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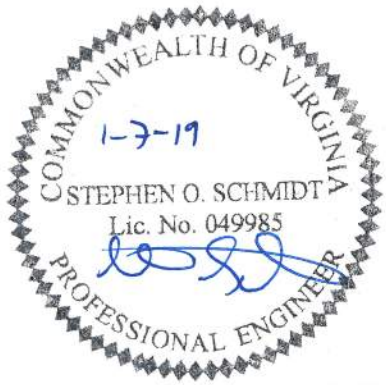
To: Kevin McDermott (Albemarle County)
From: Steve Schmidt, PE, PTOE
RE: Southwood Traffic Analysis
Date: January 7, 2019
Copy: Craig Kotarski, PE, LEED AP (Timmons Group)



Timmons Group has performed a revised traffic analysis in support of the rezoning application for the redevelopment of Southwood. The original analysis was submitted on October 24, 2018 and VDOT issued comments on December 20, 2018. This revised analysis incorporates those comments along with a revision to the proposed development.

The analysis was completed to determine the impact of the traffic generated by the proposed development on the surrounding roadway network. The site is located south of Route 631 (Old Lynchburg Road) and bifurcated by Hickory Street in Albemarle County, Virginia. See Figure 1 for the site location (all Figures are located at the end of the report).

The scope of this analysis was developed at two (2) scoping meetings held with Albemarle County and Virginia Department of Transportation (VDOT) representatives. A copy of the original scoping agreement is included in Appendix A. At a subsequent meeting, the Sunset Avenue intersection, the I-64 interchange ramps and the background developments were added to the scope of the study. As noted above, VDOT issued comments on December 20, 2018 and a response to those comments is included in Appendix A.

Background Information

The site is currently occupied by 341 existing mobile home units. The proposed development will occur in the following two phases:

- Phase 1:
  - The existing 341 mobile home units will remain
  - 300 new dwelling units consisting of:
    - 270 apartments/townhomes
    - 30 single family units
  - 50,000 S.F. of commercial space
    - Assumed as 25,000 S.F. of office space and 25,000 S.F. of retail space
- Phase 2:
  - The existing 341 mobile home units will be replaced by 500 new dwelling units for a net increase of 159 dwelling units consisting of:
    - 143 apartments/townhomes
    - 16 single family units

As discussed and detailed below, the traffic counts indicate the existing mobile homes generate traffic comparable to typical apartment units and therefore the traffic removed by the removal of the 341 mobile homes was assumed to be equal to the traffic generated by the addition of 341 new apartments units.

Primary access to the site will be provided by the existing Route 631/Hickory Street intersection, with no new connections to Route 631. Secondary access would be provided by Hickory Street to Stagecoach Road to Route 631.

For purposes of this analysis the completion of Phase 1 was assumed in 2024 and Phase 2 in 2030.

In accordance with the scoping meeting, this analysis includes the following intersections:

1. Route 631 (Old Lynchburg Road)/Hickory Street (unsignalized);
2. Route 631 (Old Lynchburg Road)/Sunset Avenue Extended (unsignalized);
3. Route 631 (5th Street Extended)/Old Lynchburg Road (unsignalized);
4. Route 631 (5th Street Extended)/Stagecoach Road (unsignalized);
5. Route 631 (5th Street Extended)/I-64 EB Ramps (signalized); and
6. Route 631 (5th Street Extended)/I-64 WB Ramps (signalized).

The analysis looks at the study intersections under 2018 existing conditions, 2024/2030 Background Traffic conditions and 2024/2030 Total Traffic conditions.

The 2024/2030 Background Traffic conditions consist of the following:

1. Existing traffic volumes (2018).
2. 1% annual growth in traffic, compounded annually. The traffic growth was applied to the mainline Route 631 movements only.
3. Traffic from other approved developments (all developments are assumed to be completed by 2024):
    a. Whittington (40 single-family D.U. and 4 multi-family D.U);
    b. Wintergreen Farms (69 single-family D.U.);
    c. Timberland Park (80 multi-family D.U.);
    d. Sunset Overlook (35 single-family D.U.);
    e. Royal Fern (26 single-family D.U. and 30 multi-family D.U.);
    f. Fifth Street Place (116 multi-family D.U.);
    g. Brookdale (96 multi-family D.U.);
    h. 5th Street Development (27,500 SF commercial retail); and
    i. Region Ten Women's Shelter (7,900 SF commercial retail).

The 2024/2030 Total Traffic conditions includes the 2024/2030 Background Traffic volumes and the traffic that will be generated by the proposed Southwood development.

Existing Roadway Network

Old Lynchburg Road/5th Street Extended (Route 631) is a 4-lane divided major collector at Hickory Street and transitions to a minor arterial roadway east of Country Green Road. Old Lynchburg Road has a posted 45 MPH speed limit. **For the purpose of this study, Old Lynchburg Road was assumed to run east-west.**

A westbound left turn lane is provided at the intersection of Old Lynchburg Road/Hickory Street and extra pavement provides an eastbound de-facto right turn lane.

Hickory Street is a 2-lane undivided local roadway with a posted 25 MPH speed limit. The road connects Old Lynchburg Road from the southeast to 5th Street Extended in the northeast.

The existing roadway geometry is shown on Figure 2.

Existing Traffic Volumes

Existing AM and PM peak hour traffic volumes were collected in February and April 2018. The raw traffic data is included in Appendix B and the peak hours are shown on Figure 3.

The counts indicate the AM peak hour occurs from 7:30-8:30 AM, and the PM peak hour occurs from 5:00-6:00 PM.

Existing Traffic Capacity Analysis

Capacity analyses were performed to assess traffic conditions for each of the analysis scenarios. The analysis includes delay, level of service, and 95th percentile queuing. The intersections were analyzed using SYNCHRO Version 9.1 based on HCM 2010 methodologies with the following assumptions:

- The peak hour factor (PHF) for the overall intersection was obtained from the turning movement counts (see Appendix B);
- Heavy vehicle percentages for each movement based on the collected traffic data; and
- All other software defaults remain unchanged.

The existing capacity analysis was performed based on the existing lane use shown on Figure 2 and the existing peak hour counts shown on Figure 3.

The results of the analysis are summarized in Table 1 and the analysis worksheets are contained in Appendix C.

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Table 1: Intersection Level of Service, Delay, and Queue Summary for 2018 Existing Traffic Conditions

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR			PM PEAK HOUR		
			Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)	Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)
1. Old Lynchburg Road (EB-WB) at	EB Thru		†	†	--	†	†	--
Hickory Street (NB)	EB Right		†	†	--	†	†	--
Unsignalized	*EB Approach*		*†*	*†*	--	*†*	*†*	--
	WB Left	300	8.3	A	3	7.6	A	5
	WB Thru		†	†	--	†	†	--
	WB Approach		*2.6*	*A*	--	*2.0*	*A*	--
	NB Left-Right		10.9	B	15	9.5	A	8
	NB Approach		*10.9*	*B*	--	*9.5*	*A*	--
2. Old Lynchburg Road (EB-WB) at	EB Left	275	7.5	A	0	8.0	A	0
Church Entrance (NB)	EB Thru-Right		†	†	--	†	†	--
Sunset Avenue Ext. (SB)	*EB Approach*		*0.3*	*A*	--	*0.6*	*A*	--
Unsignalized	WB Left	300	8.1	A	0	7.6	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	363	†	†	--	†	†	--
	WB Approach		*0.7*	*A*	--	*0.1*	*A*	--
	NB L-T-R		12.0	B	0	11.3	B	0
	NB Approach		*12.0*	*B*	--	*11.3*	*B*	--
	SB L-T-R		21.0	C	103	15.8	C	35
	SB Approach		*21.0*	*C*	--	*15.8*	*C*	--
3. Old Lynchburg Road (EB)/	EB Left	300	7.8	A	3	8.3	A	3
5th Street Extended (WB) at	EB Thru		†	†	--	†	†	--
County Complex (NB)	EB Right	115	†	†	--	†	†	--
Old Lynchburg Road (SB)	*EB Approach*		*0.6*	*A*	--	*0.7*	*A*	--
Unsignalized	WB Left	300	9.2	A	8	7.8	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	325	†	†	--	†	†	--
	WB Approach		*1.7*	*A*	--	*0.2*	*A*	--
	NB Thru-Left		24.3	C	0	16.0	C	0
	NB Right	250	10.4	B	0	9.3	A	5
	NB Approach		*16.0*	*C*	--	*9.5*	*A*	--
	SB Left	250	47.7	E	133	28.9	D	73
	SB Thru-Right		10.3	B	3	10.2	B	5
	SB Approach		*45.4*	*E*	--	*24.3*	*C*	--
4. 5th Street Extended (EB-WB) at	EB Left	250	8.1	A	0	9.3	A	0
Stagecoach Road (NB)	EB Thru		†	†	--	†	†	--
Apartment Complex (SB)	EB Right	250	†	†	--	†	†	--
Unsignalized	*EB Approach*		*8.1*	*A*	--	*0.0*	*A*	--
	WB Left	315	11.3	B	30	9.0	A	15
	WB Thru		†	†	--	†	†	--
	WB Right	225	†	†	--	†	†	--
	WB Approach		*4.2*	*A*	--	*1.6*	*A*	--
	NB Thru-Left		59.6	F	3	45.1	E	3
	NB Right	125	14.6	B	45	11.3	B	25
	NB Approach		*15.0*	*C*	--	*11.9*	*B*	--
	SB L-T-R		62.4	F	8	331.3	F	180
	SB Approach		*62.4*	*F*	--	*331.3*	*F*	--
5. 5th Street Extended (EB-WB) at	EB Thru		35.1	D	#483	25.0	C	243
I-64 EB Off-Ramp (SB)	EB Thru-Right		35.3	D	-	25.1	C	-
Signalized	*EB Approach*		*35.2*	*D*	--	*25.0*	*C*	--
	WB Left	238	22.4	C	188	17.1	B	275
	WB Thru		11.0	B	75	9.1	A	85
	WB Approach		*14.9*	*B*	--	*12.1*	*B*	--
	SB L-T-R		187.6	F	#735	350.9	F	#846
	SB Approach		*187.6*	*F*	--	*350.9*	*F*	--
	Overall		**74.9**	**E**	**--**	**120.2**	**F**	**--**
6. 5th Street Extended (EB-WB) at	EB Left	138	8.8	A	m105	10.5	B	m61
I-64 WB Off-Ramp (NB)	EB Thru		0.2	A	m141	0.3	A	m117
Signalized	*EB Approach*		*2.5*	*A*	--	*2.2*	*A*	--
	WB Thru		16.6	B	148	15.7	B	231
	WB Right	85	23.2	C	63	28.3	C	226
	WB Approach		*19.6*	*B*	--	*21.1*	*C*	--
	NB Left-Thru		32.8	C	162	31.9	C	150
	NB Right	LMT	212.5	F	#372	67.4	E	140
	NB Approach		*159.1*	*F*	--	*54.9*	*D*	--
	Overall		**42.0**	**D**	**--**	**20.3**	**C**	**--**

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.
HCM 2010 reports queues in number of vehicles. Queues shown are in feet, assuming 25' average vehicle length.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 1, each of the movements at the Old Lynchburg Road/Hickory Street intersection operates at Level of Service (LOS) B or better during both peak hours with minimal to no queueing.

With the exception of the southbound left, each of the movements at the 5th Street Extended/Old Lynchburg Road intersection operates at LOS C or better during both peak hours with minimal to no queueing. The southbound left turn operates at LOS E in the AM peak hour and LOS D in the PM peak hour.

With the exception of the northbound thru-left movement and southbound approach, each of the movements at the 5th Street Extended/Stagecoach Road intersection operates at LOS B or better during both peak hours with minimal to no queueing. The northbound thru-left movement and southbound approach operate at LOS E or F in one or both peak hours. It is important to note that these are very low volume movements; the queues associated with the LOS E and F are a maximum of 28 feet, or just over one car length.

The I-64 EB ramps currently operate at an overall LOS E during the AM peak hour and overall LOS F during the PM peak hour. The I-64 WB ramps operate at an overall LOS D during the AM peak hour and an overall LOS C during the PM peak hour.

2024 Background Traffic Volumes

Nine (9) approved developments were included in the background traffic volumes for 2024. The background site locations, trip generation, and traffic distributions for the nine (9) approved developments are included in Appendix D. The combined, anticipated traffic from all nine (9) approved background developments is shown on Figure 4.

A 1% annual growth rate has been applied to all mainline movements only on Old Lynchburg Road/5th Street Extended over a six-year period (2018 to 2024) to account for growth not included in the approved background developments. The resulting 2018 existing + growth traffic volumes are shown on Figure 5.

Figure 4 and Figure 5 were then summed to result in the 2024 total background traffic volumes, shown on Figure 6.

2024 Background Traffic Capacity Analysis

The capacity of the study intersections under 2024 background traffic conditions was analyzed using the methodologies discussed above, the existing lane geometries shown on Figure 2, the total background volumes shown on Figure 6, the existing PHF, and the existing heavy vehicle percentages.

The results of the analysis are summarized in Table 2 and the analysis worksheets are contained in Appendix E.

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Table 2: Intersection Level of Service, Delay, and Queue Summary for 2024 Background Traffic Conditions

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR			PM PEAK HOUR		
			Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)	Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)
1. Old Lynchburg Road (EB-WB) at	EB Thru		†	†	--	†	†	--
Hickory Street (NB)	EB Right		†	†	--	†	†	--
Unsignalized	*EB Approach*		*†*	*†*	--	*†*	*†*	--
	WB Left	300	8.4	A	3	7.7	A	5
	WB Thru		†	†	--	†	†	--
	WB Approach		*2.3*	*A*	--	*1.8*	*A*	--
	NB Left-Right		11.2	B	15	9.7	A	8
	NB Approach		*11.2*	*B*	--	*9.7*	*A*	--
2. Old Lynchburg Road (EB-WB) at	EB Left	275	7.5	A	0	8.1	A	0
Church Entrance (NB)	EB Thru-Right		†	†	--	†	†	--
Sunset Avenue Ext. (SB)	*EB Approach*		*0.3*	*A*	--	*0.5*	*A*	--
Unsignalized	WB Left	300	8.1	A	0	7.6	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	363	†	†	--	†	†	--
	WB Approach		*0.6*	*A*	--	*0.1*	*A*	--
	NB L-T-R		12.1	B	0	12.0	B	0
	NB Approach		*12.1*	*B*	--	*12.0*	*B*	--
	SB L-T-R		31.8	D	185	21.0	C	65
	SB Approach		*31.8*	*D*	--	*21.0*	*C*	--
3. Old Lynchburg Road (EB)/	EB Left	300	9.0	A	5	10.4	B	5
5th Street Extended (WB) at	EB Thru		†	†	--	†	†	--
County Complex (NB)	EB Right	115	†	†	--	†	†	--
Old Lynchburg Road (SB)	*EB Approach*		*0.7*	*A*	--	*0.9*	*A*	--
Unsignalized	WB Left	300	9.6	A	8	8.0	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	325	†	†	--	†	†	--
	WB Approach		*1.2*	*A*	--	*0.1*	*A*	--
	NB Thru-Left		38.4	E	3	26.2	D	0
	NB Right	250	10.8	B	0	9.5	A	5
	NB Approach		*18.8*	*C*	--	*10.1*	*B*	--
	SB Left	250	386.6	F	630	202.4	F	389
	SB Thru-Right		10.4	B	3	10.8	B	8
	SB Approach		*368.4*	*F*	--	*166.6*	*F*	--
4. 5th Street Extended (EB-WB) at	EB Left	250	8.6	A	0	10.6	B	0
Stagecoach Road (NB)	EB Thru		†	†	--	†	†	--
Apartment Complex (SB)	EB Right	250	†	†	--	†	†	--
Unsignalized	*EB Approach*		*0.0*	*A*	--	*0.1*	*A*	--
	WB Left	315	14.1	B	45	10.0	A	18
	WB Thru		†	†	--	†	†	--
	WB Right	225	†	†	--	†	†	--
	WB Approach		*4.0*	*A*	--	*1.3*	*A*	--
	NB Thru-Left		133.9	F	5	93.0	F	5
	NB Right	125	18.9	C	63	12.8	B	30
	NB Approach		*20.0*	*C*	--	*14.1*	*B*	--
	SB L-T-R		80.3	F	23	1508.8	F	335
	SB Approach		*80.3*	*F*	--	*1508.8*	*F*	--
5. 5th Street Extended (EB-WB) at	EB Thru		95.5	F	#695	34.9	C	#393
I-64 EB Off-Ramp (SB)	EB Thru-Right		100.4	F	-	35.1	D	-
Signalized	*EB Approach*		*97.9*	*F*	--	*35.0*	*C*	--
	WB Left	238	32.8	C	216	30.0	C	#350
	WB Thru		11.7	B	134	10.0	A	233
	WB Approach		*18.1*	*B*	--	*16.7*	*B*	--
	SB L-T-R		267.1	F	#862	474.4	F	#1008
	SB Approach		*267.1*	*F*	--	*474.4*	*F*	--
	Overall		121.7	F	--	152.8	F	--
6. 5th Street Extended (EB-WB) at	EB Left	138	10.5	B	m129	15.7	B	m88
I-64 WB Off-Ramp (NB)	EB Thru		0.1	A	m127	0.2	A	m123
Signalized	*EB Approach*		*2.8*	*A*	--	*3.3*	*A*	--
	WB Thru		20.2	C	215	17.9	B	362
	WB Right	85	30.4	C	147	37.1	D	#442
	WB Approach		*24.5*	*C*	--	*25.6*	*C*	--
	NB Left-Thru		36.4	D	201	36.0	D	206
	NB Right	LMT	277.6	F	#485	99.7	F	#249
	NB Approach		*200.2*	*F*	--	*74.1*	*E*	--
	Overall		51.1	D	--	26.1	C	--

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.
HCM 2010 reports queues in number of vehicles. Queues shown are in feet, assuming 25' average vehicle length.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

As shown in Table 2, each of the movements at the study intersections are expected to operate at similar LOS and queueing to the existing conditions. The 95th percentile queue for the southbound left at the 5th Street Extended/Old Lynchburg Road intersection exceeds the extents of the storage length during both the AM and PM peak hours due to the increases in traffic related to the nine (9) approved background developments.

The I-64 ramps will continue to operate at deteriorating levels of service with the addition of the approved background development traffic. The ramp signal timings were held under existing conditions, with no optimizations.

The analysis indicates that if the approved background development traffic and 1% annual growth rate occur as forecasted, improvements will be needed along the corridor. Capacity improvements will be required at the majority of study intersections.

Phase 1 (2024) - Proposed Development Trip Generation and Distribution

As noted above, the proposed Phase 1 development will contain 300 new dwelling units consisting of 270 apartments/townhomes, and 30 single family units. Additionally, Phase 1 will contain 50,000 S.F. of commercial space which was assumed to be split evenly at 25,000 S.F. of office space and 25,000 S.F. of retail space.

The trips that will be generated by the proposed Southwood development were estimated using the rates/equations in ITE's Trip Generation Manual, 10th edition and are shown on Table 3.

As shown in Table 3, Phase 1 will generate 223 AM peak hour trips (93 in and 130 out), 301 PM peak hour trips (161 in and 140 out), and 3,564 average daily trips.

The trips generated by the proposed development were distributed to the roadway network based on the existing travel patterns, the nature of the use, and the previously completed traffic studies.

The following **residential** directional distributions were assumed:

- To/From the East on Route 631 (Old Lynchburg Road/5th Street Extended) – 90%
- To/From the North on Old Lynchburg Road – 10%

The following **commercial/retail** directional distributions were assumed:

- To/From the East on Route 631 (Old Lynchburg Road/5th Street Extended) – 90%
- To/From the North on Old Lynchburg Road – 5%
- To/From the West on Old Lynchburg Road – 5%

The directional distributions were then applied to the study intersection as shown on Figure 7 for the residential portion and Figure 8 for the commercial portion.

The site trip distribution percentages shown on Figures 7 and 8 were applied to the trip generation shown in Table 3 to distribute the Phase 1 new trips to the surrounding roadway network. The resulting Phase 1 site-generated trips are shown in Figure 9.

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Table 3: Phase 1 Site Trip Generation

LAND USE	ITE CODE	AMOUNT	UNITS	WEEKDAY ADT	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
Phase 1										
Residential[1]										
Apartments/Townhomes	220[2]	270	D.U.	2,000	28	95	123	90	53	143
Single Family	210	30	D.U.	343	7	19	26	20	12	32
Residential Subtotal		300	D.U.	*2,343*	*35*	*114*	*149*	*110*	*65*	*175*
Commercial										
Retail	820	25,000	S.F.	944	15	9	24	46	49	95
Office	710	25,000	S.F.	277	43	7	50	5	26	31
Commercial Subtotal		*50,000*	*S.F.*	*1,221*	*58*	*16*	*74*	*51*	*75*	*126*
Phase 1 Total[3]				**3,564**	**93**	**130**	**223**	**161**	**140**	**301**
Phase 2										
Residential[4]										
Apartments/Townhomes	220[2]	143	D.U.	1,040	15	52	67	51	30	81
Single Family	210	16	D.U.	193	4	12	16	11	6	17
Residential Subtotal		159	D.U.	*1,233*	*19*	*64*	*83*	*62*	*36*	*98*
Phase 2 Total				**1,233**	**19**	**64**	**83**	**62**	**36**	**98**
Southwood Total (Phase 1 + Phase 2)				**4,797**	**112**	**194**	**306**	**223**	**176**	**399**

Source: ITE Trip Generation, 10th Edition.

1. Residential trip generation assumes 10% of the units will be single family dwelling units. All others will be apartments/townhomes.
2. ITE includes townhomes and apartments in the same category with the 10th edition.
3. The overall development (Phase 1 + Phase 2) is capped at 5,000 daily trips. To ensure maximum flexibility, Phase 1 trips were assumed to be split evenly between residential and commercial uses.
4. Phase 2 consists of 500 total units but will replace the existing 341 units currently on site for a net increase of 159 units.

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2024 Total Future Traffic

The 2024 total background traffic volumes (Figure 6) were combined with the site-generated trips (Figure 9) to yield the 2024 total traffic future volumes shown on Figure 10.

2024 Total Future Traffic Capacity Analysis

The operational capacity of the study intersections under 2024 total future traffic conditions was analyzed using the methodologies discussed prior, the existing lane geometries shown on Figure 2, the future volumes shown on Figure 10, the existing PHF, and the existing heavy vehicle percentages.

The results of the analysis are summarized in Table 4 and the analysis worksheets are contained in Appendix F.

As shown in Table 4, each of the movements at the study intersections continue to operate at similar LOS and queueing to the background conditions.

All movements at the main entrance at the Old Lynchburg Road/Hickory Street intersection will operate at LOS A or B in both peak hours. The existing westbound left turn lane on Old Lynchburg Road will adequately accommodate the 95th percentile queue.

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Table 4: Intersection Level of Service, Delay, and Queue Summary for 2024 Total Future Traffic Conditions

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR			PM PEAK HOUR		
			Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)	Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)
1. Old Lynchburg Road (EB-WB) at	EB Thru		†	†	--	†	†	--
Hickory Street (NB)	EB Right		†	†	--	†	†	--
Unsignalized	*EB Approach*		*†*	*†*	--	*†*	*†*	--
	WB Left	300	8.7	A	10	8.0	A	15
	WB Thru		†	†	--	†	†	--
	WB Approach		*5.1*	*A*	--	*3.6*	*A*	--
	NB Left-Right		12.9	B	40	11.2	B	28
	NB Approach		*12.9*	*B*	--	*11.2*	*B*	--
2. Old Lynchburg Road (EB-WB) at	EB Left	275	8.0	A	3	9.7	A	3
Church Entrance (NB)	EB Thru-Right		†	†	--	†	†	--
Sunset Avenue Ext. (SB)	*EB Approach*		*0.4*	*A*	--	*0.7*	*A*	--
Unsignalized	WB Left	300	8.5	A	0	7.9	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	363	†	†	--	†	†	--
	WB Approach		*0.4*	*A*	--	*0.1*	*A*	--
	NB L-T-R		15.5	C	0	17.6	C	0
	NB Approach		*15.5*	*C*	--	*17.6*	*C*	--
	SB L-T-R		104.7	F	378	43.0	E	138
	SB Approach		*104.7*	*F*	--	*43.0*	*E*	--
3. Old Lynchburg Road (EB)/	EB Left	300	9.3	A	8	11.1	B	5
5th Street Extended (WB) at	EB Thru		†	†	--	†	†	--
County Complex (NB)	EB Right	115	†	†	--	†	†	--
Old Lynchburg Road (SB)	*EB Approach*		*0.8*	*A*	--	*1.0*	*A*	--
Unsignalized	WB Left	300	10.0	B	8	8.2	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	325	†	†	--	†	†	--
	WB Approach		*1.1*	*A*	--	*0.1*	*A*	--
	NB Thru-Left		50.7	F	3	35.5	E	3
	NB Right	250	11.2	B	0	9.9	A	5
	NB Approach		*27.0*	*D*	--	*10.8*	*B*	--
	SB Left	250	648.2	F	770	443.0	F	545
	SB Thru-Right		10.7	B	3	11.5	B	10
	SB Approach		*605.6*	*F*	--	*348.9*	*F*	--
4. 5th Street Extended (EB-WB) at	EB Left	250	8.9	A	0	11.4	B	3
Stagecoach Road (NB)	EB Thru		†	†	--	†	†	--
Apartment Complex (SB)	EB Right	250	†	†	--	†	†	--
Unsignalized	*EB Approach*		*0.0*	*A*	--	*0.1*	*A*	--
	WB Left	315	16.0	C	55	10.9	B	25
	WB Thru		†	†	--	†	†	--
	WB Right	225	†	†	--	†	†	--
	WB Approach		*4.3*	*A*	--	*1.5*	*A*	--
	NB Thru-Left		185.3	F	8	161.6	F	10
	NB Right	125	22.3	C	83	14.1	B	38
	NB Approach		*23.7*	*C*	--	*16.4*	*C*	--
	SB L-T-R		144.6	F	35	2785.5	F	368
	SB Approach		*144.6*	*F*	--	*2785.5*	*F*	--
5. 5th Street Extended (EB-WB) at	EB Thru		127.0	F	#766	54.5	D	#475
I-64 EB Off-Ramp (SB)	EB Thru-Right		136.4	F	-	55.0	D	-
Signalized	*EB Approach*		*131.7*	*F*	--	*54.8*	*D*	--
	WB Left	238	32.5	C	m214	36.0	D	#349
	WB Thru		12.0	B	154	10.4	B	260
	WB Approach		*17.7*	*B*	--	*18.3*	*B*	--
	SB L-T-R		283.9	F	#887	509.7	F	#1049
	SB Approach		*283.9*	*F*	--	*509.7*	*F*	--
	Overall		139.6	F	--	164.0	F	--
6. 5th Street Extended (EB-WB) at	EB Left	138	11.3	B	m138	16.2	B	m103
I-64 WB Off-Ramp (NB)	EB Thru		0.1	A	m122	0.1	A	m112
Signalized	*EB Approach*		*3.1*	*A*	--	*3.5*	*A*	--
	WB Thru		21.8	C	232	19.6	B	395
	WB Right	85	32.9	C	164	41.0	D	#459
	WB Approach		*26.3*	*C*	--	*27.9*	*C*	--
	NB Left-Thru		38.9	D	#234	40.9	D	#257
	NB Right	LMT	277.6	F	#485	99.7	F	#267
	NB Approach		*196.6*	*F*	--	*73.8*	*E*	--
	Overall		50.5	D	--	27.1	C	--

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.
HCM 2010 reports queues in number of vehicles. Queues shown are in feet, assuming 25' average vehicle length.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

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2030 Background Traffic Volumes

To develop 2030 background traffic volumes, as discussed above, in addition to the nine (9) other developments under construction, a 1% annual growth rate has been applied to all through movements on Old Lynchburg Road/5th Street Extended over a twelve-year period (2018 to 2030). The resulting 2018 existing + growth traffic volumes are shown on Figure 11.

Figure 4 (approved background development traffic) and Figure 11 were then summed to result in the 2030 total background traffic volumes shown on Figure 12.

2030 Background Traffic Capacity Analysis

The capacity of the study intersections under 2030 background traffic conditions was analyzed using the methodologies discussed above, the existing lane use shown on Figure 2, the total background volumes shown on Figure 12, the existing PHF, and the existing heavy vehicle percentages.

The results of the analysis are summarized in Table 5 and the analysis worksheets are contained in Appendix G.

As shown in Table 5, each of the movements at the study intersections will continue to operate at similar LOS and queuing as in 2024 Background conditions. The 95th percentile queue for the southbound left at the 5th Street Extended/Old Lynchburg Road intersection continues to lengthen and exceeds the extents of the storage length.

The I-64 ramps will continue to operate at deteriorating levels of service with the addition of the approved background development traffic. The ramp signal timings were held under existing conditions, with no optimizations.

As noted under 2024 background conditions, the analysis indicates that if the approved background development traffic and 1% annual growth rate occur as forecasted, improvements will be needed along the corridor. Capacity improvements will be required at the majority of study intersections.

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Table 5: Intersection Level of Service, Delay, and Queue Summary for 2030 Background Traffic Conditions

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR			PM PEAK HOUR		
			Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)	Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)
1. Old Lynchburg Road (EB-WB) at	EB Thru		†	†	--	†	†	--
Hickory Street (NB)	EB Right		†	†	--	†	†	--
Unsignalized	*EB Approach*		*†*	*†*	--	*†*	*†*	--
	WB Left	300	8.4	A	3	7.7	A	5
	WB Thru		†	†	--	†	†	--
	WB Approach		*2.2*	*A*	--	*1.7*	*A*	--
	NB Left-Right		11.4	B	15	9.8	A	8
	NB Approach		*11.4*	*B*	--	*9.8*	*A*	--
2. Old Lynchburg Road (EB-WB) at	EB Left	275	7.6	A	0	8.2	A	0
Church Entrance (NB)	EB Thru-Right		†	†	--	†	†	--
Sunset Avenue Ext. (SB)	*EB Approach*		*0.3*	*A*	--	*0.5*	*A*	--
Unsignalized	WB Left	300	8.3	A	0	7.7	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	363	†	†	--	†	†	--
	WB Approach		*0.5*	*A*	--	*0.1*	*A*	--
	NB L-T-R		12.9	B	0	12.2	B	0
	NB Approach		*12.9*	*B*	--	*12.2*	*B*	--
	SB L-T-R		46.7	E	253	23.5	C	80
	SB Approach		*46.7*	*E*	--	*23.5*	*C*	--
3. Old Lynchburg Road (EB)/	EB Left	300	9.1	A	5	10.7	B	3
5th Street Extended (WB) at	EB Thru		†	†	--	†	†	--
County Complex (NB)	EB Right	115	†	†	--	†	†	--
Old Lynchburg Road (SB)	*EB Approach*		*0.7*	*A*	--	*1.0*	*A*	--
Unsignalized	WB Left	300	9.8	A	8	8.0	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	325	†	†	--	†	†	--
	WB Approach		*1.2*	*A*	--	*0.1*	*A*	--
	NB Thru-Left		42.2	E	3	28.2	D	0
	NB Right	250	11.0	B	0	9.6	A	5
	NB Approach		*23.5*	*C*	--	*10.3*	*B*	--
	SB Left	250	475.0	F	708	270.0	F	455
	SB Thru-Right		10.6	B	3	11.0	B	10
	SB Approach		*453.3*	*F*	--	*221.2*	*F*	--
4. 5th Street Extended (EB-WB) at	EB Left	250	8.7	A	0	10.8	B	0
Stagecoach Road (NB)	EB Thru		†	†	--	†	†	--
Apartment Complex (SB)	EB Right	250	†	†	--	†	†	--
Unsignalized	*EB Approach*		*0.0*	*A*	--	*0.1*	*A*	--
	WB Left	315	14.9	B	48	10.1	B	18
	WB Thru		†	†	--	†	†	--
	WB Right	225	†	†	--	†	†	--
	WB Approach		*4.1*	*A*	--	*1.3*	*A*	--
	NB Thru-Left		155.3	F	5	108.1	F	5
	NB Right	125	19.9	C	65	13.1	B	30
	NB Approach		*21.1*	*C*	--	*14.7*	*B*	--
	SB L-T-R		738.9	F	155	1891.4	F	350
	SB Approach		*738.9*	*F*	--	*1891.4*	*F*	--
5. 5th Street Extended (EB-WB) at	EB Thru		127.5	F	#740	47.8	D	#423
I-64 EB Off-Ramp (SB)	EB Thru-Right		135.5	F	-	48.1	D	-
Signalized	*EB Approach*		*131.5*	*F*	--	*47.9*	*D*	--
	WB Left	238	34.3	C	228	35.8	D	#384
	WB Thru		11.8	B	145	10.1	B	244
	WB Approach		*18.7*	*B*	--	*18.8*	*B*	--
	SB L-T-R		280.8	F	#891	474.4	F	#1008
	SB Approach		*280.8*	*F*	--	*474.4*	*F*	--
	Overall		139.7	F	--	153.2	F	--
6. 5th Street Extended (EB-WB) at	EB Left	138	11.3	B	m135	16.3	B	m97
I-64 WB Off-Ramp (NB)	EB Thru		0.1	A	m128	0.2	A	m120
Signalized	*EB Approach*		*3.1*	*A*	--	*3.4*	*A*	--
	WB Thru		21.5	C	228	18.9	B	389
	WB Right	85	35.3	D	173	48.5	D	#496
	WB Approach		*27.4*	*C*	--	*30.8*	*C*	--
	NB Left-Thru		37.7	D	#214	37.2	D	216
	NB Right	LMT	314.7	F	#521	118.8	F	#294
	NB Approach		*226.3*	*F*	--	*86.1*	*F*	--
	Overall		57.6	E	--	30.7	C	--

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.
HCM 2010 reports queues in number of vehicles. Queues shown are in feet, assuming 25' average vehicle length.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

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Phase 2 (2030) - Proposed Development Trip Generation/Distribution

As noted above, the proposed Phase 2 development will replace the existing 341 mobile home units with 500 new apartment/townhomes and single-family dwelling units. The existing traffic counts at the main site entrance (Old Lynchburg Road/Hickory Street) were compared to the ITE Trip Generation Manual data for both mobile home park and apartment/townhomes. It is important to note that existing mobile homes have a secondary access point via Hickory Street to Stagecoach Road to Route 631.

As shown in Table 6, at the primary entrance point only, the existing mobile home park generates 61% more trips in the AM peak hour and approximately the same number of PM peak hour trips as compared to ITE mobile home park data. It should be noted that the ITE data for mobile home parks is extremely limited (only 1 study).

When compared to ITE apartment/townhome data, at the primary entrance point only, the existing mobile home park generates 7% and 13% fewer trips in the AM and PM peak hours, respectively.

As noted above, it assumed that approximately 20% of the site traffic will utilize the secondary access point.

As shown in Table 6, the existing mobile home park generates traffic comparable to the ITE data for apartments/townhomes. Therefore, the removal of the 341 mobile homes was assumed to be equal to 341 new apartment/townhomes units from a traffic generation perspective.

The existing 341 mobile home units will be replaced by 500 new dwelling units for a net increase of 159 dwelling units. For purposes of the analysis, it was assumed the additional units will consist of 143 apartments/ townhomes, and 16 single family units. The trips that will be generated by Phase 2 of the Southwood development were estimated using the rates/equations in ITE's Trip Generation Manual, 10th edition and are shown on Table 7.

As shown in Table 7, Phase 2 of the proposed development will generate 83 AM peak hour trips (19 in and 64 out), 98 PM peak hour trips (62 in and 36 out), and 1,233 average daily trips.

The trips generated by the proposed development were distributed to the roadway network according to the directional distributions discussed prior (see Page 8).

The site trip distribution percentages shown on Figures 7 and 8 were applied to the trip generation shown in Table 7 to distribute the new trips to the surrounding roadway network. The resulting Phase 2 site-generated trips are shown in Figure 13.

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Table 6: Mobile Home Park Trip Generation Comparison

LAND USE	ITE CODE	AMOUNT	UNITS	WEEKDAY ADT	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
Existing Mobile Home Trip Comparison										
Existing Traffic Counts at Old Lynchbrug Road/Hickory Street[1]										
Mobile Home Park		341	D.U.	N/A	36	107	143	83	70	153
ITE Trip Generation[2]										
Mobile Home Park[3]	240	341	D.U.	1,705	28	61	89	97	60	157
Apartments/Townhomes	220	341	D.U.	2,537	35	118	153	111	65	176
Comparison										
Existing Counts vs ITE Mobile Home										
Difference (Counts - ITE)				N/A	8	46	54	(14)	10	(4)
Percent Difference				N/A			61%			-3%
Existing Counts vs ITE Apartments										
Difference (Counts - ITE)				N/A	1	(11)	(10)	(28)	5	(23)
Percent Difference				N/A			-7%			-13%

1. The Old Lynchburg Road/Hickory Street intersection serves as the main entrance to the mobile home park and all traffic in/out at the intersection is generated by the mobile home park. Secondary access provided by Stagecoach Road to Hickory Street.
2. Source: ITE Trip Generation, 10th Edition.
3. The ITE data for mobile home park is extremely limited (only 1 study).

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Table 7: Phase 2 Site Trip Generation

LAND USE	ITE CODE	AMOUNT	UNITS	WEEKDAY ADT	AM PEAK HOUR IN	AM PEAK HOUR OUT	AM PEAK HOUR TOTAL	PM PEAK HOUR IN	PM PEAK HOUR OUT	PM PEAK HOUR TOTAL
Phase 1										
Residential[1]										
Apartments/Townhomes	220[2]	270	D.U.	2,000	28	95	123	90	53	143
Single Family	210	30	D.U.	343	7	19	26	20	12	32
Residential Subtotal		300	D.U.	*2,343*	*35*	*114*	*149*	*110*	*65*	*175*
Commercial										
Retail	820	25,000	S.F.	944	15	9	24	46	49	95
Office	710	25,000	S.F.	277	43	7	50	5	26	31
Commercial Subtotal		*50,000*	*S.F.*	*1,221*	*58*	*16*	*74*	*51*	*75*	*126*
Phase 1 Total[3]				**3,564**	**93**	**130**	**223**	**161**	**140**	**301**
Phase 2										
Residential[4]										
Apartments/Townhomes	220[2]	143	D.U.	1,040	15	52	67	51	30	81
Single Family	210	16	D.U.	193	4	12	16	11	6	17
Residential Subtotal		159	D.U.	*1,233*	*19*	*64*	*83*	*62*	*36*	*98*
Phase 2 Total				**1,233**	**19**	**64**	**83**	**62**	**36**	**98**
Southwood Total (Phase 1 + Phase 2)				**4,797**	**112**	**194**	**306**	**223**	**176**	**399**

Source: ITE Trip Generation, 10th Edition.

1. Residential trip generation assumes 10% of the units will be single family dwelling units. All others will be apartments/townhomes.
2. ITE includes townhomes and apartments in the same category with the 10th edition.
3. The overall development (Phase 1 + Phase 2) is capped at 5,000 daily trips. To ensure maximum flexibility, Phase 1 trips were assumed to be split evenly between residential and commercial uses.
4. Phase 2 consists of 500 total units but will replace the existing 341 units currently on site for a net increase of 159 units.

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2030 Total Future Traffic

The 2030 total background traffic volumes (Figure 12) were combined with the Phase 1 and 2 site-generated trips (Figure 9 and Figure 13) to yield the 2030 total future traffic volumes shown on Figure 14.

2030 Total Future Traffic Capacity Analysis

The capacity of the study intersections under 2030 total future traffic conditions was analyzed using the methodologies discussed above, the existing lane geometries shown on Figure 2, the future volumes shown on Figure 13, the existing PHF, and the existing heavy vehicle percentages.

The results of the analysis are summarized in Table 8 and the analysis worksheets are contained in Appendix H.

As shown in Table 7, each of the movements at the study intersections would continue to operate at similar LOS and queueing to the background conditions.

All movements at the main entrance at the Old Lynchburg Road/Hickory Street intersection will operate at LOS B or better in both peak hours. The existing westbound left turn lane on Old Lynchburg Road will adequately accommodate the 95th percentile queue.

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Table 8: Intersection Level of Service, Delay, and Queue Summary for 2030 Total Traffic Conditions

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR			PM PEAK HOUR		
			Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)	Delay (sec/veh)	LOS	HCM 2010 95th Percentile Queue Length (ft)
1. Old Lynchburg Road (EB-WB) at	EB Thru		†	†	--	†	†	--
Hickory Street (NB)	EB Right		†	†	--	†	†	--
Unsignalized	*EB Approach*		*†*	*†*	--	*†*	*†*	--
	WB Left	300	8.9	A	13	8.2	A	20
	WB Thru		†	†	--	†	†	--
	WB Approach		*5.3*	*A*	--	*4.0*	*A*	--
	NB Left-Right		14.4	B	58	11.8	B	35
	NB Approach		*14.4*	*B*	--	*11.8*	*B*	--
2. Old Lynchburg Road (EB-WB) at	EB Left	275	8.1	A	3	10.1	B	3
Church Entrance (NB)	EB Thru-Right		†	†	--	†	†	--
Sunset Avenue Ext. (SB)	*EB Approach*		*0.5*	*A*	--	*0.8*	*A*	--
Unsignalized	WB Left	300	8.8	A	3	8.0	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	363	†	†	--	†	†	--
	WB Approach		*0.4*	*A*	--	*0.0*	*A*	--
	NB L-T-R		17.4	C	0	19.9	C	0
	NB Approach		*17.4*	*C*	--	*19.9*	*A*	--
	SB L-T-R		196.6	F	553	79.1	F	213
	SB Approach		*196.6*	*F*	--	*79.1*	*F*	--
3. Old Lynchburg Road (EB)/	EB Left	300	9.6	A	8	11.7	B	8
5th Street Extended (WB) at	EB Thru		†	†	--	†	†	--
County Complex (NB)	EB Right	115	†	†	--	†	†	--
Old Lynchburg Road (SB)	*EB Approach*		*0.8*	*A*	--	*1.1*	*A*	--
Unsignalized	WB Left	300	10.5	B	8	8.4	A	0
	WB Thru		†	†	--	†	†	--
	WB Right	325	†	†	--	†	†	--
	WB Approach		*1.1*	*A*	--	*0.1*	*A*	--
	NB Thru-Left		62.3	F	3	42.9	E	3
	NB Right	250	11.6	B	0	10.1	B	5
	NB Approach		*31.9*	*D*	--	*11.3*	*B*	--
	SB Left	250	886.6	F	880	654.5	F	648
	SB Thru-Right		11.1	B	3	12.1	B	13
	SB Approach		*825.6*	*F*	--	*506.4*	*F*	--
4. 5th Street Extended (EB-WB) at	EB Left	250	9.0	A	0	11.9	B	3
Stagecoach Road (NB)	EB Thru		†	†	--	†	†	--
Apartment Complex (SB)	EB Right	250	†	†	--	†	†	--
Unsignalized	*EB Approach*		*0.0*	*A*	--	*0.1*	*A*	--
	WB Left	315	17.9	C	65	11.4	B	28
	WB Thru		†	†	--	†	†	--
	WB Right	225	†	†	--	†	†	--
	WB Approach		*4.7*	*A*	--	*1.6*	*A*	--
	NB Thru-Left		261.5	F	10	215.8	F	13
	NB Right	125	26.8	D	105	14.8	B	40
	NB Approach		*28.7*	*D*	--	*17.8*	*C*	--
	SB L-T-R		1755.5	F	183	4015.0	F	380
	SB Approach		*1755.5*	*F*	--	*4015.0*	*F*	--
5. 5th Street Extended (EB-WB) at	EB Thru		179.7	F	#847	91.4	F	#525
I-64 EB Off-Ramp (SB)	EB Thru-Right		196.9	F	-	92.5	F	-
Signalized	*EB Approach*		*188.3*	*F*	--	*91.9*	*F*	--
	WB Left	238	33.5	C	m223	37.6	D	m#352
	WB Thru		12.2	B	168	10.7	B	280
	WB Approach		*18.2*	*B*	--	*18.9*	*B*	--
	SB L-T-R		301.2	F	#919	535.8	F	#1088
	SB Approach		*301.2*	*F*	--	*535.8*	*F*	--
	Overall		169.2	F	--	178.8	F	--
6. 5th Street Extended (EB-WB) at	EB Left	138	12.3	B	m149	17.6	B	m111
I-64 WB Off-Ramp (NB)	EB Thru		0.1	A	m119	0.1	A	m110
Signalized	*EB Approach*		*3.4*	*A*	--	*3.8*	*A*	--
	WB Thru		23.9	C	248	21.8	C	#477
	WB Right	85	41.5	D	191	58.4	E	#518
	WB Approach		*31.1*	*C*	--	*44.6*	*D*	--
	NB Left-Thru		41.3	D	#255	35.8	D	#290
	NB Right	LMT	314.7	F	#521	118.8	F	#313
	NB Approach		*221.8*	*F*	--	*86.1*	*F*	--
	Overall		57.0	E	--	33.2	C	--

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.
HCM 2010 reports queues in number of vehicles. Queues shown are in feet, assuming 25' average vehicle length.
- 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.
m - Volume for 95th percentile queue is metered by upstream signal.

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Conclusions

The analysis indicates that if the approved background development traffic and 1% annual growth rate occur as forecasted, improvements will be needed along the corridor. Capacity improvements will be required at the majority of study intersections.

The proposed development of Southwood will add some traffic to the corridor but will not cause any new intersection to fail and/or queues to extend beyond the available storage when compared to background conditions.

All movements at the main entrance at the Old Lynchburg Road/Hickory Street intersection will operate at LOS B or better during both peak hours. The existing westbound left turn lane on Old Lynchburg Road will adequately accommodate the projected 95th percentile queue.