improves pedestrian/bicycle connectivity between parcels, and provides enhanced emergency access to the Boar's Head property and residential neighborhoods.

Delay, LOS, and queuing results are also shown in figures at the beginning of the Appendix.

Table 10 LOS Results for Intersection Control Scenarios

Intersection and Approach	2017 Existing Conditions		Build 2A (Signal at Ednam, Stop at Golf Course)		Build 2B (Stop at Ednam, Signal at Golf Course)		Build 2C (Signal at Ednam, Signal at Golf Course)	
	AM	PM	AM	PM	AM	PM	AM	PM
US 250 / Ednam Drive	C (22.5 sec/veh)	B (15.6 sec/veh)	C (24.7 sec/veh)	B (13.2 sec/veh)	A (1.0 sec/veh)	A (1.2 sec/veh)	B (13.6 sec/veh)	B (11.3 sec/veh)
Eastbound	C-33.5	C-24.3	D-40.1	B-18.3	A-0	A-0	B-19.9	B-15
Westbound	A-9.8	B-10.1	A-6.9	A-9.3	A-4.5	A-0.3	A-4.4	A-7.8
Northbound	B-15.2	B-12	B-12.7	B-14	C-23	E-42.1	C-21.3	B-18.3
Southbound	---	---	---	---	---	---	---	---
US 250 / Golf Course Drive	A (1.1 sec/veh)	A (1.2 sec/veh)	A (2.2 sec/veh)	A (2.0 sec/veh)	C (22.9 sec/veh)	B (19.7 sec/veh)	C (23.0 sec/veh)	B (19.6 sec/veh)
Eastbound	A-0	A-0	A-0	A-0	D-35.1	C-29	D-36.4	C-29.5
Westbound	A-0.2	A-0.3	A-0.9	A-1.1	B-11.6	B-13.3	B-10.4	B-12.9
Northbound	F-50.9	F-59.5	C-23.4	C-22.9	B-10.6	B-14.1	A-8.8	B-13.2
Southbound	F-139.1	F-76.6	F-228.9	F-130.7	C-31.9	A-0.2	C-31.9	A-0.2

Legend: X - # - Level of Service - Seconds of Delay

Table 11 Queueing Results for Rerouting / Intersection Control Scenarios

Intersection and Approach	2017 Existing Conditions		Build 2A (Signal at Ednam, Stop at Golf Course)		Build 2B (Stop at Ednam, Signal at Golf Course)		Build 2C (Signal at Ednam, Signal at Golf Course)		Available Queue Storage [feet]
	AM	PM	AM	PM	AM	PM	AM	PM	
US 250 / Ednam Drive									
Eastbound Through	883	500	722	450	-	-	825	464	Continuous
Eastbound Right	13	13	17	14	-	-	12	12	350
Westbound Left	132	59	47	26	7.5	2.5	14	11	175
Westbound Through	215	388	213	355	-	-	185	352	450'
Northbound Left	28	36	25	40	5	27.5	24	33	125'
Northbound Right	45	43	32	34	7.5	2.5	25	20	Continuous
US 250 / Golf Course Drive									
Eastbound Left	0	0	0	0	0	0	0	0	350
Eastbound Through	-	-	-	-	952	751	949	761	Continuous
Eastbound Right	-	-	-	-	0	0	0	0	275
Westbound Left	2.5	2.5	12.5	15	149	146	123	131	400
Westbound Through	-	-	-	-	336	497	332	498	Continuous
Westbound Right	-	-	-	-	0	0	0	0	250
Northbound Left	5	30	15	30	0	0	0	0	Continuous
Northbound Through	5	30	15	30	37	66	31	59	Continuous
Northbound Right	5	30	15	30	0	0	0	0	Continuous
Southbound Left	30	15	40	22.5	0	0	0	0	175
Southbound Through	30	15	40	22.5	24	0	24	0	175
Southbound Right	30	15	40	22.5	0	0	0	0	175

Note: Queue length reported is the 95th %tile Queue Length [feet].

Corridor Capacity Analysis for Three Build 2 Scenarios

During scoping conversations, VDOT had expressed concern about potential impacts the reassigned trips could have on traffic flow through the US 250 corridor, should the intersection control at either Ednam Drive or Golf Course Drive change. VHB conducted analysis of the corridor to assess the impact to the US 250 corridor under the three intersection control scenarios of Build 2.

Using Synchro, VHB developed cursory optimized, coordinated signal timings for each of the Build 2 control scenarios for the US 250 corridor, defined as: Broomley Road, UVA Health Center, Ednam Drive, Farmington Drive, Golf Course Drive, Canterbury / Old Garth Road, US 29 southbound ramps, and US 29 northbound ramps. For comparison purposes, VHB developed optimized, coordinated signal timings for the existing conditions (i.e., no development or Connector Road).

The objective of this exercise was to provide a preliminary understanding of how coordination on the corridor would benefit traffic flow and to provide a high-level comparison of the three control scenarios on a corridor-wide basis. This analysis was not intended as a comprehensive coordinated signal system plan development and evaluation, an effort that would take additional time, data analysis, and field refinement.

Table 12 reports corridor performance metrics – travel time through the entire corridor and total delay incurred by vehicles travelling through the entire corridor, as reported by Synchro. Table 13 and Table 14 present the intersection-specific performance metrics (i.e., delay, LOS, queues) under the coordinated timing plan. The optimization of the coordinated signal system modifies the time allocation to various movements; so, the results in Table 13 and Table

14 are not comparable to the intersection-specific metrics presented in the previous section.

Signals optimized in isolation balance the movement of each of the intersection approaches – delay is often incurred by the mainline movements to allocate green time to the minor street movements. In a coordinated system, signal timings are optimized to prioritize the movement of the mainline traffic flow through the corridor, and additional delay is therefore often incurred by the minor street movement. Due to the heavier mainline traffic volumes, overall intersection delay and LOS metrics often improve coordination.

Conventional signal spacing practices would suggest that the existing spacing between Ednam Drive and Farmington Drive is less than ideal. During scoping meetings, VDOT voiced concern that an additional signal placed at Golf Course Drive could potentially exacerbate the less-than-ideal spacing. VDOT conjectured that a signal at Golf Course Drive in lieu of one at Ednam Drive would promote coordination through the US-29 interchange. Table 12, however, suggest that this control combination (Build 2B) results in greater corridor delay and corridor travel time than maintaining the existing control combination (Build 2A).

These results hinge upon the corridor cycle lengths, offsets, and splits – all parameters that can be tweaked to favor specific movements or to promote other strategies to manipulate flow. For example, our coordinated timings show that Build 2C (signals at both Ednam and Golf Course) outperforms Build 2B, despite the expectation that the scenario with more signals would result in more delay and longer travel times. In general, the addition of a new corridor signal (Build 2C) will add more delay and travel time to corridor vehicles than either Build 2A or Build 2B (i.e., one signal at Ednam or Golf Course); however, any of the three control scenarios could be adapted to the system.

Table 12 Corridor Comparison under Coordinated Signal Control

Corridor Analysis Metric	2017 Existing Conditions		Build 2A (Signal at Ednam, Stop at Golf Course)		Build 2B (Stop at Ednam, Signal at Golf Course)		Build 2C (Signal at Ednam, Signal at Golf Course)	
	AM	PM	AM	PM	AM	PM	AM	PM
Corridor Travel Time [s] [% increase] EB/WB	251 [-] / 273 [-]	259 [-] / 342 [-]	248 [-1.2%] / 274 [+0.4%]	261 [+0.8%] / 340 [-0.6%]	247 [-1.6%] / 288 [+5.2%]	282 [+8.2%] / 355 [+3.7%]	260 [+3.5%] / 293 [+6.8%]	266 [+2.6%] / 349 [+2.0%]
Corridor Signal Delay [sec] EB/WB	59 / 68	67 / 137	56 / 69	69 / 134	57 / 85	92 / 152	65 / 85	71 / 141
Corridor Cycle Length (1/2 Cycle Allowed)	100	120	100	130	130	90	120	130

Table 13 LOS Results for Coordinated Signal System

Intersection and Approach	2017 Existing Conditions		Build 2A (Signal at Ednam, Stop at Golf Course)		Build 2B (Stop at Ednam, Signal at Golf Course)		Build 2C (Signal at Ednam, Signal at Golf Course)	
	AM	PM	AM	PM	AM	PM	AM	PM
US 250 / Ednam Drive	B (12.8 sec/veh)	A (6.6 sec/veh)	B (11.7 sec/veh)	A (6.1 sec/veh)	A (1.0 sec/veh)	A (1.7 sec/veh)	A (7.4 sec/veh)	A (5.0 sec/veh)
Eastbound	B-18.4	B-10.2	B-16.9	A-8.6	A-0	A-0	B-10.8	A-6.8
Westbound	A-5.2	A-1.2	A-3.8	A-0.9	A-0.7	A-0.4	A-1.2	A-1.1
Northbound	B-18	C-23.7	C-20.7	C-31	E-38.3	E-43.5	C-31.1	D-41.4
Southbound	---	---	---	---	---	---	---	---
US 250 / Golf Course Drive	A (1.1 sec/veh)	A (1.2 sec/veh)	A (2.2 sec/veh)	A (1.9 sec/veh)	B (11.8 sec/veh)	B (14.3 sec/veh)	B (13.9 sec/veh)	B (12.4 sec/veh)
Eastbound	A-0	A-0	A-0	A-0	A-9.8	C-23.5	B-14.2	B-19.3
Westbound	A-0.2	A-0.3	A-0.9	A-1.1	B-13.1	A-6.5	B-13.4	A-6.2
Northbound	F-50.9	F-59.5	C-23.4	C-22.9	B-16.8	B-15.5	B-11.9	B-14.8
Southbound	F-139.1	F-76.6	F-228.9	F-112.5	D-38.7	D-43.8	D-35.7	D-39.4

Legend: X - # - Level of Service - Seconds of Delay

Table 14 Queueing Results for Coordinated Signal System

Intersection and Approach	2017 Existing Conditions		Build 2A (Signal at Ednam, Stop at Golf Course)		Build 2B (Stop at Ednam, Signal at Golf Course)		Build 2C (Signal at Ednam, Signal at Golf Course)		Available Queue Storage [feet]
	AM	PM	AM	PM	AM	PM	AM	PM	
US 250 / Ednam Drive									
Eastbound Through	929	369	899	391	-	-	516	358	Continuous
Eastbound Right	4	1	6	5	-	-	5	10	350
Westbound Left	43	1	19	1	7.5	2.5	2	1	175
Westbound Through	112	6	111	1	-	-	15	15	450'
Northbound Left	31	60	36	73	15	37.5	32	61	125'
Northbound Right	48	60	42	53	7.5	5	30	31	Continuous
US 250 / Golf Course Drive									
Eastbound Left	0	0	0	0	0	0	0	0	350
Eastbound Through	-	-	-	-	136	759	1056	449	Continuous
Eastbound Right	-	-	-	-	0	0	0	0	275
Westbound Left	2.5	2.5	12.5	15	109	33	101	41	400
Westbound Through	-	-	-	-	566	149	573	118	Continuous
Westbound Right	-	-	-	-	0	0	0	0	250
Northbound Left	5	30	15	30	0	0	0	0	Continuous
Northbound Through	5	30	15	30	63	82	47	77	Continuous
Northbound Right	5	30	15	30	0	0	0	0	Continuous
Southbound Left	30	15	40	20	0	0	0	0	175
Southbound Through	30	15	40	20	29	31	28	30	175
Southbound Right	30	15	40	20	0	0	0	0	175

Note: Queue length reported is the 95th %tile Queue Length [feet].

5

Alternative Intersection Control

Alternative Intersection Feasibility Analysis

VHB conducted an alternative intersection feasibility analysis for both the Ednam Drive and Golf Course Drive intersections based on scoping conversations during which VDOT expressed concern that the Connector Road might call for modified control at either of the two site access intersections with US 250.

This type of analysis is required according to VDOT policy governing signal justification, if the analysis showed the need for alternative control at one of the intersections to mitigate the impacts of the proposed SUP improvements. VHB's analysis included an investigation into safety, operations, right of way impact, driver expectancy, and cost of an alternative intersection as opposed to a traffic signal. VHB utilized VJuST (VDOT Junction Screening Tool) to determine the feasibility of alternative intersection treatments.

At Ednam Drive, VHB evaluated a conventional signalized intersection, a continuous green-T signalized intersection, single and dual through lane roundabout configurations, and a two-way stop control intersection. At Golf Course Drive, VHB evaluated the same intersection types minus the continuous green-T. VHB did not evaluate the remaining alternative intersection types in VJuST after determining that they were not feasible in at least one of the following categories: appropriate roadway facility type, ability to accommodate traffic patterns, ability to provide sufficient intersection spacing, or right-of-way considerations. Table 15 and Table 16 contain the analysis operations results.

Table 15 Alternative Intersection Analysis at Ednam Drive

Intersection Type	Maximum v/c for Intersection Type					
	Build 2A: AM	Build 2A: PM	Build 2B: AM	Build 2B: PM	Build 2C: AM	Build 2C: PM
Conventional Signal	0.69	0.57	0.68	0.57	0.67	0.56
Green-T Signal	0.69	0.55	0.68	0.56	0.67	0.54
Roundabout: One Through	1.01	0.90	0.98	0.83	0.98	0.82
Roundabout: 2 Through	0.54	0.50	0.51	0.43	0.51	0.43
One-Way Stop Control	0.53	0.49	0.58	0.49	0.56	0.48

Table 16 Alternative Intersection Analysis at Golf Course Drive

Intersection Type	Maximum v/c for Intersection Type					
	Build 2A: AM	Build 2A: PM	Build 2B: AM	Build 2B: PM	Build 2C: AM	Build 2C: PM
Conventional Signal	0.75	0.71	0.81	0.78	0.80	0.77
Roundabout: One Through	1.05	1.00	1.11	1.01	1.07	1.01
Roundabout: 2 Through	0.52	0.54	0.57	0.58	0.54	0.58
One-Way Stop Control	0.60	0.56	0.61	0.82	0.57	0.71

The VJuST analysis shows that both intersections would function adequately – from a volume-to-capacity (v/c) standpoint – under any of the Build 2 control/reassignment scenarios under any of the intersection types, with the exception a single-lane roundabout. VJuST only evaluates the feasibility of intersection types based on capacity analysis. The operating conditions (e.g. delay, LOS, and queues) of the feasible intersections should also be evaluated to determine the most suitable control type. Additional factors such as environmental impacts, right-of-way constraints, context sensitivity, and construction costs would also be factored into the determination of the most appropriate intersection type. VJuST is a high-level tool to eliminate intersection types from further analysis.

Signal Warrant Analyses

VHB conducted signal warrant analyses for the Ednam Drive and Golf Course Drive intersections with US 250 under the three Build 2 control/reassignment scenarios, in accordance with the methodology presented in Chapter 4C of the *Manual of Uniform Traffic Control Devices (MUTCD)*, 2009 Edition. The MUTCD lists nine warrants for justification of signal installation:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour
- Warrant 4, Pedestrian Volume
- Warrant 5, School Crossing
- Warrant 6, Coordinated Signal System
- Warrant 7, Crash Experience
- Warrant 8, Roadway Network
- Warrant 9, Intersection Near a Grade Crossing

A traffic control signal should not be installed unless a minimum of one warrant is met; however, the satisfaction of a single warrant or warrants shall not in itself require the installation of a traffic control signal. For the purposes of this analysis, only the following vehicle volume-based warrants were evaluated:

- Warrant 1, Eight-Hour Vehicular Volume
- Warrant 2, Four-Hour Vehicular Volume
- Warrant 3, Peak Hour

The volume warrants met by each intersection under each scenario are listed in Table 17. Except for Warrant 6 (Coordinated Signal System), none of the non-volume warrants (Warrants 4, 5, 7, 8, and 9) are met for either intersection under any scenario.

Table 17 Signal Warrants Met at Intersections

Scenario	Ednam Drive	Golf Course Drive
Build 2A	Warrant 1B Warrant 2 Warrant 3B	None
Build 2B	None	Warrant 1B Warrant 2 Warrant 3B
Build 2C	None	Warrant 1B Warrant 2 Warrant 3B

The results reveal that signal control is warranted at either Ednam Drive or Golf Course Drive regardless of scenario. Under no scenario is concurrent signal control at both intersections warranted. The intersection with the heavier site volume meets the warrants for a signal. In Build 2C, consisting of concurrent signal control at both intersections, traffic is assigned according to the driver behavior factors described previously, which tends to favor the intersection

nearest the attraction (e.g., Inn, sports club, etc.). The heavy external distribution to/from the east places heavier traffic volumes at Golf Course Drive, and contributes to only the Golf Course Drive intersection being warranted for signal-control. As a result, a signal would not be warranted at Ednam Drive if one were provided at Golf Course Drive.

6 Conclusion

The capacity analysis demonstrates that the expanded athletic facilities at the Boar's Head and Birdwood properties have a minimal transportation impact. That impact is restricted to the approaches at the Golf Course Drive / Colridge Drive intersection with US 250, which afflicts only patrons of the golf course on the northbound approach and the residents in the White Gables community north of US 250. The average delay on the northbound approach of Golf Course Drive increases with the addition of the new golf and tennis trips, but the average queue on the northbound approach is only two vehicles. Similarly, the impact to White Gables traffic is confined to fewer than 10 vehicles per peak hour. There would be no impact to the Ednam Drive intersection in response to the added tennis and golf trips, even in the worst-case scenario in which all tennis trips use the Ednam Drive intersection (i.e., all parking on Boar's Head property), which is unlikely considering that parking for tennis is more likely to be split across both the Boar's Head property and Birdwood property.

Furthermore, the capacity analysis demonstrates that the permanent use of the Connector Road providing inter-parcel connectivity between the Boar's Head and Birdwood properties is also anticipated to have minimal impact on the roadway network. Performance will be improved at the two site access intersections to the properties at Ednam Drive and Golf Course Drive with the added connectivity by distributing traffic across the two intersections. The Connector Road would provide inter-parcel access for local trips between the properties and between the adjacent residential neighborhoods and the Birdwood property, thus removing vehicles that are currently using US 250. Removing these trips from the US 250 corridor contributes toward VDOT's Arterial Preservation goals for this corridor to improve mainline flow for through trips.

The Connector Road also enhances emergency access to Boar's Head and the adjacent residential neighborhoods and improves pedestrian, bike, and golf cart accessibility between the properties, which opens up opportunities for shared parking opportunities across the two properties and temporary alternative traffic circulation strategies to accommodate larger events that occur on the properties.

VHB modeled traffic rerouting on the Connector Road for three separate scenarios with the Connector Road opened on a permanent basis, to assess the impact of the rerouting expected once the inter-parcel connectivity is provided. The capacity analysis demonstrates that the existing infrastructure can accommodate the shift in traffic patterns provided by the Connector Road for any of the intersection control scenarios. Intersection delay, LOS, and queueing analysis reveals that the Connector Road improves the overall operations of the intersections by distributing traffic between the two intersections until an equilibrium is reached. In all scenarios, the intersection(s) under signal control all operate at LOS B, an improvement over the LOS C condition without the Connector Road. While the provision of signal-control at Golf Course Drive would alleviate the delay for the southbound movement at Colridge Drive; the installation of a signal at this time is unnecessary for an impact to fewer than ten vehicles during the peak hour.

The Connector Road more evenly distributes traffic across the two access points with US 250, increases inter-parcel connectivity, relocates vehicle trips from US 250 internal to the properties, improves pedestrian/bicycle connectivity between parcels, and provides enhanced emergency access to the Boar's Head property and residential neighborhoods.

The corridor-wide capacity analysis reveals that with the introduction of optimized, coordinated signal timings from

Broomley Road through the US 29 interchange, the highest performing control scenario to facilitate the additional trips and reassignment due to the Connector Road, corresponds to the existing control conditions (i.e., signal at Ednam Drive and stop-control at Golf Course Drive). Contrary to the preliminary hypothesis that relocation of signal control from Ednam Drive to Golf Course Drive would result in better performance for all vehicles on the corridor based on signal-spacing best-practices, the corridor analysis suggests that the presumed better signal-spacing scenario would not perform better than the existing control conditions from a network delay and travel time basis. However, any of the three control strategies could be implemented with tweaks to the coordinated timing to achieve the overarching traffic flow goals for the corridor.

Alternative intersection analysis revealed that signal control and/or two-way stop control are the feasible intersection control options at the site access points from a volume to capacity basis. All other intersection types assessed using VDOT's VJuST tool are viable from a volume-to-capacity standpoint, except for single lane roundabout; however, feasibility of these alternatives is more heavily influenced by other economic and physical constraints (e.g., environmental, right-of-way, utilities, rail, drainage, topography, context, safety, etc.)

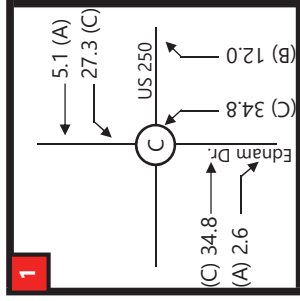
The warrant analysis shows that after the addition of the new trips and opening of the Connector Road, volume warrants 1B, 2, and 3B are met for either scenario in which signal control is present at Ednam Drive or Golf Course Drive. With the Connector Road in place and traffic distributed across the two intersections based on driver behavior factors, there is insufficient volume to warrant concurrent signal control at both intersections. Because the distribution of traffic is so heavily in favor of Charlottesville (81%), in the scenario in which vehicles were reassigned according to signal control provided at both intersections, the volumes meet the

warrants at Golf Course Drive but no longer meet the warrants at Ednam Drive.

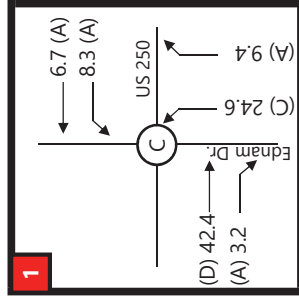
In conclusion, the increased trips generated by the modified tennis and golf land use have negligible impact on the transportation system and introduction of the Connector Road on a permanent basis have minimal impacts on the transportation system. Those impacts are accommodated by the existing infrastructure and intersection control. Consideration may be given to relocating signal control to Golf Course Drive; and, there are advantages of doing so such as improving access for the White Gables neighborhood and servicing the dominant flow direction (i.e., to/from Charlottesville) slightly better. But both scenarios more than adequately accommodate the anticipated traffic impacts created by the improvements in the SUP; and, those impacts do not necessitate the relocation of signal control, nor do those impacts necessitate any other road.

APPENDIX

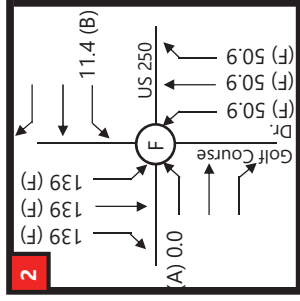
Existing Conditions



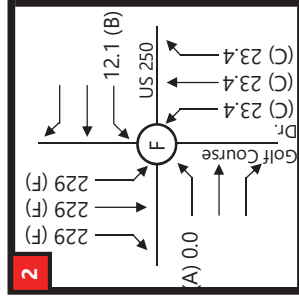
Build 2A



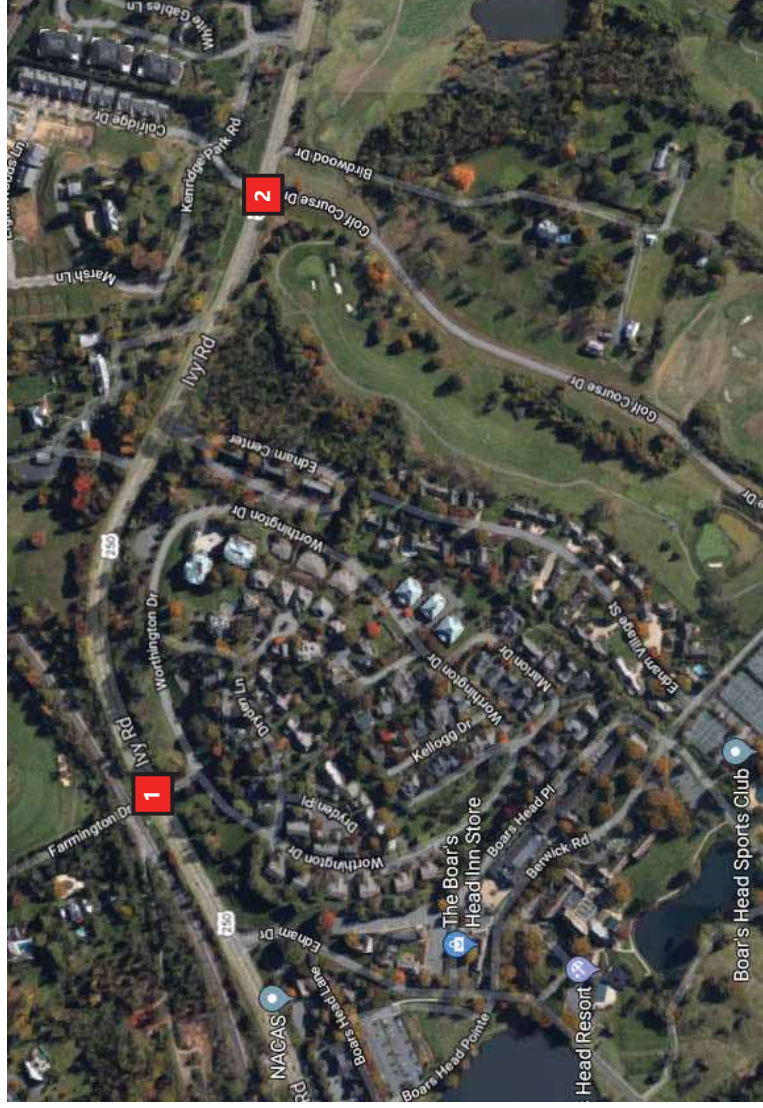
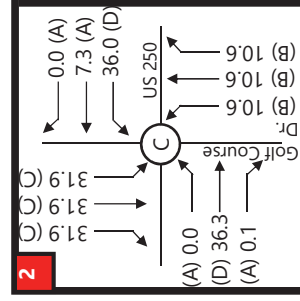
Existing Conditions



Build 2A

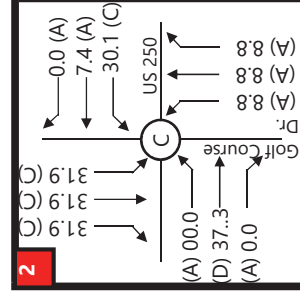


Build 2B

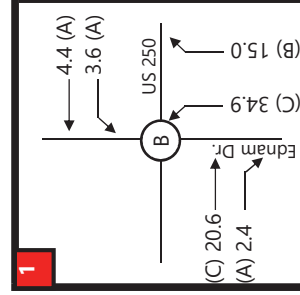


NOT TO SCALE

Build 2C



Build 2C



Legend

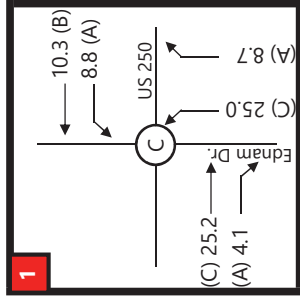
A - Delay, sec/veh (Movement Level of Service)

(A) - Overall Intersection Level of Service

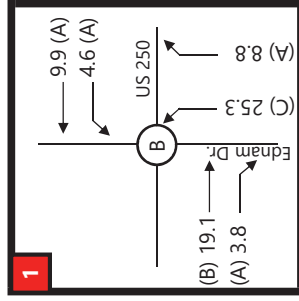
Boars Head AM Peak Analysis of Isolated Intersections (Non-Coordinated)

Intersection Delay and Level of Service (LOS)

Existing Conditions

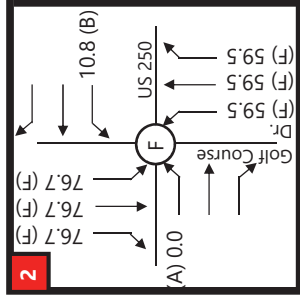


Build 2A

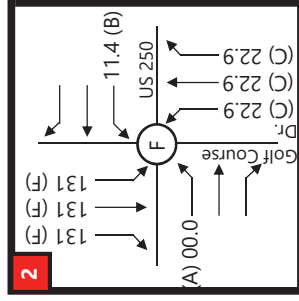


Build 2B

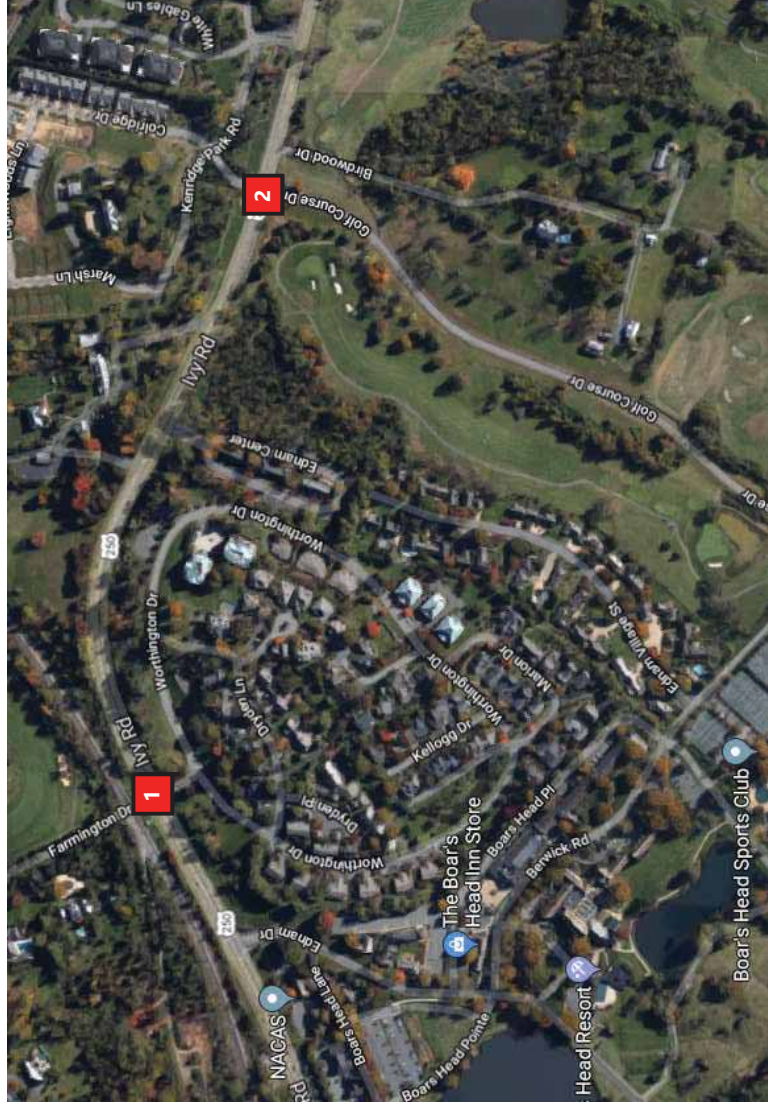
Existing Conditions



Build 2A



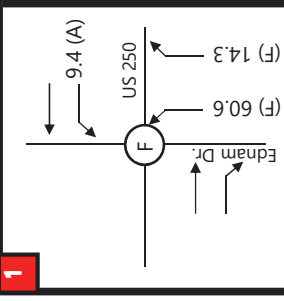
Build 2B



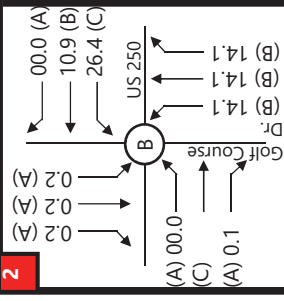
Build 2C

Build 2C

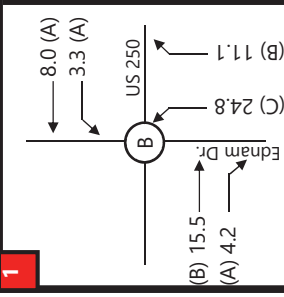
NOT TO SCALE



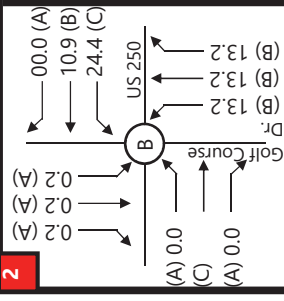
Build 2B



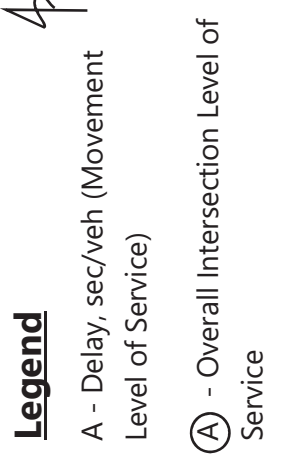
Build 2B



Build 2C



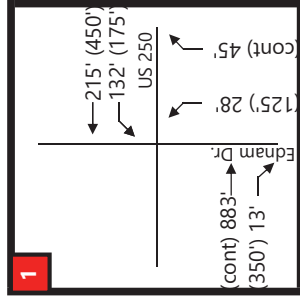
Build 2C



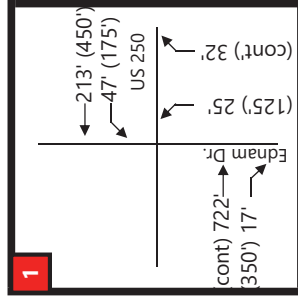
Boars Head PM Peak Analysis of Isolated Intersections (Non-Coordinated)

Intersection Delay and Level of Service (LOS)

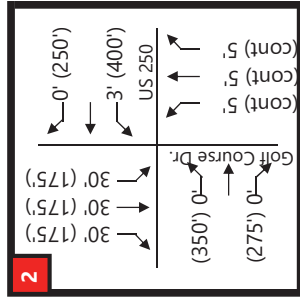
Existing Conditions



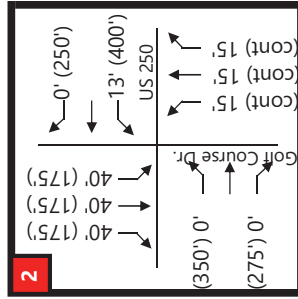
Build 2A



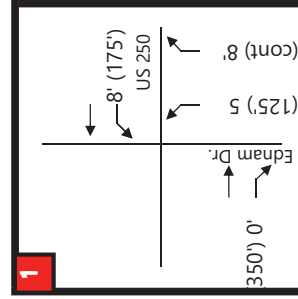
Existing Conditions



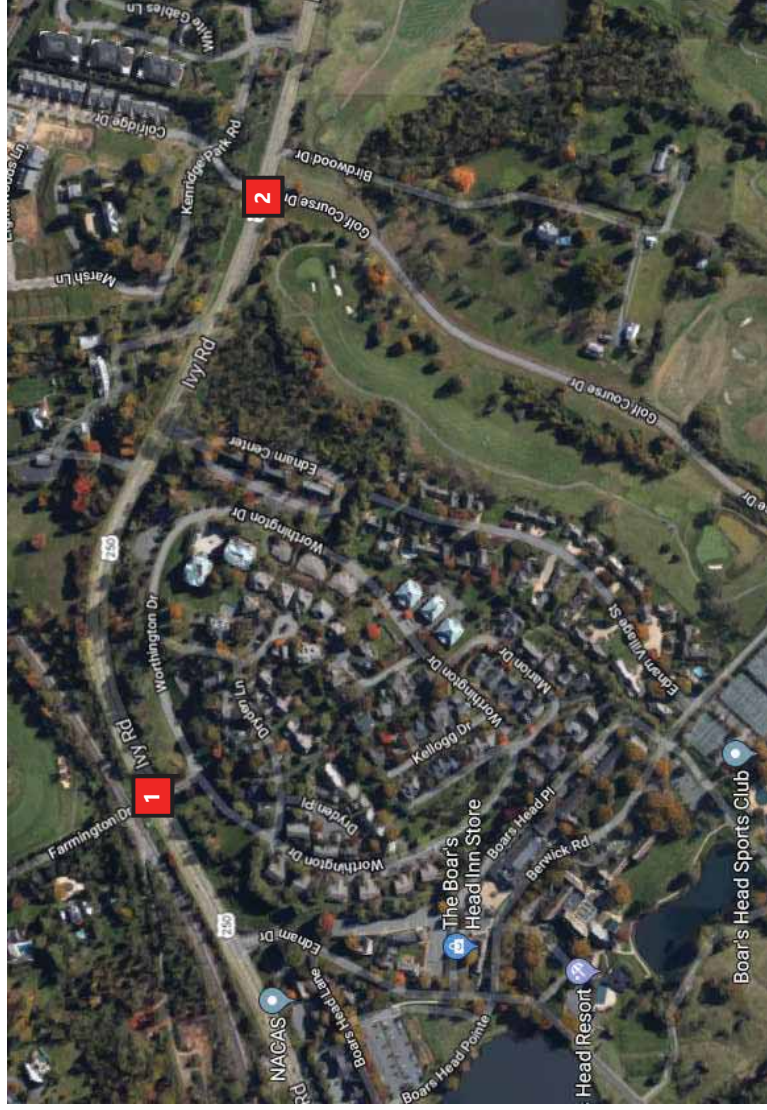
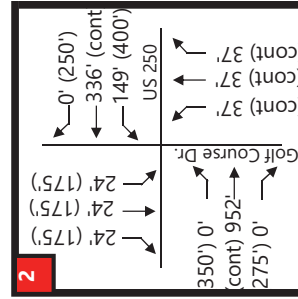
Build 2A



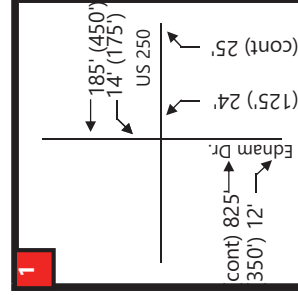
Build 2B



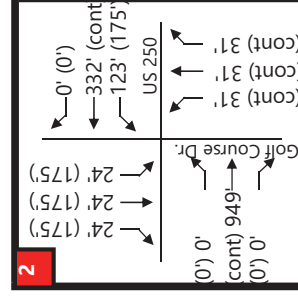
Build 2B



Build 2C



Build 2C



NOT TO SCALE

Legend

XX' (XX') Queue Length (Available Storage Length) [expressed in feet]

Cont = Continuous Storage

Note: 95th %tile queue length reported.

Boar's Head AM Peak Analysis of Isolated Intersections (Non-Coordinated)

Intersection Queue Lengths

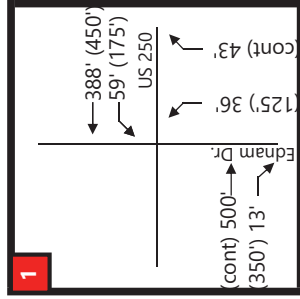


Diagram 1 shows a section of land. The northern boundary is Ednam Dr. The eastern boundary is US 250. The southern boundary is a creek. A point on the creek is marked with a bearing of $S 35^{\circ} 55' E$ and a distance of $450'$. The distance from the creek to the US 250 boundary is $26'$ ($175'$). The distance from the creek to the Ednam Dr. boundary is $350'$ ($14'$). The distance from the creek to the US 250 boundary is $34'$ ($125'$).

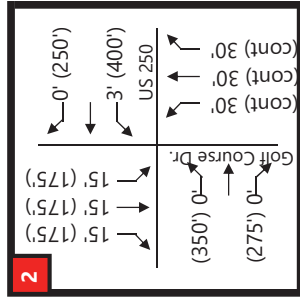
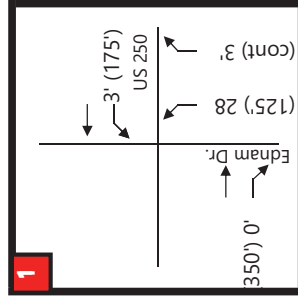
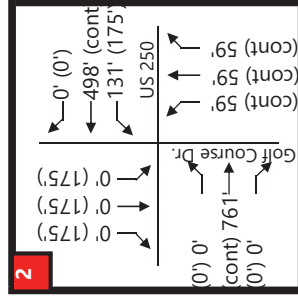
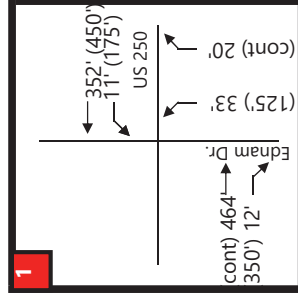
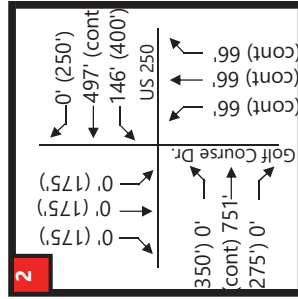


Diagram of a golf course layout showing a green with a hole and a flag, and a fairway with a tee box. The green is labeled '2' and has a hole at (250', 0') and a flag at (250', 15'). The fairway has a tee box at (0', 250') and a hole at (0', 250'). The hole is labeled 'US 250'.



Note: 95th %tile queue length reported.

Intersection Queue Lengths

Synchro Output Files for Isolated, Non-Coordinated Intersections

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	995	42	160	675	17	100		
Future Volume (veh/h)	995	42	160	675	17	100		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1082	46	174	734	18	109		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	1128	959	302	1435	196	175		
Arrive On Green	0.61	0.61	0.11	0.77	0.11	0.11		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	1082	46	174	734	18	109		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	46.0	1.0	2.4	12.5	0.8	5.5		
Cycle Q Clear(g_c), s	46.0	1.0	2.4	12.5	0.8	5.5		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1128	959	302	1435	196	175		
V/C Ratio(X)	0.96	0.05	0.58	0.51	0.09	0.62		
Avail Cap(c_a), veh/h	1130	961	305	1441	317	283		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	15.6	6.7	19.5	3.6	33.6	35.7		
Incr Delay (d2), s/veh	17.8	0.0	2.6	0.3	0.2	3.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	28.7	0.4	2.7	6.4	0.4	2.6		
LnGrp Delay(d),s/veh	33.4	6.8	22.1	4.0	33.8	39.3		
LnGrp LOS	C	A	C	A	C	D		
Approach Vol, veh/h	1128			908	127			
Approach Delay, s/veh	32.3			7.4	38.5			
Approach LOS	C			A	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.9	55.9		14.3		69.8		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	49.0		13.0		63.0		
Max Q Clear Time (g_c+I1), s	4.4	48.0		7.5		14.5		
Green Ext Time (p_c), s	0.1	0.9		0.1		21.4		
Intersection Summary								
HCM 2010 Ctrl Delay			22.2					
HCM 2010 LOS			C					

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1080	16	19	976	7	1	0	4	7	1	5
Future Vol, veh/h	0	1080	16	19	976	7	1	0	4	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1200	18	21	1084	8	1	0	4	8	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1084	0	0	1200	0	0	2330	2327	1200	2329	2327	1084
Stage 1	-	-	-	-	-	-	1200	1200	-	1127	1127	-
Stage 2	-	-	-	-	-	-	1130	1127	-	1202	1200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	643	-	-	582	-	-	26	37	226	26	37	264
Stage 1	-	-	-	-	-	-	226	258	-	249	280	-
Stage 2	-	-	-	-	-	-	248	280	-	225	258	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	643	-	-	582	-	-	24	36	226	25	36	264
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	36	-	25	36	-
Stage 1	-	-	-	-	-	-	226	258	-	249	270	-
Stage 2	-	-	-	-	-	-	233	270	-	221	258	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			50.9			139.1		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	84	643	-	-	582	-	-	40
HCM Lane V/C Ratio	0.066	-	-	-	0.036	-	-	0.361
HCM Control Delay (s)	50.9	0	-	-	11.4	-	-	139.1
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	1.2

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	696	31	163	859	34	134		
Future Volume (veh/h)	696	31	163	859	34	134		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	757	34	177	934	37	146		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	888	754	438	1291	264	236		
Arrive On Green	0.48	0.48	0.14	0.69	0.15	0.15		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	757	34	177	934	37	146		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	22.7	0.7	2.5	19.5	1.1	5.5		
Cycle Q Clear(g_c), s	22.7	0.7	2.5	19.5	1.1	5.5		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	888	754	438	1291	264	236		
V/C Ratio(X)	0.85	0.05	0.40	0.72	0.14	0.62		
Avail Cap(c_a), veh/h	913	776	447	1326	421	376		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	14.6	8.9	10.9	6.0	23.4	25.2		
Incr Delay (d2), s/veh	7.7	0.0	0.6	1.9	0.2	2.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	13.5	0.3	1.6	10.6	0.6	2.6		
LnGrp Delay(d),s/veh	22.3	8.9	11.5	7.9	23.6	27.9		
LnGrp LOS	C	A	B	A	C	C		
Approach Vol, veh/h	791			1111	183			
Approach Delay, s/veh	21.7			8.5	27.0			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.7	35.1		14.4		48.8		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	29.0		13.0		43.0		
Max Q Clear Time (g_c+I1), s	4.5	24.7		7.5		21.5		
Green Ext Time (p_c), s	0.1	3.5		0.2		12.3		
Intersection Summary								
HCM 2010 Ctrl Delay			15.1					
HCM 2010 LOS			B					

HCM 2010 TWSC
34: Golf Course/Colridge & Ivy Road

11/10/2017

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	961	5	27	1052	8	5	0	21	3	0	6
Future Vol, veh/h	0	961	5	27	1052	8	5	0	21	3	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1068	6	30	1169	9	6	0	23	3	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1169	0	0	1068	0	0	2300	2297	1068	2308	2297	1169
Stage 1	-	-	-	-	-	-	1068	1068	-	1229	1229	-
Stage 2	-	-	-	-	-	-	1232	1229	-	1079	1068	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	598	-	-	653	-	-	27	39	269	27	39	235
Stage 1	-	-	-	-	-	-	268	298	-	218	250	-
Stage 2	-	-	-	-	-	-	217	250	-	264	298	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	598	-	-	653	-	-	25	37	269	24	37	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	25	37	-	24	37	-
Stage 1	-	-	-	-	-	-	268	298	-	218	239	-
Stage 2	-	-	-	-	-	-	201	239	-	241	298	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			59.5			76.6		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	94	598	-	-	653	-	-	60
HCM Lane V/C Ratio	0.307	-	-	-	0.046	-	-	0.167
HCM Control Delay (s)	59.5	0	-	-	10.8	-	-	76.6
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.2	0	-	-	0.1	-	-	0.6

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	995	46	171	675	19	107		
Future Volume (veh/h)	995	46	171	675	19	107		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1082	50	186	734	21	116		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	1122	954	297	1428	204	182		
Arrive On Green	0.60	0.60	0.11	0.77	0.12	0.12		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	1082	50	186	734	21	116		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	46.7	1.1	3.0	12.8	0.9	5.9		
Cycle Q Clear(g_c), s	46.7	1.1	3.0	12.8	0.9	5.9		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1122	954	297	1428	204	182		
V/C Ratio(X)	0.96	0.05	0.63	0.51	0.10	0.64		
Avail Cap(c_a), veh/h	1123	954	299	1431	314	281		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	16.0	6.9	20.5	3.8	33.5	35.7		
Incr Delay (d2), s/veh	18.9	0.0	4.0	0.3	0.2	3.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	29.6	0.5	4.4	6.6	0.4	2.8		
LnGrp Delay(d),s/veh	34.8	6.9	24.6	4.1	33.7	39.4		
LnGrp LOS	C	A	C	A	C	D		
Approach Vol, veh/h	1132			920	137			
Approach Delay, s/veh	33.6			8.3	38.5			
Approach LOS	C			A	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.9	56.0		14.8		69.9		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	49.0		13.0		63.0		
Max Q Clear Time (g_c+I1), s	5.0	48.7		7.9		14.8		
Green Ext Time (p_c), s	0.1	0.3		0.2		21.4		
Intersection Summary								
HCM 2010 Ctrl Delay			23.3					
HCM 2010 LOS			C					

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1080	19	28	976	7	1	0	5	7	1	5
Future Vol, veh/h	0	1080	19	28	976	7	1	0	5	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1200	21	31	1084	8	1	0	6	8	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1084	0	0	1200	0	0	2350	2347	1200	2350	2347	1084
Stage 1	-	-	-	-	-	-	1200	1200	-	1147	1147	-
Stage 2	-	-	-	-	-	-	1150	1147	-	1203	1200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	643	-	-	582	-	-	25	36	226	25	36	264
Stage 1	-	-	-	-	-	-	226	258	-	242	274	-
Stage 2	-	-	-	-	-	-	241	274	-	225	258	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	643	-	-	582	-	-	23	34	226	23	34	264
Mov Cap-2 Maneuver	-	-	-	-	-	-	23	34	-	23	34	-
Stage 1	-	-	-	-	-	-	226	258	-	242	259	-
Stage 2	-	-	-	-	-	-	222	259	-	219	258	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			47.7			154.6		
HCM LOS							E			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	91	643	-	-	582	-	-	37
HCM Lane V/C Ratio	0.073	-	-	-	0.053	-	-	0.39
HCM Control Delay (s)	47.7	0	-	-	11.5	-	-	154.6
HCM Lane LOS	E	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.2	0	-	-	0.2	-	-	1.3

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	696	34	172	859	36	143		
Future Volume (veh/h)	696	34	172	859	36	143		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	757	37	187	934	39	155		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	882	750	433	1283	274	244		
Arrive On Green	0.47	0.47	0.14	0.69	0.15	0.15		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	757	37	187	934	39	155		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	23.0	0.8	2.7	20.0	1.2	5.9		
Cycle Q Clear(g_c), s	23.0	0.8	2.7	20.0	1.2	5.9		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	882	750	433	1283	274	244		
V/C Ratio(X)	0.86	0.05	0.43	0.73	0.14	0.63		
Avail Cap(c_a), veh/h	905	769	440	1314	417	372		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	14.9	9.1	11.2	6.2	23.3	25.3		
Incr Delay (d2), s/veh	8.1	0.0	0.7	2.0	0.2	2.7		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	13.6	0.4	1.7	10.6	0.6	2.7		
LnGrp Delay(d),s/veh	23.0	9.1	11.9	8.2	23.6	28.0		
LnGrp LOS	C	A	B	A	C	C		
Approach Vol, veh/h	794			1121	194			
Approach Delay, s/veh	22.4			8.8	27.1			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.7	35.2		14.9		49.0		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	29.0		13.0		43.0		
Max Q Clear Time (g_c+I1), s	4.7	25.0		7.9		22.0		
Green Ext Time (p_c), s	0.1	3.2		0.3		12.2		
Intersection Summary								
HCM 2010 Ctrl Delay			15.6					
HCM 2010 LOS			B					

HCM 2010 TWSC
34: Golf Course/Colridge & Ivy Road

11/10/2017

Intersection												
Int Delay, s/veh	1.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	961	7	34	1052	8	6	0	28	3	0	6
Future Vol, veh/h	0	961	7	34	1052	8	6	0	28	3	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1068	8	38	1169	9	7	0	31	3	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1169	0	0	1068	0	0	2316	2312	1068	2327	2312	1169
Stage 1	-	-	-	-	-	-	1068	1068	-	1244	1244	-
Stage 2	-	-	-	-	-	-	1248	1244	-	1083	1068	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	598	-	-	653	-	-	26	38	269	26	38	235
Stage 1	-	-	-	-	-	-	268	298	-	213	246	-
Stage 2	-	-	-	-	-	-	212	246	-	263	298	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	598	-	-	653	-	-	24	36	269	22	36	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	36	-	22	36	-
Stage 1	-	-	-	-	-	-	268	298	-	213	232	-
Stage 2	-	-	-	-	-	-	194	232	-	233	298	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			65			82.8		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	96	598	-	-	653	-	-	56
HCM Lane V/C Ratio	0.394	-	-	-	0.058	-	-	0.179
HCM Control Delay (s)	65	0	-	-	10.9	-	-	82.8
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.6	0	-	-	0.2	-	-	0.6

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	995	42	160	675	17	100		
Future Volume (veh/h)	995	42	160	675	17	100		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1082	46	174	734	18	109		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	1128	959	302	1435	196	175		
Arrive On Green	0.61	0.61	0.11	0.77	0.11	0.11		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	1082	46	174	734	18	109		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	46.0	1.0	2.4	12.5	0.8	5.5		
Cycle Q Clear(g_c), s	46.0	1.0	2.4	12.5	0.8	5.5		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1128	959	302	1435	196	175		
V/C Ratio(X)	0.96	0.05	0.58	0.51	0.09	0.62		
Avail Cap(c_a), veh/h	1130	961	305	1441	317	283		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	15.6	6.7	19.5	3.6	33.6	35.7		
Incr Delay (d2), s/veh	17.8	0.0	2.6	0.3	0.2	3.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	28.7	0.4	2.7	6.4	0.4	2.6		
LnGrp Delay(d),s/veh	33.4	6.8	22.1	4.0	33.8	39.3		
LnGrp LOS	C	A	C	A	C	D		
Approach Vol, veh/h	1128			908	127			
Approach Delay, s/veh	32.3			7.4	38.5			
Approach LOS	C			A	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.9	55.9		14.3		69.8		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	49.0		13.0		63.0		
Max Q Clear Time (g_c+I1), s	4.4	48.0		7.5		14.5		
Green Ext Time (p_c), s	0.1	0.9		0.1		21.4		
Intersection Summary								
HCM 2010 Ctrl Delay			22.2					
HCM 2010 LOS			C					

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1080	23	39	976	7	3	0	12	7	1	5
Future Vol, veh/h	0	1080	23	39	976	7	3	0	12	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1200	26	43	1084	8	3	0	13	8	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1084	0	0	1200	0	0	2374	2371	1200	2378	2371	1084
Stage 1	-	-	-	-	-	-	1200	1200	-	1171	1171	-
Stage 2	-	-	-	-	-	-	1174	1171	-	1207	1200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	643	-	-	582	-	-	24	35	226	24	35	264
Stage 1	-	-	-	-	-	-	226	258	-	235	267	-
Stage 2	-	-	-	-	-	-	234	267	-	224	258	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	643	-	-	582	-	-	22	32	226	21	32	264
Mov Cap-2 Maneuver	-	-	-	-	-	-	22	32	-	21	32	-
Stage 1	-	-	-	-	-	-	226	258	-	235	247	-
Stage 2	-	-	-	-	-	-	211	247	-	211	258	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.4			62.4			173.8		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	79	643	-	-	582	-	-	34
HCM Lane V/C Ratio	0.211	-	-	-	0.074	-	-	0.425
HCM Control Delay (s)	62.4	0	-	-	11.7	-	-	173.8
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.7	0	-	-	0.2	-	-	1.4

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	696	29	163	859	34	134		
Future Volume (veh/h)	696	29	163	859	34	134		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	757	32	177	934	37	146		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	888	754	438	1291	264	236		
Arrive On Green	0.48	0.48	0.14	0.69	0.15	0.15		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	757	32	177	934	37	146		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	22.7	0.7	2.5	19.5	1.1	5.5		
Cycle Q Clear(g_c), s	22.7	0.7	2.5	19.5	1.1	5.5		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	888	754	438	1291	264	236		
V/C Ratio(X)	0.85	0.04	0.40	0.72	0.14	0.62		
Avail Cap(c_a), veh/h	913	776	447	1326	421	376		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	14.6	8.8	10.9	6.0	23.4	25.2		
Incr Delay (d2), s/veh	7.7	0.0	0.6	1.9	0.2	2.6		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	13.5	0.3	1.6	10.6	0.6	2.6		
LnGrp Delay(d),s/veh	22.3	8.9	11.5	7.9	23.6	27.9		
LnGrp LOS	C	A	B	A	C	C		
Approach Vol, veh/h	789			1111	183			
Approach Delay, s/veh	21.7			8.5	27.0			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.7	35.1		14.4		48.8		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	29.0		13.0		43.0		
Max Q Clear Time (g_c+I1), s	4.5	24.7		7.5		21.5		
Green Ext Time (p_c), s	0.1	3.5		0.2		12.3		
Intersection Summary								
HCM 2010 Ctrl Delay			15.1					
HCM 2010 LOS			B					

HCM 2010 TWSC
34: Golf Course/Colridge & Ivy Road

11/10/2017

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	961	10	43	1052	8	8	0	30	3	0	6
Future Vol, veh/h	0	961	10	43	1052	8	8	0	30	3	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1068	11	48	1169	9	9	0	33	3	0	7
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1169	0	0	1068	0	0	2336	2332	1068	2348	2332	1169
Stage 1	-	-	-	-	-	-	1068	1068	-	1264	1264	-
Stage 2	-	-	-	-	-	-	1268	1264	-	1084	1068	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	598	-	-	653	-	-	26	37	269	25	37	235
Stage 1	-	-	-	-	-	-	268	298	-	208	241	-
Stage 2	-	-	-	-	-	-	207	241	-	263	298	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	598	-	-	653	-	-	24	34	269	21	34	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	34	-	21	34	-
Stage 1	-	-	-	-	-	-	268	298	-	208	223	-
Stage 2	-	-	-	-	-	-	186	223	-	230	298	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.4			83.4			88.1		
HCM LOS							F			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	85	598	-	-	653	-	-	53				
HCM Lane V/C Ratio	0.497	-	-	-	0.073	-	-	0.189				
HCM Control Delay (s)	83.4	0	-	-	10.9	-	-	88.1				
HCM Lane LOS	F	A	-	-	B	-	-	F				
HCM 95th %tile Q(veh)	2.1	0	-	-	0.2	-	-	0.6				

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	933	60	119	674	20	72		
Future Volume (veh/h)	933	60	119	674	20	72		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1014	65	129	733	22	78		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	1127	958	348	1441	182	162		
Arrive On Green	0.61	0.61	0.11	0.77	0.10	0.10		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	1014	65	129	733	22	78		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	38.1	1.4	1.7	11.8	0.9	3.8		
Cycle Q Clear(g_c), s	38.1	1.4	1.7	11.8	0.9	3.8		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1127	958	348	1441	182	162		
V/C Ratio(X)	0.90	0.07	0.37	0.51	0.12	0.48		
Avail Cap(c_a), veh/h	1177	1001	356	1501	330	294		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	13.8	6.6	16.1	3.4	32.9	34.2		
Incr Delay (d2), s/veh	9.3	0.0	0.7	0.3	0.3	2.2		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	22.1	0.6	1.9	6.0	0.5	1.7		
LnGrp Delay(d),s/veh	23.1	6.6	16.8	3.7	33.2	36.4		
LnGrp LOS	C	A	B	A	C	D		
Approach Vol, veh/h	1079			862	100			
Approach Delay, s/veh	22.1			5.6	35.7			
Approach LOS	C			A	D			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	13.6	53.8		13.3		67.4		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	49.0		13.0		63.0		
Max Q Clear Time (g_c+I1), s	3.7	40.1		5.8		13.8		
Green Ext Time (p_c), s	0.1	6.7		0.1		19.8		
Intersection Summary								
HCM 2010 Ctrl Delay			15.8					
HCM 2010 LOS			B					

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1058	2	80	935	7	0	0	34	7	1	5
Future Vol, veh/h	0	1058	2	80	935	7	0	0	34	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1176	2	89	1039	8	0	0	38	8	1	6
Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1039	0	0	1176	0	0	2396	2393	1176	2411	2393	1039
Stage 1	-	-	-	-	-	-	1176	1176	-	1217	1217	-
Stage 2	-	-	-	-	-	-	1220	1217	-	1194	1176	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	669	-	-	594	-	-	23	34	233	23	34	280
Stage 1	-	-	-	-	-	-	233	265	-	221	253	-
Stage 2	-	-	-	-	-	-	220	253	-	228	265	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	669	-	-	594	-	-	19	29	233	17	29	280
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	29	-	17	29	-
Stage 1	-	-	-	-	-	-	233	265	-	221	215	-
Stage 2	-	-	-	-	-	-	182	215	-	191	265	-
Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.9			23.4			228.9		
HCM LOS							C			F		
Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1				
Capacity (veh/h)	233	669	-	-	594	-	-	28				
HCM Lane V/C Ratio	0.162	-	-	-	0.15	-	-	0.516				
HCM Control Delay (s)	23.4	0	-	-	12.1	-	-	228.9				
HCM Lane LOS	C	A	-	-	B	-	-	F				
HCM 95th %tile Q(veh)	0.6	0	-	-	0.5	-	-	1.6				

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	663	37	100	856	40	85		
Future Volume (veh/h)	663	37	100	856	40	85		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	721	40	109	930	43	92		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	900	765	461	1298	244	217		
Arrive On Green	0.48	0.48	0.13	0.70	0.14	0.14		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	721	40	109	930	43	92		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	19.7	0.8	1.4	18.2	1.3	3.2		
Cycle Q Clear(g_c), s	19.7	0.8	1.4	18.2	1.3	3.2		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	900	765	461	1298	244	217		
V/C Ratio(X)	0.80	0.05	0.24	0.72	0.18	0.42		
Avail Cap(c_a), veh/h	959	815	495	1392	442	394		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	13.1	8.3	8.6	5.5	23.0	23.8		
Incr Delay (d2), s/veh	4.7	0.0	0.3	1.7	0.3	1.3		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	11.2	0.4	0.8	9.6	0.7	1.5		
LnGrp Delay(d),s/veh	17.8	8.3	8.9	7.2	23.3	25.1		
LnGrp LOS	B	A	A	A	C	C		
Approach Vol, veh/h	761			1039	135			
Approach Delay, s/veh	17.3			7.4	24.5			
Approach LOS	B			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.9	34.1		13.3		47.0		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	29.0		13.0		43.0		
Max Q Clear Time (g_c+I1), s	3.4	21.7		5.2		20.2		
Green Ext Time (p_c), s	0.1	5.4		0.2		12.4		
Intersection Summary								
HCM 2010 Ctrl Delay			12.5					
HCM 2010 LOS			B					

HCM 2010 TWSC
34: Golf Course/Colridge & Ivy Road

11/10/2017

Intersection												
Int Delay, s/veh	4.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	920	0	102	993	8	8	0	78	3	0	6
Future Vol, veh/h	0	920	0	102	993	8	8	0	78	3	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1022	0	113	1103	9	9	0	87	3	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1103	0	0	1022	0	0	2355	2352	1022	2396	2352	1103
Stage 1	-	-	-	-	-	-	1022	1022	-	1330	1330	-
Stage 2	-	-	-	-	-	-	1333	1330	-	1066	1022	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	633	-	-	679	-	-	25	36	287	23	36	257
Stage 1	-	-	-	-	-	-	285	313	-	191	224	-
Stage 2	-	-	-	-	-	-	190	224	-	269	313	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	633	-	-	679	-	-	21	30	287	14	30	257
Mov Cap-2 Maneuver	-	-	-	-	-	-	21	30	-	14	30	-
Stage 1	-	-	-	-	-	-	285	313	-	191	187	-
Stage 2	-	-	-	-	-	-	154	187	-	188	313	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			1.1			83			130.7		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	132	633	-	-	679	-	-	38
HCM Lane V/C Ratio	0.724	-	-	-	0.167	-	-	0.263
HCM Control Delay (s)	83	0	-	-	11.4	-	-	130.7
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	4.1	0	-	-	0.6	-	-	0.9

Intersection

Int Delay, s/veh 1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	1018	27	45	683	11	21
Future Vol, veh/h	1018	27	45	683	11	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	360	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1107	29	49	742	12	23

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	1107
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	631
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	631
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.7	38.3
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	65	256	-	-	631	-
HCM Lane V/C Ratio	0.184	0.089	-	-	0.078	-
HCM Control Delay (s)	72.5	20.4	-	-	11.2	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	0.6	0.3	-	-	0.3	-

HCM 2010 Signalized Intersection Summary

34: Ivy Road

11/10/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1007	35	154	861	7	9	0	85	7	1	5
Future Volume (veh/h)	0	1007	35	154	861	7	9	0	85	7	1	5
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	1119	39	171	957	8	10	0	94	8	1	6
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	76	1191	1013	291	1466	1246	52	6	153	133	28	69
Arrive On Green	0.00	0.64	0.64	0.09	0.79	0.79	0.11	0.00	0.11	0.11	0.11	0.11
Sat Flow, veh/h	580	1863	1583	1774	1863	1583	97	55	1427	698	264	641
Grp Volume(v), veh/h	0	1119	39	171	957	8	104	0	0	15	0	0
Grp Sat Flow(s),veh/h/ln	580	1863	1583	1774	1863	1583	1579	0	0	1602	0	0
Q Serve(g_s), s	0.0	51.2	0.9	2.5	21.3	0.1	2.3	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	51.2	0.9	2.5	21.3	0.1	5.9	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.10		0.90	0.53		0.40
Lane Grp Cap(c), veh/h	76	1191	1013	291	1466	1246	211	0	0	230	0	0
V/C Ratio(X)	0.00	0.94	0.04	0.59	0.65	0.01	0.49	0.00	0.00	0.07	0.00	0.00
Avail Cap(c_a), veh/h	80	1203	1022	292	1479	1257	292	0	0	304	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	15.4	6.3	22.5	4.4	2.2	40.3	0.0	0.0	38.0	0.0	0.0
Incr Delay (d2), s/veh	0.0	13.8	0.0	3.0	1.0	0.0	1.8	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	30.4	0.4	3.2	11.1	0.0	2.7	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	0.0	29.2	6.3	25.5	5.4	2.2	42.0	0.0	0.0	38.1	0.0	0.0
LnGrp LOS		C	A	C	A	A	D			D		
Approach Vol, veh/h		1158			1136			104			15	
Approach Delay, s/veh		28.4			8.4			42.0			38.1	
Approach LOS		C			A			D			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		15.1	13.9	65.4		15.1		79.3				
Change Period (Y+Rc), s		7.0	7.0	7.0		7.0		7.0				
Max Green Setting (Gmax), s		13.0	7.0	59.0		13.0		73.0				
Max Q Clear Time (g_c+I1), s		7.9	4.5	53.2		2.7		23.3				
Green Ext Time (p_c), s		0.2	0.1	5.2		0.4		30.1				
Intersection Summary												
HCM 2010 Ctrl Delay				19.7								
HCM 2010 LOS				B								

Intersection

Int Delay, s/veh 1.2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	698	22	25	872	24	16
Future Vol, veh/h	698	22	25	872	24	16
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	360	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	759	24	27	948	26	17

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	759
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	852
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	852
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.3	42.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	90	406	-	-	852	-
HCM Lane V/C Ratio	0.29	0.043	-	-	0.032	-
HCM Control Delay (s)	60.6	14.3	-	-	9.4	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	1.1	0.1	-	-	0.1	-

HCM 2010 Signalized Intersection Summary

34: Golf Course/Colridge & Ivy Road

11/10/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	851	15	177	918	8	16	0	147	3	0	6
Future Volume (veh/h)	0	851	15	177	918	8	16	0	147	3	0	6
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	946	17	197	1020	9	18	0	163	3	0	7
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	82	1061	902	337	1358	1155	61	9	222	104	24	174
Arrive On Green	0.00	0.57	0.57	0.10	0.73	0.73	0.16	0.00	0.16	0.16	0.00	0.16
Sat Flow, veh/h	546	1863	1583	1774	1863	1583	99	58	1422	323	155	1116
Grp Volume(v), veh/h	0	946	17	197	1020	9	181	0	0	10	0	0
Grp Sat Flow(s),veh/h/ln	546	1863	1583	1774	1863	1583	1579	0	0	1594	0	0
Q Serve(g_s), s	0.0	38.8	0.4	3.3	28.6	0.1	4.5	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	38.8	0.4	3.3	28.6	0.1	9.5	0.0	0.0	0.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.10		0.90	0.30		0.70
Lane Grp Cap(c), veh/h	82	1061	902	337	1358	1155	292	0	0	303	0	0
V/C Ratio(X)	0.00	0.89	0.02	0.58	0.75	0.01	0.62	0.00	0.00	0.03	0.00	0.00
Avail Cap(c_a), veh/h	90	1088	925	338	1387	1179	316	0	0	325	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	16.4	8.2	17.9	7.1	3.2	35.1	0.0	0.0	31.3	0.0	0.0
Incr Delay (d2), s/veh	0.0	9.3	0.0	2.6	2.3	0.0	3.2	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	22.5	0.2	3.0	15.3	0.1	4.4	0.0	0.0	0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	25.7	8.2	20.4	9.4	3.2	38.3	0.0	0.0	31.3	0.0	0.0
LnGrp LOS		C	A	C	A	A	D			C		
Approach Vol, veh/h		963			1226			181			10	
Approach Delay, s/veh		25.4			11.1			38.3			31.3	
Approach LOS		C			B			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		18.6	13.9	54.7		18.6		68.7				
Change Period (Y+Rc), s		7.0	7.0	7.0		7.0		7.0				
Max Green Setting (Gmax), s		13.0	7.0	49.0		13.0		63.0				
Max Q Clear Time (g_c+I1), s		11.5	5.3	40.8		2.4		30.6				
Green Ext Time (p_c), s		0.2	0.1	7.0		0.8		20.9				
Intersection Summary												
HCM 2010 Ctrl Delay			19.1									
HCM 2010 LOS			B									

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	982	39	59	681	13	28		
Future Volume (veh/h)	982	39	59	681	13	28		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	1067	42	64	740	14	30		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	1178	1001	329	1472	144	128		
Arrive On Green	0.63	0.63	0.09	0.79	0.08	0.08		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	1067	42	64	740	14	30		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	38.2	0.8	0.7	10.7	0.6	1.4		
Cycle Q Clear(g_c), s	38.2	0.8	0.7	10.7	0.6	1.4		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	1178	1001	329	1472	144	128		
V/C Ratio(X)	0.91	0.04	0.19	0.50	0.10	0.23		
Avail Cap(c_a), veh/h	1225	1041	369	1561	343	306		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	12.3	5.4	14.4	2.8	33.0	33.4		
Incr Delay (d2), s/veh	9.6	0.0	0.3	0.3	0.3	0.9		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	22.4	0.3	0.8	5.5	0.3	0.6		
LnGrp Delay(d),s/veh	21.9	5.4	14.7	3.1	33.3	34.3		
LnGrp LOS	C	A	B	A	C	C		
Approach Vol, veh/h	1109			804	44			
Approach Delay, s/veh	21.2			4.0	34.0			
Approach LOS	C			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	12.2	54.1		11.3		66.3		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	49.0		13.0		63.0		
Max Q Clear Time (g_c+I1), s	2.7	40.2		3.4		12.7		
Green Ext Time (p_c), s	0.0	6.8		0.0		21.4		
Intersection Summary								
HCM 2010 Ctrl Delay			14.5					
HCM 2010 LOS			B					

HCM 2010 Signalized Intersection Summary

34: Ivy Road

11/10/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1014	23	140	875	7	7	0	78	7	1	5
Future Volume (veh/h)	0	1014	23	140	875	7	7	0	78	7	1	5
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	1127	26	156	972	8	8	0	87	8	1	6
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	77	1199	1019	292	1474	1253	50	5	148	131	28	67
Arrive On Green	0.00	0.64	0.64	0.09	0.79	0.79	0.10	0.00	0.10	0.10	0.10	0.10
Sat Flow, veh/h	572	1863	1583	1774	1863	1583	84	49	1447	706	274	653
Grp Volume(v), veh/h	0	1127	26	156	972	8	95	0	0	15	0	0
Grp Sat Flow(s),veh/h/ln	572	1863	1583	1774	1863	1583	1580	0	0	1634	0	0
Q Serve(g_s), s	0.0	51.2	0.6	2.2	21.4	0.1	1.9	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	51.2	0.6	2.2	21.4	0.1	5.4	0.0	0.0	0.7	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.08		0.92	0.53		0.40
Lane Grp Cap(c), veh/h	77	1199	1019	292	1474	1253	203	0	0	225	0	0
V/C Ratio(X)	0.00	0.94	0.03	0.53	0.66	0.01	0.47	0.00	0.00	0.07	0.00	0.00
Avail Cap(c_a), veh/h	80	1210	1029	294	1488	1265	293	0	0	308	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	15.1	6.1	22.3	4.3	2.1	40.3	0.0	0.0	38.2	0.0	0.0
Incr Delay (d2), s/veh	0.0	13.9	0.0	1.8	1.1	0.0	1.7	0.0	0.0	0.1	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	30.6	0.2	2.8	11.0	0.0	2.4	0.0	0.0	0.4	0.0	0.0
LnGrp Delay(d),s/veh	0.0	28.9	6.1	24.2	5.3	2.1	41.9	0.0	0.0	38.3	0.0	0.0
LnGrp LOS		C	A	C	A	A	D			D		
Approach Vol, veh/h	1153			1136			95			15		
Approach Delay, s/veh	28.4			7.9			41.9			38.3		
Approach LOS	C			A			D			D		
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		14.6	13.9	65.4		14.6		79.3				
Change Period (Y+Rc), s		7.0	7.0	7.0		7.0		7.0				
Max Green Setting (Gmax), s		13.0	7.0	59.0		13.0		73.0				
Max Q Clear Time (g_c+I1), s		7.4	4.2	53.2		2.7		23.4				
Green Ext Time (p_c), s		0.2	0.1	5.2		0.4		30.6				
Intersection Summary												
HCM 2010 Ctrl Delay	19.3											
HCM 2010 LOS	B											

HCM 2010 Signalized Intersection Summary

5: Ednam Drive & Ivy Road

11/10/2017

								
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations								
Traffic Volume (veh/h)	683	27	35	866	30	28		
Future Volume (veh/h)	683	27	35	866	30	28		
Number	2	12	1	6	7	14		
Initial Q (Qb), veh	0	0	0	0	0	0		
Ped-Bike Adj(A_pbT)		1.00	1.00		1.00	1.00		
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00		
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863		
Adj Flow Rate, veh/h	742	29	38	941	33	30		
Adj No. of Lanes	1	1	1	1	1	1		
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92		
Percent Heavy Veh, %	2	2	2	2	2	2		
Cap, veh/h	964	819	434	1307	205	183		
Arrive On Green	0.52	0.52	0.09	0.70	0.12	0.12		
Sat Flow, veh/h	1863	1583	1774	1863	1774	1583		
Grp Volume(v), veh/h	742	29	38	941	33	30		
Grp Sat Flow(s),veh/h/ln	1863	1583	1774	1863	1774	1583		
Q Serve(g_s), s	17.5	0.5	0.4	16.7	0.9	0.9		
Cycle Q Clear(g_c), s	17.5	0.5	0.4	16.7	0.9	0.9		
Prop In Lane		1.00	1.00		1.00	1.00		
Lane Grp Cap(c), veh/h	964	819	434	1307	205	183		
V/C Ratio(X)	0.77	0.04	0.09	0.72	0.16	0.16		
Avail Cap(c_a), veh/h	1056	898	561	1533	487	434		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00		
Uniform Delay (d), s/veh	10.6	6.5	7.2	4.9	21.8	21.8		
Incr Delay (d2), s/veh	3.2	0.0	0.1	1.4	0.4	0.4		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	9.7	0.2	0.2	8.9	0.5	0.4		
LnGrp Delay(d),s/veh	13.8	6.5	7.2	6.3	22.2	22.2		
LnGrp LOS	B	A	A	A	C	C		
Approach Vol, veh/h	771			979	63			
Approach Delay, s/veh	13.5			6.3	22.2			
Approach LOS	B			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs	1	2		4		6		
Phs Duration (G+Y+Rc), s	10.1	33.3		11.3		43.4		
Change Period (Y+Rc), s	7.0	7.0		7.0		7.0		
Max Green Setting (Gmax), s	7.0	29.0		13.0		43.0		
Max Q Clear Time (g_c+I1), s	2.4	19.5		2.9		18.7		
Green Ext Time (p_c), s	0.0	6.8		0.1		13.2		
Intersection Summary								
HCM 2010 Ctrl Delay			9.9					
HCM 2010 LOS			A					

HCM 2010 Signalized Intersection Summary

34: Golf Course/Colridge & Ivy Road

11/10/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	863	10	167	928	8	10	0	135	3	0	6
Future Volume (veh/h)	0	863	10	167	928	8	10	0	135	3	0	6
Number	7	4	14	3	8	18	5	2	12	1	6	16
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Adj Sat Flow, veh/h/ln	1863	1863	1863	1863	1863	1863	1900	1863	1900	1900	1863	1900
Adj Flow Rate, veh/h	0	959	11	186	1031	9	11	0	150	3	0	7
Adj No. of Lanes	1	1	1	1	1	1	0	1	0	0	1	0
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	84	1075	914	341	1376	1170	54	7	214	101	24	166
Arrive On Green	0.00	0.58	0.58	0.10	0.74	0.74	0.15	0.00	0.15	0.15	0.00	0.15
Sat Flow, veh/h	540	1863	1583	1774	1863	1583	62	46	1474	324	165	1143
Grp Volume(v), veh/h	0	959	11	186	1031	9	161	0	0	10	0	0
Grp Sat Flow(s),veh/h/ln	540	1863	1583	1774	1863	1583	1582	0	0	1633	0	0
Q Serve(g_s), s	0.0	38.7	0.3	3.0	27.9	0.1	3.0	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	0.0	38.7	0.3	3.0	27.9	0.1	8.3	0.0	0.0	0.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	0.07		0.93	0.30		0.70
Lane Grp Cap(c), veh/h	84	1075	914	341	1376	1170	275	0	0	292	0	0
V/C Ratio(X)	0.00	0.89	0.01	0.55	0.75	0.01	0.59	0.00	0.00	0.03	0.00	0.00
Avail Cap(c_a), veh/h	91	1102	937	343	1404	1194	320	0	0	333	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	15.9	7.8	17.6	6.6	3.0	35.0	0.0	0.0	31.7	0.0	0.0
Incr Delay (d2), s/veh	0.0	9.2	0.0	1.8	2.2	0.0	2.0	0.0	0.0	0.0	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	22.5	0.1	2.8	14.9	0.1	3.8	0.0	0.0	0.2	0.0	0.0
LnGrp Delay(d),s/veh	0.0	25.1	7.8	19.3	8.8	3.0	37.1	0.0	0.0	31.7	0.0	0.0
LnGrp LOS		C	A	B	A	A	D			C		
Approach Vol, veh/h		970			1226			161			10	
Approach Delay, s/veh		24.9			10.4			37.1			31.7	
Approach LOS		C			B			D			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs		2	3	4		6		8				
Phs Duration (G+Y+Rc), s		17.5	13.9	54.8		17.5		68.7				
Change Period (Y+Rc), s		7.0	7.0	7.0		7.0		7.0				
Max Green Setting (Gmax), s		13.0	7.0	49.0		13.0		63.0				
Max Q Clear Time (g_c+I1), s		10.3	5.0	40.7		2.4		29.9				
Green Ext Time (p_c), s		0.2	0.1	7.1		0.7		21.5				
Intersection Summary												
HCM 2010 Ctrl Delay			18.2									
HCM 2010 LOS			B									

Synchro Output Files for Coordinated Intersections

Lanes, Volumes, Timings
5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	998	42	160	675	17	97
Future Volume (vph)	998	42	160	675	17	97
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.108		0.950	
Satd. Flow (perm)	1801	1531	194	1801	1711	1531
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		46				105
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1085	46	174	734	18	105
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1085	46	174	734	18	105
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	14.0	20.0	20.0	20.0
Total Split (s)	66.0	66.0	14.0	80.0	20.0	20.0
Total Split (%)	66.0%	66.0%	14.0%	80.0%	20.0%	20.0%
Maximum Green (s)	59.0	59.0	7.0	73.0	13.0	13.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effect Green (s)	68.9	68.9	82.9	83.9	9.9	9.9
Actuated g/C Ratio	0.69	0.69	0.83	0.84	0.10	0.10
v/c Ratio	0.87	0.04	0.59	0.49	0.11	0.43
Control Delay	17.5	2.2	14.9	2.7	41.7	14.0
Queue Delay	1.6	0.0	0.0	0.1	0.0	0.0
Total Delay	19.1	2.2	14.9	2.9	41.7	14.0
LOS	B	A	B	A	D	B
Approach Delay	18.4			5.2	18.0	
Approach LOS	B			A	B	
Queue Length 50th (ft)	329	2	23	70	11	0
Queue Length 95th (ft)	#929	m4	m43	m112	31	48
Internal Link Dist (ft)	384			462	509	
Turn Bay Length (ft)		360	200			
Base Capacity (vph)	1241	1069	297	1511	256	318
Starvation Cap Reductn	0	0	0	150	0	0
Spillback Cap Reductn	58	0	0	0	0	3
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.92	0.04	0.59	0.54	0.07	0.33

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 11 (11%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.87

Intersection Signal Delay: 12.8

Intersection LOS: B

Intersection Capacity Utilization 79.7%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Lanes, Volumes, Timings 5: Ednam Drive & Ivy Road

11/17/2017

Splits and Phases: 5: Ednam Drive & Ivy Road



Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1080	16	19	976	7	1	0	4	7	1	5
Future Volume (vph)	0	1080	16	19	976	7	1	0	4	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.892			0.946	
Flt Protected				0.950				0.990			0.974	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1590	0	0	1659	0
Flt Permitted				0.950				0.990			0.974	
Satd. Flow (perm)	1801	1801	1531	1711	1801	1531	0	1590	0	0	1659	0
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1200	18	21	1084	8	1	0	4	8	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1200	18	21	1084	8	0	5	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization 66.8%	ICU Level of Service C											
Analysis Period (min) 15												

HCM 2010 TWSC
34: Golf Course Drive & Ivy Road

11/17/2017

Intersection

Int Delay, s/veh 1.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1080	16	19	976	7	1	0	4	7	1	5
Future Vol, veh/h	0	1080	16	19	976	7	1	0	4	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1200	18	21	1084	8	1	0	4	8	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1084	0	0	1200	0	0	2330	2327	1200	2329	2327	1084
Stage 1	-	-	-	-	-	-	1200	1200	-	1127	1127	-
Stage 2	-	-	-	-	-	-	1130	1127	-	1202	1200	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	643	-	-	582	-	-	26	37	226	26	37	264
Stage 1	-	-	-	-	-	-	226	258	-	249	280	-
Stage 2	-	-	-	-	-	-	248	280	-	225	258	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	643	-	-	582	-	-	24	36	226	25	36	264
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	36	-	25	36	-
Stage 1	-	-	-	-	-	-	226	258	-	249	270	-
Stage 2	-	-	-	-	-	-	233	270	-	221	258	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.2			50.9			139.1		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	84	643	-	-	582	-	-	40
HCM Lane V/C Ratio	0.066	-	-	-	0.036	-	-	0.361
HCM Control Delay (s)	50.9	0	-	-	11.4	-	-	139.1
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.2	0	-	-	0.1	-	-	1.2

Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	4.3	39.8	0.37	33.4	B
Ednam Drive	II	45	39.2	17.5	56.7	0.42	26.5	C
Farmington Drive	II	45	11.2	20.0	31.2	0.10	11.8	F
Canterbury Road	II	35	75.0	3.8	78.8	0.73	33.3	B
US 29 SB Ramps	II	35	15.4	4.3	19.7	0.12	22.5	C
US 29 NB Ramps	II	35	15.6	8.7	24.3	0.12	18.5	D
Total	II		191.9	58.6	250.5	1.87	26.8	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	7.1	20.4	0.11	18.7	D
US 29 SB Ramps	II	35	15.6	1.1	16.7	0.12	26.9	C
Old Garth Road	II	35	15.4	27.5	42.9	0.12	10.3	F
	II	35	75.0	16.7	91.7	0.73	28.6	B
Ednam Drive	II	45	11.2	2.7	13.9	0.10	26.6	C
UVA Health Center	II	45	39.2	5.9	45.1	0.42	33.3	B
Broomley Road	II	45	35.5	7.0	42.5	0.37	31.3	B
Total	II		205.2	68.0	273.2	1.97	26.0	C

Network Totals

Number of Intersections	8
Total Delay (hr)	50
Stops (#)	5245
Average Speed (mph)	26
Total Travel Time (hr)	152
Distance Traveled (mi)	3996
Fuel Consumed (gal)	233
Fuel Economy (mpg)	17.2
Unserved Vehicles (#)	3
Vehicles in dilemma zone (#)	490
Performance Index	64.4

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1622
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	4
Stops / Veh	0.47
Stops (#)	762
Average Speed (mph)	21
Total Travel Time (hr)	9
Distance Traveled (mi)	191
Fuel Consumed (gal)	17
Fuel Economy (mpg)	11.0
CO Emissions (kg)	1.21
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.28
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	86

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1496
Control Delay / Veh (s/v)	3
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	3
Total Delay (hr)	1
Stops / Veh	0.22
Stops (#)	334
Average Speed (mph)	28
Total Travel Time (hr)	7
Distance Traveled (mi)	184
Fuel Consumed (gal)	11
Fuel Economy (mpg)	17.4
CO Emissions (kg)	0.74
NOx Emissions (kg)	0.14
VOC Emissions (kg)	0.17
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	54

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2370
Control Delay / Veh (s/v)	19
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	19
Total Delay (hr)	13
Stops / Veh	0.45
Stops (#)	1076
Average Speed (mph)	18
Total Travel Time (hr)	27
Distance Traveled (mi)	490
Fuel Consumed (gal)	36
Fuel Economy (mpg)	13.6
CO Emissions (kg)	2.52
NOx Emissions (kg)	0.49
VOC Emissions (kg)	0.58
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	86

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	2188
Control Delay / Veh (s/v)	24
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	24
Total Delay (hr)	15
Stops / Veh	0.48
Stops (#)	1046
Average Speed (mph)	18
Total Travel Time (hr)	28
Distance Traveled (mi)	500
Fuel Consumed (gal)	40
Fuel Economy (mpg)	12.5
CO Emissions (kg)	2.79
NOx Emissions (kg)	0.54
VOC Emissions (kg)	0.65
Unserved Vehicles (#)	3
Vehicles in dilemma zone (#)	91

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1989
Control Delay / Veh (s/v)	12
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	13
Total Delay (hr)	7
Stops / Veh	0.35
Stops (#)	698
Average Speed (mph)	28
Total Travel Time (hr)	19
Distance Traveled (mi)	532
Fuel Consumed (gal)	32
Fuel Economy (mpg)	16.7
CO Emissions (kg)	2.23
NOx Emissions (kg)	0.43
VOC Emissions (kg)	0.52
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	87

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1774
Control Delay / Veh (s/v)	6
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	6
Total Delay (hr)	3
Stops / Veh	0.27
Stops (#)	483
Average Speed (mph)	38
Total Travel Time (hr)	18
Distance Traveled (mi)	675
Fuel Consumed (gal)	31
Fuel Economy (mpg)	21.8
CO Emissions (kg)	2.16
NOx Emissions (kg)	0.42
VOC Emissions (kg)	0.50
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	44

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1678
Control Delay / Veh (s/v)	13
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	13
Total Delay (hr)	6
Stops / Veh	0.47
Stops (#)	784
Average Speed (mph)	31
Total Travel Time (hr)	21
Distance Traveled (mi)	655
Fuel Consumed (gal)	36
Fuel Economy (mpg)	18.4
CO Emissions (kg)	2.50
NOx Emissions (kg)	0.49
VOC Emissions (kg)	0.58
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	42

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2116
Control Delay / Veh (s/v)	1
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	1
Total Delay (hr)	1
Stops / Veh	0.03
Stops (#)	62
Average Speed (mph)	34
Total Travel Time (hr)	23
Distance Traveled (mi)	768
Fuel Consumed (gal)	30
Fuel Economy (mpg)	25.4
CO Emissions (kg)	2.11
NOx Emissions (kg)	0.41
VOC Emissions (kg)	0.49
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	12
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	12
Total Delay (hr)	50
Stops / Veh	0.34
Stops (#)	5245
Average Speed (mph)	26
Total Travel Time (hr)	152
Distance Traveled (mi)	3996
Fuel Consumed (gal)	233
Fuel Economy (mpg)	17.2
CO Emissions (kg)	16.26
NOx Emissions (kg)	3.16
VOC Emissions (kg)	3.77
Unserved Vehicles (#)	3
Vehicles in dilemma zone (#)	490
Performance Index	64.4

Lanes, Volumes, Timings
5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	696	31	161	859	34	130
Future Volume (vph)	696	31	161	859	34	130
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.268		0.950	
Satd. Flow (perm)	1801	1531	483	1801	1711	1531
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		34				141
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	757	34	175	934	37	141
Shared Lane Traffic (%)						
Lane Group Flow (vph)	757	34	175	934	37	141
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	14.0	20.0	20.0	20.0
Total Split (s)	82.0	82.0	17.0	99.0	21.0	21.0
Total Split (%)	68.3%	68.3%	14.2%	82.5%	17.5%	17.5%
Maximum Green (s)	75.0	75.0	10.0	92.0	14.0	14.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Act Effect Green (s)	84.2	84.2	99.3	99.3	10.7	10.7
Actuated g/C Ratio	0.70	0.70	0.83	0.83	0.09	0.09
v/c Ratio	0.60	0.03	0.35	0.63	0.24	0.53
Control Delay	10.6	1.4	0.7	0.7	54.0	15.8
Queue Delay	0.0	0.0	0.0	0.5	0.0	0.0
Total Delay	10.6	1.4	0.7	1.3	54.0	15.8
LOS	B	A	A	A	D	B
Approach Delay	10.2			1.2	23.7	
Approach LOS	B			A	C	
Queue Length 50th (ft)	150	0	0	1	27	0
Queue Length 95th (ft)	369	m1	m1	m6	60	60
Internal Link Dist (ft)	384			462	509	
Turn Bay Length (ft)		360	200			
Base Capacity (vph)	1264	1085	522	1490	228	326
Starvation Cap Reductn	0	0	0	211	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.60	0.03	0.34	0.73	0.16	0.43

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 72 (60%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.63

Intersection Signal Delay: 6.6

Intersection LOS: A

Intersection Capacity Utilization 63.9%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: Ednam Drive & Ivy Road



Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	961	5	27	1052	8	5	0	21	3	0	6
Future Volume (vph)	0	961	5	27	1052	8	5	0	21	3	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.893			0.905	
Flt Protected				0.950				0.990			0.985	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1592	0	0	1605	0
Flt Permitted				0.950				0.990			0.985	
Satd. Flow (perm)	1801	1801	1531	1711	1801	1531	0	1592	0	0	1605	0
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1068	6	30	1169	9	6	0	23	3	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1068	6	30	1169	9	0	29	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	65.4%				ICU Level of Service C							
Analysis Period (min)	15											

HCM 2010 TWSC
34: Golf Course Drive & Ivy Road

11/17/2017

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	961	5	27	1052	8	5	0	21	3	0	6
Future Vol, veh/h	0	961	5	27	1052	8	5	0	21	3	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1068	6	30	1169	9	6	0	23	3	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1169	0	0	1068	0	0	2300	2297	1068	2308	2297	1169
Stage 1	-	-	-	-	-	-	1068	1068	-	1229	1229	-
Stage 2	-	-	-	-	-	-	1232	1229	-	1079	1068	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	598	-	-	653	-	-	27	39	269	27	39	235
Stage 1	-	-	-	-	-	-	268	298	-	218	250	-
Stage 2	-	-	-	-	-	-	217	250	-	264	298	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	598	-	-	653	-	-	25	37	269	24	37	235
Mov Cap-2 Maneuver	-	-	-	-	-	-	25	37	-	24	37	-
Stage 1	-	-	-	-	-	-	268	298	-	218	239	-
Stage 2	-	-	-	-	-	-	201	239	-	241	298	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.3			59.5			76.6		
HCM LOS							F			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	94	598	-	-	653	-	-	60
HCM Lane V/C Ratio	0.307	-	-	-	0.046	-	-	0.167
HCM Control Delay (s)	59.5	0	-	-	10.8	-	-	76.6
HCM Lane LOS	F	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.2	0	-	-	0.1	-	-	0.6

Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	3.6	39.1	0.37	34.0	B
Ednam Drive	II	45	39.2	10.6	49.8	0.42	30.1	B
Farmington Drive	II	45	11.2	6.3	17.5	0.10	21.1	D
Canterbury Road	II	35	75.0	34.1	109.1	0.73	24.1	C
US 29 SB Ramps	II	35	15.4	9.1	24.5	0.12	18.1	D
US 29 NB Ramps	II	35	15.6	3.6	19.2	0.12	23.4	C
Total	II		191.9	67.3	259.2	1.87	25.9	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	8.2	21.5	0.11	17.8	D
US 29 SB Ramps	II	35	15.6	1.2	16.8	0.12	26.8	C
Old Garth Road	II	35	15.4	95.0	110.4	0.12	4.0	F
	II	35	75.0	23.4	98.4	0.73	26.7	C
Ednam Drive	II	45	11.2	0.7	11.9	0.10	31.1	B
UVA Health Center	II	45	39.2	6.7	45.9	0.42	32.7	B
Broomley Road	II	45	35.5	1.7	37.2	0.37	35.8	A
Total	II		205.2	136.9	342.1	1.97	20.7	D

Network Totals

Number of Intersections	8
Total Delay (hr)	82
Stops (#)	5580
Average Speed (mph)	21
Total Travel Time (hr)	180
Distance Traveled (mi)	3819
Fuel Consumed (gal)	247
Fuel Economy (mpg)	15.4
Unserved Vehicles (#)	92
Vehicles in dilemma zone (#)	361
Performance Index	97.0

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1660
Control Delay / Veh (s/v)	8
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	8
Total Delay (hr)	4
Stops / Veh	0.44
Stops (#)	724
Average Speed (mph)	21
Total Travel Time (hr)	9
Distance Traveled (mi)	189
Fuel Consumed (gal)	16
Fuel Economy (mpg)	11.7
CO Emissions (kg)	1.13
NOx Emissions (kg)	0.22
VOC Emissions (kg)	0.26
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	79

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1811
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	4
Stops / Veh	0.42
Stops (#)	754
Average Speed (mph)	21
Total Travel Time (hr)	11
Distance Traveled (mi)	224
Fuel Consumed (gal)	18
Fuel Economy (mpg)	12.8
CO Emissions (kg)	1.23
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.28
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	50

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2837
Control Delay / Veh (s/v)	64
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	64
Total Delay (hr)	51
Stops / Veh	0.74
Stops (#)	2105
Average Speed (mph)	8
Total Travel Time (hr)	65
Distance Traveled (mi)	489
Fuel Consumed (gal)	72
Fuel Economy (mpg)	6.8
CO Emissions (kg)	5.01
NOx Emissions (kg)	0.97
VOC Emissions (kg)	1.16
Unserved Vehicles (#)	90
Vehicles in dilemma zone (#)	59

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	1969
Control Delay / Veh (s/v)	24
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	24
Total Delay (hr)	13
Stops / Veh	0.39
Stops (#)	761
Average Speed (mph)	19
Total Travel Time (hr)	27
Distance Traveled (mi)	502
Fuel Consumed (gal)	35
Fuel Economy (mpg)	14.2
CO Emissions (kg)	2.47
NOx Emissions (kg)	0.48
VOC Emissions (kg)	0.57
Unserved Vehicles (#)	2
Vehicles in dilemma zone (#)	61

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1911
Control Delay / Veh (s/v)	6
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	7
Total Delay (hr)	3
Stops / Veh	0.22
Stops (#)	413
Average Speed (mph)	32
Total Travel Time (hr)	13
Distance Traveled (mi)	426
Fuel Consumed (gal)	22
Fuel Economy (mpg)	19.3
CO Emissions (kg)	1.54
NOx Emissions (kg)	0.30
VOC Emissions (kg)	0.36
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	42

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1652
Control Delay / Veh (s/v)	8
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	8
Total Delay (hr)	4
Stops / Veh	0.30
Stops (#)	500
Average Speed (mph)	36
Total Travel Time (hr)	18
Distance Traveled (mi)	628
Fuel Consumed (gal)	30
Fuel Economy (mpg)	21.0
CO Emissions (kg)	2.09
NOx Emissions (kg)	0.41
VOC Emissions (kg)	0.48
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	54

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1587
Control Delay / Veh (s/v)	4
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	4
Total Delay (hr)	2
Stops / Veh	0.14
Stops (#)	230
Average Speed (mph)	39
Total Travel Time (hr)	16
Distance Traveled (mi)	613
Fuel Consumed (gal)	25
Fuel Economy (mpg)	24.6
CO Emissions (kg)	1.74
NOx Emissions (kg)	0.34
VOC Emissions (kg)	0.40
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	16

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2088
Control Delay / Veh (s/v)	1
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	1
Total Delay (hr)	1
Stops / Veh	0.04
Stops (#)	93
Average Speed (mph)	34
Total Travel Time (hr)	22
Distance Traveled (mi)	748
Fuel Consumed (gal)	30
Fuel Economy (mpg)	25.2
CO Emissions (kg)	2.07
NOx Emissions (kg)	0.40
VOC Emissions (kg)	0.48
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	19
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	19
Total Delay (hr)	82
Stops / Veh	0.36
Stops (#)	5580
Average Speed (mph)	21
Total Travel Time (hr)	180
Distance Traveled (mi)	3819
Fuel Consumed (gal)	247
Fuel Economy (mpg)	15.4
CO Emissions (kg)	17.28
NOx Emissions (kg)	3.36
VOC Emissions (kg)	4.01
Unserved Vehicles (#)	92
Vehicles in dilemma zone (#)	361
Performance Index	97.0

Lanes, Volumes, Timings
5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	984	60	119	674	20	72
Future Volume (vph)	984	60	119	674	20	72
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.118		0.950	
Satd. Flow (perm)	1801	1531	212	1801	1711	1531
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		65				78
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1070	65	129	733	22	78
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1070	65	129	733	22	78
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	14.0	20.0	20.0	20.0
Total Split (s)	66.0	66.0	14.0	80.0	20.0	20.0
Total Split (%)	66.0%	66.0%	14.0%	80.0%	20.0%	20.0%
Maximum Green (s)	59.0	59.0	7.0	73.0	13.0	13.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effect Green (s)	69.1	69.1	83.1	84.1	9.7	9.7
Actuated g/C Ratio	0.69	0.69	0.83	0.84	0.10	0.10
v/c Ratio	0.86	0.06	0.41	0.48	0.13	0.36
Control Delay	16.8	1.9	9.1	2.8	42.6	14.6
Queue Delay	1.0	0.0	0.0	0.1	0.0	0.0
Total Delay	17.8	1.9	9.1	2.9	42.6	14.6
LOS	B	A	A	A	D	B
Approach Delay	16.9			3.8	20.7	
Approach LOS	B			A	C	
Queue Length 50th (ft)	324	3	14	83	13	0
Queue Length 95th (ft)	#899	m6	m19	m111	36	42
Internal Link Dist (ft)	384			462	509	
Turn Bay Length (ft)		360	200			
Base Capacity (vph)	1243	1077	311	1514	256	295
Starvation Cap Reductn	0	0	0	119	0	0
Spillback Cap Reductn	49	0	0	0	0	2
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.90	0.06	0.41	0.53	0.09	0.27

Intersection Summary

Area Type: Other

Cycle Length: 100

Actuated Cycle Length: 100

Offset: 5 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.86

Intersection Signal Delay: 11.7

Intersection LOS: B

Intersection Capacity Utilization 76.7%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Lanes, Volumes, Timings 5: Ednam Drive & Ivy Road

11/17/2017

Splits and Phases: 5: Ednam Drive & Ivy Road



Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1058	2	80	935	7	0	0	34	7	1	5
Future Volume (vph)	0	1058	2	80	935	7	0	0	34	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.865			0.946	
Flt Protected				0.950							0.974	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1558	0	0	1659	0
Flt Permitted				0.950							0.974	
Satd. Flow (perm)	1801	1801	1531	1711	1801	1531	0	1558	0	0	1659	0
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1176	2	89	1039	8	0	0	38	8	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1176	2	89	1039	8	0	38	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	77.1%						ICU Level of Service D					
Analysis Period (min)	15											

HCM 2010 TWSC
34: Golf Course Drive & Ivy Road

11/17/2017

Intersection												
Int Delay, s/veh	2.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	1058	2	80	935	7	0	0	34	7	1	5
Future Vol, veh/h	0	1058	2	80	935	7	0	0	34	7	1	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1176	2	89	1039	8	0	0	38	8	1	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1039	0	0	1176	0	0	2396	2393	1176	2411	2393	1039
Stage 1	-	-	-	-	-	-	1176	1176	-	1217	1217	-
Stage 2	-	-	-	-	-	-	1220	1217	-	1194	1176	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	669	-	-	594	-	-	23	34	233	23	34	280
Stage 1	-	-	-	-	-	-	233	265	-	221	253	-
Stage 2	-	-	-	-	-	-	220	253	-	228	265	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	669	-	-	594	-	-	19	29	233	17	29	280
Mov Cap-2 Maneuver	-	-	-	-	-	-	19	29	-	17	29	-
Stage 1	-	-	-	-	-	-	233	265	-	221	215	-
Stage 2	-	-	-	-	-	-	182	215	-	191	265	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			0.9			23.4			228.9		
HCM LOS							C			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	233	669	-	-	594	-	-	28
HCM Lane V/C Ratio	0.162	-	-	-	0.15	-	-	0.516
HCM Control Delay (s)	23.4	0	-	-	12.1	-	-	228.9
HCM Lane LOS	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	0.6	0	-	-	0.5	-	-	1.6

Arterial Level of Service

11/20/2017

Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	4.3	39.8	0.37	33.4	B
Ednam Drive	II	45	39.2	16.8	56.0	0.42	26.8	C
Farmington Drive	II	45	11.2	18.8	30.0	0.10	12.3	F
Canterbury Road	II	35	75.0	4.1	79.1	0.73	33.2	B
US 29 SB Ramps	II	35	15.4	4.1	19.5	0.12	22.7	C
US 29 NB Ramps	II	35	15.6	8.2	23.8	0.12	18.9	D
Total	II		191.9	56.3	248.2	1.87	27.1	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	7.0	20.3	0.11	18.8	D
US 29 SB Ramps	II	35	15.6	1.4	17.0	0.12	26.5	C
Old Garth Road	II	35	15.4	29.1	44.5	0.12	9.9	F
	II	35	75.0	15.8	90.8	0.73	28.9	B
Ednam Drive	II	45	11.2	2.8	14.0	0.10	26.4	C
UVA Health Center	II	45	39.2	5.7	44.9	0.42	33.4	B
Broomley Road	II	45	35.5	6.9	42.4	0.37	31.4	B
Total	II		205.2	68.7	273.9	1.97	25.9	C

Network Totals

Number of Intersections	8
Total Delay (hr)	49
Stops (#)	5493
Average Speed (mph)	27
Total Travel Time (hr)	150
Distance Traveled (mi)	3966
Fuel Consumed (gal)	232
Fuel Economy (mpg)	17.1
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	423
Performance Index	63.8

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1622
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	4
Stops / Veh	0.49
Stops (#)	790
Average Speed (mph)	21
Total Travel Time (hr)	9
Distance Traveled (mi)	191
Fuel Consumed (gal)	18
Fuel Economy (mpg)	10.9
CO Emissions (kg)	1.23
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.28
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	65

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1496
Control Delay / Veh (s/v)	4
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	4
Total Delay (hr)	2
Stops / Veh	0.25
Stops (#)	367
Average Speed (mph)	28
Total Travel Time (hr)	7
Distance Traveled (mi)	184
Fuel Consumed (gal)	11
Fuel Economy (mpg)	16.9
CO Emissions (kg)	0.76
NOx Emissions (kg)	0.15
VOC Emissions (kg)	0.18
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	41

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2370
Control Delay / Veh (s/v)	20
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	20
Total Delay (hr)	13
Stops / Veh	0.47
Stops (#)	1108
Average Speed (mph)	18
Total Travel Time (hr)	27
Distance Traveled (mi)	490
Fuel Consumed (gal)	37
Fuel Economy (mpg)	13.4
CO Emissions (kg)	2.55
NOx Emissions (kg)	0.50
VOC Emissions (kg)	0.59
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	61

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	2110
Control Delay / Veh (s/v)	22
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	23
Total Delay (hr)	13
Stops / Veh	0.50
Stops (#)	1053
Average Speed (mph)	18
Total Travel Time (hr)	26
Distance Traveled (mi)	480
Fuel Consumed (gal)	38
Fuel Economy (mpg)	12.6
CO Emissions (kg)	2.67
NOx Emissions (kg)	0.52
VOC Emissions (kg)	0.62
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	86

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1929
Control Delay / Veh (s/v)	11
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	12
Total Delay (hr)	6
Stops / Veh	0.34
Stops (#)	662
Average Speed (mph)	29
Total Travel Time (hr)	18
Distance Traveled (mi)	527
Fuel Consumed (gal)	31
Fuel Economy (mpg)	17.2
CO Emissions (kg)	2.14
NOx Emissions (kg)	0.42
VOC Emissions (kg)	0.50
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	88

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1774
Control Delay / Veh (s/v)	6
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	6
Total Delay (hr)	3
Stops / Veh	0.28
Stops (#)	488
Average Speed (mph)	38
Total Travel Time (hr)	18
Distance Traveled (mi)	675
Fuel Consumed (gal)	31
Fuel Economy (mpg)	21.8
CO Emissions (kg)	2.17
NOx Emissions (kg)	0.42
VOC Emissions (kg)	0.50
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	41

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1678
Control Delay / Veh (s/v)	13
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	13
Total Delay (hr)	6
Stops / Veh	0.47
Stops (#)	783
Average Speed (mph)	31
Total Travel Time (hr)	21
Distance Traveled (mi)	655
Fuel Consumed (gal)	36
Fuel Economy (mpg)	18.4
CO Emissions (kg)	2.49
NOx Emissions (kg)	0.49
VOC Emissions (kg)	0.58
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	41

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2130
Control Delay / Veh (s/v)	2
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	2
Total Delay (hr)	1
Stops / Veh	0.11
Stops (#)	242
Average Speed (mph)	33
Total Travel Time (hr)	23
Distance Traveled (mi)	763
Fuel Consumed (gal)	32
Fuel Economy (mpg)	23.9
CO Emissions (kg)	2.23
NOx Emissions (kg)	0.43
VOC Emissions (kg)	0.52
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	11
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	12
Total Delay (hr)	49
Stops / Veh	0.36
Stops (#)	5493
Average Speed (mph)	27
Total Travel Time (hr)	150
Distance Traveled (mi)	3966
Fuel Consumed (gal)	232
Fuel Economy (mpg)	17.1
CO Emissions (kg)	16.24
NOx Emissions (kg)	3.16
VOC Emissions (kg)	3.76
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	423
Performance Index	63.8

Lanes, Volumes, Timings
5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	695	37	100	856	40	85
Future Volume (vph)	695	37	100	856	40	85
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.282		0.950	
Satd. Flow (perm)	1801	1531	508	1801	1711	1531
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		40				92
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	755	40	109	930	43	92
Shared Lane Traffic (%)						
Lane Group Flow (vph)	755	40	109	930	43	92
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	14.0	20.0	20.0	20.0
Total Split (s)	94.0	94.0	14.0	108.0	22.0	22.0
Total Split (%)	72.3%	72.3%	10.8%	83.1%	16.9%	16.9%
Maximum Green (s)	87.0	87.0	7.0	101.0	15.0	15.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Max	C-Max	None	C-Max	None	None
Act Effect Green (s)	94.7	94.7	109.0	109.0	11.0	11.0
Actuated g/C Ratio	0.73	0.73	0.84	0.84	0.08	0.08
v/c Ratio	0.58	0.04	0.21	0.62	0.30	0.43
Control Delay	9.0	0.8	0.4	0.8	60.7	17.0
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	9.0	0.8	0.4	1.0	60.7	17.0
LOS	A	A	A	A	E	B
Approach Delay	8.6			0.9	31.0	
Approach LOS	A			A	C	
Queue Length 50th (ft)	187	0	0	1	35	0
Queue Length 95th (ft)	391	m5	m1	m1	73	53
Internal Link Dist (ft)	384			462	509	
Turn Bay Length (ft)		360	200			
Base Capacity (vph)	1312	1126	512	1510	223	280
Starvation Cap Reductn	0	0	0	130	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.58	0.04	0.21	0.67	0.19	0.33

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 92 (71%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.62

Intersection Signal Delay: 6.1

Intersection LOS: A

Intersection Capacity Utilization 60.7%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: Ednam Drive & Ivy Road



Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	920	0	102	933	8	0	0	78	3	0	6
Future Volume (vph)	0	920	0	102	933	8	0	0	78	3	0	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt						0.850		0.865				0.905
Flt Protected				0.950								0.985
Satd. Flow (prot)	1801	1801	1801	1711	1801	1531	0	1558	0	0	1605	0
Flt Permitted				0.950								0.985
Satd. Flow (perm)	1801	1801	1801	1711	1801	1531	0	1558	0	0	1605	0
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1022	0	113	1037	9	0	0	87	3	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1022	0	113	1037	9	0	87	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Sign Control		Free			Free			Stop			Stop	
Intersection Summary												
Area Type:	Other											
Control Type:	Unsignalized											
Intersection Capacity Utilization	68.9%						ICU Level of Service C					
Analysis Period (min)	15											

HCM 2010 TWSC
34: Golf Course Drive & Ivy Road

11/17/2017

Intersection												
Int Delay, s/veh	1.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	920	0	102	933	8	0	0	78	3	0	6
Future Vol, veh/h	0	920	0	102	933	8	0	0	78	3	0	6
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	500	-	500	500	-	500	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	1022	0	113	1037	9	0	0	87	3	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	1037	0	0	1022	0	0	2289	2285	1022	2329	2285	1037
Stage 1	-	-	-	-	-	-	1022	1022	-	1263	1263	-
Stage 2	-	-	-	-	-	-	1267	1263	-	1066	1022	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	670	-	-	679	-	-	28	40	287	26	40	281
Stage 1	-	-	-	-	-	-	285	313	-	208	241	-
Stage 2	-	-	-	-	-	-	207	241	-	269	313	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	670	-	-	679	-	-	24	33	287	16	33	281
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	33	-	16	33	-
Stage 1	-	-	-	-	-	-	285	313	-	208	201	-
Stage 2	-	-	-	-	-	-	168	201	-	188	313	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0			1.1			22.9			112.5		
HCM LOS							C			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	287	670	-	-	679	-	-	43
HCM Lane V/C Ratio	0.302	-	-	-	0.167	-	-	0.233
HCM Control Delay (s)	22.9	0	-	-	11.4	-	-	112.5
HCM Lane LOS	C	A	-	-	B	-	-	F
HCM 95th %tile Q(veh)	1.2	0	-	-	0.6	-	-	0.8

Arterial Level of Service

11/20/2017

Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	3.5	39.0	0.37	34.1	B
Ednam Drive	II	45	39.2	9.0	48.2	0.42	31.1	B
Farmington Drive	II	45	11.2	8.1	19.3	0.10	19.1	D
Canterbury Road	II	35	75.0	35.2	110.2	0.73	23.8	C
US 29 SB Ramps	II	35	15.4	9.6	25.0	0.12	17.7	D
US 29 NB Ramps	II	35	15.6	3.5	19.1	0.12	23.6	C
Total	II		191.9	68.9	260.8	1.87	25.8	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	7.9	21.2	0.11	18.0	D
US 29 SB Ramps	II	35	15.6	1.1	16.7	0.12	26.9	C
Old Garth Road	II	35	15.4	91.3	106.7	0.12	4.1	F
	II	35	75.0	24.4	99.4	0.73	26.4	C
Ednam Drive	II	45	11.2	0.8	12.0	0.10	30.8	B
UVA Health Center	II	45	39.2	6.6	45.8	0.42	32.8	B
Broomley Road	II	45	35.5	2.2	37.7	0.37	35.3	A
Total	II		205.2	134.3	339.5	1.97	20.9	D

Network Totals

Number of Intersections	8
Total Delay (hr)	81
Stops (#)	5866
Average Speed (mph)	21
Total Travel Time (hr)	178
Distance Traveled (mi)	3751
Fuel Consumed (gal)	246
Fuel Economy (mpg)	15.2
Unserved Vehicles (#)	72
Vehicles in dilemma zone (#)	307
Performance Index	97.5

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1660
Control Delay / Veh (s/v)	8
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	8
Total Delay (hr)	4
Stops / Veh	0.44
Stops (#)	728
Average Speed (mph)	21
Total Travel Time (hr)	9
Distance Traveled (mi)	189
Fuel Consumed (gal)	16
Fuel Economy (mpg)	11.6
CO Emissions (kg)	1.13
NOx Emissions (kg)	0.22
VOC Emissions (kg)	0.26
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	63

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1811
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	5
Stops / Veh	0.43
Stops (#)	783
Average Speed (mph)	20
Total Travel Time (hr)	11
Distance Traveled (mi)	224
Fuel Consumed (gal)	18
Fuel Economy (mpg)	12.5
CO Emissions (kg)	1.25
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.29
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	42

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2837
Control Delay / Veh (s/v)	64
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	64
Total Delay (hr)	51
Stops / Veh	0.76
Stops (#)	2169
Average Speed (mph)	8
Total Travel Time (hr)	65
Distance Traveled (mi)	489
Fuel Consumed (gal)	72
Fuel Economy (mpg)	6.8
CO Emissions (kg)	5.04
NOx Emissions (kg)	0.98
VOC Emissions (kg)	1.17
Unserved Vehicles (#)	72
Vehicles in dilemma zone (#)	55

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	1859
Control Delay / Veh (s/v)	24
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	24
Total Delay (hr)	12
Stops / Veh	0.42
Stops (#)	781
Average Speed (mph)	19
Total Travel Time (hr)	25
Distance Traveled (mi)	472
Fuel Consumed (gal)	34
Fuel Economy (mpg)	13.9
CO Emissions (kg)	2.37
NOx Emissions (kg)	0.46
VOC Emissions (kg)	0.55
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	56

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1813
Control Delay / Veh (s/v)	6
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	6
Total Delay (hr)	3
Stops / Veh	0.19
Stops (#)	352
Average Speed (mph)	33
Total Travel Time (hr)	13
Distance Traveled (mi)	417
Fuel Consumed (gal)	21
Fuel Economy (mpg)	20.2
CO Emissions (kg)	1.44
NOx Emissions (kg)	0.28
VOC Emissions (kg)	0.33
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	32

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1652
Control Delay / Veh (s/v)	8
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	8
Total Delay (hr)	4
Stops / Veh	0.29
Stops (#)	472
Average Speed (mph)	36
Total Travel Time (hr)	18
Distance Traveled (mi)	628
Fuel Consumed (gal)	30
Fuel Economy (mpg)	21.2
CO Emissions (kg)	2.07
NOx Emissions (kg)	0.40
VOC Emissions (kg)	0.48
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	43

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1587
Control Delay / Veh (s/v)	5
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	5
Total Delay (hr)	2
Stops / Veh	0.17
Stops (#)	262
Average Speed (mph)	38
Total Travel Time (hr)	16
Distance Traveled (mi)	613
Fuel Consumed (gal)	25
Fuel Economy (mpg)	24.1
CO Emissions (kg)	1.78
NOx Emissions (kg)	0.35
VOC Emissions (kg)	0.41
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	16

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2050
Control Delay / Veh (s/v)	2
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	2
Total Delay (hr)	1
Stops / Veh	0.16
Stops (#)	319
Average Speed (mph)	33
Total Travel Time (hr)	22
Distance Traveled (mi)	718
Fuel Consumed (gal)	30
Fuel Economy (mpg)	23.6
CO Emissions (kg)	2.13
NOx Emissions (kg)	0.41
VOC Emissions (kg)	0.49
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	19
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	19
Total Delay (hr)	81
Stops / Veh	0.38
Stops (#)	5866
Average Speed (mph)	21
Total Travel Time (hr)	178
Distance Traveled (mi)	3751
Fuel Consumed (gal)	246
Fuel Economy (mpg)	15.2
CO Emissions (kg)	17.21
NOx Emissions (kg)	3.35
VOC Emissions (kg)	3.99
Unserved Vehicles (#)	72
Vehicles in dilemma zone (#)	307
Performance Index	97.5

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1017	27	45	683	11	21
Future Volume (vph)	1017	27	45	683	11	21
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1801	1531	1711	1801	1711	1531
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1105	29	49	742	12	23
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1105	29	49	742	12	23
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	63.5%			ICU Level of Service B		
Analysis Period (min)	15					

HCM 2010 TWSC
5: Ednam Drive & Ivy Road

11/17/2017

Intersection						
Int Delay, s/veh	1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↖	↑	↖	↗
Traffic Vol, veh/h	1017	27	45	683	11	21
Future Vol, veh/h	1017	27	45	683	11	21
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	360	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	1105	29	49	742	12	23
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	1105	0	1945	1105
Stage 1	-	-	-	-	1105	-
Stage 2	-	-	-	-	840	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	632	-	71	256
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	424	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	632	-	65	256
Mov Cap-2 Maneuver	-	-	-	-	65	-
Stage 1	-	-	-	-	317	-
Stage 2	-	-	-	-	391	-
Approach	EB		WB		NB	
HCM Control Delay, s	0		0.7		38.3	
HCM LOS					E	
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	65	256	-	-	632	-
HCM Lane V/C Ratio	0.184	0.089	-	-	0.077	-
HCM Control Delay (s)	72.5	20.4	-	-	11.2	-
HCM Lane LOS	F	C	-	-	B	-
HCM 95th %tile Q(veh)	0.6	0.3	-	-	0.3	-

Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1007	35	154	861	7	9	0	85	7	1	5
Future Volume (vph)	0	1007	35	154	861	7	9	0	85	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.878			0.946	
Flt Protected				0.950				0.995			0.974	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1573	0	0	1659	0
Flt Permitted				0.082				0.972			0.862	
Satd. Flow (perm)	1801	1801	1531	148	1801	1531	0	1537	0	0	1468	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			92			34		94			6	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1119	39	171	957	8	10	0	94	8	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1119	39	171	957	8	0	104	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		

Lanes, Volumes, Timings

34: Golf Course Drive & Ivy Road

11/17/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0	20.0	14.0	20.0	20.0	20.0	20.0		20.0	20.0	
Total Split (s)	95.0	95.0	95.0	14.0	109.0	109.0	21.0	21.0		21.0	21.0	
Total Split (%)	73.1%	73.1%	73.1%	10.8%	83.8%	83.8%	16.2%	16.2%		16.2%	16.2%	
Maximum Green (s)	88.0	88.0	88.0	7.0	102.0	102.0	14.0	14.0		14.0	14.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effect Green (s)		89.9	89.9	103.9	103.9	103.9		16.1			16.1	
Actuated g/C Ratio		0.69	0.69	0.80	0.80	0.80		0.12			0.12	
v/c Ratio		0.90	0.04	0.76	0.67	0.01		0.38			0.08	
Control Delay		10.1	0.0	30.8	10.0	0.0		16.8			38.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay		10.1	0.0	30.8	10.0	0.0		16.8			38.7	
LOS		B	A	C	B	A		B			D	
Approach Delay		9.8			13.1			16.8			38.7	
Approach LOS		A			B			B			D	
Queue Length 50th (ft)		80	0	55	297	0		8			7	
Queue Length 95th (ft)		m#136	m0	m#109	566	m0		63			29	
Internal Link Dist (ft)		1969			1720			266			200	
Turn Bay Length (ft)			500	500		500						
Base Capacity (vph)		1246	1088	226	1440	1231		272			186	
Starvation Cap Reductn		0	0	0	0	0		0			0	
Spillback Cap Reductn		0	0	0	0	0		0			0	
Storage Cap Reductn		0	0	0	0	0		0			0	
Reduced v/c Ratio		0.90	0.04	0.76	0.66	0.01		0.38			0.08	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 125 (96%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 11.8

Intersection LOS: B

Intersection Capacity Utilization 79.9%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Lanes, Volumes, Timings 34: Golf Course Drive & Ivy Road

11/17/2017

Splits and Phases: 34: Golf Course Drive & Ivy Road



Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	10.1	45.6	0.37	29.2	B
Farmington Drive	II	45	45.7	22.0	67.7	0.52	27.6	C
Golf Course Drive	II	35	40.7	10.1	50.8	0.39	27.5	C
Canterbury Road	II	35	36.8	2.4	39.2	0.34	31.3	B
US 29 SB Ramps	II	35	15.4	5.0	20.4	0.12	21.7	D
US 29 NB Ramps	II	35	15.6	7.8	23.4	0.12	19.2	D
Total	II		189.7	57.4	247.1	1.87	27.2	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	7.6	20.9	0.11	18.3	D
US 29 SB Ramps	II	35	15.6	1.0	16.6	0.12	27.1	C
Old Garth Road	II	35	15.4	28.1	43.5	0.12	10.2	F
	II	35	36.8	10.0	46.8	0.34	26.2	C
	II	35	40.7	20.9	61.6	0.39	22.7	C
UVA Health Center	II	45	45.7	8.7	54.4	0.52	34.4	B
Broomley Road	II	45	35.5	8.6	44.1	0.37	30.2	B
Total	II		203.0	84.9	287.9	1.97	24.7	C

Network Totals

Number of Intersections	8
Total Delay (hr)	52
Stops (#)	5902
Average Speed (mph)	26
Total Travel Time (hr)	152
Distance Traveled (mi)	3923
Fuel Consumed (gal)	236
Fuel Economy (mpg)	16.6
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	361
Performance Index	68.1

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1622
Control Delay / Veh (s/v)	11
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	11
Total Delay (hr)	5
Stops / Veh	0.46
Stops (#)	739
Average Speed (mph)	20
Total Travel Time (hr)	10
Distance Traveled (mi)	191
Fuel Consumed (gal)	18
Fuel Economy (mpg)	10.8
CO Emissions (kg)	1.24
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.29
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	47

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1496
Control Delay / Veh (s/v)	4
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	4
Total Delay (hr)	2
Stops / Veh	0.24
Stops (#)	355
Average Speed (mph)	26
Total Travel Time (hr)	7
Distance Traveled (mi)	184
Fuel Consumed (gal)	11
Fuel Economy (mpg)	16.7
CO Emissions (kg)	0.77
NOx Emissions (kg)	0.15
VOC Emissions (kg)	0.18
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	38

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2370
Control Delay / Veh (s/v)	20
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	20
Total Delay (hr)	13
Stops / Veh	0.43
Stops (#)	1022
Average Speed (mph)	18
Total Travel Time (hr)	27
Distance Traveled (mi)	490
Fuel Consumed (gal)	36
Fuel Economy (mpg)	13.7
CO Emissions (kg)	2.50
NOx Emissions (kg)	0.49
VOC Emissions (kg)	0.58
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	48

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	2027
Control Delay / Veh (s/v)	25
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	25
Total Delay (hr)	14
Stops / Veh	0.55
Stops (#)	1118
Average Speed (mph)	17
Total Travel Time (hr)	27
Distance Traveled (mi)	453
Fuel Consumed (gal)	39
Fuel Economy (mpg)	11.7
CO Emissions (kg)	2.71
NOx Emissions (kg)	0.53
VOC Emissions (kg)	0.63
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	56

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1804
Control Delay / Veh (s/v)	2
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	2
Total Delay (hr)	1
Stops / Veh	0.07
Stops (#)	134
Average Speed (mph)	42
Total Travel Time (hr)	12
Distance Traveled (mi)	513
Fuel Consumed (gal)	20
Fuel Economy (mpg)	26.2
CO Emissions (kg)	1.37
NOx Emissions (kg)	0.27
VOC Emissions (kg)	0.32
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1774
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	5
Stops / Veh	0.51
Stops (#)	904
Average Speed (mph)	34
Total Travel Time (hr)	20
Distance Traveled (mi)	675
Fuel Consumed (gal)	38
Fuel Economy (mpg)	18.0
CO Emissions (kg)	2.62
NOx Emissions (kg)	0.51
VOC Emissions (kg)	0.61
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	64

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1678
Control Delay / Veh (s/v)	11
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	11
Total Delay (hr)	5
Stops / Veh	0.45
Stops (#)	761
Average Speed (mph)	32
Total Travel Time (hr)	20
Distance Traveled (mi)	655
Fuel Consumed (gal)	35
Fuel Economy (mpg)	18.7
CO Emissions (kg)	2.45
NOx Emissions (kg)	0.48
VOC Emissions (kg)	0.57
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	22

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2172
Control Delay / Veh (s/v)	12
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	12
Total Delay (hr)	7
Stops / Veh	0.40
Stops (#)	869
Average Speed (mph)	26
Total Travel Time (hr)	29
Distance Traveled (mi)	760
Fuel Consumed (gal)	41
Fuel Economy (mpg)	18.7
CO Emissions (kg)	2.84
NOx Emissions (kg)	0.55
VOC Emissions (kg)	0.66
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	86

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	12
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	12
Total Delay (hr)	52
Stops / Veh	0.39
Stops (#)	5902
Average Speed (mph)	26
Total Travel Time (hr)	152
Distance Traveled (mi)	3923
Fuel Consumed (gal)	236
Fuel Economy (mpg)	16.6
CO Emissions (kg)	16.51
NOx Emissions (kg)	3.21
VOC Emissions (kg)	3.83
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	361
Performance Index	68.1

Lanes, Volumes, Timings
5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	705	27	35	866	30	28
Future Volume (vph)	705	27	35	866	30	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.950		0.950	
Satd. Flow (perm)	1801	1531	1711	1801	1711	1531
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	766	29	38	941	33	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	766	29	38	941	33	30
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Sign Control	Free			Free	Stop	
Intersection Summary						
Area Type:	Other					
Control Type:	Unsignalized					
Intersection Capacity Utilization	55.6%			ICU Level of Service B		
Analysis Period (min)	15					

Intersection

Int Delay, s/veh 1.7

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↑	↑	↑	↑	↑
Traffic Vol, veh/h	705	27	35	866	30	28
Future Vol, veh/h	705	27	35	866	30	28
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	360	200	-	0	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	766	29	38	941	33	30

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	0	0	766
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	-	4.12
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	-	2.218
Pot Cap-1 Maneuver	-	-	847
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	-	847
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	43.5
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	86	403	-	-	847	-
HCM Lane V/C Ratio	0.379	0.076	-	-	0.045	-
HCM Control Delay (s)	70.4	14.7	-	-	9.5	-
HCM Lane LOS	F	B	-	-	A	-
HCM 95th %tile Q(veh)	1.5	0.2	-	-	0.1	-

Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	863	10	167	928	8	10	0	135	7	1	5
Future Volume (vph)	0	863	10	167	928	8	10	0	135	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.874			0.946	
Flt Protected				0.950				0.997			0.974	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1569	0	0	1659	0
Flt Permitted				0.142				0.981			0.785	
Satd. Flow (perm)	1801	1801	1531	256	1801	1531	0	1544	0	0	1337	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			80			29		150			6	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	959	11	186	1031	9	11	0	150	8	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	959	11	186	1031	9	0	161	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		

Lanes, Volumes, Timings

34: Golf Course Drive & Ivy Road

11/17/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0	20.0	14.0	20.0	20.0	20.0	20.0		20.0	20.0	
Total Split (s)	107.0	107.0	107.0	20.0	127.0	127.0	23.0	23.0		23.0	23.0	
Total Split (%)	71.3%	71.3%	71.3%	13.3%	84.7%	84.7%	15.3%	15.3%		15.3%	15.3%	
Maximum Green (s)	100.0	100.0	100.0	13.0	120.0	120.0	16.0	16.0		16.0	16.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effect Green (s)		99.7	99.7	118.8	118.8	118.8		21.2			21.2	
Actuated g/C Ratio		0.66	0.66	0.79	0.79	0.79		0.14			0.14	
v/c Ratio		0.80	0.01	0.55	0.72	0.01		0.46			0.08	
Control Delay		23.8	0.0	15.1	5.0	0.0		15.5			43.8	
Queue Delay		0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay		23.8	0.0	15.1	5.0	0.0		15.5			43.8	
LOS		C	A	B	A	A		B			D	
Approach Delay		23.5			6.5			15.5			43.8	
Approach LOS		C			A			B			D	
Queue Length 50th (ft)		598	0	18	139	0		10			8	
Queue Length 95th (ft)		759	0	m33	m149	m0		82			31	
Internal Link Dist (ft)		1969			1720			266			200	
Turn Bay Length (ft)			500	500		500						
Base Capacity (vph)		1231	1071	348	1464	1250		347			194	
Starvation Cap Reductn		0	0	0	0	0		0			0	
Spillback Cap Reductn		0	0	0	0	0		0			0	
Storage Cap Reductn		0	0	0	0	0		0			0	
Reduced v/c Ratio		0.78	0.01	0.53	0.70	0.01		0.46			0.08	

Intersection Summary

Area Type: Other

Cycle Length: 150

Actuated Cycle Length: 150

Offset: 20 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 14.3

Intersection LOS: B

Intersection Capacity Utilization 76.1%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 34: Golf Course Drive & Ivy Road



Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	4.7	40.2	0.37	33.1	B
Farmington Drive	II	45	45.7	8.0	53.7	0.52	34.8	B
Golf Course Drive	II	35	40.7	23.8	64.5	0.39	21.7	D
Canterbury Road	II	35	36.8	33.0	69.8	0.34	17.6	D
US 29 SB Ramps	II	35	15.4	11.7	27.1	0.12	16.3	E
US 29 NB Ramps	II	35	15.6	11.1	26.7	0.12	16.9	E
Total	II		189.7	92.3	282.0	1.87	23.8	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	6.1	19.4	0.11	19.7	D
US 29 SB Ramps	II	35	15.6	1.6	17.2	0.12	26.2	C
Old Garth Road	II	35	15.4	103.8	119.2	0.12	3.7	F
	II	35	36.8	5.0	41.8	0.34	29.4	B
	II	35	40.7	21.9	62.6	0.39	22.3	C
UVA Health Center	II	45	45.7	4.8	50.5	0.52	37.0	A
Broomley Road	II	45	35.5	8.6	44.1	0.37	30.2	B
Total	II		203.0	151.8	354.8	1.97	20.0	D

Network Totals

Number of Intersections	8
Total Delay (hr)	92
Stops (#)	6872
Average Speed (mph)	20
Total Travel Time (hr)	187
Distance Traveled (mi)	3719
Fuel Consumed (gal)	261
Fuel Economy (mpg)	14.3
Unserved Vehicles (#)	76
Vehicles in dilemma zone (#)	419
Performance Index	110.9

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1660
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	4
Stops / Veh	0.52
Stops (#)	855
Average Speed (mph)	20
Total Travel Time (hr)	9
Distance Traveled (mi)	189
Fuel Consumed (gal)	17
Fuel Economy (mpg)	10.8
CO Emissions (kg)	1.22
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.28
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	112

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1811
Control Delay / Veh (s/v)	11
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	11
Total Delay (hr)	5
Stops / Veh	0.42
Stops (#)	752
Average Speed (mph)	19
Total Travel Time (hr)	12
Distance Traveled (mi)	224
Fuel Consumed (gal)	18
Fuel Economy (mpg)	12.3
CO Emissions (kg)	1.27
NOx Emissions (kg)	0.25
VOC Emissions (kg)	0.29
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	51

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2837
Control Delay / Veh (s/v)	65
Queue Delay / Veh (s/v)	3
Total Delay / Veh (s/v)	67
Total Delay (hr)	53
Stops / Veh	0.78
Stops (#)	2223
Average Speed (mph)	7
Total Travel Time (hr)	67
Distance Traveled (mi)	489
Fuel Consumed (gal)	74
Fuel Economy (mpg)	6.6
CO Emissions (kg)	5.19
NOx Emissions (kg)	1.01
VOC Emissions (kg)	1.20
Unserved Vehicles (#)	76
Vehicles in dilemma zone (#)	47

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	1757
Control Delay / Veh (s/v)	21
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	21
Total Delay (hr)	10
Stops / Veh	0.57
Stops (#)	1000
Average Speed (mph)	20
Total Travel Time (hr)	23
Distance Traveled (mi)	446
Fuel Consumed (gal)	34
Fuel Economy (mpg)	13.3
CO Emissions (kg)	2.35
NOx Emissions (kg)	0.46
VOC Emissions (kg)	0.54
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	75

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1691
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	4
Stops / Veh	0.07
Stops (#)	125
Average Speed (mph)	30
Total Travel Time (hr)	13
Distance Traveled (mi)	404
Fuel Consumed (gal)	18
Fuel Economy (mpg)	22.3
CO Emissions (kg)	1.27
NOx Emissions (kg)	0.25
VOC Emissions (kg)	0.29
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	0

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1652
Control Delay / Veh (s/v)	6
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	6
Total Delay (hr)	3
Stops / Veh	0.21
Stops (#)	347
Average Speed (mph)	37
Total Travel Time (hr)	17
Distance Traveled (mi)	628
Fuel Consumed (gal)	28
Fuel Economy (mpg)	22.8
CO Emissions (kg)	1.93
NOx Emissions (kg)	0.37
VOC Emissions (kg)	0.45
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	53

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1587
Control Delay / Veh (s/v)	7
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	7
Total Delay (hr)	3
Stops / Veh	0.40
Stops (#)	637
Average Speed (mph)	36
Total Travel Time (hr)	17
Distance Traveled (mi)	613
Fuel Consumed (gal)	31
Fuel Economy (mpg)	19.8
CO Emissions (kg)	2.17
NOx Emissions (kg)	0.42
VOC Emissions (kg)	0.50
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	44

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2135
Control Delay / Veh (s/v)	14
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	14
Total Delay (hr)	8
Stops / Veh	0.44
Stops (#)	933
Average Speed (mph)	25
Total Travel Time (hr)	29
Distance Traveled (mi)	725
Fuel Consumed (gal)	41
Fuel Economy (mpg)	17.8
CO Emissions (kg)	2.86
NOx Emissions (kg)	0.56
VOC Emissions (kg)	0.66
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	37

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	21
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	22
Total Delay (hr)	92
Stops / Veh	0.45
Stops (#)	6872
Average Speed (mph)	20
Total Travel Time (hr)	187
Distance Traveled (mi)	3719
Fuel Consumed (gal)	261
Fuel Economy (mpg)	14.3
CO Emissions (kg)	18.24
NOx Emissions (kg)	3.55
VOC Emissions (kg)	4.23
Unserved Vehicles (#)	76
Vehicles in dilemma zone (#)	419
Performance Index	110.9

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	1005	39	59	681	13	28
Future Volume (vph)	1005	39	59	681	13	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.161		0.950	
Satd. Flow (perm)	1801	1531	290	1801	1711	1531
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		42				30
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	1092	42	64	740	14	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	1092	42	64	740	14	30
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	14.0	20.0	20.0	20.0
Total Split (s)	86.0	86.0	14.0	100.0	20.0	20.0
Total Split (%)	71.7%	71.7%	11.7%	83.3%	16.7%	16.7%
Maximum Green (s)	79.0	79.0	7.0	93.0	13.0	13.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead	Lead	Lag			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effect Green (s)	96.1	96.1	106.3	108.3	9.3	9.3
Actuated g/C Ratio	0.80	0.80	0.89	0.90	0.08	0.08
v/c Ratio	0.76	0.03	0.18	0.46	0.11	0.21
Control Delay	11.1	1.8	1.3	1.1	53.2	20.8
Queue Delay	0.1	0.0	0.0	0.0	0.0	0.0
Total Delay	11.2	1.8	1.3	1.2	53.2	20.8
LOS	B	A	A	A	D	C
Approach Delay	10.8			1.2	31.1	
Approach LOS	B			A	C	
Queue Length 50th (ft)	682	2	5	67	10	0
Queue Length 95th (ft)	516	m5	m2	m15	32	30
Internal Link Dist (ft)	384			462	509	
Turn Bay Length (ft)		360	200			
Base Capacity (vph)	1441	1234	363	1625	213	217
Starvation Cap Reductn	0	0	0	81	0	0
Spillback Cap Reductn	25	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.77	0.03	0.18	0.48	0.07	0.14

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 6 (5%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 7.4

Intersection LOS: A

Intersection Capacity Utilization 67.1%

ICU Level of Service C

Analysis Period (min) 15

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

Splits and Phases: 5: Ednam Drive & Ivy Road



Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	1014	23	140	875	7	7	0	78	7	1	5
Future Volume (vph)	0	1014	23	140	875	7	7	0	78	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.876			0.946	
Flt Protected				0.950				0.996			0.974	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1571	0	0	1659	0
Flt Permitted				0.064				0.976			0.878	
Satd. Flow (perm)	1801	1801	1531	115	1801	1531	0	1540	0	0	1496	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			100			36		100			6	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	1127	26	156	972	8	8	0	87	8	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	1127	26	156	972	8	0	95	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		

Lanes, Volumes, Timings

34: Golf Course Drive & Ivy Road

11/17/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0	20.0	14.0	20.0	20.0	20.0	20.0		20.0	20.0	
Total Split (s)	86.0	86.0	86.0	14.0	100.0	100.0	20.0	20.0		20.0	20.0	
Total Split (%)	71.7%	71.7%	71.7%	11.7%	83.3%	83.3%	16.7%	16.7%		16.7%	16.7%	
Maximum Green (s)	79.0	79.0	79.0	7.0	93.0	93.0	13.0	13.0		13.0	13.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effect Green (s)		80.9	80.9	94.9	94.9	94.9		15.1			15.1	
Actuated g/C Ratio		0.67	0.67	0.79	0.79	0.79		0.13			0.13	
v/c Ratio		0.93	0.02	0.74	0.68	0.01		0.34			0.08	
Control Delay		14.6	0.0	34.4	10.1	0.0		11.9			35.7	
Queue Delay		0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay		14.6	0.0	34.4	10.1	0.0		11.9			35.7	
LOS		B	A	C	B	A		B			D	
Approach Delay		14.2			13.4			11.9			35.7	
Approach LOS		B			B			B			D	
Queue Length 50th (ft)		92	0	52	309	0		0			6	
Queue Length 95th (ft)		m#1056	m0	m#101	573	m0		47			28	
Internal Link Dist (ft)		1969			1720			266			200	
Turn Bay Length (ft)			500	500		500						
Base Capacity (vph)		1215	1065	210	1425	1219		281			193	
Starvation Cap Reductn		0	0	0	0	0		0			0	
Spillback Cap Reductn		0	0	0	0	0		0			0	
Storage Cap Reductn		0	0	0	0	0		0			0	
Reduced v/c Ratio		0.93	0.02	0.74	0.68	0.01		0.34			0.08	

Intersection Summary

Area Type: Other

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 100

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.93

Intersection Signal Delay: 13.9

Intersection LOS: B

Intersection Capacity Utilization 79.5%

ICU Level of Service D

Analysis Period (min) 15

95th percentile volume exceeds capacity, queue may be longer.

Queue shown is maximum after two cycles.

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

Lanes, Volumes, Timings 34: Golf Course Drive & Ivy Road

11/17/2017

Splits and Phases: 34: Golf Course Drive & Ivy Road



Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	4.5	40.0	0.37	33.3	B
Ednam Drive	II	45	39.2	11.1	50.3	0.42	29.8	B
Farmington Drive	II	45	11.2	20.2	31.4	0.10	11.8	F
Golf Course Drive	II	35	40.7	14.6	55.3	0.39	25.3	C
Canterbury Road	II	35	36.8	3.0	39.8	0.34	30.8	B
US 29 SB Ramps	II	35	15.4	4.7	20.1	0.12	22.0	C
US 29 NB Ramps	II	35	15.6	7.4	23.0	0.12	19.6	D
Total	II		194.4	65.5	259.9	1.87	25.8	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	7.3	20.6	0.11	18.5	D
US 29 SB Ramps	II	35	15.6	1.9	17.5	0.12	25.7	C
Old Garth Road	II	35	15.4	28.1	43.5	0.12	10.2	F
	II	35	36.8	10.1	46.9	0.34	26.2	C
	II	35	40.7	21.4	62.1	0.39	22.5	C
Ednam Drive	II	45	11.2	1.1	12.3	0.10	30.0	B
UVA Health Center	II	45	39.2	9.6	48.8	0.42	30.7	B
Broomley Road	II	45	35.5	5.4	40.9	0.37	32.5	B
Total	II		207.7	84.9	292.6	1.97	24.3	C

Network Totals

Number of Intersections	8
Total Delay (hr)	54
Stops (#)	5895
Average Speed (mph)	25
Total Travel Time (hr)	154
Distance Traveled (mi)	3927
Fuel Consumed (gal)	237
Fuel Economy (mpg)	16.5
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	454
Performance Index	70.4

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1622
Control Delay / Veh (s/v)	10
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	10
Total Delay (hr)	5
Stops / Veh	0.46
Stops (#)	747
Average Speed (mph)	20
Total Travel Time (hr)	10
Distance Traveled (mi)	191
Fuel Consumed (gal)	18
Fuel Economy (mpg)	10.9
CO Emissions (kg)	1.23
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.28
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	50

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1496
Control Delay / Veh (s/v)	4
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	4
Total Delay (hr)	2
Stops / Veh	0.26
Stops (#)	396
Average Speed (mph)	26
Total Travel Time (hr)	7
Distance Traveled (mi)	184
Fuel Consumed (gal)	11
Fuel Economy (mpg)	16.2
CO Emissions (kg)	0.79
NOx Emissions (kg)	0.15
VOC Emissions (kg)	0.18
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	43

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2370
Control Delay / Veh (s/v)	19
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	19
Total Delay (hr)	13
Stops / Veh	0.42
Stops (#)	991
Average Speed (mph)	18
Total Travel Time (hr)	27
Distance Traveled (mi)	490
Fuel Consumed (gal)	35
Fuel Economy (mpg)	13.9
CO Emissions (kg)	2.46
NOx Emissions (kg)	0.48
VOC Emissions (kg)	0.57
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	81

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	2034
Control Delay / Veh (s/v)	26
Queue Delay / Veh (s/v)	1
Total Delay / Veh (s/v)	26
Total Delay (hr)	15
Stops / Veh	0.55
Stops (#)	1111
Average Speed (mph)	17
Total Travel Time (hr)	27
Distance Traveled (mi)	457
Fuel Consumed (gal)	39
Fuel Economy (mpg)	11.7
CO Emissions (kg)	2.73
NOx Emissions (kg)	0.53
VOC Emissions (kg)	0.63
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	74

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1825
Control Delay / Veh (s/v)	7
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	7
Total Delay (hr)	4
Stops / Veh	0.32
Stops (#)	583
Average Speed (mph)	34
Total Travel Time (hr)	15
Distance Traveled (mi)	516
Fuel Consumed (gal)	28
Fuel Economy (mpg)	18.7
CO Emissions (kg)	1.92
NOx Emissions (kg)	0.37
VOC Emissions (kg)	0.45
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	46

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1774
Control Delay / Veh (s/v)	7
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	7
Total Delay (hr)	4
Stops / Veh	0.28
Stops (#)	505
Average Speed (mph)	36
Total Travel Time (hr)	19
Distance Traveled (mi)	675
Fuel Consumed (gal)	32
Fuel Economy (mpg)	21.2
CO Emissions (kg)	2.23
NOx Emissions (kg)	0.43
VOC Emissions (kg)	0.52
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	44

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1678
Control Delay / Veh (s/v)	10
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	10
Total Delay (hr)	5
Stops / Veh	0.38
Stops (#)	637
Average Speed (mph)	33
Total Travel Time (hr)	20
Distance Traveled (mi)	655
Fuel Consumed (gal)	33
Fuel Economy (mpg)	19.8
CO Emissions (kg)	2.31
NOx Emissions (kg)	0.45
VOC Emissions (kg)	0.54
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	31

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2159
Control Delay / Veh (s/v)	14
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	14
Total Delay (hr)	8
Stops / Veh	0.43
Stops (#)	925
Average Speed (mph)	25
Total Travel Time (hr)	30
Distance Traveled (mi)	757
Fuel Consumed (gal)	42
Fuel Economy (mpg)	18.1
CO Emissions (kg)	2.93
NOx Emissions (kg)	0.57
VOC Emissions (kg)	0.68
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	85

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	13
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	13
Total Delay (hr)	54
Stops / Veh	0.39
Stops (#)	5895
Average Speed (mph)	25
Total Travel Time (hr)	154
Distance Traveled (mi)	3927
Fuel Consumed (gal)	237
Fuel Economy (mpg)	16.5
CO Emissions (kg)	16.60
NOx Emissions (kg)	3.23
VOC Emissions (kg)	3.85
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	454
Performance Index	70.4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017

						
Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Volume (vph)	705	27	35	866	30	28
Future Volume (vph)	705	27	35	866	30	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Storage Length (ft)		360	200		0	0
Storage Lanes		1	1		1	1
Taper Length (ft)			100		100	
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.850				0.850
Flt Protected			0.950		0.950	
Satd. Flow (prot)	1801	1531	1711	1801	1711	1531
Flt Permitted			0.290		0.950	
Satd. Flow (perm)	1801	1531	522	1801	1711	1531
Right Turn on Red		Yes				Yes
Satd. Flow (RTOR)		29				30
Link Speed (mph)	45			45	25	
Link Distance (ft)	464			542	589	
Travel Time (s)	7.0			8.2	16.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	766	29	38	941	33	30
Shared Lane Traffic (%)						
Lane Group Flow (vph)	766	29	38	941	33	30
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	11			11	11	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)		9	15		15	9
Number of Detectors	2	1	1	2	1	1
Detector Template	Thru	Right	Left	Thru	Left	Right
Leading Detector (ft)	100	20	20	100	20	20
Trailing Detector (ft)	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0
Detector 1 Size(ft)	6	20	20	6	20	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel						
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)	94			94		
Detector 2 Size(ft)	6			6		
Detector 2 Type	Cl+Ex			Cl+Ex		
Detector 2 Channel						
Detector 2 Extend (s)	0.0			0.0		
Turn Type	NA	Perm	pm+pt	NA	Prot	Perm
Protected Phases	2		1	6	4	
Permitted Phases		2	6			4

Lanes, Volumes, Timings

5: Ednam Drive & Ivy Road

11/17/2017



Lane Group	EBT	EBR	WBL	WBT	NBL	NBR
Detector Phase	2	2	1	6	4	4
Switch Phase						
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0
Minimum Split (s)	20.0	20.0	14.0	20.0	20.0	20.0
Total Split (s)	96.0	96.0	14.0	110.0	20.0	20.0
Total Split (%)	73.8%	73.8%	10.8%	84.6%	15.4%	15.4%
Maximum Green (s)	89.0	89.0	7.0	103.0	13.0	13.0
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lag	Lag	Lead			
Lead-Lag Optimize?	Yes	Yes	Yes			
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	C-Min	C-Min	None	C-Min	None	None
Act Effect Green (s)	102.2	102.2	112.4	113.4	10.4	10.4
Actuated g/C Ratio	0.79	0.79	0.86	0.87	0.08	0.08
v/c Ratio	0.54	0.02	0.07	0.60	0.24	0.20
Control Delay	7.0	1.4	0.3	1.0	60.0	21.0
Queue Delay	0.0	0.0	0.0	0.2	0.0	0.0
Total Delay	7.0	1.4	0.3	1.2	60.0	21.0
LOS	A	A	A	A	E	C
Approach Delay	6.8			1.1	41.4	
Approach LOS	A			A	D	
Queue Length 50th (ft)	176	1	1	17	27	0
Queue Length 95th (ft)	358	m10	m1	m15	61	31
Internal Link Dist (ft)	384			462	509	
Turn Bay Length (ft)		360	200			
Base Capacity (vph)	1416	1210	533	1571	197	203
Starvation Cap Reductn	0	0	0	122	0	0
Spillback Cap Reductn	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0
Reduced v/c Ratio	0.54	0.02	0.07	0.65	0.17	0.15

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 102 (78%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

Intersection Signal Delay: 5.0

Intersection LOS: A

Intersection Capacity Utilization 59.7%

ICU Level of Service B

Analysis Period (min) 15

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

Splits and Phases: 5: Ednam Drive & Ivy Road



Lanes, Volumes, Timings
34: Golf Course Drive & Ivy Road

11/17/2017

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	863	10	167	928	8	10	0	135	7	1	5
Future Volume (vph)	0	863	10	167	928	8	10	0	135	7	1	5
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	500		500	500		500	0		0	0		0
Storage Lanes	1		1	1		1	0		0	0		0
Taper Length (ft)	100			100			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.850			0.850		0.874			0.946	
Flt Protected				0.950				0.997			0.974	
Satd. Flow (prot)	1801	1801	1531	1711	1801	1531	0	1569	0	0	1659	0
Flt Permitted				0.135				0.981			0.774	
Satd. Flow (perm)	1801	1801	1531	243	1801	1531	0	1544	0	0	1318	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			92			34		150			6	
Link Speed (mph)		35			35			30			30	
Link Distance (ft)		2049			1800			346			280	
Travel Time (s)		39.9			35.1			7.9			6.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	959	11	186	1031	9	11	0	150	8	1	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	959	11	186	1031	9	0	161	0	0	15	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		11			11			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04	1.04
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2		1	2	
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru		Left	Thru	
Leading Detector (ft)	20	100	20	20	100	20	20	100		20	100	
Trailing Detector (ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Position(ft)	0	0	0	0	0	0	0	0		0	0	
Detector 1 Size(ft)	20	6	20	20	6	20	20	6		20	6	
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	pm+pt	NA	Perm	Perm	NA		Perm	NA	
Protected Phases		4		3	8			2			6	
Permitted Phases	4		4	8		8	2			6		

Lanes, Volumes, Timings

34: Golf Course Drive & Ivy Road

11/17/2017



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Detector Phase	4	4	4	3	8	8	2	2		6	6	
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		7.0	7.0	
Minimum Split (s)	20.0	20.0	20.0	14.0	20.0	20.0	20.0	20.0		20.0	20.0	
Total Split (s)	93.0	93.0	93.0	17.0	110.0	110.0	20.0	20.0		20.0	20.0	
Total Split (%)	71.5%	71.5%	71.5%	13.1%	84.6%	84.6%	15.4%	15.4%		15.4%	15.4%	
Maximum Green (s)	86.0	86.0	86.0	10.0	103.0	103.0	13.0	13.0		13.0	13.0	
Yellow Time (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0		5.0	5.0	
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0		2.0	2.0	
Lost Time Adjust (s)	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0		-2.0			-2.0	
Total Lost Time (s)	5.0	5.0	5.0	5.0	5.0	5.0		5.0			5.0	
Lead/Lag	Lag	Lag	Lag	Lead								
Lead-Lag Optimize?	Yes	Yes	Yes	Yes								
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Recall Mode	None	None	None	None	None	None	C-Max	C-Max		C-Max	C-Max	
Act Effect Green (s)		85.0	85.0	101.9	101.9	101.9		18.1			18.1	
Actuated g/C Ratio		0.65	0.65	0.78	0.78	0.78		0.14			0.14	
v/c Ratio		0.81	0.01	0.57	0.73	0.01		0.47			0.08	
Control Delay		19.5	0.0	16.9	4.4	0.0		14.8			39.4	
Queue Delay		0.0	0.0	0.0	0.0	0.0		0.0			0.0	
Total Delay		19.5	0.0	16.9	4.4	0.0		14.8			39.4	
LOS		B	A	B	A	A		B			D	
Approach Delay		19.3			6.2			14.8			39.4	
Approach LOS		B			A			B			D	
Queue Length 50th (ft)		372	0	16	109	0		8			7	
Queue Length 95th (ft)		m449	m0	m41	m118	m0		77			30	
Internal Link Dist (ft)		1969			1720			266			200	
Turn Bay Length (ft)			500	500		500						
Base Capacity (vph)		1219	1066	325	1454	1243		343			188	
Starvation Cap Reductn		0	0	0	0	0		0			0	
Spillback Cap Reductn		0	0	0	0	0		0			0	
Storage Cap Reductn		0	0	0	0	0		0			0	
Reduced v/c Ratio		0.79	0.01	0.57	0.71	0.01		0.47			0.08	

Intersection Summary

Area Type: Other

Cycle Length: 130

Actuated Cycle Length: 130

Offset: 17 (13%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.81

Intersection Signal Delay: 12.4

Intersection LOS: B

Intersection Capacity Utilization 76.1%

ICU Level of Service D

Analysis Period (min) 15

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

Splits and Phases: 34: Golf Course Drive & Ivy Road



Arterial Level of Service: EB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
UVA Health Center	II	45	35.5	3.5	39.0	0.37	34.1	B
Ednam Drive	II	45	39.2	7.0	46.2	0.42	32.5	B
Farmington Drive	II	45	11.2	4.2	15.4	0.10	24.0	C
Golf Course Drive	II	35	40.7	19.5	60.2	0.39	23.2	C
Canterbury Road	II	35	36.8	23.8	60.6	0.34	20.3	D
US 29 SB Ramps	II	35	15.4	9.8	25.2	0.12	17.6	D
US 29 NB Ramps	II	35	15.6	3.3	18.9	0.12	23.8	C
Total	II		194.4	71.1	265.5	1.87	25.3	C

Arterial Level of Service: WB Ivy Road

Cross Street	Arterial Class	Flow Speed	Running Time	Signal Delay	Travel Time (s)	Dist (mi)	Arterial Speed	Arterial LOS
US 29 NB Ramps	II	35	13.3	7.9	21.2	0.11	18.0	D
US 29 SB Ramps	II	35	15.6	1.1	16.7	0.12	26.9	C
Old Garth Road	II	35	15.4	93.6	109.0	0.12	4.1	F
	II	35	36.8	4.4	41.2	0.34	29.8	B
	II	35	40.7	23.9	64.6	0.39	21.6	D
Ednam Drive	II	45	11.2	1.0	12.2	0.10	30.3	B
UVA Health Center	II	45	39.2	7.0	46.2	0.42	32.5	B
Broomley Road	II	45	35.5	1.9	37.4	0.37	35.6	A
Total	II		207.7	140.8	348.5	1.97	20.4	D

Network Totals

Number of Intersections	8
Total Delay (hr)	83
Stops (#)	5842
Average Speed (mph)	21
Total Travel Time (hr)	178
Distance Traveled (mi)	3719
Fuel Consumed (gal)	245
Fuel Economy (mpg)	15.2
Unserved Vehicles (#)	84
Vehicles in dilemma zone (#)	381
Performance Index	99.0

1: US 29 NB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1660
Control Delay / Veh (s/v)	8
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	8
Total Delay (hr)	4
Stops / Veh	0.40
Stops (#)	666
Average Speed (mph)	21
Total Travel Time (hr)	9
Distance Traveled (mi)	189
Fuel Consumed (gal)	16
Fuel Economy (mpg)	12.0
CO Emissions (kg)	1.10
NOx Emissions (kg)	0.21
VOC Emissions (kg)	0.25
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	80

2: US 29 SB Ramps & Ivy Road

Direction	All
Future Volume (vph)	1811
Control Delay / Veh (s/v)	9
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	9
Total Delay (hr)	5
Stops / Veh	0.40
Stops (#)	726
Average Speed (mph)	20
Total Travel Time (hr)	11
Distance Traveled (mi)	224
Fuel Consumed (gal)	18
Fuel Economy (mpg)	12.8
CO Emissions (kg)	1.23
NOx Emissions (kg)	0.24
VOC Emissions (kg)	0.28
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	47

3: Canterbury Road/Old Garth Road & Ivy Road

Direction	All
Future Volume (vph)	2837
Control Delay / Veh (s/v)	61
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	61
Total Delay (hr)	48
Stops / Veh	0.73
Stops (#)	2078
Average Speed (mph)	8
Total Travel Time (hr)	62
Distance Traveled (mi)	489
Fuel Consumed (gal)	69
Fuel Economy (mpg)	7.1
CO Emissions (kg)	4.84
NOx Emissions (kg)	0.94
VOC Emissions (kg)	1.12
Unserved Vehicles (#)	84
Vehicles in dilemma zone (#)	57

4: Farmington Drive & Ivy Road

Direction	All
Future Volume (vph)	1757
Control Delay / Veh (s/v)	23
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	23
Total Delay (hr)	11
Stops / Veh	0.37
Stops (#)	651
Average Speed (mph)	19
Total Travel Time (hr)	23
Distance Traveled (mi)	446
Fuel Consumed (gal)	31
Fuel Economy (mpg)	14.5
CO Emissions (kg)	2.14
NOx Emissions (kg)	0.42
VOC Emissions (kg)	0.50
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	62

5: Ednam Drive & Ivy Road

Direction	All
Future Volume (vph)	1691
Control Delay / Veh (s/v)	5
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	5
Total Delay (hr)	2
Stops / Veh	0.17
Stops (#)	283
Average Speed (mph)	35
Total Travel Time (hr)	11
Distance Traveled (mi)	404
Fuel Consumed (gal)	19
Fuel Economy (mpg)	21.5
CO Emissions (kg)	1.32
NOx Emissions (kg)	0.26
VOC Emissions (kg)	0.31
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	25

6: Ivy Road & UVA Health Center

Direction	All
Future Volume (vph)	1652
Control Delay / Veh (s/v)	8
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	8
Total Delay (hr)	4
Stops / Veh	0.29
Stops (#)	480
Average Speed (mph)	35
Total Travel Time (hr)	18
Distance Traveled (mi)	628
Fuel Consumed (gal)	30
Fuel Economy (mpg)	21.1
CO Emissions (kg)	2.08
NOx Emissions (kg)	0.41
VOC Emissions (kg)	0.48
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	47

7: Private Drive/Broomley Road & Ivy Road

Direction	All
Future Volume (vph)	1587
Control Delay / Veh (s/v)	4
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	4
Total Delay (hr)	2
Stops / Veh	0.15
Stops (#)	237
Average Speed (mph)	39
Total Travel Time (hr)	16
Distance Traveled (mi)	613
Fuel Consumed (gal)	25
Fuel Economy (mpg)	24.4
CO Emissions (kg)	1.75
NOx Emissions (kg)	0.34
VOC Emissions (kg)	0.41
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	17

34: Golf Course Drive & Ivy Road

Direction	All
Future Volume (vph)	2135
Control Delay / Veh (s/v)	12
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	12
Total Delay (hr)	7
Stops / Veh	0.34
Stops (#)	721
Average Speed (mph)	26
Total Travel Time (hr)	28
Distance Traveled (mi)	725
Fuel Consumed (gal)	38
Fuel Economy (mpg)	18.9
CO Emissions (kg)	2.68
NOx Emissions (kg)	0.52
VOC Emissions (kg)	0.62
Unserved Vehicles (#)	0
Vehicles in dilemma zone (#)	46

Network Totals

Number of Intersections	8
Control Delay / Veh (s/v)	20
Queue Delay / Veh (s/v)	0
Total Delay / Veh (s/v)	20
Total Delay (hr)	83
Stops / Veh	0.39
Stops (#)	5842
Average Speed (mph)	21
Total Travel Time (hr)	178
Distance Traveled (mi)	3719
Fuel Consumed (gal)	245
Fuel Economy (mpg)	15.2
CO Emissions (kg)	17.15
NOx Emissions (kg)	3.34
VOC Emissions (kg)	3.97
Unserviced Vehicles (#)	84
Vehicles in dilemma zone (#)	381
Performance Index	99.0