DESIGN RESOURCE GROUP

TRAFFIC IMPACT ANALYSIS

Arbor Walk

On the south side of S Legacy Park Boulevard

Lancaster County, South Carolina

for

Arbor Construction, LLC

August 2021

948-001

(COA 2370)

SOUTH CAROLINA LICENSED PROFESSIONAL ENGINEER
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EXECUTIVE SUMMARY

Arbor Construction, LLC is proposing to develop a single family residential development on the south side of S Legacy Park Boulevard located in Lancaster County, SC (see Figure 1). For this study, the project is assumed to be completed in 2027.

Vance Baker Road at S Legacy Park Boulevard facing south toward Access "A"

This report provides analysis of the traffic operations within the area of influence, according to the standards set by the South Carolina Department of Transportation's (SCDOT) "Access and Roadside Management Standards" (ARMS) document dated April 27, 2015 and Lancaster County's November 2016 Unified Development Ordinance (UDO). It provides recommended access management for the site and intersection improvements needed for mitigating traffic impacts.

This study evaluates the following scenarios:

- 2021 Existing Conditions
- 2027 No Build
- 2027 Full Buildout

The area of influence of the study site as indicated by SCDOT and Lancaster County staff includes five existing intersections and one proposed access location:

1. Shelley Mullis Road & Henry Harris Road (unsignalized)
2. Shelley Mullis Road & S Legacy Park Boulevard (unsignalized)
3. Shelley Mullis Road & Vance Baker Road (unsignalized)
4. Henry Nesbit Road & Waxhaw Marvin Road (unsignalized) [NC intersection]
5. S Legacy Park Boulevard & Vance Baker Road/Access "A" (unsignalized)
6. S Legacy Park Boulevard & Access "B" (unsignalized)

According to the site plan, access to the project is expected to occur via two unsignalized locations:

- Proposed Access "A" (Full Movement) – unsignalized access located on S Legacy Park Boulevard, across from Vance Baker Road
- Proposed Access "B" (Full Movement) – unsignalized access located on S Legacy Park Boulevard, approximately 1,300 feet west of Vance Baker Road

The trip generation results indicate that the project is expected to generate 167 new AM peak hour trips and 224 new PM peak hour trips.

The intersections identified within the area of influence were analyzed to identify the traffic impact that the site development has under the build scenario. The traffic analysis is based on the LOS analysis at the identified intersections. The intersections were analyzed assuming buildout of the site in 2027.

With the results of our analyses (specifics are described in the Traffic Analysis section of this report) we suggest the following improvements/modifications at the study intersections and proposed accesses:

2027 Build Suggested Improvements/Access Configurations:

***1.* Shelley Mullis Road & Henry Harris Road (unsignalized)**

- No suggested improvements

***2.* Shelley Mullis Road & S Legacy Park Boulevard (unsignalized)**

- Restripe the northbound lane of S Legacy Park Boulevard to provide a thru-right lane and a separate left turn lane with 150 feet of storage
- Restripe the southbound lane of N Legacy Park Boulevard to provide a thru-right lane and a separate left turn lane with 150 feet of storage

***3.* Shelley Mullis Road & Vance Baker Road (unsignalized)**

- No suggested improvements

***4.* Henry Nesbit Road & Waxhaw Marvin Road (unsignalized)**

- No suggested improvements

***5.* S Legacy Park Boulevard & Vance Baker Road/Access "A" (unsignalized)**

We propose the following access configuration:

- One ingress lane and one egress lane on Access "A" (a northbound combined left-thru-right lane)

***6.* S Legacy Park Boulevard & Access "B" (unsignalized)**

We propose the following access configuration:

- One ingress lane and one egress lane on Access "B" (a northbound combined left-right turn lane)

In conclusion, even though the Arbor Walk residential development will slightly increase the amount of traffic on the adjacent corridors, the project will not materially impact adjacent roadways, intersections, or the general public traveling in the area if the site is developed according to the proposed plan and includes the suggested access configurations and offsite roadway improvements.

INTRODUCTION

Arbor Construction, LLC is proposing to develop a single family residential development on the south side of S Legacy Park Boulevard located in Lancaster County, SC (see Figure 1). For this study, the project is assumed to be completed in 2027.

- 228 Single Family Dwelling Units

For this study, the project is assumed to be completed in 2027. According to the site plan, access to the project is expected to occur via two unsignalized locations:

Vance Baker Road at S Legacy Park Boulevard facing south toward Access "A"

- Existing Access "A" (Full Movement) – unsignalized access located on S Legacy Park Boulevard, across from Vance Baker Road
- Proposed Access "B" (Full Movement) – unsignalized access located on S Legacy Park Boulevard, approximately 1,300 feet west of Vance Baker Road

1. Shelley Mullis Road & Henry Harris Road
2. Shelley Mullis Road & S Legacy Park Boulevard
3. Shelley Mullis Road & Vance Baker Road
4. Henry Nesbit Road & Waxhaw-Marvin Road
5. S Legacy Park Boulevard & Vance Baker Road/Access "A"
6. S Legacy Park Boulevard & Access "B"

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ARBOR WALK TIA

LANCASTER COUNTY, SC

ARBOR CONSTRUCTION, LLC
4119-I ROSE LAKE DRIVE
CHARLOTTE, NC 28217

AREA OF INFLUENCE MAP

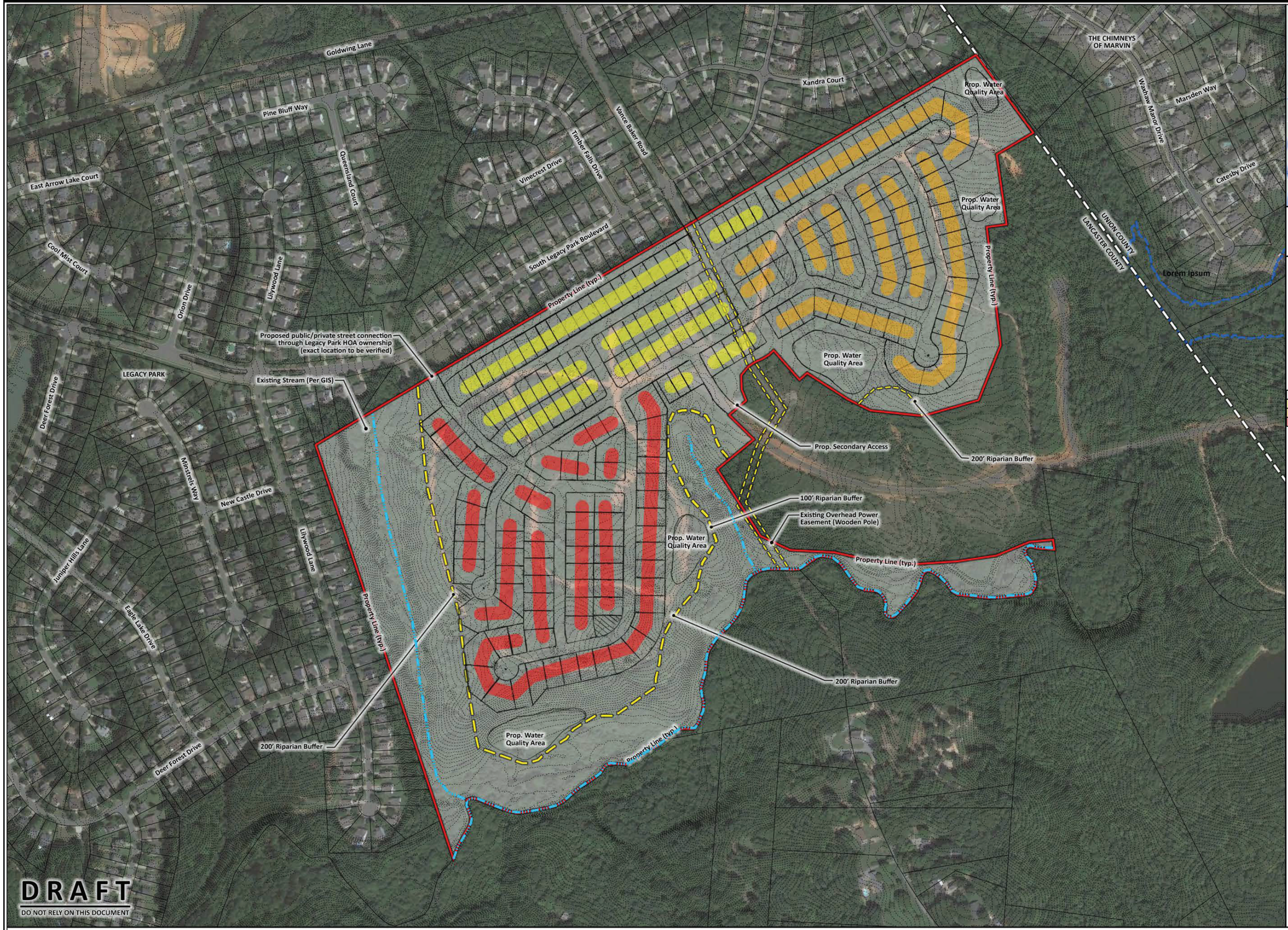
0 400' 800' N
SCALE: 1" = 800'

PROJECT #: 948-001
DRAWN BY: CRB
CHECKED BY: REG

AUGUST 2021

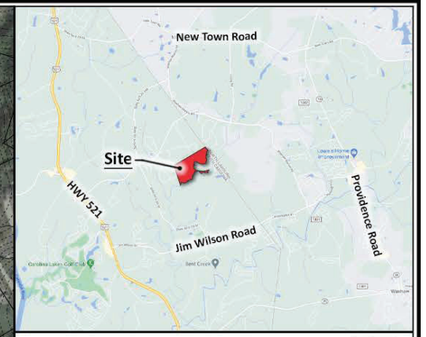
REVISIONS:

Figure 1



DRAFT

DO NOT RELY ON THIS DOCUMENT



Vicinity Map

Not To Scale

Site Data:

Tax Parcels:	009-00-015.00
Total Acreage:	+/- 112.49 Acres (per GIS)
Location:	Lancaster County, SC
Zoning:	
Existing:	LDR
Proposed:	MDR, Cluster Subdivision Overlay District, Carolina Heelsplitter Overlay

Total Potential Lots:	+/- 228 Lots
55' x 120' Lots`	+/- 76 Lots (33%)
65' x 125' Lots	+/- 77 Lots (34%)
75' x 130' Lots	+/- 75 Lots (33%)

Potential Density:	+/- 2.03 DU/AC
Open Space:	
Required:	+/- 28.12 Acres (25%) Min.
Proposed:	+/- TBD (See note below)
Watershed:	Catawba

General Notes
1. Base information provided by Lancaster County GIS Data and should be verified for accuracy.
2. All site plan, zoning, and wetland information utilized in the preparation of this plan is considered to be preliminary in nature and subject to change and final verification.
3. Draft - Do not rely on this document.

Floodplain Information
Floodplain information obtained from FEMA FIRM Panels 45057C0079E & 45057C0085E effective date of study 5/16/2017.

Stream/Wetland Information
Stream/Wetland information is based on preliminary information provided to ESP by Lancaster County GIS data. For purposes of preparation of this Base Map, any potential wetland areas and stream features depicted on the plan are considered to be preliminary in nature and approximate in location. The Base Map will need to be revised once all agencies approved on-site wetland/stream and appropriate jurisdictional boundaries are surveyed and verified with acceptable levels of accuracy-unit loss may occur.

Carolina Heelsplitter Overlay
The property is located with the HSO – Heelsplitter overlay . Credits may be purchased from the USFWS for qualified activities within projects that are located within the HSO. Credits to be purchased are based on criteria agreed to by the Lancaster County Planning Commission and US Fish and Wildlife Service.
Lot areas, related improvements and BMP's illustrated within portions of the HSO buffer shall require further evaluation to qualify for these types of credits.

Access Points/Driveways/Streets
1. Proposed project site entrance locations are considered preliminary in nature and need to be verified for adequate sight distance.
2. All roadway and street systems are considered to be preliminary and will need to be verified for sufficiency to satisfy or exceed minimum requirements established in the Lancaster County UDO and applicable standards identified by SCDOT. Street connections are conceptual and may be subject to change based on agency input and review.

Open Space /Tree Save
Open Space and Tree Save areas are conceptual and preliminary. The exact location of these areas may change as the client finalizes decisions regarding final layout, product allocation, and as other spatially dependent project components such as stormwater areas, wetland areas, utility features, and buffers, (as applicable) for this project are better defined.

Proposed Open Space TBD
(Open space calculations for CSOD subdivisions require additional program and site information which may include additional site environmental, historical and archaeological data points to fully determine)

Potential Stormwater Quality Areas
Location of proposed stormwater areas are conceptual and preliminary and still need to be determined. The exact size and location of these areas will change as the client finalizes decisions regarding final layout, product allocation, and as other proposed changes to the project are better defined. Layout and unit count subject to change based on final design of stormwater areas.

Public Information
ESP Associates is not responsible for plan deficiencies created by incorrect, incomplete, missing or outdated information derived from public sources such as GIS, Planning and Zoning departments.

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NORTH

Providence Estate Site

Preliminary Concept Plan B

ESP Job #JMbb

May 6, 2020

GRAPHIC SCALE

200 0 100 200 400

1 INCH = 200 FT.

ARBOR CONSTRUCTION

4119-I Rose Lake Drive
Charlotte, NC 28217

ANALYSIS OF EXISTING CONDITIONS

The area of influence of the study site as indicated by SCDOT and Lancaster County staff includes five existing intersections and one proposed access location:

1. Shelley Mullis Road & Henry Harris Road (unsignalized)
2. Shelley Mullis Road & S Legacy Park Boulevard (unsignalized)
3. Shelley Mullis Road & Vance Baker Road (unsignalized)
4. Henry Nesbit Road & Waxhaw Marvin Road (unsignalized) [NC intersection]
5. S Legacy Park Boulevard & Vance Baker Road/Access "A" (unsignalized)
6. S Legacy Park Boulevard & Access "B" (unsignalized)

Shelley Mullis Road facing west at Henry Harris Road

Henry Nesbit Road facing east at Waxhaw Marvin Road

S Legacy Park Boulevard is a local roadway, with a 20-mph posted speed limit. The roadway is two lanes wide (one lane in each direction); curb/gutter is present on both sides and sidewalk with a planting strip is present on the south side of the street within the vicinity of the site.

Morning (6:30-8:30 AM) and afternoon (4:30-6:30 PM) peak period turning movement counts were conducted at the study intersections on Tuesday, June 8, 2021.

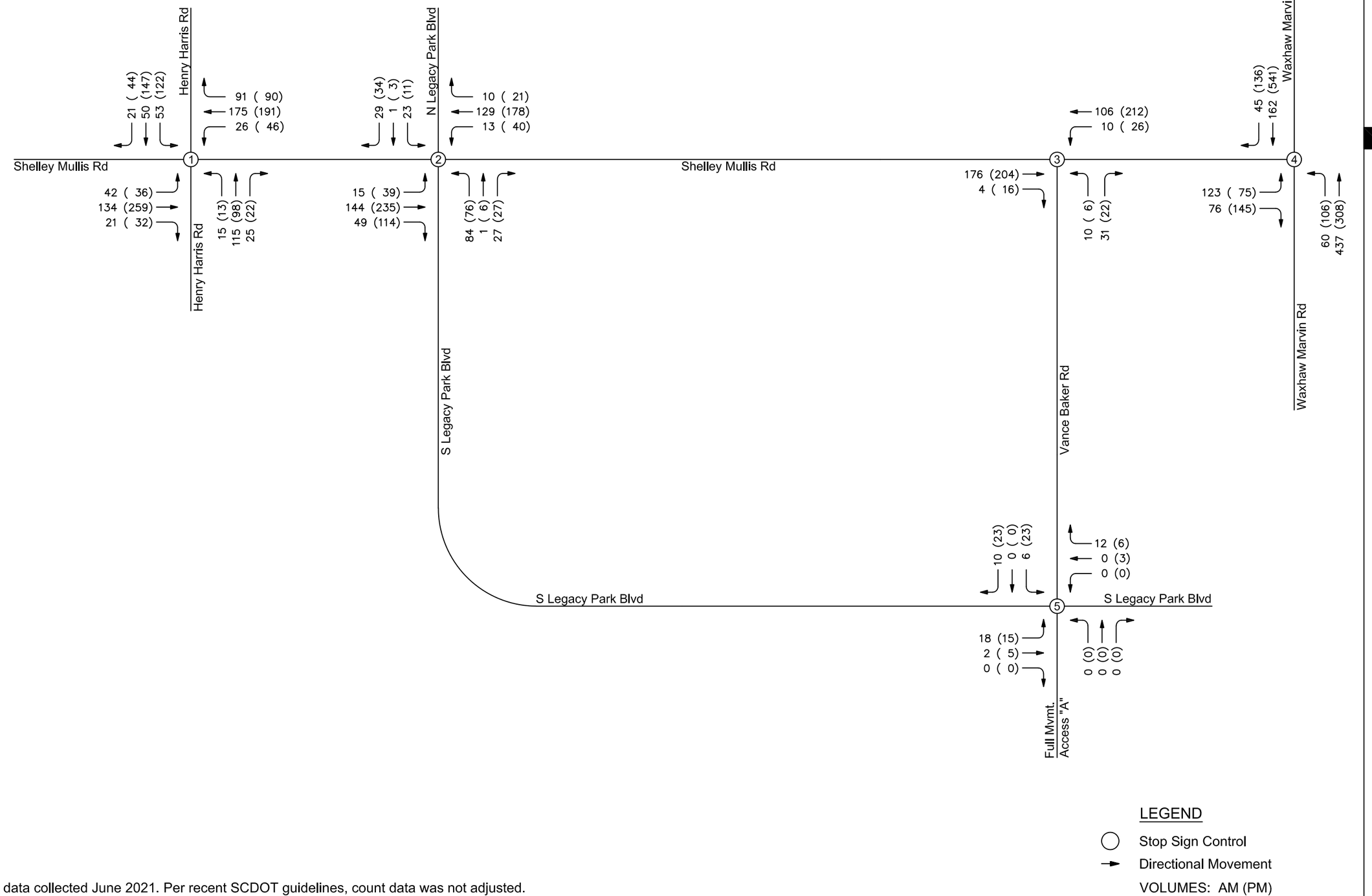
Per recent SCDOT guidelines, count data taken in 2021 was not adjusted.

In addition to the intersection turning movement counts, SCDOT is the source for average annual two-way daily traffic (AADT) volumes within the area of influence. The AADT volumes are depicted in Table 1.

Table 1: Average Annual Daily Traffic Volumes (veh. per day)

Roadway (Station ID #)	AADT (year)
Shelley Mullis Road east of Charlotte Highway (226)	5,300 (2020)

Figure 2 shows the 2021 existing traffic volumes for the AM and PM peak hours.



Count data collected June 2021. Per recent SCDOT guidelines, count data was not adjusted.

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EXISTING PEAK HOUR VOLUMES

0 XX XX N

SCALE: NTS

PROJECT #: 948-001
DRAWN BY: CRB
CHECKED BY: REG

AUGUST 2021

REVISIONS:

Figure 2

The intersections identified within the area of influence were analyzed to identify the traffic impact that the site development has under the build scenario. The traffic analysis is based on the LOS analysis at the identified intersections. The intersections were analyzed assuming buildout of the site in 2027.

LOS is a qualitative measurement of traffic operations. It is a measure of delay time. The Transportation Research Board's Highway Capacity Manual[1] (HCM) defines six levels of service for intersections with LOS "A" representing the best operating condition and LOS "F" the worst. The table below gives the criteria for both signalized (Exhibit 19-8) and unsignalized (Exhibit 20-2) intersections.

Intersection LOS	Exhibit 19-8 Signalized Intersection Control Delay per Vehicle (sec/vehicle)	Exhibit 20-2 Unsignalized Intersection Control Delay per Vehicle (sec/vehicle)
A	≤10.0	≤ 10.0
B	> 10.0 and ≤ 20.0	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	> 15.0 and ≤ 25.0
D	> 35.0 and ≤ 55.0	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	> 35.0 and ≤ 50.0
F	>80.0	> 50.0

SYNCHRO 11 was the software tool used in determining the delay, capacity, and corresponding level of service at the study intersections. The intersection worksheet reports are provided in the Appendix.

For the analysis of unsignalized intersections, the vehicular movements that must stop at the intersection experience delay (i.e. the minor leg of the intersection). For descriptive purposes:

- LOS results between "A" and "C" for the side (minor) street approach are assumed to represent short vehicle delays
- LOS results between "D" and "E" for the side (minor) street approach are assumed to represent moderate delays
- LOS results of "F" for the side (minor) street approach is assumed to represent long delays.

It should be noted that stop sign-controlled streets/driveways intersecting major streets typically experience long delays during peak hours, while most of the traffic moving through the intersection on the major street experiences little or no delay.

This report provides analysis of the traffic operations within the area of influence, according to the standards set by the South Carolina Department of Transportation's (SCDOT) "Access and Roadside Management Standards" (ARMS) document dated April 27, 2015 and Lancaster County's November 2016 Unified Development Ordinance (UDO). It provides recommended access management for the site and intersection improvements needed for mitigating traffic impacts.

[1] National Research Council. Transportation Research Board. Highway Capacity Manual 6th Ed., Washington, DC. 2016.

This study evaluates the following scenarios:

- 2021 Existing Conditions
- 2027 No Build
- 2027 Full Buildout

Base assumptions for the analysis scenarios include:

- Count volumes:
  - All counts and methodology approved by SCDOT and Lancaster Staff
- A 2% per year background growth rate between the existing/adjusted 2021 and future 2027 conditions
- All study intersections and movements assume a peak hour factor of 0.90
- Observed heavy vehicle percentages (from traffic counts) were used in all analysis for all intersections
- Signal operations were coded using defaults provided by SCDOT staff and maintained throughout all future year scenarios
- To account for trips produced by the residential development, ITE trip generation values for 228 DU's of single family housing (LUC 210) were split between the two access driveways located on S Legacy Park Boulevard, with 40% using Access "A" and 60% using Access "B".

The following intersections currently (2021) operate at:

1. Shelley Mullis Road & Henry Harris Road
   a. AM – LOS "B"
   b. PM – LOS "C"
2. Shelley Mullis Road & S Legacy Park Boulevard
   a. AM – LOS "A"
   b. PM – LOS "A"
3. Shelley Mullis Road & Vance Baker Road
   a. AM – LOS "A"
   b. PM – LOS "A"
4. Henry Nesbit Road & Waxhaw Marvin Road
   a. AM – LOS "A"
   b. PM – LOS "B"
5. S Legacy Park Boulevard & Vance Baker Road
   a. AM – LOS "A"
   b. PM – LOS "A"

Table 2: 2021 Existing Conditions Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
1. Shelley Mullis Road & Henry Harris Road						
Intersection	B	11.3	-	C	20.0	-
Eastbound - Shelley Mullis Rd	B	11.0	-	C	20.9	-
Westbound - Shelley Mullis Rd	B	12.2	-	C	20.7	-
Northbound - Henry Harris Rd	B	10.6	-	B	13.3	-
Southbound - Henry Harris Rd	B	10.4	-	C	21.3	-
2. Shelley Mullis Road & S Legacy Park Boulevard						
Intersection	A	4.2	-	A	4.1	-
Eastbound - Shelley Mullis Rd	A	0.5	-	A	0.8	-
Westbound - Shelley Mullis Rd	A	0.7	-	A	1.4	-
Northbound - S Legacy Park Blvd	B	12.6	-	C	18.3	-
Southbound - N Legacy Park Blvd	B	10.9	-	B	12.4	-
3. Shelley Mullis Road & Vance Baker Road						
Intersection	A	1.4	-	A	1.0	-
Eastbound - Shelley Mullis Rd	A	0.0	-	A	0.0	-
Westbound - Shelley Mullis Rd	A	0.7	-	A	0.9	-
Northbound - Vance Baker Rd	A	9.9	-	B	10.4	-
4. Henry Nesbit Road & Waxhaw Marvin Road						
Intersection	A	5.6	-	B	12.6	-
Eastbound - Henry Nesbit Rd	C	23.1	-	F	70.4	-
Northbound - Waxhaw Marvin Rd	A	1.0	-	A	2.5	-
Southbound - Waxhaw Marvin Rd	A	0.0	-	A	0.0	-
5. S Legacy Park Boulevard & Vance Baker Road						
Intersection	A	6.9	-	A	7.0	-
Eastbound - S Legacy Park Blvd	A	7.3	-	A	7.3	-
Westbound - S Legacy Park Blvd	A	6.4	-	A	6.7	-
Southbound - Vance Baker Rd	A	6.8	-	A	7.0	-

PROPOSED DEVELOPMENT

The daily and peak hour trip generation data for the site is presented in Table 3. The estimates for the trips generated by the development are obtained from the Institute of Transportation Engineers (ITE), Trip Generation Manual, 10th Edition, 2017.

Table 3: Site Trip Generation

Land Use [ITE Code]			Weekday Daily	AM Peak Hour			PM Peak Hour		
				Enter	Exit	Total	Enter	Exit	Total
Proposed Development									
Single Family Homes [210]	228	DUs	2,219	42	125	167	141	83	224

References:
Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.

The trip generation results indicate that the project is expected to generate 167 new AM peak hour trips and 224 new PM peak hour trips.

Per SCDOT and Lancaster County staff, three approved offsite developments were included in the future year analysis (all developments were assumed to be fully complete by 2027 to account for all offsite trips):

- Harris Mill – 377 single family homes. The site is expected to generate 272 new AM peak hour trips and 363 new PM peak hour trips.
- Widewaters – 264 multi-family apartment units, 40,110 SF of retail, 5,500 SF of convenience market with gas pumps, 3,200 SF of bank with drive in, 4,000 SF of fast casual restaurant, and 4,000 SF of fast-food restaurant. The site is expected to generate 388 new AM peak hour trips and 412 new PM peak hour trips.
- Wilson Creek – 412 single family homes. The site is expected to generate 302 new AM peak hour trips and 405 new PM peak hour trips.

Table 4: Offsite Trip Generation

Development	Daily	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Harris Mill	3,525	68	204	272	229	134	363
Widewaters	11,103	198	190	388	217	195	412
Wilson Creek	4,002	76	226	302	255	150	405
Total Trips	**18,630**	**342**	**620**	**962**	**701**	**479**	**1,180**

The AM and PM offsite trip distribution through the study intersections are included in Exhibit A and Exhibit B, respectively, of the Appendix.

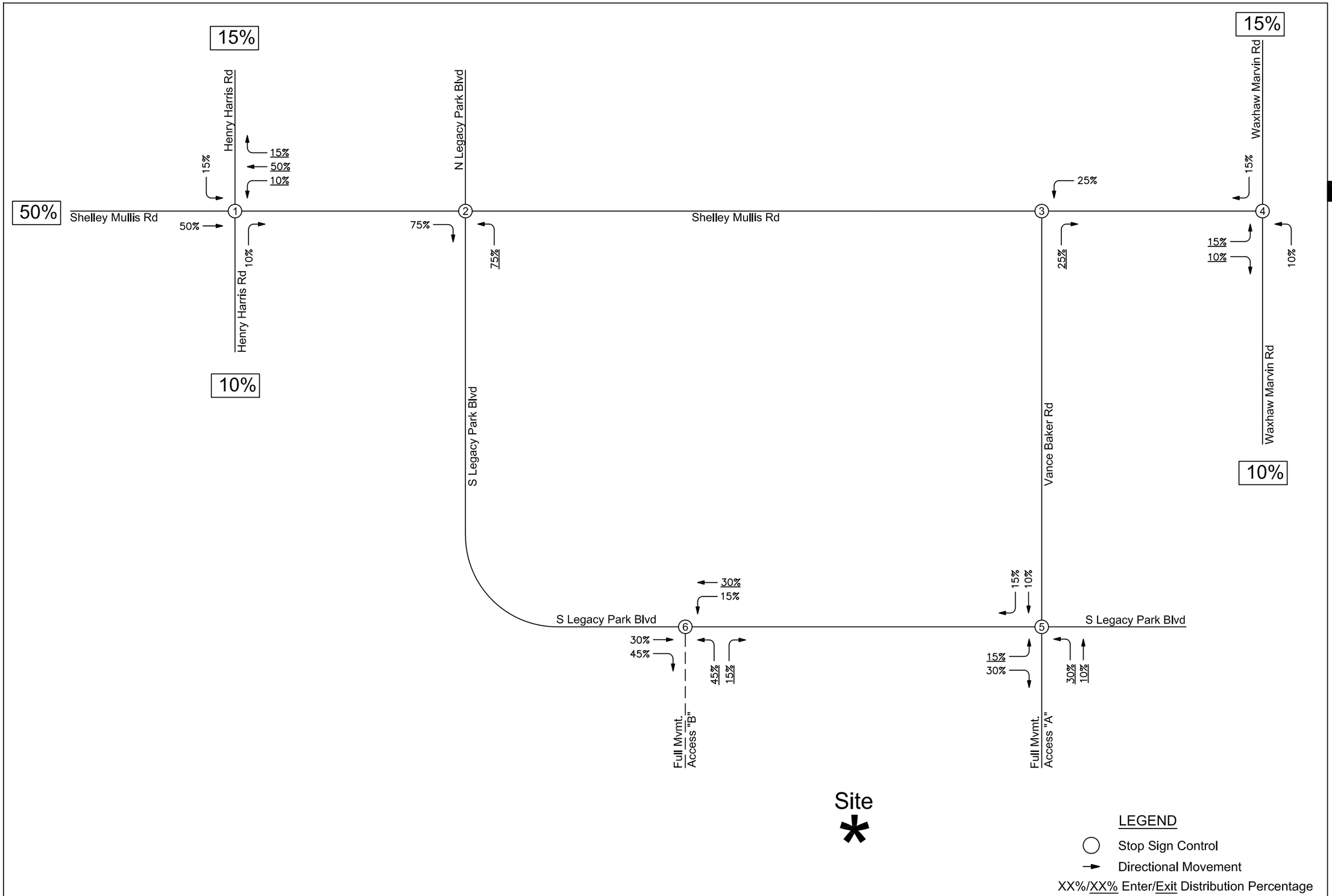
The projected background traffic volumes used in the analyses were developed from the existing peak hour TMCs. Per SCDOT and Lancaster County staff, a 2% per year growth rate was used for the 2027 background volumes.

The No Build volumes for the AM and PM peaks are presented in Figures 4 and 5, respectively. The background traffic is indicated to the far left of the movement arrows, followed by the offsite traffic in brackets. The two volumes are added to obtain the projected total No Build traffic for that movement:

Background + [Offsite] = Total

The 2027 AM and PM Build conditions peak hour traffic volumes are presented in Figures 6 and 7, respectively. The No Build traffic is indicated to the far left of the movement arrows, followed by the site traffic in parentheses. The two volumes are added to obtain the projected total traffic for that movement:

No Build + (Site) = Total



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SITE DIRECTIONAL DISTRIBUTION

0 XX XX N

SCALE: NTS

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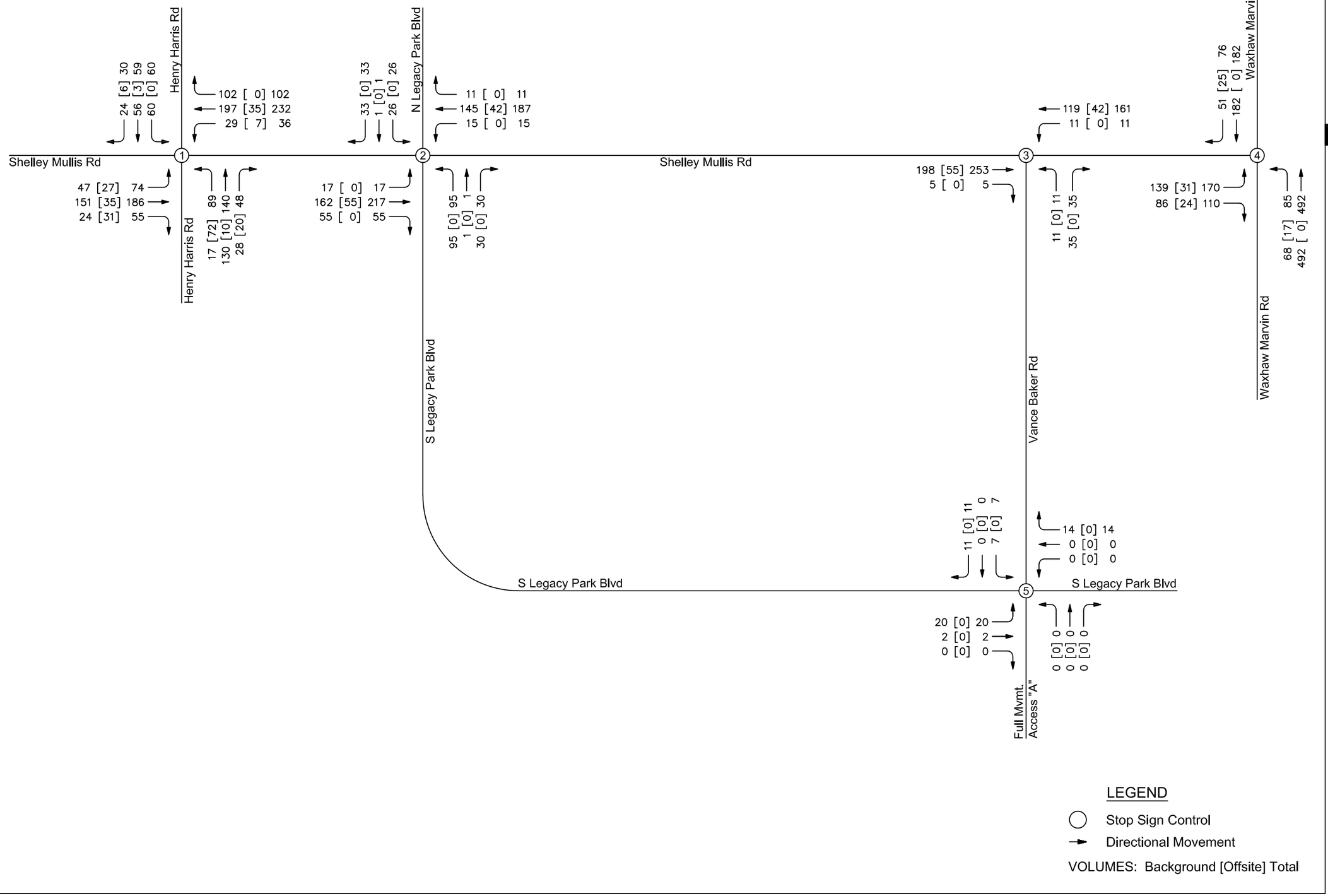
Figure 3



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2027 NO BUILD AM PEAK HOUR VOLUMES

0 XX XX N

SCALE: NTS

PROJECT #: 948-001
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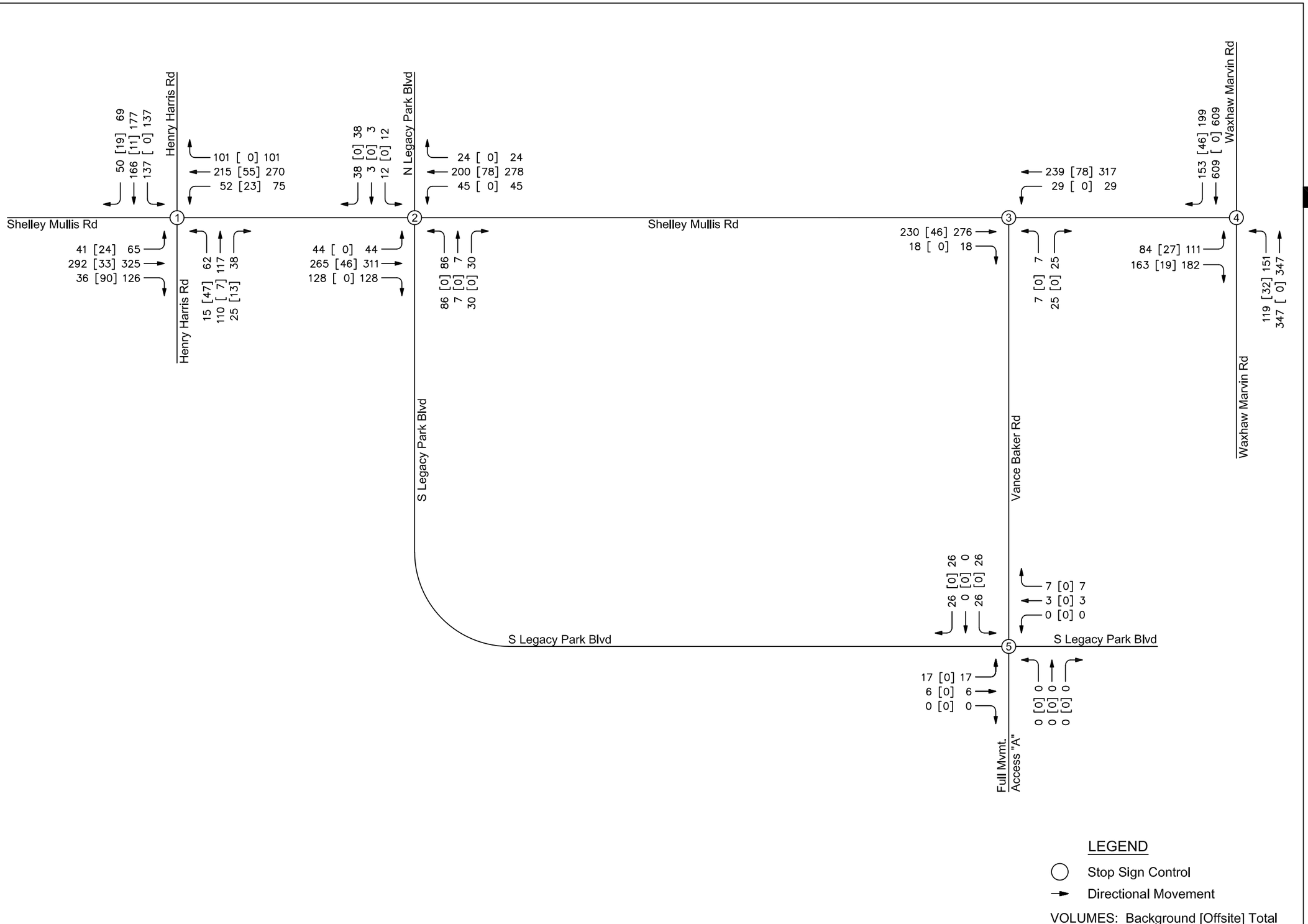
REVISIONS:

Figure 4



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2027 NO BUILD PM PEAK HOUR VOLUMES

0 XX XX N

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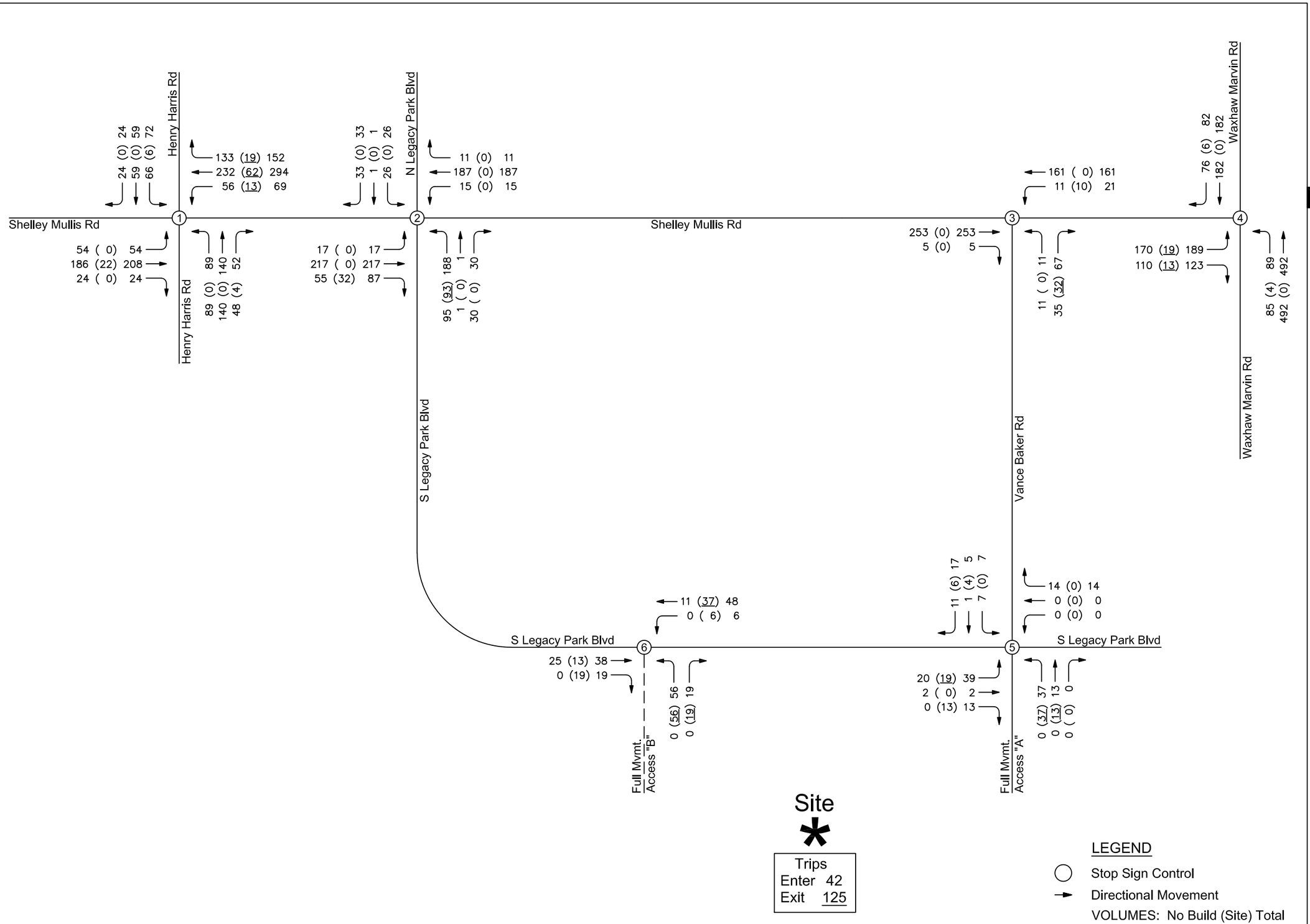
Figure 5



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2027 BUILD AM PEAK HOUR VOLUMES

0 XX XX N

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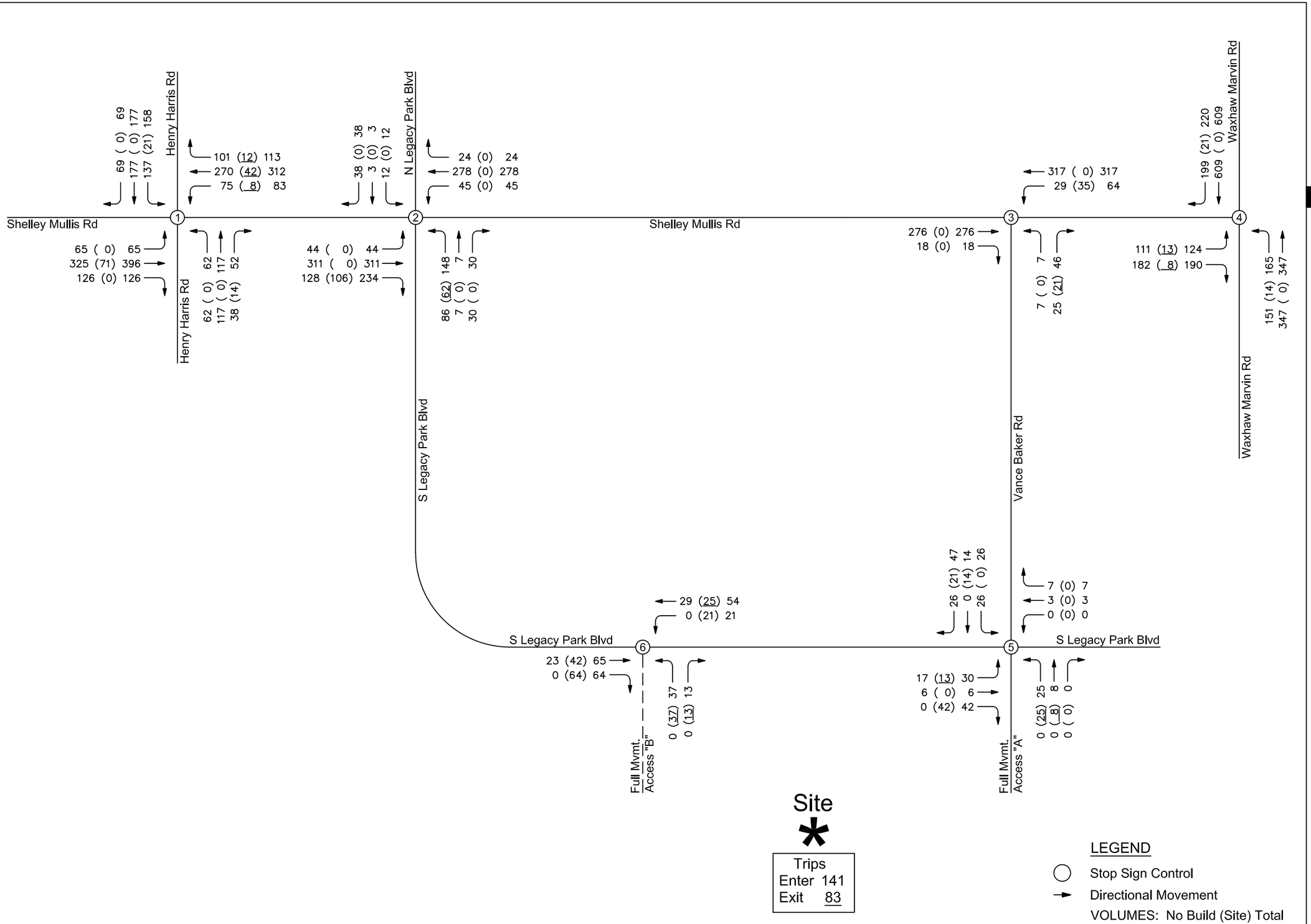
Figure 6



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2027 BUILD PM PEAK HOUR VOLUMES

0 XX XX N

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Figure 7

ANALYSIS OF FUTURE CONDITIONS

LANCASTER COUNTY ANALYSIS REQUIREMENTS - To determine the mitigation responsibility of the developer, this study compares 2027 Build results to the 2027 No Build results.

- For collector or local streets, a Level-of-Service (LOS) “C” or better shall be maintained. On any arterial or higher order street a LOS “D” or better shall be maintained. Level of service will be measured for segments and intersections using ITE standards for LOS calculation. Where the existing LOS is below these standards, the traffic impact analysis shall identify those improvements required to ensure that development related traffic demands result in no net reduction in LOS, and identify additional improvements needed to raise the level of service to the standards on the applicable streets to the adopted LOS standard.

The analysis and queue results for the study scenarios are presented in Tables 5-16.

1. Shelley Mullis Road & Henry Harris Road (unsignalized)

Table 5: Shelley Mullis Rd & Henry Harris Rd Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
Existing Conditions						
Intersection	B	11.3	-	C	20.0	-
Eastbound - Shelley Mullis Rd	B	11.0	-	C	20.9	-
Westbound - Shelley Mullis Rd	B	12.2	-	C	20.7	-
Northbound - Henry Harris Rd	B	10.6	-	B	13.3	-
Southbound - Henry Harris Rd	B	10.4	-	C	21.3	-
2027 No Build Conditions						
Intersection	B	11.7	0.49	B	14.3	0.65
Eastbound - Shelley Mullis Rd	B	10.8	-	B	14.5	-
Westbound - Shelley Mullis Rd	B	12.3	-	B	12.8	-
Northbound - Henry Harris Rd	B	12.4	-	B	14.0	-
Southbound - Henry Harris Rd	B	11.0	-	B	16.0	-
2027 Build Conditions						
Intersection	B	13.1	0.62	B	15.7	0.72
Eastbound - Shelley Mullis Rd	A	9.9	-	B	16.2	-
Westbound - Shelley Mullis Rd	B	13.6	-	B	13.9	-
Northbound - Henry Harris Rd	B	15.0	-	B	15.3	-
Southbound - Henry Harris Rd	B	13.8	-	B	17.6	-

2021 Existing Conditions

Currently the intersection is an all-way stop that operates at LOS “B” during the AM peak hour and LOS “C” during the PM peak hour. The worst leg of the intersection operates at LOS “B” during the AM peak hour and LOS “C” during the PM peak hour.

2027 No Build Conditions

The following required offsite improvements are the shared responsibility of the Harris Mill and Wilson Creek developments and have been included in the analysis for both No Build and Build Conditions at this intersection:

- Installation of a traffic signal
- Construction of left turn lanes on all approaches with:
  - 225 feet of storage on the northbound approach
  - 400 feet of storage on the eastbound approach
  - 350 feet of storage on the southbound approach, and
  - 225 feet of storage on the westbound approach

With the inclusion of offsite traffic, growth in background traffic, and the offsite improvements the intersection operates at LOS “B” during both the AM and PM peak hours.

2027 Build Conditions

When comparing the impact of the 2027 Build to the 2027 No Build conditions, the intersection continues to operate at LOS "B" during both the AM and PM peak hours. **As the intersection LOS is above the set threshold of LOS "C" in both peak hours, no developer required improvements should be deemed necessary at this intersection.**

Table 6: Shelley Mullis Rd & Henry Harris Rd Queue Results

Shelley Mullis Road @ Henry Harris Road	Storage (ft)	AM PEAK		PM PEAK	
		95th % Queue	Max Queue	95th % Queue	Max Queue
2027 No Build Conditions					
Eastbound Left-Turn (Shelley Mullis Rd)	400'	35'	78'	32'	71'
Eastbound Thru (Shelley Mullis Rd)	TERM.	87'	125'	188'	248'
Westbound Left-Turn (Shelley Mullis Rd)	225'	19'	58'	40'	106'
Westbound Thru (Shelley Mullis Rd)	TERM.	126'	153'	147'	190'
Northbound Left-Turn (Henry Harris Rd)	225'	47'	86'	45'	90'
Northbound Thru (Henry Harris Rd)	TERM.	87'	142'	89'	126'
Southbound Left-Turn (Henry Harris Rd)	350'	35'	83'	88'	132'
Southbound Thru (Henry Harris Rd)	TERM.	45'	97'	139'	163'
2027 Build Conditions					
Eastbound Left-Turn (Shelley Mullis Rd)	400'	29'	108'	34'	77'
Eastbound Thru (Shelley Mullis Rd)	TERM.	87'	125'	230'	251'
Westbound Left-Turn (Shelley Mullis Rd)	225'	32'	88'	49'	108'
Westbound Thru (Shelley Mullis Rd)	TERM.	187'	198'	174'	175'
Northbound Left-Turn (Henry Harris Rd)	225'	58'	86'	45'	103'
Northbound Thru (Henry Harris Rd)	TERM.	111'	150'	98'	123'
Southbound Left-Turn (Henry Harris Rd)	350'	50'	78'	103'	149'
Southbound Thru (Henry Harris Rd)	TERM.	53'	87'	141'	178'

2. Shelley Mullis Road & S Legacy Park Boulevard (unsignalized)

Table 7: Shelley Mullis Rd & S Legacy Park Blvd Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
Existing Conditions						
Intersection	A	4.2	-	A	4.1	-
Eastbound - Shelley Mullis Rd	A	0.5	-	A	0.8	-
Westbound - Shelley Mullis Rd	A	0.7	-	A	1.4	-
Northbound - S Legacy Park Blvd	B	12.6	-	C	18.3	-
Southbound - N Legacy Park Blvd	B	10.9	-	B	12.4	-
2027 No Build Conditions						
Intersection	A	4.4	-	A	5.2	-
Eastbound - Shelley Mullis Rd	A	0.5	-	A	0.7	-
Westbound - Shelley Mullis Rd	A	0.6	-	A	1.1	-
Northbound - S Legacy Park Blvd	C	15.9	-	D	30.4	-
Southbound - N Legacy Park Blvd	B	12.4	-	C	15.1	-
2027 Build Conditions						
Intersection	A	7.2	-	B	10.5	-
Eastbound - Shelley Mullis Rd	A	0.4	-	A	0.6	-
Westbound - Shelley Mullis Rd	A	0.6	-	A	1.2	-
Northbound - S Legacy Park Blvd	C	22.3	-	F	58.1	-
Southbound - N Legacy Park Blvd	B	12.5	-	C	15.9	-
2027 Build Conditions with Improvements						
Intersection	A	6.6	-	A	8.4	-
Eastbound - Shelley Mullis Rd	A	0.4	-	A	0.6	-
Westbound - Shelley Mullis Rd	A	0.6	-	A	1.2	-
Northbound - S Legacy Park Blvd	C	20.2	-	E	45.1	-
Southbound - N Legacy Park Blvd	B	12.1	-	C	15.1	-

2021 Existing Conditions

Currently the two-way stop control intersection operates at LOS “A” during both the AM and PM peak hours. The worst leg of the intersection (northbound) operates at LOS “B” during the AM peak hour and LOS “C” during the PM peak hour.

2027 No Build Conditions

With the inclusion of offsite traffic and growth in background traffic volumes, the intersection continues to operate at LOS “A” during both the AM and PM peak hours. The worst leg of the intersection (northbound) continues to operate at LOS “C” during the AM peak hour and drops to LOS “D” during the PM peak hour.

2027 Build Conditions

When comparing the impact of the 2027 Build to the 2027 No Build conditions, the intersection continues to operate at LOS “A” during the AM peak hour and drops to LOS “B” during the PM peak hour. The worst leg of the intersection (northbound) continues to operate at LOS “C” during the AM peak hour and drops to LOS “F” during the PM peak hour.

2027 Build Conditions with Improvements

Based on the addition of site traffic on the northbound leg, the results indicate the need to identify mitigation at the study intersection.

The following improvement was tested and is suggested:

- Restripe the northbound lane of S Legacy Park Boulevard to have a thru-right lane and a left turn lane with 150 feet of storage
- Restripe the southbound lane of N Legacy Park Boulevard to have a thru-right lane and a left turn lane with 150 feet of storage

Assuming this improvement in place, the intersection operates at LOS "A" during both the AM and PM peak hours. The worst leg of the intersection (northbound) operates at LOS "C" during the AM peak hour and operates at LOS "E" during the PM peak hour.

Although the worst leg of the intersection (northbound) operates at LOS "E" during the PM peak hour, the intersection operates at LOS "A" overall. Additionally, the only reasonable mitigation that would improve the worst leg of the intersection (northbound) is a traffic signal, which is likely not warranted or necessary at this location, therefore it is not suggested.

Table 8: Shelley Mullis Rd & S Legacy Park Blvd Queue Results

Shelley Mullis Rd @ S Legacy Park Blvd	Storage (ft)	AM PEAK		PM PEAK	
		95th % Queue	Max Queue	95th % Queue	Max Queue
2027 No Build Conditions					
Eastbound Left-Turn (Shelley Mullis Rd)	125'	0'	19'	3'	42'
Westbound Left-Turn (Shelley Mullis Rd)	150'	0'	21'	3'	42'
Northbound Left/Thru/Right (S Legacy Park Blvd)	TERM.	30'	100'	65'	84'
Southbound Left/Thru/Right (N Legacy Park Blvd)	TERM.	10'	71'	13'	68'
2027 Build Conditions with Improvements					
Eastbound Left-Turn (Shelley Mullis Rd)	125'	0'	19'	3'	30'
Westbound Left-Turn (Shelley Mullis Rd)	150'	0'	40'	5'	48'
Northbound Left-Turn (S Legacy Park Blvd)	150'	68'	127'	120'	110'
Northbound Thru/Right (S Legacy Park Blvd)	TERM.	3'	55'	8'	57'
Southbound Left-Turn (N Legacy Park Blvd)	150'	5'	40'	5'	38'
Southbound Thru/Right (N Legacy Park Blvd)	TERM.	5'	53'	8'	62'

***3.* Shelley Mullis Road & Vance Baker Road (unsignalized)**

Table 9: Shelley Mullis Rd & Vance Baker Rd Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
Existing Conditions						
Intersection	A	1.4	-	A	1.0	-
Eastbound - Shelley Mullis Rd	A	0.0	-	A	0.0	-
Westbound - Shelley Mullis Rd	A	0.7	-	A	0.9	-
Northbound - Vance Baker Rd	A	9.9	-	B	10.4	-
2027 No Build Conditions						
Intersection	A	1.2	-	A	0.9	-
Eastbound - Shelley Mullis Rd	A	0.0	-	A	0.0	-
Westbound - Shelley Mullis Rd	A	0.5	-	A	0.7	-
Northbound - Vance Baker Rd	B	10.7	-	B	11.5	-
2027 Build Conditions						
Intersection	A	1.9	-	A	1.6	-
Eastbound - Shelley Mullis Rd	A	0.0	-	A	0.0	-
Westbound - Shelley Mullis Rd	A	0.9	-	A	1.4	-
Northbound - Vance Baker Rd	B	10.8	-	B	11.6	-

2021 Existing Conditions

Currently the intersection operates at LOS “A” during both the AM and PM peak hours. The worst leg of the intersection (northbound) operates at LOS “A” during the AM peak hour and LOS “B” during the PM peak hour.

2027 No Build Conditions

With the inclusion of offsite traffic and growth in background traffic volumes, the intersection continues to operate at LOS “A” during both the AM and PM peak hours. The worst leg of the intersection (northbound) drops to LOS “B” during the AM peak hour and continues to operate at LOS “B” during the PM peak hour.

2027 Build Conditions

When comparing the impact of the 2027 Build to the 2027 No Build conditions, the intersection continues to operate at LOS “A” during both the AM and PM peak hours. The worst leg of the intersection (northbound) continues to operate at LOS “B” during both the AM and PM peak hours. **As the intersection LOS is above the set threshold of LOS “C” in both peak hours, no developer required improvements should be deemed necessary at this intersection.**

Table 10: Shelley Mullis Rd & Vance Baker Rd Queue Results

Shelly Mullis Rd @ Vance Baker Road	Storage (ft)	AM PEAK		PM PEAK	
		95th % Queue	Max Queue	95th % Queue	Max Queue
2027 No Build Conditions					
Westbound Left-Turn (Shelley Mullis Rd)	TERM.	0'	33'	3'	52'
Northbound Left/Right-Turn (Vance Baker Rd)	TERM.	5'	56'	5'	108'
2027 Build Conditions					
Westbound Left-Turn (Shelley Mullis Rd)	TERM.	3'	28'	5'	63'
Northbound Left/Right-Turn (Vance Baker Rd)	TERM.	10'	66'	8'	334'

4. Henry Nesbit Road & Waxhaw Marvin Road (unsignalized)

Table 11: Henry Nesbit Rd & Waxhaw Marvin Rd Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
Existing Conditions						
Intersection	A	5.6	-	B	12.6	-
Eastbound - Henry Nesbit Rd	C	23.1	-	F	70.4	-
Northbound - Waxhaw Marvin Rd	A	1.0	-	A	2.5	-
Southbound - Waxhaw Marvin Rd	A	0.0	-	A	0.0	-
2027 No Build Conditions						
Intersection	C	17.3	-	F	81.4	-
Eastbound - Henry Nesbit Rd	F	66.5	-	F	438.5	-
Northbound - Waxhaw Marvin Rd	A	1.2	-	A	3.4	-
Southbound - Waxhaw Marvin Rd	A	0.0	-	A	0.0	-
2027 Build Conditions						
Intersection	D	27.3	-	F	113.3	-
Eastbound - Henry Nesbit Rd	F	98.9	-	F	591.2	-
Northbound - Waxhaw Marvin Rd	A	1.2	-	A	3.7	-
Southbound - Waxhaw Marvin Rd	A	0.0	-	A	0.0	-
2027 Build Conditions with Test Improvements per Ordinance						
Intersection	B	11.8	0.59	C	21.2	0.91
Eastbound - Henry Nesbit Rd	B	17.1	-	D	35.4	-
Northbound - Waxhaw Marvin Rd	B	10.6	-	C	22.6	-
Southbound - Waxhaw Marvin Rd	A	8.3	-	B	14.9	-

2021 Existing Conditions

Currently the intersection operates at LOS “A” during the AM peak hour and LOS “B” during the PM peak hour. The worst leg of the intersection (eastbound) operates at LOS “C” during the AM peak hour and LOS “F” during the PM peak hour.

2027 No Build Conditions

With the inclusion of offsite traffic and growth in background traffic volumes, the intersection drops to LOS “C” during the AM peak hour and drops to LOS “F” during the PM peak hour. The worst leg of the intersection (eastbound) drops to LOS “F” during the AM peak hour and continues to operate LOS “F” during the PM peak hour.

2027 Build Conditions

When comparing the impact of the 2027 Build to the 2027 No Build conditions, the intersection drops to LOS “D” during the AM peak hour and continues to operate at LOS “F” during the PM peak hour. The worst leg of the intersection (eastbound) continues to operate at LOS “F” during both the AM and PM peak hours. **As the worst leg of the intersection (eastbound) under No Build conditions is an LOS “F”, which is below the set threshold of LOS “C”, and remains an LOS “F” under Build conditions, no developer required improvements should be deemed necessary at this intersection.**

2027 Build Conditions with Test Improvements per Ordinance

Based on Lancaster County requirements, the results indicate the need to identify mitigation at the study intersection.

The following improvement was tested but is not suggested as the worst leg of the intersection (eastbound) operates below the set threshold of LOS "C" under No Build Conditions:

- Construct an eastbound left turn lane on Henry Nesbit Road with 350 feet of storage
- Construct a northbound left turn lane on Waxhaw Marvin Road with 200 feet of storage
- Install a traffic signal at the intersection

Assuming this improvement in place, the intersection operates at LOS "B" during the AM peak hour and LOS "C" during the PM peak hour.

Table 12: Henry Nesbit Rd & Waxhaw Marvin Rd Queue Results

Henry Nesbit Rd @ Waxhaw Marvin Rd	Storage (ft)	AM PEAK		PM PEAK	
		95th % Queue	Max Queue	95th % Queue	Max Queue
2027 No Build Conditions					
Eastbound Left/Right-Turn (Henry Nesbit Rd)	TERM.	233'	211'	590'	1526'
Northbound Left-Turn (Waxhaw Marvin Rd)	TERM.	5'	116'	20'	264'
2027 Build Conditions					
Eastbound Left/Right-Turn (Henry Nesbit Rd)	TERM.	310'	297'	703'	1907'
Northbound Left-Turn (Waxhaw Marvin Rd)	TERM.	8'	100'	25'	300'

5. S Legacy Park Boulevard & Vance Baker Road/Access "A" (unsignalized)

Table 13: S Legacy Park Blvd & Vance Baker Rd/Access "A" Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
Existing Conditions						
Intersection	A	6.9	-	A	7.0	-
Eastbound - S Legacy Park Blvd	A	7.3	-	A	7.3	-
Westbound - S Legacy Park Blvd	A	6.4	-	A	6.7	-
Southbound - Vance Baker Rd	A	6.8	-	A	7.0	-
2027 No Build Conditions						
Intersection	A	6.9	-	A	7.1	-
Eastbound - S Legacy Park Blvd	A	7.3	-	A	7.3	-
Westbound - S Legacy Park Blvd	A	6.5	-	A	6.7	-
Southbound - Vance Baker Rd	A	6.8	-	A	7.1	-
2027 Build Conditions						
Intersection	A	7.3	-	A	7.4	-
Eastbound - S Legacy Park Blvd	A	7.4	-	A	7.4	-
Westbound - S Legacy Park Blvd	A	6.6	-	A	6.9	-
Northbound - Access "A"	A	7.6	-	A	7.6	-
Southbound - Vance Baker Rd	A	7.0	-	A	7.4	-

2021 Existing Conditions

Currently the all-way stop control intersection operates at LOS "A" during both the AM and PM peak hours. The worst leg of the intersection (eastbound) operates at LOS "A" during both the AM and PM peak hours.

2027 No Build Conditions

With the inclusion of offsite traffic and growth in background traffic volumes, the intersection continues to operate at LOS "A" during both the AM and PM peak hours. The worst leg of the intersection (eastbound) continues to operate at LOS "A" during both the AM and PM peak hours.

2027 Build Conditions

We propose the following access configuration:

- One ingress lane and one egress lane on Access "A" (a northbound combined left-thru-right lane)

Assuming this configuration in place, the intersection continues to operate at LOS "A" during both the AM and PM peak hours. The worst leg of the intersection (northbound) operates at LOS "A" during both the AM and PM peak hours.

Turn lane warrants have been conducted and are included in the appendix for this intersection to test an eastbound right turn lane and a westbound left turn lane per SCDOT's "Access and Roadside Management Standards" (ARMS) manual:

- Per the anticipated traffic volumes, the results indicate that under 2027 Build Conditions right and left turn lanes on S Legacy Park Boulevard may not be necessary and therefore are not suggested.

Table 14: S Legacy Park Blvd & Vance Baker Rd/Access "A" Queue Results

S Legacy Park Blvd @ Vance Baker Rd/Access "A"	Storage (ft)	AM PEAK		PM PEAK	
		95th % Queue	Max Queue	95th % Queue	Max Queue
2027 No Build Conditions					
Eastbound Left/Thru/Right (S Legacy Park Blvd)	TERM.	42'	45'	43'	45'
Westbound Left/Thru/Right (S Legacy Park Blvd)	TERM.	34'	35'	31'	35'
Southbound Left/Thru/Right (Vance Baker Rd)	TERM.	41'	50'	60'	68'
2027 Build Conditions with Improvements					
Eastbound Left/Thru/Right (S Legacy Park Blvd)	TERM.	56'	64'	63'	64'
Westbound Left/Thru/Right (S Legacy Park Blvd)	TERM.	35'	44'	29'	64'
Northbound Left/Thru/Right (Access "A")	TERM.	50'	50'	46'	56'
Southbound Left/Thru/Right (Vance Baker Rd)	TERM.	48'	58'	74'	95'

6. S Legacy Park Boulevard & Access “B” (unsignalized)

Table 15: S Legacy Park Blvd & Access “B” Analysis Results

Approach	AM Peak Hour			PM Peak Hour		
	LOS	Delay (sec/veh)	Capacity (v/c)	LOS	Delay (sec/veh)	Capacity (v/c)
2027 Build Conditions						
Intersection	A	4.0	-	A	2.5	-
Eastbound - S Legacy Park Blvd	A	0.0	-	A	0.0	-
Westbound - S Legacy Park Blvd	A	0.8	-	A	2.1	-
Northbound - Access "B"	A	9.4	-	A	9.8	-

2027 Build Conditions

We propose the following access configuration:

- One ingress lane and one egress lane on Access “B” (a northbound combined left-thru-right lane)

Assuming this configuration in place, the intersection operates at LOS “A” during both the AM and PM peak hours. The worst leg of the intersection (northbound) operates at LOS “A” during both the AM and PM peak hours.

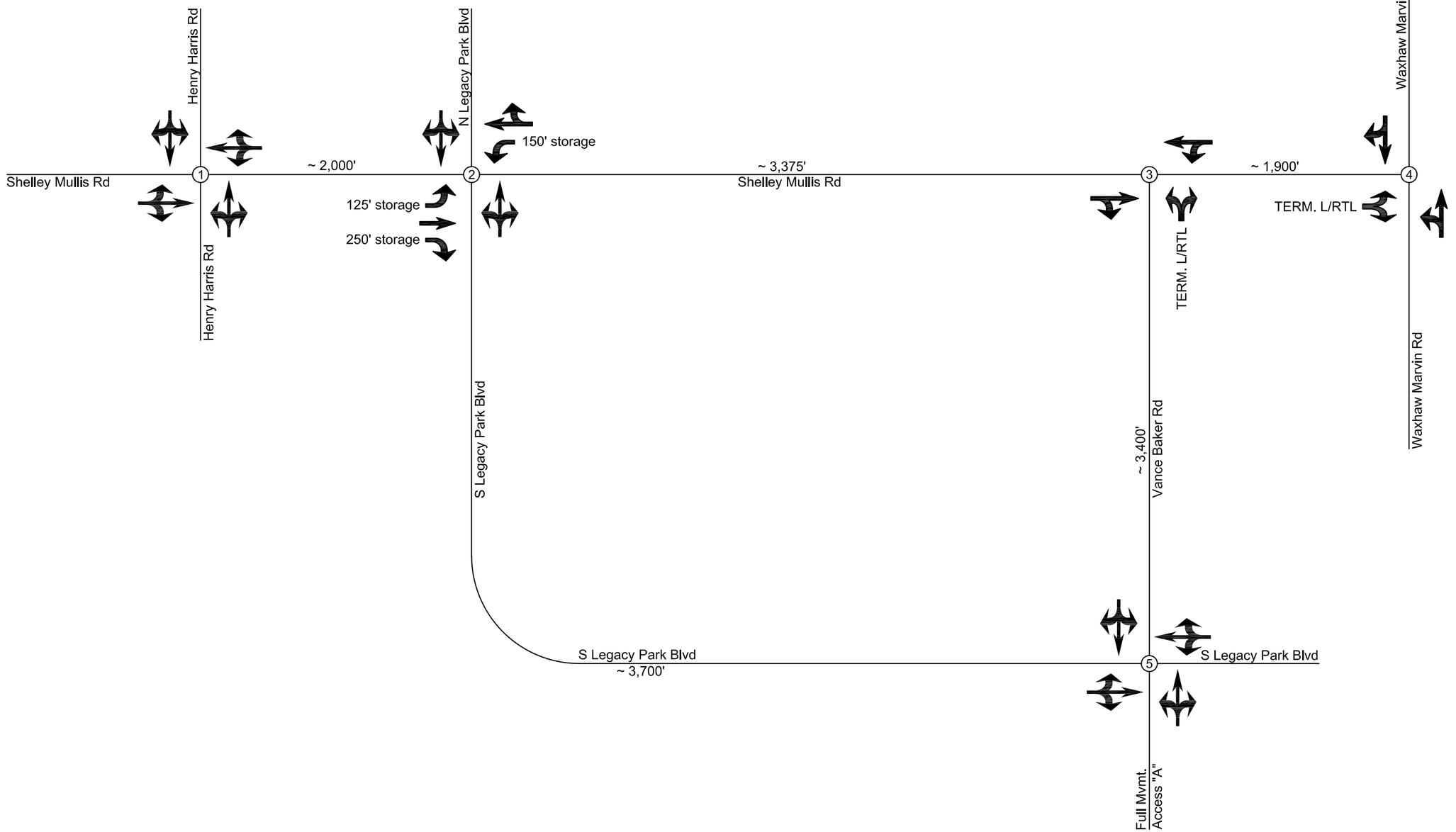
Turn lane warrants have been conducted and are included in the appendix for this intersection to test an eastbound right turn lane and a westbound left turn lane per SCDOT’s “Access and Roadside Management Standards” (ARMS) manual:

- Per the anticipated traffic volumes, the results indicate that under 2027 Build Conditions right and left turn lanes on S Legacy Park Boulevard may not be necessary and therefore are not suggested.

Table 16: S Legacy Park Blvd & Access “B” Queue Results

S Legacy Park Blvd @ Access “B”	Storage (ft)	AM PEAK		PM PEAK	
		95th % Queue	Max Queue	95th % Queue	Max Queue
2027 Build Conditions with Improvements					
Westbound Left-Turn (S Legacy Park Blvd)	TERM.	0'	12'	0'	49'
Northbound Left/Right-Turn (Access "B")	TERM.	8'	60'	5'	58'

The existing and suggested laneage are shown on Figures 8 and 9, respectively.



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ARBOR WALK TIA

LANCASTER COUNTY, SC

ARBOR CONSTRUCTION, LLC
4119-I ROSE LAKE DRIVE
CHARLOTTE, NC 28217

EXISTING LANEAGE

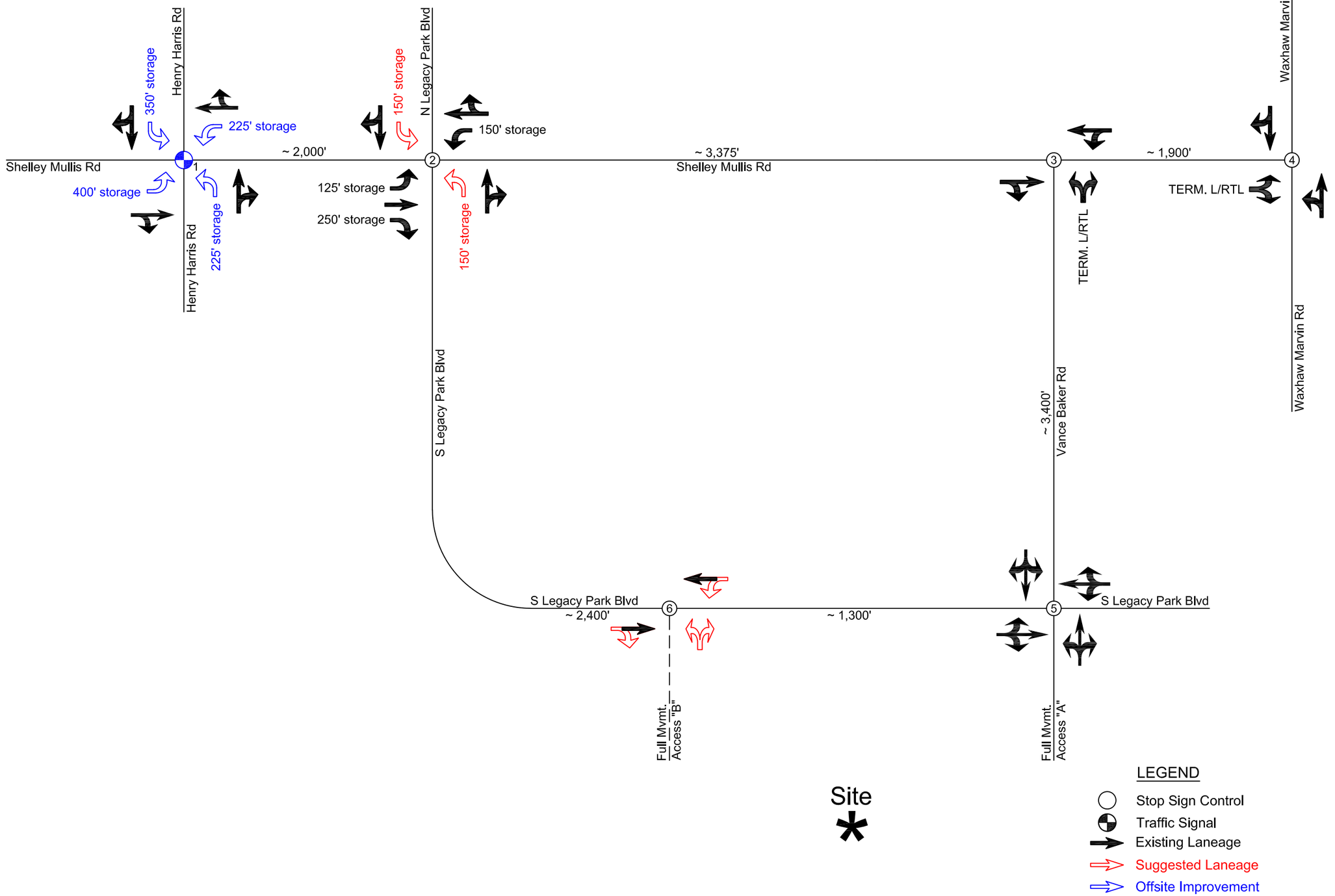
0 XX XX N
SCALE: NTS

PROJECT #: 948-001
DRAWN BY: CRB
CHECKED BY: REG

AUGUST 2021

REVISIONS:

Figure 8



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ARBOR WALK TIA

LANCASTER COUNTY, SC

ARBOR CONSTRUCTION, LLC
4119-I ROSE LAKE DRIVE
CHARLOTTE, NC 28217

SUGGESTED LANEAGE

0 XX XX N

SCALE: NTS

PROJECT #: 948-001
DRAWN BY: CRB
CHECKED BY: REG

AUGUST 2021

REVISIONS:

Figure 9

CONCLUSIONS

In conclusion, even though the Arbor Walk residential development will slightly increase the amount of traffic on the adjacent corridors, the project will not materially impact adjacent roadways, intersections, or the general public traveling in the area if the site is developed according to the proposed plan and includes the suggested access configurations and offsite roadway improvements.

APPENDIX