



TOWN COUNCIL WORK SESSION AGENDA

Herndon Police Department – Community Room
397 Herndon Parkway, Herndon, VA 20170

Tuesday, March 7, 2023 | 7:00 p.m.

1. Call to Order

2. Public Hearings

- a. Ordinance to approve and authorize the Mayor to sign a Fourth Lease Amendment with New Cingular Wireless PCS, LLC d/b/a AT&T Mobility Corporation to revise the exhibits, utility and access easement description, premises description, approved equipment list, and rent at the Town's Alabama Drive Water Tower
- b. Ordinance to consider zoning ordinance text amendment, ZOTA #23-01, to amend Chapter 78 (ZONING), Section 78-141.6 (Sign Standards for Downtown Mixed-Use Districts), to revise the regulations governing the location of wall mounted signs

3. General

- a. Resolution to approve the Town's participation in the proposed settlement of opioid-related claims against Teva, Allergan, Walmart, Walgreens, CVS, and their related corporate entities, and to direct the Town Manager and/or Town Attorney to execute the documents necessary to effectuate the Town's participation in the settlements

4. Discussion

- a. FY 2024 General Fund Budget Discussion
- b. Organizational Orientation Discussion by the Town Manager and the Information Technology Department and the Town Attorney's Office
- c. Impact of the East Spring Street project on the Sunset Business Park Businesses
- d. Revisiting the Need for the Economic Development Advisory Committee

5. Roundtable

6. Closed Meeting

Closed meeting pursuant to Virginia Code Section 2.2-3711(A)(1) to conduct a discussion relative to the performance of a member of the Town Council

7. Adjournment

STAFF REPORT

Town Council
March 7, 2023

Title:

Ordinance - to approve and authorize the Mayor to sign a Fourth Lease Amendment with New Cingular Wireless PCS, LLC d/b/a AT&T Mobility Corporation to revise the exhibits, utility and access easement description, premises description, approved equipment list, and rent at the Town's Alabama Drive Water Tower.

Staff Contact:

Tammy Chastain, Deputy Director of Public Works
(phone) 703-435-6860
(e-mail) tammy.chastain@herndon-va.gov

Summary:

The original lease agreement at the Alabama Drive Water Tower between the Town and AT&T Mobility Corporation was dated December 6, 2000 and subsequently amended in July 2006, October 2015, and most recently in January 2021. The current lease will expire on May 31, 2026.

This Fourth Amendment approves revisions to the equipment list and exhibits to allow for the removal and/or change out of various equipment:

Changes on the tank:

Remove 3 antennas and replace with 6 stacked two over two (29.5"H x 17.7"W x 9.5"D)

Remove 3 TMA's (Tower Mount Amplifiers)

Remove and replace 3 OVP's (Over Voltage Protectors)

Changes on the ground:

Remove 6 diplexers

Install one rectifier

Install battery array

This proposed fourth amendment will increase rent by \$450/per month beginning on April 1st because of the additional 3 new antennas that will be added.

Other minor changes with this amendment include clarification of the utility and access easements, and the deletion of an outdated and duplicative exhibit.

Staff Report
March 7, 2023
AT&T Third Lease Amendment– Alabama Water Tower

The next steps in the process, if this ordinance is approved, is to proceed through the Architectural Review Board process, after which, if approved, a building permit would be required.

Fiscal Impact:

The current monthly rent is \$4,091.99. If the amendment is approved, beginning on April 1st, the new monthly rent will be \$4,541.99. The lease will also remain subject to an annual 3% escalation provided for in the original Deed of Lease.

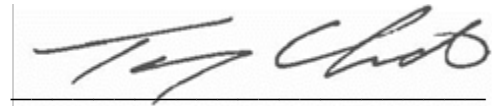
Staff Recommendation:

Staff recommends that the Town Council approve the Ordinance as proposed.

Attached Documents:

1. Draft Ordinance
2. 4th Lease Amendment with Exhibits

Staff:

A handwritten signature in black ink, appearing to read "Tammy Chastain", is written over a horizontal line.

Tammy Chastain
Deputy Director of Public Works

TOWN OF HERNDON, VIRGINIA

ORDINANCE

MARCH 14, 2023

Ordinance - to approve and authorize the Mayor to sign a Fourth Lease Amendment with New Cingular Wireless PCS, LLC d/b/a AT&T Mobility Corporation to revise the exhibits, utility and access easement description, premises description, approved equipment list, and rent at the Town's Alabama Drive Water Tower.

BE IT ORDAINED by the Town Council of the Town of Herndon, Virginia, that:

1. The Town Council approves this Fourth Amendment to Deed of Lease dated February 28, 2023. This instrument amends the original Deed of Lease dated December 6, 2000, as amended by First Amendment to Deed of Lease dated July 23, 2006, as amended by the Second Amendment to Deed of Lease dated October 20, 2015, and as amended by the Third Amendment to Deed of Lease dated January 26, 2021.
2. This instrument updates the exhibits, utility and access easement descriptions, premises description, approved equipment list, and rent.
3. Exhibit B "print date" December 26, 2000, Exhibit C dated December 8, 2020, Exhibit D dated December 8, 2020 and Exhibit E, Pages 1-5 dated December 8, 2020 are deleted in their entirety and replaced with Exhibit B dated February 28, 2023, Exhibit C dated February 28, 2023, and Exhibit D Pages 1-4 dated February 28, 2023.
4. The "Utility" and "Access" Easements shall be as described in Exhibit A.
5. The "Premises" shall be as described in Exhibits B, C and D.
6. The "Equipment" shall be as described in Exhibits C and D.
7. This instrument approves the following on equipment list: 12 antennas up to 96" H x 20" W x 8" D.
8. In all other respects the original lease remains in effect.
9. The Mayor is authorized to sign and deliver the lease amendment and any ancillary instruments necessary to evidence or effectuate the lease amendment, provided they are consistent with this ordinance and on such form approved by the Town Attorney.
10. This ordinance shall be in effect on and after the date of its adoption.

Town Site ID: Herndon Alabama Drive Water Tower
Tenant Site ID: PW1191/Herndon Water Tank
Fixed Asset No. 10067722
Market: DC/MD
Address: 624 Alabama Drive, Herndon, VA 20170

FOURTH AMENDMENT TO DEED OF LEASE

THIS FOURTH AMENDMENT TO DEED OF LEASE (“**Fourth Amendment**”), dated the 28th day of February 2023, is by and between Town of Herndon, a municipal corporation, having a mailing address of 777 Lynn Street, Herndon, VA 20170 (hereinafter referred to as “**Town**”), and New Cingular Wireless PCS, LLC, a Delaware limited liability company, having a mailing address of 1025 Lenox Park BLVD. NE, Third Floor, Atlanta, GA 30319 (hereinafter referred to as “**Lessee**”).

WHEREAS, Town and Lessee (or its respective predecessor-in-interest) entered into a Deed of Lease dated December 6, 2000 (“**Deed of Lease**”), as amended by that certain First Amendment to Deed of Lease dated July 23, 2006 (“**First Amendment**”), as amended by the Second Amendment to Deed of Lease dated October 20, 2015 (“**Second Amendment**”), and as amended by the Third Amendment to Deed of Lease dated January 26, 2021 (“**Third Amendment**”) whereby Town leased to Lessee certain Premises, therein described, that are a portion of the Property located at 624 Alabama Drive, Herndon, VA 20170 (hereinafter, the Deed of Lease, the First Amendment, the Second Amendment, and the Third Amendment are collectively referred to as the “**Lease**”); and

WHEREAS, Town and Lessee hereby affirm that, as of the date hereof: (i) no breach or default by Town or Lessee occurred; and (ii) the Lease, and all the terms, covenants, conditions, provisions and agreements thereof, except as expressly modified by this Fourth Amendment are in full force and effect, with no defenses or offsets thereto; and

WHEREAS, Town and Lessee desire to amend the Lease as follows;

NOW THEREFORE, in consideration of the mutual covenants contained in the Lease and for other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Town and Lessee hereby agree as follows:

1. All capitalized terms shall have the meaning ascribed to them in the Lease unless otherwise defined in this Fourth Amendment.
2. Exhibit B “print date” December 26, 2000, Exhibit C dated December 8, 2020, Exhibit D dated December 8, 2020 and Exhibit E, Pages 1-5 dated December 8, 2020 are deleted in their entirety.
3. The lease is hereby amended to add Exhibit B dated February 28, 2023, Exhibit C dated February 28, 2023, and Exhibit D Pages 1-4 dated February 28, 2023.
4. “Utility” and “Access” Easements shall be as described in Exhibit A.
5. “Premises” shall be as described in Exhibits B, C and D.
6. “Equipment” shall be as described in Exhibits C and D.
7. **Rent.** As additional consideration for the modification and other rights set forth in this Fourth Amendment, beginning on April 1, 2023, the rent will be increased by

Town Site ID: Herndon Alabama Drive Water Tower
Tenant Site ID: PW1191/Herndon Water Tank
Fixed Asset No. 10067722
Market: DC/MD
Address: 624 Alabama Drive, Herndon, VA 20170

\$450.00 per month. The rent shall escalate each year provided in paragraph 3(c) of Original Deed of Lease, as amended.

8. Except as specifically amended herein, the remaining terms of the Lease shall remain in full force and effect. To the extent any provision contained in this Fourth Amendment conflicts with the terms of the Lease, the terms and provisions of this Fourth Amendment shall prevail.

IN WITNESS WHEREOF, the parties have caused this Fourth Amendment to be effective as of the last date written below.

LESSOR:

TOWN OF HERNDON

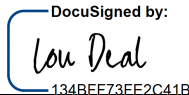
By: _____
Name: Sheila A. Olem
Title: Mayor
Date: _____

ATTEST:

By: _____
Name: _____
Title: _____

LESSEE:

NEW CINGULAR WIRELESS PCS, LLC
By: AT&T MOBILITY CORPORATION
Its: Manager

By: 
Name: Lou Deal
Title: Reac Mgr
Date: 2/22/2023

APPROVED AS TO FORM:

By: _____
Name: Lesa J. Yeatts
Title: Town Attorney

**Town Site ID: Herndon Alabama Drive Water
Tower Tenant Site ID: PW1191/Herndon Water
Tank
Fixed Asset No. 10067722
Market: DC/MD
Address: 624 Alabama Drive, Herndon, VA 20170**

Exhibit B
February 28, 2023

The property lies in the Town of Herndon, Virginia and is described as follows:

1. 624 Alabama Dr
Herndon, VA 20170
2. Fairfax County Tax Map Number: 0162 02 0148

The geodetic coordinates of the Property are as follows:

North Latitude: 38° 57' 40.83"

West Longitude 77° 23' 13.08"

Town Site ID: Herndon Alabama Drive Water Tower
Tenant Site ID: PW1191/Herndon Water Tank
Fixed Asset No. 10067722
Market: DC/MD
Address: 624 Alabama Drive, Herndon, VA 20170

Exhibit C
February 28, 2023

The premises shall consist of the following:

1. The Ground Space, consisting of approximately 336 square feet for placement of equipment shelter.
2. Space on the Tower and ground sufficient to accommodate the placement, installation, operation and maintenance of the equipment (listed on Exhibit "D").
3. The Access easement (as depicted in Exhibit "A").
4. The Utility Easements. (as depicted in Exhibit "A").
5. The premises is as depicted on the attached drawings (Exhibit "B", "C", "D")

Nothing in this legal description shall convey to Lessee any rights in the Property other than what are specifically described in this Deed of Lease as to the Premises.

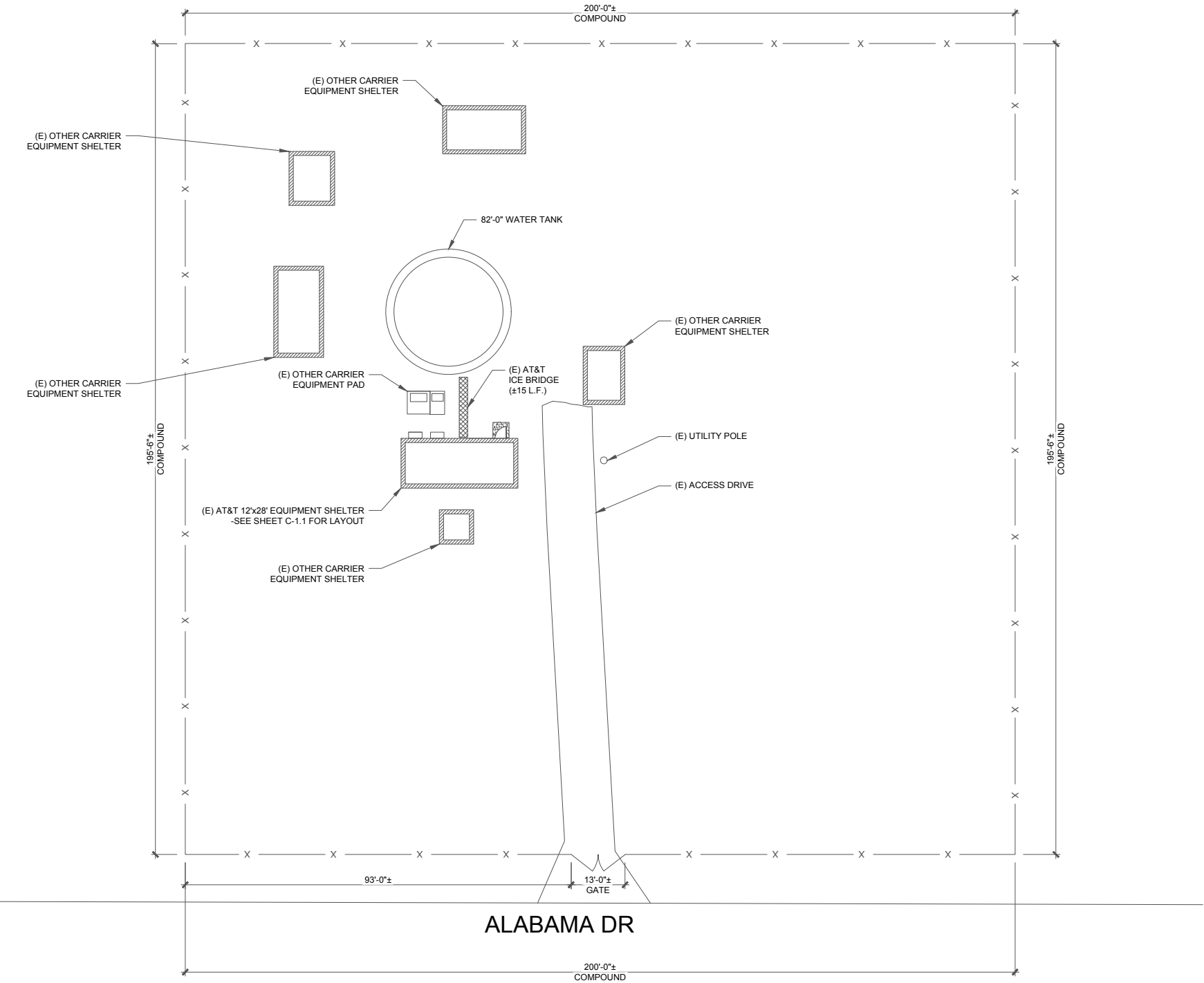
Town Site ID: Herndon Alabama Drive Water Tower
Tenant Site ID: PW1191/Herndon Water Tank
Fixed Asset No. 10067722
Market: DC/MD
Address: 624 Alabama Drive, Herndon, VA 20170

Exhibit D
Page 1 of 4
February 28, 2023

The following equipment together with any associated wires, cables, pipes, conduits and supporting structures associated with the equipment shall be located on and around the Alabama Drive Water Tank as generally shown on the attached drawings.

<u>Quantity</u>	<u>Type</u>	<u>Approximate Size</u>
1	Equipment Shelter	12' x 28'
12	Antennas	up to 96" H x 20" W x 8" D
6	Diplexers	up to 6.3" H x 4.4" W x 3" D
15	Remote Radio Units (RRU's)	up to 31.5" H x 12" W x 9" D
9	DC Trunks	up to 0.92" diameter
3	18 pair Fiber Trunks	up to 0.40" diameter
3	Junction/Slack Boxes	up to 12" x 12" x 8"
3	RET Cables	up to 3/8" diameter
3	Surge Suppressors	up to 32" x 14" x 11"
12	Coax Cables	up to 1 5/8" diameter

EXHIBIT D (February 28, 2023) (PG 2 OF 4)



7150 STANDARD DRIVE
HANOVER, MD 21076



1362 MELLON ROAD, SUITE 140
HANOVER, MD 21076



GPD GROUP, INC.®

520 South Main Street, Suite 2531
Akron, OH 44311
330.572.2100 Fax 330.572.2101

PROJECT INFORMATION:

CALHOUN CT
10067722
624 ALABAMA DRIVE
HERNDON, VA 20170
FAIRFAX COUNTY

SEAL:

**THIS DOCUMENT
IS PRELIMINARY
IN NATURE AND IS
NOT A FINAL,
SIGNED AND
SEALED
DOCUMENT**

REV.: DATE: DESCRIPTION:

A	10/13/2022	SITE EXHIBIT
B	10/17/2022	PER COMMENTS
C	11/28/2022	ANTENNAS UPDATED

DRAWN BY: CHK.: APV.:

MAS	MRL	CJS
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SHEET TITLE:

ROOFTOP PLAN

SHEET NUMBER: REVISION:

C-1

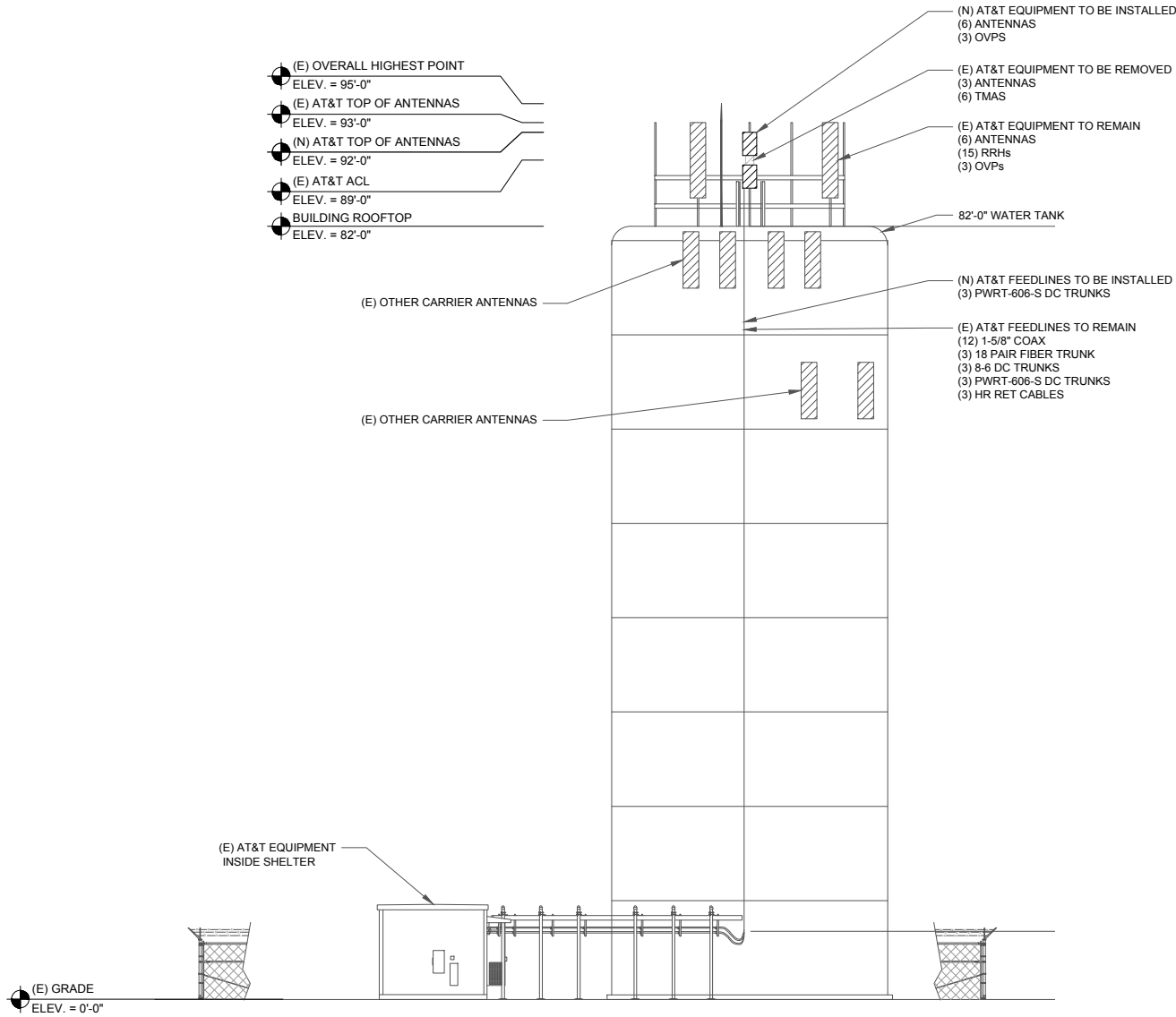
C

GPD Job #:

2022723.21.16269.01

EXHIBIT D (February 28, 2023) (PG 3 OF 4)

PAINTING NOTE:
1. ALL NEW ANTENNAS SHALL BE PAINTED TO MATCH EXISTING USING SHERWIN WILLIAMS POLANE G PLUS PAINT. PROVIDE PAINT SAMPLES FOR OWNER APPROVAL PRIOR TO ORDERING OR PAINTING. OWNER APPROVAL SHALL BE DOCUMENTED IN WRITING.
2. PAINTING METHOD SHALL BE COORDINATED WITH EQUIPMENT MANUFACTURER.



NOTES:
1. THIS DRAWING IS INTENDED TO DEPICT THE GENERAL LOCATION AND HEIGHT OF THE NEW EQUIPMENT ON THE EXISTING TOWER. CONSTRUCTION SHALL NOT PROCEED UNTIL A STRUCTURAL ANALYSIS REPORT HAS BEEN COMPLETED BY A PROFESSIONAL ENGINEER REGISTERED IN THIS STATE, CONCLUDING THAT THE EXISTING TOWER IS STRUCTURALLY ADEQUATE TO RESIST THE EXISTING AND NEW LOADS.

STRUCTURAL ANALYSIS: PENDING
DATED: PENDING
MOUNT ANALYSIS: GPD GROUP, INC.
DATED: 05/06/2022



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DRAWN BY: CHK.: APV.:

MAS	MRL	CJS
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SHEET TITLE:

BUILDING ELEVATION &
ANTENNA PLAN

SHEET NUMBER: REVISION:

C-2	C
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GPD Job #:

2022723.21.16269.01

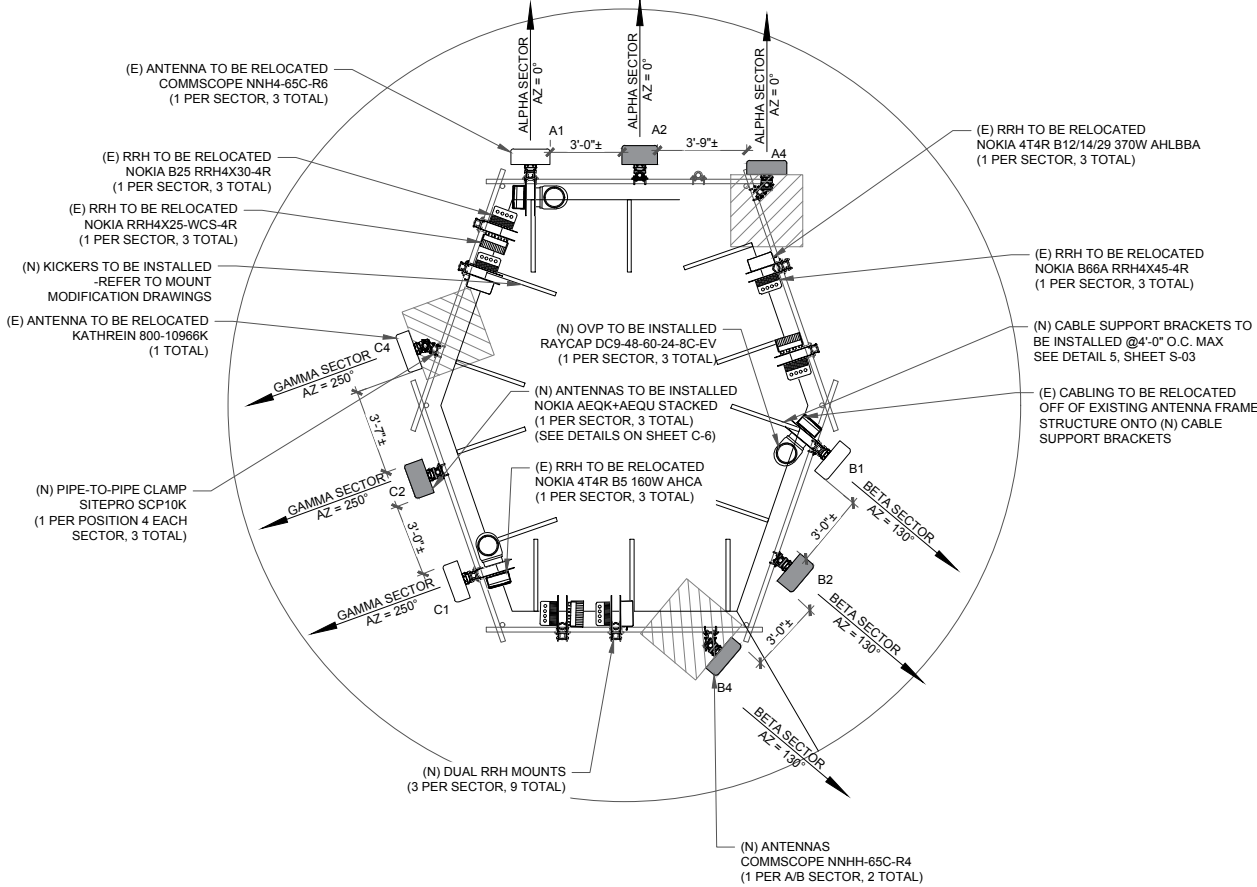
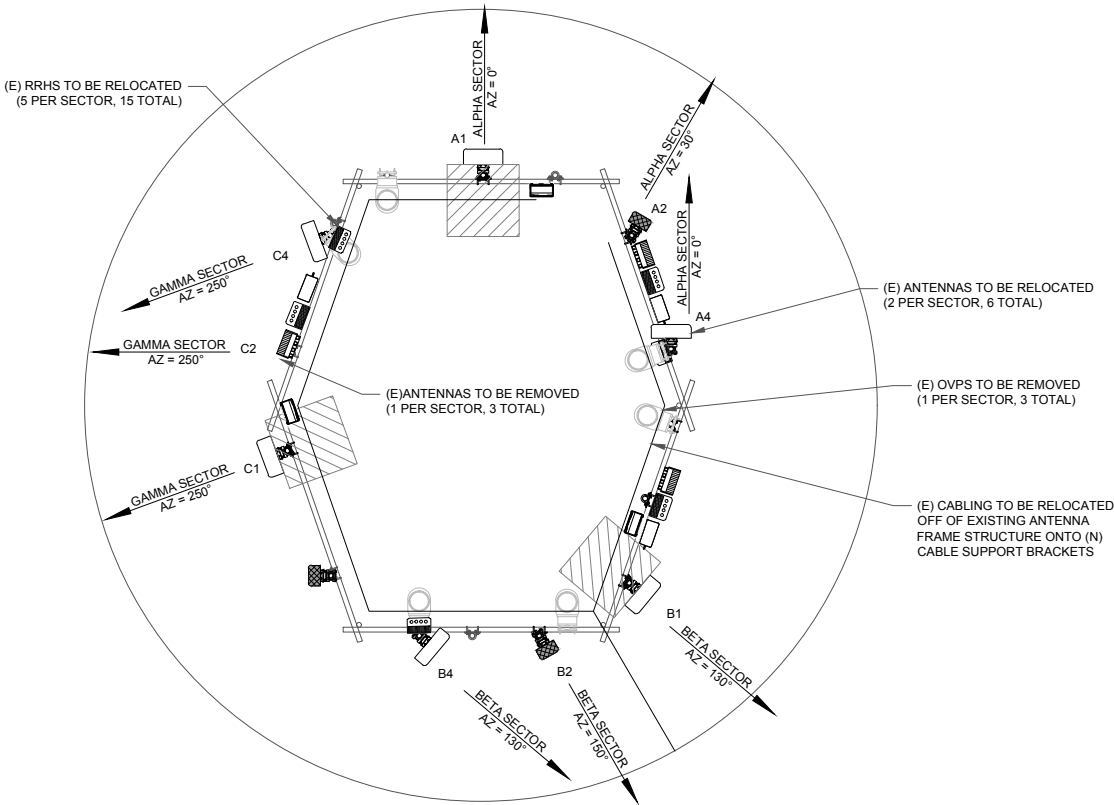
EXHIBIT D (February 28, 2023) (PG 4 OF 4)

- NOTES:
1. CONTRACTOR TO REFER TO CURRENT RFDS FOR ALL TOWER MOUNTED EQUIPMENT, MODEL NUMBERS AND PLACEMENT.
 2. CONTRACTOR TO VERIFY PIPE MAST DIAMETER PRIOR TO ORDERING ANTENNA MOUNTING HARDWARE.
 3. MINIMUM ANTENNA SEPARATION 36" BETWEEN ALL ANTENNAS.
 4. CONTRACTOR TO USE LATEST BACK TO BACK RRU MOUNT.

INSTALLER NOTE:
CBAND ANTENNA MUST HAVE A 3'-0" MINIMUM EDGE TO EDGE HORIZONTAL SPACING, AS WELL AS A MINIMUM 1'-0" VERTICAL EDGE TO EDGE SPACING BETWEEN ANTENNAS.

- PAINTING NOTE:
1. ALL NEW ANTENNAS SHALL BE PAINTED TO MATCH EXISTING USING SHERWIN WILLIAMS POLANE G PLUS PAINT. PROVIDE PAINT SAMPLES FOR OWNER APPROVAL PRIOR TO ORDERING OR PAINTING. OWNER APPROVAL SHALL BE DOCUMENTED IN WRITING.
 2. PAINTING METHOD SHALL BE COORDINATED WITH EQUIPMENT MANUFACTURER.

REFER TO A CURRENT RFDS FOR EQUIPMENT TYPES



REFER TO MOUNT MODIFICATION REPORT BY GPD GROUP, INC. DATED 05/06/2022. MODIFICATIONS TO THE MOUNT MUST BE COMPLETED BEFORE THE INSTALLATION OF THE NEW EQUIPMENT.

INSTALLER NOTE:
ADD 2ND CPRI CARD AND 2ND FIBER PAIR TO ALL EXISTING AND PROPOSED 5G CAPABLE RRHs AS OUTLINED IN SECTION 9 IN THE FINAL RFDS

CABLE ROUTING NOTE:
CONTRACTOR SHALL FIELD VERIFY ROUTE OF NEW CABLES DOES NOT OBSTRUCT ANY WATER TANK ACCESS, CLIMBING FACILITIES, OR VENT/ACCESS HATCHES



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DRAWN BY: CHK.: APV.:

MAS	MRL	CJS
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SHEET TITLE:

BUILDING ELEVATION &
ANTENNA PLAN

SHEET NUMBER: REVISION:

C-3

C

GPD Job #:

2022723.21.16269.01

EXISTING ANTENNA PLAN

1/4"=1'-0" (22x34)
1/8"=1'-0" (11x17)

1

FINAL ANTENNA PLAN

1/4"=1'-0" (22x34)
1/8"=1'-0" (11x17)

3

STAFF REPORT

Town Council

March 7, 2023

Title

Ordinance, to consider Zoning Ordinance Text Amendment, **ZOTA #23-01**, to amend Chapter 78 (ZONING), Section 78-141.6 (Sign Standards for Downtown Mixed-Use Districts), to revise the regulations governing the location of wall mounted signs.

Staff Contacts

David Stromberg, AICP – Zoning Administrator; david.stromberg@herndon-va.gov

Summary

This Zoning Ordinance Text Amendment arose out of a recent case that went before the HDRB, Historic District Review Board. The building in that case was a contributing historic structure and historically the façade of the building had a wall sign located on the second floor. The HDRB made statements that the most appropriate location for a wall sign on that building, due to the design of the building, was on the second floor. The zoning ordinance limits wall signs in the downtown zoning districts to the ground floor. The proposed amendment would expand the locations available for a wall sign, provided the sign is approved through a Certificate of Appropriateness.

This item was initiated by Town Council on February 14, 2023, and was discussed at the February 13, 2023 Planning Commission work session and February 27, 2023, Planning Commission public hearing. No members of the public have submitted comments on this item or spoke at the Planning Commission public hearing.

Background

Zoning History

The town was required to amend its signage regulations after the historic 2015 US Supreme Court decision in Reed. While the Reed decision was about content, it necessitated changes to sign ordinances in most jurisdictions due to the practice of referring to types of signs by their content.

Localities are allowed to regulate signage in a way that is content neutral. Best practice for content neutral sign regulation is to adopt provisions for time, place, and manner.

- Time – This applies to temporary signs. Any time restrictions for temporary signs should be applied evenly and not be dependent on the type of temporary sign or event
- Place – This applies to temporary and permanent signs. Zoning can regulate sign placement or location on a site or on a building or structure. Signs can also be regulated based on zoning districts.
- Manner – This applies to temporary and permanent signs. Zoning can regulate physical attributes of signs, such as height, size, type, illumination, and number of signs.

ZOTA #16-08

Based upon the Reed decision, the Town rewrote its sign regulations (ZOTA #16-08) to ensure compliance with the Reed decision. ZOTA #16-08 included changes to the regulation of wall signs in the downtown zoning districts. Previously, wall signs were limited to 15 feet above finished grade or the sill of the second story window, whichever was lower. This was changed to “ground floor” in ZOTA #16-08.

Staff Analysis

Consistency with the Comprehensive Plan

The Comprehensive Plan does not specifically address signage. The Comprehensive Plan does encourage a mix of commercial uses that bring economic vibrancy and tax revenues to the town.

The Downtown Herndon Pattern Book states, “Proper sign design will also enliven and enrich the streetscape experience for pedestrians, without detracting from the spatial coherence and quality of public spaces and the streetscape.” (p68) and “Flush-mounted wall signs are a fundamental form of identity signage. They are attached flat to the wall and form an integral part of the architectural detailing of the building. The signs should be positioned within logical features of the building, such as transom panels above entryways, signage bands above storefronts, or wall panels next to storefront windows. This amendment will maintain the focus on making signs visible in the pedestrian realm while providing additional flexibility to building owners, tenants, and the HDRB.

Need for Current Amendment

The majority of buildings in the CC, Central Commercial, PD-D, Planned Development Downtown, and PD-TD, Planned Development – Traditional Downtown, are within the HDO, Historic District Overlay. Buildings in the HDO, especially contributing structures, may vary significantly in massing and architectural façades. Some buildings, such as the

one in HDRB #22-010 have historic building elements that are intended to contain wall signage.

Impact if Approved

If this amendment is approved in its current form, it will give applicants and the HDRB more flexibility to align proposed wall signs with architectural features. The proposed text amendment meets all of the applicable standards of Section 78-155.2(g), Standards for Zoning Text Amendments.

Town Council Alternatives

The following alternatives are available to the Town Council for its decision on Zoning Ordinance Text Amendment ZOTA #23-01:

1. Approve the proposed ordinance.
2. Deny the proposed ordinance.
3. Refer the proposed ordinance back to the Planning Commission for further discussion.

Planning Commission Recommendation

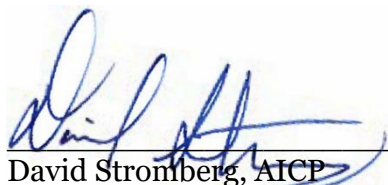
During the February 27, 2023 public hearing, the Planning Commission voted 5-0 recommending that the Town Council approve the proposed ordinance as presented.

Staff Recommendation

Staff recommends the Town Council approve proposed ordinance ZOTA #23-01 in accordance with **alternative 1**.

Attachments:

1. Draft Ordinance
2. Planning Commission Resolution Recommending Approval



David Stromberg, AICP
Zoning Administrator

TOWN OF HERNDON, VIRGINIA

ORDINANCE

March 14, 2023

Ordinance - to amend Chapter 78 (ZONING), Article XIV (Signs), Section 78-141.6 (Sign Standards for Downtown Mixed-Use Districts), to revise the regulations governing the location of wall mounted signs.

Sec. 78-141.6. – Sign standards for downtown mixed-use districts.

(a) *Freestanding, wall, and temporary signs.* Except as otherwise prohibited in this article, the following signs are permitted as accessory to any properties within the central commercial (CC), planned development-downtown (PD-D), *and* planned development-traditional downtown (PD-TD) zoning districts, the following standards apply:

TABLE 78-141.6(a):

STANDARDS FOR FREESTANDING, WALL AND TEMPORARY SIGNS IN CC, PD-D, and PD-TD
DOWNTOWN MIXED-USE DISTRICTS

Type	Freestanding	Wall	Temporary
Number	1 per street frontage when there's more than 150' of street frontage	Up to 2 per establishment	Up to 1 per property
Size	24 SF Max.	24 SF Max. per sign	12 SF max.
Height	8' Max.	N/A	If freestanding: 6' max.
Location	5' Min. from ROW	Limited to ground floor, <i>except when authorized to be in an alternate location through an approved Certificate of Appropriateness</i>	N/A
Illumination	Halo-lit or Indirect Lit	Halo-lit or Indirect Lit	None

Duration	Unlimited	Unlimited	60 Days per calendar year
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18

19

20

TOWN OF HERNDON, VIRGINIA

RESOLUTION

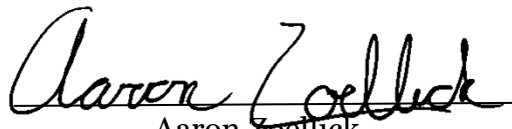
FEBRUARY 27, 2023

Resolution - to recommend APPROVAL of Zoning Ordinance Text Amendment ZOTA #23-01 to amend Chapter 78 (ZONING), Article XIV (Signs), Section 78-141.6 (Sign Standards for Downtown Mixed-Use Districts), to revise the regulations governing the location of wall mounted signs.

BE IT RESOLVED by the Planning Commission for the Town of Herndon, Virginia that:

1. The Planning Commission recommends approval of an amendment to Chapter 78 (ZONING) of the Herndon Town Code to revise the regulations governing the location of wall mounted signs in the Downtown Mixed-Use zoning districts.
2. This amendment is necessary out of public necessity, convenience, general welfare, or good zoning practice.
3. The Planning Commission held a public hearing on February 27, 2023 to consider the item.

This is certified to be a true and accurate copy of resolution 23-PC-002, adopted at a legally convened meeting of the Town of Herndon Planning Commission on February 27, 2023.



Aaron Zoellick

Clerk of Boards and Commissions

STAFF REPORT

Town Council
March 7, 2023

Title:

Resolution to approve the Town's participation in the proposed settlement of opioid-related claims against Teva, Allergan, Walmart, Walgreens, CVS, and their related corporate entities, and to direct the Town Manager and/or Town Attorney to execute the documents necessary to effectuate the Town's participation in the settlements.

Staff Contact:

Lesa J. Yeatts, Town Attorney
(703) 787-7370
lesa.yeatts@herndon-va.gov

Description:

In 2021, as a part of the nationwide settlement of opioid claims, the Town participated in the Virginia settlement with opioid distributors McKesson, Cardinal Health, and AmerisourceBergen, and with opioid manufacturer Johnson & Johnson. A new settlement has recently been reached with opioid manufacturers, Teva and Allergan, and retail pharmacy chains, Walmart, CVS, and Walgreens. This Resolution is before you for approval of the Town's participation in the new settlements and for authorization of the Town Manager and Town Attorney to sign the documents necessary to effectuate the Town's participation in the settlements.

The amount of funds that will flow to Virginia and its localities from these settlements depends on maximizing participation by as many local government subdivisions as possible. Herndon is being asked to approve the settlements and submit participation forms because, due to the structure of the settlement agreements, towns above a certain population threshold must approve the settlements and submit participation forms in order to maximize the overall recovery for the Commonwealth and its subdivisions.

Participating towns are not eligible to receive direct shares from the settlement funds—however, we may be able to apply for, request, or receive funds for opioid abatement programs through the county. Our participation will help to maximize the recovery for all of Virginia's counties, including Fairfax.

The deadline for submitting participation forms is April 18.

Fiscal Impact:

Although it is unlikely that the town will receive any funds from the settlement, a positive financial impact of accepting this settlement is anticipated for the entire Commonwealth.

Staff Recommendation:

That Council approve the Resolution as proposed, authorizing the Town's participation in the proposed settlement of opioid-related claims against Teva, Allergan, Walmart, Walgreens, CVS, and their related corporate entities, and directing the Town Manager and/or Town Attorney to execute the documents necessary to effectuate the Town's participation.

Attachment:

1. Draft Resolution

Prepared and Approved by:



Lesa J. Yeatts, Town Attorney

TOWN OF HERNDON, VIRGINIA

RESOLUTION

MARCH 14, 2023

Resolution- to approve the Town's participation in the proposed settlement of opioid-related claims against Teva, Allergan, Walmart, Walgreens, CVS, and their related corporate entities, and to direct the Town Manager and/or Town Attorney to execute the documents necessary to effectuate the Town's participation in the settlements.

WHEREAS, the opioid epidemic that has cost thousands of human lives across the country also impacts the Commonwealth of Virginia and its counties, cities, and towns by adversely impacting the delivery of emergency medical, law enforcement, criminal justice, mental health and substance abuse services; and

WHEREAS, the Commonwealth of Virginia and its counties, cities, and towns, including the Town of Herndon, have been required and will continue to be required to allocate substantial taxpayer dollars, resources, staff energy and time to address the damage the opioid epidemic has caused and continues to cause the citizens of the Commonwealth and the Town of Herndon; and

WHEREAS, settlement proposals have been negotiated that will cause Teva, Allergan, Walmart, Walgreens, and CVS to pay billions of dollars nationwide to resolve opioid-related claims against them; and

WHEREAS, the Town Attorney has reviewed the available information about the proposed settlements and has recommended that the Town participate in the settlements.

NOW, THEREFORE, BE IT RESOLVED that the Town Council of the Town of Herndon, Virginia, on this 14th day of March 2023, hereby approves of the Town's participation in the proposed settlement of opioid-related claims against Teva, Allergan, Walmart, Walgreens, CVS, and their related corporate entities, and directs the Town Manager and/or Town Attorney to execute the documents necessary to effectuate the Town's participation in the settlements, including the required release of claims against settling entities.

Notes from Question/Answer Session

PROJECT: East Spring Street Widening – UPC 105521

DATE/TIME: Tuesday, April 17, 2018 @ 10:00 a.m. - 12:15 p.m.

LOCATION: Herndon Police Station, Herndon, Virginia

SUBJECT: Sunset Business Park Business Owners 1st Meeting

QUESTION	ANSWER
1. What type of analysis was done on Sunset Business Park in advance of the project?	The current and projected traffic flow for the design year of 2042 was used for providing through and turning lanes throughout the project limit. The traffic consultant looked at historic trends in conjunction to future (2042 traffic) data projections. Both Spring Street and Herndon Parkway were evaluated. The study examined existing counts, potential impacts, mitigation, signal timing, lane configuration, and safety. Five (5) years of crash data and trends were used.
2. Can the business owners see the data and what the impacts are to Sunset Business Park?	The hotel was included as part of the 2040 projections. The impacts of the businesses on roads have been taken into account. This project will lessen the impact. The projected 2042 Average Daily Traffic (ADT) traffic is 47,200 vpd; and 2016 ADT was 30,400 vpd. The traffic study is available upon request.
3. Can a traffic light be installed at the existing median break?	One of the primary reasons that installing a traffic signal light at that location will have negative impacts is due to westbound traffic flow. The existing spacing distance on Spring Street WB between the Fairfax County Parkway off ramp traffic light and the Herndon Parkway Intersection is inadequate for meeting the requirement for turning movements queue distance to meet projected traffic. As part of the scope of the project this traffic light was not considered.
4. Is a traffic light at the median against the law?	A traffic signal in that location would violate VDOT regulations for proper placement of signalized intersections. Also, consideration of a signal would affect the scope of the project and require reauthorization of the funding.
5. Why can't a U-turn be permitted at the intersection? The median closure is a business killer.	The Spring Street WB to EB U-Turns will cause a significant conflict with the northbound right overlap that is needed because of operations.

	After this analysis, the consulting traffic engineers recommended against allowing the U-turn movements. An alternate U-turn option for allowing U-turns at the next median break on Spring Street WB was suggested to the business owner's community for their consideration at that meeting.
6. Those drivers who use the Marriott would have to go down 3 median breaks to make a U-turn. The speaker suggested not allowing a right turn on red at Herndon Parkway going east on Spring Street, to enable a U-turn on Spring Street at Herndon Parkway.	Based on the business community request, the Town and VDOT will evaluate the feasibility of limited U-turn movements at the intersection with Herndon Parkway from Spring Street Westbound to Eastbound during off peak hours.
7. Could a U-turn be permitted until Fairbrook Drive Extended is built?	The traffic consultant re-evaluated phasing timing for the U-turn at the Herndon Parkway and Spring Street [without Fairbrook Drive Extended] and their conclusion was: there is a heavy right-turn movement from northbound Herndon Parkway to eastbound Spring Street. If the timing accommodated Herndon Parkway, then Spring Street backed up. If the timing accommodated Spring Street, then Herndon Parkway backed up. The signals need to be timed so the queues aren't excessive.
8. It's okay to slow down traffic.	(No response given)
9. U-turns would not work well for big trucks.	(No response given)
10. Why is the north entrance to Sunset Business Park being closed?	Spring Street is an arterial roadway that carries heavy traffic. The median break is too close to the Fairfax County Parkway ramp. This will be re-evaluated again by the traffic consultant.
11. Traffic backs up significantly at the HK Lee Tae Kwon Do business in the evenings and negatively affects the entrance along the Herndon Parkway and the traffic circle. If the median is closed, more traffic will be pushed to this entrance, exacerbating the problem.	The Town and VDOT have a three pronged approach to helping businesses. The town intends to study the entrance along Herndon Parkway. VDOT will study U-turns and the feasibility of keeping the east entrance of Sunset Business Park open on Spring Street.
12. What is the status of Fairbrook Drive Extended?	Fairbrook Drive Extended will be built by a developer. It is privately controlled and has no time line.
13. Why does the emphasis need to be on traffic flow?	The presentation explained the objectives of the project and the need to improve safety.

14. Project Management is about risk assessment and mitigation, but the risk to Sunset Business Park is being dismissed because it is 'outside the scope'. Three (3) entrances are being reduced to 1 full entrance and 1 half entrance.	The goal of the project is to improve safety and operation. The business owners' points are well taken and VDOT will consult with the Town. The median closing has been planned by the Town for a very long time and it has been delayed several times to accommodate the businesses. Traffic has increased such that there is a safety issue with the opening of the median.
15. Relying on the Herndon Parkway entrance to the business park doesn't work because most businesses are not visible from the Herndon Parkway entrance.	The street improvements ultimately will help businesses by improving safety.
16. That is not true. We resent having no role in the design process. The issue really is in rush hour.	(No response given)
17. If a traffic light is installed at the median, it would help the business park. The signals could be timed to work together.	There is not enough room between traffic signals and there is too much traffic. If the signals were timed together, it would be detrimental to the Herndon Parkway/Spring Street intersection. Queues would be negatively impacted. The delay would cause unsafe conditions.
18. Businesses are being asked to give up a lot because of rush hour constraints that are driving the design. We are residents of Herndon and pay taxes. Don't care where traffic is headed. Making the street more convenient for through traffic is not my concern. We should be considered. VDOT must give us the U-turn at Herndon Parkway.	(No response given)
19. Can the eastern entrance to the business park be relocated to the traffic signal at the Fairfax County Parkway signal and create a four-way traffic signal? <i>And,</i> It would be best to build the northern part of Fairbrook Drive Extended with an entrance to Sunset Business Park. That's forward thinking.	In addition to the limited-access boundary of the Fairfax County Parkway, there is also the stream valley that is adjacent to the Fairfax County Parkway and which is a Resource Protection Area (RPA). Special approvals are needed for building a street in a stream valley. In addition, the traffic signal cannot become detrimental to the operation of the intersection, including the ramp onto southbound Fairfax County Parkway.
20. When will the median be closed?	2021-2022

21. Keep the northeast entrance to the Park. Why close it? There's not a lot of traffic. It's not an issue during rush hour.	Traffic using the northeast entrance to the Park blocks the queue for Fairfax County Parkway.
22. Can VDOT reevaluate allowing a U-turn at intersection of Herndon Parkway and Spring Street during non-rush hour?	Yes.
23. How can tractor trailers access the business park (both in and out)? They can't negotiate the roundabout. Some enter the business park at the Hyatt entrance.	The Town is working on redesigning the roundabout/circle drive at Herndon Parkway entrance. VDOT has noted that the tree should be removed and mountable curb be installed, or redesign as a typical street.
24. When will closing/moving the entrances opposite the business park?	This will occur around Spring 2019, but they can contact Hamid directly at VDOT.

CONCLUSION: VDOT agreed to re-evaluate:

- Defer closing the eastern entrance to the business park.
- Allowing U-turns at the Herndon Parkway and Spring Street during non-rush hour.
- Installing a signal along Herndon Parkway at the roundabout entrance.

Notes from Question/Answer Session

PROJECT: East Spring Street

DATE/TIME: Tuesday, May 15, 2018 @ 10:00 a.m.

LOCATION: Herndon Police Station

SUBJECT: Business Owners Meeting

VDOT made a presentation responding to comments received at the April 17, 2018 meeting with the Sunset Business Park business owners. The presentation explained, among other things: Permitting all design vehicles U-turns at Spring St WB to EB at the Herndon Pkwy intersection at all times would cause significant conflict with NB right turn overlap, impacting operations. The project team analyzed the following items that were requested by the group:

- *Allowing U-turns most of the day, but restricting during PM peak period (3-7PM).*
- *Leaving eastern entrance of Sunset Business Park open, with Town concurrence, until Fairbrook Extension project becomes reality.*
- *Modifying roundabout entrance to accommodate WB-67 truck.*
- *Studying traffic signal at Herndon Pkwy entrance as part of town's future effort.*

QUESTION/COMMENT	ANSWER
What would happen with traffic signal at Fairbrook Park?	That improvement is out of the scope of this project. It will occur under future development by developer/s.
We want to make sure there is a traffic signal at the cul-de-sac entrance to Sunset Business Park on Herndon Parkway. It would enable the smooth flow of traffic for Sunset Business Park and not hold it up.	That improvement is out of the scope of this project. The town may consider that improvement under a separate future project.
Should the cul-de-sac become the main entrance?	Installing a traffic signal at that location has pros and cons. It would create unacceptable queues at the traffic signal at Spring Street and Herndon Parkway, ultimately impacting Spring Street traffic
The traffic signal would solve two problems. It would aid U-turns at Spring Street and Herndon Parkway.	One of the primary reasons that installing a traffic signal light at that location will have negative impacts is due to westbound traffic flow. The existing spacing distance on Spring Street WB between the Fairfax County Parkway off ramp traffic light and the Herndon Parkway Intersection is inadequate for meeting the requirement for turning movements queue distance to meet projected traffic.
Don't like restrictions on U-turns in the pm peak.	Permitting all design vehicles U turn movements at Spring Street WB to EB at the Herndon Parkway intersection at all times would cause significant conflict with NB right turn overlap that would impact operations at the intersection.

What about U-turns on Spring Street at the Fairfax County Parkway ramp?	VDOT looked at the feasibility of these U-turns, and they are acceptable.
The traffic signal at the cul-de-sac is needed now.	If a signal were placed now at the cul-de-sac, it would require a re-evaluation of the project funding (Smart Scale) for the East Spring Street improvements, because it would change existing conditions.
Could the amount paid for the land acquisition be transferred to purchasing a traffic signal?	That is not part of the scope of this project. Any traffic signal at Herndon Parkway entrance will be studied as part of a future effort by the town.
When do the Smart Scale parameters go away?	As long as it's an active project any additions to the project would need to be re-evaluated or re-scored which may jeopardize the funding for the entire project.
Could the town have a parallel project to construct the traffic signal at the roundabout entrance?	Yes; the town is evaluating adding a traffic signal.
The numerous eateries in Sunset Business Park generate a 2.5% meals tax. That money could be used for a traffic signal. The signal would help retain the flow of revenue from Sunset Business Park.	The town plans to apply for federal and/or state funding for future signalization as a separate project to be coordinated with a traffic impact and traffic warrant analysis.
The traffic volume would not immediately require a restriction on U-turn movements. The proposed improvements are overkill, anyway.	Would a restricted U-turn in combination with a U-turn to the west of the intersection of Spring Street and Herndon Parkway be acceptable? <i>(Subsequent Comment: The current and projected traffic flow for the design year of 2042 was used for providing through and turning lanes throughout the project limit. The traffic consultant looked at historic trends in conjunction to future (2042 traffic) data projections. Both Spring Street and Herndon parkway were evaluated. The study examined existing counts, potential impacts, mitigation, signal timing, lane configuration, and safety. Five (5) years of crash data and trends were used. A consideration may be needed by the town to evaluate a restricted U-turn in combination with a U-turn to the west of the intersection of Spring Street and Herndon Parkway to be acceptable under the current design</i>
U-turns should not be restricted.	The traffic simulation was run and the PM queue is extensive on Herndon Parkway.
Will right turn traffic on Herndon Parkway be green or red stop arrow?	Red stop arrow
Speaking for Marriott, they want a U-turn at Spring Street and Fairfax County Parkway.	Movements from the easterly entrance on Spring Street from Sunset Business Park would allow right turns for vehicles going to southbound Fairfax County Parkway or towards Reston. Vehicles will not be allowed to turn west onto Spring street nor access the ramp to northbound Fairfax County Parkway. A special design has been incorporated for restricting traffic that does not follow the above movements.

Let's try having unrestricted U-turns and then see if there is a problem with them.	These movement restrictions are based on the future design of the project. Need to make sure we avoid long queues, which are safety concerns. Models help us detect this. The reason for the U-turn restriction is to alleviate safety issues caused by long queues. It is better to be proactive instead of reactive.
The studies are flawed. The volume of U-turns will not make any difference at all.	Volume is not the issue. Allowing the U-turns affects the signal timing and the phases for both left and right turning traffic. Otherwise, U-turns create conflicting movements with the affected right turns headed for the same lane. Queuing on Herndon Parkway is a problem if U-turns are permitted in the PM rush.
I am upset by VDOT. The businesses are adversely affected.	It can be a Pandora's box to put up traffic signals that are not warranted. The signal at the cul-de-sac likely will not be warranted until sometime in the 2020's. This is a federally funded project and any traffic signal to be considered has to be warranted.
Business park was not consulted when project was initiated. Now we are on the back-side trying to undo a problem.	<i>(Comment: This is a multi-modal project providing cars, bicycles and pedestrians movements around the Sunset Business Park which will include access to the future Metro. By relieving the traffic delay, customers will be able to reach their destinations quicker, including Sunset Business Park.</i>
How can the cul-de-sac entrance work without a signal?	A comprehensive study should be done in order to analyze that the current limited storage lane from Herndon Pkwy. to Sunset Business Park is sufficient.
The lack of a signal will cause too much cut-through traffic in Sunset Business Park.	<i>(Subsequent Comment: The installation of a traffic signal was not part of this project. This is a federally funded project, in order to install a traffic signal light at that location and within the scope of the project, there are several criteria that need to be met in order for a traffic light to be warranted at that location.)</i>
For the traffic study, how is the volume affected by Metro and future growth? What was the volume of growth on Herndon Parkway due to the Metro station?	The traffic study took into account regional growth rates including Metro. The traffic volume increase is 1.5 – 2% per year. <i>(Subsequent Comment: Our recommendation was to conduct another traffic study analysis after the completion of this project in order to define the most prudent improvements.)</i>
It makes better sense not to restrict U-turns until the traffic light at Herndon Parkway is installed	<i>(Subsequent Comment: This recommendation came from an independent Traffic Engineer consultant who considered safety and better flow of traffic at the intersection.)</i>
Improvement to the roundabout for delivery trucks coming to Sunset Business Park.	VDOT has incorporated into the design plan for the removal of the tree at the center of the bricked in part of the roundabout. The mountable curb allows trucks to traverse it.
What is the capacity of the roundabout now and in the future?	The town needs to evaluate and it isn't part of this project.
What is the schedule for the project?	We anticipate right of way acquisition to begin in Spring of 2019, with utility relocation to start in late summer of 2019.

	, the contract for construction to be awarded in Fall of 2020, with construction to last for two construction seasons, ending in the Summer of 2022.
Is there a plan for managing traffic?	Yes. Construction hours will be restricted.
Construction will be very hard on businesses. It is important for businesses to have a pay off after construction.	<i>(Subsequent Comment: VDOT will have representative on the ground at all times during construction. Citizens can communicate and coordinate with the Town and VDOT during that time.)</i>
The U-turn restrictions are problematic since the restrictions occur during peak business hours.	<i>(Subsequent Comment: This restriction is as a result of independent traffic analysis.)</i>
Could town drop the project?	This project has been the town's goal since 1988. It would cause gridlock.
Why can't a left turn be allowed near the ramp to the Fairfax County Parkway?	The alignment isn't conducive. There are environmental issues with realigning the entrance. Another developer is considering developing the property. There is a road on the towns comprehensive plan and it is based on the developer of that property constructing it. It is not in the CIP. The town didn't include the new signal and road with this project because of the technical issues and the cost to build are prohibitive. In addition, it would not have received funding because it doesn't address congestion relief. The CTB needs to approve break in limited access and an interchange modification would need to be approved.

CONCLUSION:

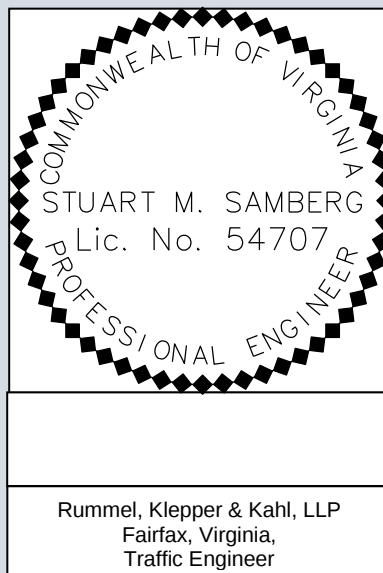
- The businesses would like a traffic light at the roundabout entrance and 24-hour U-turns at the Herndon Parkway.
- The project is being considered by the Town Council at a work session on May 15, 2018, although public comments are not taken at work sessions. The Town Council will hold a public hearing on the improvements next week, May 22, 2018 at 7 pm in the Town Council Chambers of the Herndon Municipal Center.

**E. SPRING STREET WIDENING
TRAFFIC ANALYSIS REPORT
UPC# 105521**

Prepared For:



Prepared By:



EXECUTIVE SUMMARY

RK&K was tasked to conduct a traffic engineering study along East Spring Street in Fairfax County, Virginia. The purpose of this study is to determine the feasibility and traffic impacts of widening E. Spring Street to add lanes along E. Spring Street between Herndon Parkway and Fairfax County Parkway and the Fairfax County Parkway ramps. The proposed changes are reflected in **Figure 3:2** and include the current VDOT concept plan as shown in Appendix D, with the recommended additional changes due to the traffic analysis, shown in bold:

- Widening southbound to the off ramp from Route 286 (Fairfax County Parkway) to provide:
 - two right turn lanes
 - a left turn lane that is 220 feet with a 100-foot taper
- Reconfiguration of the island on the westbound roadway east of Route 286 off-ramp to provide an additional westbound through lane
- Widening of the westbound roadway between Route 286 off-ramp and Sunset Park drive to add:
 - an additional through lane
 - a raised median separating the left turn lanes from through lanes
 - an extension of the inside left turn lane to 530 feet
 - an extension of the outside left turn lane to 236 feet with a 100-foot taper
- Widening of the eastbound roadway and connecting the median to be full length between Herndon Parkway and Sunset Park Drive providing:
 - an additional eastbound through lane
 - prohibition of northbound left-movements
- Widening of the southbound roadway on Herndon Parkway, north of E. Spring street to provide:
 - an outside southbound left-turning lane
 - an extension of the inside southbound left-turning lane to **300 feet** (200 feet Concept Plan) with a 100-foot taper
- Widening of the eastbound roadway west of Herndon Parkway proving an additional through travel lane and providing **120 feet** (105 feet 2015 Preliminary Design) left turn lane with a 100-foot taper
- Widening the northbound roadway on Herndon Parkway, south of E. Spring Street to provide a new shared through-right turn lane
- Adding an additional right turn lane of **355 feet** (120 feet Concept Plan) with a 100-foot taper northbound to E. Spring Street from Herndon parkway

The measures of effectiveness used to evaluate the operational performance of the intersections include average intersection delay per vehicle, level of service (LOS), 95th percentile queue length, and maximum queue length which were obtained from *Synchro/SimTraffic*. Percent Time Spent Following (PTSF) and LOS were used to evaluate the performance of two-lane highway segments along E. Spring Street using *HCS 2010*.

The scenarios analyzed as part of the study include 2016 Base Year and 2040 Future Year No-Build and Build conditions. The results of the analysis for these scenarios are presented in the following sections.

Base Year No-Build Scenario

The Base Year No-Build (2016) traffic analysis was performed using the existing roadway geometry and traffic volumes. The signal timings that were provided by VDOT and the Town of Herndon, with verification in the field indicate that the current pedestrian phasing is insufficient for VDOT minimum pedestrian crossing times at one study intersection.

The analysis results indicate a higher volume to capacity ratio than the existing configuration can accommodate. This is shown by the poor LOS and high delay values. The intersection of Herndon Parkway at E. Spring Street performs at a LOS F in both the AM and PM peak periods. Each of the intersections of Sunset Park Drive at E. Spring Street and the ramp from Fairfax County Parkway at E. Spring Street perform at a LOS F during one peak period. The pedestrian phasing at the intersection of Herndon Parkway and E. Spring Street does not provide sufficient time to be in accordance with VDOT standards.

Base Year Build Scenario

The Base Year Build (2016) traffic analysis was performed based on the existing traffic volumes and the Build roadway geometry. The Build alternative is shown in **Figure 3:2**. The signal timings were adjusted to accommodate pedestrian phases that are in accordance with the VDOT standard and to optimize the split times as would occur as part of VDOT's standard maintenance practices to lower the delay and improve the LOS.

The analysis results indicate that compared to the No-Build scenario, all intersections improve to an overall LOS D or better. The delays have improved from over 100 seconds in the No-Build scenario to all approaches being below 85 seconds in the Build scenario.

Future Year No-Build Scenario

The Future Year No-Build (2040) traffic analysis was performed based on the future traffic volumes described in **Section 4.0** and the existing roadway geometry.

The Future Year No-Build analysis results indicate a LOS F at all intersections during the peak periods. The delays increase to over 700 seconds along some approaches. The storage lengths at the intersection of Herndon Parkway and E. Spring Street are not sufficient in the Future Year No-Build scenario.

Future Year Build Scenario

The Future Year Build (2040) traffic analysis was performed based on the future traffic volumes described in **Section 4.0** and includes the intersection improvements described in the Base Year Build Scenario.

The Future Year Build analysis results indicate that all intersections are all expected to perform at LOS D or higher. The delays are still all below 90 seconds for every approach. The storage lengths are all sufficient except for the northbound right turn lane at Herndon Parkway at E. Spring Street.

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1.0 INTRODUCTION

RK&K was tasked to conduct a traffic engineering study along E. Spring Street in Fairfax County. The purpose of this study is to determine the feasibility and traffic impacts of widening E. Spring Street to add lanes along E. Spring Street as well as the Fairfax County Parkway ramps. The proposed changes include the current VDOT concept plan as shown in Appendix D, with the recommended additional changes due to the traffic analysis, shown in bold:

- Widening southbound to the off ramp from Route 286 (Fairfax County Parkway) to provide:
 - two right turn lanes
 - a left turn lane that is 220 feet with a 100-foot taper
- Reconfiguration of the island on the westbound roadway east of Route 286 off-ramp to provide an additional westbound through lane
- Widening of the westbound roadway between Route 286 off-ramp and Sunset Park drive to add:
 - an additional through lane
 - a raised median separating the left turn lanes from through lanes
 - an extension of the inside left turn lane to 530 feet
 - an extension of the outside left turn lane to 236 feet with a 100-foot taper
- Widening of the eastbound roadway and connecting the median to be full length between Herndon Parkway and Sunset Park Drive providing:
 - an additional eastbound through lane
 - prohibition of northbound left-movements
- Widening of the southbound roadway on Herndon Parkway, north of E. Spring street to provide:
 - an outside southbound left-turning lane
 - an extension of the inside southbound left-turning lane to **300 feet** (200 feet Concept Plan) with a 100-foot taper
- Widening of the eastbound roadway west of Herndon Parkway proving an additional through travel lane and providing **120 feet** (105 feet 2015 Preliminary Design) left turn lane with a 100-foot taper
- Widening the northbound roadway on Herndon Parkway, south of E. Spring Street to provide a new shared through-right turn lane
- Adding an additional right turn lane of **355 feet** (120 feet 2015 Preliminary Design) with a 100-foot taper northbound to E. Spring Street from Herndon parkway

2.0 STUDY AREA

The study area includes the following intersections:

1. Fairfax County Parkway at the ramp to East Spring Street (Signalized)
2. East Spring Street at the ramp from Fairfax County Parkway (Signalized)
3. Sunset Park Drive at East Spring Street (Stop-controlled on minor street only)
4. Herndon Parkway at East Spring Street (Signalized)

The existing lane configurations are shown on [Figure 3:1](#). The ramp connecting E. Spring Street to Fairfax County Parkway is two lanes in both directions. At the intersection of the ramp and Fairfax county parkway there are dual left turning lanes north from the ramp onto the parkway and a dual left from the parkway to the ramp. At the intersection of the ramp with E. Spring Street the ramp has two southbound lanes; a right turn lane and a shared left/right turn lane. E. Spring street has two thru lanes in both

eastbound/westbound directions with a single turn lane onto the ramp from either direction.

The intersection of Sunset Park Drive and East Spring Street is stop controlled on Sunset Park Drive. There is a raised island at the driveway on the north leg configured for right turns to/from East Spring Street in the westbound direction, however despite the difficult geometric maneuver and need to cross 4 westbound and 1 eastbound lanes, as there is no signage prohibiting this maneuver, left-turning movements were observed in the traffic counts. East Spring Street has two thru lanes in the eastbound direction with left turns prohibited but right turns permitted, and has three travel lanes in the westbound direction permitting both left and right turns, where the inside lane leads to the inside left turning lane of the dual left onto Herndon Parkway.

At the intersection of East Spring Street and Herndon Parkway the eastbound and southbound approaches both have a left-turn lane with storage bay, one thru and one thru-right lane. The northbound approach has a left-turn lane with storage bay, one thru and one right-turn only lane. The westbound approach has two left turn lanes, two thru lanes and one right-turn only lane.

Pedestrian crosswalks are present on two of the intersections in the study area. An existing pedestrian crosswalk is located along the northern leg of intersection of East Spring Street crossing the ramp for Fairfax County Parkway. There are also pedestrian crosswalks on all legs of the intersection of E. Spring Street and Herndon Parkway. Pedestrian sidewalks exist along all corners and approaches at E. Spring Street and Herndon Parkway and continues along E. Spring Street eastward where the south sidewalk ends at Sunset Park Drive, while the north sidewalk continues along E. Spring Street to extend beyond the project limits.

Figure 2:1 presents the study area, which includes the study intersections listed above. Per the 2014 VDOT Functional Classifications, E. Spring Street is classified as a Minor Arterial with a posted speed limit of 35 MPH. Fairfax County Parkway is classified as a Principal Arterial with a posted speed limit of 50 MPH. Herndon Parkway is classified as a Minor Arterial with a posted speed limit of 50 MPH. No functional classifications or speed limits are available for Sunset Park Drive. For this study, E. Spring Street is assigned to the east-west orientation and Fairfax County Parkway, Herndon Parkway, and Sunset Park Drive in the north-south direction. The adjacent land use within the study area is noted to be mostly commercial.

Figure 2:1 Study Area

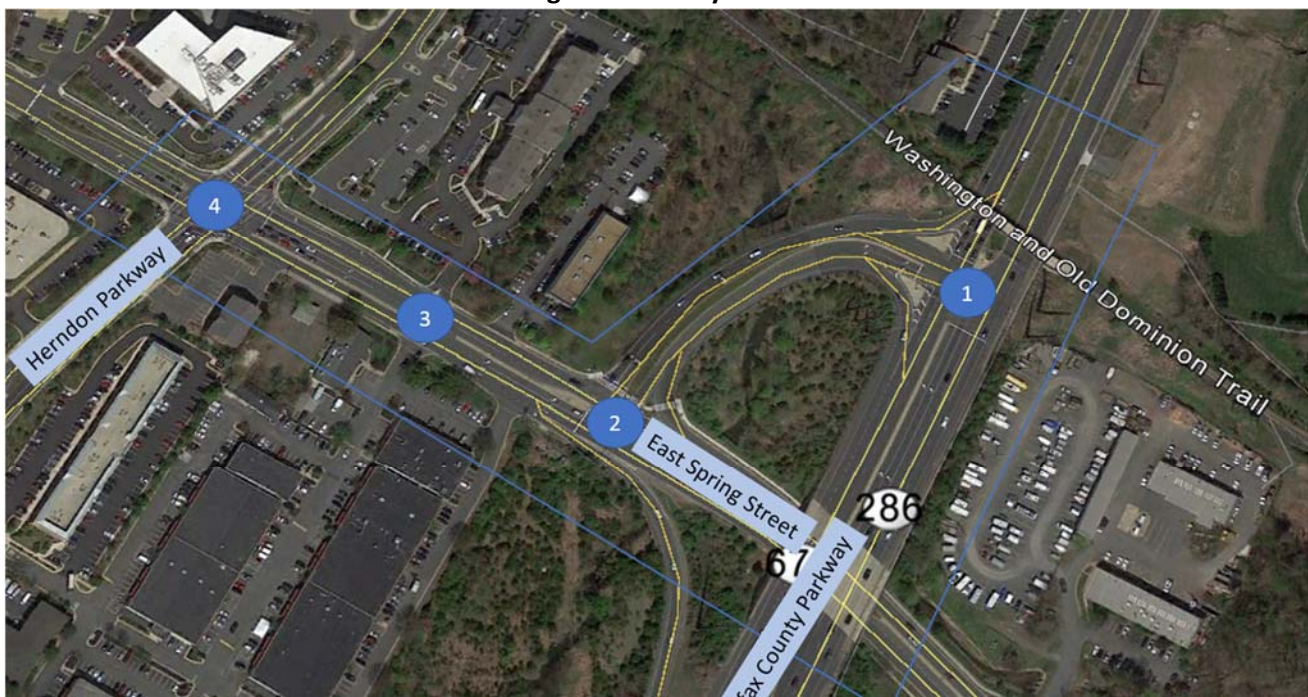


Table 2-1 Study Corridor Functional Classifications

Route Number	Road Name	Segment	Functional Classification*
675	East Spring Street	.5 miles east of the ramps from Fairfax County Parkway to .5 miles west of Herndon Parkway	Minor Arterial
286	Fairfax County Parkway	.5 miles north and south of the ramps to East Spring Street	Principal Arterial
6658	Herndon Parkway	.5 miles north and south of East Spring Street	Minor Arterial
* Functional Classification Information from ArcGIS VDOT 2014 Approved Functional Classification: http://www.arcgis.com/home/webmap/viewer.html?webmap=3eca6c9adb6649c988d98734f85baddb			

3.0 Description of Scenarios

The scenarios analyzed as part of the study include Base Year No-Build, Base Year Build, Future Year No-Build, and Future Year Build Scenarios.

3.1 Base Year No-Build Conditions

The Base Year No-Build (2016) traffic analysis was performed based on the existing roadway geometry and traffic conditions. Traffic volumes used in the analysis were developed based on the Base Year No-Build traffic forecast for the project.

Figure 3:1 presents the graphical representation of the existing lane configuration.

3.2 Base Year Build

Base Year Build Conditions (2016) traffic analysis was performed based on the Build roadway geometry and assuming the same volumes as the Base Year No-Build conditions. The Build alternative consists of the current VDOT concept plan as shown in Appendix D, with the recommended additional changes due to the traffic analysis, shown in bold:

- Widening southbound to the off ramp from Route 286 (Fairfax County Parkway) to provide:
 - two right turn lanes
 - a left turn lane that is 220 feet with a 100-foot taper
- Reconfiguration of the island on the westbound roadway east of Route 286 off-ramp to provide an additional westbound through lane
- Widening of the westbound roadway between Route 286 off-ramp and Sunset Park drive to add:
 - an additional through lane
 - a raised median separating the left turn lanes from through lanes
 - an extension of the inside left turn lane to 530 feet
 - an extension of the outside left turn lane to 236 feet with a 100-foot taper
- Widening of the eastbound roadway and connecting the median to be full length between Herndon Parkway and Sunset Park Drive providing:
 - an additional eastbound through lane

- o prohibition of northbound left-movements
- Widening of the southbound roadway on Herndon Parkway, north of E. Spring street to provide:
 - o an outside southbound left-turning lane
 - o an extension of the inside southbound left-turning lane to **300** feet (200 feet Concept Plan) with a 100-foot taper
- Widening of the eastbound roadway west of Herndon Parkway providing an additional through travel lane and providing **120** feet (105 feet 2015 Preliminary Design) left turn lane with a 100-foot taper
- Widening the northbound roadway on Herndon Parkway, south of E. Spring Street to provide a new shared through-right turn lane
- Adding an additional right turn lane of **355 feet** (120 feet 2015 Preliminary Design) with a 100-foot taper northbound to E. Spring Street from Herndon parkway

Figure 3:2 presents the graphical representation of the configuration concept.

3.3 Future Year No-Build

The Future Year No-Build scenario was analyzed to identify potential deficiencies within the transportation network in the design year (2040) without incorporating any project-related improvements. The Future Year No-Build analysis was performed utilizing the 2040 No-Build traffic forecast shown in **Figure 4:2**.

3.4 Future Year Build Conditions

The Future Year Build scenario was analyzed with the same geometry as the Base Year Build scenario and the same volumes as the Future Year No-Build conditions.

Figure 3:1 Existing Lane Configuration

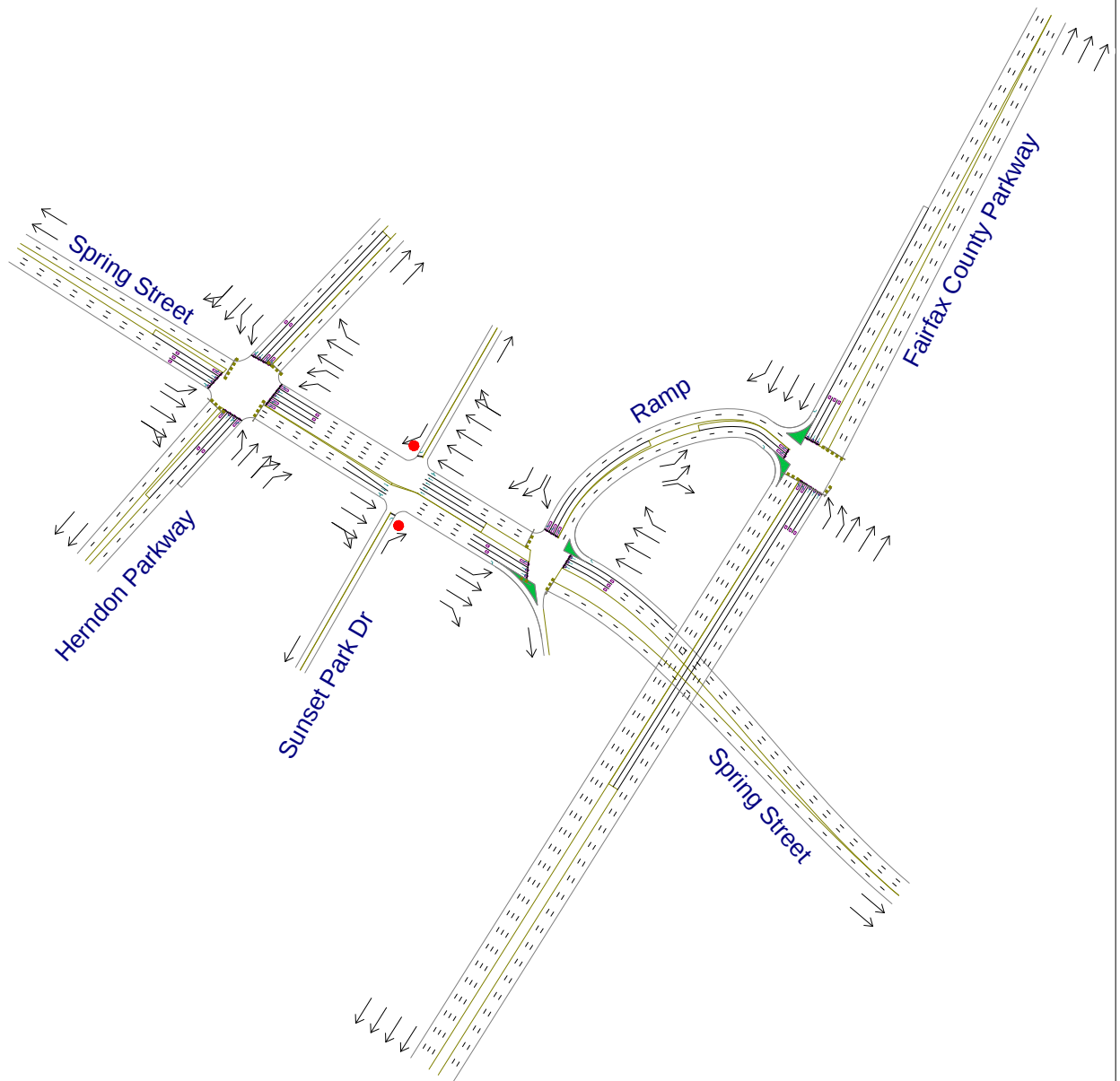
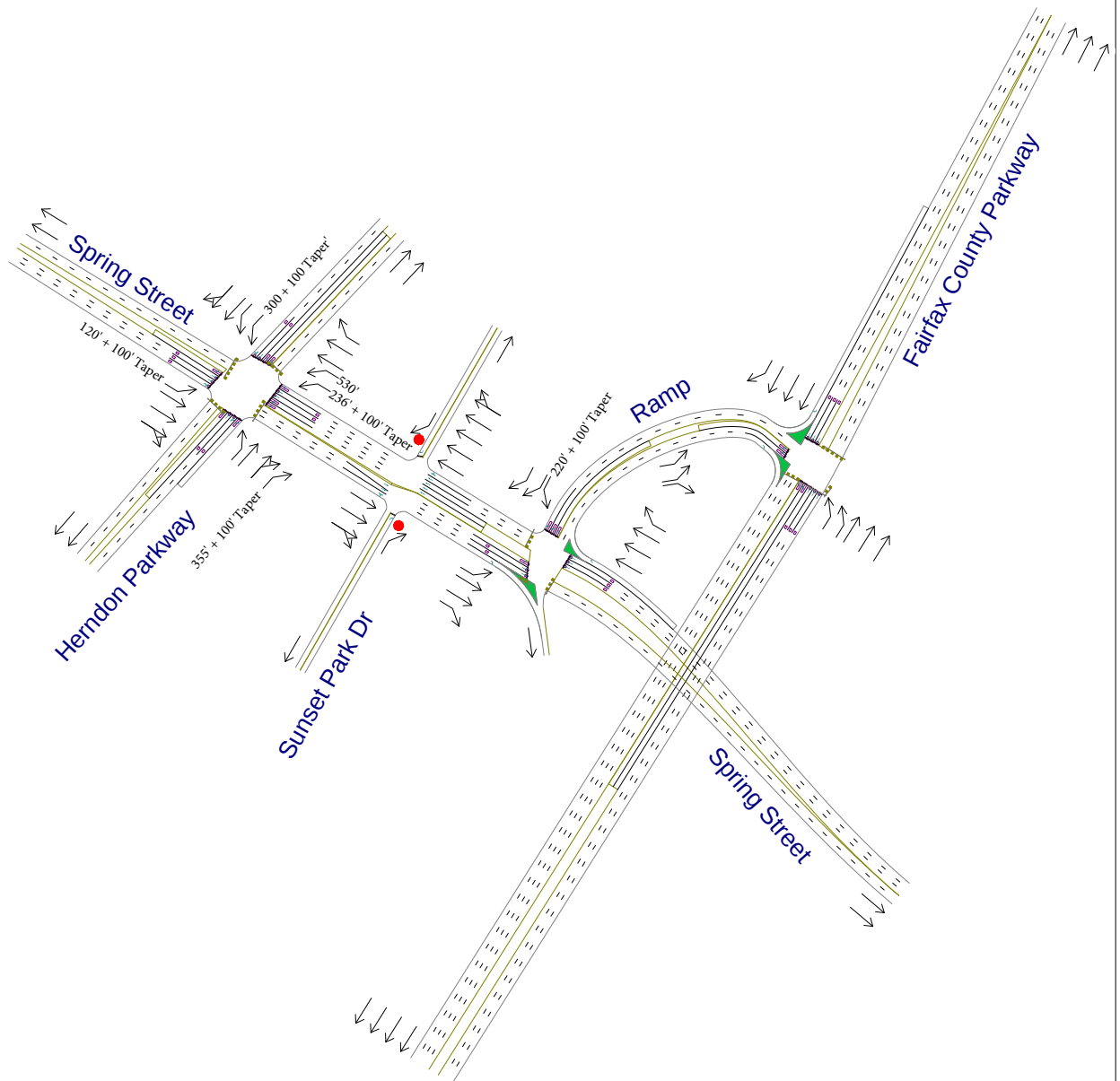


Figure 3:2 Proposed Lane with Storage Length Configuration



4.0 Methodology

The signal timings for Fairfax County Parkway and E. Spring Street were provided by VDOT. The other two intersections were provided by the Town of Herndon. The split phasing for the intersections of Herndon Parkway at East Spring Street and the ramps from Fairfax County Parkway at East Spring Street were field verified by RK&K on May 24, 2017.

13-hour traffic counts at the intersections of Fairfax County Parkway at the ramps to E. Spring Street, the ramps at E. Spring Street and E. Spring Street at Herndon Parkway were collected on October 4, 2016. The intersection of E. Spring Street at Sunset Park Drive was collected on May 9, 2017.

Error! Reference source not found. presents the existing traffic volumes, reflecting the balanced traffic volumes per the collected traffic counts. Future year volumes were then generated using a growth rate of 1% per year. This assumption was based on the official AADT publications by VDOT and is in accordance with MWCOC Round 9.0 data. Therefore, existing volumes were factored by 1.24 to generate the volumes for 2040. **Figure 4-2** presents the 2040 traffic volumes

Using the volumes, an operational analysis was performed using the Highway Capacity Manual (HCM) module contained within *Synchro* (Version 9.1, Build 904, Revision 125), and microsimulation using the companion *SimTraffic* software. The analysis results include the measures-of-effectiveness (MOE) of approach delay per vehicle, Level of Service (LOS), Average Queue and Maximum Queue. The LOS thresholds for signalized intersections, as defined by the HCM, are presented in **Table 4-1**. All *SimTraffic* simulations results are processed based on the average of 10 one-hour runs with a preceding 15-minute seeding period for AM and PM peak hours. It is noted that the VDOT Sample Size Determination Tool as directed in the Traffic Operations and Safety Analysis Manual (TOSAM) – Version 1.0, was used in determining the appropriate number of simulation runs required. The total intersection delay for Annandale Road and Maple Place was used as the MOE for sample size determination.

Table 4-1. Signalized LOS Thresholds based on 2010 Highway Capacity Manual

LOS	Delay Threshold (seconds per vehicle)
	Signalized
A	≤10
B	10-20
C	20-35
D	35-55
E	55-80
F	≥80

Figure 4:1 Base Year Peak Hour Traffic Volumes

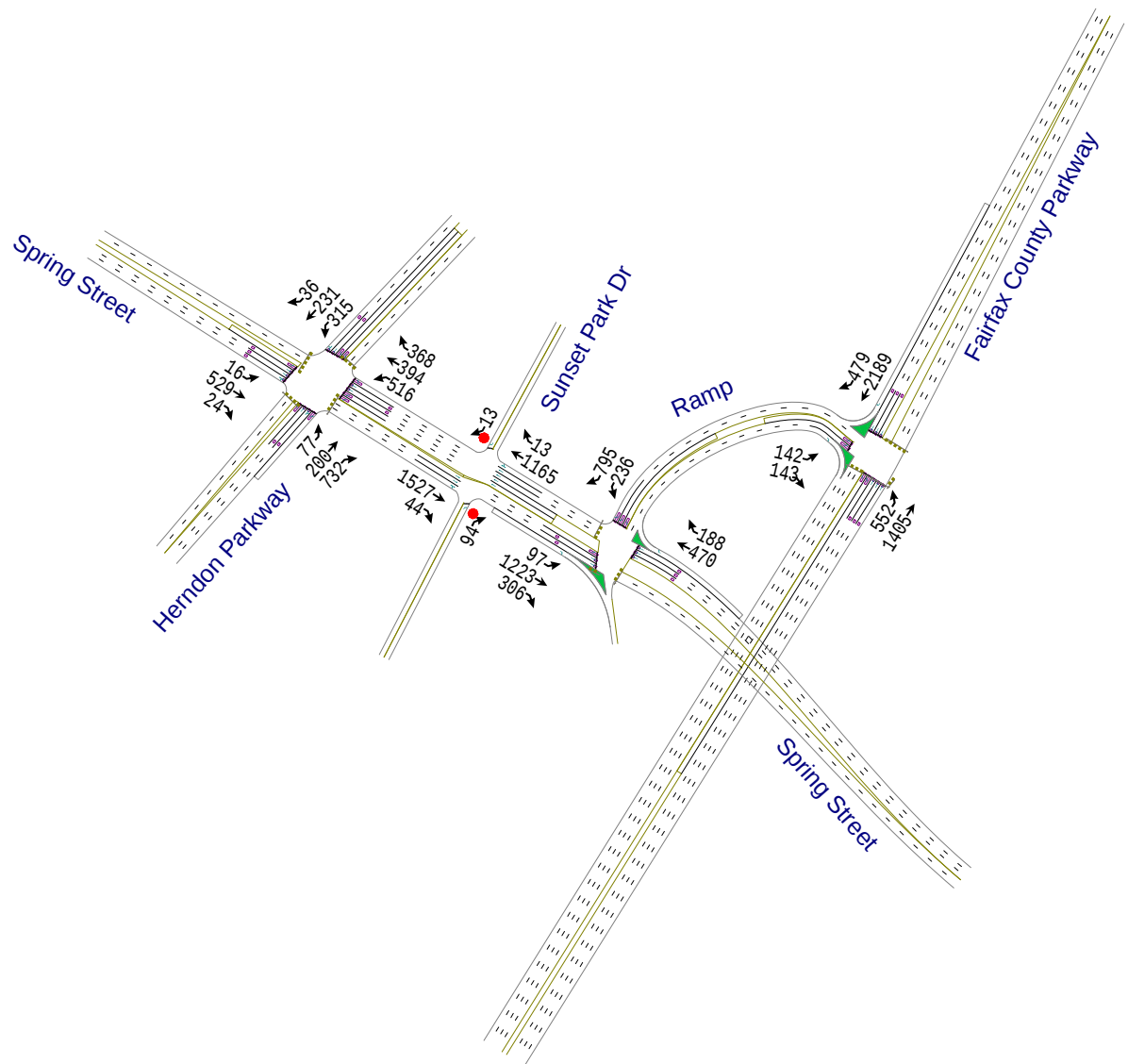
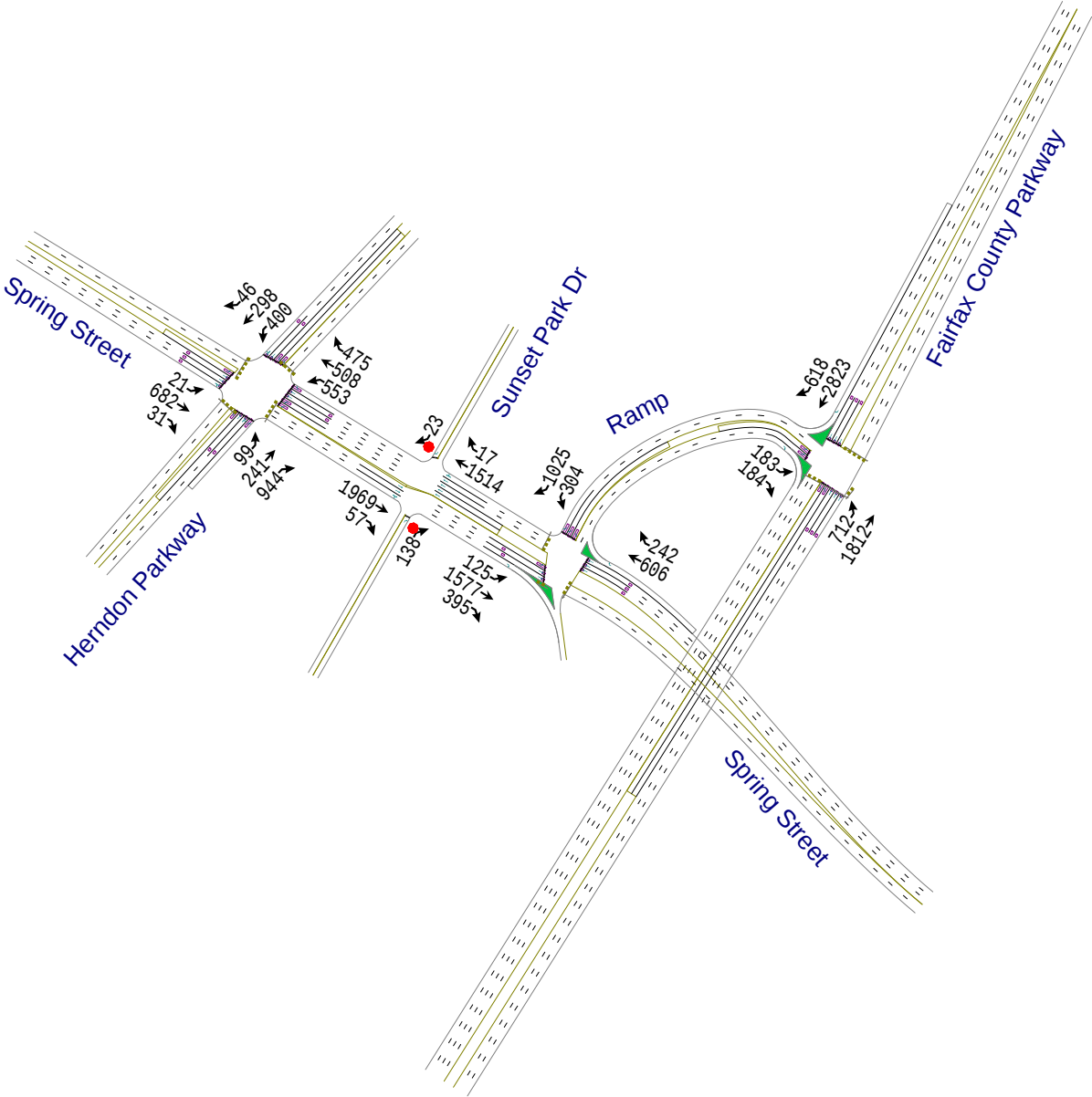


Figure 4:2 2040 Future Year Peak Hour Volumes



5.0 Measure of Effectiveness

The measures of effectiveness (MOEs) used to evaluate the operational performance of the intersections include the average intersection delay per vehicle and Level of Service (LOS). The maximum of the 95th percentile queue length from *Synchro* (*HCM 2010* Module) and maximum queue length from *SimTraffic* was used to determine the appropriate length of the storage bays for Build scenarios. The MOEs recorded from *HCS 2010* for the evaluation of the arterial corridor include Percent Time Spent Following (PTSF) and LOS.

6.0 2016 Base Year No-Build

6.1 Assumptions

The Base Year No-Build (2016) traffic analysis was performed using the existing roadway geometry and the existing traffic volumes.

6.2 2016 Base Year No-Build Intersection Analysis Results

The *Synchro* network geometry was developed based on the scaled aerial photography. The Base Year No-Build analysis results from *Synchro/SimTraffic* include delay, LOS, and queue length for each intersection within the study area and are presented in

Table 6-1Error! Reference source not found.. **Appendix B** presents *Synchro/SimTraffic* reports.

The signal timings that were provided and collected indicate that the pedestrian phasing is currently insufficient at the intersection of Herndon Parkway and E. Spring Street. The simulation results indicate that the intersection of Herndon Parkway at E. Spring Street has an overall Level of Service (LOS) of F in both the AM and PM. The northbound and the westbound approaches have lanes that have an LOS of F. In the eastbound, westbound and southbound directions, the left turning bays are not sufficient. The pedestrian phasing does not provide sufficient time to be in accordance with VDOT standards for the east leg of the intersection.

The northbound and southbound lane groups of Sunset Park Drive at E. Spring Street operate at an LOS E in the AM and F in the PM. The unacceptable LOS is due to vehicles on Sunset Park Drive trying to turn left onto E. Spring Street at this unsignalized intersection. Both approaches on Sunset Park Drive have only one lane to accommodate all maneuvers where, despite the low volume of left turn movements, the delays to wait for the gap in traffic affects not only the left-turning vehicles but all vehicles in queue behind them. In addition, the westbound left turn lane storage length is not sufficient for the current traffic demand.

The intersection of the ramp from Fairfax County Parkway and E. Spring Street operates at a LOS F in the morning and D in the evening. The low LOS is because of the southbound approach having very high volumes and only two lanes. The westbound right turn movement was also found to have insufficient storage in the PM peak hour.

The intersection of the ramp to E. Spring Street to Fairfax County Parkway operates at an acceptable LOS of C in the AM and B in the PM. However, the northbound left turn lane does not have sufficient storage in the AM peak hour.

Table 6-1. Base Year No-Build Conditions Analysis Results

Intersection	Movement	Storage Length	AM Peak					PM Peak				
			Volume Input	Average Delay	LOS	95 th % Q	Max Q	Volume Input	Average Delay	LOS	95 th % Q	Max Q
Herndon Parkway at East Spring Street	EBL	-	16	60.9	E	35	135	62	61.3	E	100	150
	EBT	-	529	47.1	D	335	345	501	62.5	E	350	375
	EBR	-	24	46.9	-	-	330	67	62.8	-	-	400
	EB	-	569	47.3	D	-	-	630	62.5	E	-	-
	WBL	-	429	66.7	E	245	300	601	156.5	F	440	330
	WBT	-	394	27.0	C	190	185	597	37.2	D	315	230
	WBR	230	368	36.9	D	100	165	322	45.0	D	160	200
	WB	-	1,191	44.4	D	-	-	1,520	86.0	F	-	-
	NBL	-	77	29.6	C	65	125	59	29.2	C	50	125
	NBT	-	187	40.4	D	215	460	313	52.1	D	395	465
	NBR	-	732	574.5	F	780	475	686	514.1	F	760	470
	NB	-	996	432.1	F	-	-	1,058	350.5	F	-	-
	SBL	-	310	35.0	D	235	150	381	57.0	E	385	410
	SBT	-	231	31.3	C	110	375	264	28.3	C	125	185
	SBR	-	36	31.4	-	-	270	25	28.4	-	-	140
	SB	-	577	33.3	C	-	-	670	44.6	D	-	-
	Overall	-	3,333	158.9	F	-	-	3,878	147.2	F	-	-
Sunset Park Dr. at East Spring Street (Unsignalized)	EBT	-	1,527	0.0	A	0	105	1,536	0.0	A	0	270
	EBR	-	44	-	-	-	120	32	0.0	A	-	270
	EB	-	1,571	0.0	A	-	-	1,568	0.0	A	-	-
	WBL	120	87	8.0	A	25	280	112	0.0	A	0	285
	WBT	-	1,165	0.0	A	0	265	1,503	10.2	B	35	285
	WBR	-	13	-	-	-	240	27	-	-	-	250
	WB	-	1,265	2.4	A	-	-	1,642	3.0	A	-	-
	NBL	-	13	-	-	-	-	3	-	-	-	-
	NBT	-	0	-	-	-	-	0	-	-	-	-
	NBR	-	94	-	-	-	-	97	-	-	-	-
	NB	-	107	55.6	F	95	500	100	15.7	C	25	310
	SBL	-	5	-	-	-	-	2	-	-	-	-
	SBT	-	0	-	-	-	-	0	-	-	-	-
	SBR	-	13	-	-	-	-	14	-	-	-	-
	SB	-	18	66.6	F	20	210	16	18.9	C	5	130
	Overall	-	2,854	-	-	-	-	3,226	-	-	-	-
Ramp at East Spring Street	EBL	-	97	78.1	E	95	145	239	172.4	F	255	250
	EBT	-	1,223	35.6	D	345	265	833	26.7	C	165	195
	EBR	205	306	0.0	A	55	205	563	0.0	A	88	100
	EB	-	1,626	38.7	D	-	-	1,635	59.2	E	-	-
	WBT	-	470	18.1	B	165	405	1,082	26.1	C	485	1010
	WBR	250	188	0.0	A	40	175	478	0.0	A	75	250
	WB	-	658	18.1	B	-	-	1,560	26.1	C	-	-
	SBL	-	236	203.0	F	745	570	97	0.0	A	310	500
	SBR	-	795	153.5	F	265	615	560	53.2	D	160	510
	SB	-	1,031	181.2	F	-	-	657	53.2	D	-	-
	Overall	-	3,315	91.8	F	-	-	3,852	45.1	D	-	-
Ramp at Fairfax County Parkway	EBL	200	142	51.2	D	80	120	295	57.0	E	185	165
	EBR	-	143	0.0	A	0	0	422	0.0	A	0	0
	EB	-	285	51.2	D	-	-	717	57.0	E	-	-
	NBL	730	552	42.9	D	235	770	353	46.9	D	165	250
	NBT	-	1,405	3.0	A	125	460	1,777	5.1	A	180	160
	NB	-	1,957	14.2	B	-	-	2,130	12.1	B	-	-
	SBT	-	2,189	26.8	C	830	1045	1,239	15.1	B	280	290
	SBR	530	479	0.0	A	0	530	304	0.0	A	0	190
	SB	-	2,668	26.8	C	-	-	1,543	15.1	B	-	-
	Overall	-	4,910	21.9	C	-	-	4,390	16.7	B	-	-

7.0 Crash Analysis

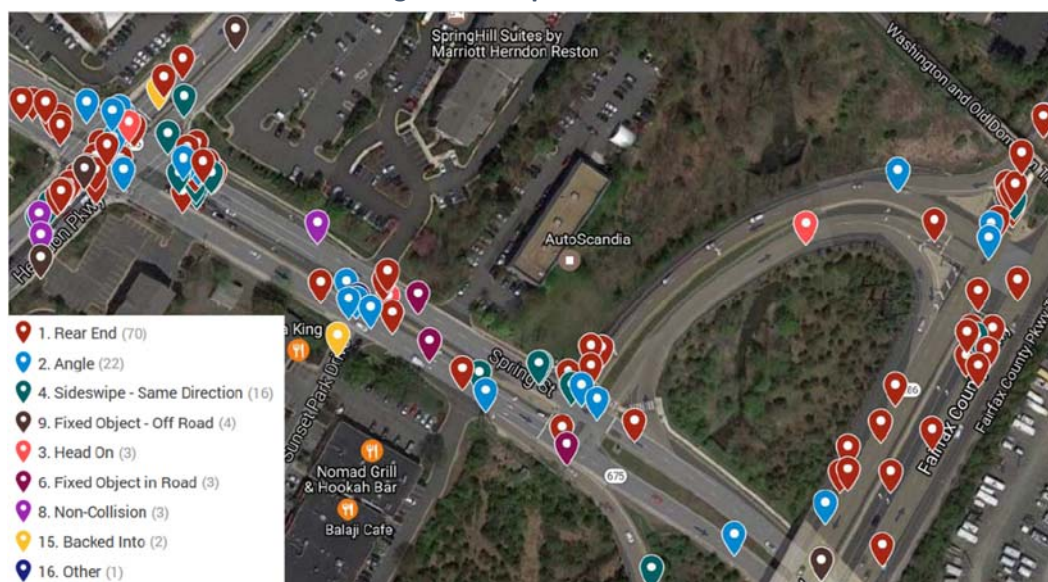
As part of the investigation of existing traffic conditions, a five-year crash history (from 2011 to 2016) for the study area was reviewed. Segment crash reviews were performed for E. Spring Street, Fairfax County Parkway, and Herndon Parkway. Crash data tables are presented in **Appendix A**.

There were 124 crashes reported inside the study area during this period. **Figure 7:1** shows the reported crashes in the location that they occurred. The figure shows that most crashes occurred within the four intersections. There were no fatalities reported inside of the study area. There were 69 reported injuries including 2 ambulatories and 4 visible injuries. The remaining 55 crashes were property damage only (PDO). The number of crashes reported on Fairfax County Parkway and Herndon parkway were 30 and 31, respectively. On E. Spring Street, there were 57 reported crashes, and on the ramp to E. Spring Street there were 5 reported crashes. The most reported type of crash was rear end (70). The other two notable type of crashes were angle (22) and sideswipe (16). All together rear end, angle and sideswipe crash types comprised 108 crashes out of the total 124.

Rear End accidents comprised the majority of all accidents on Fairfax County Parkway at 80% of all accidents. At Herndon Parkway, rear ends comprised 45% of accidents, with 23% angle crashes, and 10% sideswipe. At Spring Street, rear end accidents comprised 49% of all accidents, with 21% angle and 18% sideswipe accidents. The prominence of rear end accident types at the high-volume roadways is an anticipated trend. The proposed concept would provide two exclusive right-turn lanes for the off-ramp, additional turning lanes at Herndon Parkway, and optimize signal timing along the corridor, which is expected to improve traffic throughput and promote the reduction in driver behavior conducive to rear end crashes.

With respect to the second highest accident type in the study area, angle crashes were reviewed. At the intersection of Sunset Park Drive and E. Spring Street there is a raised island at the driveway on the north leg configured for right turns to/from E. Spring Street in the westbound direction. However, despite the difficult geometric maneuver and need to cross 4 westbound and 1 eastbound lanes, since there is no signage prohibiting this maneuver, left-turning movements were observed during the traffic counts. This maneuver resulted in a reported 4 angle collisions and 1 head-on collision at this intersection. With the proposed concept of the E. Spring Street project, this crossover will be eliminated, which would address the angle and head-on collisions at this location. A Crash Reduction Factor of 15 was found for similar road modification of an open median to an undivided median with an unsignalized 3-leg intersection.

Figure 7:1 Reported Crashes



8.0 2016 Base Year Build

8.1 Assumptions

The Base Year Build (2016) traffic analysis was performed based on the existing traffic volumes and the Build roadway geometry shown in **Figure 4:1**.

8.2 2016 Base Year Build Intersection Analysis Results

The Build alternative consists of the current VDOT concept plan as shown in Appendix D, with the recommended additional changes due to the traffic analysis, shown in bold::

- Widening southbound to the off ramp from Route 286 (Fairfax County Parkway) to provide:
 - two right turn lanes
 - a left turn lane that is 220 feet with a 100-foot taper
- Reconfiguration of the island on the westbound roadway east of Route 286 off-ramp to provide an additional westbound through lane
- Widening of the westbound roadway between Route 286 off-ramp and Sunset Park drive to add:
 - an additional through lane
 - a raised median separating the left turn lanes from through lanes
 - an extension of the inside left turn lane to 530 feet
 - an extension of the outside left turn lane to 236 feet with a 100-foot taper
- Widening of the eastbound roadway and connecting the median to be full length between Herndon Parkway and Sunset Park Drive providing:
 - an additional eastbound through lane
 - prohibition of northbound left-movements
- Widening of the southbound roadway on Herndon Parkway, north of E. Spring street to provide:
 - an outside southbound left-turning lane
 - an extension of the inside southbound left-turning lane to **300 feet** (200 feet Concept Plan)with a 100-foot taper
- Widening of the eastbound roadway west of Herndon Parkway proving an additional through travel lane and providing **120 feet** (105 feet 2015 Preliminary Design) left turn lane with a 100-foot taper
- Widening the northbound roadway on Herndon Parkway, south of E. Spring Street to provide a new shared through-right turn lane
- Adding an additional right turn lane of **355 feet** (120 feet 2015 Preliminary Design) with a 100-foot taper northbound to E. Spring Street from Herndon parkway

The Base Year Build analysis results are shown in **Table 8-1**. The results indicate that the intersection of Herndon Parkway at E. Spring Street improves to an overall LOS of C in the AM and D in the PM. The northbound and the westbound approaches improve to LOS C or D. The eastbound approach remains at an overall LOS of E where the right turn lane operates at LOS F. The delay in the eastbound approach has increased slightly but the other approaches have decreased overall. Although there were significant improvements in the north and westbound approaches, the eastbound approach increased in delay of about 15 seconds.

The unsignalized intersection of Sunset Park Drive at E. Spring Street does not qualify as an intersection in synchro due to there being no thru movements across E. Spring Street and therefore cannot be

analyzed, however Simtraffic can simulate conditions and analyzes the queues. Simtraffic indicates the queues in all four approaches are not significant.

The intersection of the ramp from Fairfax County Parkway and E. Spring Street improves from LOS F in the morning and D in the evening in the No-Build scenario to LOS B in both AM and PM in the Build scenario. In the eastbound left turn lane, the LOS remains at F, however delay dropped by over 120 seconds. All other approaches operate at a LOS C or higher.

The intersection of the ramp to E. Spring Street to Fairfax County Parkway still operates at an acceptable LOS with LOS is C in both the AM and PM. The Northbound left turn lane appears to be slightly short of the anticipated demand in the AM by just one car length.

Table 8-1 Base Year Build Conditions Analysis Results

Intersection	Movement	Storage Length	AM Peak					PM Peak				
			Volume Input	Average Delay	LOS	95 th % Q	Max Q	Volume Input	Average Delay ¹	LOS	95 th % Q	Max Q
Herndon Parkway at East Spring Street	EBL	155	16	50.6	D	35	60	62	74.9	E	110	155
	EBT	-	529	34.6	C	190	295	501	71.0	E	240	330
	EBR	-	24	35.1	D	-	245	67	82.8	F	-	375
	EB	-	569	35.2	D	-	-	630	75.0	E	-	-
	WBL	-	429	46.3	D	285	285	601	37.7	D	420	310
	WBT	-	394	22.2	C	170	200	597	26.0	C	300	265
	WBR	-	368	20.6	C	50	160	322	18.2	B	105	175
	WB	-	1,191	31.5	C	-	-	1,520	29.6	C	-	-
	NBL	230	77	22.7	C	70	100	59	36.8	D	70	215
	NBT	-	187	31.1	C	135	430	313	64.2	E	340	455
	NBR	170	732	20.1	C	255	170	686	5.3	A	105	170
	NB	-	996	22.5	C	-	-	1,058	24.6	C	-	-
	SBL	350	310	24.9	C	110	335	381	44.6	D	195	345
	SBT	-	231	31.2	C	205	310	264	43.9	D	160	300
	SBR	-	36	31.3	C	-	165	25	44.0	D	-	160
	SB	-	577	27.8	C	-	-	670	44.3	D	-	-
	Overall	-	3,333	28.8	C	-	-	3,878	37.9	D	-	-
Sunset Park Dr at East Spring Street (Unsignalized)	EBT	-	1,527	-	-	-	25	1,536	-	-	-	15
	EBR	-	44	-	-	-	40	32	-	-	-	10
	EB	-	1,571	-	-	-	-	1,568	-	-	-	-
	WBL	150	87	-	-	-	5	112	-	-	-	55
	WBT	-	1,165	-	-	-	0	1,503	-	-	-	10
	WBR	-	13	-	-	-	-	27	-	-	-	-
	WB	-	1,265	-	-	-	-	1,642	-	-	-	-
	NBL	-	13	-	-	-	-	3	-	-	-	-
	NBT	-	0	-	-	-	-	0	-	-	-	-
	NBR	-	94	-	-	-	-	97	-	-	-	-
	NB	-	107	-	-	-	125	100	-	-	-	125
	SBL	-	5	-	-	-	-	2	-	-	-	-
	SBT	-	0	-	-	-	-	0	-	-	-	-
	SBR	-	13	-	-	-	-	14	-	-	-	-
	SB	-	18	-	-	-	35	16	-	-	-	45
	Overall	-	2,854	-	-	-	-	3,226	-	-	-	-
Ramp at East Spring Street	EBL	-	97	37.9	D	120	120	239	45.9	D	275	240
	EBT	-	1,223	8.7	A	345	235	833	3.6	A	120	105
	EBR	205	306	6.1	A	35	180	563	4.4	A	25	0
	EB	-	1,626	9.9	A	-	-	1,635	10.1	B	-	-
	WBT	-	470	21.7	C	130	215	1,082	16.4	B	235	390
	WBR	250	188	20.8	C	85	50	478	15.8	B	55	190
	WB	-	658	21.4	C	-	-	1,560	16.2	B	-	-
	SBL	270	236	31.0	C	165	270	97	32.4	C	125	245
	SBR	-	795	7.8	A	50	350	560	14.0	B	80	350
	SB	-	1,031	13.1	B	-	-	657	16.7	B	-	-
	Overall	-	3,315	13.2	B	-	-	3,852	13.7	B	-	-
Ramp at Fairfax County Parkway	EBL	200	142	68.0	E	110	135	295	53.0	D	141	185
	EBR	-	143	0.0	A	0	0	422	0.0	A	0	0
	EB	-	285	68.0	E	-	-	717	53.0	D	-	-
	NBL	730	552	49.3	D	325	750	353	27.6	C	170	265
	NBT	-	1,405	3.2	A	100	350	1,777	6.2	A	235	235
	NB	-	1,957	16.2	B	-	-	2,130	9.8	A	-	-
	SBT	-	2,189	27.6	C	640	545	1,239	31.5	C	305	350
	SBR	530	479	0.0	A	0	265	304	0.0	A	0	95
	SB	-	2,668	27.6	C	-	-	1,543	31.5	C	-	-
	Overall	-	4,910	23.7	C	-	-	4,390	20.6	C	-	-

9.0 2040 Year No Build

9.1 Assumptions

The Future Year No-Build assumes no operational changes from existing conditions to the roadways in the study corridor and the volumes were produced as noted in Section 3.

9.2 2040 No-Build Intersection Analysis Results

The traffic volumes previously presented in **Figure 4:2** were used for the analysis. The 2040 Year No-Build analysis results are shown in **Table 9-1**. The results indicate that the intersection of Herndon Parkway at E. Spring Street has an overall Level of Service (LOS) of F in both the AM and PM. The overall intersection delay increased by almost 100 seconds between 2016 and 2040. The left turn storage lengths in all approaches become insufficient by 2040.

The northbound lane group in the AM and the southbound lane group in the AM and PM of Sunset Park Drive at E. Spring Street operates at LOS F. The poor LOS is due to cars on Sunset Park Drive trying to turn left onto E. Spring Street. Both approaches on Sunset Park Drive have only one lane and the delays to wait for the gap in traffic to make the left turn movement affects not only the left-turning vehicles but all vehicles in queue behind them.

The intersection of the ramp from Fairfax County Parkway and E. Spring Street operates at a LOS F in the morning and E in the evening. As compared to the 2016 No Build conditions, the delay has increased by about 50 percent in both the AM and the PM. The low LOS is due to the southbound approach having very high volumes and only two lanes. The eastbound left turn movement is also a significant problem due to high volumes and insufficient storage.

The intersection of the ramp to E. Spring Street to Fairfax County Parkway no longer operates at an acceptable LOS for the AM peak period, which experiences a delay of 93.7 seconds. The Northbound left turn lane is not sufficient in the morning while the eastbound left turn lane is not sufficient in the PM.

Table 9-1 2040 No-Build Analysis Results

Intersection	Movement	Storage Length	AM Peak					PM Peak				
			Volume Input	Average Delay	LOS	95 th % Q	Max Q	Volume Input	Average Delay	LOS	95 th % Q	Max Q
Herndon Parkway at East Spring Street	EBL	150	21	60.0	E	45	150	80	72.5	E	135	515
	EBT	-	682	101.9	F	495	510	646	131.0	F	510	530
	EBR	-	31	101.2	F	-	500	86	131.3	F	-	530
	EB	-	734	100.3	F	-	-	812	125.4	F	-	-
	WBL	275	553	120.3	F	280	310	775	304.9	F	515	350
	WBT	-	508	33.1	C	205	195	770	45.5	D	360	260
	WBR	230	475	75.1	E	60	170	415	75.3	E	105	195
	WB	-	1,536	77.5	E	-	-	1,960	154.3	F	-	-
	NBL	125	99	30.1	C	80	125	76	29.6	C	60	350
	NBT	-	241	43.4	D	275	465	404	91.7	F	570	455
	NBR	-	944	853.3	F	1240	475	885	775.6	F	1180	465
	NB	-	1,284	637.6	F	-	-	1,365	531.6	F	-	-
	SBL	150	400	55.4	E	335	430	491	164.4	F	700	555
	SBT	-	298	28.6	C	145	225	340	28.1	C	160	550
	SBR	-	46	28.7	C	-	150	32	28.2	C	-	505
	SB	-	744	43.1	D	-	-	863	105.6	F	-	-
	Overall	-	4,298	242.8	F	-	-	5,000	244.2	F	-	-
Sunset Park Dr at East Spring Street (Unsignalized)	EBT	-	1,969	-	-	0	140	1,981	-	-	0	290
	EBR	-	57	-	-	-	175	41	-	-	-	225
	EB	-	2,026	-	-	-	-	2,022	-	-	-	-
	WBL	120	112	29.6	D	70	285	144	-	-	110	285
	WBT	-	1,502	-	-	0	275	1,938	50.0	F	110	280
	WBR	-	17	-	-	-	265	35	-	-	-	260
	WB	-	1,631	8.9	D	-	-	2,117	14.9	F	-	-
	NBL	-	17	-	-	-	-	4	-	-	-	-
	NBT	-	0	-	-	-	-	0	-	-	-	-
	NBR	-	121	-	-	-	-	125	-	-	-	-
	NB	-	138	796.8	F	370	520	129	32.4	D	70	405
	SBL	-	6	-	-	-	-	3	-	-	-	-
	SBT	-	0	-	-	-	-	0	-	-	-	-
	SBR	-	17	-	-	-	-	18	-	-	-	-
	SB	-	23	828.0	F	95	380	21	112.6	F	40	265
	Overall	-	3,680	-	-	-	-	4,160	-	-	-	-
Ramp at East Spring Street	EBL	-	125	87.2	F	90	170	308	309.2	F	235	250
	EBT	-	1,577	42.8	D	345	270	1,074	33.0	C	155	170
	EBR	205	395	0.0	A	55	205	726	0.0	A	30	0
	EB	-	2,097	46.0	D	-	-	2,108	94.7	F	-	-
	WBT	-	606	20.7	C	216	815	1,395	47.3	D	780	1010
	WBR	250	242	0.0	A	45	250	616	0.0	A	235	250
	WB	-	848	20.7	C	-	-	2,011	47.3	D	-	-
	SBL	-	304	372.3	F	1045	575	125	0.0	A	510	515
	SBR	-	1025	303.7	F	685	615	722	71.6	E	305	485
	SB	-	1,329	342.1	F	-	-	847	71.6	E	-	-
	Overall	-	4,274	159.1	F	-	-	4,966	71.0	E	-	-
Ramp at Fairfax County Parkway	EBL	200	183	51.1	D	105	140	380	82.4	F	260	155
	EBR	-	184	0.0	A	0	0	544	0.0	A	0	0
	EB	-	367	51.1	D	-	-	924	82.4	F	-	-
	NBL	730	712	41.4	D	290	1460	455	44.8	D	205	280
	NBT	-	1,812	3.9	A	185	1450	2,292	6.7	A	285	185
	NB	-	2,524	14.5	B	-	-	2,747	13.0	B	-	-
	SBT	-	2,823	167.3	F	1245	1050	1,598	20.4	C	430	405
	SBR	530	618	0.0	A	0	530	392	0.0	A	0	270
	SB	-	3,441	167.3	F	-	-	1,990	20.4	C	-	-
	Overall	-	6,332	93.7	F	-	-	5,661	21.1	C	-	-

10.0 2040 Year Build

10.1 Assumptions

The Future Year Build assumes the same traffic volumes as the Future Year No-Build condition and the same geometric design of the Base Year Build condition.

10.2 2040 Year Build Intersection Analysis Results

The traffic volumes presented in **Figure 4:2** previously were used for the analysis. The results for 2040 Build conditions are presented in **Table 10. 1**.

The 2040 Year Build analysis results are shown in **Table 10-1**. The results indicate that, as compared to the 2040 No-Build condition, the intersection of Herndon Parkway at E. Spring Street improves to an overall LOS of C in the AM and D in the PM. The PM has dropped from delays of as high as 775 seconds to all delays under 90 seconds. It should be noted that during the PM peak the WBL queue exceeds the available storage length, however due to the limited space available due to the conflicting EBL storage lane length at Spring Street and Herndon Parkway off-ramp where the queue storage length is also slightly insufficient, there is no additional storage length to draw from.

The intersection of Sunset Park Drive at E. Spring Street does not qualify as an intersection in synchro due to there being no thru movements across E. Spring Street and therefore cannot be analyzed. However, Simtraffic can simulate conditions and analyzes the queues and indicates the approach queues are not significant.

The intersection of the ramp from Fairfax County Parkway and E. Spring Street improves overall from from LOS F to LOS B in the AM, and from LOS E to LOS D in the PM between the 2040 No-Build scenario and Build scenario. The SB lane groups improve from LOS F in the AM, and from LOS E in the PM, to LOS B in both future year conditions.

The intersection of the ramp to E. Spring Street to Fairfax County Parkway is included in the report as it relates to the network, however is not within the project scope for improvements. However, with the proposed signal timing changes and operational improvements to the adjacent study intersection, this intersection sees overall improvement from LOS F to a low LOS E in the AM peak hour, and continues to operate at LOS C in the PM peak hour.

Table 10-1 2040 Build Analysis Results

Intersection	Movement	Storage Length	AM Peak					PM Peak				
			Volume Input	Average Delay	LOS	95 th % Q	Max Q	Volume Input	Average Delay	LOS	95 th % Q	Max Q
Herndon Parkway at East Spring Street	EBL	155	21	54.1	D	45	150	80	79.7	E	135	155
	EBT	-	682	46.1	D	255	365	646	74.8	E	335	410
	EBR	-	31	49.9	D	-	235	86	88.2	F	-	415
	EB	-	734	47.6	D	-	-	812	79.4	E	-	-
	WBL	530	553	53.9	D	335	290	775	76.9	E	645	395
	WBT	-	508	28.2	C	235	195	770	34.3	C	405	350
	WBR	-	475	29.2	C	105	130	415	23.4	C	245	250
	WB	-	1,536	37.8	D	-	-	1,960	50.8	D	-	-
	NBL	230	99	22.3	C	85	175	76	35.0	D	85	230
	NBT	-	241	31.9	C	220	460	404	89.4	F	575	780
	NBR	405	944	21.5	C	380	405	885	7.8	A	170	170
	NB	-	1,284	23.5	C	-	-	1,365	33.7	C	-	-
	SBL	350	400	25.5	C	145	340	491	68.3	E	325	350
	SBT	-	298	30.2	C	155	290	340	39.9	D	205	520
	SBR	-	46	30.2	C	-	205	32	40.0	D	-	290
	SB	-	744	27.7	C	-	-	863	56.1	E	-	-
	Overall	-	4,298	33.4	C	-	-	5,000	51.6	D	-	-
Sunset Park Dr at East Spring Street	EBT	-	1,969	-	-	-	-	45	1,981	-	-	-
	EBR	-	57	-	-	-	-	0	41	-	-	-
	EB	-	2,026	-	-	-	-	-	2,022	-	-	-
	WBL	150	112	-	-	-	-	15	144	-	-	-
	WBT	-	1,502	-	-	-	-	0	1,938	-	-	-
	WBR	-	17	-	-	-	-	-	35	-	-	-
	WB	-	1,631	-	-	-	-	-	2,117	-	-	-
	NBL	-	17	-	-	-	-	-	4	-	-	-
	NBT	-	0	-	-	-	-	-	0	-	-	-
	NBR	-	121	-	-	-	-	-	125	-	-	-
	NB	-	138	-	-	-	-	135	129	-	-	-
	SBL	-	6	-	-	-	-	-	3	-	-	-
	SBT	-	0	-	-	-	-	-	0	-	-	-
	SBR	-	17	-	-	-	-	-	18	-	-	-
	SB	-	23	-	-	-	-	40	21	-	-	-
	Overall	-	3,680	-	-	-	-	-	4,160	-	-	-
Ramp at East Spring Street	EBL	-	125	38.8	D	150	140	308	72.1	E	395	295
	EBT	-	1,577	14.8	B	630	230	1,074	4.8	A	190	145
	EBR	205	395	8.6	A	50	0	726	6.2	A	30	0
	EB	-	2,097	15.1	B	-	-	2,108	19.9	A	-	-
	WBT	-	606	26.1	C	185	270	1,395	18.5	B	340	555
	WBR	250	242	24.4	C	60	80	616	18.5	B	65	245
	WB	-	848	25.6	C	-	-	2,011	19.5	B	-	-
	SBL	270	304	29.3	C	200	270	125	31.2	C	140	270
	SBR	-	1025	16.2	B	80	455	722	14.0	B	100	505
	SB	-	1,329	19.2	B	-	-	847	16.5	B	-	-
	Overall	-	4,274	18.4	B	-	-	4,966	17.1	B	-	-
Ramp at Fairfax County Parkway	EBL	200	183	84.8	F	155	145	380	54.6	D	175	265
	EBR	-	184	0.0	A	0	0	544	0.0	A	5	0
	EB	-	367	84.8	F	-	-	924	54.6	D	-	-
	NBL	730	712	104.6	F	480	730	455	36.1	D	220	505
	NBT	-	1,812	4.0	A	145	1430	2,292	9.5	A	375	365
	NB	-	2,524	32.4	C	-	-	2,747	13.9	B	-	-
	SBT	-	2,823	77.0	E	1095	1030	1,598	31.5	C	435	465
	SBR	530	618	0.0	A	0	530	392	0.0	A	0	225
	SB	-	3,441	77.0	E	-	-	1,990	31.5	C	-	-
	Overall	-	6,332	56.9	E	-	-	5,661	23.1	C	-	-

APPENDIX A: Crash Tables

Count of Crash Severity	Column Label									
Row Labels	1. Rear End	15. Backed Into	16. Other	2. Angle	3. Head On	4. Sideswipe	6. Fixed Object in Road	8. Non-Collision	9. Fixed Object - Off Road	Grand Total
A.Ambulatory Injury	1							1		2
B.Visible Injury	2			1	1					4
C.Non Visible Injury	41			12	1	6		2	1	63
PDO.Property Damage Only	26	2	1	9	1	10	3		3	55
Grand Total	70	2	1	22	3	16	3	3	4	124

Count of Road Name	1. Rear End	15. Backed Into	16. Other	2. Angle	3. Head On	4. Sideswipe - Same Direction	6. Fixed Object in Road	8. Non-Collision	9. Fixed Object - Off Road	Grand Total
Fairfax County Parkway	80%	0%	0%	7%	0%	7%	3%	0%	3%	100%
Herndon Parkway	45%	3%	0%	23%	3%	10%	3%	6%	6%	100%
Ramp	60%	0%	0%	20%	0%	20%	0%	0%	0%	100%
Spring St	49%	2%	2%	21%	4%	18%	2%	2%	2%	100%
Spring St/Herndon Parkway	100%	0%	0%	0%	0%	0%	0%	0%	0%	100%

Row Labels	Count of Road Name
Fairfax County Parkway	30
Herndon Parkway	31
Ramp	5
Spring St	57
Spring St/Herndon Parkway	1
Grand Total	124

Row Labels	Count of Time Slicing (ATTR)
0AM TO 3AM	1
3AM TO 6AM	2
6AM TO 9AM	16
9AM TO 12PM	20
12PM TO 3PM	27
3PM TO 6PM	28
6PM TO 9PM	24
9PM TO 12AM	6
Grand Total	124

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/07/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	142	143	552	1405	2189	479		
Future Volume (veh/h)	142	143	552	1405	2189	479		
Number	3	18	5	2	6	16		
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	154	0	600	1527	2379	0		
Adj No. of Lanes	2	1	2	3	3	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	227	104	710	4120	2684	836		
Arrive On Green	0.07	0.00	0.21	0.81	0.53	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	154	0	600	1527	2379	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	4.6	0.0	17.6	8.5	43.6	0.0		
Cycle Q Clear(g_c), s	4.6	0.0	17.6	8.5	43.6	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	227	104	710	4120	2684	836		
V/C Ratio(X)	0.68	0.00	0.85	0.37	0.89	0.00		
Avail Cap(c_a), veh/h	393	181	1344	4120	2684	836		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.92	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	48.0	0.0	40.1	2.7	22.0	0.0		
Incr Delay (d2), s/veh	3.3	0.0	2.9	0.3	4.8	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.3	0.0	8.6	4.1	21.5	0.0		
LnGrp Delay(d),s/veh	51.2	0.0	42.9	3.0	26.8	0.0		
LnGrp LOS	D		D	A	C			
Approach Vol, veh/h	154			2127	2379			
Approach Delay, s/veh	51.2			14.2	26.8			
Approach LOS	D			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		91.1			29.7	61.4		13.9
Change Period (Y+Rc), s		6.0			8.0	6.0		7.0
Max Green Setting (Gmax), s		80.0			41.0	31.0		12.0
Max Q Clear Time (g_c+I1), s		10.5			19.6	45.6		6.6
Green Ext Time (p_c), s		66.7			2.1	0.0		0.2
Intersection Summary								
HCM 2010 Ctrl Delay			21.9					
HCM 2010 LOS			C					

HCM Unsignalized Intersection Capacity Analysis

8: Sunset Park Drive & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1527	44	87	1165	13	13	0	94	5	0	13
Future Volume (Veh/h)	0	1527	44	87	1165	13	13	0	94	5	0	13
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1660	48	95	1266	14	14	0	102	5	0	14
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (ft)	385				319							
pX, platoon unblocked	0.95			0.83			0.86	0.86	0.83	0.86	0.86	0.95
vC, conflicting volume	1280			1708			2310	3154	854	2395	3171	429
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1102			1451			1833	2815	427	1932	2834	205
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			75			57	100	79	77	100	98
cM capacity (veh/h)	596			386			32	11	480	22	11	760
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	1107	601	412	633	330	116	19					
Volume Left	0	0	95	0	0	14	5					
Volume Right	0	48	0	0	14	102	14					
cSH	1700	1700	386	1700	1700	180	77					
Volume to Capacity	0.65	0.35	0.25	0.37	0.19	0.65	0.25					
Queue Length 95th (ft)	0	0	24	0	0	93	22					
Control Delay (s)	0.0	0.0	8.0	0.0	0.0	55.6	66.6					
Lane LOS			A			F	F					
Approach Delay (s)	0.0		2.4			55.6	66.6					
Approach LOS						F	F					
Intersection Summary												
Average Delay			3.4									
Intersection Capacity Utilization			85.4%	ICU Level of Service				E				
Analysis Period (min)			15									

Intersection: 3: Herndon Parkway & East Spring Street

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	TR	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	136	344	331	297	298	164	186	166	124	461	477	149
Average Queue (ft)	27	234	205	167	171	85	97	70	51	426	442	126
95th Queue (ft)	100	328	299	276	273	149	162	120	115	526	458	173
Link Distance (ft)		487	487	301	301	301	301			422	422	
Upstream Blk Time (%)				0	0					30	89	
Queuing Penalty (veh)				1	1					0	0	
Storage Bay Dist (ft)	150							230	125			150
Storage Blk Time (%)	0	33					0	0	0	8		10
Queuing Penalty (veh)	0	6					0	0	1	7		12

Intersection: 3: Herndon Parkway & East Spring Street

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	375	271
Average Queue (ft)	124	67
95th Queue (ft)	287	164
Link Distance (ft)	509	509
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)	2	
Queuing Penalty (veh)	8	

Intersection: 5: Ramp & East Spring Street/Sunset Park Drive

Movement	EB	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	L	T	T	R	T	T	R	LTR	R
Maximum Queue (ft)	144	252	265	205	318	405	176	569	617
Average Queue (ft)	52	174	182	60	114	143	15	516	520
95th Queue (ft)	114	244	258	212	265	328	106	627	780
Link Distance (ft)	238	238	238		960	960		534	534
Upstream Blk Time (%)		1	1					25	38
Queuing Penalty (veh)		4	7					138	206
Storage Bay Dist (ft)				205			250		
Storage Blk Time (%)			3	0		2	0		
Queuing Penalty (veh)			9	2		4	0		

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	102	119	551	771	457	389	77	1044	1040	1046	530
Average Queue (ft)	40	58	309	303	100	74	24	1007	1007	1012	525
95th Queue (ft)	83	98	605	744	380	329	63	1055	1046	1053	593
Link Distance (ft)		534		1415	1415	1415	1415	993	993	993	
Upstream Blk Time (%)				1	1	0		50	45	73	
Queuing Penalty (veh)				0	0	0		0	0	0	
Storage Bay Dist (ft)	200		730								530
Storage Blk Time (%)			2	3						55	12
Queuing Penalty (veh)			5	9						279	93

Intersection: 8: Sunset Park Drive & East Spring Street

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	LT	T	TR	LTR	LTR
Maximum Queue (ft)	104	120	281	263	239	501	208
Average Queue (ft)	7	16	202	67	15	452	102
95th Queue (ft)	48	71	330	245	108	603	276
Link Distance (ft)	301	301	238	238	238	483	550
Upstream Blk Time (%)			18	4	0	74	
Queuing Penalty (veh)			79	17	1	0	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 887

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & East Spring Street

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	501	67	601	597	322	59	313	686	381	264	25
Future Volume (veh/h)	62	501	67	601	597	322	59	313	686	381	264	25
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	67	545	73	653	649	350	64	340	746	414	287	27
Adj No. of Lanes	1	2	0	2	2	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	106	667	89	545	1101	493	455	435	369	440	1132	106
Arrive On Green	0.06	0.21	0.21	0.16	0.31	0.31	0.08	0.23	0.23	0.20	0.35	0.35
Sat Flow, veh/h	1774	3139	419	3442	3539	1583	1774	1863	1583	1774	3273	306
Grp Volume(v), veh/h	67	307	311	653	649	350	64	340	746	414	154	160
Grp Sat Flow(s),veh/h/ln	1774	1770	1789	1721	1770	1583	1774	1863	1583	1774	1770	1809
Q Serve(g_s), s	4.4	19.8	19.9	19.0	18.6	23.5	3.1	20.5	28.0	21.2	7.5	7.6
Cycle Q Clear(g_c), s	4.4	19.8	19.9	19.0	18.6	23.5	3.1	20.5	28.0	21.2	7.5	7.6
Prop In Lane	1.00		0.23	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	106	376	380	545	1101	493	455	435	369	440	612	626
V/C Ratio(X)	0.63	0.82	0.82	1.20	0.59	0.71	0.14	0.78	2.02	0.94	0.25	0.26
Avail Cap(c_a), veh/h	148	376	380	545	1101	493	455	435	369	462	634	648
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.2	45.0	45.1	50.5	34.9	36.5	29.1	43.1	46.0	29.9	28.1	28.2
Incr Delay (d2), s/veh	6.2	17.5	17.7	106.0	2.3	8.4	0.1	9.0	468.1	27.1	0.2	0.2
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	2.4	11.5	11.7	17.0	9.5	11.4	1.5	11.7	60.3	16.8	3.7	3.9
LnGrp Delay(d),s/veh	61.3	62.5	62.8	156.5	37.2	45.0	29.2	52.1	514.1	57.0	28.3	28.4
LnGrp LOS	E	E	E	F	D	D	C	D	F	E	C	C
Approach Vol, veh/h		685			1652			1150			728	
Approach Delay, s/veh		62.5			86.0			350.5			44.6	
Approach LOS		E			F			F			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.1	43.3	29.5	34.0	25.0	31.5	16.0	47.5				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	33.0	25.0	28.0	19.0	24.0	10.0	43.0				
Max Q Clear Time (g_c+I1), s	6.4	25.5	23.2	30.0	21.0	21.9	5.1	9.6				
Green Ext Time (p_c), s	0.0	5.1	0.3	0.0	0.0	1.6	0.0	8.7				
Intersection Summary												
HCM 2010 Ctrl Delay				147.2								
HCM 2010 LOS				F								

HCM 2010 Signalized Intersection Summary

5: Ramp & East Spring Street

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	239	833	563	0	1082	478	0	0	0	97	0	560
Future Volume (veh/h)	239	833	563	0	1082	478	0	0	0	97	0	560
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	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
Parking Bus, Adj	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	0	1863	1863				1900	1863	1863
Adj Flow Rate, veh/h	260	905	0	0	1176	0				0	0	721
Adj No. of Lanes	1	2	1	0	2	1				0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	0	2	2				2	2	2
Cap, veh/h	222	2336	1045	0	1717	768				0	470	799
Arrive On Green	0.04	0.22	0.00	0.00	0.49	0.00				0.00	0.00	0.25
Sat Flow, veh/h	1774	3539	1583	0	3632	1583				0	1863	3167
Grp Volume(v), veh/h	260	905	0	0	1176	0				0	0	721
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	0	1770	1583				0	1863	1583
Q Serve(g_s), s	15.0	26.2	0.0	0.0	30.7	0.0				0.0	0.0	26.4
Cycle Q Clear(g_c), s	15.0	26.2	0.0	0.0	30.7	0.0				0.0	0.0	26.4
Prop In Lane	1.00		1.00	0.00		1.00				0.00		1.00
Lane Grp Cap(c), veh/h	222	2336	1045	0	1717	768				0	470	799
V/C Ratio(X)	1.17	0.39	0.00	0.00	0.68	0.00				0.00	0.00	0.90
Avail Cap(c_a), veh/h	222	2336	1045	0	1717	768				0	543	924
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00				0.00	0.00	0.88
Uniform Delay (d), s/veh	57.5	26.2	0.0	0.0	23.8	0.0				0.0	0.0	43.4
Incr Delay (d2), s/veh	114.9	0.5	0.0	0.0	2.2	0.0				0.0	0.0	9.8
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	14.4	13.0	0.0	0.0	15.6	0.0				0.0	0.0	12.6
LnGrp Delay(d),s/veh	172.4	26.7	0.0	0.0	26.1	0.0				0.0	0.0	53.2
LnGrp LOS	F	C			C							D
Approach Vol, veh/h		1165			1176						721	
Approach Delay, s/veh		59.2			26.1						53.2	
Approach LOS		E			C						D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	21.0	63.7		35.3		84.7						
Change Period (Y+Rc), s	6.0	5.5		5.0		5.5						
Max Green Setting (Gmax), s	15.0	53.5		35.0		74.5						
Max Q Clear Time (g_c+I1), s	17.0	32.7		28.4		28.2						
Green Ext Time (p_c), s	0.0	15.0		1.8		25.2						
Intersection Summary												
HCM 2010 Ctrl Delay			45.1									
HCM 2010 LOS			D									
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/08/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	295	422	353	1777	1239	304		
Future Volume (veh/h)	295	422	353	1777	1239	304		
Number	3	18	5	2	6	16		
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	321	0	384	1932	1347	0		
Adj No. of Lanes	2	1	2	3	3	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	382	176	480	3891	2795	870		
Arrive On Green	0.11	0.00	0.14	0.77	0.55	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	321	0	384	1932	1347	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	9.6	0.0	11.3	15.1	17.0	0.0		
Cycle Q Clear(g_c), s	9.6	0.0	11.3	15.1	17.0	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	382	176	480	3891	2795	870		
V/C Ratio(X)	0.84	0.00	0.80	0.50	0.48	0.00		
Avail Cap(c_a), veh/h	393	181	1344	3891	2795	870		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.73	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	45.8	0.0	43.8	4.7	14.5	0.0		
Incr Delay (d2), s/veh	11.2	0.0	3.1	0.5	0.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	5.1	0.0	5.6	7.1	8.0	0.0		
LnGrp Delay(d),s/veh	57.0	0.0	46.9	5.1	15.1	0.0		
LnGrp LOS	E		D	A	B			
Approach Vol, veh/h	321			2316	1347			
Approach Delay, s/veh	57.0			12.1	15.1			
Approach LOS	E			B	B			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		86.3			22.6	63.7		18.7
Change Period (Y+Rc), s		6.0			8.0	6.0		7.0
Max Green Setting (Gmax), s		80.0			41.0	31.0		12.0
Max Q Clear Time (g_c+I1), s		17.1			13.3	19.0		11.6
Green Ext Time (p_c), s		56.4			1.3	11.7		0.1
Intersection Summary								
HCM 2010 Ctrl Delay			16.7					
HCM 2010 LOS			B					

HCM Unsignalized Intersection Capacity Analysis

8: Sunset Park Dr & East Spring Street

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑			↑↑↑			↑			↑	
Traffic Volume (veh/h)	0	1536	32	112	1503	27	3	0	97	2	0	14
Future Volume (Veh/h)	0	1536	32	112	1503	27	3	0	97	2	0	14
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	1670	35	122	1634	29	3	0	105	2	0	15
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		None			None							
Median storage (veh)												
Upstream signal (ft)		385			319							
pX, platoon unblocked	0.75			0.83			0.83	0.83	0.83	0.83	0.83	0.75
vC, conflicting volume	1663			1705			2491	3594	852	2832	3598	559
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	701			1445			1023	2352	421	1434	2355	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			69			97	100	78	96	100	98
cM capacity (veh/h)	666			387			117	20	484	46	20	810
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	1113	592	530	817	438	108	17					
Volume Left	0	0	122	0	0	3	2					
Volume Right	0	35	0	0	29	105	15					
cSH	1700	1700	387	1700	1700	445	276					
Volume to Capacity	0.65	0.35	0.31	0.48	0.26	0.24	0.06					
Queue Length 95th (ft)	0	0	33	0	0	23	5					
Control Delay (s)	0.0	0.0	10.2	0.0	0.0	15.7	18.9					
Lane LOS			B			C	C					
Approach Delay (s)	0.0		3.0			15.7	18.9					
Approach LOS						C	C					
Intersection Summary												
Average Delay			2.0									
Intersection Capacity Utilization			92.0%	ICU Level of Service				F				
Analysis Period (min)			15									

Intersection: 3: Herndon Parkway & East Spring Street

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	TR	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	150	375	399	275	327	219	228	200	124	464	472	411
Average Queue (ft)	72	218	247	211	234	98	117	65	49	411	432	211
95th Queue (ft)	157	356	401	323	358	186	196	141	127	534	500	345
Link Distance (ft)		487	487		304	304	304			422	422	511
Upstream Blk Time (%)		0	1		9	0				28	78	0
Queuing Penalty (veh)		0	0		45	0				0	0	0
Storage Bay Dist (ft)	150			275				230	125			
Storage Blk Time (%)	0	24		1	12		0	0	0	35		
Queuing Penalty (veh)	1	15		3	36		0	0	1	21		

Intersection: 3: Herndon Parkway & East Spring Street

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	186	140
Average Queue (ft)	94	38
95th Queue (ft)	160	104
Link Distance (ft)	511	511
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Ramp & East Spring Street

Movement	EB	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	L	T	T	R	T	T	R	LTR	R
Maximum Queue (ft)	248	179	195	101	1000	1012	250	501	510
Average Queue (ft)	183	63	76	5	935	966	202	268	146
95th Queue (ft)	287	144	156	57	1134	1116	361	471	398
Link Distance (ft)	238	238	238		960	960		533	533
Upstream Blk Time (%)	19	0	1		30	81		2	3
Queuing Penalty (veh)	105	1	3		0	0		6	10
Storage Bay Dist (ft)				205			250		
Storage Blk Time (%)			1	0		56	2		
Queuing Penalty (veh)			4	0		270	10		

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	153	163	250	217	161	153	117	289	263	217	189
Average Queue (ft)	61	80	125	109	90	73	39	200	157	87	17
95th Queue (ft)	124	140	210	187	147	132	92	278	244	190	113
Link Distance (ft)		533		1415	1415	1415	1415	993	993	993	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	200		730								530
Storage Blk Time (%)	0	0									
Queuing Penalty (veh)	0	0									

Intersection: 8: Sunset Park Dr & East Spring Street

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	LT	T	TR	LTR	LTR
Maximum Queue (ft)	267	269	286	286	252	310	128
Average Queue (ft)	65	60	263	121	36	213	51
95th Queue (ft)	236	230	283	324	171	385	154
Link Distance (ft)	304	304	238	238	238	293	304
Upstream Blk Time (%)	1	0	43	9	0	52	
Queuing Penalty (veh)	7	3	235	49	1	0	
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 827

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	682	31	553	508	475	99	241	944	400	298	46
Future Volume (veh/h)	21	682	31	553	508	475	99	241	944	400	298	46
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	23	741	34	601	552	516	108	262	1026	435	324	50
Adj No. of Lanes	1	2	0	2	2	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	63	720	33	545	1173	525	442	435	369	460	1076	164
Arrive On Green	0.04	0.21	0.21	0.16	0.33	0.33	0.08	0.23	0.23	0.20	0.35	0.35
Sat Flow, veh/h	1774	3446	158	3442	3539	1583	1774	1863	1583	1774	3079	471
Grp Volume(v), veh/h	23	380	395	601	552	516	108	262	1026	435	185	189
Grp Sat Flow(s),veh/h/ln	1774	1770	1835	1721	1770	1583	1774	1863	1583	1774	1770	1780
Q Serve(g_s), s	1.5	25.1	25.1	19.0	14.8	38.8	5.3	15.1	28.0	21.7	9.1	9.3
Cycle Q Clear(g_c), s	1.5	25.1	25.1	19.0	14.8	38.8	5.3	15.1	28.0	21.7	9.1	9.3
Prop In Lane	1.00		0.09	1.00		1.00	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	63	370	383	545	1173	525	442	435	369	460	618	622
V/C Ratio(X)	0.36	1.03	1.03	1.10	0.47	0.98	0.24	0.60	2.78	0.95	0.30	0.30
Avail Cap(c_a), veh/h	148	370	383	545	1173	525	442	435	369	476	634	638
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.5	47.5	47.5	50.5	31.8	39.8	29.8	41.0	46.0	27.7	28.4	28.4
Incr Delay (d2), s/veh	3.5	54.4	53.7	69.8	1.4	35.3	0.3	2.3	807.3	27.7	0.3	0.3
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	0.8	17.8	18.4	14.3	7.4	22.1	2.6	8.0	95.1	17.7	4.5	4.6
LnGrp Delay(d),s/veh	60.0	101.9	101.2	120.3	33.1	75.1	30.1	43.4	853.3	55.4	28.6	28.7
LnGrp LOS	E	F	F	F	C	E	C	D	F	E	C	C
Approach Vol, veh/h		798			1669			1396			809	
Approach Delay, s/veh		100.3			77.5			637.6			43.1	
Approach LOS		F			E			F			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.3	45.8	29.9	34.0	25.0	31.1	16.0	47.9				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	33.0	25.0	28.0	19.0	24.0	10.0	43.0				
Max Q Clear Time (g_c+I1), s	3.5	40.8	23.7	30.0	21.0	27.1	7.3	11.3				
Green Ext Time (p_c), s	0.0	0.0	0.2	0.0	0.0	0.0	0.1	11.5				
Intersection Summary												
HCM 2010 Ctrl Delay				242.8								
HCM 2010 LOS				F								

HCM 2010 Signalized Intersection Summary

5: Ramp & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	125	1577	395	0	606	242	0	0	0	304	0	1025
Future Volume (veh/h)	125	1577	395	0	606	242	0	0	0	304	0	1025
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	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
Parking Bus, Adj	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	0	1863	1863				1900	1863	1863
Adj Flow Rate, veh/h	136	1714	0	0	659	0				330	588	722
Adj No. of Lanes	1	2	1	0	2	1				0	1	1
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	0	2	2				2	2	2
Cap, veh/h	163	2197	983	0	1696	759				192	342	462
Arrive On Green	0.03	0.20	0.00	0.00	0.48	0.00				0.29	0.29	0.29
Sat Flow, veh/h	1774	3539	1583	0	3632	1583				658	1172	1583
Grp Volume(v), veh/h	136	1714	0	0	659	0				918	0	722
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	0	1770	1583				1830	0	1583
Q Serve(g_s), s	9.2	55.0	0.0	0.0	14.3	0.0				35.0	0.0	35.0
Cycle Q Clear(g_c), s	9.2	55.0	0.0	0.0	14.3	0.0				35.0	0.0	35.0
Prop In Lane	1.00		1.00	0.00		1.00				0.36		1.00
Lane Grp Cap(c), veh/h	163	2197	983	0	1696	759				534	0	462
V/C Ratio(X)	0.84	0.78	0.00	0.00	0.39	0.00				1.72	0.00	1.56
Avail Cap(c_a), veh/h	163	2197	983	0	1696	759				534	0	462
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00				0.73	0.00	0.73
Uniform Delay (d), s/veh	57.3	40.0	0.0	0.0	20.0	0.0				42.5	0.0	42.5
Incr Delay (d2), s/veh	29.9	2.8	0.0	0.0	0.7	0.0				329.8	0.0	261.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.9	27.9	0.0	0.0	7.1	0.0				66.5	0.0	48.8
LnGrp Delay(d),s/veh	87.2	42.8	0.0	0.0	20.7	0.0				372.3	0.0	303.7
LnGrp LOS	F	D			C					F		F
Approach Vol, veh/h		1850			659						1640	
Approach Delay, s/veh		46.0			20.7						342.1	
Approach LOS		D			C						F	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	17.0	63.0		40.0		80.0						
Change Period (Y+Rc), s	6.0	5.5		5.0		5.5						
Max Green Setting (Gmax), s	11.0	57.5		35.0		74.5						
Max Q Clear Time (g_c+I1), s	11.2	16.3		37.0		57.0						
Green Ext Time (p_c), s	0.0	28.9		0.0		14.7						
Intersection Summary												
HCM 2010 Ctrl Delay			159.1									
HCM 2010 LOS			F									
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/07/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations	 		 	  	  			
Traffic Volume (veh/h)	183	184	712	1812	2823	618		
Future Volume (veh/h)	183	184	712	1812	2823	618		
Number	3	18	5	2	6	16		
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	199	0	774	1970	3068	0		
Adj No. of Lanes	2	1	2	3	3	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	267	123	891	4061	2356	734		
Arrive On Green	0.08	0.00	0.26	0.80	0.46	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	199	0	774	1970	3068	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	5.9	0.0	22.6	13.4	48.7	0.0		
Cycle Q Clear(g_c), s	5.9	0.0	22.6	13.4	48.7	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	267	123	891	4061	2356	734		
V/C Ratio(X)	0.75	0.00	0.87	0.49	1.30	0.00		
Avail Cap(c_a), veh/h	393	181	1344	4061	2356	734		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.86	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	47.4	0.0	37.2	3.5	28.2	0.0		
Incr Delay (d2), s/veh	3.7	0.0	4.2	0.4	139.1	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	3.0	0.0	11.3	6.2	53.0	0.0		
LnGrp Delay(d),s/veh	51.1	0.0	41.4	3.9	167.3	0.0		
LnGrp LOS	D		D	A	F			
Approach Vol, veh/h	199			2744	3068			
Approach Delay, s/veh	51.1			14.5	167.3			
Approach LOS	D			B	F			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		89.9			35.2	54.7		15.1
Change Period (Y+Rc), s		6.0			8.0	6.0		7.0
Max Green Setting (Gmax), s		80.0			41.0	31.0		12.0
Max Q Clear Time (g_c+I1), s		15.4			24.6	50.7		7.9
Green Ext Time (p_c), s		64.3			2.6	0.0		0.2
Intersection Summary								
HCM 2010 Ctrl Delay			93.7					
HCM 2010 LOS			F					

HCM Unsignalized Intersection Capacity Analysis

8: Sunset Park Drive /Sunset Park Drive & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	1969	57	112	1502	17	17	0	121	6	0	17
Future Volume (Veh/h)	0	1969	57	112	1502	17	17	0	121	6	0	17
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2140	62	122	1633	18	18	0	132	7	0	18
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (ft)	385				319							
pX, platoon unblocked	0.91			0.81			0.85	0.85	0.81	0.85	0.85	0.91
vC, conflicting volume	1651			2202			2977	4066	1101	3088	4088	553
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1382			2013			2365	3644	650	2495	3670	180
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			46			0	100	60	0	100	98
cM capacity (veh/h)	449			226			9	2	333	4	2	759
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	1427	775	530	816	426	150	25					
Volume Left	0	0	122	0	0	18	7					
Volume Right	0	62	0	0	18	132	18					
cSH	1700	1700	226	1700	1700	62	15					
Volume to Capacity	0.84	0.46	0.54	0.48	0.25	2.44	1.64					
Queue Length 95th (ft)	0	0	72	0	0	371	93					
Control Delay (s)	0.0	0.0	29.6	0.0	0.0	796.8	828.0					
Lane LOS			D			F	F					
Approach Delay (s)	0.0		8.9			796.8	828.0					
Approach LOS						F	F					
Intersection Summary												
Average Delay			37.6									
Intersection Capacity Utilization			107.4%	ICU Level of Service				G				
Analysis Period (min)			15									

Intersection: 3: Herndon Parkway & East Spring Street

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	TR	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	149	512	498	274	312	181	196	172	124	464	475	430
Average Queue (ft)	38	390	367	171	194	83	98	74	54	419	443	197
95th Queue (ft)	125	558	548	297	320	154	161	135	122	541	460	333
Link Distance (ft)		487	487		304	304	304			422	422	511
Upstream Blk Time (%)		15	17		3		0			28	92	0
Queuing Penalty (veh)		0	0		14		0			0	0	0
Storage Bay Dist (ft)	150			275				230	125			
Storage Blk Time (%)	0	66		0	4		0	0	1	10		
Queuing Penalty (veh)	0	14		1	11		0	0	1	10		

Intersection: 3: Herndon Parkway & East Spring Street

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	224	151
Average Queue (ft)	104	52
95th Queue (ft)	182	127
Link Distance (ft)	511	511
Upstream Blk Time (%)	0	
Queuing Penalty (veh)	0	
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Ramp & East Spring Street

Movement	EB	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	L	T	T	R	T	T	R	LTR	R
Maximum Queue (ft)	171	258	269	205	782	816	250	574	613
Average Queue (ft)	69	193	206	96	382	411	83	546	578
95th Queue (ft)	148	258	275	263	908	970	276	574	676
Link Distance (ft)	238	238	238		960	960		532	532
Upstream Blk Time (%)	0	2	3		4	15		41	56
Queuing Penalty (veh)	0	11	20		0	0		276	375
Storage Bay Dist (ft)				205			250		
Storage Blk Time (%)			5	1		22	1		
Queuing Penalty (veh)			20	5		54	2		

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	118	141	730	1462	1452	1432	1370	1035	1045	1048	530
Average Queue (ft)	49	66	668	1202	1065	882	172	977	1004	1015	529
95th Queue (ft)	103	120	919	1894	2024	1869	754	1196	1101	1036	550
Link Distance (ft)		532		1415	1415	1415	1415	993	993	993	
Upstream Blk Time (%)				58	44	4	0	54	50	83	
Queuing Penalty (veh)				0	0	0	0	0	0	0	
Storage Bay Dist (ft)	200		730								530
Storage Blk Time (%)	0	0	29	53						63	19
Queuing Penalty (veh)	0	0	103	190						391	181

Intersection: 8: Sunset Park Drive /Sunset Park Drive & East Spring Street

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	LT	T	TR	LTR	LTR
Maximum Queue (ft)	139	175	284	275	266	519	382
Average Queue (ft)	18	33	247	128	37	497	197
95th Queue (ft)	85	113	319	330	178	564	417
Link Distance (ft)	304	304	238	238	238	501	445
Upstream Blk Time (%)			36	11	0	95	7
Queuing Penalty (veh)			198	59	1	0	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 1939

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	646	86	775	770	415	76	404	885	491	340	32
Future Volume (veh/h)	80	646	86	775	770	415	76	404	885	491	340	32
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	87	702	93	842	837	451	83	439	962	534	370	35
Adj No. of Lanes	1	2	0	2	2	1	1	1	1	1	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	629	83	545	1045	468	436	435	369	430	1172	110
Arrive On Green	0.06	0.20	0.20	0.16	0.30	0.30	0.08	0.23	0.23	0.21	0.36	0.36
Sat Flow, veh/h	1774	3143	416	3442	3539	1583	1774	1863	1583	1774	3270	308
Grp Volume(v), veh/h	87	395	400	842	837	451	83	439	962	534	199	206
Grp Sat Flow(s),veh/h/ln	1774	1770	1789	1721	1770	1583	1774	1863	1583	1774	1770	1808
Q Serve(g_s), s	5.8	24.0	24.0	19.0	26.2	33.7	4.0	28.0	28.0	25.0	9.8	9.9
Cycle Q Clear(g_c), s	5.8	24.0	24.0	19.0	26.2	33.7	4.0	28.0	28.0	25.0	9.8	9.9
Prop In Lane	1.00		0.23	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	112	354	358	545	1045	468	436	435	369	430	634	648
V/C Ratio(X)	0.78	1.12	1.12	1.55	0.80	0.96	0.19	1.01	2.60	1.24	0.31	0.32
Avail Cap(c_a), veh/h	148	354	358	545	1045	468	436	435	369	430	634	648
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	55.4	48.0	48.0	50.5	39.0	41.7	29.4	46.0	46.0	36.7	27.8	27.9
Incr Delay (d2), s/veh	17.1	83.0	83.3	254.4	6.5	33.7	0.2	45.7	729.6	127.7	0.3	0.3
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	3.4	19.9	20.1	28.3	13.7	19.1	2.0	19.9	87.1	29.4	4.8	5.0
LnGrp Delay(d),s/veh	72.5	131.0	131.3	304.9	45.5	75.3	29.6	91.7	775.6	164.4	28.1	28.2
LnGrp LOS	E	F	F	F	D	E	C	F	F	F	C	C
Approach Vol, veh/h	882				2130				1484			
Approach Delay, s/veh	125.4				154.3				531.6			
Approach LOS	F				F				F			
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.6	41.4	31.0	34.0	25.0	30.0	16.0	49.0				
Change Period (Y+Rc), s	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	33.0	25.0	28.0	19.0	24.0	10.0	43.0				
Max Q Clear Time (g_c+I1), s	7.8	35.7	27.0	30.0	21.0	26.0	6.0	11.9				
Green Ext Time (p_c), s	0.0	0.0	0.0	0.0	0.0	0.0	0.1	12.8				
Intersection Summary												
HCM 2010 Ctrl Delay	244.2											
HCM 2010 LOS	F											

HCM 2010 Signalized Intersection Summary

5: Ramp & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	308	1074	726	0	1395	616	0	0	0	125	0	722
Future Volume (veh/h)	308	1074	726	0	1395	616	0	0	0	125	0	722
Number	1	6	16	5	2	12				7	4	14
Initial Q (Qb), veh	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
Parking Bus, Adj	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	0	1863	1863				1900	1863	1863
Adj Flow Rate, veh/h	335	1167	0	0	1516	0				0	0	931
Adj No. of Lanes	1	2	1	0	2	1				0	1	2
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92				0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	0	2	2				2	2	2
Cap, veh/h	222	2197	983	0	1578	706				0	543	924
Arrive On Green	0.04	0.20	0.00	0.00	0.45	0.00				0.00	0.00	0.29
Sat Flow, veh/h	1774	3539	1583	0	3632	1583				0	1863	3167
Grp Volume(v), veh/h	335	1167	0	0	1516	0				0	0	931
Grp Sat Flow(s),veh/h/ln	1774	1770	1583	0	1770	1583				0	1863	1583
Q Serve(g_s), s	15.0	35.3	0.0	0.0	49.8	0.0				0.0	0.0	35.0
Cycle Q Clear(g_c), s	15.0	35.3	0.0	0.0	49.8	0.0				0.0	0.0	35.0
Prop In Lane	1.00		1.00	0.00		1.00				0.00		1.00
Lane Grp Cap(c), veh/h	222	2197	983	0	1578	706				0	543	924
V/C Ratio(X)	1.51	0.53	0.00	0.00	0.96	0.00				0.00	0.00	1.01
Avail Cap(c_a), veh/h	222	2197	983	0	1578	706				0	543	924
HCM Platoon Ratio	0.33	0.33	0.33	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00				0.00	0.00	0.84
Uniform Delay (d), s/veh	57.5	32.1	0.0	0.0	32.2	0.0				0.0	0.0	42.5
Incr Delay (d2), s/veh	251.7	0.9	0.0	0.0	15.1	0.0				0.0	0.0	29.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	22.9	17.6	0.0	0.0	27.5	0.0				0.0	0.0	19.0
LnGrp Delay(d),s/veh	309.2	33.0	0.0	0.0	47.3	0.0				0.0	0.0	71.6
LnGrp LOS	F	C			D							F
Approach Vol, veh/h		1502			1516						931	
Approach Delay, s/veh		94.7			47.3						71.6	
Approach LOS		F			D						E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	21.0	59.0		40.0		80.0						
Change Period (Y+Rc), s	6.0	5.5		5.0		5.5						
Max Green Setting (Gmax), s	15.0	53.5		35.0		74.5						
Max Q Clear Time (g_c+I1), s	17.0	51.8		37.0		37.3						
Green Ext Time (p_c), s	0.0	1.6		0.0		29.4						
Intersection Summary												
HCM 2010 Ctrl Delay			71.0									
HCM 2010 LOS			E									
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/07/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	380	544	455	2292	1598	392		
Future Volume (veh/h)	380	544	455	2292	1598	392		
Number	3	18	5	2	6	16		
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	413	0	495	2491	1737	0		
Adj No. of Lanes	2	1	2	3	3	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	393	181	598	3875	2603	810		
Arrive On Green	0.11	0.00	0.17	0.76	0.51	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	413	0	495	2491	1737	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	12.0	0.0	14.6	24.0	26.6	0.0		
Cycle Q Clear(g_c), s	12.0	0.0	14.6	24.0	26.6	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	393	181	598	3875	2603	810		
V/C Ratio(X)	1.05	0.00	0.83	0.64	0.67	0.00		
Avail Cap(c_a), veh/h	393	181	1344	3875	2603	810		
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.22	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	46.5	0.0	41.8	5.8	19.0	0.0		
Incr Delay (d2), s/veh	35.9	0.0	3.0	0.8	1.4	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	7.6	0.0	7.2	11.4	12.7	0.0		
LnGrp Delay(d),s/veh	82.4	0.0	44.8	6.7	20.4	0.0		
LnGrp LOS	F		D	A	C			
Approach Vol, veh/h	413			2986	1737			
Approach Delay, s/veh	82.4			13.0	20.4			
Approach LOS	F			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		86.0			26.3	59.7		19.0
Change Period (Y+Rc), s		6.0			8.0	6.0		7.0
Max Green Setting (Gmax), s		80.0			41.0	31.0		12.0
Max Q Clear Time (g_c+I1), s		26.0			16.6	28.6		14.0
Green Ext Time (p_c), s		53.0			1.7	2.4		0.0
Intersection Summary								
HCM 2010 Ctrl Delay			21.1					
HCM 2010 LOS			C					

HCM Unsignalized Intersection Capacity Analysis

8: Sunset Park Dr & East Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations					 							
Traffic Volume (veh/h)	0	1981	41	144	1938	35	4	0	125	3	0	18
Future Volume (Veh/h)	0	1981	41	144	1938	35	4	0	125	3	0	18
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	0	2153	45	157	2107	38	4	0	136	3	0	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type	None				None							
Median storage (veh)												
Upstream signal (ft)	385				319							
pX, platoon unblocked	0.60			0.82			0.69	0.69	0.82	0.69	0.69	0.60
vC, conflicting volume	2145			2198			3212	4634	1099	3652	4638	721
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	544			2021			1235	3309	678	1878	3315	0
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			31			90	100	58	61	100	97
cM capacity (veh/h)	608			227			39	2	323	8	2	645
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	WB 3	NB 1	SB 1					
Volume Total	1435	763	684	1054	565	140	23					
Volume Left	0	0	157	0	0	4	3					
Volume Right	0	45	0	0	38	136	20					
cSH	1700	1700	227	1700	1700	267	55					
Volume to Capacity	0.84	0.45	0.69	0.62	0.33	0.52	0.42					
Queue Length 95th (ft)	0	0	111	0	0	70	39					
Control Delay (s)	0.0	0.0	50.0	0.0	0.0	32.4	112.6					
Lane LOS			F			D	F					
Approach Delay (s)	0.0		14.9			32.4	112.6					
Approach LOS						D	F					
Intersection Summary												
Average Delay			8.9									
Intersection Capacity Utilization			115.6%	ICU Level of Service				H				
Analysis Period (min)			15									

Intersection: 3: Herndon Parkway & East Spring Street

Movement	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB	SB
Directions Served	L	T	TR	L	L	T	T	R	L	T	R	L
Maximum Queue (ft)	517	528	528	338	347	243	262	194	353	454	466	557
Average Queue (ft)	419	487	484	264	269	115	135	65	52	423	442	510
95th Queue (ft)	695	569	580	373	376	204	219	140	210	514	458	618
Link Distance (ft)	487	487	487	300	300	300	300		422	422	422	510
Upstream Blk Time (%)	40	76	55	19	22	0	0		1	31	93	82
Queuing Penalty (veh)	0	0	0	92	106	0	0		0	0	0	0
Storage Bay Dist (ft)								230				
Storage Blk Time (%)							0	0				
Queuing Penalty (veh)							1	0				

Intersection: 3: Herndon Parkway & East Spring Street

Movement	SB	SB
Directions Served	T	TR
Maximum Queue (ft)	547	505
Average Queue (ft)	455	114
95th Queue (ft)	712	361
Link Distance (ft)	510	510
Upstream Blk Time (%)	38	0
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: Ramp & East Spring Street

Movement	EB	EB	EB	WB	WB	WB	SB	SB
Directions Served	L	T	T	T	T	R	LTR	R
Maximum Queue (ft)	250	162	171	988	1012	250	514	483
Average Queue (ft)	181	59	72	953	979	195	337	216
95th Queue (ft)	282	129	142	1078	996	363	532	509
Link Distance (ft)	240	240	240	960	960		534	534
Upstream Blk Time (%)	9	0	0	29	87		2	4
Queuing Penalty (veh)	46	0	0	0	0		7	16
Storage Bay Dist (ft)						250		
Storage Blk Time (%)					59	2		
Queuing Penalty (veh)					363	15		

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	137	155	282	260	174	183	137	406	367	328	270
Average Queue (ft)	60	78	153	131	108	97	59	264	228	164	49
95th Queue (ft)	117	135	241	214	166	163	120	382	342	291	191
Link Distance (ft)		534		1415	1415	1415	1415	993	993	993	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	200		730								530
Storage Blk Time (%)	0	0									0
Queuing Penalty (veh)	0	0									0

Intersection: 8: Sunset Park Dr & East Spring Street

Movement	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	TR	LT	T	TR	LTR	LTR
Maximum Queue (ft)	292	224	286	281	260	407	267
Average Queue (ft)	73	16	266	144	53	315	142
95th Queue (ft)	276	125	286	344	211	527	357
Link Distance (ft)	300	300	240	240	240	390	363
Upstream Blk Time (%)	3	1	43	11	0	71	11
Queuing Penalty (veh)	32	7	301	75	2	0	0
Storage Bay Dist (ft)							
Storage Blk Time (%)							
Queuing Penalty (veh)							

Network Summary

Network wide Queuing Penalty: 1064

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & Spring Street

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	16	529	24	516	394	368	77	200	732	315	231	36
Future Volume (veh/h)	16	529	24	516	394	368	77	200	732	315	231	36
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	17	575	26	561	428	400	84	217	796	342	251	39
Adj No. of Lanes	1	3	0	2	2	1	1	1	2	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	53	1107	50	654	1352	760	444	492	1438	661	758	116
Arrive On Green	0.03	0.22	0.22	0.19	0.38	0.38	0.10	0.26	0.26	0.10	0.25	0.25
Sat Flow, veh/h	1774	4989	224	3442	3539	1583	1774	1863	3167	3442	3077	472
Grp Volume(v), veh/h	17	390	211	561	428	400	84	217	796	342	143	147
Grp Sat Flow(s),veh/h/ln	1774	1695	1823	1721	1770	1583	1774	1863	1583	1721	1770	1779
Q Serve(g_s), s	0.9	10.1	10.1	15.7	8.5	17.5	3.2	9.7	18.2	7.2	6.6	6.8
Cycle Q Clear(g_c), s	0.9	10.1	10.1	15.7	8.5	17.5	3.2	9.7	18.2	7.2	6.6	6.8
Prop In Lane	1.00		0.12	1.00		1.00	1.00		1.00	1.00		0.27
Lane Grp Cap(c), veh/h	53	753	405	654	1352	760	444	492	1438	661	436	438
V/C Ratio(X)	0.32	0.52	0.52	0.86	0.32	0.53	0.19	0.44	0.55	0.52	0.33	0.34
Avail Cap(c_a), veh/h	178	818	440	830	1352	760	444	666	1735	805	676	680
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.2	34.0	34.1	39.0	21.6	18.0	22.5	30.5	19.8	24.2	30.8	30.8
Incr Delay (d2), s/veh	3.4	0.6	1.0	7.3	0.6	2.6	0.2	0.6	0.3	0.6	0.4	0.4
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	0.5	4.8	5.2	8.1	4.2	8.2	1.6	5.0	8.0	3.4	3.3	3.4
LnGrp Delay(d),s/veh	50.6	34.6	35.1	46.3	22.2	20.6	22.7	31.1	20.1	24.9	31.2	31.3
LnGrp LOS	D	C	D	D	C	C	C	C	C	C	C	C
Approach Vol, veh/h		618			1389			1097			632	
Approach Delay, s/veh		35.2			31.5			22.5			27.8	
Approach LOS		D			C			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	9.0	44.0	14.2	32.3	24.9	28.1	16.0	30.5				
Change Period (Y+Rc), s	6.0	6.0	4.5	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	38.0	13.9	35.6	24.0	24.0	10.0	38.0				
Max Q Clear Time (g_c+I1), s	2.9	19.5	9.2	20.2	17.7	12.1	5.2	8.8				
Green Ext Time (p_c), s	0.0	8.2	0.5	6.0	1.2	6.3	0.1	7.6				
Intersection Summary												
HCM 2010 Ctrl Delay				28.8								
HCM 2010 LOS				C								
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/08/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	142	143	552	1405	2189	479		
Future Volume (veh/h)	142	143	552	1405	2189	479		
Number	3	18	5	2	6	16		
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	154	0	600	1527	2379	0		
Adj No. of Lanes	2	1	2	3	3	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	210	97	765	4139	2755	858		
Arrive On Green	0.02	0.00	0.22	0.81	0.54	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	154	0	600	1527	2379	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	5.3	0.0	19.7	9.6	48.3	0.0		
Cycle Q Clear(g_c), s	5.3	0.0	19.7	9.6	48.3	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	210	97	765	4139	2755	858		
V/C Ratio(X)	0.73	0.00	0.78	0.37	0.86	0.00		
Avail Cap(c_a), veh/h	229	106	765	4195	2797	871		
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.97	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	57.8	0.0	44.0	3.0	23.7	0.0		
Incr Delay (d2), s/veh	10.2	0.0	5.4	0.3	3.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	2.9	0.0	9.9	4.5	23.5	0.0		
LnGrp Delay(d),s/veh	68.0	0.0	49.3	3.2	27.6	0.0		
LnGrp LOS	E		D	A	C			
Approach Vol, veh/h	154			2127	2379			
Approach Delay, s/veh	68.0			16.2	27.6			
Approach LOS	E			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		105.7			34.7	71.0		14.3
Change Period (Y+Rc), s		* 8			8.0	6.0		7.0
Max Green Setting (Gmax), s		* 99			25.0	66.0		8.0
Max Q Clear Time (g_c+I1), s		11.6			21.7	50.3		7.3
Green Ext Time (p_c), s		39.1			3.0	14.7		0.0
Intersection Summary								
HCM 2010 Ctrl Delay			23.7					
HCM 2010 LOS			C					
Notes								

HCM Signalized Intersection Capacity Analysis

5: Spring Street & Ramp

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	97	1223	306	0	470	188	0	0	0	236	0	795
Future Volume (vph)	97	1223	306	0	470	188	0	0	0	236	0	795
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		0.88
Frt	1.00	1.00	0.85		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1711	3421	1531		4916	1531				1711		2694
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1711	3421	1531		4916	1531				1711		2694
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	105	1329	333	0	511	204	0	0	0	257	0	864
RTOR Reduction (vph)	0	0	94	0	0	115	0	0	0	0	0	134
Lane Group Flow (vph)	105	1329	239	0	511	89	0	0	0	257	0	730
Turn Type	Prot	NA	Perm		NA	Perm				Perm		pm+ov
Protected Phases	1	6			2							1
Permitted Phases		6	6		2	2				4		4
Actuated Green, G (s)	28.0	86.1	86.1		52.1	52.1				23.4		51.4
Effective Green, g (s)	28.0	86.1	86.1		52.1	52.1				23.4		51.4
Actuated g/C Ratio	0.23	0.72	0.72		0.43	0.43				0.19		0.43
Clearance Time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)	399	2454	1098		2134	664				333		1288
v/s Ratio Prot	0.06	c0.39			0.10							c0.13
v/s Ratio Perm			0.16			0.06				c0.15		0.14
v/c Ratio	0.26	0.54	0.22		0.24	0.13				0.77		0.57
Uniform Delay, d1	37.6	7.8	5.7		21.4	20.4				45.8		25.9
Progression Factor	1.00	1.00	1.00		1.00	1.00				0.49		0.28
Incremental Delay, d2	0.4	0.9	0.5		0.3	0.4				8.4		0.5
Delay (s)	37.9	8.7	6.1		21.7	20.8				31.0		7.8
Level of Service	D	A	A		C	C				C		A
Approach Delay (s)		9.9			21.4			0.0			13.1	
Approach LOS		A			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			13.2		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			120.0		Sum of lost time (s)					16.5		
Intersection Capacity Utilization			54.8%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & Spring Street

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	62	501	67	713	597	322	59	316	686	383	264	25
Future Volume (veh/h)	62	501	67	713	597	322	59	316	686	383	264	25
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	67	545	73	775	649	350	64	343	746	416	287	27
Adj No. of Lanes	1	3	0	2	2	1	1	1	2	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	94	670	89	1247	1617	897	363	410	1844	523	809	76
Arrive On Green	0.05	0.15	0.15	0.36	0.46	0.46	0.07	0.22	0.22	0.11	0.25	0.25
Sat Flow, veh/h	1774	4547	600	3442	3539	1583	1774	1863	3167	3442	3273	306
Grp Volume(v), veh/h	67	404	214	775	649	350	64	343	746	416	154	160
Grp Sat Flow(s),veh/h/ln	1774	1695	1757	1721	1770	1583	1774	1863	1583	1721	1770	1809
Q Serve(g_s), s	5.2	16.2	16.5	25.9	17.1	17.2	3.7	24.6	6.1	12.7	10.1	10.2
Cycle Q Clear(g_c), s	5.2	16.2	16.5	25.9	17.1	17.2	3.7	24.6	6.1	12.7	10.1	10.2
Prop In Lane	1.00		0.34	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	94	500	259	1247	1617	897	363	410	1844	523	438	447
V/C Ratio(X)	0.71	0.81	0.82	0.62	0.40	0.39	0.18	0.84	0.40	0.79	0.35	0.36
Avail Cap(c_a), veh/h	165	605	314	1247	1617	897	363	452	1917	602	518	530
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.3	57.8	57.9	36.7	25.3	16.9	36.6	52.2	5.2	38.2	43.5	43.5
Incr Delay (d2), s/veh	9.6	13.2	24.8	1.0	0.7	1.3	0.2	12.0	0.1	6.4	0.5	0.5
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	2.8	8.5	9.8	12.4	8.5	7.8	1.8	14.0	3.6	6.5	5.0	5.2
LnGrp Delay(d),s/veh	74.9	71.0	82.8	37.7	26.0	18.2	36.8	64.2	5.3	44.6	43.9	44.0
LnGrp LOS	E	E	F	D	C	B	D	E	A	D	D	D
Approach Vol, veh/h		685			1774			1153			730	
Approach Delay, s/veh		75.0			29.6			24.6			44.3	
Approach LOS		E			C			C			D	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.4	70.0	19.8	36.8	56.7	26.6	16.0	40.6				
Change Period (Y+Rc), s	6.0	6.0	4.5	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	13.0	52.0	18.5	34.0	40.0	25.0	10.0	41.0				
Max Q Clear Time (g_c+I1), s	7.2	19.2	14.7	26.6	27.9	18.5	5.7	12.2				
Green Ext Time (p_c), s	0.1	11.3	0.6	4.2	6.9	2.1	0.0	8.6				
Intersection Summary												
HCM 2010 Ctrl Delay			37.9									
HCM 2010 LOS			D									
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/08/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	295	422	353	1777	1239	304		
Future Volume (veh/h)	295	422	353	1777	1239	304		
Number	3	18	5	2	6	16		
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	321	0	384	1932	1347	0		
Adj No. of Lanes	2	1	2	3	3	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	404	186	1099	3762	1848	575		
Arrive On Green	0.04	0.00	0.32	0.74	0.36	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	321	0	384	1932	1347	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	9.7	0.0	9.0	16.7	24.1	0.0		
Cycle Q Clear(g_c), s	9.7	0.0	9.0	16.7	24.1	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	404	186	1099	3762	1848	575		
V/C Ratio(X)	0.79	0.00	0.35	0.51	0.73	0.00		
Avail Cap(c_a), veh/h	590	271	1099	3762	2179	679		
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.79	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	49.2	0.0	27.4	5.7	28.9	0.0		
Incr Delay (d2), s/veh	3.8	0.0	0.2	0.5	2.6	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.8	0.0	4.3	7.9	11.7	0.0		
LnGrp Delay(d),s/veh	53.0	0.0	27.6	6.2	31.5	0.0		
LnGrp LOS	D		C	A	C			
Approach Vol, veh/h	321			2316	1347			
Approach Delay, s/veh	53.0			9.8	31.5			
Approach LOS	D			A	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		85.7			41.5	44.2		19.3
Change Period (Y+Rc), s		* 8			8.0	6.0		7.0
Max Green Setting (Gmax), s		* 74			21.0	45.0		18.0
Max Q Clear Time (g_c+I1), s		18.7			11.0	26.1		11.7
Green Ext Time (p_c), s		39.4			9.2	12.1		0.6
Intersection Summary								
HCM 2010 Ctrl Delay			20.6					
HCM 2010 LOS			C					
Notes								

HCM Signalized Intersection Capacity Analysis

5: Spring Street & Ramp

06/08/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							 
Traffic Volume (vph)	239	833	563	0	1082	478	0	0	0	97	0	560
Future Volume (vph)	239	833	563	0	1082	478	0	0	0	97	0	560
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		0.88
Frt	1.00	1.00	0.85		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1711	3421	1531		4916	1531				1711		2694
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1711	3421	1531		4916	1531				1711		2694
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	260	905	612	0	1176	520	0	0	0	105	0	609
RTOR Reduction (vph)	0	0	130	0	0	249	0	0	0	0	0	18
Lane Group Flow (vph)	260	905	482	0	1176	271	0	0	0	105	0	591
Turn Type	Prot	NA	Perm		NA	Perm				Perm		pm+ov
Protected Phases	1	6			2							1
Permitted Phases		6	6		2	2				4		4
Actuated Green, G (s)	22.0	82.7	82.7		54.7	54.7				11.8		33.8
Effective Green, g (s)	22.0	82.7	82.7		54.7	54.7				11.8		33.8
Actuated g/C Ratio	0.21	0.79	0.79		0.52	0.52				0.11		0.32
Clearance Time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)	358	2694	1205		2561	797				192		1021
v/s Ratio Prot	c0.15	0.26			c0.24							c0.12
v/s Ratio Perm			0.31			0.18				0.06		0.10
v/c Ratio	0.73	0.34	0.40		0.46	0.34				0.55		0.58
Uniform Delay, d1	38.7	3.2	3.5		15.8	14.6				44.1		29.7
Progression Factor	1.00	1.00	1.00		1.00	1.00				0.67		0.45
Incremental Delay, d2	7.2	0.3	1.0		0.6	1.2				2.9		0.7
Delay (s)	45.9	3.6	4.4		16.4	15.8				32.4		14.0
Level of Service	D	A	A		B	B				C		B
Approach Delay (s)		10.1			16.2			0.0			16.7	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			13.7		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.56									
Actuated Cycle Length (s)			105.0		Sum of lost time (s)					16.5		
Intersection Capacity Utilization			52.4%		ICU Level of Service					A		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection: 3: Herndon Parkway & Spring Street

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	TR	L	L	T	T	R	L	T	TR
Maximum Queue (ft)	59	264	295	245	259	283	172	199	162	99	397	432
Average Queue (ft)	16	80	177	146	171	191	93	109	71	37	117	241
95th Queue (ft)	46	200	256	224	249	269	160	171	128	78	250	418
Link Distance (ft)		482	482	482	294	294	294	294	294	412	412	412
Upstream Blk Time (%)					0	0					0	2
Queuing Penalty (veh)					0	1					0	0
Storage Bay Dist (ft)	155											
Storage Blk Time (%)		0										14
Queuing Penalty (veh)		0										50

Intersection: 3: Herndon Parkway & Spring Street

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	TR
Maximum Queue (ft)	170	317	335	312	166
Average Queue (ft)	133	151	231	101	61
95th Queue (ft)	226	346	375	297	130
Link Distance (ft)				365	365
Upstream Blk Time (%)			0	6	
Queuing Penalty (veh)			0	0	
Storage Bay Dist (ft)	170	350	350		
Storage Blk Time (%)	2	0	6	5	
Queuing Penalty (veh)	8	0	7	16	

Intersection: 5: Spring Street & Ramp

Movement	EB	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	L	T	T	R	T	T	T	R	L	R	R
Maximum Queue (ft)	118	233	234	182	216	189	142	50	268	348	293
Average Queue (ft)	40	98	103	19	128	54	60	3	154	170	83
95th Queue (ft)	94	198	207	118	208	142	120	26	249	297	200
Link Distance (ft)	238	238	238		949	949	949			531	531
Upstream Blk Time (%)		0	0							0	0
Queuing Penalty (veh)		1	2							1	0
Storage Bay Dist (ft)				205				250	270		
Storage Blk Time (%)			1	0					0	1	
Queuing Penalty (veh)			2	1					0	1	

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	120	137	640	747	352	170	86	546	528	431	265
Average Queue (ft)	48	69	455	379	93	73	27	366	338	266	66
95th Queue (ft)	96	113	729	755	289	140	68	480	461	378	204
Link Distance (ft)		531		1415	1415	1415	1415	993	993	993	
Upstream Blk Time (%)				0	0						
Queuing Penalty (veh)				0	0						
Storage Bay Dist (ft)	200		730								530
Storage Blk Time (%)			3	1							
Queuing Penalty (veh)			7	3							

Intersection: 8: Sunset Park Dr & Spring Street

Movement	EB	EB	WB	NB	SB
Directions Served	T	TR	T	R	R
Maximum Queue (ft)	25	38	3	123	36
Average Queue (ft)	1	2	0	43	9
95th Queue (ft)	14	19	0	88	29
Link Distance (ft)	294	294		355	290
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			150		
Storage Blk Time (%)					
Queuing Penalty (veh)					

Network Summary

Network wide Queuing Penalty: 101

Intersection: 3: Herndon Parkway & Spring Street

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	TR	L	L	T	T	R	L	T	TR
Maximum Queue (ft)	154	308	332	375	302	308	246	265	174	216	429	453
Average Queue (ft)	73	183	174	213	221	241	150	167	69	49	273	348
95th Queue (ft)	155	274	309	358	297	319	227	238	131	141	483	531
Link Distance (ft)		481	481	481	293	293	293	293	293		411	411
Upstream Blk Time (%)				0	1	2	0	0			7	26
Queuing Penalty (veh)				0	2	7	0	0			0	0
Storage Bay Dist (ft)	155									230		
Storage Blk Time (%)	1	19								0	5	35
Queuing Penalty (veh)	1	12								0	3	121

Intersection: 3: Herndon Parkway & Spring Street

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	TR
Maximum Queue (ft)	170	302	346	298	160
Average Queue (ft)	150	150	214	82	85
95th Queue (ft)	224	267	320	188	158
Link Distance (ft)				365	365
Upstream Blk Time (%)			0	0	
Queuing Penalty (veh)			0	0	
Storage Bay Dist (ft)	170	350	350		
Storage Blk Time (%)	4		0	0	
Queuing Penalty (veh)	20		0	1	

Intersection: 5: Spring Street & Ramp

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	L	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	239	98	106	390	306	168	188	245	351	204
Average Queue (ft)	127	25	35	224	133	75	69	79	120	45
95th Queue (ft)	222	72	86	335	262	145	162	163	247	118
Link Distance (ft)	237	237	237	949	949	949			531	531
Upstream Blk Time (%)	1								0	
Queuing Penalty (veh)	2								0	
Storage Bay Dist (ft)							250	270		
Storage Blk Time (%)							0	0	1	
Queuing Penalty (veh)							0	0	1	

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	158	184	266	198	235	235	199	349	308	257	97
Average Queue (ft)	74	97	153	75	146	140	87	237	208	138	5
95th Queue (ft)	133	158	238	147	217	212	184	325	294	244	44
Link Distance (ft)		531		1415	1415	1415	1415	993	993	993	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	200		730								530
Storage Blk Time (%)	0	0									
Queuing Penalty (veh)	0	0									

Intersection: 8: Sunset Park Dr & Spring Street

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB
Directions Served	T	T	TR	T	T	T	T	R	R
Maximum Queue (ft)	16	2	8	27	56	5	8	123	45
Average Queue (ft)	1	0	0	1	5	0	0	50	10
95th Queue (ft)	12	2	4	15	30	5	6	99	32
Link Distance (ft)	293	293	293			237	237	406	349
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				150	150				
Storage Blk Time (%)									
Queuing Penalty (veh)									

Network Summary

Network wide Queuing Penalty: 170

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & Spring Street

08/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	21	682	31	553	508	475	99	241	944	400	298	46
Future Volume (veh/h)	21	682	31	553	508	475	99	241	944	400	298	46
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	23	741	34	601	552	516	108	262	1026	435	324	50
Adj No. of Lanes	1	3	0	2	2	1	1	1	2	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	65	953	44	677	1242	728	446	551	1559	657	919	140
Arrive On Green	0.04	0.19	0.19	0.20	0.35	0.35	0.09	0.30	0.30	0.11	0.30	0.30
Sat Flow, veh/h	1774	4985	228	3442	3539	1583	1774	1863	3167	3442	3079	471
Grp Volume(v), veh/h	23	503	272	601	552	516	108	262	1026	435	185	189
Grp Sat Flow(s),veh/h/ln	1774	1695	1823	1721	1770	1583	1774	1863	1583	1721	1770	1780
Q Serve(g_s), s	1.4	15.3	15.4	18.4	13.0	28.3	4.3	12.5	26.4	9.3	8.9	9.0
Cycle Q Clear(g_c), s	1.4	15.3	15.4	18.4	13.0	28.3	4.3	12.5	26.4	9.3	8.9	9.0
Prop In Lane	1.00		0.13	1.00		1.00	1.00		1.00	1.00		0.26
Lane Grp Cap(c), veh/h	65	648	348	677	1242	728	446	551	1559	657	528	531
V/C Ratio(X)	0.35	0.78	0.78	0.89	0.44	0.71	0.24	0.48	0.66	0.66	0.35	0.36
Avail Cap(c_a), veh/h	164	751	404	763	1242	728	446	612	1663	724	621	624
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	50.9	41.6	41.6	42.4	27.0	23.5	22.0	31.3	20.6	23.5	29.8	29.8
Incr Delay (d2), s/veh	3.2	4.5	8.3	11.5	1.2	5.8	0.3	0.6	0.9	2.0	0.4	0.4
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	0.7	7.5	8.5	9.8	6.6	13.4	2.1	6.5	11.6	4.5	4.4	4.5
LnGrp Delay(d),s/veh	54.1	46.1	49.9	53.9	28.2	29.2	22.3	31.9	21.5	25.5	30.2	30.2
LnGrp LOS	D	D	D	D	C	C	C	C	C	C	C	C
Approach Vol, veh/h		798			1669			1396			809	
Approach Delay, s/veh		47.6			37.8			23.5			27.7	
Approach LOS		D			D			C			C	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	44.0	16.3	38.0	27.3	26.7	16.0	38.3				
Change Period (Y+Rc), s	6.0	6.0	4.5	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	10.0	38.0	13.9	35.6	24.0	24.0	10.0	38.0				
Max Q Clear Time (g_c+I1), s	3.4	30.3	11.3	28.4	20.4	17.4	6.3	11.0				
Green Ext Time (p_c), s	0.0	3.5	0.5	3.7	0.9	2.7	0.1	2.3				
Intersection Summary												
HCM 2010 Ctrl Delay			33.4									
HCM 2010 LOS			C									
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

08/07/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	183	184	712	1812	2823	618		
Future Volume (veh/h)	183	184	712	1812	2823	618		
Number	3	18	5	2	6	16		
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	199	0	774	1970	3068	0		
Adj No. of Lanes	2	1	2	3	3	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	229	106	717	4111	2797	871		
Arrive On Green	0.02	0.00	0.21	0.81	0.55	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	199	0	774	1970	3068	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	6.9	0.0	25.0	14.5	66.0	0.0		
Cycle Q Clear(g_c), s	6.9	0.0	25.0	14.5	66.0	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	229	106	717	4111	2797	871		
V/C Ratio(X)	0.87	0.00	1.08	0.48	1.10	0.00		
Avail Cap(c_a), veh/h	229	106	717	4195	2797	871		
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.95	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	58.2	0.0	47.5	3.6	27.0	0.0		
Incr Delay (d2), s/veh	26.6	0.0	57.1	0.4	50.0	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	4.1	0.0	17.5	6.7	43.5	0.0		
LnGrp Delay(d),s/veh	84.8	0.0	104.6	4.0	77.0	0.0		
LnGrp LOS	F		F	A	F			
Approach Vol, veh/h	199			2744	3068			
Approach Delay, s/veh	84.8			32.4	77.0			
Approach LOS	F			C	E			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		105.0			33.0	72.0		15.0
Change Period (Y+Rc), s		* 8			8.0	6.0		7.0
Max Green Setting (Gmax), s		* 99			25.0	66.0		8.0
Max Q Clear Time (g_c+I1), s		16.5			27.0	68.0		8.9
Green Ext Time (p_c), s		47.4			0.0	0.0		0.0
Intersection Summary								
HCM 2010 Ctrl Delay			56.9					
HCM 2010 LOS			E					
Notes								

HCM Signalized Intersection Capacity Analysis

5: Spring Street & Ramp

08/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		 			  							 
Traffic Volume (vph)	125	1577	395	0	606	242	0	0	0	304	0	1025
Future Volume (vph)	125	1577	395	0	606	242	0	0	0	304	0	1025
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		0.88
Frt	1.00	1.00	0.85		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1711	3421	1531		4916	1531				1711		2694
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1711	3421	1531		4916	1531				1711		2694
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	136	1714	429	0	659	263	0	0	0	330	0	1114
RTOR Reduction (vph)	0	0	129	0	0	160	0	0	0	0	0	66
Lane Group Flow (vph)	136	1714	300	0	659	103	0	0	0	330	0	1048
Turn Type	Prot	NA	Perm		NA	Perm				Perm		pm+ov
Protected Phases	1	6			2							1
Permitted Phases		6	6		2	2				4		4
Actuated Green, G (s)	28.0	81.1	81.1		47.1	47.1				28.4		56.4
Effective Green, g (s)	28.0	81.1	81.1		47.1	47.1				28.4		56.4
Actuated g/C Ratio	0.23	0.68	0.68		0.39	0.39				0.24		0.47
Clearance Time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)	399	2312	1034		1929	600				404		1400
v/s Ratio Prot	0.08	c0.50			0.13							c0.17
v/s Ratio Perm			0.20			0.07				c0.19		0.21
v/c Ratio	0.34	0.74	0.29		0.34	0.17				0.82		0.75
Uniform Delay, d1	38.3	12.6	7.8		25.6	23.7				43.3		26.0
Progression Factor	1.00	1.00	1.00		1.00	1.00				0.51		0.57
Incremental Delay, d2	0.5	2.2	0.7		0.5	0.6				7.2		1.3
Delay (s)	38.8	14.8	8.6		26.1	24.4				29.3		16.2
Level of Service	D	B	A		C	C				C		B
Approach Delay (s)		15.1			25.6			0.0			19.2	
Approach LOS		B			C			A			B	
Intersection Summary												
HCM 2000 Control Delay			18.4									HCM 2000 Level of Service B
HCM 2000 Volume to Capacity ratio			0.81									
Actuated Cycle Length (s)			120.0									Sum of lost time (s) 16.5
Intersection Capacity Utilization			68.4%									ICU Level of Service C
Analysis Period (min)			15									
c Critical Lane Group												

Intersection: 3: Herndon Parkway & Spring Street

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	TR	L	L	T	T	R	L	T	TR
Maximum Queue (ft)	154	368	327	236	290	292	180	196	128	173	448	461
Average Queue (ft)	28	238	196	134	192	208	89	112	56	62	381	425
95th Queue (ft)	103	335	294	213	283	294	150	171	98	131	538	481
Link Distance (ft)		481	481	481	296	296	296	296	296		411	411
Upstream Blk Time (%)					3	4					17	55
Queuing Penalty (veh)					8	12					0	0
Storage Bay Dist (ft)	155									230		
Storage Blk Time (%)	0	38								0	2	54
Queuing Penalty (veh)	0	8								0	2	256

Intersection: 3: Herndon Parkway & Spring Street

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	TR
Maximum Queue (ft)	405	293	339	290	203
Average Queue (ft)	390	155	219	92	99
95th Queue (ft)	464	270	321	210	178
Link Distance (ft)				365	365
Upstream Blk Time (%)	2		0	1	
Queuing Penalty (veh)	0		0	0	
Storage Bay Dist (ft)	405	350	350		
Storage Blk Time (%)	2	0	1	0	
Queuing Penalty (veh)	14	0	1	2	

Intersection: 5: Spring Street & Ramp

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	L	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	140	229	229	274	211	181	80	270	456	399
Average Queue (ft)	55	116	130	161	85	89	9	180	209	118
95th Queue (ft)	116	197	209	248	189	162	47	282	365	274
Link Distance (ft)	239	239	239	949	949	949			531	531
Upstream Blk Time (%)		0	0						0	0
Queuing Penalty (veh)		1	0						0	1
Storage Bay Dist (ft)							250	270		
Storage Blk Time (%)						0		1	3	
Queuing Penalty (veh)						0		5	10	

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	128	147	726	730	1461	1438	1428	1030	1023	1033	530
Average Queue (ft)	64	78	688	685	1218	1179	863	779	755	709	365
95th Queue (ft)	115	129	837	876	1991	1965	1834	1151	1131	1151	704
Link Distance (ft)		531			1415	1415	1415	993	993	993	
Upstream Blk Time (%)					66	12	1	10	5	12	
Queuing Penalty (veh)					0	0	0	0	0	0	
Storage Bay Dist (ft)	200		730	730							530
Storage Blk Time (%)			17	35	38					13	2
Queuing Penalty (veh)			100	213	271					78	17

Intersection: 8: Sunset Park Dr & Spring Street

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	T	T	TR	T	T	T	R	R
Maximum Queue (ft)	24	58	13	31	36	27	399	47
Average Queue (ft)	1	2	1	6	7	6	326	15
95th Queue (ft)	18	41	7	48	52	66	488	39
Link Distance (ft)	296	296	296			239	369	299
Upstream Blk Time (%)						0	63	
Queuing Penalty (veh)						1	0	
Storage Bay Dist (ft)				150	150			
Storage Blk Time (%)				0	1	0		
Queuing Penalty (veh)				0	2	2		

Network Summary

Network wide Queuing Penalty: 1004

HCM 2010 Signalized Intersection Summary

3: Herndon Parkway & Spring Street

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	646	86	919	769	415	76	408	884	494	340	32
Future Volume (veh/h)	79	646	86	919	769	415	76	408	884	494	340	32
Number	1	6	16	5	2	12	7	4	14	3	8	18
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	1900	1863	1863	1863	1863	1863	1863	1863	1863	1900
Adj Flow Rate, veh/h	86	702	93	999	836	451	83	443	961	537	370	35
Adj No. of Lanes	1	3	0	2	2	1	1	1	2	2	2	0
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	107	786	103	1003	1430	849	375	452	1692	563	958	90
Arrive On Green	0.06	0.17	0.17	0.29	0.40	0.40	0.07	0.24	0.24	0.13	0.29	0.29
Sat Flow, veh/h	1774	4550	598	3442	3539	1583	1774	1863	3167	3442	3270	308
Grp Volume(v), veh/h	86	521	274	999	836	451	83	443	961	537	199	206
Grp Sat Flow(s),veh/h/ln	1774	1695	1757	1721	1770	1583	1774	1863	1583	1721	1770	1808
Q Serve(g_s), s	6.7	21.1	21.3	40.6	25.8	25.9	4.7	33.1	10.0	17.3	12.6	12.7
Cycle Q Clear(g_c), s	6.7	21.1	21.3	40.6	25.8	25.9	4.7	33.1	10.0	17.3	12.6	12.7
Prop In Lane	1.00		0.34	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	107	586	304	1003	1430	849	375	452	1692	563	518	530
V/C Ratio(X)	0.80	0.89	0.90	1.00	0.58	0.53	0.22	0.98	0.57	0.95	0.38	0.39
Avail Cap(c_a), veh/h	165	605	314	1003	1430	849	375	452	1692	563	518	530
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)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	65.0	56.6	56.7	49.5	32.6	21.1	34.7	52.6	7.4	41.3	39.4	39.5
Incr Delay (d2), s/veh	14.7	18.2	31.5	27.4	1.8	2.4	0.3	36.8	0.5	26.9	0.5	0.5
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	3.7	11.3	13.1	23.1	13.0	11.8	2.3	21.6	5.7	12.4	6.2	6.4
LnGrp Delay(d),s/veh	79.7	74.8	88.2	76.9	34.3	23.4	35.0	89.4	7.8	68.3	39.9	40.0
LnGrp LOS	E	E	F	E	C	C	C	F	A	E	D	D
Approach Vol, veh/h		881			2286			1487			942	
Approach Delay, s/veh		79.4			50.8			33.7			56.1	
Approach LOS		E			D			C			E	
Timer	1	2	3	4	5	6	7	8				
Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	14.5	62.5	23.0	40.0	46.8	30.2	16.0	47.0				
Change Period (Y+Rc), s	6.0	6.0	4.5	6.0	6.0	6.0	6.0	6.0				
Max Green Setting (Gmax), s	13.0	52.0	18.5	34.0	40.0	25.0	10.0	41.0				
Max Q Clear Time (g_c+I1), s	8.7	27.9	19.3	35.1	42.6	23.3	6.7	14.7				
Green Ext Time (p_c), s	0.1	13.8	0.0	0.0	0.0	0.9	0.0	11.6				
Intersection Summary												
HCM 2010 Ctrl Delay			51.6									
HCM 2010 LOS			D									
Notes												

HCM 2010 Signalized Intersection Summary

6: Fairfax County Parkway & Ramp

06/07/2017

								
Movement	EBL	EBR	NBL	NBT	SBT	SBR		
Lane Configurations								
Traffic Volume (veh/h)	380	544	455	2291	1597	392		
Future Volume (veh/h)	380	544	455	2291	1597	392		
Number	3	18	5	2	6	16		
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	413	0	495	2490	1736	0		
Adj No. of Lanes	2	1	2	3	3	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	493	227	842	3630	2096	653		
Arrive On Green	0.05	0.00	0.24	0.71	0.41	0.00		
Sat Flow, veh/h	3442	1583	3442	5253	5253	1583		
Grp Volume(v), veh/h	413	0	495	2490	1736	0		
Grp Sat Flow(s),veh/h/ln	1721	1583	1721	1695	1695	1583		
Q Serve(g_s), s	12.5	0.0	13.3	28.8	32.0	0.0		
Cycle Q Clear(g_c), s	12.5	0.0	13.3	28.8	32.0	0.0		
Prop In Lane	1.00	1.00	1.00			1.00		
Lane Grp Cap(c), veh/h	493	227	842	3630	2096	653		
V/C Ratio(X)	0.84	0.00	0.59	0.69	0.83	0.00		
Avail Cap(c_a), veh/h	590	271	842	3630	2179	679		
HCM Platoon Ratio	0.33	0.33	1.00	1.00	1.00	1.00		
Upstream Filter(I)	0.63	0.00	1.00	1.00	1.00	0.00		
Uniform Delay (d), s/veh	48.8	0.0	35.0	8.4	27.5	0.0		
Incr Delay (d2), s/veh	5.8	0.0	1.1	1.1	3.9	0.0		
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0		
%ile BackOfQ(50%),veh/ln	6.4	0.0	6.5	13.7	15.7	0.0		
LnGrp Delay(d),s/veh	54.6	0.0	36.1	9.5	31.5	0.0		
LnGrp LOS	D		D	A	C			
Approach Vol, veh/h	413			2985	1736			
Approach Delay, s/veh	54.6			13.9	31.5			
Approach LOS	D			B	C			
Timer	1	2	3	4	5	6	7	8
Assigned Phs		2			5	6		8
Phs Duration (G+Y+Rc), s		83.0			33.7	49.3		22.0
Change Period (Y+Rc), s		* 8			8.0	6.0		7.0
Max Green Setting (Gmax), s		* 74			21.0	45.0		18.0
Max Q Clear Time (g_c+I1), s		30.8			15.3	34.0		14.5
Green Ext Time (p_c), s		39.5			5.6	9.3		0.5
Intersection Summary								
HCM 2010 Ctrl Delay			23.1					
HCM 2010 LOS			C					
Notes								

HCM Signalized Intersection Capacity Analysis

5: Spring Street & Ramp

06/07/2017

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	308	1074	726	0	1395	616	0	0	0	125	0	722
Future Volume (vph)	308	1074	726	0	1395	616	0	0	0	125	0	722
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Lane Util. Factor	1.00	0.95	1.00		0.91	1.00				1.00		0.88
Frt	1.00	1.00	0.85		1.00	0.85				1.00		0.85
Flt Protected	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (prot)	1711	3421	1531		4916	1531				1711		2694
Flt Permitted	0.95	1.00	1.00		1.00	1.00				0.95		1.00
Satd. Flow (perm)	1711	3421	1531		4916	1531				1711		2694
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	335	1167	789	0	1516	670	0	0	0	136	0	785
RTOR Reduction (vph)	0	0	182	0	0	333	0	0	0	0	0	17
Lane Group Flow (vph)	335	1167	607	0	1516	337	0	0	0	136	0	768
Turn Type	Prot	NA	Perm		NA	Perm				Perm		pm+ov
Protected Phases	1	6			2							1
Permitted Phases		6	6		2	2				4		4
Actuated Green, G (s)	22.0	80.8	80.8		52.8	52.8				13.7		35.7
Effective Green, g (s)	22.0	80.8	80.8		52.8	52.8				13.7		35.7
Actuated g/C Ratio	0.21	0.77	0.77		0.50	0.50				0.13		0.34
Clearance Time (s)	6.0	5.5	5.5		5.5	5.5				5.0		6.0
Vehicle Extension (s)	3.0	3.0	3.0		3.0	3.0				3.0		3.0
Lane Grp Cap (vph)	358	2632	1178		2472	769				223		1069
v/s Ratio Prot	c0.20	0.34			c0.31							c0.15
v/s Ratio Perm			0.40			0.22				0.08		0.13
v/c Ratio	0.94	0.44	0.52		0.61	0.44				0.61		0.72
Uniform Delay, d1	40.8	4.2	4.6		18.8	16.6				43.1		30.3
Progression Factor	1.00	1.00	1.00		1.00	1.00				0.63		0.40
Incremental Delay, d2	31.3	0.5	1.6		1.1	1.8				4.0		2.0
Delay (s)	72.1	4.8	6.2		19.9	18.5				31.2		14.0
Level of Service	E	A	A		B	B				C		B
Approach Delay (s)		15.1			19.5			0.0			16.5	
Approach LOS		B			B			A			B	
Intersection Summary												
HCM 2000 Control Delay			17.1		HCM 2000 Level of Service					B		
HCM 2000 Volume to Capacity ratio			0.73									
Actuated Cycle Length (s)			105.0		Sum of lost time (s)					16.5		
Intersection Capacity Utilization			64.8%		ICU Level of Service					C		
Analysis Period (min)			15									
c Critical Lane Group												

Intersection: 3: Herndon Parkway & Spring Street

Movement	EB	EB	EB	EB	WB	WB	WB	WB	WB	NB	NB	NB
Directions Served	L	T	T	TR	L	L	T	T	R	L	T	TR
Maximum Queue (ft)	155	396	408	416	388	395	328	352	248	230	772	781
Average Queue (ft)	94	311	370	381	346	356	207	225	90	101	740	749
95th Queue (ft)	181	455	444	436	414	411	307	321	174	244	811	779
Link Distance (ft)		373	373	373	295	295	295	295	295		729	729
Upstream Blk Time (%)		16	55	73	33	44	1	2	0		34	82
Queuing Penalty (veh)		0	0	0	130	172	5	10	0		0	0
Storage Bay Dist (ft)	155									230		
Storage Blk Time (%)	2	54								0	22	53
Queuing Penalty (veh)	4	43								0	17	233

Intersection: 3: Herndon Parkway & Spring Street

Movement	NB	SB	SB	SB	SB
Directions Served	R	L	L	T	TR
Maximum Queue (ft)	170	340	349	519	288
Average Queue (ft)	167	234	279	180	125
95th Queue (ft)	193	362	383	441	236
Link Distance (ft)				629	629
Upstream Blk Time (%)				0	
Queuing Penalty (veh)				0	
Storage Bay Dist (ft)	170	350	350		
Storage Blk Time (%)	6	0	4	2	
Queuing Penalty (veh)	41	0	7	12	

Intersection: 5: Spring Street & Ramp

Movement	EB	EB	EB	WB	WB	WB	WB	SB	SB	SB
Directions Served	L	T	T	T	T	T	R	L	R	R
Maximum Queue (ft)	293	141	147	555	529	386	244	270	503	480
Average Queue (ft)	176	42	51	310	222	123	127	131	265	137
95th Queue (ft)	290	110	116	484	418	273	250	278	496	422
Link Distance (ft)	237	237	237	949	949	949			531	531
Upstream Blk Time (%)	5	0			0	0			1	2
Queuing Penalty (veh)	29	1			0	0			4	7
Storage Bay Dist (ft)							250	270		
Storage Blk Time (%)						0	1	0	17	
Queuing Penalty (veh)						3	3	1	21	

Intersection: 6: Fairfax County Parkway & Ramp

Movement	EB	EB	NB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	L	L	L	L	T	T	T	T	T	T	R
Maximum Queue (ft)	191	267	507	469	365	336	238	465	420	345	226
Average Queue (ft)	95	118	294	191	170	169	144	296	264	196	31
95th Queue (ft)	161	200	521	444	330	299	227	403	371	306	145
Link Distance (ft)		531			1415	1415	1415	993	993	993	
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	200		730	730							530
Storage Blk Time (%)	0	1	0	0	0					0	0
Queuing Penalty (veh)	0	2	0	1	0					0	0

Intersection: 8: Sunset Park Dr & Spring Street

Movement	EB	EB	EB	WB	WB	WB	WB	NB	SB
Directions Served	T	T	TR	T	T	T	T	R	R
Maximum Queue (ft)	64	23	14	142	149	290	213	256	89
Average Queue (ft)	4	1	1	70	82	71	25	92	25
95th Queue (ft)	38	17	8	171	181	265	141	195	75
Link Distance (ft)	295	295	295			237	237	381	363
Upstream Blk Time (%)						3	0	0	
Queuing Penalty (veh)						19	1	0	
Storage Bay Dist (ft)				150	150				
Storage Blk Time (%)				0	3	2			
Queuing Penalty (veh)				2	13	18			

Network Summary

Network wide Queuing Penalty: 797

APPENDIX C: SYNCHRO SIGNAL TIMINGS

Timings

3: Herndon Parkway & Spring Street

06/12/2017

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	16	529	516	394	368	77	200	732	315	231
Future Volume (vph)	16	529	516	394	368	77	200	732	315	231
Turn Type	Prot	NA	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	1	6	5	2	3	7	4	5	3	8
Permitted Phases		6		2	2	4		4	8	
Detector Phase	1	6	5	2	3	7	4	5	3	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	8.0	10.0	5.0	10.0	10.0	8.0	5.0	8.0
Minimum Split (s)	16.0	30.0	14.0	31.0	9.5	16.0	40.0	14.0	9.5	44.0
Total Split (s)	16.0	30.0	30.0	44.0	18.4	16.0	41.6	30.0	18.4	44.0
Total Split (%)	13.3%	25.0%	25.0%	36.7%	15.3%	13.3%	34.7%	25.0%	15.3%	36.7%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.5	4.0	4.0	4.0	3.5	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.5	6.0	6.0	6.0	4.5	6.0
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lead	Lag	Lead	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	Min	None	Max	None	None	None	None	None	None
Act Effect Green (s)	8.3	19.4	20.5	41.2	59.3	26.9	16.6	43.3	32.1	20.8
Actuated g/C Ratio	0.09	0.21	0.22	0.45	0.65	0.29	0.18	0.47	0.35	0.23
v/c Ratio	0.11	0.58	0.76	0.28	0.35	0.22	0.72	0.57	0.59	0.38
Control Delay	47.2	36.3	42.0	19.5	2.3	21.9	17.4	17.0	24.4	31.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	47.2	36.3	42.0	19.5	2.3	21.9	17.4	17.0	24.4	31.5
LOS	D	D	D	B	A	C	B	B	C	C
Approach Delay		36.6		23.6			17.6			27.6
Approach LOS		D		C			B			C

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 91.6

Natural Cycle: 110

Control Type: Semi Act-Uncoord

Maximum v/c Ratio: 0.76

Intersection Signal Delay: 24.7

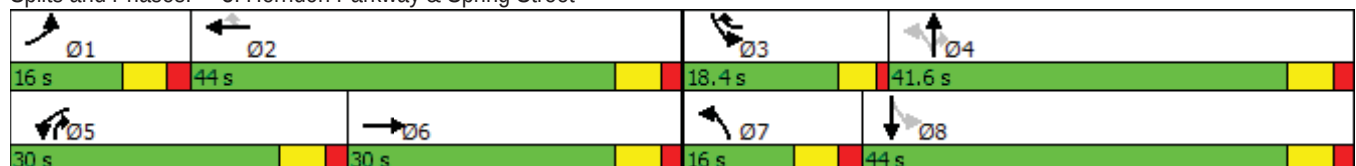
Intersection LOS: C

Intersection Capacity Utilization 66.6%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 3: Herndon Parkway & Spring Street



Timings

5: Spring Street & Ramp

06/12/2017



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	97	1223	306	470	188	236	795
Future Volume (vph)	97	1223	306	470	188	236	795
Turn Type	Prot	NA	Perm	NA	Perm	Perm	pm+ov
Protected Phases	1	6		2			1
Permitted Phases		6	6	2	2	4	4
Detector Phase	1	6	6	2	2	4	1
Switch Phase							
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	5.0	7.0
Minimum Split (s)	13.0	15.5	15.5	15.5	15.5	36.0	13.0
Total Split (s)	34.0	78.0	78.0	44.0	44.0	42.0	34.0
Total Split (%)	28.3%	65.0%	65.0%	36.7%	36.7%	35.0%	28.3%
Yellow Time (s)	4.0	3.5	3.5	3.5	3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.5	5.5	5.5	5.5	5.0	6.0
Lead/Lag	Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	28.0	86.1	86.1	52.1	52.1	23.4	56.4
Actuated g/C Ratio	0.23	0.72	0.72	0.43	0.43	0.20	0.47
v/c Ratio	0.26	0.54	0.28	0.24	0.26	0.77	0.62
Control Delay	39.7	9.6	1.4	22.8	4.2	34.7	6.2
Queue Delay	0.0	0.4	0.0	0.0	0.0	0.0	0.0
Total Delay	39.7	9.9	1.4	22.8	4.2	34.7	6.2
LOS	D	A	A	C	A	C	A
Approach Delay		10.1		17.5			
Approach LOS		B		B			

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

Offset: 12 (10%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.77

Intersection Signal Delay: 12.4

Intersection LOS: B

Intersection Capacity Utilization 54.8%

ICU Level of Service A

Analysis Period (min) 15

Splits and Phases: 5: Spring Street & Ramp



Timings

6: Fairfax County Parkway & Ramp

06/12/2017

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations	 		 	  	  	
Traffic Volume (vph)	142	143	552	1405	2189	479
Future Volume (vph)	142	143	552	1405	2189	479
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	8		5	2	6	
Permitted Phases		Free				Free
Detector Phase	8		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	20.0	20.0	
Minimum Split (s)	14.0		13.0	26.0	26.0	
Total Split (s)	15.0		33.0	105.0	72.0	
Total Split (%)	12.5%		27.5%	87.5%	60.0%	
Yellow Time (s)	3.0		4.0	5.0	5.0	
All-Red Time (s)	4.0		4.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		8.0	6.0	6.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Min	C-Min	
Act Effct Green (s)	8.0	120.0	24.3	99.0	66.7	120.0
Actuated g/C Ratio	0.07	1.00	0.20	0.82	0.56	1.00
v/c Ratio	0.69	0.10	0.90	0.38	0.87	0.34
Control Delay	65.4	0.1	63.7	3.0	27.6	0.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	65.4	0.1	63.7	3.0	27.6	0.6
LOS	E	A	E	A	C	A
Approach Delay	32.7			20.1	22.8	
Approach LOS	C			C	C	

Intersection Summary

Cycle Length: 120

Actuated Cycle Length: 120

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

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.90

Intersection Signal Delay: 22.3

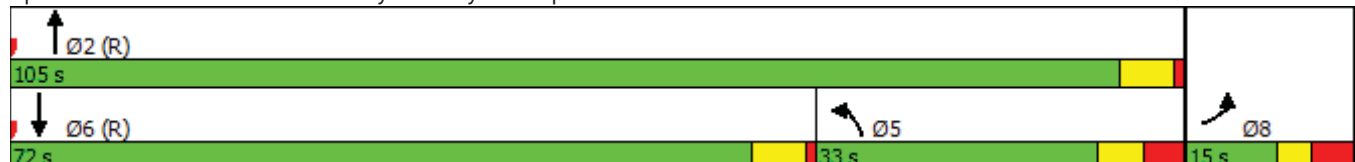
Intersection LOS: C

Intersection Capacity Utilization 81.4%

ICU Level of Service D

Analysis Period (min) 15

Splits and Phases: 6: Fairfax County Parkway & Ramp



Timings

3: Herndon Parkway & Spring Street

06/12/2017

										
Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations										
Traffic Volume (vph)	79	646	919	769	415	76	408	884	494	340
Future Volume (vph)	79	646	919	769	415	76	408	884	494	340
Turn Type	Prot	NA	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA
Protected Phases	1	6	5	2	3	7	4	5	3	8
Permitted Phases		6		2	2	4		4	8	
Detector Phase	1	6	5	2	3	7	4	5	3	8
Switch Phase										
Minimum Initial (s)	8.0	10.0	8.0	10.0	5.0	10.0	10.0	8.0	5.0	8.0
Minimum Split (s)	16.0	30.0	14.0	31.0	9.5	16.0	40.0	14.0	9.5	44.0
Total Split (s)	19.0	31.0	46.0	58.0	23.0	16.0	40.0	46.0	23.0	47.0
Total Split (%)	13.6%	22.1%	32.9%	41.4%	16.4%	11.4%	28.6%	32.9%	16.4%	33.6%
Yellow Time (s)	4.0	4.0	4.0	4.0	3.5	4.0	4.0	4.0	3.5	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	1.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	6.0	6.0	6.0	4.5	6.0	6.0	6.0	4.5	6.0
Lead/Lag	Lead	Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	C-Min	None	C-Max	None	None	None	None	None	None
Act Effect Green (s)	11.3	24.9	40.1	53.7	78.2	44.0	34.0	74.1	58.5	41.0
Actuated g/C Ratio	0.08	0.18	0.29	0.38	0.56	0.31	0.24	0.53	0.42	0.29
v/c Ratio	0.62	0.91	1.05	0.64	0.49	0.24	1.06	0.59	0.99	0.41
Control Delay	81.7	71.1	91.0	38.2	13.7	28.5	86.9	10.8	75.2	40.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	81.7	71.1	91.0	38.2	13.7	28.5	86.9	10.8	75.2	40.5
LOS	F	E	F	D	B	C	F	B	E	D
Approach Delay		72.2		56.5			59.1			60.3
Approach LOS		E		E			E			E

Intersection Summary

Cycle Length: 140

Actuated Cycle Length: 140

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

Natural Cycle: 140

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 1.06

Intersection Signal Delay: 60.3

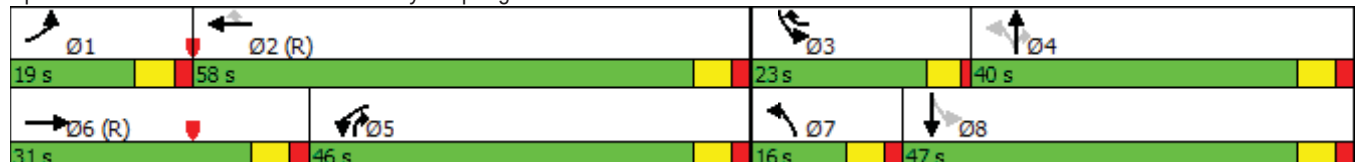
Intersection LOS: E

Intersection Capacity Utilization 94.2%

ICU Level of Service F

Analysis Period (min) 15

Splits and Phases: 3: Herndon Parkway & Spring Street



Timings

5: Spring Street & Ramp

06/12/2017



Lane Group	EBL	EBT	EBR	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	308	1074	726	1395	616	125	722
Future Volume (vph)	308	1074	726	1395	616	125	722
Turn Type	Prot	NA	Perm	NA	Perm	Perm	pm+ov
Protected Phases	1	6		2			1
Permitted Phases		6	6	2	2	4	4
Detector Phase	1	6	6	2	2	4	1
Switch Phase							
Minimum Initial (s)	7.0	10.0	10.0	10.0	10.0	5.0	7.0
Minimum Split (s)	13.0	15.5	15.5	15.5	15.5	36.0	13.0
Total Split (s)	28.0	69.0	69.0	41.0	41.0	36.0	28.0
Total Split (%)	26.7%	65.7%	65.7%	39.0%	39.0%	34.3%	26.7%
Yellow Time (s)	4.0	3.5	3.5	3.5	3.5	4.0	4.0
All-Red Time (s)	2.0	2.0	2.0	2.0	2.0	1.0	2.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	6.0	5.5	5.5	5.5	5.5	5.0	6.0
Lead/Lag	Lag			Lead	Lead		Lag
Lead-Lag Optimize?	Yes			Yes	Yes		Yes
Recall Mode	None	C-Max	C-Max	C-Max	C-Max	None	None
Act Effect Green (s)	22.0	80.8	80.8	52.8	52.8	13.7	40.7
Actuated g/C Ratio	0.21	0.77	0.77	0.50	0.50	0.13	0.39
v/c Ratio	0.94	0.44	0.58	0.61	0.61	0.61	0.74
Control Delay	75.8	5.2	2.2	20.7	4.0	36.9	14.5
Queue Delay	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Total Delay	75.8	5.2	2.4	20.7	4.0	36.9	14.5
LOS	E	A	A	C	A	D	B
Approach Delay		14.6		15.6			
Approach LOS		B		B			

Intersection Summary

Cycle Length: 105

Actuated Cycle Length: 105

Offset: 13 (12%), Referenced to phase 2:WBT and 6:EBT, Start of Green

Natural Cycle: 90

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.94

Intersection Signal Delay: 15.6

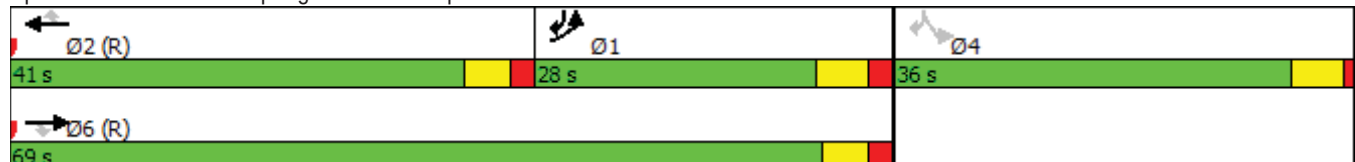
Intersection LOS: B

Intersection Capacity Utilization 64.8%

ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 5: Spring Street & Ramp



Timings

6: Fairfax County Parkway & Ramp

06/12/2017

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	380	544	455	2291	1597	392
Future Volume (vph)	380	544	455	2291	1597	392
Turn Type	Prot	Free	Prot	NA	NA	Free
Protected Phases	8		5	2	6	
Permitted Phases		Free				Free
Detector Phase	8		5	2	6	
Switch Phase						
Minimum Initial (s)	7.0		5.0	20.0	20.0	
Minimum Split (s)	14.0		13.0	26.0	26.0	
Total Split (s)	25.0		29.0	80.0	51.0	
Total Split (%)	23.8%		27.6%	76.2%	48.6%	
Yellow Time (s)	3.0		4.0	5.0	5.0	
All-Red Time (s)	4.0		4.0	1.0	1.0	
Lost Time Adjust (s)	0.0		0.0	0.0	0.0	
Total Lost Time (s)	7.0		8.0	6.0	6.0	
Lead/Lag			Lag		Lead	
Lead-Lag Optimize?			Yes		Yes	
Recall Mode	None		None	C-Min	C-Min	
Act Effect Green (s)	16.8	105.0	21.0	75.2	46.2	105.0
Actuated g/C Ratio	0.16	1.00	0.20	0.72	0.44	1.00
v/c Ratio	0.78	0.39	0.75	0.71	0.80	0.28
Control Delay	39.1	0.6	47.4	10.2	29.2	0.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.1	0.6	47.4	10.2	29.2	0.5
LOS	D	A	D	B	C	A
Approach Delay	16.4			16.3	23.6	
Approach LOS	B			B	C	

Intersection Summary

Cycle Length: 105

Actuated Cycle Length: 105

Offset: 104 (99%), Referenced to phase 2:NBT and 6:SBT, Start of Green

Natural Cycle: 65

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.80

Intersection Signal Delay: 18.9

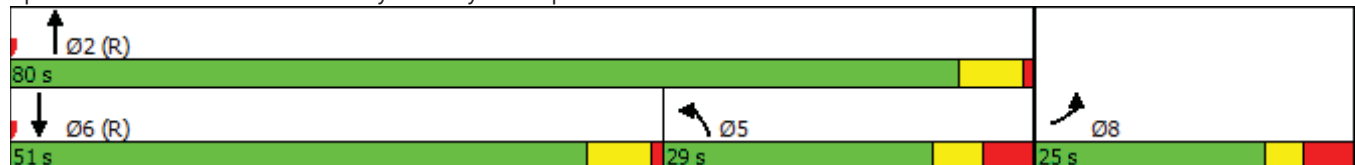
Intersection LOS: B

Intersection Capacity Utilization 72.2%

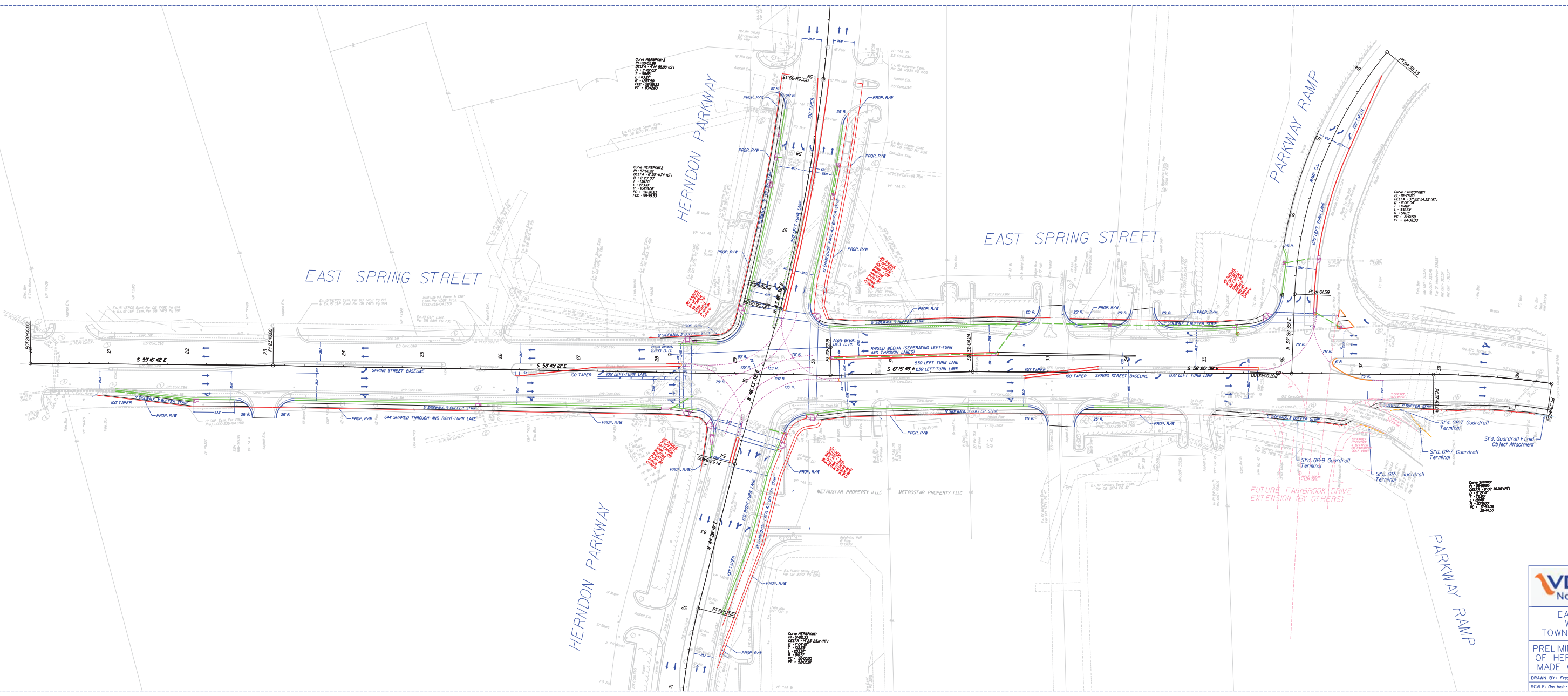
ICU Level of Service C

Analysis Period (min) 15

Splits and Phases: 6: Fairfax County Parkway & Ramp



APPENDIX D: VDOT PRELIMINARY DESIGN SEPTEMBER, 9 2015





Virginia Department of Transportation
Northern Virginia District

EAST SPRING STREET
WIDENING PROJECT
TOWN OF HERNDON, VIRGINIA

PRELIMINARY DESIGN PER TOWN
OF HERNDON HB2 APPLICATION
MADE ON SEPTEMBER 9, 2015

DRAWN BY: Fred Moman, P.E.	REVIEWED BY: Tim Hartzell, P.E.
SCALE: One inch = 25 Feet	DATE: January, 2017
Roll Plan	

WELLS + ASSOCIATES



**FAIRBROOK BUSINESS PARK
TRAFFIC IMPACT STATEMENT
TOWN OF HERNDON, VIRGINIA**

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**Prepared for:
Fairbrook Business Park Associates II LP C/O Quadrangle Development**

**Prepared by:
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Revised through June 4, 2020

Section 1 INTRODUCTION

PURPOSE

This report presents an updated traffic impact statement (TIS) prepared in conjunction with a proposed Special Exception Amendment Application for the Fairbrook Business Park. The site is located on the north side of the Dulles Toll Road, south of Spring Street, and east of Herndon Parkway as shown on Figure 1-1. The traffic study has been revised based on comments received from the Virginia Department of Transportation (VDOT) dated July 24, 2019 and the Town of Herndon dated July 24, 2019. A copy of the comment response document is included in Appendix A. All of the responses have been incorporated into this updated report.

This updated report includes traffic counts collected in 2020 (prior to the COVID-19 pandemic), updated traffic analyses for 2030 (site buildout without and with Fairbrook Drive Extended) and 2035 conditions (with buildout of the HTOC), and maintains the trip threshold for the site based on the underlying zoning density without the extension of Fairbrook Drive.

The property is currently occupied by an office building of 80,088 S.F. that includes a 9,111 S.F. day care facility. Based on Special Exception approvals, the site is approved for a total of 515,688 S.F. of office space and a 162-room hotel (total of 601,250 GSF). The underlying zoning permits up to 848,592 GSF of office uses. The Applicant (Fairbrook Business Park Associates II LP) proposes a Special Exception Amendment utilizing the Landmark Business – Alternate Regulations to develop the site with a combination of residential and office uses that total approximately 1.50 MSF, split into approximately 900 residential units, 600,000 S.F. of general office space, and a 10,000 S.F. day care facility. In addition, the residential and office space includes a minor amount (approximately 10,000 S.F.) of retail/amenity space.

Specifically, this transportation impact study identifies the impacts of the proposed new uses on the surrounding roadway network and is based on the Town of Herndon Traffic Impact Study parameters outlined in section 78-501.2 of the Zoning Ordinance. Representatives of the development team met with the Town of Herndon and the Virginia Department of Transportation (VDOT) to identify the study scope and agree on specific study parameters. A copy of the scoping agreement is included in Appendix A.

Senate Bill 699, Chapter 527 of the 2006 Acts of Assembly was passed by the Virginia legislature in 2006 to enhance the coordination of land use and transportation planning in the Commonwealth. All development proposals which meet certain specific trip generation thresholds are subject to the regulations as outlined in VDOT's *Updated Traffic Impact Analysis Regulations Administrative Guidelines* dated November 2014 (the "Administrative Guidelines"). An amendment to the legislation took effect in January 2012. Based on the legislative updates (now referred to as Chapter 870), a development proposal is generally considered to substantially impact the transportation network if it generates 5,000 or more daily vehicle trips. Based on a review of the Applicant's proposed development plan, a Chapter 870 compliant traffic impact study was required (see Appendix A).

STUDY OBJECTIVES

The objectives of this study were to: (1) analyze existing 2020 traffic conditions in the study area, (2) establish a trip cap for phase 1 conditions (without Fairbrook Drive Extended), (3) analyze future 2030 (buildout) traffic conditions without and/or with the proposed new uses, (4) analyze 2035 (buildout of the Herndon Metro Station Plan) with the proposed uses, and (5) recommend any roadway improvements and/or transportation enhancements necessary to mitigate any traffic impacts associated with the new uses. Utilizing a four-step process consisting of trip generation, trip distribution, a determination of mode split, and traffic assignment, future conditions were forecasted, and intersections were evaluated in terms of levels of service and queuing. Appropriate mitigation measures were then identified and evaluated to remediate impacted levels of service.

Tasks undertaken in this study included the following:

1. Reviewed the Applicant's proposed plans and other background data.
2. Conducted a field reconnaissance of existing roadway and intersection geometries, traffic controls, and speed limits.
3. Attended meetings and corresponded with the Town of Herndon and the Virginia Department of Transportation (VDOT) staff and the project team to establish the general study scope and specific analysis parameters.
4. Conducted updated year 2020 counts of existing traffic at nine (9) key intersections during the weekday AM and PM peak hours (prior to the COVID-19 pandemic).
5. Analyzed existing 2020 levels of service at each of the key study intersections.
6. Forecasted future traffic volumes without the development based on existing traffic counts, regional traffic growth, traffic associated with other area developments, and the underlying approved zoning density for 2030, and with the buildout of the Herndon Metro Station Plan in 2035.
7. Calculated future weekday levels of service without the development at each of the key study intersections for 2030 and 2035 based on background traffic forecasts and existing and/or improved traffic controls and intersection geometries.
8. Estimated the number of weekday peak hour trips that would be generated by the buildout of the proposed new uses based on standard Institute of Transportation Engineers (ITE) 10th edition, Trip Generation rates and/or equations.
9. Prepared weekday AM and PM peak hour total future traffic forecasts with the proposed development based on background traffic forecasts plus site traffic assignments for 2030 (buildout) and 2035 conditions.
10. Calculated weekday total future levels of service for each of the key study intersections based on projected total future traffic forecasts, existing/future traffic controls and intersection geometries for 2030 and 2035.
11. Identified network improvements/enhancements required to accommodate future traffic volumes with the proposed new uses.

12. Establish a trip cap to determine the timing of the Fairbrook Drive Extension.
13. Conducted queuing analyses for years 2030 and 2035 conditions with the proposed uses.

This study was conducted in accordance with section 78-502.2 of Town of Herndon Zoning Ordinance and the 24 VAC 30-155-60 regulations. Sources of data for this analysis included traffic counts conducted by Wells + Associates, the Town of Herndon, the Virginia Department of Transportation (VDOT), the Institute of Transportation Engineers (ITE), Fairfax County, VHB, WCL&W, PC, VIKA Engineers, the Highway Capacity Manual 2000, Synchro version 10.2, and the files of Wells + Associates.

STUDY AREA

This study was conducted in accordance with the parameters set forth in the executed scoping document included in Appendix A and agreed to by the Town of Herndon, VDOT, and the Applicant (and its representatives). The study area (see Figure 1-2) was selected based on those intersections potentially affected by the proposed new uses.

For purposes of this analysis, the following intersections/locations are included in the study area:

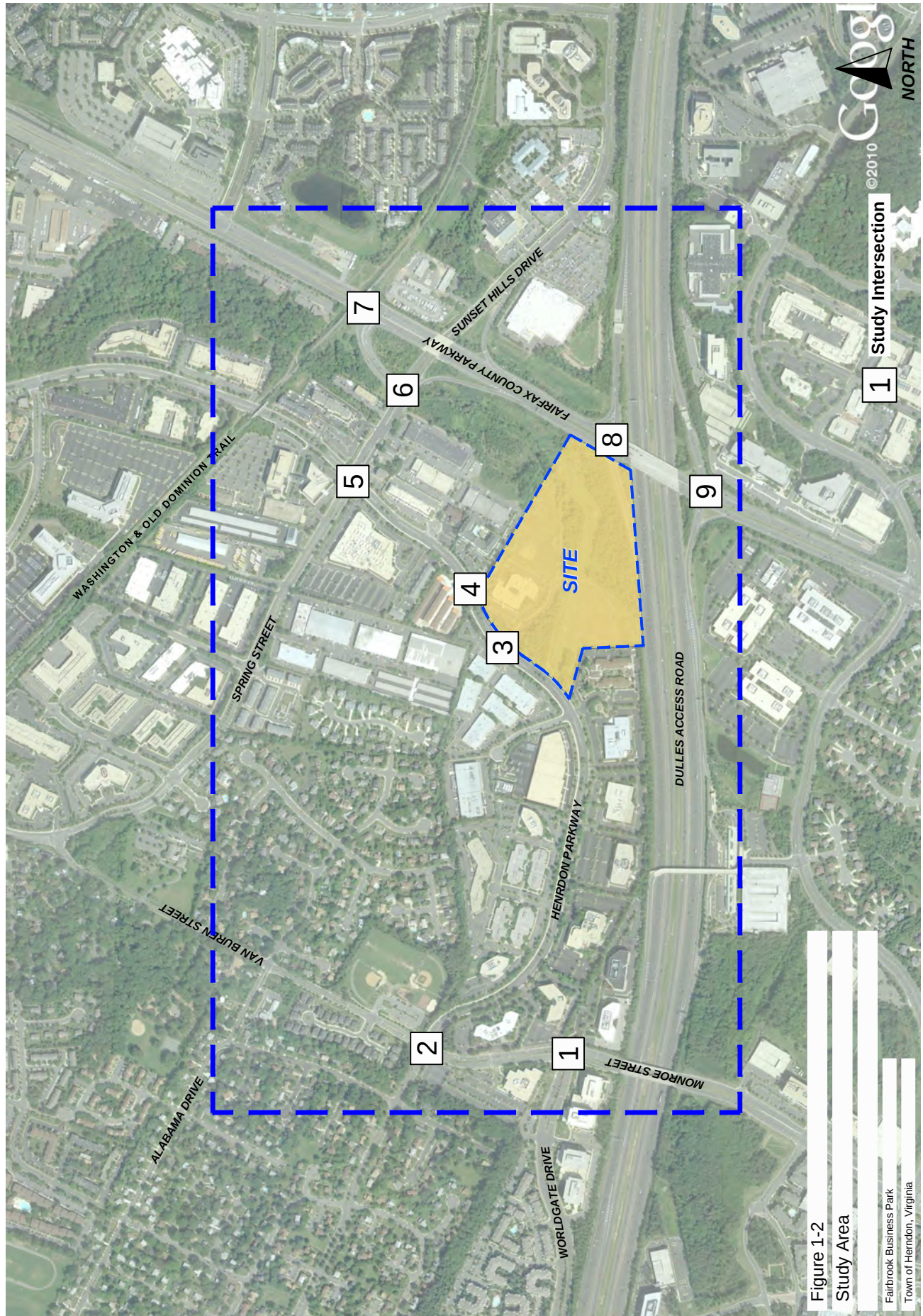
1. Van Buren Street/Monroe Street/Worldgate Drive
2. Van Buren Street/Herndon Parkway
3. Herndon Parkway/Fairbrook Drive
4. Herndon Parkway/Site Driveway
5. Herndon Parkway/Spring Street
6. Fairfax County Parkway Ramps/Spring Street
7. Fairfax County Parkway/Spring Street
8. Fairfax County Parkway/Dulles Toll Road WB Ramps
9. Fairfax County Parkway/Dulles Toll Road EB Ramps

STUDY METHODOLOGY

Synchro software (version 10.2) was used to evaluate levels of service at the study intersections during the weekday AM and PM peak hours. Synchro is a macroscopic model used for optimizing traffic signal timing and performing capacity analyses. The software can model existing traffic signal timings or optimize splits, offsets, and cycle lengths for individual intersections, an arterial, or a complete network. Synchro allows the user to evaluate the effects of changing intersection geometrics, traffic demands, traffic control, and/or traffic signal settings as well as optimize traffic signal timings.

The levels of service reported for the signalized and unsignalized intersections analyzed herein were taken from the Highway Capacity Manual 2000 (HCM) reports generated by Synchro version 10. Level of service descriptions are included in Appendix B.





Section 9

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

Based on this assessment, the following can be concluded:

1. The proposed Fairbrook Business Park development is envisioned as a transit-related mixed-use community consistent with the recommendations of the Comprehensive Plan that will create an attractive living and working environment and take full advantage of future transit service.
2. The currently approved underlying zoning would permit 848,592 GSF of office space to be constructed on-site, with turn lane and traffic signal improvements required at the Herndon Parkway/Fairbrook Drive intersection. The future extension of Fairbrook Drive is not required. Based on the underlying zoning the site would generate 618 weekday AM peak hour, 651 weekday PM peak hour trips, reflecting the trip threshold for the property. Thus, once the calculated peak hour trip generation of the proposed development exceeds this threshold, the Fairbrook Drive Extension would be required.
3. Under existing conditions, all of the study intersections with the exception of Herndon Parkway/Van Buren Street and the Spring Street/Herndon Parkway intersections operate at acceptable overall levels of service (LOS "D" or better) during weekday peak hours. Several side street movements at the Fairbrook Drive/Herndon Parkway intersection operate beyond capacity during peak hours due to mainline traffic volumes.
4. As a result of background regional growth, pipeline development related trips and trips associated with the approved uses, overall levels of service and vehicle delays would worsen at several key study intersections. Additional network improvements/enhancements would be necessary beyond those already committed by others to accommodate the pipeline vehicle trips and regional traffic growth.
5. The full buildout of the proposed development (900 residential units/600,000 S.F. of office/10,000 S.F. daycare) would generate 688 external weekday AM peak hour, 800 external weekday PM peak hour, and 8,178 external weekday daily trips over the existing uses. When compared to the approved uses, the proposed site would generate 126 more AM peak hour, 190 more PM peak hour, and 2,254 more daily trips.
6. The development of Fairbrook Business Park would result in intersection levels of service generally consistent with those forecasted under background future conditions (without development of the site as proposed) under 2030 conditions. However, locations operating at or beyond capacity would experience increased delays over background conditions without further improvements.
7. The future conditions analysis indicates that the extension of Fairbrook Drive would be required to be constructed as part of the site development to improve overall traffic operations along Herndon Parkway and effectively mitigate site generated traffic beyond the established trip threshold based on the approved underlying zoning. It would relieve travel demands at the critical Herndon Parkway/Spring Street intersection, improve access to the site and adjacent properties along Herndon Parkway, and reduce critical queues at

the Spring Street/Herndon Parkway and Spring Street/Fairfax County Ramps intersections. The extension of Fairbrook Drive would be required once the calculated peak hour trip generation of the proposed development exceeds the threshold of 618 AM peak hour and 651 PM peak hour trips generated by the uses permitted by the underlying zoning.

RECOMMENDATIONS

The following transportation improvements and enhancements were identified to mitigate the impacts of the proposed development:

1. Fairbrook Drive Extended
 - a. Extend Fairbrook Drive from Herndon Parkway to Spring Street (by Applicant once the trip generation exceeds underlying zoning)
2. Herndon Parkway/Fairbrook Drive
 - a. Install a traffic signal, if deemed warranted by VDOT and the Town of Herndon (by previous committed to by Applicant as part of 2007 Special Exception)
 - b. Construct a northbound right turn lane on Herndon Parkway (by previous committed to by Applicant as part of 2007 Special Exception)
 - c. Construct an additional westbound left turn lane on Fairbrook Drive (by Applicant)
3. Spring Street/Fairfax County Parkway Ramps
 - a. Extend Fairbrook Drive from Herndon Parkway to Spring Street (by Applicant once the trip generation exceeds underlying zoning)
 - b. Reconstruct the intersection to accommodate fourth leg (by Applicant once the trip generation exceeds underlying zoning)
4. Transportation Demand Management
 - a. Implement a transportation demand management (TDM) program to reduce the number of trips generated by residents and workers (by Applicant)