MA 22-10: Rolesville Senior Living
Traffic Impact Analysis

Rolesville, North Carolina

July 25, 2023

Prepared for:

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Sign-off Sheet

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7/25/2023

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Executive Summary

The proposed Rolesville Senior Living development (Map Amendment 22-10) is located on the south side of Burlington Mills Road west of Main Street (US 401 Business) in Rolesville, NC. The parcel is currently zoned as a General Commercial-Conditional Zoning (GC-CZ) District under the Land Development Ordinance (LDO). The applicant is pursuing a rezoning to a Residential High-Density Conditional Zoning (RH-CZ) District.

The 10.13-acre site is anticipated to be completed in 2028 and consists of 164 units of multifamily senior adult housing. Using the Institute of Transportation Engineers (ITE) Trip Generation Manual, it is estimated that at full build-out the development is expected to generate 499 new trips per average weekday. In the AM and PM peak hours, the development is expected to generate 32 AM peak hour trips (11 entering and 21 exiting) and 41 PM peak hour trips (23 entering and 18 exiting). Access to the site is envisioned to be provided by a single driveway located at the future intersection of Burlington Mills Road at Old Burlington Mills Road.

The purpose of this report is to evaluate the proposed development in terms of traffic conditions, evaluate the ability of the adjacent roadways to accommodate the additional traffic volumes, and recommend transportation improvements needed to mitigate congestion that may result from the additional site traffic. This report presents trip generation, trip distribution, traffic analysis, and recommendations for transportation improvements needed to meet anticipated traffic demands.

This report examines the following scenarios for the AM and PM peak hours:

- 2023 Existing
- 2028 No-Build
- 2028 Build
- 2028 Build Improved

Capacity analysis for the AM and PM peak hours in each scenario was performed for the following existing intersections:

- US 401 Business (Main Street) at SR 2051 (Burlington Mills Road)
- SR 2051 (Burlington Mills Road) at SR 2049 (Forestville Road)

The study will also include the following planned (i.e., future) intersections:

- US 401 Business (Main Street) at SR 2051 (Old Burlington Mills Road)
- SR 2051 (Old Burlington Mills Road) at Burlington Mills Road

The results of the capacity analysis at these existing and planned intersections, in addition to the aforementioned driveways, are summarized in Tables ES-1:

Table ES-1: Level of Service Summary Table

Level of Service (Delay in seconds per vehicle)	2023 Existing		2028 No-Build		2028 Build		2028 Build Imp.	
	AM	PM	AM	PM	AM	PM	AM	PM
Burlington Mills Road at Forestville Road	C (34.8)	C (28.1)	E (59.9)	F (81.2)	E (61.3)	F (81.7)	E (61.3)	F (81.7)
Burlington Mills Road at Old Burlington Mills Road / Site Driveway.			F (120.2)	C (19.8)	F (263.3)	D (26.2)	F (263.3)	D (26.2)
Main Street at Old Burlington Mills Road	B (19.5)	B (12.9)	C (23.8)	C (18.9)	C (23.9)	C (19.0)	C (23.9)	C (19.0)
Main Street at Realigned Burlington Mills Road / Virginia Water Drive			E (62.1)	D (42.4)	E (62.8)	D (42.9)	E (62.8)	D (42.9)
Not Included:		Signalized:			Stop-Controlled:			

Rolesville's LDO[8], Section 8.E, establishes the following Level of Service Standards:

1. *The traffic impact analysis must demonstrate that the proposed development would not cause build-out-year, peak-hour levels of service on any arterial or collector road or intersection within the study area to fall below Level of Service (LOS) "D," as defined by the latest edition of the Highway Capacity Manual, or, where the existing level of service is already LOS "E" that the proposed development would not cause the LOS to fall to the next lower letter grade.*

2. *If the road segment or intersection is already LOS "F," the traffic impact analysis must demonstrate that the proposed development, with any proposed improvements, would not cause build-out year peak-hour operation to degrade more than five (5) percent of the total delay on any intersection approach.*

As shown in Table ES-1, the proposed development accounts for a minimal increase in average delay at the study intersections. In many instances, this increase is less than one second per vehicle when comparing results between the No-Build and Build scenarios. The one exception is the intersection of Burlington Mills Road at Old Burlington Mills Road / Site Driveway. Long delays at this intersection during the AM peak hour are attributed to traffic traveling to / from Rolesville Middle School. The school, located just to the west of the proposed development, operates from 8:15 AM to 3:00 PM.

At the intersection of Burlington Mills Road at Old Burlington Mills Road / Site Driveway, the delay on the southbound approach increases from 120 seconds per vehicle to 263 seconds per vehicle between the no-build and build scenarios. Improvements are recommended at the intersection, but these improvements do not reduce the delay on the southbound approach. While delay per vehicle is high on the approach, there is a minimal amount of traffic (22 vehicles total) in the AM peak hour and the queues are contained within the turn-lanes. A traffic signal was evaluated at the intersection and is not recommended due to low side-street traffic volumes.

Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. Intersections where no improvements are recommended are locations that do not meet the standards specified in the LDO[8].

Burlington Mills Road at Forestville Road

- No improvements are recommended at this intersection

Burlington Mills Road at Old Burlington Mills Road / Rolesville Senior Living Driveway

- Construct site driveway as a full-movement access point
- Construct site driveway with one ingress lane and two egress lanes consisting of an exclusive left-turn lane and a shared thru/right-turn lane. Construct the access with 75 feet of internal protective stem
- Provide a westbound left turn lane with 50 feet of full-width storage and appropriate taper
- Restripe the southbound approach of Old Burlington Mills Road to provide an exclusive left-turn lane and a shared thru/right-turn lane.
- Restripe the eastbound approach of Burlington Mills Road to provide a shared thru/right-turn lane.

Main Street at Old Burlington Mills Road

- No improvements are recommended at this intersection

Realigned Burlington Mills Road at Main Street

- No improvements are recommended at this intersection

These recommendations are illustrated in Figure ES-1. A conceptual design is provided in Figure ES-2.

Figure ES-1: Recommended Improvements

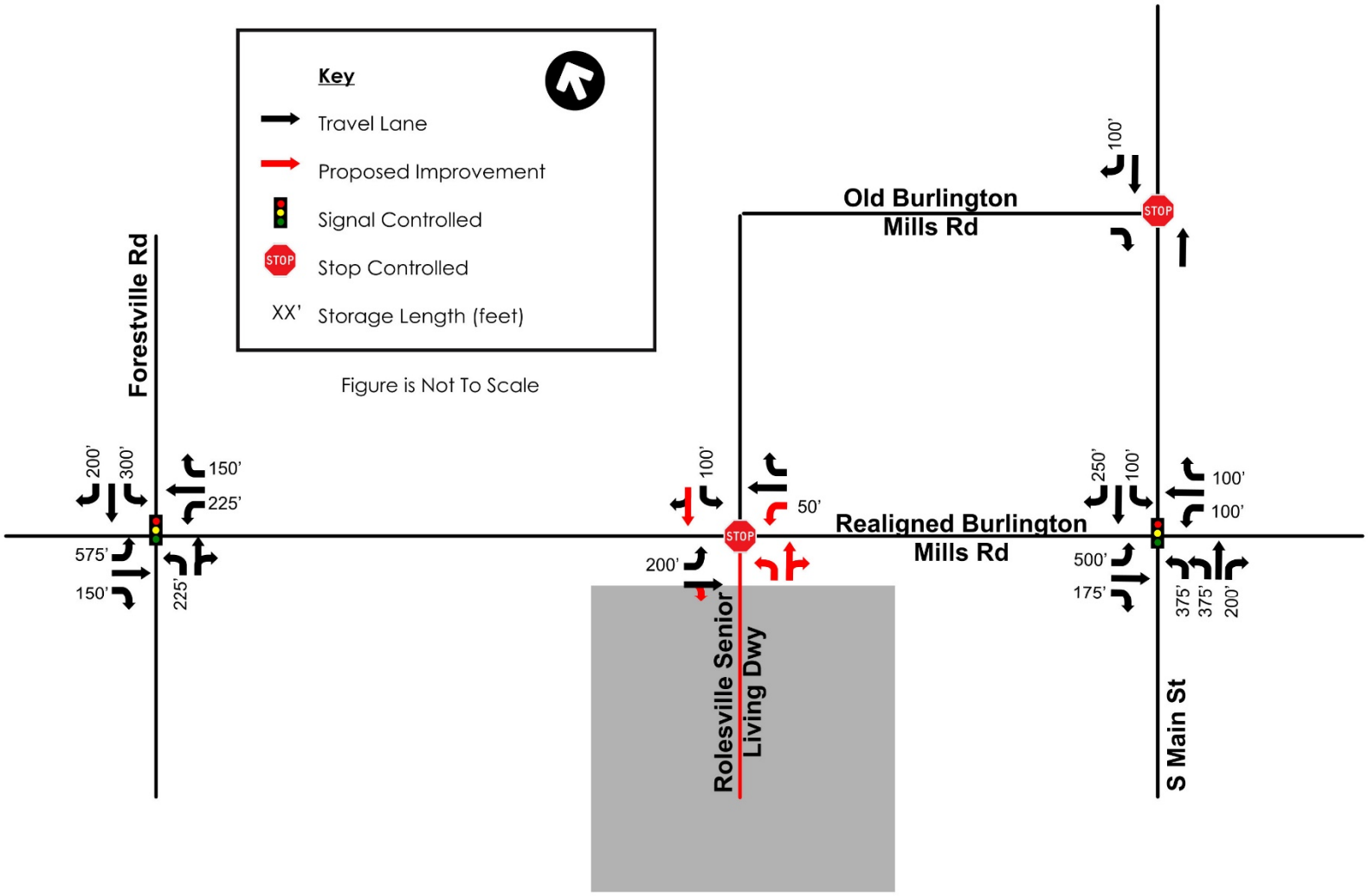
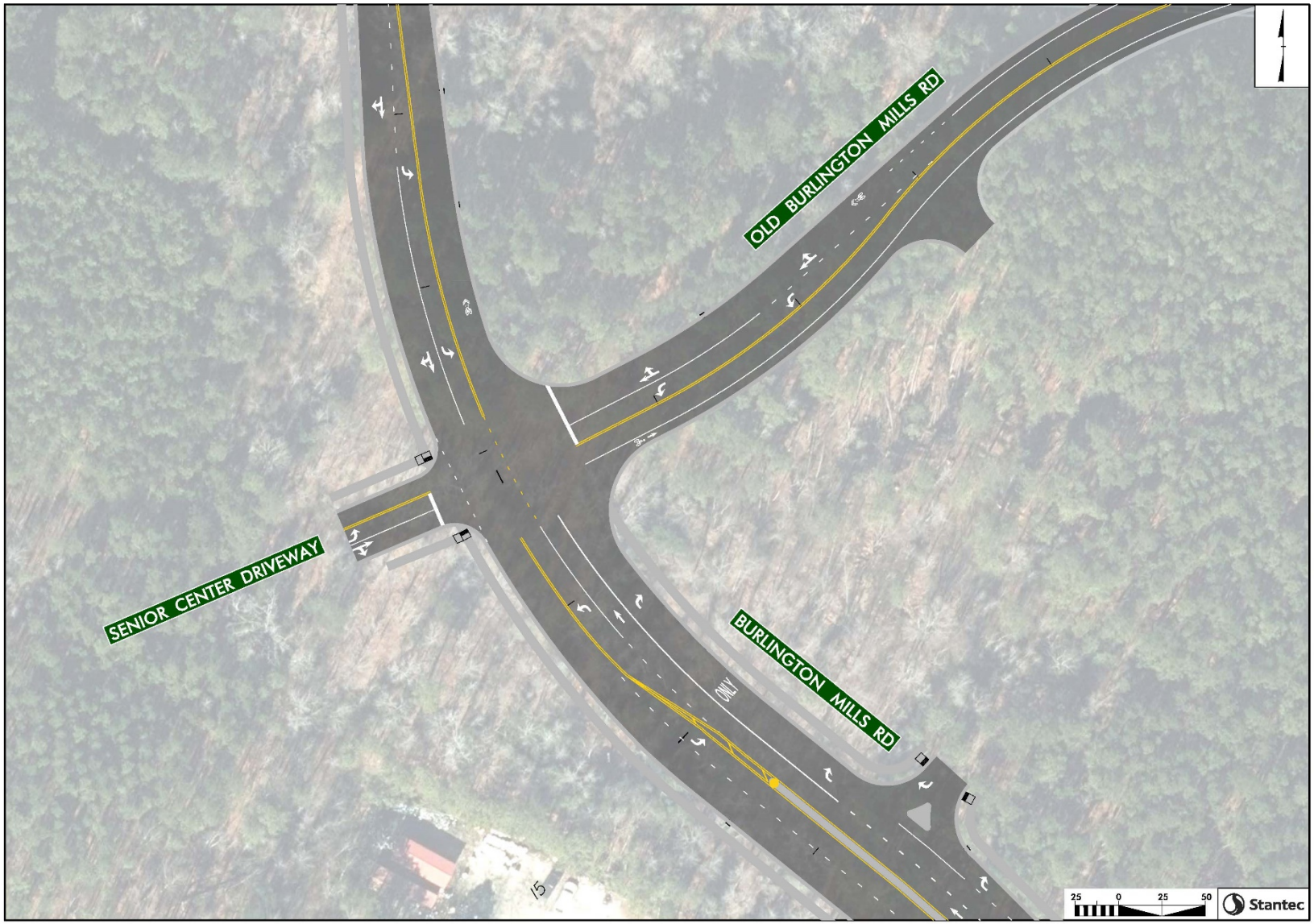


Figure ES-2: Conceptual Design



1.0 INTRODUCTION

The proposed Rolesville Senior Living development (Map Amendment 22-10) is located on the south side of Burlington Mills Road west of Main Street (US 401 Business) in Rolesville, NC. The parcel is currently zoned as a General Commercial-Conditional Zoning (GC-CZ) District under the Land Development Ordinance (LDO). The applicant is pursuing a rezoning to a Residential High-Density Conditional Zoning (RH-CZ) District. The 10.13-acre site is anticipated to be completed in 2028 and consists of 164 units of multifamily senior adult housing. The project location is shown in Figure 1. The site plan, prepared by McAdams, can be found in Figure 2.

The traffic analysis considers future build conditions during the build-out year (2028). Access to the site is anticipated to be provided by one driveway on Burlington Mills Road. The analysis scenarios are as follows:

- 2023 Existing
- 2028 No-Build
- 2028 Build
- 2028 Build Improved

The purpose of this report is to evaluate the development in terms of projected vehicular traffic conditions, evaluate the ability of the adjacent roadways to accommodate the additional traffic, and recommend transportation improvements needed to mitigate congestion that may result from additional site traffic. This report presents trip generation, trip distribution, traffic analyses, and recommendations for improvements needed to meet anticipated traffic demands. The analysis examines the AM and PM peak hours for the aforementioned analysis scenarios.

Figure 1: Site Location

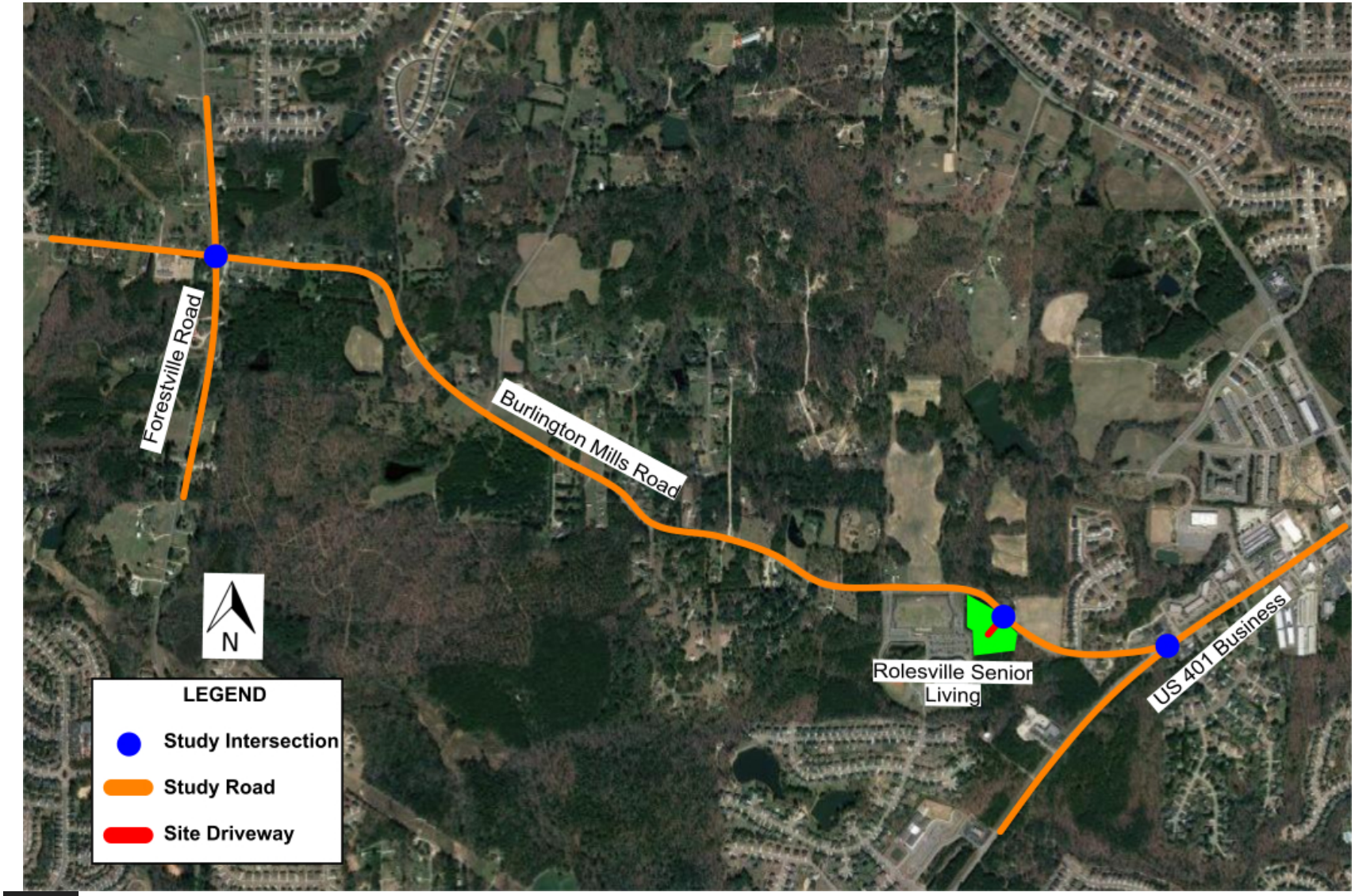
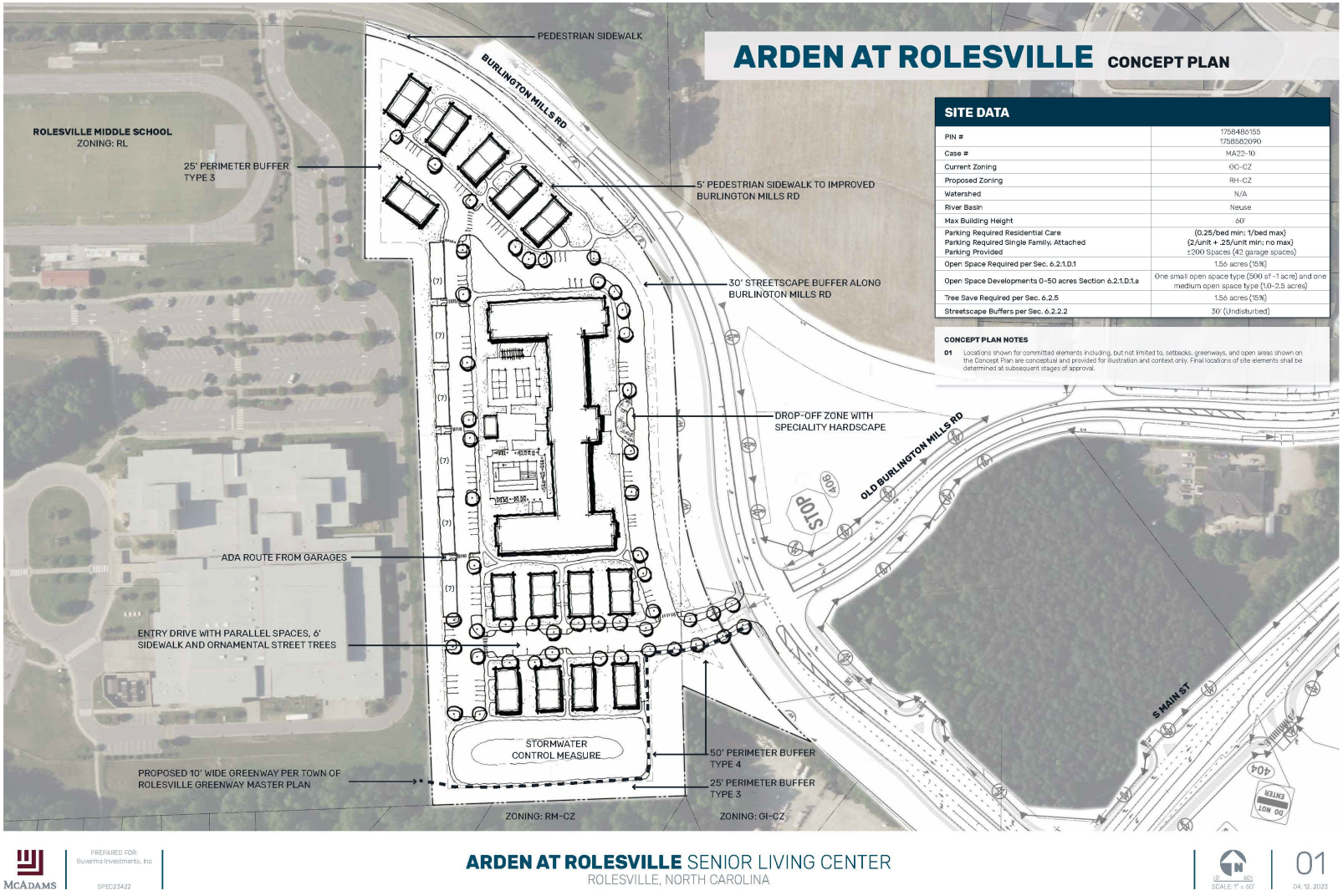


Figure 2: Site Plan



2.0 INVENTORY OF TRAFFIC CONDITIONS

2.1 STUDY AREA

Stantec coordinated with the Town of Rolesville, the applicant, and the North Carolina Department of Transportation (NCDOT) to determine the appropriate study area and assumptions. The following existing intersections were agreed upon to be analyzed to determine the impacts associated with this development. These intersections are shown in Figure 1.

- US 401 Business (Main Street) at SR 2051 (Burlington Mills Road)
- SR 2051 (Burlington Mills Road) at SR 2049 (Forestville Road)

2.2 PROPOSED ACCESS

Access to the site is envisioned to be provided by one access point at the intersection of Burlington Mills Road at Old Burlington Mills Road. This will add a fourth leg to the future three-legged, stop-controlled intersection.

2.3 EXISTING CONDITIONS

Table 1 provides a detailed description of the existing study area roadway network. All functional classification and average annual daily traffic (AADT) information were obtained from NCDOT.

Table 1: Existing Conditions

Road Name	Road Number	Primary Cross-Section	Functional Classification[1]	AADT[2] (year)	Speed Limit (mph)	Maintenance Agency
Burlington Mills Road	SR 2051	Two-Lane Undivided	Major Collector	4,000-8,200 vpd (2021)	35-45	NCDOT
Forestville Road	SR 2049	Two-Lane Undivided	Minor Arterial	13,500-17,000 vpd (2021)	45	NCDOT
Main Street	US 401 Business	Two-Lane w/ TWLTL*	Principal Arterial	10,000-13,500 vpd (2021)	35	NCDOT

*TWLTL = Continuous Two-Way Left-Turn Lane

The existing lane configuration and traffic control for the study area intersections are illustrated in Figure 3.

2.4 FUTURE CONDITIONS

The following sub-sections discuss the projects that are anticipated to modify the study area intersections between 2023 and the future year 2028. The future year lane configuration and traffic control for the study area intersections are illustrated in Figure 4.

2.4.1 U-6241 (Main Street)

The U-6241 project will realign Burlington Mills Road near Main Street as well as make streetscape and multimodal improvements along Main Street. The access point to the proposed development is located approximately 700 feet west of where the realigned Burlington Mills Road will tie into the existing alignment of Burlington Mills Road (a.k.a. Old Burlington Mills Road). This will create a new, three-legged, stop-controlled intersection.

The project will convert the existing signalized intersection of Main Street at Burlington Mills Road to an unsignalized (i.e., stop-controlled) intersection. Furthermore, Burlington Mills Road will be converted from full-movement access onto Main Street to right-in / right-out only access.

2.4.2 Pearce Farm (fka Tom's Creek)

The following improvements are currently proposed to be implemented in association with the development of the Pearce Farm site:

Burlington Mills Road at Forestville Road

- Extend the existing eastbound left-turn lane to 575 feet of full-width storage and appropriate taper
- Extend the existing westbound left-turn lane to 225 feet of full-width storage and appropriate taper
- Construct a westbound right-turn lane with 150 feet of full-width storage and appropriate taper
- Extend the existing northbound left-turn lane to 225 feet of full-width storage and appropriate taper
- Extend the existing southbound left-turn lane to 300 feet of full-width storage and appropriate taper
- Construct a southbound right-turn lane with 200 feet of full-width storage and appropriate taper

A copy of the TIA is contained in the Appendix. The Pearce Farm is discussed in more detail in Section 4.3.3.

2.4.3 Wallbrook

The following improvements were committed to by the Wallbrook development:

Main Street at Realigned Burlington Mills Road

- Construct dual northbound exclusive left-turn lanes with 375 feet of full-width storage and appropriate taper
- Construct an exclusive northbound right-turn lane with 200 feet of full-width storage and appropriate taper
- Construct an exclusive westbound left-turn lane with 100 feet of full-width storage and appropriate taper
- Construct an exclusive westbound right-turn lane with 100 feet of full-width storage and appropriate taper
- Construct an exclusive eastbound left-turn lane with 500 feet of full-width storage and appropriate taper
- Construct an exclusive eastbound right-turn lane with 175 feet of full-width storage and appropriate taper
- Construct an exclusive southbound left-turn lane with 100 feet of full-width storage and appropriate taper
- Construct an exclusive southbound right-turn lane with at least 250 feet of full-width storage and appropriate taper

A copy of the TIA is contained in the Appendix. The Wallbrook development is discussed in more detail in Section 4.3.4.

Figure 3: 2023 Existing Lanes and Traffic Control

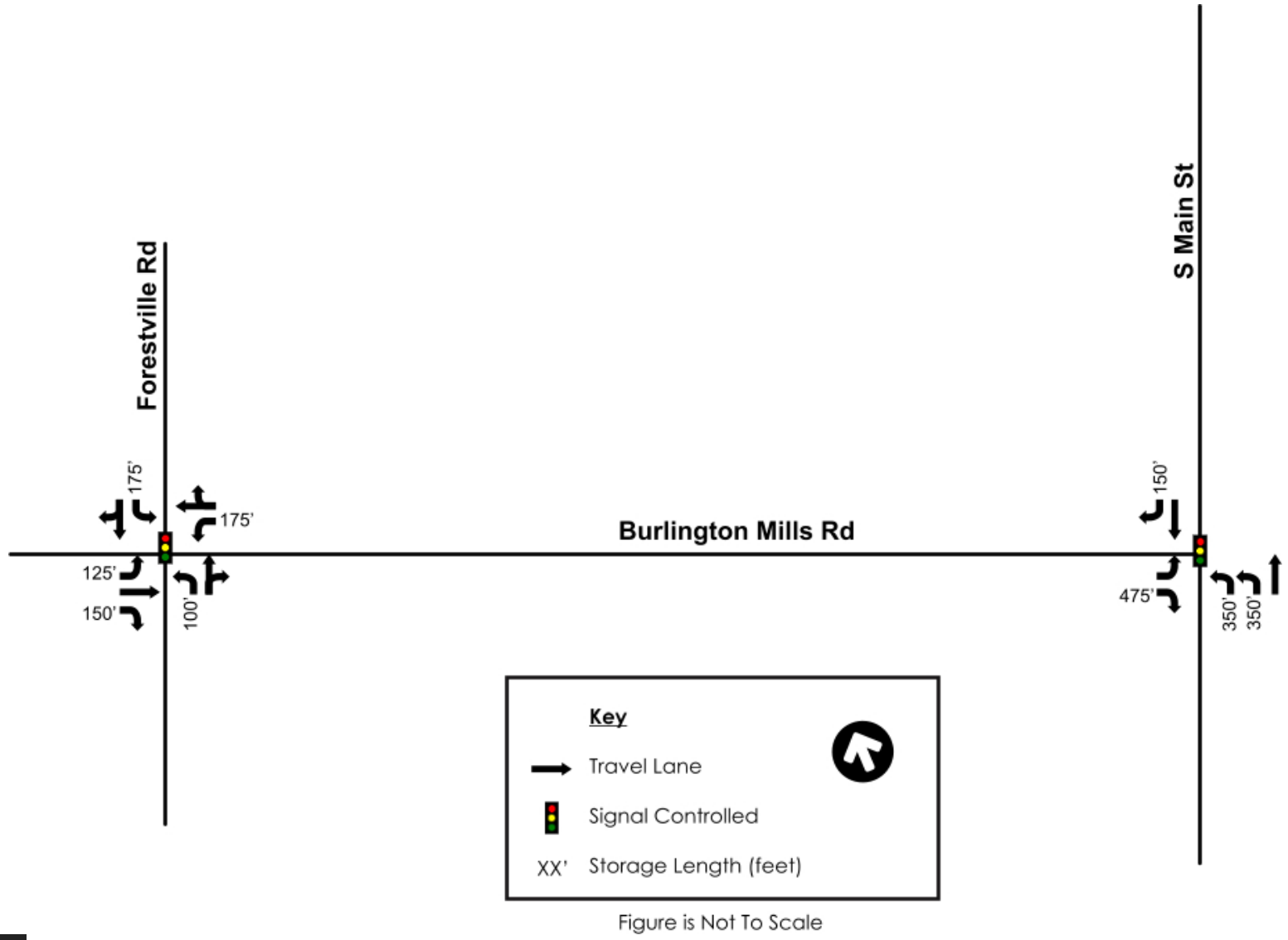


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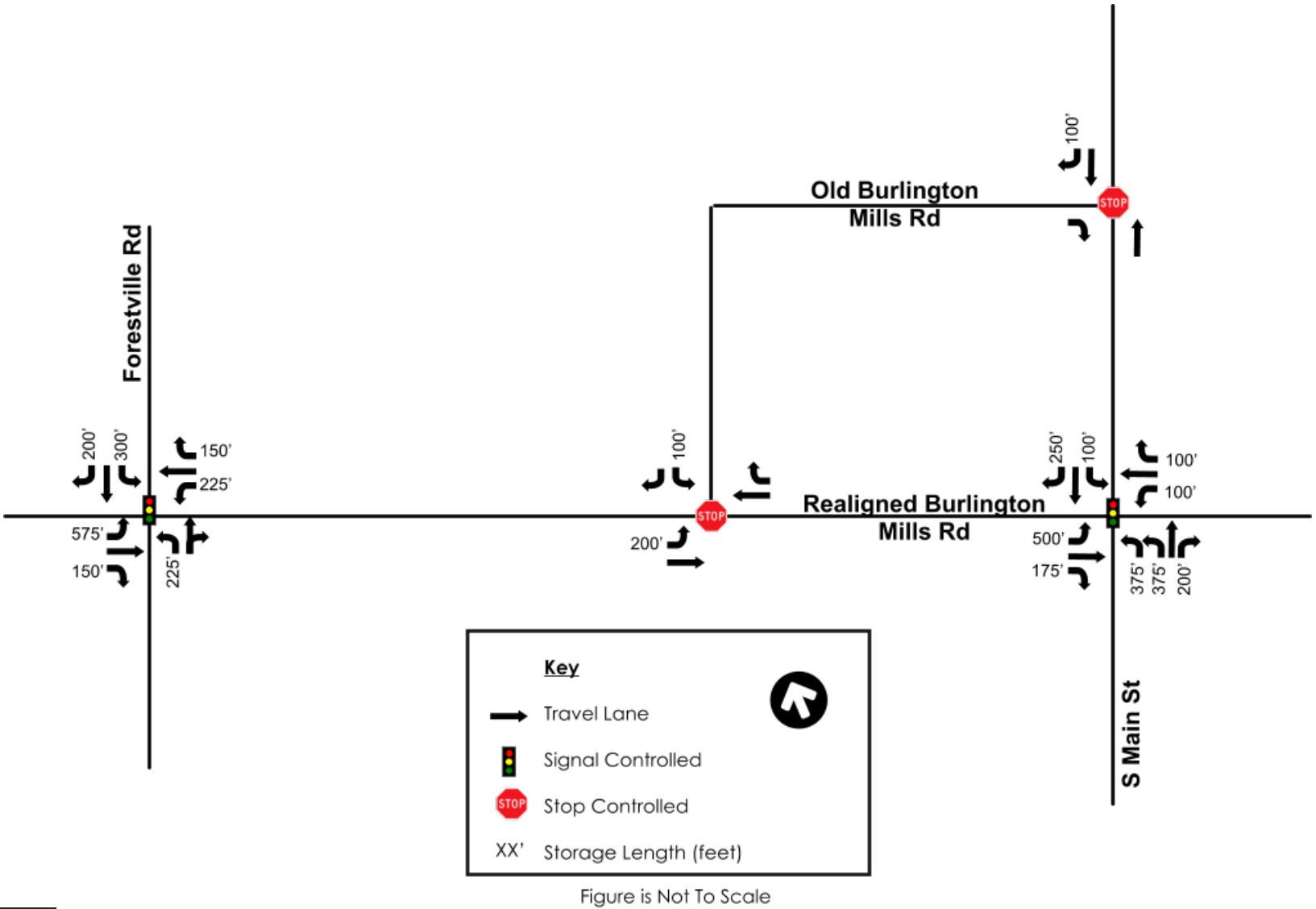
Figure 4: 2028 No-Build Lanes and Traffic Control



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3.0 TRIP GENERATION AND DISTRIBUTION

3.1 TRIP GENERATION

Trip generation for the proposed development was performed using the 11th Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual[3]. The Rate Versus Equation spreadsheet published by NCDOT[4] was used to supplement the ITE methodology. No trip reductions were taken for internal capture or pass-by traffic. Trip generation for the proposed development is shown in Table 2.

Table 2: Trip Generation

Land Use	Size	Daily			AM Peak			PM Peak		
		Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Senior Adult Housing - Multifamily (LUC 252)	164 Units	499	250	249	32	11	21	41	23	18
Total Trips Generated		**499**	**250**	**249**	**32**	**11**	**21**	**41**	**23**	**18**

3.2 SITE TRIP DISTRIBUTION

To accurately determine the effect of the proposed development on the surrounding roadway network, an estimate of the expected distribution of traffic entering and exiting the site is needed. These percentages were developed using a combination of existing traffic volume counts, historic AADTs provided by NCDOT, and engineering judgment. This trip distribution was submitted as part of NCDOT's TIA Scoping Checklist contained in the Appendix. All traffic volume calculations can be found in the Appendix.

- 40% to/from the south on Main Street
- 25% to/from the north on Main Street
- 25% to/from the north on Forestville Road
- 10% to/from the west on Burlington Mills Road

The trip distribution for the proposed development is shown in Figure 5. The trip assignment is shown in Figure 6.

Figure 5: Trip Distribution

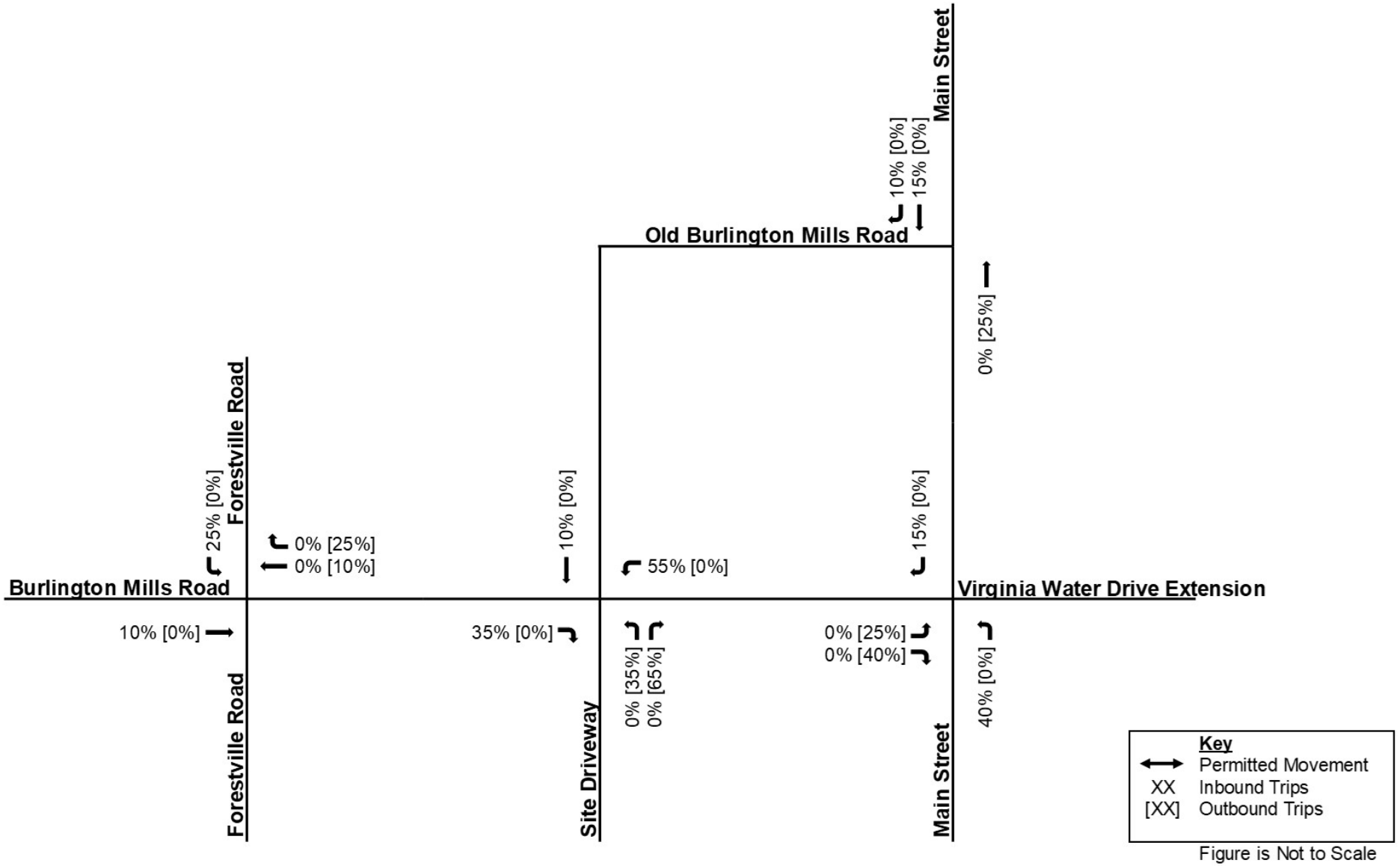
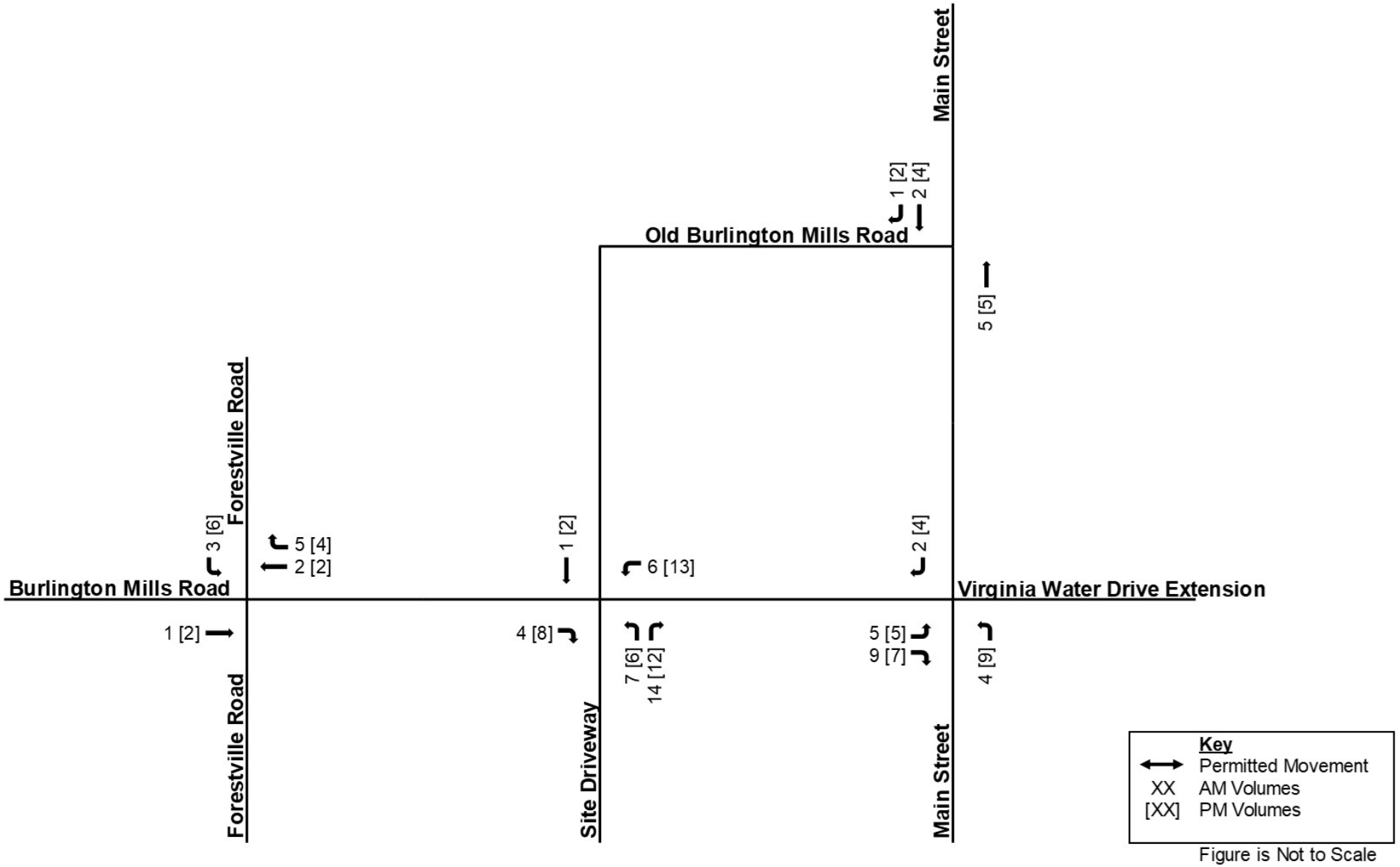


Figure 6: Trip Assignment



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4.0 TRAFFIC VOLUMES

All traffic volume calculations can be found in the Appendix.

4.1 DATA COLLECTION

Morning (7:00 – 9:00 AM) and evening (4:00 – 6:00 PM) turning movement counts were taken at the study intersections on May 24, 2023, while schools were in session. Due to the distance between study intersections and the number of driveways between them, the traffic counts were not balanced. All traffic count data can be found in the appendix. The existing (2023) traffic volumes are shown in Figure 7.

4.2 BACKGROUND TRAFFIC GROWTH

Background traffic growth is the increase in traffic volumes due to usage increases and non-specific growth throughout the area. The 2023 existing volumes were grown by a 2.0 percent annual rate to estimate the 2028 volumes. The growth in vehicles as a result of this future traffic growth is shown in Figure 8.

4.3 ADJACENT DEVELOPMENT TRAFFIC

There are four (4) developments proposed to be constructed within and nearby the study area: Marshall Village, Perry Farms, Pearce Farm (fka Tom's Creek), and Wallbrook. The total trips associated with these developments are

Traffic Volumes
July 25, 2023

shown in

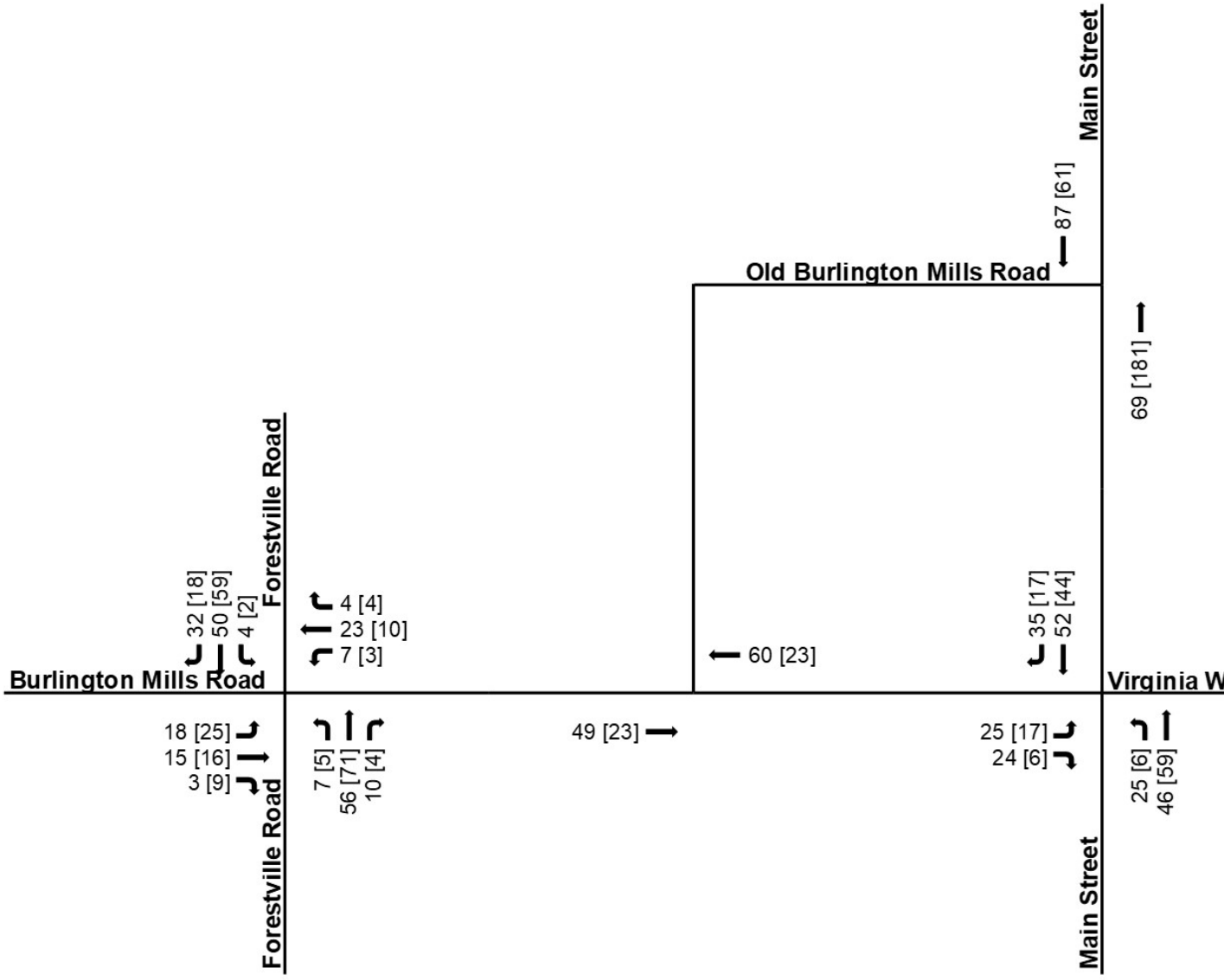


Figure 9. Figures showing the individual development trips can be found in the appendix. The following subsections highlight salient data for each of the approved developments.

4.3.1 Marshall Village

Marshall Village is a residential development located in the northwest quadrant of the Forestville Road and Burlington Mills Road intersection. The proposed development is expected to consist of 171 townhomes and is estimated to be built out in 2024. A figure illustrating the trips attributed to Marshall Village, as well as a copy of the traffic study prepared by Ramey Kemp & Associates is provided in the Appendix.

4.3.2 Perry Farms

Perry Farms is a mixed-use development project located in the northeast quadrant of the US 401 (Louisburg Road) and Forestville Road intersection. The development will consist of 224 units of mid-rise multi-family housing, 160 units of low-rise multi-family housing, a 10,000-square-foot daycare center, a 5,000-square-foot medical-dental office building, and a 5,000-square-foot convenience market/gas station. The Perry Farms development is estimated to be built out by 2025. The trips attributed to the Perry Farms development, as well as a copy of the traffic study prepared by Davenport is provided in the Appendix.

4.3.3 Pearce Farm (fka Tom's Creek)

Pearce Farm is a residential development project located in the southeast quadrant of the Forestville Road and Burlington Mills Road intersection. It is currently assumed that the project will consist of 606 units of single-family detached housing and that the project will be built out by 2029. The improvements associated with the Wallbrook development are discussed in Section 2.4.3. To provide a conservative analysis, it was assumed that the entire project would be built out and completed by the construction of the Rolesville Senior Living facility. The trips attributed to the Pearce Farm development, as well as a copy of the traffic study prepared by Stantec is provided in the Appendix.

4.3.4 Wallbrook

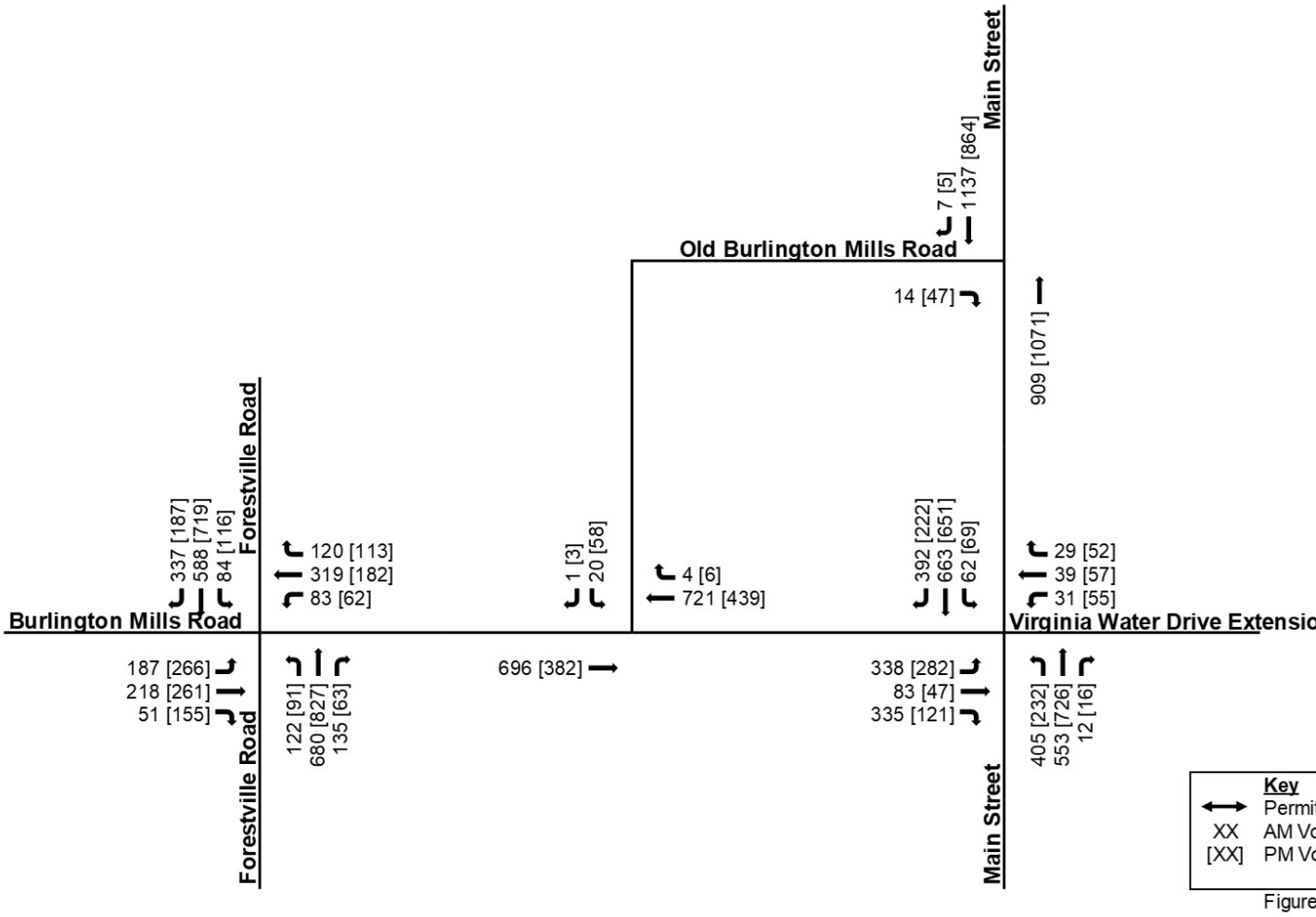
Wallbrook is a proposed mixed-use development project located along Main Street. The proposed development is expected to consist of 107,000 square feet of office space, 17,000 square feet of restaurants, 143,000 square feet of retail space, and 170 townhomes. The development is estimated to be built out by 2025. The improvements associated with the Wallbrook development are discussed in Section 2.4.3. The trips attributed to the Wallbrook development, as well as a copy of the traffic study prepared by Stantec, can be found in the Appendix.

4.4 NO-BUILD TRAFFIC VOLUMES

The 2028 No-Build traffic volumes consist of the sum of the 2023 Existing traffic volumes, the Background traffic growth, and the adjacent development growth. The 2028 No-Build traffic volumes are shown in Figure 10.

4.5 BUILD TRAFFIC VOLUMES

The 2028 Build traffic volumes include the 2028 No-Build traffic and the proposed development traffic discussed in Section 3.0. The 2028 Build traffic volumes are shown in



Figure

Traffic Volumes
July 25, 2023

Figure 11.

Traffic Volumes
July 25, 2023

Figure 7: 2023 Existing Traffic Volumes

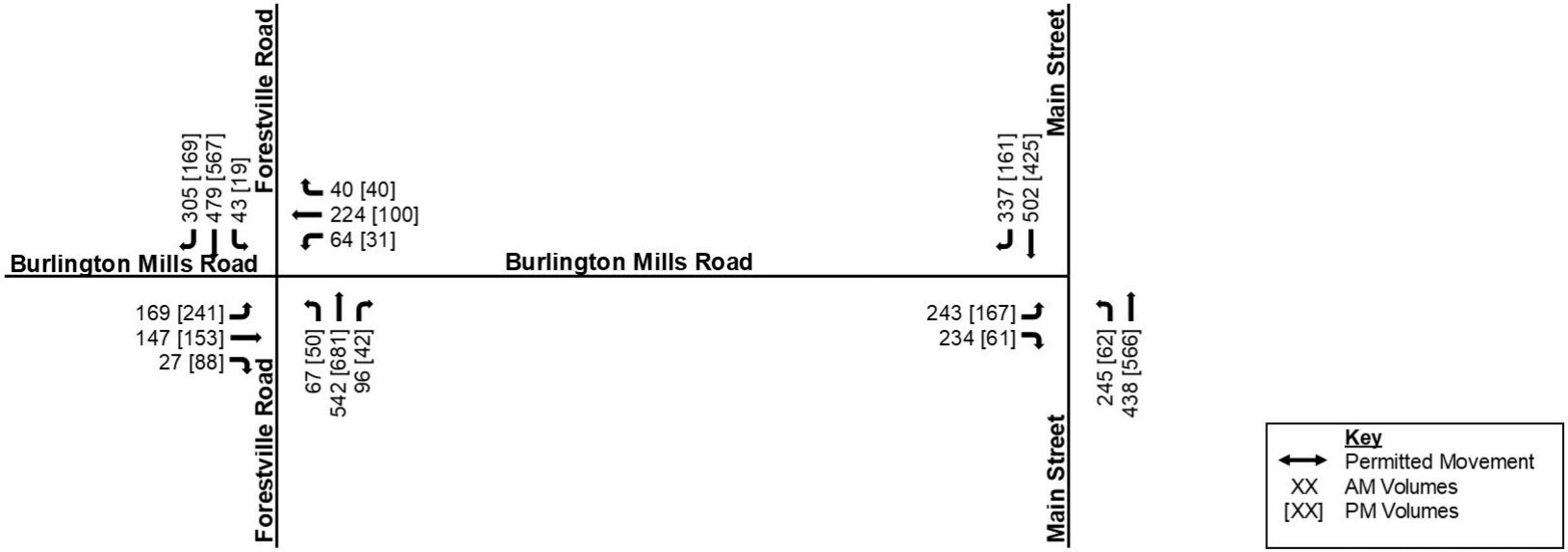


Figure 8: Background Traffic Growth

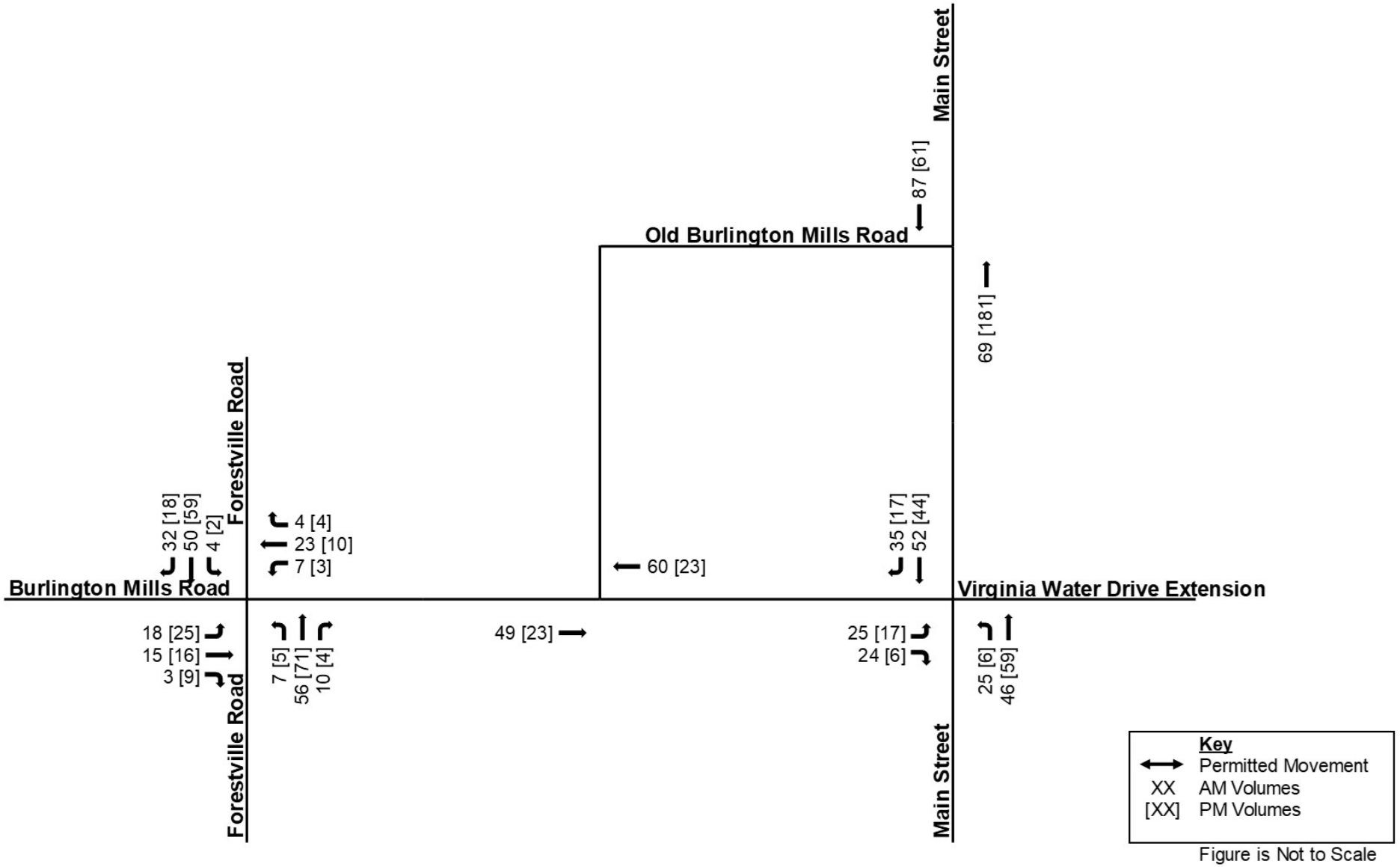


Figure 9: Adjacent Development Traffic Volumes

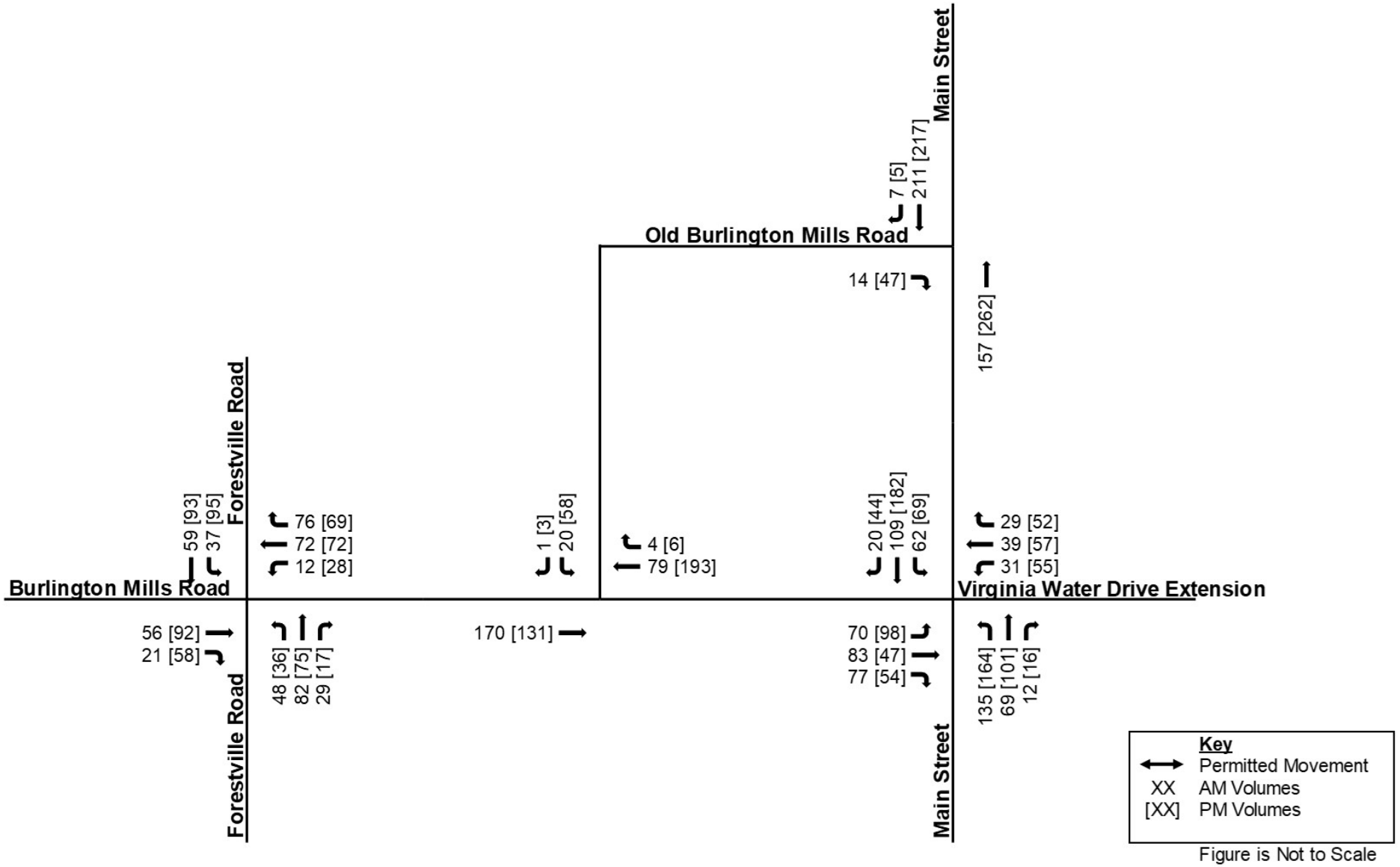


Figure 10: 2028 No-Build Traffic Volumes

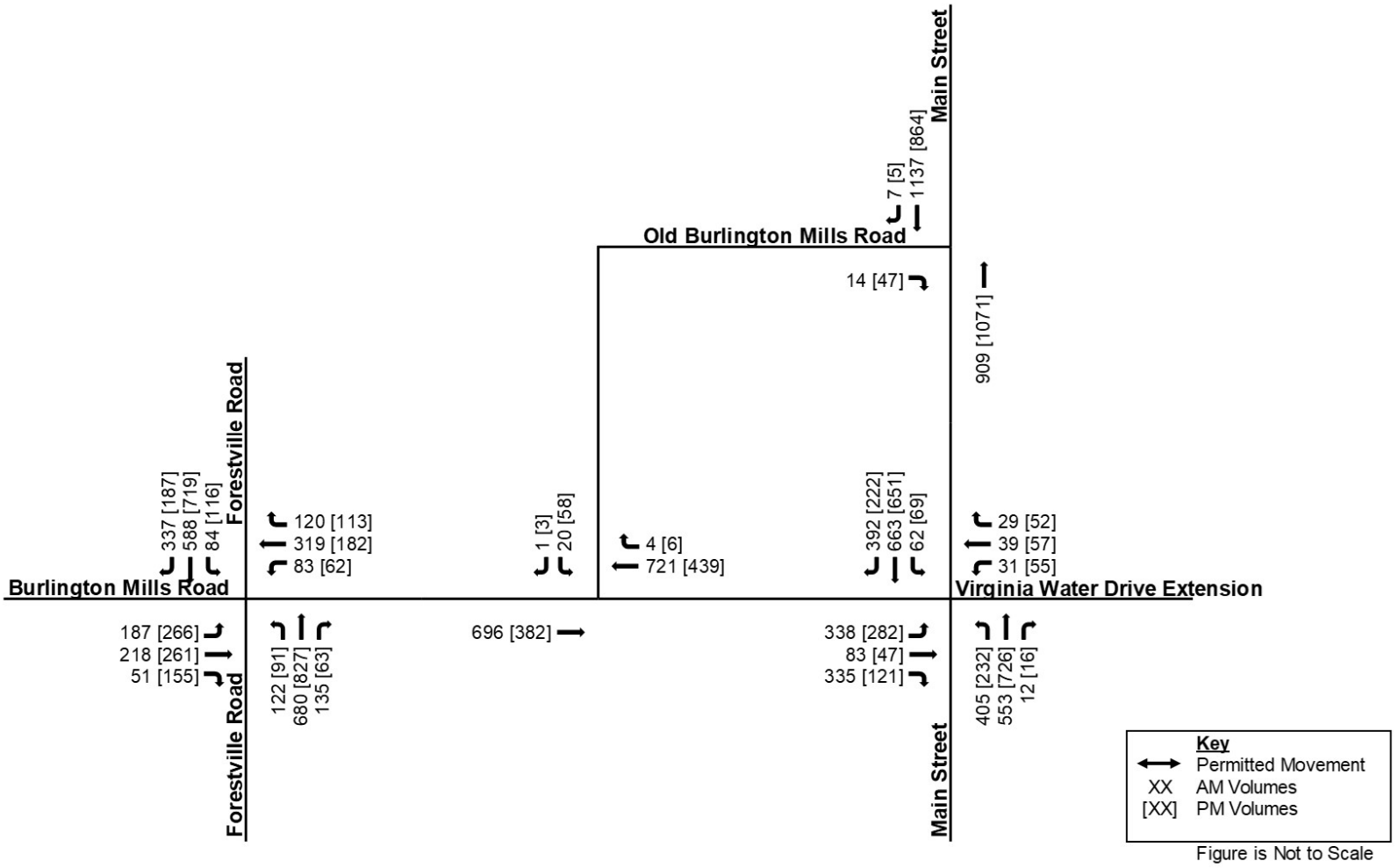
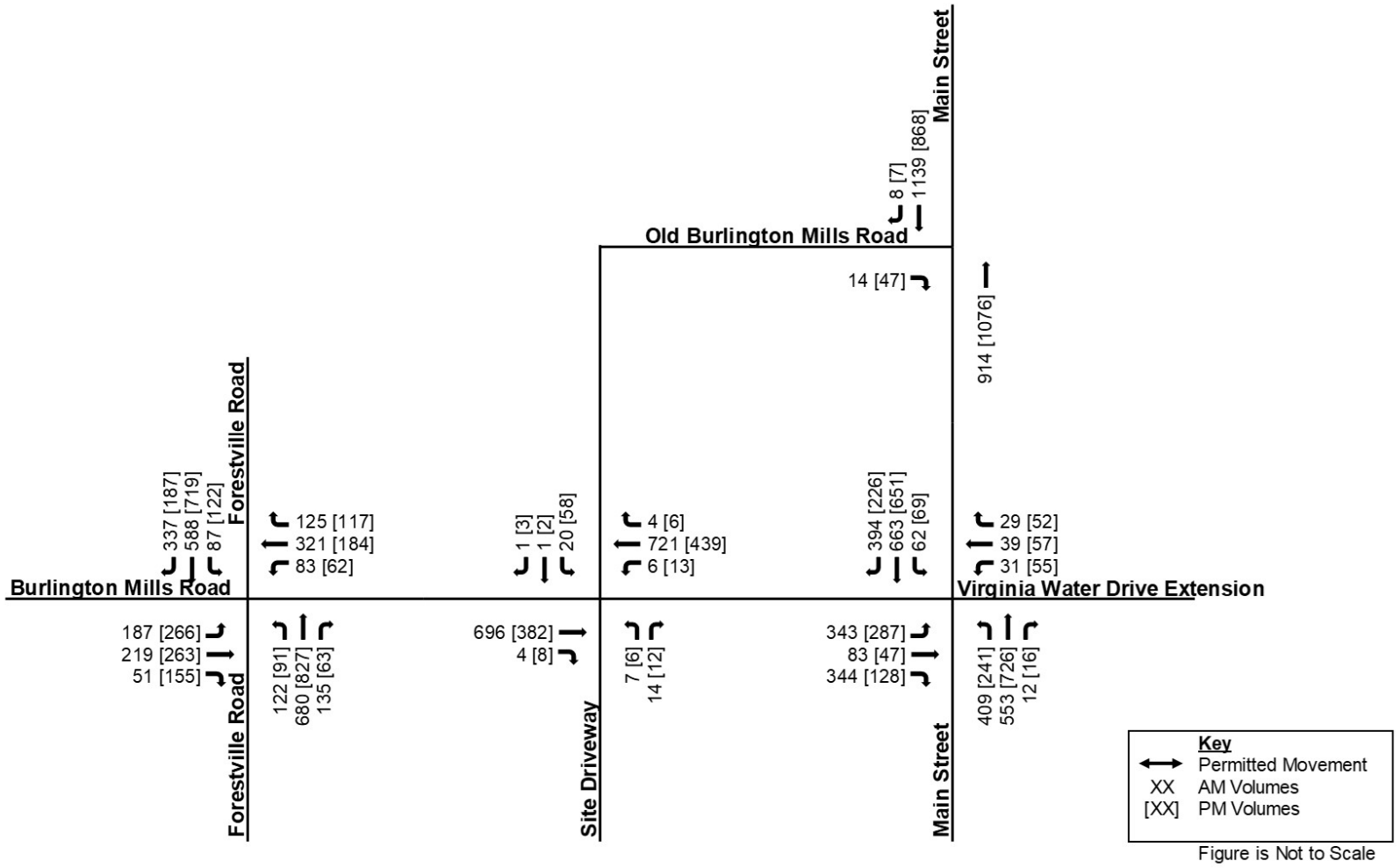


Figure 11: 2028 Build Traffic Volumes



5.0 CAPACITY ANALYSIS

Capacity analyses were performed for the roadway network in the study area. The traffic analysis program Synchro Version 11 was used to analyze all signalized and stop-controlled intersections according to methods put forth by the Transportation Research Board's Highway Capacity Manual[5] (HCM). The HCM defines capacity as the "maximum rate or flow at which persons or vehicles can be reasonably expected to traverse a point or uniform section of a line or roadway during a specified period under prevailing roadway, traffic, and control conditions, usually expressed as vehicles per lane per hour."

Level of service (LOS) is a term used to describe different traffic conditions and is defined as a "qualitative measure describing operational conditions within a traffic stream, and their perception by motorists or passengers." LOS varies from Level A, representing free flow, to Level F where traffic breakdown conditions are evident. At an unsignalized intersection, the primary traffic on the main roadway is virtually uninterrupted. Therefore, the overall delay for the intersection is usually less than what is calculated for minor street movements. The overall intersection delay and the delay for the intersections' minor movement(s) are reported in the summary tables of this report. LOS D is acceptable for signalized intersections in suburban areas during peak periods. For unsignalized intersections, it is common for some of the minor street movements or approaches to be operating at LOS F during peak hour conditions and that is not necessarily indicative of an area that requires improvements.

Capacity analyses were completed following *NCDOT Capacity Analysis Guidelines*[6] as well as the *Draft NCDOT Capacity Analysis Guidelines Best Practices*[7]. Table 3 presents the criteria of each LOS as indicated in the HCM.

Table 3: Level of Service Criteria

Level of Service (LOS)	Signalized Intersection Control Delay (seconds/vehicle)	Unsignalized Intersection Control Delay (seconds/vehicle)
A	≤ 10	≤ 10
B	>10 and ≤ 20	>10 and ≤ 15
C	>20 and ≤ 35	>15 and ≤ 25
D	>35 and ≤ 55	>25 and ≤ 35
E	>55 and ≤ 80	>35 and ≤ 50
F	>80	>50

The Town of Rolesville's Land Development Ordinance (LDO)[8], Section 8.E, establishes the following Level of Service Standards:

1. *The traffic impact analysis must demonstrate that the proposed development would not cause build-out-year, peak-hour levels of service on any arterial or collector road or intersection within the study area to fall below Level of Service (LOS) "D," as defined by the latest edition of the Highway Capacity Manual, or, where the existing level of service is already LOS "E" that the proposed development would not cause the LOS to fall to the next lower letter grade.*

2. *If the road segment or intersection is already LOS "F," the traffic impact analysis must demonstrate that the proposed development, with any proposed improvements, would not cause build-out year peak-hour operation to degrade more than five (5) percent of the total delay on any intersection approach.*

All Synchro files and detailed printouts can be found in the Appendix.

5.1 2023 EXISTING

In the base year under the existing geometric conditions, both study intersections operate at an overall acceptable LOS. It should be noted that the Burlington Mills Road at Forestville Road eastbound left, operates at LOS E and LOS F in the AM and PM peak hours; respectively. The results from the 2023 existing analysis are shown in Table 4. Instances where the overall intersection or lane group operate at LOS E or F are highlighted in the table.

Table 4: 2023 Existing Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (feet)		Max. Obs. Queue (feet)	
				AM	PM	AM	PM	AM	PM	AM	PM
	Burlington Mills Road at Forestville Road	Overall		34.8	28.1	C	C				
		EB	L	88.8	63.1	F	E	235	280	225	221
			T	26.9	27.4	C	C	124	129	863	363
			R	14.9	16.4	B	B	25	64	233	163
		WB	L	21.1	18.5	C	B	45	26	114	65
			TR	25.5	21.2	C	C	151	83	243	142
		NB	L	9.6	8.6	A	A	31	26	198	199
			TR	13.5	15.0	B	B	342	421	354	405
		SB	L	15.3	14.3	B	B	38	20	274	182
			TR	50.0	34.5	D	C	779	693	1065	574
	Burlington Mills Road at Main Street (US 401 Business)	Overall		19.5	12.9	B	B				
		EB	L	42.3	38.5	D	D	118	38	193	87
			T	7.2	6.7	A	A	175	230	172	38
		WB	T	19.0	11.9	B	B	331	246	473	232
			R	3.9	2.1	A	A	71	30	250	280
		SB	L	40.9	37.8	D	D	231	63	431	316
			R	20.3	11.6	C	B	185	23	252	127

Intersection or Lane Group Operates at LOS E

Intersection or Lane Group Operates at LOS F

5.2 2028 NO-BUILD

In the 2028 No-Build conditions, the analysis assumes the improvements associated with the adjacent developments and NCDOT projects are constructed. These improvements, discussed in Section 2.4, are listed below:

Burlington Mills Road at Forestville Road

- Extend the existing eastbound left-turn lane to 575 feet of full-width storage and appropriate taper
- Extend the existing westbound left-turn lane to 225 feet of full-width storage and appropriate taper
- Construct a westbound right-turn lane with 150 feet of full-width storage and appropriate taper
- Extend the existing northbound left-turn lane to 225 feet of full-width storage and appropriate taper
- Extend the existing southbound left-turn lane to 300 feet of full-width storage and appropriate taper
- Construct a southbound right-turn lane with 200 feet of full-width storage and appropriate taper

Main Street at Realigned Burlington Mills Road

- Construct dual northbound exclusive left-turn lanes with 375 feet of full-width storage and appropriate taper
- Construct an exclusive northbound right-turn lane with 200 feet of full-width storage and appropriate taper
- Construct an exclusive westbound left-turn lane with 100 feet of full-width storage and appropriate taper
- Construct an exclusive westbound right-turn lane with 100 feet of full-width storage and appropriate taper
- Construct an exclusive eastbound left-turn lane with 500 feet of full-width storage and appropriate taper
- Construct an exclusive eastbound right-turn lane with 175 feet of full-width storage and appropriate taper
- Construct an exclusive southbound left-turn lane with 100 feet of full-width storage and appropriate taper
- Construct an exclusive southbound right-turn lane with at least 250 feet of full-width storage and appropriate taper

Main Street at Old Burlington Mills Road

- The existing signalized and full-movement intersection will be converted to a stop-controlled right-in / right-out intersection.

Synchro LOS and delay results for the 2028 No-Build analysis scenario are listed in Table 5. Instances where the overall intersection or lane group operate at LOS E or F are highlighted in the table.

SimTraffic observations noted queues approaching 1,000 feet on the westbound approach of Burlington Mills Road at Forestville Road. On the northbound approach of Forestville Road at Burlington Mills Road, queues were observed exceeding 1,000 feet. Similarly, the southbound approach of Main Street resulted in a maximum observed queue greater than 1,000 feet in the AM peak hour.

Table 5: 2028 No-Build Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (feet)		Max. Obs. Queue (feet)	
				AM	PM	AM	PM	AM	PM	AM	PM
	Burlington Mills Road at Forestville Road	Overall		59.9	81.2	E	F				
		EB	L	121.7	93.2	F	F	377	496	413	541
			T	39.8	37.5	D	D	259	296	272	559
			R	23.2	24.4	C	C	59	151	85	244
		WB	L	60.4	137.8	E	F	71	132	325	287
			T	89.9	53.5	F	D	473	160	684	954
			R	31.7	32.5	C	C	85	93	250	230
		NB	L	114.8	111.7	F	F	264	213	325	324
			TR	66.5	135.2	E	F	1177	1433	2343	2783
		SB	L	127.4	123.1	F	F	205	260	359	400
			T	38.4	56.5	D	E	670	1005	728	1016
			R	10.0	6.7	B	A	152	75	300	300
	Burlington Mills Road at Old Burlington Mills Road	EB	L	10.0		B		0	0	81	23
		SB	L	141.7	20.5	F	C	45	20	81	67
			R	12.5	10.0	B	B	0	0	49	26
	Main Street (US 401 Business) at Old Burlington Mills Road	EB	R	23.8	18.9	C	C	5	15	253	76
	Realigned Burlington Mills Road at Main Street (US 401 Business)	Overall		62.1	42.4	E	D				
		EB	L	229.8	61.6	F	E	655	394	594	409
			T	47.7	28.3	D	C	120	56	671	134
			R	39.5	16.4	D	B	248	50	269	181
		WB	L	74.8	82.0	E	F	71	110	83	103
			T	72.9	74.4	E	E	82	108	99	125
			R	50.0	37.5	D	D	56	63	76	95
		NB	L	91.2	78.0	F	E	345	208	398	222
			T	23.6	34.9	C	C	549	888	509	899
			R	9.8	7.5	A	A	14	13	158	271
		SB	L	76.5	105.0	E	F	116	162	199	199
			T	35.3	37.0	D	D	768	781	1100	979
			R	7.4	4.8	A	A	138	58	350	350

Intersection or Lane Group Operates at LOS E

Intersection or Lane Group Operates at LOS F

5.3 2028 BUILD

As part of the 2028 Build analysis, the proposed driveway was added to the network as detailed in Section 2.2. In 2028, with the proposed development in place, a minimal increase in average delay at the study intersections was observed when compared with the 2028 No-Build analysis. In many instances, this increase is less than one second per vehicle.

The one exception is the intersection of Burlington Mills Road at Old Burlington Mills Road / Site Driveway. Long delays at this intersection during the AM peak hour are attributed to traffic traveling to / from Rolesville Middle School. The school, located just to the west of the proposed development, operates from 8:15 AM to 3:00 PM. At the intersection of Burlington Mills Road at Old Burlington Mills Road / Site Driveway, the delay on the southbound approach increases from 120 seconds per vehicle to 263 seconds per vehicle between the no-build and build scenarios.

Queuing observed in the No-Build analysis is still present in the Build scenario with long queues observed at the intersections of Burlington Mills at Forestville Road and Realigned Burlington Mills Road at Main Street.

Synchro LOS and delay results for the 2028 Build scenario are listed in Table 6. Instances where the overall intersection or lane group operate at LOS E or F are highlighted in the table.

Table 6: 2028 Build Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (feet)		Max. Obs. Queue (feet)	
				AM	PM	AM	PM	AM	PM	AM	PM
	Burlington Mills Road at Forestville Road	Overall		61.3	81.7	E	F				
		EB	L	121.7	93.7	F	F	377	496	364	558
			T	39.8	37.6	D	D	261	298	285	467
			R	23.2	24.4	C	C	59	151	93	250
		WB	L	60.1	137.0	E	F	68	128	325	279
			T	91.5	53.4	F	D	472	157	945	664
			R	31.3	32.4	C	C	88	94	250	230
		NB	L	114.8	111.7	F	F	264	213	325	324
			TR	66.5	135.4	E	F	1177	1433	2130	2788
		SB	L	159.5	134.0	F	F	243	276	398	400
			T	38.4	56.5	E	E	670	1005	876	1157
			R	10.0	6.7	B	A	152	75	300	300
	Burlington Mills Road at Rolesville Senior Living Driveway	EB	L	10.0	8.3	B	A	0	5	55	15
		WB	LT	9.3	8.2	A	A	0	0	304	88
		NB	LTR	101.2	15.8	F	C	42.5	5	84	42
		SB	L	343.8	27.2	F	D	67.5	27.5	58	69
			TR	61.9	14.0	F	B	10	0	29	31
	Main Street (US 401 Business) at Old Burlington Mills Road	EB	R	23.9	19.0	C	C	5	15	213	82
	Realigned Burlington Mills Road at Main Street (US 401 Business)	Overall		62.8	42.9	E	D				
		EB	L	234.6	62.6	F	E	633	396	579	385
			T	46.1	29.2	D	C	115	56	656	188
			R	40.7	17.0	D	B	293	53	274	186
		WB	L	76.1	79.6	E	E	71	110	76	121
			T	72.9	74.4	E	E	82	108	122	133
			R	49.6	37.2	D	D	56	63	86	94
		NB	L	89.6	80.4	F	F	372	224	366	475
			T	24.2	35.2	C	D	560	889	525	950
			R	10.4	7.2	B	A	14	13	139	245
		SB	L	75.0	104.0	E	F	116	162	199	199
			T	35.5	37.2	D	D	760	781	1100	977
			R	7.2	4.7	A	A	126	58	350	350

Intersection or Lane Group Operates at LOS E

Intersection or Lane Group Operates at LOS F

5.4 2028 BUILD IMPROVED

5.4.1 Proposed Improvements

Burlington Mills Road at Old Burlington Mills Road / Rolesville Senior Living Driveway

- Construct site driveway as a full-movement access point
- Construct site driveway with one ingress lane and two egress lanes consisting of an exclusive left-turn lane and a shared thru/right-turn lane. Construct the access with 75 feet of internal protective stem
- Provide a westbound left turn lane with 50 feet of full-width storage and appropriate taper
- Restripe the southbound approach of Old Burlington Mills Road to provide an exclusive left-turn lane and a shared thru/right-turn lane.
- Restripe the eastbound approach of Burlington Mills Road to provide a shared thru/right-turn lane.

5.4.2 Analysis Results

The 2028 Build Improved capacity analysis results are shown in Table 7. Instances where the overall intersection or lane group operate at LOS E or F are highlighted in the table. Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. The proposed development accounts for a minimal increase in average delay at the study intersections. In many instances, this increase is less than one second per vehicle. Intersections where no improvements are recommended are locations that do not meet the LOS Standards specified in the LDO[8].

The one exception is the intersection of Burlington Mills Road at Old Burlington Mills Road / Site Driveway. Long delays at this intersection during the AM peak hour are attributed to traffic traveling to / from Rolesville Middle School. The school, located just to the west of the proposed development, operates from 8:15 AM to 3:00 PM. At the intersection of Burlington Mills Road at Old Burlington Mills Road / Site Driveway, the delay on the southbound approach increases from 120 seconds per vehicle to 263 seconds per vehicle between the no-build and build scenarios. Improvements are recommended at the intersection, but these improvements do not reduce the delay on the southbound approach. While delay per vehicle is high on the approach, there is a minimal amount of traffic (22 vehicles total) in the AM peak hour and the queues are contained within the turn-lanes. A traffic signal was evaluated at the intersection and is not recommended due to low side-street traffic volumes. This is discussed in section 5.4.3.

Table 7: 2028 Build Improved Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (feet)		Max. Obs. Queue (feet)	
				AM	PM	AM	PM	AM	PM	AM	PM
STOP	Burlington Mills Road at Old Burlington Mills Road / Rolesville Senior Living Driveway	EB	L	10.0	8.3	B	A	0	0	52	22
		WB	L	9.3	8.2	A	A	0	0	31	33
		NB	L	177.2	20.8	F	C	22.5	2.5	39	27
			TR	37.4	13.4	E	B	12.5	2.5	69	40
		SB	L	343.8	27.0	F	D	67.5	27.5	62	67
			TR	61.9	14.0	F	B	10	0	38	27

Intersection or Lane Group Operates at LOS E

Intersection or Lane Group Operates at LOS F

5.4.3 Traffic Signal Warrants

The results shown in Table 7 show that high delays (in seconds per vehicle) are anticipated on the side street approaches of Old Burlington Mills Road and the proposed site driveway. These high delays are observed in the AM peak hour which can be attributed to traffic traveling to/from Rolesville Middle School. The intersection operates at acceptable levels of service and delays in the PM peak hour.

The intersection is planned to be located approximately 650 feet from the future signalized intersection of Main Street at Burlington Mills Road / Virginia Water Drive. If signalized, queues could spill back and affect operations at either Main Street or the proposed driveway.

Volumes on the side streets of Old Burlington Mills Road and the proposed driveway are lower than the threshold established by the Manual on Uniform Traffic Control Devices (MUTCD)[9] peak hour warrant for the installation of a traffic signal (i.e., Warrant 3). As a result, the intersection of Burlington Mills Road at Old Burlington Mills Road / Rolesville Senior Living Driveway is not recommended for the installation of a traffic signal.

5.4.4 Conceptual Design

A conceptual design of the intersection of Burlington Mills Road at Old Burlington Mills Road / Rolesville Senior Living Driveway has been produced to determine the amount of storage that can be provided with minimal impact to U-6241 currently under construction. The design shown in Figure 13 provides the following:

Left-Turn Lane at the Proposed Rolesville Senior Living Driveway

The design shown provides 100 feet total of full-width turn lane which can be broken down into 50 feet of full-width deceleration length and 50 feet of full-width storage. The combined length is greater than the SimTraffic maximum observed queueing of 52 feet as shown in Table 7.

U-6241 Left-Turn Lanes at Main Street

The conceptual design reduces the storage of the left-turn lanes by approximately 15 feet.

6.0 RECOMMENDATIONS

Based on the findings of this study, specific improvements have been identified and should be completed as part of the proposed development. These recommendations are shown in Figure 12. A conceptual design is provided in Figure 13. Intersections where no improvements are recommended are locations that do not meet the LOS Standards specified in the LDO[8].

Burlington Mills Road at Forestville Road

- No improvements are recommended at this intersection

Burlington Mills Road at Old Burlington Mills Road / Rolesville Senior Living Driveway

- Construct the site driveway as a full-movement access point
- Construct the site driveway with one ingress lane and two egress lanes consisting of an exclusive left-turn lane and a shared thru/right-turn lane. Construct the access with 75 feet of internal protective stem
- Provide a westbound left turn lane with 50 feet of full-width storage and appropriate taper
- Restripe the southbound approach of Old Burlington Mills Road to provide an exclusive left-turn lane and a shared thru/right-turn lane.
- Restripe the eastbound approach of Burlington Mills Road to provide a shared thru/right-turn lane.

Main Street at Old Burlington Mills Road

- No improvements are recommended at this intersection

Realigned Burlington Mills Road at Main Street

- No improvements are recommended at this intersection

Figure 12: Recommended Improvements

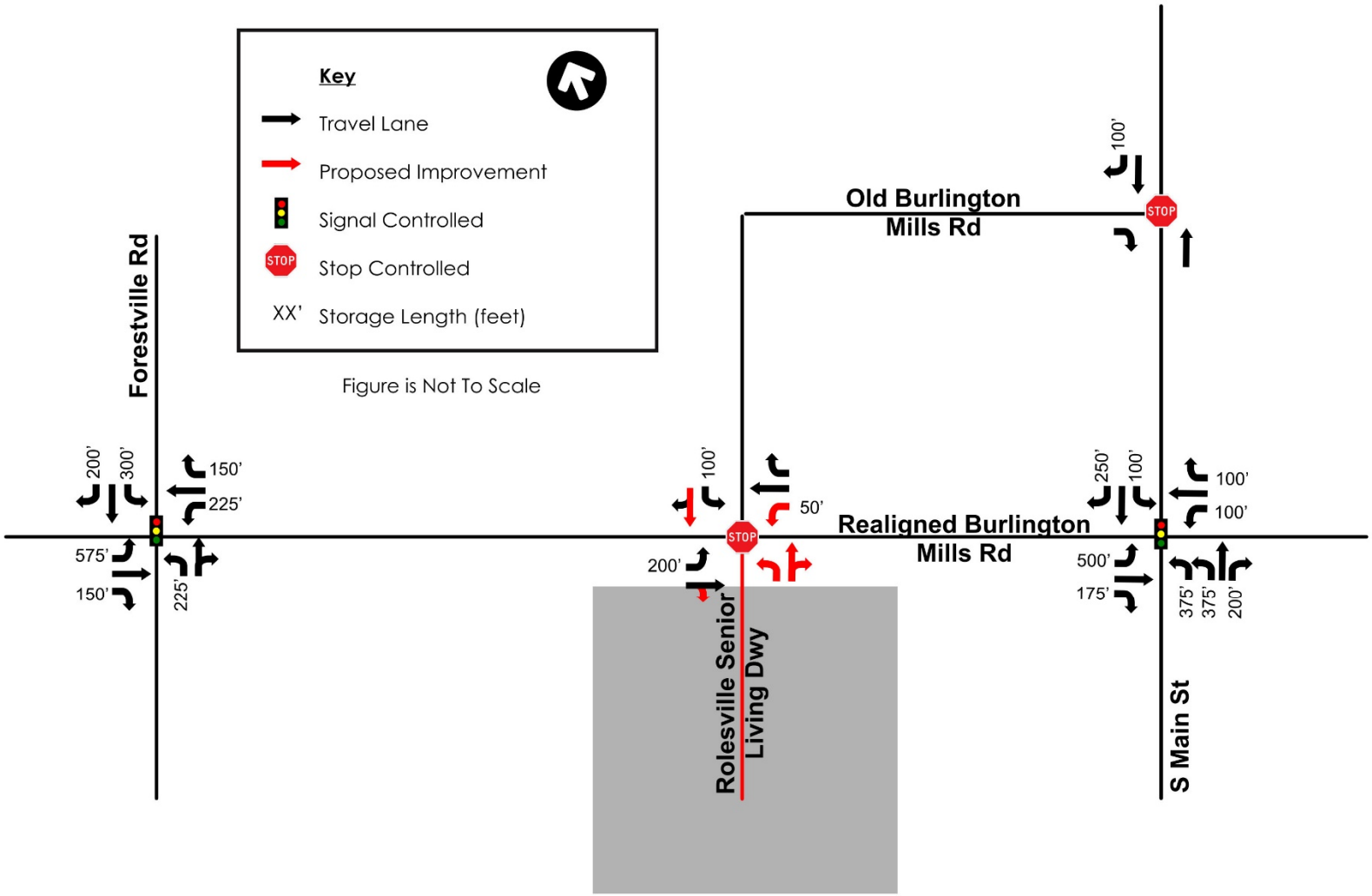
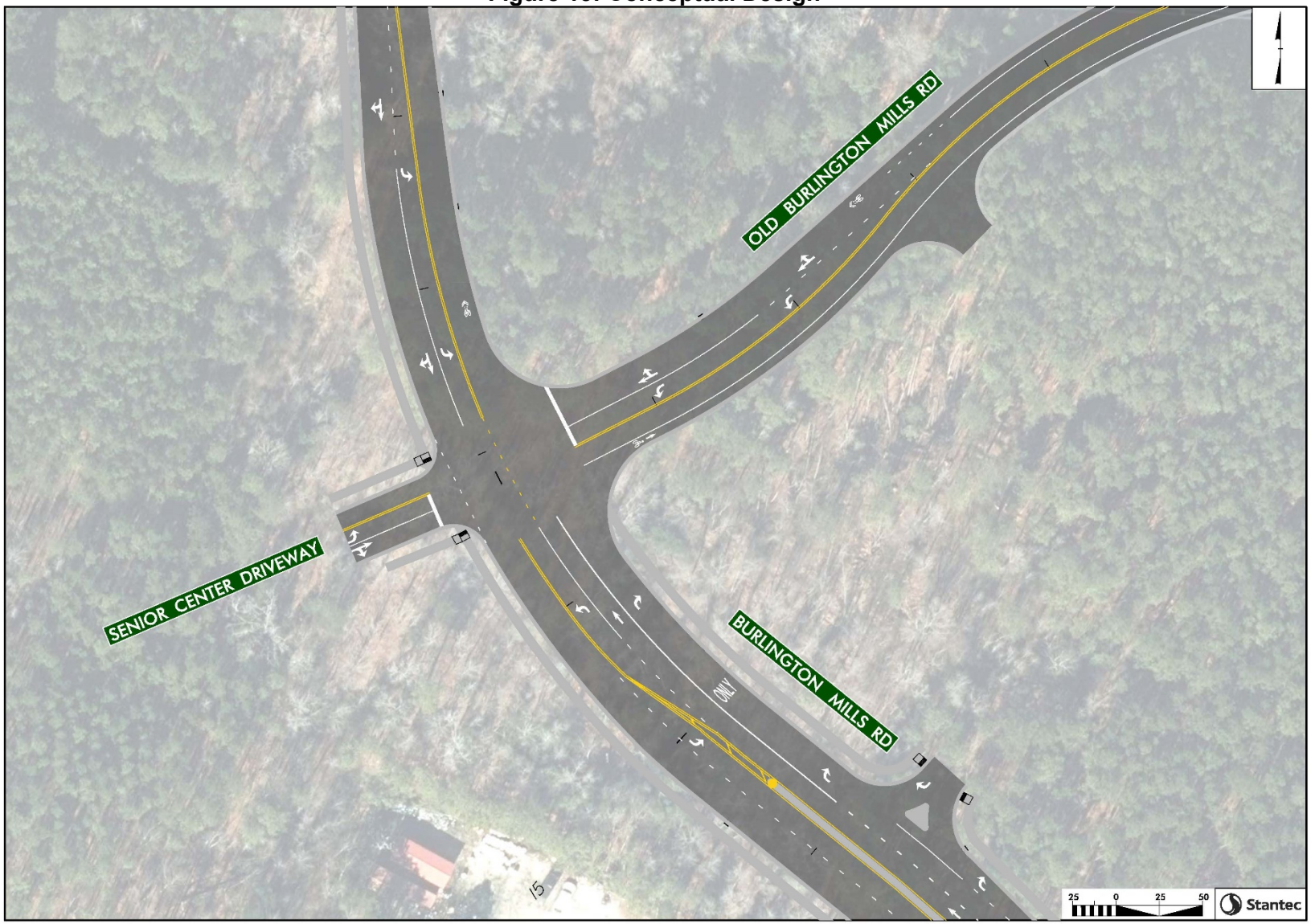


Figure 13: Conceptual Design



7.0 REFERENCES

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8.0 APPENDIX

- Scoping Correspondence
- Site Plan
- Raw Traffic Count Data
- Adjacent Development Information
- Adjacent Development Traffic Volumes
- Traffic Volume Calculations
- Synchro Files
- Synchro & SimTraffic Reports
- Conceptual Design