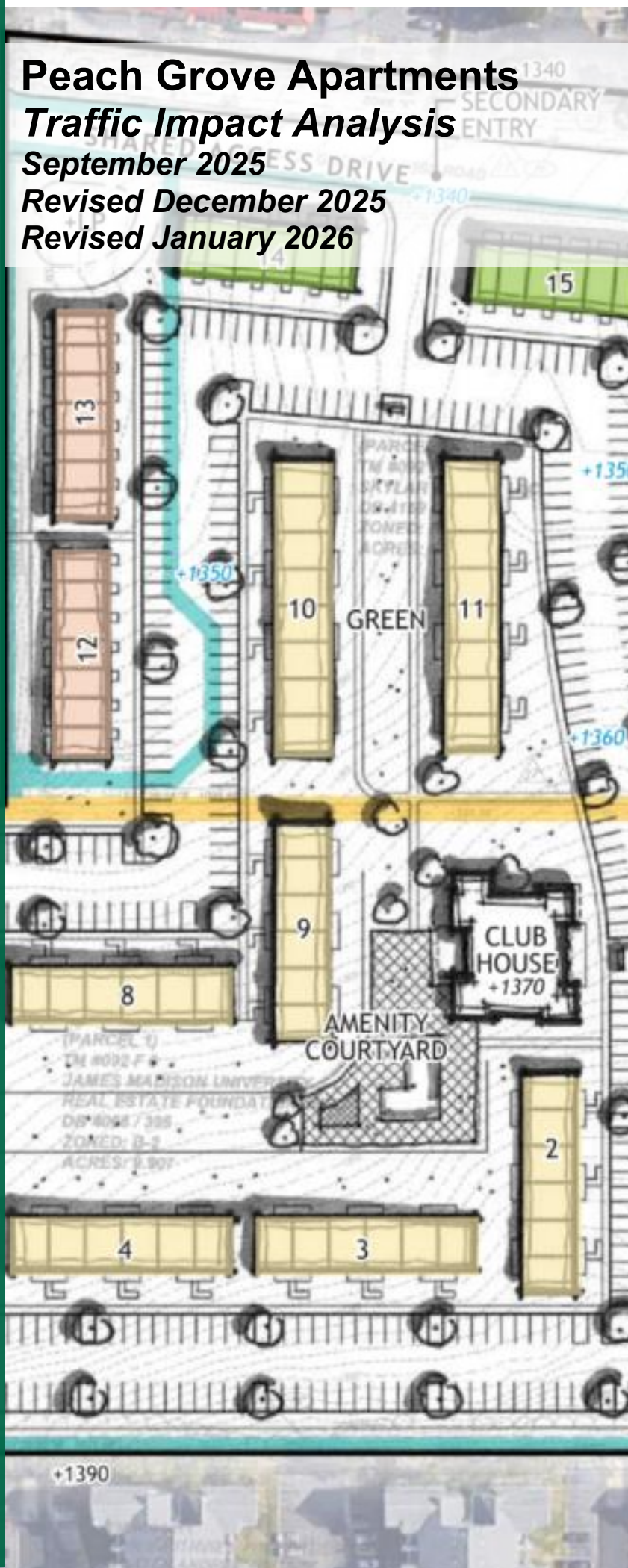
TIMMONS GROUP

Peach Grove Apartments

Traffic Impact Analysis

September 2025
Revised December 2025
Revised January 2026



Prepared for:

LCD Acquisitions, Inc.

Thomas Ruff, PE, PTOE, AICP
Project Manager

(804) 200-6430
Thomas.Ruff@Timmons.com

608 Preston Ave, Suite 200
Charlottesville, VA 22903

Peach Grove Student Apartments

Traffic Impact Analysis

Harrisonburg, Virginia

Prepared For:

LCD Acquisitions, Inc.

Prepared By:

Timmons Group
608 Preston Avenue
Suite 200
Charlottesville, Virginia 22903
(804) 200-6430

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

Project Manager – Thomas Ruff, PE, PTOE, AICP

Project Engineer – Evan Robohm, PE

Analyst – Zachary Holder

January 2026

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

1 EXECUTIVE SUMMARY

This report presents the findings of the traffic impact analysis prepared for the proposed Peach Grove Apartments off-campus student housing development in the City of Harrisonburg, Virginia. The purpose of this analysis is to determine the impact of the proposed development on the surrounding roadway network.

The proposed development is located on undeveloped land generally near the SW corner of Peach Grove Avenue and Port Republic Road as shown in Figure 1 (all figures are located at the end of their respective chapter). The proposed development will consist of approximately 800 beds (180-200 dwelling units) of off-campus student housing. The subject property is comprised of two parcels as described below:

- Parcel 1 (092-F-6, approx. 9.91 ac)
  - Located closest to Apartments along Lois Lane
  - Currently zoned B-2, seeking rezoning to R-5c with SUPs for multi-family buildings of more than 12 units per building and to increase height.
- Parcel 2 (092-F-10, approx. 5.44 ac)
  - Located closest to the McDonalds
  - Currently zoned R-5c, seeking to amend proffers with SUPs for multi-family buildings of more than 12 units per building and to increase height.

Access to the site will be provided via two (2) full movement entrances. One (1) on Peach Grove Avenue and one (1) on the Commercial Access Road that borders the east side of the property. A conceptual plan is shown on Figure 2. When complete, the proposed development will generate a total of 132 trips (36 in and 96 out) during the AM peak, 246 trips (128 in and 118 out) during the PM peak, and 3,193 average weekday daily trips. Note that the anticipated total site trips are based on a conservative estimate of 200 bedrooms. The number of dwelling units and bedrooms shown in Figure 2 is more accurate to the expected development.

The study limits include the following six (6) existing intersections:

1. Port Republic Road at Peach Grove Avenue/Neff Avenue (signalized);
2. Peach Grove Avenue at Commercial Access Road (unsignalized);
3. Peach Grove Avenue at Lois Lane (unsignalized);
4. Port Republic Road at McDonalds Access (unsignalized);
5. Port Republic Road at Food Lion Access (unsignalized);
6. Port Republic Road at Devon Lane (signalized);

In addition, the two site entrances will be analyzed in 2030 future conditions.

Timmons Group conducted a scoping meeting on September 22, 2025 with the City of Harrisonburg to set the parameters for this traffic analysis. In accordance with the scoping agreement, analyses were completed for the following scenarios:

1. 2025 Existing Traffic Conditions;
2. 2030 Background Traffic Conditions (without development of the site); and
3. 2030 Future Traffic Conditions (with development of the site).
4. Turn Lane Warrant Analysis (TLWA) at the proposed site entrances on Peach Grove Avenue and Commercial Access Road.

A copy of the scoping documents is included in Appendix A.

The following steps were taken to determine the potential traffic impacts associated with this project:

1. Data Collection – Existing AM and PM peak hour traffic counts were collected at study intersections 1, 2, and 4 on April 29, 2025. Traffic counts for intersections 3, 5, and 6 were provided by the City of Harrisonburg.

2. Traffic Growth – Background annual traffic growth rates were based on a recent MPO study of the project area. A 0.75% growth rate was applied to Neff Avenue, Devon Lane, and Port Republic Road north of Peach Grove Avenue. A 2.0% annual growth rate was applied to Peach Grove Avenue and Port Republic Road South of Peach Grove Avenue. A 1.0% annual growth rate was applied to the existing bike and pedestrian volumes at all study intersections for the 2030 analysis scenarios to account for development outside the study area.

3. Background Developments – The traffic generated from the approved Forest Hills Tower rezoning were included under 2030 Background and Future traffic conditions. The expected number of AM and PM peak hour vehicle site trips were taken from the approved traffic impact analysis dated July 21, 2023. A copy of the Forest Hills Tower TIA is included in Appendix B.

4. Trip Generation – Traffic generated by the proposed development was estimated using the 11th edition of the Institute of Transportation Engineers' *Trip Generation Manual*.

5. Traffic Distributions – The distribution of trips generated by the proposed developed was based on the existing traffic volumes, the nature of the use, and local knowledge.

6. Site Traffic Projections – Future traffic volumes were determined by combining the 2030 background traffic volumes with proposed new trips generated by the site to create the 2030 total traffic volumes used in the analysis.

7. Traffic Capacity Analysis – Level of service calculations for existing, background, and future conditions were performed using SYNCHRO Version 11 with SimTraffic for all study intersections.

8. Queuing Analysis – The 95th percentile queue lengths (Synchro) and maximum queues (SimTraffic) were reviewed at the intersections listed above.

Based on the operational analysis provided, the roadway network generally operates at acceptable levels of service today under 2025 existing conditions. Side street approaches to Port Republic Road (Devon Lane, Peach Grove Ave, and Neff Ave) experience congestion during the PM peak hour particularly. With 5 years of additional traffic growth in the study area, the roadway network is able to handle more traffic with minor increases in delay and queueing to the operations at the study intersections.

Upon completion of the proposed development, the Port Republic Road/Peach Grove Ave intersection will experience increases in delay, mostly during the PM peak hour; most notably:

- Overall intersection delay increases 8.4 seconds and continues to operate at LOS D
- WB thru maximum queue increases by about 200 ft and continues to operate at LOS E
- EB left delay increases by 32.2 seconds and now operates at a LOS F

All queuing challenges at the Port Republic Road/Peach Grove Ave intersection present under 2030 build conditions were not created by the proposed development. The increase in overall intersection delay is most attributed to delay increases at the southbound approach; however, the proposed development will add minimal traffic to this approach.

Some unsignalized intersections experience a large increase in delay in the PM peak hour due to the proposed development's traffic volumes: Peach Grove Avenue/Commercial Access Road and Port Republic Road/Food Lion Access. At both of these intersections, the side street approach operates at a LOS F which is typical for a minor street approach to a busy arterial street.

The overall PM peak hour delay at the Peach Grove Avenue/Commercial Access Road may induce cut-through traffic through the proposed site. The following traffic calming measures are recommended for consideration to mitigate potential safety concerns caused by cut-through traffic:

- Speed Tables/Raised Crosswalks
    - Ideal near building entrances and sidewalks leading to the clubhouse, amenity courtyard, or mailboxes
- Raised Intersections
    - Install at the main and secondary entrance to lower speeds throughout the development and visually signal the transition from a public road to a private residential space
- Chicanes/Lateral Shifts
    - Introduce a horizontal deflection by alternating planters, parking, or curb extensions
- Enhanced Signage
    - Including lower internal speed limit (10-15 mph) as well as "No Thru Traffic" signage.

The results of the turn lane warrant analysis indicate that improvements are needed at Intersection #7 (Peach Grove Avenue at Site Entrance A):

- Install an eastbound left turn lane (minimum 100' storage x 100' taper)
- Install a westbound right turn taper (minimum 100' taper)

Note that Peach Grove Avenue has an existing two-way left-lane and can be used to serve the purposes of the left turn lane. The applicant is proposing to install a westbound right turn lane with 150' storage which satisfies the requirements of the turn lane warrant.

At the two signalized study intersections (Port Republic Road/Devon Lane and Port Republic Road/Peach Grove Avenue), physical improvements are needed to improve capacity. Timmons Group has reviewed potential options, and all involve roadway widening beyond the existing right-of-way. These are broader, corridor-level needs that are not triggered by the proposed development. The traffic generated by the project can be accommodated within the existing network; therefore, no further development-specific roadway improvements are required.

2 BACKGROUND INFORMATION

2.1 DESCRIPTION OF ON-SITE DEVELOPMENT

The proposed development is located on undeveloped land generally near the SW corner of Peach Grove Avenue and Port Republic Road as shown in Figure 1 (all figures are located at the end of their respective chapter). The proposed development will consist of approximately 800 beds (180-200 dwelling units) of off-campus student housing. The subject property is comprised of two parcels as described below:

- Parcel 1 (092-F-6, approx. 9.91 ac)
  - Located closest to Apartments along Lois Lane
  - Currently zoned B-2, seeking rezoning to R-5c with SUPs for multi-family buildings of more than 12 units per building and to increase height.
- Parcel 2 (092-F-10, approx. 5.44 ac)
  - Located closest to the McDonalds
  - Currently zoned R-5c, seeking to amend proffers with SUPs for multi-family buildings of more than 12 units per building and to increase height.

Access to the site will be provided via two (2) full movement entrances. One (1) on Peach Grove Avenue and one (1) on the Commercial Access Road that borders the east side of the property. A conceptual plan is shown on Figure 2.

2.2 STUDY LIMITS

The study limits include the following six (6) existing intersections:

1. Port Republic Road at Peach Grove Avenue/Neff Avenue (signalized);
2. Peach Grove Avenue at Commercial Access Road (unsignalized);
3. Peach Grove Avenue at Lois Lane (unsignalized);
4. Port Republic Road at McDonalds Access (unsignalized);
5. Port Republic Road at Food Lion Access (unsignalized);
6. Port Republic Road at Devon Lane (signalized);

In addition, the two site entrances will be analyzed in 2030 future conditions.

2.3 EXISTING ROADWAY NETWORK

Peach Grove Avenue between Stone Spring Road and Port Republic Road is a two-lane major collector with a two-way left turn lane and a speed limit of 25 mph. No VDOT count book traffic data is available for Peach Grove Avenue. The roadway has a bike lane and sidewalk on the northern side through the study area. There is a sidewalk on the southern side from Port Republic Road to the intersection of Peach Grove Ave and Commercial Access Road.

Port Republic Road between Devon Lane and Stone Spring Road is a four-lane minor arterial with a two-way left turn lane and a speed limit of 35 mph. According to VDOT 2024 count book data, Port Republic Road services 28,280 vehicles per day to the north of Peach Grove Avenue and 15,150 vehicles per day to the south of Peach Grove Avenue. The roadway has sidewalks on both sides through the study area. There are bike lanes in both directions from the Peach Grove Avenue/Neff Avenue intersection north through Devon Lane.

Neff Avenue between Port Republic Road and Reservoir Street is a four-lane major collector with a speed limit of 35 mph. No VDOT count book traffic data is available for Neff Ave services Avenue. The roadway has bike lanes on both sides and sidewalks on one side (north) through the study area.

Commercial Access Road and McDonalds Access between Peach Grove Avenue and Port Republic Road is a two-lane private road with no posted speed limit.. The roadway has no existing bike lanes or sidewalks through the study area.

The 2025 existing lane use and traffic control at the study intersections is shown on Figure 3.

3 2025 EXISTING CONDITIONS

3.1 EXISTING TRAFFIC VOLUMES

Existing peak hour turning movement counts were collected at study intersections #1 (Port Republic Road at Peach Grove Avenue/Neff Avenue), #2 (Peach Grove Avenue at Commercial Access Road), and #4 (Port Republic Road at McDonalds Access) during the AM (7:00-9:00) and PM (4:00-6:00) peak hour timeframes. The counts were conducted on April 29, 2025 on a typical weekday when public schools and James Madison University were in session. The counts included heavy vehicles by movement, bikes, and pedestrians.

Peak hour traffic data for the remaining intersections (#3, 5, 6) were provided by the City of Harrisonburg. Traffic counts from these intersections were adjusted to be within 10% of the collected traffic data.

The common peak hours across all study intersections were found to be 8:00–9:00 AM and 4:45–5:45 PM. The existing vehicle traffic counts are shown on Figure 4; existing pedestrian volumes are shown on Figures 5.

All traffic counts are included in Appendix C. Existing signal timings for all intersections were provided by the City of Harrisonburg and are included in Appendix D.

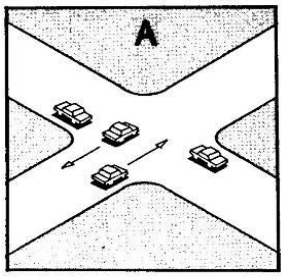
3.2 CAPACITY ANALYSIS

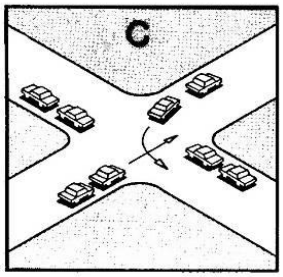
Capacity analysis allows traffic engineers to determine the impacts of traffic on the surrounding roadway network. The Transportation Research Board's (TRB) *Highway Capacity Manual* (HCM) methodologies govern how the capacity analyses are conducted and how the results are interpreted. There are six letter grades of Levels of Service (LOS) from A to F, with LOS A representing the best operating conditions and LOS F the worst operating conditions. Table 1 shows in detail how each of these levels of service are interpreted.

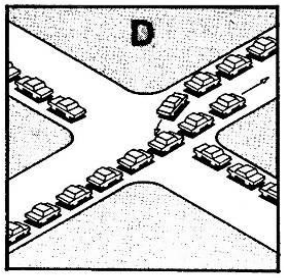
Table 1: Level of Service Definitions

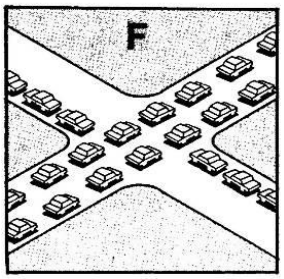
Level of Service	Roadway Segments or Controlled Access Highways	Intersections
A	Free flow, low traffic density.	No vehicle waits longer than one signal indication.
B	Delay is not unreasonable, stable traffic flow.	On a rare occasion motorists wait through more than one signal indication.
C	Stable condition, movements somewhat restricted due to higher volumes, but not objectionable for motorists.	Intermittently drivers wait through more than one signal indication, and occasionally backups may develop behind left turning vehicles, traffic flow still stable and acceptable.
D	Movements more restricted, queues and delays may occur during short peaks, but lower demands occur often enough to permit clearing, thus preventing excessive backups.	Delays at intersections may become extensive with some, especially left-turning vehicles waiting two or more signal indications, but enough cycles with lower demand occur to permit periodic clearance, thus preventing excessive backups.
E	Actual capacity of the roadway invloves delay to all motorists due to congestion.	Very long queues may create lengthly delays, especially for left-turning vehicles.
F	Forced flow with demand volumes greater than capacity resulting in complete congestion. Volumes drop to zero in extreme cases.	Backups from locations downstream restrict or prevent movement of vehicles out of approach creating a storage ares during part or all of an hour.

SOURCE: *"A Policy on Design of Design of Urban Highways and Arterial Streets"* - AASHTO, 1973 based upon material published in *"Highway Capacity Manual"*, National Academy of Sciences, 1965.









For all study intersections, level of service is defined in terms of delay, a measure of driver discomfort, frustration, fuel consumption and lost travel time. Table 2 summarizes the delay associated with each LOS category:

Table 2: Signalized and Unsignalized Intersection Level of Service Criteria

Signalized Intersections		Unsignalized Intersections	
Level of Service	Control Delay per Vehicle (sec/veh)	Level of Service	Average Control Delay (sec/veh)
A	≤ 10	A	0 to 10
B	> 10 to ≤ 20	B	> 10 to ≤ 15
C	> 20 to ≤ 35	C	> 15 to ≤ 25
D	> 35 to ≤ 55	D	> 25 to ≤ 35
E	> 55 to ≤ 80	E	> 35 to ≤ 50
F	> 80	F	> 50

Source: Exhibit 16-2 and Exhibit 17-2 from TRB's "Highway Capacity Manual 2000"

Capacity analyses were performed to assess existing (2025), background (2030), and future (2030) operational conditions. The signalized and unsignalized intersections were analyzed using SYNCHRO Version 11 based on HCM 6th Edition methodologies.

3.3 EXISTING CONDITIONS CAPACITY ANALYSIS RESULTS

Table 3 summarizes the 2025 existing intersection LOS, delay, 95th percentile queue lengths (Synchro), and longest queue lengths (SimTraffic) based on the 2025 existing intersection geometry (Figure 2) and the peak hour traffic and pedestrian volumes shown on Figure 4 and Figure 5, respectively. The corresponding SYNCHRO and SimTraffic reports are included in Appendix E. Note that the intersection numbers shown on the LOS, delay, and queue length summary tables correspond with the intersection numbers used in the SYNCHRO models and report figures.

As shown in Table 3, under 2025 existing conditions:

1. The signalized intersection of Port Republic Road and Peach Grove Avenue/Neff Avenue operates at an overall LOS C and LOS D during the AM and PM peak hours, respectively.
    a. The mainline (north-south) approaches and movements operate at a LOS D or better during the AM and PM peak hours, except for the northbound through and right movements which operate at LOS E during the PM peak hour. The maximum queue length of the northbound right fills the available turn lane capacity during the PM peak hour.
    b. The eastbound approach and movements all operate at LOS E during both the AM and PM peak hours, except for the eastbound left which operates at LOS D during the PM peak hour. The maximum queue length of the eastbound right fills the available capacity during the PM peak hour.
    c. The westbound approaches operate at LOS D during the AM and PM peak hours, and the westbound through movements operate at LOS E during the AM and PM peak hours. The through lane queues may block access to the right turn lane during the PM peak hour.

2. At the unsignalized intersection of Peach Grove Avenue and the Commercial Access Road the mainline (east-west) approaches operate at a LOS A during the AM and PM peaks. The side street (north-south) approaches operate at a LOS C or better during the AM and PM peaks, except for the southbound approach which operates at LOS D during the PM peak hour. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

3. At unsignalized intersections #3-5 the mainline approaches operate at a LOS A during the AM and PM peaks. The side street approach operates at a LOS D or better during the AM and PM peaks. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

4. The signalized intersection of Port Republic Road and Devon Lane operates at an overall LOS D during both the AM and PM peak hours.
    a. The mainline (north-south) approaches and movements operate at LOS D or better during the AM and PM peak hours. The maximum queue length of the southbound left exceeds the available turn lane storage during the PM peak hour.
    b. The side street (east-west) approaches operate at LOS E during both the AM and PM peak hours. The maximum simulated queue length of the westbound left/through movement exceeds the available turn lane storage.

Table 3: Intersection Level of Service and Delay Summary

2025 Existing Traffic

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Port Republic Road (N-S)	EB Left	200	63.7	E	110	173	45.6	D	105	197
Peach Grove Ave/Neff Ave (E-W)	EB Thru		65.5	E	168	223	68.8	E	208	330
Signalized	EB Right	200	66.6	E	-	184	70.1	E	-	199
	EB Approach		*65.5*	*E*	-		*64.2*	*E*	-	
	WB Left		50.8	D	34	93	53.0	D	112	558
	WB Thru		73.7	E	121	217	72.6	E	320	819
	WB Right	230	39.7	D	0	167	8.1	A	39	230
	WB Approach		*51.9*	*D*	-		*45.0*	*D*	-	
	NB Left	300	12.4	B	23	108	20.7	C	30	125
	NB Thru		29.4	C	127	197	55.3	E	211	288
	NB Right	190	15.9	B	0	87	55.8	E	0	190
	NB Approach		*24.2*	*C*	-		*52.2*	*D*	-	
	SB Left	200	16.0	B	52	139	25.6	C	95	170
	SB Thru		0.7	A	62	139	7.0	A	94	400
	SB Right		0.7	A	-	137	7.0	A	-	348
	SB Approach		*5.3*	*A*	-		*13.5*	*B*	-	
	Overall		31.9	C	-		39.0	D	-	
2. Peach Grove Ave (E-W)	EB Left		8	A	3	48	8.7	A	5	58
Commercial Access (N-S)	EB Thru/Right		†	†	-	*	†	†	-	*
Unsignalized	*EB Approach*		*0.8*	*A*	-		*1.1*	*A*	-	
	WB Left		8.2	A	3	30	8.2	A	0	30
	WB Thru/Right		†	†	-	33	†	†	-	100
	WB Approach		*0.8*	*A*	-		*0.2*	*A*	-	
	NB Left/Thru/Right		15	C	13	55	22.5	C	20	59
	NB Approach		*15*	*C*	-		*22.5*	*C*	-	
	SB Left/Thru/Right		15.1	C	13	58	31	D	73	126
	SB Approach		*15.1*	*C*	-		*31*	*D*	-	
3. Peach Grove Ave (E-W)	EB Left		8	A	0	33	8.7	A	3	40
Lois Lane (N-S)	EB Thru		†	†	-		†	†		
Unsignalized	*EB Approach*		*0.3*	*A*	-		*0.6*	*A*	-	
	WB Thru/Right		†	†	-		†	†	-	27
	WB Approach		*0*	*A*	-		*0*	*A*	-	
	SB Left/Right		16.3	C	45	123	17	C	35	117
	SB Approach		*16.3*	*C*	-		*17*	*C*	-	
4. Port Republic Road (N-S)	EB Left/Right		12	B	8	58	14.5	B	8	103
McDonalds Access (E-W)	*EB Approach*		*12*	*B*	-		*14.5*	*B*	-	
Unsignalized	NB Left		9	A	0	26	0	A	0	
	NB Thru		†	†	-	24	†	†	-	
	NB Approach		*0.1*	*A*	-		*0*	*A*	-	
	SB Thru		†	†	-	*	†	†	-	*
	SB Thru/Right		†	†	-	*	†	†	-	*
	SB Approach		*0*	*A*	-		*0*	*A*	-	
5. Port Republic Road (N-S)	EB Left/Right		15.3	C	15	75	30.4	D	63	158
Food Lion Access (E-W)	*EB Approach*		*15.3*	*C*	-		*30.4*	*D*	-	
Unsignalized	NB Left		9	A	3	52	11	B	5	68
	NB Thru		†	†	-		†	†	-	
	NB Approach		*0.3*	*A*	-		*0.4*	*A*	-	
	SB Thru		†	†	-		†	†	-	
	SB Thru/Right		†	†	-	11	†	†	-	2
	SB Approach		*0*	*A*	-		*0*	*A*	-	
6. Port Republic Road (N-S)	EB Left/Thru		65.1	E	334	401	75.3	E	287	350
Devon Lane (E-W)	EB Right	150	0.0	A	0	134	0.0	A	0	135
Signalized	*EB Approach*		*65.1*	*E*	-		*75.3*	*E*	-	
	WB Left/Thru	100	61.8	E	62	80	73.1	E	87	92
	WB Right		71.2	E	0	82	65.0	E	0	70
	WB Approach		*67.8*	*E*	-		*71.9*	*E*	-	
	NB Left	175	24.2	C	m9	45	38.9	D	m18	124
	NB Thru		21.0	C	283	240	18.5	B	217	224
	NB Thru/Right		20.9	C	-	238	18.5	B	-	234
	NB Approach		*21.0*	*C*	-		*19.4*	*B*	-	
	SB Left	265	14.9	B	42	76	13.4	B	124	264
	SB Thru		36.8	D	316	236	42.7	D	656	425
	SB Thru/Right		36.7	D	-	212	43.5	D	-	403
	SB Approach		*35.5*	*D*	-		*39.4*	*D*	-	
	Overall		35.1	D	-		36.4	D	-	

1 Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

m - Volume for 95th percentile queue is metered by upstream signal.

* - Queue assigned to downstream signalized intersection

4 2030 BACKGROUND CONDITIONS

The background 2030 volumes were analyzed assuming existing intersection geometry in conjunction with approved background developments and projected background traffic volumes.

4.1 BACKGROUND DEVELOPMENTS

The traffic generated from the approved Forest Hills Tower rezoning were included under 2030 Background and Future traffic conditions. This development is located at the NE corner of the Port Republic Road & Devon Lane intersection. The expected number of AM and PM peak hour vehicle site trips were taken from the approved traffic impact analysis dated July 21, 2023. Site trips from the Forest Hills Tower rezoning are shown on Figure 6. A copy of the Forest Hills Tower TIA is included in Appendix B.

4.2 2030 BACKGROUND TRAFFIC VOLUMES

The 2% and 0.75% annual vehicle growth rates and the 1% annual pedestrian growth rates discussed above were compounded annually for the five-year period from 2025 to 2030 and was applied to all movements at the study intersections. The resulting 2030 forecasted vehicle growth (existing + growth) volumes are shown on Figure 7; the 2030 pedestrian background (existing + growth) volumes are shown on Figure 8.

The traffic generated by background developments (Figure 6) were combined with the 2030 growth forecast volumes (Figure 7) to create the 2030 Background Traffic volumes, shown on Figure 9.

4.3 BACKGROUND 2030 CAPACITY ANALYSIS RESULTS

Table 4 summarizes the 2030 background intersection LOS, delay, 95th percentile queue lengths (Synchro), and maximum queue lengths (SimTraffic) based on the 2025 existing intersection geometry (Figure 2) and the 2030 background peak hour traffic and pedestrian volumes shown on Figure 9 and Figure 8, respectively, and the Forest Hills Tower Rezoning site trips (Figure 6). The corresponding SYNCHRO and SimTraffic reports are included in Appendix F. Note that the intersection numbers shown on the LOS, delay, and queue length summary tables correspond with the intersection numbers used in the SYNCHRO models and report figures.

As shown in Table 4 under 2030 background conditions:

1. The signalized intersection of Port Republic Road and Peach Grove Avenue/Neff Avenue continues to operate at an overall LOC C and LOS D during the AM and PM peak hours, respectively.
    a. The mainline (north-south) approaches and movements operate at a LOS D or better during the AM and PM peak hours, except for the northbound through and right movements which operate at LOS E during the PM peak hour. The simulated maximum queue of the northbound right turn lane exceeds its capacity during the AM and PM peak hours.
    b. The eastbound approach and movements all operate at LOS E during both the AM and PM peak hours, except for the eastbound left which operates at LOS D during the PM peak hour. The simulated maximum queue of the eastbound left turn lane reaches its available capacity during the PM peak hour. Note that the eastbound left is a two way left turn lane that could theoretically accommodate much larger queues. However, the analysis indicates that under 2030 existing conditions the maximum left turn queue will block access to the Commercial Access Road and business driveways (Intersection 2). The maximum queue length of the eastbound right fills the available capacity during the PM peak hour.

   c. The westbound approaches operate at LOS D during the AM and PM peak hours, and the westbound through movements operate at LOS E during the AM and PM peak hours. The through lane queues may block access to the right turn lane during the PM peak hour.

2. At the unsignalized intersection of Peach Grove Avenue and the Commercial Access Road the mainline (east-west) approaches continue to operate at a LOS A during the AM and PM peaks. The side street (north-south) approaches operate at a LOS D or better during the AM and PM peaks, except for the southbound approach which operates at LOS E during the PM peak hour. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

3. At unsignalized intersections #3-5, the approaches continue to operate at a LOS A during the AM and PM peaks. The side street approaches operate at a LOS C or better during the AM and PM peaks, except for the eastbound approach of Port Republic Road and Food Lion Access which operates at LOS E during the PM peak hour. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

4. The signalized intersection of Port Republic Road and Devon Lane operates at an overall LOS C and LOS D during the AM and PM peak hours, respectively.
   a. The mainline (north-south) approaches and movements operate at LOS D or better during the AM and PM peak hours. The maximum queue lengths of the southbound left exceeds the available turn lane storage during the PM peak hour.
   b. The side street (east-west) approaches operate at LOS E during both the AM and PM peak hours. The maximum simulated queue length of the westbound left/through movement exceeds the available turn lane storage. The maximum queue of the eastbound through/left movement blocks access to the eastbound right turn lane during the PM peak hour.

Table 4: Intersection Level of Service and Delay Summary

2030 Background Traffic

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Port Republic Road (N-S)	EB Left	200	63.3	E	122	188	48.8	D	121	199
Peach Grove Ave/Neff Ave (E-W)	EB Thru		65.9	E	184	264	70.7	E	231	382
Signalized	EB Right	200	67.1	E	-	194	72.2	E	-	200
	EB Approach		*65.7*	*E*	-		*66.2*	*E*	-	
	WB Left		50.7	D	32	88	51.8	D	115	613
	WB Thru		72.2	E	116	208	73.6	E	331	891
	WB Right	230	40.2	D	0	162	8.7	A	49	230
	WB Approach		*51.4*	*D*	-		*44.4*	*D*	-	
	NB Left	300	12.4	B	24	96	22.6	C	34	250
	NB Thru		29.6	C	132	187	58.3	E	246	362
	NB Right	190	16.1	B	0	188	57.9	E	0	190
	NB Approach		*24.4*	*C*	-		*55.0*	*D*	-	
	SB Left	200	16.6	B	59	144	33.7	C	140	171
	SB Thru		0.6	A	64	156	10.0	B	134	462
	SB Right		0.7	A	-	159	10.0	B	-	406
	SB Approach		*5.6*	*A*	-		*18.5*	*B*	-	
	Overall		32.0	C	-		41.8	D	-	
2. Peach Grove Ave (E-W)	EB Left		8	A	3	41	9	A	5	60
Commercial Access (N-S)	EB Thru/Right		†	†	-	*	†	†	-	*
Unsignalized	*EB Approach*		*0.8*	*A*	-		*1.1*	*A*	-	
	WB Left		8.2	A	3	30	8.3	A	0	30
	WB Thru/Right		†	†	-	44	†	†	-	149
	WB Approach		*0.8*	*A*	-		*0.2*	*A*	-	
	NB Left/Thru/Right		14.9	B	13	62	27.7	D	30	77
	NB Approach		*14.9*	*B*	-		*27.7*	*D*	-	
	SB Left/Thru/Right		15.1	C	13	69	49	E	115	159
	SB Approach		*15.1*	*C*	-		*49*	*E*	-	
3. Peach Grove Ave (E-W)	EB Left		8	A	0	29	8.8	A	3	51
Lois Lane (N-S)	EB Thru		†	†	-		†	†		
Unsignalized	*EB Approach*		*0.3*	*A*	-		*0.6*	*A*	-	
	WB Thru/Right		†	†	-	2	†	†	-	37
	WB Approach		*0*	*A*	-		*0*	*A*	-	
	SB Left/Right		16.3	C	45	135	19.1	C	45	137
	SB Approach		*16.3*	*C*	-		*19.1*	*C*	-	
4. Port Republic Road (N-S)	EB Left/Right		12.2	B	8	55	15.3	C	8	154
McDonalds Access (E-W)	*EB Approach*		*12.2*	*B*	-		*15.3*	*C*	-	
Unsignalized	NB Left		9.1	A	0	26	0	A	0	
	NB Thru		†	†	-	28	†	†	-	
	NB Approach		*0.1*	*A*	-		*0*	*A*	-	
	SB Thru		†	†	-	*	†	†	-	*
	SB Thru/Right		†	†	-	*	†	†	-	*
	SB Approach		*0*	*A*	-		*0*	*A*	-	
5. Port Republic Road (N-S)	EB Left/Right		16.2	C	15	76	36.5	E	78	133
Food Lion Access (E-W)	*EB Approach*		*16.2*	*C*	-		*36.5*	*E*	-	
Unsignalized	NB Left		9.2	A	3	56	11.5	B	5	64
	NB Thru		†	†	-	9	†	†	-	
	NB Approach		*0.3*	*A*	-		*0.4*	*A*	-	
	SB Thru		†	†	-	9	†	†	-	2
	SB Thru/Right		†	†	-	10	†	†	-	2
	SB Approach		*0*	*A*	-		*0*	*A*	-	
6. Port Republic Road (N-S)	EB Left/Thru		65.5	E	351	422	76.1	E	300	336
Devon Lane (E-W)	EB Right	150	0.0	A	0	135	0.0	A	0	148
Signalized	*EB Approach*		*65.5*	*E*	-		*76.1*	*E*	-	
	WB Left/Thru	100	62.5	E	105	97	79.0	E	150	98
	WB Right		70.4	E	0	159	63.1	E	0	177
	WB Approach		*66.8*	*E*	-		*75.4*	*E*	-	
	NB Left	175	24.5	C	m9	80	41.8	D	m16	136
	NB Thru		15.9	B	301	278	14.8	B	240	293
	NB Thru/Right		15.9	B	-	290	14.7	B	-	302
	NB Approach		*16.0*	*B*	-		*15.9*	*B*	-	
	SB Left	265	16.2	B	60	114	15.9	B	154	261
	SB Thru		37.2	D	332	237	45.0	D	690	411
	SB Thru/Right		37.1	D	-	208	46.0	D	-	400
	SB Approach		*35.4*	*D*	-		*41.2*	*D*	-	
	Overall		33.7	C	-		37.0	D	-	

1 Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 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.

$ - Delay exceeds 300s

* - Queue assigned to downstream signalized intersection

5 TRIP GENERATION

Site traffic for the proposed development was estimated based on the site characteristics and subsequently distributed to the surrounding roadway network.

The proposed development will consist of approximately 800 beds (180-200 dwelling units) of off-campus student housing. Access to the site will be provided via two (2) full movement entrances. One (1) on Peach Grove Avenue and one (1) on the Commercial Access Road that borders the east side of the property.

5.1 SITE TRIP GENERATION

The site-generated traffic volumes shown in Table 5 were estimated using the 11th Edition of the Institute of Transportation Engineers' (ITE) *Trip Generation Manual* and were calculated using the land use "Off-Campus Student Apartments Over ½ Mile from Campus" with the number of bedrooms as the independent variable.

Table 5: Peach Grove Apartments Trip Generation Summary

Buildout - Peach Grove Apartments				Weekday						
			Land Use	AM Peak Hour			PM Peak Hour			Average
Land Use	Amount	Units	Code	In (27%)	Out (73%)	Total	In (52%)	Out (48%)	Total	Daily Trips
1. ITE Trip Generation[(1)]										
Off-Campus Student Apartments >0.5 mi from Campus	800	Bedrooms	225	36	96	132	128	118	246	3,193
Total ITE Site Trips Generated				**36**	**96**	**132**	**128**	**118**	**246**	**3,193**

Notes:

(1) Calculated from the Institute of Transportation Engineers *Trip Generation Manual*, 11th Edition. Assumes General Urban/Suburban land use category.

As shown in Table 5, the proposed development will generate a total of 132 trips (36 in and 96 out) during the AM peak, 246 trips (128 in and 118 out) during the PM peak, and 3,193 average weekday daily trips.

5.2 EXTERNAL TRIP DISTRIBUTIONS

The distribution of external trips generated by the development was based on the existing travel patterns, the nature of the use, the existing traffic volumes, and local knowledge.

The following directional distributions were assumed for the site and are shown on Figure 10:

- 10% to/from the west on Peach Grove Avenue;
- 30% to/from the east on Neff Avenue;
- 10% to/from the south on Port Republic Road; and
- 50% to/from the north on Port Republic Road.

5.3 TRAFFIC ASSIGNMENT

The trip distribution percentages for the external trips from Figure 10 were applied to the trip generation table (Table 5) to distribute the external trips to the surrounding roadway network. The resulting site generated external trips are shown on Figure 11.

6 2030 TOTAL FUTURE CONDITIONS

To complete the analysis of 2030 total conditions (with the proposed development), the estimated site trips were added to the background 2030 traffic volumes. The projected volumes were then used to complete the capacity analysis.

6.1 TOTAL FUTURE TRAFFIC VOLUMES

To generate the 2030 total future traffic volumes, the external site trips shown on Figure 11 and the background 2030 vehicle volumes shown in Figure 9 were summed. The resulting 2030 total future traffic volumes are shown on Figure 12.

6.2 2030 FUTURE CONDITIONS ANALYSIS RESULTS

Table 6 summarizes the 2030 total future intersection LOS, delay, 95th percentile queue lengths (Synchro), and maximum queue lengths (SimTraffic) based on the 2025 existing intersection geometry (Figure 2), the background peak hour pedestrian volumes shown on Figure 8, and the 2030 total traffic volumes shown on Figure 12. The corresponding SYNCHRO and SimTraffic reports are included in Appendix G. Note that the intersection numbers shown on the LOS, delay, and queue length summary tables correspond with the intersection numbers used in the SYNCHRO models and report figures.

As shown in Table 6, under 2030 total future conditions with development of the site:

1. The signalized intersection of Port Republic Road and Peach Grove Avenue/Neff Avenue operates at an overall LOS D during the AM and PM peak hours.
    a. The mainline (north-south) approaches and movements operate at a LOS D or better during the AM and PM peak hours, except for the northbound approach and through and right movements which continue to operate at LOS E during the PM peak hour. The maximum queue length of the northbound right exceeds the available turn lane storage during the PM peak hour.
    b. The eastbound approach and movements all operate at LOS E during both the AM and PM peak hours. The simulated maximum queue length of the eastbound left turn lane and eastbound right turn lane fills the available capacity during the PM peak hour.
    c. The westbound approaches operate at LOS D during the AM and PM peak hours, and the westbound through movements operate at LOS E during the AM and PM peak hours. During the PM peak hour, the maximum queue for the through movement blocks the right turn lane.

2. At the unsignalized intersection of Peach Grove Avenue and the Commercial Access Road the mainline (east-west) approaches continue to operate at a LOS A during the AM and PM peaks. The side street (north-south) approaches operate at a LOS C during the AM peak and at LOS E or F during the PM peak hour. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

3. At unsignalized intersections #3-4, the mainline approaches continue to operate at a LOS A during the AM and PM peaks. The side street approach continues to operate at a LOS C or better during the AM and PM peaks. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

4. At the unsignalized intersection of Port Republic Road and Food Lion Commercial Access Road, the mainline (north-south) approaches continue to operate at LOS A during the AM and PM peaks. The side street (east-west) approach operates at LOS C during the AM peak and now operates

at LOS F during the PM peak. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

5. The signalized intersection of Port Republic Road and Devon Lane now operates at an overall LOS C and LOS D during the AM and PM peak hours, respectively.
    a. The mainline (north-south) approaches and movements operate at LOS D or better during the AM and PM peak hours. The maximum queue lengths of the southbound left exceed the available turn lane storage during the PM peak hour.
    b. The side street (east-west) approaches continue to operate at LOS E during both the AM and PM peak hours. The maximum simulated queue length of the westbound left/through movement exceeds the available turn lane storage.

6. At the proposed unsignalized intersection of Peach Grove Avenue and Site Entrance A, all movements and approaches operate with minimal delays and no queueing concerns in both the AM and PM peak hours. The southbound approach operates at LOS B and LOS C during the AM and PM peak hours, respectively.

7. At the proposed unsignalized intersection of Commercial Access Road and Site Entrance B, all movements and approaches operate with minimal delays and no queueing concerns in both the AM and PM peak hours.

Table 6: Intersection Level of Service Delay Summary

2030 Total Future Traffic

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Port Republic Road (N-S)	EB Left	200	79.5	E	159	164	81.0	F	#216	200
Peach Grove Ave/Neff Ave (E-W)	EB Thru		68.7	E	206	208	73.5	E	259	481
Signalized	EB Right	200	70.3	E	-	168	75.2	E	-	200
	EB Approach		*72.3*	*E*	-		*76.1*	*E*	-	
	WB Left		49.6	D	32	67	51.6	D	115	1004
	WB Thru		75.1	E	126	182	78.6	E	372	1078
	WB Right	230	41.2	D	7	108	8.7	A	48	230
	WB Approach		*53.2*	*D*	-		*47.7*	*D*	-	
	NB Left	300	13.2	B	26	69	25.5	C	41	240
	NB Thru		29.6	C	135	150	58.3	E	247	358
	NB Right	190	16.1	B	0	67	57.9	E	0	190
	NB Approach		*24.4*	*C*	-		*54.8*	*D*	-	
	SB Left	200	17.9	B	59	113	48.5	D	147	170
	SB Thru		0.7	A	64	100	27.6	C	143	489
	SB Right		0.7	A	-	129	27.6	C	-	436
	SB Approach		*6.0*	*A*	-		*34.9*	*C*	-	
	Overall		35.1	D	-		50.2	D	-	
2. Peach Grove Ave (E-W)	EB Left		8.1	A	3	33	9.3	A	8	98
Commercial Access (N-S)	EB Thru/Right		†	†	-		†	†	-	*
Unsignalized	*EB Approach*		*0.8*	*A*	-		*1.1*	*A*	-	
	WB Left		8.3	A	3	30	8.5	A	0	30
	WB Thru/Right		†	†	-	16	†	†	-	154
	WB Approach		*0.8*	*A*	-		*0.2*	*A*	-	
	NB Left/Thru/Right		16	C	13	39	35.2	E	38	116
	NB Approach		*16*	*C*	-		*35.2*	*E*	-	
	SB Left/Thru/Right		22.6	C	38	51	196	F	300	194
	SB Approach		*22.6*	*C*	-		*196*	*F*	-	
3. Peach Grove Ave (E-W)	EB Left		8	A	0	6	8.9	A	3	42
Lois Lane (N-S)	EB Thru		†	†	-		†	†		
Unsignalized	*EB Approach*		*0.3*	*A*	-		*0.6*	*A*	-	
	WB Thru/Right		†	†	-		†	†	-	21
	WB Approach		*0*	*A*	-		*0*	*A*	-	
	SB Left/Right		16.5	C	45	91	19.6	C	45	139
	SB Approach		*16.5*	*C*	-		*19.6*	*C*	-	
4. Port Republic Road (N-S)	EB Left/Right		12.3	B	8	34	15.7	C	8	114
McDonalds Access (E-W)	*EB Approach*		*12.3*	*B*	-		*15.7*	*C*	-	
Unsignalized	NB Left		9.2	A	0	9	0	A	0	
	NB Thru		†	†	-	9	†	†	-	
	NB Approach		*0.1*	*A*	-		*0*	*A*	-	
	SB Thru		†	†	-		†	†	-	*
	SB Thru/Right		†	†	-		†	†	-	*
	SB Approach		*0*	*A*	-		*0*	*A*	-	
5. Port Republic Road (N-S)	EB Left/Right		17.8	C	23	56	52.2	F	115	169
Food Lion Access (E-W)	*EB Approach*		*17.8*	*C*	-		*52.2*	*F*	-	
Unsignalized	NB Left		9.3	A	3	24	11.9	B	5	66
	NB Thru		†	†	-		†	†	-	2
	NB Approach		*0.3*	*A*	-		*0.4*	*A*	-	
	SB Thru		†	†	-	2	†	†	-	9
	SB Thru/Right		†	†	-		†	†	-	2
	SB Approach		*0*	*A*	-		*0*	*A*	-	
6. Port Republic Road (N-S)	EB Left/Thru		65.1	E	349	323	75.5	E	298	330
Devon Lane (E-W)	EB Right	150	0.0	A	0	30	0.0	A	0	135
Signalized	*EB Approach*		*65.1*	*E*	-		*75.5*	*E*	-	
	WB Left/Thru	100	62.5	E	105	75	79.0	E	150	98
	WB Right		70.4	E	0	64	63.1	E	0	184
	WB Approach		*66.8*	*E*	-		*75.4*	*E*	-	
	NB Left	175	24.7	C	m8	31	45.0	D	m16	164
	NB Thru		16.1	B	330	239	15.0	B	m271	314
	NB Thru/Right		16.1	B	-	246	15.0	B	-	330
	NB Approach		*16.2*	*B*	-		*16.1*	*B*	-	
	SB Left	265	16.3	B	60	63	16.4	B	#180	264
	SB Thru		37.7	D	342	188	49.2	D	#756	564
	SB Thru/Right		37.6	D	-	173	51.0	D	-	487
	SB Approach		*35.8*	*D*	-		*45.4*	*D*	-	
	Overall		33.5	C	-		39.0	D	-	
7. Peach Grove Ave (E-W)	EB Left/Thru		7.9	A	0		8.9	A	0	58
Site Entrance A (N-S)	*EB Approach*		*0*	*A*	-		*0.1*	*A*	-	
	WB Thru		†	†	-		†	†	-	2
	WB Right	150	†	†	-		†	†	-	
	WB Approach		†	†	-		*†*	*†*	-	
	SB Left/Right		13.1	B	8	44	17	C	15	69
	SB Approach		*13.1*	*B*	-		*17*	*C*	-	
8. Commercial Access (N-S)	EB Left/Thru/Right		8.7	A	5	35	9	A	5	62
Site Entrance B (E-W)	*EB Approach*		*8.7*	*A*	-		*9*	*A*	-	
	WB Left/Thru/Right		9.3	A	0	21	10.1	B	0	46
	WB Approach		*9.3*	*A*	-		*10.1*	*B*	-	
	NB Left/Thru/Right		7.2	A	0	3	7.3	A	3	12
	NB Approach		*6.8*	*A*	-		*7.2*	*A*	-	
	SB Left/Thru/Right		0	A	0		0	A	0	
	SB Approach		*0*	*A*	-		*0*	*A*	-	

1 Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 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.

* - Queue assigned to downstream signalized intersection

7 TURN LANE WARRANT ANALYSIS

To determine the need for any roadway improvements to accommodate the proposed development, a turn lane warrant analysis was performed at the intersections of Peach Grove Avenue and Site Entrance A, and the Commercial Access Road and Site Entrance B.

Turn lane warrant analyses were performed using the 2030 future traffic volumes (Figure 12). The warrants were completed using the applicable nomographs from the VDOT Road Design Manual, Appendix F. Note that VDOT does not have a figure for every possible speed limit; the lowest speed limit available to evaluate turn lanes is 40 mph. Therefore, this analysis is more conservative than using a 25 mph figure. The turning movements analyzed include:

- Peach Grove Avenue and Site Entrance A
    - Eastbound left
    - Westbound right

- Commercial Access Road and Site Entrance B
    - Northbound left
    - Southbound right

Note that since turning movement counts were not collected at the Site Entrance B intersection (Intersection 8), the opposing traffic volumes used to complete the left-turn lane warrant were estimated by balancing the unknown traffic volumes at Intersection 8 with the calculated total future traffic volumes at Intersection 2 and Intersection 4 shown in Figure 12. To provide a conservative estimate (i.e. a worst-case scenario) it was assumed that all traffic would reach Intersection 2 and Intersection 4 via the southbound approach of Intersection 8. The turn lane nomographs used in the analysis are shown on Figures 13 through 16.

The turn lane warrant analysis indicates the following:

- Eastbound left turn lane and taper **is warranted** on Peach Grove Avenue at Site Entrance A.
- Westbound right turn taper **is warranted** on Peach Grove Avenue at Site Entrance A.
- Northbound left turn lane nor taper **is not warranted** on Commercial Access Road at Site Entrance B.
- Southbound right turn lane nor taper **is not warranted** on Commercial Access Road at Site Entrance B.

Given the posted speed limit (25 MPH) and functional classification (urban major collector) of Peach Grove Avenue, the VDOT *Road Design Manual* recommends a minimum 100’ taper and a minimum 100’ storage for warranted turn lanes, with the storage being determined further by capacity analysis. The results of the capacity analysis performed using 2030 total future conditions (Section 6.2) demonstrate that a left turn lane with 100’ of storage and 100’ of taper is able to contain the queue length for all traffic entering the site during both the AM and PM peak hours.

8 MITIGATION SCENARIO ANALYSIS

At the request of the City, Timmons Group has analyzed a potential scenario to reduce vehicle delay impacts at the Peach Grove Ave/Commercial Access intersection. This information is presented for information only and does not suggest additional improvements recommended by this report.

The additional vehicular traffic at the unsignalized intersection of Peach Grove Avenue and Commercial Access (Intersection #2 in tables and figures) generated by the development of the site results in an increase in delay at the intersection. To minimize this delay and prevent potential adverse effects on safety, a mitigation scenario was analyzed in which southbound left turning and through vehicles at Intersection #2 were prohibited. The background and site generated traffic were redistributed according to the following scenario:

- Southbound left and southbound through site generated trips at Intersection #2 were rerouted to be eastbound rights at Intersection #5 (Port Republic Road and Food Lion Access). The rerouted site trips are shown on Figure 17.
- 75% of background southbound lefts at Intersection #2 were rerouted to be eastbound rights at Intersection #5 and then southbound lefts at Intersection #1. The remaining 25% were rerouted to be eastbound rights at Intersection #4 and then southbound throughs at Intersection #1. The rerouted background trips are shown on Figure 18.

The rerouted site and background trips shown on Figures 17 and 18 were combined to created the rerouted 2030 total traffic shown on Figure 19.

Table 7 summarizes the rerouted 2030 total future intersection LOS, delay, 95th percentile queue lengths (Synchro), and maximum queue lengths (SimTraffic) based on the 2025 existing intersection geometry (Figure 2), the background peak hour pedestrian volumes shown on Figure 8, and the rerouted 2030 total traffic volumes shown on Figure 19. The corresponding SYNCHRO and SimTraffic reports are included in Appendix H. Note that the intersection numbers shown on the LOS, delay, and queue length summary tables correspond with the intersection numbers used in the SYNCHRO models and report figures.

As shown in Table 7, under 2030 total future conditions with development of the site:

1. The signalized intersection of Port Republic Road and Peach Grove Avenue/Neff Avenue operates at an overall LOC C and LOS D during the AM and PM peak hours, respectively.
    a. The mainline (north-south) approaches and movements operate at a LOS D or better during the AM and PM peak hours, except for the northbound approach and through and right movements which continue to operate at LOS E during the PM peak hour. The southbound left now also operates at LOS E during the PM peak hour. The maximum queue length of the northbound right exceeds the available turn lane storage during the PM peak hour.
    b. The eastbound approach and movements all operate at LOS E during both the AM and PM peak hours, except for the eastbound left which now operates at LOS E during the PM peak hour. The simulated maximum queue length of the eastbound left turn lane and eastbound right turn lane fills the available capacity during the AM and PM peak hours.
    c. The westbound approaches operate at LOS D during the AM and PM peak hours, and the westbound through movements operate at LOS E during the AM and PM peak hours. During the PM peak hour, the maximum queue for the through movement blocks the right turn lane.

2. At the unsignalized intersection of Peach Grove Avenue and the Commercial Access Road the mainline (east-west) approaches continue to operate at a LOS A during the AM and PM peaks. The side street (north-south) approaches operate at a LOS C or better during the AM peak and PM peak hours, except for the northbound approach which operates at LOS D during the PM peak hour. All approaches have adequate distance to accommodate 95th percentile and maximum queue lengths.

All other intersections are not impacted by the proposed mitigation scenario, see the results shown in Chapter 6.

Table 7: Intersection Level of Service Delay Summary

Rerouted 2030 Total Future Traffic

Intersection and Type of Control	Movement and Approach	Turn Lane Storage (ft)	AM PEAK HOUR				PM PEAK HOUR			
			Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)	Delay [1] (sec/veh)	LOS [1]	HCS 95th Percentile Queue Length (ft)	Simulated Maximum Queue Length (ft)
1. Port Republic Road (N-S)	EB Left	200	63.4	E	122	180	49.4	D	#128	199
Peach Grove Ave/Neff Ave (E-W)	EB Thru		67.3	E	195	313	70.1	E	223	395
Signalized	EB Right	200	68.7	E	-	199	71.5	E	-	200
	EB Approach		*66.9*	*E*	-		*65.7*	*E*	-	
	WB Left		50.2	D	32	94	49.4	D	115	958
	WB Thru		75.1	E	126	248	78.6	E	372	1053
	WB Right	230	40.4	D	0	188	8.7	A	48	230
	WB Approach		*52.8*	*D*	-		*47.3*	*D*	-	
	NB Left	300	12.8	B	26	96	25.5	C	41	242
	NB Thru		29.6	C	134	198	58.3	E	247	352
	NB Right	190	16.1	B	0	137	57.9	E	0	190
	NB Approach		*24.4*	*C*	-		*54.8*	*D*	-	
	SB Left	200	17.6	B	64	148	56.7	E	190	171
	SB Thru		0.7	A	66	176	27.8	C	154	562
	SB Right		0.7	A	-	180	27.9	C	-	525
	SB Approach		*6.1*	*A*	-		*38.5*	*D*	-	
	Overall		32.7	C	-		48.7	D	-	
2. Peach Grove Ave (E-W)	EB Left		8.1	A	3	47	9.3	A	8	84
Commercial Access (N-S)	EB Thru/Right		†	†	-	*	†	†	-	*
Unsignalized	*EB Approach*		*0.8*	*A*	-		*1.1*	*A*	-	
	WB Left		8.3	A	3	30	8.5	A	3	30
	WB Thru/Right		†	†	-	69	†	†	-	136
	WB Approach		*0.8*	*A*	-		*0.3*	*A*	-	
	NB Left/Thru/Right		16	C	13	62	34.9	D	38	87
	NB Approach		*16*	*C*	-		*34.9*	*D*	-	
	SB Left/Thru/Right		10.2	B	5	51	14.5	B	20	103
	SB Approach		*10.2*	*B*	-		*14.5*	*B*	-	
3. Peach Grove Ave (E-W)	EB Left		8	A	0	31	8.9	A	3	45
Lois Lane (N-S)	EB Thru		†	†	-		†	†		
Unsignalized	*EB Approach*		*0.3*	*A*	-		*0.6*	*A*	-	
	WB Thru/Right		†	†	-	5	†	†	-	27
	WB Approach		*0*	*A*	-		*0*	*A*	-	
	SB Left/Right		16.5	C	45	127	19.6	C	45	136
	SB Approach		*16.5*	*C*	-		*19.6*	*C*	-	
4. Port Republic Road (N-S)	EB Left/Right		12.3	B	8	62	16.2	C	15	129
McDonalds Access (E-W)	*EB Approach*		*12.3*	*B*	-		*16.2*	*C*	-	
Unsignalized	NB Left		9.2	A	0	24	0	A	0	
	NB Thru		†	†	-	25	†	†	-	16
	NB Approach		*0.1*	*A*	-		*0*	*A*	-	
	SB Thru		†	†	-	*	†	†	-	*
	SB Thru/Right		†	†	-	*	†	†	-	*
	SB Approach		*0*	*A*	-		*0*	*A*	-	
5. Port Republic Road (N-S)	EB Left/Right		20.5	C	40	111	120.8	F	265	346
Food Lion Access (E-W)	*EB Approach*		*20.5*	*C*	-		*120.8*	*F*	-	
Unsignalized	NB Left		9.3	A	3	56	11.9	B	5	72
	NB Thru		†	†	-		†	†	-	
	NB Approach		*0.3*	*A*	-		*0.4*	*A*	-	
	SB Thru		†	†	-	16	†	†	-	34
	SB Thru/Right		†	†	-		†	†	-	16
	SB Approach		*0*	*A*	-		*0*	*A*	-	
6. Port Republic Road (N-S)	EB Left/Thru		65.1	E	349	371	75.5	E	298	340
Devon Lane (E-W)	EB Right	150	0.0	A	0	120	0.0	A	0	135
Signalized	*EB Approach*		*65.1*	*E*	-		*75.5*	*E*	-	
	WB Left/Thru	100	62.5	E	105	95	79.0	E	150	98
	WB Right		70.4	E	0	132	63.1	E	0	174
	WB Approach		*66.8*	*E*	-		*75.4*	*E*	-	
	NB Left	175	24.7	C	m9	74	45.0	D	m18	151
	NB Thru		16.1	B	325	291	15.0	B	265	285
	NB Thru/Right		16.1	B	-	300	15.0	B	-	300
	NB Approach		*16.2*	*B*	-		*16.1*	*B*	-	
	SB Left	265	16.3	B	60	90	16.4	B	#180	265
	SB Thru		37.7	D	342	252	49.2	D	#756	504
	SB Thru/Right		37.6	D	-	239	51.0	D	-	484
	SB Approach		*35.8*	*D*	-		*45.4*	*D*	-	
	Overall		33.5	C	-		39.0	D	-	
7. Peach Grove Ave (E-W)	EB Left/Thru		7.9	A	0	22	8.9	A	0	64
Site Entrance A (N-S)	*EB Approach*		*0*	*A*	-		*0.1*	*A*	-	
	WB Thru		†	†	-		†	†	-	2
	WB Right	150	†	†	-		†	†	-	
	WB Approach		†	†	-		†	†	-	
	SB Left/Right		13.1	B	8	61	17	C	15	69
	SB Approach		*13.1*	*B*	-		*17*	*C*	-	
8. Commercial Access (N-S)	EB Left/Thru/Right		8.9	A	3	50	9.9	A	8	58
Site Entrance B (E-W)	*EB Approach*		*8.9*	*A*	-		*9.9*	*A*	-	
	WB Left/Thru/Right		9.3	A	0	31	10.1	B	0	49
	WB Approach		*9.3*	*A*	-		*10.1*	*B*	-	
	NB Left/Thru/Right		7.2	A	0	3	7.3	A	3	20
	NB Approach		*6.8*	*A*	-		*7.2*	*A*	-	
	SB Left/Thru/Right		0	A	0		0	A	0	
	SB Approach		*0*	*A*	-		*0*	*A*	-	

1 Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

- 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.

* - Queue assigned to downstream signalized intersection

9 CONCLUSIONS

This report summarizes the findings and recommendations of the analysis provided in support of the Peach Grove Student Apartments, located near the intersection of Port Republic Road & Peach Grove Avenue. The development consists of 800 beds of off-campus student housing and is expected to be completed by 2030.

Based on the operational analysis provided, the roadway network generally operates at acceptable levels of service today under 2025 existing conditions. Side street approaches to Port Republic Road (Devon Lane, Peach Grove Ave, and Neff Ave) experience congestion during the PM peak hour particularly. With 5 years of additional traffic growth in the study area, the roadway network is able to handle more traffic with minor increases in delay and queueing to the operations at the study intersections.

Upon completion of the proposed development, the Port Republic Road/Peach Grove Ave intersection will experience increases in delay, mostly during the PM peak hour; most notably:

- Overall intersection delay increases 8.4 seconds and continues to operate at LOS D
- WB thru maximum queue increases by about 200 ft and continues to operate at LOS E
- EB left delay increases by 32.2 seconds and now operates at a LOS F

All queuing and storing issues at the Port Republic Road/Peach Grove Ave intersection present under 2030 build conditions are extant without the proposed development. The increase in overall delay is impacted significantly by delay increases at the southbound approach; however, the proposed development will add minimal traffic to this approach.

Some unsignalized intersections experience a large increase in delay in the PM peak hour due to the proposed development's traffic volumes: Peach Grove Avenue/Commercial Access Road and Port Republic Road/Food Lion Access. At both of these intersections, the side street approach operates at a LOS F which is typical for a minor street approach to a busy arterial street.

The overall PM peak hour delay at the Peach Grove Avenue/Commercial Access Road may induce cut-through traffic through the proposed site. The following traffic calming measures are recommended for consideration to mitigate potential safety concerns caused by cut-through traffic:

- Speed Tables/Raised Crosswalks
    - Ideal near building entrances and sidewalks leading to the clubhouse, amenity courtyard, or mailboxes
- Raised Intersections
    - Install at the main and secondary entrance to lower speeds throughout the development and visually signal the transition from a public road to a private residential space
- Chicanes/Lateral Shifts
    - Introduce a horizontal deflection by alternating planters, parking, or curb extensions
- Enhanced Signage
    - Including lower internal speed limit (10-15 mph) as well as "No Thru Traffic" signage.

The results of the turn lane warrant analysis indicate that improvements are needed at Intersection #7 (Peach Grove Avenue at Site Entrance A):

- Install an eastbound left turn lane (minimum 100' storage x 100' taper)
- Install a westbound right turn taper (minimum 100' taper)

Note that Peach Grove Avenue has an existing two-way left-lane and can be used to serve the purposes of the left turn lane. The applicant is proposing to install a westbound right turn lane with 150' storage which satisfies the requirements of the turn lane warrant.

At the two signalized study intersections (Port Republic Road/Devon Lane and Port Republic Road/Peach Grove Avenue), physical improvements are needed to improve capacity. Timmons Group has reviewed potential options, and all involve roadway widening beyond the existing right-of-way. These are broader, corridor-level needs that are not triggered by the proposed development. The traffic generated by the project can be accommodated within the existing network; therefore, no further development-specific roadway improvements are required.

The results of the mitigation scenario analysis indicates that making the southbound approach right-out only at Intersection #2 (Peach Grove Avenue and Commercial Access) improves the southbound approach delay from LOS F to LOS B and reduces projected queue lengths. At the signalized intersection of Port Republic Road and Peach Grove Avenue/Neff Avenue, the rerouted traffic results in minimal overall changes. The southbound left now operates at LOS E during the PM peak hour, and the eastbound left improves to LOS D during the PM peak hour. This report does not recommend the applicant to make this change because while the Commercial Access is within their property, it is within a shared access easement and subject to the rights of the other property owners as defined by the language of the shared access easement. To pursue the limited movement at that intersection, the applicant would need to receive approval from the adjacent property owners.