

TECHNICAL APPENDIX

APPENDIX A

SCOPING DOCUMENTATION

RAMEY KEMP ASSOCIATES

TOGETHER WE ARE LIMITLESS



T 919 872 5115

5808 Faringdon Pl,
Raleigh, NC 27609

December 16, 2022

Meredith Gruber, PLA, AICP
Town of Rolesville - Planning Director
PO Box 250
502 Southtown Circle
Rolesville, NC 27571
meredith.gruber@rolesville.nc.gov
[Sent via Email]

Reference: 1216 Rolesville Road
Rolesville, North Carolina

Subject: Memorandum of Understanding for TIA Report

Dear Ms. Gruber:

The following is a Memorandum of Understanding (MOU) outlining the proposed scope of work and assumptions related to the Traffic Impact Analysis (TIA) for the proposed 1216 Rolesville Road development. This MOU reflects the assumptions outlined during the initial coordination between Ramey Kemp Associates (RKA), the Town of Rolesville (Town), and the North Carolina Department of Transportation (NCDOT).

The proposed development is to be located on the west side of Rolesville Road across from Sunset Manor Drive in Rolesville, North Carolina. The development is expected to consist of 68 townhomes and 30,000 sf of commercial space. It is anticipated to be built out by 2028. Access to the proposed development is expected to be provided via two (2) full-movement driveway connections to Rolesville Road: one aligning with Sunset Manor Drive and one located approximately 275 feet (ft) to the south. Refer to the attached site location map and preliminary site plan.

Study Area

The study area is proposed to consist of the following existing intersections:

- E Young Street (SR 1003) and US 401 (Signalized) *includes u-turn locations north and south*
- E Young Street (SR 1003) and Quarry Road (Unsignalized)
- E Young Street (SR 1003) and Rolesville High School Driveway (Unsignalized)
- Rolesville Road (SR 1003) and Sunset Manor Drive (Unsignalized)
- Rolesville Road (SR 1003) and Fowler Road (Unsignalized)



Existing Traffic Volumes

Existing peak hour traffic volumes will be determined based on traffic counts conducted at the study intersections below, in September 2022 during typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods, while schools were in session:

- E Young Street (SR 1003) and US 401 (*u-turn locations will be counted in January 2022*)
- E Young Street (SR 1003) and Quarry Road
- E Young Street (SR 1003) and Rolesville High School Driveway
- Rolesville Road (SR 1003) and Sunset Manor Drive
- Rolesville Road (SR 1003) and Fowler Road

Traffic volumes will be balanced, where appropriate.

Background Traffic Volumes

It is proposed that background traffic volumes be determined by projecting 2022 existing traffic volumes to the year 2028 using a 2% annual growth rate. If it is determined that there are nearby approved developments to consider, then trips from those developments will be added to the projected 2028 traffic volumes to determine background 2028 traffic volumes.

Future Roadway Improvements

There are no future roadway improvements within the study area to consider under future traffic conditions.

Trip Generation

Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 11th Edition. Refer to Table 1 on the following page for a summary of the proposed site trip generation for full buildout of the proposed development.

Table 1: Trip Generation Summary

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	Weekday AM Peak Hour Trips (vph)			Weekday PM Peak Hour Trips (vph)		
			Enter	Exit	Total	Enter	Exit	Total
Single-Family Attached Housing (215)	68 DU	468	7	23	30	22	15	37
Retail (<40 KSF) (822)	30 KSF	1,496	36	23	59	85	85	170
Total Trips		1,964	43	46	89	107	100	207
<i>Internal Capture (15% PM)*</i>			-	-	-	-15	-15	-30
Total External Trips			43	46	89	92	85	177
<i>Pass-By Trips: Shopping Center (34% PM)</i>			-	-	-	-26	-26	-52
Total Primary Trips			43	46	89	66	59	125

*Utilizing methodology contained in the NCHRP Report 684.

It is estimated that the proposed development will generate approximately 1,964 site trips on the roadway network during a typical 24-hour weekday period. Of the daily traffic volume, it is anticipated that 89 trips (43 entering and 46 exiting) will occur during the weekday AM peak hour and 207 trips (107 entering and 100 exiting) will occur during the weekday PM peak hour.

Internal capture of trips between the retail and residential land uses was considered in this study. Internal capture is the consideration for trips that will be made within the site between different land uses, so the vehicle technically never leaves the internal site but can still be considered as a trip to that specific land use. Based on NCHRP Report 684 methodology, a weekday PM peak hour internal capture rate of 15% was applied to the trips generated from the development. The internal capture reductions are expected to account for approximately 30 trips (15 entering and 15 exiting) during the weekday PM peak hour. Refer to the attached NCHRP internal capture reports for reference.

Pass-by trips will also be taken into consideration in this study. Pass-by trips are made by the traffic already using the adjacent roadway, entering the site as an intermediate stop on their way to another destination. Pass-by percentages are applied to site trips after adjustments for internal capture. Pass-by trips are expected to account for approximately 52 trips (26 entering and 26 exiting) during the weekday PM peak hour. It should be noted that the pass-by trips were balanced, as it is likely that these trips would enter and exit in the same hour.

The total primary trips are the calculated site trips after the reduction for internal capture and pass-by trips. Primary site traffic is expected to generate approximately 89 trips (43 entering and 46 exiting) during the weekday AM peak hour and 125 trips (66 entering and 59 exiting) during the weekday PM peak hour.



Trip Distribution and Assignment

Site trips are distributed based on the locations of existing traffic patterns, population centers adjacent to the study area, and engineering judgment. A summary of the overall distributions is below.

Residential

- 35% to/from the south via Rolesville Road
- 30% to/from the west via US 401 Bypass
- 15% to/from the east via US 401 Bypass
- 10% to/from the east via Fowler Road
- 10% to/from the north via E Young Street

Commercial

- 25% to/from the south via Rolesville Road
- 20% to/from the east via US 401 Bypass
- 20% to/from the north via E Young Street
- 15% to/from the west via US 401 Bypass
- 10% to/from the east via Fowler Road
- 10% to/from the east via Quarry Road

Analysis Scenarios

All capacity analyses will be performed utilizing Synchro (Version 11). All study intersections will be analyzed during the weekday AM and PM peak hours under the following proposed traffic scenarios:

- 2022 Existing Traffic Conditions
- 2028 No-Build Traffic Conditions
- 2028 Build Traffic Conditions

Report

The TIA report will be prepared based on the Town and NCDOT requirements.

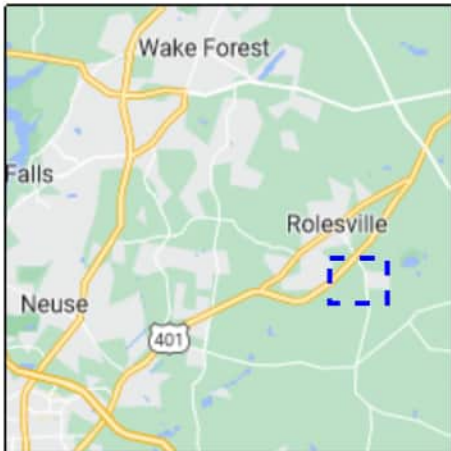
If you find this memorandum of understanding acceptable, please let me know so that we may include it in the TIA report. If you have any questions or concerns, please do not hesitate to contact me.

Sincerely,
Ramey Kemp Associates,




Jessica McClure

Jessica McClure, P.E.
State Traffic Engineering Lead

Attachments: Site Location Map
 Site Plan
 NCHRP 684 Internal Capture Reports



LEGEND

-  Existing Study Intersection
-  Proposed Site Access
-  Study Area



1216 Rolesville Road
Rolesville, NC

Site Location Map

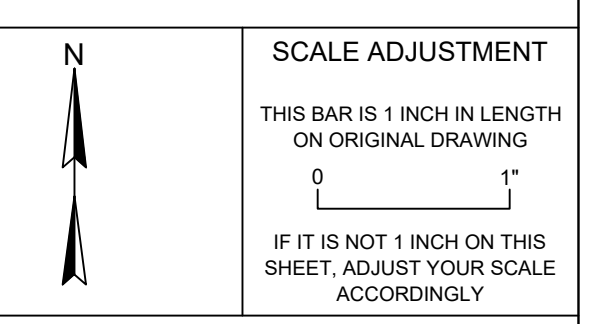
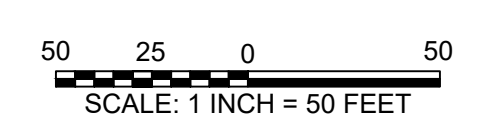
Scale: Not to Scale

SUMMARY INFORMATION	
DEVELOPMENT NAME: ROLESVILLE ROAD MIXED USE	
SITE ADDRESS: 1216 ROLESVILLE RD	
PIN NUMBER(S): 1768-33-7689	
TOTAL ACREAGE: 11.8 AC	
EXISTING USE: VACANT	
PROPOSED USE: MIXED USE	
JURISDICTION: TOWN OF ROLESVILLE	
CURRENT ZONING DISTRICT: RL	
PROPOSED ZONING DISTRICT: NEIGHBORHOOD CENTER (NC)	
PROPOSED COMMERCIAL AREA: 30,000 SF	
PROPOSED MAX. BLDG. HEIGHT: 35' (TWO STORIES)	
SETBACKS (MIN/MAX): FRONT: 15'/100' SIDE: 10'/50' REAR: 10'/50'	
PARKING REQUIREMENTS: RETAIL SALES AND SERVICE: 2.5 SPACE / 1,000 SF PARKING REQUIRED: 2.5 SPACE / 1,000 SF * 30,000 SF = 75 SPACES PARKING PROVIDED: 76 SPACES (2 ADA ACCESSIBLE)	
PROPOSED TOWNHOME UNITS: 68	
MAX. DENSITY: 8 UNITS/AC	
PROPOSED DENSITY: 5.8 UNITS/AC	
PROPOSED MAX. BLDG. HEIGHT: 35' (TWO STORIES)	
SETBACKS (MIN/MAX): FRONT: 15'/100' SIDE: 10'/50' (MIN. 30' BETWEEN STRUCTURES) REAR: 10'/50'	
PARKING REQUIREMENTS: DWELLING MULTIPLE FAMILY PARKING: 2.0 SPACES PER UNIT PLUS 0.25 GUEST SPACE PER UNIT PARKING REQUIRED: 2.0 SPACES * 68 UNITS + 0.25 SPACES * 68 UNITS = 153 SPACES PARKING PROVIDED: 2 SPACES PER DRIVEWAY + 21 GUEST = 157 SPACES MAIL KIOSK PARKING PROVIDED: 2 SPACES FOR MAIL KIOSK (1 IS ADA ACCESSIBLE) TOTAL PARKING PROVIDED: 157 SPACES + 2 MAIL KIOSK SPACES = 159 SPACES (1 IS ADA ACCESSIBLE)	
REQUIRED OPEN SPACE: 1.77 AC (15%)	
PROPOSED OPEN SPACE: 3.87 AC (32.8%)	
USE BREAKDOWN: RIGHT-OF-WAY: 2.62 AC (22.2%) RESIDENTIAL LOTS: 3.72 AC (31.5%) COMMERCIAL AREA: 1.26 AC (10.6%) COMMON AREAS & OPEN SPACE: 4.20 AC (35.6%)	
ENGINEER: FLM ENGINEERING, INC. PO BOX 91727 RALEIGH, NC 27675 919.610.1051	

REVISION HISTORY			
REV #	DESCRIPTION	DATE	BY
1	TOR COMMENTS	5/2/2022	FLM
2	ELIMINATE WESTERN STUB ROAD	7/12/2022	FLM

ORIGINAL PLAN SIZE: 24" X 36"

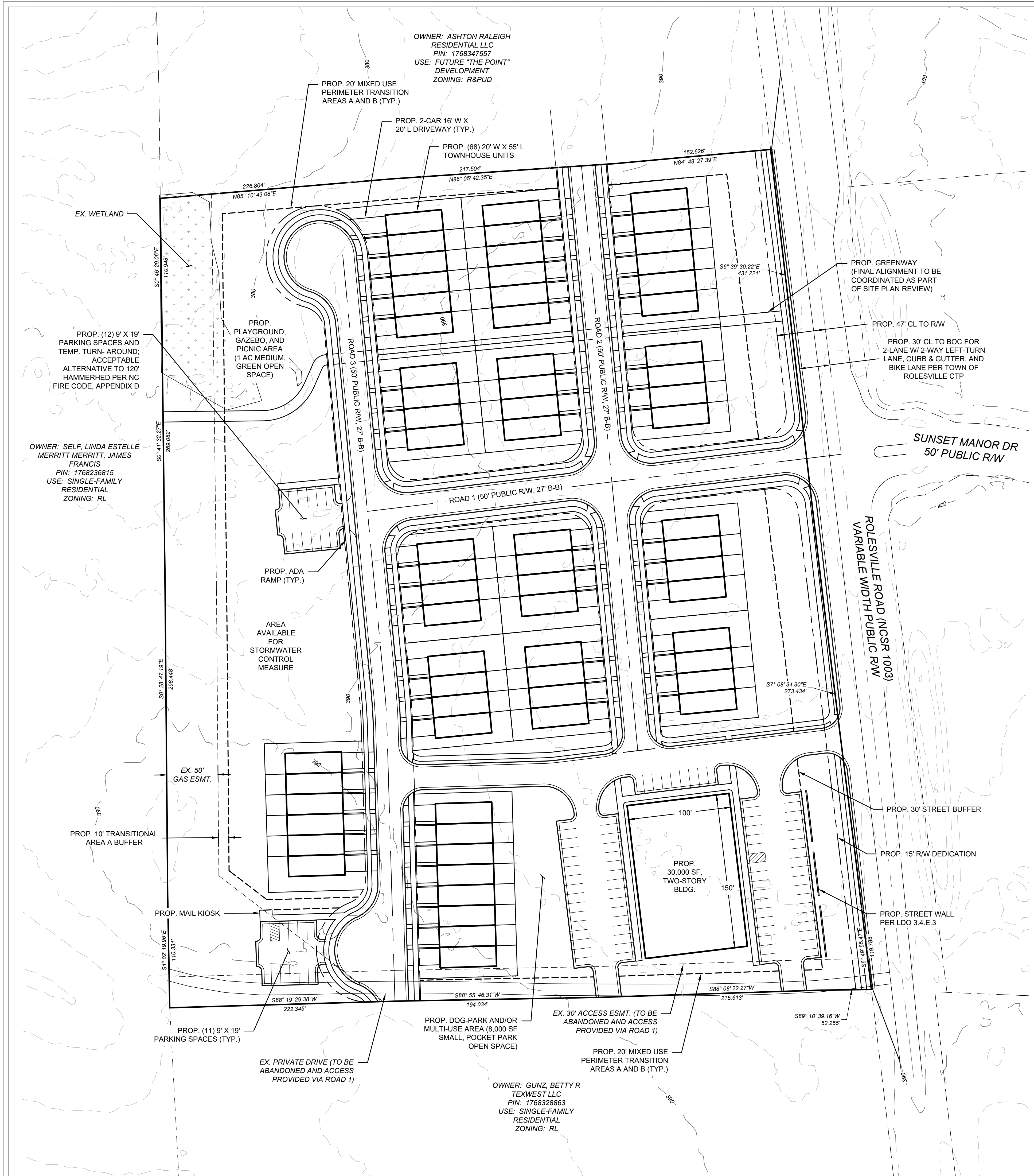
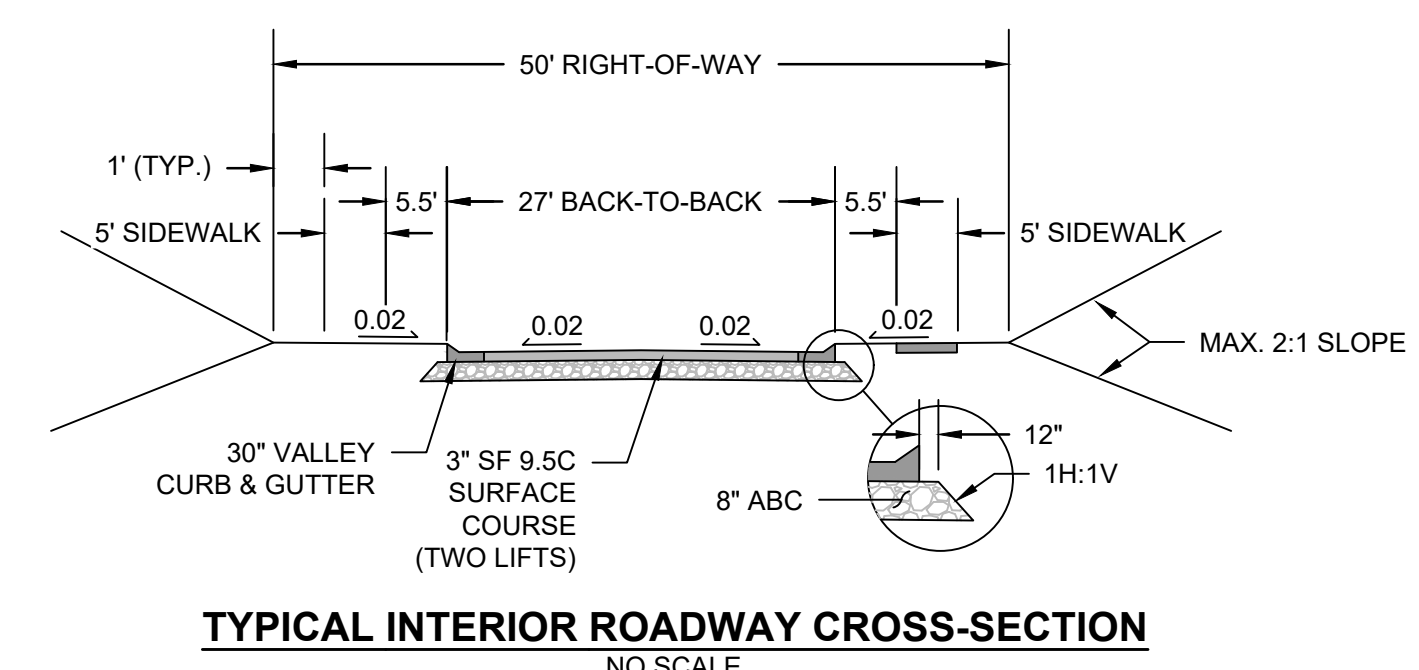
PRELIMINARY PLANS
DO NOT USE FOR CONSTRUCTION



- NOTES**
- SKETCH PLAN BASED ON WAKE COUNTY GIS DATA PARCEL DATA.
 - THERE ARE NO AREAS WITHIN THE REGULATORY FLOODPLAIN AS SHOWN ON FEMA FIRM PANEL 3720185000J, EFFECTIVE 5/2/2006.
 - EXISTING TOPOGRAPHIC DATA SHOWN IS WAKE COUNTY GIS TWO-FOOT CONTOURS.

LEGEND

—	EX. PROPERTY LINE
- - -	EX. ADJACENT OWNERS
- - -	EX. EASEMENT
- - -	EX. MAJOR CONTOUR (10')
- - -	EX. MINOR CONTOUR (2')
- - -	PROP. RIGHT-OF-WAY
- - -	PROP. LOT LINES
- - -	PROP. BUFFER



ROLESVILLE RD MIXED USE MA 22-05

1216 ROLESVILLE RD
ROLESVILLE, NC

DATE:	02-21-2022
SCALE:	AS SHOWN
DESIGNED BY:	FLM
APPROVED BY:	
PROJECT NO.:	

SKETCH PLAN

C-1
SHEET 1 OF 1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	1216 Rolesville Road	Organization:	RKA
Project Location:	Rolesville, NC	Performed By:	MM
Scenario Description:	Full-Build	Date:	12/14/2022
Analysis Year:	2028	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office						
Retail	822	30	KSF	59	36	23
Restaurant						
Cinema/Entertainment						
Residential	215	68	DU	30	7	23
Hotel						
All Other Land Uses ²				89	43	46

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	98	48	50
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips ⁵	89	43	46
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	0%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	1216 Rolesville Road
Analysis Period:	AM Street Peak Hour

Table 7-A: Conversion of Vehicle-Trip Ends to Person-Trip Ends						
Land Use	Table 7-A (D): Entering Trips			Table 7-A (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	36	40	1.10	23	25
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	7	8	1.10	23	25
Hotel	1.10	0	0	1.10	0	0

Table 8-A (O): Internal Person-Trip Origin-Destination Matrix (Computed at Origin)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	7		3	0	4	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	0	5	0		0
Hotel	0	0	0	0	0	

Table 8-A (D): Internal Person-Trip Origin-Destination Matrix (Computed at Destination)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		13	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	3		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	7	0	0		0
Hotel	0	2	0	0	0	

Table 9-A (D): Internal and External Trips Summary (Entering Trips)						
Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	40	40	36	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	8	8	7	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Table 9-A (O): Internal and External Trips Summary (Exiting Trips)						
Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	0	25	25	23	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	0	25	25	23	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	1216 Rolesville Road	Organization:	RKA
Project Location:	Rolesville, NC	Performed By:	MM
Scenario Description:	Full-Build	Date:	12/14/2022
Analysis Year:	2028	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office						
Retail	822	30	KSF	170	85	85
Restaurant						
Cinema/Entertainment						
Residential	215	68	DU	37	22	15
Hotel						
All Other Land Uses ²						
				207	107	100

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					500	
Restaurant						
Cinema/Entertainment						
Residential		500				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	11	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	229	118	111
Internal Capture Percentage	15%	14%	15%
External Vehicle-Trips ⁵	177	92	85
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	6%	12%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	46%	35%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

Project Name:	1216 Rolesville Road
Analysis Period:	PM Street Peak Hour

Land Use	Table 7-P (D): Entering Trips			Table 7-P (O): Exiting Trips		
	Veh. Occ.	Vehicle-Trips	Person-Trips*	Veh. Occ.	Vehicle-Trips	Person-Trips*
Office	1.10	0	0	1.10	0	0
Retail	1.10	85	94	1.10	85	94
Restaurant	1.10	0	0	1.10	0	0
Cinema/Entertainment	1.10	0	0	1.10	0	0
Residential	1.10	22	24	1.10	15	17
Hotel	1.10	0	0	1.10	0	0

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	2		27	4	24	5
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	1	6	4	0		1
Hotel	0	0	0	0	0	

Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		8	0	0	1	0
Retail	0		0	0	11	0
Restaurant	0	47		0	4	0
Cinema/Entertainment	0	4	0		1	0
Residential	0	9	0	0		0
Hotel	0	2	0	0	0	

Destination Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	6	88	94	80	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	11	13	24	12	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

Origin Land Use	Person-Trip Estimates			External Trips by Mode*		
	Internal	External	Total	Vehicles ¹	Transit ²	Non-Motorized ²
Office	0	0	0	0	0	0
Retail	11	83	94	75	0	0
Restaurant	0	0	0	0	0	0
Cinema/Entertainment	0	0	0	0	0	0
Residential	6	11	17	10	0	0
Hotel	0	0	0	0	0	0
All Other Land Uses ³	0	0	0	0	0	0

¹Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P
²Person-Trips
³Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator
*Indicates computation that has been rounded to the nearest whole number.

Molly Mathewson

From: Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>
Sent: Monday, February 6, 2023 6:40 AM
To: Molly Mathewson
Cc: Jessica McClure; Willis, Holt; Warren, Jeremy L; Nolfo, Matthew J
Subject: RE: [External] 1216 Rolesville Road TIA
Attachments: RRKA Services Agreement - 1216 Rolesville Rd_07282022.pdf

Good morning –

I defer to the Scope which was completed in late July (attached is the record Town Staff has) but I would have automatically thought that the The Point, plus those below, would be part of that “future background traffic” anticipated (that 2028 horizon). All of these projects have between like 2-5 years head start toward completion than this 1216 Rolesville Rd. project, with Point and Kalas already moving dirt. Links:

- Kalas Falls - <https://www.rolesvillenc.gov/projects/kalas-falls>
- Preserve at Moody Farms - <https://www.rolesvillenc.gov/projects/preserve-moody-farm-hollingsworthmoody-property>
- Rolesville Crossing - <https://www.rolesvillenc.gov/projects/rolesville-crossing-fka-hopper-communities-fka-wheatland>
- Tucker Wilkins - <https://www.rolesvillenc.gov/projects/tucker-wilkins-property>

From: Molly Mathewson <mmathewson@rameykemp.com>
Sent: Monday, February 6, 2023 8:00 AM
To: Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>
Cc: Jessica McClure <JMCClure@rameykemp.com>; Willis, Holt <ehwillis@ncdot.gov>; Warren, Jeremy L <jlwarren@ncdot.gov>; Nolfo, Matthew J <mjnolfo@ncdot.gov>
Subject: RE: [External] 1216 Rolesville Road TIA

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

Thanks, Mike. We will include The Point. Are there any other adjacent developments we should consider? Kalas Falls?

—
Molly Mathewson, PE
Transportation Engineering Project Manager
O 919 872 5115 | C 919 260 1275
rameykemp.com

From: Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>
Sent: Thursday, February 2, 2023 6:53 AM
To: Molly Mathewson <mmathewson@rameykemp.com>; Nolfo, Matthew J <mjnolfo@ncdot.gov>
Cc: Jessica McClure <JMCClure@rameykemp.com>; Willis, Holt <ehwillis@ncdot.gov>; Warren, Jeremy L <jlwarren@ncdot.gov>
Subject: RE: [External] 1216 Rolesville Road TIA

Good morning,

Yes, you should be able to learn a lot about the past Development Approvals by Town of Rolesville for a project called The Point here: <https://www.rolesvillenc.gov/projects/point>

Two reliable contacts for The Point are:

- Developer/home builder - Bob Mishler bob.mishler@ashtonwoods.com
- Engineer - Mike Sanchez sanchez@mcadamsco.com

When this project was attaining its Zoning entitlements, circa 2019, their TIA was done by “their” consultant which was Kimley Horn. *Today, the Town uses a couple of on-call TIA consultants (RKA and Stantec), so that process so to speak is different today than then, just FYI.*

Recently, for the portion of this project known as “Point North Phases 11, 12,13” (the portion north of or inside the 401 Bypass), the developer had to re-refresh a TIA as part of the Approval process for PR 20-06 – Kimley-Horn again did that work for the Applicant. You can find that in this

link: https://www.rolesvillenc.gov/sites/default/files/uploads/projects/tb_agenda_packet_item_c.1_2022-09-06.pdf

The Point developer is actively building infrastructure pursuant to CD 20-06 aka Package 1 which entails their Phases 1,2,6,9.

Big Picture – 1216 Rolesville is contiguous to The Point project (its southern townhome area will continue a street into 1216 Rolesville Road) so I am surprised if/that The Point as a coming development project was not in the scope of study.

I hope my input helps!

Mike Elabarger
Senior Planner

From: Molly Mathewson <mmathewson@rameykemp.com>

Sent: Wednesday, February 1, 2023 5:16 PM

To: Nolfo, Matthew J <mjnolfo@ncdot.gov>; Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>

Cc: Jessica McClure <JMCClure@rameykemp.com>; Willis, Holt <ehwillis@ncdot.gov>; Warren, Jeremy L <jlwarren@ncdot.gov>

Subject: RE: [External] 1216 Rolesville Road TIA

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

Matt/Michael,

We have become aware of a potential adjacent development for this study, and I wanted to reach out to get some more info. The Point (<https://www.rolesvillenc.gov/projects/point>) appears to be within the study area of 1216 Rolesville Road. But I’m not sure what the anticipated build out year is and whether it would impact our 2028 build year conditions. Is this one we need to include in the 1216 Rolesville Road TIA?

Thanks!

Molly Mathewson, PE
Transportation Engineering Project Manager
O 919 872 5115 | C 919 260 1275
rameykemp.com

From: Molly Mathewson
Sent: Wednesday, January 4, 2023 8:55 AM
To: Nolfo, Matthew J <mjnolfo@ncdot.gov>; Warren, Jeremy L <jlwarren@ncdot.gov>
Cc: Jessica McClure <JMCClure@rameykemp.com>; Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>; Willis, Holt <ehwillis@ncdot.gov>
Subject: RE: [External] 1216 Rolesville Road TIA

Sounds good. Thanks, Matthew!

Molly Mathewson, PE
Transportation Engineering Project Manager
O 919 872 5115 | C 919 260 1275
rameykemp.com

From: Nolfo, Matthew J <mjnolfo@ncdot.gov>
Sent: Thursday, December 29, 2022 1:16 PM
To: Molly Mathewson <mmathewson@rameykemp.com>; Warren, Jeremy L <jlwarren@ncdot.gov>
Cc: Jessica McClure <JMCClure@rameykemp.com>; Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>; Willis, Holt <ehwillis@ncdot.gov>
Subject: RE: [External] 1216 Rolesville Road TIA

Molly,

The scope looks good for us. As a heads up, a left turn lane will be required for all left-in entrances on Rolesville, and the 2nd entrance will likely be restricted to RIRO.

Thanks,

Matthew Nolfo
Senior Assistant District Engineer
Southern Wake County
Wake County District Office (Division 5 District 1)
North Carolina Department of Transportation

mjnolfo@ncdot.gov
(919) 814 – 6115

Physical Address
4009 District Drive
Raleigh, NC 27607

Mailing Address
1575 Mail Service Center
Raleigh, NC 27699-1575



From: Molly Mathewson <mmathewson@rameykemp.com>
Sent: Friday, December 16, 2022 1:03 PM
To: Nolfo, Matthew J <mjnolfo@ncdot.gov>; Warren, Jeremy L <jlwarren@ncdot.gov>
Cc: Jessica McClure <JMCClure@rameykemp.com>; Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>
Subject: RE: [External] 1216 Rolesville Road TIA

CAUTION: External email. Do not click links or open attachments unless you verify. Send all suspicious email as an attachment to [Report Spam](#).

Jeremy and Matt,

I've attached a draft MOU for this site for your review. It is based on the proposal that Craig had done. It looks like he had a scoping call on 7/21/22 with NCDOT and the Town and then put the proposal together after that. So, I'm thinking at least some of the scope items, like intersections, may have been set, but just trying to nail it all down. I am available on my cell to discuss if needed. Thanks and have a great weekend!

Molly Mathewson, PE
Transportation Engineering Project Manager
O 919 872 5115 | C 919 260 1275
rameykemp.com

From: Molly Mathewson
Sent: Thursday, December 15, 2022 5:24 PM
To: Nolfo, Matthew J <mjnolfo@ncdot.gov>; Warren, Jeremy L <jlwarren@ncdot.gov>; Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>
Cc: Jessica McClure <JMCClure@rameykemp.com>
Subject: RE: [External] 1216 Rolesville Road TIA

Hey Matt,

Site plan is attached. Thanks for looking into this.

Molly Mathewson, PE
Transportation Engineering Project Manager
O 919 872 5115 | C 919 260 1275
rameykemp.com

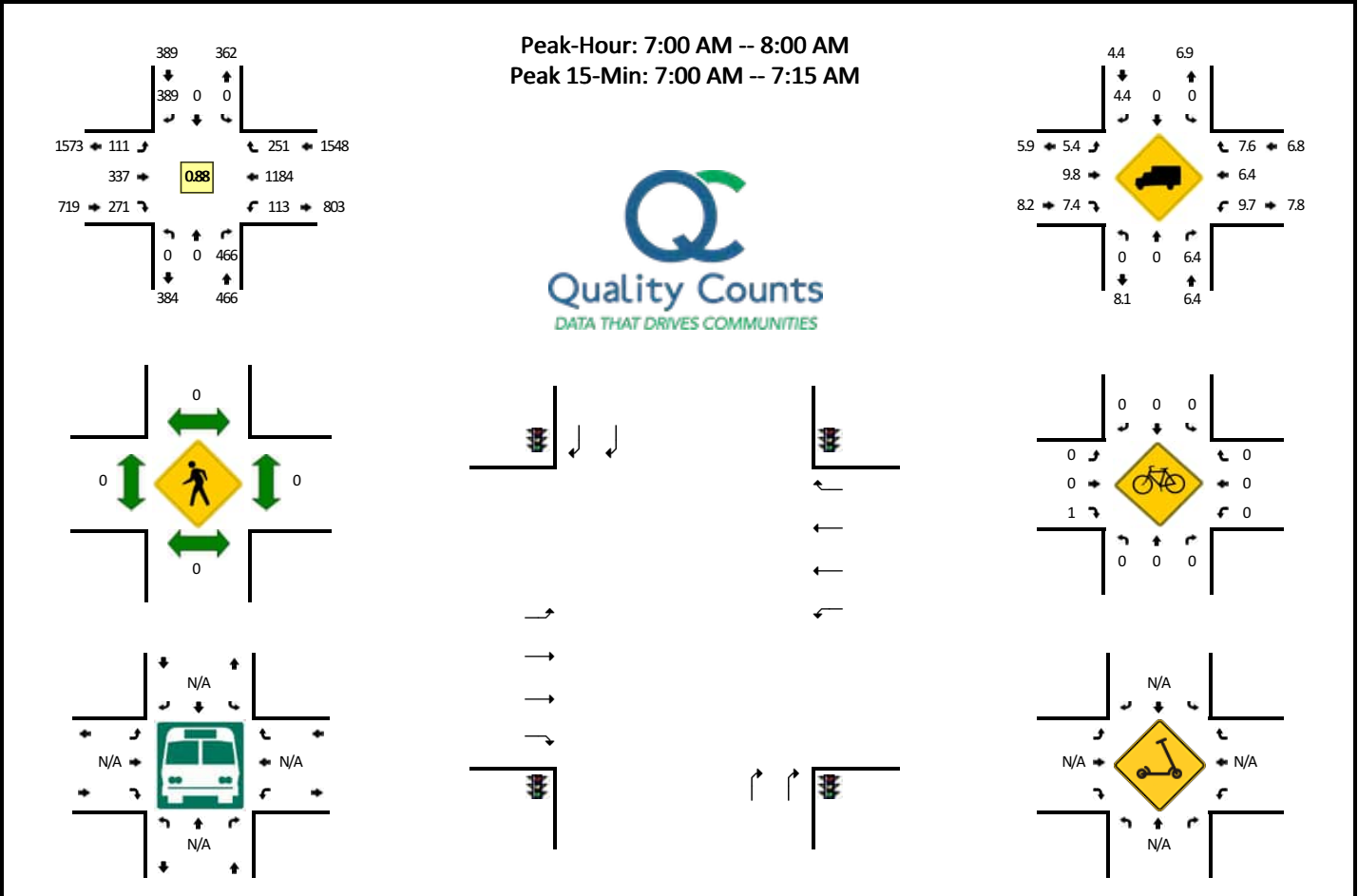
From: Nolfo, Matthew J <mjnolfo@ncdot.gov>
Sent: Thursday, December 15, 2022 4:21 PM
To: Warren, Jeremy L <jlwarren@ncdot.gov>; Molly Mathewson <mmathewson@rameykemp.com>; Elabarger, Michael S <michael.elabarger@rolesville.nc.gov>

APPENDIX B

TRAFFIC COUNTS AND SIGNAL PLANS

LOCATION: E Young St -- Louisburg Rd
CITY/STATE: Rolesville, NC

QC JOB #: 15912409
DATE: Tue, Sep 13 2022

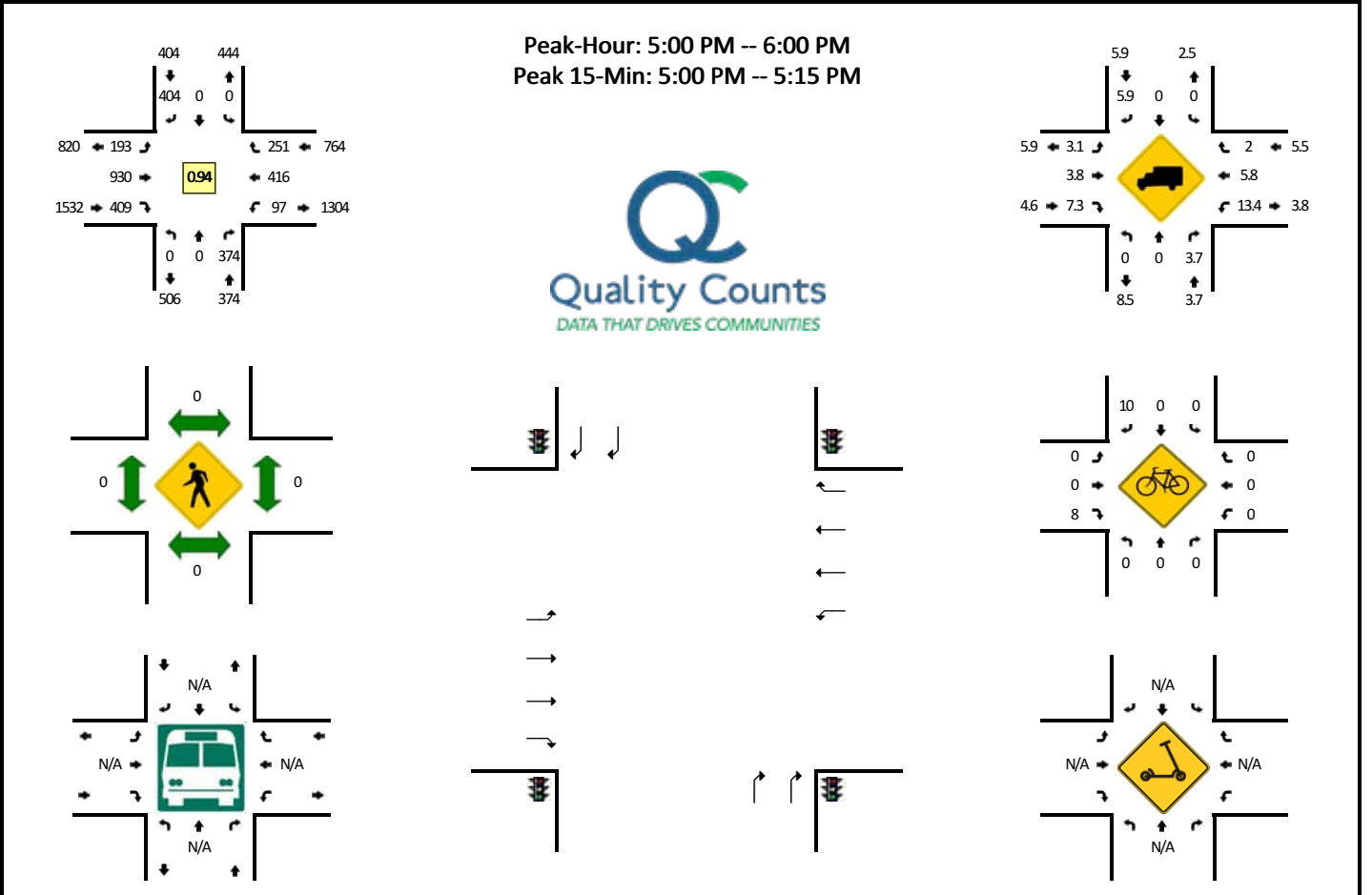


15-Min Count Period Beginning At	E Young St (Northbound)				E Young St (Southbound)				Louisburg Rd (Eastbound)				Louisburg Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	0	139	0	0	0	121	0	13	57	113	0	25	377	42	0	887	
7:15 AM	0	0	143	0	0	0	94	0	35	84	67	0	21	330	70	0	844	
7:30 AM	0	0	100	0	0	0	75	0	28	96	48	0	38	240	77	0	702	
7:45 AM	0	0	84	0	0	0	99	0	35	100	43	0	29	237	62	0	689	3122
8:00 AM	0	0	51	0	0	0	98	0	29	101	62	0	41	181	38	0	601	2836
8:15 AM	0	0	74	0	0	0	88	0	23	71	46	0	33	211	49	0	595	2587
8:30 AM	0	0	66	0	0	0	61	0	23	96	35	0	28	203	48	0	560	2445
8:45 AM	0	0	66	0	0	0	65	0	16	88	37	0	27	153	49	0	501	2257
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	0	556	0	0	0	484	0	52	228	452	0	100	1508	168	0	3548	
Heavy Trucks	0	0	32		0	0	28		0	24	48		4	96	12		244	
Buses																	0	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																	0	

Comments: Please ensure to capture entire intersection. Thank you

LOCATION: E Young St -- Louisburg Rd
CITY/STATE: Rolesville, NC

QC JOB #: 15912410
DATE: Tue, Sep 13 2022



15-Min Count Period Beginning At	E Young St (Northbound)				E Young St (Southbound)				Louisburg Rd (Eastbound)				Louisburg Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	0	94	0	0	0	90	0	37	205	72	0	17	111	55	0	681	
4:15 PM	0	0	73	0	0	0	83	0	40	214	77	0	24	115	54	0	680	
4:30 PM	0	0	78	0	0	0	86	0	32	219	79	0	12	90	47	0	643	
4:45 PM	0	0	116	0	0	0	61	0	53	220	71	0	27	112	64	0	724	2728
5:00 PM	0	0	103	0	0	0	112	0	44	245	103	0	27	118	64	0	816	2863
5:15 PM	0	0	99	0	0	0	91	0	58	247	80	0	13	108	60	0	756	2939
5:30 PM	0	0	95	0	0	0	111	0	44	207	110	0	34	97	66	0	764	3060
5:45 PM	0	0	77	0	0	0	90	0	47	231	116	0	23	93	61	0	738	3074

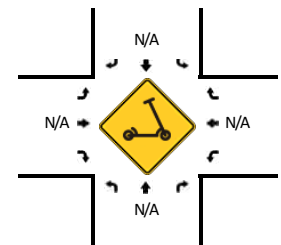
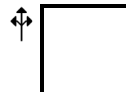
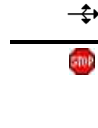
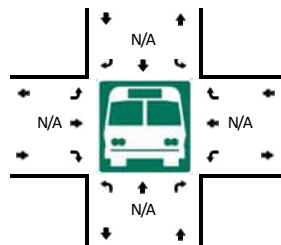
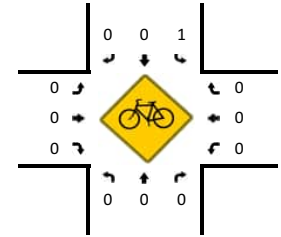
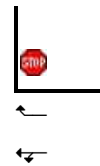
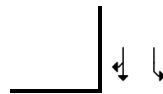
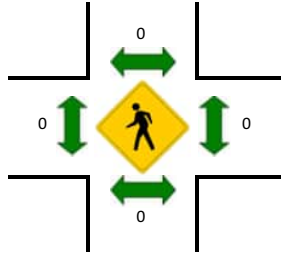
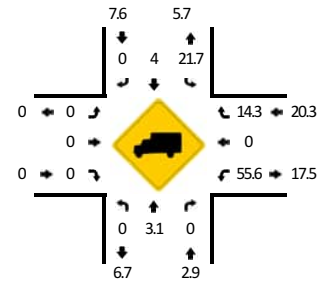
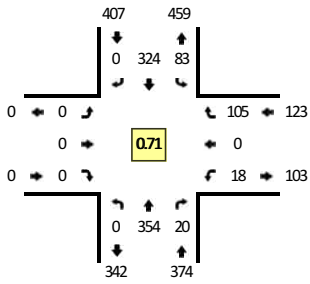
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	
All Vehicles	0	0	412	0	0	0	448	0	176	980	412	0	108	472	256	0	3264
Heavy Trucks	0	0	4		0	0	16		4	48	28		24	16	4		144
Buses																	0
Pedestrians		0				0				0				0			0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0
Scoters																	0

Comments: Please ensure to capture entire intersection. Thank you

LOCATION: E Young St -- Quarry Rd
CITY/STATE: Rolesville, NC

QC JOB #: 15912405
DATE: Tue, Sep 13 2022

Peak-Hour: 7:00 AM -- 8:00 AM
 Peak 15-Min: 7:00 AM -- 7:15 AM



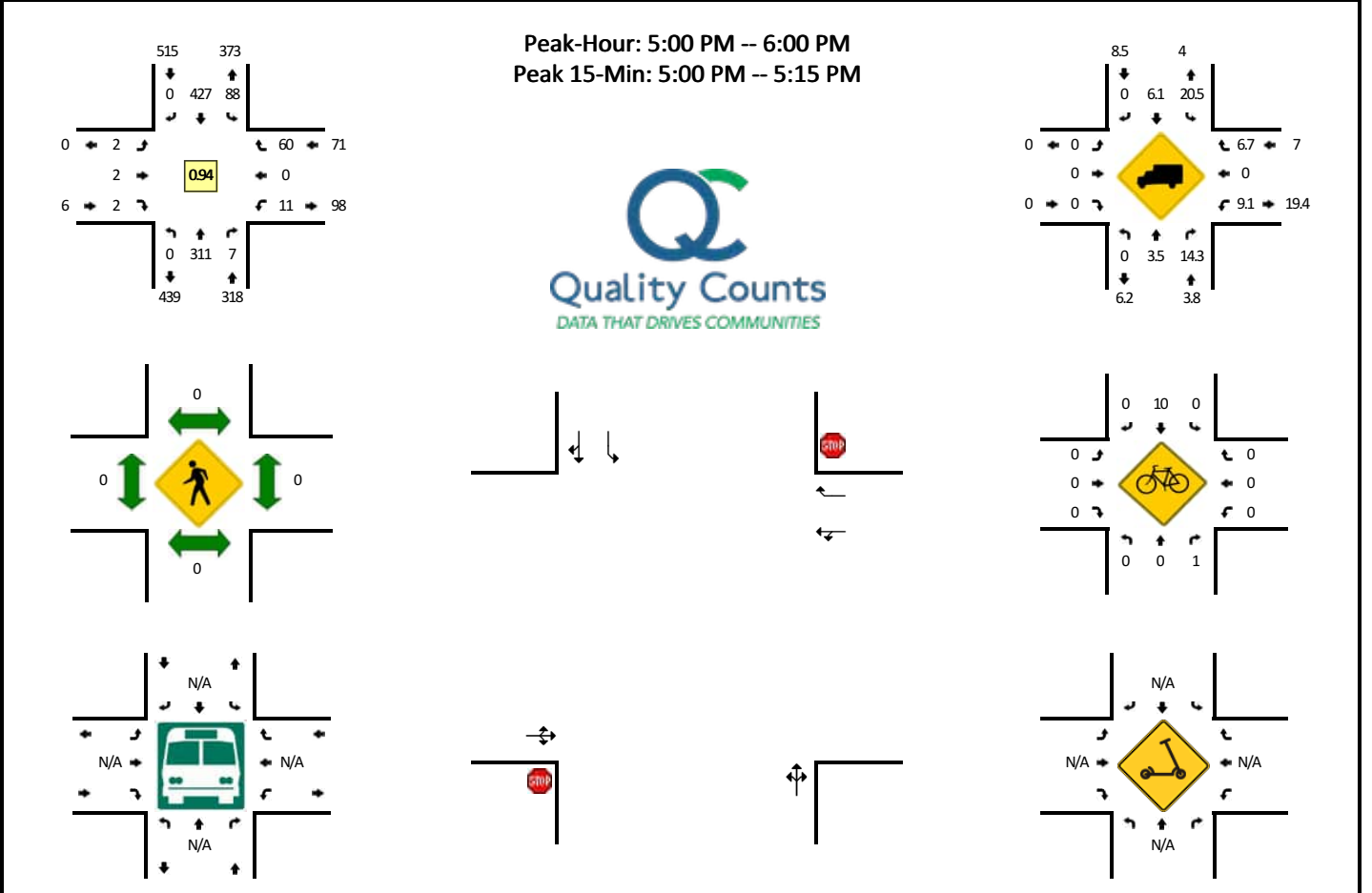
15-Min Count Period Beginning At	E Young St (Northbound)				E Young St (Southbound)				Quarry Rd (Eastbound)				Quarry Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	114	11	0	43	112	0	0	0	0	0	0	9	0	31	0	320	
7:15 AM	0	115	8	0	26	65	0	0	0	0	0	0	6	0	41	0	261	
7:30 AM	0	56	1	0	7	76	0	0	0	0	0	0	1	0	18	0	159	
7:45 AM	0	69	0	0	7	71	0	0	0	0	0	0	2	0	15	0	164	904
8:00 AM	0	44	1	0	18	84	2	0	0	0	0	0	2	0	8	0	159	743
8:15 AM	0	66	1	0	5	75	0	0	0	0	1	0	1	0	23	0	172	654
8:30 AM	0	48	1	0	5	58	0	0	1	0	0	0	2	0	14	0	129	624
8:45 AM	0	54	3	0	8	55	0	0	0	0	0	0	0	0	11	0	131	591

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	456	44	0	172	448	0	0	0	0	0	0	36	0	124	0	1280	
Heavy Trucks	0	12	0		48	4	0		0	0	0		16	0	12		92	
Buses																		
Pedestrians		0				0				0				0				0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0			0
Scoters																		

Comments:

LOCATION: E Young St -- Quarry Rd
CITY/STATE: Rolesville, NC

QC JOB #: 15912406
DATE: Tue, Sep 13 2022

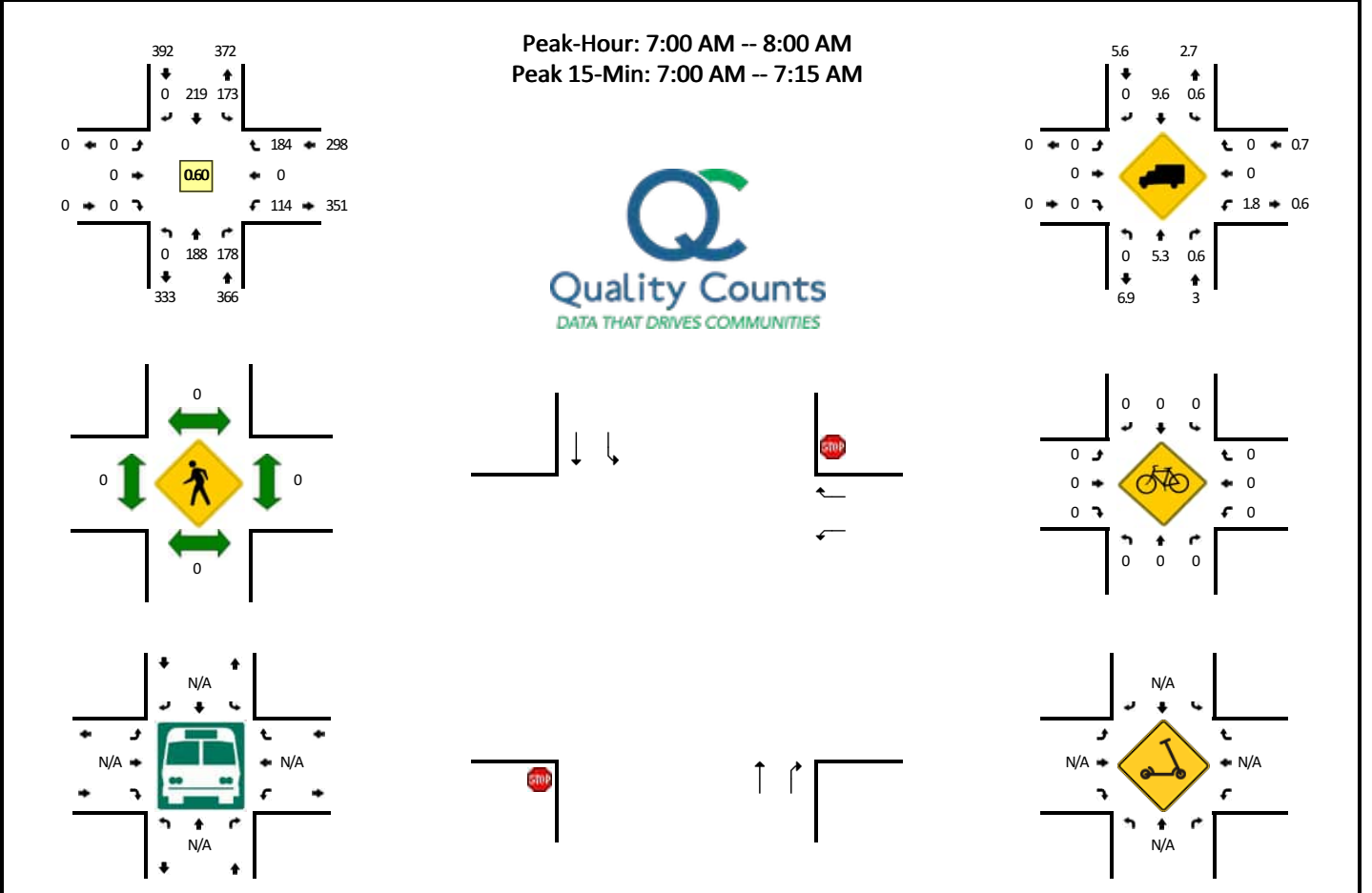


15-Min Count Period Beginning At	E Young St (Northbound)				E Young St (Southbound)				Quarry Rd (Eastbound)				Quarry Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	79	2	0	22	70	0	0	0	0	0	0	3	0	15	0	191	
4:15 PM	0	53	1	0	15	82	0	0	0	0	0	0	1	0	16	0	168	
4:30 PM	0	68	6	0	13	77	0	0	1	0	0	0	1	0	11	0	177	
4:45 PM	0	88	3	0	13	85	0	0	2	2	3	0	4	1	23	0	224	760
5:00 PM	0	87	2	0	27	101	0	0	1	0	2	0	5	0	17	0	242	811
5:15 PM	0	84	1	0	15	93	0	0	1	2	0	0	1	0	13	0	210	853
5:30 PM	0	76	3	0	27	105	0	0	0	0	0	0	1	0	16	1	229	905
5:45 PM	0	64	1	0	19	128	0	0	0	0	0	0	3	0	14	0	229	910
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	348	8	0	108	404	0	0	4	0	8	0	20	0	68	0	968	
Heavy Trucks	0	8	0		20	36	0		0	0	0		4	0	0		68	
Buses																	0	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																	0	

Comments:

LOCATION: E Young St -- Rolesville High School Dwy
CITY/STATE: Rolesville, NC

QC JOB #: 15912407
DATE: Tue, Sep 13 2022

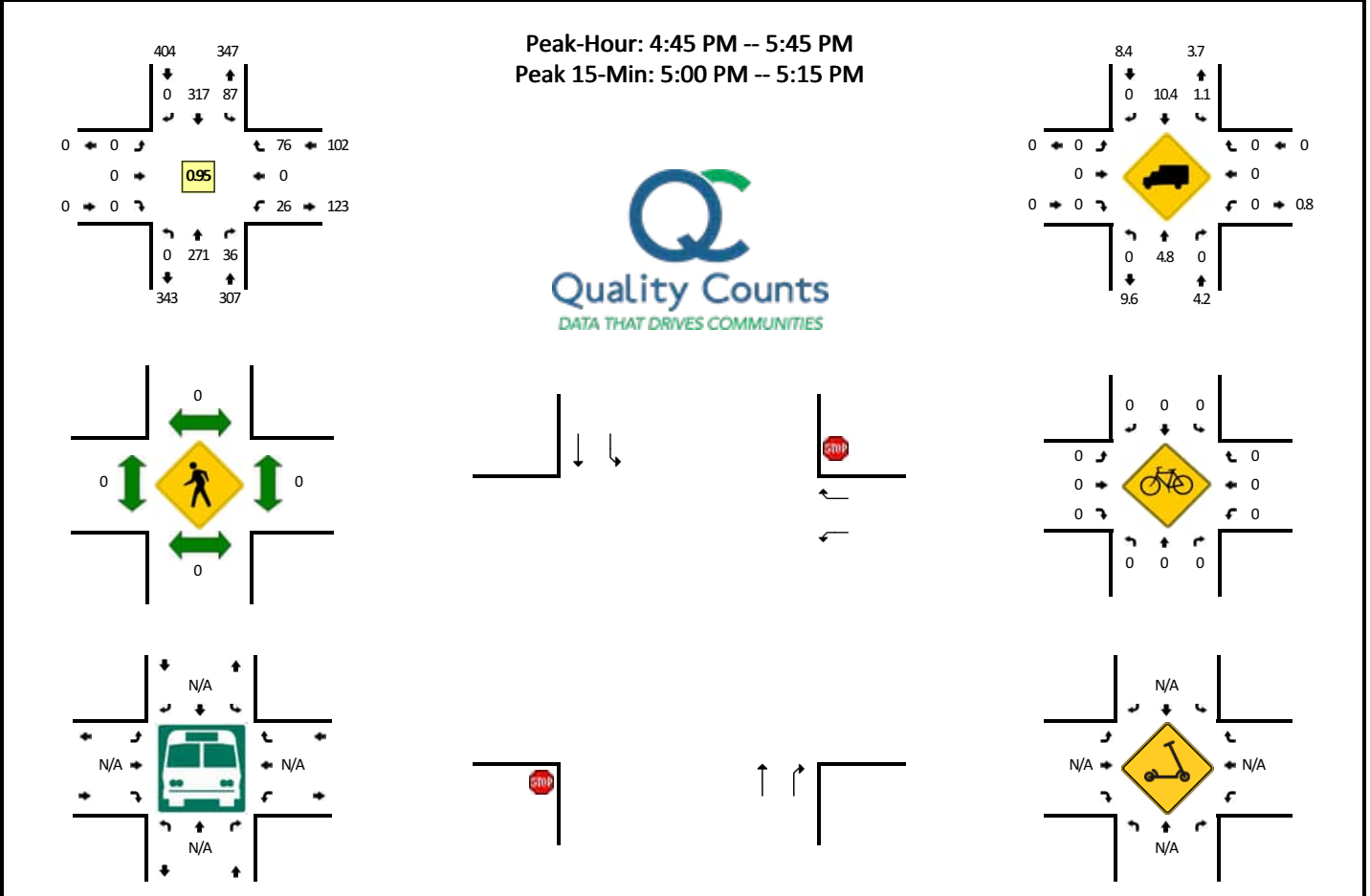


15-Min Count Period Beginning At	E Young St (Northbound)				E Young St (Southbound)				Rolesville High School Dwy (Eastbound)				Rolesville High School Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	37	130	0	101	33	0	0	0	0	0	0	51	0	87	0	439	
7:15 AM	0	47	44	0	52	54	0	0	0	0	0	0	53	0	77	0	327	
7:30 AM	0	50	4	0	15	62	0	0	0	0	0	0	5	0	12	0	148	
7:45 AM	0	54	0	0	5	70	0	0	0	0	0	0	5	0	8	0	142	1056
8:00 AM	0	41	2	0	6	78	0	0	0	0	0	0	3	0	4	0	134	751
8:15 AM	0	53	2	0	5	70	0	0	0	0	0	0	2	0	4	0	136	560
8:30 AM	0	46	2	0	6	53	0	0	0	0	0	0	2	0	2	0	111	523
8:45 AM	0	52	1	0	7	48	0	0	0	0	0	0	2	0	7	0	117	498
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	148	520	0	404	132	0	0	0	0	0	0	204	0	348	0	1756	
Heavy Trucks	0	16	4		0	16	0		0	0	0		0	0	0		36	
Buses																		
Pedestrians		0				0				0				0				0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		0

Comments:

LOCATION: E Young St -- Rolesville High School Dwy
CITY/STATE: Rolesville, NC

QC JOB #: 15912408
DATE: Tue, Sep 13 2022

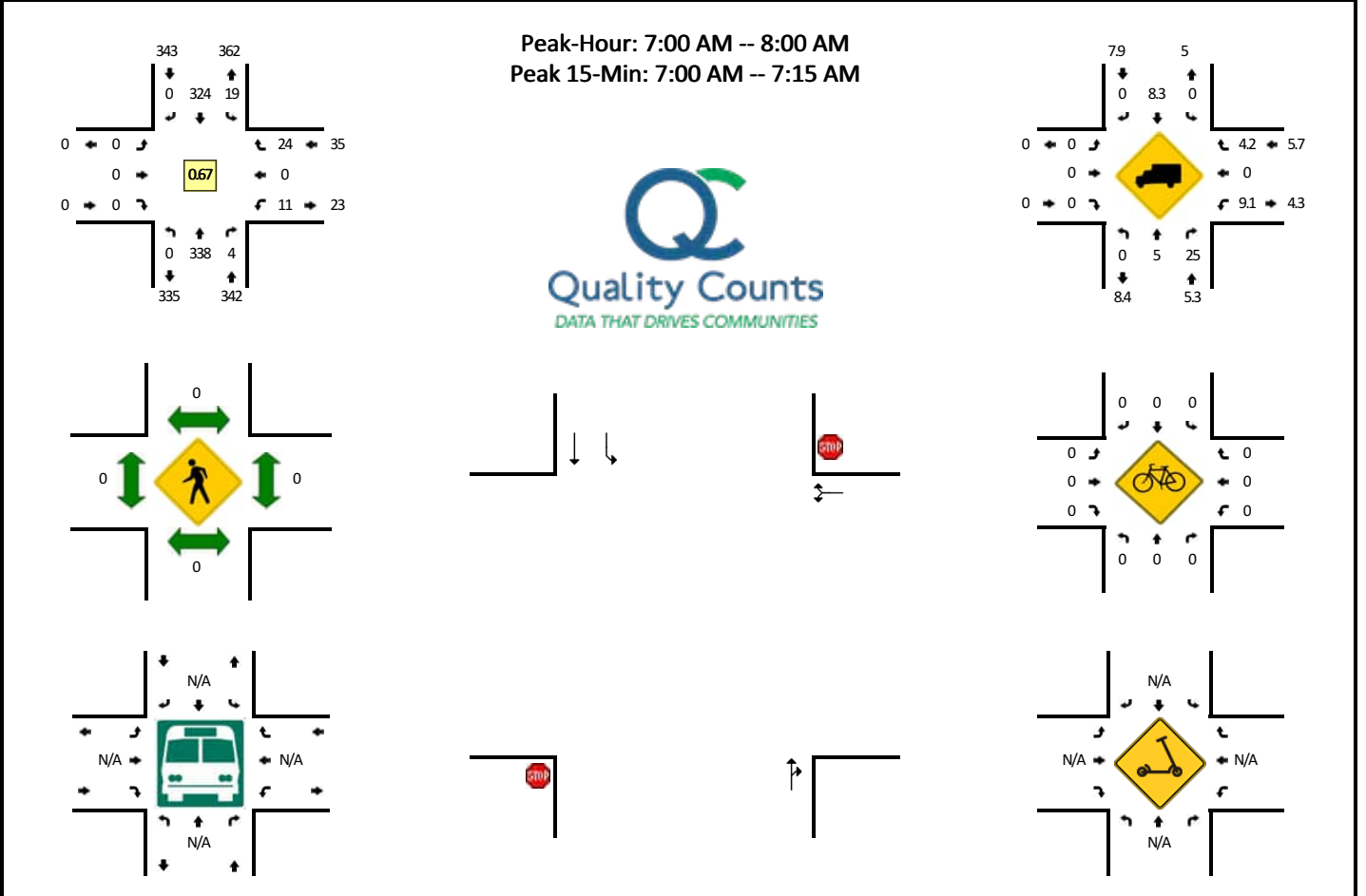


15-Min Count Period Beginning At	E Young St (Northbound)				E Young St (Southbound)				Rolesville High School Dwy (Eastbound)				Rolesville High School Dwy (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	59	5	0	11	60	0	0	0	0	0	0	12	0	20	0	167	
4:15 PM	0	42	6	0	15	71	0	0	0	0	0	0	5	0	14	0	153	
4:30 PM	0	55	5	0	15	59	0	0	0	0	0	0	3	0	20	0	157	
4:45 PM	0	72	12	0	30	67	0	0	0	0	0	0	6	0	21	0	208	685
5:00 PM	0	69	9	0	22	82	0	0	0	0	0	0	11	0	21	0	214	732
5:15 PM	0	63	4	0	15	83	0	0	0	0	0	0	4	0	20	0	189	768
5:30 PM	0	67	11	0	20	85	0	0	0	0	0	0	5	0	14	0	202	813
5:45 PM	0	50	11	0	55	80	0	0	0	0	0	0	0	0	11	0	207	812
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	276	36	0	88	328	0	0	0	0	0	0	44	0	84	0	856	
Heavy Trucks	0	12	0		4	32	0		0	0	0		0	0	0		48	
Buses																		
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		

Comments:

LOCATION: Rolesville Rd -- Sunset Manor Dr
CITY/STATE: Wake Forest, NC

QC JOB #: 15912401
DATE: Tue, Sep 13 2022

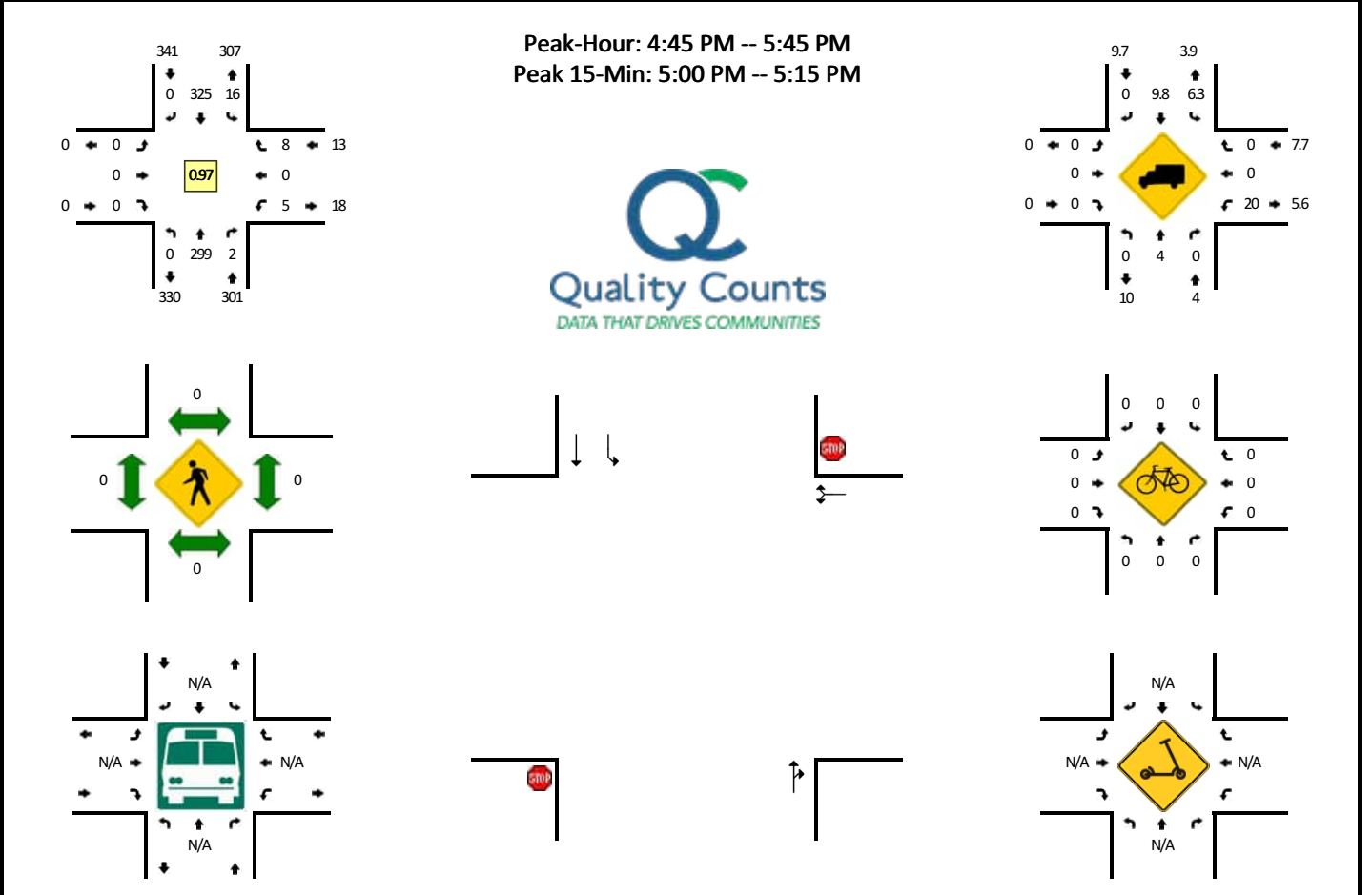


15-Min Count Period Beginning At	Rolesville Rd (Northbound)				Rolesville Rd (Southbound)				Sunset Manor Dr (Eastbound)				Sunset Manor Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	162	3	0	13	72	0	0	0	0	0	0	5	0	15	0	270	
7:15 AM	0	77	0	0	2	105	0	0	0	0	0	0	2	0	1	0	187	
7:30 AM	0	50	0	0	1	73	0	0	0	0	0	0	1	0	3	0	128	
7:45 AM	0	49	1	0	3	74	0	0	0	0	0	0	3	0	5	0	135	720
8:00 AM	0	42	1	0	2	75	0	0	0	0	0	0	1	0	1	0	122	572
8:15 AM	0	54	0	0	0	78	0	0	0	0	0	0	0	0	1	0	133	518
8:30 AM	0	45	4	0	2	53	0	0	0	0	0	0	1	0	3	0	108	498
8:45 AM	0	49	0	0	0	49	0	0	0	0	0	0	1	0	4	0	103	466
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	648	12	0	52	288	0	0	0	0	0	0	20	0	60	0	1080	
Heavy Trucks	0	20	0	0	0	12	0	0	0	0	0	0	0	0	0	0	32	
Buses																	0	
Pedestrians		0				0					0			0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																	0	

Comments:

LOCATION: Rolesville Rd -- Sunset Manor Dr
CITY/STATE: Wake Forest, NC

QC JOB #: 15912402
DATE: Tue, Sep 13 2022



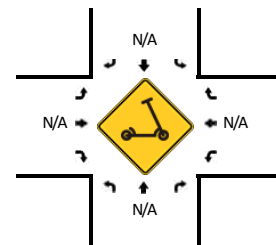
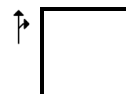
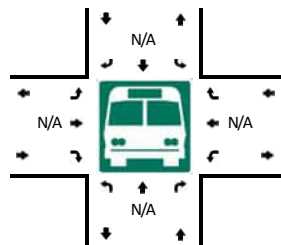
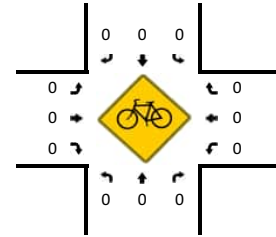
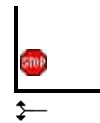
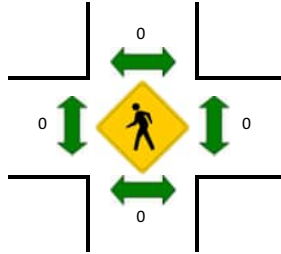
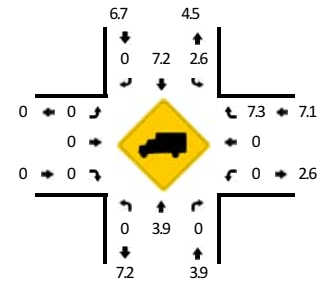
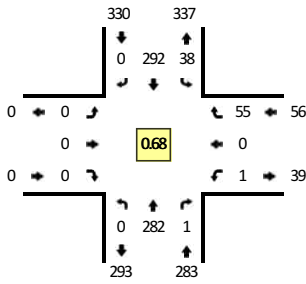
15-Min Count Period Beginning At	Rolesville Rd (Northbound)				Rolesville Rd (Southbound)				Sunset Manor Dr (Eastbound)				Sunset Manor Dr (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	60	0	0	4	68	0	0	0	0	0	0	0	0	4	0	136	
4:15 PM	0	47	1	0	3	73	0	0	0	0	0	0	0	0	1	0	125	
4:30 PM	0	55	2	0	3	58	0	0	0	0	0	0	0	0	5	0	123	
4:45 PM	0	83	0	0	3	70	0	0	0	0	0	0	2	0	1	0	159	543
5:00 PM	0	74	0	0	3	87	0	0	0	0	0	0	1	0	3	0	168	575
5:15 PM	0	67	2	0	7	82	0	0	0	0	0	0	2	0	1	0	161	611
5:30 PM	0	75	0	0	3	86	0	0	0	0	0	0	0	0	3	0	167	655
5:45 PM	0	60	0	0	3	76	0	0	0	0	0	0	2	0	1	0	142	638
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	296	0	0	12	348	0	0	0	0	0	0	4	0	12	0	672	
Heavy Trucks	0	8	0	0	0	28	0	0	0	0	0	0	0	0	0	0	36	
Buses																	0	
Pedestrians		0				0				0				0			0	
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																	0	

Comments:

LOCATION: Rolesville Rd -- Fowler Rd
CITY/STATE: Wake Forest, NC

QC JOB #: 15912403
DATE: Tue, Sep 13 2022

Peak-Hour: 7:00 AM -- 8:00 AM
Peak 15-Min: 7:00 AM -- 7:15 AM



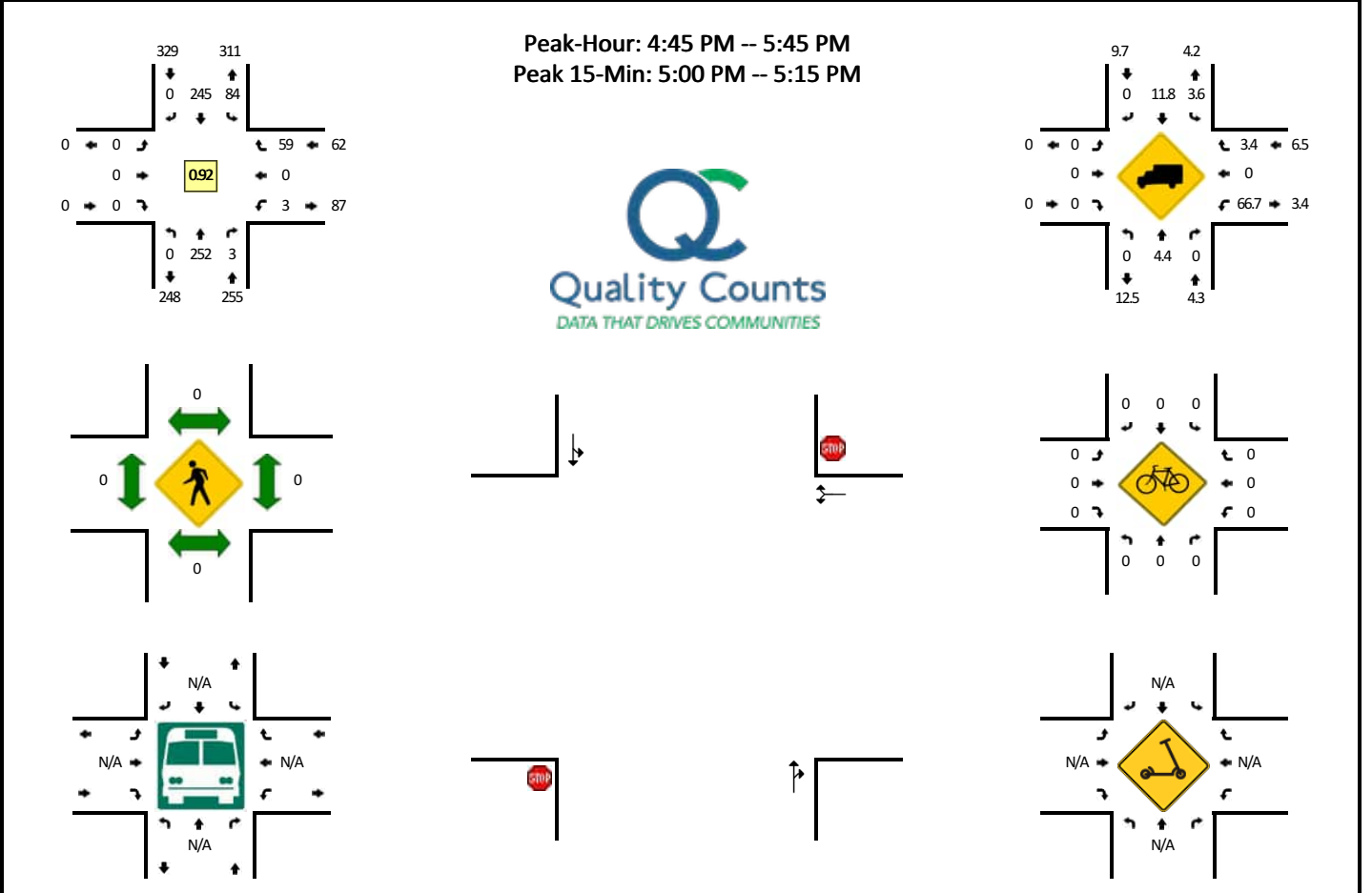
15-Min Count Period Beginning At	Rolesville Rd (Northbound)				Rolesville Rd (Southbound)				Fowler Rd (Eastbound)				Fowler Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
7:00 AM	0	137	1	0	3	75	0	0	0	0	0	0	1	0	28	0	245	
7:15 AM	0	63	0	0	11	97	0	0	0	0	0	0	0	0	7	0	178	
7:30 AM	0	42	0	0	12	56	0	0	0	0	0	0	0	0	10	0	120	
7:45 AM	0	40	0	0	12	64	0	0	0	0	0	0	0	0	10	0	126	669
8:00 AM	0	36	1	0	14	66	0	0	0	0	0	0	1	0	9	0	127	551
8:15 AM	0	37	0	0	9	67	0	0	0	0	0	0	1	0	20	0	134	507
8:30 AM	0	42	0	0	8	46	0	0	0	0	0	0	1	0	6	0	103	490
8:45 AM	0	33	0	0	8	46	0	0	0	0	0	0	1	0	13	0	101	465

Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	548	4	0	12	300	0	0	0	0	0	0	4	0	112	0	980	
Heavy Trucks	0	16	0		0	12	0		0	0	0		0	0	4		32	
Buses																		
Pedestrians		0				0				0				0				0
Bicycles	0	0	0		0	0	0		0	0	0		0	0	0		0	
Scoters																		0

Comments:

LOCATION: Rolesville Rd -- Fowler Rd
CITY/STATE: Wake Forest, NC

QC JOB #: 15912404
DATE: Tue, Sep 13 2022



15-Min Count Period Beginning At	Rolesville Rd (Northbound)				Rolesville Rd (Southbound)				Fowler Rd (Eastbound)				Fowler Rd (Westbound)				Total	Hourly Totals
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
4:00 PM	0	46	2	0	17	52	0	0	0	0	0	0	1	0	13	0	131	
4:15 PM	0	36	1	0	17	54	0	0	0	0	0	0	0	0	10	0	118	
4:30 PM	0	47	0	0	19	41	0	0	0	0	0	0	1	0	11	0	119	
4:45 PM	0	65	0	0	18	54	0	0	0	0	0	0	2	0	15	0	154	522
5:00 PM	0	74	0	0	25	63	0	0	0	0	0	0	1	0	13	0	176	567
5:15 PM	0	54	2	0	24	59	0	0	0	0	0	0	0	0	14	0	153	602
5:30 PM	0	59	1	0	17	69	0	0	0	0	0	0	0	0	17	0	163	646
5:45 PM	0	49	0	0	20	58	0	0	0	0	0	0	0	0	10	0	137	629
Peak 15-Min Flowrates	Northbound				Southbound				Eastbound				Westbound				Total	
	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U	Left	Thru	Right	U		
All Vehicles	0	296	0	0	100	252	0	0	0	0	0	0	4	0	52	0	704	
Heavy Trucks	0	8	0	0	0	28	0	0	0	0	0	0	0	0	0	0	36	
Buses																	0	
Pedestrians		0				0					0			0			0	
Bicycles	0	0	0		0	0	0			0	0	0	0	0	0		0	
Scooters																	0	

Comments:



8210 University Executive Park
Charlotte, NC 28262

File Name : US 401 Northern U-Turn Bulb
Site Code : 00000002
Start Date : 1/10/2023
Page No : 1

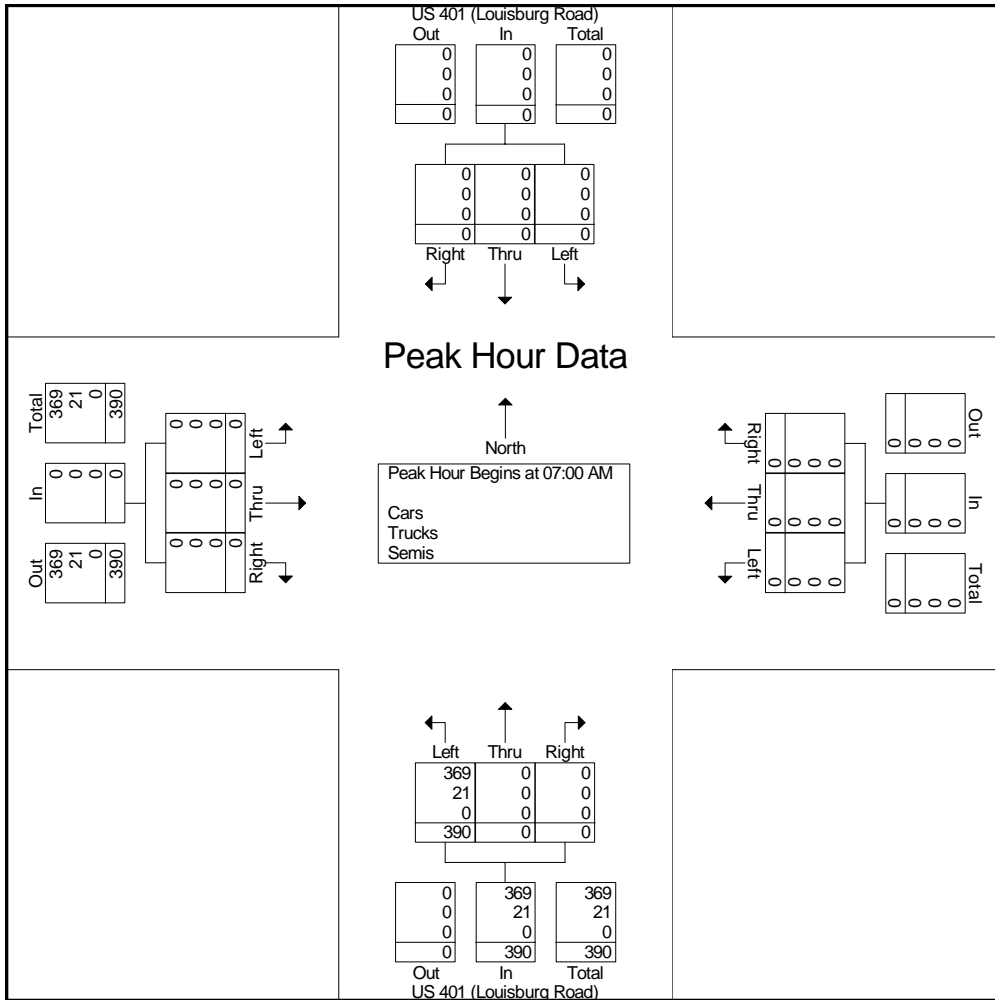
Groups Printed- Cars - Trucks - Semis

Start Time	US 401 (Louisburg Road) From North					From East					US 401 (Louisburg Road) From South					From West					Exclu. Total	Inclu. Total	Int. Total
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total			
07:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	93	0	93	0	0	0	0	0	0	93	93
07:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	103	0	103	0	0	0	0	0	0	103	103
07:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	122	0	122	0	0	0	0	0	0	122	122
07:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	72	0	72	0	0	0	0	0	0	72	72
Total	0	0	0	0	0	0	0	0	0	0	0	0	390	0	390	0	0	0	0	0	0	390	390
08:00 AM	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54	0	0	0	0	0	0	54	54
08:15 AM	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54	0	0	0	0	0	0	54	54
08:30 AM	0	0	0	0	0	0	0	0	0	0	0	0	54	0	54	0	0	0	0	0	0	54	54
08:45 AM	0	0	0	0	0	0	0	0	0	0	0	0	59	0	59	0	0	0	0	0	0	59	59
Total	0	0	0	0	0	0	0	0	0	0	0	0	221	0	221	0	0	0	0	0	0	221	221
*** BREAK ***																							
04:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	73	0	73	0	0	0	0	0	0	73	73
04:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	60	0	60	0	0	0	0	0	0	60	60
04:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	65	0	65	0	0	0	0	0	0	65	65
04:45 PM	0	0	0	0	0	0	0	0	0	0	0	0	77	0	77	0	0	0	0	0	0	77	77
Total	0	0	0	0	0	0	0	0	0	0	0	0	275	0	275	0	0	0	0	0	0	275	275
05:00 PM	0	0	0	0	0	0	0	0	0	0	0	0	78	0	78	0	0	0	0	0	0	78	78
05:15 PM	0	0	0	0	0	0	0	0	0	0	0	0	56	0	56	0	0	0	0	0	0	56	56
05:30 PM	0	0	0	0	0	0	0	0	0	0	0	0	62	0	62	0	0	0	0	0	0	62	62
05:45 PM	0	0	1	0	1	0	0	0	0	0	0	0	54	0	54	0	0	0	0	0	0	55	55
Total	0	0	1	0	1	0	0	0	0	0	0	0	250	0	250	0	0	0	0	0	0	251	251
Grand Total	0	0	1	0	1	0	0	0	0	0	0	0	1136	0	1136	0	0	0	0	0	0	1137	1137
Apprch %	0	0	100			0	0	0			0	0	100			0	0	0			0		
Total %	0	0	0.1		0.1	0	0	0		0	0	0	99.9		99.9	0	0	0		0	0	100	
Cars	0	0	0		0	0	0	0		0	0	0	1088		1088	0	0	0		0	0	0	1088
% Cars	0	0	0		0	0	0	0		0	0	0	95.8		95.8	0	0	0		0	0	0	95.7
Trucks	0	0	1		1	0	0	0		0	0	0	47		47	0	0	0		0	0	0	48
% Trucks	0	0	100		100	0	0	0		0	0	0	4.1		4.1	0	0	0		0	0	0	4.2
Semis	0	0	0		0	0	0	0		0	0	0	1		1	0	0	0		0	0	0	1
% Semis	0	0	0		0	0	0	0		0	0	0	0.1		0.1	0	0	0		0	0	0	0.1



8210 University Executive Park
Charlotte, NC 28262

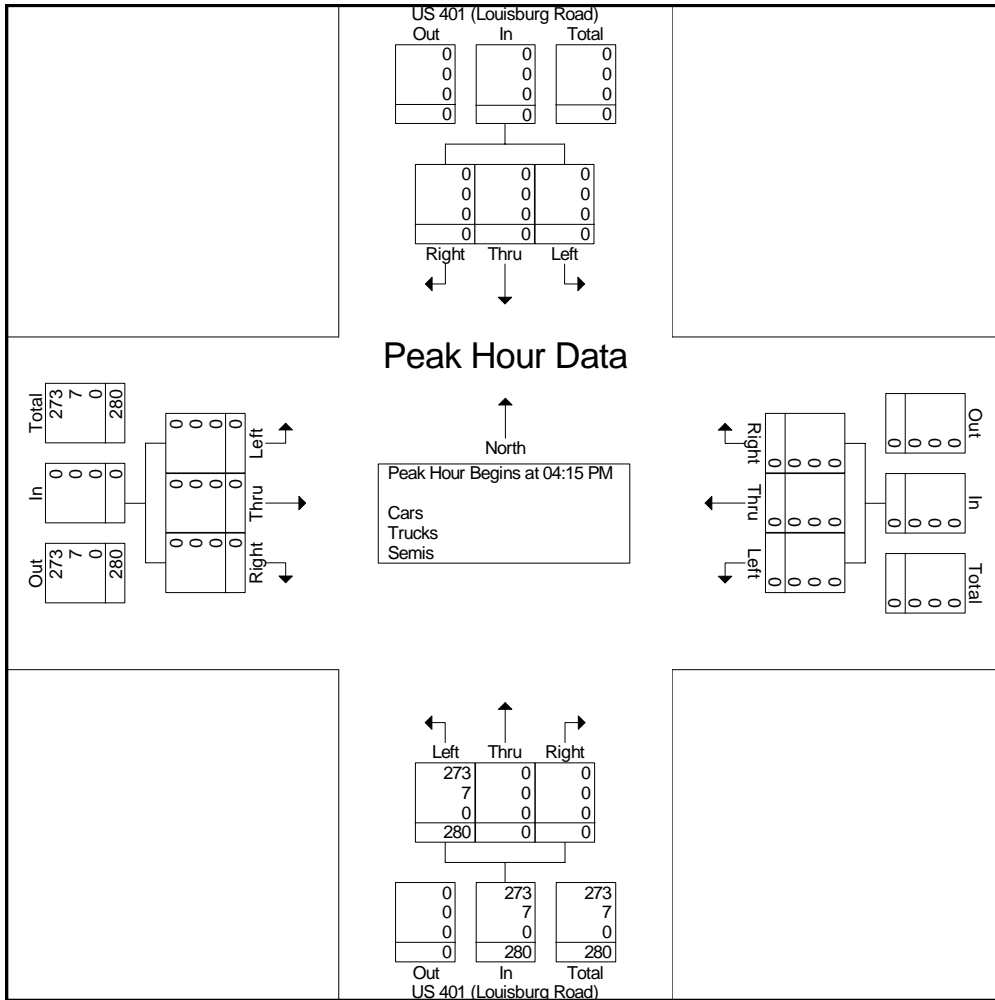
File Name : US 401 Northern U-Turn Bulb
Site Code : 00000002
Start Date : 1/10/2023
Page No : 3





8210 University Executive Park
Charlotte, NC 28262

File Name : US 401 Northern U-Turn Bulb
Site Code : 00000002
Start Date : 1/10/2023
Page No : 5





8210 University Executive Park
Charlotte, NC 28262

File Name : US 401 Southern U-Turn Bulb
Site Code : 00000001
Start Date : 1/10/2023
Page No : 1

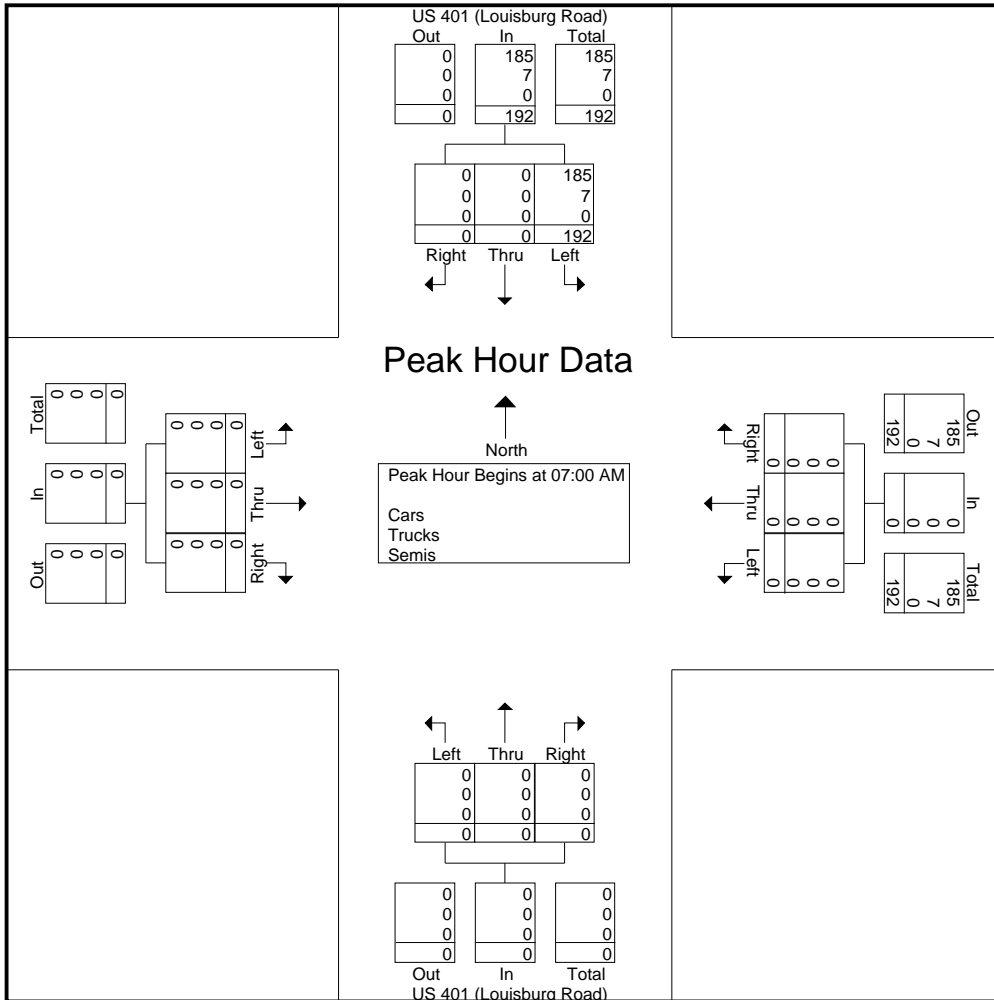
Groups Printed- Cars - Trucks - Semis

Start Time	US 401 (Louisburg Road) From North					From East					US 401 (Louisburg Road) From South					From West					Exclu. Total	Inclu. Total	Int. Total	
	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total	Right	Thru	Left	Peds	App. Total				
07:00 AM	0	0	87	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	87
07:15 AM	0	0	34	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	34
07:30 AM	0	0	26	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	26
07:45 AM	0	0	45	0	45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	45
Total	0	0	192	0	192	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	192	192	
08:00 AM	0	0	37	0	37	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37	37	
08:15 AM	0	0	44	0	44	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	44	
08:30 AM	0	0	39	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39	39	
08:45 AM	0	0	57	0	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57	57	
Total	0	0	177	0	177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	177	177	
*** BREAK ***																								
04:00 PM	0	0	87	0	87	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	87	
04:15 PM	0	0	73	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	73	
04:30 PM	0	0	65	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	65	
04:45 PM	0	0	82	0	82	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	82	
Total	0	0	307	0	307	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	307	307	
05:00 PM	0	0	73	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	73	73	
05:15 PM	0	0	58	0	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	58	
05:30 PM	0	0	76	0	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	76	76	
05:45 PM	0	0	62	0	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	62	62	
Total	0	0	269	0	269	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	269	269	
Grand Total	0	0	945	0	945	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	945	945	
Apprch %	0	0	100			0	0	0			0	0	0			0	0	0						
Total %	0	0	100		100	0	0	0		0	0	0	0		0	0	0	0		0	0	100		
Cars	0	0	900		900	0	0	0		0	0	0	0		0	0	0	0		0	0	0	900	
% Cars	0	0	95.2		95.2	0	0	0		0	0	0	0		0	0	0	0		0	0	0	95.2	
Trucks	0	0	43		43	0	0	0		0	0	0	0		0	0	0	0		0	0	0	43	
% Trucks	0	0	4.6		4.6	0	0	0		0	0	0	0		0	0	0	0		0	0	0	4.6	
Semis	0	0	2		2	0	0	0		0	0	0	0		0	0	0	0		0	0	0	2	
% Semis	0	0	0.2		0.2	0	0	0		0	0	0	0		0	0	0	0		0	0	0	0.2	



8210 University Executive Park
Charlotte, NC 28262

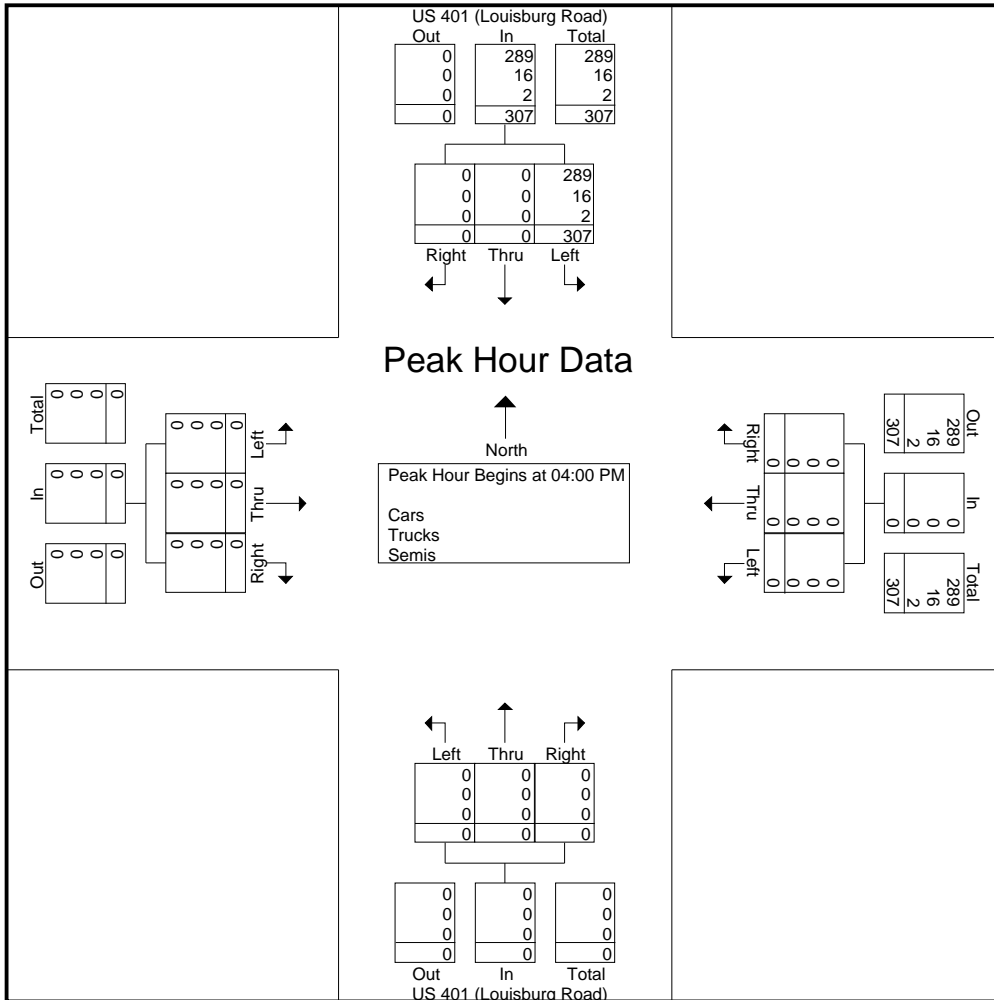
File Name : US 401 Southern U-Turn Bulb
Site Code : 00000001
Start Date : 1/10/2023
Page No : 3





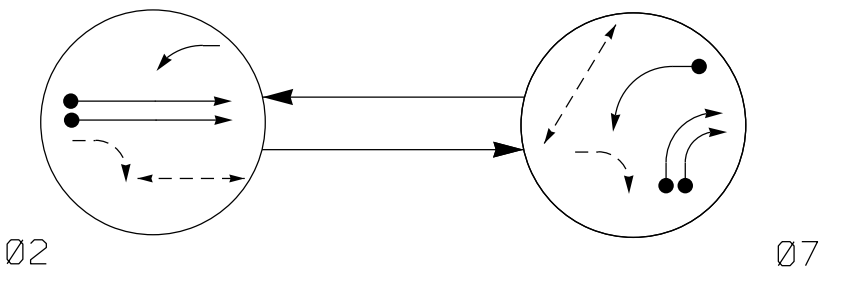
8210 University Executive Park
Charlotte, NC 28262

File Name : US 401 Southern U-Turn Bulb
Site Code : 00000001
Start Date : 1/10/2023
Page No : 5

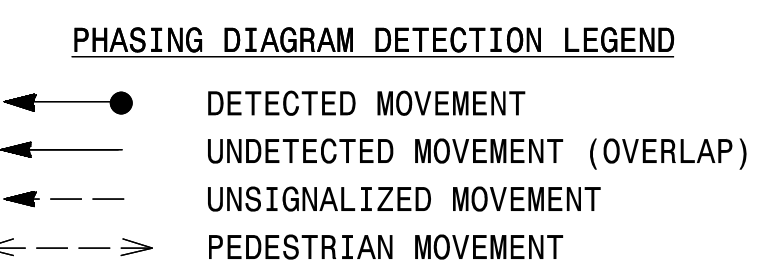
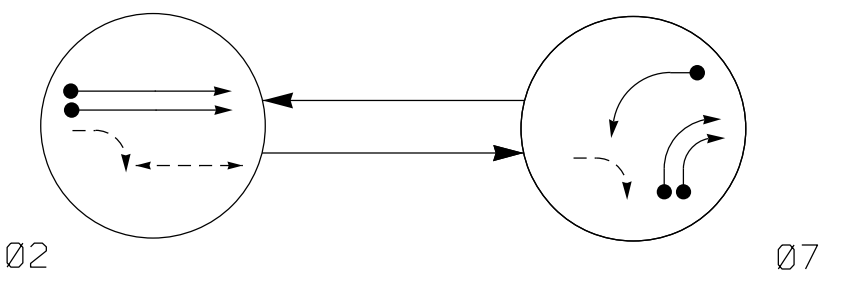


2 Phase Fully Actuated w/ EV Preemption
US 401 Bypass (Rolesville) CLS
Signal System #: 10552

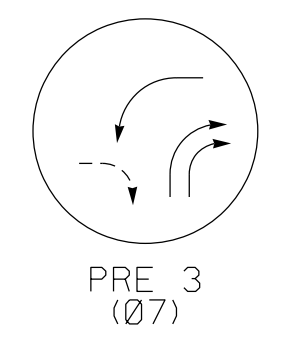
DEFAULT PHASING DIAGRAM



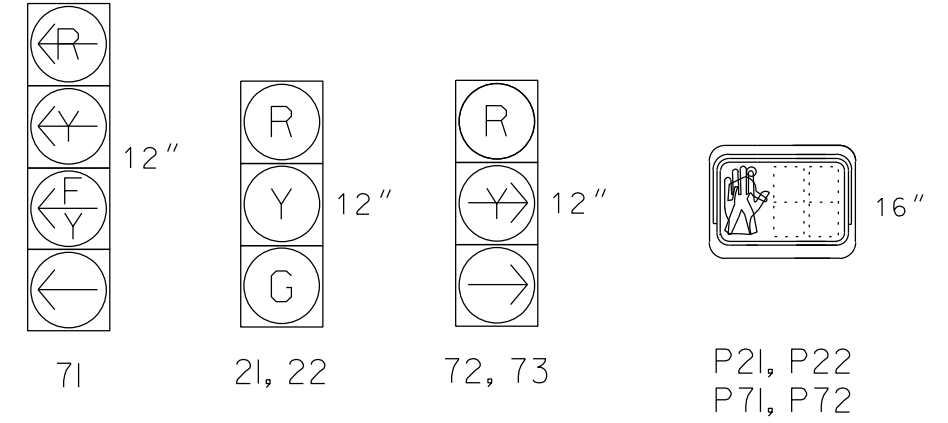
ALTERNATE PHASING DIAGRAM



EV PREEMPT PHASES
(Medium Priority)



SIGNAL FACE I.D.
All Heads L.E.D.



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02	07	PRE	FLASH
21, 22	G	R	R	Y
71	Y	Y	Y	Y
72, 73	R	Y	Y	R
P21, P22	W	DW	DW	DRK
P71, P72	DW	W	DW	DRK

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	02	07	PRE	FLASH
21, 22	G	R	R	Y
71	Y	Y	Y	Y
72, 73	R	Y	Y	R
P21, P22	W	DW	DW	DRK
P71, P72	DW	W	DW	DRK

W - Walk
 DW - Don't Walk
 DRK - Dark

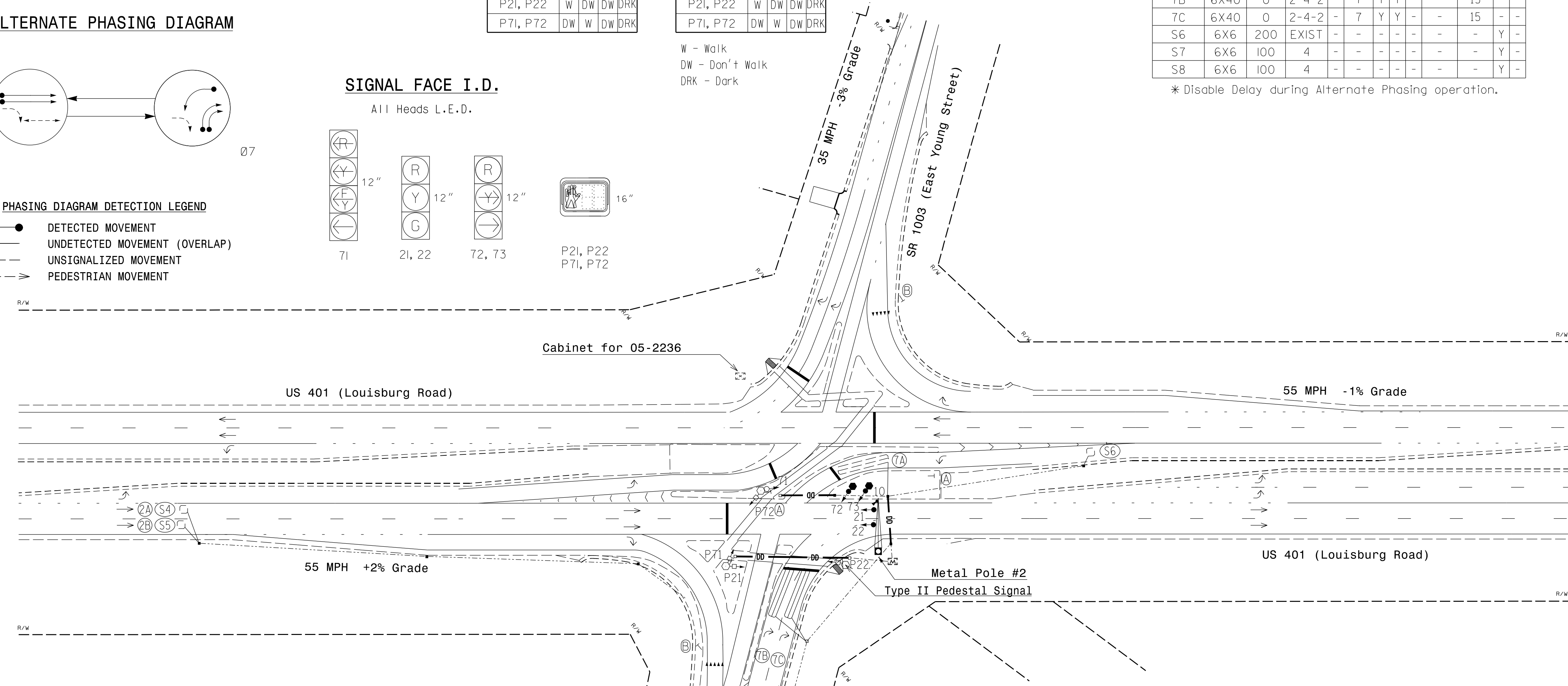
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
					PHASE	CALLING	EXTENSION	FULL TIME DELAY			
2A/S4	6X6	420	EXIST	-	2	Y	Y	-	-	Y	-
2B/S5	6X6	420	EXIST	-	2	Y	Y	-	-	Y	-
7A	6X40	0	2-4-2	-	7	Y	Y	-	-	15*	-
7B	6X40	0	2-4-2	-	7	Y	Y	-	-	15	-
7C	6X40	0	2-4-2	-	7	Y	Y	-	-	15	-
S6	6X6	200	EXIST	-	-	-	-	-	-	Y	-
S7	6X6	100	4	-	-	-	-	-	-	Y	-
S8	6X6	100	4	-	-	-	-	-	-	Y	-

* Disable Delay during Alternate Phasing operation.

NOTES

- Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
- Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
- Set all detector units to presence mode.
- Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
- Program pedestrian heads to countdown flashing "DON'T WALK" time only.
- This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
- Optical detector 10 calls PRE 3.
- The Division Traffic Engineer will determine the hours of use for each phasing plan.
- Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
- Closed loop system data:
 Master Asset #: 10552,
 Controller Asset #: 2290.



OASIS 2070 TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	14	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	25
Yellow Clearance	5.0	3.0
Red Clearance	1.0	2.8
Red Revert	2.0	2.0
Walk 1 *	7	7
Don't Walk 1	13	10
Seconds Per Actuation *	1.5	-
Max Variable Initial *	46	-
Time Before Reduction *	15	-
Time To Reduce *	45	-
Minimum Gap	3.4	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

OASIS 2070 EV PREEMPT

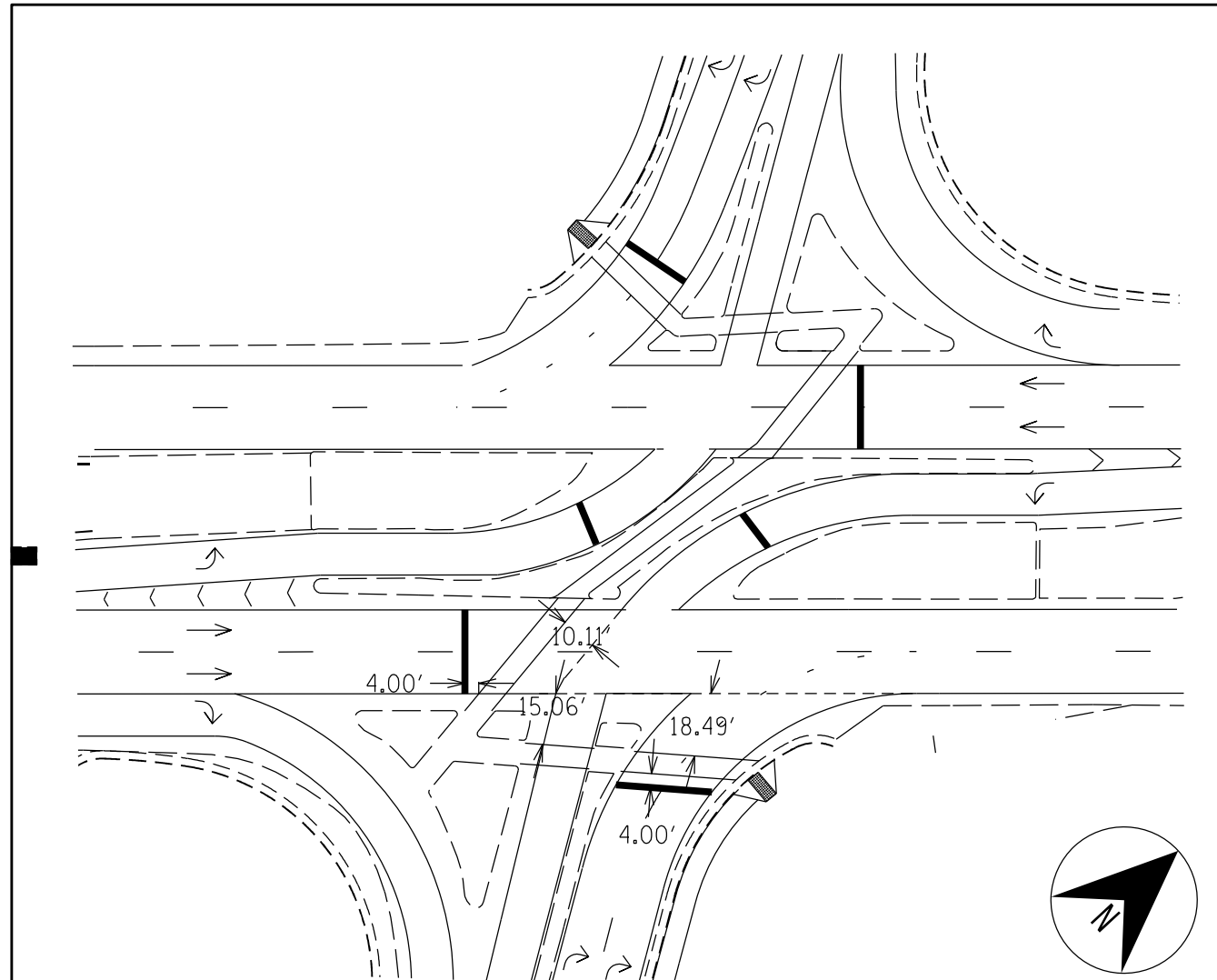
FUNCTION	PRE 3
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	2
Priority	MED
Delay Time	0
Min Green Before Pre	1
Ped Clear Before Pre	7
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	10
Dwell Max Time (Minutes)	2
Enable Backup Protection	N
Ped Clear Through Yellow	Y
Omit Overlaps	-
Preempt Extend**	2

* Time defaults to time used for phase during normal operation
 ** Program Timing on Optical Detection Unit

LEGEND

PROPOSED	EXISTING
○ → Traffic Signal Head	● → N/A
○ → Modified Signal Head	○ → N/A
○ → Sign	○ → N/A
○ → Pedestrian Signal Head With Push Button & Sign	○ → N/A
○ → Signal Pole with Guy	○ → N/A
○ → Signal Pole with Sidewalk Guy	○ → N/A
□ → Inductive Loop Detector	□ → N/A
□ → Controller & Cabinet	□ → N/A
□ → Junction Box	□ → N/A
--- 2-in Underground Conduit	--- N/A
N/A → Right of Way	N/A → N/A
→ Directional Arrow	→ N/A
○ → Metal Pole with Mastarm	○ → N/A
N/A → Directional Drill	N/A → N/A
○ → Optical Detector	○ → N/A
□ → Master Controller & Cabinet	□ → N/A
○ → No U-Turn Sign (R3-4)	○ → N/A
○ → "YIELD" Sign (R1-2)	○ → N/A
N/A → Curb Ramp	N/A → N/A

NC Dept of Transportation
 Division of Highways
 Final Drawing Date: 1/16/2020
 ITS & Signals Unit



Stopbar Locations For:
 US 401 NB (Louisburg Road) at SR 1003 (East Young Street)

Signal Upgrade

Prepared in the Offices of:
 Transportation Mobility and Safety Division
 DEPARTMENT OF TRANSPORTATION
 STATE OF NORTH CAROLINA
 Signal Design Section
 750 N. Greenfield Pkwy, Garner, NC 27529

US 401 NB (Louisburg Road) at SR 1003 (East Young Street)

Division 5 Wake County Rolesville

PLAN DATE: November 2019 REVIEWED BY: T. Kirk

PREPARED BY: T. Wells REVIEWED BY:

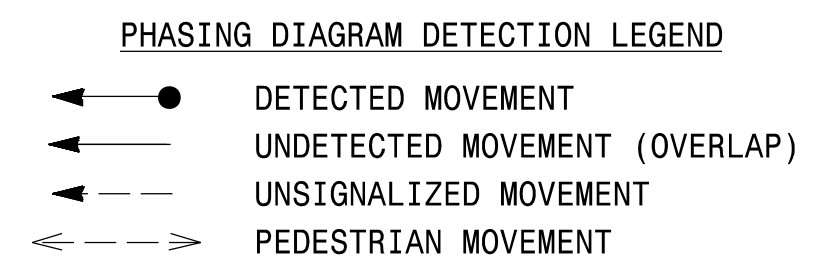
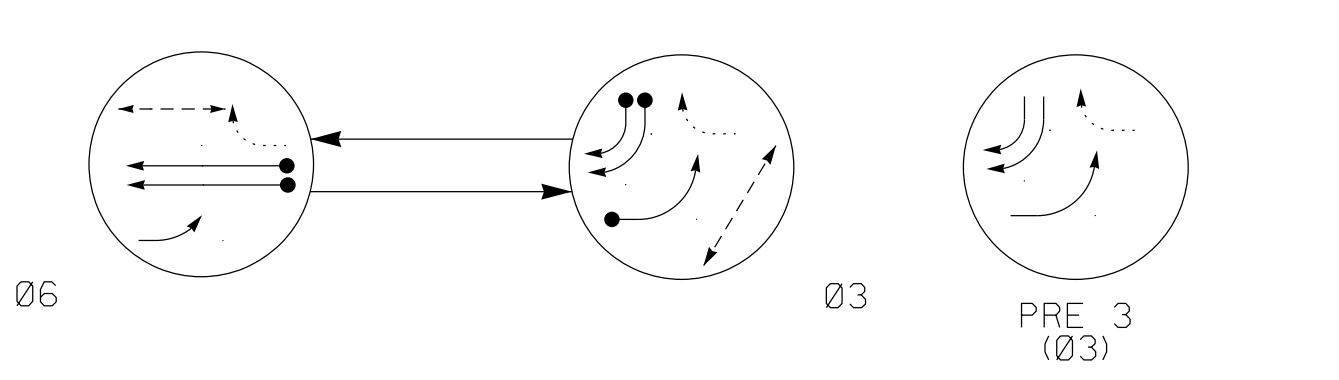
REVISIONS	INIT.	DATE

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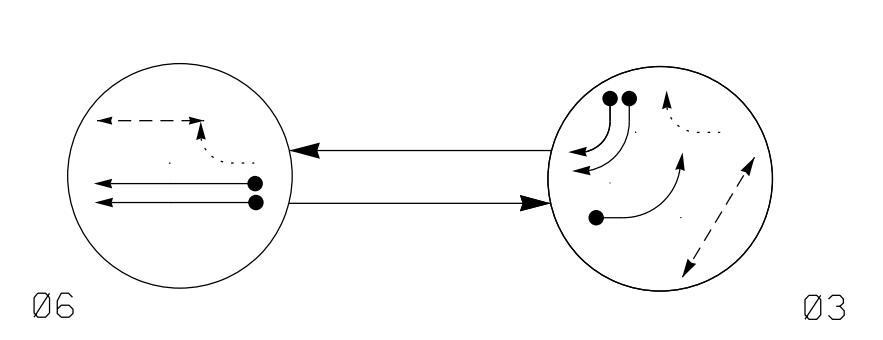
NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 043930
 TIMOTHY S. KIRK
 11/20/2019
 DATE
 SIG. INVENTORY NO. 05-2390

44823\$CTIME\$44823\$
 44823\$USER\$44823\$
 44823\$DATE\$44823\$
 44823\$TIME\$44823\$

DEFAULT PHASING DIAGRAM EV PREEMPT PHASES (Medium Priority)



ALTERNATE PHASING DIAGRAM



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	06	03	PRE 3 (03)	06
31	←	→	←	→
32, 33	←	→	←	→
61, 62	←	→	←	→
P31, P32	←	→	←	→
P61, P62 P63, P64	←	→	←	→

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	06	03	PRE 3 (03)	06
31	←	→	←	→
32, 33	←	→	←	→
61, 62	←	→	←	→
P31, P32	←	→	←	→
P61, P62 P63, P64	←	→	←	→

OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	DETECTOR PROGRAMMING				SYSTEM LOOP	NEW CARD	
				NEW LOOP	PHASE	CALLING	EXTENSION			
3A	6X40	0	2-4-2	-	3	Y	Y	-	15*	-
3B	6X40	0	2-4-2	-	3	Y	Y	-	15	-
3C	6X40	0	2-4-2	-	3	Y	Y	-	15	-
6A/S9	6X6	420	EXIST	-	6	Y	Y	-	-	Y
6B/S10	6X6	420	EXIST	-	6	Y	Y	-	-	Y
S11	6X6	200	EXIST	-	-	-	-	-	-	Y
S12	6X6	100	4	-	-	-	-	-	-	Y
S13	6X6	100	4	-	-	-	-	-	-	Y

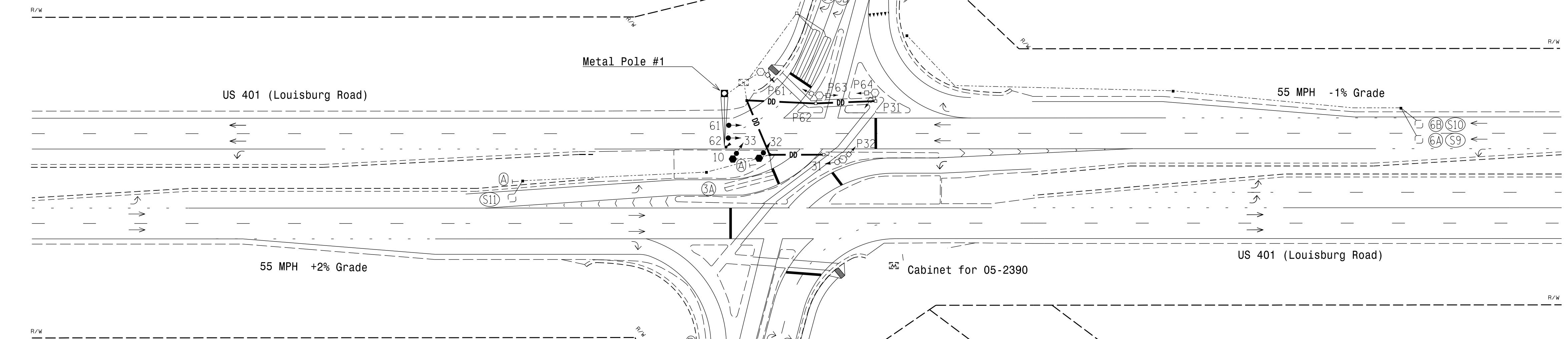
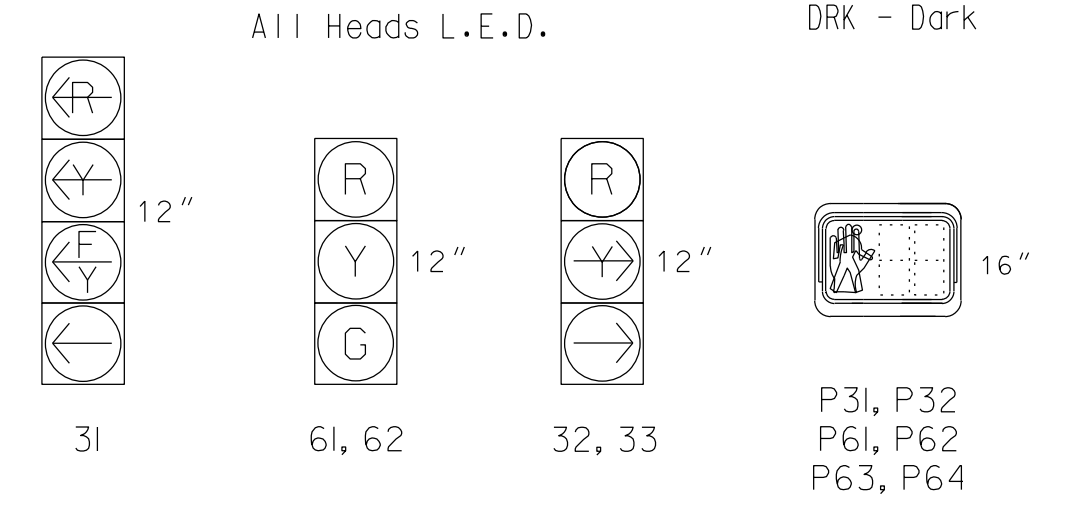
*Disable Delay during Alternate Phasing operation.

2 Phase Fully Actuated w/ EV Preemption US 401 Bypass (Rolesville) CLS Signal System #: 10552

NOTES

1. Refer to "Roadway Standard Drawings NCDOT" dated January 2018 and "Standard Specifications for Roads and Structures" dated January 2018.
2. Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
3. Set all detector units to presence mode.
4. Omit "WALK" and flashing "DON'T WALK" with no pedestrian calls.
5. Program pedestrian heads to countdown flashing "DON'T WALK" time only.
6. This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
7. Optical detector 10 calls PRE 3.
8. The Division Traffic Engineer will determine the hours of use for each phasing plan.
9. Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
10. Closed loop system data: Controller Asset #: 2236.

SIGNAL FACE I.D.



OASIS 2070 TIMING CHART

FEATURE	PHASE	
	3	6
Min Green 1 *	7	14
Extension 1 *	2.0	6.0
Max Green 1 *	25	90
Yellow Clearance	3.0	5.3
Red Clearance	2.6	1.1
Red Revert	2.0	2.0
Walk 1 *	7	7
Don't Walk 1	10	12
Seconds Per Actuation *	-	1.5
Max Variable Initial *	-	46
Time Before Reduction *	-	15
Time To Reduce *	-	45
Minimum Gap	-	3.4
Recall Mode	-	MIN RECALL
Vehicle Call Memory	-	YELLOW
Dual Entry	-	-
Simultaneous Gap	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

OASIS 2070 EV PREEMPT

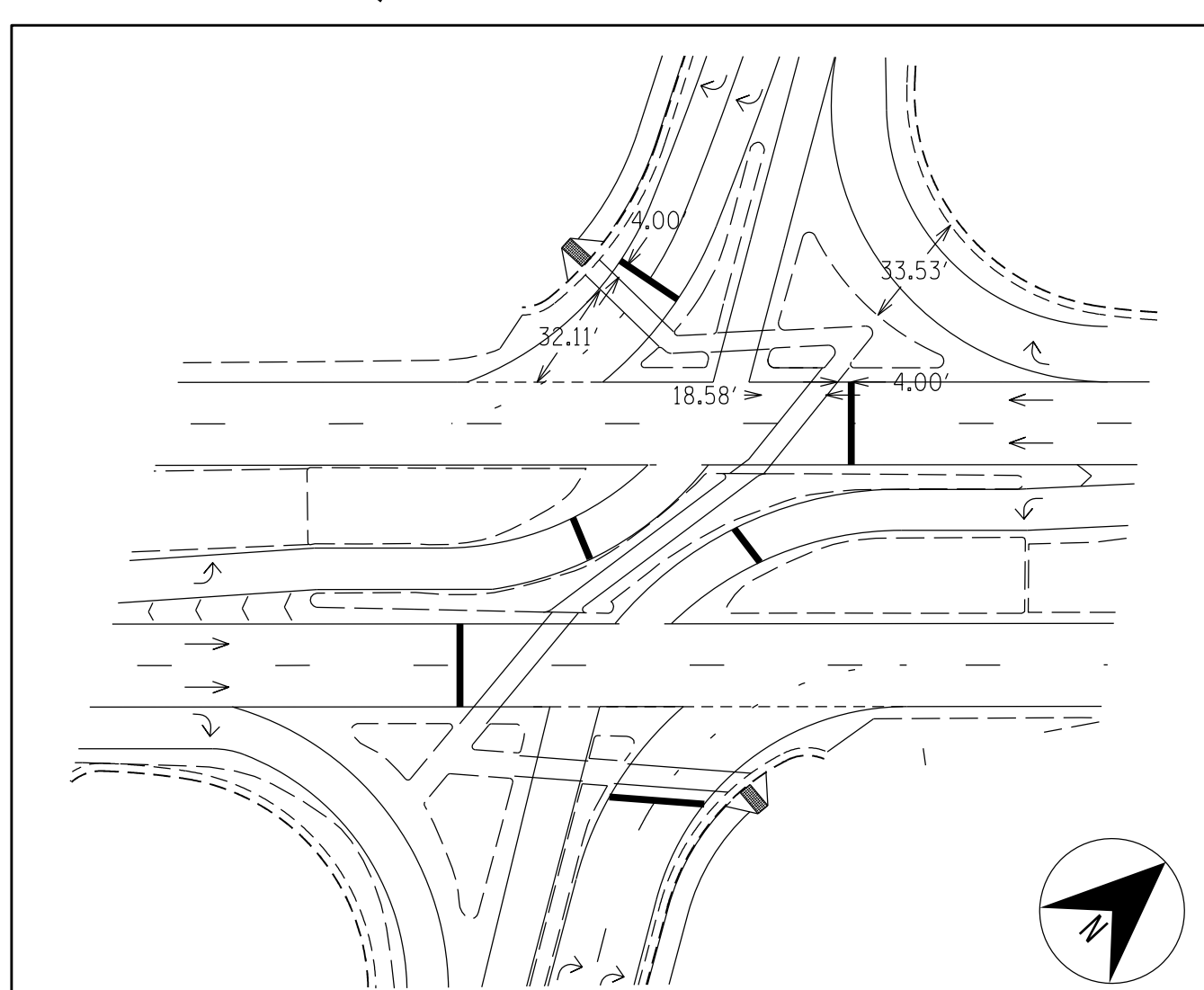
FUNCTION	PRE 3
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	6
Priority	MED
Delay Time	0
Min Green Before Pre	1
Ped Clear Before Pre	7
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	10
Dwell Max Time (Minutes)	2
Enable Backup Protection	N
Ped Clear Through Yellow	Y
Omit Overlaps	-
Preempt Extend**	2

* Time defaults to time used for phase during normal operation
** Program Timing on Optical Detection Unit

LEGEND

PROPOSED	EXISTING
○ Traffic Signal Head	● Traffic Signal Head
○ Modified Signal Head	N/A
○ Sign	N/A
○ Pedestrian Signal Head With Push Button & Sign	○ Pedestrian Signal Head
○ Signal Pole with Guy	○ Signal Pole with Guy
○ Signal Pole with Sidewalk Guy	○ Signal Pole with Sidewalk Guy
○ Inductive Loop Detector	○ Inductive Loop Detector
○ Controller & Cabinet	○ Controller & Cabinet
○ Junction Box	○ Junction Box
○ 2-in Underground Conduit	○ 2-in Underground Conduit
N/A	○ Right of Way
○ Directional Arrow	○ Directional Arrow
○ Metal Pole with Mastarm	○ Metal Pole with Mastarm
○ Type II Signal Pedestal	○ Type II Signal Pedestal
N/A	○ Directional Drill
○ Optical Detector	○ Optical Detector
○ No U-Turn Sign (R3-4)	○ No U-Turn Sign (R3-4)
○ "YIELD" Sign (R1-2)	○ "YIELD" Sign (R1-2)
N/A	○ Curb Ramp

NC Dept of Transportation
Division of Highways
Final Drawing Date: 1/16/2020
ITS & Signals Unit



Stopbar Locations For:
US 401 SB (Louisburg Road) at SR 1003 (East Young Street)

Signal Upgrade

Prepared in the Offices of:
TIMOTHY S. KIRK
Professional Engineer
11/20/2019

US 401 SB (Louisburg Road) at SR 1003 (East Young Street)

Division 5 Wake County Rolesville

PLAN DATE: November 2019 REVIEWED BY: T. Kirk

PREPARED BY: T. Wells REVIEWED BY:

REVISIONS	REVISIONS	INIT.	DATE

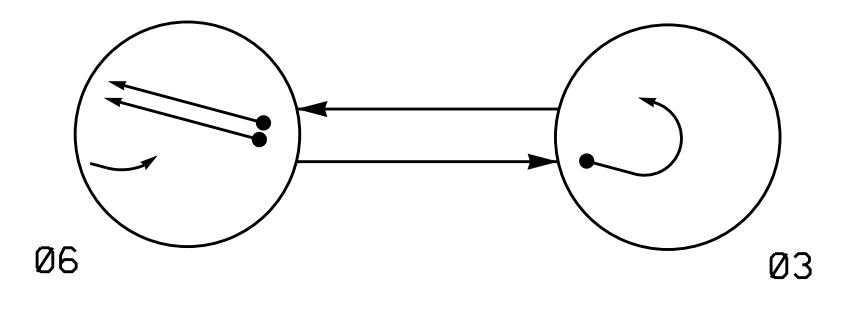
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SEAL
TIMOTHY S. KIRK
PROFESSIONAL ENGINEER
043930
11/20/2019

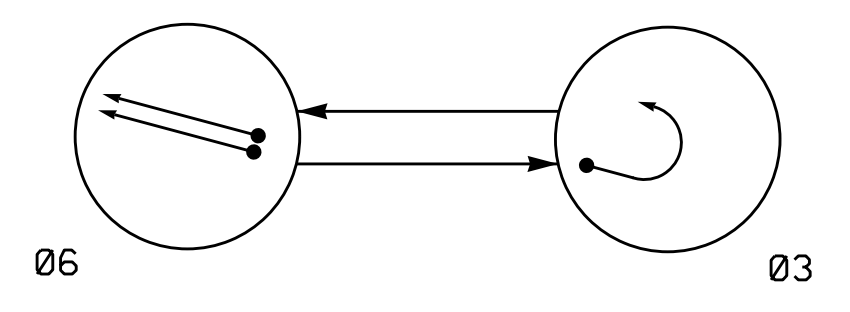
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2 Phase Fully Actuated w/ EV Preemption US 401 Bypass (Rolesville) CLS

DEFAULT PHASING DIAGRAM

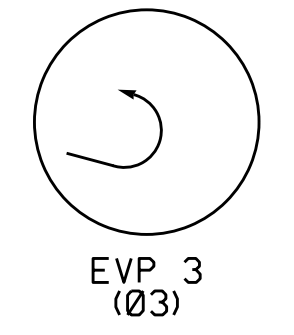


ALTERNATE PHASING DIAGRAM



PHASING DIAGRAM DETECTION LEGEND
 ● DETECTED MOVEMENT
 ○ UNDETECTED MOVEMENT (OVERLAP)
 - - - UNSIGNALIZED MOVEMENT
 - - - PEDESTRIAN MOVEMENT

EV PREEMPT PHASES (Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	06	03	EVP 3	FLASH
3l, 32	F	Y	←	→
6l, 62	G	R	R	Y

ALTERNATE PHASING TABLE OF OPERATION

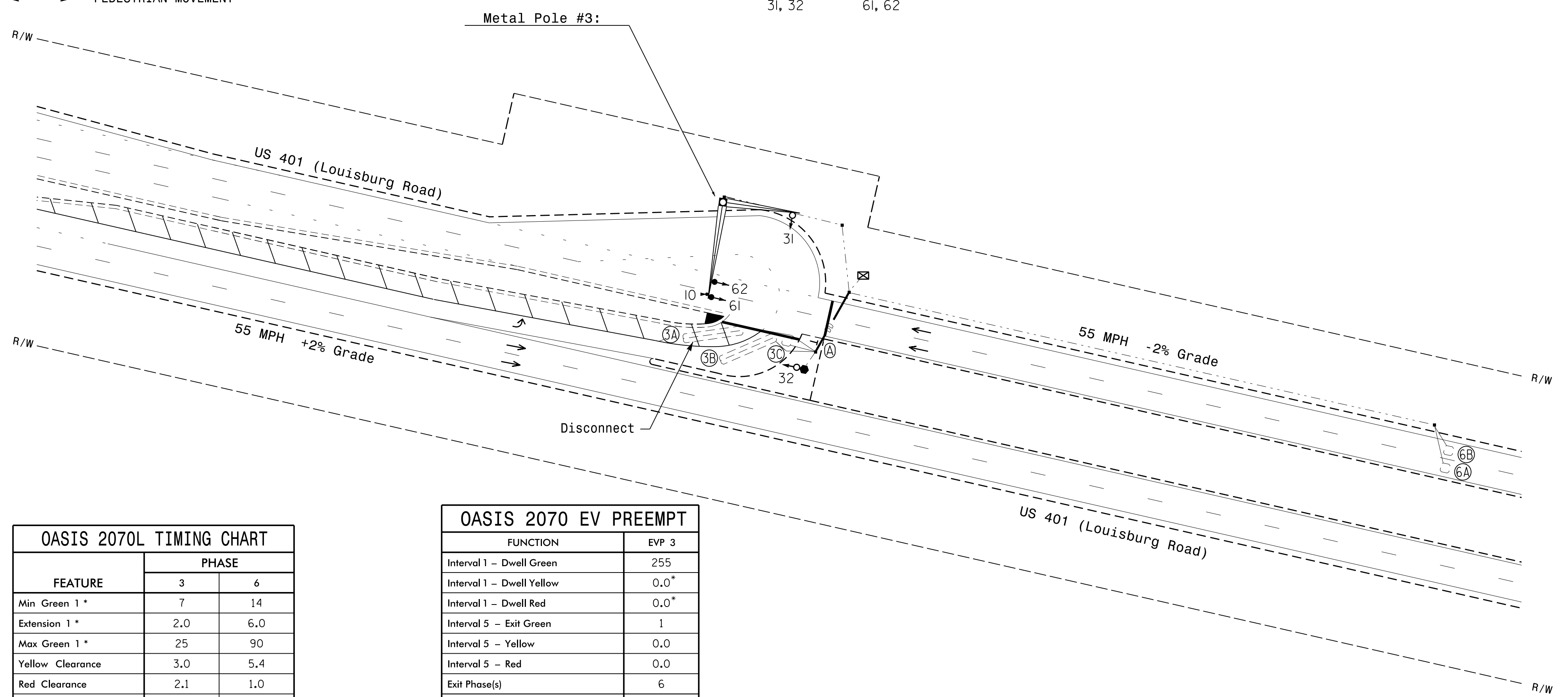
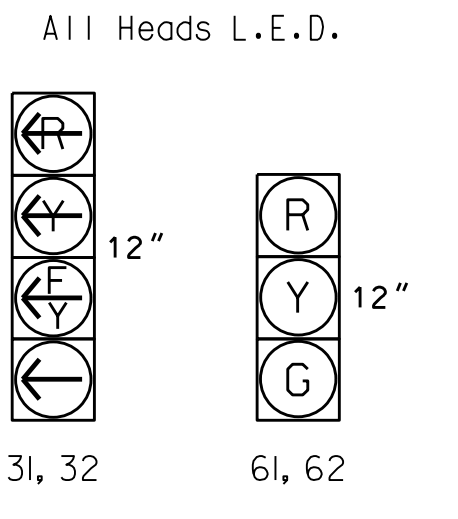
SIGNAL FACE	PHASE			
	06	03	EVP 3	FLASH
3l, 32	←	→	←	→
6l, 62	G	R	R	Y

OASIS 2070L LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING							
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME	DELAY TIME	SYSTEM LOOP	NEW CARD
3A	6X40	0	2-4-2	-	DISCONNECT							
3B	6X40	0	2-4-2	-	3	Y	Y	-	-	15*	-	Y
3C	6X6	0	EXIST	-	3	Y	Y	-	-	15*	-	Y
6A	6X6	420	EXIST	-	6	Y	Y	-	-	-	-	Y
6B	6X6	420	EXIST	-	6	Y	Y	-	-	-	-	Y

*Disable Delay during Alternate Phasing operation.

SIGNAL FACE I.D.



OASIS 2070L TIMING CHART

FEATURE	PHASE	
	3	6
Min Green 1 *	7	14
Extension 1 *	2.0	6.0
Max Green 1 *	25	90
Yellow Clearance	3.0	5.4
Red Clearance	2.1	1.0
Red Revert	2.0	2.0
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	-	1.5
Max Variable Initial *	-	46
Time Before Reduction *	-	15
Time To Reduce *	-	45
Minimum Gap	-	3.4
Recall Mode	-	MIN RECALL
Vehicle Call Memory	-	YELLOW
Dual Entry	-	-
Simultaneous Gap	ON	ON

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 6 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

OASIS 2070 EV PREEMPT

FUNCTION	EVP 3
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	6
Priority	MED
Delay Time	0
Min Green Before Pre	1
Ped Clear Before Pre	0
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	10
Dwell Max Time (Minutes)	2
Enable Backup Protection	N
Ped Clear Through Yellow	N
Omit Overlaps	-
Preempt Extend**	2

** Time defaults to time used for phase during normal operation Program Timing on Optical Detection Unit

- NOTES
- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
 - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
 - Set all detector units to presence mode.
 - Locate new cabinet so as not to obstruct sight distance of vehicles turning right on red.
 - Disconnect existing loop 3A.
 - Pavement markings are existing unless otherwise shown.
 - Remove existing "LEFT ON GREEN ARROW ONLY" (R10-5) signs.
 - This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
 - Optical detector 10 calls EVP 3.
 - The Division Traffic Engineer will determine the hours of use for each phasing plan.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
 - Closed loop system data: Controller Asset #: 2391.

LEGEND

PROPOSED	EXISTING
○ Traffic Signal Head	● Traffic Signal Head
○ Modified Signal Head	N/A
⊥ Sign	⊥ Sign
⊥ Pedestrian Signal Head With Push Button & Sign	⊥ Pedestrian Signal Head With Push Button & Sign
○ Signal Pole with Guy	● Signal Pole with Guy
○ Signal Pole with Sidewalk Guy	● Signal Pole with Sidewalk Guy
⊗ Inductive Loop Detector	⊗ Inductive Loop Detector
□ Controller & Cabinet	□ Controller & Cabinet
□ Junction Box	□ Junction Box
- - - 2-in Underground Conduit	- - - 2-in Underground Conduit
N/A Right of Way	- - - Right of Way
➔ Directional Arrow	➔ Directional Arrow
○ Metal Pole with Mastarm	○ Metal Pole with Mastarm
○ Type II Signal Pedestal	○ Type II Signal Pedestal
N/A Directional Drill	○ Directional Drill
○ Optical Detector	○ Optical Detector
△ No Left Turn Sign (R3-2)	△ No Left Turn Sign (R3-2)

Signal Upgrade

US 401 SB (Louisburg Road) at U-Turn North of SR 1003 (Rolesville Road)

Division 5 Wake County Rolesville

PLAN DATE: March 2016 REVIEWED BY: M.E. Giles

PREPARED BY: M.E. Giles REVIEWED BY:

REVISIONS: _____ INIT. DATE

SCALE: 1"=50'

750 N. Greenfield Pkwy, Garner, NC 27529

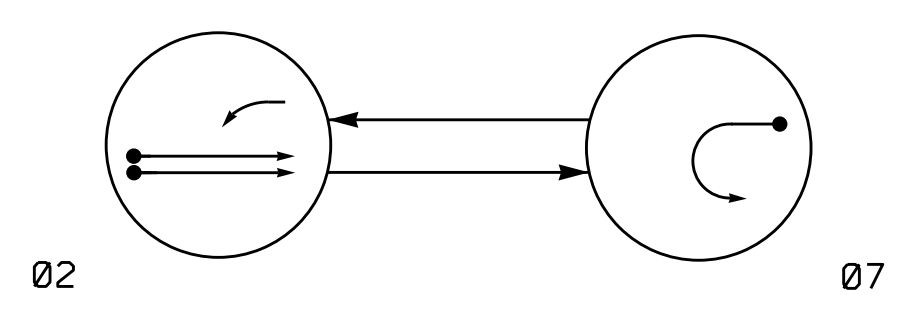
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER ROBERT J. ZIEGLER

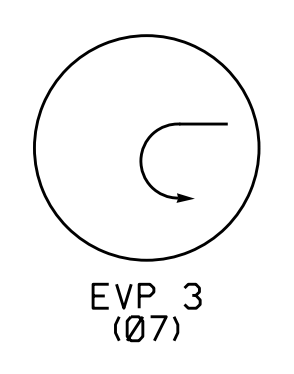
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DEFAULT PHASING DIAGRAM



EV PREEMPT PHASES (Medium Priority)



DEFAULT PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 2	Ø 7	EVP 3	F LASH
21, 22	G	R	R	Y
71, 72	F	←	←	←

ALTERNATE PHASING TABLE OF OPERATION

SIGNAL FACE	PHASE			
	Ø 2	Ø 7	EVP 3	F LASH
21, 22	G	R	R	Y
71, 72	←	←	←	←

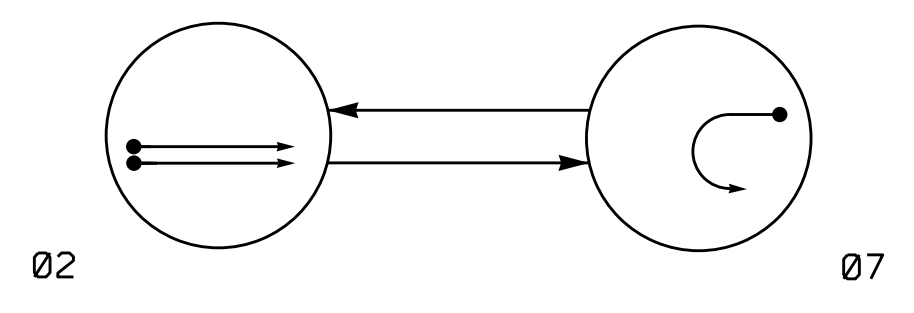
OASIS 2070 LOOP & DETECTOR INSTALLATION CHART

LOOP	SIZE (FT)	DISTANCE FROM STOPBAR (FT)	TURNS	NEW LOOP	DETECTOR PROGRAMMING					SYSTEM LOOP NEW CARD		
					PHASE	CALLING	EXTENSION	FULL TIME DELAY	STRETCH TIME		DELAY TIME	
2A/S1	6X6	420	EXIST	-	2	Y	Y	-	-	-	Y	-
2B/S2	6X6	420	EXIST	-	2	Y	Y	-	-	-	Y	-
7A	6X40	0	2-4-2	-	7	Y	Y	-	-	15*	-	-
7B	6X40	0	2-4-2	-	7	Y	Y	-	-	15*	-	-
S3	6X6	200	EXIST	-	-	-	-	-	-	-	Y	-

*Disable Delay during Alternate Phasing operation.

2 Phase Fully Actuated w/ EV Preemption US 401 Bypass (Rolesville) CLS

ALTERNATE PHASING DIAGRAM

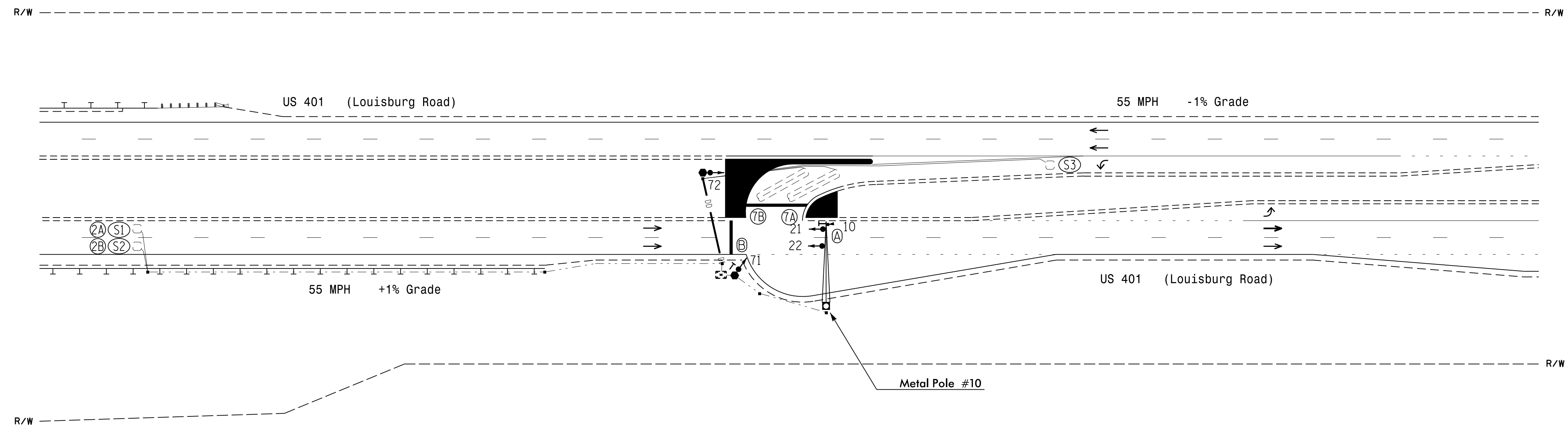
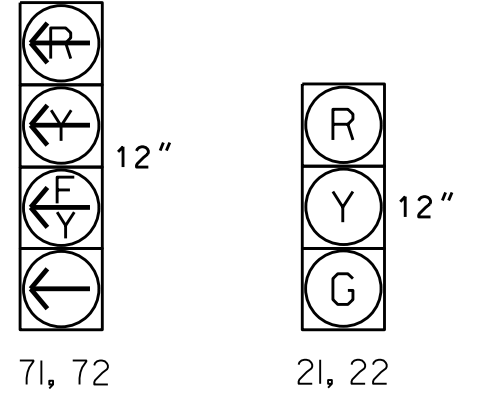


PHASING DIAGRAM DETECTION LEGEND

- DETECTED MOVEMENT
- UNDETECTED MOVEMENT (OVERLAP)
- UNSIGNALIZED MOVEMENT
- PEDESTRIAN MOVEMENT

SIGNAL FACE I.D.

All Heads L.E.D.



- NOTES
- Refer to "Roadway Standard Drawings NCDOT" dated January 2012 and "Standard Specifications for Roads and Structures" dated January 2012.
 - Do not program signal for late night flashing operation unless otherwise directed by the Engineer.
 - Set all detector units to presence mode.
 - Pavement markings are existing.
 - This intersection features an optical preemption system. Shown locations of optical detectors are conceptual only.
 - Optical detector 10 calls EVP 3.
 - The Division Traffic Engineer will determine the hours of use for each phasing plan.
 - Maximum times shown in timing chart are for free-run operation only. Coordinated signal system timing values supersede these values.
 - Closed loop system data: Controller Asset #: 2425.

LEGEND

PROPOSED	EXISTING
Traffic Signal Head	N/A
Modified Signal Head	N/A
Sign	N/A
Pedestrian Signal Head With Push Button & Sign	N/A
Signal Pole with Guy	N/A
Signal Pole with Sidewalk Guy	N/A
Inductive Loop Detector	N/A
Controller & Cabinet	N/A
Junction Box	N/A
2-in Underground Conduit	N/A
Right of Way	N/A
Directional Arrow	N/A
Metal Pole with Mastarm	N/A
Guardrail	N/A
Type II Signal Pedestal	N/A
Directional Drill	N/A
Optical Detector	N/A
No Left Turn Sign (R3-2)	N/A
No Right Turn Sign (R3-1)	N/A

OASIS 2070 LOOP TIMING CHART

FEATURE	PHASE	
	2	7
Min Green 1 *	14	7
Extension 1 *	6.0	2.0
Max Green 1 *	90	25
Yellow Clearance	5.2	3.0
Red Clearance	1.0	1.8
Red Revert	2.0	2.0
Walk 1 *	-	-
Don't Walk 1	-	-
Seconds Per Actuation *	1.5	-
Max Variable Initial *	46	-
Time Before Reduction *	15	-
Time To Reduce *	45	-
Minimum Gap	3.4	-
Recall Mode	MIN RECALL	-
Vehicle Call Memory	YELLOW	-
Dual Entry	-	-
Simultaneous Gap	ON	ON

OASIS 2070 EV PREEMPT

FUNCTION	EVP 3
Interval 1 - Dwell Green	255
Interval 1 - Dwell Yellow	0.0*
Interval 1 - Dwell Red	0.0*
Interval 5 - Exit Green	1
Interval 5 - Yellow	0.0
Interval 5 - Red	0.0
Exit Phase(s)	2
Priority	MED
Delay Time	0
Min Green Before Pre	1
Ped Clear Before Pre	0
Yellow Clear Before Pre	0.0*
Red Clear Before Pre	0.0*
Dwell Min Time	10
Dwell Max Time (Minutes)	2
Enable Backup Protection	N
Ped Clear Through Yellow	N
Omit Overlaps	-
Preempt Extend**	2

* These values may be field adjusted. Do not adjust Min Green and Extension times for phase 2 lower than what is shown. Min Green for all other phases should not be lower than 4 seconds.

* Time defaults to time used for phase during normal operation
** Program Timing on Optical Detection Unit

Signal Upgrade

US 401 NB (Louisburg Road) at U-Turn South of SR 1003 (Rolesville Road)

Division 5 Wake County Rolesville

PLAN DATE: February 2016 REVIEWED BY: M.E. Giles

PREPARED BY: M.E. Giles REVIEWED BY: [Signature]

750 N. Greenfield Pkwy, Garner, NC 27529

SCALE 0 50 1"=50'

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SEAL: ROBERT J. ZIEMBA, ENGINEER, 026486

SIG. INVENTORY NO. 05-2425

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APPENDIX C

INTERNAL CAPTURE CALCULATIONS

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	1216 Rolesville Road	Organization:	RKA
Project Location:	Rolesville, NC	Performed By:	MM
Scenario Description:	Full-Build	Date:	12/14/2022
Analysis Year:	2028	Checked By:	
Analysis Period:	AM Street Peak Hour	Date:	

Table 1-A: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office						
Retail	822	30	KSF	59	36	23
Restaurant						
Cinema/Entertainment						
Residential	215	68	DU	30	7	23
Hotel						
All Other Land Uses ²				89	43	46

Table 2-A: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-A: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail						
Restaurant						
Cinema/Entertainment						
Residential						
Hotel						

Table 4-A: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	0	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	0	0	0		0
Hotel	0	0	0	0	0	

Table 5-A: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	98	48	50
Internal Capture Percentage	0%	0%	0%
External Vehicle-Trips ⁵	89	43	46
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-A: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	0%	0%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	0%	0%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-A vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made to Tables 5-A, 9-A (O and D). Enter transit, non-motorized percentages that will result with proposed mixed-use project complete.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-A.

⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

NCHRP 684 Internal Trip Capture Estimation Tool			
Project Name:	1216 Rolesville Road	Organization:	RKA
Project Location:	Rolesville, NC	Performed By:	MM
Scenario Description:	Full-Build	Date:	12/14/2022
Analysis Year:	2028	Checked By:	
Analysis Period:	PM Street Peak Hour	Date:	

Table 1-P: Base Vehicle-Trip Generation Estimates (Single-Use Site Estimate)						
Land Use	Development Data (For Information Only)			Estimated Vehicle-Trips ³		
	ITE LUCs ¹	Quantity	Units	Total	Entering	Exiting
Office						
Retail	822	30	KSF	170	85	85
Restaurant						
Cinema/Entertainment						
Residential	215	68	DU	37	22	15
Hotel						
All Other Land Uses ²						
				207	107	100

Table 2-P: Mode Split and Vehicle Occupancy Estimates						
Land Use	Entering Trips			Exiting Trips		
	Veh. Occ. ⁴	% Transit	% Non-Motorized	Veh. Occ. ⁴	% Transit	% Non-Motorized
Office	1.10	0%	0%	1.10	0%	0%
Retail	1.10	0%	0%	1.10	0%	0%
Restaurant	1.10	0%	0%	1.10	0%	0%
Cinema/Entertainment	1.10	0%	0%	1.10	0%	0%
Residential	1.10	0%	0%	1.10	0%	0%
Hotel	1.10	0%	0%	1.10	0%	0%
All Other Land Uses ²	1.10	0%	0%	1.10	0%	0%

Table 3-P: Average Land Use Interchange Distances (Feet Walking Distance)						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office						
Retail					500	
Restaurant						
Cinema/Entertainment						
Residential		500				
Hotel						

Table 4-P: Internal Person-Trip Origin-Destination Matrix*						
Origin (From)	Destination (To)					
	Office	Retail	Restaurant	Cinema/Entertainment	Residential	Hotel
Office		0	0	0	0	0
Retail	0		0	0	11	0
Restaurant	0	0		0	0	0
Cinema/Entertainment	0	0	0		0	0
Residential	0	6	0	0		0
Hotel	0	0	0	0	0	

Table 5-P: Computations Summary			
	Total	Entering	Exiting
All Person-Trips	229	118	111
Internal Capture Percentage	15%	14%	15%
External Vehicle-Trips ⁵	177	92	85
External Transit-Trips ⁶	0	0	0
External Non-Motorized Trips ⁶	0	0	0

Table 6-P: Internal Trip Capture Percentages by Land Use		
Land Use	Entering Trips	Exiting Trips
Office	N/A	N/A
Retail	6%	12%
Restaurant	N/A	N/A
Cinema/Entertainment	N/A	N/A
Residential	46%	35%
Hotel	N/A	N/A

¹Land Use Codes (LUCs) from *Trip Generation Manual*, published by the Institute of Transportation Engineers.

²Total estimate for all other land uses at mixed-use development site is not subject to internal trip capture computations in this estimator.

³Enter trips assuming no transit or non-motorized trips (as assumed in ITE *Trip Generation Manual*).

⁴Enter vehicle occupancy assumed in Table 1-P vehicle trips. If vehicle occupancy changes for proposed mixed-use project, manual adjustments must be made.

⁵Vehicle-trips computed using the mode split and vehicle occupancy values provided in Table 2-P.

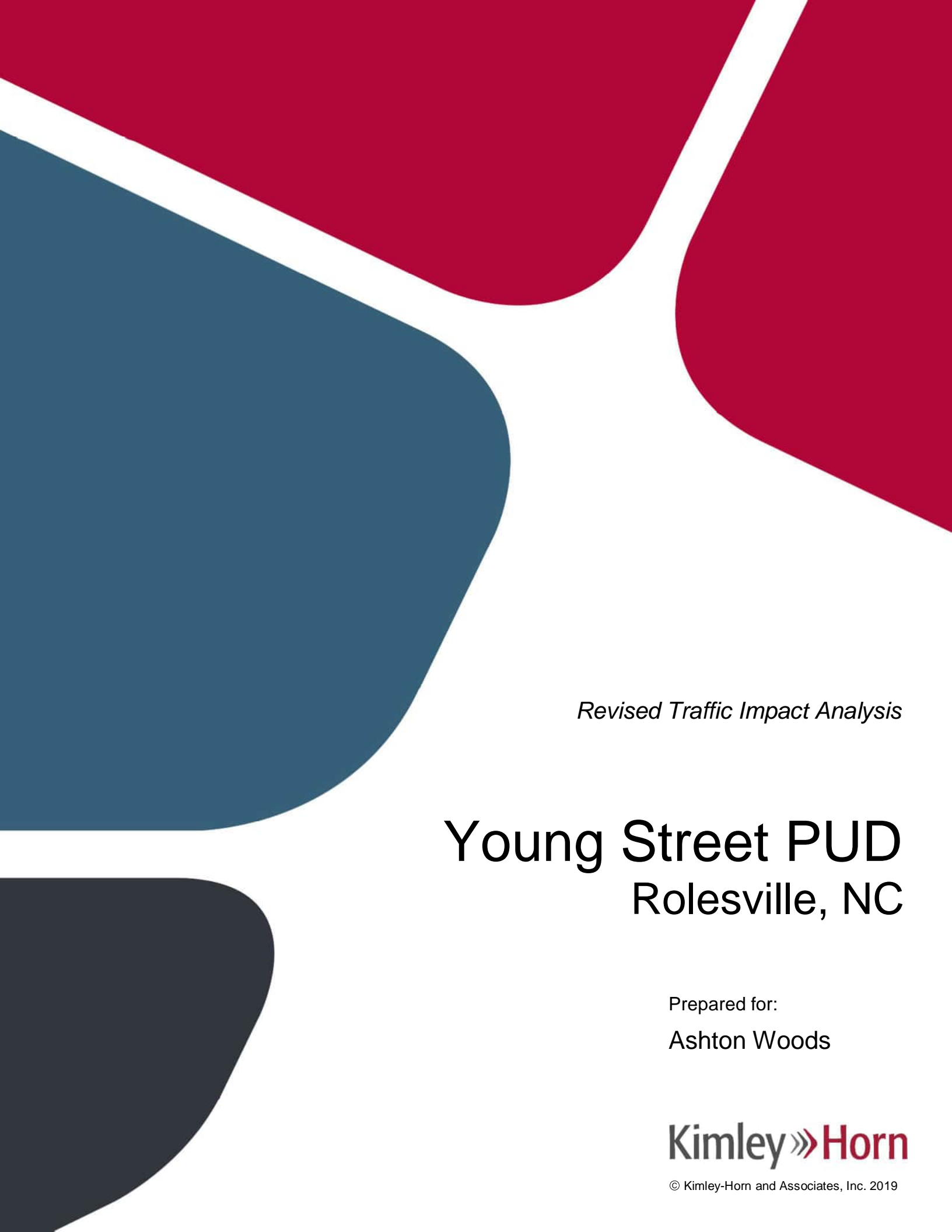
⁶Person-Trips

*Indicates computation that has been rounded to the nearest whole number.

Estimation Tool Developed by the Texas A&M Transportation Institute - Version 2013.1

APPENDIX D

ADJACENT DEVELOPMENT INFORMATION



Revised Traffic Impact Analysis

Young Street PUD Rolesville, NC

Prepared for:
Ashton Woods

Kimley»Horn

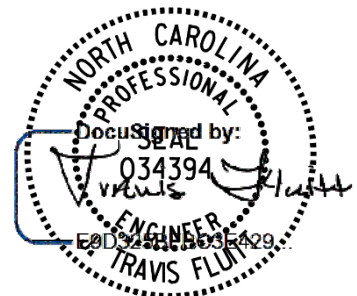
© Kimley-Horn and Associates, Inc. 2019

Revised Traffic Impact Analysis for
Young Street PUD
Rolesville, North Carolina

Prepared for:
Ashton Woods
Raleigh, North Carolina

Prepared by:
Kimley-Horn and Associates, Inc.
NC License #F-0102
421 Fayetteville Street, Suite 600
Raleigh, NC 27601
(919) 677-2000

June 2019
015956012



6/13/2019

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.

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.

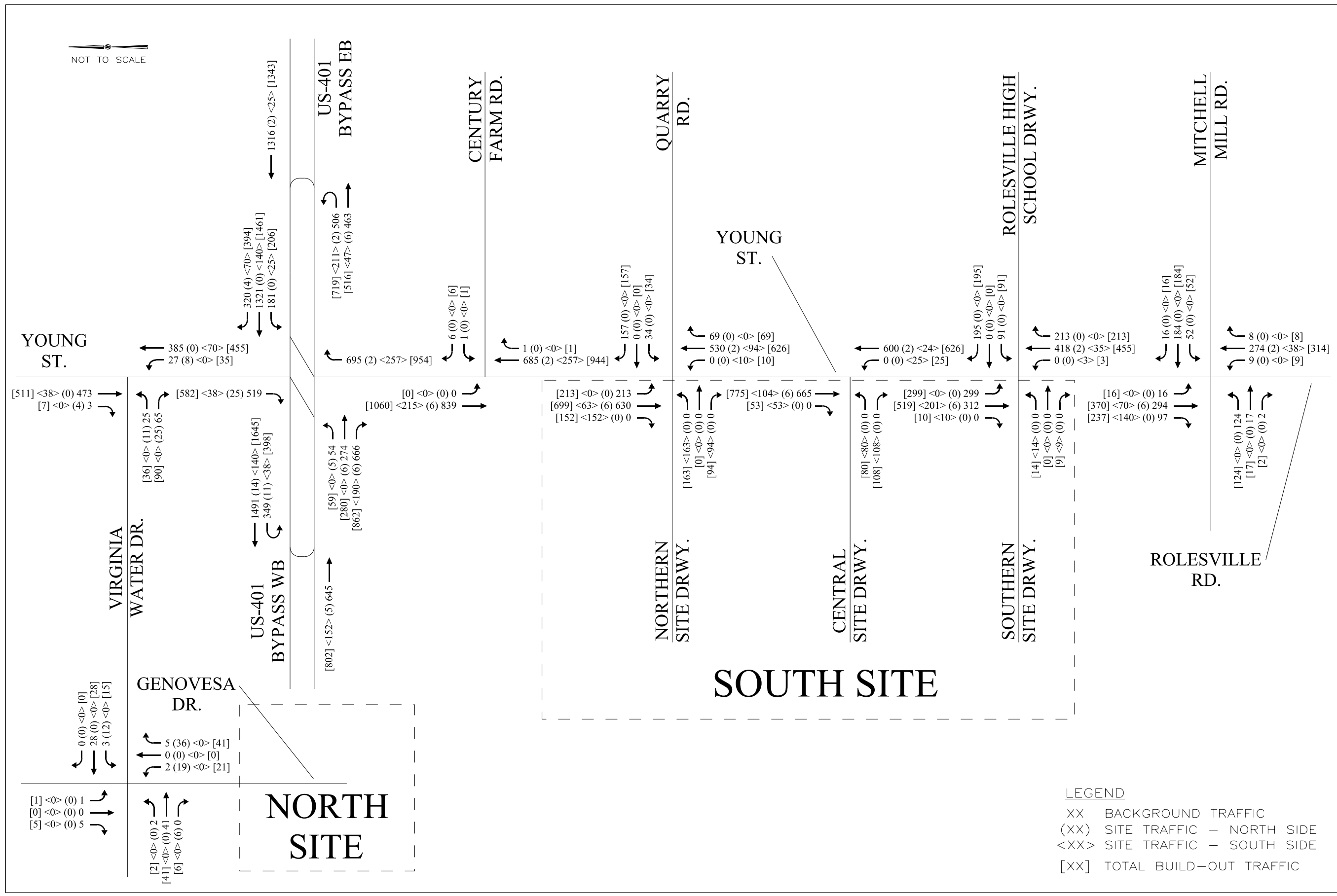
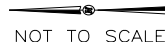


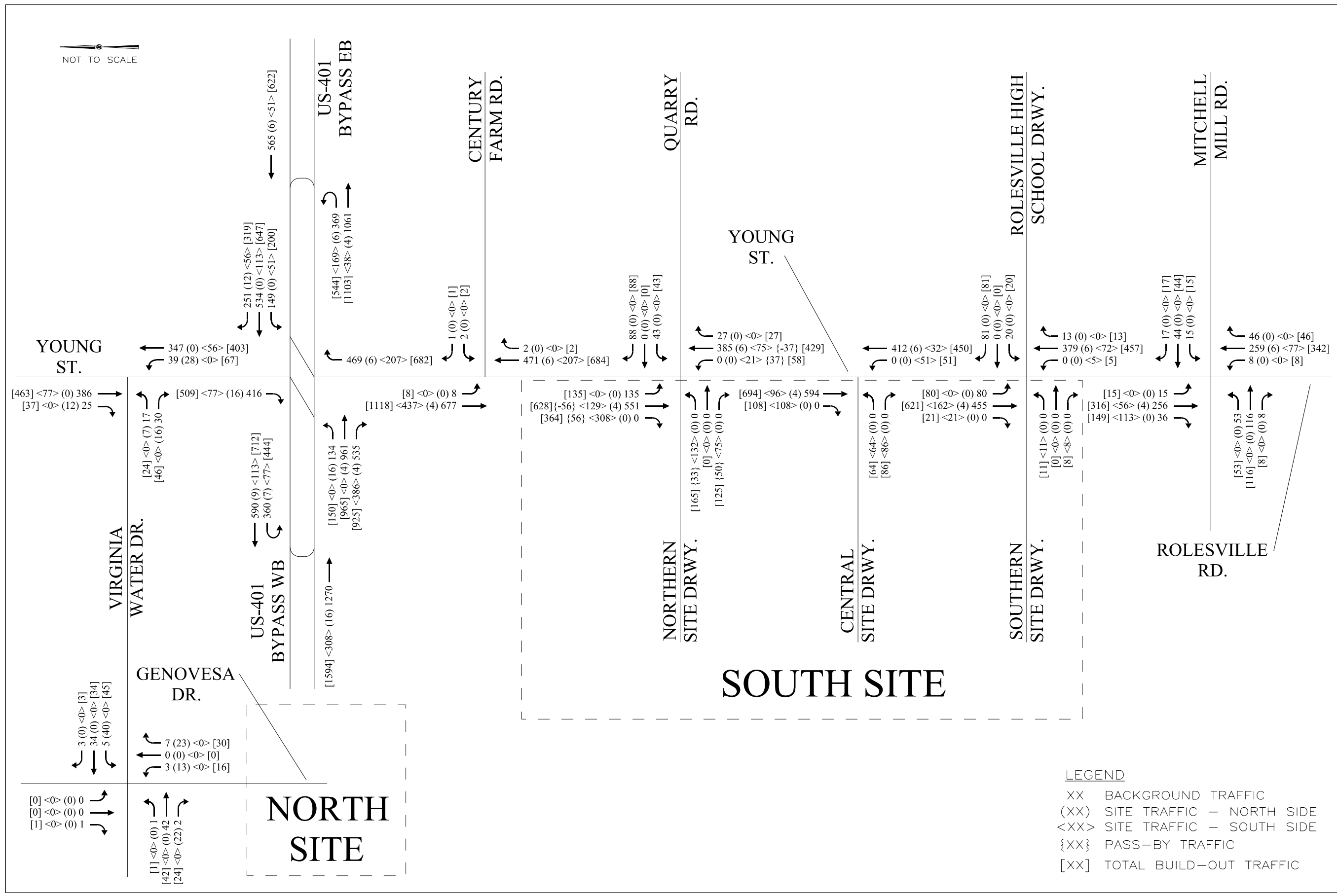
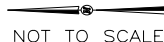
FIGURE 14

PROJECTED (2025) BUILD-OUT AM PEAK HOUR TRAFFIC VOLUMES – COMMERCIAL BUILD-OUT

YOUNG STREET PUD ROLESVILLE, NC TRAFFIC IMPACT ANALYSIS



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YOUNG STREET PUD
ROLESVILLE, NC
TRAFFIC IMPACT ANALYSIS

PROJECTED (2025)
BUILD-OUT PM PEAK HOUR
TRAFFIC VOLUMES –
COMMERCIAL BUILD-OUT

FIGURE
16

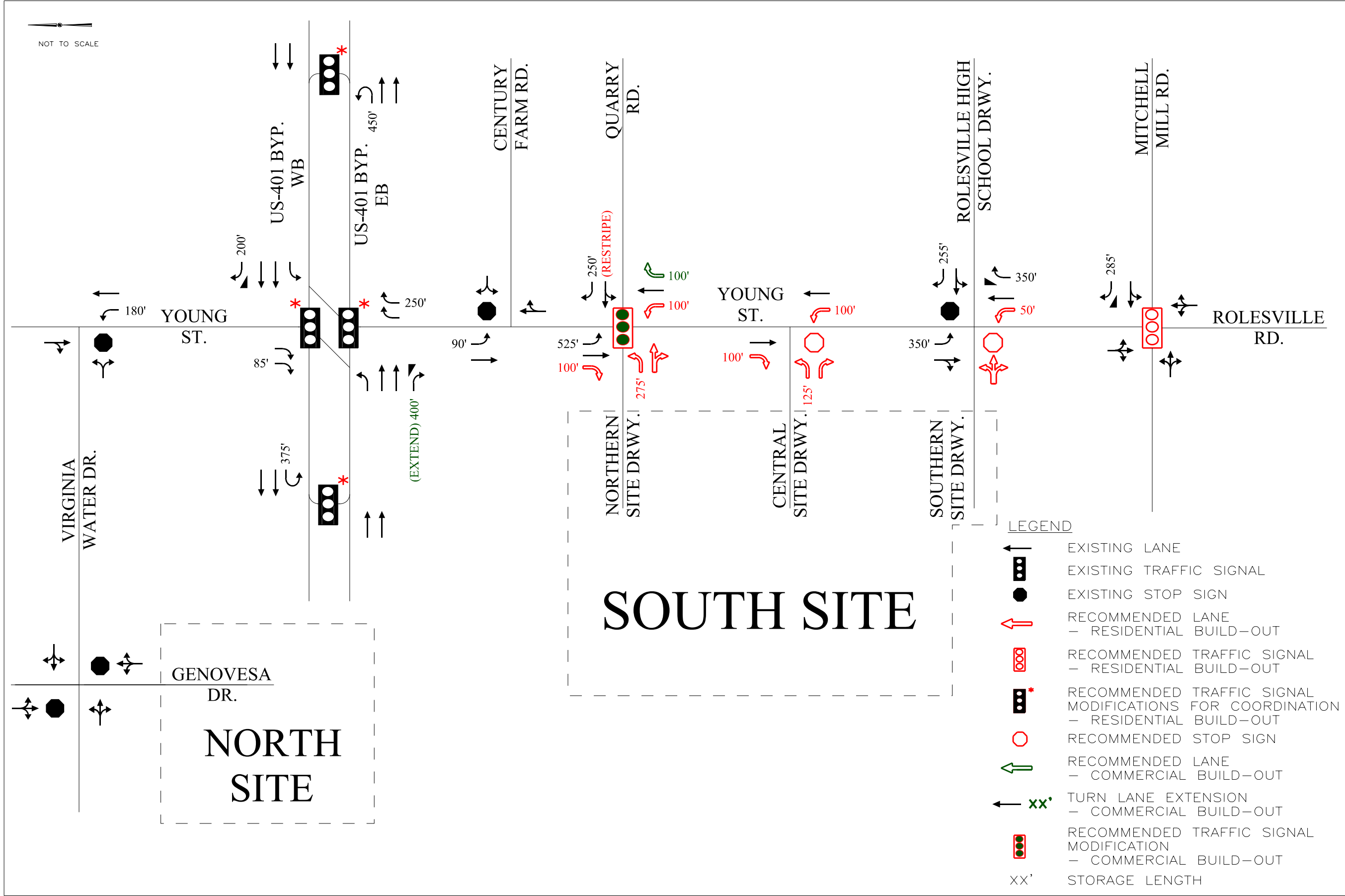


FIGURE
ES-1

RECOMMENDED
ROADWAY LANEAGE

YOUNG STREET PUD
ROLESVILLE, NC
TRAFFIC IMPACT ANALYSIS



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Kalas Property Traffic Impact Analysis

Prepared for:
Mitchell Mill Road Investors LLC
PO Box 3557
Cary, NC, 27519

Prepared by:
Stantec Consulting Services Inc.
801 Jones Franklin Road
Suite 300
Raleigh, NC 27606



January 19, 2016

KALAS PROPERTY TRAFFIC IMPACT ANALYSIS

Executive Summary

January 2016

Executive Summary

The proposed Kalas Property development is located on the west side of SR 1003 (Rolesville Road), between SR 2224 (Mitchell Mill Road) and SR 2308 (Fowler Road), in Rolesville, NC. The proposed development will contain 215 single family homes and is scheduled for completion in 2021.

The proposed development is expected to generate 2,124 new trips per day with 160 new trips during the AM peak hour (40 in and 120 out) and 209 new trips during the PM peak hour (132 in and 77 out).

The purpose of this report is to evaluate the proposed development in terms of projected traffic conditions, evaluate the ability of the adjacent roadways to accommodate the additional traffic volumes, and to recommend transportation improvements needed to mitigate congestion that may result from the additional site traffic. This report presents trip generation, trip distribution, traffic analyses, and recommendations for transportation improvements needed to meet anticipated traffic demands while examining existing conditions (2015), 2021 No-Build conditions, and 2021 Build-Out conditions for the AM and PM peak hours.

As a part of the proposed development, two new access roads will be constructed on SR 1003 (Rolesville Road): one approximately 1,500 feet (0.28 mi.) and the other approximately 2,300 feet (0.44 mi.) north of the intersection with SR 2224 (Mitchell Mill Road). The proposed site access roads should be built to meet or exceed minimum NCDOT and Town of Rolesville standards. Table E-1 shows a summary of the capacity analyses included in this Traffic Impact Analysis:

KALAS PROPERTY TRAFFIC IMPACT ANALYSIS

Executive Summary

January 2016

Conclusion

This study shows that traffic generated by the proposed development will not have a significant impact on Rolesville Road or any of the study intersections in this report. As part of the development, a 100 foot northbound left turn lane should be constructed at each of the proposed site driveways. The recommended improvements in this report will safely and efficiently accommodate the projected site traffic from Kalas Property.

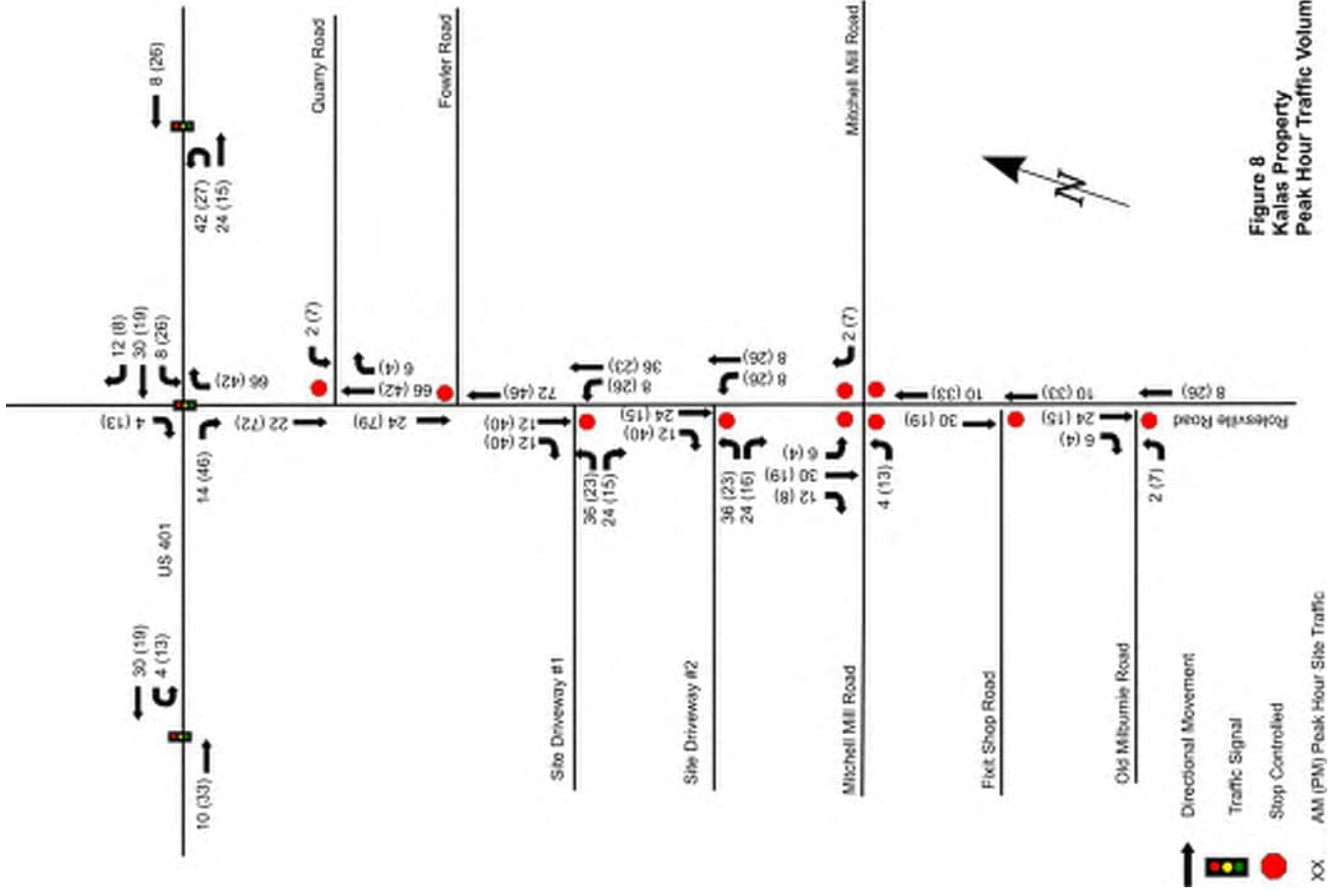


Figure 8
 Kalas Property
 Peak Hour Traffic Volumes

Directional Movement
 Traffic Signal
 Stop Controlled
 XX AM (PM) Peak Hour Site Traffic

KALAS PROPERTY TRAFFIC IMPACT ANALYSIS

Projected Traffic Volumes
January 2016

6.2 APPROVED DEVELOPMENT TRAFFIC

Approved development traffic is generated by specific approved, but not yet constructed, projects within the vicinity of the subject project. Based on coordination with the Town of Rolesville and NCDOT, the following approved developments were considered in the analyses of the Kalas Property development:

- Rogers Farm Subdivision

A traffic impact analysis report was not required by the Town of Rolesville for the Rogers Farm subdivision. With the information provided regarding the future development, trips generated by the development during the AM and PM peak hours were distributed in the same manner as the site traffic distributed in this report (see Figure 6).

The following is the ITE trip generation information used for the Rogers Farm subdivision:

Table 2: ITE Trip Generation Rogers Farm Subdivision							
Land Use	ITE Site Code	Size	24 Hour Two-Way Volume	AM Peak		PM Peak	
				Enter	Exit	Enter	Exit
Single-Family Detached Housing	210	98 units	1,030	20	59	65	38

A summary of all traffic from the above mentioned approved developments is illustrated in Figure 6A.

KALAS PROPERTY TRAFFIC IMPACT ANALYSIS

Projected Traffic Volumes

January 2016

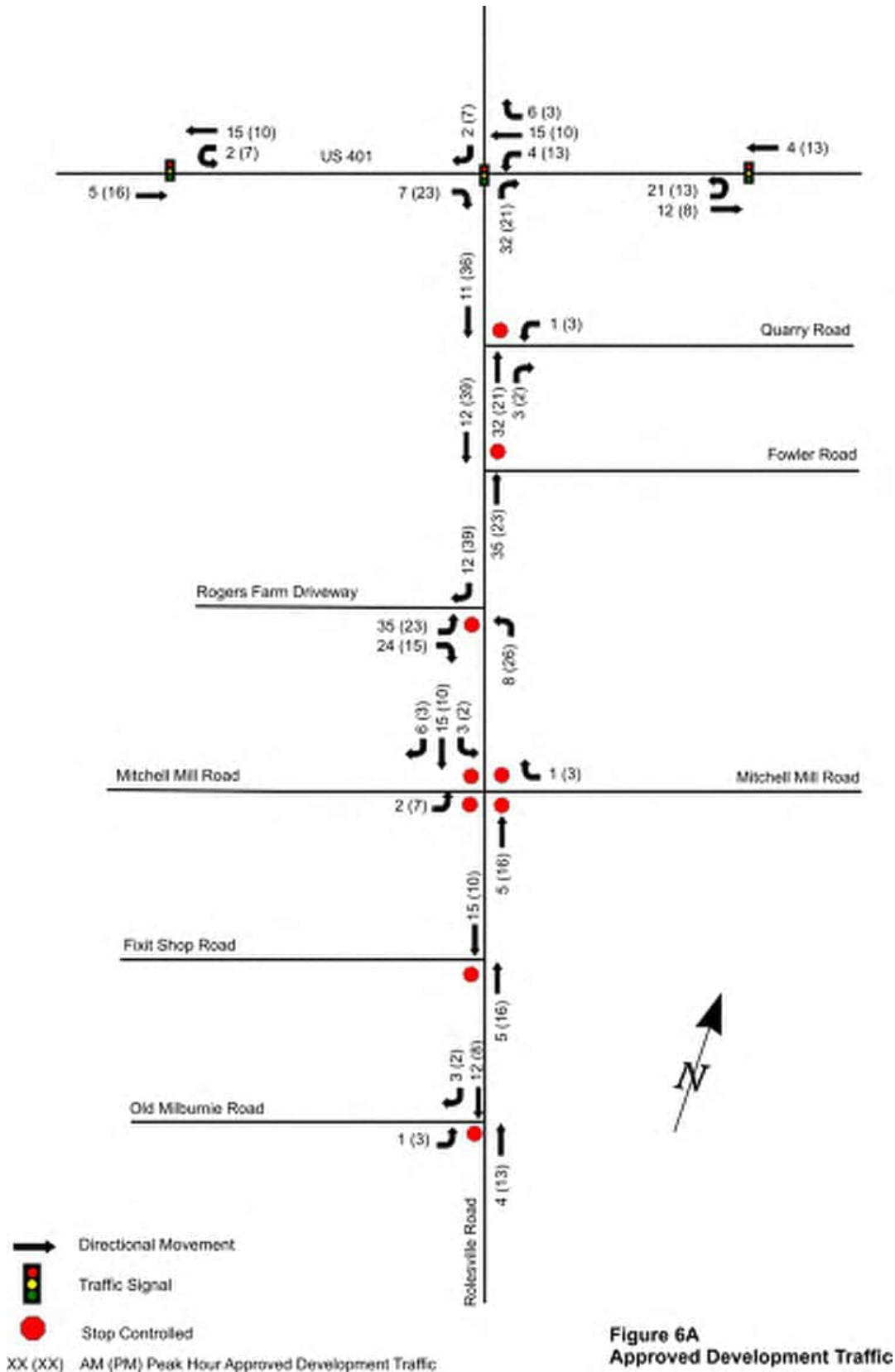
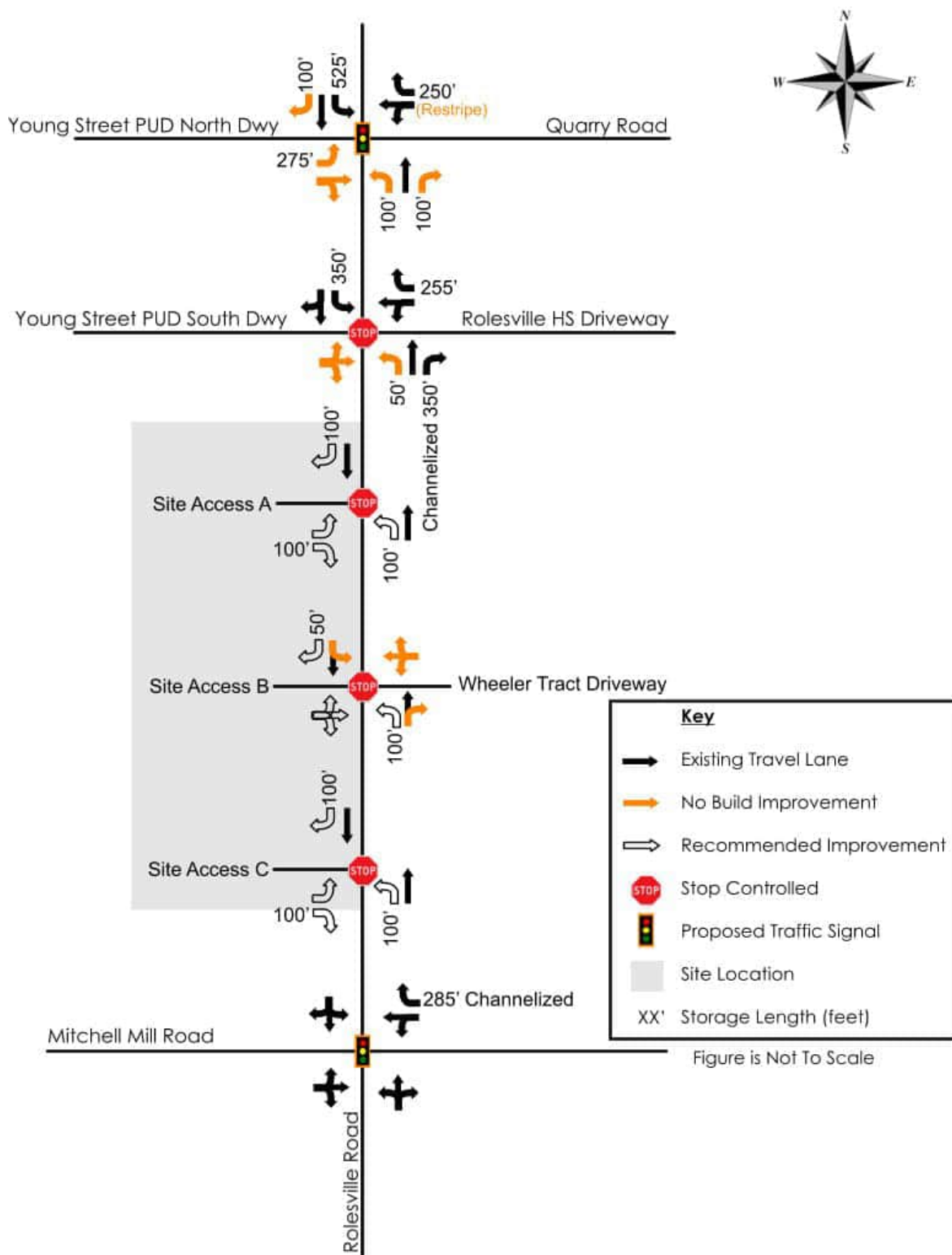


Figure 6A
Approved Development Traffic

Recommendations
 August 24, 2019

Figure 16: Recommended Improvements





October 8, 2021
File: 171002513

Attention: Meredith Gruber
Town of Rolesville
502 Southtown Circle, Rolesville, NC 27571

Dear Ms. Gruber,

Reference: Moody / Hollingsworth Property (A.K.A. The Preserve at Moody Farm)

The purpose of this letter is to provide trip generation and an evaluation of traffic for the subject development. The development, currently proposed by Caruso Homes, is located along Rolesville Road in Rolesville. The conceptual site plan, prepared by American Engineering Associates – Southeast, PA, proposes 82 detached single-family homes. Access to the site is envisioned to be provided by one full-movement driveway onto Rolesville Road as well as two stub connections to the planned Kalas Falls residential development. The site plan can be found in the attachments. This letter presents trip generation, distribution, and traffic analysis of the proposed driveway onto Rolesville Road.

TRIP GENERATION

The proposed development is anticipated to consist of 82 detached single-family homes. Estimated weekday daily, AM peak hour, and PM peak hour trips for the proposed use were calculated using methodology contained within the Institute of Transportation *Trip Generation Manual, 10th Edition*. The methodology was supplemented using the North Carolina Department of Transportation Congestion Management Section *Rate vs Equation Spreadsheet* (July 1, 2018). Trip generation results are shown in Table 1. It should be noted that no reductions due to internal capture or pass-by trips are applicable to this type of development.

Table 1: Proposed Trip Generation

Proposed Use / Land Use Code	Size	Units	Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	Enter	Exit	Total	Enter	Exit
Single-Family Housing (LUC 210)	82	d.u.	866	63	16	47	84	53	31
Net New External Trips			866	63	16	47	84	53	31

Section 8 of the Town of Rolesville Land Development Ordinance (adopted June 1, 2021) establishes thresholds for when a Traffic Impact Analysis (TIA) is required for a particular development. Those are as follows:

- The proposed development could be expected to generate one hundred (100) or more added vehicle trips to or from the site during the peak traffic hour.
- The proposed development could be expected to generate one thousand (1,000) or more added vehicle trips to or from the site during a twenty-four (24) hour period.

Reference: Moody / Hollingsworth Property (A.K.A. The Preserve at Moody Farm)

Accordingly, the subject development is anticipated to generate less traffic than the thresholds established in Section 8 of the Land Development Ordinance.

TRAFFIC EVALUATION

Traffic was evaluated at the driveway of the proposed development as well as along Rolesville Road. Weekday AM (7:00-9:00 AM) and PM (4:00-6:00 PM) turning movement counts were collected on Wednesday, September 12, 2018 at the intersection of Rolesville Road at Mitchell Mill Road. These traffic counts were grown by two-percent (2%) per year from 2018 to 2026 to account for future traffic growth along Rolesville Road. In addition to this background growth, the following nearby approved developments were accounted for:

- The Point (A.K.A. Young Street PUD)
- Wheeler Tract
- Kalas / Watkins Family Property

The trips generated by the proposed development (as shown in Table 1) were assigned to the surrounding roadway network using the distribution presented in the Kalas / Watkins Family Property TIA. That is, sixty-percent (60%) being assigned to/from the north along Rolesville Road. The remaining forty-percent (40%) is assigned to/from the south along Rolesville Road. Traffic volume calculations and figures are included as attachments.

PROPOSED DRIVEWAY

Primary access to the site will be provided by a driveway on Rolesville Road. This is anticipated to operate under the control of a stop-sign on the proposed driveway. The ultimate cross-section of Rolesville Road is a two-lane with a two-way left-turn lane. Accordingly, this analysis assumes a left-turn lane is installed by the development’s build-out year (i.e. 2026).

Capacity analysis was performed for the proposed driveway onto Rolesville Road using Synchro (version 10) software. The level of service (LOS) for the study intersections is summarized in Table 2.

Analysis indicates that this proposed driveway is expected to operate at an acceptable LOS in the study year 2026.

Table 2: Rolesville Road at Site Driveway Level of Service and Delay

Intersection / Approach	Intersection Control	2026 Build LOS (Delay in sec./veh.)	
		AM	PM
Overall Intersection	Stop Controlled	A (0.6)	A (0.5)
Eastbound Approach		C (16.6)	B (14.8)
Northbound Left-Turn		A (9.5)	A (9.2)

October 8, 2021
Meredith Gruber
Page 3 of 3

Reference: Moody / Hollingsworth Property (A.K.A. The Preserve at Moody Farm)

ROLESVILLE ROAD

Traffic generated by the proposed development during the AM and PM peak hours constitutes at most seven percent (7%) of the total volume of traffic at the site driveway. At the nearby intersection of Rolesville Road at Mitchell Mill Road, the proposed development is anticipated to add at most 33 vehicles per hour, or approximately one vehicle every two minutes, to the intersection. Therefore, increases in delays at nearby intersections are expected to be minimal with the addition of site traffic.

CONCLUSIONS

Based on the information presented herein, the following can be said of the proposed development:

- The subject development is anticipated to generate less traffic than the thresholds established in Section 8 of the Land Development Ordinance.
- The proposed driveway onto Rolesville Road is anticipated to operate at an acceptable level of service at project build-out.
- The proposed development is expected to result in minimal increases in traffic volume along Rolesville Road.

Feel free to contact me if you have any questions regarding the information presented herein.

Regards,

Stantec Consulting Services Inc.



Matt Peach, PE, PTOE
Senior Transportation Engineer
Phone: (919) 865-7375
Matt.Peach@Stantec.com



Attachment: Conceptual Site Plan, Traffic Counts, Trip Generation, Traffic Volume Calculations, Traffic Volume Figures, Synchro Reports

- c. Jay Gilleece (American Engineering)
Brad Haertling (American Engineering)

Traffic Impact Analysis Wheeler Tract Rolesville Road



TRAFFIC IMPACT ANALYSIS

FOR

WHEELER TRACT

LOCATED

IN

ROLESVILLE, NC

Prepared For:
Hopper Communities
173 Paraggi Court
Clayton, NC 27527

Prepared By:
Ramey Kemp & Associates, Inc.
5808 Faringdon Place, Suite 100
Raleigh, NC 27609
License #C-0910

June 2019



RKA Project No. 19045

Prepared By: CAB

Reviewed By: JTR

**TRAFFIC IMPACT ANALYSIS
WHEELER TRACT
ROLESVILLE, NORTH CAROLINA**

EXECUTIVE SUMMARY

1. Development Overview

A Traffic Impact Analysis (TIA) was conducted for the proposed Wheeler Tract development in accordance with the Rolesville (Town) Unified Development Ordinance (UDO) and North Carolina Department of Transportation (NCDOT) capacity analysis guidelines. The proposed development is to be located in the northeast quadrant of the intersection of Rolesville Road and Mitchell Mill Road in Rolesville, North Carolina. The proposed development is expected to consist of 233 single-family homes and 125 townhomes and is estimated to be built out in 2026. Site access will be provided via one (1) full movement driveway on Rolesville Road, one (1) full movement driveway on Mitchell Mill Road, and one (1) roadway connection to the existing development to the south of the site, Woods Crossing, via Taviswood Way.

2. Existing Traffic Conditions

The study area for the TIA was determined through coordination with the Town and NCDOT and consists of the following existing intersections:

- Rolesville Road and Mitchell Mill Road (unsignalized)
- Rolesville Road and Fowler Road (unsignalized)
- Rolesville Road and Taviswood Way (unsignalized)

Existing peak hour traffic volumes were determined based on traffic counts conducted at the study intersections listed above, in May of 2019 by BSI Traffic Data Collection during a typical weekday AM (7:00 AM – 9:00 AM) and PM (4:00 PM – 6:00 PM) peak periods.

Traffic volumes were balanced between study intersections, where appropriate.

3. Site Trip Generation

The proposed development is expected to consist of 188 single-family homes and 162 townhomes. Average weekday daily, AM peak hour, and PM peak hour trips for the proposed development were estimated using methodology contained within the ITE *Trip Generation Manual*, 10th Edition. Table 2 provides a summary of the trip generation potential for the site.

Table E-1: Site Trip Generation

Land Use (ITE Code)	Intensity	Daily Traffic (vpd)	AM Peak Hour Trips (vph)		PM Peak Hour Trips (vph)	
			Enter	Exit	Enter	Exit
Single Family Detached Housing (210)	233 dwellings	2300	42	128	144	85
Multifamily Housing - Townhomes (220)	125 dwellings	900	14	45	46	27
Total Trips		3,200	56	173	190	112

4. Future Traffic Conditions

Through coordination with the Town and NCDOT, it was determined that an annual growth rate of 2% would be used to generate projected (2026) weekday AM and PM peak hour traffic volumes based on a review of traffic growth patterns and adjacent development information. Through coordination with the Town, the following adjacent developments were identified to be included in this study:

- East Young Street PUD (The Point)
- Kalas Property
- Watkins Family Property

Through coordination with NCDOT and the Town, the future roadway improvements associated with the East Young Street PUD should be included in the analysis of future traffic conditions, where applicable.

The study analyzes traffic conditions during the weekday AM and PM peak hours for the following scenarios:

- Existing (2019) Traffic Conditions
- Background (2026) Traffic Conditions
- Combined (2026) Traffic Conditions
- Combined (2026) Traffic Conditions with Improvements

5. Capacity Analysis Summary

The analysis considered weekday AM and PM peak hour traffic for existing (2019), background (2026), and combined (2026) conditions. Refer to Section 7 of the report for the capacity analysis performed at each study intersection.

6. Recommendations

Based on the findings of this study, specific geometric and traffic control improvements have been identified at study intersections. The improvements are summarized below and are illustrated in Figure E-1.

Recommended Improvements by Developer

Rolesville Road and Mitchell Mill Road

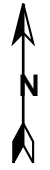
- Monitor intersection for signalization.

Rolesville Road and Site Drive 1

- Provide site access via a full movement intersection with one ingress lane and one egress lane.
- Provide stop control for westbound Site Drive 1 approach.
- Provide a designated southbound left-turn lane with at least 100 feet of storage and appropriate deceleration and taper.

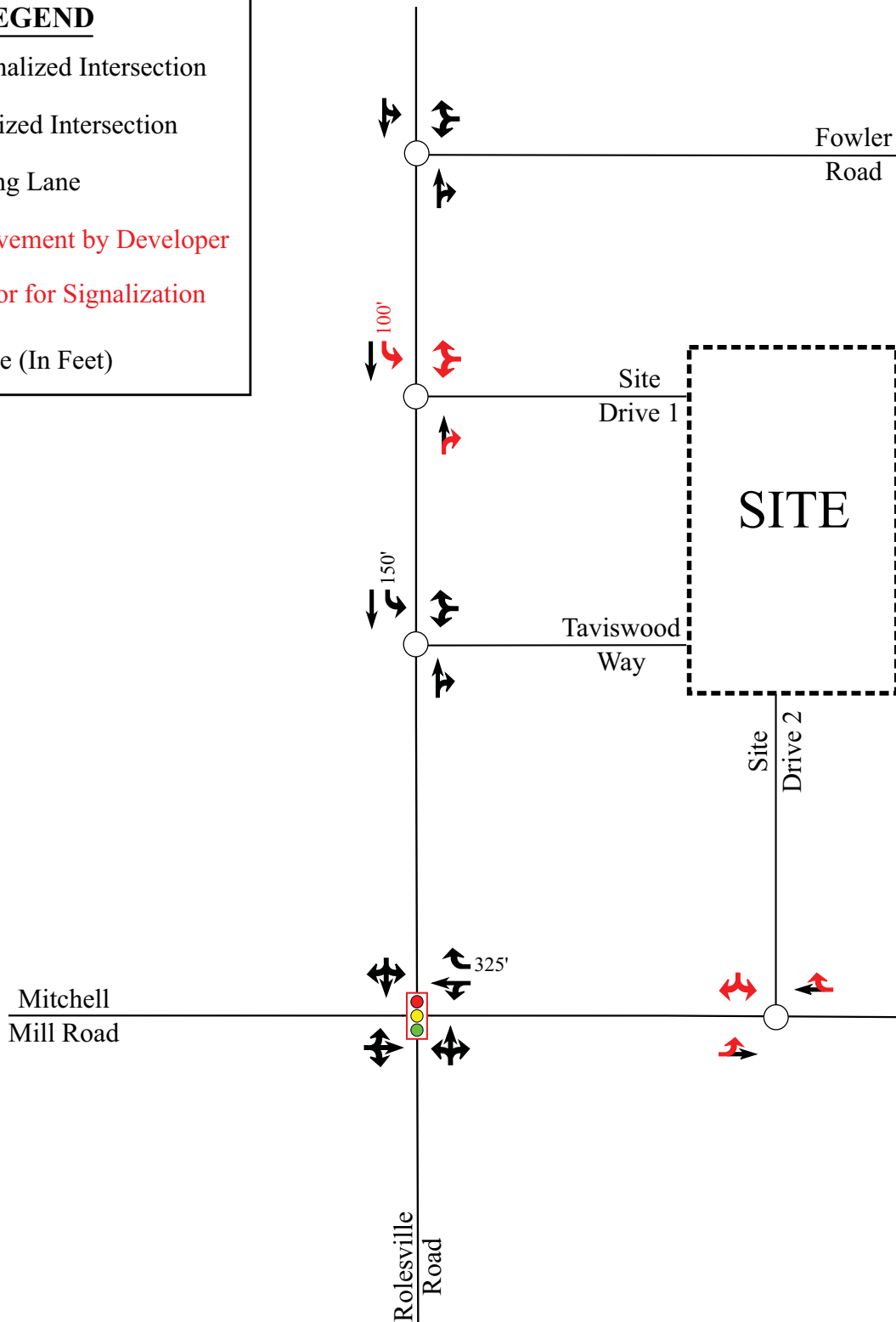
Mitchell Mill Road and Site Drive 2

- Provide site access via a full movement intersection with one ingress lane and one egress lane.
- Provide stop control for southbound Site Drive 2 approach.
- Provide stop control for southbound Site Drive approach.



LEGEND

- Unsignalized Intersection
- 🚦 Signalized Intersection
- ➡ Existing Lane
- ➡ Improvement by Developer
- 🚦 Monitor for Signalization
- X' Storage (In Feet)



Wheeler Tract
Rolesville, NC

Recommended
Lane Configurations

Scale: Not to Scale Figure E-1



October 8, 2021
File: 171002516

Attention: Meredith Gruber
Town of Rolesville
502 Southtown Circle, Rolesville, NC 27571

Dear Ms. Gruber,

Reference: Tucker-Wilkins Property

The purpose of this letter is to provide trip generation and an evaluation of traffic for the subject development. The development, is located along Rolesville Road in Rolesville. The conceptual site plan, prepared by American Engineering Associates – Southeast, PA, proposes 27 detached single-family homes and 64 townhomes. Access to the site is envisioned to be provided by one full-movement driveway onto Rolesville Road as well as one stub connection to the planned Kalas Falls residential development. The site plan can be found in the attachments. This letter presents trip generation, distribution, and traffic analysis of the proposed driveway onto Rolesville Road.

TRIP GENERATION

The proposed development is anticipated to consist of 27 detached single-family homes and 64 townhomes (low-rise multifamily housing). Estimated weekday daily, AM peak hour, and PM peak hour trips for the proposed use were calculated using methodology contained within the Institute of Transportation *Trip Generation Manual, 10th Edition*. The methodology was supplemented using the North Carolina Department of Transportation Congestion Management Section *Rate vs Equation Spreadsheet* (July 1, 2018). Trip generation results are shown in Table 1. It should be noted that no reductions due to internal capture or pass-by trips are applicable to this type of development.

Table 1: Proposed Trip Generation

Proposed Use / Land Use Code	Size	Units	Daily Trips	AM Peak Hour			PM Peak Hour		
				Total	Enter	Exit	Total	Enter	Exit
Single-Family Housing (LUC 210)	27	d.u.	312	24	6	18	29	18	11
Multifamily Housing (LUC 220)	64	d.u.	443	31	7	24	40	25	15
Net New External Trips			755	55	13	42	69	43	26

Section 8 of the Town of Rolesville Land Development Ordinance (adopted June 1, 2021) establishes thresholds for when a Traffic Impact Analysis (TIA) is required for a particular development. Those are as follows:

- The proposed development could be expected to generate one hundred (100) or more added vehicle trips to or from the site during the peak traffic hour.

Reference: Tucker-Wilkins Property

- The proposed development could be expected to generate one thousand (1,000) or more added vehicle trips to or from the site during a twenty-four (24) hour period.

Accordingly, the subject development is anticipated to generate less traffic than the thresholds established in Section 8 of the Land Development Ordinance.

TRAFFIC EVALUATION

Traffic was evaluated at the driveway of the proposed development as well as along Rolesville Road. Weekday AM (7:00-9:00 AM) and PM (4:00-6:00 PM) turning movement counts were collected on Wednesday, September 12, 2018 at the intersection of Rolesville Road at Mitchell Mill Road. These traffic counts were grown by two-percent (2%) per year from 2018 to 2026 to account for future traffic growth along Rolesville Road. In addition to this background growth, the following nearby approved developments were accounted for:

- The Point (A.K.A. Young Street PUD)
- Wheeler Tract
- Kalas / Watkins Family Property

The trips generated by the proposed development (as shown in Table 1) were assigned to the surrounding roadway network using the distribution presented in the Kalas / Watkins Family Property TIA. That is, sixty-percent (60%) being assigned to/from the north along Rolesville Road. The remaining forty-percent (40%) is assigned to/from the south along Rolesville Road. Traffic volume calculations and figures are included as attachments.

PROPOSED DRIVEWAY

Primary access to the site will be provided by a driveway on Rolesville Road. This is anticipated to operate under the control of a stop-sign on the proposed driveway. The ultimate cross-section of Rolesville Road is a two-lane with a two-way left-turn lane. Accordingly, this analysis assumes a left-turn lane is installed by the development’s build-out year (i.e. 2026).

Capacity analysis was performed for the proposed driveway onto Rolesville Road using Synchro (version 10) software. The level of service (LOS) for the study intersections is summarized in Table 2.

Table 2: Rolesville Road at Site Driveway Level of Service and Delay

Intersection / Approach	Intersection Control	2026 Build LOS (Delay in sec./veh.)	
		AM	PM
Overall Intersection	Stop Controlled	A (0.6)	A (0.5)
Eastbound Approach		C (16.5)	B (13.3)
Northbound Left-Turn		A (9.7)	A (8.6)

October 8, 2021
Meredith Gruber
Page 3 of 3

Reference: Tucker-Wilkins Property

Analysis indicates that this proposed driveway is expected to operate at an acceptable LOS in the study year 2026.

ROLESVILLE ROAD

Traffic generated by the proposed development during the AM and PM peak hours constitutes at most seven percent (7%) of the total volume of traffic at the site driveway. At the nearby intersection of Rolesville Road at Mitchell Mill Road, the proposed development is anticipated to add at most 27 vehicles per hour, or approximately one vehicle every two minutes, to the intersection. Therefore, increases in delays at nearby intersections are expected to be minimal with the addition of site traffic.

CONCLUSIONS

Based on the information presented herein, the following can be said of the proposed development:

- The subject development is anticipated to generate less traffic than the thresholds established in Section 8 of the Land Development Ordinance.
- The proposed driveway onto Rolesville Road is anticipated to operate at an acceptable level of service at project build-out.
- The proposed development is expected to result in minimal increases in traffic volume along Rolesville Road.

Feel free to contact me if you have any questions regarding the information presented herein.

Regards,

Stantec Consulting Services Inc.



Matt Peach, PE, PTOE
Senior Transportation Engineer
Phone: (919) 865-7375
Matt.Peach@Stantec.com



Attachment: Conceptual Site Plan, Traffic Counts, Trip Generation, Traffic Volume Calculations, Traffic Volume Figures, Synchro Reports

- c. Jay Gilleece (American Engineering)
Brad Haertling (American Engineering)

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	SBU						0	0
	WB Right						0	0
	WB Through						0	0
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		EB Through						0	0
	EB Left						0	0	
	EBU						0	0	
	Sync ID#	38							
		SB Right						0	0
		SB Through						0	0
		SB Left						0	0

38	SBU						0	0
	WB Right						0	0
	WB Through						0	0
	WB Left						0	0
	WBU						0	0
	NB Right						0	0
	NB Through						0	0
	NB Left						0	0
	NBU						0	0
	EB Right						0	0
	EB Through						0	0
	EB Left						0	0
	EBU						0	0
Sync ID#	39							
39	SB Right						0	0
	SB Through						0	0
	SB Left						0	0
	SBU						0	0
	WB Right						0	0
	WB Through						0	0
	WB Left						0	0
	WBU						0	0
	NB Right						0	0
	NB Through						0	0
	NB Left						0	0
	NBU						0	0
	EB Right						0	0
EB Through						0	0	
EB Left						0	0	
EBU						0	0	
Sync ID#	40							
40	SB Right						0	0
	SB Through						0	0
	SB Left						0	0
	SBU						0	0
	WB Right						0	0
	WB Through						0	0
	WB Left						0	0
	WBU						0	0
	NB Right						0	0
	NB Through						0	0
	NB Left						0	0
	NBU						0	0
	EB Right						0	0
EB Through						0	0	
EB Left						0	0	
EBU						0	0	

APPENDIX E

CAPACITY ANALYSIS CALCULATIONS













US 401

&

E YOUNG STREET

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑				↑↑		↑↑	↑			
Traffic Volume (vph)	0	113	0	0	0	466	0	337	271	0	0	0
Future Volume (vph)	0	113	0	0	0	466	0	337	271	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		250	0		125	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	1.00	1.00	1.00
Flt Protected						0.850			0.850			
Satd. Flow (prot)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						918			301			
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		382			1438			380			424	
Travel Time (s)		5.8			21.8			4.7			5.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	126	0	0	0	518	0	374	301	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	126	0	0	0	518	0	374	301	0	0	0
Turn Type		NA				Prot		NA	Free			
Protected Phases		7				7		2!				
Permitted Phases		2!							Free			
Detector Phase		7				7		2				
Switch Phase												
Minimum Initial (s)		7.0				7.0		14.0				
Minimum Split (s)		25.0				25.0		27.0				
Total Split (s)		30.0				30.0		70.0				
Total Split (%)		30.0%				30.0%		70.0%				
Maximum Green (s)		23.0				23.0		63.0				
Yellow Time (s)		5.0				5.0		5.0				
All-Red Time (s)		2.0				2.0		2.0				
Lost Time Adjust (s)		-2.0				-2.0		-2.0				
Total Lost Time (s)		5.0				5.0		5.0				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0				2.0		6.0				
Minimum Gap (s)		2.0				2.0		3.4				
Time Before Reduce (s)		0.0				0.0		15.0				
Time To Reduce (s)		0.0				0.0		45.0				
Recall Mode		None				None		Min				
Walk Time (s)		7.0				7.0		7.0				
Flash Dont Walk (s)		10.0				10.0		13.0				
Pedestrian Calls (#/hr)		0				0		0				
Act Effct Green (s)		35.0				9.0		16.0	35.0			
Actuated g/C Ratio		1.00				0.26		0.46	1.00			
v/c Ratio		0.07				0.37		0.23	0.19			

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

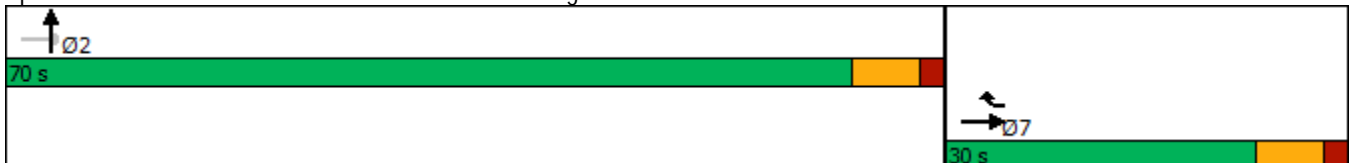
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		0.1				0.8		6.2	0.3			
Queue Delay		0.0				0.0		0.0	0.0			
Total Delay		0.1				0.8		6.2	0.3			
LOS		A				A		A	A			
Approach Delay		0.1			0.8			3.6				
Approach LOS		A			A			A				
Queue Length 50th (ft)		0				0		20	0			
Queue Length 95th (ft)		0				0		35	0			
Internal Link Dist (ft)		302			1358			300			344	
Turn Bay Length (ft)						250			125			
Base Capacity (vph)		1863				2253		3539	1583			
Starvation Cap Reductn		0				0		0	0			
Spillback Cap Reductn		0				0		0	0			
Storage Cap Reductn		0				0		0	0			
Reduced v/c Ratio		0.07				0.23		0.11	0.19			

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 35
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.37
 Intersection Signal Delay: 2.1
 Intersection Capacity Utilization 43.0%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.













Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 111: US 401 NB/US 401 & E. Young Street



Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑				↑↑		↑↑	↑			
Traffic Volume (vph)	0	97	0	0	0	374	0	930	409	0	0	0
Future Volume (vph)	0	97	0	0	0	374	0	930	409	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		250	0		125	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	1.00	1.00	1.00
Flt						0.850			0.850			
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						236			180			
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		382			1438			380			424	
Travel Time (s)		5.8			21.8			4.7			5.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	108	0	0	0	416	0	1033	454	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	108	0	0	0	416	0	1033	454	0	0	0
Turn Type		NA				Prot		NA	Free			
Protected Phases		7				7		2!				
Permitted Phases		2!							Free			
Detector Phase		7				7		2				
Switch Phase												
Minimum Initial (s)		7.0				7.0		14.0				
Minimum Split (s)		25.0				25.0		27.0				
Total Split (s)		30.0				30.0		70.0				
Total Split (%)		30.0%				30.0%		70.0%				
Maximum Green (s)		23.0				23.0		63.0				
Yellow Time (s)		5.0				5.0		5.0				
All-Red Time (s)		2.0				2.0		2.0				
Lost Time Adjust (s)		-2.0				-2.0		-2.0				
Total Lost Time (s)		5.0				5.0		5.0				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0				2.0		6.0				
Minimum Gap (s)		2.0				2.0		3.4				
Time Before Reduce (s)		0.0				0.0		15.0				
Time To Reduce (s)		0.0				0.0		45.0				
Recall Mode		None				None		Min				
Walk Time (s)		7.0				7.0		7.0				
Flash Dont Walk (s)		10.0				10.0		13.0				
Pedestrian Calls (#/hr)		0				0		0				
Act Effct Green (s)		44.0				10.5		23.2	44.0			
Actuated g/C Ratio		1.00				0.24		0.53	1.00			
v/c Ratio		0.06				0.49		0.55	0.29			

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

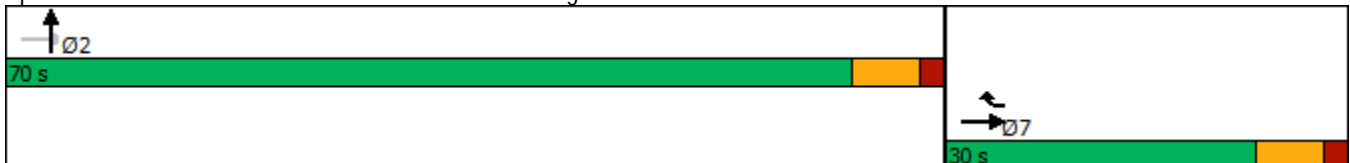
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		0.1				9.4		8.1	0.5			
Queue Delay		0.0				0.0		0.0	0.0			
Total Delay		0.1				9.4		8.1	0.5			
LOS		A				A		A	A			
Approach Delay		0.1			9.4			5.8				
Approach LOS		A			A			A				
Queue Length 50th (ft)		0				21		72	0			
Queue Length 95th (ft)		0				63		135	0			
Internal Link Dist (ft)		302			1358			300			344	
Turn Bay Length (ft)						250			125			
Base Capacity (vph)		1863				1725		3539	1583			
Starvation Cap Reductn		0				0		0	0			
Spillback Cap Reductn		0				0		0	0			
Storage Cap Reductn		0				0		0	0			
Reduced v/c Ratio		0.06				0.24		0.29	0.29			

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 44
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.55
 Intersection Signal Delay: 6.2
 Intersection Capacity Utilization 47.1%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.













Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 111: US 401 NB/US 401 & E. Young Street



Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑				↑↑		↑↑	↑			
Traffic Volume (vph)	0	173	0	0	0	985	0	386	546	0	0	0
Future Volume (vph)	0	173	0	0	0	985	0	386	546	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		250	0		400	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						709			607			
Link Speed (mph)		45			45			55				55
Link Distance (ft)		382			1438			380				841
Travel Time (s)		5.8			21.8			4.7				10.4
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	192	0	0	0	1094	0	429	607	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	192	0	0	0	1094	0	429	607	0	0	0
Turn Type		NA				Perm		NA	Free			
Protected Phases		7						2!				
Permitted Phases		2!				7			Free			
Detector Phase		7				7		2				
Switch Phase												
Minimum Initial (s)		7.0				7.0		14.0				
Minimum Split (s)		25.0				25.0		27.0				
Total Split (s)		35.0				35.0		55.0				
Total Split (%)		38.9%				38.9%		61.1%				
Maximum Green (s)		28.0				28.0		48.0				
Yellow Time (s)		5.0				5.0		5.0				
All-Red Time (s)		2.0				2.0		2.0				
Lost Time Adjust (s)		-2.0				-2.0		-2.0				
Total Lost Time (s)		5.0				5.0		5.0				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0				2.0		6.0				
Minimum Gap (s)		2.0				2.0		3.4				
Time Before Reduce (s)		0.0				0.0		15.0				
Time To Reduce (s)		0.0				0.0		45.0				
Recall Mode		None				None		C-Max				
Act Effct Green (s)		90.0				22.7		57.3	90.0			
Actuated g/C Ratio		1.00				0.25		0.64	1.00			
v/c Ratio		0.10				0.89		0.19	0.38			
Control Delay		0.1				20.0		6.9	0.9			
Queue Delay		0.0				0.0		0.0	0.0			
Total Delay		0.1				20.0		6.9	0.9			

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
LOS		A				C		A	A			
Approach Delay		0.1			20.0			3.4				
Approach LOS		A			C			A				
Queue Length 50th (ft)		0				123		38	1			
Queue Length 95th (ft)		0				201		56	12			
Internal Link Dist (ft)		302			1358			300			761	
Turn Bay Length (ft)						250			400			
Base Capacity (vph)		1846				1401		2251	1583			
Starvation Cap Reductn		0				0		0	0			
Spillback Cap Reductn		0				0		0	0			
Storage Cap Reductn		0				0		0	0			
Reduced v/c Ratio		0.10				0.78		0.19	0.38			

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 88 (98%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 11.0
 Intersection Capacity Utilization 57.8%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.

Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 111: US 401 NB/US 401 & E. Young Street



Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑				↑↑		↑↑	↑			
Traffic Volume (vph)	0	222	0	0	0	764	0	1051	1004	0	0	0
Future Volume (vph)	0	222	0	0	0	764	0	1051	1004	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		250	0		400	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						58			797			
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		382			1438			380			424	
Travel Time (s)		5.8			21.8			4.7			5.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	247	0	0	0	849	0	1168	1116	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	247	0	0	0	849	0	1168	1116	0	0	0
Turn Type		NA				Perm		NA	Free			
Protected Phases		7						2!				
Permitted Phases		2!				7			Free			
Detector Phase		7				7		2				
Switch Phase												
Minimum Initial (s)		7.0				7.0		14.0				
Minimum Split (s)		25.0				25.0		27.0				
Total Split (s)		39.0				39.0		41.0				
Total Split (%)		48.8%				48.8%		51.3%				
Maximum Green (s)		32.0				32.0		34.0				
Yellow Time (s)		5.0				5.0		5.0				
All-Red Time (s)		2.0				2.0		2.0				
Lost Time Adjust (s)		-2.0				-2.0		-2.0				
Total Lost Time (s)		5.0				5.0		5.0				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0				2.0		6.0				
Minimum Gap (s)		2.0				2.0		3.4				
Time Before Reduce (s)		0.0				0.0		15.0				
Time To Reduce (s)		0.0				0.0		45.0				
Recall Mode		None				None		C-Max				
Walk Time (s)		7.0				7.0		7.0				
Flash Dont Walk (s)		10.0				10.0		13.0				
Pedestrian Calls (#/hr)		0				0		0				
Act Effct Green (s)		80.0				29.4		40.6	80.0			
Actuated g/C Ratio		1.00				0.37		0.51	1.00			
v/c Ratio		0.13				0.80		0.65	0.70			

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

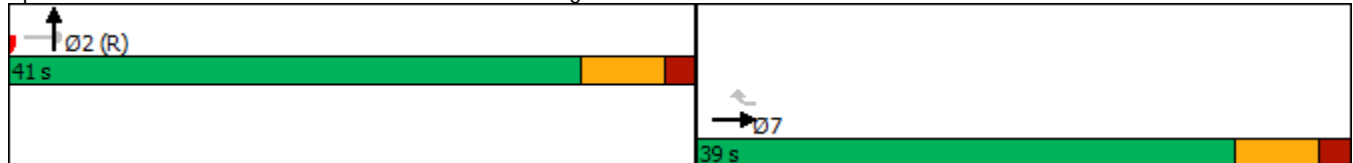
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		0.1				27.0		12.6	4.0			
Queue Delay		0.0				0.0		0.0	0.0			
Total Delay		0.1				27.0		12.6	4.0			
LOS		A				C		B	A			
Approach Delay		0.1			27.0			8.4				
Approach LOS		A			C			A				
Queue Length 50th (ft)		0				193		181	3			
Queue Length 95th (ft)		0				251		261	508			
Internal Link Dist (ft)		302			1358			300			344	
Turn Bay Length (ft)						250			400			
Base Capacity (vph)		1837				1217		1795	1583			
Starvation Cap Reductn		0				0		0	0			
Spillback Cap Reductn		0				0		0	0			
Storage Cap Reductn		0				0		0	0			
Reduced v/c Ratio		0.13				0.70		0.65	0.70			

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.80
 Intersection Signal Delay: 12.5
 Intersection Capacity Utilization 64.1%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.



















Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 111: US 401 NB/US 401 & E. Young Street



Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations						 		 				
Traffic Volume (vph)	0	181	0	0	0	1011	0	386	562	0	0	0
Future Volume (vph)	0	181	0	0	0	1011	0	386	562	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		250	0		400	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						709			624			
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		382			1438			380			424	
Travel Time (s)		5.8			21.8			4.7			5.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	201	0	0	0	1123	0	429	624	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	201	0	0	0	1123	0	429	624	0	0	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type		NA				Perm		NA	Free			
Protected Phases		7						2!				
Permitted Phases		2!				7			Free			
Detector Phase		7				7		2				
Switch Phase												
Minimum Initial (s)		7.0				7.0		14.0				
Minimum Split (s)		25.0				25.0		27.0				
Total Split (s)		35.0				35.0		55.0				
Total Split (%)		38.9%				38.9%		61.1%				
Yellow Time (s)		5.0				5.0		5.0				
All-Red Time (s)		2.0				2.0		2.0				
Lost Time Adjust (s)		-2.0				-2.0		-2.0				
Total Lost Time (s)		5.0				5.0		5.0				
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode		None				None		C-Max				
Act Effct Green (s)		90.0				23.6		56.4	90.0			
Actuated g/C Ratio		1.00				0.26		0.63	1.00			
v/c Ratio		0.11				0.90		0.19	0.39			

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		0.1				21.0		7.1	1.0			
Queue Delay		0.0				0.0		0.0	0.0			
Total Delay		0.1				21.0		7.1	1.0			
LOS		A				C		A	A			
Approach Delay		0.1			21.0			3.5				
Approach LOS		A			C			A				
Queue Length 50th (ft)		0				133		38	1			
Queue Length 95th (ft)		0				218		56	13			
Internal Link Dist (ft)		302			1358			300			344	
Turn Bay Length (ft)						250			400			
Base Capacity (vph)		1862				1401		2217	1583			
Starvation Cap Reductn		0				0		0	0			
Spillback Cap Reductn		0				0		0	0			
Storage Cap Reductn		0				0		0	0			
Reduced v/c Ratio		0.11				0.80		0.19	0.39			

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 88 (98%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.90
 Intersection Signal Delay: 11.5
 Intersection Capacity Utilization 58.3%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.













Intersection LOS: B
 ICU Level of Service B

Splits and Phases: 111: US 401 NB/US 401 & E. Young Street



Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑				↑↑		↑↑	↑			
Traffic Volume (vph)	0	235	0	0	0	797	0	1051	1028	0	0	0
Future Volume (vph)	0	235	0	0	0	797	0	1051	1028	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		250	0		400	0		0
Storage Lanes	0		0	0		1	0		1	0		0
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	1.00	1.00	1.00
Frt						0.850			0.850			
Flt Protected												
Satd. Flow (prot)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Flt Permitted												
Satd. Flow (perm)	0	1863	0	0	0	2787	0	3539	1583	0	0	0
Right Turn on Red	Yes		Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						58			783			
Link Speed (mph)		45			45			55			55	
Link Distance (ft)		382			1438			380			424	
Travel Time (s)		5.8			21.8			4.7			5.3	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	261	0	0	0	886	0	1168	1142	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	261	0	0	0	886	0	1168	1142	0	0	0
Turn Type		NA				Perm		NA	Free			
Protected Phases		7						2!				
Permitted Phases		2!				7			Free			
Detector Phase		7				7		2				
Switch Phase												
Minimum Initial (s)		7.0				7.0		14.0				
Minimum Split (s)		25.0				25.0		27.0				
Total Split (s)		39.0				39.0		41.0				
Total Split (%)		48.8%				48.8%		51.3%				
Maximum Green (s)		32.0				32.0		34.0				
Yellow Time (s)		5.0				5.0		5.0				
All-Red Time (s)		2.0				2.0		2.0				
Lost Time Adjust (s)		-2.0				-2.0		-2.0				
Total Lost Time (s)		5.0				5.0		5.0				
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)		2.0				2.0		6.0				
Minimum Gap (s)		2.0				2.0		3.4				
Time Before Reduce (s)		0.0				0.0		15.0				
Time To Reduce (s)		0.0				0.0		45.0				
Recall Mode		None				None		C-Max				
Walk Time (s)		7.0				7.0		7.0				
Flash Dont Walk (s)		10.0				10.0		13.0				
Pedestrian Calls (#/hr)		0				0		0				
Act Effct Green (s)		80.0				30.3		39.7	80.0			
Actuated g/C Ratio		1.00				0.38		0.50	1.00			
v/c Ratio		0.14				0.81		0.66	0.72			

Lanes, Volumes, Timings
 111: US 401 NB/US 401 & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

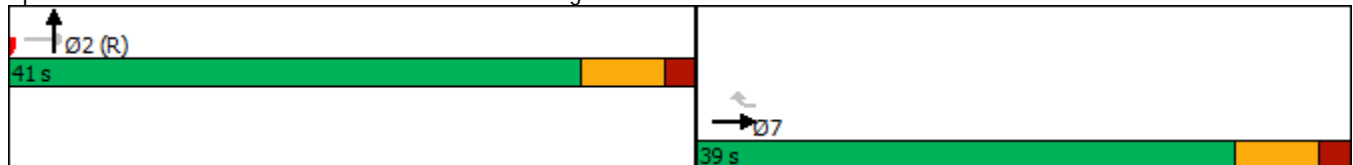
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay		0.2				27.1		13.2	4.5			
Queue Delay		0.0				0.0		0.0	0.0			
Total Delay		0.2				27.1		13.2	4.5			
LOS		A				C		B	A			
Approach Delay		0.2			27.1			8.9				
Approach LOS		A			C			A				
Queue Length 50th (ft)		0				201		192	4			
Queue Length 95th (ft)		0				267		257	605			
Internal Link Dist (ft)		302			1358			300			344	
Turn Bay Length (ft)						250			400			
Base Capacity (vph)		1829				1217		1757	1583			
Starvation Cap Reductn		0				0		0	0			
Spillback Cap Reductn		0				0		0	0			
Storage Cap Reductn		0				0		0	0			
Reduced v/c Ratio		0.14				0.73		0.66	0.72			

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 12.9
 Intersection Capacity Utilization 65.3%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.



















Intersection LOS: B
 ICU Level of Service C

Splits and Phases: 111: US 401 NB/US 401 & E. Young Street



Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			 								 	
Traffic Volume (vph)	0	0	389	0	111	0	0	0	0	0	1184	251
Future Volume (vph)	0	0	389	0	111	0	0	0	0	0	1184	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		0	0		0	0		125
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected												
Satd. Flow (prot)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Flt Permitted												
Satd. Flow (perm)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)			129									120
Link Speed (mph)		35			45			55			55	
Link Distance (ft)		1204			426			579			336	
Travel Time (s)		23.5			6.5			7.2			4.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	432	0	123	0	0	0	0	0	1316	279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	432	0	123	0	0	0	0	0	1316	279
Turn Type			Prot		NA						NA	Free
Protected Phases			3		3						6!	
Permitted Phases					6!							Free
Detector Phase			3		3						6	
Switch Phase												
Minimum Initial (s)			7.0		7.0						14.0	
Minimum Split (s)			25.0		25.0						28.0	
Total Split (s)			30.0		30.0						70.0	
Total Split (%)			30.0%		30.0%						70.0%	
Maximum Green (s)			23.0		23.0						63.0	
Yellow Time (s)			5.0		5.0						5.0	
All-Red Time (s)			2.0		2.0						2.0	
Lost Time Adjust (s)			-2.0		-2.0						-2.0	
Total Lost Time (s)			5.0		5.0						5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0		2.0						6.0	
Minimum Gap (s)			2.0		2.0						3.4	
Time Before Reduce (s)			0.0		0.0						15.0	
Time To Reduce (s)			0.0		0.0						45.0	
Recall Mode			None		None						Min	
Walk Time (s)			7.0		7.0						7.0	
Flash Dont Walk (s)			11.0		11.0						14.0	
Pedestrian Calls (#/hr)			0		0						0	
Act Effct Green (s)			13.0		55.6						32.3	55.6
Actuated g/C Ratio			0.23		1.00						0.58	1.00
v/c Ratio			0.58		0.07						0.64	0.18

Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			17.1		0.1						9.7	0.2
Queue Delay			0.0		0.0						0.0	0.0
Total Delay			17.1		0.1						9.7	0.2
LOS			B		A						A	A
Approach Delay		17.1			0.1						8.1	
Approach LOS		B			A						A	
Queue Length 50th (ft)			49		0						128	0
Queue Length 95th (ft)			106		0						232	0
Internal Link Dist (ft)		1124			346			499			256	
Turn Bay Length (ft)			100									125
Base Capacity (vph)			1361		1863						3491	1583
Starvation Cap Reductn			0		0						0	0
Spillback Cap Reductn			0		0						0	0
Storage Cap Reductn			0		0						0	0
Reduced v/c Ratio			0.32		0.07						0.38	0.18

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 55.6
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.64
 Intersection Signal Delay: 9.4
 Intersection Capacity Utilization 54.7%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.



















Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 222: US 401/US 401 SB & E. Young Street



Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			 								 	
Traffic Volume (vph)	0	0	404	0	193	0	0	0	0	0	416	251
Future Volume (vph)	0	0	404	0	193	0	0	0	0	0	416	251
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		0	0		0	0		125
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected												
Satd. Flow (prot)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Flt Permitted												
Satd. Flow (perm)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)			768									248
Link Speed (mph)		35			45			55			55	
Link Distance (ft)		1204			426			579			336	
Travel Time (s)		23.5			6.5			7.2			4.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	449	0	214	0	0	0	0	0	462	279
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	449	0	214	0	0	0	0	0	462	279
Turn Type			Prot		NA						NA	Free
Protected Phases			3		3						6!	
Permitted Phases					6!							Free
Detector Phase			3		3						6	
Switch Phase												
Minimum Initial (s)			7.0		7.0						14.0	
Minimum Split (s)			25.0		25.0						28.0	
Total Split (s)			30.0		30.0						70.0	
Total Split (%)			30.0%		30.0%						70.0%	
Maximum Green (s)			23.0		23.0						63.0	
Yellow Time (s)			5.0		5.0						5.0	
All-Red Time (s)			2.0		2.0						2.0	
Lost Time Adjust (s)			-2.0		-2.0						-2.0	
Total Lost Time (s)			5.0		5.0						5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0		2.0						6.0	
Minimum Gap (s)			2.0		2.0						3.4	
Time Before Reduce (s)			0.0		0.0						15.0	
Time To Reduce (s)			0.0		0.0						45.0	
Recall Mode			None		None						Min	
Walk Time (s)			7.0		7.0						7.0	
Flash Dont Walk (s)			11.0		11.0						14.0	
Pedestrian Calls (#/hr)			0		0						0	
Act Effct Green (s)			9.0		35.0						16.0	35.0
Actuated g/C Ratio			0.26		1.00						0.46	1.00
v/c Ratio			0.35		0.11						0.29	0.18

Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			0.7		0.1						6.5	0.2
Queue Delay			0.0		0.0						0.0	0.0
Total Delay			0.7		0.1						6.5	0.2
LOS			A		A						A	A
Approach Delay		0.7			0.1						4.2	
Approach LOS		A			A						A	
Queue Length 50th (ft)			0		0						25	0
Queue Length 95th (ft)			0		0						42	0
Internal Link Dist (ft)		1124			346			499			256	
Turn Bay Length (ft)			100									125
Base Capacity (vph)			2210		1863						3539	1583
Starvation Cap Reductn			0		0						0	0
Spillback Cap Reductn			0		0						0	0
Storage Cap Reductn			0		0						0	0
Reduced v/c Ratio			0.20		0.11						0.13	0.18

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 35
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.35
 Intersection Signal Delay: 2.5
 Intersection Capacity Utilization 40.3%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.



















Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 222: US 401/US 401 SB & E. Young Street



Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			 								 	
Traffic Volume (vph)	0	0	512	0	130	0	0	0	0	0	1578	393
Future Volume (vph)	0	0	512	0	130	0	0	0	0	0	1578	393
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		0	0		0	0		125
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected												
Satd. Flow (prot)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Flt Permitted												
Satd. Flow (perm)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)			55									150
Link Speed (mph)		35			45			55			55	
Link Distance (ft)		1204			426			579			336	
Travel Time (s)		23.5			6.5			7.2			4.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	569	0	144	0	0	0	0	0	1753	437
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	569	0	144	0	0	0	0	0	1753	437
Turn Type			Perm		NA						NA	Free
Protected Phases					3						6!	
Permitted Phases			3		6!							Free
Detector Phase			3		3						6	
Switch Phase												
Minimum Initial (s)			7.0		7.0						14.0	
Minimum Split (s)			25.0		25.0						28.0	
Total Split (s)			25.0		25.0						55.0	
Total Split (%)			31.3%		31.3%						68.8%	
Maximum Green (s)			18.0		18.0						48.0	
Yellow Time (s)			5.0		5.0						5.0	
All-Red Time (s)			2.0		2.0						2.0	
Lost Time Adjust (s)			-2.0		-2.0						-2.0	
Total Lost Time (s)			5.0		5.0						5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0		2.0						6.0	
Minimum Gap (s)			2.0		2.0						3.4	
Time Before Reduce (s)			0.0		0.0						15.0	
Time To Reduce (s)			0.0		0.0						45.0	
Recall Mode			None		None						C-Max	
Walk Time (s)			7.0		7.0						7.0	
Flash Dont Walk (s)			11.0		11.0						14.0	
Pedestrian Calls (#/hr)			0		0						0	
Act Effct Green (s)			18.9		80.0						51.1	80.0
Actuated g/C Ratio			0.24		1.00						0.64	1.00
v/c Ratio			0.81		0.08						0.78	0.28

Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			36.3		0.1						10.5	0.3
Queue Delay			0.0		0.0						0.0	0.0
Total Delay			36.3		0.1						10.5	0.3
LOS			D		A						B	A
Approach Delay		36.3			0.1						8.5	
Approach LOS		D			A						A	
Queue Length 50th (ft)			136		0						385	0
Queue Length 95th (ft)			#205		0						81	0
Internal Link Dist (ft)		1124			346			499			256	
Turn Bay Length (ft)			100									125
Base Capacity (vph)			738		1841						2259	1583
Starvation Cap Reductn			0		0						0	0
Spillback Cap Reductn			0		0						0	0
Storage Cap Reductn			0		0						0	0
Reduced v/c Ratio			0.77		0.08						0.78	0.28

Intersection Summary



















Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.81
 Intersection Signal Delay: 13.5
 Intersection Capacity Utilization 69.9%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 ! Phase conflict between lane groups.

Splits and Phases: 222: US 401/US 401 SB & E. Young Street



Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			 								 	
Traffic Volume (vph)	0	0	587	0	233	0	0	0	0	0	649	379
Future Volume (vph)	0	0	587	0	233	0	0	0	0	0	649	379
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		0	0		0	0		125
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected												
Satd. Flow (prot)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Flt Permitted												
Satd. Flow (perm)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)			213									400
Link Speed (mph)		35			45			55			55	
Link Distance (ft)		1204			426			579			336	
Travel Time (s)		23.5			6.5			7.2			4.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	652	0	259	0	0	0	0	0	721	421
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	652	0	259	0	0	0	0	0	721	421
Turn Type			Perm		NA						NA	Free
Protected Phases					3						6!	
Permitted Phases			3		6!							Free
Detector Phase			3		3						6	
Switch Phase												
Minimum Initial (s)			7.0		7.0						14.0	
Minimum Split (s)			25.0		25.0						28.0	
Total Split (s)			29.0		29.0						31.0	
Total Split (%)			48.3%		48.3%						51.7%	
Maximum Green (s)			22.0		22.0						24.0	
Yellow Time (s)			5.0		5.0						5.0	
All-Red Time (s)			2.0		2.0						2.0	
Lost Time Adjust (s)			-2.0		-2.0						-2.0	
Total Lost Time (s)			5.0		5.0						5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0		2.0						6.0	
Minimum Gap (s)			2.0		2.0						3.4	
Time Before Reduce (s)			0.0		0.0						15.0	
Time To Reduce (s)			0.0		0.0						45.0	
Recall Mode			None		None						C-Max	
Walk Time (s)			7.0		7.0						7.0	
Flash Dont Walk (s)			11.0		11.0						14.0	
Pedestrian Calls (#/hr)			0		0						0	
Act Effct Green (s)			17.2		60.0						32.8	60.0
Actuated g/C Ratio			0.29		1.00						0.55	1.00
v/c Ratio			0.69		0.14						0.37	0.27

Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

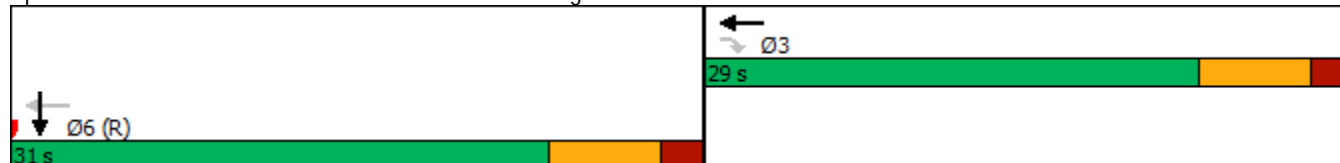
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			15.8		0.2						7.1	0.4
Queue Delay			0.0		0.0						0.0	0.0
Total Delay			15.8		0.2						7.1	0.4
LOS			B		A						A	A
Approach Delay		15.8			0.2						4.6	
Approach LOS		B			A						A	
Queue Length 50th (ft)			76		0						71	0
Queue Length 95th (ft)			109		0						132	0
Internal Link Dist (ft)		1124			346			499			256	
Turn Bay Length (ft)			100									125
Base Capacity (vph)			1242		1829						1937	1583
Starvation Cap Reductn			0		0						0	0
Spillback Cap Reductn			0		0						0	0
Storage Cap Reductn			0		0						0	0
Reduced v/c Ratio			0.52		0.14						0.37	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 10 (17%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 7.6
 Intersection Capacity Utilization 60.1%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.

Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 222: US 401/US 401 SB & E. Young Street



Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	520	0	130	0	0	0	0	0	1588	400
Future Volume (vph)	0	0	520	0	130	0	0	0	0	0	1588	400
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		0	0		0	0		125
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Flt Protected												
Satd. Flow (prot)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Flt Permitted												
Satd. Flow (perm)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)			55									150
Link Speed (mph)		35			45			55			55	
Link Distance (ft)		1204			426			579			336	
Travel Time (s)		23.5			6.5			7.2			4.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	578	0	144	0	0	0	0	0	1764	444
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	578	0	144	0	0	0	0	0	1764	444
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type			Perm		NA						NA	Free
Protected Phases					3						6!	
Permitted Phases			3		6!							Free
Detector Phase			3		3						6	
Switch Phase												
Minimum Initial (s)			7.0		7.0						14.0	
Minimum Split (s)			25.0		25.0						28.0	
Total Split (s)			25.0		25.0						55.0	
Total Split (%)			31.3%		31.3%						68.8%	
Yellow Time (s)			5.0		5.0						5.0	
All-Red Time (s)			2.0		2.0						2.0	
Lost Time Adjust (s)			-2.0		-2.0						-2.0	
Total Lost Time (s)			5.0		5.0						5.0	
Lead/Lag												
Lead-Lag Optimize?												
Recall Mode			None		None						C-Max	
Act Effct Green (s)			19.0		80.0						51.0	80.0
Actuated g/C Ratio			0.24		1.00						0.64	1.00
v/c Ratio			0.82		0.08						0.78	0.28

Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			36.8		0.1						10.2	0.3
Queue Delay			0.0		0.0						0.0	0.0
Total Delay			36.8		0.1						10.2	0.3
LOS			D		A						B	A
Approach Delay		36.8			0.1						8.2	
Approach LOS		D			A						A	
Queue Length 50th (ft)			139		0						390	0
Queue Length 95th (ft)			#221		0						83	0
Internal Link Dist (ft)		1124			346			499			256	
Turn Bay Length (ft)			100									125
Base Capacity (vph)			738		1839						2254	1583
Starvation Cap Reductn			0		0						0	0
Spillback Cap Reductn			0		0						0	0
Storage Cap Reductn			0		0						0	0
Reduced v/c Ratio			0.78		0.08						0.78	0.28

Intersection Summary



















Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 65
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.82
 Intersection Signal Delay: 13.5
 Intersection Capacity Utilization 70.4%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 ! Phase conflict between lane groups.

Splits and Phases: 222: US 401/US 401 SB & E. Young Street



Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

												
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			 								 	
Traffic Volume (vph)	0	0	599	0	233	0	0	0	0	0	659	390
Future Volume (vph)	0	0	599	0	233	0	0	0	0	0	659	390
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		100	0		0	0		0	0		125
Storage Lanes	0		1	0		0	0		0	0		1
Taper Length (ft)	25			25			25			25		
Lane Util. Factor	1.00	1.00	0.88	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected												
Satd. Flow (prot)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Flt Permitted												
Satd. Flow (perm)	0	0	2787	0	1863	0	0	0	0	0	3539	1583
Right Turn on Red			Yes	Yes		Yes			Yes			Yes
Satd. Flow (RTOR)			206									405
Link Speed (mph)		35			45			55			55	
Link Distance (ft)		1204			426			579			336	
Travel Time (s)		23.5			6.5			7.2			4.2	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	0	0	666	0	259	0	0	0	0	0	732	433
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	666	0	259	0	0	0	0	0	732	433
Turn Type			Perm		NA						NA	Free
Protected Phases					3						6!	
Permitted Phases			3		6!							Free
Detector Phase			3		3						6	
Switch Phase												
Minimum Initial (s)			7.0		7.0						14.0	
Minimum Split (s)			25.0		25.0						28.0	
Total Split (s)			29.0		29.0						31.0	
Total Split (%)			48.3%		48.3%						51.7%	
Maximum Green (s)			22.0		22.0						24.0	
Yellow Time (s)			5.0		5.0						5.0	
All-Red Time (s)			2.0		2.0						2.0	
Lost Time Adjust (s)			-2.0		-2.0						-2.0	
Total Lost Time (s)			5.0		5.0						5.0	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)			2.0		2.0						6.0	
Minimum Gap (s)			2.0		2.0						3.4	
Time Before Reduce (s)			0.0		0.0						15.0	
Time To Reduce (s)			0.0		0.0						45.0	
Recall Mode			None		None						C-Max	
Walk Time (s)			7.0		7.0						7.0	
Flash Dont Walk (s)			11.0		11.0						14.0	
Pedestrian Calls (#/hr)			0		0						0	
Act Effct Green (s)			17.6		60.0						32.4	60.0
Actuated g/C Ratio			0.29		1.00						0.54	1.00
v/c Ratio			0.69		0.14						0.38	0.27

Lanes, Volumes, Timings
 222: US 401/US 401 SB & E. Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

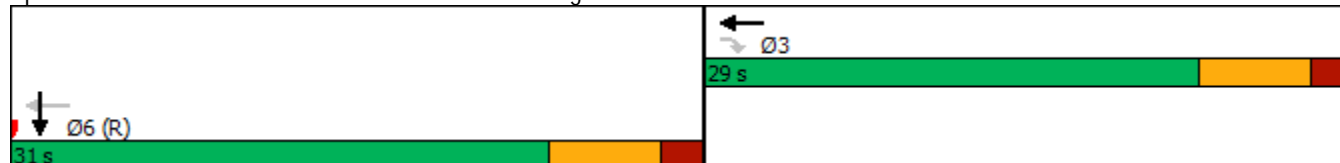
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay			16.1		0.2						7.4	0.4
Queue Delay			0.0		0.0						0.0	0.0
Total Delay			16.1		0.2						7.4	0.4
LOS			B		A						A	A
Approach Delay		16.1			0.2						4.8	
Approach LOS		B			A						A	
Queue Length 50th (ft)			79		0						73	0
Queue Length 95th (ft)			113		0						136	0
Internal Link Dist (ft)		1124			346			499			256	
Turn Bay Length (ft)			100									125
Base Capacity (vph)			1238		1855						1911	1583
Starvation Cap Reductn			0		0						0	0
Spillback Cap Reductn			0		0						0	0
Storage Cap Reductn			0		0						0	0
Reduced v/c Ratio			0.54		0.14						0.38	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 10 (17%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 55
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.69
 Intersection Signal Delay: 7.8
 Intersection Capacity Utilization 60.8%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.

Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 222: US 401/US 401 SB & E. Young Street



APPENDIX F

CAPACITY ANALYSIS CALCULATIONS










US 401

&

U-TURN NORTH OF E YOUNG STREET

Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	390	0	0	0	0	1158
Future Volume (vph)	390	0	0	0	0	1158
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	Yes	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	45		55			55
Link Distance (ft)	434		466			1116
Travel Time (s)	6.6		5.8			13.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	433	0	0	0	0	1287
Shared Lane Traffic (%)						
Lane Group Flow (vph)	433	0	0	0	0	1287
Turn Type	pm+pt					NA
Protected Phases	3					6!
Permitted Phases	6!					
Detector Phase	3					6
Switch Phase						
Minimum Initial (s)	7.0					14.0
Minimum Split (s)	25.0					25.0
Total Split (s)	30.0					70.0
Total Split (%)	30.0%					70.0%
Maximum Green (s)	23.0					63.0
Yellow Time (s)	5.0					5.0
All-Red Time (s)	2.0					2.0
Lost Time Adjust (s)	-2.0					-2.0
Total Lost Time (s)	5.0					5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0					6.0
Minimum Gap (s)	2.0					3.4
Time Before Reduce (s)	0.0					15.0
Time To Reduce (s)	0.0					45.0
Recall Mode	None					Min
Act Effct Green (s)	48.7					29.4
Actuated g/C Ratio	1.00					0.60
v/c Ratio	0.24					0.60
Control Delay	0.3					7.1
Queue Delay	0.0					0.0
Total Delay	0.3					7.1
LOS	A					A
Approach Delay	0.3					7.1
Approach LOS	A					A

Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

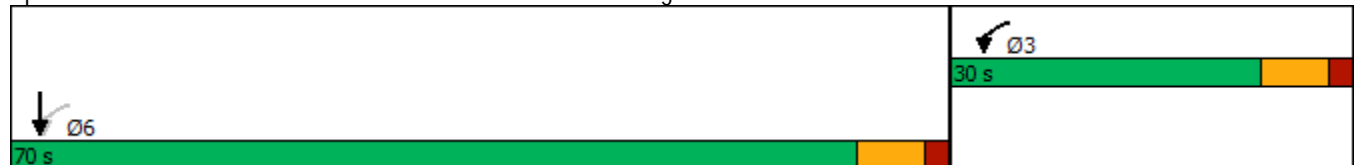
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	0					96
Queue Length 95th (ft)	0					136
Internal Link Dist (ft)	354		386			1036
Turn Bay Length (ft)						
Base Capacity (vph)	1770					3539
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.24					0.36

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 48.7
 Natural Cycle: 55
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.60
 Intersection Signal Delay: 5.4
 Intersection Capacity Utilization 61.1%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: US 401/US 401 SB & U-Turn N of E Young Street



Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	280	0	0	0	0	484
Future Volume (vph)	280	0	0	0	0	484
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	Yes	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	45		55			55
Link Distance (ft)	434		466			1116
Travel Time (s)	6.6		5.8			13.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	311	0	0	0	0	538
Shared Lane Traffic (%)						
Lane Group Flow (vph)	311	0	0	0	0	538
Turn Type	pm+pt					NA
Protected Phases	7					6!
Permitted Phases	6!					
Detector Phase	7					6
Switch Phase						
Minimum Initial (s)	7.0					14.0
Minimum Split (s)	25.0					25.0
Total Split (s)	30.0					70.0
Total Split (%)	30.0%					70.0%
Maximum Green (s)	23.0					63.0
Yellow Time (s)	5.0					5.0
All-Red Time (s)	2.0					2.0
Lost Time Adjust (s)	-2.0					-2.0
Total Lost Time (s)	5.0					5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0					6.0
Minimum Gap (s)	2.0					3.4
Time Before Reduce (s)	0.0					15.0
Time To Reduce (s)	0.0					45.0
Recall Mode	None					Min
Act Effct Green (s)	35.0					16.0
Actuated g/C Ratio	1.00					0.46
v/c Ratio	0.18					0.33
Control Delay	0.2					6.8
Queue Delay	0.0					0.0
Total Delay	0.2					6.8
LOS	A					A
Approach Delay	0.2					6.8
Approach LOS	A					A

Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

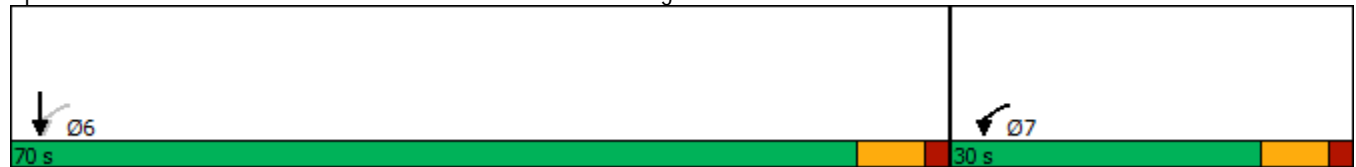
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	0					30
Queue Length 95th (ft)	0					50
Internal Link Dist (ft)	354		386			1036
Turn Bay Length (ft)						
Base Capacity (vph)	1770					3539
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.18					0.15

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 35
 Natural Cycle: 50
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.33
 Intersection Signal Delay: 4.4
 Intersection Capacity Utilization 49.2%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 3: US 401/US 401 SB & U-Turn N of E Young Street



Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	793	0	0	0	0	1352
Future Volume (vph)	793	0	0	0	0	1352
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	Yes	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	45		55			55
Link Distance (ft)	79		466			1116
Travel Time (s)	1.2		5.8			13.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	881	0	0	0	0	1502
Shared Lane Traffic (%)						
Lane Group Flow (vph)	881	0	0	0	0	1502
Turn Type	pm+pt					NA
Protected Phases	3					6!
Permitted Phases	6!					
Detector Phase	3					6
Switch Phase						
Minimum Initial (s)	7.0					14.0
Minimum Split (s)	25.0					25.0
Total Split (s)	45.0					35.0
Total Split (%)	56.3%					43.8%
Maximum Green (s)	38.0					28.0
Yellow Time (s)	5.0					5.0
All-Red Time (s)	2.0					2.0
Lost Time Adjust (s)	-2.0					-2.0
Total Lost Time (s)	5.0					5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0					6.0
Minimum Gap (s)	2.0					3.4
Time Before Reduce (s)	0.0					15.0
Time To Reduce (s)	0.0					45.0
Recall Mode	None					C-Max
Act Effct Green (s)	80.0					48.4
Actuated g/C Ratio	1.00					0.60
v/c Ratio	0.50					0.70
Control Delay	1.0					17.4
Queue Delay	0.0					0.0
Total Delay	1.0					17.4
LOS	A					B
Approach Delay	1.0					17.4
Approach LOS	A					B

Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

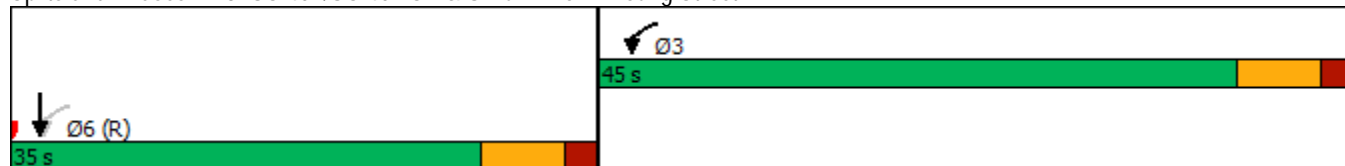
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	0					222
Queue Length 95th (ft)	0					#596
Internal Link Dist (ft)	1		386			1036
Turn Bay Length (ft)						
Base Capacity (vph)	1770					2140
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.50					0.70

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.70
 Intersection Signal Delay: 11.4
 Intersection Capacity Utilization 88.8%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 ! Phase conflict between lane groups.










Intersection LOS: B
 ICU Level of Service E

Splits and Phases: 3: US 401/US 401 SB & U-Turn N of E Young Street



Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	581	0	0	0	0	669
Future Volume (vph)	581	0	0	0	0	669
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	Yes	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	45		55			55
Link Distance (ft)	434		466			1116
Travel Time (s)	6.6		5.8			13.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	646	0	0	0	0	743
Shared Lane Traffic (%)						
Lane Group Flow (vph)	646	0	0	0	0	743
Turn Type	pm+pt					NA
Protected Phases	3					6!
Permitted Phases	6!					
Detector Phase	3					6
Switch Phase						
Minimum Initial (s)	7.0					14.0
Minimum Split (s)	25.0					25.0
Total Split (s)	29.0					31.0
Total Split (%)	48.3%					51.7%
Maximum Green (s)	22.0					24.0
Yellow Time (s)	5.0					5.0
All-Red Time (s)	2.0					2.0
Lost Time Adjust (s)	-2.0					-2.0
Total Lost Time (s)	5.0					5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0					6.0
Minimum Gap (s)	2.0					3.4
Time Before Reduce (s)	0.0					15.0
Time To Reduce (s)	0.0					45.0
Recall Mode	None					C-Max
Act Effct Green (s)	60.0					40.2
Actuated g/C Ratio	1.00					0.67
v/c Ratio	0.36					0.31
Control Delay	0.6					4.7
Queue Delay	0.0					0.0
Total Delay	0.6					4.7
LOS	A					A
Approach Delay	0.6					4.7
Approach LOS	A					A

Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

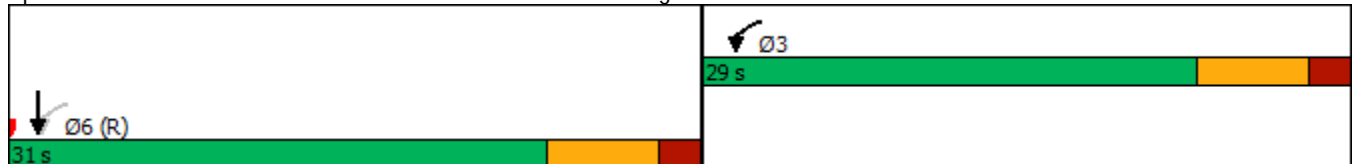
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	0					45
Queue Length 95th (ft)	0					77
Internal Link Dist (ft)	354		386			1036
Turn Bay Length (ft)						
Base Capacity (vph)	1770					2371
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.36					0.31

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 0 (0%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.36
 Intersection Signal Delay: 2.8
 Intersection Capacity Utilization 60.1%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: US 401/US 401 SB & U-Turn N of E Young Street



Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) AM Peak Hour

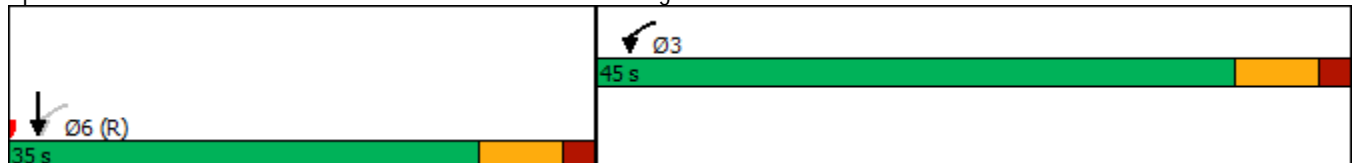
						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	810	0	0	0	0	1360
Future Volume (vph)	810	0	0	0	0	1360
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	Yes	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	45		55			55
Link Distance (ft)	434		466			1116
Travel Time (s)	6.6		5.8			13.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	900	0	0	0	0	1511
Shared Lane Traffic (%)						
Lane Group Flow (vph)	900	0	0	0	0	1511
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(ft)	12		12			12
Link Offset(ft)	0		0			0
Crosswalk Width(ft)	16		16			16
Two way Left Turn Lane						
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15	9		9	15	
Turn Type	pm+pt					NA
Protected Phases	3					6!
Permitted Phases	6!					
Detector Phase	3					6
Switch Phase						
Minimum Initial (s)	7.0					14.0
Minimum Split (s)	25.0					25.0
Total Split (s)	45.0					35.0
Total Split (%)	56.3%					43.8%
Yellow Time (s)	5.0					5.0
All-Red Time (s)	2.0					2.0
Lost Time Adjust (s)	-2.0					-2.0
Total Lost Time (s)	5.0					5.0
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None					C-Max
Act Effct Green (s)	80.0					47.4
Actuated g/C Ratio	1.00					0.59
v/c Ratio	0.51					0.72
Control Delay	1.0					18.4
Queue Delay	0.0					0.0
Total Delay	1.0					18.4

Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
LOS	A					B
Approach Delay	1.0					18.4
Approach LOS	A					B
Queue Length 50th (ft)	0					239
Queue Length 95th (ft)	0					#601
Internal Link Dist (ft)	354		386			1036
Turn Bay Length (ft)						
Base Capacity (vph)	1770					2096
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.51					0.72

Intersection Summary










Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.72
 Intersection Signal Delay: 12.0
 Intersection Capacity Utilization 90.0%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.
 ! Phase conflict between lane groups.

Splits and Phases: 3: US 401/US 401 SB & U-Turn N of E Young Street



Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

						
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						 
Traffic Volume (vph)	602	0	0	0	0	682
Future Volume (vph)	602	0	0	0	0	682
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.95
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1770	0	0	0	0	3539
Flt Permitted	0.950					
Satd. Flow (perm)	1770	0	0	0	0	3539
Right Turn on Red	Yes	Yes		Yes		
Satd. Flow (RTOR)						
Link Speed (mph)	45		55			55
Link Distance (ft)	434		466			1116
Travel Time (s)	6.6		5.8			13.8
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	669	0	0	0	0	758
Shared Lane Traffic (%)						
Lane Group Flow (vph)	669	0	0	0	0	758
Turn Type	pm+pt					NA
Protected Phases	3					6!
Permitted Phases	6!					
Detector Phase	3					6
Switch Phase						
Minimum Initial (s)	7.0					14.0
Minimum Split (s)	25.0					25.0
Total Split (s)	29.0					31.0
Total Split (%)	48.3%					51.7%
Maximum Green (s)	22.0					24.0
Yellow Time (s)	5.0					5.0
All-Red Time (s)	2.0					2.0
Lost Time Adjust (s)	-2.0					-2.0
Total Lost Time (s)	5.0					5.0
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0					6.0
Minimum Gap (s)	2.0					3.4
Time Before Reduce (s)	0.0					15.0
Time To Reduce (s)	0.0					45.0
Recall Mode	None					C-Max
Act Effct Green (s)	60.0					40.1
Actuated g/C Ratio	1.00					0.67
v/c Ratio	0.38					0.32
Control Delay	0.6					4.8
Queue Delay	0.0					0.0
Total Delay	0.6					4.8
LOS	A					A
Approach Delay	0.6					4.8
Approach LOS	A					A

Lanes, Volumes, Timings
 3: US 401/US 401 SB & U-Turn N of E Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

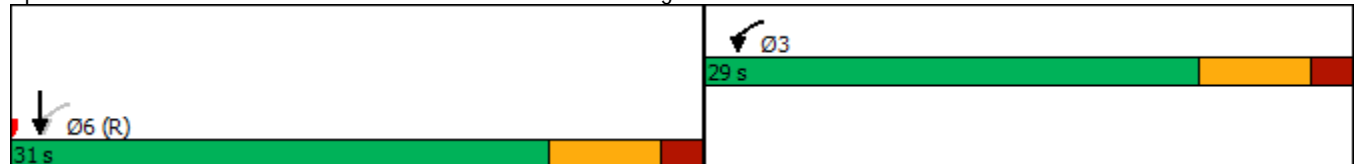
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	0					47
Queue Length 95th (ft)	0					81
Internal Link Dist (ft)	354		386			1036
Turn Bay Length (ft)						
Base Capacity (vph)	1770					2362
Starvation Cap Reductn	0					0
Spillback Cap Reductn	0					0
Storage Cap Reductn	0					0
Reduced v/c Ratio	0.38					0.32

Intersection Summary

Area Type: Other
 Cycle Length: 60
 Actuated Cycle Length: 60
 Offset: 0 (0%), Referenced to phase 2: and 6:WBSB, Start of Green
 Natural Cycle: 50
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.38
 Intersection Signal Delay: 2.8
 Intersection Capacity Utilization 60.8%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.

Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 3: US 401/US 401 SB & U-Turn N of E Young Street



APPENDIX G

CAPACITY ANALYSIS CALCULATIONS










US 401

&

U-TURN SOUTH OF E YOUNG STREET

Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 		
Traffic Volume (vph)	192	0	0	527	0	0
Future Volume (vph)	192	0	0	527	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-1%			1%	0%	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1778	0	0	3522	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1778	0	0	3522	0	0
Right Turn on Red	Yes	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			55	55	
Link Distance (ft)	307			1176	460	
Travel Time (s)	4.7			14.6	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	213	0	0	586	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	213	0	0	586	0	0
Turn Type	pm+pt			NA		
Protected Phases	7			2!		
Permitted Phases	2!					
Detector Phase	7			2		
Switch Phase						
Minimum Initial (s)	7.0			14.0		
Minimum Split (s)	14.0			21.0		
Total Split (s)	30.0			70.0		
Total Split (%)	30.0%			70.0%		
Maximum Green (s)	23.0			63.0		
Yellow Time (s)	5.0			5.0		
All-Red Time (s)	2.0			2.0		
Lost Time Adjust (s)	-2.0			-2.0		
Total Lost Time (s)	5.0			5.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			6.0		
Minimum Gap (s)	2.0			3.4		
Time Before Reduce (s)	0.0			15.0		
Time To Reduce (s)	0.0			45.0		
Recall Mode	None			Min		
Act Effct Green (s)	35.6			16.6		
Actuated g/C Ratio	1.00			0.47		
v/c Ratio	0.12			0.36		
Control Delay	0.1			6.9		
Queue Delay	0.0			0.0		
Total Delay	0.1			6.9		
LOS	A			A		
Approach Delay	0.1			6.9		

Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

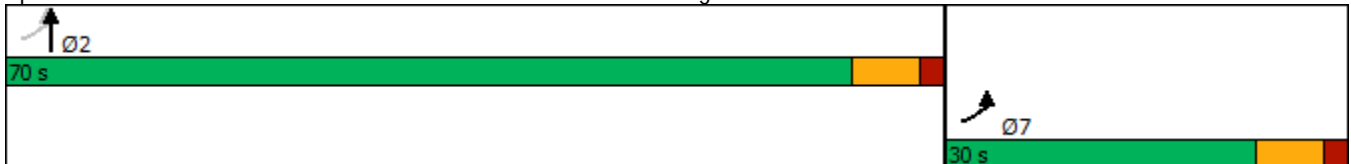
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	A		A			
Queue Length 50th (ft)	0		33			
Queue Length 95th (ft)	0		55			
Internal Link Dist (ft)	227		1096		380	
Turn Bay Length (ft)						
Base Capacity (vph)	1778		3522			
Starvation Cap Reductn	0		0			
Spillback Cap Reductn	0		0			
Storage Cap Reductn	0		0			
Reduced v/c Ratio	0.12		0.17			

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 35.6
 Natural Cycle: 40
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.36
 Intersection Signal Delay: 5.1
 Intersection Capacity Utilization 33.5%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 4: US 401 NB/US 401 & U-Turn South of E Young Street



Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 		
Traffic Volume (vph)	307	0	0	1225	0	0
Future Volume (vph)	307	0	0	1225	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-1%			1%	0%	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1778	0	0	3522	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1778	0	0	3522	0	0
Right Turn on Red	Yes	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			55	55	
Link Distance (ft)	307			1176	460	
Travel Time (s)	4.7			14.6	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	341	0	0	1361	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	341	0	0	1361	0	0
Turn Type	pm+pt			NA		
Protected Phases	7			2!		
Permitted Phases	2!					
Detector Phase	7			2		
Switch Phase						
Minimum Initial (s)	7.0			14.0		
Minimum Split (s)	14.0			21.0		
Total Split (s)	30.0			70.0		
Total Split (%)	30.0%			70.0%		
Maximum Green (s)	23.0			63.0		
Yellow Time (s)	5.0			5.0		
All-Red Time (s)	2.0			2.0		
Lost Time Adjust (s)	-2.0			-2.0		
Total Lost Time (s)	5.0			5.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			6.0		
Minimum Gap (s)	2.0			3.4		
Time Before Reduce (s)	0.0			15.0		
Time To Reduce (s)	0.0			45.0		
Recall Mode	None			Min		
Act Effct Green (s)	51.0			31.8		
Actuated g/C Ratio	1.00			0.62		
v/c Ratio	0.19			0.62		
Control Delay	0.2			7.2		
Queue Delay	0.0			0.0		
Total Delay	0.2			7.2		
LOS	A			A		
Approach Delay	0.2			7.2		

Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

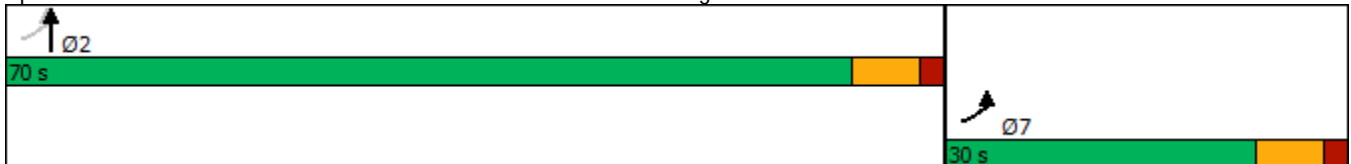
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	A		A			
Queue Length 50th (ft)	0		105			
Queue Length 95th (ft)	0		148			
Internal Link Dist (ft)	227		1096		380	
Turn Bay Length (ft)						
Base Capacity (vph)	1778		3522			
Starvation Cap Reductn	0		0			
Spillback Cap Reductn	0		0			
Storage Cap Reductn	0		0			
Reduced v/c Ratio	0.19		0.39			

Intersection Summary

Area Type: Other
 Cycle Length: 100
 Actuated Cycle Length: 51
 Natural Cycle: 40
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.62
 Intersection Signal Delay: 5.8
 Intersection Capacity Utilization 59.2%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service B

Splits and Phases: 4: US 401 NB/US 401 & U-Turn South of E Young Street



Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 		
Traffic Volume (vph)	276	0	0	784	0	0
Future Volume (vph)	276	0	0	784	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-1%			1%	0%	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1778	0	0	3522	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1778	0	0	3522	0	0
Right Turn on Red	Yes	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			55	55	
Link Distance (ft)	307			1176	460	
Travel Time (s)	4.7			14.6	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	307	0	0	871	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	307	0	0	871	0	0
Turn Type	pm+pt			NA		
Protected Phases	7			2!		
Permitted Phases	2!					
Detector Phase	7			2		
Switch Phase						
Minimum Initial (s)	7.0			14.0		
Minimum Split (s)	14.0			21.0		
Total Split (s)	25.0			65.0		
Total Split (%)	27.8%			72.2%		
Maximum Green (s)	18.0			58.0		
Yellow Time (s)	5.0			5.0		
All-Red Time (s)	2.0			2.0		
Lost Time Adjust (s)	-2.0			-2.0		
Total Lost Time (s)	5.0			5.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			6.0		
Minimum Gap (s)	2.0			3.4		
Time Before Reduce (s)	0.0			15.0		
Time To Reduce (s)	0.0			45.0		
Recall Mode	None			C-Max		
Act Effect Green (s)	90.0			71.0		
Actuated g/C Ratio	1.00			0.79		
v/c Ratio	0.17			0.31		
Control Delay	0.2			3.0		
Queue Delay	0.0			0.0		
Total Delay	0.2			3.0		
LOS	A			A		
Approach Delay	0.2			3.0		

Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) AM Peak Hour

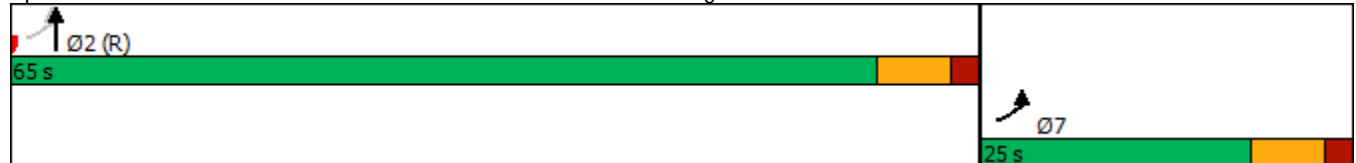
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	A		A			
Queue Length 50th (ft)	0		55			
Queue Length 95th (ft)	0		72			
Internal Link Dist (ft)	227		1096		380	
Turn Bay Length (ft)						
Base Capacity (vph)	1778		2778			
Starvation Cap Reductn	0		0			
Spillback Cap Reductn	0		0			
Storage Cap Reductn	0		0			
Reduced v/c Ratio	0.17		0.31			

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.31
 Intersection Signal Delay: 2.3
 Intersection Capacity Utilization 45.3%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 4: US 401 NB/US 401 & U-Turn South of E Young Street



Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 		
Traffic Volume (vph)	469	0	0	1819	0	0
Future Volume (vph)	469	0	0	1819	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-1%			1%	0%	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1778	0	0	3522	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1778	0	0	3522	0	0
Right Turn on Red	Yes	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			55	55	
Link Distance (ft)	307			1176	460	
Travel Time (s)	4.7			14.6	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	521	0	0	2021	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	521	0	0	2021	0	0
Turn Type	pm+pt			NA		
Protected Phases	7			2!		
Permitted Phases	2!					
Detector Phase	7			2		
Switch Phase						
Minimum Initial (s)	7.0			14.0		
Minimum Split (s)	14.0			21.0		
Total Split (s)	35.0			45.0		
Total Split (%)	43.8%			56.3%		
Maximum Green (s)	28.0			38.0		
Yellow Time (s)	5.0			5.0		
All-Red Time (s)	2.0			2.0		
Lost Time Adjust (s)	-2.0			-2.0		
Total Lost Time (s)	5.0			5.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			6.0		
Minimum Gap (s)	2.0			3.4		
Time Before Reduce (s)	0.0			15.0		
Time To Reduce (s)	0.0			45.0		
Recall Mode	None			C-Max		
Act Effct Green (s)	80.0			60.8		
Actuated g/C Ratio	1.00			0.76		
v/c Ratio	0.29			0.75		
Control Delay	0.4			7.8		
Queue Delay	0.0			0.0		
Total Delay	0.4			7.8		
LOS	A			A		
Approach Delay	0.4			7.8		

Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 No-Build (2028) PM Peak Hour

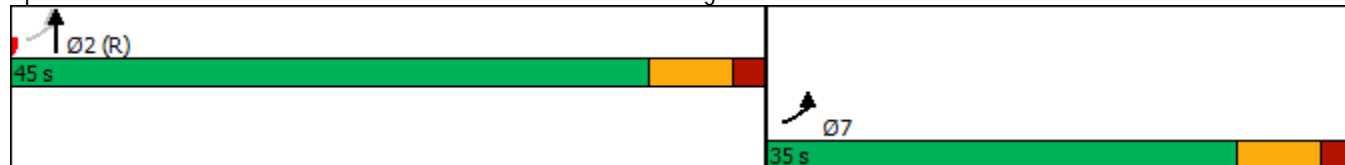
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	A			A		
Queue Length 50th (ft)	0			226		
Queue Length 95th (ft)	0			321		
Internal Link Dist (ft)	227			1096		380
Turn Bay Length (ft)						
Base Capacity (vph)	1778			2678		
Starvation Cap Reductn	0			0		
Spillback Cap Reductn	0			0		
Storage Cap Reductn	0			0		
Reduced v/c Ratio	0.29			0.75		

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.75
 Intersection Signal Delay: 6.3
 Intersection Capacity Utilization 84.6%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 4: US 401 NB/US 401 & U-Turn South of E Young Street



Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) AM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 		
Traffic Volume (vph)	284	0	0	792	0	0
Future Volume (vph)	284	0	0	792	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-1%			1%	0%	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1778	0	0	3522	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1778	0	0	3522	0	0
Right Turn on Red	Yes	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			55	55	
Link Distance (ft)	307			1176	460	
Travel Time (s)	4.7			14.6	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	316	0	0	880	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	316	0	0	880	0	0
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(ft)	12			12	12	
Link Offset(ft)	0			0	0	
Crosswalk Width(ft)	16			16	16	
Two way Left Turn Lane						
Headway Factor	0.99	0.99	1.01	1.01	1.00	1.00
Turning Speed (mph)	15	9	15			9
Turn Type	pm+pt			NA		
Protected Phases	7			2!		
Permitted Phases	2!					
Detector Phase	7			2		
Switch Phase						
Minimum Initial (s)	7.0			14.0		
Minimum Split (s)	14.0			21.0		
Total Split (s)	25.0			65.0		
Total Split (%)	27.8%			72.2%		
Yellow Time (s)	5.0			5.0		
All-Red Time (s)	2.0			2.0		
Lost Time Adjust (s)	-2.0			-2.0		
Total Lost Time (s)	5.0			5.0		
Lead/Lag						
Lead-Lag Optimize?						
Recall Mode	None			C-Max		
Act Effct Green (s)	90.0			71.0		
Actuated g/C Ratio	1.00			0.79		
v/c Ratio	0.18			0.32		
Control Delay	0.2			3.0		
Queue Delay	0.0			0.0		

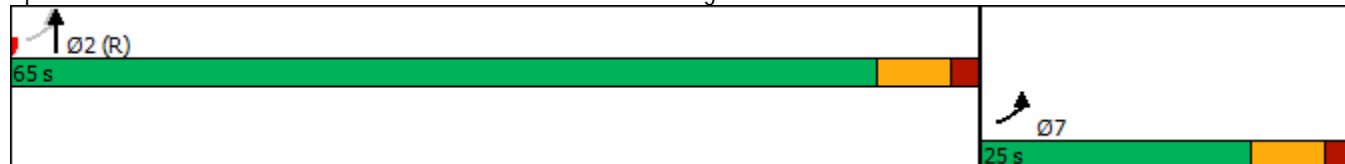
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Total Delay	0.2			3.0		
LOS	A			A		
Approach Delay	0.2			3.0		
Approach LOS	A			A		
Queue Length 50th (ft)	0			55		
Queue Length 95th (ft)	0			73		
Internal Link Dist (ft)	227			1096	380	
Turn Bay Length (ft)						
Base Capacity (vph)	1778			2778		
Starvation Cap Reductn	0			0		
Spillback Cap Reductn	0			0		
Storage Cap Reductn	0			0		
Reduced v/c Ratio	0.18			0.32		

Intersection Summary

Area Type: Other
 Cycle Length: 90
 Actuated Cycle Length: 90
 Offset: 0 (0%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 40
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.32
 Intersection Signal Delay: 2.3
 Intersection Capacity Utilization 46.0%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.










Intersection LOS: A
 ICU Level of Service A

Splits and Phases: 4: US 401 NB/US 401 & U-Turn South of E Young Street



Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

						
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations				 		
Traffic Volume (vph)	481	0	0	1831	0	0
Future Volume (vph)	481	0	0	1831	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Grade (%)	-1%			1%	0%	
Lane Util. Factor	1.00	1.00	1.00	0.95	1.00	1.00
Frt						
Flt Protected	0.950					
Satd. Flow (prot)	1778	0	0	3522	0	0
Flt Permitted	0.950					
Satd. Flow (perm)	1778	0	0	3522	0	0
Right Turn on Red	Yes	Yes				Yes
Satd. Flow (RTOR)						
Link Speed (mph)	45			55	55	
Link Distance (ft)	307			1176	460	
Travel Time (s)	4.7			14.6	5.7	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	534	0	0	2034	0	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	534	0	0	2034	0	0
Turn Type	pm+pt			NA		
Protected Phases	7			2!		
Permitted Phases	2!					
Detector Phase	7			2		
Switch Phase						
Minimum Initial (s)	7.0			14.0		
Minimum Split (s)	14.0			21.0		
Total Split (s)	35.0			45.0		
Total Split (%)	43.8%			56.3%		
Maximum Green (s)	28.0			38.0		
Yellow Time (s)	5.0			5.0		
All-Red Time (s)	2.0			2.0		
Lost Time Adjust (s)	-2.0			-2.0		
Total Lost Time (s)	5.0			5.0		
Lead/Lag						
Lead-Lag Optimize?						
Vehicle Extension (s)	2.0			6.0		
Minimum Gap (s)	2.0			3.4		
Time Before Reduce (s)	0.0			15.0		
Time To Reduce (s)	0.0			45.0		
Recall Mode	None			C-Max		
Act Effct Green (s)	80.0			60.8		
Actuated g/C Ratio	1.00			0.76		
v/c Ratio	0.30			0.76		
Control Delay	0.4			7.9		
Queue Delay	0.0			0.0		
Total Delay	0.4			7.9		
LOS	A			A		
Approach Delay	0.4			7.9		

Lanes, Volumes, Timings
 4: US 401 NB/US 401 & U-Turn South of E Young Street

1216 Rolesville Road - Rolesville, NC
 Build (2028) PM Peak Hour

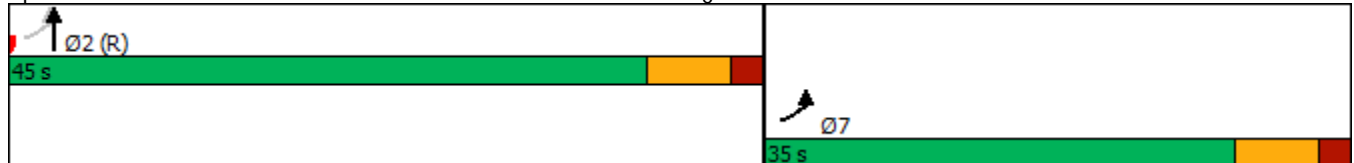
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Approach LOS	A		A			
Queue Length 50th (ft)	0		229			
Queue Length 95th (ft)	0		332			
Internal Link Dist (ft)	227		1096		380	
Turn Bay Length (ft)						
Base Capacity (vph)	1778		2675			
Starvation Cap Reductn	0		0			
Spillback Cap Reductn	0		0			
Storage Cap Reductn	0		0			
Reduced v/c Ratio	0.30		0.76			

Intersection Summary

Area Type: Other
 Cycle Length: 80
 Actuated Cycle Length: 80
 Offset: 0 (0%), Referenced to phase 2:NBEB and 6:, Start of Green
 Natural Cycle: 60
 Control Type: Actuated-Coordinated
 Maximum v/c Ratio: 0.76
 Intersection Signal Delay: 6.4
 Intersection Capacity Utilization 85.6%
 Analysis Period (min) 15
 ! Phase conflict between lane groups.

Intersection LOS: A
 ICU Level of Service E

Splits and Phases: 4: US 401 NB/US 401 & U-Turn South of E Young Street



APPENDIX H

CAPACITY ANALYSIS CALCULATIONS

E YOUNG STREET

&

QUARRY ROAD

Intersection

Int Delay, s/veh	2.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	18	105	354	20	83	384
Future Vol, veh/h	18	105	354	20	83	384
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	-	500	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	20	117	393	22	92	427

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1015	404	0	0	415
Stage 1	404	-	-	-	-
Stage 2	611	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	264	647	-	-	1144
Stage 1	674	-	-	-	-
Stage 2	542	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	243	647	-	-	1144
Mov Cap-2 Maneuver	243	-	-	-	-
Stage 1	674	-	-	-	-
Stage 2	499	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.2	0	1.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	243	647	1144
HCM Lane V/C Ratio	-	-	0.082	0.18	0.081
HCM Control Delay (s)	-	-	21.1	11.8	8.4
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.7	0.3

Intersection

Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	60	350	7	88	427
Future Vol, veh/h	11	60	350	7	88	427
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	250	-	-	500	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	67	389	8	98	474

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1063	393	0	0	397
Stage 1	393	-	-	-	-
Stage 2	670	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	247	656	-	-	1162
Stage 1	682	-	-	-	-
Stage 2	509	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	226	656	-	-	1162
Mov Cap-2 Maneuver	226	-	-	-	-
Stage 1	682	-	-	-	-
Stage 2	466	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.8	0	1.4
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	226	656	1162
HCM Lane V/C Ratio	-	-	0.054	0.102	0.084
HCM Control Delay (s)	-	-	21.8	11.1	8.4
HCM Lane LOS	-	-	C	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0.3	0.3

Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

No-Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	4	94	22	4	118	10	696	29	93	567	152
Future Volume (vph)	163	4	94	22	4	118	10	696	29	93	567	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	0		250	100		100	500		100
Storage Lanes	1		0	0		1	1		1	1		1
Taper Length (ft)	100			25			100			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.856				0.850			0.850			0.850
Flt Protected	0.950				0.959		0.950			0.950		
Satd. Flow (prot)	1770	1595	0	0	1786	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950				0.682		0.426			0.091		
Satd. Flow (perm)	1770	1595	0	0	1270	1583	794	1863	1583	170	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		104				131			164			169
Link Speed (mph)		35			45			45			45	
Link Distance (ft)		1151			1133			1011			1438	
Travel Time (s)		22.4			17.2			15.3			21.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	181	4	104	24	4	131	11	773	32	103	630	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	108	0	0	28	131	11	773	32	103	630	169
Turn Type	Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm	D.P+P	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases				8		8	2		2	2		6
Detector Phase	7	4		8	8	1	2	2	2	1	6	7
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	12.0	12.0	12.0	7.0	12.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0	14.0	19.0	19.0	19.0	14.0	19.0	14.0
Total Split (s)	23.0	37.0		14.0	14.0	14.0	69.0	69.0	69.0	14.0	83.0	23.0
Total Split (%)	19.2%	30.8%		11.7%	11.7%	11.7%	57.5%	57.5%	57.5%	11.7%	69.2%	19.2%
Maximum Green (s)	16.0	30.0		7.0	7.0	7.0	62.0	62.0	62.0	7.0	76.0	16.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag	Lag	Lead		Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	None
Act Effct Green (s)	16.1	22.5			9.8	16.7	43.8	43.8	43.8	53.6	59.0	83.4
Actuated g/C Ratio	0.17	0.24			0.11	0.18	0.47	0.47	0.47	0.58	0.64	0.90
v/c Ratio	0.59	0.23			0.21	0.33	0.03	0.88	0.04	0.39	0.53	0.12
Control Delay	49.7	8.7			52.8	9.7	14.3	35.1	0.1	14.4	12.2	0.4
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	49.7	8.7			52.8	9.7	14.3	35.1	0.1	14.4	12.2	0.4
LOS	D	A			D	A	B	D	A	B	B	A
Approach Delay		34.4			17.3			33.5			10.3	
Approach LOS		C			B			C			B	

Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

No-Build (2028) AM Peak Hour

Lane Group												
Queue Length 50th (ft)	112	2			18	0	4	459	0	27	238	0
Queue Length 95th (ft)	#224	47			52	53	13	634	0	58	328	8
Internal Link Dist (ft)		1071			1053			931			1358	
Turn Bay Length (ft)	275					250	100		100	500		100
Base Capacity (vph)	372	661			133	392	576	1353	1194	266	1524	1436
Starvation Cap Reductn	0	0			0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.49	0.16			0.21	0.33	0.02	0.57	0.03	0.39	0.41	0.12

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 92.9
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.88
 Intersection Signal Delay: 22.7
 Intersection Capacity Utilization 70.7%
 Analysis Period (min) 15
 # 95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Intersection LOS: C
 ICU Level of Service C

Splits and Phases: 5: E. Young Street & The Point North Site Dvwy/Quarry Road



Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

No-Build (2028) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	4	125	19	4	68	58	568	12	99	779	364
Future Volume (vph)	165	4	125	19	4	68	58	568	12	99	779	364
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	0		250	100		100	500		100
Storage Lanes	1		0	0		1	1		1	1		1
Taper Length (ft)	100			25			100			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.854				0.850			0.850			0.850
Flt Protected	0.950				0.960		0.950			0.950		
Satd. Flow (prot)	1770	1591	0	0	1788	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950				0.898		0.215			0.161		
Satd. Flow (perm)	1770	1591	0	0	1673	1583	400	1863	1583	300	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		139				100			164			404
Link Speed (mph)		35			45			45			45	
Link Distance (ft)		1151			1133			1011			1438	
Travel Time (s)		22.4			17.2			15.3			21.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	183	4	139	21	4	76	64	631	13	110	866	404
Shared Lane Traffic (%)												
Lane Group Flow (vph)	183	143	0	0	25	76	64	631	13	110	866	404
Turn Type	Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm	D.P+P	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases				8		8	2		2	2		6
Detector Phase	7	4		8	8	1	2	2	2	1	6	7
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	12.0	12.0	12.0	7.0	12.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0	14.0	19.0	19.0	19.0	14.0	19.0	14.0
Total Split (s)	26.0	40.0		14.0	14.0	14.0	66.0	66.0	66.0	14.0	80.0	26.0
Total Split (%)	21.7%	33.3%		11.7%	11.7%	11.7%	55.0%	55.0%	55.0%	11.7%	66.7%	21.7%
Maximum Green (s)	19.0	33.0		7.0	7.0	7.0	59.0	59.0	59.0	7.0	73.0	19.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag	Lag	Lead		Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	None
Act Effct Green (s)	16.5	20.7			9.9	14.1	35.1	35.1	35.1	44.9	50.4	76.4
Actuated g/C Ratio	0.20	0.25			0.12	0.17	0.43	0.43	0.43	0.55	0.61	0.93
v/c Ratio	0.52	0.28			0.12	0.21	0.38	0.79	0.02	0.32	0.76	0.27
Control Delay	40.0	7.1			45.5	5.8	24.8	29.0	0.0	10.9	18.3	0.6
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.0	7.1			45.5	5.8	24.8	29.0	0.0	10.9	18.3	0.6
LOS	D	A			D	A	C	C	A	B	B	A
Approach Delay		25.6			15.6			28.1			12.5	
Approach LOS		C			B			C			B	

Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

No-Build (2028) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	78	2			11	0	18	230	0	17	233	0
Queue Length 95th (ft)	205	50			47	25	65	488	0	56	612	12
Internal Link Dist (ft)		1071			1053			931			1358	
Turn Bay Length (ft)	275					250	100		100	500		100
Base Capacity (vph)	497	819			201	354	311	1452	1270	341	1614	1499
Starvation Cap Reductn	0	0			0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.37	0.17			0.12	0.21	0.21	0.43	0.01	0.32	0.54	0.27

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 82.1
 Natural Cycle: 75
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.79
 Intersection Signal Delay: 18.7
 Intersection Capacity Utilization 80.1%
 Analysis Period (min) 15

Intersection LOS: B
 ICU Level of Service D

Splits and Phases: 5: E. Young Street & The Point North Site Dvwy/Quarry Road



Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

Build (2028) AM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	163	4	94	25	4	118	10	722	31	93	591	152
Future Volume (vph)	163	4	94	25	4	118	10	722	31	93	591	152
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	0		250	100		100	500		100
Storage Lanes	1		0	0		1	1		1	1		1
Taper Length (ft)	100			25			100			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.856				0.850			0.850			0.850
Flt Protected	0.950				0.958		0.950			0.950		
Satd. Flow (prot)	1770	1595	0	0	1785	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950				0.682		0.403			0.086		
Satd. Flow (perm)	1770	1595	0	0	1270	1583	751	1863	1583	160	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		104				131			164			169
Link Speed (mph)		35			45			45			45	
Link Distance (ft)		1151			1133			1011			1438	
Travel Time (s)		22.4			17.2			15.3			21.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	181	4	104	28	4	131	11	802	34	103	657	169
Shared Lane Traffic (%)												
Lane Group Flow (vph)	181	108	0	0	32	131	11	802	34	103	657	169
Enter Blocked Intersection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Turn Type	Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm	D.P+P	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases				8		8	2		2	2		6
Detector Phase	7	4		8	8	1	2	2	2	1	6	7
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	12.0	12.0	12.0	7.0	12.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0	14.0	19.0	19.0	19.0	14.0	19.0	14.0
Total Split (s)	23.0	37.0		14.0	14.0	14.0	69.0	69.0	69.0	14.0	83.0	23.0
Total Split (%)	19.2%	30.8%		11.7%	11.7%	11.7%	57.5%	57.5%	57.5%	11.7%	69.2%	19.2%
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag	Lag	Lead		Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	None
Act Effct Green (s)	16.1	22.5			9.7	16.7	46.0	46.0	46.0	55.8	61.2	85.6
Actuated g/C Ratio	0.17	0.24			0.10	0.18	0.48	0.48	0.48	0.59	0.64	0.90
v/c Ratio	0.61	0.24			0.25	0.34	0.03	0.89	0.04	0.40	0.55	0.12

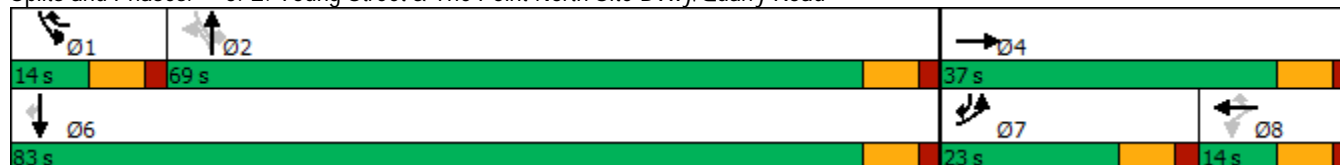
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Control Delay	51.4	8.8			54.7	9.9	14.0	35.8	0.1	15.5	12.4	0.4
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	51.4	8.8			54.7	9.9	14.0	35.8	0.1	15.5	12.4	0.4
LOS	D	A			D	A	B	D	A	B	B	A
Approach Delay		35.5			18.7			34.1			10.5	
Approach LOS		D			B			C			B	
Queue Length 50th (ft)	117	2			21	0	4	489	0	27	254	0
Queue Length 95th (ft)	#224	47			58	53	14	675	0	63	350	8
Internal Link Dist (ft)		1071			1053			931			1358	
Turn Bay Length (ft)	275					250	100		100	500		100
Base Capacity (vph)	362	647			130	386	535	1328	1175	258	1506	1438
Starvation Cap Reductn	0	0			0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.50	0.17			0.25	0.34	0.02	0.60	0.03	0.40	0.44	0.12

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 95.1
 Natural Cycle: 90
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.89
 Intersection Signal Delay: 23.3
 Intersection Capacity Utilization 72.0%
 Analysis Period (min) 15
 Intersection LOS: C
 ICU Level of Service C

95th percentile volume exceeds capacity, queue may be longer.
 Queue shown is maximum after two cycles.

Splits and Phases: 5: E. Young Street & The Point North Site Dvwy/Quarry Road



Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

Build (2028) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	165	4	125	24	4	68	58	601	17	99	816	364
Future Volume (vph)	165	4	125	24	4	68	58	601	17	99	816	364
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	275		0	0		250	100		100	500		100
Storage Lanes	1		0	0		1	1		1	1		1
Taper Length (ft)	100			25			100			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.854				0.850			0.850			0.850
Flt Protected	0.950				0.958		0.950			0.950		
Satd. Flow (prot)	1770	1591	0	0	1785	1583	1770	1863	1583	1770	1863	1583
Flt Permitted	0.950				0.680		0.174			0.136		
Satd. Flow (perm)	1770	1591	0	0	1267	1583	324	1863	1583	253	1863	1583
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		139				100			164			404
Link Speed (mph)		35			45			45			45	
Link Distance (ft)		1151			1133			1011			1438	
Travel Time (s)		22.4			17.2			15.3			21.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	183	4	139	27	4	76	64	668	19	110	907	404
Shared Lane Traffic (%)												
Lane Group Flow (vph)	183	143	0	0	31	76	64	668	19	110	907	404
Turn Type	Prot	NA		Perm	NA	pm+ov	Perm	NA	Perm	D.P+P	NA	pm+ov
Protected Phases	7	4			8	1		2		1	6	7
Permitted Phases				8		8	2		2	2		6
Detector Phase	7	4		8	8	1	2	2	2	1	6	7
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0	7.0	12.0	12.0	12.0	7.0	12.0	7.0
Minimum Split (s)	14.0	14.0		14.0	14.0	14.0	19.0	19.0	19.0	14.0	19.0	14.0
Total Split (s)	26.0	40.0		14.0	14.0	14.0	66.0	66.0	66.0	14.0	80.0	26.0
Total Split (%)	21.7%	33.3%		11.7%	11.7%	11.7%	55.0%	55.0%	55.0%	11.7%	66.7%	21.7%
Maximum Green (s)	19.0	33.0		7.0	7.0	7.0	59.0	59.0	59.0	7.0	73.0	19.0
Yellow Time (s)	5.0	5.0		5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
All-Red Time (s)	2.0	2.0		2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Lost Time Adjust (s)	-2.0	-2.0			-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0	-2.0
Total Lost Time (s)	5.0	5.0			5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Lead/Lag	Lead			Lag	Lag	Lead	Lag	Lag	Lag	Lead		Lead
Lead-Lag Optimize?	Yes			Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Vehicle Extension (s)	3.0	3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	Min	Min	Min	None	Min	None
Act Effct Green (s)	16.7	23.6			9.9	16.8	37.5	37.5	37.5	47.5	53.0	78.2
Actuated g/C Ratio	0.19	0.27			0.11	0.19	0.43	0.43	0.43	0.54	0.61	0.89
v/c Ratio	0.54	0.27			0.22	0.20	0.46	0.84	0.02	0.36	0.81	0.28
Control Delay	44.0	7.1			50.8	5.6	31.7	33.1	0.1	12.5	21.8	0.7
Queue Delay	0.0	0.0			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	44.0	7.1			50.8	5.6	31.7	33.1	0.1	12.5	21.8	0.7
LOS	D	A			D	A	C	C	A	B	C	A
Approach Delay		27.8			18.7			32.2			15.1	
Approach LOS		C			B			C			B	

Lanes, Volumes, Timings

1216 Rolesville Road - Rolesville, NC

5: E. Young Street & The Point North Site Dvwy/Quarry Road

Build (2028) PM Peak Hour

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)	102	2			18	0	27	356	0	29	431	0
Queue Length 95th (ft)	210	51			56	26	72	529	0	56	667	12
Internal Link Dist (ft)		1071			1053			931			1358	
Turn Bay Length (ft)	275					250	100		100	500		100
Base Capacity (vph)	467	778			143	385	239	1377	1212	309	1533	1466
Starvation Cap Reductn	0	0			0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0			0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0			0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.39	0.18			0.22	0.20	0.27	0.49	0.02	0.36	0.59	0.28

Intersection Summary

Area Type: Other
 Cycle Length: 120
 Actuated Cycle Length: 87.6
 Natural Cycle: 80
 Control Type: Actuated-Uncoordinated
 Maximum v/c Ratio: 0.84
 Intersection Signal Delay: 21.7
 Intersection Capacity Utilization 84.6%
 Analysis Period (min) 15

Intersection LOS: C
 ICU Level of Service E

Splits and Phases: 5: E. Young Street & The Point North Site Dvwy/Quarry Road



APPENDIX I

CAPACITY ANALYSIS CALCULATIONS

E YOUNG STREET

&

ROLESVILLE HIGH SCHOOL DRIVEWAY

Intersection

Int Delay, s/veh	19.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	114	184	190	178	173	229
Future Vol, veh/h	114	184	190	178	173	229
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	325	-	200	350	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	60	60	90	60	60	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	190	307	211	297	288	254

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1041	211	0	-	211
Stage 1	211	-	-	-	-
Stage 2	830	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	255	829	-	0	1360
Stage 1	824	-	-	0	-
Stage 2	428	-	-	0	-
Platoon blocked, %					
Mov Cap-1 Maneuver	201	829	-	-	1360
Mov Cap-2 Maneuver	201	-	-	-	-
Stage 1	824	-	-	-	-
Stage 2	337	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	45.1	0	4.4
HCM LOS	E		

Minor Lane/Major Mvmt	NBTWBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	201	829	1360
HCM Lane V/C Ratio	-	0.945	0.37	0.212
HCM Control Delay (s)	-	98.7	11.9	8.4
HCM Lane LOS	-	F	B	A
HCM 95th %tile Q(veh)	-	7.8	1.7	0.8

Intersection

Int Delay, s/veh	2.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↘	↗	↑	↗	↘	↑
Traffic Vol, veh/h	26	76	281	36	87	351
Future Vol, veh/h	26	76	281	36	87	351
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	Free	-	None
Storage Length	0	325	-	200	350	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	29	84	312	40	97	390

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	896	312	0	-	312
Stage 1	312	-	-	-	-
Stage 2	584	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	311	728	-	0	1248
Stage 1	742	-	-	0	-
Stage 2	557	-	-	0	-
Platoon blocked, %			-		-
Mov Cap-1 Maneuver	287	728	-	-	1248
Mov Cap-2 Maneuver	287	-	-	-	-
Stage 1	742	-	-	-	-
Stage 2	514	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.7	0	1.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBTWBLn1WBLn2	SBL	SBT
Capacity (veh/h)	- 287 728	1248	-
HCM Lane V/C Ratio	- 0.101 0.116	0.077	-
HCM Control Delay (s)	- 18.9 10.6	8.1	-
HCM Lane LOS	- C B	A	-
HCM 95th %tile Q(veh)	- 0.3 0.4	0.3	-

Intersection

Int Delay, s/veh 227.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↑	↔	↔	↔	
Traffic Vol, veh/h	14	4	9	128	4	207	4	458	200	195	533	10
Future Vol, veh/h	14	4	9	128	4	207	4	458	200	195	533	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	325	50	-	200	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	60	90	60	60	60	90	90	60	60	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	7	10	213	7	345	4	509	333	325	592	11

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1941	1765	598	1773	1770	509	603	0	-	509	0	0
Stage 1	1248	1248	-	517	517	-	-	-	-	-	-	-
Stage 2	693	517	-	1256	1253	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	49	84	502	~ 65	83	564	975	-	0	1056	-	-
Stage 1	212	245	-	541	534	-	-	-	0	-	-	-
Stage 2	434	534	-	~ 210	244	-	-	-	0	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	~ 13	58	502	~ 44	57	564	975	-	-	1056	-	-
Mov Cap-2 Maneuver	~ 13	58	-	~ 44	57	-	-	-	-	-	-	-
Stage 1	211	170	-	539	532	-	-	-	-	-	-	-
Stage 2	166	532	-	~ 137	169	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	542.8	785.3	0.1	3.5
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	975	-	24 44 564	1056	-	-
HCM Lane V/C Ratio	0.005	-	1.343 5 0.612	0.308	-	-
HCM Control Delay (s)	8.7	-	\$ 542.8 \$ 1983.9 20.9 9.9	-	-	-
HCM Lane LOS	A	-	F F C	A	-	-
HCM 95th %tile Q(veh)	0	-	4 25.3 4.1 1.3	-	-	-

Notes

-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh	5.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↑	↔	↔	↔	↔
Traffic Vol, veh/h	11	4	8	29	4	86	5	528	41	98	789	21
Future Vol, veh/h	11	4	8	29	4	86	5	528	41	98	789	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	325	50	-	200	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	4	9	32	4	96	6	587	46	109	877	23

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1756	1706	889	1712	1717	587	900	0	-	587	0	0
Stage 1	1107	1107	-	599	599	-	-	-	-	-	-	-
Stage 2	649	599	-	1113	1118	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	66	91	342	71	90	510	755	-	0	988	-	-
Stage 1	255	286	-	488	490	-	-	-	0	-	-	-
Stage 2	458	490	-	253	282	-	-	-	0	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	47	80	342	60	79	510	755	-	-	988	-	-
Mov Cap-2 Maneuver	47	80	-	60	79	-	-	-	-	-	-	-
Stage 1	253	255	-	484	486	-	-	-	-	-	-	-
Stage 2	366	486	-	215	251	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	76	44.8	0.1	1
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	755	-	75 62 510	988	-	-
HCM Lane V/C Ratio	0.007	-	0.341 0.591 0.187	0.11	-	-
HCM Control Delay (s)	9.8	-	76 125.7 13.7	9.1	-	-
HCM Lane LOS	A	-	F F B	A	-	-
HCM 95th %tile Q(veh)	0	-	1.3 2.4 0.7	0.4	-	-

Intersection

Int Delay, s/veh	255.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↑	↔	↔	↔	↔
Traffic Vol, veh/h	14	4	9	128	4	207	4	486	200	195	560	10
Future Vol, veh/h	14	4	9	128	4	207	4	486	200	195	560	10
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	325	50	-	200	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	60	90	60	60	60	90	90	60	60	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	16	7	10	213	7	345	4	540	333	325	622	11

Major/Minor	Minor2		Minor1		Major1			Major2				
Conflicting Flow All	2002	1826	628	1834	1831	540	633	0	-	540	0	0
Stage 1	1278	1278	-	548	548	-	-	-	-	-	-	-
Stage 2	724	548	-	1286	1283	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	44	77	483	~ 59	76	542	950	-	0	1028	-	-
Stage 1	204	237	-	521	517	-	-	-	0	-	-	-
Stage 2	417	517	-	~ 202	236	-	-	-	0	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	~ 11	52	483	~ 39	52	542	950	-	-	1028	-	-
Mov Cap-2 Maneuver	~ 11	52	-	~ 39	52	-	-	-	-	-	-	-
Stage 1	203	162	-	519	515	-	-	-	-	-	-	-
Stage 2	149	515	-	~ 130	161	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, \$	661.1	906.4	0.1	3.4
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	950	-	21 39	542	1028	-
HCM Lane V/C Ratio	0.005	-	1.534 5.641	0.637	0.316	-
HCM Control Delay (s)	8.8	-	\$ 661.1 \$ 2292.5	22.5	10.1	-
HCM Lane LOS	A	-	F F	C	B	-
HCM 95th %tile Q(veh)	0	-	4.2 25.8	4.5	1.4	-

Notes

-: Volume exceeds capacity \$: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection

Int Delay, s/veh	5.8											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔	↔	↔	↔	↔	↔	↔	↔
Traffic Vol, veh/h	11	4	8	29	4	86	5	566	41	98	831	21
Future Vol, veh/h	11	4	8	29	4	86	5	566	41	98	831	21
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	Free	-	-	None
Storage Length	-	-	-	-	-	325	50	-	200	350	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	12	4	9	32	4	96	6	629	46	109	923	23

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1844	1794	935	1800	1805	629	946	0	-	629	0	0
Stage 1	1153	1153	-	641	641	-	-	-	-	-	-	-
Stage 2	691	641	-	1159	1164	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	58	80	322	62	79	482	725	-	0	953	-	-
Stage 1	240	272	-	463	469	-	-	-	0	-	-	-
Stage 2	435	469	-	238	269	-	-	-	0	-	-	-
Platoon blocked, %												
Mov Cap-1 Maneuver	40	70	322	52	69	482	725	-	-	953	-	-
Mov Cap-2 Maneuver	40	70	-	52	69	-	-	-	-	-	-	-
Stage 1	238	241	-	459	465	-	-	-	-	-	-	-
Stage 2	343	465	-	201	238	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	94.5	54.5	0.1	1
HCM LOS	F	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1WBLn1WBLn2	SBL	SBT	SBR
Capacity (veh/h)	725	-	64 54 482	953	-	-
HCM Lane V/C Ratio	0.008	-	0.399 0.679 0.198	0.114	-	-
HCM Control Delay (s)	10	-	94.5 159.4 14.3	9.3	-	-
HCM Lane LOS	B	-	F F B	A	-	-
HCM 95th %tile Q(veh)	0	-	1.5 2.8 0.7	0.4	-	-

APPENDIX J

CAPACITY ANALYSIS CALCULATIONS

ROLESVILLE ROAD

&

SUNSET MANOR DRIVE/ SITE DRIVE 1

HCM 6th TWSC
 7: Rolesville Road/E. Young Street & Sunset Manor Drive

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

Intersection

Int Delay, s/veh	0.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	11	24	344	4	19	324
Future Vol, veh/h	11	24	344	4	19	324
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	12	27	382	4	21	360

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	786	384	0	0	386
Stage 1	384	-	-	-	-
Stage 2	402	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	361	664	-	-	1172
Stage 1	688	-	-	-	-
Stage 2	676	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	355	664	-	-	1172
Mov Cap-2 Maneuver	355	-	-	-	-
Stage 1	688	-	-	-	-
Stage 2	664	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.5	0	0.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	521	1172
HCM Lane V/C Ratio	-	-	0.075	0.018
HCM Control Delay (s)	-	-	12.5	8.1
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

Intersection

Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	8	309	4	16	361
Future Vol, veh/h	5	8	309	4	16	361
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	6	9	343	4	18	401

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	782	345	0	0	347
Stage 1	345	-	-	-	-
Stage 2	437	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	363	698	-	-	1212
Stage 1	717	-	-	-	-
Stage 2	651	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	358	698	-	-	1212
Mov Cap-2 Maneuver	358	-	-	-	-
Stage 1	717	-	-	-	-
Stage 2	641	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	12.3	0	0.3
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	511	1212
HCM Lane V/C Ratio	-	-	0.028	0.015
HCM Control Delay (s)	-	-	12.3	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.1	0

Intersection

Int Delay, s/veh	0.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations	↔		↔		↔	↔
Traffic Vol, veh/h	12	27	634	5	21	649
Future Vol, veh/h	12	27	634	5	21	649
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	30	704	6	23	721

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1474	707	0	0	710
Stage 1	707	-	-	-	-
Stage 2	767	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	139	435	-	-	889
Stage 1	489	-	-	-	-
Stage 2	458	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	135	435	-	-	889
Mov Cap-2 Maneuver	135	-	-	-	-
Stage 1	489	-	-	-	-
Stage 2	446	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.7	0	0.3
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	258	889
HCM Lane V/C Ratio	-	-	0.168	0.026
HCM Control Delay (s)	-	-	21.7	9.2
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.6	0.1

Intersection

Int Delay, s/veh	0.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	6	9	565	4	18	809
Future Vol, veh/h	6	9	565	4	18	809
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	100	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	7	10	628	4	20	899

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1569	630	0	0	632
Stage 1	630	-	-	-	-
Stage 2	939	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	122	482	-	-	951
Stage 1	531	-	-	-	-
Stage 2	380	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	119	482	-	-	951
Mov Cap-2 Maneuver	119	-	-	-	-
Stage 1	531	-	-	-	-
Stage 2	372	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	23	0	0.2
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	217	951
HCM Lane V/C Ratio	-	-	0.077	0.021
HCM Control Delay (s)	-	-	23	8.9
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.2	0.1

Intersection

Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	28	4	5	12	4	27	16	634	5	21	673	4
Future Vol, veh/h	28	4	5	12	4	27	16	634	5	21	673	4
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	31	4	6	13	4	30	18	704	6	23	748	4

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1556	1542	750	1544	1541	707	752	0	0	710	0	0
Stage 1	796	796	-	743	743	-	-	-	-	-	-	-
Stage 2	760	746	-	801	798	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	92	115	411	94	115	435	858	-	-	889	-	-
Stage 1	380	399	-	407	422	-	-	-	-	-	-	-
Stage 2	398	421	-	378	398	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	80	110	411	87	110	435	858	-	-	889	-	-
Mov Cap-2 Maneuver	80	110	-	87	110	-	-	-	-	-	-	-
Stage 1	372	389	-	398	413	-	-	-	-	-	-	-
Stage 2	359	412	-	359	388	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	71.3		31.7		0.2		0.3	
HCM LOS	F		D					

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	858	-	-	93	182	889	-
HCM Lane V/C Ratio	0.021	-	-	0.442	0.263	0.026	-
HCM Control Delay (s)	9.3	-	-	71.3	31.7	9.2	-
HCM Lane LOS	A	-	-	F	D	A	-
HCM 95th %tile Q(veh)	0.1	-	-	1.8	1	0.1	-

Intersection

Int Delay, s/veh	7.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕		↕	↕		↕	↕	
Traffic Vol, veh/h	50	4	4	6	4	9	36	553	4	18	846	5
Future Vol, veh/h	50	4	4	6	4	9	36	553	4	18	846	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	75	-	-	100	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	56	4	4	7	4	10	40	614	4	20	940	6

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	1686	1681	943	1683	1682	616	946	0	0	618	0	0
Stage 1	983	983	-	696	696	-	-	-	-	-	-	-
Stage 2	703	698	-	987	986	-	-	-	-	-	-	-
Critical Hdwy	7.12	6.52	6.22	7.12	6.52	6.22	4.12	-	-	4.12	-	-
Critical Hdwy Stg 1	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Critical Hdwy Stg 2	6.12	5.52	-	6.12	5.52	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	4.018	3.318	3.518	4.018	3.318	2.218	-	-	2.218	-	-
Pot Cap-1 Maneuver	74	95	318	75	94	491	725	-	-	962	-	-
Stage 1	299	327	-	432	443	-	-	-	-	-	-	-
Stage 2	428	442	-	298	326	-	-	-	-	-	-	-
Platoon blocked, %								-	-	-	-	-
Mov Cap-1 Maneuver	66	88	318	67	87	491	725	-	-	962	-	-
Mov Cap-2 Maneuver	66	88	-	67	87	-	-	-	-	-	-	-
Stage 1	283	320	-	408	419	-	-	-	-	-	-	-
Stage 2	392	418	-	284	319	-	-	-	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	180.3	40.2	0.6	0.2
HCM LOS	F	E		

Minor Lane/Major Mvmt	NBL	NBT	NBR	EBLn1WBLn1	SBL	SBT	SBR
Capacity (veh/h)	725	-	-	71	123	962	-
HCM Lane V/C Ratio	0.055	-	-	0.908	0.172	0.021	-
HCM Control Delay (s)	10.3	-	-	180.3	40.2	8.8	-
HCM Lane LOS	B	-	-	F	E	A	-
HCM 95th %tile Q(veh)	0.2	-	-	4.5	0.6	0.1	-

APPENDIX K

CAPACITY ANALYSIS CALCULATIONS

ROLESVILLE ROAD

&

FOWLER ROAD

HCM 6th TWSC
 8: Rolesville Road & Fowler Road

1216 Rolesville Road - Rolesville, NC
 Existing (2022) AM Peak Hour

Intersection

Int Delay, s/veh	1.4					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	55	293	4	38	297
Future Vol, veh/h	4	55	293	4	38	297
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	61	326	4	42	330

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	742	328	0	0	330
Stage 1	328	-	-	-	-
Stage 2	414	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	383	713	-	-	1229
Stage 1	730	-	-	-	-
Stage 2	667	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	367	713	-	-	1229
Mov Cap-2 Maneuver	367	-	-	-	-
Stage 1	730	-	-	-	-
Stage 2	639	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11	0	0.9
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	670	1229
HCM Lane V/C Ratio	-	-	0.098	0.034
HCM Control Delay (s)	-	-	11	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.1

HCM 6th TWSC
 8: Rolesville Road & Fowler Road

1216 Rolesville Road - Rolesville, NC
 Existing (2022) PM Peak Hour

Intersection

Int Delay, s/veh	1.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	59	252	4	84	282
Future Vol, veh/h	4	59	252	4	84	282
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	66	280	4	93	313

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	781	282	0	0	284
Stage 1	282	-	-	-	-
Stage 2	499	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	363	757	-	-	1278
Stage 1	766	-	-	-	-
Stage 2	610	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	331	757	-	-	1278
Mov Cap-2 Maneuver	331	-	-	-	-
Stage 1	766	-	-	-	-
Stage 2	556	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	10.7	0	1.8
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	700	1278
HCM Lane V/C Ratio	-	-	0.1	0.073
HCM Control Delay (s)	-	-	10.7	8
HCM Lane LOS	-	-	B	A
HCM 95th %tile Q(veh)	-	-	0.3	0.2

Intersection

Int Delay, s/veh	1.1					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	62	577	10	43	618
Future Vol, veh/h	4	62	577	10	43	618
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	69	641	11	48	687

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1430	647	0	0	652
Stage 1	647	-	-	-	-
Stage 2	783	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	148	471	-	-	935
Stage 1	521	-	-	-	-
Stage 2	450	-	-	-	-
Platoon blocked, %					
Mov Cap-1 Maneuver	136	471	-	-	935
Mov Cap-2 Maneuver	136	-	-	-	-
Stage 1	521	-	-	-	-
Stage 2	413	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	15.7	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	410	935
HCM Lane V/C Ratio	-	-	0.179	0.051
HCM Control Delay (s)	-	-	15.7	9.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.6	0.2

Intersection

Int Delay, s/veh	1.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	66	501	8	95	720
Future Vol, veh/h	12	66	501	8	95	720
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	73	557	9	106	800

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1574	562	0	0	566
Stage 1	562	-	-	-	-
Stage 2	1012	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	121	526	-	-	1006
Stage 1	571	-	-	-	-
Stage 2	351	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	98	526	-	-	1006
Mov Cap-2 Maneuver	98	-	-	-	-
Stage 1	571	-	-	-	-
Stage 2	284	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.7	0	1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	315	1006
HCM Lane V/C Ratio	-	-	0.275	0.105
HCM Control Delay (s)	-	-	20.7	9
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.1	0.4

Intersection

Int Delay, s/veh	1.2					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	4	67	588	10	47	632
Future Vol, veh/h	4	67	588	10	47	632
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	4	74	653	11	52	702

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1465	659	0	0	664
Stage 1	659	-	-	-	-
Stage 2	806	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	141	464	-	-	925
Stage 1	515	-	-	-	-
Stage 2	439	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	128	464	-	-	925
Mov Cap-2 Maneuver	128	-	-	-	-
Stage 1	515	-	-	-	-
Stage 2	399	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	16.1	0	0.6
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	404	925
HCM Lane V/C Ratio	-	-	0.195	0.056
HCM Control Delay (s)	-	-	16.1	9.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	0.7	0.2

Intersection

Int Delay, s/veh	1.9					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	12	72	519	8	101	735
Future Vol, veh/h	12	72	519	8	101	735
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	13	80	577	9	112	817

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1623	582	0	0	586
Stage 1	582	-	-	-	-
Stage 2	1041	-	-	-	-
Critical Hdwy	6.42	6.22	-	-	4.12
Critical Hdwy Stg 1	5.42	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-
Follow-up Hdwy	3.518	3.318	-	-	2.218
Pot Cap-1 Maneuver	113	513	-	-	989
Stage 1	559	-	-	-	-
Stage 2	340	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	90	513	-	-	989
Mov Cap-2 Maneuver	90	-	-	-	-
Stage 1	559	-	-	-	-
Stage 2	270	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	21.8	0	1.1
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	307	989
HCM Lane V/C Ratio	-	-	0.304	0.113
HCM Control Delay (s)	-	-	21.8	9.1
HCM Lane LOS	-	-	C	A
HCM 95th %tile Q(veh)	-	-	1.3	0.4

APPENDIX L

CAPACITY ANALYSIS CALCULATIONS

ROLESVILLE ROAD

&

SITE DRIVE 2

Intersection

Int Delay, s/veh	0.1					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	13	0	655	666	24
Future Vol, veh/h	0	13	0	655	666	24
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	14	0	728	740	27

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	- 740	- 0	- 0
Stage 1	- -	- -	- -
Stage 2	- -	- -	- -
Critical Hdwy	- 6.22	- -	- -
Critical Hdwy Stg 1	- -	- -	- -
Critical Hdwy Stg 2	- -	- -	- -
Follow-up Hdwy	- 3.318	- -	- -
Pot Cap-1 Maneuver	0 417	0 -	- -
Stage 1	0 -	0 -	- -
Stage 2	0 -	0 -	- -
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	- 417	- -	- -
Mov Cap-2 Maneuver	- -	- -	- -
Stage 1	- -	- -	- -
Stage 2	- -	- -	- -

Approach	EB	NB	SB
HCM Control Delay, s	13.9	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	- 417	- -	- -
HCM Lane V/C Ratio	- 0.035	- -	- -
HCM Control Delay (s)	- 13.9	- -	- -
HCM Lane LOS	- B	- -	- -
HCM 95th %tile Q(veh)	- 0.1	- -	- -

Intersection

Int Delay, s/veh	0.4					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↖	↖	↗
Traffic Vol, veh/h	0	33	0	591	802	51
Future Vol, veh/h	0	33	0	591	802	51
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	0	-	-	-	50
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	0	37	0	657	891	57

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	-	891	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	-	6.22	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	-	3.318	-
Pot Cap-1 Maneuver	0	341	0
Stage 1	0	-	0
Stage 2	0	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	-	341	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	16.8	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT EBLn1	SBT	SBR
Capacity (veh/h)	-	341	-
HCM Lane V/C Ratio	-	0.108	-
HCM Control Delay (s)	-	16.8	-
HCM Lane LOS	-	C	-
HCM 95th %tile Q(veh)	-	0.4	-

APPENDIX M

SIMTRAFFIC QUEUEING REPORTS

Intersection: 3: US 401/US 401 SB & U-Turn N of E Young Street

Movement	WB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	315	183	164
Average Queue (ft)	126	82	75
95th Queue (ft)	227	170	148
Link Distance (ft)	374	1077	1077
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: US 401 NB/US 401 & U-Turn South of E Young Street

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	110	73	74
Average Queue (ft)	45	7	7
95th Queue (ft)	83	36	36
Link Distance (ft)	173	1146	1146
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: E. Young Street & Quarry Road

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	46	33	51
Average Queue (ft)	11	16	19
95th Queue (ft)	33	23	44
Link Distance (ft)	1087		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		250	500
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: E. Young Street & Rolesville HS Driveway

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	136	102	54
Average Queue (ft)	56	48	26
95th Queue (ft)	103	79	61
Link Distance (ft)	567		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		325	350
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Rolesville Road/E. Young Street & Sunset Manor Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	30	28
Average Queue (ft)	19	5
95th Queue (ft)	42	21
Link Distance (ft)	1124	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Rolesville Road & Fowler Road

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	62	112
Average Queue (ft)	15	15
95th Queue (ft)	37	54
Link Distance (ft)	1657	1427
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: US 401 SB & US 401

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 88: US 401 & U-Turn N of E Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 99: US 401/US 401 NB & E. Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 111: US 401 NB/US 401 & E. Young Street

Movement	EB	WB	WB	NB	NB
Directions Served	T	R	R	T	T
Maximum Queue (ft)	99	190	97	140	131
Average Queue (ft)	39	88	58	58	40
95th Queue (ft)	62	144	92	102	94
Link Distance (ft)	333	1356		304	304
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250		
Storage Blk Time (%)					0
Queuing Penalty (veh)					0

Intersection: 222: US 401/US 401 SB & E. Young Street

Movement	EB	EB	WB	SB	SB	SB
Directions Served	R	R	T	T	T	R
Maximum Queue (ft)	169	181	95	303	330	264
Average Queue (ft)	96	43	42	170	198	38
95th Queue (ft)	145	107	77	276	301	190
Link Distance (ft)	1150		376	264	264	
Upstream Blk Time (%)				1	2	0
Queuing Penalty (veh)				11	12	0
Storage Bay Dist (ft)		100				125
Storage Blk Time (%)	6	0			27	
Queuing Penalty (veh)	12	0			70	

Intersection: 888: US 401 SB/US 401 & E. Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 999: US 401 & U-Turn South of E Young Street

Movement

- Directions Served
- Maximum Queue (ft)
- Average Queue (ft)
- 95th Queue (ft)
- Link Distance (ft)
- Upstream Blk Time (%)
- Queuing Penalty (veh)
- Storage Bay Dist (ft)
- Storage Blk Time (%)
- Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 105

Intersection: 3: US 401/US 401 SB & U-Turn N of E Young Street

Movement	WB	SB
Directions Served	L	T
Maximum Queue (ft)	73	27
Average Queue (ft)	38	1
95th Queue (ft)	62	9
Link Distance (ft)	374	1077
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 4: US 401 NB/US 401 & U-Turn South of E Young Street

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	222	115	114
Average Queue (ft)	87	55	44
95th Queue (ft)	151	119	98
Link Distance (ft)	173	1146	1146
Upstream Blk Time (%)	1		
Queuing Penalty (veh)	2		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: E. Young Street & Quarry Road

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	23	42	78
Average Queue (ft)	7	15	22
95th Queue (ft)	22	32	56
Link Distance (ft)	1087		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		250	500
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 6: E. Young Street & Rolesville HS Driveway

Movement	WB	WB	SB
Directions Served	L	R	L
Maximum Queue (ft)	31	78	53
Average Queue (ft)	15	33	21
95th Queue (ft)	41	53	52
Link Distance (ft)	567		
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)		325	350
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: Rolesville Road/E. Young Street & Sunset Manor Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	30	53
Average Queue (ft)	14	3
95th Queue (ft)	38	20
Link Distance (ft)	1124	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Rolesville Road & Fowler Road

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	37	112
Average Queue (ft)	13	13
95th Queue (ft)	27	60
Link Distance (ft)	1657	1427
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: US 401 SB & US 401

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 88: US 401 & U-Turn N of E Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 99: US 401/US 401 NB & E. Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 111: US 401 NB/US 401 & E. Young Street

Movement	EB	WB	WB	NB	NB
Directions Served	T	R	R	T	T
Maximum Queue (ft)	53	161	118	158	137
Average Queue (ft)	31	61	56	91	73
95th Queue (ft)	60	103	94	140	116
Link Distance (ft)	333	1356		304	304
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			250		
Storage Blk Time (%)					0
Queuing Penalty (veh)					1

Intersection: 222: US 401/US 401 SB & E. Young Street

Movement	EB	EB	WB	SB	SB
Directions Served	R	R	T	T	T
Maximum Queue (ft)	177	172	127	88	93
Average Queue (ft)	105	32	59	50	43
95th Queue (ft)	155	84	98	85	79
Link Distance (ft)	1150		376	264	264
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)	8	0			
Queuing Penalty (veh)	15	0			

Intersection: 888: US 401 SB/US 401 & E. Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 999: US 401 & U-Turn South of E Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 19

Intersection: 3: US 401/US 401 SB & U-Turn N of E Young Street

Movement	WB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	114	967	888
Average Queue (ft)	92	439	430
95th Queue (ft)	99	834	784
Link Distance (ft)	38	1076	1076
Upstream Blk Time (%)	47		
Queuing Penalty (veh)	378		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: US 401 NB/US 401 & U-Turn South of E Young Street

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	204	95	93
Average Queue (ft)	94	10	8
95th Queue (ft)	157	46	44
Link Distance (ft)	173	1146	1146
Upstream Blk Time (%)	0		
Queuing Penalty (veh)	1		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: E. Young Street & The Point North Site Dvwy/Quarry Road

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	217	82	61	102	200	637	200	129	363	200
Average Queue (ft)	78	30	13	36	24	336	74	45	142	37
95th Queue (ft)	150	62	36	77	124	533	216	95	269	133
Link Distance (ft)		1093	1075			935			1335	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	275			250	100		100	500		100
Storage Blk Time (%)						47			13	
Queuing Penalty (veh)						18			32	

Intersection: 6: E. Young Street & The Point South Site Dvwy/Rolesville HS Driveway

Movement	EB	WB	WB	B20	NB	SB
Directions Served	LTR	LT	R	T	L	L
Maximum Queue (ft)	93	639	425	264	22	87
Average Queue (ft)	23	231	151	25	2	34
95th Queue (ft)	55	549	398	143	10	62
Link Distance (ft)	1108	567		689		
Upstream Blk Time (%)		8				
Queuing Penalty (veh)		0				
Storage Bay Dist (ft)			325		50	350
Storage Blk Time (%)		25				
Queuing Penalty (veh)		60				

Intersection: 7: Rolesville Road/E. Young Street & Sunset Manor Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	52	28
Average Queue (ft)	24	9
95th Queue (ft)	50	29
Link Distance (ft)	1124	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Rolesville Road & Fowler Road

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	75	112
Average Queue (ft)	21	24
95th Queue (ft)	51	75
Link Distance (ft)	1657	1427
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: US 401 SB & US 401

Movement

Directions Served
 Maximum Queue (ft)
 Average Queue (ft)
 95th Queue (ft)
 Link Distance (ft)
 Upstream Blk Time (%)
 Queuing Penalty (veh)
 Storage Bay Dist (ft)
 Storage Blk Time (%)
 Queuing Penalty (veh)

Intersection: 88: US 401 & U-Turn N of E Young Street

Movement	NE	NE	NE
Directions Served	L	T	T
Maximum Queue (ft)	700	746	706
Average Queue (ft)	278	27	25
95th Queue (ft)	538	255	241
Link Distance (ft)		776	776
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)	500		
Storage Blk Time (%)	5		
Queuing Penalty (veh)	16		

Intersection: 99: US 401/US 401 NB & E. Young Street

Movement

Directions Served
 Maximum Queue (ft)
 Average Queue (ft)
 95th Queue (ft)
 Link Distance (ft)
 Upstream Blk Time (%)
 Queuing Penalty (veh)
 Storage Bay Dist (ft)
 Storage Blk Time (%)
 Queuing Penalty (veh)

Intersection: 111: US 401 NB/US 401 & E. Young Street

Movement	EB	WB	WB	NB	NB	NB
Directions Served	T	R	R	T	T	R
Maximum Queue (ft)	150	694	375	127	115	208
Average Queue (ft)	79	267	108	77	53	38
95th Queue (ft)	135	472	270	129	102	151
Link Distance (ft)	333	1335		304	304	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			250			400
Storage Blk Time (%)		17	0			
Queuing Penalty (veh)		87	0			

Intersection: 222: US 401/US 401 SB & E. Young Street

Movement	EB	EB	WB	SB	SB	SB
Directions Served	R	R	T	T	T	R
Maximum Queue (ft)	363	300	117	228	241	260
Average Queue (ft)	211	129	57	112	168	9
95th Queue (ft)	298	245	99	187	221	89
Link Distance (ft)	1150		376	264	264	
Upstream Blk Time (%)						0
Queuing Penalty (veh)						0
Storage Bay Dist (ft)		100				125
Storage Blk Time (%)	49	1			16	
Queuing Penalty (veh)	127	2			62	

Intersection: 888: US 401 SB/US 401 & E. Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 999: US 401 & U-Turn South of E Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 783

Intersection: 3: US 401/US 401 SB & U-Turn N of E Young Street

Movement	WB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	261	184	97
Average Queue (ft)	121	37	21
95th Queue (ft)	197	116	69
Link Distance (ft)	374	1077	1077
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: US 401 NB/US 401 & U-Turn South of E Young Street

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	286	572	750
Average Queue (ft)	195	321	363
95th Queue (ft)	259	488	564
Link Distance (ft)	173	1146	1146
Upstream Blk Time (%)	10		
Queuing Penalty (veh)	47		
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: E. Young Street & The Point North Site Dvwy/Quarry Road

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	196	144	42	125	200	317	195	112	412	200
Average Queue (ft)	92	57	12	20	64	180	14	47	227	80
95th Queue (ft)	163	125	33	58	162	284	73	84	388	210
Link Distance (ft)		1093	1075			935			1335	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	275			250	100		100	500		100
Storage Blk Time (%)					1	19			22	
Queuing Penalty (veh)					8	14			103	

Intersection: 6: E. Young Street & The Point South Site Dvwy/Rolesville HS Driveway

Movement	EB	WB	WB	NB	SB
Directions Served	LTR	LT	R	L	L
Maximum Queue (ft)	68	73	118	23	59
Average Queue (ft)	15	25	39	1	16
95th Queue (ft)	44	57	72	10	39
Link Distance (ft)	1108	567			
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)			325	50	350
Storage Blk Time (%)					
Queuing Penalty (veh)					

Intersection: 7: Rolesville Road/E. Young Street & Sunset Manor Drive

Movement	WB	SB
Directions Served	LR	L
Maximum Queue (ft)	30	29
Average Queue (ft)	10	9
95th Queue (ft)	33	28
Link Distance (ft)	1124	
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		100
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 8: Rolesville Road & Fowler Road

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	38	196
Average Queue (ft)	17	51
95th Queue (ft)	37	138
Link Distance (ft)	1657	1427
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 22: US 401 SB & US 401

Movement

Directions Served
 Maximum Queue (ft)
 Average Queue (ft)
 95th Queue (ft)
 Link Distance (ft)
 Upstream Blk Time (%)
 Queuing Penalty (veh)
 Storage Bay Dist (ft)
 Storage Blk Time (%)
 Queuing Penalty (veh)

Intersection: 88: US 401 & U-Turn N of E Young Street

Movement

Directions Served
 Maximum Queue (ft)
 Average Queue (ft)
 95th Queue (ft)
 Link Distance (ft)
 Upstream Blk Time (%)
 Queuing Penalty (veh)
 Storage Bay Dist (ft)
 Storage Blk Time (%)
 Queuing Penalty (veh)

Intersection: 99: US 401/US 401 NB & E. Young Street

Movement	NE
Directions Served	T
Maximum Queue (ft)	212
Average Queue (ft)	54
95th Queue (ft)	170
Link Distance (ft)	404
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 111: US 401 NB/US 401 & E. Young Street

Movement	EB	WB	WB	NB	NB	NB
Directions Served	T	R	R	T	T	R
Maximum Queue (ft)	162	204	164	304	401	304
Average Queue (ft)	91	124	99	179	319	284
95th Queue (ft)	152	184	146	251	457	344
Link Distance (ft)	333	1335		304	304	
Upstream Blk Time (%)				0	11	15
Queuing Penalty (veh)				0	116	0
Storage Bay Dist (ft)			250			400
Storage Blk Time (%)					11	15
Queuing Penalty (veh)					113	80

Intersection: 222: US 401/US 401 SB & E. Young Street

Movement	EB	EB	WB	SB	SB	SB
Directions Served	R	R	T	T	T	R
Maximum Queue (ft)	306	226	162	156	136	141
Average Queue (ft)	145	80	81	81	76	5
95th Queue (ft)	237	183	135	125	119	46
Link Distance (ft)	1150		376	264	264	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)		100				125
Storage Blk Time (%)	17	0			1	0
Queuing Penalty (veh)	50	1			2	1

Intersection: 888: US 401 SB/US 401 & E. Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 999: US 401 & U-Turn South of E Young Street

Movement

Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 534

Intersection: 3: US 401/US 401 SB & U-Turn N of E Young Street

Movement	WB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	387	1129	1080
Average Queue (ft)	275	552	528
95th Queue (ft)	378	1051	999
Link Distance (ft)	374	1077	1077
Upstream Blk Time (%)	1	2	0
Queuing Penalty (veh)	5	12	2
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: US 401 NB/US 401 & U-Turn South of E Young Street

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	115	48	74
Average Queue (ft)	60	2	4
95th Queue (ft)	106	17	27
Link Distance (ft)	173	1146	1146
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: E. Young Street & The Point North Site Dvwy/Quarry Road

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	132	146	83	81	21	526	200	92	301	200
Average Queue (ft)	76	28	16	28	6	309	73	37	132	38
95th Queue (ft)	133	83	54	65	21	418	217	74	223	133
Link Distance (ft)		1093	1075			935			1335	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	275			250	100		100	500		100
Storage Blk Time (%)						48			12	
Queuing Penalty (veh)						20			29	

Intersection: 6: E. Young Street & The Point South Site Dvwy/Rolesville HS Driveway

Movement	EB	WB	WB	B20	NB	SB
Directions Served	LTR	LT	R	T	L	L
Maximum Queue (ft)	48	639	425	704	21	81
Average Queue (ft)	20	319	185	269	1	33
95th Queue (ft)	41	793	482	805	10	69
Link Distance (ft)	1108	567		689		
Upstream Blk Time (%)		40		31		
Queuing Penalty (veh)		0		0		
Storage Bay Dist (ft)			325		50	350
Storage Blk Time (%)		44	2			
Queuing Penalty (veh)		106	2			

Intersection: 7: Rolesville Road/E. Young Street & Site Drive 1/Sunset Manor Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	70	71	48	47
Average Queue (ft)	28	32	7	6
95th Queue (ft)	57	60	28	25
Link Distance (ft)	994	1122		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			75	100
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Rolesville Road & Fowler Road

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	37	53
Average Queue (ft)	13	16
95th Queue (ft)	27	49
Link Distance (ft)	1657	1154
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Rolesville Road & Site Drive 2

Movement	EB
Directions Served	R
Maximum Queue (ft)	38
Average Queue (ft)	5
95th Queue (ft)	18
Link Distance (ft)	969
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: US 401 SB & US 401

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 88: US 401 & U-Turn N of E Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 99: US 401/US 401 NB & E. Young Street

Movement

Directions Served
 Maximum Queue (ft)
 Average Queue (ft)
 95th Queue (ft)
 Link Distance (ft)
 Upstream Blk Time (%)
 Queuing Penalty (veh)
 Storage Bay Dist (ft)
 Storage Blk Time (%)
 Queuing Penalty (veh)

Intersection: 111: US 401 NB/US 401 & E. Young Street

Movement	EB	WB	WB	NB	NB	NB
Directions Served	T	R	R	T	T	R
Maximum Queue (ft)	144	652	350	203	117	167
Average Queue (ft)	80	254	128	77	51	14
95th Queue (ft)	132	512	320	149	95	81
Link Distance (ft)	333	1335		304	304	
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			250			400
Storage Blk Time (%)		15				
Queuing Penalty (veh)		75				

Intersection: 222: US 401/US 401 SB & E. Young Street

Movement	EB	EB	WB	SB	SB
Directions Served	R	R	T	T	T
Maximum Queue (ft)	286	292	200	190	210
Average Queue (ft)	183	136	76	111	142
95th Queue (ft)	260	245	144	163	185
Link Distance (ft)	1150		376	264	264
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)	38	5			9
Queuing Penalty (veh)	100	12			35

Intersection: 888: US 401 SB/US 401 & E. Young Street

Movement	SW
Directions Served	T
Maximum Queue (ft)	24
Average Queue (ft)	1
95th Queue (ft)	8
Link Distance (ft)	416
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 999: US 401 & U-Turn South of E Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Network Summary

Network wide Queuing Penalty: 398

Intersection: 3: US 401/US 401 SB & U-Turn N of E Young Street

Movement	WB	SB	SB
Directions Served	L	T	T
Maximum Queue (ft)	339	197	139
Average Queue (ft)	139	47	38
95th Queue (ft)	246	118	90
Link Distance (ft)	374	1077	1077
Upstream Blk Time (%)			
Queuing Penalty (veh)			
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 4: US 401 NB/US 401 & U-Turn South of E Young Street

Movement	EB	NB	NB
Directions Served	L	T	T
Maximum Queue (ft)	325	1170	1198
Average Queue (ft)	223	556	653
95th Queue (ft)	318	1223	1271
Link Distance (ft)	173	1146	1146
Upstream Blk Time (%)	17	6	19
Queuing Penalty (veh)	82	0	0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 5: E. Young Street & The Point North Site Dvwy/Quarry Road

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	LT	R	L	T	R	L	T	R
Maximum Queue (ft)	199	121	84	58	200	494	200	94	479	200
Average Queue (ft)	101	43	31	21	59	267	18	49	265	93
95th Queue (ft)	173	91	76	48	139	446	102	90	476	226
Link Distance (ft)		1093	1075			935			1335	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	275			250	100		100	500		100
Storage Blk Time (%)					3	30			23	
Queuing Penalty (veh)					17	22			104	

Intersection: 6: E. Young Street & The Point South Site Dvwy/Rolesville HS Driveway

Movement	EB	WB	WB	NB	SB	SB
Directions Served	LTR	LT	R	L	L	TR
Maximum Queue (ft)	51	74	74	20	67	56
Average Queue (ft)	16	36	39	3	23	2
95th Queue (ft)	44	73	60	16	52	19
Link Distance (ft)	1108	567				1091
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			325	50	350	
Storage Blk Time (%)						
Queuing Penalty (veh)						

Intersection: 7: Rolesville Road/E. Young Street & Site Drive 1/Sunset Manor Drive

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	L	L
Maximum Queue (ft)	118	56	26	27
Average Queue (ft)	49	18	12	8
95th Queue (ft)	93	45	31	26
Link Distance (ft)	1007	1122		
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)			75	100
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Rolesville Road & Fowler Road

Movement	WB	SB
Directions Served	LR	LT
Maximum Queue (ft)	78	222
Average Queue (ft)	22	61
95th Queue (ft)	53	161
Link Distance (ft)	1657	1154
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 9: Rolesville Road & Site Drive 2

Movement	EB
Directions Served	R
Maximum Queue (ft)	52
Average Queue (ft)	26
95th Queue (ft)	51
Link Distance (ft)	995
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 22: US 401 SB & US 401

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 88: US 401 & U-Turn N of E Young Street

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 99: US 401/US 401 NB & E. Young Street

Movement	NE	NE
Directions Served	T	T
Maximum Queue (ft)	415	513
Average Queue (ft)	40	243
95th Queue (ft)	234	575
Link Distance (ft)	404	404
Upstream Blk Time (%)	0	8
Queuing Penalty (veh)	1	94
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 111: US 401 NB/US 401 & E. Young Street

Movement	EB	WB	WB	NB	NB	NB
Directions Served	T	R	R	T	T	R
Maximum Queue (ft)	235	281	192	312	419	304
Average Queue (ft)	108	148	125	165	367	300
95th Queue (ft)	188	235	191	237	442	322
Link Distance (ft)	333	1335		304	304	
Upstream Blk Time (%)				0	22	28
Queuing Penalty (veh)				1	232	0
Storage Bay Dist (ft)			250			400
Storage Blk Time (%)		1			22	28
Queuing Penalty (veh)		3			229	148

Intersection: 222: US 401/US 401 SB & E. Young Street

Movement	EB	EB	WB	SB	SB
Directions Served	R	R	T	T	T
Maximum Queue (ft)	225	193	184	158	117
Average Queue (ft)	150	83	81	79	75
95th Queue (ft)	225	188	148	126	117
Link Distance (ft)	1150		376	264	264
Upstream Blk Time (%)					
Queuing Penalty (veh)					
Storage Bay Dist (ft)		100			
Storage Blk Time (%)	25	0			0
Queuing Penalty (veh)	73	1			1

Intersection: 888: US 401 SB/US 401 & E. Young Street

Movement

Directions Served
 Maximum Queue (ft)
 Average Queue (ft)
 95th Queue (ft)
 Link Distance (ft)
 Upstream Blk Time (%)
 Queuing Penalty (veh)
 Storage Bay Dist (ft)
 Storage Blk Time (%)
 Queuing Penalty (veh)

Intersection: 999: US 401 & U-Turn South of E Young Street

Movement	SW
Directions Served	L
Maximum Queue (ft)	34
Average Queue (ft)	1
95th Queue (ft)	12
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	25
Storage Blk Time (%)	0
Queuing Penalty (veh)	0

Network Summary

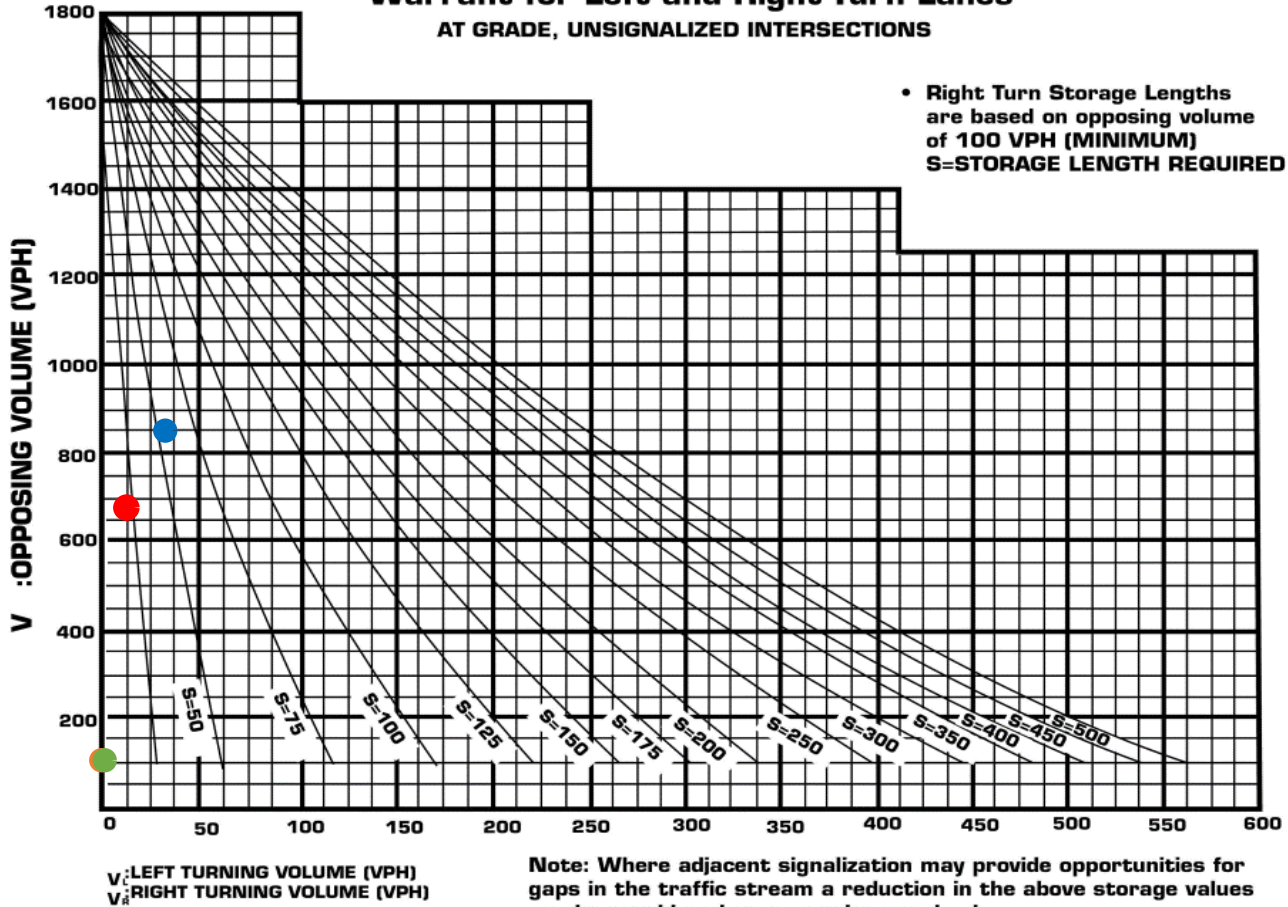
Network wide Queuing Penalty: 1008

APPENDIX N

TURN LANE WARRANTS

1216 Rolesville Road
TURN LANE STORAGE WARRANTS

Warrant for Left and Right-Turn Lanes
AT GRADE, UNSIGNALIZED INTERSECTIONS



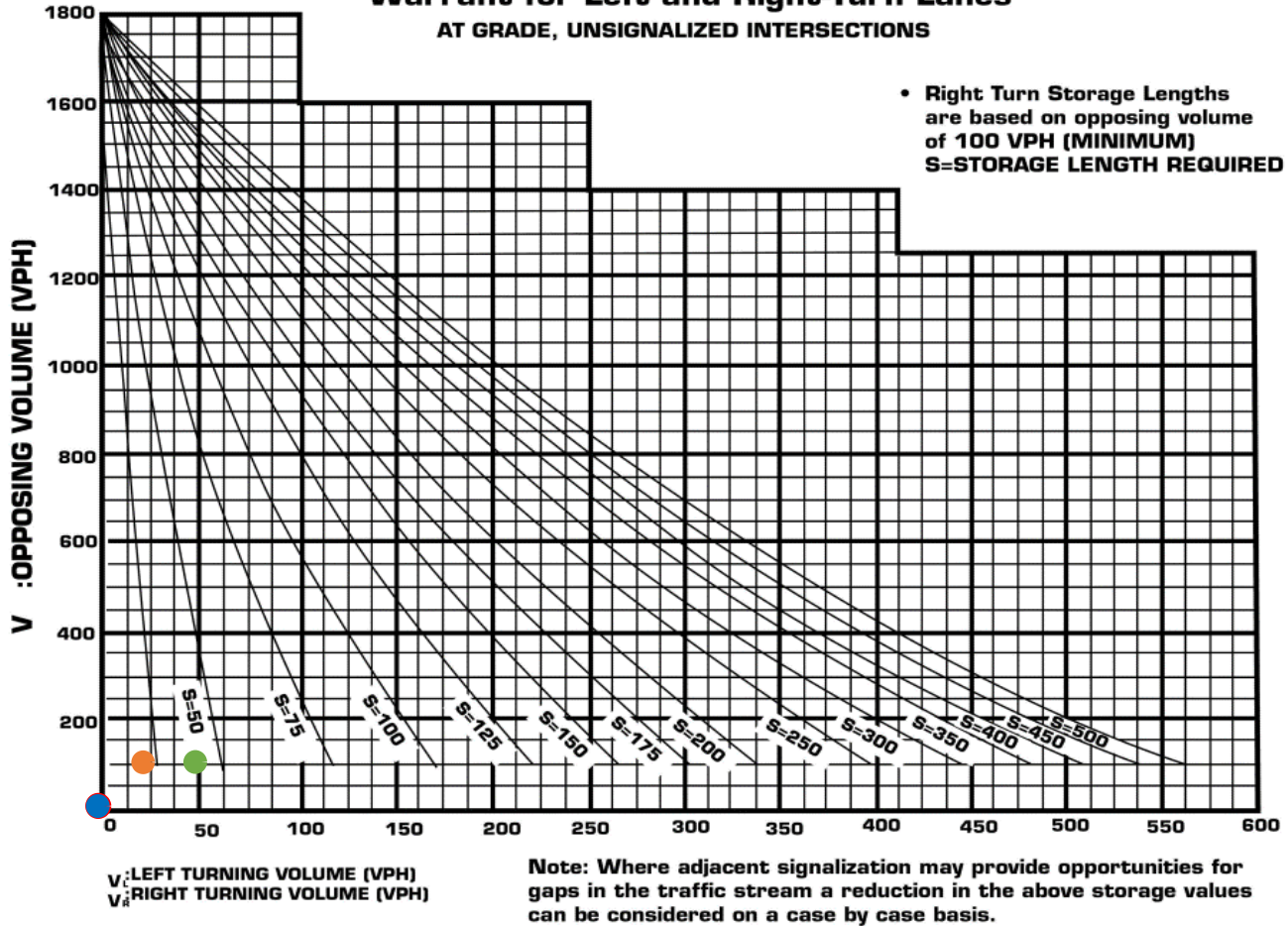
Policy On Street And Driveway Access to North Carolina Highways

INTERSECTION: Rolesville Road and Site Drive 1

SCENARIO	Movement	Turn Lane	Turning Volume (V _R /V _L)	Approach / Opposing Volume (V _A /V _O)	Symbol
AM Build	NBL	Left	16	676	●
PM Build	NBL	Left	36	851	●
AM Build	SBR	Right	3	100	●
PM Build	SBR	Right	5	100	●

1216 Rolesville Road
TURN LANE STORAGE WARRANTS

**Warrant for Left and Right-Turn Lanes
AT GRADE, UNSIGNALIZED INTERSECTIONS**



Policy On Street And Driveway Access to North Carolina Highways

INTERSECTION: Rolesville Road and Site Drive 2

SCENARIO	Movement	Turn Lane	Turning Volume (V _r /V _l)	Approach / Opposing Volume (V _a /V _o)	Symbol
AM Build	NBL	Left	N/A	N/A	●
PM Build	NBL	Left	N/A	N/A	●
AM Build	SBR	Right	24	100	●
PM Build	SBR	Right	51	100	●