



**REZ 23-02: Woodlief Assemblage  
Traffic Impact Analysis**

Rolesville, North Carolina

July 28, 2023

Prepared for:

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# Sign-off Sheet

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## Table of Contents

<b>EXECUTIVE SUMMARY</b> .....	<b>I</b>
<b>1.0 INTRODUCTION</b> .....	<b>1.1</b>
<b>2.0 INVENTORY OF TRAFFIC CONDITIONS</b> .....	<b>2.4</b>
2.1 STUDY AREA .....	2.4
2.2 PROPOSED ACCESS .....	2.4
2.3 EXISTING CONDITIONS .....	2.4
2.4 FUTURE CONDITIONS .....	2.5
2.4.1 The Point .....	2.5
2.4.2 Kalas Falls .....	2.6
2.4.3 Rolesville Road at Mitchell Mill Road .....	2.6
<b>3.0 TRIP GENERATION AND DISTRIBUTION</b> .....	<b>3.9</b>
3.1 TRIP GENERATION .....	3.9
3.2 SITE TRIP DISTRIBUTION .....	3.9
<b>4.0 TRAFFIC VOLUMES</b> .....	<b>4.12</b>
4.1 DATA COLLECTION .....	4.12
4.2 BACKGROUND TRAFFIC GROWTH .....	4.12
4.3 ADJACENT DEVELOPMENT TRAFFIC .....	4.12
4.3.1 The Point .....	4.12
4.3.2 Kalas Falls .....	4.12
4.3.3 Moody Farm .....	4.13
4.3.4 Tucker-Wilkins .....	4.13
4.3.5 Rolesville Crossing (aka Wheeler Tract) .....	4.13
4.4 NO-BUILD TRAFFIC VOLUMES .....	4.13
4.5 BUILD TRAFFIC VOLUMES .....	4.13
<b>5.0 CAPACITY ANALYSIS</b> .....	<b>5.19</b>
5.1 2023 EXISTING .....	5.21
5.2 2028 NO-BUILD .....	5.22
5.3 2028 BUILD .....	5.24
5.4 2028 BUILD IMPROVED .....	5.26
5.4.1 Proposed Improvements .....	5.26
<b>6.0 RECOMMENDATIONS</b> .....	<b>6.29</b>
<b>7.0 REFERENCES</b> .....	<b>7.32</b>
<b>8.0 APPENDIX</b> .....	<b>8.32</b>



**LIST OF TABLES**

Table 1: Existing Conditions .....2.5  
Table 2: Trip Generation .....3.9  
Table 3: Level of Service Criteria .....5.19  
Table 4: 2023 Existing Level of Service and Delay .....5.21  
Table 5: 2028 No-Build Level of Service and Delay .....5.23  
Table 6: 2028 Build Level of Service and Delay .....5.25  
Table 7: 2028 Build Improved Level of Service and Delay .....5.28

**LIST OF FIGURES**

Figure 1: Site Location .....1.2  
Figure 2: Site Plan .....1.3  
Figure 3: 2023 Existing Lanes and Traffic Control .....2.7  
Figure 4: 2028 No-Build Lanes and Traffic Control .....2.8  
Figure 5: Trip Distribution .....3.10  
Figure 6: Trip Assignment .....3.11  
Figure 7: 2023 Existing Traffic Volumes .....4.14  
Figure 8: Background Traffic Growth .....4.15  
Figure 9: Adjacent Development Traffic Volumes .....4.16  
Figure 10: 2028 No-Build Traffic Volumes .....4.17  
Figure 11: 2028 Build Traffic Volumes .....4.18  
Figure 12: Recommended Improvements .....6.31

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## Executive Summary

The proposed Woodlief Assemblage development (Rezoning Application 23-02) is located on the east side of Rolesville Road north of Mitchell Mill Road in Rolesville, NC. The parcel is currently zoned as Wake County's R-30 Zoning District. The applicant is pursuing a rezoning to the following Town of Rolesville Land Development Ordinance (LDO)<sup>8</sup> Zoning Districts: approximately 25% of the site will be Residential High Density as a Conditional Zoning District (RH-CZ) whereas the remaining 75% of the site will be Residential Medium Density as a Conditional Zoning District (RM-CZ).

The 106.92-acre site is anticipated to be completed in 2028 and consists of 158 units of single-family (detached) homes and 95 units of low-rise multifamily homes (i.e., townhomes). Using the Institute of Transportation Engineers (ITE) Trip Generation Manual, it is estimated that, at full build-out, the development is expected to generate 2,222 new trips per average weekday. In the AM and PM peak hours, the development is expected to generate 165 trips (41 entering and 124 exiting) and 214 trips (134 entering and 80 exiting); respectively. Access to the site is envisioned to be provided by two full-movement driveways located along Rolesville Road. The first and northernmost driveway (Site Access A) is planned to connect to the existing intersection of Rolesville Road at Catlett Farm Road. Site Access A will add a fourth leg to this existing stop-controlled intersection. The second and southernmost driveway (Site Access B) is planned to connect to the future intersection of Rolesville Road at Kalas Falls Driveway A. Site Access B will add a fourth leg to this planned stop-controlled intersection. The Kalas Falls development is currently in review and is anticipated to be constructed before the proposed development.

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 Bypass at SR 1003 (Young Street)
- US 401 Bypass at SR 1003 (Young Street)
- US 401 Bypass East U-Turn
- US 401 Bypass West U-Turn
- SR 1003 (Young Street) at SR 2305 (Quarry Road)
- SR 1003 (Young Street / Rolesville Road) at Rolesville High School
- SR 1003 (Rolesville Road) at SR 2308 (Fowler Road)
- SR 1003 (Rolesville Road) at SR 4318 (Catlett Farm Road)



**REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS**

- SR 1003 (Rolesville Road) at SR 2224 (Mitchell Mill Road)




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

- SR 1003 (Rolesville Road) at Kalas Falls Driveway A

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/vehicle)	2023 Existing		2028 No-Build		2028 Build		2028 Build-Improved	
	AM	PM	AM	PM	AM	PM	AM	PM
US 401 Bypass Eastbound at Young Street	B (13.9)	B (11.8)	F (91.6)	E (73.5)	F (106.7)	F (90.3)	F (106.7)	F (90.3)
US 401 Bypass Westbound at Young Street	A (8.8)	A (1.0)	B (19.9)	A (7.6)	B (19.9)	A (7.9)		
US 401 Bypass U-Turn East of Young Street	A (4.4)	A (1.9)	A (5.4)	A (2.5)	A (6.9)	A (2.8)		
US 401 Bypass U-Turn West of Young Street	A (2.3)	A (2.4)	A (1.2)	A (2.9)	A (1.2)	A (3.1)		
Young Street at Quarry Road / The Point North Driveway	F (53.4)	C (18.2)	C (30.2)	C (218)	C (32.7)	C (24.7)		
Rolesville Road at Rolesville HS Driveway / The Point South Driveway	F (85.2)	B (14.7)	F (2,560.2)	F (74.3)	F (3,304.7)	F (101.4)	D (40.3)	A (9.8)
Rolesville Road at Fowler Road	B (11.5)	B (10.5)	C (19.7)	C (16.7)	D (26.0)	E (35.7)		
Rolesville Road at Catlett Farm Road / Site Access A	B (11.9)	B (11.1)	C (22.0)	C (24.5)	E (41.1)	F (59.4)	F (63.1)	F (71.3)
Rolesville Road at Kalas Falls Driveway A / Site Access B			F (67.3)	F (53.7)	F (227.0)	F (167.8)	F (220.8)	F (158.3)
Rolesville Road at Mitchell Mill Road	C (22.7)	B (13.4)	D (37.5)	C (20.1)	D (41.9)	C (21.6)		

 Signalized Intersection  
 Unsignalized Intersection  
 Intersection not Analyzed in Scenario

Rolesville’s LDO<sup>8</sup>, 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 impacts the intersections of US 401 Bypass at Young Street, Rolesville Road at the Rolesville High School / The Point Driveway, Rolesville Road at Catlett Farm Road / proposed site driveway, and Rolesville Road at Kalas Falls Driveway / proposed site driveway.

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 LOS Standards specified in the LDO<sup>8</sup> or are not otherwise recommended.

### **Averette Road, Young Street, and Rolesville Road Corridor Study**

It is recommended that the applicant coordinate their site plan and improvements with the findings of the Averette Road, Young Street, and Rolesville Road Corridor Study to ensure consistency with future addendums to the Community Transportation Plan.

### **US 401 Bypass at Young Street**

- Extend the northbound right-turn lane from 250 feet of full-width storage to 600 feet of full-width storage and appropriate taper.

### **Young Street at Quarry Road / The Point North Driveway**

- No improvements are recommended at this intersection.

### **Young Street at Rolesville HS Driveway / The Point South Driveway**

- Monitor the intersection for the installation of a traffic signal. When signalized, the westbound approach should be striped as an exclusive left-turn lane with a shared thru/right-turn storage lane to avoid the use of split-phasing.

### **Rolesville Road at Fowler Road**

- No improvements are recommended at this intersection.

### **Rolesville Road at Catlett Farm Road / Site Access A**

- Construct Site Access A as a full-movement access point consisting of an exclusive left-turn lane with 100 feet of storage and a shared thru/right-turn lane. It is recommended that the internal protective stem (IPS) be maximized as the site layout permits.
- Construct an exclusive southbound left-turn lane on Rolesville Road with 100 feet of storage and appropriate taper.



- Construct an exclusive northbound left-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.
- Construct an exclusive northbound right-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.

### **Rolesville Road at Kalas Falls Driveway A / Site Access B**

- Construct Site Access B as a full-movement access point consisting of an exclusive left-turn lane with 100 feet of storage and a shared thru/right-turn lane. If possible, provide 175 feet of IPS.
- Construct an exclusive southbound left-turn lane on Rolesville Road with 100 feet of storage and appropriate taper.
- Construct an exclusive northbound right-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.

### **Rolesville Road at Mitchell Mill Road**

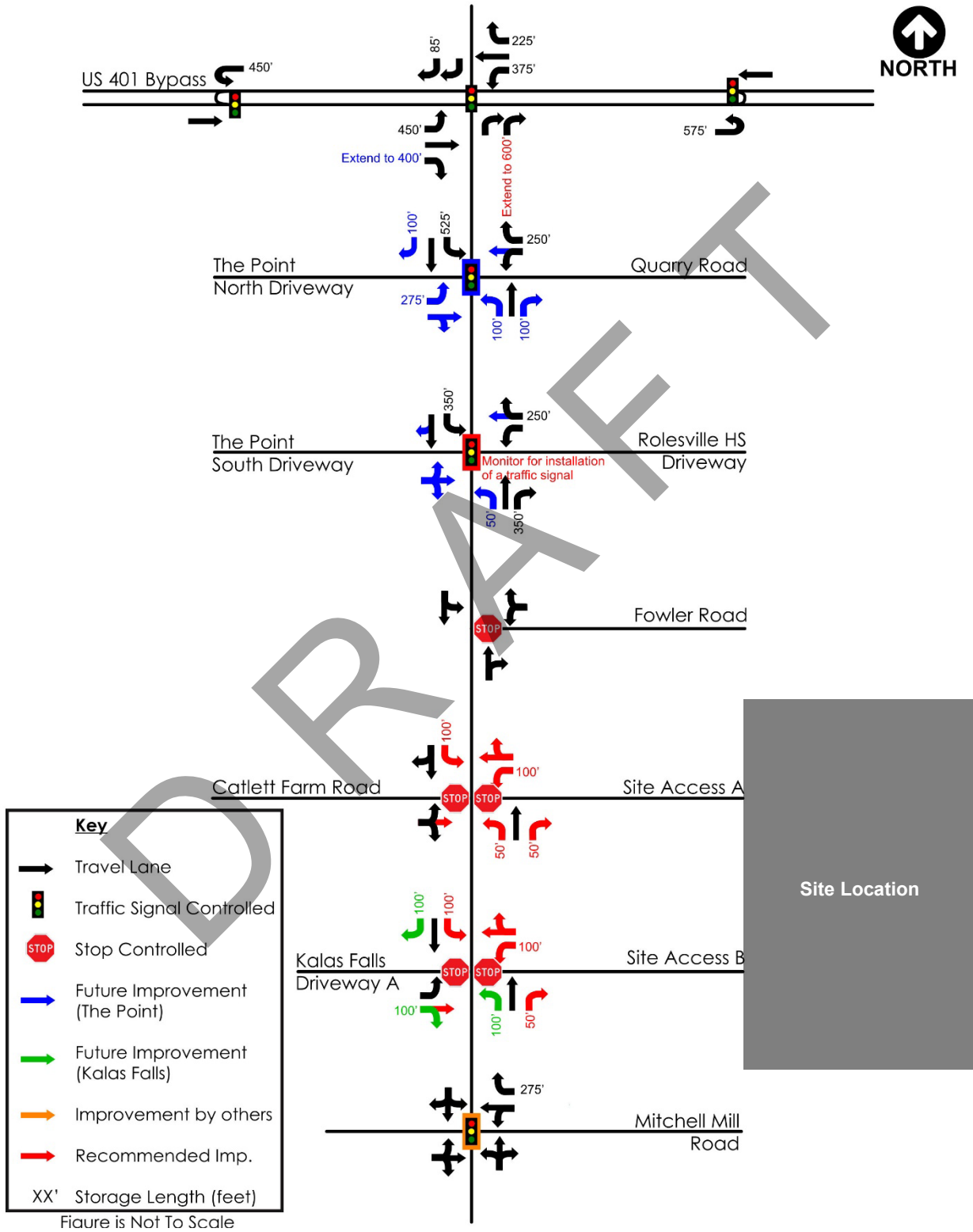
- No improvements are recommended at this intersection.

These recommendations are illustrated in Figure ES-1.





Figure ES-1: Recommended Improvements



Introduction  
July 28, 2023

## 1.0 INTRODUCTION

The proposed Woodlief Assemblage development (Rezoning Application 23-02) is located on the east side of Rolesville Road north of Mitchell Mill Road in Rolesville, NC. The parcel is currently zoned as Wake County's R-30 Zoning District. The applicant is pursuing a rezoning to the following Town of Rolesville Land Development Ordinance (LDO)8 Zoning Districts: approximately 25% of the site will be Residential High Density as a Conditional Zoning District (RH-CZ) whereas the remaining 75% of the site will be Residential Medium Density as a Conditional Zoning District (RM-CZ).

The 106.92-acre site is anticipated to be completed in 2028 and consists of 158 units of single-family (detached) homes and 95 units of low-rise multifamily homes (i.e., townhomes). Using the Institute of Transportation Engineers (ITE) Trip Generation Manual, it is estimated that at full build-out the development is expected to generate 2,222 new trips per average weekday. In the AM and PM peak hours, the development is expected to generate 165 trips (41 entering and 124 exiting) and 214 trips (134 entering and 80 exiting); respectively. Access to the site is envisioned to be provided by two full-movement driveways located along Rolesville Road. The project location is shown in Figure 1. The site plan, prepared by WithersRavenel, can be found in Figure 2.

The traffic analysis considers future build conditions during the build-out year (2028). 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.



REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS

Introduction  
July 28, 2023

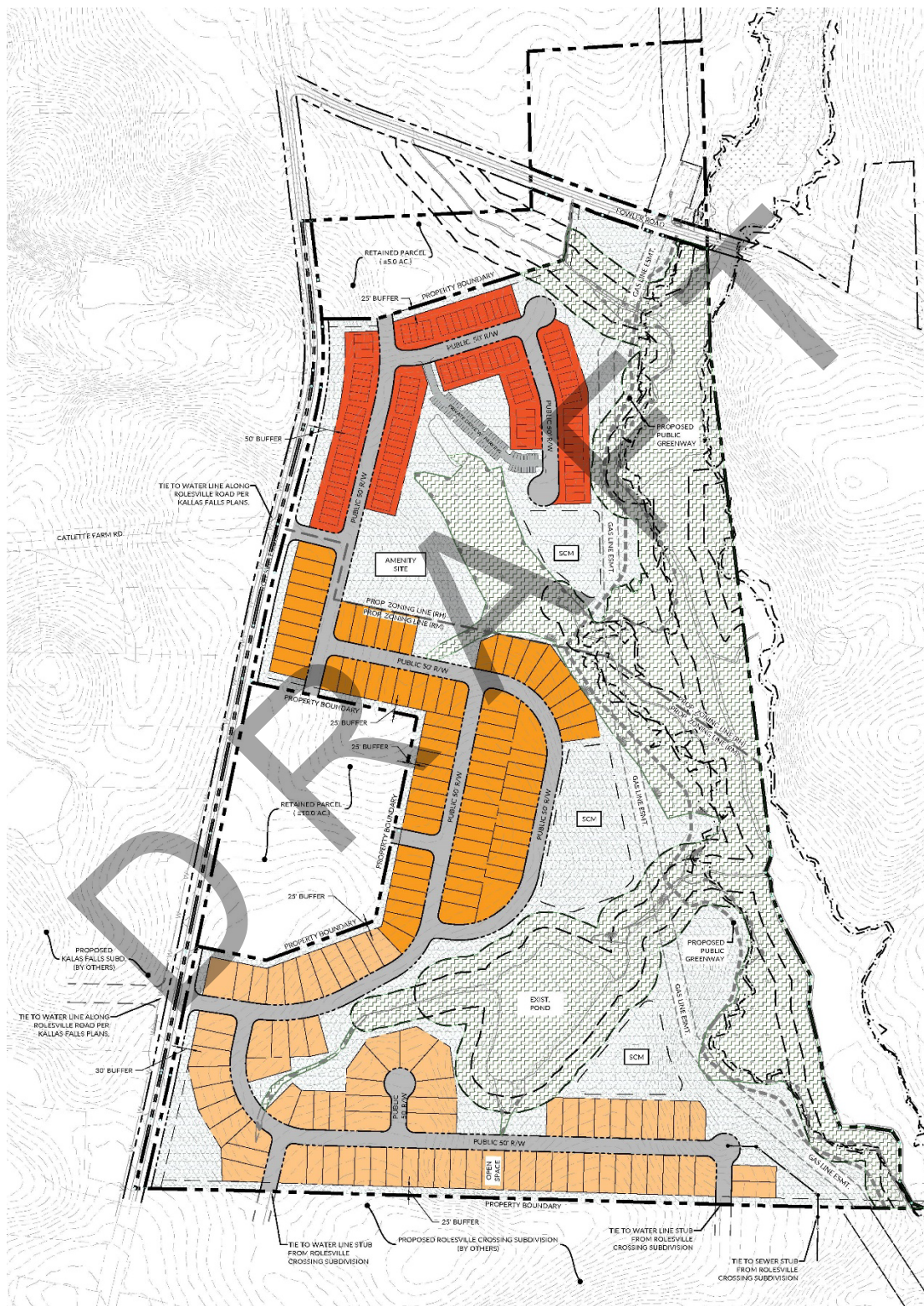
Figure 1: Site Location



REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS

Introduction  
July 28, 2023

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 Bypass at Young Street
- US 401 Bypass at Young Street
- US 401 Bypass East U-Turn
- US 401 Bypass West U-Turn
- Young Street at Quarry Road
- Young Street / Rolesville Road at Rolesville High School
- Rolesville Road at Fowler Road
- Rolesville Road at Catlett Farm Road
- Rolesville Road at Mitchell Mill Road

### 2.2 PROPOSED ACCESS

Access to the site is envisioned to be provided by two full-movement driveways located along Rolesville Road. The first and northernmost driveway (Site Access A) is planned to connect to the existing intersection of Rolesville Road at Catlett Farm Road. Site Access A will add a fourth leg to this existing stop-controlled intersection. The second and southernmost driveway (Site Access B) is planned to connect to the future intersection of Rolesville Road at Kalas Falls Driveway A. Site Access B will add a fourth leg to this planned stop-controlled intersection. The Kalas Falls development is currently in review and is anticipated to be constructed before the proposed development.

### 2.3 EXISTING CONDITIONS

Table 1 provides a detailed description of the existing study area roadway network. All functional classification<sup>1</sup> and average annual daily traffic (AADT)<sup>2</sup> information were obtained from NCDOT.



Inventory of Traffic Conditions  
 July 28, 2023

**Table 1: Existing Conditions**

Road Name	Road Number	Primary Cross-Section	Functional Classification <sup>1</sup>	AADT <sup>2</sup> (year)	Speed Limit (mph)	Maintenance Agency
US 401 Bypass	US 401	4-Lane Divided	Other Principal Arterial	18,500 vpd (2021)	55	NCDOT
Young Street / Rolesville Road	SR 1003	2-Lane Undivided	Minor Arterial	5,400 vpd (2021)	45	NCDOT
Quarry Road	SR 2305	2-Lane Undivided	Local Road	1,000 vpd (2015)	35	NCDOT
Rolesville High School Driveway	-	2-Lane Undivided	-	-	-	Private
Fowler Road	SR 2308	2-Lane Undivided	Major Collector	1,300 vpd (2021)	45	NCDOT
Catlett Farm Road	SR 4318	2-Lane Undivided	Local Road	-	-	NCDOT
Mitchell Mill Road	SR 2224	2-Lane Undivided	Major Collector	2,400 vpd (2021)	45	NCDOT4-

<sup>1</sup>TWLT = 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 The Point

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

#### US 401 Bypass at Young Street

- Extend the existing eastbound right-turn lane to 400 feet of full-width storage and appropriate taper.

#### Young Street at Quarry Road / The Point North Driveway

- Construct the North Driveway as a full-movement driveway onto Young Street across from Quarry Road.
- Construct the North Driveway with one ingress lane and one egress lane with an exclusive eastbound left-turn lane with 275 feet of full-width storage and appropriate taper.
- Construct a northbound left-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a northbound right-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a southbound right-turn lane with 100 feet of full-width storage and appropriate taper.
- Install a traffic signal at the intersection.



## REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS

Inventory of Traffic Conditions

July 28, 2023

### Young Street at Rolesville High School Driveway / The Point South Driveway

- Construct the South Driveway as a full-movement driveway onto Young Street across from the Rolesville High School Driveway.
- Construct the North Driveway with one ingress lane and one egress lane.
- Construct a northbound left-turn lane with 50 feet of full-width storage and appropriate taper.

A copy of the TIA is contained in the Appendix. The Point development is discussed in more detail in Section 4.3.1.

### 2.4.2 Kalas Falls

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

#### Young Street at Kalas Falls Driveway A

- Construct Driveway A as a full-movement driveway onto Young Street across from Quarry Road.
- Construct Driveway A with one ingress lane and one egress lane with an exclusive eastbound right-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a northbound left-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a southbound right-turn lane with 100 feet of full-width storage and appropriate taper.

A copy of the TIA is contained in the Appendix. The Kalas Falls development is discussed in more detail in Section 4.3.2.

### 2.4.3 Rolesville Road at Mitchell Mill Road

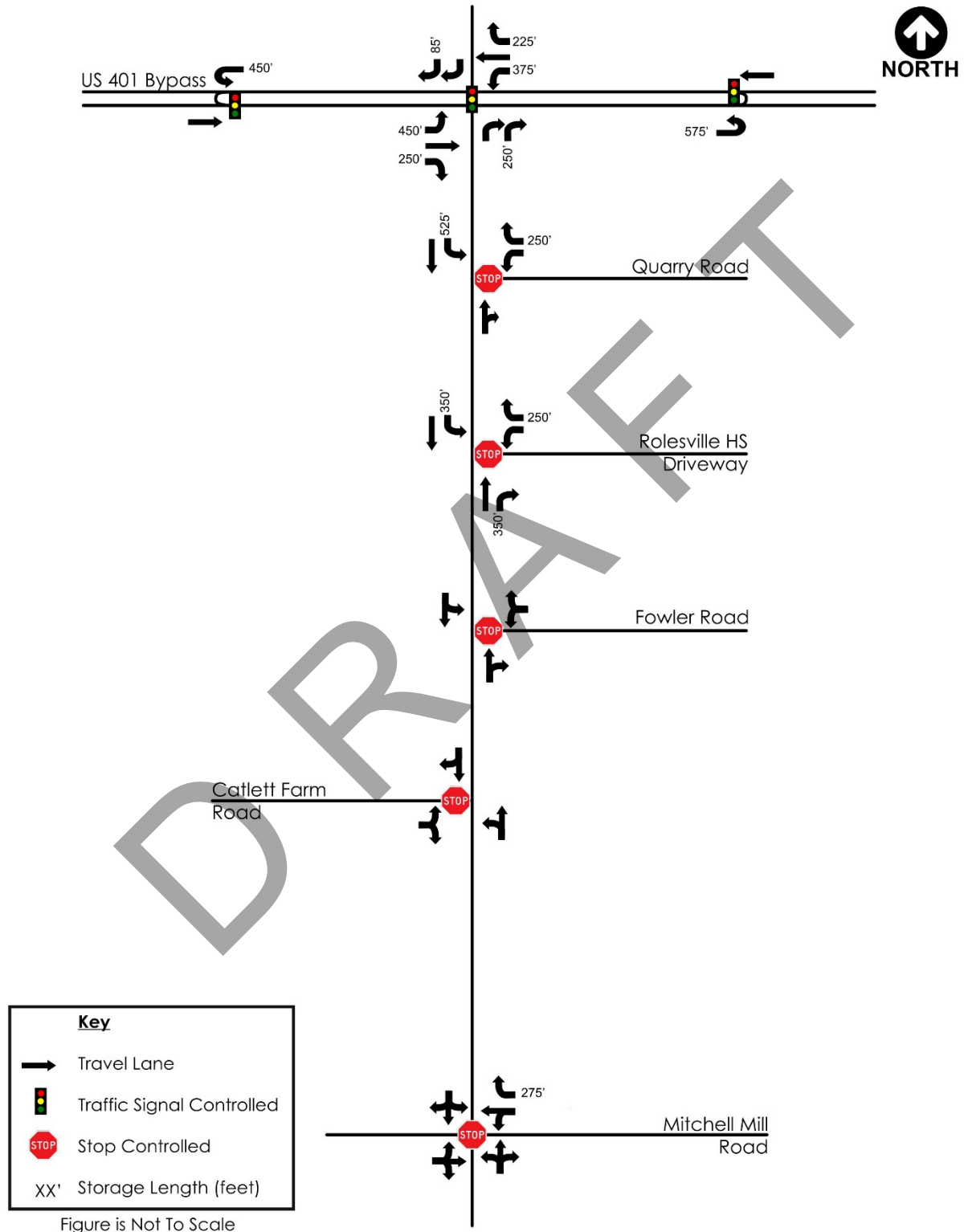
Currently, several developments along the Young Street / Rolesville Road corridor have committed to monitoring the intersection of Rolesville Road at Mitchell Mill Road for the installation of a traffic signal. When warranted, a traffic signal will be installed at the intersection. This report assumes that a traffic signal is installed and operational in the future year of 2028.



REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS

Inventory of Traffic Conditions  
 July 28, 2023

Figure 3: 2023 Existing Lanes and Traffic Control





**REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS**

Inventory of Traffic Conditions  
 July 28, 2023

**Figure 4: 2028 No-Build Lanes and Traffic Control**

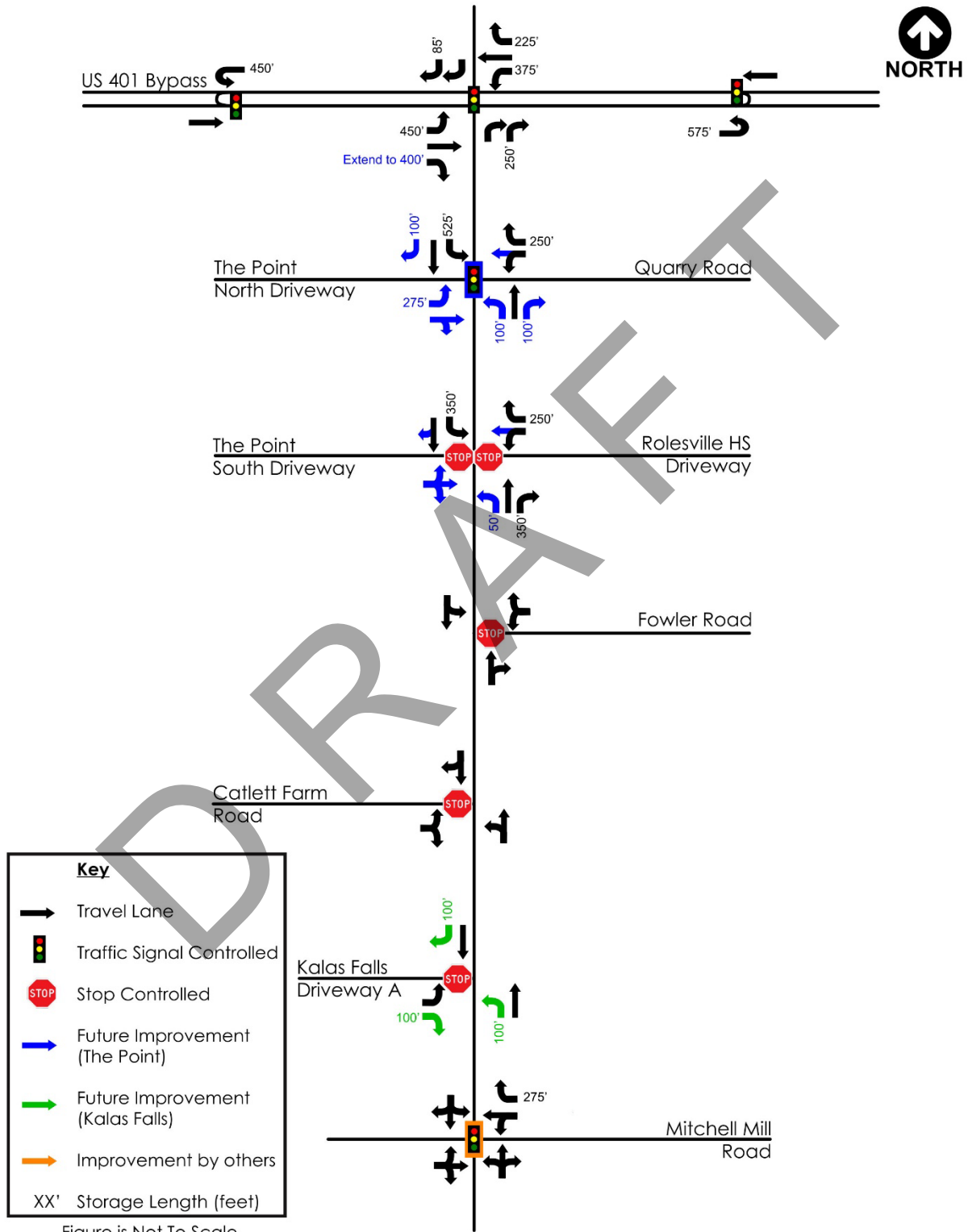


Figure is Not To Scale



### 3.0 TRIP GENERATION AND DISTRIBUTION

#### 3.1 TRIP GENERATION

Trip generation for the proposed development was performed using the 11<sup>th</sup> Edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual<sup>3</sup>. The Rate Versus Equation spreadsheet published by NCDOT<sup>4</sup> 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
Single-Family Detached Housing (LUC 210)	158 Units	1,538	769	769	113	29	84	153	96	57
Multifamily Housing (Low-Rise) (LUC 220)	95 Units	684	342	342	52	12	40	61	38	23
<b>Total Trips Generated</b>		<b>2,222</b>	<b>1,111</b>	<b>1,111</b>	<b>165</b>	<b>41</b>	<b>124</b>	<b>214</b>	<b>134</b>	<b>80</b>

#### 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.

- 30% to/from the west on US 401 Bypass
- 15% to/from the north on Young Street
- 15% to/from the east on US 401 Bypass
- 15% to/from the west on Mitchell Mill Road
- 10% to/from the east on Fowler Road
- 10% to/from the south on Rolesville Road
- 5% to/from the east on Quarry 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

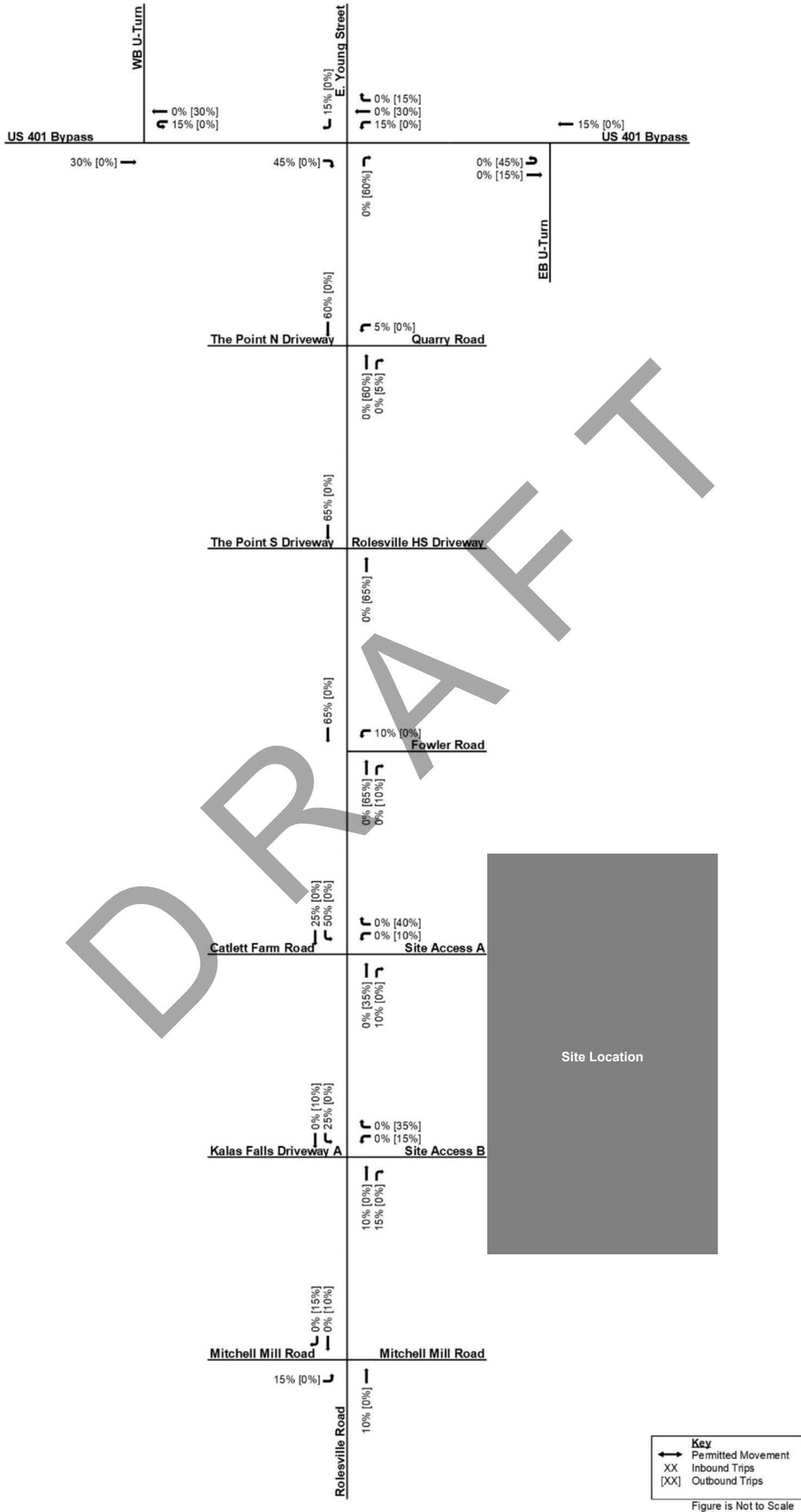
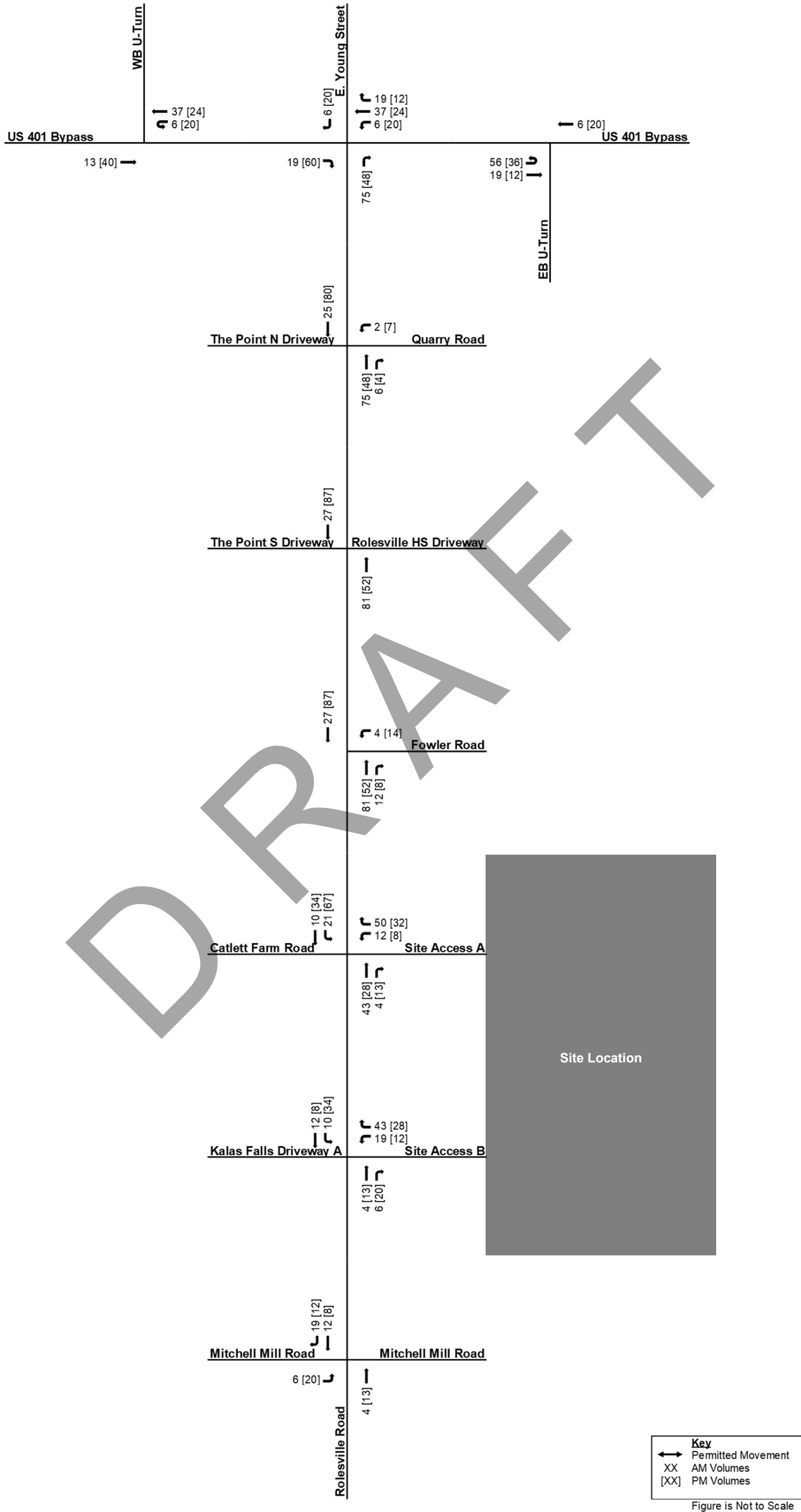


Figure 6: Trip Assignment



## 4.0 TRAFFIC VOLUMES

All traffic volume calculations can be found in the Appendix.

### 4.1 DATA COLLECTION

Morning (6:30 – 9:00 AM) and evening (4:00 – 6:00 PM) turning movement counts were taken at the study intersections on Thursday, June 1, 2023, while schools were in session. Traffic counts were balanced between the study intersections along US 401. Otherwise, traffic counts were not balanced due to the distance between study intersections and the number of driveways between them. 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 growth 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 because of this future traffic growth is shown in Figure 8.

### 4.3 ADJACENT DEVELOPMENT TRAFFIC

There are five (5) developments proposed to be constructed within and nearby the study area: The Point, Kalas Falls, Moody Farm, Tucker-Wilkins, and Rolesville Crossing. 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 The Point

The Point is a proposed mixed-use development project located along the west side of Young Street near the US 401 Bypass. The proposed development is expected to consist of up to 621 units of single-family detached housing, 320 units of low-rise multifamily housing, and 112,800 square-feet of retail space. The development is expected to be built in phases and is estimated to be fully built-out by 2025. The improvements associated with The Point development are discussed in Section 2.4.1. The trips attributed to The Point development, as well as a copy of the traffic study prepared by Kimley-Horn and Associates, can be found in the Appendix.

#### 4.3.2 Kalas Falls

Kalas Falls is a residential development project located along the west side of Rolesville Road between Fowler Road and Mitchell Mill Road. The proposed development is expected to consist of 487 units of single-family detached housing and 108 units of low-rise multifamily housing. The development is anticipated to be fully built-out by 2025. The improvements associated with Kalas Falls are discussed in Section 2.4.2. The trips attributed to the Kalas Falls development, as well as a copy of the traffic study prepared by Stantec, can be found in the Appendix.



Traffic Volumes  
July 28, 2023

### 4.3.3 Moody Farm

Moody Farm is a residential development project located along the west side of Rolesville Road between Fowler Road and Mitchell Mill Road. The proposed development is expected to consist of 82 units of single-family detached housing. The development is anticipated to be fully built-out by 2028. The trips attributed to the Moody Farm development, as well as a copy of the traffic study prepared by Stantec, can be found in the Appendix.

### 4.3.4 Tucker-Wilkins

The Tucker-Wilkins property is a residential development project located along the west side of Rolesville Road between Fowler Road and Mitchell Mill Road. The proposed development is expected to consist of 27 units of single-family detached housing and 64 units of low-rise multifamily housing. The development is anticipated to be fully built-out by 2028. The trips attributed to the Tucker-Wilkins property, as well as a copy of the traffic study prepared by Stantec, can be found in the Appendix.

### 4.3.5 Rolesville Crossing (fka Wheeler Tract)

Rolesville Crossing (formerly known as the Wheeler Tract) is a residential development project located in the northeast quadrant of the intersection of Rolesville Road and Mitchell Mill Road. The proposed development is expected to consist of 233 units of single-family detached housing and 125 units of low-rise multifamily housing. The development is anticipated to be fully built-out by 2026. The trips attributed to Rolesville Crossing, as well as a copy of the traffic study prepared by Ramey Kemp & Associates, Inc., 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 (Figure 7), the Background traffic growth (Figure 8), and the adjacent development growth (Figure 9). 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.



Figure 7: 2023 Existing Traffic Volumes

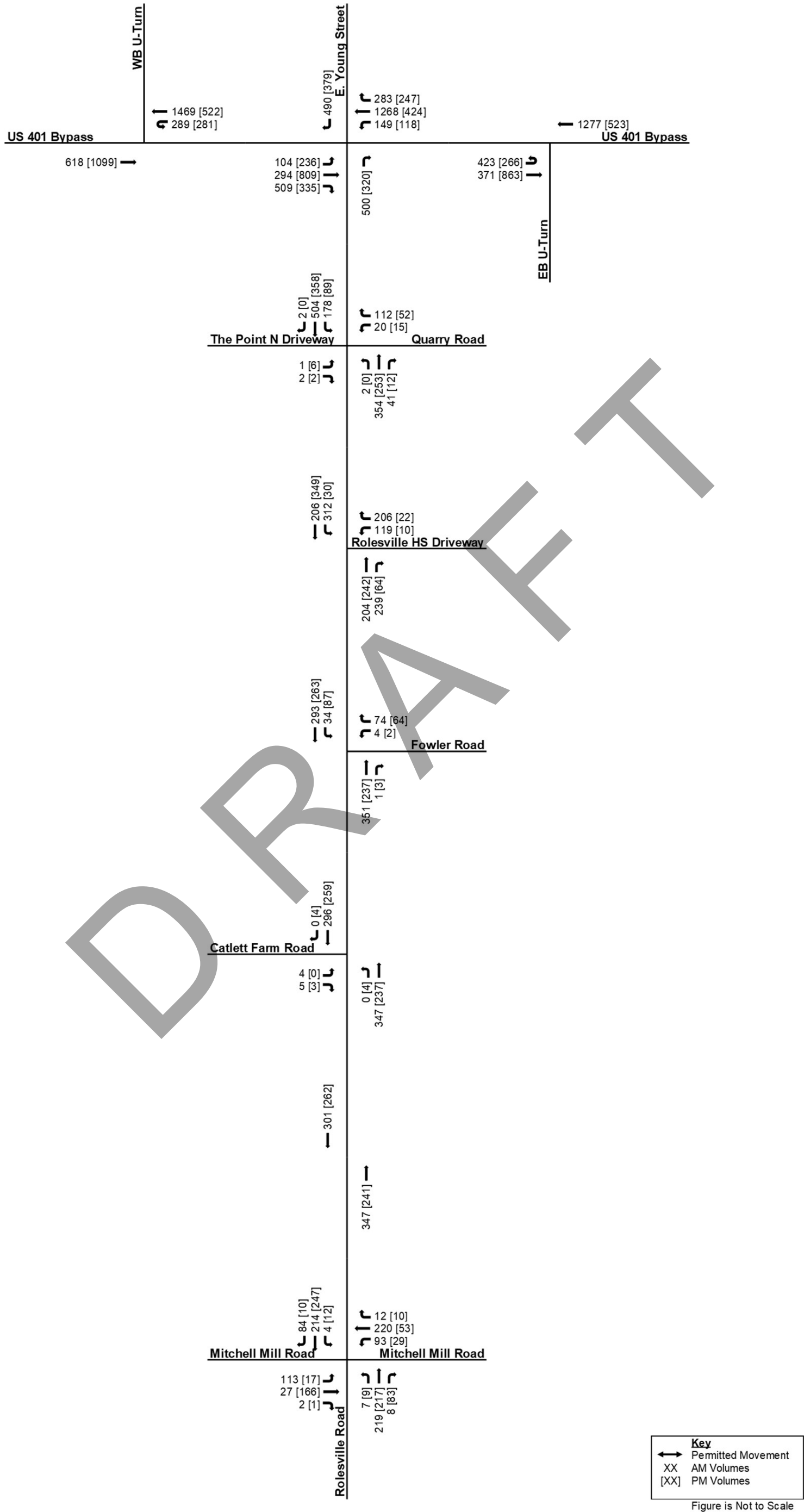


Figure 8: Background Traffic Growth

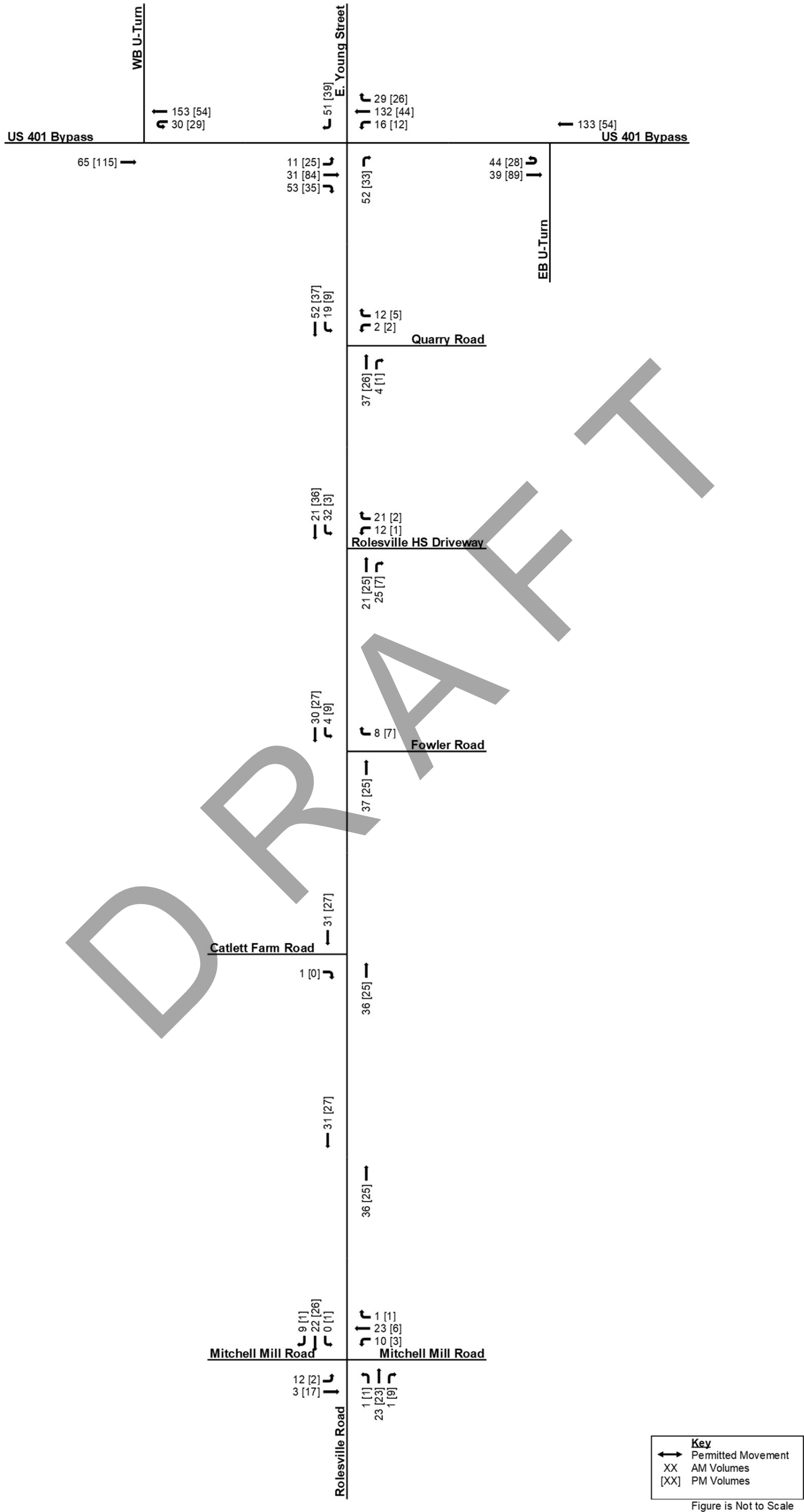




Figure 9: Adjacent Development Traffic Volumes

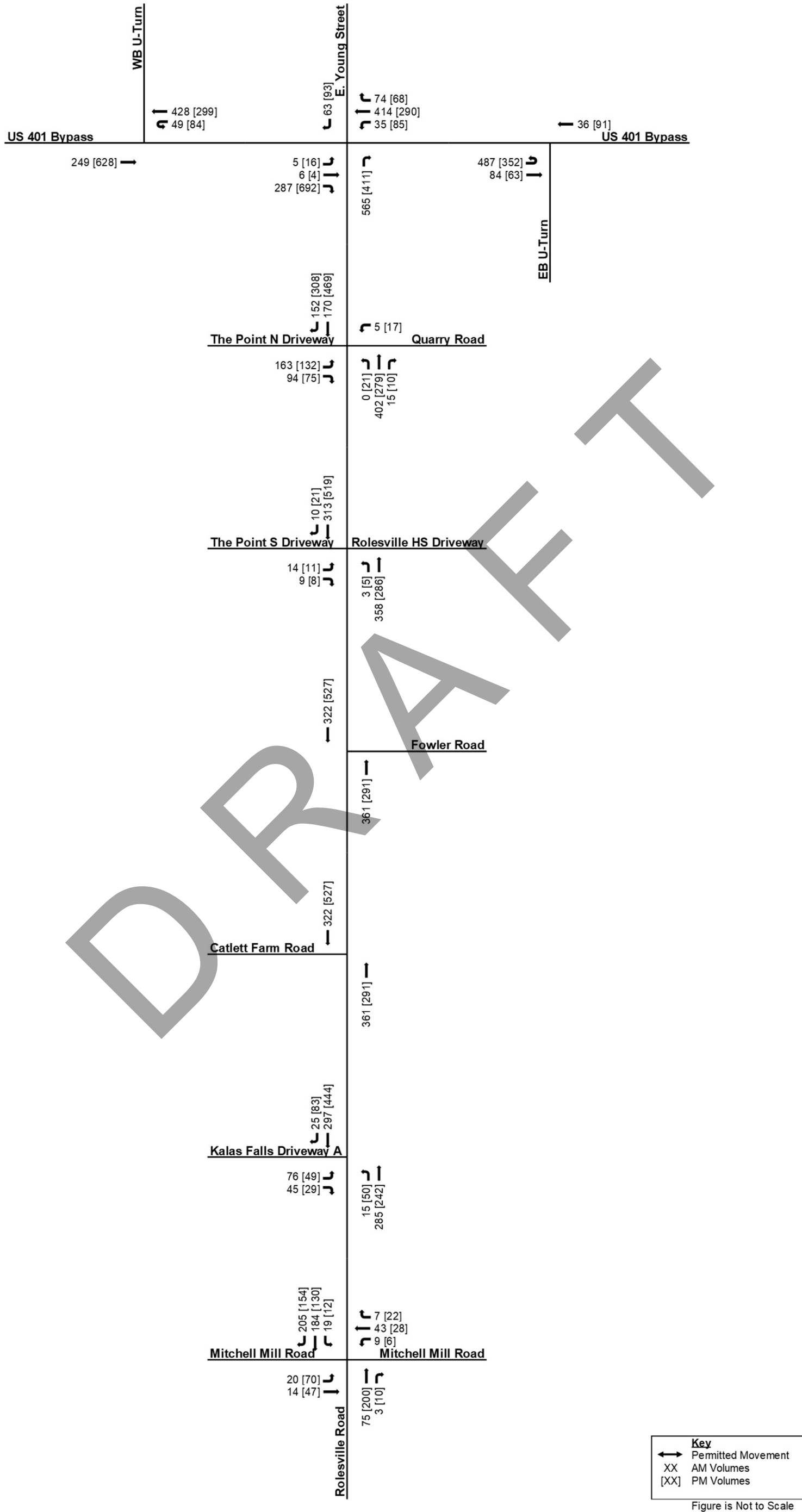


Figure 10: 2028 No-Build Traffic Volumes

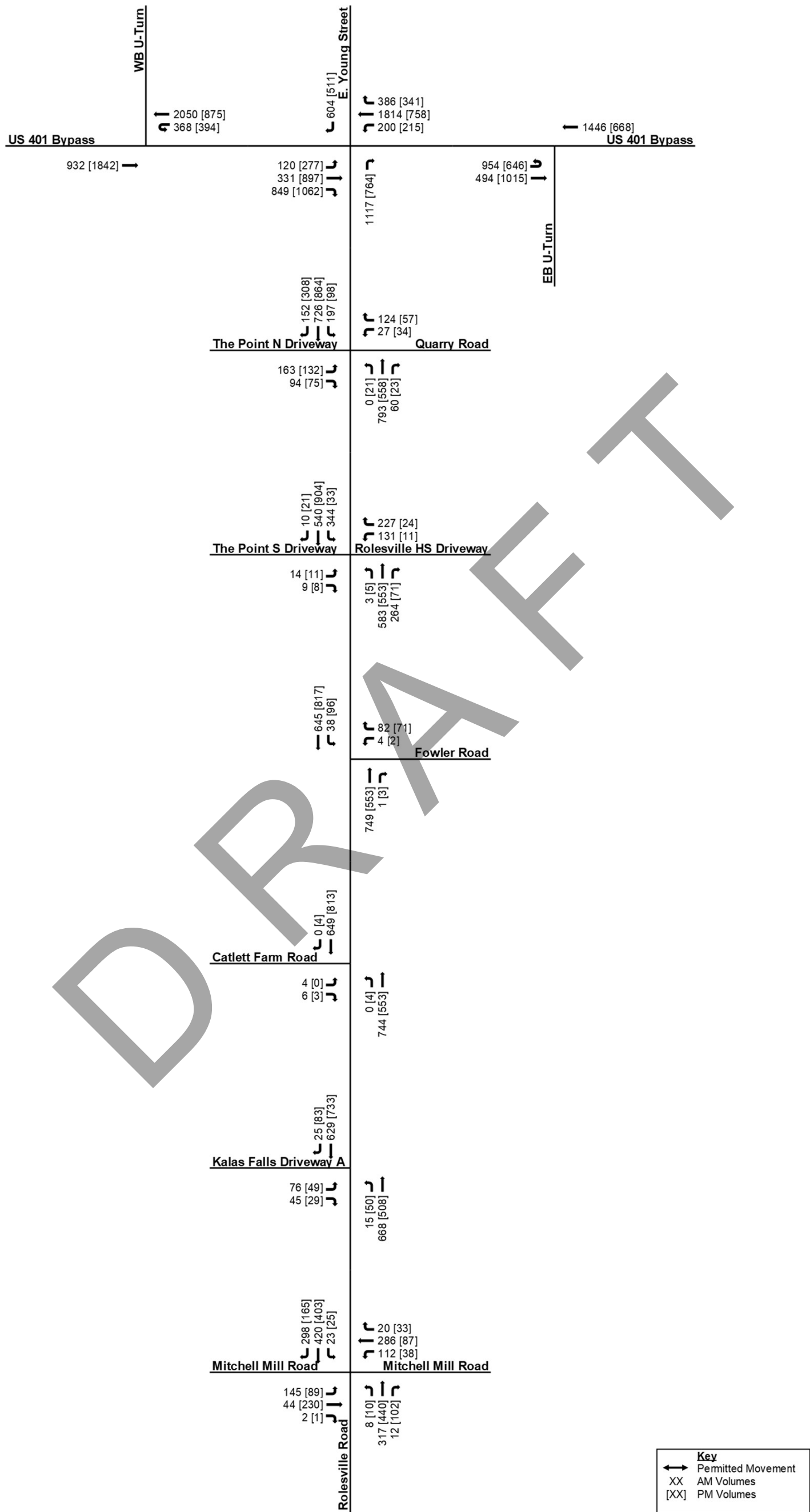
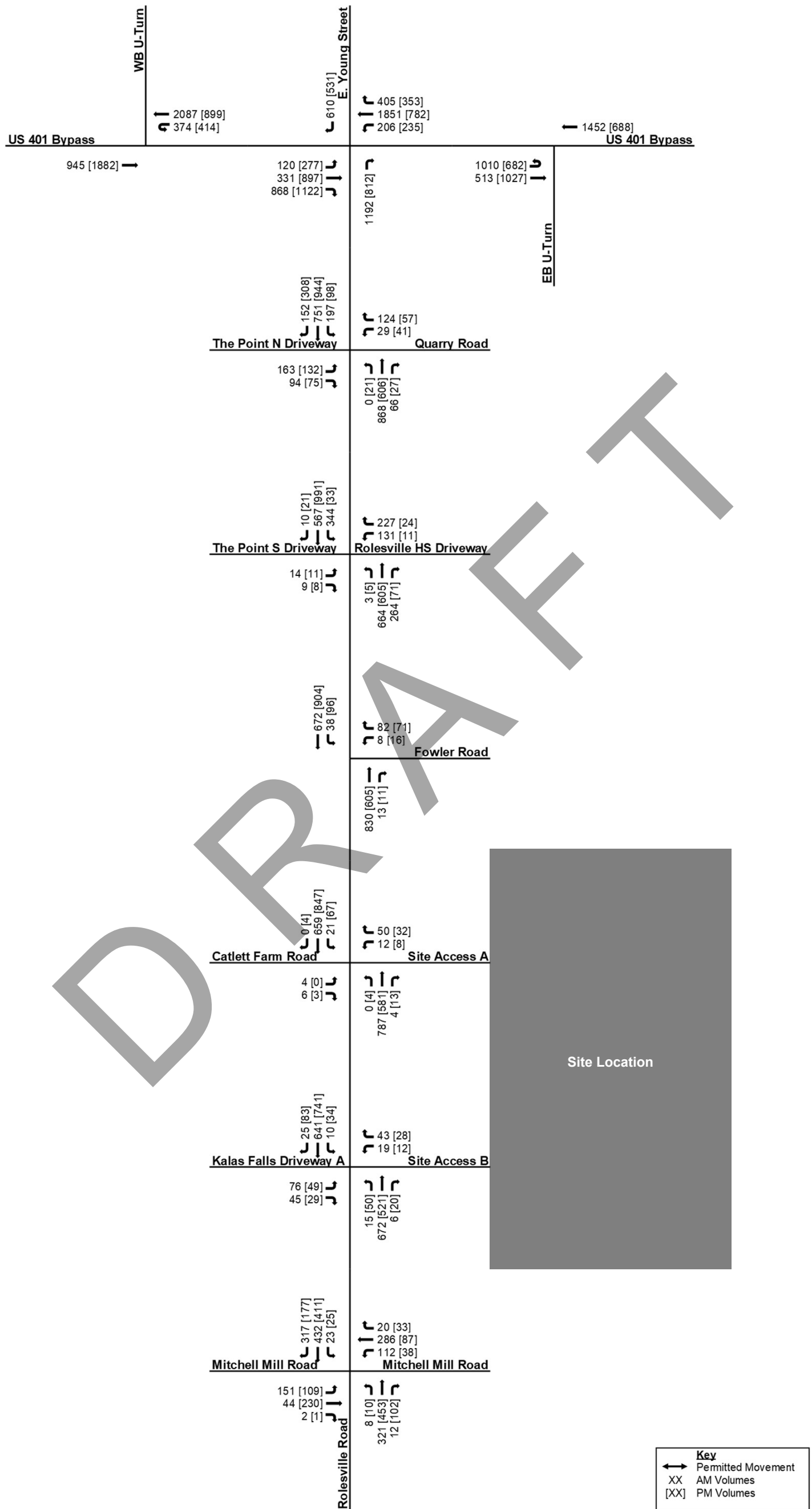


Figure is Not to Scale



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<sup>6</sup> (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*<sup>6</sup> as well as the *Draft NCDOT Capacity Analysis Guidelines Best Practices*<sup>7</sup>. 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)<sup>8</sup>, 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.*



## REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS

Capacity Analysis  
July 28, 2023

- 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.

DRAFT



### 5.1 2023 EXISTING

In the base year, under the existing geometric conditions, the westbound left-turn from Quarry Road and the westbound left-turn from Rolesville High School onto Rolesville Road operate at LOS F in the AM peak hour. The remaining study area intersections and movements operate at an acceptable level in both peak hours. The results from the 2023 Existing analysis is 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	
	US 401 Bypass Eastbound at Young Street	Overall	13.9	11.8	B	B					
		EB	T	3.1	4.9	A	A	30	123	85	146
			R	11.1	5.5	B	A	282	123	179	49
		WB	L	0.1	0.1	A	A	0	0	140	134
		NB	R	27.2	40.2	C	D	153	147	362	264
	US 401 Bypass Westbound at Young Street	Overall	8.8	1.0	A	A					
		EB	L	0.1	0.1	A	A	0	0	127	240
		WB	T	5.0	0.4	A	A	36	0	174	86
			R	0.6	0.7	A	A	1	0	23	12
		SB	R	25.2	2.5	C	A	139	0	214	182
	US 401 U-Turn East of Young Street	Overall	4.4	1.9	A	A					
		EB	U	2.0	1.4	A	A	44	19	258	188
		WB	T	5.2	2.1	A	A	142	38	154	21
	US 401 U-Turn West of Young Street	Overall	2.3	2.4	A	A					
		EB	T	3.2	2.9	A	A	49	95	64	106
		WB	U	0.2	0.2	A	A	0	0	167	209
	Young Street at Quarry Road	WB	L	53.4	18.2	F	C	20	5	34	25
			R	12.0	10.2	B	B	17.5	5	42	26
		SB	L	8.9	8.1	A	A	15	7.5	90	46
	Rolesville Road at Rolesville HS Driveway	WB	L	85.2	14.7	F	B	135	2.5	139	35
			R	11.2	9.8	B	A	30	2.5	131	42
		SB	L	8.6	7.9	A	A	25	2.5	83	33
	Rolesville Road at Fowler Road	WB	LR	11.5	10.5	B	B	12.5	7.5	48	41
		SB	L	8.2	8.0	A	A	2.5	5	58	71
	Rolesville Road at Catlett Farm	EB	LR	11.9	11.1	B	B	2.5	0	30	28
		NB	L	7.9	7.8	A	A	0	0	11	13
		EB	LTR	13.3	12.2	B	B	32.5	37.5	111	100
	Rolesville Road at Mitchell Mill Road	WB	LT	22.7	11.0	C	B	122.5	15	233	60
			R	9.0	8.8	A	A	2.5	2.5	0	0
		NB	LTR	15.2	13.4	C	B	62.5	70	96	103
		SB	LTR	17.4	12.9	C	B	92.5	57.5	266	148

\*Maximum queue extends off the SimTraffic network and may be longer than recorded

- Intersection or Lane Group Operates at LOS E
- Intersection of 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:

### US 401 Bypass at Young Street

- Extend the existing eastbound right-turn lane to 400 feet of full-width storage and appropriate taper.

### Young Street at Quarry Road / The Point North Driveway

- Construct the North Driveway as a full-movement driveway onto Young Street across from Quarry Road.
- Construct the North Driveway with one ingress lane and one egress lane with an exclusive eastbound left-turn lane with 275 feet of full-width storage and appropriate taper.
- Construct a northbound left-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a northbound right-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a southbound right-turn lane with 100 feet of full-width storage and appropriate taper.
- Install a traffic signal at the intersection.

### Young Street at Rolesville High School Driveway / The Point South Driveway

- Construct the South Driveway as a full-movement driveway onto Young Street across from the Rolesville High School Driveway.
- Construct the South Driveway with one ingress lane and one egress lane.
- Construct a northbound left-turn lane with 50 feet of full-width storage and appropriate taper.

### Young Street at Kalas Falls Driveway A

- Construct Driveway A as a full-movement driveway onto Young Street across from Quarry Road.
- Construct Driveway A with one ingress lane and one egress lane with an exclusive eastbound right-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a northbound left-turn lane with 100 feet of full-width storage and appropriate taper.
- Construct a southbound right-turn lane with 100 feet of full-width storage and appropriate taper.

### Rolesville Road at Mitchell Mill Road

- Install a traffic signal at the 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. In the future year of 2028 without the proposed development in-place, the US 401 Bypass Eastbound at Young Street intersection operates at LOS F in the AM peak hour and LOS E in the PM peak hour. All other signalized intersections in the study area operate at acceptable overall LOS. Stop-controlled movements turning left onto Rolesville Road from the Rolesville High School Driveway, The Point's South Driveway, and the Kalas Falls Driveway operate at LOS F. This is attributed to high thru volumes on Rolesville Road during the peak hours. Long queues were observed at the northbound right-turn from Young Street onto the US 401 Bypass and on thru movements at the following intersections:

- Northbound Young Street at Quarry Road / The Point's North Driveway
- Southbound Rolesville Road at Mitchell Mill Road



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
	US 401 Bypass Eastbound at Young Street	Overall		91.6	73.5	F	E				
		EB	T	19.1	11.6	B	B	135	242	412	460
			R	109.0	97.6	F	F	1,414	1,707	343	346
		WB	L	0.1	0.1	A	A	0	0	218	302
NB	R	116.3	133.3	F	F	1,007	737	375	1,358		
	US 401 Bypass Westbound at Young Street	Overall		19.9	7.6	B	A				
		EB	L	0.1	0.2	A	A	0	0	134	240
			T	15.2	6.5	B	A	423	130	240	174
		WB	R	0.8	1.1	A	A	0	0	100	72
SB	R	49.1	17.5	D	B	309	102	398	666		
	US 401 U-Turn East of Young Street	Overall		5.4	2.5	A	A				
		EB	U	1.6	0.7	A	A	0	0	632	342
		WB	T	8.0	4.3	A	A	354	79	300	142
	US 401 U-Turn West of Young Street	Overall		1.2	2.9	A	A				
		EB	T	1.6	3.5	A	A	68	221	116	329
		WB	U	0.3	0.4	A	A	0	0	258	568
	Young Street at Quarry Road / The Point North Driveway	Overall		30.2	21.8	C	C				
		EB	L	64.9	45.6	E	D	272	178	375	375
			TR	39.5	30.7	D	C	123	98	723	700
		WB	LT	58.4	50.6	E	D	61	70	389	170
			R	44.5	36.3	D	D	156	84	347	187
		NB	L	13.0	19.5	B	B	7	26	122	200
			T	38.0	23.4	D	C	852	437	2,110	2,110
		SB	R	13.3	14.0	B	B	47	23	200	200
L	46.4		9.6	D	A	246	50	175	75		
	Rolesville Road at Rolesville HS Driveway / The Point South Driveway	EB	LTR	770.3	61.0	F	F	105	27.5	204	178
		WB	LT	2560.2	74.3	F	F	465	22.5	659	47
			R	21.2	12.7	C	B	77.5	5	355	187
		NB	L	8.7	10.4	A	B	0	0	105	125
	Rolesville Road at Fowler Road	WB	LR	19.7	16.7	C	C	27.5	20	249	160
		SB	L	9.7	9.1	A	A	5	10	227	287
	Rolesville Road at Catlett Farm	EB	LR	22.0	24.5	C	C	5	2.5	34	27
		NB	L	9.1	9.7	A	A	0	0	287	95
	Rolesville Road at Kalas Falls Driveway A	EB	L	67.3	53.7	F	F	82.5	47.5	91	86
			R	14.2	15.4	B	C	10	7.5	48	61
		NB	L	9.2	10.2	A	B	2.5	5	38	59
	Rolesville Road at Mitchell Mill Road	Overall		37.5	20.1	D	C				
		EB	LTR	72.3	24.2	E	C	255	196	340	251
			LT	32.7	16.0	C	B	332	74	378	134
		WB	R	18.0	14.0	B	B	23	26	91	4
			LTR	15.2	17.3	B	B	191	261	966	850
SB	LTR	41.7	21.8	D	C	680	325	1,045	1,207		

\*Maximum queue extends off the SimTraffic network and may be longer than recorded

Intersection or Lane Group Operates at LOS E

Intersection or Lane Group Operates at LOS F





Capacity Analysis  
July 28, 2023

### 5.3 2028 BUILD

As part of the 2028 Build analysis, the proposed driveways were added to the network as detailed in Section 2.2. In the future year of 2028 with the proposed development in-place, the Eastbound US 401 Bypass at Young Street intersection operates at LOS F both peak hours. All other signalized intersections in the study area operate at acceptable overall LOS. Stop-controlled movements turning left onto Rolesville Road from the Rolesville High School Driveway, The Point's South Driveway, and the Kalas Falls Driveway operate at LOS F. This is attributed to high thru volumes on Rolesville Road during the peak hours. Long queues were observed at the northbound right-turn from Young Street onto the US 401 Bypass and on thru movements at the following intersections:

- Northbound Young Street at Quarry Road / The Point's North Driveway
- Southbound Rolesville Road at Mitchell Mill Road

Proposed Site Access A operates at LOS E and F in the AM and PM peak hours, respectively. Proposed Site Access B operates at LOS E in both peak hours.

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
	US 401 Bypass Eastbound at Young Street	Overall		106.7	90.3	F	F				
		EB	T	21.1	12.0	C	B	146	250	398	479
			R	127.6	129.6	F	F	1,549	1,870	340	346
		WB	L	0.1	0.2	A	A	0	0	237	347
NB	R	133.7	148.7	F	F	1,150	793	1360	1,358		
	US 401 Bypass Westbound at Young Street	Overall		19.9	7.9	B	A				
		EB	L	0.1	0.2	A	A	0	0	131	224
			T	14.1	6.9	B	A	158	120	243	199
		WB	R	0.8	1.1	A	A	0	0	190	82
SB	R	54.2	17.8	D	B	300	109	534	2,425		
	US 401 U-Turn East of Young Street	Overall		6.9	2.8	A	A				
		EB	U	1.8	0.8	A	A	0	0	678	367
		WB	T	10.4	4.8	B	A	392	90	278	175
	US 401 U-Turn West of Young Street	Overall		1.2	3.1	A	A				
		EB	T	1.5	3.7	A	A	69	233	127	618
		WB	U	0.3	0.4	A	A	0	0	267	565
	Young Street at Quarry Road / The Point North Driveway	Overall		32.7	24.9	C	C				
		EB	L	76.4	53.3	E	D	284	192	375	375
			TR	41.7	33.8	D	C	124	101	710	714
		WB	LT	60.3	57.6	E	E	63	89	316	130
			R	47.2	38.3	D	D	158	84	281	185
		NB	L	12.0	24.4	B	C	7	30	143	200
			T	40.2	23.7	D	C	967	475	2,110	2,109
		SB	R	12.3	13.0	B	B	48	24	200	200
			L	56.8	9.6	E	A	266	47	160	75
T	11.7	27.9	B	C	450	787	260	394			
	Rolesville Road at Rolesville HS Driveway / The Point South Driveway	EB	LTR	1464.3	84.4	F	F	117.5	35	295	229
		WB	LT	3304.7	101.4	F	F	480	27.5	674	49
			R	25.9	13.4	D	B	95	5	355	139
		NB	L	8.8	10.8	A	B	0	0	119	138
	Rolesville Road at Fowler Road	WB	LR	26.0	35.7	D	E	40	55	532	260
		SB	L	10.1	9.4	B	A	5	10	221	340
	Rolesville Road at Cattlett Farm / Site Access A	EB	LTR	41.1	59.4	E	F	10	12.5	50	39
		WB	LTR	34.9	34.5	D	D	42.5	27.5	167	93
		NB	L	9.1	9.9	A	A	0	0	740	350
		SB	L	9.7	9.2	A	A	2.5	7.5	93	189
	Rolesville Road at Kalas Falls Driveway A / Site Access B	EB	L	227.0	167.8	F	F	152.5	97.5	219	93
			TR	17.1	20.6	C	C	12.5	12.5	105	58
		WB	LTR	41.7	42.3	E	E	50	35	152	77
		NB	L	9.2	10.2	A	B	2.5	5	52	61
		SB	L	9.3	8.8	A	A	0	2.5	118	176
	Rolesville Road at Mitchell Mill Road	Overall		41.9	21.6	D	C				
		EB	LTR	84.0	27.6	F	C	268	238	326	281
			LT	33.2	16.3	C	B	332	74	346	148
		WB	R	18.0	14.1	B	B	23	26	0	0
			LTR	15.3	17.6	B	B	195	270	835	910
SB	LTR	47.9	23.3	D	C	724	377	1,172	1,098		

\*Maximum queue extends off the SimTraffic network and may be longer than recorded

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

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.

#### Averette Road, Young Street, and Rolesville Road Corridor Study

It is recommended that the applicant coordinate their site plan and improvements with the findings of the Averette Road, Young Street, and Rolesville Road Corridor Study to ensure consistency with future addendums to the Community Transportation Plan.

#### US 401 Bypass at Young Street

- Extend the northbound right-turn lane from 250 feet of full-width storage to 600 feet of full-width storage and appropriate taper.

The proposed development causes the intersection to degrade from LOS E to LOS F between the no-build and build scenarios at this intersection. Extending the turn-lane is intended to reduce queuing on the northbound approach. As development occurs along the Rolesville Road corridor, it is recommended that the timing of the traffic signals at the intersection be evaluated to accommodate changes in traffic.

#### Young Street at Quarry Road / The Point North Driveway

- No improvements are recommended at this intersection.

With the proposed development in-place, the intersection is projected to operate at LOS C in both peak hours.

#### Young Street at Rolesville HS Driveway / The Point South Driveway

- Monitor the intersection for the installation of a traffic signal. When signalized, the westbound approach should be striped as an exclusive left-turn lane with a shared thru/right-turn storage lane to avoid the use of split-phasing.

The proposed development increases delay on both side-street approaches at the intersection. It is recommended that the intersection be monitored for the installation of a traffic signal. If installed, the intersection is projected to operate at acceptable LOS in both peak hours.

#### Rolesville Road at Fowler Road

- No improvements are recommended at this intersection.

The proposed development increases the delay on Fowler Road in the PM peak hour causing the approach to operate at LOS E. However, traffic volumes on Fowler Road are low and it is typical for unsignalized approaches to operate with higher delays during the peak hours.



### Rolesville Road at Catlett Farm Road / Site Access A

- Construct Site Access A as a full-movement access point consisting of an exclusive left-turn lane with 100 feet of storage and a shared thru/right-turn lane. It is recommended that the internal protective stem (IPS) be maximized as the site layout permits.
- Construct an exclusive southbound left-turn lane on Rolesville Road with 100 feet of storage and appropriate taper.
- Construct an exclusive northbound left-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.
- Construct an exclusive northbound right-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.

### Rolesville Road at Kalas Falls Driveway A / Site Access B

- Construct Site Access B as a full-movement access point consisting of an exclusive left-turn lane with 100 feet of storage and a shared thru/right-turn lane. If possible, provide 175 feet of IPS.
- Construct an exclusive southbound left-turn lane on Rolesville Road with 100 feet of storage and appropriate taper.
- Construct an exclusive northbound right-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.

### Rolesville Road at Mitchell Mill Road





- No improvements are recommended at this intersection.





REZ 23-02: WOODLIEF ASSEMBLAGE TRAFFIC IMPACT ANALYSIS

Capacity Analysis  
July 28, 2023

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	
	US 401 Bypass Eastbound at Young Street	Overall	106.7	90.3	F	F					
		EB	T	21.1	12.0	C	B	146	250	432	482
			R	127.6	129.6	F	F	1,549	1,870	344	346
		WB	L	0.1	0.2	A	A	0	0	266	288
		NB	R	133.7	148.7	F	F	1,150	793	1,359	1,359
	Rolesville Road at Rolesville HS Driveway / The Point South Driveway	Overall	40.3	9.8	D	A					
		EB	LTR	43.6	52.3	D	D	49	46	114	62
			WB	L	55.6	50.5	E	D	176	28	670
		TR		80.7	52.6	F	D	346	54	355	96
		NB	L	19.0	7.4	B	A	9	7	122	101
			T	43.6	9.2	D	A	763	357	2,116	2,112
			R	24.7	6.4	C	A	229	39	450	450
		SB	L	67.7	50.3	E	D	453	61	450	80
			TR	7.8	6.5	A	A	244	477	1,739	314
	Rolesville Road at Catlett Farm / Site Access A	EB	LTR	40.3	53.6	E	F	10	12.5	61	38
		WB	L	63.1	71.3	F	F	15	12.5	108	54
			TR	20.0	18.2	C	C	17.5	10	296	94
		NB	L	9.1	9.9	A	A	0	0	59	47
		SB	L	9.7	9.2	A	A	2.5	7.5	29	57
	Rolesville Road at Kalas Falls Driveway A / Site Access B	EB	L	220.8	158.3	F	F	150	95	459	105
			TR	17.1	20.3	C	C	12.5	12.5	148	66
		WB	L	68.6	76.9	F	F	25	17.5	44	41
			TR	17.7	17.9	C	C	12.5	10	172	51
		NB	L	9.2	10.2	A	B	2.5	5	151	61
		SB	L	9.3	8.8	A	A	0	2.5	28	38

\*Maximum queue extends off the SimTraffic network and may be longer than recorded

-  Intersection or Lane Group Operates at LOS E
-  Intersection or Lane Group Operates at LOS F



Recommendations  
July 28, 2023

## 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. Intersections where no improvements are recommended are locations that do not meet the LOS Standards specified in the LDO<sup>8</sup>.

### Averette Road, Young Street, and Rolesville Road Corridor Study

It is recommended that the applicant coordinate their site plan and improvements with the findings of the Averette Road, Young Street, and Rolesville Road Corridor Study to ensure consistency with future addendums to the Community Transportation Plan.

### US 401 Bypass at Young Street

- Extend the northbound right-turn lane from 250 feet of full-width storage to 600 feet of full-width storage and appropriate taper.

### Young Street at Quarry Road / The Point North Driveway

- No improvements are recommended at this intersection.

### Young Street at Rolesville HS Driveway / The Point South Driveway

- Monitor the intersection for the installation of a traffic signal. When signalized, the westbound approach should be striped as an exclusive left-turn lane with a shared thru/right-turn storage lane to avoid the use of split-phasing.

### Rolesville Road at Fowler Road

- No improvements are recommended at this intersection.

### Rolesville Road at Catlett Farm Road / Site Access A

- Construct Site Access A as a full-movement access point consisting of an exclusive left-turn lane with 100 feet of storage and a shared thru/right-turn lane. It is recommended that the internal protective stem (IPS) be maximized as the site layout permits.
- Construct an exclusive southbound left-turn lane on Rolesville Road with 100 feet of storage and appropriate taper.
- Construct an exclusive northbound left-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.
- Construct an exclusive northbound right-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.



Recommendations  
July 28, 2023

### Rolesville Road at Kalas Falls Driveway A / Site Access B

- Construct Site Access B as a full-movement access point consisting of an exclusive left-turn lane with 100 feet of storage and a shared thru/right-turn lane. If possible, provide 175 feet of IPS.
- Construct an exclusive southbound left-turn lane on Rolesville Road with 100 feet of storage and appropriate taper.
- Construct an exclusive northbound right-turn lane on Rolesville Road with 50 feet of storage and appropriate taper.

### Rolesville Road at Mitchell Mill Road

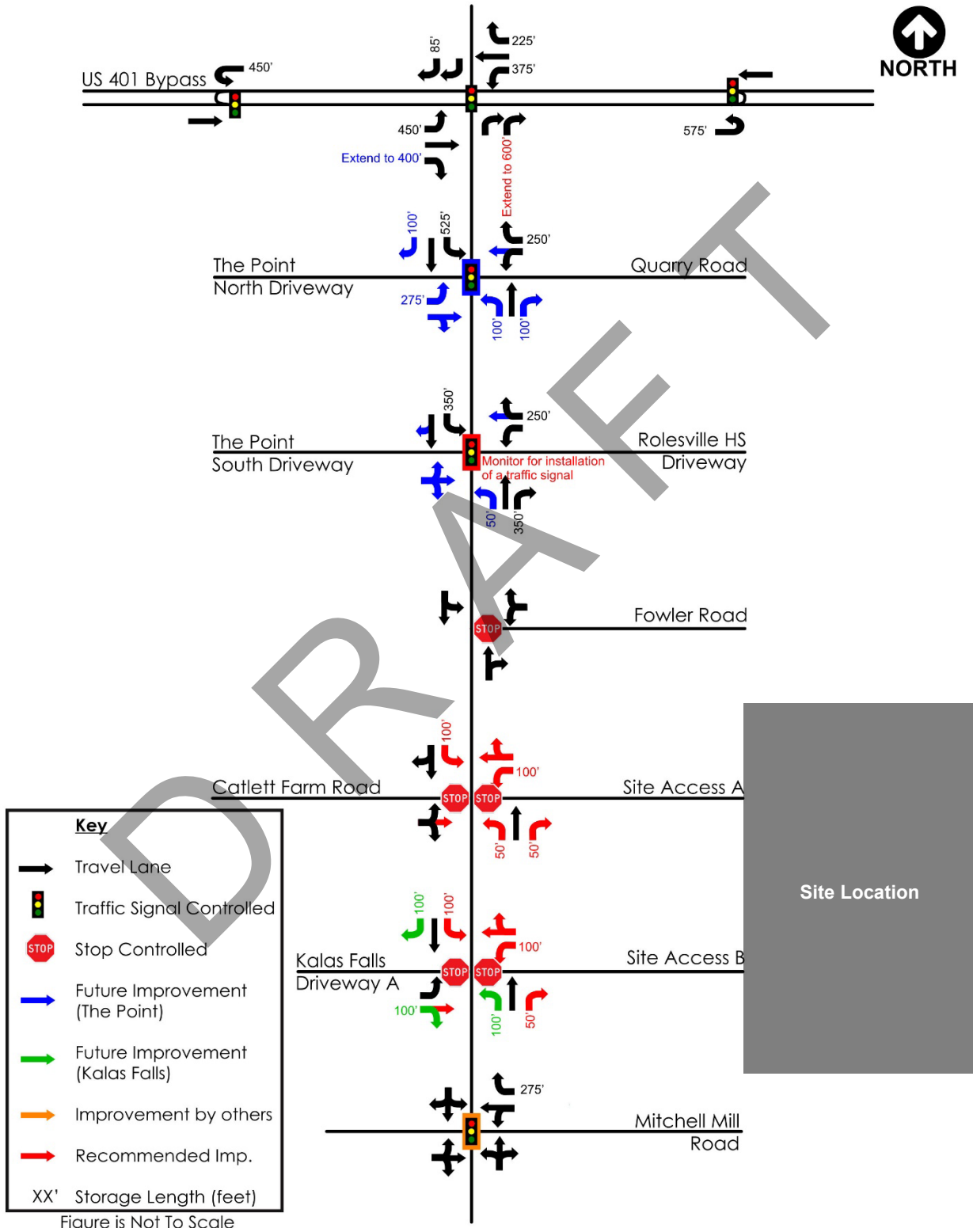
- No improvements are recommended at this intersection.

DRAFT



Recommendations  
 July 28, 2023

Figure 12: Recommended Improvements





References

July 28, 2023

## 7.0 REFERENCES

<sup>1</sup> **NCDOT Functional Classification Map**,

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

<sup>2</sup> **2020 NCDOT Average Daily Traffic Volumes**,

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

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

<sup>4</sup> **NCDOT Trip Generation Rate Equation Recommendations**,

<https://connect.ncdot.gov/resources/safety/Congestion%20Mngmt%20and%20Signing/DRAFT%20-%20Trip%20Generation%20Rate%20Eqn.xlsm>

<sup>5</sup> **Highway Capacity Manual 6<sup>th</sup> Edition: A Guide for Multimodal Mobility Analysis**. Washington D.C.: Transportation Research Board, 2016.

<sup>6</sup> **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>

<sup>7</sup> **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>

<sup>8</sup> **Land Development Ordinance**. Town of Rolesville, June 1, 2021,

<https://www.rolesvillenc.gov/code-ordinances>

## 8.0 APPENDIX

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

