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Foster Forge Farm School

Albemarle County, VA

Turn Lanes Analysis and Study Report

May 04, 2022

Revised May 10, 2022



Trip Generation Report for Foster Forge Farm School

May-10-2022

Assumptions:
1. 70% of students are coming from the city (northbound in the AM), and 30% are coming from the county (southbound in the AM).

There is 30% of the students = 18 students southbound to the school using parents vehicles. (right turn)
There is 30% of the staff = 4 staff persons southbound to the school using vehicles. (right turn)
There is 35% of the students = 21 students northbound to the school using parents vehicles. (left turn)
There is 35% of the students = 21 students northbound to the school using School Bus. (left turn)
There is 70% of the staff = 10 staff persons northbound to the school using vehicles. (left turn)

	#Of Students
School Bus	21
Parents Vehicles	39



Students by Parents Vehicles

Code	Land Use	#Students	ADT=2.13*#Students	AM Peak Hour =0.58*#Students
522	Middle School/Junior High School	39	84	23

54% Entering		46% Exiting	
12		11	
Southbound (right turn)= 30%entering	Northbound(left Turn)= 70%entering	72% exiting Southbound (right turn)	28% exiting Northbound (left turn)
4	8	8	3

PM Peak Hour =0.17*#Students			
7			
49% Entering		51% Exiting	
3		4	
Southbound (right turn)= 28%entering	Northbound(left Turn)= 72%entering	70% exiting Southbound (right turn)	30% exiting northbound (left turn)
1	2	3	1

Note: ITE Code 522 shows for vehicles only, it doesn't differenate between bus and normal car.Therfore, we assume the bus has 4 trips during peak hours per day, 2 in the morning, and 2 in the evening.

Students by Bus

Code	Land Use	#Students	ADT=2.13*#Students
522	Middle School/Junior High School	21	45

AM Peak Hour =0.58*#Students			
2			
54% Entering		46% Exiting	
1		1	
Southbound (right turn)= 30%entering	Northbound(left Turn)= 70%entering	72% exiting Southbound (right turn)	28% exiting Northbound (left turn)
0	1	1	0

PM Peak Hour =0.17*#Students			
2			
49% Entering		51% Exiting	
1		1	
Southbound (right turn)= 30%entering	Northbound(left Turn)= 70%entering	30% exiting Southbound (right turn)	70% exiting northbound (left turn)
0	1	1	0

FFF school is a private school without large building maintenance and food preparation that makes it unique facility with actual planned pattern of use as shown below.

Staff Vehicles

Code	Land Use	#Employee	ADT=4*#Employee
522	Middle School/Junior High School	12	48

AM Peak Hour =1*#Employees			
12			
90% Entering		10% Exiting	
11		1	
Southbound (right turn)= 30%entering	Northbound(left Turn)= 70%entering	72% exiting Southbound (right turn)	28% exiting Northbound (left turn)
3	8	1	0

PM Peak Hour =1*#Employees			
12			
10% Entering		90% Exiting	
1		11	
Southbound (right turn)= 28%entering	Northbound(left Turn)= 72%entering	30% exiting Southbound (right turn)	70% exiting northbound (left turn)
0	1	3	8

Existing Traffic Data

Growth factor = 0.8% per year, and AADT 2020= 6000 VPD
Using this equation, the estimated AADT at 2025= 6244 VPD

$$\mathrm{CAGR} = \left(\frac{V_{\text{final}}}{V_{\text{begin}}}\right)^{1/t} - 1$$

CAGR = compound annual growth rate
V_{begin} = beginning value
V_{final} = final value
t = time in years



Virginia Department of Transportation
Traffic Engineering Division
2020
Annual Average Daily Traffic Volume Estimates By Section of Route
Albemarle Maintenance Area

Route	Length	AADT	QA	4Tire	Bus	Truck 2Axle	Truck 3+Axle	Truck 1Trail	Truck 2Trail	QC	K Factor	QK	Dir Factor	AAWDT	QW	Year
Albemarle County																
654 Garth Barracks Rd	1.60	**6000**	G	97%	0%	1%	1%	0%	0%	C	0.102	F	0.715	6400	G	2020
From: 02-601 Old Garth Rd																
To: 02-656 Georgetown Rd																

AADT for SR 654 BarracksRd in 2025=	6244	VPD
Peak Hour ADT=0.102*AADT	637	VPH
Directional Factor	71.5%	

AM Peak Hour SR 654 Traffic		
Southbound=0.715*Peak Hour ADT	Northbound=0.285*Peak Hour ADT	
456	182	VPH

PM Peak Hour SR 654 Traffic		
Southbound=0.285*Peak Hour ADT	Northbound=0.715*Peak Hour ADT	
182	456	VPH

Site Traffic Generation Data

AM Peak Hour Site Traffic			
Southbound (right turn) entering	Northbound(left Turn) entering	exiting Southbound (right turn)	exiting Northbound (left turn)
7	17	10	3

PM Peak Hour Site Traffic			
Southbound (right turn) entering	Northbound(left Turn) entering	exiting Southbound (right turn)	exiting northbound (left turn)
1	4	7	9

Right Turn Lane Assessment

RTL Guidelines for 2-Lane Highway

AM	PHV Approach Total	463	vph	= AM Peak Hour SR 654 Traffic Southbound + AM Peak Hour Site Traffic Southbound (entering)
	PHV Right Turns	7	vph	= AM Peak Hour Site Traffic Southbound (entering)
PM	PHV Approach Total	183	vph	= PM Peak Hour SR 654 Traffic Southbound + PM Peak Hour Site Traffic Southbound (entering)
	PHV Right Turns	1	vph	= PM Peak Hour Site Traffic Southbound (entering)

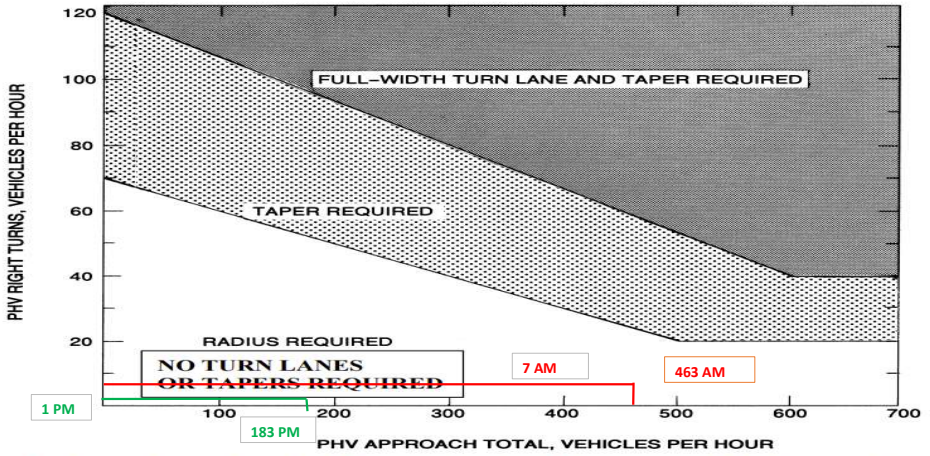


FIGURE 3-26 WARRANTS FOR RIGHT TURN TREATMENT (2-LANE HIGHWAY)

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

Left Turn Lane Assessment

AM	Opposing Volume	463	vph	= AM Peak Hour SR 654 Traffic Southbound + AM Peak Hour Site Traffic Southbound (entering)
	Left Turn Volume	17	vph	= AM Peak Hour Site Traffic Northbound (entering)
	Advancing Volume	199	vph	= AM Peak Hour SR 654 Traffic Northbound + AM Peak Hour Site Traffic Northbound (entering)
	% L	9%	%	= Left Turn Volume/ Advancing Volume

PM	Opposing Volume	183	vph	= PM Peak Hour SR 654 Traffic Southbound + PM Peak Hour Site Traffic Southbound (entering)
	Left Turn Volume	4	vph	= PM Peak Hour Site Traffic Northbound (entering)
	Advancing Volume	460	vph	= PM Peak Hour SR 654 Traffic Northbound + PM Peak Hour Site Traffic Northbound (entering)
	% L	1%	%	= Left Turn Volume/ Advancing Volume

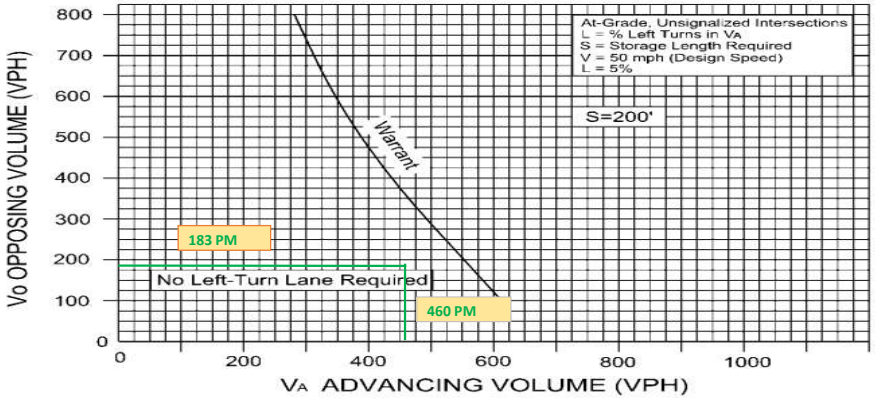


FIGURE 3-10 WARRANT FOR LEFT TURN STORAGE LANES ON TWO LANE HIGHWAY

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

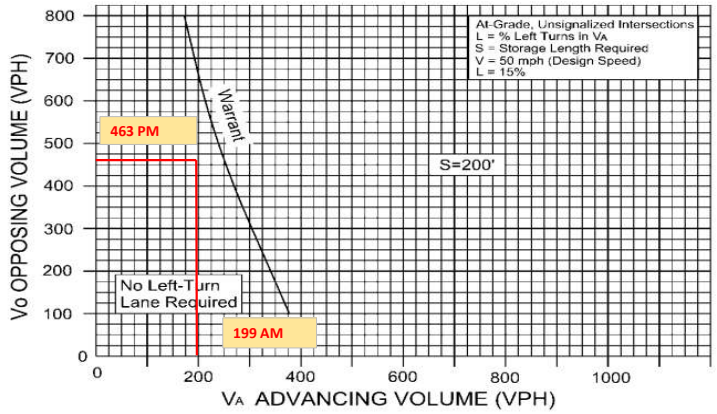


FIGURE 3-12 WARRANT FOR LEFT TURN STORAGE LANES ON TWO LANE HIGHWAY

Nothing required.

Appendix A

Land Use 522
Middle School/Junior High School

Description

A middle or junior high school serves students who have completed elementary school and have not yet entered high school. Both public and private middle schools/junior high schools are included in this land use. Elementary school (Land Use 520), high school (Land Use 530), private school (K-8) (Land Use 534), private school (K-12) (Land Use 536), and charter elementary school (Land Use 537) are related uses.

Additional Data

The percentage of students at the sites who were transported to school via bus varied considerably. Due to the varied transit and school bus usage at these sites, it is desirable that future studies include additional detail on the percentage of students who were bused to school and the percentage that were dropped off and picked up.

Because the ratio of floor space to student population varies widely among the schools surveyed, the number of students may be a more reliable independent variable on which to establish trip generation rates.

Time-of-day distribution data for this land use are presented in Appendix A. For the two general urban/suburban sites with data, the overall highest vehicle volumes during the AM and PM on a weekday were counted between 7:00 and 8:00 a.m. and 5:00 and 6:00 p.m., respectively.

The sites were surveyed in the 1990s, the 2000s, and the 2010s in California, Connecticut, Delaware, Florida, Minnesota, Nebraska, Oregon, Pennsylvania, and Tennessee.

Source Numbers

431, 444, 534, 536, 564, 579, 592, 611, 719, 867, 936, 940

Middle School/Junior High School
(522)

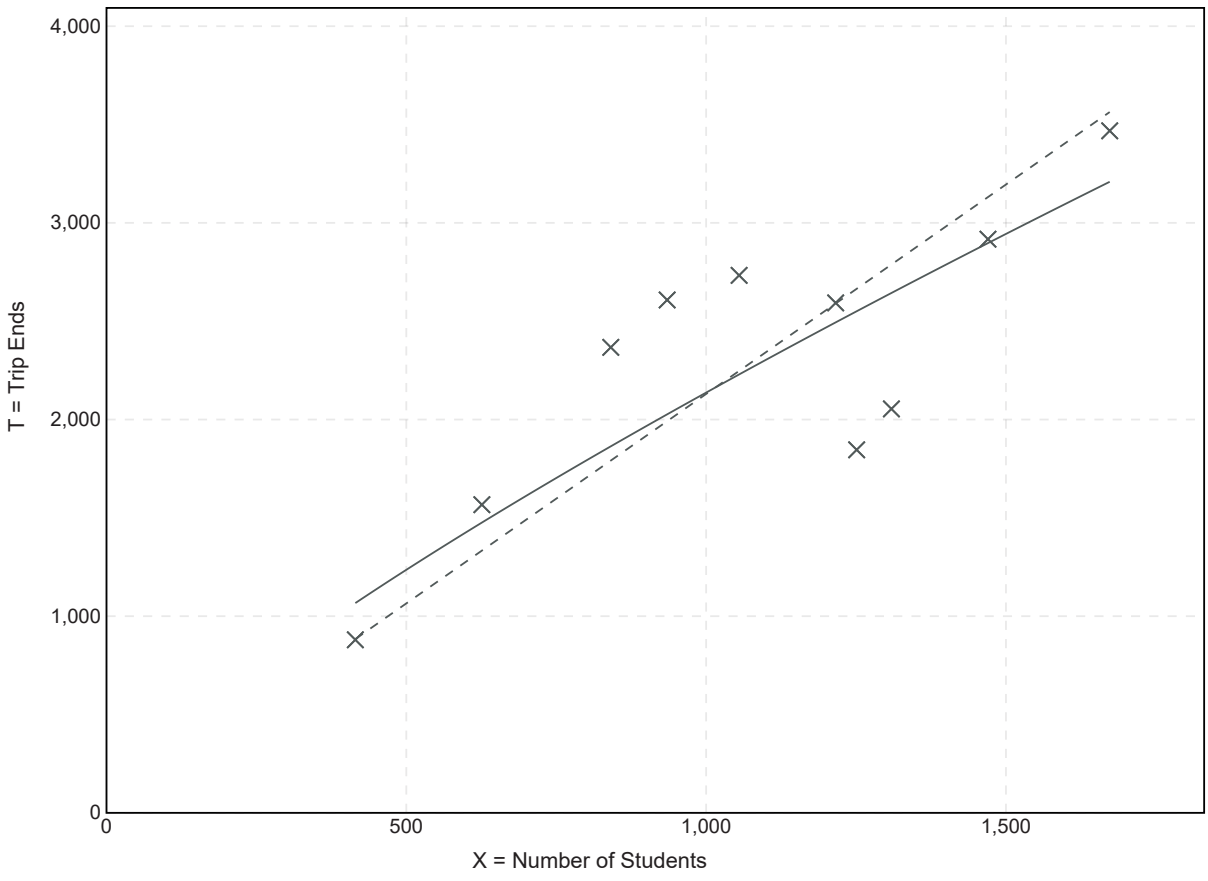
Vehicle Trip Ends vs: **Students**
On a: **Weekday**

Setting/Location: **General Urban/Suburban**
Number of Studies: 10
Avg. Num. of Students: 1079
Directional Distribution: 50% entering, 50% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
2.13	1.48 - 2.81	0.46

Data Plot and Equation



Fitted Curve Equation: Ln(T) = 0.79 Ln(X) + 2.21

R^2= 0.73

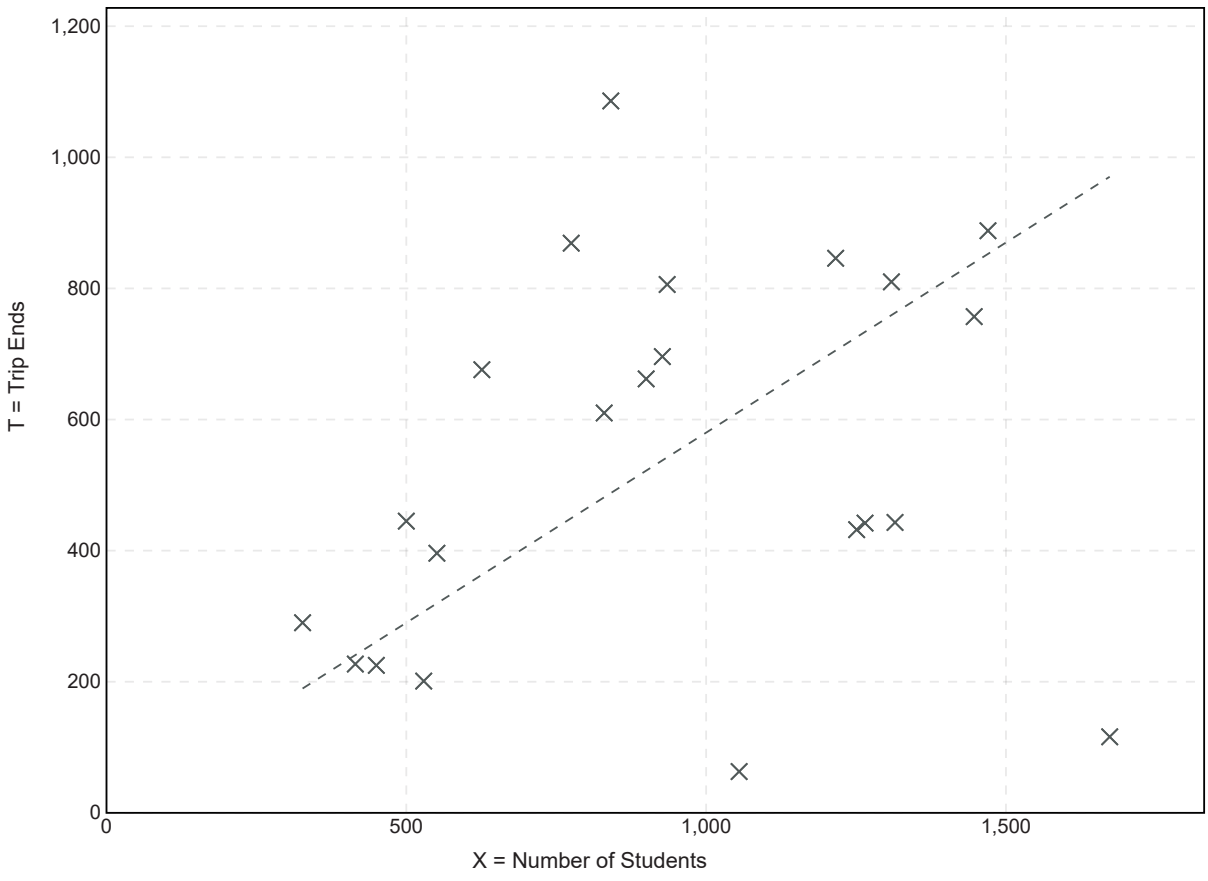
Middle School/Junior High School
(522)

Vehicle Trip Ends vs: **Students**
On a: **Weekday,**
Peak Hour of Adjacent Street Traffic,
One Hour Between 7 and 9 a.m.
Setting/Location: **General Urban/Suburban**
Number of Studies: 22
Avg. Num. of Students: 937
Directional Distribution: 54% entering, 46% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.58	0.06 - 1.29	0.32

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **

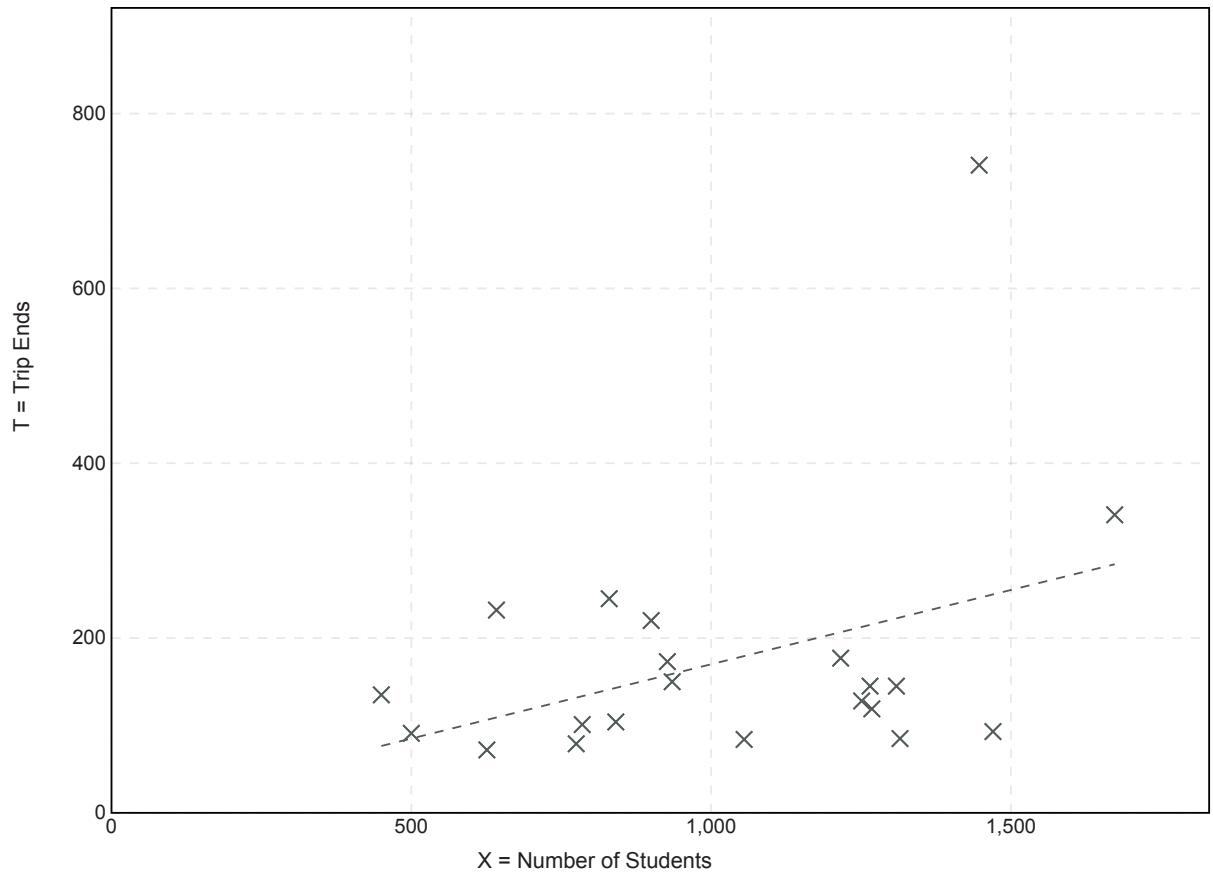
Middle School/Junior High School
(522)

Vehicle Trip Ends vs:	**Students**
On a:	**Weekday,**
	Peak Hour of Adjacent Street Traffic,
	One Hour Between 4 and 6 p.m.
Setting/Location:	**General Urban/Suburban**
Number of Studies:	21
Avg. Num. of Students:	1023
Directional Distribution:	49% entering, 51% exiting

Vehicle Trip Generation per Student

Average Rate	Range of Rates	Standard Deviation
0.17	0.06 - 0.51	0.12

Data Plot and Equation



Fitted Curve Equation: Not Given

R^2= **