

# REZONING TRAFFIC IMPACT STATEMENT

# VENTURE BUSINESS PARK

## STAFFORD COUNTY, VA

### Submitted for:

Matan Acquisitions II, LLC  
4600 Wedgewood Blvd. Suite A  
Frederick, Maryland 21703

### Submitted by:

**Pennoni**  
1602 Village Market Boulevard, S.E, Suite 330  
Leesburg, Virginia 20175



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Douglas R. Kennedy, PE VA 021450

MATNX21001

## January 2022

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January 21, 2022

Mr. Michael Zuraf  
Department of Planning & Zoning  
County of Stafford  
1300 Courthouse Road, 2<sup>nd</sup> Floor  
Stafford, Virginia 22554

**Re:    *Rezoning Application Technical Support  
Venture Business Park  
Tax Map 38-80  
Rock Hill Magisterial District  
Traffic Impact Statement  
Pennoni NMSHL21001***

Dear Mr. Zuraf:

On behalf of the applicant, Pennoni has prepared the following summary to support the rezoning application from B-2 to M-1 and identified on the proposed Generalized Development Plan as for the Venture Business Park on Tax Map 38--80.

The proposed development consists of up to 250,000 SF of industrial uses on 31.7± acres. The study was requested since potential site trips will 1,000 VPD with the industrial uses. The traffic statement includes existing traffic patterns from post-COVID traffic conditions and VDOT Route 630 interchange volumes, trip generation for the proposed development, trip distribution, and level of service analysis for the public street site access to Wyche Road (VA route 702) and the adjacent existing traffic signals on VA Route 630 (Courthouse Road).

Since the proposed GDP trips are less than 5,000 vehicles per day (VPD) a formal VDOT submission of a 527 study is not required; however, Pennoni staff did provide a draft VDOT 527 scoping document to the County and VDOT for review, attached as **Appendix A**. At the January 6,2022 meeting. County staff requested other development thresholds, which have been include in the

**Venture Business Park Traffic Summary:**

Total trips for 250,000 SF general industrial uses at **1,218 VPD**; highest of industrial trip ranges,  
Peak hour trips at **185-200 vph**, for roadway peaks with heavy vehicle impacts at 16-23 trips per hour,  
Weekday peak trip generator at 225 VPH,  
Site impacts at VA Route 630 signal at less than **6.0 percent**,  
Proposed site trip generation **reduced by 65%** from by-right office uses with rezoning,  
Acceptable LOS for additional traffic at Wyche Road/Bradburn Place, Venture Road with rezoning, and  
No change in LOS grades at signal at Courthouse/Hospital Center Blvd./Wyche Road with proposed rezoning.

technical analysis and VDOT provided current synchro files and suggested heavy vehicle traffic be shown with revised trip distribution to I-95. The revisions were incorporated by Pennoni for this analysis and modified to reflect existing field conditions. The edited scoping form is also included in the Appendix.

The site densities are summarized in **Table 1**. The site vicinity is shown in **Exhibit 1**; and the proposed GDP plan is included as **Exhibit 2**.

**Table 1: Venture Business Park GDP Site Densities**

Land Use/Location (1)	Densities
M-1 Industrial Uses	250,000 gsf

(1) See Exhibit 2 BFG General Development Plan.

## Site Context

The subject site is located west of Wyche Road and straddles the existing Bradburn Place. Bradburn Place is a private access road to be used for the truck access for the adjacent DHL (Or People Movers) development east of I-95, as shown in **Exhibit 1**. The subject parcel is shown to be 31.7± acres, zoned as B-2 to be rezone for M-1 uses. The site is vacant. day site. The property is west of Wyche Road and proposes to realign Bradburn Place on-site to maintain access to the DHL activities but provide a larger building footprint for industrial uses. The site proposes an employee right-in only entrance access on southbound Wyche Road for employee ingress at the end of the existing right turn lane from Wyche Road to Bradburn Place. With the realignment of Bradburn Place, the site access for trucks and egress for employees and truck are shown at 2 locations north of the realigned Bradburn Place corridor. No changes to the geometry at Wyche Road/Bradburn Place/Venture Road is proposed with the realignment. Geometric improvements to upgrade Wyche Road as part of the DHL access using public access grants are under review by VDOT and the County and are included to support heavy vehicle access. However, the upgrades for Wyche Road would not change the road geometry, just facilitate heavy vehicle turns south of Courthouse Road. The Generalized Development Plan, prepared by Bagby, Foroughi, and Goodpasture, PLLC (BFG), is excerpted as **Exhibit 2**.

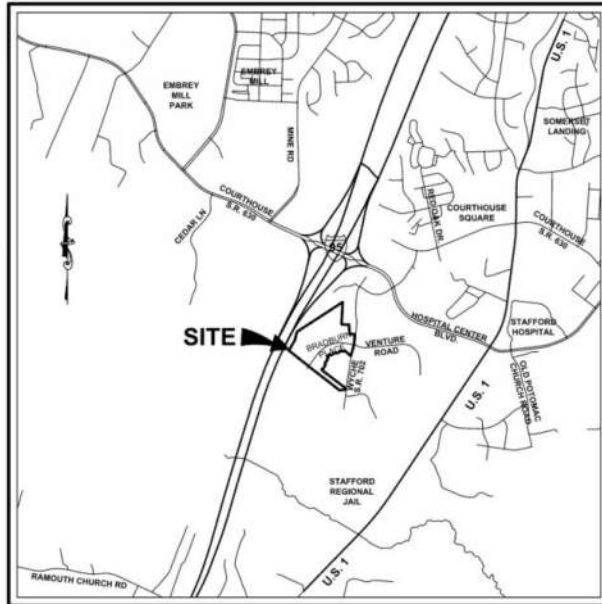


Exhibit 1: Site Location (Source: BFG GDP)

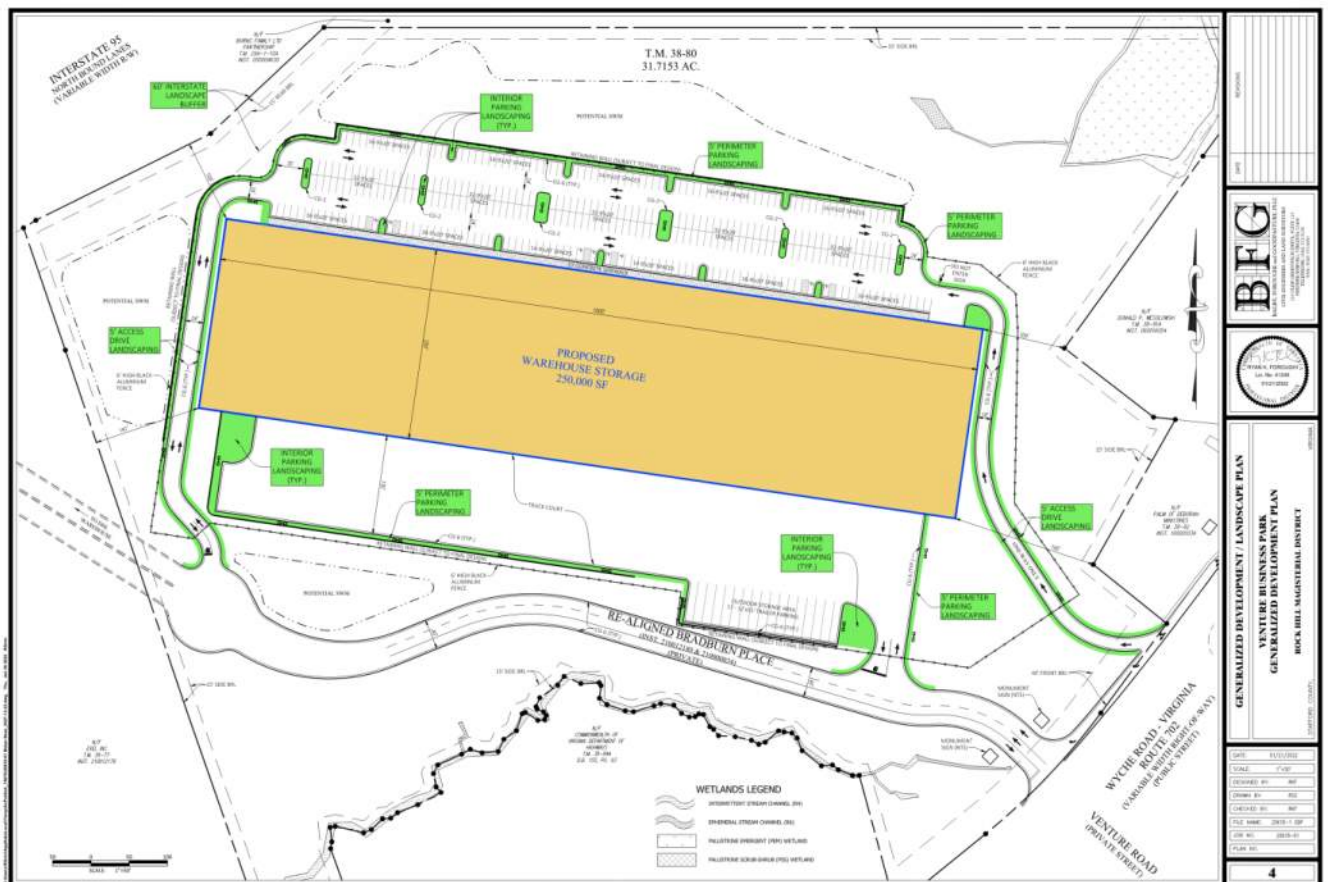


Exhibit 2: Generalized Development Plan

(Source: Bagby, Foroughi, and Goodpasture, PLLC, excerpted by Pennoni)



## Zoning and Comprehensive Plan Conformance

The existing zoning of the subject site is changed from B-2 to M-1 to support the proposed employment uses. The Comprehensive Plan is not proposed to be revised with this activity as the uses are consistent with the adjoining activities at the DHL site. For transportation, the Comprehensive Plan Figure 4.1 is excerpted and annotated as **Exhibit 3** below. The 2016 plan shows the realignment of Courthouse Road to Hospital Center Boulevard and the north leg of Courthouse Road is as 4-lane divided collector, as upgraded as part of the VDOT Route 630/I-95 interchange improvements, completed in December 2020. Wyche Road south of Courthouse Road is a local street.

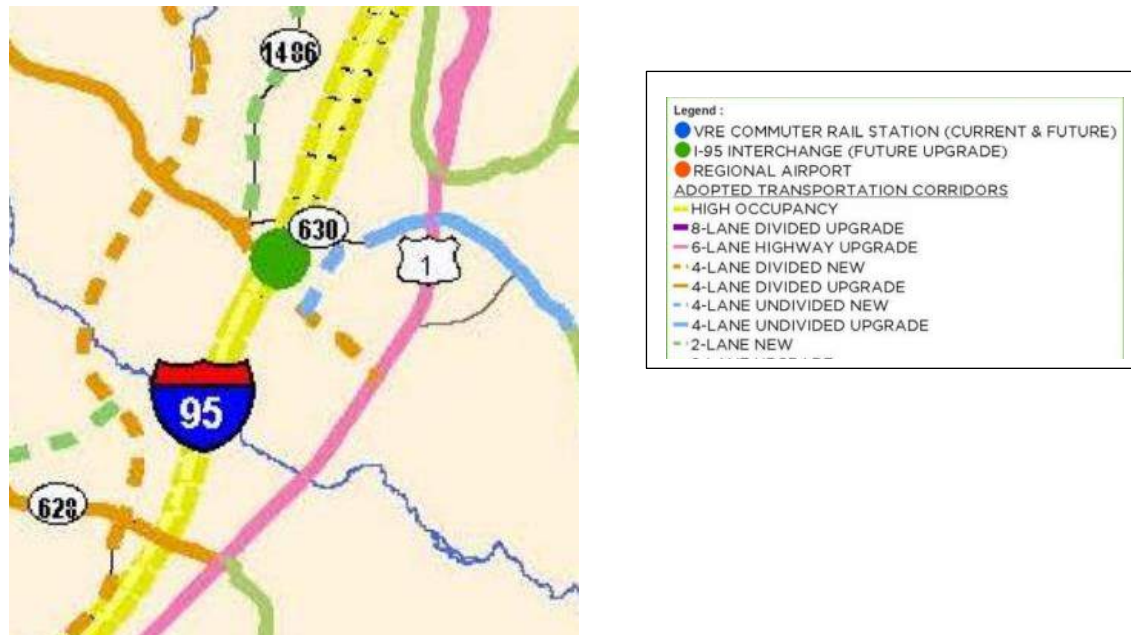


Exhibit 3: Stafford County Transportation Needs (Figure 4.1, April 2016)

*(Source: Stafford County Comprehensive Plan, excerpted and annotated by Pennoni)*

For the trip generation comparisons, the 31.7 acres was calculated if developed as office uses consistent with the Comprehensive Plan. The site development at a 0.30 Floor-Area-Ratio (FAR) would yield up to 414,500 sf of office if the site were developed for employment uses.

## VDOT Chapter 527/870 Requirements

The analysis is formatted following the generalized VDOT 527 Traffic Study to summarize traffic assumptions; however, the proposed site activities do not require a formal VDOT 527 study submission. As part of the requirements of VDOT's Chapter 527/870 regulations, a traffic impact analysis must be submitted with any rezoning or special exception action if the site trip generation is over 5,000 vehicles per day. **For the subject site, trip generation for the site does not trigger additional Chapter 527/870 review for land use or site plan review based on a range of land uses.**

### Proposed Access

New public access is proposed with the GDP, with an existing inbound entrance for employees on Wyche Road. The proposed entrance will be signed for no truck access, to accommodate industrial, warehouse or distribution center access for heavy vehicles is oriented via Bradburn Place. Employee egress from the north side of the proposed building is provided to Bradburn Place for exiting trips. Two entrances are shown to the relocated Bradburn Place for the industrial access to the private street.

The Wyche Road entrance as proposed is located at the taper of the existing right turn lane to Bradburn Place. With the proposed rezoning, a right-in only would warrant a separate right turn deceleration lane for the new entrance, which is shown on the proposed GDP, as excerpted in **Exhibit 2A** with a 100 ft turn lane and 100 ft. taper to satisfy VDOT design requirements.

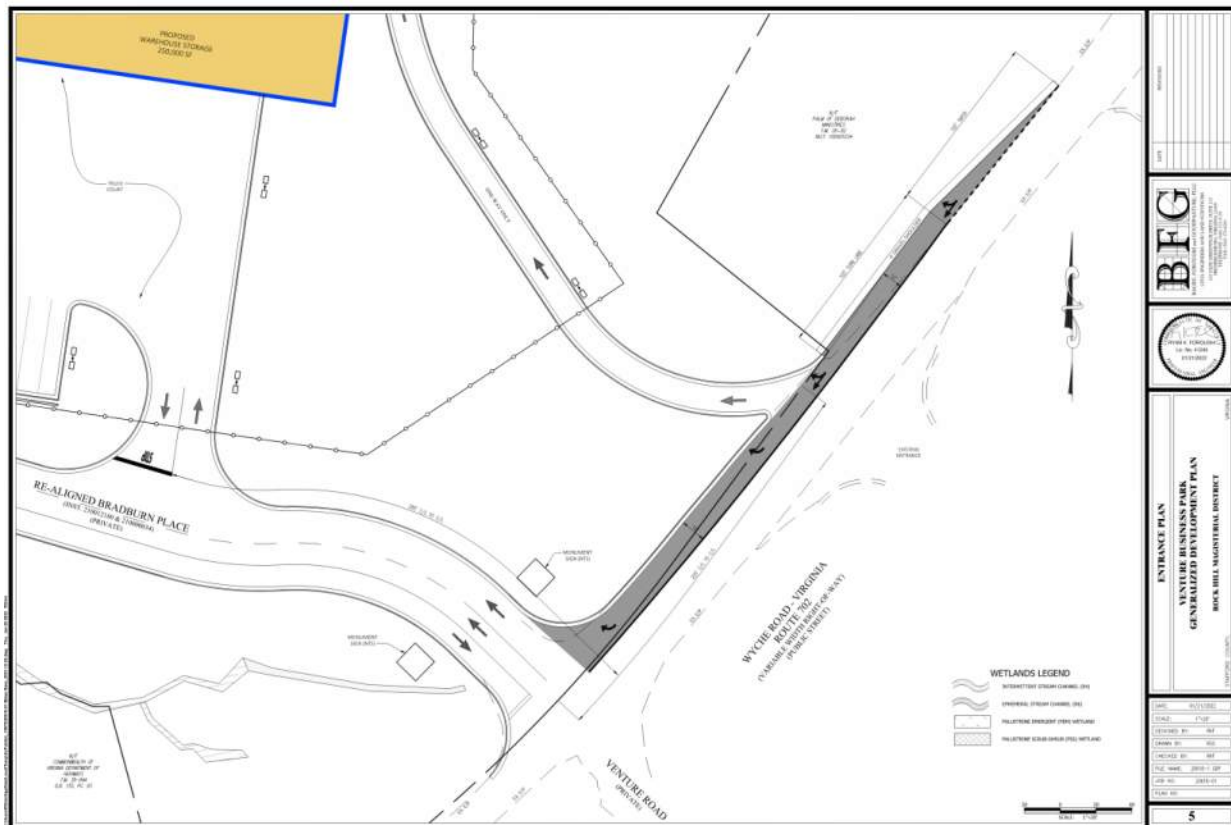


Exhibit 2A: Generalized Development Plan

(Source: Bagby, Foroughi, and Goodpasture, PLLC, excerpted by Pennoni)

## Site Trip Generation

The trip generation associated with the proposed rezoning uses are summarized in **Table 2**, with a comparison to the Comprehensive Plan office uses.

**Table 2: Proposed Venture Business Park Comparison with Comp. Plan Uses**

Land Use Density	Trip Variable (ITE LUC Code)	AM Peak Hour Traffic	PM Peak Hour Traffic	Daily
Comp. Plan Uses @ 0.30 FAR 414,500 gsf	Per ksf (LUC 710) e	501/68 <b><u>569</u></b>	92/448 <b><u>540</u></b>	<b><u>3,658</u></b>
<b>Proposed Rezoning</b>	Per ksf (LUC 110) ave	163/22 <b><u>185</u></b>	26/174 <b><u>200</u></b>	<b><u>1,218</u></b>
Difference Rezoning to Comp Plan		-338/-46 <b><u>-384</u></b>	-66/-274 <b><u>-340</u></b>	<b><u>-2,780</u></b>
% Change		<b><u>-67%</u></b>	<b><u>-63%</u></b>	<b><u>-70%</u></b>

Source: Institute of Transportation Engineers (ITE) Trip Generation (Manual, 11<sup>th</sup> Edition) (Sept 2021). Calculations by Pennoni. See Tables 3, 4, 5 for average rates, % splits, trip ranges, heavy vehicle volumes and alternative variables.

Density based on 31.7153 acres. See Table 6 for by-right office calculations.

For LUC 110, peak hour of generator shown on Table 3 for off-peak times. AM Generator at 228 VPH, PM generator at 200 VPH (two-way) not occurring during roadway peak.

For LUC 110, Peak hour of Generator Saturday trips at 28 VPH. Daily trip rate not shown above for LUC 110 at 173 VPD from 1 study. Saturday peak hour trips calculated as weekday PM/Daily ratio (16.4%) and applied to ITE Saturday average (173 sat. daily trips \*.164 = **28 VPH**)

Legend: “e” trip rate equations; “ave” average LUC = Land Use Code

Inbound/Outbound **Total (2-way) Trips.**

The ITE Trip Generation details for industrial uses are included in **Table 3** for industrial uses, along with a comparison of Project Mover trips from the February 2021 traffic study for the DHL site.

Highest trip shown as ITE Use Code Land Use Code (LUC) 110 vs Warehouse (LUC 150), High-Cube Transload Warehouse (LUC 154), High-Cube Fulfillment Center (LUC 155), High Cube Parcel Warehouse (LUC 156), and Data Center (LUC 160).

Based on input from VDOT from the scoping, the average trip rates for LUC 110 were used, since final activities may vary, and the trips were higher than the ITE equations.



Since the M-1 uses permits a range of employment activities, Pennoni checked a range of uses of industrial uses to include average and ITE equations for general industrial, warehouse, and multiple ‘high-cube’ warehouse distribution center activities, as shown in **Table 4**.

For the Venture Business Park site, the average industrial rates were applied to the proposed 250,000 sf building footprint to reflect the highest traffic activity for the site. This approach allows for flexibility subject to the final tenant and footprint of the development, subject to future market conditions. Note that only the general industrial uses (ITE Code LUC 110) and the High Cube Parcel Warehouse (LUC 156) generate more than 1,000 VPD for the weekday trip generation scenarios. However, the LUC 156 has reduced peak hour trips, so the industrial use was included in this analysis. Development as a warehouse use or high-cube fulfillment facilities would reduce Daily traffic to approximately 500 VPD. Effective trip rates are shown at the bottom of the Table 4 with the reference notes.

**Table 3: Site Trip Generation**

ITE Land Use <sup>(1,2)</sup>						AM PEAK HOUR			PM PEAK HOUR			DAILY
CODE	DENSITY	Variable	USE			IN	OUT	TOTAL	IN	OUT	TOTAL	(2-way)
<i>ALL TRIPS ARE VEHICLE TRIPS</i>												
<b><u>Venture Business Park</u></b>												
<b><u>Proposed Building</u></b>												
110	110-110	250.000	ksf	General Light Industrial	(4)	163	22	185	26	174	200	1,218
110	110-120	250.000	ksf	General Light Industrial (Gen)	(4)	198	30	228	36	164	200	1,218
110	110-200	250.000	ksf	General Light Ind. @ 250,000 sf	e	153	21	174	22	146	168	990
		250.000	ksf	Gen Light Ind.( Average)		163	22	185	26	174	200	1,218
<b><u>Alternative as Warehouse Use</u></b>												
150	150-101	250.000	ksf	Warehousing @ 250 ksf	e	42	12	54	16	40	56	423
150	150-110	250.000	ksf	Warehousing	(5)	33	10	43	13	32	45	428
		250.000	ksf	Warhose (Average)		33	10	43	13	32	45	428
<b><u>Trips Assumed for DHL Site (5)</u></b>												
<b><u>Project Mover (February 2021 TIA)</u></b>												
820	820-182	0.000	ksf	Tractor Trailers		0	0	0	0	0	0	90
932	932-110	0.000	ksf	Delivery Vans		14	0	14	0	60	60	204
881	881-110	0.000	ksf	Automobiles		20	47	67	22	10	32	1,274
		533.000	ksf	People Mover		34	47	81	22	70	92	1,568
<b><u>Total Proposed</u></b>					FAR (6)							
<b>250.000</b>	<b>250.000</b>	<b>ksf</b>	<b>TOTAL CUP</b>		<b>0.18</b>	<b>163</b>	<b>22</b>	<b>185</b>	<b>26</b>	<b>174</b>	<b>200</b>	<b>1,218</b>

<b>Total Trips for VDOT 527/870 Threshold</b>	<b>No internal/Pass-by Trips</b>	<b>1,218</b>
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Number of Studies AM/PM(Daily)		AM Peak Hour		PM Peak Hour		Daily	
Effective Trip Rates <sup>(3)</sup>		(2-way)	% Inbound	(2-way)	% Inbound	Weekday	
221/ 232 (59)	710 General Office Building	ksf	1.52	88%	1.44	17%	10.84
41/ 41 (37)	110 General Light Industrial	ksf	0.74	88%	0.80	13%	4.87
41/ 41 (37)	110 General Light Ind. @ 250,000 sf	ksf	0.70	88%	0.67	13%	3.96
36/ 49 (31)	150 Warehousing @ 250 ksf	ksf	0.22	78%	0.22	29%	1.69
36/ 49 (31)	150 Warehousing	ksf	0.17	77%	0.18	29%	1.71
	Project Mover Site Estimates	ksf	0.15	42%	0.17	24%	2.94
102/ 103 (91)	154 High-Cube Transload and Short-Term St	ksf	0.08	77%	0.10	28%	1.40
22/ 22 (10)	155 High-Cube Fulfillment Ctr Wareh - Non-	ksf	0.15	81%	0.16	39%	1.81
4/ 4 (8)	156 High-Cube Parcel Hub Warehouse	ksf	0.70	50%	0.64	68%	4.63

- (1) Trip Generation Manual (11th Edition), Institute of Transportation Engineers (ITE); 2021. Average trip rates used, unless noted with "e", then equations used.
- (2) ITE Land Use Code shown as the first 3 digits. Decimal shown for internal use by Pennoni for lookup table for trip rate variable.
- (3) Effective trip rates calculated by land use:  
 For average rates = (Density) x (ave. trip rate) = 2-way Trips ; x (inbound percentage) for Trips In  
 For ITE equations, "e" noted = (Density) x (trip equation) = 2-way Trips ; x (inbound percentage) for Trips In
- (4) For LUC 110, Used average rates for peak hours, Daily as R2 < 0.75, and Daily trips with trip equations lower than average.  
 For LUC 110, checked peak hour of generator for Stafford County checklist. Not occurring during roadway peak hours.
- (5) For LUC 150, Used average rates for peak hours as R2 < 0.75, and Daily trips with trip equations lower than average.
- (6) FAR based on app. 31.7153 acres net for site.

**Table 4: Site Trip Generation Industrial Ranges**

ITE Land Use <sup>(1,2)</sup>						AM PEAK HOUR			PM PEAK HOUR			DAILY	
CODE	DENSITY	Variable	USE			IN	OUT	TOTAL	IN	OUT	TOTAL	(2-way)	
<b>Venture Business Park</b>													
Subject site acreage						0.3			effective FAR			0.18	
Max SF Employment Uses						sf							
<u>Development as proposed as Industrial Uses (LUC 110)</u>													
110	110.110	250.000	ksf	General Light Industrial	(4)	163	22	185	26	174	200	1,218	
110	110.202	250.000	ksf	General Light Ind. @ 250,000 sf e		153	21	174	22	146	168	990	
		250.000	ksf	Use		163	22	185	26	174	200	1,218	
<u>Development as proposed as Warehouse Uses (LUC 150)</u>													
150	150.110	250.000	ksf	Warehousing	(4)	33	10	43	13	32	45	428	
150	150.201	250.000	ksf	Warehousing @ 250 ksf	e	42	12	54	16	40	56	423	
		250.000	ksf	Use		33	10	43	13	32	45	428	
<u>Development as proposed as High-Cube Transload Warehouse (Non-Sort) (LUC 154)</u>													
154	154.110	250.000	ksf	High-Cube Transload and Short-Term S		15	5	20	7	18	25	350	
		250.000	ksf	Use		15	5	20	7	18	25	350	
<u>Development as proposed as High-Cube Fulfillment Ctr (LUC 155)</u>													
155	155.110	250.000	ksf	High-Cube Fulfillment Ctr Wareh		31	7	38	16	24	40	453	
155	155.201	250.000	ksf	Hi-Cube FulfillCtr War @ 250k e		31	7	38	16	24	40	326	
		250.000	ksf	Use		31	7	38	16	24	40	453	
<u>Development as proposed as High-Cube Parcel Warehouse (LUC 156)</u>													
156	156.110	250.000	ksf	High-Cube Parcel Hub Warehouse		88	87	175	109	51	160	1,158	
156	156.201	250.000	ksf	Hi-Cube Parcel Hub Ware@ 250k		9	9	18	109	51	160	1,158	
		250.000	ksf	Use		88	87	175	109	51	160	1,158	
<u>Development as proposed as Data Center Uses (LUC 160)</u>													
160	160.110	250.000	ksf	Data Center		15	13	28	7	16	23	248	
		250.000	ksf	Use		15	13	28	7	16	23	248	
samples													
Average of industrial employment uses						7	49	22	70	25	45	71	551
Average of industrial employment uses w/ Data Ctr						6	55	24	77	29	48	78	601
Use industrial for highest peak hour trips													
<b>250.000</b>	<b>250.000</b>	<b>ksf</b>	<b>General Light Industrial</b>			<b>163</b>	<b>22</b>	<b>185</b>	<b>26</b>	<b>174</b>	<b>200</b>	<b>1,218</b>	

**Number of Studies AM/PM(Daily)**

*Effective Trip Rates <sup>(3)</sup>*

				AM Peak Hour		PM Peak Hour		Daily
				(2-way)	% Inbound	(2-way)	% Inbound	(2-way)
41/41 (37)	110	General Light Industrial	ksf	0.74	88%	0.80	13%	4.87
22/22 (10)	155	High-Cube Fulfillment Ctr Wareh	ksf	0.15	82%	0.16	40%	1.81
221/232 (59)	710	General Office Building	ksf	1.52	88%	1.44	17%	10.84
2/2 (1)	155	Hi-Cube FulfillCtr War @ 250k	ksf	0.15	82%	0.16	40%	1.30
41/41 (37)	110	General Light Ind. @ 250,000 sf	ksf	0.70	88%	0.67	13%	3.96
4/4 (8)	156	Hi-Cube Parcel Hub Ware@ 250k	ksf	0.07	50%	0.64	68%	4.63
4/4 (8)	156	High-Cube Parcel Hub Warehouse	ksf	0.70	50%	0.64	68%	4.63
6/5 (2)	160	Data Center	ksf	0.11	54%	0.09	30%	0.99

(1) Trip Generation Manual (11th Edition) Institute of Transportation Engineers (ITE); 2021. Average trip rates used, unless noted with "e", then equations used.

(2) ITE Land Use Code shown as the first 3 digits. Decimal shown for internal use by Pennoni for lookup table for trip rate variable.

(3) Effective trip rates calculated by land use:

For average rates =

(Density) x (ave. trip rate) = 2-way Trips ; x (inbound percentage) for Trips In

For ITE equations, "e" noted =

(Density) x (trip equation) = 2-way Trips ; x (inbound percentage) for Trips In

(4) For LUC 110 and 150, Used average rates for peak hours as R2 < 0.75.

## Rezoning Determination Calculations

The County rezoning analysis determination form inputs are shown below:

- 228 VPH (AM Peak hour of Generator), per ITE LUC 110 *general industrial @ 250,000 sf* (see Table 3)
- 1,800 VPD on state-controlled highways (Wyche Road from VDOT published counts)
- 185 VPH Peak AM
- 200 VPH Peak PM
- 28 VPH Peak Saturday
- 1,218 VPD highest intensity \*(see Tables 3 and 4)

## Internal and Pass-By Reductions

Pass-by trips are trips to the subject site by vehicles already on the network, defined by ITE, “[...] as an intermediate stop on the way from an origin to a primary trip destination without a route diversion [...].” The ITE data for industrial and warehouse typically do not have pass-by reductions. Similarly, although the site is adjacent to the approved DHL plan, internal trips between the distribution facilities are not anticipated. Internal site trips with the Burns property commercial development under construction also were not included in this analysis.

## Heavy Vehicle Calculations

Given the proposed industrial uses, trucks were assumed to comprise a relevant portion of the site traffic, which have different impacts on the study intersections than passenger vehicles. Given that the most likely development for the site is general industrial or a High-Cube Transload & Short-Term Storage Warehouse, truck percentages from the ITE Trip Generation 11th Edition (as published in the 10<sup>th</sup> edition Supplement (February 2020) and the ITE study, “High-Cube Warehouse Vehicle Trip Generation Analysis” (October 2016), were reviewed and applied for this analysis. To recognize the different purpose of truck trips (generally non-local) versus passenger vehicle trips (generally local, such as employees), different distributions were assumed for each.

The DHL site use the same approach in trip generation; however, heavy vehicle trucks were not projected to occur during the weekday roadway peak hours. Van deliveries were included. For the subject site, the trip generation was segregated with passenger car and heavy vehicle traffic components, to calculate heavy vehicle trips components for the Level of Service evaluations. For each land use type of industrial, the heavy vehicle percentages were calculated by time period and adjusted to reflect the highest peak percentages as calculated as an average of the heavy vehicle trip rates divided by the total vehicle trip rates. The ITE 10<sup>th</sup> Edition Supplement also included an Appendix C which calculated a weighted average of heavy vehicle trips as a percentage of total trips. The range of heavy vehicles for the general industrial/employment and commercial uses were calculated by phase, and the results were compared to the actual heavy vehicle percentages for use from the ITE Supplement. For the Venture Business Park, industrial heavy vehicle components are summarized in **Table 5**.

**Table 5: Site Trip Generation with Heavy Vehicles by Use**

ITE Land Use (1)					AM PEAK HOUR			PM PEAK HOUR			DAILY
CODE	DENSITY	Variable	USE		IN	OUT	TOTAL	IN	OUT	TOTAL	(2-way)
<i>ALL TRIPS ARE VEHICLE TRIPS (HV TRIP SHOWN IN UNDERLINE)</i>											
<b>Venture Business Park</b>				(3)							
110	110.000	250.000	ksf	General Light Industrial	163	22	185	26	174	200	1,218
				Percentage Heavy Vehicles (4)	3%			2.0%			8%
				Heavy Vehicles	<u>4</u>	<u>2</u>	<u>6</u>	<u>2</u>	<u>2</u>	<u>4</u>	<u>97</u>
				Passenger Cars	159	20	179	24	172	196	1,121
				<i>Alt. check HV trips based on building size ITE Supp. (5)</i>							
110	110.000	250.000	ksf	Gen Light Industrial T	<u>2</u>	<u>1</u>	<u>3</u>	<u>2</u>	<u>1</u>	<u>3</u>	<u>63</u>
				check HV for % > HV rate in ITE	OK			OK			OK
150	150.000	250.000	ksf	Warehousing	33	10	43	13	32	45	428
				Percentage Heavy Vehicles (4)	13.0%			17.0%			27%
				Heavy Vehicles	<u>3</u>	<u>2</u>	<u>6</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>150</u>
				Passenger Cars	30	7	37	9	28	37	278
				<i>Alt. check HV trips based on building size ITE Supp. (5)</i>							
150	150.000	250.000	ksf	Warehousing T	<u>3</u>	<u>2</u>	<u>5</u>	<u>4</u>	<u>4</u>	<u>8</u>	<u>150</u>
				check HV for % > HV rate in ITE	OK			OK			OK
154	154.000	250.000	ksf	High-Cube Transload and Short-Term S	15	5	20	7	18	25	350
				Percentage Heavy Vehicles (4)	20%			16%			16%
				Heavy Vehicles	<u>2</u>	<u>2</u>	<u>4</u>	<u>2</u>	<u>2</u>	<u>4</u>	<u>56</u>
				Passenger Cars	13	3	16	5	16	21	294
				<i>Alt. check HV trips based on building size ITE Supp. (5)</i>							
154	154.000	250.000	ksf	High-Cube Transload Short-Term S T HV	<u>2</u>	<u>3</u>	<u>5</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>55</u>
				check HV for % > HV rate in ITE	NO			OK			OK
155	155.000	250.000	ksf	High-Cube Fulfillment Ctr Wareh - Non	31	7	38	16	24	40	453
				Percentage Heavy Vehicles (4)	9%			7%			9%
				Heavy Vehicles	<u>3</u>	<u>2</u>	<u>5</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>59</u>
				Passenger Cars	28	5	33	15	22	37	394
				<i>Alt. check HV trips based on building size ITE Supp. (5)</i>							
155	155.000	250.000	ksf	High-Cube Fulfillment Ctr Wareh HV	<u>3</u>	<u>2</u>	<u>5</u>	<u>1</u>	<u>2</u>	<u>3</u>	<u>58</u>
				check HV for % > HV rate in ITE	OK			OK			OK
156	156.000	250.000	ksf	High-Cube Parcel Hub Warehouse	88	87	175	109	51	160	1,158
				Percentage Heavy Vehicles (4)	5%			1%			9%
				Heavy Vehicles	<u>10</u>	<u>13</u>	<u>23</u>	<u>11</u>	<u>5</u>	<u>16</u>	<u>145</u>
				Passenger Cars	78	74	152	98	46	144	1,013
				<i>Alt. check HV trips based on building size ITE Supp. (5)</i>							
156	156.000	250.000	ksf	High-Cube Parcel Hub Wareh T HV	<u>0</u>	<u>23</u>	<u>23</u>	<u>10</u>	<u>5</u>	<u>15</u>	<u>145</u>
				check HV for % > HV rate in ITE	OK			OK			OK
110	110.000	250.000	ksf	General Light Industrial	163	22	185	26	174	200	1,218
				Percentage Heavy Vehicles (6)	12.5%			8.0%			12.3%
			USE	Heavy Vehicles	<u>14</u>	<u>9</u>	<u>23</u>	<u>8</u>	<u>8</u>	<u>16</u>	<u>150</u>
				Passenger Cars	149	13	162	18	166	184	1,068

(1) Trip Generation Manual (11th Edition), Institute of Transportation Engineers (ITE); 2021. Average trip rates used, unless noted with "e", then equations used.  
 (2) ITE Land Use Code shown as the first 3 digits. Decimal shown for internal use by Pennoni for lookup table for trip rate variable.  
 (3) Heavy vehicle calculations based on percentage of HV applied to total trips. See Appendix for ranges of percentages.  
 (4) Heavy Vehicle Trips as highest of LUC % based on either weighted average from ITE 10th Edition Supplement Appendix C "Truck Trips as Percent of Total Vehicle Trips" or comparison of trip rates for HV vs. total trips per 1,000.  
 (5) Heavy Vehicle trips checked based on truck trip rate per 1,000 sf and compared to computed truck trips.  
 (6) Heavy Vehicle trips checked based on truck trip rate per 1,000 sf and compared to computed truck trips. Percentage from use adjusted to equal or exceed trips per 1,000 sf  
 (7) Heavy Vehicle trip % adjusted to match highest peak hour/Daily HV percentage for industrial uses.

For the range of uses, heavy vehicle trips were calculated for 2 alternative methodologies:

- A. Heavy vehicle trucks as a percentage of total peak hour/Daily trips (as shown in Table 4) using the ITE Supplement Appendix C percentages applied to the individual uses,
- B. Calculation of heavy vehicle trips as a stand-alone truck based on the ITE trip rates per 1,0000 sf from ITE.

For each land use, Pennoni calculated the total max truck for the peak hours and Daily scenarios. The green line shaded line reflects the total trips from Table 4 and the Heavy vehicle trips are shown underlined. For the subject site, the heavy vehicle percentages would range between 3 and 20 percent of the peak hour trips by use, or approximately 3 to 23 peak hour trips. Pennoni used the highest peak hour volumes at 23 AM and 16 PM heavy vehicles per hour, based on the High Cube Parcel Hub Warehouse (LUC 156) and applied it to the general industrial trip generation, as shown on the bottom of Table 5. The remaining trips we assigned as passenger cars for employees, visitors, etc. For the site, this would equate to 162 AM and 184 PM peak hour trips. For the Daily conditions the Heavy vehicles are projected to be approximately 12 percent of the total trips (150 VPD) and the passenger car trips are estimated at 1068 VPD. The higher values of individual uses were applied to the total trips for the Venture Business Park site for heavy vehicle components to verify if the truck trips will impact signal and Wyche Road turn operations.

### By-Right Trip Calculations

The site activities associated with the subject rezoning reduce site trip generation in relation to the existing zoning. The proposed zoning activities are anticipated to reduce peak hour and Daily trips. While the VDOT technical traffic analysis procedures for the Chapter 527 review does not account for by-right trips, the comparisons are outlined below to emphasize that the proposed activities are a ‘down-zoning’, which effectively reduce future site trips by significantly reducing the commercial activities of the property and eliminating the residential component as approved for the site. The excerpt from the previous traffic study with the approved trip generation for the Governors Hill rezoning is summarized in **Table 6**.



**Table 6: Comprehensive Plan Trip Generation Comparisons**

ITE Land Use <sup>(1,2)</sup>				AM PEAK HOUR			PM PEAK HOUR			DAILY		
CODE	DENSITY	Variable	USE	IN	OUT	TOTAL	IN	OUT	TOTAL	(2-way)		
<b>ALL TRIPS ARE VEHICLE TRIPS</b>												
<b>Venture Business Park</b>				FAR	FUTURE TRIP GENERATION FOR REDEVELOPMENT WITH LAND USE RANGES							
Subject site acreage		31.72		0.30	FOR POTENTIAL EMPLOYMENT USES						effective FAR	0.18
Max SF Employment Uses		414,450		sf								
<i>Development as proposed as Industrial Uses (LUC 110)</i>												
110	110.110	250.000	ksf	General Light Industrial	(4)	163	22	185	26	174	200	1,218
110	110.240	250.000	ksf	General Light Ind. @ 250,000 sf	e	153	21	174	22	146	168	990
		250.000	ksf	Use Average		163	22	185	26	174	200	1,218
<i>Development with Comp. Plan as Office Uses (LUC 710)</i>												
710	710.110	414.450	ksf	General Office Building	(5)	554	76	630	101	496	597	4,493
710	710.186	414.450	ksf	General Office Bldg @ 374,260 sf	e	501	68	569	92	448	540	3,998
		414.450	ksf	Use Equation		501	68	569	92	448	540	3,998
<b>250.000</b>	<b>250.000</b>	<b>ksf</b>	<b>General Light Industrial</b>			<b>163</b>	<b>22</b>	<b>185</b>	<b>26</b>	<b>174</b>	<b>200</b>	<b>1,218</b>

0.20 FAR GENERAL INDUSTRIAL MINUS COMP. PLAN      -338      -46      **-384**      -66      -274      **-340**      **-2,780**

COMP. PLAN WITH 0.30 FAR OFFICE

Change SF	-164.450	ksf	Percentage Change	-40%	density	-67%	-63%	<b>-70%</b>
-----------	----------	-----	-------------------	------	---------	------	------	-------------

Number of Studies	AM/PM(Daily)	Effective Trip Rates <sup>(3)</sup>	AM Peak Hour		PM Peak Hour		Daily	
			(2-way)	% Inbound	(2-way)	% Inbound	Weekday	
41/ 41 (37)	110	General Light Industrial	ksf	0.74	88%	0.80	13%	4.87
41/ 41 (37)	110	General Light Ind. @ 250,000 sf	ksf	0.70	88%	0.67	13%	3.96
221/ 232 (59)	710	General Office Building	ksf	1.52	88%	1.44	17%	10.84
221/ 232 (59)	710	General Office Bldg @ 374,260 sf	ksf	1.37	88%	1.30	17%	9.65
221/ 232 (59)	710	General Office Building	ksf	1.52	88%	1.44	17%	10.84

(1) Trip Generation Manual (11th Edition), Institute of Transportation Engineers (ITE); 2021. Average trip rates used, unless noted with "e", then equations used.

(2) ITE Land Use Code shown as the first 3 digits. Decimal shown for internal use by Pennoni for lookup table for trip rate variable.

(3) Effective trip rates calculated by land use:

For average rates =

For ITE equations, "e" noted =

(Density) x (ave. trip rate) = 2-way Trips ; x (inbound percentage) for Trips In

(Density) x (trip equation) = 2-way Trips ; x (inbound percentage) for Trips In

(4) For LUC 110, Used average rates for peak hours, Daily as R2 < 0.75, and Daily trips with trip equations lower than average.

(5) FAR based on app. 28.64 acres net for site.

## 2021 Existing Conditions

To assess the existing traffic patterns, Pennoni received current traffic counts and signal operation files from VDOT as part of the Route 630 interchange improvements at I-95.

New counts we collected on Tuesday, October 5,2021 at the following locations to verify existing conditions:

- # 3: Courthouse Road/Wyche Road/Hospital Center Boulevard,
- # 6: Wyche Road/Bradburn Place/Venture Road

Data was collected between 6:00 AM and 9:00 AM and between 4:00 and 7:00 PM to calculate current traffic conditions on Wyche Road.

VDOT counts were reviewed for the 3 adjacent signals at the I-95 Courthouse Road signals, including the Austin Ridge signal west of I-95. PM volumes were updated from the VDOT synchro files provided, since the overall PM peak volumes on VA Route 630 from October were slightly higher than shown in the VDOT files. The new counts and VDOT summaries are included as **Appendix B**.

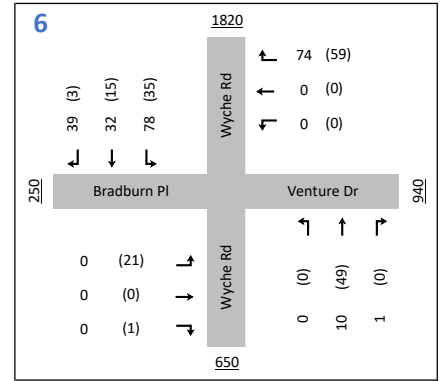
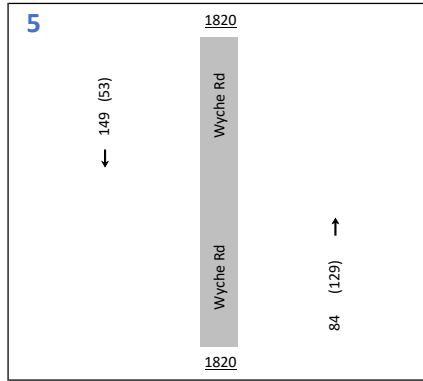
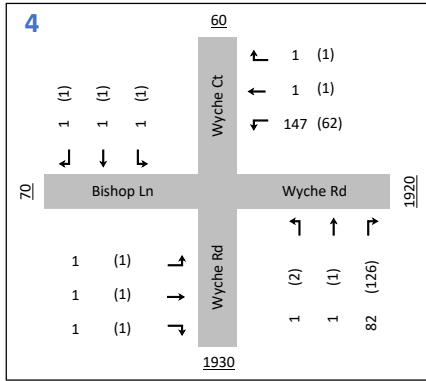
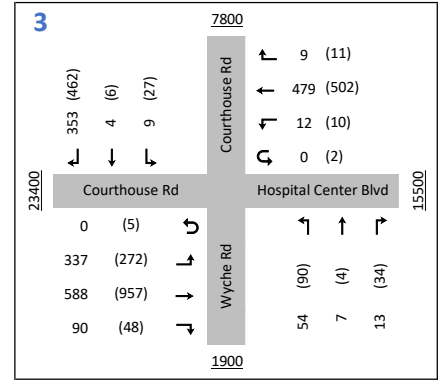
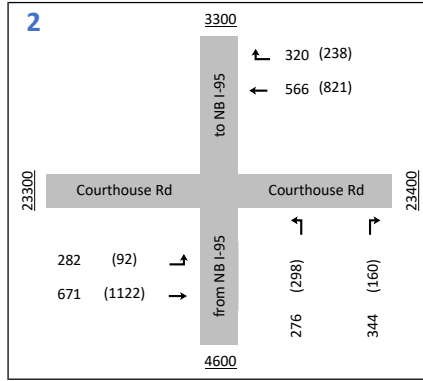
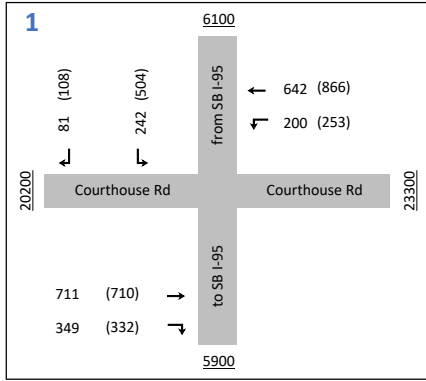
For this analysis, Pennoni reviewed the available VDOT traffic counts as well as the October 2021 traffic counts at the Courthouse Road/Wyche Road /Hospital Center Boulevard signal and balanced with VDOT counts. Based on the VDOT and new counts, these counts reveal the morning peak hour to have occurred 7:15 AM to 8:15 AM and the evening peak hour to have occurred 4:00 PM to 5:00 PM. The Venture Road and Bradburn place has an earlier morning peak hour of 6:15 AM to 7:15 AM, which was used for analysis of that intersection. VDOT TE staff had advised informally in the Fall 2021 that the old counts from the previous traffic studies in the vicinity should be updated for Wyche Road.

For the unsignalized intersection on Wyche Road/Wyche Court/Bishop Lane, Pennoni balanced the field counts from October 2021 at Bradburn Place/Venture Road, or the Courthouse signal, whichever was higher. The peak hour volumes are included graphically in the top portion of **Figure 1**. Intersections #3, #4, and #6 were identified to be included in the network analysis. The I-95 interchange signals at the diverging diamond are included based on VDOT traffic counts and are shown as intersection #1 and #2. The volumes are included for verification of through traffic coordination on Courthouse Road but are not summarized for LOS impacts, per the scoping meeting.

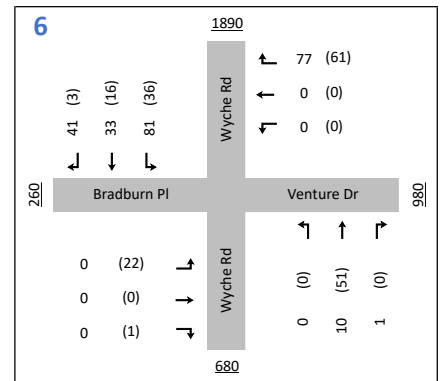
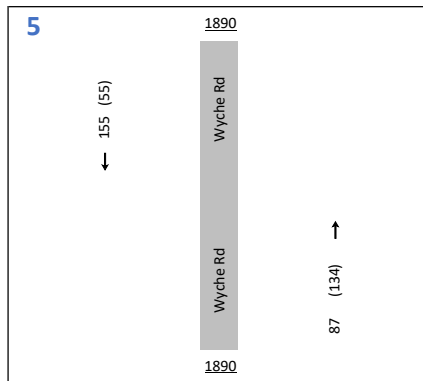
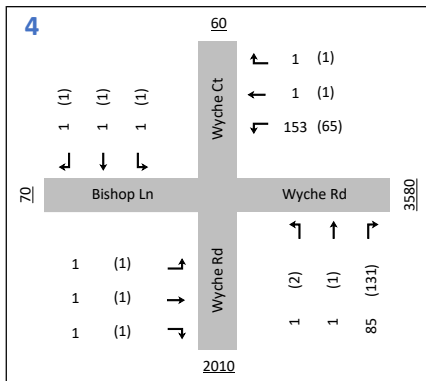
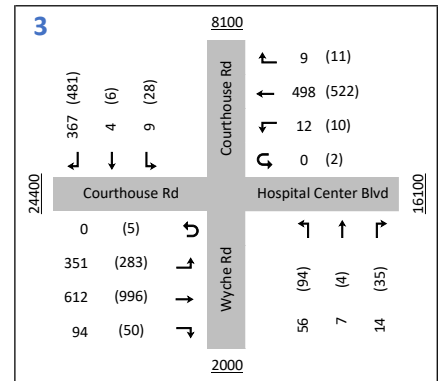
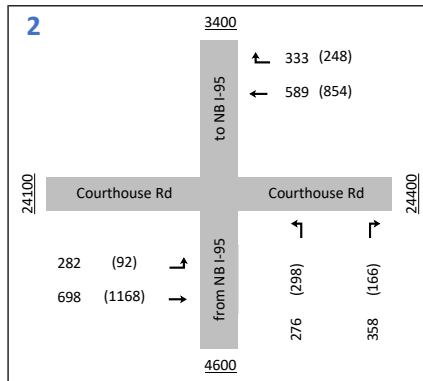
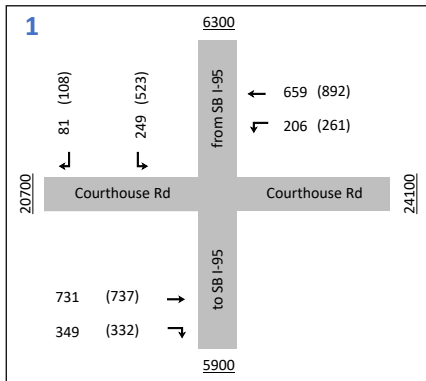
### 2021 Traffic Operations

Pennoni checked the existing weekday peak hour operations for the study area signals, based on the existing signal cycle lengths. The VDOT-provided synchro files were modified by Pennoni to add the Wyche Road linkage and the diverging diamond interchange signal files were adjusted to reflect the existing aerial for geometry as constructed. Additionally, the signal operations at the Courthouse Road/Wyche Road/Hospital Center Boulevard signal were modified to reflect the existing 4-section flashing yellow operations for the Hospital Center Boulevard westbound left turns. The overall traffic operations are summarized in **Table 7**. Synchro outputs are included as **Appendix C**. Level of Service analysis was accomplished using Synchro 10, applying the Transportation Research Board (TRB) Highway Capacity Manual for signalized conditions and for Two-Way Stop Conditions along Wyche Road. HCM 2000 was used for U turns at the Courthouse Road/Wyche Road/Hospital Center Boulevard signal.

### 2021 EXISTING VOLUMES



### 2023 BASE VOLUMES



Peak Hour Volume: AM (PM)

Average Daily Traffic: ADT



VENTURE AT STAFFORD  
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2021 EXISTING VOLUMES & 2023  
BASE VOLUMES

FIGURE 1

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January 2022

**Table 7: Existing 2021 LOS, Delay, and Back of Queue**

#	INTERSECTION (Traffic Control) [Cycle Lngth: AM, PM] {Offsets: AM, PM}	Lane Group/ Approach	Storage Lengths (ft.)			2021 EXISTING					
			Full- Width	Taper	EFFECTI VE	AM Peak Hour			PM Peak Hour		
						LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)
4	WYCHE RD & WYCHE CT/ BISHOP LN  (Unsignalized)	EB/LTR	-	-	-	A	8.9	0	A	9.3	0
		EB Bishop Ln			A	8.9	-	A	9.3	-	
		WB/LTR	-	-	-	B	9.7	15	B	10.3	10
		WB Wyche Rd			B	9.7	-	B	10.3	-	
		NB/LTR	-	-	-	A	7.2	0	A	7.2	0
						A	0.0		A	0.0	
						-	-		-	-	
		NB Wyche Rd			-	0.1	-	-	0.1	-	
		SB/LTR	-	-	-	A	7.4	0	A	7.7	0
						A	0.0		A	0.0	
-	-					-	-				
SB Wyche Ct			-	2.5	-	-	2.6	-			
Overall			-	6.2	-	-	3.2	-			
6	WYCHE RD & BRADBURN PL/ VENTURE RD  (Unsignalized)	EB/LTR	-	-	-	A	0.0	-	B	11.1	5
		EB Bradburn PL			A	0.0	-	B	11.1	-	
		WB/LTR	-	-	-	A	9.2	8	A	9.3	5
		WB Venture Rd			A	9.2	-	A	9.3	-	
		NB/LTR	-	-	-	A	0.0	0	A	0.0	0
						-	-		-	-	
						-	-		-	-	
		NB Wyche Rd			-	0.0	-	-	0.0	-	
		SB/LT	-	-	-	A	7.4	5	A	8.2	0
						A	0.0		A	0.0	
SB/R	120	165	200	-	-	-	-	-			
SB Wyche Rd			-	3.9	-	-	3.6	-			
Overall			-	5.4	-	-	4.0	-			
3	COURTHOUSE RD/ HOSPITAL CENTER BLVD & WYCHE RD  (Signalized) [120s, 150s]	EB/LL	175	215	280	E	62.7	161	F	95.1	146
		EB/TTT	-	-	-	A	9.9	122	A	8.2	220
		EB/R	170	170	255	B	17.7	0	B	18.9	0
		EB Courthouse Rd			C	28.1	-	C	27.4	-	
		WB/L	180	100	230	C	24.9	15	C	25.4	17
		WB/TTR(T)	-	-	-	C	30.1	155	C	30.3	179
		WB/(R)	315	-	315	C					
		WB Hospital Center Blvd			C	29.9	-	C	30.1	-	
		NB/LL	235	235	350	E	56.2	44	E	68.9	78
		NB/T	-	-	-	D	41.2	19	D	48.8	14
		NB/R	235	100	285	D	41.1	0	D	48.9	0
		NB Wyche Rd			D	52.1	-	E	63.0	-	
		SB/L	190	135	255	D	50.5	m26	E	64.1	63
		SB/T	-	-	-	D	40.0	m13	D	47.6	18
		SB/RR	480	-	480	C	24.3	155	C	34.6	245
			360	115	415						
SB Courthouse Rd			C	25.1	-	D	36.4	-			
Overall			C	28.9	-	C	31.7	-			

## 2023 Future Conditions

The total build-out traffic volumes were derived by factoring the following traffic volume changes:

- Localized traffic growth from 2021 to 2023 for through movements on Courthouse Road at two percent compound annual growth,
- Inclusion of other development traffic volumes that would impact the study area, and
- Site traffic associated with the proposed rezoning,

### Growth Trends

The VDOT historical traffic volumes for Courthouse Road have varied with the interchange construction and the new linkage to US Route 1. The local traffic studies processed in 2020 and 2021 during COVID used historical trends and traffic projections prior to the opening of the interchange at I-95. As scoped, the existing volume from the Fall 2021 were increased by 2 percent annual growth prior to the inclusion of other Courthouse Road corridor development. Base 2023 volumes are summarized in the bottom of **Figure 1** for the 2023 conditions with ambient growth.

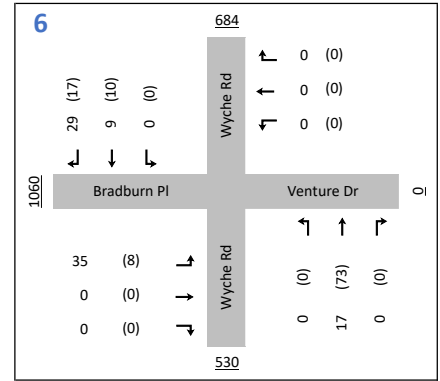
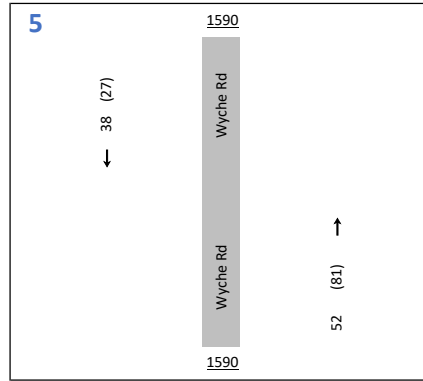
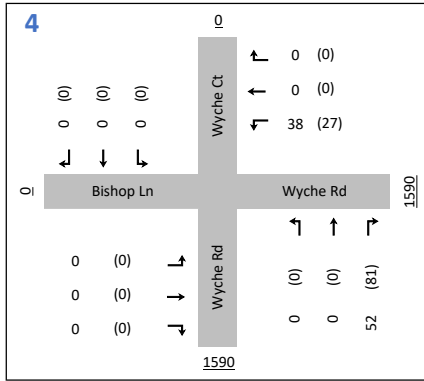
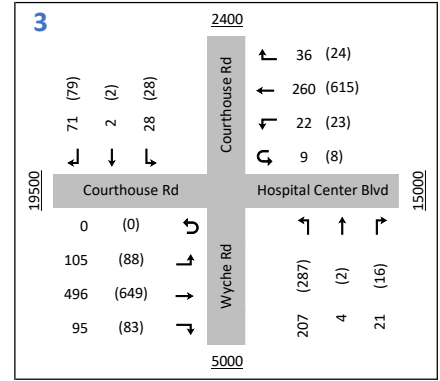
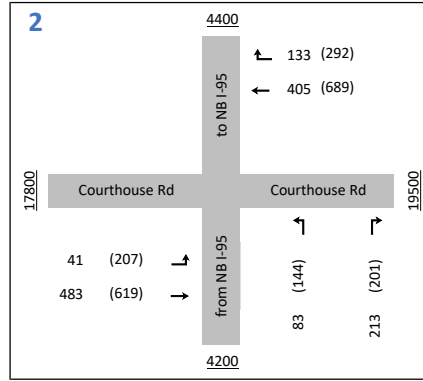
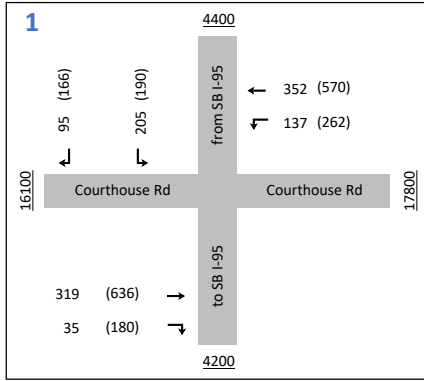
### Other Development

To develop future year forecasts, the site trips for other development was added to existing roadway network. Pennoni reviewed the other adjacent traffic studies and included the following land use activities, as summarized in **Table 8**. The other developments reflect 50 percent of the assumed build-out of the other sites, with other traffic volumes derived from the following resources:

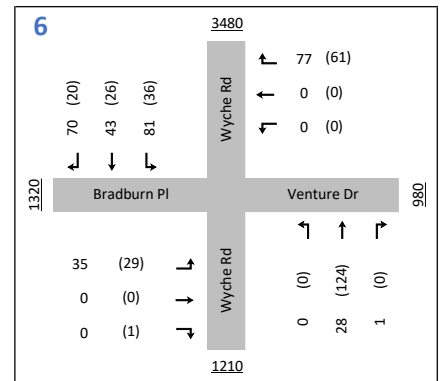
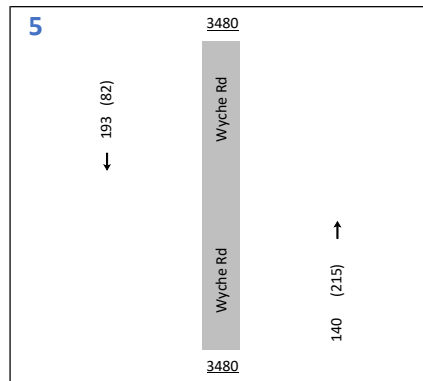
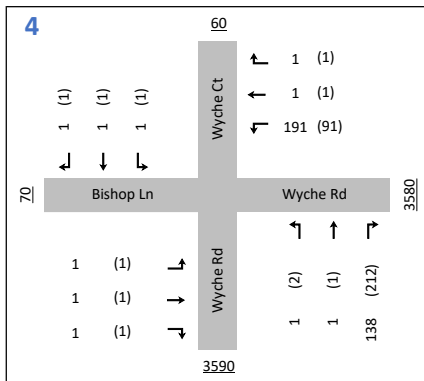
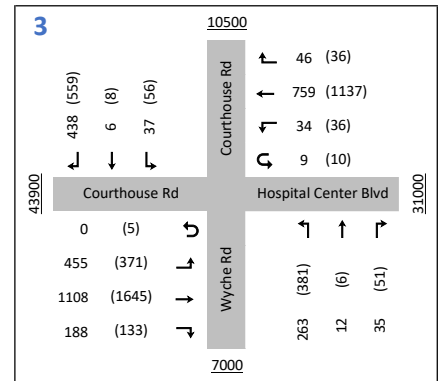
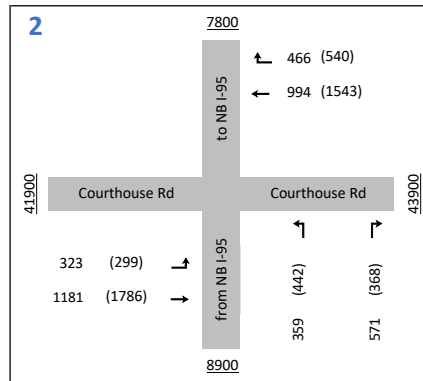
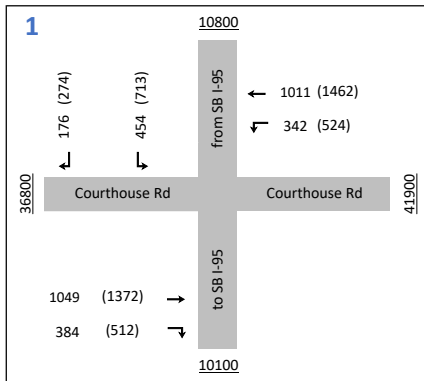
- Vetra, *Revised Traffic Impact Analysis for the Burns Property Rezoning*, July 25, 2019
- Ramey Kemp Associates, *Courthouse Tracts – U.S. 1 at Hospital Center Boulevard, Access Management Exception (AME) Request and Traffic Impact Analysis (TIA)*, letter to M. Zuraf (Stafford Co.), July 17, 2020
- Ramey Kemp Associates, *Project Mover - Traffic Impact Analysis (TIA)*, letter to B. Geouge (Stafford Co.), February 24, 2021

For the other development, individual project trips were factored from the other studies and assigned by Pennoni to the local roadway network based on the distributions in the approved traffic studies. Pennoni used the previous peak hour /Daily trip generation numbers, pass-by, and distributions from the three (3) report references. The trips were not updated with new trip generation rates from the ITE 11<sup>th</sup> Edition. Effective trip generation for others are included in **Appendix D**. Other development site trips at the three site study intersections (#3, #4, and #6) and at the adjacent I-95 diverging diamond signal (Intersections #1 and #2) are shown at the top of **Figure 2**.

### OTHER DEVELOPMENT VOLUMES



### 2023 BACKGROUND VOLUMES



Peak Hour Volume: AM (PM)

Average Daily Traffic: ADT



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BUSINESS PARK  
TRAFFIC IMPACT ANALYSIS  
STAFFORD COUNTY, VIRGINIA

OTHER DEVELOPMENT VOLUMES  
& 2023 BACKGROUND VOLUMES

FIGURE 2

Project #MATNX21001  
January 2022



**Table 8: Other Development Summary**

Land Use/Location	Density	% Buildout
Build-Out 2025-2030		2023 (1)
Austin Ridge Commercial <i>Austin Ridge Drive</i> <i>(northwest of I-95/VA Rte. 630) (2)</i>	76,412 <i>sf</i> Retail	25 %
Embrey Mill Commercial <i>Mine Road and Sunflower Rd</i> <i>(northwest of I-95/VA Rte. 630) (2)</i>	250,000 <i>sf</i> office 500,000 <i>sf</i> Retail	25 %
South Campus <i>US Route 1at Hospital Ctr Blvd</i> <i>(southeast quadrant) (2)</i>	531,868 <i>sf</i> Office/Retail	25 %
Stafford Commons (2) <i>US Route 1, (S of Hospital Ctr.</i> <i>Blvd)</i>	40,000 <i>sf</i> Retail	100 %
Stafford Hospital (2) <i>Hospital Center Boulevard</i>	320,000 <i>sf</i> office Phase 1 & 2	50 %
Westgate Center <i>Austin Ridge Drive</i> <i>(northwest of I-95/VA Rte. 630) (2)</i>	200 <i>rm</i> Hotel 100,000 <i>sf</i> general office 425,000 <i>sf</i> Retail	50 %
Burns Corner (Property) <i>Courthouse Road</i> <i>(4 land bays at all quadrants of</i> <i>signal, listed by land bay 1 NW-N</i> <i>Land bay 2 NE-E</i> <i>Land Bay 3 SE_S</i> <i>Land Bay 4 SW-W) (2)</i>	12,000 <i>sf</i> Day Care Ctr 9,750 <i>sf</i> general office 3,250 <i>sf</i> Med-Dental office 13,000 <i>sf</i> Retail <u>4,000 <i>sf</i> Fast Food Restaurant w/ Drive-Thru</u> <u>4,600 <i>sf</i> Fast Food Restaurant w/ Drive-Thru</u> 29,250 <i>sf</i> office 9,750 <i>sf</i> Med-Dental office 39,000 <i>sf</i> Retail 31,500 <i>sf</i> Supermarket 16 <i>Fueling positions (6,300 sf)</i> Super Convenience Market/Gas Station <u>2,600 <i>sf</i> Fast Food Restaurant w/ Drive-Thru</u> 100 <i>rm</i> Hotel 10,000 <i>sf</i> Hight-turnover Rest.	50 %
People Movers (DHL) <i>Wyche Road (3)</i>	533,000 <i>sf</i> Distribution Center	100 %
Courthouse Tracts <i>US Rte. 1 at Hospital Ctr Blvd (Rte.</i> <i>799)</i> <i>(southwest quadrant of signal) (4)</i>	2,700 <i>sf</i> Fast Food Restaurant w/ Drive Thru Super Convenience Market/Gas Station 16 <i>Fueling positions (4,650 sf)</i> Super Convenience Market/Gas Station	Partial (5)

See next page for notes

Table 8 Sources/Notes:

- (1) See scoping revised document in Appendix A for context. All trips from available traffic study for uses and assigned as a percentage of total build-out. See Appendix D for total peak hour and Daily trips for each other land use. Distributions to study area intersections used by Pennoni from other traffic studies as noted below.
- (2) Vetra, *Revised Traffic Impact Analysis for the Burns Property Rezoning*, July 25, 2019
- (3) Ramey Kemp Associates, *Project Mover - Traffic Impact Analysis (TIA), letter to B. Geouge (Stafford Co.)*, February 24, 2021
- (4) Ramey Kemp Associates, *Courthouse Tracts – U.S. 1 at Hospital Center Boulevard, Access Management Exception (AME) Request and Traffic Impact Analysis (TIA), letter to M. Zuraf (Stafford Co.)*, July 17, 2020
- (5) Partial build-out to include only the convenience store/gas uses.

### Background Traffic 2023 without Subject Rezoning

Future traffic volumes without the subject site for the study intersections are presented graphically in the bottom portion of **Figure 2**. These volumes were calculated using the inputs outlined above, with 2 percent growth on all movements and other development. Future traffic operations without the subject site for the study intersections are presented with the LOS by lane group summarized in **Table 9**. Synchro worksheets are included in **Appendix E**.

The traffic operations were updated in the future year Synchro scenario for the existing 2021 signal geometry to include the following improvements programmed with the Burns Property development, and as summarized in **Exhibit 4**:

- Westbound Right turn lane on Hospital Center Boulevard to north Courthouse Road adjacent to proposed Burns Corner Land Bay 2 activities, to allow three westbound throughs at signal (shown in orange in exhibit),

The subject improvements by others add signal capacity for the westbound Hospital Center Boulevard leg with the development of the Land Bay 2 uses with a right turn on the east le and are shown in the Phase 1 proffers as proffer 10.b.i. Additional improvements for the Burns property access plan were included for the other development site assignments. No changes to the I-95 interchange operations at intersection #1 and #2 signals in the figures were programmed, including the long-term option of an additional westbound approach widening on Courthouse Road from the Wyche Road signal to the I-95 on-ramp.

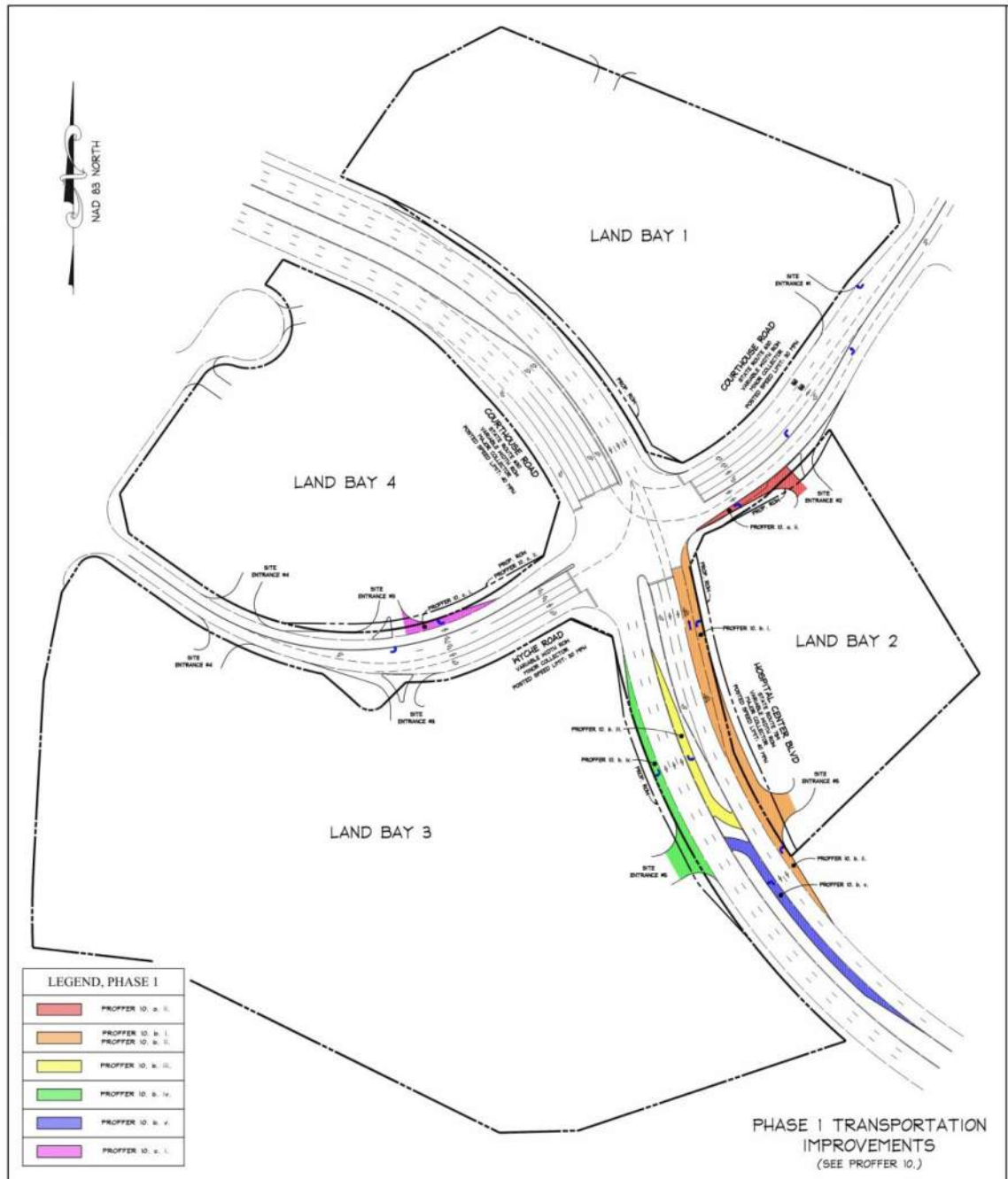


Exhibit 4: Burns Property Assumed Localized Improvements at Courthouse Road

(Source: Engineering Groupe, Transportation Improvement Exhibit Burns Corner GDP, Revised July 2020, excerpted by Pennoni)

**Table 9: Background 2023 w/o the Site LOS, Delay, and Back of Queue**

#	INTERSECTION (Traffic Control) [Cycle Lngth: AM, PM] {Offsets: AM, PM}	Lane Group/ Approach	Storage Lengths (ft.)			2023 BACKGROUND					
			Full- Width	Taper	EFFECTI VE	AM Peak Hour			PM Peak Hour		
						LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)
4	WYCHE RD & WYCHE CT/ BISHOP LN  (Unsignalized)	EB/LTR	-	-	-	A	9.1	0	A	9.3	0
		EB Bishop Ln			A	9.1	-	A	9.3	-	
		WB/LTR	-	-	-	B	10.2	23	B	10.3	10
		WB Wyche Rd			B	10.2	-	B	10.3	-	
		NB/LTR	-	-	-	A	7.2	0	A	7.2	0
						A	0.0		A	0.0	
						-	-		-	-	
		NB Wyche Rd			-	0.1	-	-	0.1	-	
		SB/LTR	-	-	-	A	7.5	0	A	7.7	0
						A	0.0		A	0.0	
-	-					-	-				
SB Wyche Ct			-	2.5	-	-	2.6	-			
Overall			-	6.0	-	-	3.2	-			
6	WYCHE RD & BRADBURN PL/ VENTURE RD  (Unsignalized)	EB/LTR	-	-	-	B	11.6	5	B	11.1	5
		EB Bradburn PL			B	11.6	-	B	11.1	-	
		WB/LTR	-	-	-	A	9.2	8	A	9.3	5
		WB Venture Rd			A	9.2	-	A	9.3	-	
		NB/LTR	-	-	-	A	0.0	0	A	0.0	0
						-	-		-	-	
						-	-		-	-	
		NB Wyche Rd			-	0.0	-	-	0.0	-	
		SB/LT	-	-	-	A	7.5	5	A	8.2	0
			-	-	-	A	0.0		A	0.0	
SB/R	120	165	200	-	-	-	-	-	-		
SB Wyche Rd			-	3.1	-	-	3.6	-			
Overall			-	5.1	-	-	4.0	-			
3	COURTHOUSE RD/ HOSPITAL CENTER BLVD & WYCHE RD  (Signalized) [120s, 150s]	EB/LL	175	215	280	D	50.5	176	F	84.3	232
		EB/TTT	-	-	-	B	18.5	294	C	21.4	563
		EB/R	170	170	255	C	24.3	m0	C	25.4	m2
		EB Courthouse Rd			C	27.4	-	C	32.6	-	
		WB/L	180	100	230	C	28.9	35	D	38.3	47
		WB/TTR(T)	-	-	-	D	39.1	246	D	48.1	447
		WB/(R)	315	-	315	C	31.6	0	C	34.6	0
		WB Hospital Center Blvd			D	38.2	-	D	47.3	-	
		NB/LL	235	235	350	D	54.1	148	E	67.6	245
		NB/T	-	-	-	D	39.1	26	D	46.3	17
		NB/R	235	100	285	D	38.7	0	D	46.5	0
		NB Wyche Rd			D	51.8	-	E	64.8	-	
		SB/L	190	135	255	D	50.6	67	E	60.5	108
		SB/T	-	-	-	D	43.5	18	D	51.3	24
		SB/RR	480	-	480	C	25.6	202	D	37.6	343
			360	115	415						
SB Courthouse Rd			C	27.7	-	D	39.9	-			
Overall			C	32.4	-	D	40.8	-			

### Proposed Rezoning Trip Distribution

Proposed site trips were proposed in the scoping document to be generally distributed towards the Courthouse Road corridor, with no through trips to the south. The trip distributions are shown in **Exhibit 5**. As noted, the site trip generation was assigned with two components, with heavy vehicle trips and passenger cars assigned separately to reflect the heavy vehicle orientation to the I-95 corridor. The site trip distribution percentages are summarized in **Table 10**.

**Table 10: Site Trip Distributions**

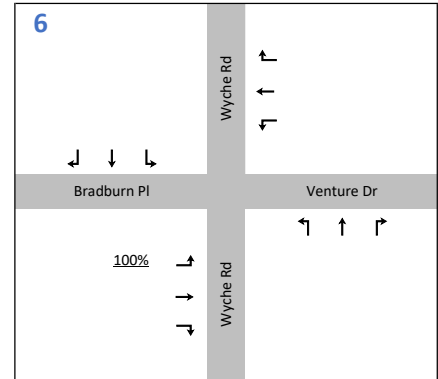
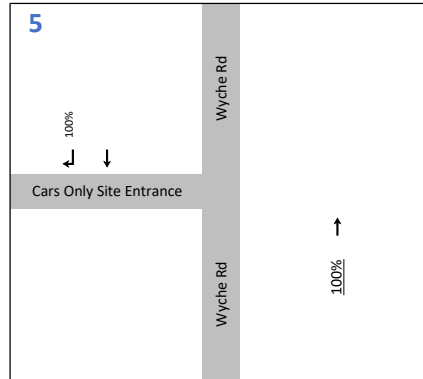
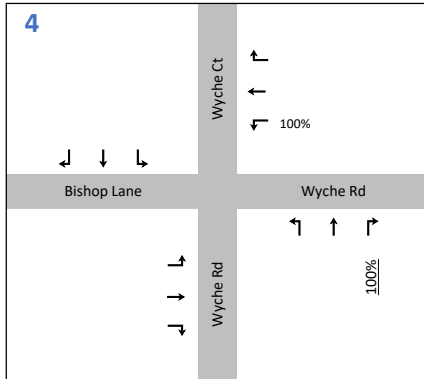
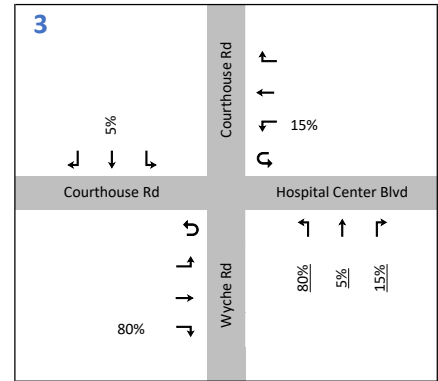
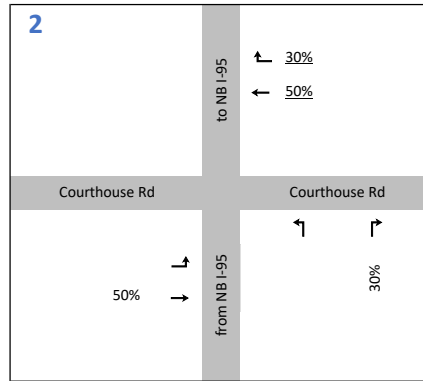
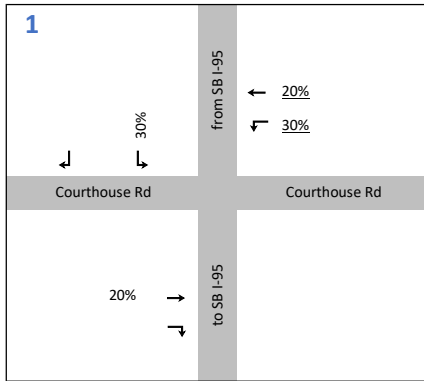
Direction	Employment (Passenger Car)	Employment (Trucks)
North I-95	30%	50%
West VA 630	20%	0%
South I-95	30%	50%
East Hospital Center Blvd	15%	0%
East VA 630	5%	0%
Total	100%	100%



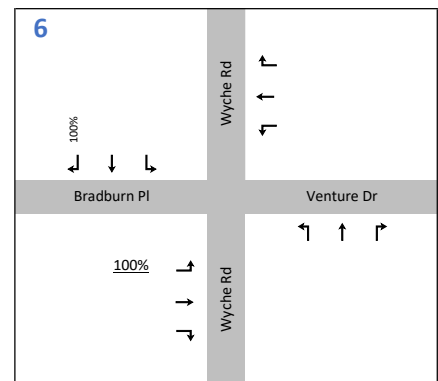
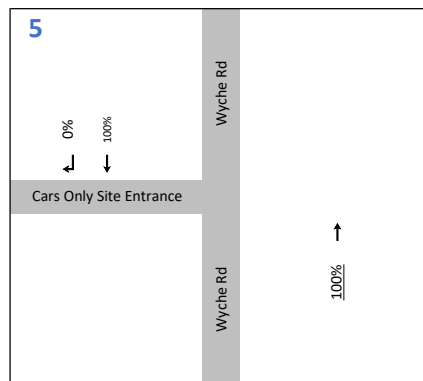
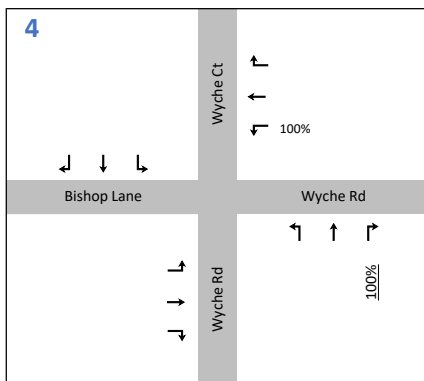
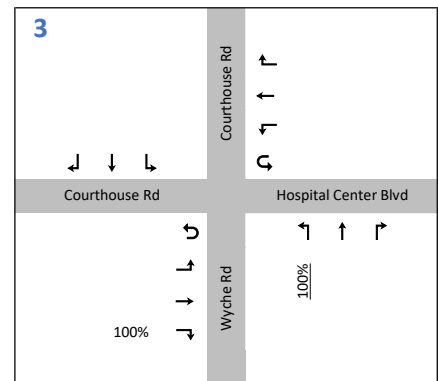
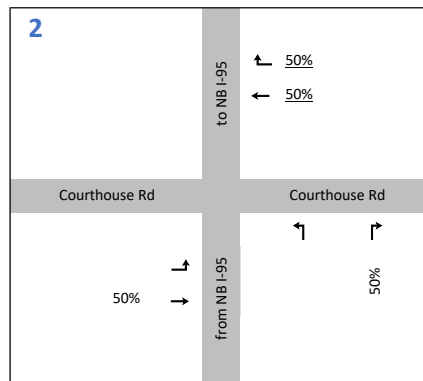
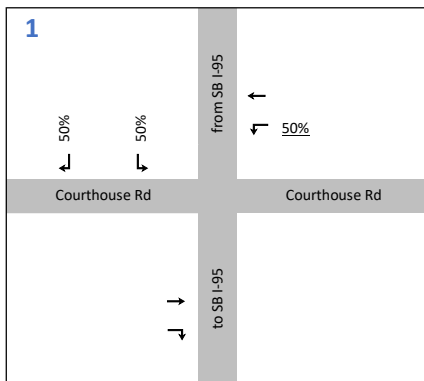
Exhibit 5: Site Trip Distributions

Site trip assignments percentages are included graphically in **Figure 3** for the site trips with cars and heavy vehicles separated. The total site trips are summarized in the top portion of **Figure 4**, to reflect the peak hour and Daily assignments for the proposed rezoning.

### SITE DISTRIBUTIONS (CARS)



### SITE DISTRIBUTIONS (TRUCKS)



Distributions: IN% OUT%



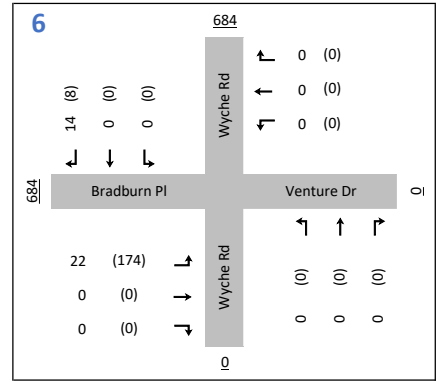
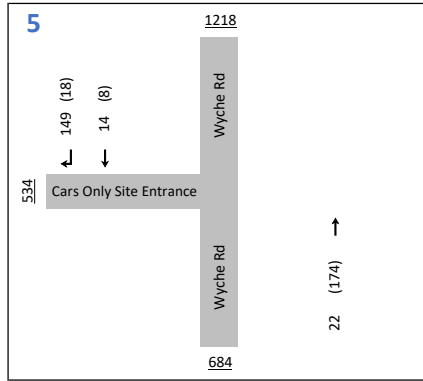
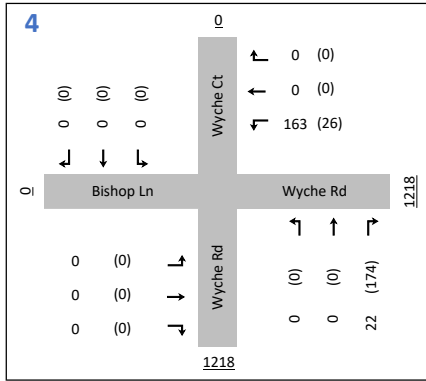
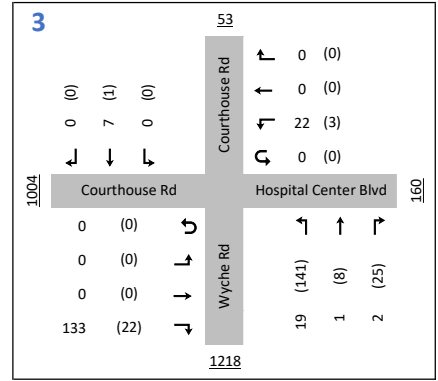
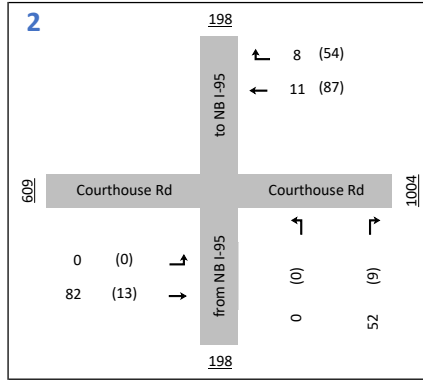
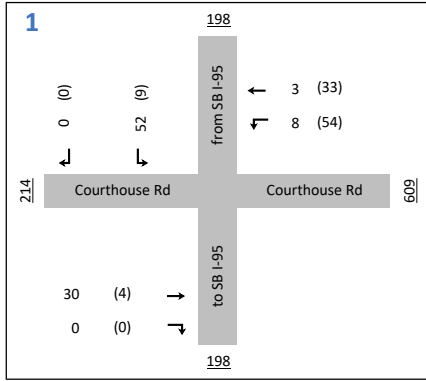
VENTURE AT STAFFORD  
BUSINESS PARK  
TRAFFIC IMPACT ANALYSIS  
STAFFORD COUNTY, VIRGINIA

### SITE DISTRIBUTIONS

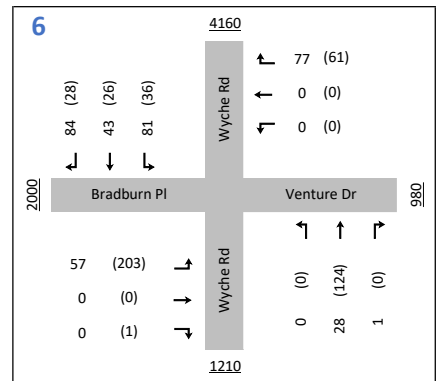
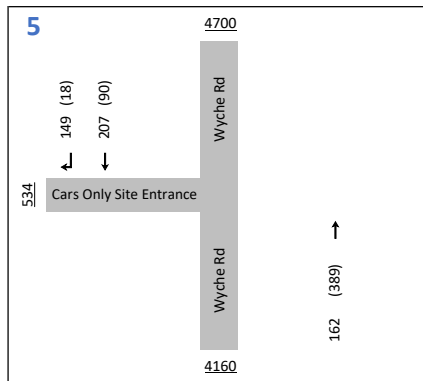
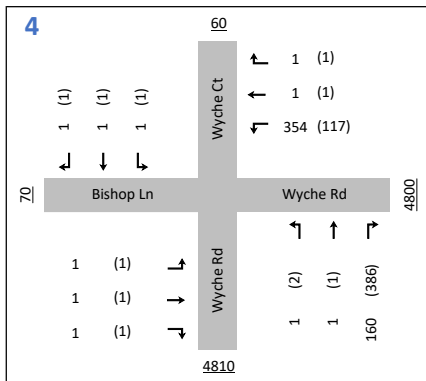
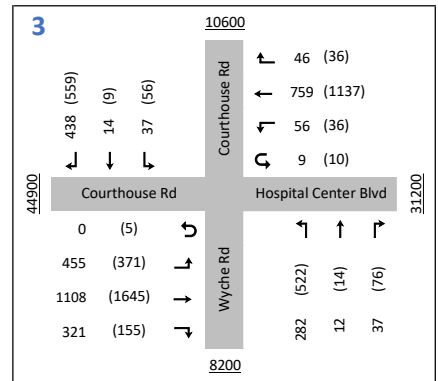
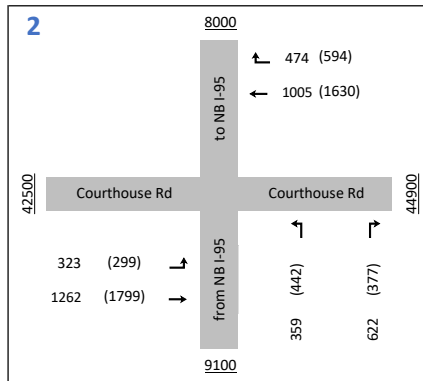
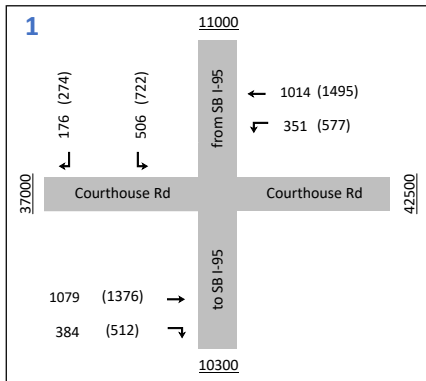
### FIGURE 3

Project #MATNX21001  
January 2022





2023 TOTAL VOLUMES



Peak Hour Volume: AM (PM)

Average Daily Traffic: ADT



VENTURE AT STAFFORD  
BUSINESS PARK  
TRAFFIC IMPACT ANALYSIS  
STAFFORD COUNTY, VIRGINIA

SITE ASSIGNMENTS & 2023 TOTAL VOLUMES

FIGURE 4

Project #MATNX21001  
January 2022

## Total Traffic Volumes/Operations with proposed Rezoning

Future traffic volumes for the study intersections are presented graphically in the bottom of **Figure 4** with the proposed rezoning added to the existing roadway network. Future traffic operations with the subject site for the study intersections are summarized in **Table 11**. Synchro worksheets are included in **Appendix F**. The Phase 1 Burns Corner Property improvements were included in the Total 2023 conditions.

The top part of Table 11 depicts the levels of service, delays, and 95<sup>th</sup> percentile queues for Wyche Road unsignalized public street locations. The following results are noted:

- At intersection #4, The overall LOS “A” at the Wyche Road/Wyche Court/Bishop Lane intersection is maintained with the subject site traffic added. AM and PM peak hour turns from Wyche Road (east leg) westbound to the south leg of Wyche Road operate at LOS “B” for both peak hours with stop control as one lane approach.
- The overall LOS “A” at Wyche Road/Bradburn Place/Venture Road (intersection #6) is maintained for both peaks with all side street turns operating at LOS “A” with the added site trips.

Site operations reflect heavy vehicle volumes for our site and full build-out of the development of the DHL site.

The lower part of Table 11 depicts the future levels of service, delays, and 95<sup>th</sup> percentile queues for the VA Route 630 signal at Wyche Road/Hospital Center Boulevard (Intersection #3). The following results are noted:

- The overall LOS “C” at for the AM peak improves effective delays by 1.5 seconds with the additional traffic.
- For the PM peak, the LOS “D” overall is maintained with the signal cycle length at 150 seconds. Overall delay is increased by less than 2 seconds with the site trips.
- The northbound leg of Wyche Road at the signal with dual lefts, one through, and a separate right to Hospital Boulevard operates at a LOS “D” in the AM peak and at a LOS “E” in the PM peak with the site. The northbound approach delay from Synchro is at 70 seconds average delay, which is below the LOS “F” threshold of average delay at 80 seconds. The HCM defines a LOS “D” at an average 55 seconds or less for signalized locations. The LOS grade remains at OS “E” with an additional 2.1 seconds of side street delay in the PM peak.
- While not adding site trips to the movement, the eastbound lefts at Courthouse Road to go the north leg of Courthouse Road operates at a LOS “D” in the AM peak and at a LOS “F” in the PM peak hour. This is unchanged in LOS grade from the no-build scenario. The effective delay is approximately 83 seconds. Signal optimization may be possible, but the effective storage is adequate for the PM peak hour and throughs operate at LOS “C/D” with existing signal timing

Site operations reflect the projected heavy vehicle percentages. Peak hour factors for the future condition shown at 0.95.

**Table 11: Total 2023 with the Site LOS, Delay, and Back of Queue**

#	INTERSECTION (Traffic Control) [Cycle Lngth: AM, PM] (Offsets: AM, PM)	Lane Group/ Approach	Storage Lengths (ft.)			2023 TOTAL					
			Full- Width	Taper	EFFECTI VE	AM Peak Hour			PM Peak Hour		
						LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)
4	WYCHE RD & WYCHE CT/ BISHOP LN  (Unsignalized)	EB/LTR	-	-	-	A	9.1	0	B	10.0	0
		EB Bishop Ln			A	9.1	-	B	10.0	-	
		WB/LTR	-	-	-	B	12.2	55	B	11.6	18
		WB Wyche Rd			B	12.2	-	B	11.6	-	
		NB/LTR	-	-	-	A	7.2	0	A	7.2	0
						A	0.0		A	0.0	
		NB Wyche Rd			-	0.0	-	-	0.0	-	
		SB/LTR	-	-	-	A	7.6	0	A	8.1	-
						A	0.0		A	0.0	
		SB Wyche Ct			-	2.5	-	-	2.7	-	
Overall			-	8.4	-	-	1.0	-			
6	WYCHE RD & BRADBURN PL/ VENTURE RD  (Unsignalized)	EB/LTR	-	-	-	B	12.3	10	B	14.0	40
		EB Bradburn PL			B	12.3	-	B	14.0	-	
		WB/LTR	-	-	-	A	9.2	8	A	9.3	5
		WB Venture Rd			A	9.2	-	A	9.3	-	
		NB/LTR	-	-	-	A	0.0	0	A	0.0	0
						A	0.0		-	-	
		NB Wyche Rd			-	0.0	-	-	0.0	-	
		SB/LT	-	-	-	A	7.5	5	A	8.2	3
						A	0.0		A	0.0	
		SB/R	120	165	200	-	-	-	-	-	
SB Wyche Rd			-	2.9	-	-	3.3	-			
Overall			-	5.4	-	-	7.8	-			
3	COURTHOUSE RD/ HOSPITAL CENTER BLVD & WYCHE RD  (Signalized) [120s, 150s]	EB/LL	175	215	280	D	51.3	184	F	83.0	232
		EB/TTT	-	-	-	B	18.8	283	C	22.0	550
		EB/R	170	170	255	A	6.8	m0	B	10.5	m3
		EB Courthouse Rd			C	24.6	-	C	31.7	-	
		WB/L	180	100	230	C	29.9	48	D	40.4	50
		WB/TTR(T)	-	-	-	D	39.3	246	D	49.4	447
		WB/(R)	315	-	315	C	31.7	0	D	35.3	0
		WB Hospital Center Blvd			D	38.2	-	D	48.7	-	
		NB/LL	235	235	350	D	54.9	159	E	70.4	334
		NB/T	-	-	-	D	39.1	m25	D	46.3	30
		NB/R	235	100	285	D	38.8	0	D	46.5	0
		NB Wyche Rd			D	52.5	-	E	66.9	-	
		SB/L	190	135	255	D	50.4	67	E	59.4	108
		SB/T	-	-	-	D	44.3	33	E	55.0	27
		SB/RR	480	-	480	C	26.0	202	D	41.5	354
360	115		415								
SB Courthouse Rd			C	28.4	-	D	43.3	-			
Overall			C	31.0	-	D	42.4	-			

### Signal LOS Changes

The operational analyses at the Courthouse Road intersection were identified in the scoping meeting as a ‘key’ traffic element for the technical review. The site traffic as noted above, can be accommodated without additional geometry or signal timing/operational changes. **Table 12A** depicts the signal operations at the Courthouse Road signal at Wyche Road/Hospital Center Boulevard with the three traffic scenarios to highlight the general changes in operations with growth and with the subject rezoning for the AM peak hour. The PM LOS comparisons are summarized in **Table 12B**. The site slightly increases overall delay at the signal in relation to the “Background” (or no-build) scenario, but the overall operations maintain the LOS “C” for the AM peak and a LOS “D” for the PM peak hour, as projected with the background 2023 forecasts without the site. The northbound Wyche Road leg operates at a LOS “D” for the AM peak hour with and without the subject site. For the PM peak, the LOS remains unchanged at a LOS “E” with and without the site. However, the increase in delay is less than 2.5 seconds on the Wyche Road approach and the Synchro outputs to not identify queue failures (i.e., stacking exceeding the available storage capacity) for the site build-out.

**Table 12A: Courthouse Road AM Peak LOS Comparisons**

#	INTERSECTION (Traffic Control) [Cycle Length: AM, PM] (Offsets: AM, PM)	Lane Group/ Approach	Storage Lengths (ft.)			2021 EXISTING			2023 BACKGROUND			2023 TOTAL			
			Full- Width	Taper	EFFECTIVE	AM Peak Hour			AM Peak Hour			AM Peak Hour			
						LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)	
3	COURTHOUSE RD/ HOSPITAL CENTER BLVD & WYCHE RD  (Signalized) [120s, 150s]	EB/LL	175	215	280	E	62.7	161	D	50.5	176	D	51.3	184	
		EB/TTT	-	-	-	A	9.9	122	B	18.5	294	B	18.8	283	
		EB/R	170	170	255	B	17.7	0	C	24.3	m0	A	6.8	m0	
		<b>EB Courthouse Rd</b>					<b>C</b>	<b>28.1</b>	<b>-</b>	<b>C</b>	<b>27.4</b>	<b>-</b>	<b>C</b>	<b>24.6</b>	<b>-</b>
		WB/L	180	100	230	C	24.9	15	C	28.9	35	C	29.9	48	
		WB/TTR(T)	-	-	-	C	30.1	155	D	39.1	246	D	39.3	246	
		WB/(R)	315	-	315	C	31.6	0	C	31.6	0	C	31.7	0	
		<b>WB Hospital Center Blvd</b>					<b>C</b>	<b>29.9</b>	<b>-</b>	<b>D</b>	<b>38.2</b>	<b>-</b>	<b>D</b>	<b>38.2</b>	<b>-</b>
		NB/LL	235	235	350	E	56.2	44	D	54.1	148	D	54.9	159	
		NB/T	-	-	-	D	41.2	19	D	39.1	26	D	39.1	m25	
		NB/R	235	100	285	D	41.1	0	D	38.7	0	D	38.8	0	
		<b>NB Wyche Rd</b>					<b>D</b>	<b>52.1</b>	<b>-</b>	<b>D</b>	<b>51.8</b>	<b>-</b>	<b>D</b>	<b>52.5</b>	<b>-</b>
		SB/L	190	135	255	D	50.5	m26	D	50.6	67	D	50.4	67	
		SB/T	-	-	-	D	40.0	m13	D	43.5	18	D	44.3	33	
		SB/RR	480	-	480	C	24.3	155	C	25.6	202	C	26.0	202	
			360	115	415	C	25.1	-	C	27.7	-	C	28.4	-	
		<b>SB Courthouse Rd</b>					<b>C</b>	<b>25.1</b>	<b>-</b>	<b>C</b>	<b>27.7</b>	<b>-</b>	<b>C</b>	<b>28.4</b>	<b>-</b>
<b>Overall</b>					<b>C</b>	<b>28.9</b>	<b>-</b>	<b>C</b>	<b>32.4</b>	<b>-</b>	<b>C</b>	<b>31.0</b>	<b>-</b>		

**Table 12B: Courthouse Road AM Peak LOS Comparisons**

#	INTERSECTION (Traffic Control) [Cycle Lngth: AM, PM] (Offsets: AM, PM)	Lane Group/ Approach	Storage Lengths (ft.)			2021 EXISTING			2023 BACKGROUND			2023 TOTAL			
			Full- Width	Taper	EFFECTI VE	PM Peak Hour			PM Peak Hour			PM Peak Hour			
						LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)	LOS	Delay (s/veh)	95th Queue (ft)	
3	COURTHOUSE RD/ HOSPITAL CENTER BLVD & WYCHE RD  (Signalized) [120s, 150s]	EB/LL	175	215	280	F	95.1	146	F	84.3	232	F	83.0	232	
		EB/TTT	-	-	-	A	8.2	220	C	21.4	563	C	22.0	550	
		EB/R	170	170	255	B	18.9	0	C	25.4	m2	B	10.5	m3	
		<b>EB Courthouse Rd</b>					<b>C</b>	<b>27.4</b>	<b>-</b>	<b>C</b>	<b>32.6</b>	<b>-</b>	<b>C</b>	<b>31.7</b>	<b>-</b>
		WB/L	180	100	230	C	25.4	17	D	38.3	47	D	40.4	50	
		WB/TTR(T)	-	-	-	C	30.3	179	D	48.1	447	D	49.4	447	
		WB/(R)	315	-	315				C	34.6	0	D	35.3	0	
		<b>WB Hospital Center Blvd</b>					<b>C</b>	<b>30.1</b>	<b>-</b>	<b>D</b>	<b>47.3</b>	<b>-</b>	<b>D</b>	<b>48.7</b>	<b>-</b>
		NB/LL	235	235	350	E	68.9	78	E	67.6	245	E	70.4	334	
		NB/T	-	-	-	D	48.8	14	D	46.3	17	D	46.3	30	
		NB/R	235	100	285	D	48.9	0	D	46.5	0	D	46.5	0	
		<b>NB Wyche Rd</b>					<b>E</b>	<b>63.0</b>	<b>-</b>	<b>E</b>	<b>64.8</b>	<b>-</b>	<b>E</b>	<b>66.9</b>	<b>-</b>
		SB/L	190	135	255	E	64.1	63	E	60.5	108	E	59.4	108	
		SB/T	-	-	-	D	47.6	18	D	51.3	24	E	55.0	27	
		SB/RR	480	-	480	C	34.6	245	D	37.6	343	D	41.5	354	
			360	115	415										
		<b>SB Courthouse Rd</b>					<b>D</b>	<b>36.4</b>	<b>-</b>	<b>D</b>	<b>39.9</b>	<b>-</b>	<b>D</b>	<b>43.3</b>	<b>-</b>
		<b>Overall</b>					<b>C</b>	<b>31.7</b>	<b>-</b>	<b>D</b>	<b>40.8</b>	<b>-</b>	<b>D</b>	<b>42.4</b>	<b>-</b>

Timing changes may improve signal efficiency but are not suggested since the LOS change is minor. The peak hour operations do note as LOS “F” for the PM peak from Courthouse Road lefts to northbound VA Route 630 in the dual left turn bays. However, the subject site trips are not added to this movement and the projected 95% back of queue is less than the available storage. Additionally, since the site trip generation for the peak hours would be reduced in relation to the Comprehensive Plan with office activities developed, off-site mitigation is not suggested.

Site Impacts

The operational analyses were conducted using trip generation for the general industrial uses totaling 250,000 sf. On Courthouse Road, the site impacts on the study intersections are negligible. The AM peak hour site impacts are shown to be approximately 45.2 percent with the less than 5 percent for the PM peak hour. Site impacts on Wyche Road are higher, but the unsignalized intersections, even with the development of the Burns Commercial site, can be accommodated. Percentages include both passenger car and heavy vehicle site impacts. **Table 13** depicts the site impacts by peak hour and intersection at the Courthouse Road signal at Wyche Road/Hospital Center Boulevard and at the Wyche Road link north of the site.

**Table 13: Site Impacts at Wyche Road Intersections**

	Courthouse Road/Wyche Road/Hospital Center Boulevard			Wyche Road/Bishop Ct		
	Background	Site	Impact	Background	Site	Impact
AM	3390	185	5.2%	341	29	7.8%
PM	4427	200	4.3%	298	182	37.9%

## Conclusions

Based on the trip generation and intersection analysis, Pennoni offers the following conclusions:

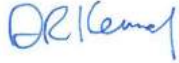
- 1) The existing Courthouse Road (VA Rte. 630) signal at Wyche Road/Hospital Center Boulevard operates at LOS “C” overall for existing conditions.
- 2) Applying a 2 percent annual compound growth rate for regional through traffic on Courthouse Road and localized approved development slightly increases signal delays; Adding site trips does not change overall signal operations on Courthouse Road.
- 3) Trip generation for the proposed rezoning is approximately 1,220 VPD, with 200 peak hour trips for the roadway peak with the proposed industrial uses. The site trip generation sensitivity includes heavy vehicle activities, which are included in the Level of Service analysis.
- 4) The Proposed trip generation conservatively includes M-1 use as general industrial, as the peak hour and Daily trips are the highest for the proposed 250,000 gsf building footprint. Site trips if developed as warehouse or High Cube Distribution Center would result in lower site trip generation.
- 5) The proposed site trips are reduced from the Comprehensive Plan potential yield for the property if were developed as office uses with an average FAR of 0.30. The reduction in site traffic are over 300 peak hour trips and 2,700 VPD, or a 2/3 reduction (-67%) in site trip generation impacts to the public streets with the rezoning.
- 6) The site access operates acceptable condition with the site egress to Bradburn Place, include LOS “A” operations at the Wyche Road/Bradburn Place/Venture Road intersection.
- 7) The proposed use can be accommodated with the existing roadway network without additional traffic mitigation, and
- 8) The new access as proposed with the rezoning to include extend the right turn lane on southbound Wyche Road to Bradburn Place would accommodate a in-only passenger car entrance. The proposed turn lane extension to the existing right turn lane would satisfy VDOT storage and taper requirements for a commercial entrance on Wyche Road.

The proposed rezoning does not negatively impact mainline traffic operations in the study area, with impacts less than 6 percent of the Courthouse Road volumes at the Wyche Road traffic signal.



If you should have any questions, please contact our office at (703) 840-4830.

Sincerely,  
PENNONI



Mr. Douglas R. Kennedy, P.E.  
Associate Vice President

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Enclosures:

- Appendix A: Scoping
- Appendix B: Existing Traffic Counts
- Appendix C: Existing Synchro Outputs
- Appendix D: Other Development
- Appendix E: Background 2023 without Site Synchro Outputs
- Appendix F: Total 2023 with Site Synchro Outputs

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