



**REZ-23-05: Scarboro Apartments
Traffic Impact Analysis**

Rolesville, North Carolina

October 25, 2024

Prepared for:

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Sign-off Sheet

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Executive Summary

The proposed Scarboro Apartments development is located in the south of US 401 Business (South Main Street) between Perry Street and School Street in Rolesville, NC. The current zoning is Residential Low Density (RL), and the applicant is pursuing a rezoning to Town Center (TC) as part of REZ-23-05. The 13.15-acre site is anticipated to be completed in 2028 and consists of 240 low-rise multi-family housing units and 20,000 square feet of retail. Access to the site is anticipated to be provided via the following:

- Perry Street
- The construction of a new collector street which will extend southward to the future Young Street Connector

Traffic is also able to access the proposed development from Young Street via Perry Street.

Using the Institute of Transportation Engineers (ITE) Trip Generation Manual, the development is estimated to generate 2,670 net new (i.e., non-pass-by primary trips) trips per average weekday. In the AM and PM peak hours, the development is estimated to generate 140 AM peak hour trips (49 entering and 91 exiting) and 226 PM peak hour trips (135 entering and 91 exiting).

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:

- 2024 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 (South Main Street) at SR 2052 (Rogers Road)/Redford Place Drive
- US 401 Business (South Main Street) at Old Rogers Road/School Street
- US 401 Business (South Main Street) at Perry Street
- US 401 Business (South Main Street) at SR 1003 (Young Street)
- SR 1003 (Young Street) at Perry Street

Additionally, future (i.e., 2028) scenarios include the planned Young Street Connector and the following future intersections:

- Redford Place Drive at Parker Ridge Driveways
- SR 1003 (Young Street) at Young Street Connector
- Young Street Connector at Proposed Collector Street

The results of the capacity analysis at these intersections, are summarized in Tables ES-1:



Table ES-1: Level of Service Summary Table

Level of Service (Delay, sec/veh)	2024 Existing		2028 No-Build		2028 Build		2028 Build Improved	
	AM	PM	AM	PM	AM	PM	AM	PM
South Main Street at Rogers Road/Redford Place Drive	C (26.0)	C (24.6)	E (78.0)	D (38.9)	F (82.1)	D (44.7)	D (48.3)	D (45.1)
South Main Street at Old Rogers Road/School Street	E (49.5)	F (52.2)	F (##)	F (180.3)	F (##)	F (282.0)	F (77.5)	F (94.6)
South Main Street at Perry Street	B (13.8)	B (14.1)	F (78.0)	E (35.7)	F (##)	F (80.4)	F (153)	F (139.5)
South Main Street at Young Street	C (31.2)	C (27.0)	E (67.8)	D (41.7)	E (68.3)	D (43.0)	D (52.4)	D (43.1)
Young Street at Perry Street	C (16.9)	C (15.1)	C (21.6)	C (18.3)	D (28.3)	C (23.0)	D (28.1)	C (23.0)
Redford Place Drive at Parker Ridge Driveway			A (4.3)	A (4.7)	A (4.4)	A (5.0)	A (4.4)	A (5.0)
Young Street at Young Street Connector			C (18.5)	C (17.0)	C (23.4)	C (23.5)	C (23.7)	C (23.5)
Young Street Connector at Proposed Collector Street					A (9.5)	B (10.1)	A (9.5)	B (10.1)

	Signalized Intersection
	Stop Controlled Intersection
##	Delay Exceeds 300 Seconds



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

The Town of Rolesville's Land Development Ordinance (LDO)⁷, 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.*

South Main Street at Perry Street

With the addition of traffic generated by the proposed development, the northbound Perry Street approach at the South Main Street & Perry Street intersection increases delay by greater than 5%. If high delays are experienced on the stop-controlled approaches, drivers may opt for alternative routes. Within the study area of this TIA, Perry Street interacts with both South Main Street and Perry Street.

The development proposes to construct a new collector street that will run North-South throughout the development. This proposed collector street will also extend off-site to the south and connect to the proposed Young Street Connector. This will provide alternative routes for traffic to enter and exit the proposed development.

In addition to the construction of the Proposed Collector Street, additional turn-lane improvements are recommended at the South Main Street at Perry Street with the 75' eastbound right-turn lane and 100' northbound left-turn lane for any vehicles who may choose still to enter and exit the Scarboro Apartments development off South Main Street.

With the implementation of the new turn lanes, the delay for the northbound approach during the AM peak hour has been substantially reduced. Although the northbound left-turn movement continues to experience significant delays, it affects only a small volume of vehicles, and these high delays are anticipated to be isolated to the AM and PM peak hours. If the issue persists, it is possible that drivers may seek alternative routes, such as the Proposed Collector Road to Young Street Connector route or Perry Street to Young Street route.



Recommendations

Based on the findings of this study, specific improvements have been identified and some should be completed as part of the proposed development. These recommendations are illustrated in Figure ES-1.

South Main Street & Rogers Road/Redford Place Drive

- Construct a westbound right-turn lane with 225' of full-width storage and appropriate taper.
- The above recommendation will require the modification of the traffic signal at the intersection.

South Main Street & Old Rogers Road/School Street

- No improvements are recommended at this intersection.

South Main Street & Perry Street

- Construct an eastbound right-turn lane with 75' of full-width storage and appropriate taper.
- Construct a northbound left-turn lane with 100' of full-width storage and appropriate taper.

South Main Street & Young Street

- No improvements are recommended at this intersection.

Young Street & Perry Street

- No improvements are recommended at this intersection.

Redford Place Drive at Parker Ridge Driveways

- No improvements are recommended at this intersection.

Young Street at Young Street Connector

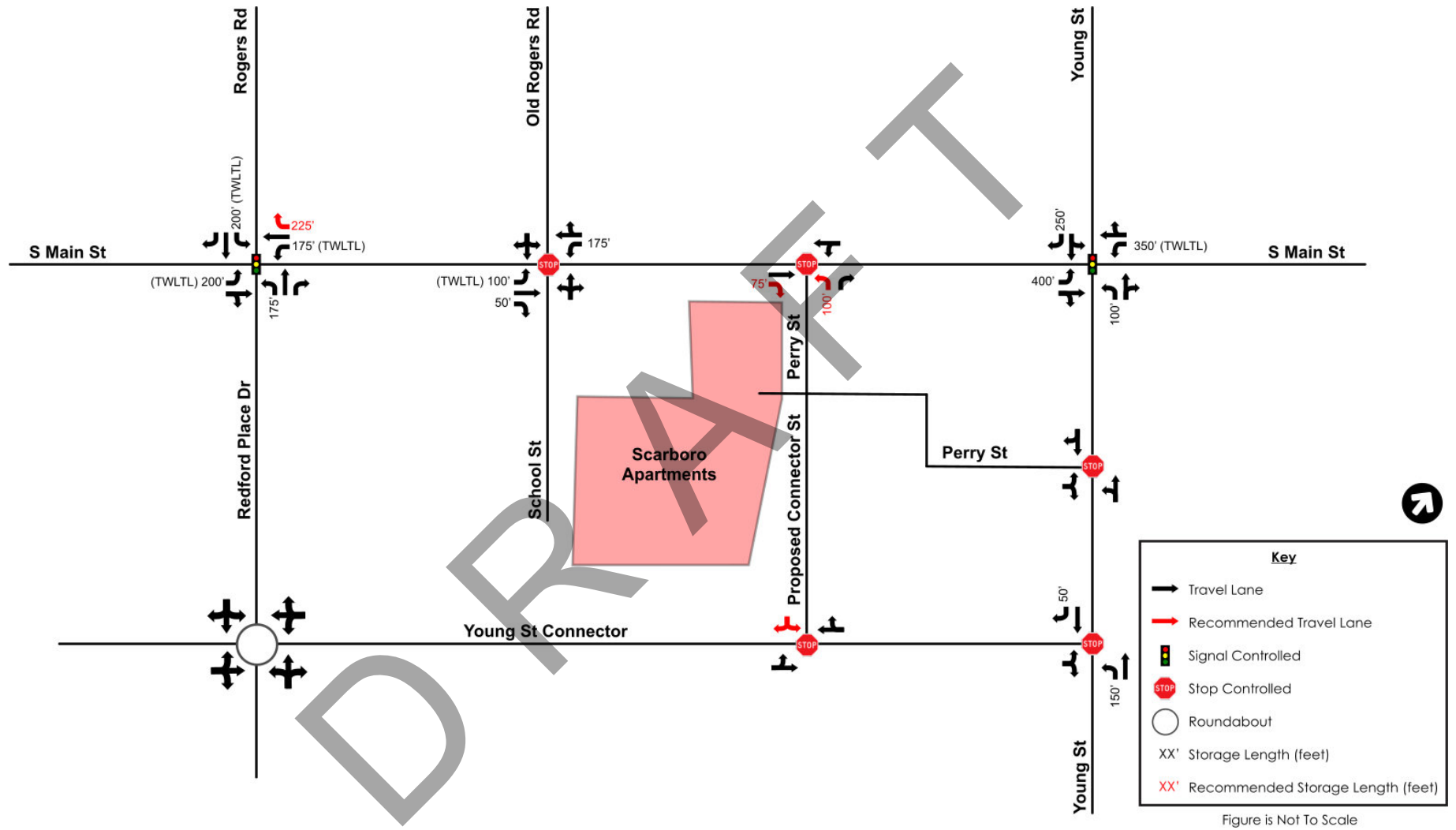
- No improvements are recommended at this intersection.

Young Street Connector at Proposed Collector Street

- The Proposed Collector Street will be constructed between Perry Street and the Young Street Connector.
- Construct the Proposed Collector Street with one lane in each direction.
- Install a stop sign on the southbound approach of the Proposed Collector Street at the Young Street Connector Intersection.



Figure ES-1: Recommended Improvements



1.0 INTRODUCTION

The proposed Scarboro Apartments development is located in the south of US 401 Business (South Main Street) between Perry Street and School Street in Rolesville, NC. The current zoning is Residential Low Density (RL), and the applicant is pursuing a rezoning to Town Center (TC) as a part of REZ-23-05. The 13.15-acre site is anticipated to be completed in 2028 and consists of 240 low-rise multi-family housing units and 20,000 square feet of retail. The project location is shown in Figure 1. The site plan, prepared by Qunity, can be found in Figure 2.

The traffic analysis will consider future build conditions during the build-out year (2028). Access to the site is anticipated to be provided off of Perry Street between South Main Street and Glenn Circle. Connectivity would also be provided to Young Street via Perry Street and a connection to the proposed Young Street Connector.

The traffic analysis includes the following scenarios as follows:

- 2024 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.

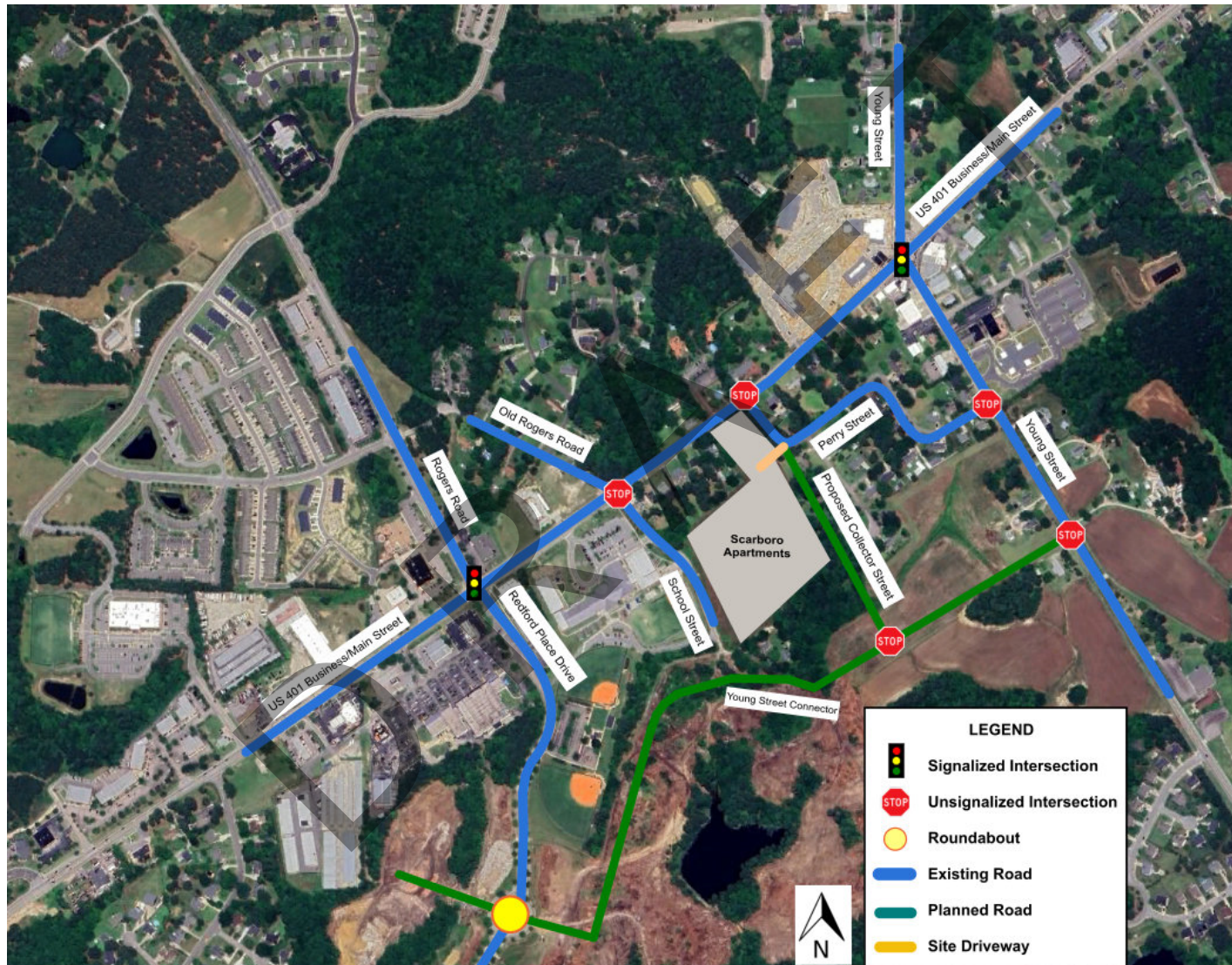


REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Introduction

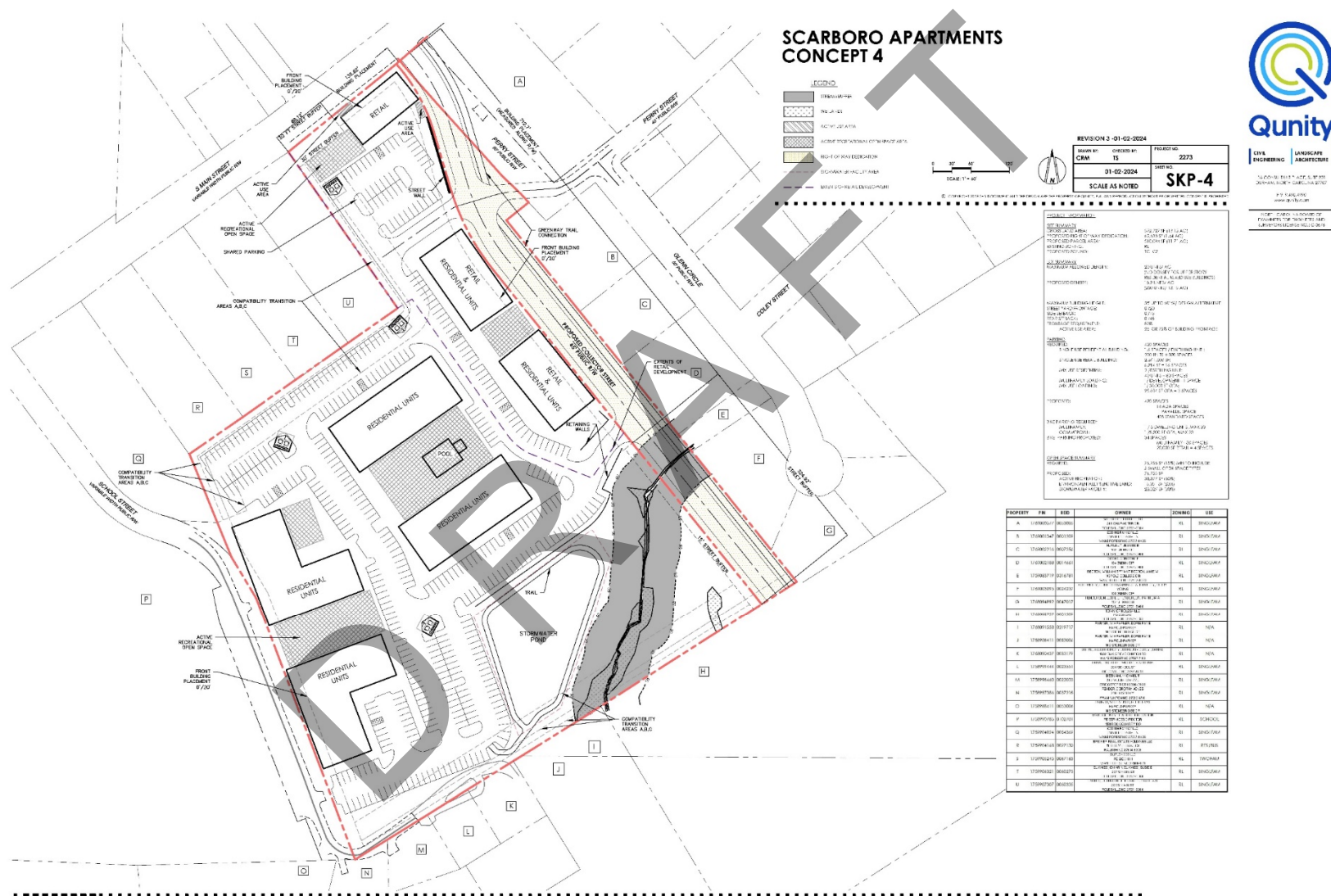
October 25, 2024

Figure 1: Site Location



Introduction
October 25, 2024

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.

- US 401 Business (South Main Street) at SR 2052 (Rogers Road)/Redford Place Drive
- US 401 Business (South Main Street) at Old Rogers Road/School Street
- US 401 Business (South Main Street) at Perry Street
- US 401 Business (South Main Street) at SR 1003 (Young Street)
- SR 1003 (Young Street) at Perry Street

Additionally, future (i.e., 2028) scenarios include the planned Young Street Connector discussed in Section 2.4.2 which add the following intersections to the study area:

- Redford Place Drive at Parker Ridge Access
- SR 1003 (Young Street) at Young Street Connector
- Young Street Connector at Proposed Collector Street

These intersections are shown in Figure 1.

2.2 PROPOSED ACCESS

Access to the site will be provided by via Perry Street, which currently has full-movement access onto South Main Street under the control of a stop sign. The proposed development will realign Perry Street and provide a connection to the existing neighborhood to the east as shown in Figure 2. This connection will provide access to Young Street via Perry Street. Additionally, a proposed collector street will be extended through the site, from Perry Street to the proposed Young Street Connector.

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.



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Inventory of Traffic Conditions
October 25, 2024

Table 1: Existing Conditions

Road Name	Road Number	Primary Cross-Section	Functional Classification ¹	AADT ² (year)	Speed Limit (mph)	Maintenance Agency
South Main Street	US 401 Business	Two-Lane w/ TWLTL*	Principal Arterial	12,000-14,500 vpd (2021)	35	NCDOT
Old Rogers Road	-	Two-Lane Undivided	Local Road	-	35	Town of Rolesville
Perry Street	-	Two-Lane Undivided	Local Road	-	25	Town of Rolesville
Redford Place Drive	-	Two-Lane Undivided	Local Road	-	25	Town of Rolesville
Rogers Road	SR 2052	Four-Lane w/TWLTL*	Major Collector	9,400 vpd (2021)	35	NCDOT
School Street	-	Two-Lane Undivided	Local Road	-	35	Town of Rolesville
Young Street	SR 1003	Two-Lane Undivided	Minor Arterial	7,700 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 future year lane configuration and traffic control for the study area intersections are illustrated in Figure 4.

2.4.1 U-6241

The U-6241 project will realign Burlington Mills Road near South Main Street as well as make streetscape and multimodal improvements along South Main Street. As part of the project, geometric improvements will be made in the study area. At the South Main Street & Young Street intersection, the U-6241 project will remove the dedicated southbound left turn lane and re-stripe the existing southbound through lane to a shared thru-left turn lane.

2.4.2 Young Street Connector

As a condition of the Parker Ridge development (MA 22-03), an east-west connection will be constructed linking the Parker Ridge development to Young Street. Called the "Young Street Connector," this will travel through PIN 1768-09-8727 and have full-movement access onto Young Street. A northbound left-turn lane with 150 feet of full-width storage and a southbound right-turn lane with 50 feet of full-width storage on Young Street will also be provided. Per the conditions of approval, the connector shall be complete not later than approval of the 138th dwelling unit building permit. A copy of the plans of the Young Street Connector are provided in the appendix.

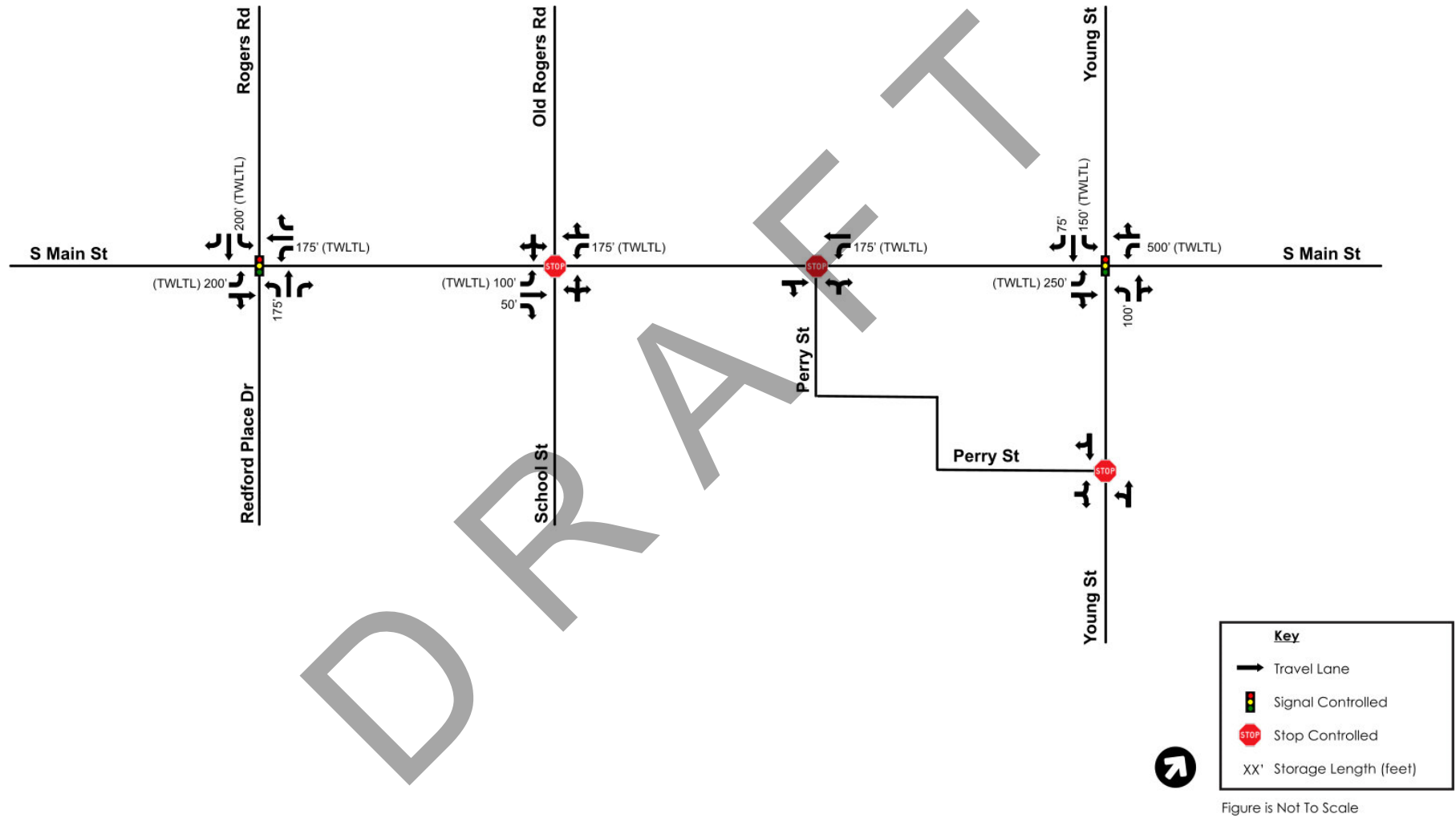


REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Inventory of Traffic Conditions

October 25, 2024

Figure 3: 2024 Existing Lanes and Traffic Control

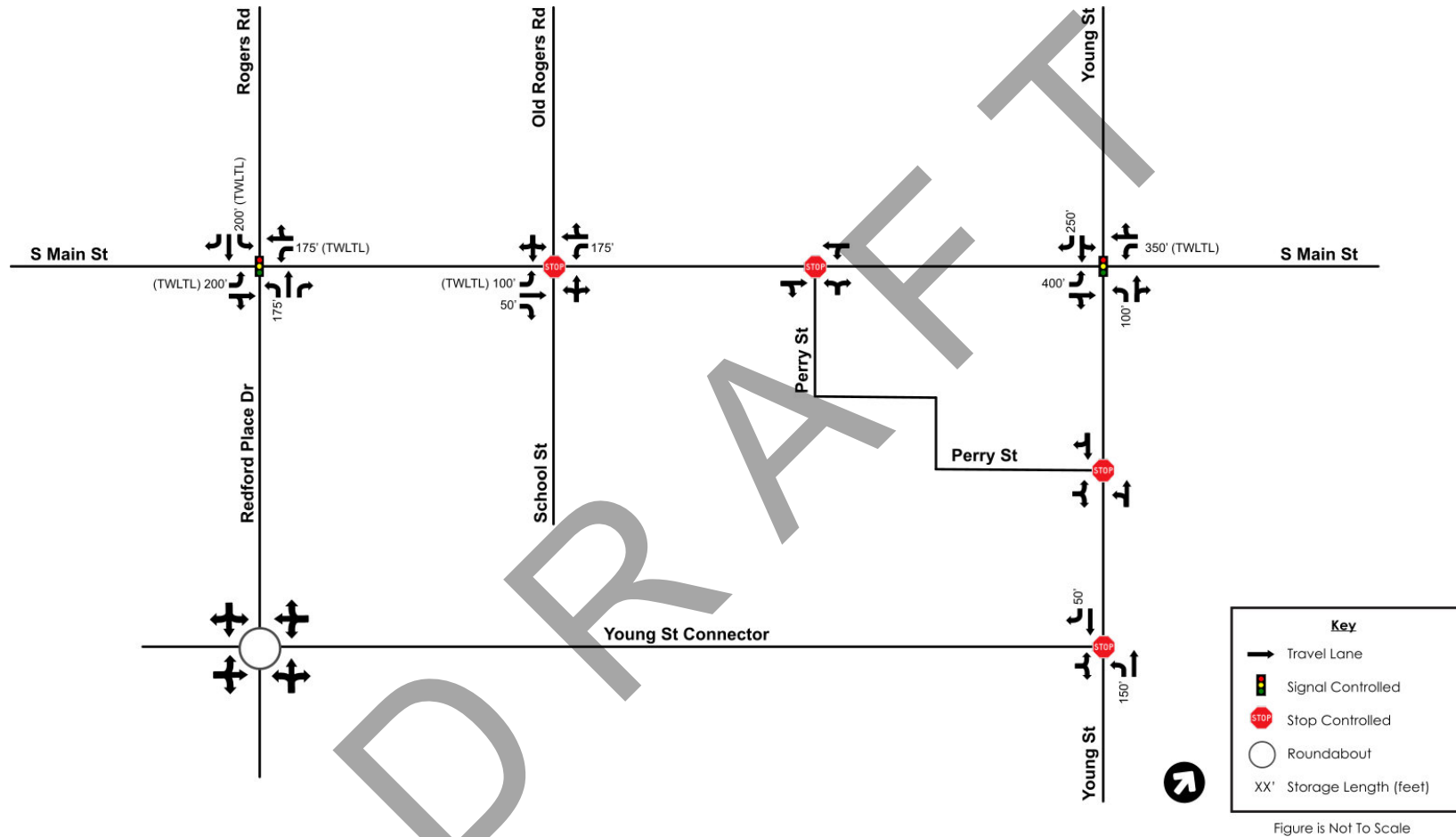


REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Inventory of Traffic Conditions

October 25, 2024

Figure 4: 2028 No-Build Lanes and Traffic Control



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 Manual³. The Rate versus Equation spreadsheet published by NCDOT⁴ was used to supplement the ITE methodology. No trip reductions were taken for 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
Low-Rise Multifamily Housing (LUC 220)	240 units	1614	807	807	97	23	74	124	78	46
Strip Retail Plaza (LUC 822)	20,000 square feet	1090	545	545	47	28	19	132	66	66
Internal Capture Trips		-34	-17	-17	-4	-2	-2	-30	-9	-21
Total Trips Generated		2,670	1335	1335	140	49	91	226	135	91

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.

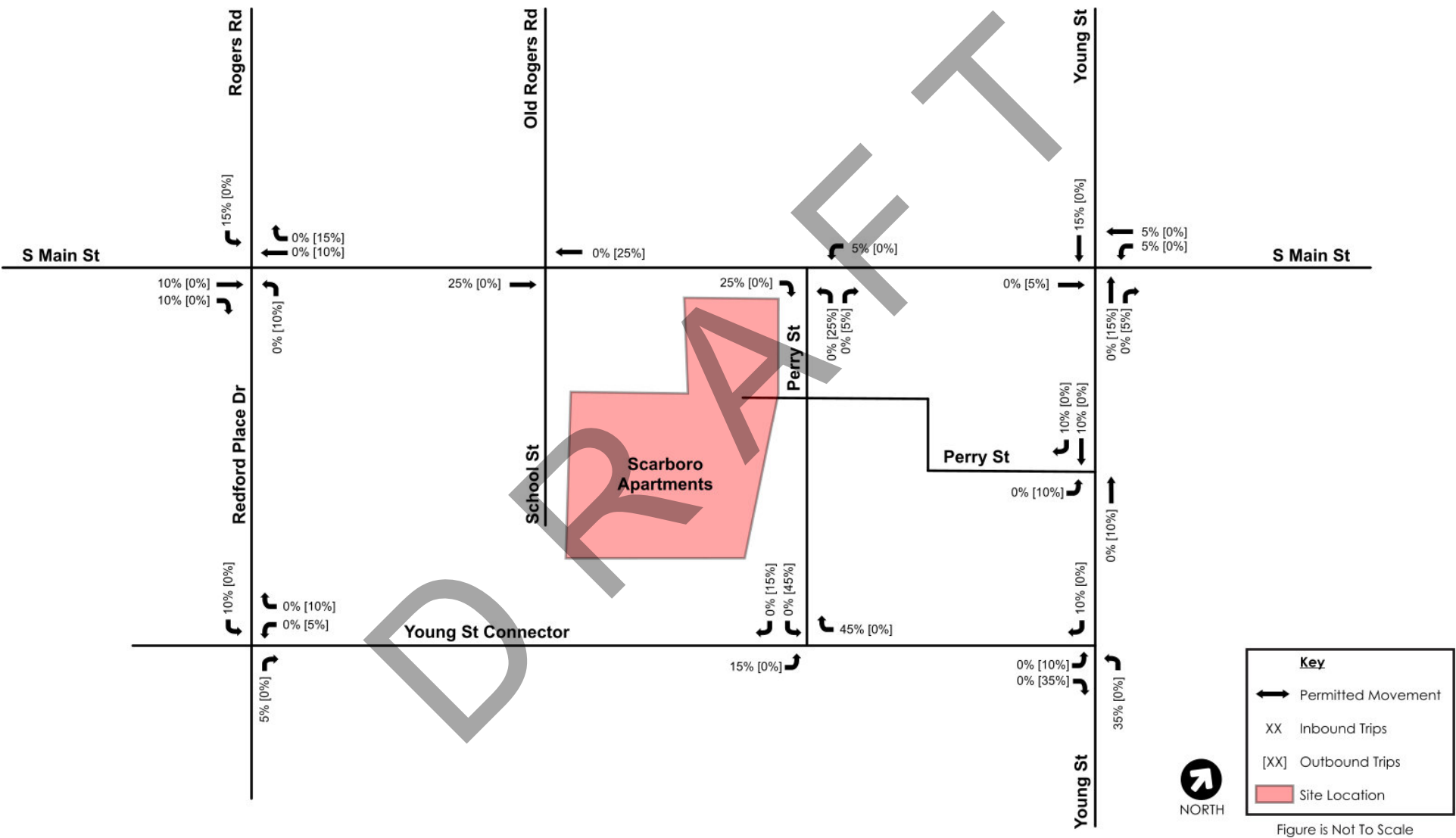
- 35% to/from the south on Young Street
- 20% to/from the west on Main Street
- 15% to/from the north on Rogers Road
- 15% to/from the north on Young Street
- 10% to/from the east on Main Street
- 5% to/from the south on Redford Place Drive

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



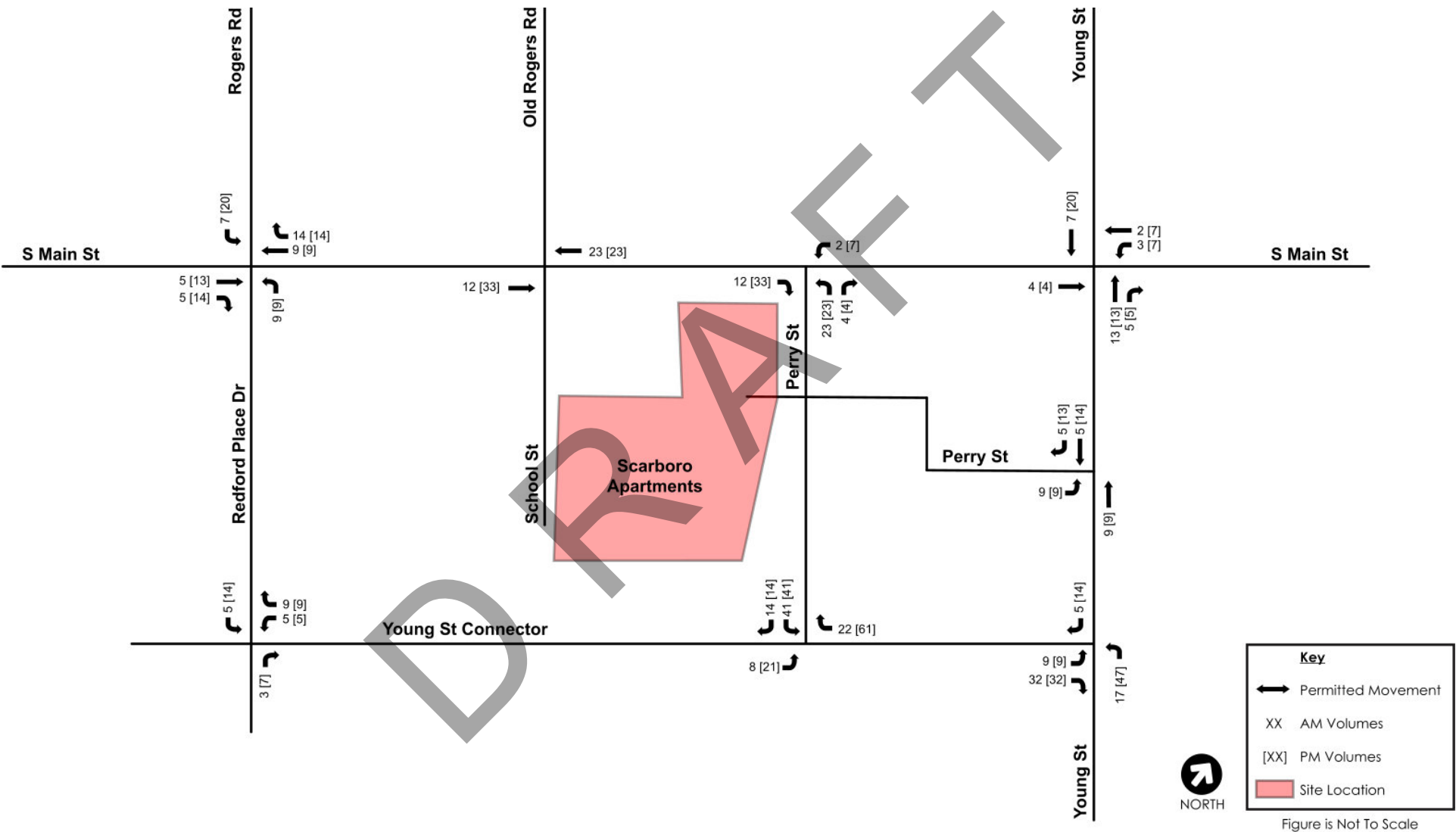
Trip Generation and Distribution
 October 25, 2024

Figure 5: Trip Distribution



Trip Generation and Distribution
October 25, 2024

Figure 6: Trip Assignment



4.0 TRAFFIC VOLUME DEVELOPMENT

All traffic volume calculations can be found in the Appendix.

4.1 DATA COLLECTION

On Wednesday, May 22nd, 2024, AM (7:00 – 9:30 AM) and PM (4:00 – 6:00 PM) turning movement counts were collected at the study intersections. Rolesville Elementary School was open and operating at a normal bell schedule during data collection. The count data, provided by Quality Counts, LLC is included in the Appendix.

Traffic volumes were not balanced, as the discrepancies in volumes between the study intersections were very minimal, as well as the presence of several driveways between the study intersections. The Existing (2024) 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 2024 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 two (2) developments proposed to be constructed within and nearby the study area: Cobblestone and Parker Ridge. The total trips associated with these developments are shown in Figure 9. The following subsections highlight salient data for each of the approved developments.

4.3.1 Cobblestone

Cobblestone is a mixed-use development proposed in the northwest quadrant of the intersection of South Main Street & Young Street. The proposed development is expected to consist of 180 apartments, 18,200 square feet of municipal flex space, and 50,000 square feet of retail space. A copy of the traffic study prepared by Ramey Kemp & Associates is provided in the Appendix.

4.3.2 Parker Ridge

Parker Ridge is a residential development located on both sides of Redford Place Drive south of South Main Street. It is anticipated to consist of 162 single-family homes and 114 townhomes. No improvements to study area intersections are expected as a part of Parker Ridge. A copy of the traffic study prepared by Stantec is provided in the Appendix.

4.4 NO-BUILD TRAFFIC VOLUMES

The 2028 No-Build traffic volumes consist of the sum of the 2024 Existing traffic volumes, the Background traffic growth, and the adjacent development traffic. The 2028 No-Build traffic volumes are shown in Figure 10.



4.5 BUILD TRAFFIC VOLUMES

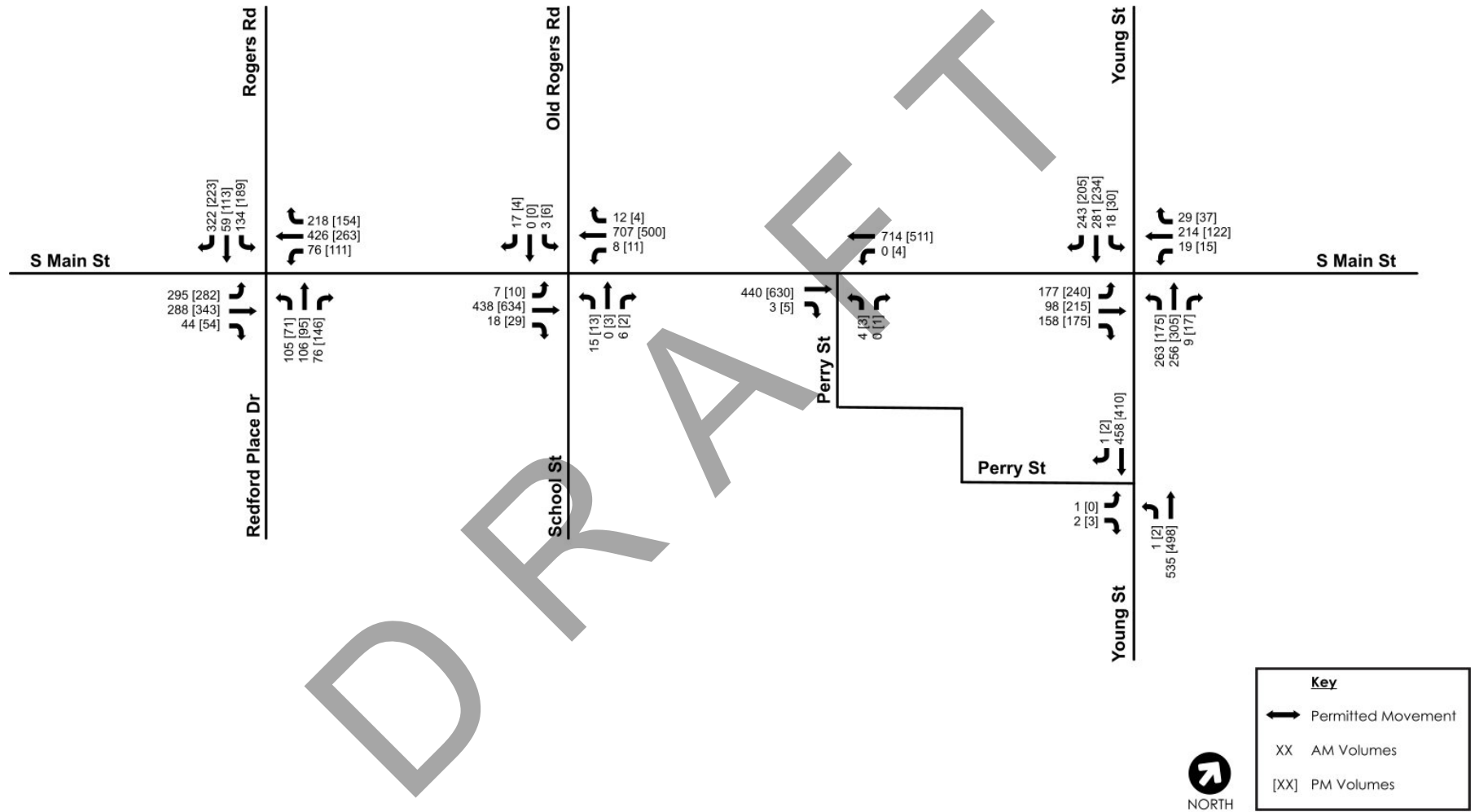
The 2028 Build traffic volumes include the 2028 No-Build traffic, and the proposed development traffic discussed in Section 3.0. The 2028 Build traffic volumes are shown in Figure 11.



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Traffic Volume Development
October 25, 2024

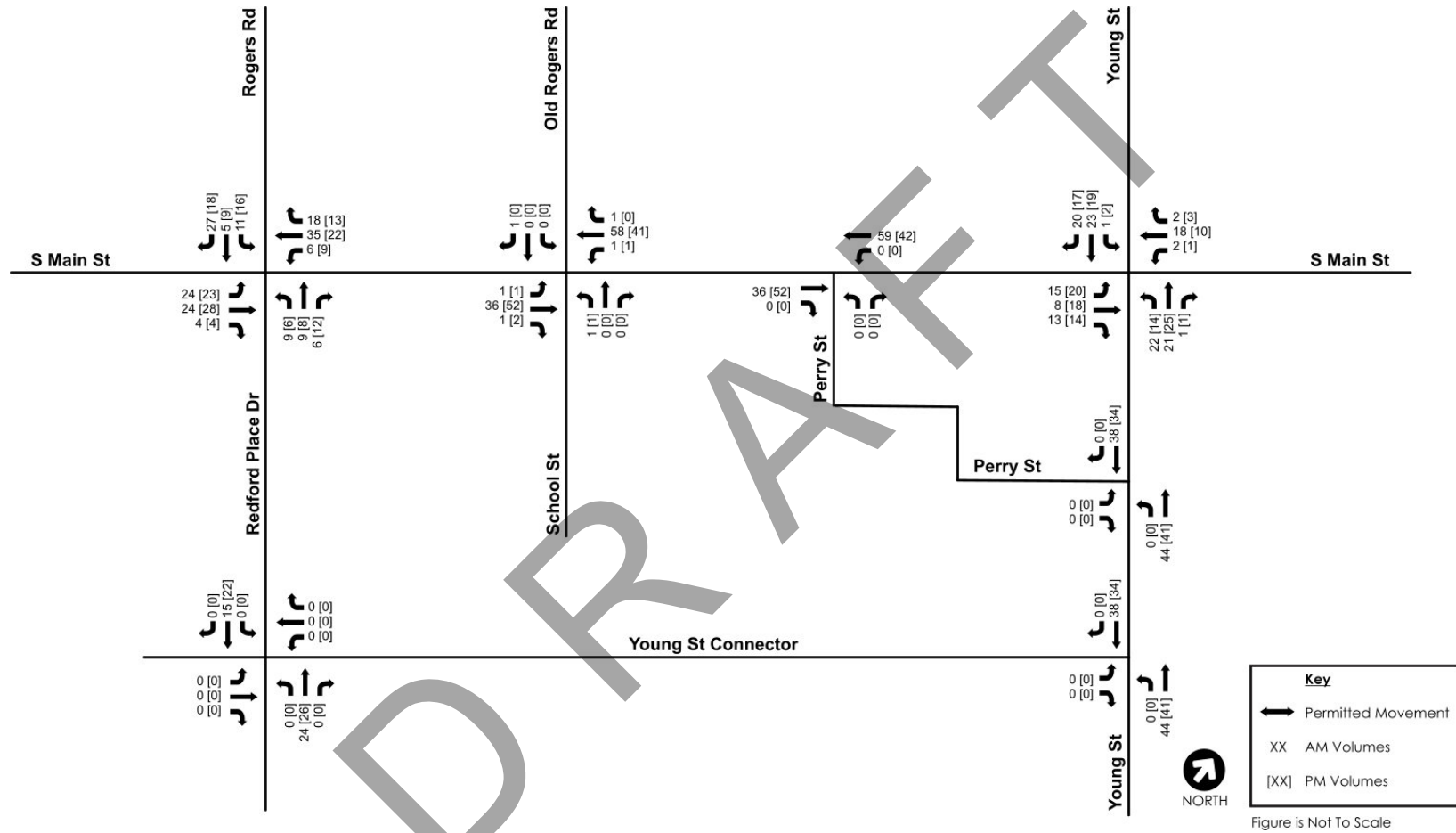
Figure 7: 2024 Existing Traffic Volumes



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Traffic Volume Development
October 25, 2024

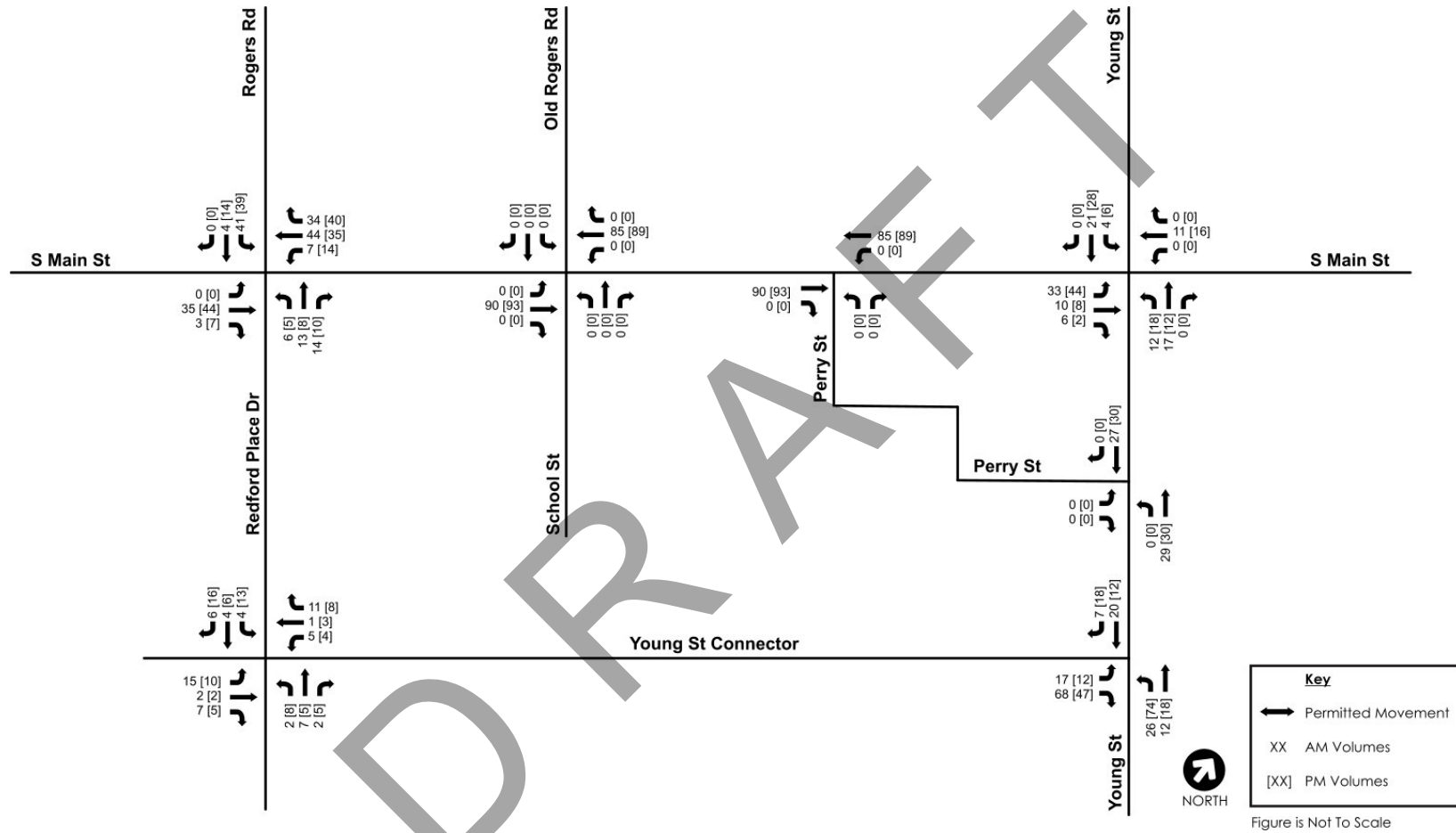
Figure 8: Background Traffic Growth



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Traffic Volume Development
October 25, 2024

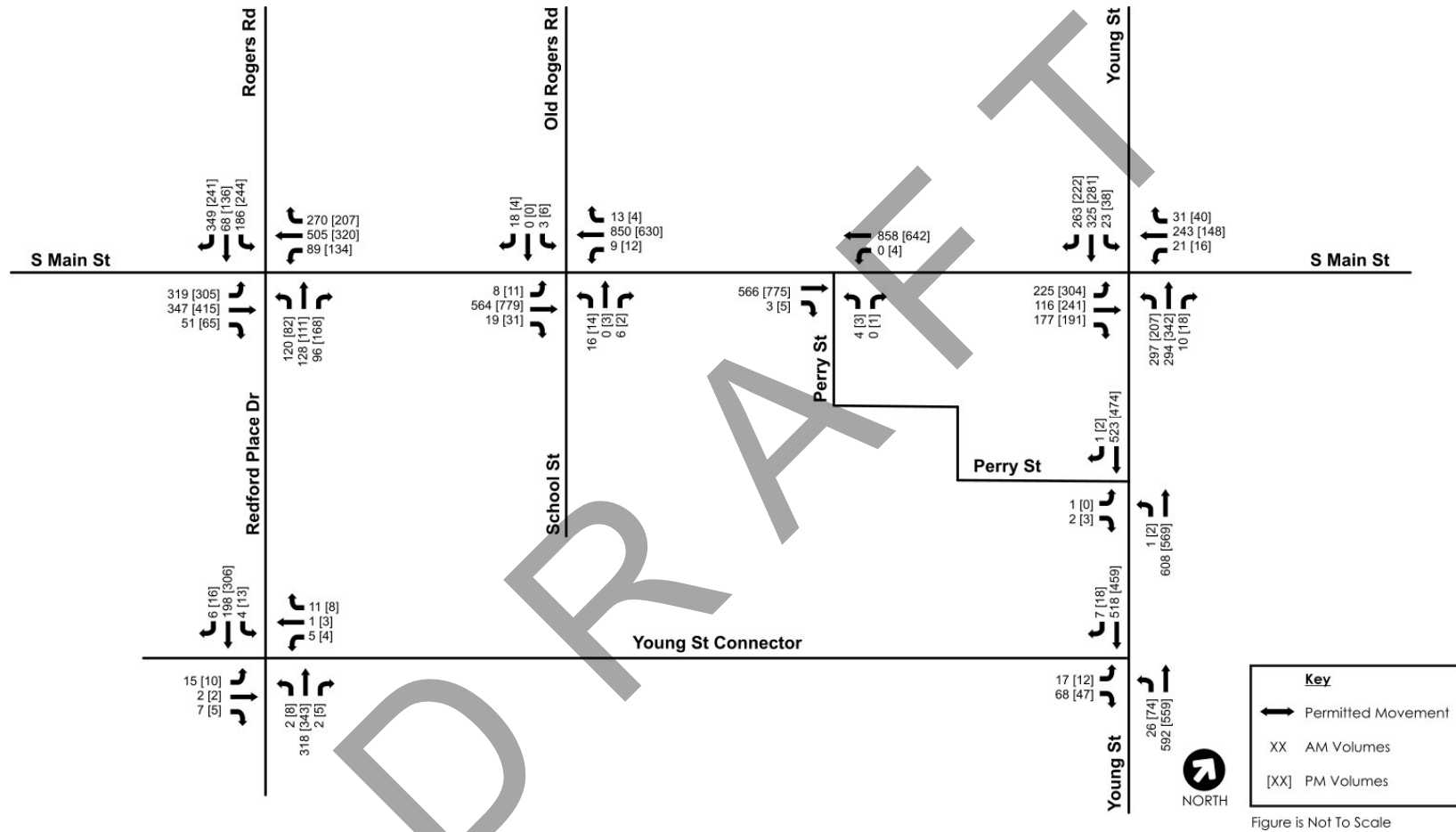
Figure 9: Adjacent Development Traffic Volumes



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Traffic Volume Development
October 25, 2024

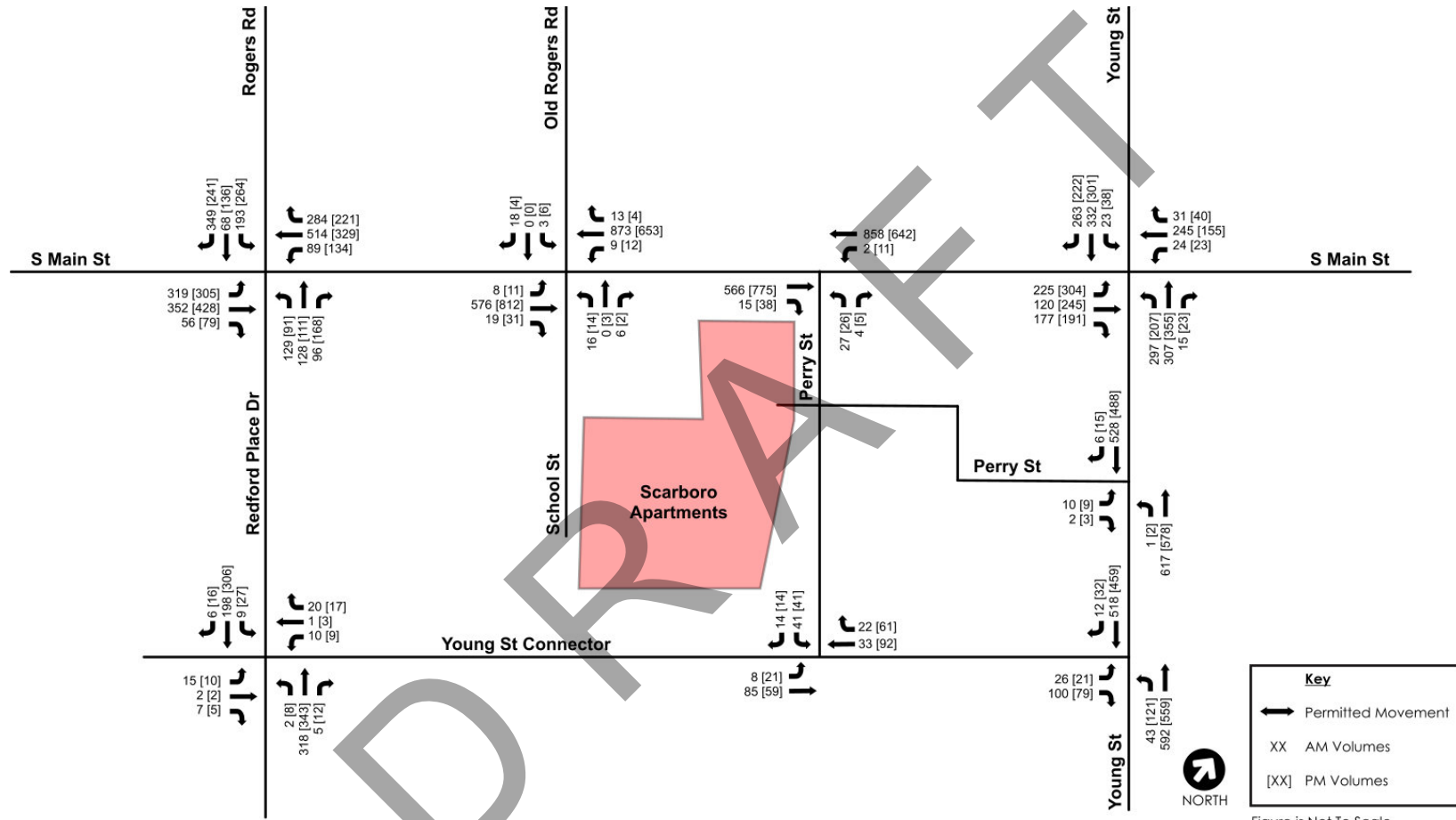
Figure 10: 2028 No-Build Traffic Volumes



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Traffic Volume Development
October 25, 2024

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 Manual⁴ (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 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*⁵ as well as the *Draft NCDOT Capacity Analysis Guidelines Best Practices*⁶. 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 & Roundabout 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)⁷, Section 8.E, establishes the following Level of Service Standards:

3. *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.*



4. *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 EXISTING CAPACITY ANALYSIS (2024)

In the base year of 2024 under the existing geometric conditions, all signalized study intersections operate at an overall LOS C or better.

All approaches to unsignalized (i.e. stop controlled) intersections operate at LOS E or better with the exception of the northbound approach of the South Main Street & Old Rogers Road/School Street intersection which operates at LOS F in the PM peak hour due to the difficulty in finding a gap in both directions of South Main Street through traffic to make the northbound left or through movement.





The results from the 2024 existing analysis are shown in Table 4.



REZ-23-05: SCARBORO APARTMENTS TRAFFIC IMPACT ANALYSIS

Capacity Analysis
October 25, 2024

Table 4: 2024 Existing Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (ft)		Max. Obs. Queue (ft)	
				AM	PM	AM	PM	AM	PM	AM	PM
	South Main Street & Rogers Road/Redford Place Drive	Overall		26	24.6	C	C				
		EB	L	11.8	9.2	B	A	164	140	239	236
			TR	16.1	16.4	B	B	249	296	265	344
		WB	L	5.6	6.1	A	A	25	42	234	157
			T	20.3	12.5	C	B	349	224	374	241
			R	7.3	5.1	A	A	78	47	157	118
		NB	L	37.4	40	D	D	114	86	169	129
			T	58.8	58.6	E	E	143	132	198	184
			R	28	34.3	C	C	72	131	133	217
		SB	L	50.7	53	D	D	141	205	194	234
			T	57.3	54.3	E	D	93	150	129	210
			R	42.8	30.9	D	C	221	171	317	222
	South Main Street & Old Rogers Road/School Street	Overall		1.7	1.6						
		NB	LTR	49.5	52.2	E	F	23	20	39	41
		EB	L	10	8.6	A	A	0	0	20	18
		WB	L	8.4	9.4	A	A	0	0	27	27
		SB	LTR	27.7	45.2	D	E	13	13	38	32
	South Main Street & Perry Street	Overall		0.1	0.1						
		NB	LR	13.8	14.1	B	B	3	3	30	33
		WB	L	8.4	9.3	A	A	0	0	24	22
	South Main Street & Young Street	Overall		31.2	27	C	C				
		EB	L	16.1	12.6	B	B	140	189	180	207
			TR	16.2	12.4	B	B	195	329	171	269
		WB	L	17.6	13.6	B	B	26	20	42	36
			TR	32	26.9	C	C	270	171	282	166
		NB	L	37.1	35.5	D	D	206	144	199	200
			TR	24.7	34.2	C	C	189	270	382	416
		SB	L	17.9	25.4	B	C	21	37	227	249
			T	55.8	56.6	E	E	305	264	814	639
			R	31.8	20.5	C	C	209	108	125	125
	Young Street & Perry Street	Overall		0.2	0.2						
		NB	LTR	8.4	8.2	A	A	0	0	60	51
		EB	LR	16.9	15.1	C	C	3	3	37	30



5.2 2028 NO-BUILD

In the 2028 No-Build conditions, the analysis assumes the improvements associated with the U-6241 project, as well as completion of the Young Street Connector and Parker Ridge development. These improvements were discussed in Section 2.4, but are also listed below:

South Main Street at Redford Place Drive/Rogers Road

- Remove the existing westbound dedicated right-turn lane and re-stripe the existing westbound through lane to a shared thru-right turn lane.

South Main Street at Young Street

- Remove the existing southbound left turn lane and re-stripe the existing southbound through lane to a shared thru-left turn lane.
- Extend the storage of the existing southbound right turn lane from 75' to 250'.
- Reduce the storage of the existing eastbound left turn lane from 400' to 250'.
- Reduce the storage of the existing westbound left turn lane from 500' to 350'.

Young Street at Young Street Connector

- Provide a northbound left-turn lane with 150' of full-width storage and appropriate taper.
- Provide a southbound right-turn lane with 50' of full-width storage and appropriate taper.

Redford Place Drive at Parker Ridge Driveways

- Connect proposed Parker Ridge driveways to existing roundabout with one ingress and one egress lane each.

In the 2028 No-Build scenario, the signalized intersections of South Main Street & Rogers Road/Redford Place Drive and South Main Street & Young Street intersections operates at LOS E in the AM peak hour. Several movements at the intersection of South Main Street & Rogers Road/Redford Place Drive project to have long queues such as the eastbound left and westbound shared thru-left turn lane in the AM peak hour.

At the intersection of South Main Street & Old Rogers Road/School Street, the northbound and southbound approaches experience heavy delays during the AM and PM peak hours. Vehicles waiting at the stop-controlled approaches will experience longer waits to make any left-turn or through movements with the uninterrupted flow of the South Main Street approaches. Additionally, the westbound queue on South Main Street from the Rogers Road/Redford Place Drive intersection often stretches beyond this intersection, making it impossible for vehicles to turn westbound.

At the intersection of South Main Street & Perry Street, the northbound approach experiences heavy delays during the AM peak hour. Despite an overall delay of only 0.4 seconds, SimTraffic simulations revealed that the westbound queue on South Main Street from the Rogers Road/Redford Place Drive intersection sometimes extends beyond this intersection. This queue limits the available gaps for vehicles from Perry Street attempting to travel westbound on South Main Street.



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At unsignalized intersections, it is a common occurrence for minor streets to experience higher delays due to the difficulty in making a left-turn or through movement through the intersection with the uninterrupted main street traffic.

The following movements operate at LOS F during one or both peak hours:

- South Main Street at Redford Place Drive/Rogers Road – EBL/WBL/NBL/NBT/SBL/SBT – AM peak hour.
- South Main Street at Old Rogers Road/School Street – NBLTR/SBLTR – both peak hours
- South Main Street & Perry Street – NBLR – AM peak hour.
- South Main Street & Young Street – NBL/NBTR/SBLT/SBR – AM peak hour.






Synchro LOS and delay results for the 2028 No-Build analysis scenario are listed in Table 5.



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

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (ft)		Max. Obs. Queue (ft)	
				AM	PM	AM	PM	AM	PM	AM	PM
	South Main Street & Rogers Road/Redford Place Drive	Overall		78	38.9	E	D				
		EB	L	143.3	41	F	D	716	312	250	250
			TR	25.1	27.4	C	C	410	416	1416	585
		WB	L	105	12.1	F	B	180	59	250	250
			TR	73.7	39	E	D	1407	531	860	772
		NB	L	101.9	49.9	F	D	244	111	224	133
			T	99.4	54	F	D	255	143	357	190
			R	45.4	38.8	D	D	139	176	193	242
		SB	L	120.4	73.8	F	E	468	406	249	250
			T	80.1	48.6	F	D	149	172	525	770
R	51.7		22.3	D	C	446	180	467	421		
	South Main Street & Old Rogers Road/School Street	Overall		13.5	3.9						
		NB	LTR	##	180.3	F	F	98	55	385	48
		EB	L	11.7	9.3	B	A	0	0	82	25
		WB	L	8.9	9.9	A	A	0	3	227	30
		SB	LTR	135.3	119	F	F	53	30	436	41
	South Main Street & Perry Street	Overall		0.4	0.3						
		NB	LR	78	35.7	F	E	13	5	39	33
		WB	LT	8.8	9.7	A	A	0	0	528	47
	South Main Street & Young Street	Overall		67.8	41.7	E	D				
		EB	L	30.7	31.4	C	C	236	207	376	332
			TR	22.9	28	C	C	330	284	411	419
		WB	L	32.6	24.1	C	C	41	25	66	40
			TR	57.7	42.7	E	D	465	205	426	232
		NB	L	92.7	43.8	F	D	506	236	200	200
			TR	89.7	64.4	F	E	513	468	788	551
		SB	LT	89.3	60.2	F	E	580	416	678	360
	Young Street & Perry Street	Overall		0.2	0.2						
		NB	LT	8.8	8.5	A	A	0	0	83	44
		EB	LR	21.6	18.3	C	C	3	3	37	34
	Redford Place Drive at Parker Ridge Driveway	Overall		4.3	4.7	A	A				
		EB	LTR	4.3	4.4	A	A	3	3	44	37
		WB	LTR	3.9	4.3	A	A	4	3	29	35
		NB	LTR	3.7	4.5	A	A	25	42	51	60
		SB	LTR	4.6	4.9	A	A	43	48	36	42
	Young Street at Young Street Connector	Overall		1.5	1.4						
		NB	L	8.8	8.7	A	A	3	8	37	52
		EB	LR	18.5	17	C	C	25	15	68	58

= Delay exceeds 300 seconds



5.3 2028 BUILD

In the 2028 Build scenario, the analysis includes the Proposed Collector Street, which will be constructed as part of this development. This collector will run north to south, connecting Perry Street to the Young Street Connector. It is assumed that the collector will be a two-lane roadway, with one lane in each direction.

The operations in this scenario are generally similar to the No-Build scenario with the exception of the South Main Street & Redford Place Drive/Rogers Road intersection, which now operates at LOS F in the AM peak hour.

At the intersection of South Main Street & Old Rogers Road/School Street, the minor roads both experience significant delays during the AM and PM peak hours, operating at the lowest level of service (LOS F). Similarly, the northbound approach at the South Main Street & Perry Street intersection also faces delays at LOS F in both peak hours. At unsignalized intersections, it is a common occurrence for minor streets to experience higher delays due to the difficulty in making a left-turn or through movement through the intersection with the uninterrupted main street traffic.

The following movements operate at LOS F during one or both peak hours:

- South Main Street at Redford Place Drive/Rogers Road – EBL/WBL/WBTR/NBL/NBT/SBT – AM peak hour, SBL – both peak hours
- South Main Street at Old Rogers Road/School Street – NBLTR/SBLTR – both peak hours
- South Main Street & Perry Street – NBLR – both peak hours
- South Main Street & Young Street – NBL/NBTR/SBLT – AM peak hour.









Synchro LOS and delay results for the 2028 Build scenario are listed in Table 6.



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Table 6: 2028 Build Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (ft)		Max. Obs. Queue (ft)	
				AM	PM	AM	PM	AM	PM	AM	PM
	South Main Street & Rogers Road/Redford Place Drive	Overall		82.1	44.7	F	D				
		EB	L	143.3	44.2	F	D	716	393	250	250
			TR	25.1	28.5	C	C	416	474	1433	666
		WB	L	106.7	12.5	F	B	182	65	250	250
			TR	84.5	51.2	F	D	1486	643	873	803
		NB	L	102.3	49.5	F	D	259	123	224	164
			T	99.4	55.3	F	E	255	145	370	180
			R	45.9	39.5	D	D	140	179	174	226
		SB	L	126.5	90.7	F	F	489	366	250	250
			T	81.3	56.1	F	E	150	172	525	957
		R	52.7	22.6	D	C	461	177	428	820	
	South Main Street & Old Rogers Road/School Street	Overall		21.1	5.7						
		NB	LTR	##	282	F	F	110	65	445	51
		EB	L	12	9.5	B	A	3	0	77	28
		WB	L	8.9	10	A	B	0	3	249	30
		SB	LTR	205.9	173.1	F	F	65	38	422	34
	South Main Street & Perry Street	Overall		7	1.8						
		NB	LR	##	80.4	F	F	90	43	278	67
		WB	LT	8.9	9.9	A	A	0	0	848	112
	South Main Street & Young Street	Overall		68.3	43	E	D				
		EB	L	32.3	35.5	C	D	231	215	394	359
			TR	24.1	29.3	C	C	334	288	415	412
		WB	L	33.4	26	C	C	47	33	64	60
			TR	59.1	44.2	E	D	468	212	423	252
		NB	L	89.2	42.7	F	D	506	236	200	200
			TR	92.5	65.1	F	E	547	505	822	571
		SB	LT	89.8	60.3	F	E	594	457	775	378
			R	79.7	17.7	E	B	444	116	350	299
	Young Street & Perry Street	Overall		0.4	0.3						
		NB	L	8.8	8.6	A	A	0	0	97	31
		EB	LR	28.3	23	D	C	8	5	45	39
	Redford Place Drive at Parker Ridge Driveway	Overall		4.4	5	A	A				
		EB	LTR	4.5	4.7	A	A	6	5	35	35
		WB	LTR	3.9	4.4	A	A	4	3	36	40
		NB	LTR	3.9	4.7	A	A	26	47	75	66
		SB	LTR	4.8	5.3	A	A	44	50	60	69
	Young Street at Young Street Connector	Overall		2.6	2.7						
		NB	L	8.8	9.1	A	A	5	13	44	78
		EB	LR	23.4	23.5	C	C	50	40	111	75
	Young Street Connector at Proposed Collector Street	Overall		2.8	2.5						
		EB	L	7.3	7.6	A	A	0	3	16	36
		SB	LR	9.5	10.1	A	B	5	8	60	61

= Delay exceeds 300 seconds



6.0 2028 BUILD IMPROVED

In the 2028 Build Improved scenarios, several improvements are proposed to mitigate the impacts of the proposed development. With the proposed improvements in place, discussed in Section 7.0, all study intersections operate at LOS D or better with the exception of the South Main Street intersections with Old Rogers Road/School Street and Perry Street.

To mitigate the impacts of the development on the South Main Street & Rogers Road/Redford Place Drive intersection, a 225' westbound right-turn lane was evaluated in the 2028 Build Improved scenario. With this improvement in place, the intersection operates at LOS D in both peak hours.

To improve the intersection of South Main Street and Perry Street, a 75' eastbound right-turn lane was evaluated, as well as a 100' northbound left-turn lane. As noted in Section 5.0, the Rolesville LDO requires that any study area intersections that operate at LOS F and where the delay in the Build scenario increases by more than 5% when compared to the No-Build scenario should be investigated for mitigation. The South Main Street intersection with Perry Street is discussed in detail in the following section.

6.1.1 South Main Street at Perry Street

With the addition of traffic generated by the proposed development, the northbound Perry Street approach at the South Main Street & Perry Street intersection increases in delay by greater than 5%. If high delays are experienced on the stop-controlled approaches, drivers may opt for alternative routes. Within the study area of this TIA, Perry Street interacts with both South Main Street and Young Street providing two existing access points for development traffic.

In addition, a new collector road is proposed to be constructed south of Perry Street, connecting the development driveway with the proposed Young Street Connector. The intersections associated with the Young Street Connector and the Proposed Collector Road are expected to operate at LOS C or better in this scenario so there is ample capacity to handle any development traffic that is diverted from the South Main Street & Perry Street intersection.

Further consideration could be made for limiting the northbound Perry Street approach to right-in/right-out access in the future to improve operations at the intersection itself.

With the implementation of the new turn lanes, the delay for the northbound approach during the AM peak hour has been substantially reduced. Although the northbound left-turn movement continues to experience significant delays, it affects only a small volume of vehicles, and these high delays are anticipated to be isolated to the AM and PM peak hours. If the issue persists, it is possible that affected drivers may seek alternative routes, such as the Proposed Collector Road to Young Street Connector route or Perry Street to Young Street route.









The 2028 Build Improved capacity analysis results are shown in Table 7.



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2028 Build Improved
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Table 7: 2028 Build Improved Level of Service and Delay

Intersection		Approach	Lane Group	Delay (sec./veh.)		Level of Service (LOS)		95th % Queue (ft)		Max. Obs. Queue (ft)	
				AM	PM	AM	PM	AM	PM	AM	PM
	South Main Street & Rogers Road/Redford Place Drive	Overall		48.3	45.1	D	D				
		EB	L	80.4	70.8	F	E	492	424	250	250
			TR	27.4	46.3	C	D	395	603	758	953
		WB	L	57.4	77.1	E	E	117	252	250	250
			T	40.9	44.7	D	D	668	426	835	708
		NB	R	28.7	14.7	C	B	311	166	325	325
			L	57.9	64.1	E	E	187	135	210	152
		SB	T	61.9	56.3	E	E	177	147	240	184
			R	36.3	25.2	D	C	112	111	164	182
			L	96.6	57.2	F	E	347	340	245	249
T	55.4		38.5	E	D	105	152	391	430		
	R	34.9	12.6	C	B	248	109	409	201		
	South Main Street & Old Rogers Road/School Street	Overall		2	2.1						
		NB	LTR	77.5	94.6	F	F	38	38	66	49
		EB	L	11.7	9.5	B	A	0	0	27	24
		WB	L	8.9	10	A	B	0	3	28	32
		SB	LTR	33.2	69.4	D	F	18	20	58	33
	South Main Street & Perry Street	Overall		2.8	2.6						
		NB	L	153	139.5	F	F	58	53	50	61
			R	12.5	15.3	B	C	0	0	23	23
		WB	LT	8.9	9.9	A	A	0	0	81	123
	South Main Street & Young Street	Overall		52.4	43.1	D	D				
		EB	L	32.2	35.4	C	D	185	223	333	370
			TR	23.6	29.4	C	C	245	350	350	402
		WB	L	25	26	C	C	36	33	55	62
			TR	46.6	44.2	D	D	335	212	323	255
		NB	L	64.9	42.7	E	D	373	236	200	200
			TR	67.6	65.1	E	E	423	505	614	569
		SB	LT	67.1	60.3	E	E	466	457	505	382
			R	58.5	17.7	E	B	330	116	345	264
	Young Street & Perry Street	Overall		0.4	0.3						
		NB	L	8.7	8.6	A	A	0	0	35	49
		EB	LR	28.1	23	D	C	8	5	45	39
	Redford Place Drive at Parker Ridge Driveway	Overall		4.4	5	A	A				
		EB	LTR	4.5	4.7	A	A	6	5	35	34
		WB	LTR	3.9	4.4	A	A	4	3	36	40
		NB	LTR	3.9	4.7	A	A	26	47	66	62
		SB	LTR	4.8	5.3	A	A	44	50	45	66
	Young Street at Young Street Connector	Overall		2.6	2.7						
		NB	L	8.9	9.1	A	A	5	13	40	75
		EB	LR	23.7	23.5	C	C	50	40	95	86
	Young Street Connector at Proposed Collector Street	Overall		2.8	2.5						
		EB	L	7.3	7.6	A	A	0	3	12	33
		SB	LR	9.5	10.1	A	B	8	8	60	61

= Delay exceeds 300 seconds



7.0 RECOMMENDATIONS

Based on the findings of this study, specific improvements have been identified and some should be completed as part of the proposed development.

South Main Street & Rogers Road/Redford Place Drive

- Construct a westbound right-turn lane with 225' of full-width storage and appropriate taper.
- The above recommendation will require the modification of the traffic signal at the intersection.

South Main Street & Old Rogers Road/School Street

- No improvements are recommended at this intersection.

South Main Street & Perry Street

- Construct an eastbound right-turn lane with 75' of full-width storage and appropriate taper.
- Construct a northbound left-turn lane with 100' of full-width storage and appropriate taper.

South Main Street & Young Street

- No improvements are recommended at this intersection.

Young Street & Perry Street

- No improvements are recommended at this intersection.

Redford Place Drive at Parker Ridge Driveways

- No improvements are recommended at this intersection.

Young Street at Young Street Connector

- No improvements are recommended at this intersection.

Young Street Connector at Proposed Collector Street

- The Proposed Collector Street will be constructed between Perry Street and the Young Street Connector.
- Construct the Proposed Collector Street with one lane in each direction.
- Install a stop sign on the southbound approach of the Proposed Collector Street at the Young Street Connector Intersection.

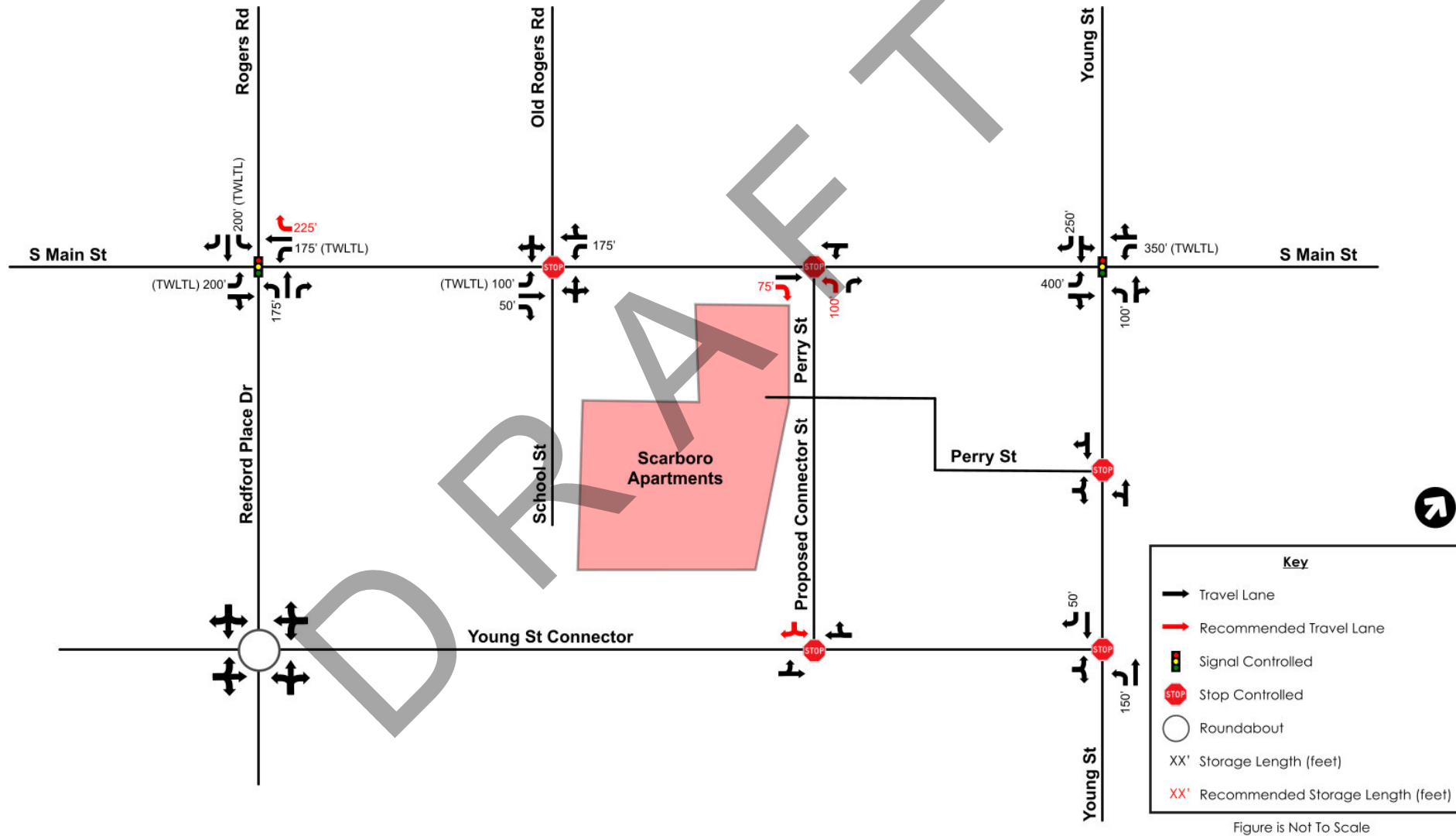
These recommendations are illustrated in Figure 12.



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Recommendations
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Figure 12: Recommended Improvements



References

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8.0 REFERENCES

¹ **NCDOT Functional Classification Map**,

<http://ncdot.maps.arcgis.com/home/webmap/viewer.html?layers=029a9a9fe26e43d687d30cd3c08b1792>

² **2020 NCDOT Average Daily Traffic Volumes**,

<https://ncdot.maps.arcgis.com/apps/webappviewer/index.html?id=964881960f0549de8c3583bf46ef5ed4>

³ **Trip Generation (11th Edition)**, Institute of Transportation Engineers (ITE), September 2021.

⁴ **Highway Capacity Manual 6th Edition: A Guide for Multimodal Mobility Analysis**. Washington D.C.: Transportation Research Board, 2016.

⁵ **NCDOT Capacity Analysis Guidelines**. North Carolina Department of Transportation (NCDOT), March 2022, <https://connect.ncdot.gov/resources/safety/Congestion%20Mngmt%20and%20Signing/Standards%20-%20Capacity%20Analysis%20Guidelines.pdf>

⁶ **Draft NCDOT Capacity Analysis Guidelines: Best Practices**. North Carolina Department of Transportation (NCDOT), March 2022, <https://connect.ncdot.gov/resources/safety/Congestion%20Mngmt%20and%20Signing/Best%20Practices%20-%20Capacity%20Analysis%20Guidelines.pdf>

⁷ **Land Development Ordinance**. Town of Rolesville, June 1, 2021, <https://www.rolesvillenc.gov/code-ordinances>

⁸ **Manual on Uniform Traffic Control Devices (MUTCD)**. Federal Highway Administration, May 2012, https://mutcd.fhwa.dot.gov/kno_2009r1r2.htm

9.0 APPENDIX

- Scoping Correspondence
- Site Plan
- Raw Traffic Count Data
- Approved Development Information
- Traffic Volume Calculations
- Synchro Files
- Synchro & SimTraffic Reports
- Young Street Connector Plans

