GOROVE / SLADE

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MEMORANDUM

To: Daniel Taber — Town of Dumfries, Town Manager
Laura O'Dell — Town of Dumfries, Town Planner/Zoning Administrator

CC: Pete Singh — Dumfries Development Group LLC

From: Cheryl Sharp
Chad Baird

Date: November 26, 2013

Subject: First Town Center Parking Assessment

At the request of the developer and in support of the Conditional Use Permit and Site Plan for the First Town Center project, Gorove/Slade Associates, Inc. conducted a parking demand analysis of the proposed First Town Center development located on the parcel located along Main Street in the Town of Dumfries, Virginia. This assessment contained herein identifies the adequacy of the planned parking supply for the anticipated parking demand at the proposed redevelopment.

Development Plan

Based on the currently proposed development plan, dated November 2013, the development will contain the following parking-generating land uses outlined below in Table 1. Per Section 70.13(h) of the Town's Zoning Ordinance, the floor area used for parking calculations is the gross floor area (GFA) multiplied by a core factor of 0.80. The proposed parking supply is shown in Table 2.

Table 1: Development Land Uses and Sizes

Land Use	Size		GFA with Core Factor	
Office	54,000	SF (GFA)	43,200	SF
Retail	66,000	SF (GFA)	52,800	SF
Residential	284	DUs	N/A	
1-Bedroom	*158*	*DUs*		
2-Bedroom	*116*	*DUs*		
3-Bedroom	*10*	*DUs*		

Table 2: Site Parking Supply

Parking Location	Number of Spaces
Building 1 Garage	240
Building 2 Garage	495
On-site Surface Parking	88
Total On-Site Parking	823

Parking per Town Code

Town of Dumfries Parking Requirements

The Town's current parking requirement per Section 70-30 of the Town of Dumfries Zoning Ordinance for retail use is one (1) space for every 200 square feet of net floor area, one (1) space for every 300 square feet of net office floor area, one

As described previously, the site will have a mix of different land uses and therefore there is a strong potential for parking synergy between the different land uses. The office, residential, and retail have different periods of the day when parking demand is at its highest, and therefore presents the opportunity for shared parking spaces between these different uses. The Town ordinance allows up to a 30% parking credit allowance to account for shared parking between land uses. The amount and validity of the parking credit, also known as a mixed-use reduction, for shared parking will be analyzed in the next section. The number of required spaces per the Town code, including the 30% mixed-use shared parking reduction, is presented below.

Table 3: Number of Required Parking Spaces

Land Use	Parking Ratio	Size		# of Required Spaces
Office	1/300sf	43.2	kSF	144
Retail	1/200sf	52.8	kSF	264
Apartments	Varies*	284	DUs	631
Total				1,039
30% Mixed Use Reduction				-311
Total with 30% Reduction				728

** Varies; 1.5 per Efficiency, 2 per 1-bed, 2.5 per 2 or 3-bed*

Residential Parking Requirements in Other Local Jurisdictions

For comparison purposes, the table below shows the residential parking ratios currently used in other Northern Virginia jurisdictions and what the number of required spaces would be if the subject development were in that jurisdiction.

Table 4: Other Jurisdictions' Current Parking Requirements

Jurisdiction	Parking Ratio	# of Spaces	Variance from Town	% Variance from Town
Alexandria	1.3/1-Bed; 1.75/2-Bed; 2.2/3-Bed or higher	426	-205	-33%
Arlington County	1.125/DU + 1/DU after first 200 DUs	309	-322	-51%
Dumfries	1.5/Eff.-Bed; 2/1-Bed; 2.5/2-Bed or higher	631	--	--
Fairfax County (General)	1.6/DU	454	-177	-28%
Fairfax County (Tysons)	1.1-1.4/1-Bed; 1.35-1.7/2-Bed; 1.6-2.0/3-Bed	344	-287	-45%
		435	-196	-31%
Fairfax (City)	2/DU	568	-63	-10%
Falls Church	1/Eff.-Bed; 1.5/1-Bed; 2/2-Bed or higher	489	-142	-23%
Loudoun County	1.5/1-Bed; 2/2-Bed or higher	489	-142	-23%
Prince William County	1/Eff.-Bed; 1.5/1-Bed; 2.2/2-Bed or higher	514	-117	-19%

As can be seen in the table above, the Town has the highest residential parking rate in Northern Virginia. While some of these rates are for more urban locations, the Town rates are 19-23% higher than the less dense outer suburb counties of Loudoun and Prince William.

Parking Demand

Institute of Transportation Engineers

A parking demand assessment was prepared for the proposed First Town Center development based on national parking demand rates from the Institute of Transportation Engineers (ITE) Parking Generation, 4nd Edition. The ITE manual is compiled of research, data, and experiences of transportation engineering and planning professionals, and is the industry's leading resource for determining parking demand. A second industry standard for parking information is the Urban Land Institute (ULI) Shared Parking, 2nd Edition. However, this manual addresses shared parking synergy (as described in the next section), and references the ITE manual for the initial parking demand. The results of the parking demand analysis are presented in Table 5. The rates used for general retail represent the weekday (non-Friday) demand during December, the busiest shopping period of the year.

Table 5: ITE Parking Analysis

Land Use	Land Use Code	Size		Effective Parking Rate [1]	ITE Parking Demand	Parking Supply	Parking Surplus	
							# of Spaces	*Percent*
Office	701	43.0	kSF	2.847 sp / 1,000 sf	123			
Retail	820	52.8	kSF	3.76 sp / 1,000 sf	199			
Low/Mid Rise Apts	221	284	DUs	1.29 sp / DU	366			
Total					688	823	135	19.6%

[1] *"Effective" parking rate, since Supermarket demand was based on an equation. The other three land uses were based on the rate shown.*

Using the ITE Parking Generation rates for parking demand, the site will provide almost 20% more spaces than will be demanded by the residents and retail employees/patrons during peak demand in December.

Census Data

In addition to an analysis of statutory requirements (above) and traditional industry parking models (e.g. ULI/ITE), we have analyzed the actual parking use from rental apartments in the Town of Dumfries. While we were unable to find data about the actual demand for purely rental apartments, we were able to find census data about the number of cars used by rental housing of all kinds by local jurisdiction. Note that the dataset includes all housing types that are occupied by renters, including single family homes, townhomes and multifamily apartments. Note also the dataset does not distinguish between age of the housing or the number of bedrooms. Because of this inclusiveness of age and type, we anticipate that the dataset skew towards housing with more bedrooms and more cars.

The specific census data is from the 2007-2011 American Community Survey 5-Year Estimates from www.census.gov. The American Community Survey (ACS) is the more detailed long form census that uses statistical sampling techniques to paint a more detailed portrait of our communities. It is subject to sampling variability and the degree of uncertainty for an estimate arising from sampling variability is represented through margin of error. The margins of error for the data presented below are included in the appendix. Citizens receiving this additional survey are required by law to complete and return it to the Census Bureau.

The number of estimated renter-occupied dwelling units and the estimated aggregate number of vehicles for those renters based on the ACS was used in order to determine current vehicle parking demand for renters in the area surrounding the site. This summary is shown in Table 6.

Table 6: Town of Dumfries Census Data – Parking Demand for Renter Occupied Units

Town of Dumfries	# of Units	
Aggregate # of Vehicles for Renter-Occupied Units	861	Vehicles
Renter-Occupied Units	565	DUs
No vehicle available	*79*	DUs
1 vehicle available	*128*	DUs
2 vehicles available	*290*	DUs
3 or more vehicles available	*48*	DUs
Existing Parking Rate for Renter-Occupied Units	1.58	Vehicles/DU

Although the census data for rented units in the Town of Dumfries indicates an existing parking rate of 1.58 vehicles/dwelling unit, this is not necessarily representative of the proposed residential use.

The entire northern Virginia region was also studied, as it captures a housing scenario that provides a balance between both urban areas very proximate to Metro stations, such as Arlington, and more suburban areas such as Loudoun and Prince William Counties. This analysis recognizes the urban nature of the proposed development and Town of Dumfries with its proximity to metro and mixed use density, as well as the suburban nature of the counties surrounding the Town of Dumfries. A summary of the census data for the Commonwealth of Virginia and Northern Virginia is shown in Table 7.

Table 7: Statewide and Northern Virginia Census Data – Parking Demand for Renter Occupied Units

Location	Renter Occupied Units			# Vehicles Available			Parking Demand
	Estimate (# Units)	MOE		Estimate (# Vehicles)	MOE		Average Rate (Veh/unit)
Virginia	944180	±	6400	1304752	±	12363	1.38
Alexandria city, VA	35349	±	927	41713	±	1296	1.18
Arlington County, VA	49340	±	1105	58093	±	1725	1.18
Dumfries town, VA	565	±	147	861	±	282	1.58
Fairfax city, VA	2590	±	234	4007	±	519	1.55
Fairfax County, VA	111787	±	1964	168284	±	3896	1.51
Fauquier County, VA	4905	±	498	8517	±	1032	1.74
Fredericksburg city, VA	5722	±	443	6646	±	628	1.16
Herndon town, VA	2865	±	365	6646	±	628	2.32
Leesburg town, VA	3966	±	398	5473	±	634	1.38
Loudoun County, VA	20774	±	792	32963	±	1507	1.59
Prince William County, VA	32834	±	1047	52480	±	2256	1.60
Stafford County, VA	8605	±	615	13984	±	1073	1.63
Vienna town, VA	1013	±	170	1811	±	372	1.79
Weighted Average (Northern Virginia only)							1.43

Per the census information provided above, the weighted average renter parking demand for the whole of Northern Virginia is approximately 1.43 vehicles per unit.

Assuming the proposed mix of bedrooms does not change, the effective proposed rate is 1.72 spaces per dwelling unit, as will be seen in the next section. Based on national industry standard rates, Northern Virginia census data, and census data for only the Town of Dumfries, a rate as low as 1.58 spaces per rental dwelling unit is justified.

Proposed Parking

Proposed Parking Rates

The proposed on-site parking requirements for use is one (1) space for every 200 square feet for general retail, one (1) space for every 300 square feet office use, 1.5 spaces for each 1-bedroom dwelling unit, and 2 spaces for every 2- or 3-bedroom dwelling units. These residential rates are reduced compared to the required amount per the Town's Zoning Ordinance; however, they are still higher than or on par with other Northern Virginia jurisdiction residential parking rates.

Table 8: Proposed Number of Required Parking Spaces

Land Use	Parking Ratio	Size		# of Required Spaces	Parking Supply	Parking Surplus	
						# of Spaces	Percent
Office	1/300sf	43.2	kSF	144			
Retail	1/200sf	52.8	kSF	264			
Apartments	Varies*	284	DUs	489			
Total				897	823	-74	-8.2%
Mixed Use (Shared Parking) Reduction (from Table 9)		17.2%		-154			
Total with Reduction				743	823	80	10.8%

** Varies; 1.5 per 1-bed, 2 per 2- or 3-bed*

Without accounting for parking synergy between the land uses, the site, with the proposed residential parking rates, will have a parking shortage of 8.2%. That shortage is transformed to a 10.8% surplus in parking for the entire site once the synergy between the land uses is considered on the site.

The 154 shared parking spaces will effectively increase the residential parking to 643 spaces, or 12 more spaces than required by the Zoning Ordinance, during the nighttime peak, when the residential demand is highest and little to no commercial demand.

Mixed Use/Shared Parking

Residential uses have good parking synergy with retail uses, since peak residential hours are at night and retail peak hours are during the day. Both leading sources for shared parking patterns, the ITE Parking Generation, 4th Edition and the Urban Land Institute (ULI) Shared Parking, 2nd Edition, were referenced for determining the time-of-day shared parking opportunities between the land uses. The ITE manual was more heavily relied upon as it contains more recent information than the ULI manual and the ULI manual did not contain information on all the specific land use categories proposed in this redevelopment. The results of the shared parking analysis showing the variable time of day peaks is shown in Table 9.

Table 9: Shared Parking Analysis

Time	Office		Retail		Residential		Total Site
	% Demand	# of Spaces	% Demand	# of Spaces	% Demand	# of Spaces	**# of Spaces**
Proposed Parking (per Table 8:)		144		264		489	**897**
12-4:00AM	0%	0	0%	0	100%	489	**489**
5:00 AM	0%	0	0%	0	100%	489	**489**
6:00 AM	0%	4	0%	0	100%	489	**493**
7:00 AM	0%	43	9%	24	90%	440	**507**
8:00 AM	0%	108	16%	42	85%	416	**566**
9:00 AM	0%	137	55%	145	80%	391	**673**
10:00 AM	63%	144	57%	150	75%	367	**661**
11:00 AM	71%	144	84%	222	70%	342	**708**
12:00 PM	94%	130	84%	222	65%	318	**669**
1:00 PM	100%	130	83%	219	70%	342	**691**
2:00 PM	95%	144	94%	248	70%	342	**734**
3:00 PM	98%	144	90%	238	70%	342	**724**
4:00 PM	97%	130	81%	214	75%	367	**710**
5:00 PM	92%	72	93%	246	85%	416	**733**
6:00 PM	79%	36	100%	264	90%	440	**740**
7:00 PM	60%	14	93%	246	97%	474	**734**
8:00 PM	0%	10	96%	253	98%	479	**743**
9:00 PM	0%	4	87%	230	99%	484	**718**
10:00 PM	0%	1	0%	0	100%	489	**490**
11:00 PM	0%	0	0%	0	100%	489	**489**
Maximum without Shared Parking							**897**
Maximum with Shared Parking							**743**
Reduction due to Shared Parking							**-17.2%**

The shared parking analysis shows that the mix of planned uses will yield a 17.2% reduction just from having variable peak time of day parking demands. Utilizing shared parking reduces the requirement to 743 spaces. The 17.2% is well below the 30% parking credit allowed in the Town's Zoning Ordinance.

Summary

Based on the analysis provided, a parking reduction with shared parking for the proposed site is requested.

- The number of proposed parking spaces is more than sufficient to accommodate the anticipated parking demand for the planned site.
- With the proposed reduced parking rates and the implementation of shared parking across the site, the site will have a parking space surplus of 10.8%.
- The residential rate reduction of 1.5 for 1-bedroom and 2.0 for 2- and 3-bedroom dwellings proposed herein is justified based on national industry standards, and the American Community Survey data collected for both the Northern Virginia area and Town of Dumfries.

B25044

TENURE BY VEHICLES AVAILABLE
Universe: Occupied housing units
2007-2011 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

	Dumfries town, Virginia	
	Estimate	Margin of Error
Total:	1,676	+/-176
Owner occupied:	1,131	+/-242
No vehicle available	24	+/-32
1 vehicle available	241	+/-105
2 vehicles available	482	+/-150
3 vehicles available	206	+/-111
4 vehicles available	160	+/-116
5 or more vehicles available	18	+/-27
Renter occupied:	545	+/-147
No vehicle available	79	+/-80
1 vehicle available	128	+/-93
2 vehicles available	290	+/-143
3 vehicles available	39	+/-46
4 vehicles available	9	+/-24
5 or more vehicles available	0	+/-95

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

While the 2007-2011 American Community Survey (ACS) data generally reflect the December 2009 Office of Management and Budget (OMB) definitions of metropolitan and micropolitan statistical areas; in certain instances the names, codes, and boundaries of the principal cities shown in ACS tables may differ from the OMB definitions due to differences in the effective dates of the geographic entities.

Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2000 data. Boundaries for urban areas have not been updated since Census 2000. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2007-2011 American Community Survey

Explanation of Symbols:

1. An '**' entry in the margin of error column indicates that either no sample observations or too few sample observations were

B25046

AGGREGATE NUMBER OF VEHICLES AVAILABLE BY TENURE

Universe: Occupied housing units

2007-2011 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

	Dumfries town, Virginia	
	Estimate	Margin of Error
Aggregate number of vehicles available:	3,414	+/-528
Owner occupied	2,553	+/-651
Renter occupied	861	+/-282

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

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Estimates of urban and rural population, housing units, and characteristics reflect boundaries of urban areas defined based on Census 2000 data. Boundaries for urban areas have not been updated since Census 2000. As a result, data for urban and rural areas from the ACS do not necessarily reflect the results of ongoing urbanization.

Source: U.S. Census Bureau, 2007-2011 American Community Survey

Explanation of Symbols:

1. An '**' entry in the margin of error column indicates that either no sample observations or too few sample observations were available to compute a standard error and thus the margin of error. A statistical test is not appropriate.
2. An '-' entry in the estimate column indicates that either no sample observations or too few sample observations were available to compute an estimate, or a ratio of medians cannot be calculated because one or both of the median estimates falls in the lowest interval or upper interval of an open-ended distribution.
3. An '-' following a median estimate means the median falls in the lowest interval of an open-ended distribution.
4. An '+' following a median estimate means the median falls in the upper interval of an open-ended distribution.
5. An '***' entry in the margin of error column indicates that the median falls in the lowest interval or upper interval of an open-ended distribution. A statistical test is not appropriate.
6. An '*****' entry in the margin of error column indicates that the estimate is controlled. A statistical test for sampling variability is not appropriate.
7. An 'N' entry in the estimate and margin of error columns indicates that data for this geographic area cannot be displayed because the number of sample cases is too small.
8. An '(X)' means that the estimate is not applicable or not available.

B11012

HOUSEHOLD TYPE BY TENURE

Universe: Households

2007-2011 American Community Survey 5-Year Estimates

Supporting documentation on code lists, subject definitions, data accuracy, and statistical testing can be found on the American Community Survey website in the Data and Documentation section.

Sample size and data quality measures (including coverage rates, allocation rates, and response rates) can be found on the American Community Survey website in the Methodology section.

Although the American Community Survey (ACS) produces population, demographic and housing unit estimates, it is the Census Bureau's Population Estimates Program that produces and disseminates the official estimates of the population for the nation, states, counties, cities and towns and estimates of housing units for states and counties.

	Dumfries town, Virginia	
	Estimate	Margin of Error
Total:	1,676	+/-176
Family households:	1,159	+/-117
Married-couple family:	629	+/-144
Owner-occupied housing units	471	+/-140
Renter-occupied housing units	158	+/-108
Other family:	530	+/-154
Male householder, no wife present:	80	+/-81
Owner-occupied housing units	29	+/-35
Renter-occupied housing units	51	+/-75
Female householder, no husband present:	450	+/-150
Owner-occupied housing units	212	+/-106
Renter-occupied housing units	238	+/-111
Nonfamily households:	517	+/-189
Owner-occupied housing units	419	+/-171
Renter-occupied housing units	98	+/-75

Data are based on a sample and are subject to sampling variability. The degree of uncertainty for an estimate arising from sampling variability is represented through the use of a margin of error. The value shown here is the 90 percent margin of error. The margin of error can be interpreted roughly as providing a 90 percent probability that the interval defined by the estimate minus the margin of error and the estimate plus the margin of error (the lower and upper confidence bounds) contains the true value. In addition to sampling variability, the ACS estimates are subject to nonsampling error (for a discussion of nonsampling variability, see Accuracy of the Data). The effect of nonsampling error is not represented in these tables.

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Source: U.S. Census Bureau, 2007-2011 American Community Survey

Explanation of Symbols:

1. An '**' entry in the margin of error column indicates that either no sample observations or too few sample observations were

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MEMORANDUM

To:	Daniel Taber	Town of Dumfries, Town Manager
	Laura O'Dell	Town of Dumfries, Town Planner/Zoning Adminstrator
Cc:	Pete Singh	Dumfries Development Group LLC
From:	Chad Baird	
	Cheryl Sharp	
Date:	October 14, 2013	
Subject:	First Town Center Development Traffic Analysis Memo	

At the request of the developer to support the Conditional Use Permit and Site Plan for the First Town Center Project, the following memorandum was prepared to evaluate the traffic impact that the proposed First Town Center Development will have on Main Street (Route 1) and to provide potential future typical road cross-sections for the frontage of the site.

DEVELOPMENT PLAN

First Town Center Development is located along the south side of Main Street within the Town of Dumfries. The site location is shown in Figure 1. The site will consist of approximately 280 apartment units, 60,000 SF of specialty retail and 40,000 SF of office space. The development is expected to be completed in 2016.

The development will have three accesses along Main Street, in addition to an inter-parcel access point located to the south. The northern entrance will be a right-in right-out entrance, the central entrance will be full-access aligned with existing Colonial Street, while the southern entrance will be full-access and part of a T-intersection. The Inter-parcel access will be at the Whiskey St./Washington St./Main St. intersection, to the south. The site plan is shown in Figure 2.

870 REQUIREMENTS

The determination on whether the VDOT Chapter 870 regulations apply is based on the daily (24-hour) vehicle trips generated by the site. From December 31, 2011, onward, a traffic study is required to be submitted to VDOT when a rezoning development generates more than 5,000 daily trips. If an application generates 5,000 or fewer trips per day (vpd), a traffic study is not required.

The trips generated by the site are less than 5,000 vpd and are shown in Table 1. In addition, the proposed development is currently zoned for the uses proposed. Site plans do not require state traffic impact studies. Therefore, the development does not trigger the need for an official traffic impact study under Virginia Department of Transportation (VDOT) requirements per Chapter 870 of the 2011 Acts of Assembly (24 VAC 30-155). These regulations supersede former guidelines referred to as "Chapter 527." Therefore, the information contained herein meets all of VDOT's traffic impact study requirements.

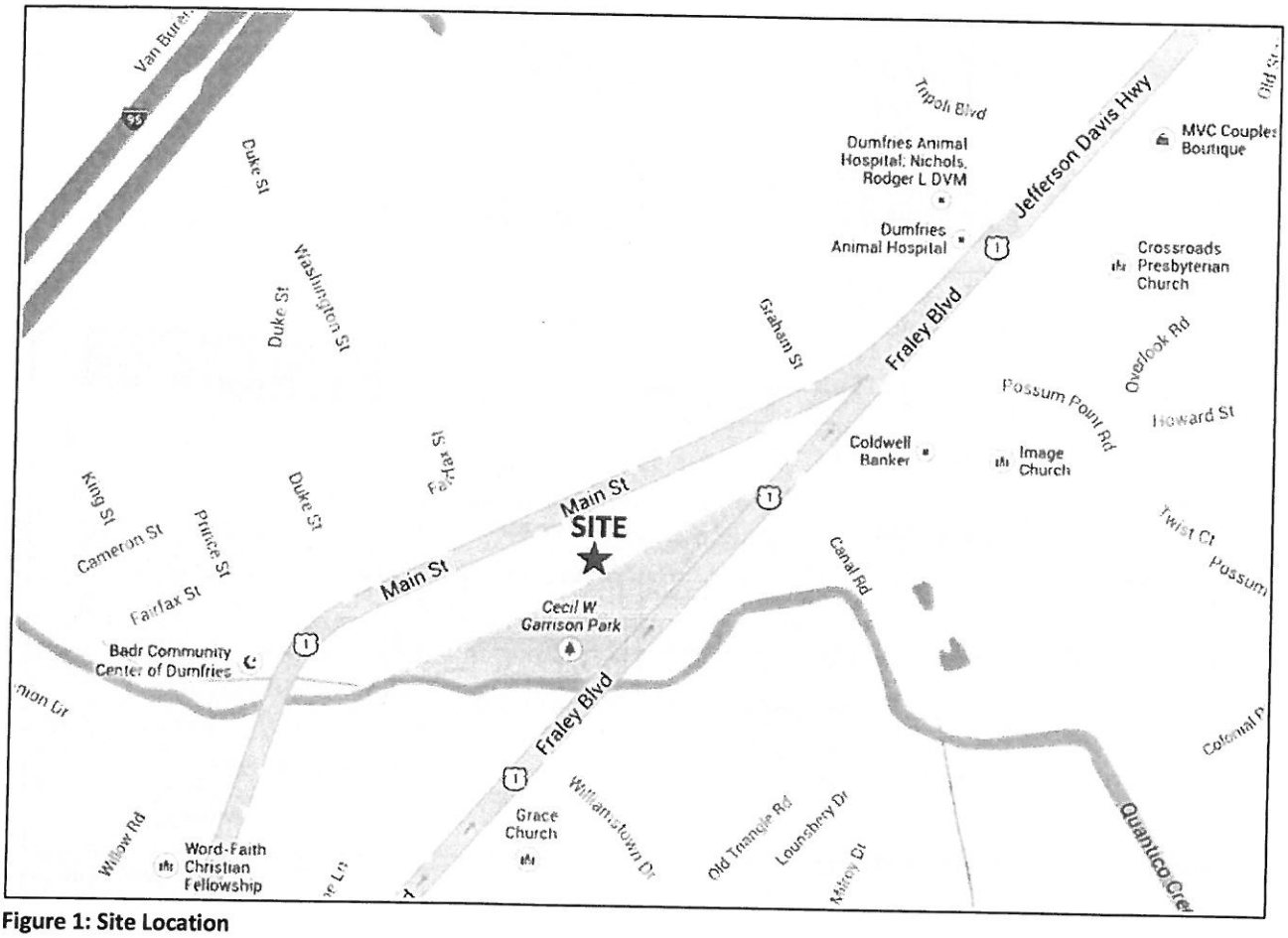


Figure 1: Site Location

ROAD NETWORK

Existing

Route 1 currently is generally a one-way pair through the Town of Dumfries. The northbound section is two lanes referred to as Fraley Boulevard. The two lane southbound section is Main Street, and is separated from the northbound lanes by numerous parcels and land bays. To provide local access, and unlike Fraley Boulevard, Main Street has one northbound lane as well that ends at Canal Road by merging with Fraley Boulevard. While Route 1 regionally is a north-south route, in the immediate vicinity of the site, it generally traverses east-west, and therefore is identified as such in the analysis and graphic of this study.

Future

Route 1 is planned to be widened by Prince William County and VDOT, transforming the two-lane northbound section of Fraley Boulevard to a six-lane arterial serving both north and southbound directions. This provides the opportunity to recreate Main Street as a pedestrian friendly town boulevard. Recommendations on the future Main Street cross-section are provided later in this memorandum based on the analysis contained herein.

Trip Generation

To determine the future with development (2016) traffic volumes, the site-generated traffic volumes were calculated based on ITE Trip Generation and then added to the 2013 existing traffic volumes. The proposed plan includes the construction of 280 apartment units, 60,000 SF of specialty retail and 40,000 SF of office space. The site's trip generation is shown in Table 1. It was determined that there would be a 5%/10%/15% (AM/PM/Weekday) internal capture rate applied to the site; this is based on the acceptable rates as outlined in VDOT's Chapter 870 Administrative Guidelines. There will be 232 external trips during the weekday morning peak hour, 351 external new trips in the afternoon peak hour, and 4,229 external weekday daily trips. The site generated trips are shown in Table 1. Details regarding the internal capture calculations are included in the Appendix.

Table 1: Weekday Trip Generation

Land Use	ITE Code	Size		------ Weekday ------						
				AM Peak Hour			PM Peak Hour			Daily
				In	*Out*	*Total*	*In*	*Out*	*Total*	*Total*
Proposed Residential										
Apartments	220	280	DU	28	113	141	112	60	172	1,820
Internal Trips Reduction [1]				*-1*	*-4*	*-5*	*-12*	*-7*	*-19*	*-296*
Total Residential External Trips				*27*	*109*	*136*	*100*	*53*	*153*	*1,524*
Proposed Office										
General Office Building	710	40.0	kSF	55	7	62	10	50	60	441
Internal Trips Reduction [1]				*-4*	*0*	*-4*	*-2*	*-6*	*-8*	*-44*
Total Office External Trips				*51*	*7*	*58*	*8*	*44*	*52*	*397*
Proposed Retail/Services										
Specialty Retail Center [2]	826	60.0	kSF	21	20	41	73	92	165	2,604
Internal Trips Reduction [1]				*-1*	*-2*	*-3*	*-9*	*-10*	*-19*	*-296*
Total Retail/Services External Trips				*20*	*18*	*38*	*64*	*82*	*146*	*2,308*
Total (Without Reductions)				**104**	**140**	**244**	**195**	**202**	**397**	**4,865**
Internal Trip Reductions				***-6***	***-6***	***-12***	***-23***	***-23***	***-46***	***-636***
Total Trips				**98**	**134**	**232**	**172**	**179**	**351**	**4,229**

(1) The Internal Capture Reduction is based on ITE's internal capture methodology as described in the Trip Generation Handbook, 2nd Edition.
(2) ITE Code 826 (Specialty Retail) AM Peak Hour is based on 25% of the PM Peak Hour data since the ITE manual does not provide any AM adjacent street data information.

Site Traffic Distribution and Assignment/Future Volumes (2016)

The distribution of site trips was based on existing traffic patterns, location of the site, and the nature of the proposed development. Trips generated from the site were assigned based on the abovementioned factors. For this study, it was assumed that 50% of the site traffic originated from the north, while the other 50% originated from the south. Of the total site trips, approximately 5% was assumed to access the site via the inter-parcel access. The site generated trips and site traffic distribution are shown in Figure 4.

To determine the future with development volumes, site traffic was added to the 2013 existing traffic volumes. The future with development volumes are shown in Figure 5 below.

Future with Development Plus Six Years (2022)

In the future, Fraley Boulevard (Route 1), currently the northbound portion of the Route 1 one-way pair through Dumfries, will be widened to a six-lane road with three lanes travelling in each direction (northbound/southbound). With the

completion of the Fraley Boulevard (Route 1) widening described previously, the majority of the traffic travelling southwest along Main Street will be re-routed to Fraley Boulevard as the traffic is regional in nature. In this analysis, it was assumed that approximately 90% of the southwest traffic currently using Main Street would be added to the Fraley Boulevard network. The future volumes with re-routing are shown in Figure 6.

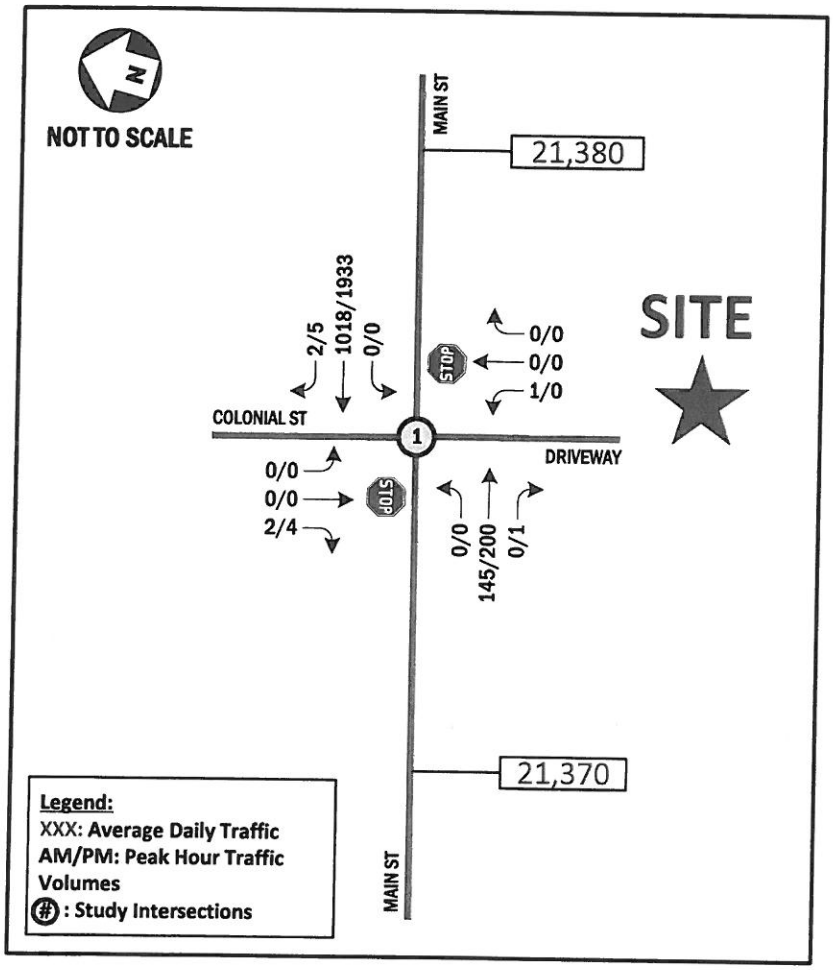


Figure 3: Existing/Future without Development Traffic Volumes

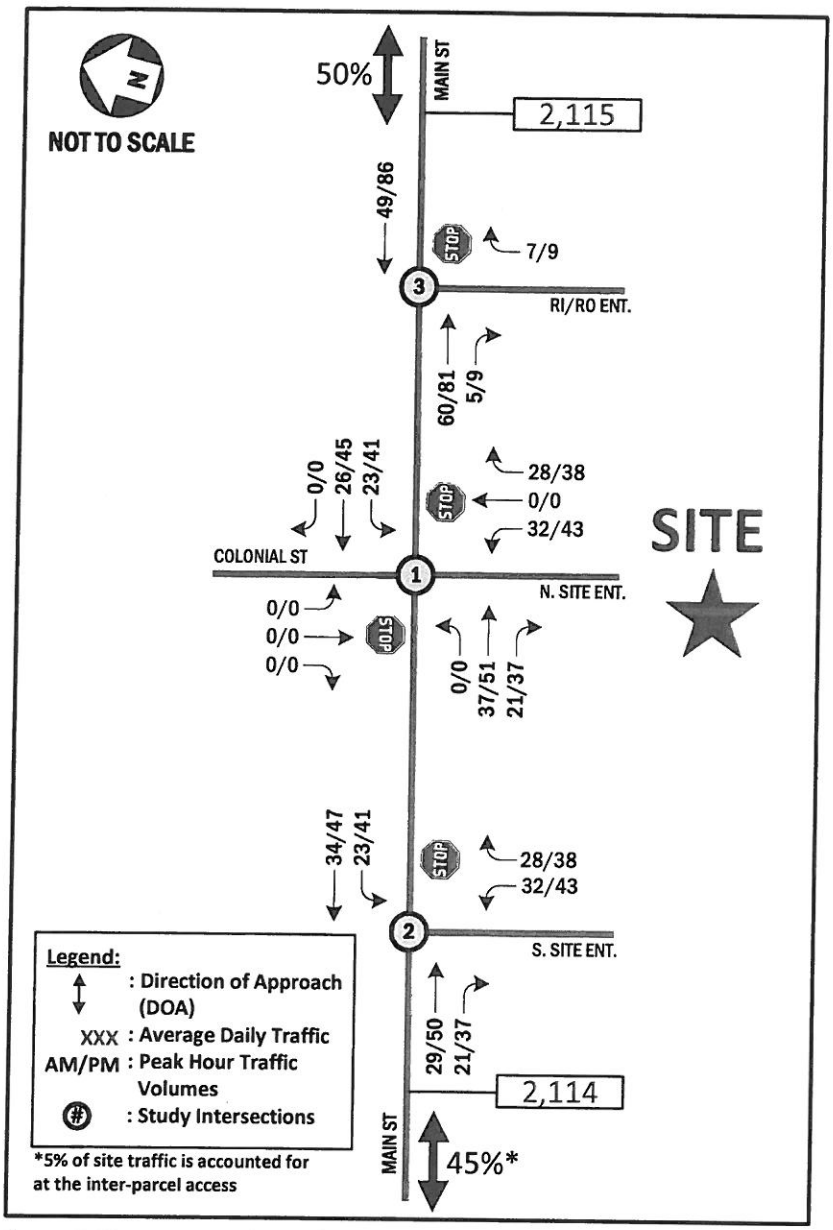


Figure 4: Site Generated Trips/Site DOA

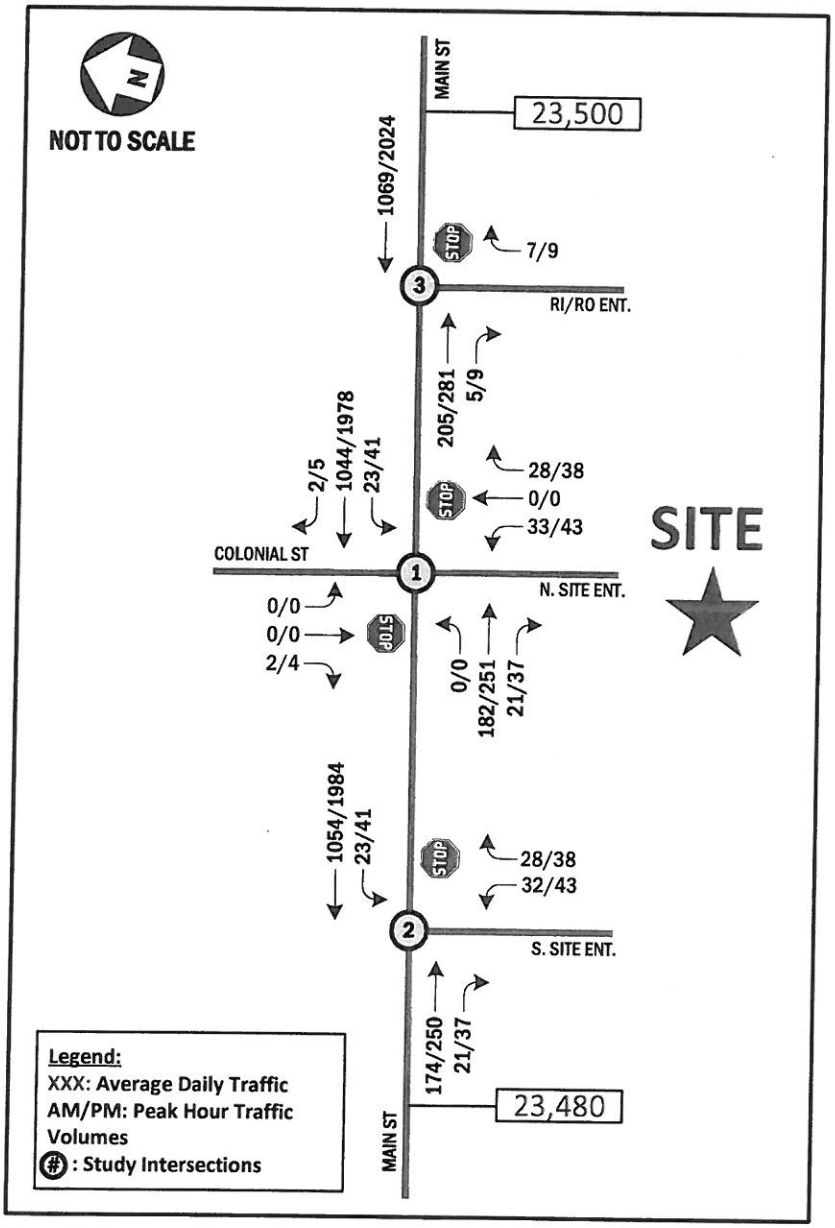


Figure 5: Future with Development Traffic Volumes (2016)

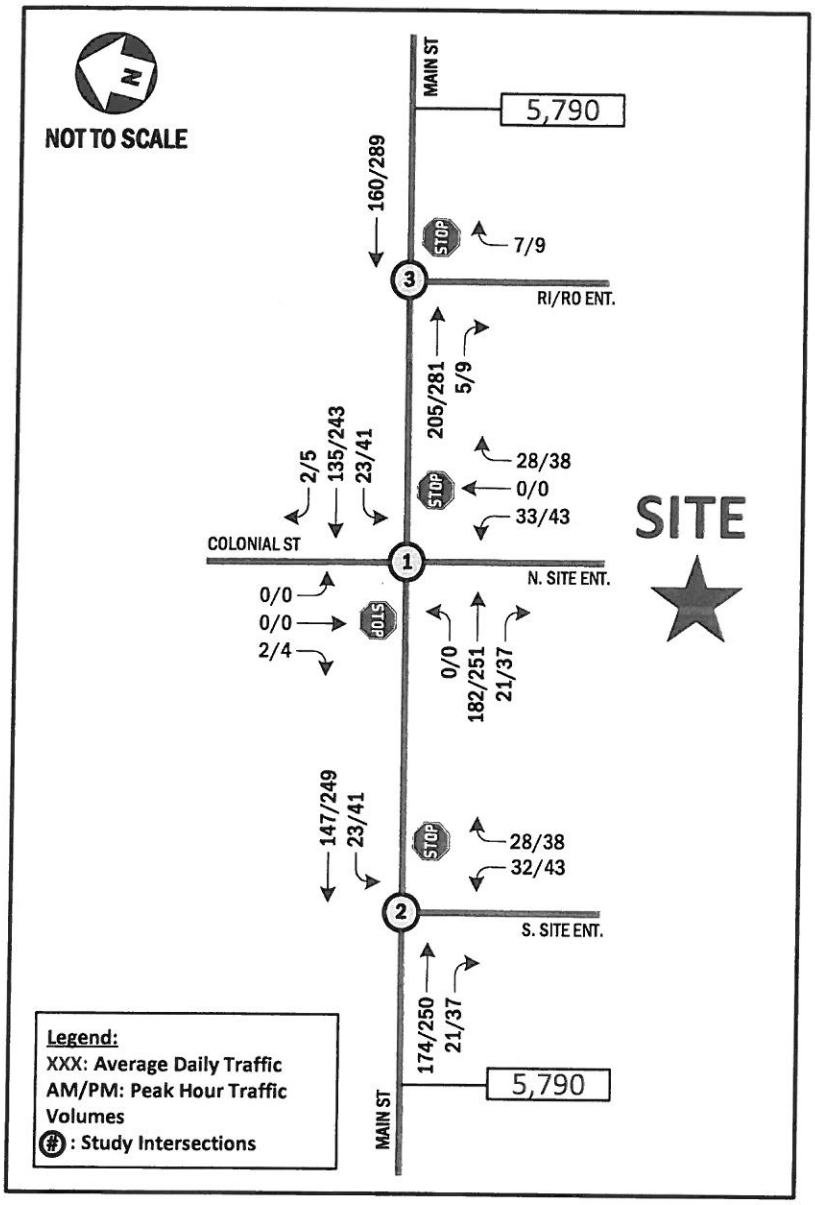


Figure 6: Future with Development Plus Six Years Traffic Volumes (2022)

INTERSECTION CAPACITY ANALYSIS

Intersection capacity analyses were performed for the existing, total future (interim conditions) and total future (ultimate conditions) for the intersections during the weekday morning and afternoon peak hours. *Synchro, version 7.0* was used to analyze the study intersections with results based on the Highway Capacity Manual (HCM) methodology. Peak hour factors of 0.92 and the default heavy vehicle percentage of 2% were used in all scenarios. The results of the capacity analyses are expressed in level of service (LOS) and delay (seconds per vehicle) per lane group. The 95th and 50th percentile queue lengths are expressed in feet. The results are presented in Table 2, Table 3 and Table 4 for the Existing/Future without Development, Future with Development (2016), and Future with Development plus Six Years (2022) scenarios, respectively.

Table 2: Existing Conditions (2013)/Future without Development (2016) Intersection Capacity Analysis Results

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak			
			LOS	Delay	50th Queue	95th Queue	LOS	Delay	50th Queue	95th Queue
1	Main St & Colonial St (Unsignalized)									
	Eastbound Thru/Right	1170	A	0.0	N/A	0	A	0.0	N/A	0
	Westbound Thru/Right	475	A	0.0	N/A	0	A	0.0	N/A	0
	Northbound Approach	140	B	12.9	N/A	0	A	0.0	N/A	0
	Southbound Approach	275	B	12.6	N/A	0	C	21.5	N/A	1

Table 3: Future with Development Interim Conditions (2016) Intersection Capacity Analysis Results

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak			
			LOS	Delay	50th Queue	95th Queue	LOS	Delay	50th Queue	95th Queue
1	Main St & Colonial St/Site Entrance (Unsignalized)									
	Eastbound Thru/Right	550	A	0.0	N/A	0	A	0.0	N/A	0
	Westbound Thru/Right	475	A	0.5	N/A	1	A	1.1	N/A	3
	Northbound Approach	140	B	12.8	N/A	11	C	23.2	N/A	32
	Southbound Approach	275	B	12.8	N/A	0	C	22.1	N/A	2
2	Main St & South Site Entrance (Unsignalized)									
	Eastbound Thru/Right	620	A	0.0	N/A	0	A	0.0	N/A	0
	Westbound Thru	550	A	0.6	N/A	1	A	0.9	N/A	3
	Northbound Approach	200	B	12.0	N/A	10	C	18.9	N/A	25
3	Main St & RI/RO Entrance (Unsignalized)									
	Northbound Right	170	A	9.7	N/A	1	B	10.3	N/A	1

Table 4: Future with Development Plus Six Years (2022) Intersection Capacity Analysis Results

No.	Intersection (Movement)	Bay/ Link Length (feet)	AM Peak				PM Peak			
			LOS	Delay	50th Queue	95th Queue	LOS	Delay	50th Queue	95th Queue
1	Main St & Colonial St/Site Entrance (Unsignalized)									
	Eastbound Thru/Right	550	A	0.0	N/A	0	A	0.0	N/A	0
	Westbound Thru/Right	475	A	1.2	N/A	1	A	1.4	N/A	3
	Northbound Approach	140	B	11.2	N/A	9	B	14.1	N/A	17
	Southbound Approach	275	A	9.0	N/A	0	A	9.7	N/A	0
2	Main St & South Site Entrance (Unsignalized)									
	Eastbound Thru/Right	620	A	0.0	N/A	0	A	0.0	N/A	0
	Westbound Thru	550	A	1.2	N/A	1	A	1.4	N/A	3
	Northbound Approach	200	B	10.8	N/A	8	B	13.2	N/A	15
3	Main St & RI/RO Entrance (Unsignalized)									
	Northbound Right	170	A	9.5	N/A	1	A	10.0	N/A	1

Based on the capacity analysis results, the site entrances will operate at acceptable levels of service during both of the peak periods under all scenarios. The results for each scenario are shown graphically in Figure 7, Figure 8 and Figure 9.

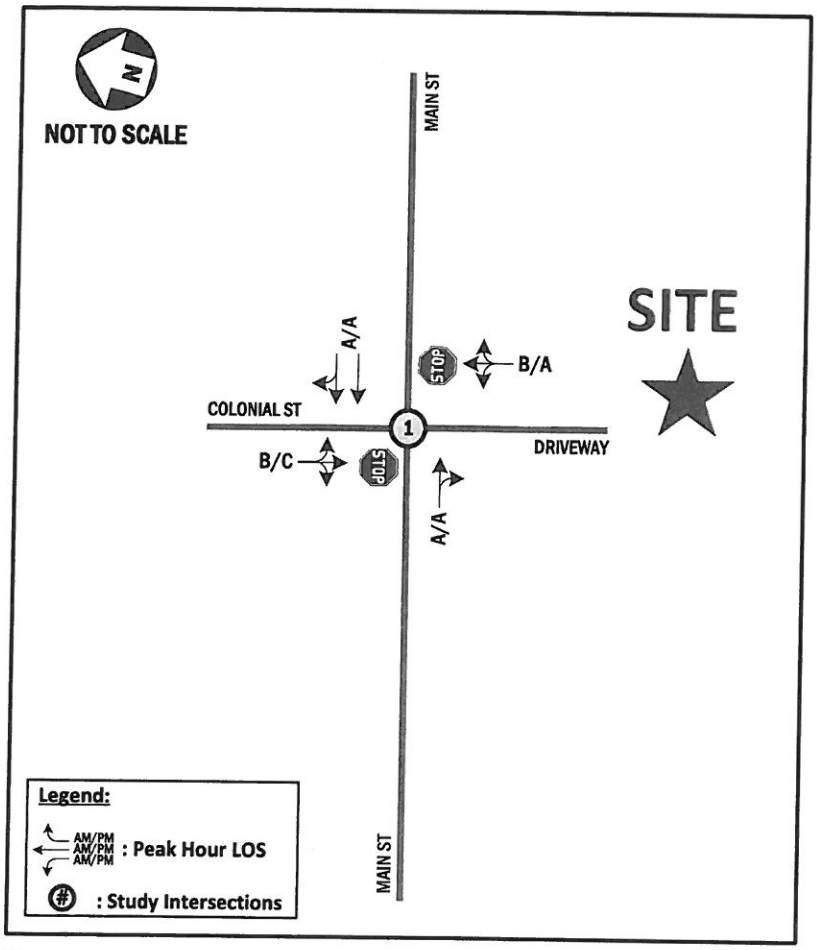


Figure 7: Existing Intersection Capacity Analysis Results

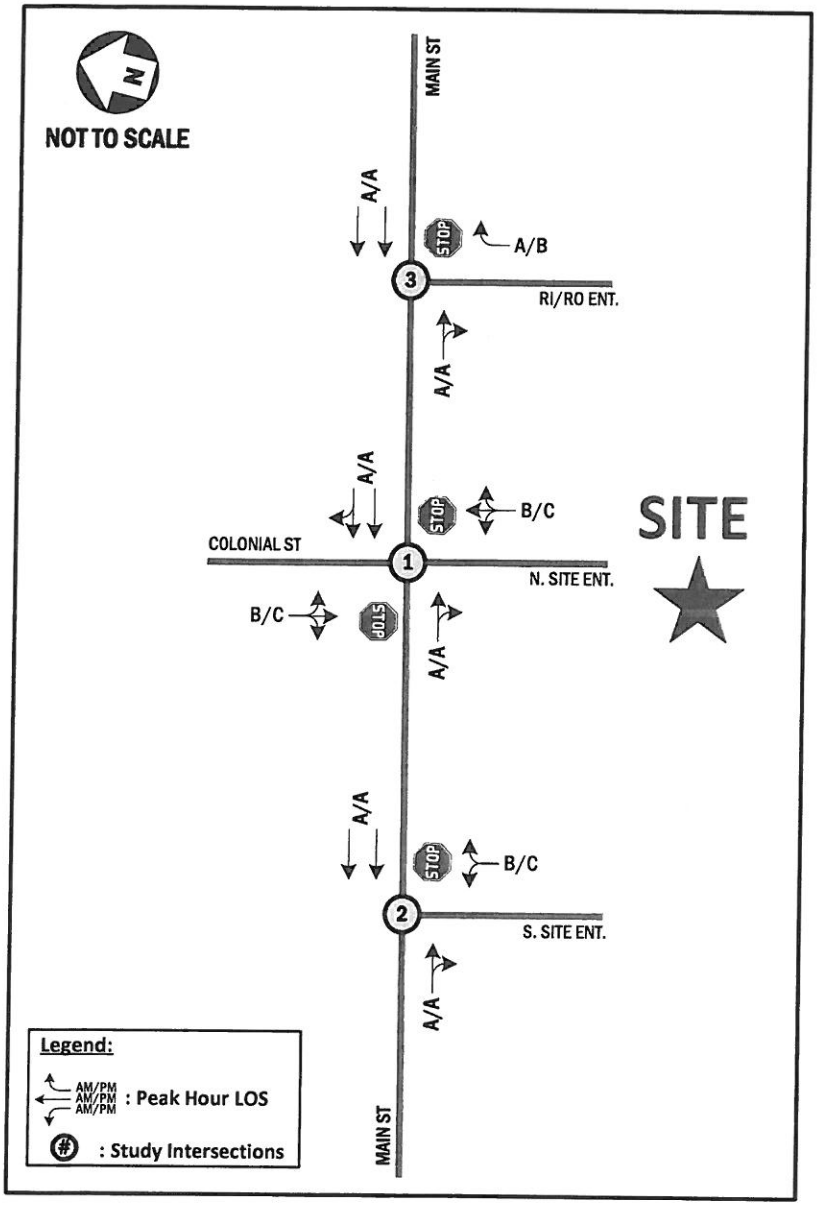


Figure 8: Future with Development Intersection Capacity Analysis Results

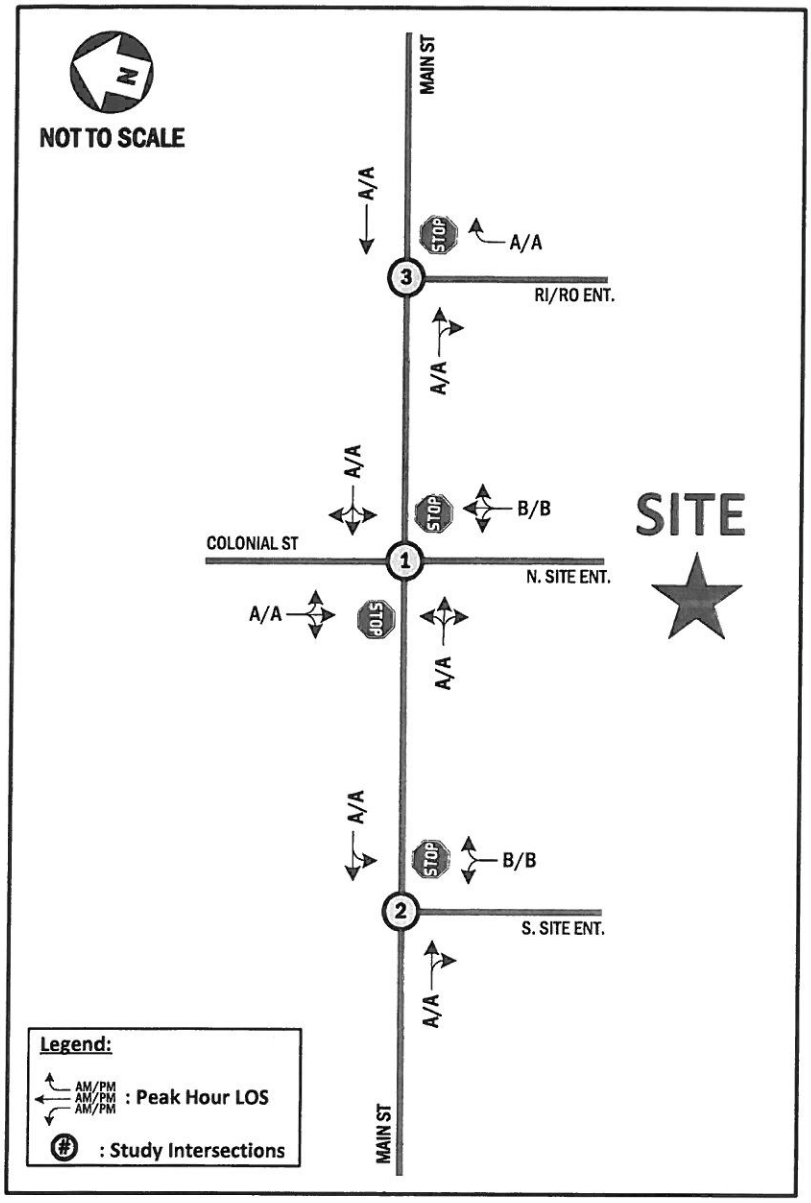


Figure 9: Future with Development Plus Six Years Intersection Capacity Analysis Results

TURN LANE WARRANT ANALYSIS

A turn lane warrant analysis was conducted for the site entrances along Main Street under future with development and future with development plus six years conditions. This analysis examined whether right and left turn lanes were warranted at the study intersections using the VDOT guidelines contained in Section 3 of Appendix F in VDOT's Road Design Manual. The findings of the turn lane warrant analyses are presented in Table 5. The detailed analyses worksheets are provided in Appendix E.

Table 5: Turn Lane Warrant Analyses Results

	Left Turn Lane Warrant	Right Turn Lane Warrant		
		Radius Only	Taper Only	Full-Width Turn Lane
2016				
Main Street & Colonial Street/ North Site Entrance	N/A*	Y	N	N
Main Street & South Site Entrance	N/A*	Y	N	N
Main Street & RI/RO Entrance	N/A*	Y	N	N
2022				
Main Street & Colonial Street/North Site Entrance	N	Y	N	N
Main Street & South Site Entrance	N	Y	N	N
Main Street & RI/RO Entrance	N/A	Y	N	N

*Note: *There is a two-way left turn lane median present under existing conditions.*

Based on the results shown in Table 5, none of the site entrances warrant left or right turn lanes under future with development and future with development plus six years conditions.

ACCESS MANAGEMENT GUIDELINES

Under the existing road network, Main Street is classified as an urban principal arterial with a speed limit of 35 mph. VDOT's Access Management regulations require 565' spacing between full access entrances. If the classification for Main Street is reduced to a 25- or 30-mph collector road when Fraley Boulevard is widened and the regional traffic removed from Main Street, the regulations would require only 225' spacing between intersections. This reclassification was assumed in the 2022 scenario. The proposed spacing is shown in Table 6 below. The spacing requirements for full access intersections are not met and an access management exception will need to be filed with VDOT.

Table 6: Access Management – Entrance Analysis

Segment	Proposed Spacing	Access Management Requirement	Meet Requirement?
2016			
Canal Road to RI/RO Entrance	185'	305'	N
RI/RO Entrance to North Site Entrance	285'	305'	N
North Site Entrance to South Site Entrance	555'	565'	N
South Site Entrance to Washington Street/Whiskey Street	310'	565'	N
2022			
Canal Road to RI/RO Entrance	185'	200'	N
RI/RO Entrance to North Site Entrance	285'	200'	N
North Site Entrance to South Site Entrance	555'	225'	Y
South Site Entrance to Washington Street/Whiskey Street	310'	225'	Y

With the current regulations and planned spacing, all of the entrances will require an Access Management Exception to be approved by VDOT. The two proposed full-access entrances will meet the regulations in the future, assuming that Main Street will be reclassified when regional traffic is rerouted to the widened Fraley Boulevard. However, the right-in/right-out entrance will require an Access Management Exception to be approved by VDOT.

FUTURE MAIN STREET CROSS-SECTION

It is our understanding that the existing cross-section of Main Street is 52 feet. The widening of Fraley Boulevard to accommodate both the north and southbound directions of Route 1 presents an opportunity for the Town of Dumfries to recreate Main Street as a town center area with complete streets, serving motorists, bicyclists, and pedestrians. Three options for reconfiguration of the 52' cross-section are presented below for the Town of Dumfries' consideration when the Town modifies the Main Street cross-section as part of the Route 1 widening. The options reflect various combinations of complete streets elements such as on-street parking, left turn bays, dedicated bicycle lanes, and traffic calming measures.

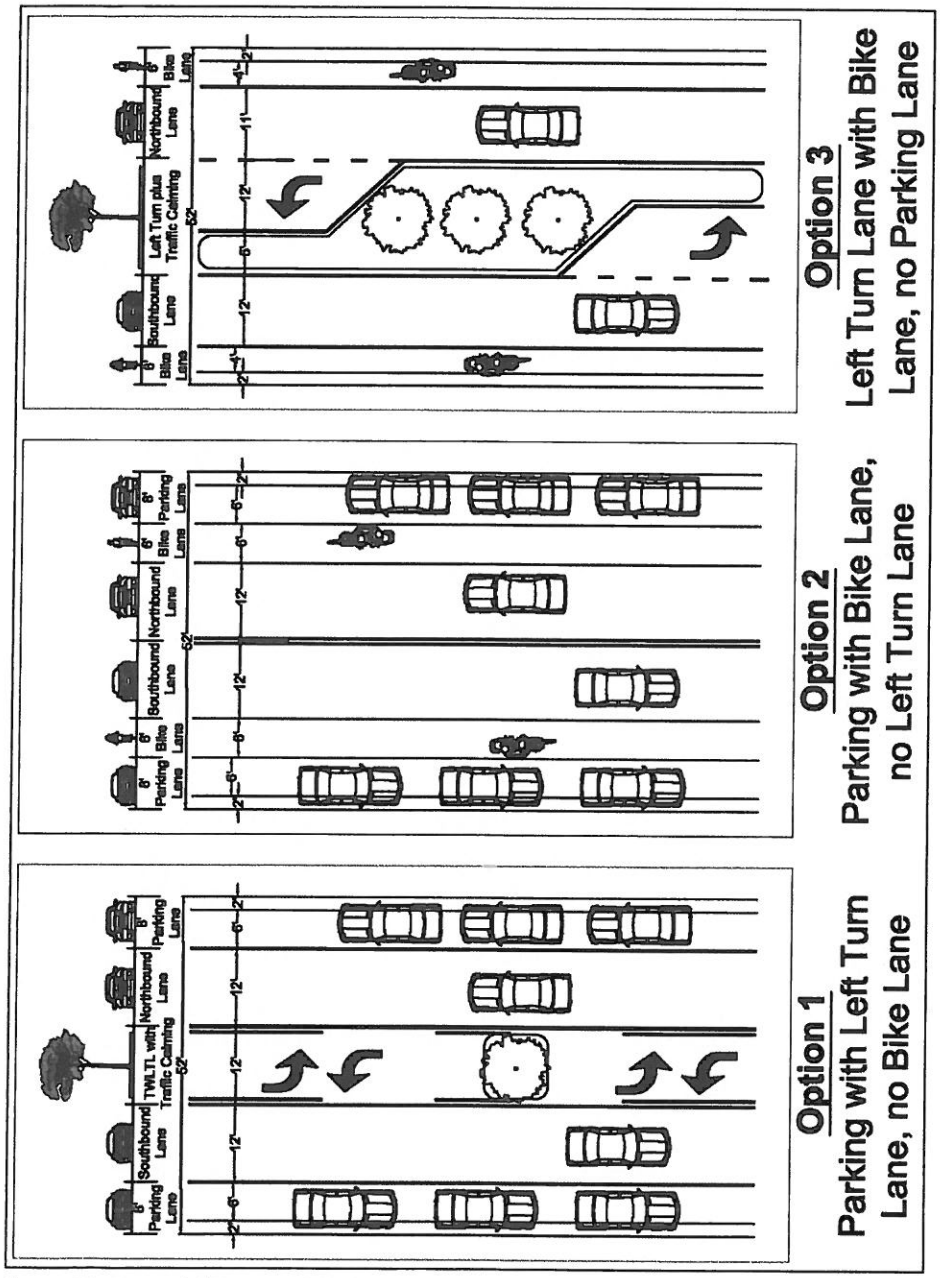


Figure 10: Potential Future Main Street Cross-sections

CONCLUSIONS

The subject site plan will consist of approximately 280 apartment units, 60,000 SF of specialty retail and 40,000 SF of office space. The development will have three accesses along Main Street, in addition to an inter-parcel access point with the property located to the south. The development is expected to be completed in 2016.

The existing cross-section and an assumed two-lane future cross-section are sufficient to accommodate the proposed development; no auxiliary lanes are needed to move traffic in and out of the site. All site entrances will operate at acceptable levels of service under stop control in both the build-out year (2016) and future condition with Route 1 widened to six lanes.

The proposed entrance spacing is insufficient based on the current classification and speed of Main Street, and Access Management Exceptions will be prepared and submitted to VDOT for approval. In the event that Main Street is reclassified once the Fraley Boulevard portion of Route 1 is widened to six lanes, the proposed spacing for the two full-access entrances will meet VDOT standards; however, the spacing for the right-in/right-out entrance will not.

APPENDIX

Appendix A – Level of Service Definitions

APPENDIX A: 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.

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	145	0	0	1018	2	1	0	0	0	0	2
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	158	0	0	1107	2	1	0	0	0	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1109			158			713	1266	158	1265	1265	554
vC1, stage 1 conf vol							158	158		1108	1108	
vC2, stage 2 conf vol							555	1109		158	158	
vCu, unblocked vol	1109			158			713	1266	158	1265	1265	554
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	100
cM capacity (veh/h)	626			1420			458	273	860	217	274	476

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	158	738	371	1	2
Volume Left	0	0	0	1	0
Volume Right	0	0	2	0	2
cSH	1700	1700	1700	458	476
Volume to Capacity	0.09	0.43	0.22	0.00	0.00
Queue Length 95th (ft)	0	0	0	0	0
Control Delay (s)	0.0	0.0	0.0	12.9	12.6
Lane LOS				B	B
Approach Delay (s)	0.0	0.0		12.9	12.6
Approach LOS				B	B

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	38.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	200	1	0	1933	5	0	0	0	0	0	4
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	217	1	0	2101	5	0	0	0	0	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2107			218			1273	2324	218	2322	2322	1053
vC1, stage 1 conf vol							218	218		2104	2104	
vC2, stage 2 conf vol							1055	2107		218	218	
vCu, unblocked vol	2107			218			1273	2324	218	2322	2322	1053
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			100			100	100	100	100	100	98
cM capacity (veh/h)	257			1348			228	89	786	51	89	223

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	218	1401	706	0	4
Volume Left	0	0	0	0	0
Volume Right	1	0	5	0	4
cSH	1700	1700	1700	1700	223
Volume to Capacity	0.13	0.82	0.42	0.00	0.02
Queue Length 95th (ft)	0	0	0	0	1
Control Delay (s)	0.0	0.0	0.0	0.0	21.5
Lane LOS				A	C
Approach Delay (s)	0.0	0.0		0.0	21.5
Approach LOS				A	C

Intersection Summary			
Average Delay	0.0		
Intersection Capacity Utilization	63.6%	ICU Level of Service	B
Analysis Period (min)	15		

Appendix C – Future with Development Intersection Capacity Analysis Results (2016)

First Town Center
1: Site Drive/Colonial Street & Main Street

HCM Unsignalized Intersection Capacity Analysis
10/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	177	23	23	1044	2	33	0	32	0	0	2
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	192	25	25	1135	2	36	0	35	0	0	2
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	1137			217			824	1392	205	1426	1403	568
vC1, stage 1 conf vol							205	205		1186	1186	
vC2, stage 2 conf vol							620	1187		240	217	
vCu, unblocked vol	1137			217			824	1392	205	1426	1403	568
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			98			91	100	96	100	100	100
cM capacity (veh/h)	610			1349			409	246	802	189	245	466

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	217	592	570	71	2
Volume Left	0	25	0	36	0
Volume Right	25	0	2	35	2
cSH	1700	1349	1700	539	466
Volume to Capacity	0.13	0.02	0.34	0.13	0.00
Queue Length 95th (ft)	0	1	0	11	0
Control Delay (s)	0.0	0.5	0.0	12.7	12.8
Lane LOS		A		B	B
Approach Delay (s)	0.0	0.3		12.7	12.8
Approach LOS				B	B

Intersection Summary			
Average Delay	0.9		
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		

First Town Center
2: West Site Entrance & Main Street

HCM Unsignalized Intersection Capacity Analysis
10/4/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	168	23	23	1056	32	32
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	183	25	25	1148	35	35
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			208		819	195
vC1, stage 1 conf vol					195	
vC2, stage 2 conf vol					624	
vCu, unblocked vol			208		819	195
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			98		92	96
cM capacity (veh/h)			1361		461	813

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	208	408	765	70
Volume Left	0	25	0	35
Volume Right	25	0	0	35
cSH	1700	1361	1700	589
Volume to Capacity	0.12	0.02	0.45	0.12
Queue Length 95th (ft)	0	1	0	10
Control Delay (s)	0.0	0.6	0.0	11.9
Lane LOS		A		B
Approach Delay (s)	0.0	0.2		11.9
Approach LOS				B

Intersection Summary			
Average Delay	0.8		
Intersection Capacity Utilization	53.8%	ICU Level of Service	A
Analysis Period (min)	15		

First Town Center
1: Private Driveway/Colonial Street & Main Street

HCM Unsignalized Intersection Capacity Analysis
10/4/2013

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	0	243	41	41	1978	5	43	0	43	0	0	4
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	264	45	45	2150	5	47	0	47	0	0	4
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type		TWLTL			TWLTL							
Median storage veh)		2			2							
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	2155			309			1455	2531	286	2575	2551	1078
vC1, stage 1 conf vol							286	286		2242	2242	
vC2, stage 2 conf vol							1168	2245		333	309	
vCu, unblocked vol	2155			309			1455	2531	286	2575	2551	1078
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)							6.5	5.5		6.5	5.5	
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	100			96			75	100	93	100	100	98
cM capacity (veh/h)	246			1249			187	72	710	40	73	214

Direction, Lane #	EB 1	WB 1	WB 2	NB 1	SB 1
Volume Total	309	1120	1080	93	4
Volume Left	0	45	0	47	0
Volume Right	45	0	5	47	4
cSH	1700	1249	1700	296	214
Volume to Capacity	0.18	0.04	0.64	0.32	0.02
Queue Length 95th (ft)	0	3	0	33	2
Control Delay (s)	0.0	1.1	0.0	22.7	22.1
Lane LOS		A		C	C
Approach Delay (s)	0.0	0.5		22.7	22.1
Approach LOS				C	C

Intersection Summary				
Average Delay	1.3			
Intersection Capacity Utilization	93.0%	ICU Level of Service	F	
Analysis Period (min)	15			

First Town Center
2: West Site Entrance & Main Street

HCM Unsignalized Intersection Capacity Analysis
10/4/2013

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Volume (veh/h)	241	41	41	1984	43	43
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	262	45	45	2157	47	47
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	TWLTL			TWLTL		
Median storage veh)	2			2		
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume			307		1452	284
vC1, stage 1 conf vol					284	
vC2, stage 2 conf vol					1167	
vCu, unblocked vol			307		1452	284
tC, single (s)			4.1		6.8	6.9
tC, 2 stage (s)					5.8	
tF (s)			2.2		3.5	3.3
p0 queue free %			96		80	93
cM capacity (veh/h)			1251		238	713

Direction, Lane #	EB 1	WB 1	WB 2	NB 1
Volume Total	307	763	1438	93
Volume Left	0	45	0	47
Volume Right	45	0	0	47
cSH	1700	1251	1700	357
Volume to Capacity	0.18	0.04	0.85	0.26
Queue Length 95th (ft)	0	3	0	26
Control Delay (s)	0.0	0.9	0.0	18.6
Lane LOS		A		C
Approach Delay (s)	0.0	0.3		18.6
Approach LOS				C

Intersection Summary				
Average Delay	0.9			
Intersection Capacity Utilization	86.2%	ICU Level of Service	E	
Analysis Period (min)	15			

Appendix E – Turn Lane Warrant Analysis

Main St./Site Entrance/Colonial St.
AM- [redacted] PM- [redacted]
Main St./South Site Entrance
AM- [redacted] PM- [redacted]

WARRANT FOR LEFT-TURN STORAGE LANES ON TWO-LANE HIGHWAY

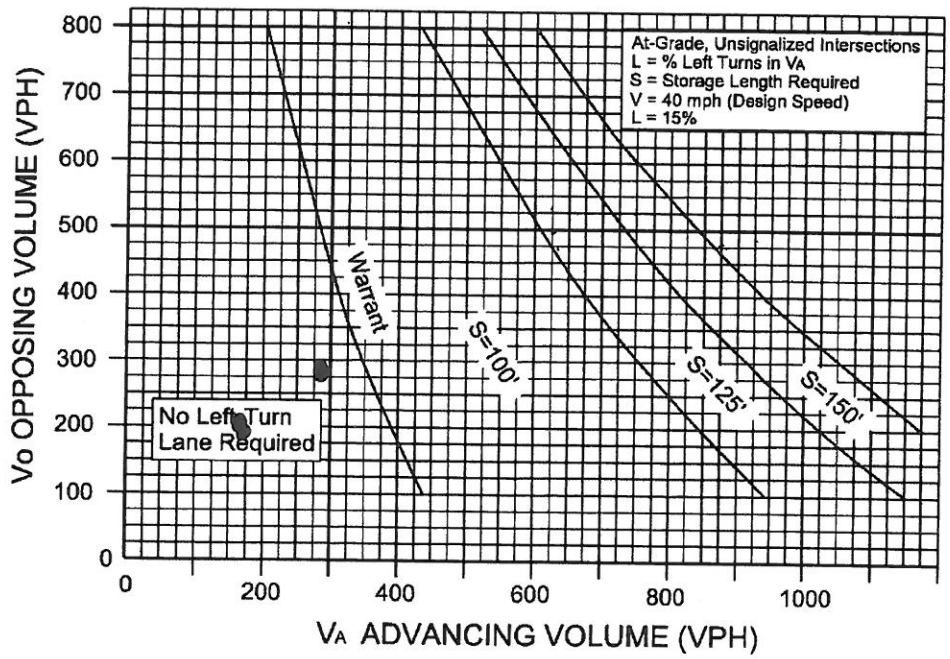


FIGURE 3-7

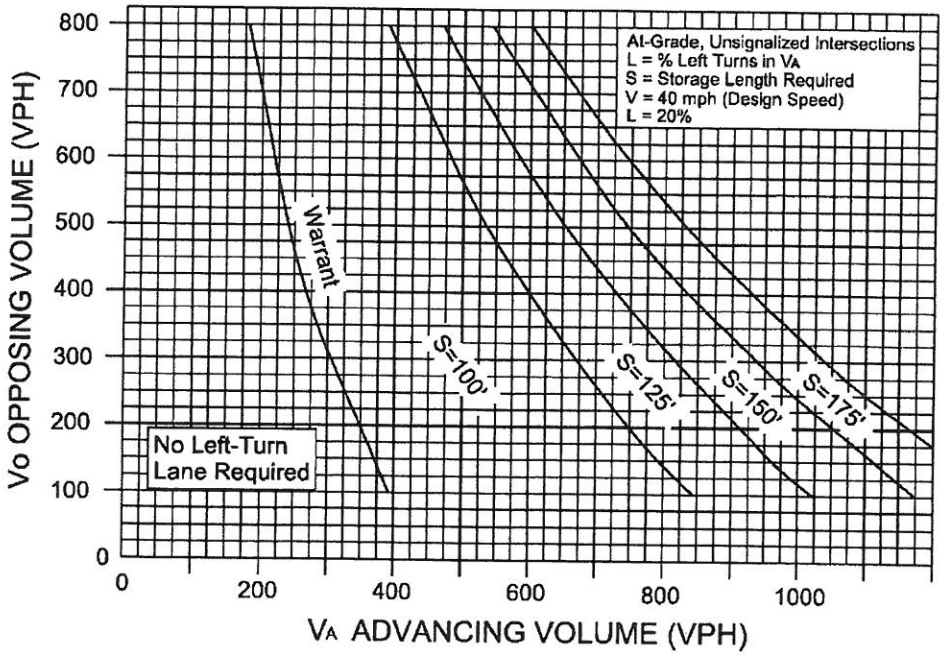


FIGURE 3-8

Right Turn Lane Warrant

The future with development (2016) condition traffic volumes, shown in Table E1, were evaluated to determine whether right turn bays would be warranted at the study intersections. The warrants were based on Figure 3-26 of VDOT's Road Design Manual, Appendix F (shown below).

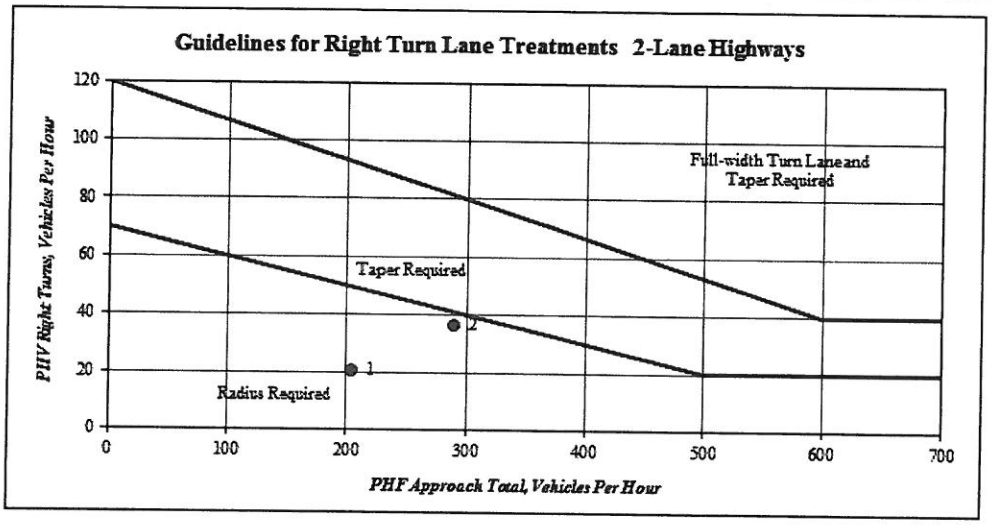
Table E1: Right Turn Lane Warrant Analysis

	AM Peak Hour		PM Peak Hour	
Future with Development (2016)				
Main Street and Site Entrance/Colonial Street				
Approach Total	203	veh/hr	288	veh/hr
Right Turn Volume	21	veh/hr	37	veh/hr
Main Street and Site Entrance				
Approach Total	195	veh/hr	287	veh/hr
Right Turn Volume	21	veh/hr	37	veh/hr
Main Street and RI/RO Site Entrance				
Approach Total	205	veh/hr	290	veh/hr
Right Turn Volume	5	veh/hr	9	veh/hr

Guidelines for Right Turn Treatments
Two-Lane Highways
NCHRP Report 279
"Intersection Channelization Guide"

Project Name: First Town Center
Intersection: Main Street/Colonial Street/North Site Entrance
Movement: Right Turns into Site Entrance
Analyst: TML

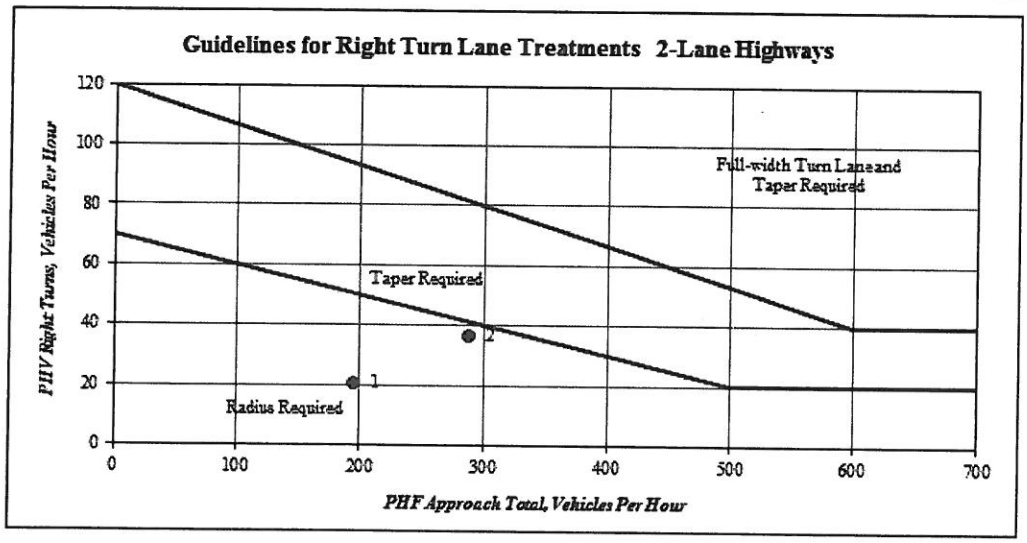
	Condition	PHV Approach Total	PHV Right Turns	Taper Threshold	Full Lane Threshold	Treatment
1	Total Future AM	203	21	50	93	Radius Required
2	Total Future PM	288	37	41	82	Radius Required
3						
4						
5						
6						



Guidelines for Right Turn Treatments
Two-Lane Highways
NCHRP Report 279
"Intersection Channelization Guide"

Project Name: First Town Center
Intersection: Main Street/South Site Entrance
Movement: Right Turns into Site Entrance
Analyst: TML

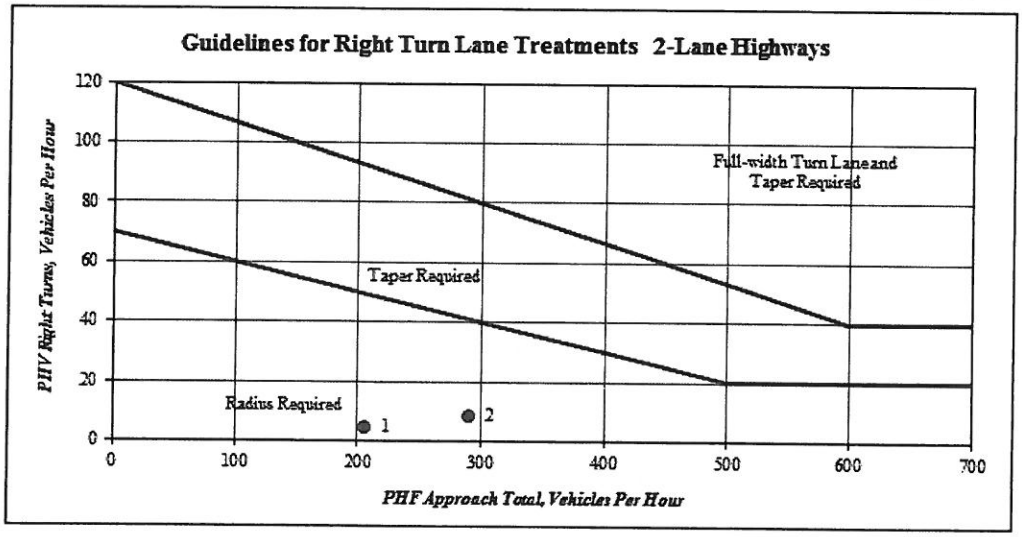
	Condition	PHV Approach Total	PHV Right Turns	Taper Threshold	Full Lane Threshold	Treatment
1	Total Future AM	195	21	51	94	Radius Required
2	Total Future PM	287	37	41	82	Radius Required
3						
4						
5						
6						



Guidelines for Right Turn Treatments
Two-Lane Highways
NCHRP Report 279
"Intersection Channelization Guide"

Project Name: First Town Center
Intersection: Main Street/RI/RO Entrance
Movement: Right Turns into Site Entrance
Analyst: TML

	Condition	PHV Approach Total	PHV Right Turns	Taper Threshold	Full Lane Threshold	Treatment
1	Total Future AM	205	5	50	93	Radius Required
2	Total Future PM	290	9	41	81	Radius Required
3						
4						
5						
6						



Left Turn Lane Warrant

The future with development (2022) condition traffic volumes, shown in Table E2, were evaluated to determine whether left turn bays would be warranted at the study intersections. The warrants were based on Figure 3-7 of VDOT's Road Design Manual, Appendix F (shown below).

Table E2: Left Turn Lane Warrant Analysis

	AM Peak Hour		PM Peak Hour	
Future with Development (2022)				
Main Street and Site Entrance/Colonial Street				
Opposing Volume	203	veh/hr	288	veh/hr
Left Turn Volume	23	veh/hr	41	veh/hr
Main Street and Site Entrance				
Opposing Volume	195	veh/hr	287	veh/hr
Left Turn Volume	23	veh/hr	41	veh/hr

Right Turn Lane Warrant

The future with development (2022) condition traffic volumes, shown in Table E3, were evaluated to determine whether right turn bays would be warranted at the study intersections. The warrants were based on Figure 3-26 of VDOT's Road Design Manual, Appendix F (shown below).

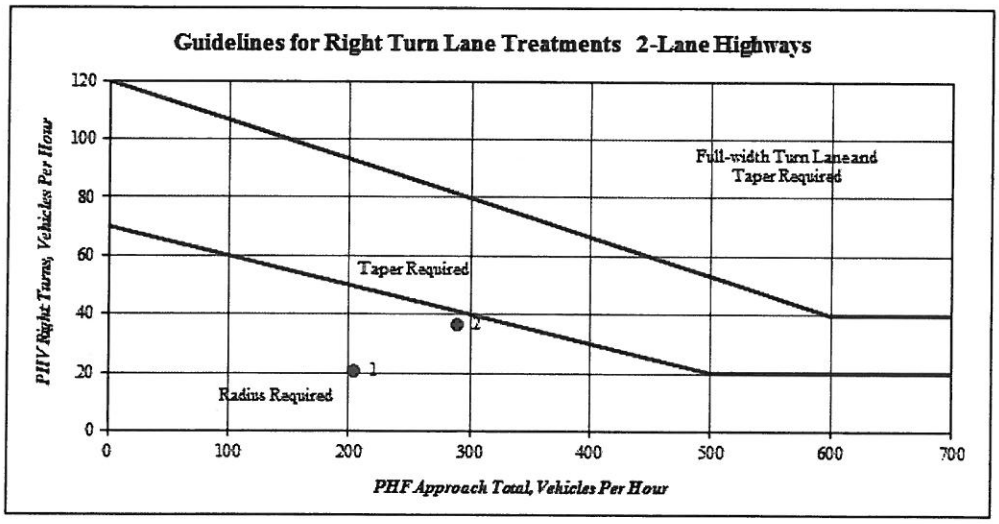
Table E3: Right Turn Lane Warrant Analysis

	AM Peak Hour		PM Peak Hour	
Future with Development (2022)				
Main Street and Site Entrance/Colonial Street				
Approach Total	203	veh/hr	288	veh/hr
Right Turn Volume	21	veh/hr	37	veh/hr
Main Street and Site Entrance				
Approach Total	195	veh/hr	287	veh/hr
Right Turn Volume	21	veh/hr	37	veh/hr
Main Street and RI/RO Entrance				
Approach Total	210	veh/hr	290	veh/hr
Right Turn Volume	5	veh/hr	9	veh/hr

Guidelines for Right Turn Treatments
Two-Lane Highways
NCHRP Report 279
"Intersection Channelization Guide"

Project Name: First Town Center
Intersection: Main Street and Site Entrance/Colonial Street
Movement: Right Turns into Site Entrance
Analyst: TML

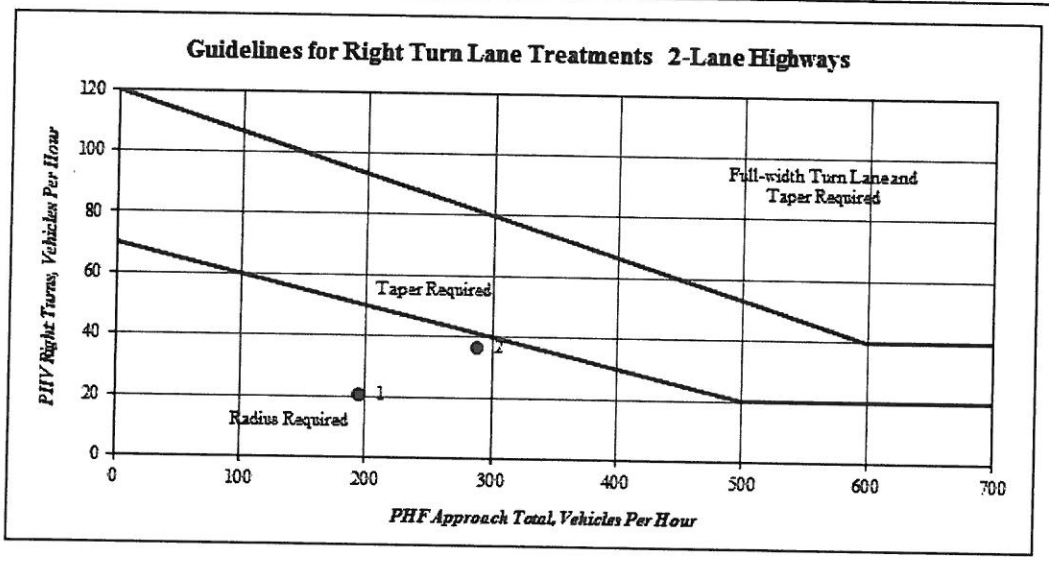
	Condition	PHV Approach Total	PHV Right Turns	Taper Threshold	Full Lane Threshold	Treatment
1	Total Future AM	203	21	50	93	Radius Required
2	Total Future PM	288	37	41	82	Radius Required
3						
4						
5						
6						



Guidelines for Right Turn Treatments
Two-Lane Highways
NCHRP Report 279
"Intersection Channelization Guide"

Project Name: First Town Center
Intersection: Main Street and South Site Entrance
Movement: Right Turns into Site Entrance
Analyst: TML

	Condition	PHV Approach Total	PHV Right Turns	Taper Threshold	Full Lane Threshold	Treatment
1	Total Future AM	195	21	51	94	Radius Required
2	Total Future PM	287	37	41	82	Radius Required
3						
4						
5						
6						



Analyst: TML
Date: 9/30/2013

Dumfries Development
2016 TRIP GENERATION
AND INTERNAL CAPTURE SUMMARY

Project No.: 2481-001
Name of Dvlpt: Dumfries
Time Period: AM Peak Hour

Land Use A Residential

ITE LU Code 220
Size 280 DU

	Total	Internal	External
Enter	28	1	27
Exit	113	4	109
Total	141	5	136
%	100%	4%	96%

Exit to External: 109
Enter from External: 27

5% 6 Demand
5% 1 Demand
5% 6 Demand
5% 1 Demand

3 Balanced
0 Balanced
1 Balanced
1 Balanced

5% 3 Demand
5% 0 Demand
5% 1 Demand
5% 1 Demand

Land Use B Office

ITE LU Code 710
Size 40 kSF

	Total	Internal	External
Enter	55	4	51
Exit	7	0	7
Total	62	4	58
%	100%	6%	94%

Exit to External: 7
Enter from External: 51

Demand 5% 3
Balanced 1
Demand 5% 1

5% 0 Demand
0 Balanced
5% 1 Demand

Land Use C Retail

ITE LU Code 826
Size 60 kSF

	Total	Internal	External
Enter	21	1	20
Exit	20	2	18
Total	41	3	38
%	100%	7%	93%

Enter from External: 20
Exit to External: 18

Net External Trips for Multi-Use Development

	Land Use A	Land Use B	Land Use C	Total
Enter	27	51	20	98
Exit	109	7	18	134
Total	136	58	38	232
Single-Use Trip Gen Est.	141	62	41	244

INTERNAL CAPTURE
12 Vehicles
5 %

Reference: ITE Trip Generation Handbook, Chapter 7, p. 103

Analyst: TML
Date: 9/30/13

Dumfries Development
2016 TRIP GENERATION
AND INTERNAL CAPTURE SUMMARY

Project No.: 2481-001
Name of Dvlpt: Dumfries
Time Period: PM Peak Hour

Land Use A Residential

ITE LU Code 220
Size 280 DU

	Total	Internal	External
Enter	112	12	100
Exit	60	7	53
Total	172	19	153
%	100%	**11%**	89%

Exit to External: 53
Enter from External: 100

5% 3 *Demand* — 1 *Balanced*
5% 6 *Demand* — 3 *Balanced*
10% 6 *Demand* — 6 *Balanced*
10% 11 *Demand* — 9 *Balanced*

5% 1 *Demand*
5% 3
10% 7 *Demand*
10% 9 *Demand*

Land Use B Office

ITE LU Code 710
Size 40 kSF

	Total	Internal	External
Enter	10	2	8
Exit	50	6	44
Total	60	8	52
%	100%	**13%**	87%

Exit to External: 44
Enter from External: 8

Demand 5% 1 — *Balanced* 1 — *Demand* 5% 5
5% 3 *Demand* — 3 *Balanced* — 5% 4 *Demand*

Land Use C Retail

ITE LU Code 826
Size 60 kSF

	Total	Internal	External
Enter	73	9	64
Exit	92	10	82
Total	165	19	146
%	100%	**12%**	88%

Enter from External: 64
Exit to External: 82

Net External Trips for Multi-Use Development

	Land Use A	*Land Use B*	*Land Use C*	*Total*
Enter	*100*	*8*	*64*	*172*
Exit	*53*	*44*	*82*	*179*
Total	*153*	*52*	*146*	*351*
Single-Use Trip Gen Est.	*172*	*60*	*165*	*397*

INTERNAL CAPTURE
46 *Vehicles*
12 *%*

Reference: ITE Trip Generation Handbook, Chapter 7, p. 103

Dumfries Development
2016 TRIP GENERATION
AND INTERNAL CAPTURE SUMMARY

Analyst: TML
Date: 9/30/13

Project No.: 2481-001
Name of Dvlpt: Dumfries
Time Period: Weekday Daily

Land Use A Residential

ITE LU Code 220
Size 280 DU

	Total	Internal	External
Enter	910	148	762
Exit	910	148	762
Total	1,820	296	1,524
%	100%	**16%**	84%

Exit to External: 762
Enter from External: 762

5% 46 *Demand* — 11 *Balanced* — 5% 11 *Demand*

5% 46 *Demand* — 11 *Balanced* — 5% 11

15% 137 *Demand* — 137 *Balanced* — 15% 195 *Demand*

15% 137 *Demand* — 137 *Balanced* — 15% 195 *Demand*

Land Use B Office

ITE LU Code 710
Size 40 kSF

	Total	Internal	External
Enter	221	22	199
Exit	221	22	199
Total	441	44	397
%	100%	**10%**	90%

Exit to External: 199
Enter from External: 199

Demand 5% 11 — *Balanced* 11 — *Demand* 5% 65

5% 11 *Demand* — 11 *Balanced* — 5% 65 *Demand*

Land Use C Retail

ITE LU Code 826
Size 60 kSF

	Total	Internal	External
Enter	1,302	148	1,154
Exit	1,302	148	1,154
Total	2,604	296	2,308
%	100%	**11%**	89%

Enter from External: 1,154
Exit to External: 1,154

Net External Trips for Multi-Use Development

	Land Use A	*Land Use B*	*Land Use C*	*Total*
Enter	*762*	*199*	*1,154*	*2,115*
Exit	*762*	*199*	*1,154*	*2,115*
Total	*1524*	*397*	*2,308*	*4,229*
Single-Use Trip Gen Est.	*1820*	*441*	*2,604*	*4,865*

INTERNAL CAPTURE
636 *Vehicles*
13 *%*

Reference: ITE Trip Generation Handbook Chapter 7, p. 103

NARRATIVE DESCRIPTION FOR CONDITIONAL USE PERMIT APPLICATION
FIRST TOWN CENTER – MAIN STREET

December 2013

The property for which the Conditional Use Permit (CUP) is sought is located along the south side of Main Street, and constitutes the majority of the block bookended by Canal Road and Washington Street, a see in Figure-1 below,

The project "First Town Center" a proposed mixed use development consists of ±5.6 acre site is made up of eighteen parcels identified as GPINs ~~8189-81-7785~~, ~~8189-81-8991~~, ~~8189~~-81-9393, 8189-81-9594, 8189-91-0097, 8189-91-0597, 8189-91-1099, 8189-92-1401, 8189-92-1904, 8189-92-2208, 8189-92-2710, 8189-92-3112, 8189-92-3717, 8189-92-4617, 8189-92-5018, 8189-92-5420, 8189-92-5823, 8189-92-6326 (the "Property"). The conditional use permit is for a portion of the project site approximately 3.0acres to permit multi-family residential homes located above a ground floor commercial, retail or office use.

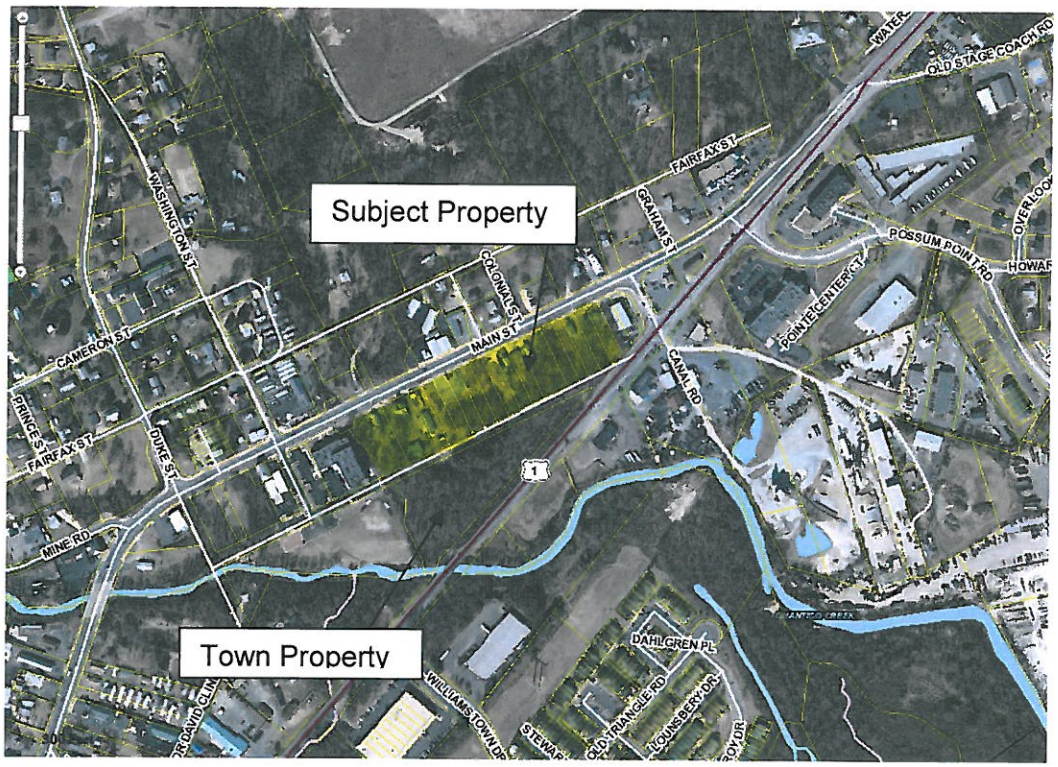


Figure 1 - Site

CUP Request. The property is currently zoned B-2, and commercial and office uses are permitted by right. Pursuant to § 70-282 (a) (40) of the Town's Zoning Ordinance, the Applicant is requesting this CUP to authorize multifamily residential homes, located above a ground floor commercial, retail or office use. In order to accomplish the full potential of

the project 'First Town Center'. It should be emphasized that this CUP request will do nothing more than request before the Council to tailor its consideration of specific proposals, during the processes of review and issuance of conditional use permits in the B-2 zone.

First Town Center Proposal

As illustrated in Figure 2, First Town Center is a mixed use development that seamlessly combines residential, office, and retail uses. The plan includes 48,000 square of ground floor retail/commercial space and five floors of residences contain approximately 284 residential units and recreational indoor/outdoor amenities. The proposed residential units mix is approximately 158 one bedroom units and 124 two/three bedroom units, subject to architectural plan revisions, approvals and permits. In addition, the Center will have a 4-storey building consisting of 18,000 square feet of ground floor retail/commercial use and 54,000 square feet of office use.

The Property has exceptional access, and extraordinary visibility, with approximately 1,100 feet of Main Street frontage and approximately 1000 feet of future Market Street frontage in the rear. The site is today comprised of a series of unremarkable single family residences with some commercial uses interspersed, and vacant parcels. Because the Property is located in the very heart of Dumfries, it is ripe for redevelopment as a primary gateway project, and is ideally located to create a strong and defining presence for the Town. The current development proposal, known as "First Town Center," the basis for this Conditional Use Permit application (the "CUP"), provides the Town a dramatic opportunity to establish such a presence. It may well be years before another property owner – with a commitment to the Town equal to that which the present applicant has demonstrated – is able to assemble parcels for the purpose of their common development. It is therefore with enthusiasm that the Applicant presents this proposal, and expresses an eagerness to work with the Town to revitalize a crucial area in the community, and to bring new place-making, revenue generating and housing opportunities that will necessarily increase the Town's economic and social activity, and its near- and long-term viability.

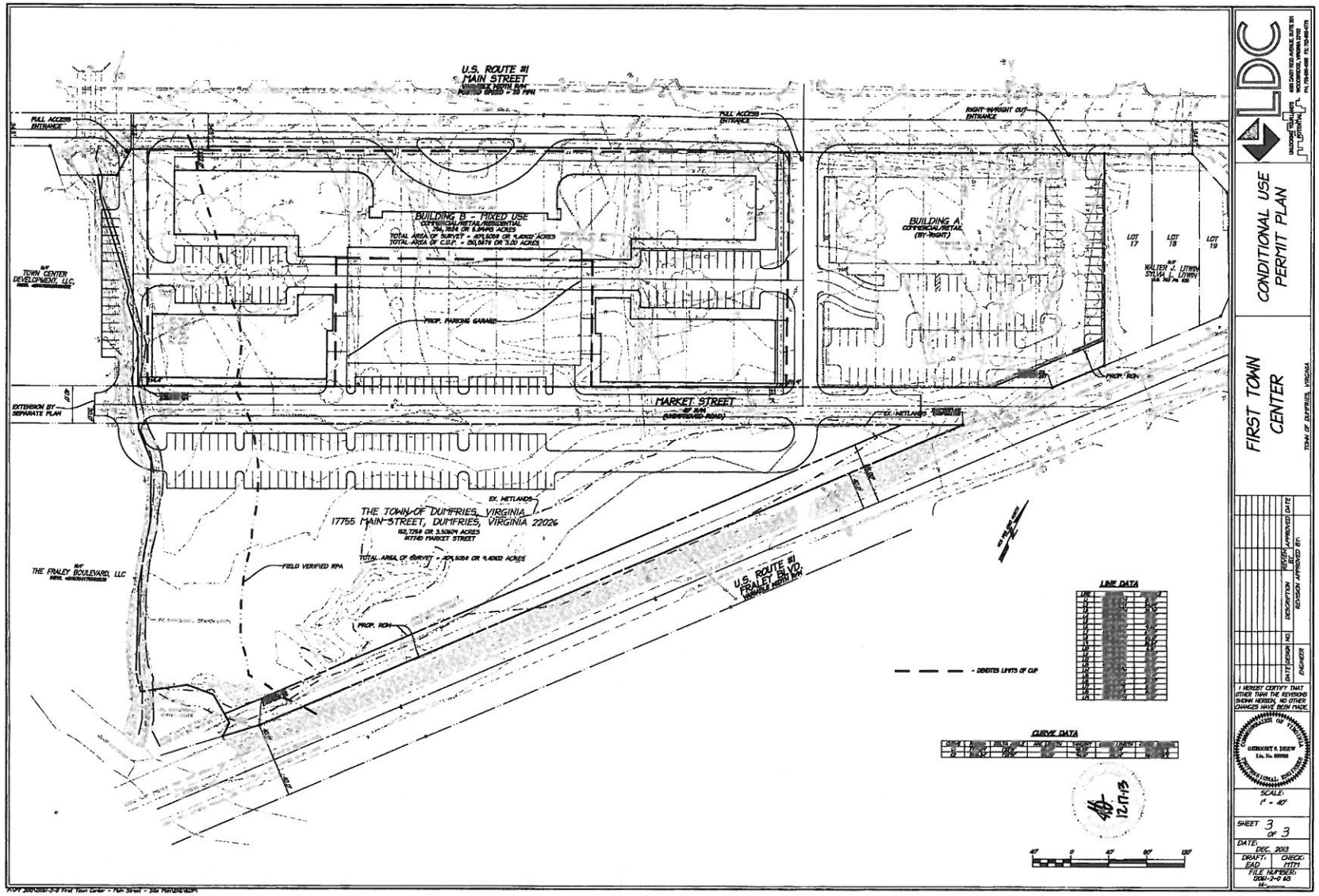


Figure 2 First Town Center – Limit of CUP

The buildings and core activity center for the project including the parking facility are proposed to be located on the Property, with a portion of storm-water management facility, and public parking located on approximately 3.4 acres immediately south and east of the site; the 3.4 acres is property of the Town of Dumfries . The use of the Town property will be subject to an Agreement between the Town and the Applicant, with mutually agreeable terms of the Agreement to include the Applicant's commitment to make off-site improvements that will include a landscaped stormwater management area that will serve not only the subject property but also a portion of the roadway facilities 'Main Street' fronting the site.

In addition, the Applicant will coordinate with the Town as to further revitalization plans for Market Street, and will commit to the construction and maintenance of Market Street.

The applicant will also make curb and gutter and beautification improvements (landscape and hardscape) facing Main Street that will include construction of sidewalk, landscaping, and installation of decorative light posts.

Economic Impact

Formal fiscal impact analyses are not essential to recognize that the economic growth potential for the Town of Dumfries has changed dramatically in recent years and has become intrinsically linked to the 2005 Base Relocation and Closure Commission (BRAC) decisions that have resulted in the imminent relocation of the five most important military investigative agencies to Marine Corps Base Quantico. The significance of this directive for the area surrounding the Base cannot be overstated, as it is estimated that a total of 2,767 new jobs will be transferred to it. It is more specifically estimated that 351 military, 1861 civilians and 555 contractors, plus approximately 200 students in two training academies, will be situated at the facility. The generation of new jobs is just one factor contributing to growth in the immediately surrounding area. The factor that will be compounded by the relocation of many of the families, and the establishment of necessary supportive office and retail services that will be occasioned by the influx of employment in the area. There is presently insufficient housing, and retail particularly office space for commercial support service such as medical offices, real estate office among other similar neighborhood small business uses the immediate area and the Town's opportunity to capture an educated and affluent group of residents and businesses in a single high-quality mixed-use project is likely a once-in-a-lifetime event.

Given the proximity of the Town to the Base, Dumfries may never again have this moment to capture the businesses and other property owners/residence that will seek ready and convenient access to the Base, places to eat, work, and shop. As a mixed use project, First Town Center is an exemplary proposal which combines, in a compact area of the Town, upscale buildings that will capture the eye, and the probable investments of Fortune 100/500 companies, as well as provide quality housing. When completed and occupied, the Town will experience, and increasing revenue stream from real property, personal property, BPOL, retail sales, and meals taxes, not to mention the added vitality residents and businesses will bring.

Transportation

Access to the site will be provided by a principal entrance from Main Street, secondary entrances from Market Street, and inter-parcel connection by Market Street to properties to the southwest.

1. The additional traffic to be generated by the proposed project will have no consequential impact on the surrounding road network. As identified in the Traffic Impact Analysis ("TIA") prepared by Gorov/Slade, "various traffic analyses have been conducted for existing and future conditions. Analytical evaluations within the TIA show that the proposed mixed-use 'First Town Center' will not have any significant impact at the analyzed Main Street link and Main Street/Site entrance intersection." For a full analysis of the transportation impacts, please see the TIA which is made part of this application.

   In addition on on-site Project Parking Utilization study has be been and included as part of this application.

Anticipated On and Off-Site Improvements.

1. Main Street Frontage improvements. As noted on the CUP Plan, the Applicant will provide landscape enhancements along the Main Street frontage including the installation of Town approved lighting fixtures, landscaping and sidewalk.
2. Stormwater management. As part of the First Town Center development, the Applicant will work with Public Works to engineer and construct a state of the art storm water management system that will be designed to capture and treat run-off not only from the project site, but also from Main Street fronting the site. This will largely resolve long-standing drainage issues in the Market Street area.
3. Market Street improvements. As with Main Street, the Applicant will design and construct the necessary improvements which will link into the existing portion of Market Street.

Amenities Proposed for the Site.

Amenities to be provided are anticipated to include but not be limited to an outdoor recreational common area, passive and active recreation trails, and fountain area. In addition, the resident will has dedicated access other indoor resident amenities including roof top garden.

Approximate Phasing Plan.

Although the timing of any development is dependent on many factors, it is expected that construction on the office and residential units would begin approximately twelve months after the approval of the CUP and final site plan, and issuance of the appropriate construction permits and approvals by all government agencies/bodies having jurisdiction over the property.