

WEBB AND ASSOCIATES

A SURVEYING AND DESIGN COMPANY

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January 9, 2017

TEAM CRUCIBLE TRAINING COMPLEX TM 76-A-2, Spotsylvania County Rt 1 Entrance Analysis

The project will be served by one entrance onto Route 1, Jeff Davis Highway.

Data taken from ITE 6th Addition, Trip Generation.

Route 1 - TRAFFIC VOLUME

Historical VDOT Traffic Data, Year/AADT

Const. Year	Design Year	VDOT Traffic Data		10 yr	10 yr
		Year	Year	10 yr	Ann Avg
2017	2027	2010	2015	Increase	% Inc
		9200	9800	600	0.634%

Design Growth*	Design Years	Design Year	Design AADT	k Factor	Peak Hour	Direction Factor	PH in Peak Dir.	PH in Opp Direction
1.5%	10	2027	11717	0.097	1137	0.684	777	359

* Estimated Growth Rate

SITE- TRIP GENERATION DATA

Office Building

Based on 40,000 SF Occupied Gross Floor Area (ITE 6th Addition, Trip Generation)

Section 715 - Single Tenant Office Space

Total Occupied Gross Leasable Area (OGLA)=	40,000	SF						
Total OGLA/1000 SF=	40.00	(1,000 SF)						
Average VPD, Weekday =	11.57	VPD/1000 SF						
VPD, Average =	40.00	X	11.57	=	463	VPD		
Peak Hour VPH, AM =			1.78	VPH/1000 SF				
VPH, AM Peak =	40.00	X	1.78	=	71	VPH		
Peak Hour VPH, PM =			1.72	VPH/1000 SF				
VPH, PM Peak =	40.00	X	1.72	=	69	VPH		

Training Facility- School

School, ITE LAND USE 530

Total Number of Students (Ultimate Buildout) =	30	Students						
Average VPD, Weekday =	1.45	VPD/Student						
VPD, Average =	30.00	X	1.45	=	44	VPD		
Peak Hour VPH, AM =			0.45	VPH/Student				
VPH, AM Peak =	30.00	X	0.45	=	14	VPH		
Peak Hour VPH, PM =			0.29	VPH/Student				
VPH, PM Peak =	30.00	X	0.29	=	9	VPH		

TOTAL TRIP GENERATION

Average VPD, Weekday	=	506	VPD
Peak Hour VPH, AM Peak Hour	=	85	VPH
Peak Hour VPH, PM Peak Hour	=	78	VPH

LEFT TURN LANE ANALYSIS

A.M. PEAK HOUR

Project - Traffic Data

Peak Hour, A.M. Weekday: Land Use 715
89% Entering and 11% Exiting (Based on ITE manual)

Vehicles Per Hour

Peak Hour				=	85 VPH
Vehicles Entering Site =	85	X	89%	=	75 VPH
Assume % making a left turn =	25%	X	75	=	19 VPH
Assume % making a right turn =	75%	X	75	=	57 VPH

Rt 1 - VDOT Traffic Data

Projected VPD = 11,717 AADT, 2027
K Factor = 0.097 Peak Hour
Dir Factor = 0.684 % of Traffic in Peak Direction

Assume AM Peak Direction is Advancing Traffic, Northbound

Using Projected AAWDT

Peak Hour =	11,717	X	0.097	=	1,137 VPH
Advancing traffic(Northbound) =	1137	X	0.684	=	777 VPH
Opposing traffic(Southbound) =	1137	-	777	=	359 VPH

% of Left Turns = 19 ÷ 777 = 2.4% (Use 5%)
Posted Speed Limit= 55 mph, Use 60 mph

Enter data in Figure 3-3:(See attached) **Left Turn Lane is NOT REQUIRED**

P.M. Peak Hour

Peak Hour, P.M. Weekday: Land Use 715
15% Entering and 85% Exiting (Based on ITE Manual)

Vehicles Per Hour

Peak Hour =	2.86	X	4.01	=	78 VPH
Vehicles Entering Site =	78	X	15%	=	12 VPH
Assume % making a left turn =	25%	X	12	=	3 VPH
Assume % making a right turn =	75%	X	12	=	9 VPH

Rt 1 - VDOT Traffic Data

Projected VPD = 11,717 AADT, 2023
K Factor = 0.097 Peak Hour
Dir Factor = 0.684 % of Traffic in Peak Direction

Assume PM Peak Direction is Opposing Traffic, Southbound

Peak Hour =	11,717	X	0.097	=	1137 VPH
Opposing traffic(Southbound) =	1,137	X	0.684	=	777 VPH
Advancing traffic(Northbound) =	1,137	-	777	=	359 VPH

% of Left Turns = 3 ÷ 359 = 0.8% (Use 10%)
Posted Speed Limit= 55 mph

Enter data in Figure 3-3:(See attached) **Left Turn Lane is NOT REQUIRED**

RIGHT TURN LANE ANALYSIS

A.M. PEAK HOUR

Using data from above and Figure 3-27, VDOT Design Manual.

PHV (Peak Hour Volume, Approaching, Southbound) =	359 VPH
Right Turn Volume into Site =	57 VPH
Percentage of Right Turning Vehicles =	16%

Posted Speed = 55 mph, PHV < 300, PHV right turns NOT> 40: No Adjustment Required.

Enter Data in Figure 3-27:(See Attached) **Taper Required**

P.M. PEAK HOUR

Using data from above and Figure 3-27, VDOT Design Manual.

PHV (Peak Hour Volume, Approaching, Southbound) =	777 VPH
Right Turn Volume into Site =	9 VPH
Percentage of Right Turning Vehicles =	1%

Posted Speed = 55 mph, PHV < 300, PHV right turns NOT> 40: No Adjustment Required.

Enter Data in Figure 3-27:(See Attached) **Taper Required**
Length = 200 ft

Warrants for Left Turn Storage Lanes on Four-Lane Highways

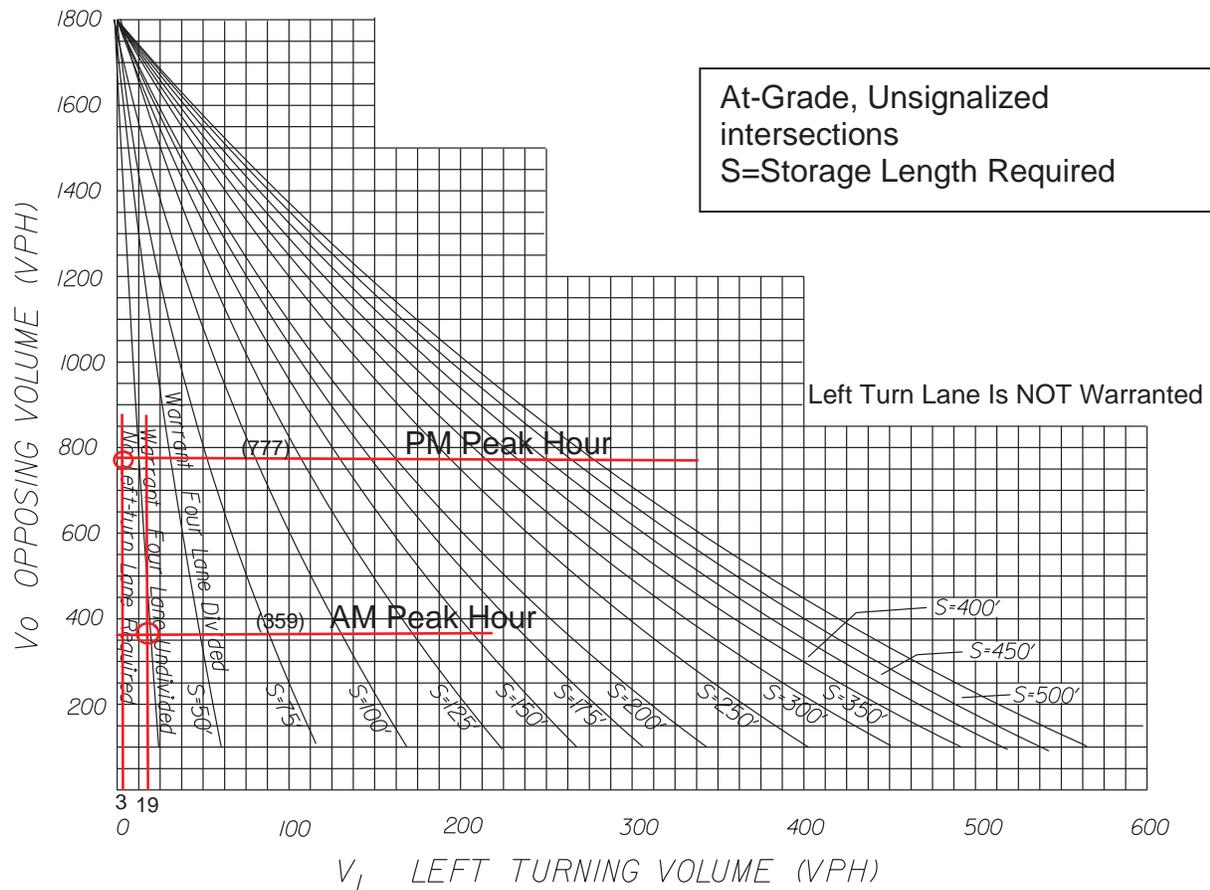


FIGURE 3-3 WARRANTS FOR LEFT TURN STORAGE LANES ON FOUR-LANE HIGHWAYS

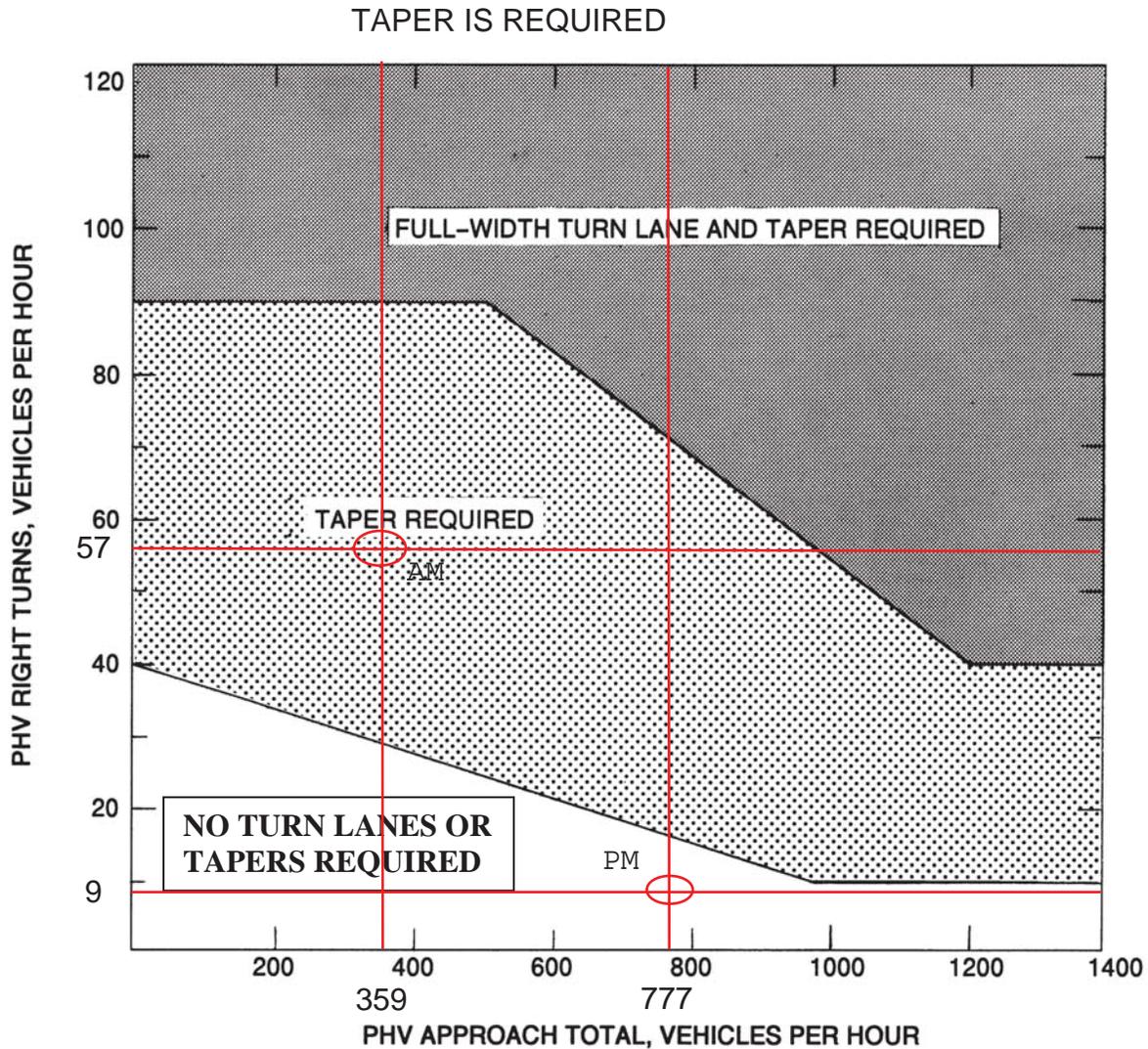
Figure 3-3 was derived from Highway Research Report No. 211.

Opposing volume and left turning volume in vehicles per hour (VPH) are used for left turn storage lane warrants on four-lane highways.

For plan detail requirements when curb and/or gutter are used, see VDOT’s Road Design Manual, Section 2E-3 on the VDOT web site:
<http://www.virginiadot.org/business/locdes/rdmanual-index.asp>.

Left-turn lanes shall* also be established on two-lane highways where traffic volumes are high enough to warrant them.

* Rev. 1/15



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV- - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

If PHV is not known use formula: $PHV = ADT \times K \times D$

K = the percent of AADT occurring in the peak hour

D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-27 WARRANTS FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

* Rev. 1/15

Virginia Department of Transportation
Traffic Engineering Division
2015
Annual Average Daily Traffic Volume Estimates By Section of Route
Spotsylvania Maintenance Area

Route	Jurisdiction	Length	AADT	QA	4Tire	Bus	Truck				QC	K Factor	QK	Dir Factor	AAWDT	QW
							2Axle	3+Axle	1Trail	2Trail						
1 Jefferson Davis Hwy	Spotsylvania County	2.61	9800	G	92%	0%	1%	1%	5%	1%	F	0.097	0.684	10000	G	
1 Jefferson Davis Hwy	Spotsylvania County	4.25	13000	G	92%	0%	1%	1%	5%	1%	F	0.096	0.586	13000	G	
1 Jefferson Davis Hwy	Spotsylvania County	2.27	19000	G	96%	1%	1%	1%	2%	0%	C	0.087	0.572	21000	G	
1 17 Jefferson Davis Hwy	Spotsylvania County	1.18	54000	G	98%	0%	1%	0%	0%	0%	F	0.083	0.578	58000	G	
1 Jefferson Davis Hwy	Spotsylvania County	0.96	27000	G	98%	0%	1%	0%	0%	0%	F	0.081	0.513	29000	G	
1 Jefferson Davis Hwy	Spotsylvania County	1.30	28000	G	98%	0%	1%	0%	0%	0%	F	0.084	0.542	30000	G	
1 Jefferson Davis Blvd	City of Fredericksburg	1.48	33000	A	98%	0%	1%	0%	0%	0%	C	0.096	0.627	35000	A	
1 Jefferson Davis Blvd	City of Fredericksburg	0.90	29000	G	98%	0%	1%	0%	0%	0%	F	0.087	0.58	30000	G	
1 Jefferson Davis Blvd	City of Fredericksburg	0.59	30000	G	98%	0%	1%	0%	0%	0%	F	0.085	0.606	32000	G	
1 Jefferson Davis Blvd	City of Fredericksburg	0.29	27000	G	98%	0%	1%	0%	0%	0%	F	0.082	0.627	29000	G	
1 17 Jefferson Davis Blvd	City of Fredericksburg	0.11	33000	N	98%	0%	1%	0%	0%	0%	N	0.098	0.592	36000	N	
1 Ramp	Spotsylvania County	0.12	5700	G								0.08		5700	G	
1 17 Ramp US 1, US 17 to I-95 N at Exit 126	Spotsylvania County	0.12	17000	G								0.09		19000	G	
1 LaFayette Blvd	Spotsylvania County	1.52	24000	G	97%	1%	1%	1%	1%	0%	C	0.085	0.514	25000	G	
1 LaFayette Blvd	City of Fredericksburg	1.42	24000	G	97%	1%	1%	1%	1%	0%	F	0.08	0.52	26000	G	
1 LaFayette Blvd	City of Fredericksburg	0.38	11000	G	97%	1%	1%	1%	1%	0%	F	0.084	0.657	12000	G	

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							2Axle	3+Axle	1Trail	2Trail						
1 Jefferson Davis Hwy	Spotsylvania County	2.61	9200	G	96%	0%	1%	1%	1%	0%	F	NA		9800	G	
1 Jefferson Davis Hwy	Spotsylvania County	4.25	13000	G	96%	0%	1%	1%	1%	0%	F	0.096	F	14000	G	
1 Jefferson Davis Hwy	Spotsylvania County	2.27	18000	G	95%	1%	1%	1%	2%	0%	C	0.089	F	20000	G	
1 17 Jefferson Davis Hwy	Spotsylvania County	1.18	55000	G	98%	0%	1%	0%	0%	0%	F	0.081	F	55000	G	
1 Jefferson Davis Hwy	Spotsylvania County	0.96	24000	G	98%	0%	1%	0%	0%	0%	F	0.078	F	26000	G	
1 Jefferson Davis Hwy	Spotsylvania County	1.30	24000	G	98%	0%	1%	0%	0%	0%	F	0.082	F	26000	G	
1 Jefferson Davis Blvd	City of Fredericksburg	1.48	30000	A	98%	0%	1%	0%	0%	0%	C	0.1	A	0.613	33000	A
1 Jefferson Davis Blvd	City of Fredericksburg	0.90	30000	G	98%	0%	1%	0%	0%	0%	F	0.087	F	32000	G	
1 Jefferson Davis Blvd	City of Fredericksburg	0.59	29000	G	98%	0%	1%	0%	0%	0%	F	0.082	F	32000	G	
1 Jefferson Davis Blvd	City of Fredericksburg	0.29	22000	G	98%	0%	1%	0%	0%	0%	F	NA		24000	G	
1 17 Jefferson Davis Blvd	City of Fredericksburg	0.11	30000	N	98%	0%	1%	0%	1%	0%	N	0.084	N	0.606	32000	N
1 Ramp	Spotsylvania County	0.12	NA									NA		NA		
1 17 Ramp US 1, US 17 to I-95 N at Exit 126	Spotsylvania County	0.12	NA									NA		NA		
1 LaFayette Blvd	Spotsylvania County	1.52	22000	G	96%	1%	1%	1%	1%	0%	C	0.085	F	24000	G	
1 LaFayette Blvd	City of Fredericksburg	1.42	22000	G	96%	1%	1%	1%	1%	0%	F	0.085	F	24000	G	
1 LaFayette Blvd	City of Fredericksburg	0.38	10000	G	96%	1%	1%	1%	1%	0%	F	0.086	F	11000	G	