Traffic Impact Study

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INTRODUCTION AND SUMMARY

Purpose and Study Objective

This report presents the findings of a traffic impact analysis conducted for the proposed residential development along Sager Avenue, in the City of Fairfax, Virginia.

The proposed development would consist of approximately 21-single family townhomes.

The development is planned to sit on four parcels of land totaling approximately 3.14 acres. The parcels can be identified as 57-4-02-139, 57-4-02-140, 57-4-02-141 and 57-4-02-142 in City of Fairfax Real Estate Assessment Database. Three of the four parcels are currently zoned RH (Residential-High) while one is zoned Commercial Retail (CR). Two single-family detached houses fronting Sager Avenue currently occupy a portion of the site. Access to the site is planned to be provided by one full-access point along Sager Avenue across from existing Barbour Drive.

The following tasks were completed as part of this study:

- A scoping meeting was held with the City Staff on Tuesday, April 2, 2019 which included discussions about the parameters of the study and relevant background information. A copy of the signed scoping document is included as Appendix A.
- Field reconnaissance in the vicinity of the site was performed to collect information related to existing traffic controls, roadway geometry, and traffic flow characteristics.
- Traffic counts were conducted at the intersection of Sager Avenue and Barbour Drive on Thursday, April 4, 2019 during the weekday morning and weekday afternoon peak periods.
- The Future without Development (2021) Condition traffic volumes were projected based on an inherent growth of 1.0% compounded annually and conservatively applied to all movements at the intersection of Sager Avenue and Barbour Drive, to account for regional growth along the roadway network.
- Proposed site traffic volumes were derived based on the methodology outlined in the Institute of Transportation Engineers' (ITE's) Trip Generation Manual, 10th Edition publication.
- The Future with Development (2021) Condition traffic volumes were projected based on existing regional traffic patterns, regional growth, and plans for the proposed development.
- Intersection capacity analyses and queuing analyses were performed for the Existing Conditions (2019), Future without Development (2021) Conditions, and Future with Development (2021) Conditions during the weekday morning and weekday afternoon peak hours at the study intersection. The intersection capacity and queuing analyses were conducted based on the methodology outlined in the Highway Capacity Manual, using Synchro, version 10.

Sources of data for this study include City of Fairfax, Fairfax County, VDOT, and the office files and field reconnaissance efforts by Gorove/Slade Associates, Inc.

Executive Summary

Site Location and Study Area

The proposed residential development consisting of approximately 2-single family townhomes, is planned to be located between Sager Avenue and Main Street, in the City of Fairfax, Virginia.

The study area consists of the following one existing intersection:

- Sager Avenue and Barbour Drive (unsignalized)

Description of Proposed Development

The subject site is generally located between Sager Avenue and Main Street and west of the Fairfax Museum and Visitor Center. The Applicant proposes to construct 21 single family townhomes. The development is planned to sit on four parcels of land totaling approximately 3.14 acres. The parcels can be identified as 57-4-02-139, 57-4-02-140, 57-4-02-141 and 57-4-02-142 in City of Fairfax Real Estate Assessment Database. Three of the four parcels are currently zoned RH (Residential-High) while one is zoned Commercial Retail (CR). The proposed full-access entrance to the site along Sager Avenue would form the fourth leg of the currently three-legged intersection of Sager Avenue and Barbour Drive. The Applicant intends to submit a request to rezone the property to PD-R (Planned Development Residential) to permit the redevelopment of the property in accordance with the proposed development.

Principal Findings and Conclusions

The analysis contained herein presents the Existing (2019) Conditions, Future without Development (2021) Conditions and Future with Development (2021) Conditions. Based on the above guidelines, the analysis presented in this report supports the following conclusions.

Existing (2019) Conditions

- Based on the capacity analysis results for the existing (2019) conditions, utilizing the turning movement traffic counts collected at the intersection of Sager Avenue and Barbour Drive in April 2019, all approaches operate with acceptable level of service of D or better during the morning and afternoon peak hour periods.
- Additionally, the side street (northbound approach) at the intersection experiences queues that are significantly shorter than one standard car length.

Future without Development (2021) Conditions

- To account for regional growth, a 1.0% growth rate, compounded annually for a period of two years to 2021 was applied to the existing (2019) traffic volumes at the study intersection.
- No other approved developments in the vicinity of the subject site were identified to be included as background studies.
- The inherent growth volumes were combined with the existing (2019) condition traffic volumes to obtain the future without development (2021) traffic volumes at the study intersections.

- With the increase in the traffic, the intersection operates similar to the existing (2019) conditions, with only marginal increase in delays and no change in 95th percentile queue lengths.

Future with Proposed Development (2021) Conditions

- The development of the site to allow for a residential development consisting of 21 single-family townhomes would generate approximately 11 vehicular trips during the morning peak hour, 15 trips during the afternoon peak hour and 118 weekday daily trips. Based on the existing traffic volumes at the study intersection, the proposed development is anticipated to constitute less than 10% of the traffic at the intersection.
- Access to site is proposed to be provided by a single full-access point along Sager Avenue, across from the exiting Barbour Drive. With the proposed site entrance, the study intersection would be converted to a four-legged intersection.
- The northbound approach at the intersection would experience less than 10% increase in delays compared to the future without development (2021) conditions, while continuing to operate with acceptable level of service during both the morning and afternoon peak hour periods.
- The southbound approach (site entrance) operates with acceptable level of service during morning and afternoon peak hour periods.
- Even with the addition of traffic from the proposed development, vehicles on the side-streets find sufficient gaps simultaneously in the through traffic along Sager Avenue to travel east or west. As such, the queues on the side-streets would remain significantly shorter than one standard car length.
- Traffic generated by the proposed development is anticipated to have an imperceptible impact on non-site traffic movements at the study intersection or other nearby locations. Hence, no roadway improvements are recommended in conjunction with the development of the proposed site.

A summary of the findings of capacity analysis for all the study scenarios is presented in Table 1 below.

Table 1: Capacity Analysis Summary

Intersection		Acceptable LOS?			Site Causes a 10% or More Increase In Delay Over FB	Acceptable Queue?			Site Causes a 10% or More Increase In Queue Over FB	Summary of Issue	Mitigation Strategy
		EX	2021 FB	2021 TF		EX	2021 FB	2021 TF			
1	Sager Avenue and Barbour Drive	Y	Y	Y	No	Y	Y	Y	No	None	None

Note:

Y All movements operate acceptably (LOS D or better, queues are contained in the available storage)

N One or more lane groups operate unacceptably

BACKGROUND INFORMATION: PROPOSED DEVELOPMENT (SITE AND NEARBY)

Site Location and Major Transportation Features

This study was performed in order to assess the potential traffic impact associated with the proposed residential development consisting of approximately 21-single family townhomes, along Sager Avenue, in the City of Fairfax, Virginia. Access to the site is planned by a single full-access point along Sager Avenue. The proposed entrance would form the fourth leg of the intersection of Sager Avenue and Barbour Drive. The development is anticipated to be complete in the year 2021.

A site location map is shown in Figure 1 and the site's conceptual development plan is shown in Figure 2.

Scope of Study

The study area consists of the following single existing intersection

- Sager Avenue and Barbour Drive

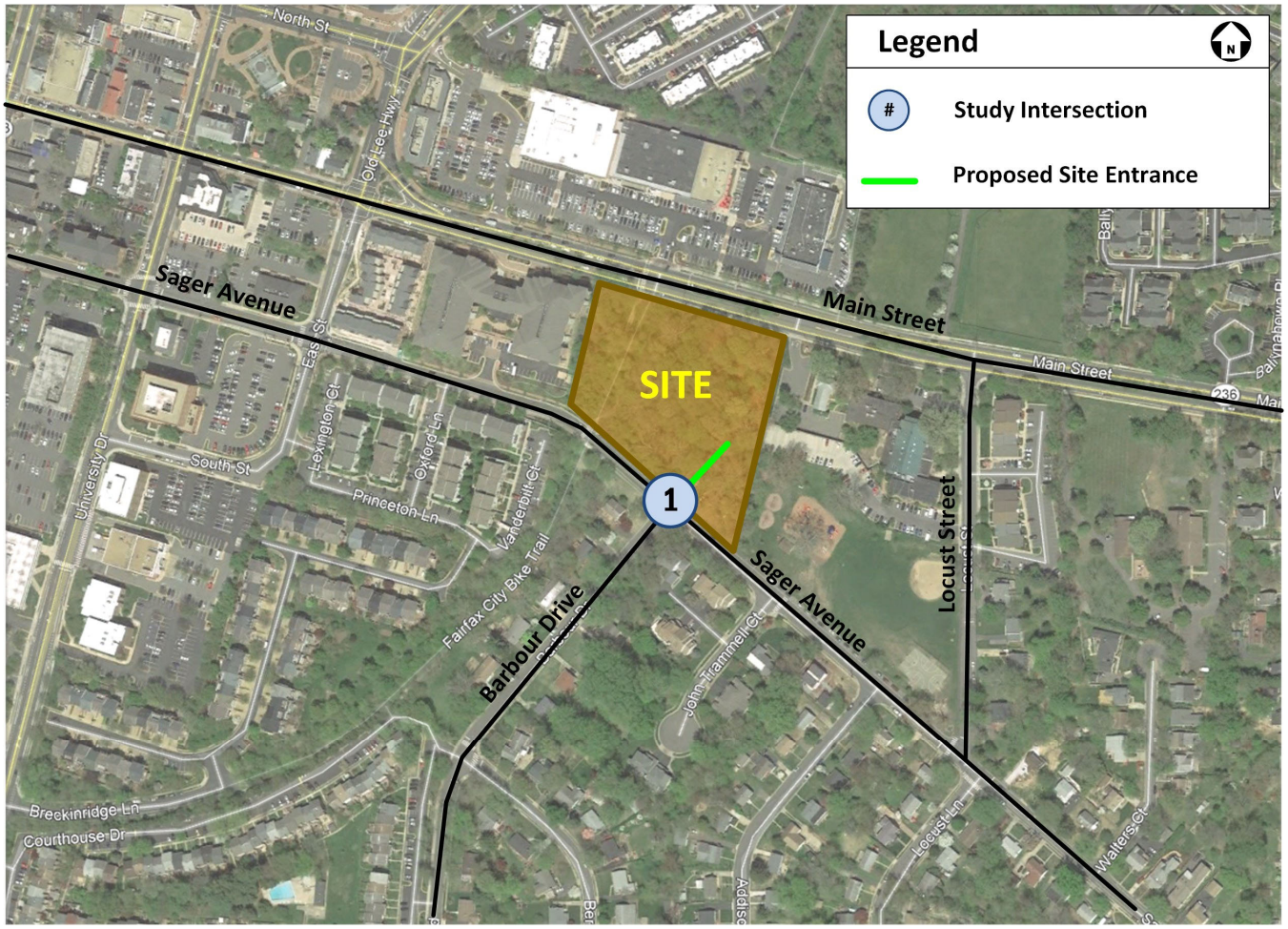

Figure 1: Area Map and Site Location

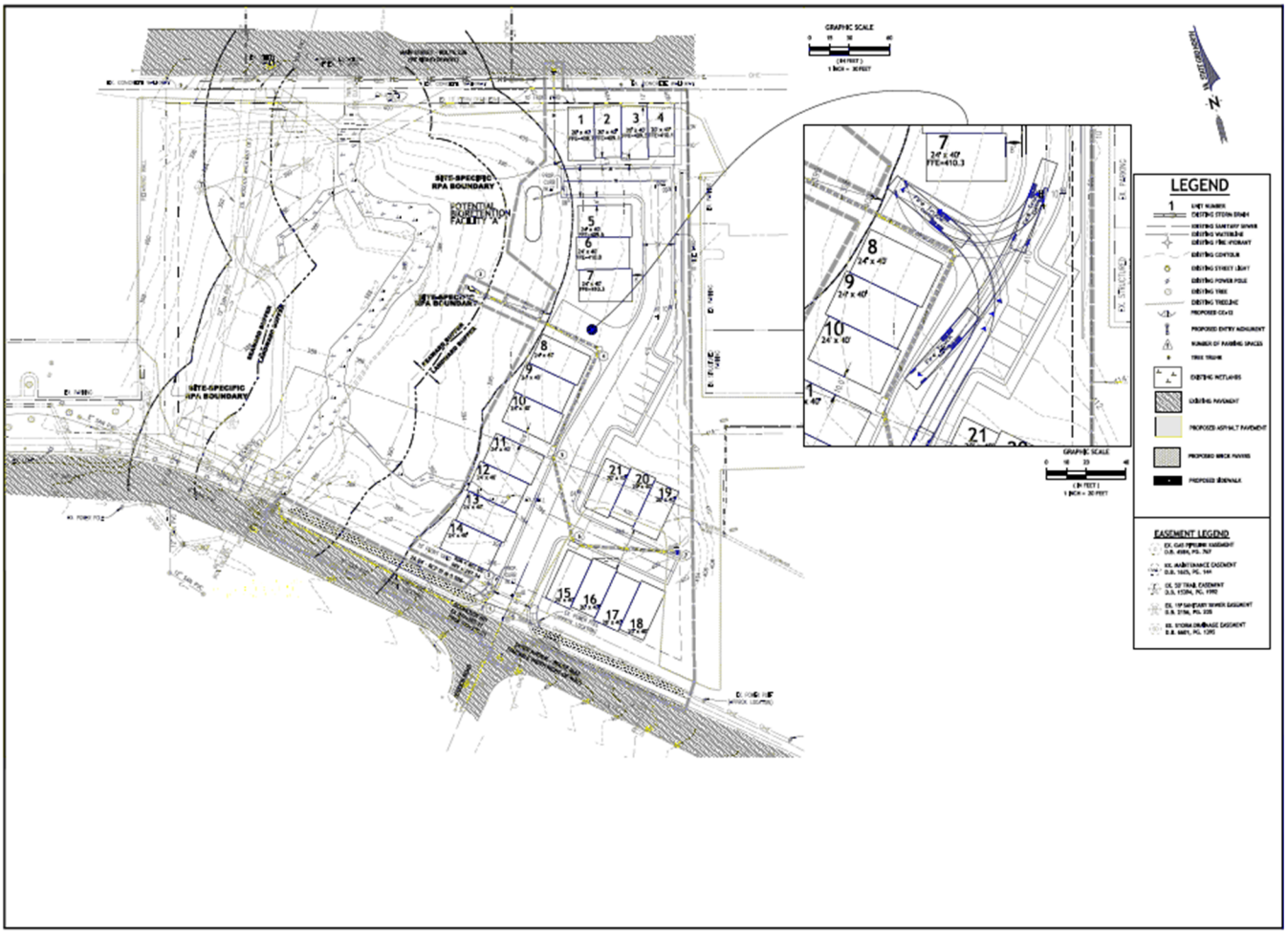

Figure 2: Proposed Concept Development Plan (Provided by J2 Engineers)

This report presents the findings of analyses performed for the following conditions:

- **Existing Conditions (2019):** Considers existing traffic volumes and existing roadway configurations.
- **Future without Development (2021) Conditions:** Considers future traffic conditions for the year 2021 with regional growth, but without the proposed development.
- **Future with Development (2021) Conditions:** Considers future traffic conditions for the year 2021 (build-out year) with regional growth and the proposed development.

The results of the analysis and the traffic impacts associated with the proposed development is presented in the *Conclusion* section of this report.

Roadway Network

A description of the major roadways within the immediate vicinity of the site is presented below.

Sager Avenue is a two-lane roadway with a 25-mph speed limit in the vicinity of the proposed development. Per the City's Multimodal Transportation Plan, the roadway is recognized as a 'Neighborhood Collector' by the City, which is equivalent to VDOT functional classification of a Minor Collector mainly serving the residential development between Roberts Road to the east and Chain Bridge Road to the west. The average daily traffic (ADT) on Sager Avenue was 2,700 vpd according to 2017 VDOT published data.

Barbour Drive is a two-lane unstriped local roadway that serves a residential area. Based on the City's Multimodal Transportation Plan, the roadway also serves as a 'Neighborhood Collector'. The ADT for the roadway was not available through the published 2017 VDOT data.

Bicycle and Pedestrian Accommodations

Currently, an asphalt sidewalk exists along the subject property's frontage, extending approximately 70-feet south of the site's frontage. A brick paved sidewalk along Sager Avenue also currently exists, fronting the Providence Square development, just north of the subject site. The southern frontage of Sager Avenue generally consists of a paved sidewalk with curb and gutter throughout its length between Roberts Road and Chain Bridge Road. The existing sidewalks in the general vicinity of the site are shown on Figure 3 below.

Based on Fairfax County Bike Map, Sager Avenue and Barbour Avenue are classified as 'Most Comfortable' biking routes within the County.

The Mason to Metro Bike Trail cuts across the site, coinciding with the Sager Trail on the subject property. The western portion of the subject property surrounding the Sager Trail, is dedicated as a Resource Protection Area (RPA), as such no development is proposed in this buffer zone.

An excerpt of Fairfax County's bike map, titled Bike Fairfax is shown on Figure 3.

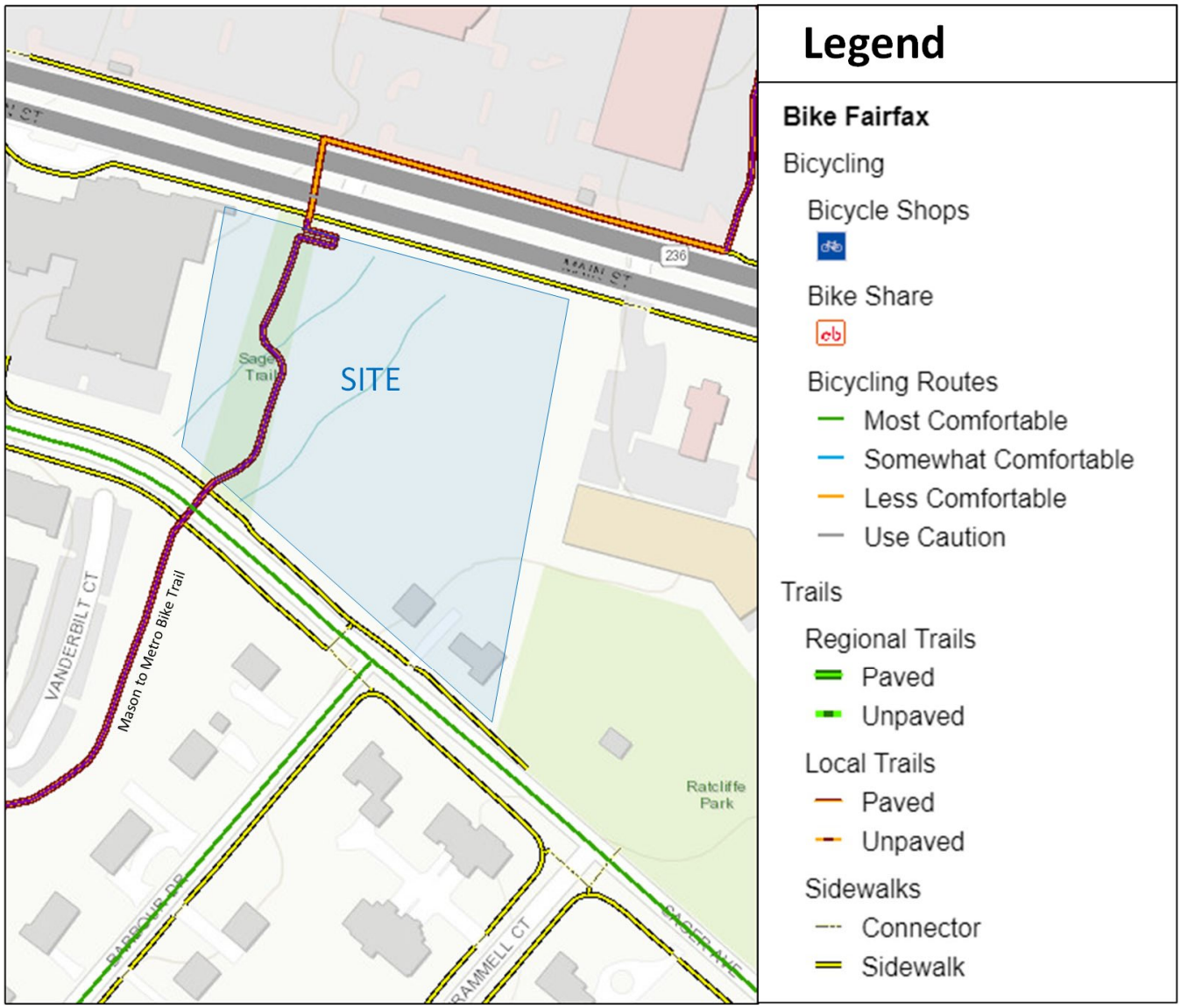

Figure 3: Fairfax County Recommended Bicycle Network Map

EXISTING (2019) CONDITIONS

Existing Traffic Volumes

In order to determine the weekday morning and afternoon peak hour period turning movement traffic volumes, traffic counts were conducted at the intersection of Sager Avenue and Barbour Drive on Thursday, April 4, 2019 during the weekday morning and afternoon peak periods.

Analysis of the traffic data found the following system peak hours:

- AM Peak Hour: 8:00 AM to 9:00 AM
- PM Peak Hour: 5:00 PM to 6:00 PM

The existing (2019) conditions traffic volumes and lane configuration at the study intersection are illustrated on Figure 4. The raw traffic count data is included in Appendix B.

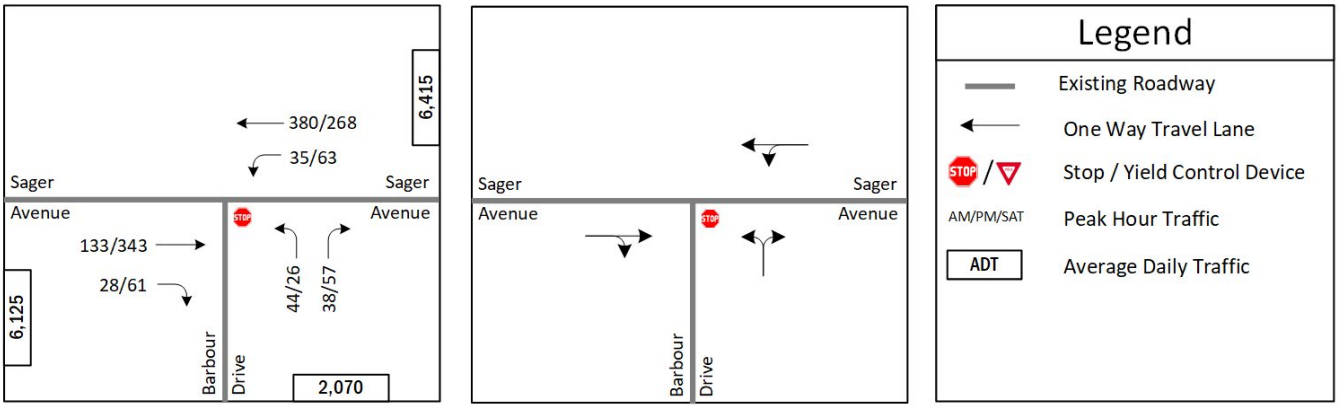

Figure 4: Existing (2019) Traffic Volumes and Lane Configuration

Existing (2019) Conditions Capacity Analysis

Intersection capacity analyses were performed for the existing (2019) conditions scenario at the study area intersections during the weekday morning and afternoon peak hours. *Synchro,* version 10, was used in the analysis of the study intersection with results based on the Highway Capacity Manual (HCM) methodology. As agreed by the City Staff during the scoping meeting, it is desirable to achieve a level of service (LOS) D or better for any approach for traffic operations using the HCM methodology.

The existing peak hour factors (by intersection) acquired from the existing traffic counts, with a minimum of 0.85, were used in the analysis. Heavy vehicle percentages were also based on the traffic counts.

The results of the intersection capacity and queuing analyses are presented in Table 2 and are expressed in level of service (LOS) and delay (seconds per vehicle). The overall intersections, approaches, and lane groups that operated at LOS E or F are shown in red. The 95th percentile queues were determined from Synchro and are expressed in feet. The description of the

different LOS and delay are included in Appendix C. The detailed analysis worksheets of Existing (2019) Conditions are contained in Appendix D.

Table 2: Existing (2019) Conditions Capacity Analysis Results

No.	Intersection (Movement)	AM Peak			PM Peak		
		LOS	Delay	95th %. Queue (ft)	LOS	Delay	95th %. Queue (ft)
1	**Intersection of Sager Avenue and Barbour Drive**						
	Overall Intersection (Un-signalized)						
	Westbound Approach						
	Westbound Left/Thru	A	7.6	0	A	8.3	0
	Northbound Approach	***B***	***12.7***		***B***	***13.7***	
	Northbound Left/Right	B	12.7	15	B	13.7	15

As mentioned previously, it is desirable to achieve a level of service (LOS) D or better per approach for traffic operations using the HCM methodology. Based on the capacity analysis results, all approaches at the intersection of Sager Avenue and Barbour Drive operate with acceptable level of service during the weekday morning and afternoon periods under the existing (2019) conditions.

Based on the 95th percentile queue results, the northbound approach at the intersection (Barbour Drive) would experience queues shorter than one car length. This indicates that vehicles on Barbour Drive find sufficient gaps in the through traffic along Sager Avenue to further travel east or west along Sager Avenue.

The results of the intersection capacity analyses for the existing conditions are shown in Figure 5.

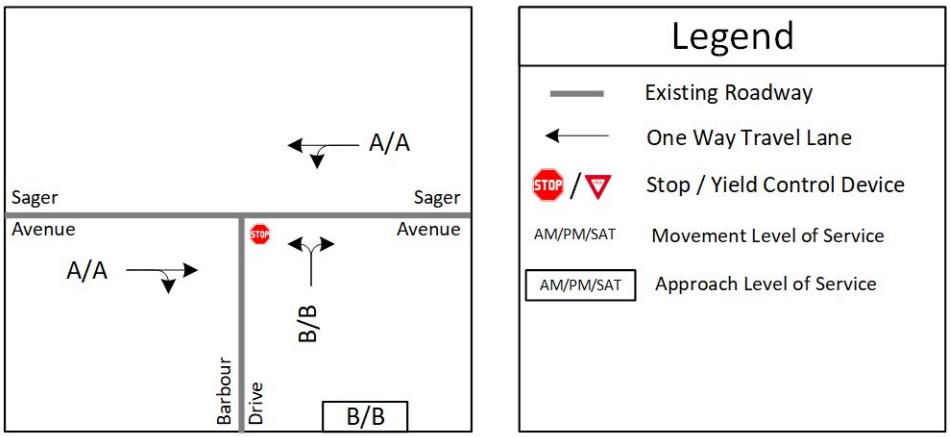

Figure 5: Existing (2019) Conditions Capacity Analysis

FUTURE WITHOUT DEVELOPMENT (2021) CONDITIONS

Future without Development Traffic Volumes

Inherent Growth

The proposed development of the site is anticipated to be complete in the year 2021. To account for future roadway conditions, an inherent growth rate of 1.0%, applied annually over a period of three years - totaling 2.01% total growth of the existing volumes, was applied to the existing (2019) conditions traffic volumes at the intersection of Sager Avenue and Barbour Drive. The inherent regional growth volumes are illustrated in Figure 6.

Background Developments and Planned Roadway Improvements

There were no additional background development or roadway improvements considered for this study, based on the scoping agreement.

The existing traffic and regional growth traffic volumes were combined to estimate the future volumes without the proposed development as illustrated in Figure 7.

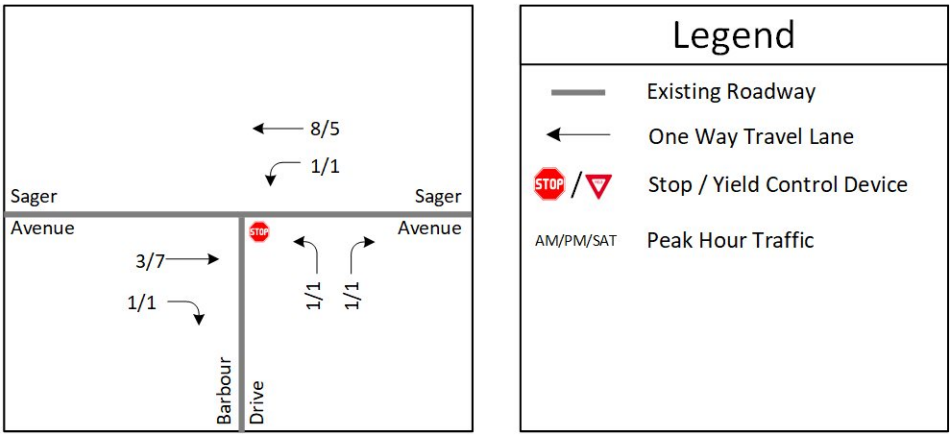

Figure 6: Background Growth Volumes (from 2019 to 2021)

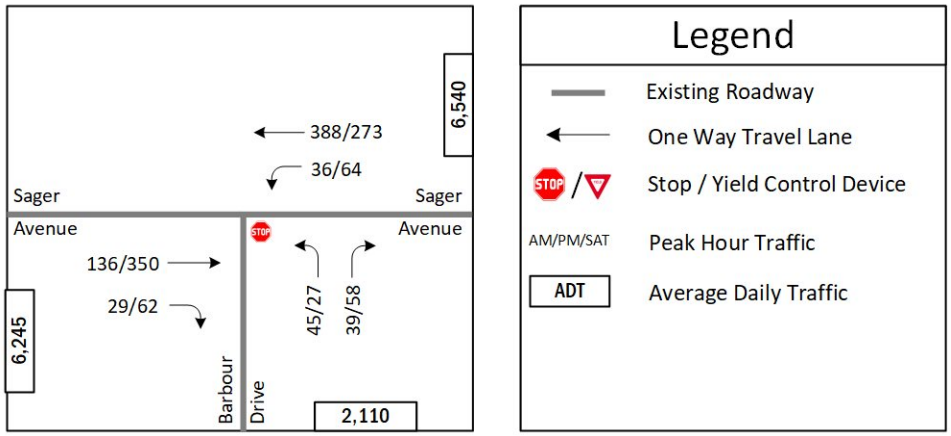

Figure 7: Future without Development (2021) Traffic Volumes

Future without Development Capacity Analysis

Intersection capacity analyses were performed for the future without development (2021) conditions scenario at the study intersections during the weekday morning and afternoon peak hours. *Synchro,* version 10, was used in the analysis of the study intersections with results based on the Highway Capacity Manual (HCM) methodology.

A minimum peak hour factor of 0.92 by intersection was utilized in the analysis for future conditions. Furthermore, the heavy vehicle percentages were based on the traffic counts. The capacity analysis and queuing analysis results are shown in Table 3 and the detailed analysis worksheets are contained in Appendix E.

Table 3: Future without Development (2021) Intersection Capacity Analysis

No.	Intersection (Movement)	AM Peak			PM Peak		
		LOS	Delay	95th %. Queue (ft)	LOS	Delay	95th %. Queue (ft)
1	**Intersection of Sager Avenue and Barbour Drive**						
	Overall Intersection (Un-signalized)						
	Westbound Approach						
	Westbound Left/Thru	A	7.6	0	A	8.4	0
	Northbound Approach	***B***	***12.8***		***B***	***13.9***	
	Northbound Left/Right	B	12.8	15	B	13.9	15

The intersection of Sager Avenue and Barbour Drive experiences a marginal increase in delay but continues to operate at acceptable levels of service during the study peak hours. The queue lengths at the intersection remain unchanged compared to the existing (2019) conditions.

The results of the intersection capacity analyses for the future without development conditions in Figure 8.

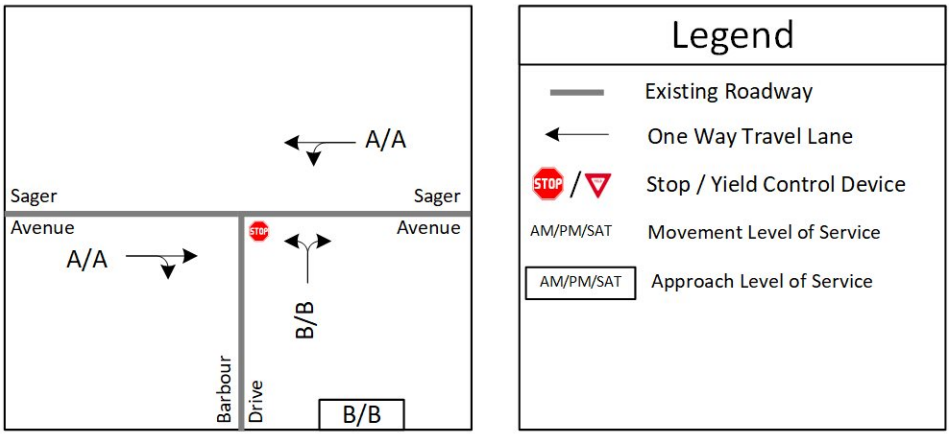

Figure 8: Future without Development (2021) Levels of Service

TRIP GENERATION AND SITE ACCESS

The proposed development is anticipated to be complete in the year 2021 and is planned to consist of approximately 21-single family townhomes. The Institute of Transportation Engineers' (ITE's) Trip Generation Manual, 10th Edition was used to determine the trips into and out of the subject study site for the weekday morning and afternoon peak hours and typical weekday daily trips to the site. For the purposes of this study, the proposed development trips were based on Multifamily Housing (Mid-Rise) (ITE Land Use Code 221), which includes apartments, townhouses, and condominium units.

The proposed development's trip generation is illustrated in Table 4 below.

Table 4: Site Trip Generation

Land Use	ITE Code	Size	------ Weekday ------						
			AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total
Proposed Development									
Multifamily Housing (Low-Rise) (Apartments, Townhomes, Condo; max 2 floors)	220	21 DU	3	8	11	9	6	15	118

Based on the Trip Generation Manual, the proposed development will generate approximately 11 vehicular trips during the morning peak hour, 15 trips during the afternoon peak hour and 118 weekday daily trips. Based on the existing traffic volumes at the study intersection, the proposed development is anticipated to constitute less than 10% of the traffic at the intersection.

Currently, the intersection of Sager Avenue and Barbour Drive operates as a T-intersection. Access to the site is proposed to be provided by a single full-movement point along Hunter Mill Road. The proposed site access would form the fourth leg at the intersection of Sager Avenue and Barbour Drive.

The site generated trips were assigned to the roadway network based on the existing traffic patterns and engineering judgement. The direction of approach utilized in the trip assignment is shown on Figure 9, while the site generated trips at the study intersection are shown on Figure 10 below.

Figure 9: Direction of Approach for Site Generated

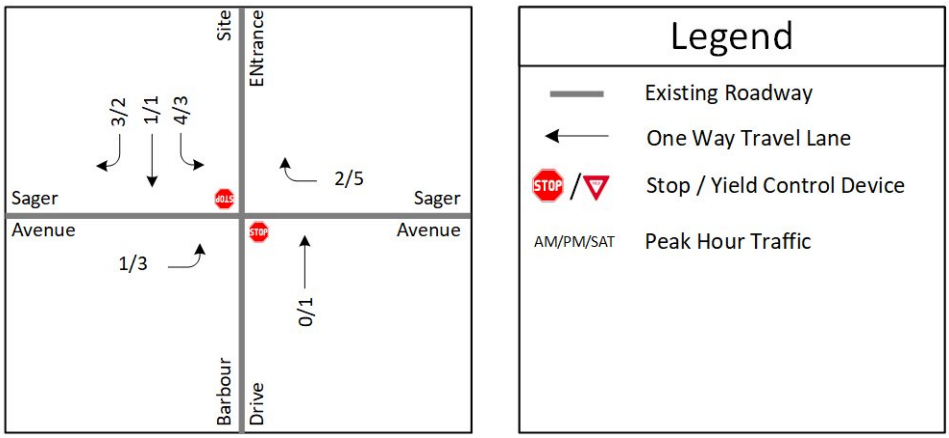

Figure 10: Site Generated trips

FUTURE WITH PROPOSED DEVELOPMENT (2021) CONDITIONS

Future with Proposed Development Traffic Volumes

In order to project the future with development (2021) volumes, the site generated traffic volumes were combined with the future without development (2021) traffic volumes. The future with proposed development (2021) conditions traffic volume are illustrated on Figure 11. As mentioned previously, access to the site is proposed by a full-access point along Sager Avenue, across from the existing Barbour Drive. This access would form the fourth leg of the existing T-intersection of Sager Avenue with Barbour Drive. The proposed lane configuration at the intersection with the development in-place is also shown on Figure 11. With the completion of the proposed development, the intersection would operate as a two-way stop control, whereby the side streets at the intersections (Barbour Drive and proposed site entrance) would be under stop-control.

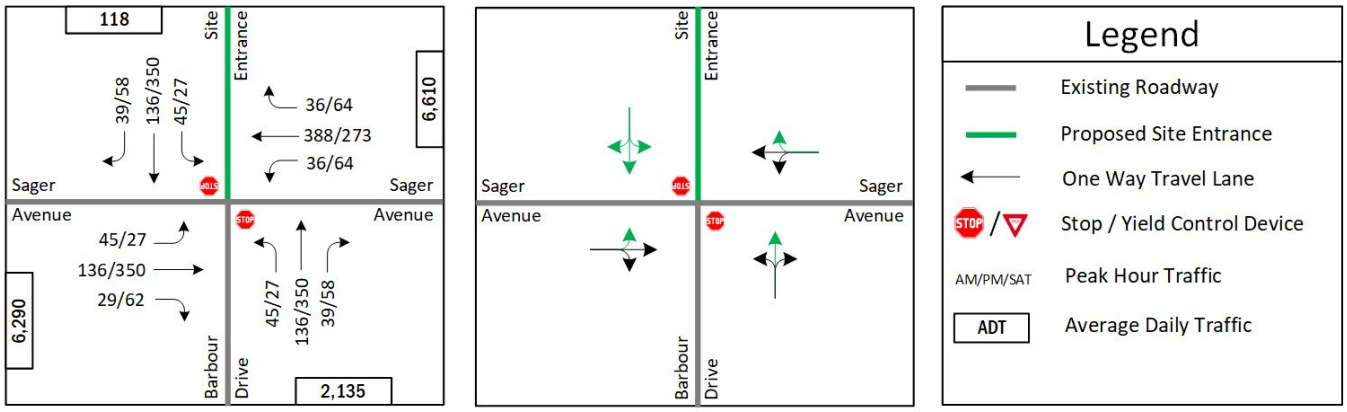

Figure 11: Future with Proposed Development (2021) Conditions Traffic Volumes

Future with Development Capacity Analysis

Intersection capacity analyses were performed for the future with development (2021) conditions at the study area intersections during the weekday morning and afternoon peak hours. *Synchro,* version 10, was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology.

A minimum peak hour factor of 0.92 by intersection was utilized in the analysis for future conditions. Furthermore, the heavy vehicle percentages were based on the traffic counts. The capacity analysis and queuing analysis results are shown in Table 5 and the detailed analysis worksheets are contained in Appendix F.

Table 5: Future with Proposed Development (2021) Intersection Capacity Analysis

No.	Intersection (Movement)	AM Peak			PM Peak		
		LOS	Delay	95th %. Queue (ft)	LOS	Delay	95th %. Queue (ft)
1	**Intersection of Sager Avenue and Barbour Drive**						
	Overall Intersection (Un-signalized)						
	Eastbound Approach						
	Eastbound Left/Thru/Right	A	8.2	0	A	7.8	0
	Westbound Approach						
	Westbound Left/Thru/Right	A	7.6	3	A	8.4	5
	Northbound Approach	***B***	***13.8***		***C***	***15***	
	Northbound Left/Thru/Right	B	13.8	15	C	15	18
	Southbound Approach	***B***	***13.8***		***C***	***16.4***	
	Southbound Left/Thru/Right	B	13.8	3	C	16.4	3

With the addition of the site generated traffic at the study intersection, the northbound approach experiences an increase in delay by approximately 1 and 1.1 seconds during the morning and afternoon peak hour periods respectively, while continuing to operate at acceptable level of service of D or better. The site entrance (southbound approach) at the intersection would also experience with acceptable level of service during both the morning and afternoon peak hours.

The 95th percentile queue at the northbound approach remains unchanged during the morning peak hour, but experiences a marginal increase during the afternoon peak hour, while still being significantly shorter than one car length. Similarly, the southbound and westbound approaches experience queues significantly shorter than one car length. As such, excessive queuing is not anticipated at the intersection with the addition of trips from the proposed development.

Overall, traffic generated by the proposed development is anticipated to have an imperceptible impact on non-site traffic movements at the study intersection or other nearby locations. Hence, no roadway improvements are recommended in conjunction with the development of the proposed site.

The results of the intersection capacity analyses for the future with development conditions are illustrated on Figure 12.

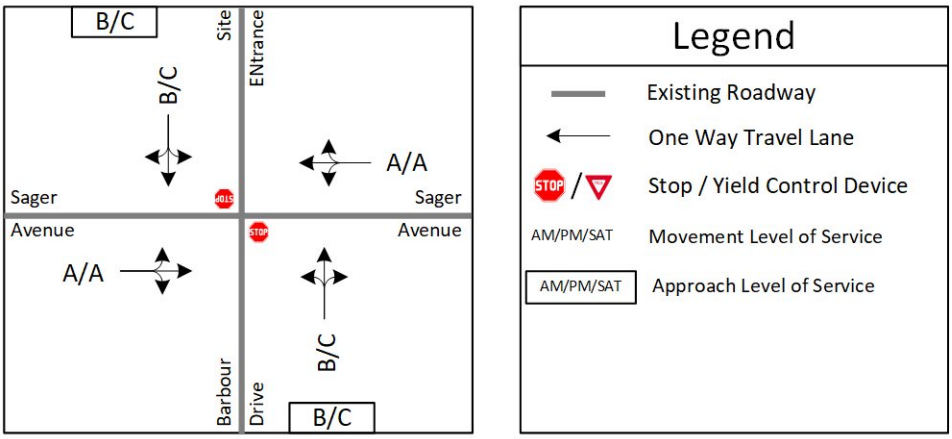

Figure 12: Future with Development (2021) Levels of Service

CONCLUSIONS

This report presents the findings of a traffic analysis conducted for the proposed residential development consisting of approximately 21-single family townhomes, in the City of Fairfax, Virginia.

Existing (2019) Conditions

- Based on the capacity analysis results for the existing (2019) conditions, utilizing the turning movement traffic counts collected at the intersection of Sager Avenue and Barbour Drive in April 2019, all approaches operate with acceptable level of service of D or better during the morning and afternoon peak hour periods.
- Additionally, the side street (northbound approach) at the intersection experiences queues that are significantly shorter than one standard car length.

Future without Development (2021) Conditions

- To account for regional growth, a 1.0% growth rate, compounded annually for a period of two years to 2021 was applied to the existing (2019) traffic volumes at the study intersection.
- No other approved developments in the vicinity of the subject site were identified to be included as background studies.
- The inherent growth volumes were combined with the existing (2019) condition traffic volumes to obtain the future without development (2021) traffic volumes at the study intersections.
- With the increase in the traffic, the intersection operates similar to the existing (2019) conditions, with only marginal increase in delays and no change in 95th percentile queue lengths.

Future with Proposed Development (2021) Conditions

- The development of the site to allow for a residential development consisting of 21 single-family townhomes would generate approximately 11 vehicular trips during the morning peak hour, 15 trips during the afternoon peak hour and 118 weekday daily trips. Based on the existing traffic volumes at the study intersection, the proposed development is anticipated to constitute less than 10% of the traffic at the intersection.
- Access to site is proposed to be provided by a single full-access point along Sager Avenue, across from the exiting Barbour Drive. With the proposed site entrance, the study intersection would be converted to a four-legged intersection.
- The northbound approach at the intersection would experience less than 10% increase in delays compared to the future without development (2021) conditions, while continuing to operate with acceptable level of service during both the morning and afternoon peak hour periods.
- The southbound approach (site entrance) operates with acceptable level of service during morning and afternoon peak hour periods.
- Even with the addition of traffic from the proposed development, vehicles on the side-streets find sufficient gaps simultaneously in the through traffic along Sager Avenue to travel east or west. As such, the queues on the side-streets would remain significantly shorter than one standard car length.

- Traffic generated by the proposed development is anticipated to have an imperceptible impact on non-site traffic movements at the study intersection or other nearby locations. Hence, no roadway improvements are recommended in conjunction with the development of the proposed site.

A summary of the capacity analysis results for all the study scenarios is presented below in Table 6.

Table 6:Capacity Analysis Summary

Intersection		Acceptable LOS?			Site Causes a 10% or More Increase In Delay Over FB	Acceptable Queue?			Site Causes a 10% or More Increase In Queue Over FB	Summary of Issue	Mitigation Strategy
		EX	2021 FB	2021 TF		EX	2021 FB	2021 TF			
1	Sager Avenue and Barbour Drive	Y	Y	Y	No	Y	Y	Y	No	None	None

Note:

Y All movements operate acceptably (LOS D or better, queues are contained in the available storage)

N One or more lane groups operate unacceptably

TECHNICAL APPENDIX

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Appendix A:

THIS IS NOT A CHAPTER 870 STUDY

VDOT Virginia Department of Transportation	PRE-SCOPE OF WORK MEETING FORM Information on the Project Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information			
Consultant Name: Tele: E-mail:	Chad Baird, Gorove/Slade Associates, Inc. 571-248-0992 chad.baird@goroveslade.com		
Developer/Owner Name: Tele: E-mail:	Andre Rosenberger, Madison Homes, LLC andrew@madisonhomesinc.com		
Project Information			
Project Name:	Mathy Park	Locality/County:	City of Fairfax
Project Location: (Attach regional and site specific location map)	The proposed development of Mathy Park would be located along the north frontage Sager Avenue in the City of Fairfax.		
Submission Type	Comp Plan ☐	Rezoning ☒	Site Plan ☐ / Subd Plat ☐
Project Description: (Including details on the land use, acreage, phasing, access location, etc. Attach additional sheet if necessary)	The proposed site will consist of 21 single family attached homes. The development is planned to sit on four parcels of land totaling approximately 3.14 acres. The parcels can be identified as 57-4-02-139, 57-4-02-140, 57-4-02-141 and 57-4-02-142 in City of Fairfax Real Estate Assessment Database. Three of the four parcels are currently zoned RH (Residential-High) while one is zoned Commercial Retail (CR). Two single-family detached houses fronting Sager Avenue currently occupy a portion of the site. Access to the site is planned to be provided by one full-access point along Sager Avenue across from existing Barbour Drive.		
Proposed Use(s): (Check all that apply; attach additional pages as necessary)	Residential ☒	Commercial ☐	Mixed Use ☐ / Other ☐
	Residential Uses(s) Number of Units: 21 ITE LU Code(s): 220 (Multi-family Housing (Low-Rise)) **Commercial Use(s)** ITE LU Code(s): Square Ft or Other Variable:		**Other Use(s)** ITE LU Code(s): Square Ft or Other Variable: ITE LU Code(s): Square Ft or Other Variable:

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

	Industrial Use(s) ITE LU Code(s): Square Ft or Other Variable:			
Total Peak Hour Trip Projection:	Less than 100 ☒	100 – 499 ☐	500 – 999 ☐	1,000 or more ☐

Traffic Impact Analysis Assumptions

Study Period	Existing Year: 2019	Build-out Year: 2021	Design Year:

Study Area Boundaries (Attach map)	North: Main Street (Rte. 236)	South: Barbour Drive
	East: Fairfax Museum and Visitor Center	West: Fairfax City Bike Trail
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	None	
Consistency With Comprehensive Plan (Land use, transportation plan)	Yes	
Available Traffic Data (Historical, forecasts)	VDOT Historical AADT Data	
Trip Distribution Commercial / Industrial & Services (Please refer to attached Figure 2)	Road Name: Sager Avenue (to/from the East) – 50%	Road Name: Sager Avenue (to/from the West) – 35%
	Road Name: Barbour Drive (to/from the South) – 15%	

Annual Vehicle Trip Growth Rate:	1.0%	Peak Period for Study (check all that apply)	☒ AM ☒ PM ☐ SAT
		Peak Hour of the Generator	7AM; 12 PM; 90 Daily
		Peak Hour of the Adjacent Street	5AM; 13 PM; 90 Daily

Study Intersections and/or Road Segments (Attach additional sheets as necessary) Please refer to attached Figure 1	1. Sager Avenue and Barbour Drive	

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Trip Adjustment Factors	Internal allowance Reduction: ☐ Yes ☒ No Between Commercial and Services:	Pass-by allowance Reduction: ☐ Yes ☒ No Services: Commercial:
Software Methodology	☒ Synchro ☐ HCS (v.2000/+) ☐ SIDRA ☐ CORSIM ☐ Other _____	
Traffic Signal Proposed or Affected (Analysis software to be used, progression speed, cycle length)	None	
Improvement(s) Assumed or to be Considered	None	
Background Traffic Studies Considered	None	
Plan Submission	☐ Master Development Plan (MDP) ☒ Generalized Development Plan (GDP) ☐ Preliminary/Sketch Plan ☐ Other Plan type (Final Site, Subd. Plan)	
Additional Issues to be Addressed	☒ Queuing analysis ☐ Actuation/Coordination ☐ Weaving analysis ☐ Merge analysis ☒ Bike/Ped Accommodations ☒ Intersection(s) ☐ TDM Measures ☐ Other	

NOTES on ASSUMPTIONS:

1. The scenarios to be included in the study are Existing (2019), Future without Development (2021), Future with Development (2021).
2. Existing peak hour factors in the range of 0.85 to 1.00 will be used for existing scenarios (by intersection). The default peak hour factor of 0.92 (by intersection) will be used for all future scenarios unless the existing peak hour factor is found to be higher.
3. Heavy vehicle percentages from the traffic counts or VDOT counts will be utilized for major movements.
4. For any approach LOS D or better would be considered as acceptable/desirable traffic operation condition. For all approaches, the projected future conditions without development LOS and delay will be maintained in the future with development condition. Will show intersection, approach, and movement LOS.
5. 95% percentile queues will be provided from Synchro.
6. HCM 2010 methodology will be utilized where applicable. HCM 2000 methodology would be used elsewhere.

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

SIGNED: _____ DATE: 4/11/2019
Applicant or Consultant

PRINT NAME: Chad Baird
Applicant or Consultant

SIGNED: _____ DATE: _____
VDOT Representative

PRINT NAME: _____
VDOT Representative

SIGNED: Curt McCullough DATE: 4/18/19
Local Government Representative

PRINT NAME: Curt McCullough
Local Government Representative

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Table 1: Historic Growth

Road Segment:	From:	To:	Published VDOT AADT					Growth Rate			
			2013	2014	2015	2016	2017	2013 - 2017	2014 - 2017	2015 - 2017	2016 - 2017
Sager Avenue	Chain Bridge Road	Dwight Avenue	2,700	2,700	2,700	2,700	2,700	0%	0%	0%	0%
Main Street	Old Lee Highway	Whitacre Road	40,000	38,000	37,000	38,000	38,000	-1%	0%	1%	0%

Figure 1: Existing Study Intersections

Figure 2: Direction of Approach

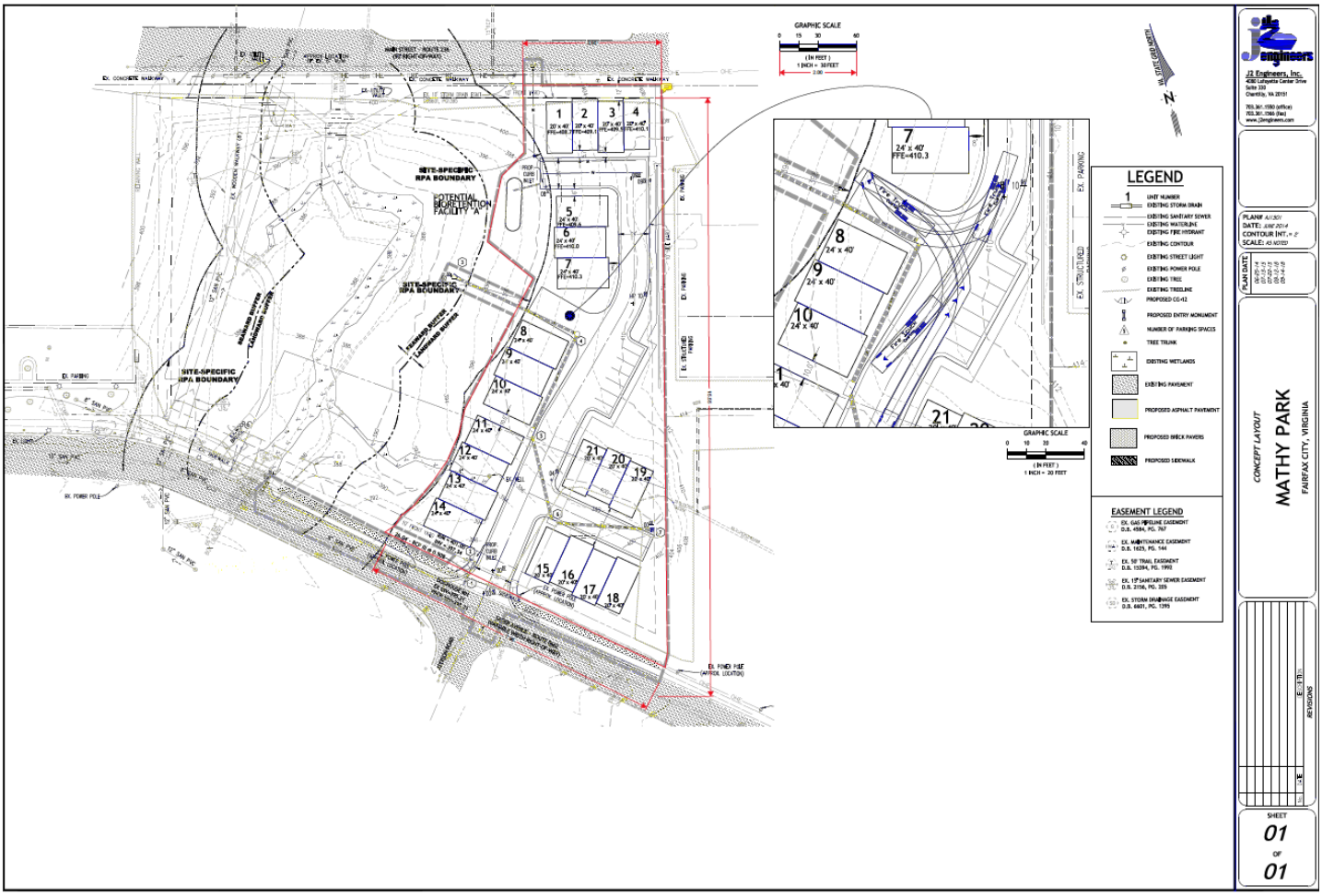


Figure 3: Development Plan

Table 2: Trip Generation – Peak Hour of the Adjacent Street (ITE 10th Edition; To be Used in Study)

Land Use	ITE Code	Size	------ Weekday ------						
			AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	Total
Existing Use									
Single-Family Detached Housing	210	2 DU	2	4	6	1	1	2	28
Proposed Development									
Multifamily Housing (Low-Rise) (Apartments, Townhomes, Condo; max 2 floors)	220	21 DU	3	8	11	9	6	15	118
Differnce (Proposed minus Existing)			**1**	**4**	**5**	**8**	**5**	**13**	**90**

Appendix B: Traffic Counts

Prepared by National Data & Surveying Services

Barbour Dr & Sager Ave

Peak Hour Turning Movement Count

ID: 19-11043-001
City: Fairfax

Day: Thursday
Date: 04/04/2019

PEAK HOURS		COUNT PERIODS
08:00 AM - 09:00 AM	AM	06:00 AM - 09:00 AM
NONE	NOON	NONE
05:00 PM - 06:00 PM	PM	04:00 PM - 07:00 PM

Barbour Dr — SOUTHBOUND

AM	0	0	0	0	0	AM
NOON	0	0	0	0	0	NOON
PM	0	0	0	0	0	PM

0 0 0 0

Sager Ave — EASTBOUND

AM	NOON	PM	
424	0	294	
0	0	0	0
0	0	0	0
133	0	343	1
28	0	61	0
AM	NOON	PM	

CONTROL

1-Way Stop (NB)

	AM	NOON	PM
TEV	658	0	818
PHF	0.94		0.97

Sager Ave — WESTBOUND

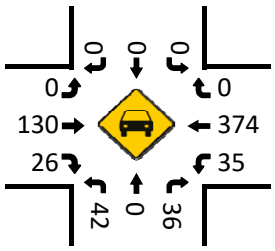
	PM	NOON	AM
0	0	0	0
1	268	0	380
0	63	0	35
0	0	0	0
	400	0	171
	PM	NOON	AM

0 0 1 0

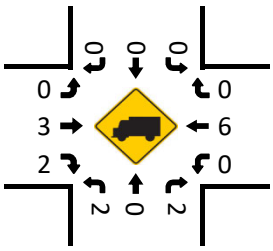
Barbour Dr — NORTHBOUND

PM	124	0	26	0	57	PM
NOON	0	0	0	0	0	NOON
AM	63	0	44	0	38	AM

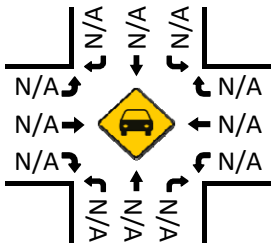
Cars (AM)



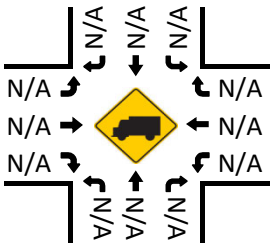
HT (AM)



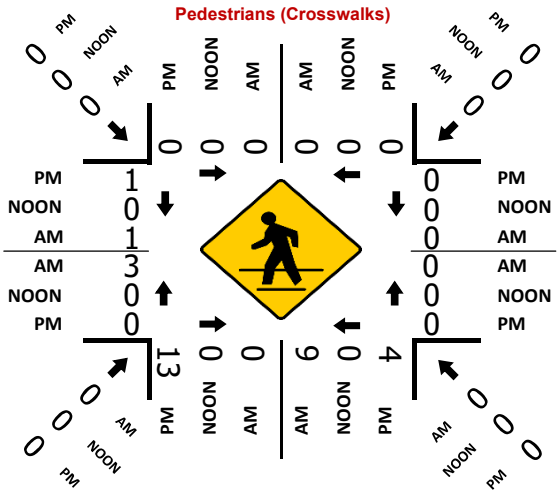
Cars (NOON)



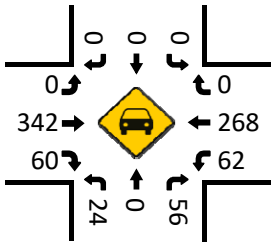
HT (NOON)



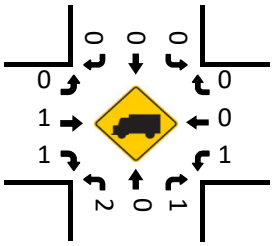
Pedestrians (Crosswalks)



Cars (PM)



HT (PM)



National Data & Surveying Services

Intersection Turning Movement Count

Location: Barbour Dr & Sager Ave
City: Fairfax
Control: 1-Way Stop (NB)

Project ID: 19-11043-001
Date: 4/4/2019

Total

NS/EW Streets:	Barbour Dr				Barbour Dr				Sager Ave				Sager Ave				
AM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
6:00 AM	5	0	5	0	0	0	0	0	0	2	0	0	2	16	0	0	30
6:15 AM	5	0	3	0	0	0	0	0	0	6	0	0	6	14	0	0	34
6:30 AM	3	0	4	0	0	0	0	0	0	10	1	0	2	24	0	0	44
6:45 AM	1	0	8	0	0	0	0	0	0	9	1	0	5	30	0	0	54
7:00 AM	6	0	12	0	0	0	0	0	0	19	1	0	5	42	0	0	85
7:15 AM	16	0	6	0	0	0	0	0	0	20	4	0	7	55	0	0	108
7:30 AM	8	0	17	0	0	0	0	0	0	27	3	0	4	60	0	0	119
7:45 AM	11	0	14	0	0	0	0	0	0	30	4	0	4	65	0	0	128
8:00 AM	11	0	13	0	0	0	0	0	0	28	8	0	8	87	0	0	155
8:15 AM	13	0	9	0	0	0	0	0	0	31	8	0	10	104	0	0	175
8:30 AM	10	0	7	0	0	0	0	0	0	36	3	0	10	90	0	0	156
8:45 AM	10	0	9	0	0	0	0	0	0	38	9	0	7	99	0	0	172
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	99	0	107	0	0	0	0	0	0	256	42	0	70	686	0	0	1260
APPROACH %'s :	48.06%	0.00%	51.94%	0.00%					0.00%	85.91%	14.09%	0.00%	9.26%	90.74%	0.00%	0.00%	
PEAK HR :	08:00 AM - 09:00 AM																TOTAL
PEAK HR VOL :	44	0	38	0	0	0	0	0	0	133	28	0	35	380	0	0	658
PEAK HR FACTOR :	0.846	0.000	0.731	0.000	0.000	0.000	0.000	0.000	0.000	0.875	0.778	0.000	0.875	0.913	0.000	0.000	0.940
	0.854								0.856				0.910				

PM	NORTHBOUND				SOUTHBOUND				EASTBOUND				WESTBOUND				
	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
4:00 PM	6	0	6	0	0	0	0	0	0	67	12	0	11	49	0	0	151
4:15 PM	3	0	7	0	0	0	0	0	0	82	6	0	11	49	0	0	158
4:30 PM	5	0	9	0	0	0	0	0	0	91	9	0	10	52	0	0	176
4:45 PM	5	0	17	0	0	0	0	0	0	79	16	0	14	47	0	0	178
5:00 PM	6	0	18	0	0	0	0	0	0	82	20	0	15	58	0	0	199
5:15 PM	9	0	16	0	0	0	0	0	0	96	12	0	14	63	0	0	210
5:30 PM	8	0	9	0	0	0	0	0	0	89	14	0	8	79	0	0	207
5:45 PM	3	0	14	0	0	0	0	0	0	76	15	0	26	68	0	0	202
6:00 PM	14	0	19	0	0	0	0	0	0	86	9	0	16	55	0	0	199
6:15 PM	2	0	12	0	0	0	0	0	0	75	9	0	13	58	0	0	169
6:30 PM	6	0	13	0	0	0	0	0	0	58	2	0	13	61	0	0	153
6:45 PM	5	0	8	0	0	0	0	0	0	60	11	0	21	84	0	0	189
	NL	NT	NR	NU	SL	ST	SR	SU	EL	ET	ER	EU	WL	WT	WR	WU	TOTAL
TOTAL VOLUMES :	72	0	148	0	0	0	0	0	0	941	135	0	172	723	0	0	2191
APPROACH %'s :	32.73%	0.00%	67.27%	0.00%					0.00%	87.45%	12.55%	0.00%	19.22%	80.78%	0.00%	0.00%	
PEAK HR :	05:00 PM - 06:00 PM																TOTAL
PEAK HR VOL :	26	0	57	0	0	0	0	0	0	343	61	0	63	268	0	0	818
PEAK HR FACTOR :	0.722	0.000	0.792	0.000	0.000	0.000	0.000	0.000	0.000	0.893	0.763	0.000	0.606	0.848	0.000	0.000	0.974
	0.830								0.935				0.880				

Appendix C: Level of Service Definition

APPENDIX C: LEVEL OF SERVICE DEFINITIONS

All capacity analyses are based on the procedures specified by the Transportation Research Board, Special Report 209: *Highway Capacity Manual (HCM)*, 2000. Levels of service (LOS) range from A to F. A brief description of each level of service for signalized and unsignalized intersections is provided below.

Signalized Intersections: Level of service is based upon the traffic volume present in each lane on the roadway, the capacity of each lane at the intersection and the delay associated with each directional movement. The levels of service for signalized intersections are defined below:

- Level of Service A describes operations with very low average delay per vehicle, i.e., less than 10.0 seconds. This occurs when progression is extremely favorable, and most vehicles arrive during the green phase. Most vehicles do not stop. Short signal cycle lengths may also contribute to low delay.
- Level of Service B describes operations with average delay in the range of 10.1 to 20.0 seconds per vehicle. This generally occurs with good progression and/or short cycle lengths. More vehicles stop than for LOS A, causing higher levels of average delay.
- Level of Service C describes operations with delay in the range of 20.1 to 35.0 seconds per vehicle. These higher delays may result from fair progression and/or longer cycle lengths. Individual cycle failures may begin to appear at this level. The number of vehicles stopping is significant at this level although many still pass through the intersection without stopping. This is generally considered the lower end of the range of the acceptable level of service in rural areas.
- Level of Service D describes operations with delay in the range of 35.1 to 55.0 seconds per vehicle. At LOS D, the influence of congestion becomes more noticeable. Longer delays may result from some combination of unfavorable progression, long cycle lengths, and/or high traffic volumes as compared to the roadway capacity. Many vehicles are required to stop and the number of vehicles that do not have to stop declines. Individual signal cycle failures, where all waiting vehicles do not clear the intersection during a single green time, are noticeable. This is generally considered the lower end of the range of the acceptable level of service in urban areas.
- Level of Service E describes operations with delay in the range of 55.1 to 80.0 seconds per vehicle. These higher delay values generally indicate poor progression, long cycle lengths, and high traffic volumes. Individual cycle failures are frequent occurrences. LOS E has been set as the limit of acceptable conditions.
- Level of Service F describes operations with average delay in excess of 80.0 seconds per vehicle. This is considered to be unacceptable to most drivers. This condition often occurs with over-saturation, i.e., when traffic arrives at a flow rate that exceeds the capacity of the intersection. It may also occur at high volumes with many individual cycle failures. Poor progression and long cycle lengths may also contribute to such delays.

Unsignalized Intersections: At an unsignalized intersection, the major street through traffic and right-turns are assumed to operate unimpeded and therefore receive no level of service rating. The level of service for the minor street and the major street left-turn traffic is dependent on the volume and capacity of the available lanes, and, the number and frequency of acceptable gaps in the major street traffic to make a conflicting turn. The level of service grade is provided for each conflicting movement at an unsignalized intersection and is based on the total average delay experienced by each vehicle. The delay includes the time it takes a vehicle to move from the back of a queue through the intersection.

The unsignalized intersection level of service analysis does not account for variations in driver behavior or the effects of nearby traffic signals. Therefore, the results from this analysis usually indicate worse levels of service than may be experienced in the field. The unsignalized intersection level of service descriptions are provided below:

- Level of Service A. Describes operations where there is very little to no conflicting traffic for a minor side street movement, i.e., an average total delay of less than 10.0 seconds per vehicle.
- Level of Service B. Describes operations with average total delay in the range of 10.1 to 15.0 seconds per vehicle.
- Level of Service C. Describes operations with average total delay in the range of 15.1 to 25.0 second per vehicle.
- Level of Service D. Describes operations with average total delay in the range of 25.1 to 35.0 seconds per vehicle.
- Level of Service E. Describes operations with average total delay in the range of 35.1 to 50.0 seconds per vehicle.
- Level of Service F. Describes operations with average total delay of 50 seconds per vehicle. LOS F exists when there are insufficient gaps of suitable size to allow a side street demand to cross safely through or enter a major street traffic stream. This level of service is generally evident from extremely long total delays experienced by side street traffic and by queuing on the minor approaches. It is important to note that LOS F may not always result in long queues but may result in adjustments to normal driver behavior.

Appendix D: Existing Conditions (2019) Capacity Analysis Worksheets

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	133	28	35	380	44	38
Future Vol, veh/h	133	28	35	380	44	38
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	7	0	2	5	5
Mvmt Flow	141	30	37	404	47	40

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	171	0	634	156
Stage 1	-	-	-	-	156	-
Stage 2	-	-	-	-	478	-
Critical Hdwy	-	-	4.1	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1418	-	438	882
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	617	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1418	-	423	882
Mov Cap-2 Maneuver	-	-	-	-	423	-
Stage 1	-	-	-	-	865	-
Stage 2	-	-	-	-	596	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	12.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	557	-	-	1418	-
HCM Lane V/C Ratio	0.157	-	-	0.026	-
HCM Control Delay (s)	12.7	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.1	-

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	343	61	63	268	26	57
Future Vol, veh/h	343	61	63	268	26	57
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	2	2	0	8	2
Mvmt Flow	354	63	65	276	27	59

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	417	0	792	386
Stage 1	-	-	-	-	386	-
Stage 2	-	-	-	-	406	-
Critical Hdwy	-	-	4.12	-	6.48	6.22
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.218	-	3.572	3.318
Pot Cap-1 Maneuver	-	-	1142	-	350	662
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	660	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1142	-	327	662
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	674	-
Stage 2	-	-	-	-	616	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	13.7
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	501	-	-	1142	-
HCM Lane V/C Ratio	0.171	-	-	0.057	-
HCM Control Delay (s)	13.7	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Appendix E: Future Without Development (2021) Conditions Capacity Analysis Worksheets

Intersection	
Int Delay, s/veh	2

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	136	29	36	388	45	39
Future Vol, veh/h	136	29	36	388	45	39
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	7	0	2	5	5
Mvmt Flow	145	31	38	413	48	41

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	176	0	650	161
Stage 1	-	-	-	-	161	-
Stage 2	-	-	-	-	489	-
Critical Hdwy	-	-	4.1	-	6.45	6.25
Critical Hdwy Stg 1	-	-	-	-	5.45	-
Critical Hdwy Stg 2	-	-	-	-	5.45	-
Follow-up Hdwy	-	-	2.2	-	3.545	3.345
Pot Cap-1 Maneuver	-	-	1412	-	429	876
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	610	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1412	-	414	876
Mov Cap-2 Maneuver	-	-	-	-	414	-
Stage 1	-	-	-	-	861	-
Stage 2	-	-	-	-	589	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	12.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	548	-	-	1412	-
HCM Lane V/C Ratio	0.163	-	-	0.027	-
HCM Control Delay (s)	12.8	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.1	-

Intersection	
Int Delay, s/veh	2.1

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	350	62	64	273	27	58
Future Vol, veh/h	350	62	64	273	27	58
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	2	2	0	8	2
Mvmt Flow	361	64	66	281	28	60

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	425	0	806	393
Stage 1	-	-	-	-	393	-
Stage 2	-	-	-	-	413	-
Critical Hdwy	-	-	4.12	-	6.48	6.22
Critical Hdwy Stg 1	-	-	-	-	5.48	-
Critical Hdwy Stg 2	-	-	-	-	5.48	-
Follow-up Hdwy	-	-	2.218	-	3.572	3.318
Pot Cap-1 Maneuver	-	-	1134	-	343	656
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	655	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1134	-	319	656
Mov Cap-2 Maneuver	-	-	-	-	319	-
Stage 1	-	-	-	-	669	-
Stage 2	-	-	-	-	610	-

Approach	EB	WB	NB
HCM Control Delay, s	0	1.6	13.9
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	491	-	-	1134	-
HCM Lane V/C Ratio	0.178	-	-	0.058	-
HCM Control Delay (s)	13.9	-	-	8.4	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.6	-	-	0.2	-

Appendix F: Future with Development (2021) Conditions Capacity Analysis Worksheets

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	1	136	29	36	388	2	45	0	39	4	1	3
Future Vol, veh/h	1	136	29	36	388	2	45	0	39	4	1	3
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	94	94	94	94	92	94	92	94	92	92	92
Heavy Vehicles, %	2	2	7	0	2	2	5	2	5	2	2	2
Mvmt Flow	1	145	31	38	413	2	48	0	41	4	1	3

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	415	0	0	176	0	0	655	654	161	673	668	414
Stage 1	-	-	-	-	-	-	163	163	-	490	490	-
Stage 2	-	-	-	-	-	-	492	491	-	183	178	-
Critical Hdwy	4.12	-	-	4.1	-	-	7.15	6.52	6.25	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.15	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.15	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.2	-	-	3.545	4.018	3.345	3.518	4.018	3.318
Pot Cap-1 Maneuver	1144	-	-	1412	-	-	375	386	876	369	379	638
Stage 1	-	-	-	-	-	-	832	763	-	560	549	-
Stage 2	-	-	-	-	-	-	553	548	-	819	752	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1144	-	-	1412	-	-	362	372	876	342	365	638
Mov Cap-2 Maneuver	-	-	-	-	-	-	362	372	-	342	365	-
Stage 1	-	-	-	-	-	-	831	762	-	559	530	-
Stage 2	-	-	-	-	-	-	530	529	-	779	751	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	13.8	13.8
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	498	1144	-	-	1412	-	-	418
HCM Lane V/C Ratio	0.179	0.001	-	-	0.027	-	-	0.021
HCM Control Delay (s)	13.8	8.2	0	-	7.6	0	-	13.8
HCM Lane LOS	B	A	A	-	A	A	-	B
HCM 95th %tile Q(veh)	0.6	0	-	-	0.1	-	-	0.1

Intersection	
Int Delay, s/veh	2.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	3	350	62	64	273	5	27	1	58	3	1	2
Future Vol, veh/h	3	350	62	64	273	5	27	1	58	3	1	2
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	97	97	97	97	92	97	92	97	92	92	92
Heavy Vehicles, %	2	0	2	2	0	2	8	2	2	2	2	2
Mvmt Flow	3	361	64	66	281	5	28	1	60	3	1	2

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	286	0	0	425	0	0	816	817	393	846	847	284
Stage 1	-	-	-	-	-	-	399	399	-	416	416	-
Stage 2	-	-	-	-	-	-	417	418	-	430	431	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.18	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.18	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.18	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.572	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	1276	-	-	1134	-	-	289	311	656	282	299	755
Stage 1	-	-	-	-	-	-	615	602	-	614	592	-
Stage 2	-	-	-	-	-	-	602	591	-	603	583	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	1276	-	-	1134	-	-	272	289	656	242	277	755
Mov Cap-2 Maneuver	-	-	-	-	-	-	272	289	-	242	277	-
Stage 1	-	-	-	-	-	-	613	600	-	612	551	-
Stage 2	-	-	-	-	-	-	558	550	-	545	581	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	1.6	15	16.4
HCM LOS			C	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	450	1276	-	-	1134	-	-	322
HCM Lane V/C Ratio	0.197	0.003	-	-	0.058	-	-	0.02
HCM Control Delay (s)	15	7.8	0	-	8.4	0	-	16.4
HCM Lane LOS	C	A	A	-	A	A	-	C
HCM 95th %tile Q(veh)	0.7	0	-	-	0.2	-	-	0.1