

Revised Traffic Impact Analysis

Young Street PUD Rolesville, NC

Prepared for:
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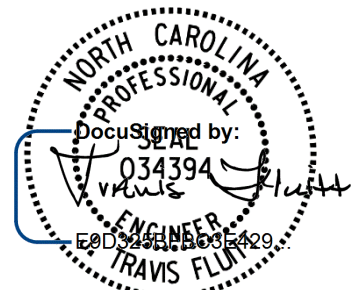
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Young Street PUD
Rolesville, North Carolina

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Executive Summary

Kimley-Horn and Associates, Inc. has revised the original Traffic Impact Analysis dated April 4, 2019 for the proposed Young Street PUD to address comments provided by the Town of Rolesville and the North Carolina Department of Transportation (NCDOT). The project will be located along both sides of the US 401 Bypass west of Young Street in Rolesville, North Carolina. The portion of the property north of US 401 Bypass is currently vacant and is adjacent to residential development. The portion of the property south of US 401 Bypass has one single-family home, and adjacent uses include Rolesville High School and some residential development. This project is an update to the Shearon/Byrum/Williams PUD, which included 250 townhomes (with approximately 210 of those located north of the US 401 Bypass), 650 single-family homes, and 10.82 acres of commercial space. The updated PUD will allow for up to 320 townhomes, 621 single-family homes (with approximately 96 of those located north of the US 401 Bypass), and 12.28 acres of commercial space.

Since there are no plans to develop the commercial portion of the site at this time, analyses were performed with and without the commercial portion of the development. For this analysis it was assumed that the commercial space could be developed at 10,000 square feet per acre.

The single-family homes north of the US 401 Bypass are proposed to be accessed via the extension of Genovesa Drive. Development south of the US 401 Bypass is proposed to be accessed via site driveways on Young Street aligning with Quarry Road and the Rolesville High School driveway with a third generally centered between those two driveways. Build-out of the development is envisioned in 2025.

At each of the study intersections, the adjacent street AM (6:00 to 9:00 AM) and PM (4:00 to 6:00 PM) peak hours were analyzed. Additionally, in order to determine the impacts of site traffic during the school PM peak hour (assumed to occur between 1:00 to 4:00 PM based on school hours at Rolesville High School), analyses were performed at the intersections of Young Street at Quarry Road and Young Street at the Rolesville High School Driveway for that peak as well. The AM peak hour of the school aligns with the AM peak hour of the adjacent street traffic.

This report presents trip generation, distribution, traffic analyses, and recommendations for transportation improvements required to meet anticipated traffic demands in conjunction with the development. The traffic conditions studied include the existing (2019) traffic condition, the projected (2025) background traffic condition, the projected (2025) residential build-out traffic condition, the projected (2025) commercial build-out traffic condition (which includes the total development), and the projected (2025) commercial build-out of the currently-approved PUD.

Per discussions with the Town of Rolesville, trip generation calculations for both build-out scenarios separated out development proposed to the north and south of the US 401 Bypass. As shown in **Table ES-1** below, the currently-approved PUD has the potential to generate 10,098 new trips during a typical weekday with 777 new trips during the AM peak hour, 787 new trips during the school PM peak hour, and 958 new trips during the PM peak hour.

Table ES-1 – Currently-Approved PUD ITE Traffic Generation (Vehicles)											
Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		School PM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out	In	Out
Development North of US 401 Bypass											
220	Multifamily Housing – Low-Rise	210	d.u.	774	774	22	75	54	32	72	42
North Side Total Net New External Trips				774	774	22	75	54	32	72	42
Development South of US 401 Bypass											
220	Single Family Detached Housing	650	d.u.	2,910	2,910	117	349	300	177	386	227
220	Multifamily Housing – Low-Rise	40	d.u.	131	131	5	15	12	8	16	10
820	Shopping Center	108,200	s.f.	3,172	3,172	128	78	276	300	276	300
Internal Capture (South Side Only)				1,062	1,062	6	6	106	106	106	106
Pass-by Reduction (South Side Only)				876	876	0	0	84	75	84	75
South Side Total Net New External Trips				4,275	4,275	244	436	398	303	488	356
Total Net New External Trips – Current PUD				5,049	5,049	266	511	452	335	560	398

As shown in Table ES-2 below, the northern and southern residential components have the potential to generate 8,162 new trips during a typical weekday with 595 new trips during the AM peak hour, 589 new trips during the school PM peak hour, and 763 new trips during the PM peak hour.

Table ES-2 – Residential Build-out ITE Traffic Generation (Vehicles)											
Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		School PM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out	In	Out
Development North of US 401 Bypass											
220	Single Family Detached Housing	96	d.u.	501	501	18	55	48	28	62	36
North Side Total Net New External Trips				501	501	18	55	48	28	62	36
Development South of US 401 Bypass											
220	Single Family Detached Housing	525	d.u.	2,391	2,391	95	283	244	144	314	185
220	Multifamily Housing – Low-Rise	320	d.u.	1,189	1,189	33	111	79	46	105	61
South Side Total Net New External Trips				3,580	3,580	128	394	323	190	419	246
Total New External Trips – Residential Phase				4,081	4,081	146	449	371	218	481	282

As shown in **Table ES-3** below, the commercial build-out of the site has the potential to generate 10,838 new trips during a typical weekday with 794 new trips during the AM peak hour, 814 new trips during the school PM peak hour, and 988 new trips during the PM peak hour.

Table ES-3 – Commercial Build-out ITE Traffic Generation (Vehicles)											
Land Use Code	Land Use	Intensity		Daily		AM Peak Hour		School PM Peak Hour		PM Peak Hour	
				In	Out	In	Out	In	Out	In	Out
Development North of US 401 Bypass											
220	Single Family Detached Housing	96	d.u.	501	501	18	55	48	28	62	36
North Side Total Net New External Trips				501	501	18	55	48	28	62	36
Development South of US 401 Bypass											
220	Single Family Detached Housing	525	d.u.	2,391	2,391	95	283	244	144	314	185
220	Multifamily Housing – Low-Rise	320	d.u.	1,189	1,189	33	111	79	46	105	61
820	Shopping Center	122,800	s.f.	3,457	3,457	132	81	304	329	304	329
Internal Capture (South Side Only)				1,158	1,158	7	7	116	116	116	116
Pass-by Reduction (South Side Only)				961	961	0	0	93	83	93	83
South Side Total Net New External Trips				4,918	4,918	253	468	418	320	514	376
Total Net New External Trips – Commercial Build-out				5,419	5,419	271	523	466	348	576	412

Based on these trip generation calculations, the proposed PUD is expected to only generate approximately 740 more net new daily trips, 17 additional AM peak hour trips, 27 additional school PM peak hour trips, and 30 additional PM peak hour trips than the currently-approved PUD.

Capacity analyses were performed using Synchro Version 10 software. **Table ES-4** summarizes the operation of the study intersections for the AM and PM peak hour traffic conditions. For reference, US 401 Bypass was analyzed as the east-west roadway for this analysis given its alignment through the study area.

Table ES-4 Level-of-Service Summary		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
US 401 Bypass Westbound at Young Street (Signalized)		
Existing (2019) Traffic	B (10.7)	A (3.0)
Background (2025) Traffic	B (12.9)	A (3.2)
Current PUD Build-out (2025) Traffic with Signal Timing Improvements	B (15.4)	A (6.5)
Residential Build-out (2025) Traffic with Signal Timing Improvements	B (14.4)	A (6.3)
Commercial Build-out (2025) Traffic with Signal Timing Improvements	B (15.2)	A (6.6)
US 401 Bypass Eastbound at Young Street (Signalized)		
Existing (2019) Traffic	A (2.5)	A (4.2)
Background (2025) Traffic	A (2.8)	A (6.6)
Current PUD Build-out (2025) Traffic with Signal Timing Improvements	A (7.6)	B (13.0)
Residential Build-out (2025) Traffic with Signal Timing Improvements	A (7.1)	B (11.2)
Commercial Build-out (2025) Traffic with Signal Timing Improvements	A (7.9)	B (13.3)
US 401 Bypass at U-Turn East of Young Street (Signalized)		
Existing (2019) Traffic	A (4.8)	A (3.6)
Background (2025) Traffic	A (4.7)	A (3.8)
Current PUD Build-out (2025) Traffic with Signal Timing Improvements	A (3.7)	A (1.6)
Residential Build-out (2025) Traffic with Signal Timing Improvements	A (4.2)	A (1.8)
Commercial Build-out (2025) Traffic with Signal Timing Improvements	A (3.8)	A (1.6)
US 401 Bypass at U-Turn West of Young Street (Signalized)		
Existing (2019) Traffic	A (4.2)	A (5.0)
Background (2025) Traffic	A (4.3)	A (4.9)
Current PUD Build-out (2025) Traffic with Signal Timing Improvements	A (1.7)	A (3.3)
Residential Build-out (2025) Traffic with Signal Timing Improvements	A (1.5)	A (3.1)
Commercial Build-out (2025) Traffic with Signal Timing Improvements	A (1.8)	A (3.3)

Table ES-4 (cont.) Level-of-Service Summary		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
Young Street at Virginia Water Drive (Unsignalized)		
Existing (2019) Traffic	EB – C (15.0) NBL – A (8.5)	EB – B (12.8) NBL – A (8.1)
Background (2025) Traffic	EB – C (16.4) NBL – A (8.6)	EB – B (14.4) NBL – A (8.4)
Current PUD Build-out (2025) Traffic	EB – C (22.1) NBL – A (8.8)	EB – C (18.4) NBL – A (8.8)
Residential Build-out (2025) Traffic	EB – C (20.2) NBL – A (8.7)	EB – C (17.6) NBL – A (8.7)
Commercial Build-out (2025) Traffic	EB – C (21.1) NBL – A (8.8)	EB – C (18.3) NBL – A (8.8)
Virginia Water Drive at Genovesa Drive (Unsignalized)		
Existing (2019) Traffic	NB – A (9.2) SB – A (9.2) EBL – A (7.3) WBL – A (7.3)	NB – A (9.3) SB – A (9.1) EBL – A (7.3) WBL – A (7.3)
Background (2025) Traffic	NB – A (9.1) SB – A (9.1) EBL – A (7.3) WBL – A (7.3)	NB – A (9.3) SB – A (9.2) EBL – A (7.4) WBL – A (7.3)
Current PUD Build-out (2025) Traffic	NB – A (9.3) SB – A (9.4) EBL – A (7.3) WBL – A (7.4)	NB – A (9.9) SB – B (10.0) EBL – A (7.4) WBL – A (7.5)
Residential Build-out (2025) Traffic	NB – A (9.2) SB – A (9.3) EBL – A (7.3) WBL – A (7.4)	NB – A (9.7) SB – A (9.8) EBL – A (7.4) WBL – A (7.5)
Commercial Build-out (2025) Traffic	NB – A (9.2) SB – A (9.3) EBL – A (7.3) WBL – A (7.4)	NB – A (9.7) SB – A (9.8) EBL – A (7.4) WBL – A (7.5)
Young Street at Century Farm Road (Unsignalized)		
Existing (2019) Traffic	WB – D (26.5) SBL – A (9.0)	WB – B (13.8) SBL – A (8.1)
Background (2025) Traffic	WB – D (26.1) SBL – A (9.3)	WB – C (18.9) SBL – A (8.5)
Current PUD Build-out (2025) Traffic	WB – E (47.3) SBL – B (10.5)	WB – E (39.2) SBL – A (9.3)
Residential Build-out (2025) Traffic	WB – E (40.3) SBL – B (10.4)	WB – D (33.3) SBL – A (9.1)
Commercial Build-out (2025) Traffic	WB – E (48.4) SBL – B (10.6)	WB – E (40.9) SBL – A (9.4)

Table ES-4 (cont.) Level-of-Service Summary			
Condition	AM Peak Hour LOS (Delay)	School PM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
Young Street at Quarry Road/Northern Site Driveway			
Existing (2019) Traffic	WB – D (30.3) SBL – A (9.7)	WB – C (18.5) SBL – A (9.0)	WB – B (12.9) SBL – A (8.2)
Background (2025) Traffic	WB – F (131.7) SBL – B (12.0)	WB – E (38.0) SBL – A (9.9)	WB – C (21.4) SBL – A (8.8)
Current PUD Build-out (2025) Traffic with Improvements – <i>Signalized</i>	D (35.2)	C (25.6)	B (17.6)
Residential Build-out (2025) Traffic with Improvements – <i>Signalized</i>	D (40.5)	C (23.9)	B (17.4)
Commercial Build-out (2025) Traffic with Improvements – <i>Signalized</i>	D (39.7)	C (23.4)	B (17.8)
Young Street at Rolesville High School Driveway/Southern Site Driveway (Unsignalized)			
Existing (2019) Traffic	WB – F (155.8) SBL – A (9.7)	WB – C (19.6) SBL – A (8.2)	WB – B (11.2) SBL – A (8.0)
Background (2025) Traffic	WB – F (446.0) NBL – B (11.8)	WB – F (64.9) SBL – A (8.7)	WB – B (13.5) SBL – A (8.4)
Current PUD Build-out (2025) Traffic with Improvements	EB – F (>1000) WB – F (>1000) NBL – A (9.2) SBL – B (12.4)	EB – F (425.5) WB – F (323.8) NBL – A (9.8) SBL – A (9.2)	EB – E (35.8) WB – C (19.1) NBL – A (8.9) SBL – A (8.6)
Residential Build-out (2025) Traffic with Improvements	EB – F (>1000) WB – F (>1000) NBL – A (9.1) SBL – B (12.1)	EB – F (226.9) WB – F (247.1) NBL – A (9.4) SBL – A (9.1)	EB – D (30.7) WB – C (18.0) NBL – A (8.8) SBL – A (8.6)
Commercial Build-out (2025) Traffic with Improvements	EB – F (>1000) WB – F (>1000) NBL – A (9.3) SBL – B (12.4)	EB – F (550.7) WB – F (343.1) NBL – A (9.9) SBL – A (9.2)	EB – E (36.1) WB – C (19.4) NBL – A (9.0) SBL – A (8.6)

Table ES-4 (cont.) Level-of-Service Summary		
Condition	AM Peak Hour LOS (Delay)	PM Peak Hour LOS (Delay)
Rolesville Road at Mitchell Mill Road		
Existing (2019) Traffic – <i>All-Way Stop</i>	C (16.2)	B (10.6)
Background (2025) Traffic – <i>All-Way Stop</i>	C (22.0)	B (13.1)
Current PUD Build-out (2025) Traffic – <i>Signalized</i>	B (18.9)	B (11.7)
Residential Build-out (2025) Traffic – <i>Signalized</i>	B (18.2)	B (11.4)
Commercial Build-out (2025) Traffic – <i>Signalized</i>	B (19.2)	B (13.2)
Young Street at Central Site Driveway (Unsignalized)		
Current PUD Build-out (2025) Traffic with Improvements	EB – F (52.3) NBL – B (10.0)	EB – D (29.9) NBL – B (10.0)
Residential Build-out (2025) Traffic with Improvements	EB – E (41.4) NBL – A (9.7)	EB – C (24.0) NBL – A (9.8)
Commercial Build-out (2025) Traffic with Improvements	EB – F (58.2) NBL – B (10.0)	EB – D (31.4) NBL – B (10.1)

Residential Build-out

The following improvements are recommended to be performed to accommodate projected site traffic volumes at build-out of the residential portion of the development:

US 401 Bypass:

- Coordinate the traffic signals at the intersections of US 401 at Young Street and the Superstreet U-turns

Young Street at Quarry Road/North Site Driveway:

- Construct a northbound left-turn lane on Young Street with 100 feet of storage and appropriate tapers
- Construct a southbound right-turn lane on Young Street with 100 feet of storage and appropriate tapers
- Restripe the existing westbound left-turn lane on Quarry Road to a shared left/through lane
- Provide an exclusive left-turn lane with 275 feet of storage and appropriate tapers and a shared through/right lane on the North Site Driveway
- Install a traffic signal when warranted

Young Street at Central Site Driveway:

- Construct a northbound left-turn lane on Young Street with 100 feet of storage and appropriate tapers
- Construct a southbound right-turn lane on Young Street with 100 feet of storage and appropriate tapers

- Provide exclusive left and right-turn lanes on the Central Site Driveway with 125 feet of storage and appropriate tapers for the left-turn lane

Young Street at Rolesville High School Driveway/South Site Driveway:

- Construct a northbound left-turn lane on Young Street with 50 feet of storage and appropriate tapers
- Provide one egress lane on the South Site Driveway

Rolesville Road at Mitchell Mill Road:

- Install a traffic signal when warranted

Analyses indicate that with the recommended improvements in place, all of the study intersections except for Young Street at Century Farm Road and Young Street at Rolesville High School Driveway/South Site Driveway are expected to operate at an acceptable LOS at build-out of the residential-only phase of the development.

Analyses indicate that the intersection of Young Street at Century Farm Road is expected to operate with long delays on the minor street approach (Century Farm Road) in the AM peak hour at project build-out. However, it is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours while the majority of the traffic moving through the intersection on the major street experiences little or no delay. SimTraffic traffic simulations indicate that no queuing issues are expected at this intersection.

Analyses indicate that the intersection of Young Street at the Rolesville High School Driveway/South Site Driveway is expected to operate with long delays on the minor street approach (Rolesville High School Driveway) in the AM peak hour and school PM peak hour with or without the proposed project in place in the study year 2025. SimTraffic traffic simulations also indicate the possibility of long queues on the westbound left-turn movement at this intersection in the AM peak hour and school PM peak hour. However, it is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, while the majority of the traffic moving through the intersection on the major street experiences little or no delay. This intersection is not expected to meet 4-hour or 8-hour MUTCD traffic signal warrants.

Commercial Build-out

The following additional improvements are recommended to be performed in addition to those recommended above for the residential phase to accommodate projected site traffic volumes when the retail portion of the site is developed:

US 401 Bypass Eastbound at Young Street:

- Extend the storage of the existing eastbound right-turn lane on US 401 Bypass by approximately 175 feet to provide 400 feet of storage and appropriate tapers

Young Street at Quarry Road/North Site Driveway:

- Construct a northbound right-turn lane on Young Street with 100 feet of storage and appropriate tapers
- Modify the traffic signal to accommodate the additional laneage

Analyses indicate that with the recommended improvements in place, all of the study intersections except for Young Street at Century Farm Road, Young Street at the Central Site Driveway, and Young Street at Rolesville High School Driveway/South Site Driveway are expected to operate at acceptable LOS at commercial build-out of the development.

Analyses indicate that the intersection of Young Street at Century Farm Road is expected to operate with long delays on the minor street approach (Century Farm Road) in the AM peak hour at project build-out. It is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, while the majority of the traffic moving through the intersection on the major street experiences little or no delay. SimTraffic traffic simulations indicate that short queues are likely on the minor street approach in the AM peak hour at commercial build-out.

Analyses indicate that the intersection of Young Street at the Central Site Driveway is expected to operate with long delays on the minor street approach (Central Site Driveway) in the AM peak hour in the commercial build-out traffic condition. It is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, while the majority of the traffic moving through the intersection on the major street experiences little or no delay. SimTraffic traffic simulations indicate the possibility of long queues on the eastbound left-turn movement at this intersection in the AM peak hour in the commercial build-out condition.

Analyses indicate that the intersection of Young Street at the Rolesville High School Driveway/South Site Driveway is expected to operate with long delays on the minor street approach (Rolesville High School Driveway) in the AM peak hour and school PM peak hour with or without the proposed project in place in the study year 2025. SimTraffic traffic simulations also indicate the possibility of long queues on the westbound left-turn movement at this intersection in the AM peak hour and school PM peak hour. However, it is typical for stop sign controlled side streets and driveways intersecting major streets to experience long delays during peak hours, while the majority of the traffic moving through the intersection on the major street experiences little or no delay. This intersection is not expected to meet 4-hour or 8-hour MUTCD traffic signal warrants.

As shown in the analysis, the impact of site traffic associated with the commercial build-out of this proposed PUD is generally consistent with the currently-approved PUD for the site. The proposed PUD is expected to generate no more than 50 additional peak hour trips in each of the studied peak hours compared to the approved PUD, and delays at commercial build-out of both plans are generally consistent at each of the study intersections.

The recommended laneage for the development is shown on **Figure ES-1**.

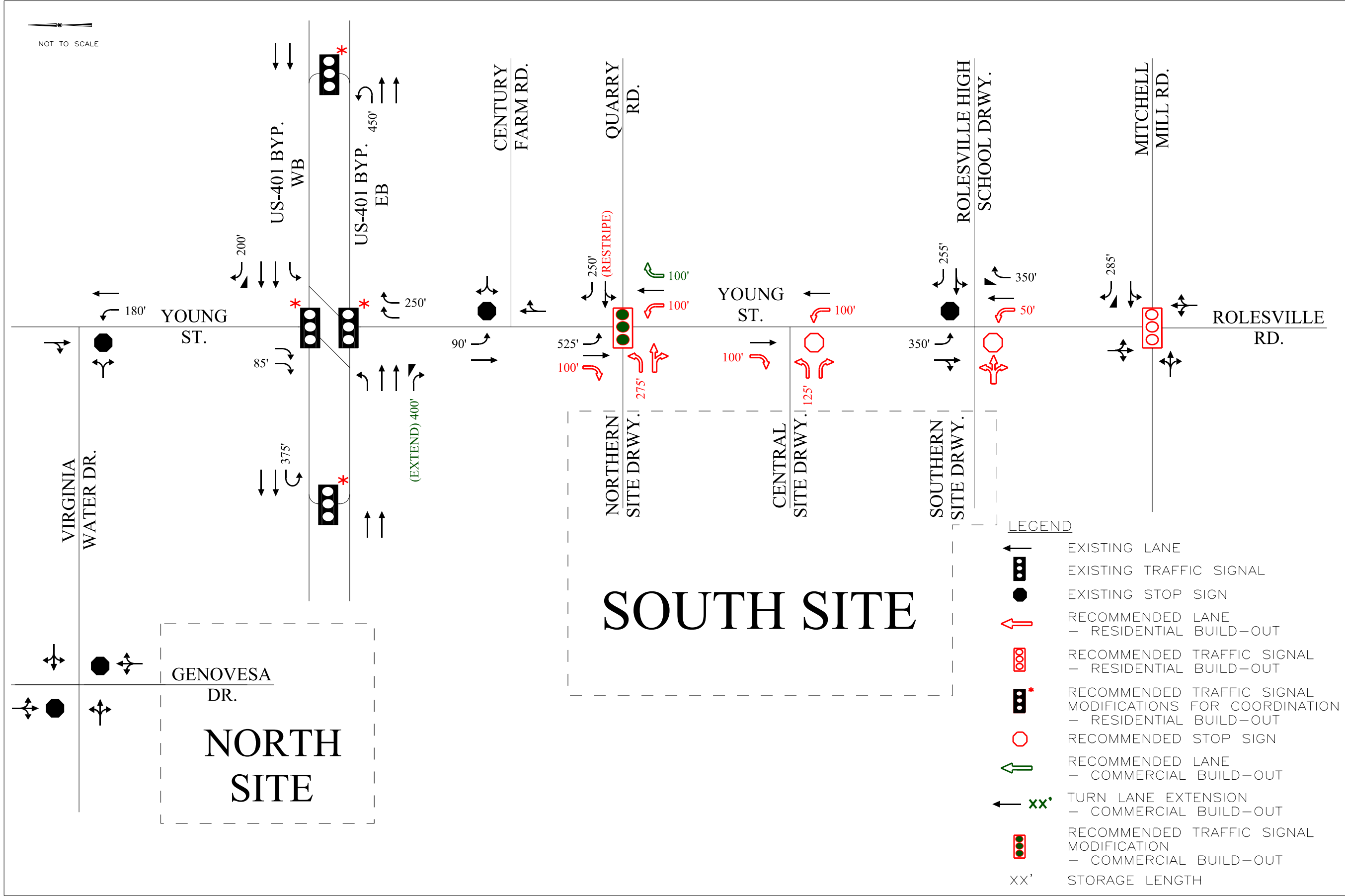


FIGURE
ES-1

RECOMMENDED
ROADWAY LANEAGE

YOUNG STREET PUD
ROLESVILLE, NC
TRAFFIC IMPACT ANALYSIS



THIS DOCUMENT, TOGETHER WITH THE CONCEPTS AND DESIGNS PRESENTED HEREIN, AS AN INSTRUMENT OF SERVICE, IS INTENDED ONLY FOR THE SPECIFIC PURPOSE AND CLIENT FOR WHICH IT WAS PREPARED. REUSE OF AND IMPROPER RELIANCE ON THIS DOCUMENT WITHOUT WRITTEN AUTHORIZATION AND ADAPTATION BY KIMLEY-HORN AND ASSOCIATES, INC. SHALL BE WITHOUT LIABILITY TO KIMLEY-HORN AND ASSOCIATES, INC.